PERIN Portugal in Europe Research and Innovation Network

Estratégia de promoção da participação nacional nos programas de financiamento da União Europeia 2021-2027 Investigação & Inovação, Erasmus+, Espaço e Digital

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Elaborado em articulação entre a Fundação para a Ciência e a Tecnologia, I. P. (FCT), a Agência Nacional de Inovação (ANI), S.A., a Agência Espacial Portuguesa (PT Space), a Agência de Investigação Clínica e Inovação Biomédica (AICIB), a Direção-Geral do Ensino Superior (DGES) e a Agência Nacional Erasmus+ Educação e Formação

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Prefácio: Uma estratégia para reforçar a participação nacional nos programas europeus nas áreas da Investigação e Inovação, Erasmus+, Espaço e Digital

Este documento atualiza os termos para a adoção de uma estratégia nacional que tem como objetivo **duplicar, em 2021-2027, a presença portuguesa nos Programas Europeus face a 2014-2020**, e atrair cerca de **dois mil milhões** de euros de financiamento da União Europeia nas áreas da Investigação e Inovação nesse período, bem como **triplicar o nº de estudantes em mobilidade** no Ensino Superior.

Pretende-se mobilizar e articular, de forma efetiva, os recursos públicos e privados e, em particular, através dos programas de financiamento da União Europeia nas áreas da Investigação e Inovação, Erasmus+, Espaço e Digital, que permitam a Portugal reforçar a excelência nestas áreas nacionais, afirmar-se melhor aos níveis europeu e internacional e reforçar o investimento público e privado em I&D.

Foi neste contexto que a evolução, a partir de 2019, do *GPPQ-Gabinete de Promoção do Programa-Quadro*, para a rede **PERIN** — *Portugal in Europe Research and Innovation Network* – visou promover um melhor posicionamento de Portugal no contexto da política europeia de Investigação e Inovação, Erasmus+, Espaço e Digital.

A rede PERIN envolve a Fundação para a Ciência e a Tecnologia, I. P. (FCT), a Agência Nacional de Inovação (ANI), S.A., a Agência Espacial Portuguesa (PT Space), a Agência de Investigação Clínica e Inovação Biomédica (AICIB), a Direção-Geral do Ensino Superior (DGES) e a Agência Nacional Erasmus+ Educação e Formação, tendo por missão reforçar a participação de Portugal no âmbito do Quadro Financeiro Plurianual 2021-2027, assim como estimular sinergias com fundos estruturais em todos os instrumentos que prevejam formas de cofinanciamento público, nacional ou europeu.

Esta estratégia exige uma mobilização efetiva a nível nacional de vários e diversificados atores, incluindo: a) Delegados e Pontos de Contacto Nacionais aos Programas Europeus; b) Peritos aos Programas Europeus; e c) Rede nacional de Núcleos de Promoção de Investigação e Inovação no âmbito de Programas Europeus.

Tem ainda por base as orientações expressas na resolução do Conselho de Ministros nº 186/2021 de 29 de dezembro, que aprovou o programa de investimento público em investigação e desenvolvimento para 2021-2030, de forma a atingirmos um nível de investimento em I&D de 3% do PIB até 2030. Inclui um esforço de articulação entre fundos públicos e privados, nacionais e europeus, assim como a adoção clara de um modelo de cofinanciamento e diversificação de fontes de financiamento das instituições de I&D. O objectivo é garantir a convergência de Portugal com a Europa até 2030, tendo por objetivo principal o aumento da qualidade dos níveis de produção e difusão de conhecimento, juntamente com a competitividade da economia portuguesa, através da investigação, desenvolvimento e inovação, assim como do aumento da qualificação da população portuguesa, fomentando o investimento global em I&D e melhorando as condições de emprego qualificado em Portugal, nos contextos europeu internacional.

A evolução dos últimos anos, sobretudo desde 2016, mostra que as metas descritas acima são possíveis e realistas, sobretudo se forem bem considerados os **obstáculos que ainda persistem** à inovação em Portugal em termos comparados europeus, incluindo:

- Relativo baixo nível de sofisticação da estrutura da economia e da atividade empresarial, designadamente em termos da estrutura das exportações, com reduzida valorização económica da propriedade intelectual e industrial:
 - exige evoluir no desenvolvimento de produtos e sistemas de maior valor acrescentado, promovendo, em paralelo, instrumentos de certificação da conformidade com as normas internacionais (e.g., na área de dispositivos médicos);
- Relativo baixo nível de investimento empresarial em investigação e desenvolvimento (I&D), quando comparado em termos europeus, apesar do crescimento verificado nos últimos anos:
 - exige continuar o trajeto recente do aumento da despesa em I&D, alcançando um investimento global em I&D de 3% do PIB até 2030, com uma parcela relativa de 1/3 de despesa pública e 2/3 de despesa privada, o que implica o esforço coletivo de duplicar o investimento público e privado em I&D, em associação com a promoção do emprego qualificado;
- Reduzido nível de formação avançada da força laboral, apesar do crescimento significativo de jovens a frequentar o ensino superior:
 - exige garantir a formação de adultos e processos de formação ao longo da vida, garantindo a formação superior de 50% da população ativa entre 30-34 anos até 2030 (atualmente em cerca de 44%), assim como continuar a aumentar a fração dos jovens de 20 anos a estudar no ensino superior dos atuais 51% para 60% até 2030.

É, assim, oportuno debater as lições para o futuro e fazer esse exercício pois hoje vivemos um quadro novo para pensar a evolução de Portugal no contexto europeu, sobretudo em termos da exigência crescente de melhor articular políticas e estratégias para a coesão e para a competitividade, para garantir um processo efetivo de convergência europeia até 2030

Lisboa, fevereiro de 2022

Manuel Heitor Ministro da Ciência, Tecnologia e Ensino Superior

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Parte 1

Contexto Geral:

Uma estratégia para reforçar a participação nos programas europeus nas áreas da Investigação e Inovação, Erasmus+, Espaço e Digital (em português) A rede PERIN — Portugal in Europe Research and Innovation Network, e a estratégia para reforçar a participação nacional nos programas europeus nas áreas da Investigação e Inovação, Erasmus+, Espaço e Digital

A rede PERIN — *Portugal in Europe Research and Innovation Network* tem sido promovida, desde 2019, com o objetivo de adotar uma estratégia nacional orientada para **duplicar**, em 2021-2027, a presença **Portuguesa nos Programas Europeus face a 2014-2020**, atraindo cerca de **dois mil milhões de euros de financiamento da União Europeia para atividades de investigação e inovação com base competitiva pelos setores público e privado, triplicar a participação das empresas portuguesas**, bem como triplicar o nº de estudantes em mobilidade no Ensino Superior.

Pretende-se mobilizar e articular, de forma efetiva, os recursos públicos e privados, em particular, através dos programas de financiamento da União Europeia nas áreas da Investigação e Inovação, Ensino Superior (Erasmus+), Espaço e Digital, que permitam a Portugal reforçar a excelência nestas áreas nacionais, melhor se afirmar aos níveis europeu e internacional, bem como reforçar o investimento público e privado em I&D.

Foi neste contexto que foi lançada a Estratégia PERIN 2021, a qual inseria um roteiro de ações a implementar, com vista a alcançar os objetivos a que se propôs. A Estratégia é revista anualmente, em março de cada ano.

A rede PERIN envolve os parceiros institucionais Fundação para a Ciência e a Tecnologia, I. P. (FCT), a Agência Nacional de Inovação (ANI), S.A., a Agência Espacial Portuguesa (PT Space), a Agência de Investigação Clínica e Inovação Biomédica (AICIB), a Direção-Geral do Ensino Superior (DGES) e a Agência Nacional Erasmus+ Educação e Formação (ANE+EF), tendo por missão reforçar e duplicar a participação de Portugal no âmbito do Quadro Financeiro Plurianual 2021-2027, e promover a utilização dos fundos estruturais como contrapartida nacional em todos os instrumentos que prevejam o cofinanciamento.

Esta estratégia exige uma mobilização efetiva a nível nacional de vários e diversificados atores, incluindo: a) Delegados/Peritos e b) Pontos de Contacto Nacionais aos Programas Europeus; c) Rede Nacional de Núcleos de Promoção de Investigação e Inovação, no âmbito de Programas Europeus.

1. O Contexto geral: a participação nacional nos Programas-Quadro de I&I e ERASMUS+ da UE

1.1. Horizonte 2020 (2014-2020) - Resultados (finais)

No final de 2021 foi encerrado o programa Horizonte 2020, com a divulgação dos últimos resultados. As entidades portuguesas captaram um total de financiamento de **1177,17 Milhões de Euros** (*Figura 1*). Este valor corresponde a uma taxa de retorno do financiamento nacional de **1,68%** e, portanto, superior à contribuição nacional para o Programa Horizonte 2020, de cerca 1,3%, assim como superior à meta de 1,5% fixada em 2014 para todo o Programa-Quadro.

Figura 1. Evolução do financiamento europeu captado por instituições portuguesas



Fonte: ANI, Observatório PERIN, março de 2022.

âmbito do programa Horizonte 2020, a participação de entidades nacionais incluiu a participação em **3607 projetos**, resultantes de 17658 propostas submetidas, correspondendo a uma taxa de sucesso de 14%, face a uma taxa média de sucesso de 13% para o global da União Europeia.

Na distribuição do financiamento por tipologia de instituições participantes no Horizonte 2020 (*Figura 2*), observa-se que as instituições científicas e de ensino superior são os principais beneficiários, com cerca de 64% (755 M€) de todo o financiamento atribuído a Portugal. As PME atraíram 16% (192 M€) e as grandes empresas cerca de 11% (127 M€).

Figura 2. Distribuição do financiamento europeu captado por tipologia de instituições portuguesas



Fonte: ANI, março 2022

A **Figura 3** ilustra os temas e programas específicos e associadas à participação nacional, com alguns temas claramente acima da média nacional (1,68%), incluindo:

- Nanotecnologias, matérias avançadas e biotecnologia;
- Tecnologias de informação e comunicação;
- Espaço e sistemas espaciais;
- Apoio a PMEs;
- Bio economia e sistemas para a economia circular;
- Energia e redes inteligentes de energia;
- Ação climática;
- Segurança;
- Computação avançada (Euro HPC).



Figura 3. Distribuição do financiamento europeu captado por instituições portuguesas, por programa

Fonte: ANI, Observatório PERIN, março 2022

Saliente-se que PT teve a melhor participação no programa Widening, a nível europeu, que atingiu os 11,5% e que constituiu, no H2020, uma das maiores fontes de financiamento para a capacitação nacional do sistema de I&I, através dos vários instrumentos aí disponibilizados.

Por outro lado, no âmbito das grandes parcerias industriais europeias, constituídas através de "Iniciativas Tecnológicas Conjuntas" (i.e., "JTIs") nas áreas da aeronáutica (i.e., CleanSky), eletrónica (i.e., ECSEL), medicamentos e farmacêutica (i.e., IMI), e sistemas ferroviários (i.e., "Shift2Rail"), a participação nacional foi modesta, tornando necessária uma intervenção concertada a fim que, ao longo do programa-quadro Horizonte Europa, seja invertida esta tendência.

14% 12% 10% 8% 6% 4% 2% 0% Fisão FCHJU Ë ECEL Cap. Risco SESAR hift2Rail ERC NMP+B Es paço poio a PME rumento PME Saúde Transportes SWAPS Σ EuroHPC 틒 Marie Curie infraest ruturas Fast Track Energia ıção Climática Sociedades Segurança Widening Cleansky Economic 8. nst

Figura 4. Distribuição do financiamento por programa, em termos da taxa de retorno de financiamento, a março 2022

Fonte: ANI, Observatório PERIN, março 2022

Em suma, PT foi um beneficiário líquido do Horizonte 2020, aparecendo na 9ª posição em termos de financiamento captado face ao orçamento investido, tal como ilustrado na Figura 5.

Adicionalmente, PT continua a mostrar uma dinâmica colaborativa forte, tendo fortalecido a sua rede de colaboração desde o 6º Programa-Quadro IDT (2002-2006) até ao Horizonte 2020 (2014-2020).

Figura 5. Taxa de retorno de financiamento europeu, por Estado Membro (adaptado da publicação Nature. 2018 May;557(7704):150. doi: 10.1038/d41586-018-05105-0. "€100-billion budget proposed for Europe's next big research programme"



1.1. Horizonte Europa (2021-2027) - primeiro ano, dados preliminares

No momento em que a Estratégia anual da PERIN 2022 é lançada, o primeiro ano do Horizonte Europa não está ainda fechado e há ainda resultados de muitos concursos por apurar. Em acréscimo, as primeiras bases de dados do sistema ECORDA nas quais se registam os contratos assinados não foram ainda disponibilizadas, pois os dados são muito preliminares e qualquer comparação com outros países, por exemplo, seria muito incompleta.

Até agora, as entidades portuguesas captaram um financiamento total de 129 M€ (destes, para instituições de Ensino Superior, 29 M€, Grandes Empresas, 9 M€, PME, 31 M€, Centros de Investigação, 45 M€ e Outros Tipos de Instituições, 15 M€).

A maior parte do financiamento foi conseguido no âmbito do Pilar II com um total de 95 M€ (Clusters 1-6 e 3 M€ para o Joint Research Center), seguido de 17 M€ no Pilar III nos programas *European Research Council*, *European Innovation Council (Pathfinder, Accelerator* e *Transitions), European Institute of Innovation & Technology* (EIT) e *European Innovation Ecosystems* (EIE), 14 M€ no Pilar I e 2,8 M€ no Programa Transversal WIDERA e 2,7 M€ no Programa EURATOM.

As entidades Portuguesas participam em 234 projectos, 37 coordenados por Portugal, num total de 348 participações. Foram até agora submetidas 1154 propostas portuguesas (284 propostas coordenadas por Portugal, correspondendo a um total 1754 participações). Quer em financiamento, quer em número de propostas submetidas, **Portugal teve, até agora, uma taxa de sucesso de 20%.**

A taxa de financiamento para PT corresponde a 1,9% do financiamento global, o que é um indicador muito

positivo para o objetivo PERIN de duplicar o financiamento europeu.

Relativamente ao Pilar I, de destacar que PT atingius o recorde de projetos financiados num só concurso do ERC Starting Grant na sua edição de 2021 (8 projetos PT) e igualou o máximo de projetos financiados num só concurso do ERC Proof of Concept (4 projetos PT). PT tem taxas de retorno nas Infraestruturas de Investigação de 2,0%, refletindo um incremento importante face a 2020, e nas Marie Sklodowska-Curie a taxa de retorno encontra-se acima dos 3%, enquanto se aguardam os resultados dos principais concursos.

Relativamente ao Pilar II, a figura 6 abaixo ilustra resultados apurados, até ao momento, nos 6 Clusters. Tendo em consideração os valores da taxa de retorno, estes resultados são um bom indicador para o objetivo de duplicar a participação nacional nos programas europeus.





Fonte: ANI, Observatório PERIN, março de 2022.

Em relação ao Pilar Widening&ERA mantém-se taxas de retorno elevadas (6%), num cenário em que instrumentos emblemáticos como o Twinning, ERA-CHAIRs, Teaming e Excellence Hubs ainda se encontram em fase de submissão ou avaliação.

Sobre o EURATOM, destaca-se a participação nacional em projetos de ambas as configurações do programa, Fissão e Fusão, e a implementação de uma estrutura de apoio à comunidade que com certeza irá ser refletida nos níveis de participação e sucesso dos próximos anos.

1.2. O Programa ERASMUS+

• Mobilidade e parcerias europeias no Ensino Superior

A participação nacional no Programa Erasmus+ é gerida e promovida pela Agência Nacional para a Gestão do Programa Erasmus+ Educação e Formação (EF), doravante designada por Agência Erasmus+, cujo papel, quer na promoção da cooperação europeia na área da educação e formação (EF), quer nas

parcerias interinstitucionais, mas, sobretudo, na mobilidade para fins de aprendizagem, interessa reforçar no Quadro Financeiro Plurianual 2021-2027.

O Programa Erasmus+ constitui um elemento central na construção e desenvolvimento da identidade europeia, atuando nomeadamente ao nível da mobilidade para fins de aprendizagem de estudantes, formandos, docentes e outro pessoal educativo dos diversos setores da EF (ação-chave 1), e na promoção de parcerias interinstitucionais e redes europeias de educação e formação (ação-chave 2).

O sucesso do Programa Erasmus+ no ensino superior constitui um sinal claro, quer do reconhecimento pelos estudantes portugueses das vantagens académicas, profissionais e pessoais que advêm do intercâmbio com instituições de ensino superior estrangeiras, quer da confiança dos estudantes estrangeiros na qualidade e inovação das instituições de ensino superior portuguesas. De facto, até 2020 (**Figura 2**):

- número de mobilidades de estudantes portugueses a estudar na Europa ao abrigo do Programa Erasmus+ aumentou cerca de cinco vezes, i.e., de cerca de duas mil mobilidades no ano 2000 para mais de dez mil mobilidades no ano 2020,
- número de mobilidades de estudantes estrangeiros a estudar em Portugal ao abrigo do Programa Erasmus+ aumentou cerca de seis vezes, i.e., de cerca de duas mil mobilidades de estudantes para quinze mil mobilidades de estudantes no mesmo período temporal.



Figura 2. Evolução do total de mobilidades Erasmus de Portugal ("outbound") e para Portugal ("Inbound"), 2000-2020

Fonte: ANE+EF, julho de 2020

Este aumento está associado ao reconhecimento crescente de um sistema de ensino superior progressivamente integrado em redes europeias e orientado para a excelência, devendo continuar a reforçar este trajeto. O estímulo à integração em redes europeias é cada vez mais crítico para o aumento da qualidade, inovação e excelência das instituições de ensino superior portuguesas, da formação dos estudantes e da sua qualificação técnica e científica.

É já um facto, que a pandemia terá afetado, em toda a Europa, este crescimento positivo, sendo que os dados aqui avançados enquanto previsão para a mobilidade em candidatura (mobilidades awarded), entre 2018 e 2020, estão ainda por apurar, tendo em conta que a maioria dos projetos de mobilidade foram prolongados.

No contexto do ensino superior, e abrangendo já os dois períodos programáticos (2014-2020 e 2021-2027) a participação nacional através no programa Erasmus+ garantiu um financiamento superior a **199 milhões de euros,** desagregados da seguinte forma:

- Mobilidade (Higher Education, Student and staff mobility) 153 M€
- O Mobilidade internacional de créditos (Higher Education, International credit mobility) 28 M€
 O Parcerias estratégicas (Higher Education, Strategic partnerships) 17 M€

Tabela 1. Súmula da evolução da participação nacional no Programa ERASMUS + (Candidaturas submetidas e
aprovadas) em março de 2022

Γ

	2014-2021 OVERVIEW – ENSINO SUPERIOR								
Action Type	Call Year	2014	2015	2016	2017	2018 *	2019 *	2020 *	2021 *
KA103 - Higher education	Nº Candidaturas Submetidas (received)	90	86	84	81	84	85	89	85
student and staff mobility	Nº Candidaturas Aprovadas (awarded)	89	86	83	78	84	85	89	83
	Nº Candidaturas Aprovadas (S/ Financiamento - lista de reserva)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Nº Candidaturas Aprovadas (C/ Financiamento - contracted)	88	84	83	77	83	84	89	82
	Grants (contracted)	14 830 712 €	14 787 677 €	15 368 548 €	17 750 256 €	20 258 177 €	23 315 429€	24 441 835€	22 763 230 €
	Grants (realised)	13 520 599 €	13 616 783 €	14 744 531 €	16 597 811 €	17 615 100 €	1 655 840 €	37 084 €	n/d
	Partic. (contracted)	8 060	8 891	10 137	11 572	11 873	12 526	13 313	13 468
	Partic. (finalised)	9 571	10 358	11 044	12 206	12 187	1 017	n/d	
	Org. (contracted)	88	84	83	77	83	84	89	82
KA107 - Higher education	Nº Candidaturas Submetidas (received)	n/a	33	33	31	40	40	41	n/a
and staff mobility between Program	Nº Candidaturas Aprovadas (awarded)	n/a	13	16	24	26	28	29	n/a
me and Partner Countries	№ Candidaturas Aprovadas (S/ Financiamento - lista de reserva)	n/a	7	0	0	0	7	0	n/a
	Nº Candidaturas Aprovadas (C/ Financiamento - contracted)	n/a	13	16	23	25	28	29	n/a
	Grants (contracted)	n/a	3 187 706€	3 589 656 €	3 902 896 €	4 485 667 €	6 465 963 €	6 760 835 €	n/a

	Grants (realised)	n/a	3 155 377 €	3 526 503 €	3 794 651 €	1 791 791 €	n/d	n/d	n/a
	Partic. (contracted)	n/a	961	981	1 410	1 439	2 096	2 421	n/a
	Partic. (finalised)	n/a	986	1 132	1 448	593	n/d	n/d	n/a
	Org. (contracted)	n/a	13	16	23	25	28	29	n/a
KA203 - Strategic Partnersh	Nº Candidaturas Submetidas (received)	37	34	40	26	31	50	74	32
higher education	№ Candidaturas Aprovadas (awarded)	3	3	2	6	6	8	18	14
	Nº Candidaturas Aprovadas (S/ Financiamento - lista de reserva)	26	28	33	13	18	17	33	13
	Nº Candidaturas Aprovadas (C/ Financiamento - contracted)	3	3	2	6	6	8	18	13
	Grants (contracted)	892 730 €	1 062 486 €	828 341 €	1 722 385 €	1 748 926 €	2 703 054 €	4 705 680 €	3 734 545 €
	Grants (realised)	854 345 €	962 717 €	820 466 €	1 641 728 €	1 364 836 €	n/d	n/d	n/d
	Partic. (contracted)	286	821	699	1 792	1 274	2 557	4 278	n/d
	Org. (contracted)	25	20	23	34	30	53	105	21

* Dados provisórios. ** KA107 teve início em 2015; não foi aberto convite a candidaturas em 2021, ao abrigo do novo programa.

Fonte: Erasmus+ Dashboard, 15/03/2022

As ações centralizadas que são geridas pela Agência Executiva do Programa ERASMUS+ em Bruxelas (EACEA), incluem três tipologias de ações:

- a) KA3 Apoio às reformas de políticas, que atribui financiamento para uma ampla variedade de ações destinadas a estimular o desenvolvimento de políticas inovadoras, o diálogo e a implementação de políticas, e o intercâmbio de conhecimentos nos campos da educação, formação e juventude
- b) Programas Conjuntos de Mestrado Erasmus Mundus
- c) Redes de Universidades Europeias

No que respeita aos Mestrados conjuntos que envolvem instituições de ensino superior portuguesas, entre 2014 e 2020, foram aprovados os constantes da Tabela 2.

	Erasmus Mundus Joint Masters (2014-2020)							
	lotal cand aprovadas	Aprovada s c/ part de PT	C O O r d P T	financi ament global	Participantes PI	lotal partic pante s PT		
2 0 1 4	11	3	1	1 7. 3 M io	IST, IPTomar, Lusofona (coordena)	3		
2 0 1 5	15	4	0	4 4. 9 M io	U.Minho, UCP,U.Lisboa,U. Porto			
2 0 1 6	27	6	1	7 8. 8 M io	U.Coimbra, UNL (2), U.Porto, IPCoimbra,Inst Univ Lisboa (coordena), U. Algarve	19		
2 0 1 7	38	11	2	11 2. 6 Mi 0	U.Évora,COFAC (2, coordena1),IPSantarém, U Algarve (2),Inst Univ Lisboa,UCP,U.Aveiro,U.Coimbra, U. Lisboa(coordena), UNL	42		
2 0 1 8	45	14	2	1 5 2 M 10	U.Minho (2 cordena 1), U. Coimbra(3),U.Évora(coordena),IST(2), IPlisboa, IP Tomar, U. Lisboa (3), U. Porto (2), Inst Nac Invest Agrária(2), Casa Arábe, Inst Univ. Lisboa	51		
2 0 1 9	48	10	1	1 7 8 M 10	U.Coimbra,U.Minho,IPTomar,U. Porto(3),U.Lisboa,C OFAC (coordena), IPCoimbra, U. Algarve	s.d		
2 2 2 8	3	1	0	4 8 M i 0	UNL	s.d		
* call EMJM	especial para com Japão							
dados pela E/	extraidos dos resultado ACEA	os publicados						

Tabela 2. Programas Conjuntos de Mestrado - Erasmus Mundus

Relativamente aos 2 concursos lançados em 2019 e 2020, no quadro da fase piloto das redes das universidades europeias, foram submetidas no primeiro concurso 54 candidaturas e aprovadas 17 Redes. Portugal apresentou candidatura (como parceiro) em 16 e obteve financiamento em 3 (Universidade de Aveiro, Universidade do Porto e Universidade de Lisboa (através do Instituto Superior Técnico). O envelope financeiro para o período de 3 anos foi de 85 milhões (5 M € por rede).

No segundo concurso foram apresentadas 62 candidaturas e aprovadas 24 Redes. Portugal participou em 21 candidaturas na qualidade de parceiro e de coordenador, tendo obtido financiamento em 6 com coordenação de 3 com uma participação de 7 IES (Instituto Politécnico do Porto, Instituto Politécnico de Setúbal, Universidade de Coimbra, Universidade Lusófona, Instituto Politécnico de Leiria e Instituto Politécnico do Cávado e do Ave no mesmo consórcio, e Universidade da Beira Interior).

Estão atualmente em funcionamento, financiadas, 41 redes com mais de 280 Instituições de Ensino Superior envolvidas em toda a Europa, e um financiamento total de cerca de 287 milhões de euros sendo o financiamento por rede, para 3 anos, de até 5 milhões via Programa Erasmus+ e de até 2 milhões via Programa Horizonte 2020.

O ano 2022 assinala o início do *roll-out* da iniciativa Universidades Europeias, no quadro do Erasmus+ 2021-2027, no sentido de garantir a continuidade e sustentabilidade das atuais redes de financiamento e de expandir o número de instituições de ensino superior participantes, seja permitindo às redes em funcionamento aumentar o número de parceiros, seja através da constituição de novas

2 Principais metas a atingir, 2021 e 2027

METAS A ATINGIR

Programas da UE de financiamento à Investigação, Inovação, Ensino Superior, Espaço e Digital: duplicar a participação nos Programas Europeus atraindo dois mil milhões de Euros para Portugal em I&D; triplicar a participação de empresas portuguesas; triplicar a mobilidade de estudantes ERASMUS+ e reforçar a participação portuguesa na iniciativa das Universidades Europeias.

2.1. Investigação e Inovação

O Relatório Mazzucato, elaborado com vista à preparação do 9º Programa-Quadro plurianual (2021-2027) de Investigação e Inovação da União Europeia, atual "Horizonte Europa", identificou como fundamental a compreensão pela comunidade da importância da Ciência e da Inovação para enfrentar os grandes desafios globais num contexto em que são salutares a contenção na utilização dos recursos e a preparação para as alterações climáticas. Neste relatório, ficou claro que o envolvimento da sociedade depende da compreensão dos objetivos e também da sua participação na identificação dos problemas e no desenho das soluções. Esta reflexão suscitou a construção das missões a empreender, no âmbito e transversais a todo o programa-quadro, a partir de objetivos claros e facilmente apropriáveis: descobrir a cura do cancro, proteger e preservar os oceanos, proteger os solos, criar cidades sustentáveis e amigas do ambiente, agir para preparar chá e mitigar amanhã o impacto da acção climática.

Horizonte Europa

No Horizonte Europa (HE), a maior parte do financiamento está alocada a concursos competitivos abertos e Portugal tem de responder aos seguintes desafios:

- aumentar a sua participação nas Parcerias Europeias
- integrar redes europeias de referência
- alargar substancialmente (triplicar) a participação de empresas portuguesas.



Figura 7. Programa Específico que Implementa o Horizonte Europa, onde se incluem os 3 Pilares principais e o Pilar Transversal relativo ao Alargamento da Participação e Reforço do Espaço Europeu de Investigação. Estão indicados os orçamentos indicativos para dada uma das atividades financiadas no âmbito de cada Pilar, para o período de 2021-2027.

Tal como enunciado no Regulamento do Horizonte Europa, o Pilar I (Excelência Científica), promove a excelência científica e a atração dos melhores talentos para a Europa, em todas as fases da carreira, incluindo os jovens investigadores, e apoia a criação e difusão da excelência científica, bem como de conhecimentos, metodologias e competências, tecnologias e soluções de elevada qualidade para enfrentar os desafios sociais, ambientais e económicos globais. Inclui:

- Conselho Europeu de Investigação (ERC), com o foco na ciência de fronteira;
- **Ações Marie Sklodowska-Curie** com o foco principal na mobilidade transfronteiriça, intersectorial e interdisciplinar dos investigadores;
- Infraestruturas de Investigação tendo como áreas de ação a consolidação e desenvolvimento do panorama das infraestruturas de investigação europeias.

No **Pilar II** (Desafios **Globais e Competitividade Industrial Europeia**) apoia-se a criação e melhor difusão de novos conhecimentos, tecnologias e soluções sustentáveis de elevada qualidade, o reforço da competitividade industrial europeia e o impacto da I&I na elaboração das políticas da União. As atividades de I&I são organizadas em seis agregados (Clusters), abrangendo atividades de diferentes TRL (*Technology Readiness Levels* TRL). Cada Cluster contribui para a realização de vários Objetivos de Desenvolvimento sustentável (ODS) e muitos ODS são apoiados por mais do que um agregado. As atividades de I&I devem ser executadas no âmbito dos seguintes Clusters e entre eles:

- Cluster Saúde, com o foco principal na saúde ao longo da vida; determinantes ambientais e sociais da saúde; doenças não transmissíveis e doenças raras; doenças infeciosas, incluindo as doenças associadas à pobreza e negligenciadas; ferramentas, tecnologias e soluções digitais no domínio da saúde e dos cuidados de saúde; sistemas de cuidados de saúde;
- Cluster Cultura, Criatividade e Sociedade Inclusiva, com áreas de intervenção como a democracia e governação; cultura, património cultural e criatividade; transformações sociais e económicas;

- Cluster Segurança Civil para a Sociedade, com o foco nas sociedades resilientes a catástrofes; proteção e segurança; cibersegurança;
- Cluster Digital, Indústria e Espaço, com diversas áreas de intervenção desde as tecnologias de fabrico; tecnologias digitais fundamentais, incluindo tecnologias quânticas; tecnologias facilitadoras emergentes; materiais avançados; inteligência artificial e robótica; próxima geração da Internet; computação avançada e megadados; indústrias circulares; indústrias de baixo carbono e não poluentes; espaço, incluindo a observação da Terra;
- Cluster Clima, Energia e Mobilidade, com áreas de intervenção como a ciência e soluções climáticas; aprovisionamento energético; sistemas e redes energéticos; edifícios e instalações industriais na transição energética; comunidades e cidades; competitividade industrial nos transportes; transportes não poluentes, seguros e acessíveis e mobilidade; mobilidade inteligente; armazenamento de energia;
- Cluster Alimentação, Bioeconomia, Recursos Naturais, Agricultura e Ambiente, com o foco na observação do ambiente; biodiversidade e recursos naturais; agricultura, silvicultura e zonas rurais; mares, oceanos e águas interiores; sistemas alimentares; sistemas de inovação de base biológica na bioeconomia da União; sistemas circulares.
- Ações no âmbito do Centro Comum de Investigação (Joint Research Centre, JRC), o serviço de ciência e conhecimento da Comissão Europeia e que tem como principal missão apoiar a tomada de decisão em políticas públicas europeias através da provisão de informação e conhecimento científicos independentes. Em termos de oportunidades, destacam-se o acesso aberto às infraestruturas físicas do JRC e às infraestruturas de investigação nuclear do JRC, os programas de doutoramento colaborativo nas instalações do JRC, a iniciativa "Living Labs" (com vista à inovação, cocriação e desenvolvimento de start-ups), ou o projeto "Science meets Parliaments/Science meets Regions" (destinado a aproximar os investigadores dos decisores políticos e a promover a ciência participada por cidadãos).

São ainda consideradas 50 **Parcerias Europeias** no 1º período de programação do Horizonte Europa (2021-2024). Estas parcerias representam cerca de metade do orçamento previsto para o Pilar II e é necessário intensificar o esforço de aumento de captação de verbas neste segmento do Horizonte Europa, nas denominadas parcerias institucionalizadas (e.g. JTI) para atingir a meta proposta.

Cluster	Cofinanciadas	Coprogramadas	Art 187 (JTIs)	Artº 185
HEALTH	 Chemicals risk assessment ERA for Health Research Transforming Health & Care systems Personalised Medicine Rare diseases One Health/AMR Antimicrobial Resistance (AMR) 	• Pandemic Preparedness	 EU-Africa Global Health Innovativ e Health Initiative 	
DIGITAL, INDUSTRY and SPACE		 AI, data and robotics Photonics Europe Clean Steel Made in Europe Carbon Neutral and 	 3. Performanc e Computing 4. Key Digital Technologie s 	6. European Metrology

		Circular Industry7. Global competitive space systems	5. Smart Networks and Services
CLIMATE ENERGY and MOBILITY	 7. Driving urban transitions to a sustainable future (DUT) 8. CleanEnergy Transition (CET) 	 People-centric sustainable built environment (Built4People) Towards zero-emission road transport (2ZERO) Connected, Cooperative and Automated Mobility (CCAM) Zero-emission waterborne transport European Partnership for an Industrial Battery Value Chain 	 a. Transformin g Europe's rail system r. Integrated Air Traffic Managemen t (ATM) a. AVIETON b. Clean Hydrogen
FOOD, BIOECONOMY , AGRICULTURE , NATURAL RESOURCES and ENVIRONMEN T	 9. Accelerating farming systems transition 10. Animal health 11. Environment al Observations 12. Rescuing biodiversity 13. Blue Economy 14. Safe and Sustainable Food System 15. Water4All 17. Innovative SMEs 		16. Circul ar bio-based Europe
		18. European Open Science Cloud (EOSC)	

Figura 8. Parcerias Europeias para 2021-2027. (* a iniciativa Chips Act irá reforçar a parceria Key Digital Tecnologias, KDT passando esta a chamar-se Chips JU no futuro a partir do programa de Trabalhos 2023-2024). Fonte: ANI, março 2022

No Pilar III (Europa Inovadora) promovem-se todas as formas de inovação, incluindo a inovação não tecnológica, principalmente no âmbito das PME, incluindo as empresas em fase de arranque, facilitando o desenvolvimento tecnológico, a demonstração e a transferência de conhecimentos, bem como o reforço da implantação de soluções inovadoras. O Pilar III define-se em três programas:

- Conselho Europeu de Inovação (EIC), é essencialmente executado sobretudo através da investigação colaborativa, centrado principalmente na inovação radical e disruptiva, visando especialmente a inovação geradora de mercado, e apoiando simultaneamente todos os tipos de inovação, incluindo a inovação incremental. Está assente, essencialmente, em dois tipos de instrumentos:
 - Explorador (*Pathfinder*), para investigação avançada, destinado a apoiar as tecnologias radicais, geradoras de mercado e/ou profundas (deep-tech), futuras e emergentes;
 - Acelerador (*Accelerator*), destinado a colmatar o défice de financiamento entre as fases finais das atividades de I&I e a aceitação pelo mercado, com vista à implantação efetiva das inovações radicais geradoras de mercados e à expansão de empresas quando o mercado não

oferece financiamento viável.

- Ecossistemas Europeus de Inovação, com áreas de intervenção que incluem, em particular, ligar, se for caso disso em cooperação com o EIT, intervenientes nacionais e regionais no domínio da inovação e apoiar a execução de programas de inovação conjuntos transfronteiriços, com vista a impulsionar a eficácia do sistema europeu de inovação. Tais atividades deverão ser implementadas em sinergia, entre outros, com o apoio do FEDER aos ecossistemas de inovação e às parcerias inter-regionais em torno de temáticas de especialização inteligente;
- Instituto Europeu de Inovação e Tecnologia (EIT), com o foco nos ecossistemas de inovação sustentáveis em toda a Europa; inovação e competências empresariais numa perspetiva de aprendizagem ao longo da vida, incluindo o reforço das capacidades das instituições de ensino superior em toda a Europa; novas soluções para o mercado com vista a enfrentar os desafios globais; sinergias e valor acrescentado no âmbito do Programa. Para além das Parcerias Europeias há ainda a acrescentar as 8 *Knowledge and Innovation Communities* (KIC) do European Innovation Institute, EIT, já existentes, e as duas novas KIC: a já lançada durante o HE *Culture and Creatives Industries* e a *Water, Marine and Maritime Sectors and Ecosystems,* com lançamento previsto para 2026.

No Pilar Transversal (Alargamento da Participação e Reforço do EEI, *Widening&ERA*), existem áreas de ação horizontais a todos os Pilares do Horizonte Europa e outros Programas, como o apoio a atividades que contribuam para atrair talentos, para uma Europa mais baseada no conhecimento, mais inovadora e com maior igualdade de género, na vanguarda da concorrência global, no âmbito de um EEI a funcionar corretamente, em que os conhecimentos e a mão de obra altamente qualificada circulem livremente de forma equilibrada, em que os resultados da I&I sejam difundidos em larga escala e compreendidos e aceites com confiança por cidadãos informados, beneficiando a sociedade no seu conjunto, e em que as políticas da União, nomeadamente a política de I&I, se baseiem em evidências científicas de elevada qualidade. O pilar assenta em atividades tais como o alargamento da participação e difusão da excelência, inclusive através da associação de equipas (*HOP ON*), da geminação (*Twinning*), de cátedras do EEI (*ERA-CHAIRs*), da Cooperação Europeia em Ciência e Tecnologia (COST) e de iniciativas e atividades de excelência (*Teaming for Excellence, European Excellence Initiative, Excellence Hubs*), reforma e melhoria do sistema europeu de I&I, nomeadamente implementando a Nova Comunicação do EEI.

O Programa EURATOM de Investigação e Formação 2021-2025, abrangendo a área da investigação e formação nuclear e com um orçamento de 1381 Milhões de Euros, complementa o Programa Horizonte Europa, utilizando os mesmos instrumentos e regras de participação. A duração do Programa (cinco anos, um prazo fixado pelo Artigo 7º do Tratado EURATOM) será posteriormente prorrogada por dois anos (até 2027) para o alinhar com o Quadro Financeiro Plurianual da UE (QFP) e o Programa Horizonte Europa. O Euratom é implementado através de ações diretas (empreendidas pelo Centro Comum de Investigação – JRC, *Joint Research Centre* – no âmbito de um Programa separado) e indiretas (empreendidas por consórcios de múltiplos parceiros).

O programa tem duas configurações: a) **Fusão**, que se centra na implementação do Roteiro Europeu de Investigação para a concretização da Energia de Fusão, como uma opção a longo prazo de recurso a tecnologias descarbonizantes para produção de energia em larga escala; b) **Fissão**, que se centra na segurança, proteção radiológica, gestão do combustível irradiado e dos resíduos radioativos e desmantelamento. Na vertente da proteção radiológica, destaca-se a sua importância para a área da medicina, estando estabelecidas sinergias entre o Programa EURATOM e o <u>Plano Europeu de Luta contra o</u> <u>Cancro</u> (cf. radiação ionizante utilizada para diagnóstico e terapêutica), e para outros setores como a

indústria, a agricultura e o ambiente.

Em termos de oportunidades, o Programa EURATOM implementa concursos competitivos para investigação e formação em vários tópicos, prémios, Parcerias Europeias, para além de financiar investigadores das áreas cobertas pelo Programa EURATOM, que agora se podem candidatar às *Marie Skłodowska-Curie Actions (MSCA) Postdoctoral Fellowships*.

Pela sua dimensão e pelas oportunidades de participação nacional associadas, destacam-se as três Parcerias Europeias cofinanciadas previstas pelo Programa EURATOM: a) A Parceria para a Investigação em Fusão está a ser empreendida pelo Consórcio Europeu para o Desenvolvimento da Energia de Fusão, EUROfusion (do qual faz parte o Instituto Superior Técnico, através do Instituto de Plasmas e Fusão Nuclear), que recentemente divulgou a obtenção de um valor recorde de 59 megajoules de energia de fusão sustentada, demonstrando o potencial da fusão nuclear para fornecer energia sustentável. b) A Parceria para a Investigação em Proteção Radiológica e Deteção de Radiações Ionizantes, no âmbito de um concurso competitivo do Programa de Trabalho EURATOM 2021-2022.; c) A Parceria para a Gestão de Resíduos Radioativos (no âmbito do Programa de Trabalho EURATOM para 2023-2024), que se baseará no Programa Europeu Conjunto em curso para a gestão de resíduos radioativos, EURAD.

2.2. Programa Erasmus+

No que diz respeito ao orçamento do Programa Erasmus+, há um aumento de cerca de 18 mil milhões de euros (2014-2020) para 24 mil milhões de euros em 2021-2027, representando um incremento de 30%. O grande objetivo nacional é **triplicar a mobilidade de estudantes e reforçar a participação Portuguesa na iniciativa das Universidades Europeias.**

É neste âmbito que a transição entre o Programa Erasmus+ 2014-2020, cujos projetos estarão em conclusão até ao final de 2023, e o atual Programa Erasmus+ para o período 2021-2027, deve ser acompanhada pela modernização e reforço das ações desenvolvidas, garantindo uma dimensão estratégica e uma estrutura organizativa e de gestão que consiga refletir os desafios crescentes que se colocam ao desenvolvimento do programa e, sobretudo, ao reforço da participação de Portugal.

Neste sentido, a Agência Erasmus+ preparou o **plano de transição entre o Programa Erasmus+ 2014-2020 e o Programa Erasmus+ 2021-2027**, de modo a enquadrar a atividade da entidade de gestão, a nível nacional, do Programa Erasmus+ 2021-2027 na dimensão de EF, adequada ao prosseguimento dos seguintes objetivos:

- Aumentar a mobilidade de estudantes do ensino superior, de Portugal para o estrangeiro e do estrangeiro para Portugal, reforçando e diversificando o atual padrão de mobilidade e países de origem e destino dos estudantes;
- b) Aumentar significativamente a mobilidade dos formandos do EFP no sentido de, progressivamente, e durante o período de vigência do Programa Erasmus+, a aproximar do objetivo definido no âmbito da Agenda Europeia de Competências;
- c) Estimular a diferenciação dos padrões de mobilidade entre universidades e politécnicos, especializando e diversificando a mobilidade de ambos os tipos de instituições;
- Reforçar a atração de luso-descendentes para as instituições de ensino superior portuguesas (IES), em especial através do programa "Estudar e Investigar em Portugal", com ênfase nas regiões europeias com elevada concentração de emigrantes portugueses;
- e) Reforçar e modernizar os acordos institucionais e ligações entre as instituições de

ensino superior nacionais e as congéneres europeias para a mobilidade de estudantes e docentes;

- f) Incentivar a constituição e a participação nas redes europeias de instituições de ensino superior, designadamente em harmonia com os objetivos da iniciativa "Universidades Europeias";
- g) Reforçar, modernizar e promover a rede de gabinetes Erasmus+ em todas as instituições de ensino superior;
- h) Promover parcerias estratégicas para a mobilidade entre operadores nacionais e europeus de ensino e formação profissional, tendo em vista, o incremento da mobilidade, através do estabelecimento de acordos de aprendizagem sólidos, que, designadamente, salvaguardem o reconhecimento das aprendizagens realizadas;
- i) **Implementar mecanismos regulares de monitorização e divulgação** da gestão do Programa a nível nacional e de divulgação pública da correspondente informação.

O Plano de Transição "Erasmus+ 2014-2020 para 2021-2027", enquadra e redefine a missão e estratégia da Agência face a estes objetivos e aos desafios do novo programa, procurando igualmente promover as sinergias e complementaridades, nomeadamente no ensino superior e no apoio à ciência, entre os mecanismos nacionais já existentes e os fundos comunitários, para a sua melhor otimização no plano nacional

METAS A ATINGIR

- Reforçar a participação portuguesa nas redes de "Universidades Europeias"
- Triplicar a mobilidade, incoming e outgoing, no período 2021-2027, face ao período 2014-2020;
- Reforçar as sinergias com o Erasmus+, nos mestrados, doutoramentos, nas bolsas Marie Curie – MSCA e nas redes das "Universidades Europeias", incluindo a oferta de graus conjuntos europeus;
- Reforçar a participação nacional na dimensão externa do programa, incluindo na cooperação com África.

AÇÕES A IMPLEMENTAR

- Reforço das ações de promoção para a mobilidade, junto das IES e dos estudantes do Ensino secundário (11º e 12ª ano);
- Ações de divulgação mais alargadas da iniciativa das redes de "Universidades Europeias";
- Apoio adicional da FCT às instituições de ensino superior portuguesas já selecionadas no contexto das redes de "Universidades Europeias" para a concessão de bolsas de doutoramento;
- Reforço das sinergias entre as ações a promover no quadro das atividades da <u>Agência</u> <u>Nacional Erasmus +</u>, <u>Rede PERIN</u> e iniciativa "<u>Study & Research in Portugal</u>", reforço das ações de promoção para uma maior participação nacional em programas de mestrado e doutoramentos conjuntos, potenciando as ligações entre o Programa Erasmus+ e as Ações Marie Curie – Mestrados e Doutoramentos conjuntos.

2.3. Programa Espaço

A participação de Portugal no Programa Espaço da UE (2021-2027) está a ser coordenada desde 2020 pela Agência Espacial Portuguesa - Portugal Space de modo a valorizar o posicionamento Atlântico de Portugal no Mundo, potenciando a atração de financiamento e mobilizando diversos atores, tanto nacionais como internacionais, em termos de uma abordagem inovadora e integrativa. Além disso, tem valorizado e valorizou, a co-presidência portuguesa do Conselho da Agência Espacial Europeia (ESA), 2020-2023 e a Presidência Portuguesa do Conselho da União Europeia.

O Programa Espaço da UE é dividido em 4 componentes:

- Navegação Galileo / EGNOS
- Observação da Terra Copernicus
- Comunicações seguras por satélite (incluindo o GOVSATCOM)
- Space Situational Awareness (SSA) que inclui:
- Space Surveillance and Tracking (SST)
- Space Weather (SW)
- Near Earth Objects (NEO).

A tecnologia, dados e serviços associados aos recursos espaciais têm um papel essencial na estratégia europeia, sendo a Europa um dos líderes mundiais na indústria espacial. A relevância deste setor na economia europeia é reconhecida, verificando-se um incremento de investimento ao longo dos últimos programas de financiamento.



Fonte: Regulamento (UE) 2021/696 do Parlamento Europeu e do Conselho.

Para o período 2021-2027, o orçamento total é 14.842M€, sendo 9.000M€ para os Programas Galileo e EGNOS, 5.400M€ para o Programa Copernicus e 442M€ para as componentes Space Situational Awareness (SSA) e GOVSATCOM, para comunicações seguras governamentais. Cabe salientar que em fevereiro 2022 a Comissão Europeia anunciou um sistema de comunicações por satélite seguras com um orçamento da EU de 2.400M€, do qual o GOVSATCOM irá fazer parte.

METAS A ATINGIR:

- Garantir a implementação adequada do programa *Space Surveiliance and Tracking* (SST) em PT em articulação com o Ministério da Defesa Nacional e o consórcio *European Space Surveiliance and Tracking* (EUSST);
- Garantir o envolvimento mais direto de entidades nacionais nos serviços do Copernicus, assim como estimular novas oportunidades no âmbito do Galileo e Govsatcom;
- Criação de novas empresas, expansão das atuais e captação de investimento direto estrangeiro, aumentando a faturação do setor de 40-50 milhões de euros para 500 Milhões Euros até 2030, como considerado na estratégia nacional para o Espaço;
- Promover a agenda "Interações Atlânticas", sobretudo com o reforço das atividades de Observação da Terra, com particular foco nos oceanos, tendo em vista a resolução de problemas societais como prevenção de catástrofes e alterações climáticas, em Portugal e noutros países, com destaque para África.
- Promoção do programa "Azores International Satellite Launch Programme (AISLP)", através da atração de fundos públicos e privados, nacionais e europeus, para comparticipar a construção e promoção do futuro porto espacial dos Açores (em articulação com o programa "Horizon Europe").

AÇÕES:

- Dada a natureza deste novo programa, as ações terão de ser adequadas a cada um dos subprogramas e articuladas entre a rede PERIN e a Agência Espacial Portuguesa Portugal Space;
- Deve ser garantido o envolvimento da Agência Espacial Portuguesa Portugal Space na captação de fundos de financiamento europeus adicionais, em complementaridade com a participação nacional na ESA;
- Deve ser assegurado o maior envolvimento das IES, setor empresarial e agências internacionais.

2.4. CEF 2 (Connecting Europe Facility – Digital)

O Programa CEF-Digital (CEF2: 2021-2027), com um orçamento total entre 9 e 11 B €, vai considerar dois pilares:

- Pilar I Infraestruturas 5G: Corredores 5G (transportes), conetividade Gigabit e 5G *Smart Communities*/ propulsores socioeconómicos.
- Pilar II Infraestruturas de dados transnacionais: Cabos submarinos de importância estratégica, conetividade terabit para HPC, Pan-European Cloud Federation e Infraestruturas de Comunicações Avançadas (como EQCI).

AÇÕES A IMPLEMENTAR

- Promoção das oportunidades de financiamento do programa no âmbito do Pilar II (Infraestruturas de dados transnacionais), junto da comunidade nacional, com atividades de apoio às candidaturas e participação no programa;
- Promover e reforçar a participação de entidades/iniciativas nacionais, através da promoção da sua articulação com outras entidades e infraestruturas chave;
- Prioridades a assegurar:
 - Conectividade estratégica de terabit para HPC (associado ao EuroHPC)
 - Redes estratégicas (a nível do "esqueleto") para a conetividade transfronteiriça e sustentável das federações cloud
 - Conectividade submarina de importância estratégica.

METAS A ATINGIR, 2020 e 2027

- Aumento da cobertura de fibra e conectividade 5G em residências, empresas, instituições de ensino, centros de saúde e outros propulsores socioeconómicos, localizados em áreas onde essas redes não existem e onde o apoio público é necessário. Espera-se que proporcione também um estímulo a aplicações 5G inovadoras, no âmbito das comunidades inteligentes e de negócios
 - 1. Alargamento da conetividade 5G a **corredores de transportes transfronteiriços** (ininterruptos) com aplicação, por exemplo, à mobilidade automatizada conectada;
 - 2. Implementação de conectividade crítica terabit, de última geração, entre infraestruturas de importância europeia estratégica como clouds, infraestruturas de dados, e computação de alto desempenho (HPC). A implementação da conetividade HPC irá permitir, por exemplo, a implementação de várias aplicações de Inteligência Artificial, com uso intensivo de dados. O objetivo é tornar a capacidade computacional exascale acessível a todos os Estados-Membros e utilizadores, incluindo os industriais;
- Promover Portugal como o centro de amarração de cabos submarinos, estratégico para assegurar a ligação intercontinental da América e África à Europa. Esta rede de cabos submarinos renovados irá permitir acessos de internet de alta velocidade a cidadãos e empresas localizadas em áreas remotas ou ilhas,

assegurando ao mesmo tempo ligações intercontinentais à rede EU. Nesse âmbito, é importante assegurar o financiamento para a renovação e implementação da rede de cabos submarinos Madeira-Açores-Portugal Continental (liderado pela ANACOM);

Promoção indireta do *European Green Deal* e dos objetivos de descarbonização da UE, apoiando infraestruturas inteligentes de TIC verdes, através da utilização de redes de fibra óptica com eficiência energética e redes de alta capacidade de ponta, incluindo 5G, como facilitadores para a sustentabilidade ambiental de muitas atividades sociais e económicas.

2.5. Programa Europa Digital

O Programa Europa Digital (Programa DIGITAL) é um dos novos programas do Quadro Financeiro Plurianual 2021-2027, focado na implementação de tecnologias digitais, acelerando a sua utilização, apoiando a criação de competências (*skills*) digitais avançadas e, simultaneamente, garantindo a autonomia estratégica dos Estados Membros e países associados ao Programa. Pretende, assim, responder aos seguintes desafios:

- Fazer face à competição global no domínio das tecnologias digitais (desde o mercado de semicondutores, passando pela capacidade em computação de alto desempenho e infraestruturas cloud, dados e inteligência artificial);
- Assegurar a proteção das infraestruturas críticas e dos dados (nomeadamente respondendo às ameaças na área da cibersegurança);
- Promover interoperabilidade das soluções tecnológicas, dando-lhes escala e gerando massa crítica no conjunto dos Estados Membros da UE e países associados ao Programa.

O Programa DIGITAL será implementado em pleno alinhamento com a visão da Comissão Europeia para a transformação digital da Europa até 2030, "Década Digital da Europa: objetivos digitais para 2030"¹.

A estrutura do Programa assenta em 5 objetivos específicos:

- 1. Computação de Alto Desempenho (*HPC*), implementada sobretudo através da Parceria *EuroHPC*;
- 2. IA, Dados e *Cloud*, incluindo os *data spaces* e as *AI Testing and Experimentation Facilities (TEFs)*;
- 3. Cibersegurança, incluindo iniciativas como as telecomunicações quânticas (*EuroQCI*), *European Cybershield* e apoio à implementação das diretivas europeias na área da cibersegurança;
- 4. Competências Digitais Avançadas, incluindo apoio para os "Digital Masters", desenvolvimento de soluções por parte de atores na área da EduTech e formações de curta duração ajustadas às necessidades das PMEs;
- 5. Transformação Digital e Interoperabilidade (como objetivo transversal), no qual se insere a implementação dos *European Digital Innovation Hubs* (*EDIHs*).

¹ <u>https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_pt</u>

Figura 9. Diagrama com os cinco Objetivos Específicos ('SO, Specific Objectives') e ações principais do Programa DIGITAL



As atividades do Programa são implementadas através de tipos de ações correspondentes a subvenções (grants) na forma de ações de coordenação e apoio ('CSA' – financiadas a 100% pela UE), 'subvenções simples' (50% cofinanciamento UE), 'subvenções para contratação pública' (procurement, com 50% cofinanciamento UE) e 'subvenções de apoio a PMEs' (75% de cofinanciamento da UE para PMEs e 50% de cofinanciamento da UE para restantes entidades). Estão também previstas atividades na forma de procurement contribuições para a Parceria Europeia EuroHPC, bem como para a implementação de iniciativas como a Destination Earth por parte da ESA e da ECMWF.

Importa salientar que o Programa DIGITAL não se destina a financiar investigação e desenvolvimento (I&D), focando-se na implantação (*deployment*) de tecnologias digitais, algumas das quais podem ter resultado de projetos de ID&I apoiados, no passado ao nível do Horizonte 2020, e desde 2021 a partir do Horizonte Europa.

Este programa é, assim, complementar com outras fontes de financiamento, a saber:

- Horizon Europe (Pilar II, Cluster Digital, Indústria e Espaço);
- CEF 2 (Conetividade; 5G; cabos submarinos)
- *Health* (*DataSpaces*, telemedicina)
- Fundos de coesão (conectividade digital em áreas *white/grey, smart specialization*, competências digitais para todos),
- Fundos para a agricultura (utilização de *big data* para monitorização CAP, banda larga em áreas rurais)

Figura 10. Diagrama com os cinco Objetivos Específicos ('SO, Specific Objectives') e ações principais
do Programa DIGITAL

	EU-w	ide collective effo	Nationa	ıl regional I local	Financial instrument	
Horizon Europe	Digital Europe	Connecting Europe Facility		Cohesion Funds	Agriculture funds) InvestEU
Cluster 4 (Digital, Industry and Space) Key Digital Technologies Partnership	Strategic capacities: computing, data, testbeds, etc. Advanced digital skills EU-Wide deployment	Broadband and 5G roll out Connecting Communities	Data Spaces for Health Telemedicine eHealth Digital Service Infrastructure	Digital connectivity in white and grey areas Support to enterprises in line with Smart specialisation Digital skills for all citizens	Making use of Big Data for CAP monitoring Broadband rollout in rural areas	Leverage private capital for investments in SMEs, research, digital, infrastructure, skills

2.5.1. Computação de Alto Desempenho (HPC)

A computação de alto desempenho, ou *High Performance Computing*, em Portugal conta já com vários anos e um crescente número de utilizadores. Com o apoio às infraestruturas já existentes, a criação do *Minho Advanced Computing Center* em 2018 e a implementação da Rede Nacional de Computação Avançada (RNCA) em 2019, Portugal apresenta em 2022 quatro centros operacionais que disponibilizam recursos de *HPC* a todas as áreas e comunidades interessadas:

- Minho Advanced Computing Center | Plataforma Bob (e Deucalion em 2022)
- Laboratório de Computação Avançada da UCoimbra | Plataforma Navigator
- High Performance Computing da UÉvora | Plataforma Oblivion
- Infraestrutura Nacional de Computação Distribuída | Plataforma Cirrus

Além destes centros, a RNCA (Rede Nacional de Computação Avançada) incorpora uma rede de 7 Centros de Competência e Visualização que, em conjunto com o projeto *EuroCC* do *EuroHPC*, irá interagir com o ensino superior, empresas, administração pública e público em geral. Em colaboração com os Polos de Inovação Digital, ou DIHs (*EDIHs*), esta rede visa dinamizar o uso de *HPC*, aumentar a competitividade nacional e a eficiência no tratamento de grandes volumes de dados. O interesse e a necessidade desta tecnologia tornam-se patentes com as duas primeiras edições do Concurso de Projetos de Computação Avançada, em 2020 e 2021, onde foram contabilizadas mais de 100 candidaturas a recursos computacionais, com representatividade a nível de todos os domínios científicos e regiões NUTII. O Programa DIGITAL, através do 'SO1', e alinhado com a Estratégia Nacional de Computação Avançada, poderá cofinanciar esta infraestrutura promovendo parcerias, sinergias e ações nas áreas-chave de conhecimento: saúde, clima, energia, mobilidade e sociedade.

Figura 11. Diagrama com os 3 eixos da Estratégia Nacional de CA e áreas-chave de conhecimento Fonte: Advanced Computing Portugal.2030



METAS A ATINGIR

- Instalação dos Supercomputadores DEUCALION e MARENOSTRUM 5, dois projetos EuroHPC aprovados em 2019, disponibilizando os recursos disponíveis às comunidades de investigação e inovação através de concursos públicos e protocolos estratégicos;
- Promoção e expansão da RNCA Rede Nacional de Computação Avançada para implementação de uma infraestrutura unificada e especializada de serviços HPC - High Performance Computing, Artificial Intelligence (AI), Data storage, Cloud Computing, Quantum

computing;

- Instalação na RNCA de pelo menos 10 Centros de Competência e Visualização distribuídos geograficamente por diversas Comissões de Coordenação e Desenvolvimento Regionais (CCDRs);
- Promoção das competências em Computação Avançada, financiadas no âmbito do projeto *EuroCC* pela *EuroHPC* com início em 2020, e coordenado pela FCT;
- Aumento da utilização das infraestruturas de processamento de dados em Portugal por um fator de 10- citando o exemplo do Supercomputador Português *Bob*, o cluster *HPC* em Riba d'Ave que tem acolhido dezenas de projetos de investigação e inovação na sua fase piloto;
- Cooperação com os programas já existentes da Go Portugal (UTAustin, MIT, CMU) e outras parcerias internacionais como a Partnership for Advanced Computing in Europe (PRACE) e a Rede Ibérica de Computação Avançada (RICA);
- Coordenação de esforços entre o projeto *EuroCC* e a rede Nacional e Europeia dos DIHs (*EDIHs*), *e o Centro Nacional de Competências em Cibersegurança* - com o foco de captar empresas e administração pública para a transformação digital dos seus processos e serviços.

AÇÕES A IMPLEMENTAR

- Captar financiamento através de fundos europeus Programa DIGITAL, Horizonte Europa, Mecanismo Interligar a Europa – Digital (*CEF2 - Digital*) e *European High-Performance Computing Joint Undertaking* (*EuroHPC JU*) - para co-sustentar a operação e atualização dos centros operacionais e de competência da Rede Nacional de Computação Avançada (RNCA);
- Garantir o acompanhamento direto dos concursos do Programa DIGITAL em articulação com o Horizonte Europa e parcerias nas áreas chaves do conhecimento (saúde, clima, energia, mobilidade e sociedade) com vista a permitir a melhor influenciar as prioridades e estabelecer sinergias com os programas nacionais;
- 3. Envolver *ab initio* as entidades nacionais, públicas e privadas, ligadas à IA, supercomputação e competências digitais;
- 4. Desenvolver ações de promoção das oportunidades para os setores industriais e serviços que possam beneficiar da utilização de *HPC*;
- 5. Atualizar a infraestrutura digital nacional ao nível da conectividade, dos *Datacenters* e Supercomputadores (citando o *Bob*, Navigator, *Oblivion*, *Cirrus* e futuras máquinas que venham a ser instaladas);
- 6. Promover a utilização da Computação Avançada nas modalidades de HPC, HTC e Cloud junto da comunidade académica, indústria e administração pública através de disponibilização dos recursos da RNCA em concursos de projetos de computação avançada promovidos pela FCT (cuja primeira edição foi em 2020), bem como o apoio à participação em calls EuroHPC/PRACE;
- 7. Apoiar a participação dos centros operacionais da RNCA na rede de parceiros PRACE.

2.5.2. Inteligência Artificial, Dados e Cloud

O Programa DIGITAL prevê três vertentes de trabalho durante os primeiros 2 anos de implementação do programa:

- 1. Infraestrutura e serviços *Cloud-to-edge* fomenta a criação de uma estrutura pan-Europeia federada que permitirá à Europa garantir a soberania e controlo dos seus dados.
- 2. Data for EU oferecerá às empresas e ao setor público o acesso a ferramentas e componentes de inteligência artificial, assim como recursos de dados em setores industriais e societais chave, baseados numa infraestrutura de *cloud* federada. O foco estará na implantação dos *data spaces* para o *Green Deal*, saúde, mobilidade, *smart communities*, produção industrial (*manufacturing*), agricultura e património cultural. Os *data spaces* serão suportados por um centro de coordenação que permitirá a reutilização de dados entre setores. De forma a garantir a soberania, sustentabilidade e segurança, os *data spaces* contarão com uma infraestrutura e serviços *cloud-to-edge*.
- 3. A plataforma "*AI on demand*" será consolidada como uma ferramenta central de recursos de IA necessários para a utilização pela indústria e setor público.
- 4. Al Testing and Experimentation Facilities (TEFs) serão implementadas em cinco setores de aplicação prioritários: Edge AI, produção industrial, saúde, smart cities and communities e agro-alimentar. Pretende-se que as várias TEFs setoriais disponibilizem infraestruturas digitais para o teste e experimentação de tecnologias baseadas em inteligência artificial, tanto ao nível de software (e.g. plataformas de IA e algoritmos de machine learning), como ao nível de hardware (e.g. robótica e interfaces ciber-físicos). As TEFs não devem cobrir atividades de investigação e desenvolvimento (I&D), pelo contrário, devem focar-se em TRLs mais altos (6-8) e devem abranger aplicações em ambiente real (i.e. utilizando "dados reais"), orientados aos requisitos dos utilizadores finais e a constrangimentos decorrentes da legislação em vigor aplicável e das especificidades de cada setor.

Portugal tem vindo a mostrar consecutivamente bons resultados nos indicadores de inovação (que incluem, mas não estão limitados, à IA), tendo sido reconhecido como dispondo de um ambiente amigo da inovação e um sistema de investigação atrativo. As instituições nacionais estão particularmente bem posicionadas em termos da colaboração internacional em investigação, nestas áreas. Assume especial relevância, neste objetivo, o Estratégia Nacional para a Inteligência Artificial (*AI PORTUGAL 2030*), publicado no âmbito do INCODE.2030.

METAS A ATINGIR

De acordo com a Estratégia Nacional para a Inteligência Artificial, Portugal deve ambicionar a estimular um mercado de trabalho intensivo em conhecimento, com uma comunidade de empresas de vanguarda que produzem e exportam tecnologias de inteligência artificial, apoiada por uma academia envolvida quer na investigação fundamenta como aplicada de alto nível.

As tecnologias de IA estarão facilmente disponíveis para promover a eficiência e a qualidade de todas as atividades, incluindo PMEs, serviços públicos e para todos os cidadãos. A mão-de-obra será altamente qualificada e Portugal estará na vanguarda da educação em IA para todos. A IA melhorará a qualidade dos serviços e a eficiência dos processos, garantindo justiça, bem-estar e qualidade de vida. Os principais objetivos a atingir por Portugal em 2030, são os que seguem:

- Crescimento Económico de elevado valor acrescentado o valor das tecnologias de Al para o crescimento económico será significativo;
- Posicionar Portugal como local preferencial para alojamento de dados na Europa para o efeito Portugal oferece localização geográfica ideal para servir de *hub* entre a Europa, Américas e África, elevados níveis de segurança, conectividade terrestre e por cabos submarinos de elevada capacidade, disponibilidade de energia renovável de baixo custo;
- Excelência Científica melhorar a posição da investigação fundamental e aplicada em Al da academia portuguesa (universidades, institutos politécnicos e instituições de investigação) medida em termos do impacto de publicações, medidos em termos de impacto de publicações, coordenações e colaborações internacionais;
- Desenvolvimento Humano aumentar drasticamente as qualificações da força de trabalho, em particular as qualificações tecnológicas, promovendo a consciencialização e inclusão em todos os níveis de educação.

AÇÕES A IMPLEMENTAR

1. Infraestrutura e serviços Cloud-to-edge

- Estimular a participação de operadores nacionais de comunicações no desenvolvimento e implementação da futura *Cloud* Europeia, promovendo a soberania Europeia em relação aos dados dos seus cidadãos e o esforço tecnológico de implementação destas plataformas, incluindo na definição de protocolos de interoperabilidade entre diferentes setores.
- Fomentar a participação das potenciais comunidades utilizadoras nacionais, nomeadamente as ligadas à Ciência, Inovação e Ensino Superior, na adoção dos serviços da futura *Cloud* Europeia.
- Promover internacionalmente Portugal como local preferencial para o alojamento de dados na Europa, com base nos benefícios identificados anteriormente (localização, segurança, conectividade, e energias renováveis).

2. Data for EU

- Cooperar com as entidades reguladoras, agências e o EOSC (European Open Science Cloud) na geração de dados e metadados de qualidade, facilmente acessíveis e armazenados de forma segura. Os esforços realizados pela Ciência Aberta podem servir de ponto de partida e dar suporte a outras áreas societais.
- Apoiar a participação Portuguesa no mercado único como fornecedor e cliente dos dados, ao nível da formação e ensino superior, nas áreas ligadas ao Green Deal, mobilidade, indústria, agricultura e cultura. Os data spaces nessas áreas poderão ter acesso a grants de 50% (75% para PMEs). Articular ações com o observatório nacional de IA e estratégia nacional de IA.

3. Plataforma AI on demand

- Mapear entidades nacionais com competências em IA e estimular o registo na plataforma das que possam disponibilizar serviços a nível europeu.
- Promover amplamente a plataforma junto de entidades com interesse e/ou a desenvolver atividades de investigação e inovação em IA.
• Estimular o envolvimento de entidades nacionais no consórcio que implementa a iniciativa.

4. AI Testing and Experimentation Facilities

- Promover o mapeamento das entidades nacionais que possam albergar, participar ou usar uma *TEF* e decidir onde Portugal pretende apostar.
- Estimular estratégias de posicionamento para potenciar a exploração destas iniciativas, quer como *TEF* quer como utilizador, em colaboração com as iniciativas de outros Estados-Membros.
- Estabelecer um mecanismo de cofinanciamento nacional, à semelhança daquele que foi constituído para os *EDIHs*, baseado nos apoios concedidos no Plano de Recuperação e Resiliência e outras fontes de financiamento nacional compatíveis com os objetivos do Programa.

5. Produção industrial

• Alargar o mapeamento já realizado com recurso ao *Produtech* sobre infraestruturas tecnológicas com capacidade de desenvolver pilotos à escala real

6. Saúde

 Mobilizar os vários atores nacionais, nomeadamente as várias entidades do Ministério da Saúde, incluindo a DGS, o SPMS, com o objetivo de agregar dados de hospitais e estimular instituições, empresas e unidades de IT/Saúde em Portugal para participar nas atividades previstas ao nível dos *data spaces* e da *TEF* na área da saúde.

7. Mobilidade

• Mobilizar cidades e casos de projetos piloto para a apropriação de novos sistemas.

2.5.3. Cibersegurança e Confiança

METAS A ATINGIR

- Estabelecimento de um Centro Nacional de Competências em Cibersegurança, no âmbito da cooperação com o Centro Europeu de Competências Industriais, Tecnológicas e de Investigação em Cibersegurança e com a Rede de Centros Nacionais de Coordenação;
- Dinamização da Comunidade de Competências em Cibersegurança, envolvendo particularmente entidades ligadas ao Sistema Científico e Tecnológico Nacional, empresas e o setor público;
- Reforçar o Sistema Nacional de Certificação em Cibersegurança com o desenvolvimento de novos esquemas de certificação de Cibersegurança, promovendo as condições para a confiança nas organizações e na utilização de soluções tecnológicas e processos alinhados com as melhores práticas e normas, bem como no mercado digital;
- Instalar o polo de inovação digital em Cibersegurança integrado na rede nacional de polos de inovação digital com o objetivo de apoiar processos de transformação digital das organizações (em ligação com o Objetivo Específico 5 do Programa DIGITAL);
- Desenvolver programas de capacitação em cibersegurança transversais às organizações e aos cidadãos, bem como de formação técnica avançada em segurança do ciberespaço em ligação com o ensino superior universitário e politécnico, contribuindo para o aumento do número de profissionais do sector.

AÇÕES A IMPLEMENTAR

- Definir sinergias e relações de cooperação entre o Centro Nacional de Cibersegurança, enquanto Autoridade Nacional de Cibersegurança, a Fundação para a Ciência e a Tecnologia, I.P., enquanto agência pública nacional de apoio à investigação em ciência, tecnologia e inovação, e a Agência Nacional de Inovação, S. A., enquanto entidade com responsabilidade no desenvolvimento de ações destinadas a apoiar a inovação tecnológica e empresarial em Portugal, com vista à formalização do Centro Nacional de Coordenação de Competências em Cibersegurança;
- Estabelecer uma rede nacional de Centros de Competências em Cibersegurança, alinhada com os objetivos definidos para o Centro de Coordenação Nacional de Competências em Cibersegurança, com vista a uma ação coordenada e em complementaridade com os polos de inovação digital para responder às necessidades nesta área;
- Fomentar e mobilizar entidades regionais e nacionais pertencentes ao Sistema Científico e Tecnológico Nacional e ao tecido económico, bem como organismos e serviços da Administração Pública, nos programas de financiamento europeu que compreendam linhas para o desenvolvimento de capacidades em Cibersegurança, bem como a criação de sinergias com vista a responder a necessidades identificadas no domínio da Cibersegurança de natureza da capacitação tecnológica das organizações e na capacitação e especialização de pessoas;
- Apoiar as organizações, incluindo as dos domínios de interesse público, e as regiões nos seus processos de transformação digital recorrendo ao conhecimento e competências,

nacionais e europeias, disponibilizados pelos centros de competências e polo de inovação digital de Cibersegurança, estabelecendo a relação necessária com outras especializações temáticas como são a Inteligência Artificial e a Computação de Alto Desempenho;

- Promover a adoção pelas organizações de quadros de referência e normativos reconhecidos com vista ao cumprimento de requisitos de segurança das suas infraestruturas, processos e serviços por forma a reduzir o risco associado às ciberameaças;
- Fomentar a partilha de informação e boas práticas no domínio da Cibersegurança entre organizações, públicas e privadas, estimulando a criação de centros de análise e partilha de informação (*Information Sharing and Analysis Centres* – ISACs) e de centros de operações de segurança (*Security Operation Centres* – SOCs);
- Adaptar a oferta formativa em Cibersegurança nos diversos níveis de conhecimento competências básicas e avançadas –, incluindo o ensino formal, às necessidades nacionais e setoriais decorrentes do avanço tecnológico e social (em ligação com o Objetivo Específico 4 do Programa Europa Digital);
- Implementar um Programa de Formação Avançada em Cibersegurança com vista a qualificar e requalificar profissionais com competências avançadas em Cibersegurança.

2.5.4. Competências Digitais Avançadas

METAS A ATINGIR E AÇÕES A IMPLEMENTAR

- Promover a oferta académica e de pós-graduações profissionais, para públicos adultos diplomados de todas as áreas científicas, incidindo sobre fundamentos e aplicações das principais tecnologias digitais emergentes, designadamente IA, Cibersegurança, *Blockchain*, Computação Avançada, *Big Data* e *IoT*, assim como programas de formação para requalificação dos licenciados em áreas das Tecnologias da Informação da Comunicação e Eletrónica;
- Estimular competências na área das tecnologias da informação e da comunicação (TIC), através da criação de Academias Tecnológicas de empresas tecnológicas nas instituições de Ensino Superior (IES);
- Apoiar a criação de programas de doutoramento em áreas tecnológicas emergentes, designadamente em colaboração internacional e envolvendo atividades de I&D em cooperação com instituições públicas e/ou privadas;
- Organizar ações de informação específicas sobre o Programa DIGITAL para os respetivos públicos-alvo.

2.5.5. Transformação Digital e Interoperabilidade

METAS A ATINGIR E AÇÕES A IMPLEMENTAR

- Acompanhar a participação nacional nos concursos europeus para os Polos de Inovação Digital (DIHs) cofinanciados pelo Programa DIGITAL, que visem apoiar as Empresas e Administração Pública na utilização das competências-chave definidas pelos objetivos específicos do Programa DIGITAL: HPC, IA, Cibersegurança;
- Incentivar à participação na criação de digital twins em várias temáticas, incluindo na área da saúde, e na área do Green Deal (Destination Earth Initiative);
- Apoiar iniciativas que explorem a aplicação de tecnologias baseadas em nas tecnologias de blockchain, nomeadamente no setor público;
- Identidade Digital (Digital Product Passport) e Princípio "once-only" a nível nacional;
- Promover ações que visem a confiança na transformação digital e utilização das tecnologias de forma segura via Centro Internet Segura e o European Digital Media Observatory (EDMO).

2.5.6. Sinergias entre programas

O futuro Programa Europeu do Espaço, tal como como o Programa DIGITAL, é complementar com toda a atividade de I&D a ser desenvolvida no programa Horizonte Europa, requerendo uma ação contínua de articulação através da rede PERIN. Por exemplo, no caso do Espaço, devem ser considerados setores up stream e down stream e incluindo o desenvolvimento dos dados e serviços produzidos pelas constelações do Galileo e do Copernicus. No caso do Programa DIGITAL, as lógicas de intervenção são complementares com a componente de I&D do Digital, a ser realizado no âmbito do Horizonte Europa, incluindo a computação avançada, inteligência artificial (IA) e Cibersegurança, entre outras áreas. As infraestruturas do Programa DIGITAL são, por sua vez, colocadas à disposição dos sistemas de investigação. No âmbito do programa Erasmus+, a mobilidade internacional de crédito conta com outras fontes de financiamento da UE e as universidades europeias são cofinanciadas pelo Horizonte Europa para apoio às dimensões de Investigação e Inovação.

O Horizonte Europa reforçará o seu impacto colaborando estreitamente com outros programas e políticas da UE, como o InvestEU, a política de coesão da UE, os Fundos Europeus Estruturais e de Investimento, o Mecanismo Interligar a Europa (CEF2), bem como o Mecanismo de Recuperação e Resiliência, no âmbito do Plano de Recuperação para a Europa pós-COVID-19, a fim de promover uma divulgação e uma adoção mais rápidas dos resultados da investigação e da inovação aos níveis nacional e regional. Pela primeira vez na história do PQ de IDT, as regiões podem, numa base voluntária, transferir uma parte dos seus fundos regionais para o programa Horizonte Europa, para serem utilizados em atividades de investigação e inovação na sua região.

Graças às sinergias com o Erasmus+, o Programa DIGITAL apoiará o desenvolvimento e a aquisição das competências digitais avançadas necessárias para a implantação de tecnologias de ponta como a IA ou a computação de alto desempenho, em cooperação com os setores industriais envolvidos. A abordagem do programa Erasmus+ relacionada com as competências avançadas complementará as intervenções do Programa DIGITAL em prol da aquisição de competências em todos os domínios e a todos os níveis, através de experiências de mobilidade.

Toda a complementaridade e esforço de sinergias requer uma ação contínua de articulação através da rede PERIN.

Face ao que antecede, as sinergias com outros programas incluirão igualmente:

- os programas no âmbito da gestão partilhada, incluindo o FEDER, o FSE+, o Fundo Europeu Agrícola de Desenvolvimento Rural e o Fundo Europeu dos Assuntos Marítimos, das Pescas e Aquicultura:
 - a) as modalidades de financiamento complementar por parte destes serão utilizadas para apoiar ações que estabeleçam pontes entre as especializações inteligentes e apoiem a transformação digital da economia e da sociedade europeias;
 - b) o FEDER contribui para o desenvolvimento e o reforço dos ecossistemas de inovação regionais e locais, a transformação industrial e a transformação digital da sociedade e da administração pública;

- o programa Mecanismo Interligar a Europa *Connecting Europe* Facility (CEF) para apoio à I&D na área dos transportes, energia e mobilidade, promovendo também a implantação, o "*deployment*" das tecnologias em fase de adaptação pelo mercado;
- o programa UE pela Saúde (EU4Health), que visa reforçar o grau de preparação da UE para as principais ameaças sanitárias transfronteiriças, reforçar os sistemas de saúde para que possam enfrentar epidemias, bem como os desafios a longo prazo, e disponibilizar e tornar acessíveis os medicamentos e os dispositivos médicos, defender a utilização prudente e eficiente dos agentes antimicrobianos, bem como promover a inovação médica e farmacêutica e o fabrico mais ecológico.
- o Programa *Life* que apoia a difusão e adoção dos resultados de I&D desenvolvidos no quadro do Horizonte Europa para o desenvolvimento da Política Climática;
- o programa *Invest EU* para o financiamento do "*blended finance*" do EIC e PMEs através da janela de I&D;
- o Fundo Europeu de Defesa, o qual é parte do Horizonte Europa como programa específico nomeadamente na componente de I&D, com clara separação entre as atividades civis e de natureza militar;
- os Instrumentos Financeiros da Ação Externa Europeia;
- o "Selo de Excelência" concedido a propostas de projetos apresentadas ao Horizonte 2020, que embora de comprovada qualidade não podem ser financiadas devido a limitações orçamentais do PQ de IDT, tendo como objetivo ajudar essas propostas a encontrar financiamento alternativo. Prevê-se que este instrumento seja também aplicado a propostas no âmbito do Programa Erasmus+ 2021-2027. Caso o financiamento alternativo se verifique, tais propostas serão implementadas em consonância com as regras da fonte de financiamento aplicável;
- o programa da UE Europa Criativa (2021-2027) que reúne ações de apoio aos sectores cultural e criativo europeus. Tem duas metas principais: salvaguardar, desenvolver e promover o património e a diversidade cultural e linguística da Europa e aumentar a competitividade e o potencial económico dos sectores culturais e criativos, em especial do sector audiovisual.
- o programa da UE Cidadãos, Igualdade, direitos e Valores (CERV) que pretende proteger e promover os direitos e valores da União Europeia e irá contribuir para o apoio e desenvolvimento de sociedade abertas, democráticas e inclusivas.

METAS A ATINGIR

- Explorar a forma mais eficaz de operacionalizar as sinergias e complementaridades entre os vários programas de financiamento, de modo a garantir uma ação mais coerente e complementar na divulgação das ações e no direcionamento dos proponentes para os programas que melhor se adequam às suas necessidades;
- Desenvolver as sinergias entre os Fundos Estruturais e os Programas HE, Erasmus+, Espaço, Mecanismo Interligar a Europa (CEF2 – Digital) e Programa DIGITAL, bem como todos os outros listados acima.

AÇÕES

- Criação de uma task force no âmbito da PERIN para estimular o diálogo com as entidades que gerem os outros programas a nível nacional, e mandatar os NCP ou delegados respetivos para explorarem as modalidades de operacionalizar as sinergias com os outros programas de financiamento da UE;
- Acompanhamento por essa task force da criação de estruturas de governação, por parte da Comissão Europeia, no âmbito dos mecanismos de coordenação, da programação, execução, e alinhamento dos procedimentos dos programas, a fim de garantir a maior eficácia possível deste processo, a nível nacional.

Parte 2

Programmes and Thematic Areas (in English)

I. Horizonte Europa | *Horizon Europe*

PILLAR 1

EXCELLENT SCIENCE

1.1. European Research Council (ERC)

SCOPE

The European Research Council grants aim to support the highest quality research in Europe through competitive funding and to support investigator-driven frontier research across all fields, based on scientific excellence.

Strategicly, it is important to highlight:

- Participation Levels. Large margin for potential growth in terms of participation levels, as success in the ERC during H2020 is concentrated in a small number of R&D institutions. There are 5 R&D institutions which concentrate more than 50% of the ERC Grants awarded between 2014-2020. Top R&D Institutions should aim at having at least one ongoing ERC grantee. It is also important to evaluate specific actions to the Social Sciences and Humanities domain, as these research communities are not demonstrating the same interest in the programme as the ones from the other two scientific domains (Life Sciences or Physical Sciences and Engineering);
- Success Rates and Gender Parity. Convergence in terms of success rates is necessary, as
 Portugal lies below the European average in the ERC (10% PT vs. 14% Europe). The
 increase in participation levels from the top R&D Institutions should be accompanied by
 an increase in success rates as well. The issue of gender imbalance as one progresses in
 the type of ERC Grants (from Starting to Advanced) should continue to be addressed at
 the ERC Committee level;
- Monitoring and Leveraging National Initiatives. National projects and independent experienced researchers under scientific employment contracts (including the ones employed by ERC Grantees) should be closely monitored to spot authors/teams with high-impact publications and possible emerging research topics; at an individual level, it is also important to maximise the synergies with the Diaspora (FCT Protocols with the Diaspora) and International Partnerships between PT and institutions of reference, with both representing a stepping stone towards a potential ERC Grant in Portugal.;
- European Synergies. Interlink European individual funding schemes, not only the obvious linkages to the MSCA and the Widening Programme, but also the success stories of Pillar II (Cofunded Actions, for example) with PT participation. For ERC grantees, it is also relevant to establish synergies with activities implemented by the Innovation Pillar of Horizon Europe, and to strengthen the participation and success in the Proof of Concept funding scheme;
- Societal Impact and Regional Cooperation. ERC grantees (or former grantees) employ (or have employed) on average six team members; the former act as mentors and the latter as potential successful stories in Horizon Europe (ERC or other Horizon Europe funding scheme). Regional/Local mentoring schemes should be implemented taking advantage of Portugal being a Widening Country. Take advantage of the ERC media coverage to act as ambassador of science in Portugal and to establish a close link to society at large;
- Reform the ERC Advanced Grant Scheme. The ERC principles are solely based on scientific excellence and open to all. However, it is critical to understand Europe is characterised by a diversity of European R&I ecosystems, and the ERC needs to adapt so all applicants

are in equal footing. More than 75% of the grants attributed by the ERC are concentrated in 8 countries, and this is particularly pronounced in the Advanced Grant scheme;

 Widening and Spreading Excellence. Proposals with Host Institutions inWidening countries recommended for funding but beyond the budget of the ERC Calls should be funded by the Widening Programme directly. This does not compromise scientific and evaluation principles of the ERC, but it provides an alternative route to fund excellent proposals.

FACTS

Portugal in ERC (selected stats under H2020) Data: December 2021 (source Horizon 2020 Dashboards)

	Horizon 2020		Horizon Europe	
	PT Projects (%	PT Funding	PT Projects (% total)	PT Funding
	total)	(% total)		(% total)
StG	33 (1,1%)	49,5 M€ (1,2%)	5* (1,3%)	8,3 M€ (1,3%)
CoG	38 (1,7%)	72,2 M€ (1,6%)		
AdG	11 (0,7%)	21,2 M€ (0,6%)		
SyG	2 (2,0%)	5,0 M€ (0,5%)		
РоС	15 (1,3%)	2,3 M€ (1,4%)€	4 (2,4%)	0,6 M€ (2,4%)
Total	99 (1,3%)	150,2 M€ (1,1%)	9 (1,6%)	8,9 M€ (1,4%)

StG = Starting Grant; CoG = Consolidator Grant; AdG = Advanced Grant; SyG = Synergy Grant; PoC = Proof of Concept.

*Several proposals in the reserve list may be funded.

PROPOSED TARGETS (2021-2027)

	Horizon 2020		Horizon Europe		
	PT Status	Total	PT Objective	PT Status	Total
Number of Proposals submitted	1002 (1,8%)	55280	1000-1200 (2,2%-2,4%)	118* (2,7%)	4414
Number of	99	7851	120-170	9	563

Projects					
Success Rate (average)	9,9%	14,2%	12%-14%%		
Global overview on budget allocation to PT	150 M€ (1,1%)	13.405 M€	200 M€ 1,3%	8,9 M€ (1,4%)	644 M€
Contribution to the global PT objective of 2.000 M€		10%			

Herein the calculation was based on separate budgets (H2020 and HE). Data: December 2021. Current Status in HE refers to StG-2021 and PoC-2022 Calls.

* it is yet to be known the number of proposals submitted by PT in the PoC Call.

SWOT ANALYSIS

Strengths	Weaknesses
 Bottom-up (no priorities), open to all, scientific excellence is the sole criterion for awarding grants (high risk/high benefit fundamental frontier research and scientific breakthroughs); Empowers researchers, career development, independence (own idea; own team; grant mobility); Encourages merit-based HR management standards in R&I and ERA principles implementation; ERC is the leading EU programme in scientific production (number and quality of scientific papers) and patents; ERC a is stable, predictable and reliable funding mechanism (in terms of rules, deadlines, forms, etc.); simple and straightforward application system; prestigious and highly credible programme; Growing interest of the Portuguese research community on ERC; gateway to career stability and to lead new scientific fields; Current legal framework of Scientific Employment formally attributes scientific independence to the researchers. The absence of a formal supervisor benefits candidates in proving their independence and originality; Good media coverage on ERC grants in Portugal. 	 Large gap between widening countries and top performers; 8 countries get more than 75% of the budget and account for more than 60% of the applications; Parity: more men apply; 20% of the AdG candidates are women; PT female grantees: StG: 44%; CoG: 57%; AdG:25%; Social and Humanities scientists apply less (including the Portuguese); Evaluation system: first step evaluation is made by non-specialist panels but these evaluators are specialists in a given field – unequal assessment of proposals. Training of NCPs and Widening applicants should be a priority for the ERC (the writing style and approach to an ERC application is unique); R&D Units lack professional structures to support candidates; Number of Portuguese applications (1,8% in H2020) and lower success rate than EU average (10,1% vs 14,6% in H2020). PT lacks talent spotting mechanisms and structures; Concentration of ERC grants in PT in only a few R&D Units – only 30 R&D Units with ERC grants in PT; 5 best performing R&D Units have over 50% of the grants; Possible saturation of PT high performers in the ERC and their inability to support candidates at the rate of H2020 may hinder PT success in the ERC; Current legal framework for attracting HRs in public institutions is not aligned with the ERC demands;
Opportunities	

- Portugal should take advantage of success in MSCA and Widening programmes to leverage success in the ERC;
- Multiplying impact and mentoring schemes: PT grantees in Portugal to engage in collaborative projects with nationally funded research schemes and provide mentoring to other ERC candidates;
- Use nationally funded programmes to spot talents and to increase participation levels in ERC;
- Take advantage of the excellent work-life balance and PT being one of the safest countries worldwide to attract foreign talents;
- ERC Grantees to leverage success in projects of added institutional complexity and dimension, namely Teaming or Excellence Hubs;
- Increase participation levels and success rates of ERC Grantees in Proof of Concept Calls, and build a culture of linking fundamental research with the local and regional ecosystems (link to the EIC);
- Mobilise training and mentoring schemes at the regional level, career development initiatives, use ERC prestige to leverage nationally funded research and to foment national cohesion and convergence;
- Opportunity for growth in participation levels and success rates, and to diversify institutional success in the ERC – Associate Laboratories and R&D Units ranked as 'excellent' (n=105) and 'very good'(n=118);
- Establish linkages between the diaspora and ERC applications (leverage protocols between PARSUK, AGRAFr, ASPPA, PAPS, SPOT NORDIC and others).

- Advanced Grants is not designed adequately to widening countries and in particular to the Portuguese system (difficult to compete with large research teams and with top countries); this is proven by a significant drop in the success of PT researchers;
- Portuguese research system (e.g. career opportunities, research infrastructures and number of young established researchers) limit the capacity of hosting and attracting ERC candidates;
- Limited institutional flexibility to retain talents of the ERC calibre;
- PT has similar numbers in awarded projects to Norway, Ireland and Finland, all these below 2% of the total ERC budget. Denmark ranks at #12 (above 2%). Poland and Greece with large margins for growth in the ERC may present an additional limitation for PT success;

MAIN STRATEGIC ACTIONS (2021-2027)

- Strategic Dissemination. Make use of virtual environments to communicate with the top
 performing R&D Units. Emphasis on R&D Units of reference coordinated by developing
 regions. Combine dissemination activities with media coverage and interviews to ERC
 Grantees;
- Participation Levels. Introduce the programme to the young researchers and promote the decentralisation of candidatures. Empower research support officers at R&D Units. Capitalise the prestige of ERC grants to increase participation levels;
- Strategic Objective. Ensure all R&D Units of reference at the national level, and in all thematic areas, have at least one ongoing ERC grantee in Horizon Europe (target of 120-170 grants);

- Synergies and Pathways. Articulate individual schemes funded at the national level (Scientific Employment), and at European level with PT participation (MSCA, Widening and Cofunded Partnerships), to spot talents and build success stories in the ERC. Synergies and Pathways are to be an integral part of the dissemination strategy as well. Encourage institutions to map funded projects with high impact publications and to target specific research teams and its members;
- Diaspora. Leverage existing protocols between the PT Associations in Europe and FCT and link this to the national programme REGRESSAR to increase participation levels and attract the diaspora through the ERC;
- Complementary Funding. Implement a complementary grant scheme to ERC candidates who reached the interview step of a given Call. Foment the implementation of local/regional/national programmes providing a financial incentive to prepare a successful application to the following ERC call. Exceptions, modality and conditions to be defined;
- Mirror the Scientific Council. Create a Mirror Group of the ERC Scientific Council in Portugal (Coordinated by the NCPs with up to 5 Members, including international researchers);
- Training. Implement training of NCPs in the support of ERC applications taking advantage of their past experience and career in research, establish closer linkages to the ERCEA, and build a structure of support at the national level based on scientific domains (beyond NCP attributions);

1.2. MSCA - Marie Skłodowska Curie Actions

SCOPE

Marie Skłodowska-Curie Actions (MSCA) is the EU's flagship funding programme under Horizon Europe for doctoral education and postdoctoral training. With a total budget of €6.6 billion over 2021-2027, the MSCA support researchers at all stages of their careers from across all disciplines, aiming at their training, career development and employability improvement. MSCAs are based on three dimensions of mobility: international, interdisciplinary and intersectoral (between academic and non-academic sectors). In all cases, applications are submitted by institutions that, in case of success, recruit one or more researchers. Considering the diversity of actions, it is important to summarize their specific scope:

Action	Scope
Postdoctoral Fellowships (PFs) Individual Fellowships in H2020	Funding for the hiring of a researcher with less than eight years of experience after the doctorate, for 2-3 years. The application includes the CV of the researcher to be hired. Only one beneficiary entity.
Doctoral networks (DNs) Innovative Training Networks in H2020	Funding of an international doctoral program. Consortium with at least three entities from three different European countries.
COFUND	Co-financing of a doctoral or post-doctoral program. A single beneficiary entity, with the possibility of having implementation partners.
Staff Exchanges (SE) Research and Innovation Staff Exchanges in H2020	Fund research staff mobility across countries, disciplines and sectors (salaries not included). Consortium with at least three institutions from three different countries.
MSCA & Citizens NIGHT in H2020	Fund the European Researchers' Night. Proposals can be submitted by a single entity or by consortia of several national or regional entities.

PT strategic approach should focus on:

- Increasing participation levels There is a large margin for growth in participation levels, as success in the MSCA Individual Fellowships (IFs, now Post-Doctoral Fellowships) in H2020 was in just 50 institutions (47 R&D Units, 3 enterprises and 1 state agency), while 5 R&D Units concentrate more than 40% of the MSCA-IFs. Top-100 R&D Units (Associated Laboratories and R&D Units ranked as "Excellent") should ambition having at least one ongoing MSCA-IF throughout Horizon Europe.
- **Promoting the implementation of Seal of Excellence programs** For several of the actions, the evaluation process awards Seals of Excellence, to recognize excellent applications that were not financed due to lack of budget. The creation of such

programs to finance the best applications with a Seal of Excellence hosted in Portugal, would make MSCA more attractive. These programs can be created by national, regional or local entities, public or private.

- Involving Portuguese researcher's associations in the diaspora All researchers recruited under the MSCA must comply with a mobility rule: they cannot have lived or worked in the country of the host institution for more than 12 months in the three years prior do the call deadline. This makes Portuguese researchers abroad potentially eligible, and MSCAs are an opportunity to return.
- Stimulating the participation of collabs The three dimensions of MSCA mobility are aligned with the collaborative typology of Collabs. Thus, Collabs are in a privileged position to present applications that fit well with the evaluation criteria, for example, through societal impact and linkage to the non-academic sector.
- Strengthen the supporting structures of R&D Units and promote its further professionalization MSCA applications and implementation include administrative, legal and financial aspects that can be an obstacle for researchers.
- To identify **potential connections between MSCA and other funding schemes** For example, bilateral agreements, COST Actions or ERA-NET projects as a prelude for DNs or Staff Exchange.
- To assure national contribution for COFUND schemes Portugal has had a very low number of applications and approved projects (1 out of 14 between 2014-2019). These contributions can be from national, regional or local sources, public or private. Synergies with cohesion funds are also encouraged.
- To stimulate the PT community to work as expert evaluators for the EC Many successful proposals have been submitted by researchers that have previously worked as expert evaluators.

Action	Number of Participations of PT organisations	EU contribution to PT organisations (in EUR million)	Number of projects	Success rate regarding nr of PT proposals	Overall success rate (all countries)
IF	110	17,55	110	9,99 %	14,81 %
ITN	128	46,34	105	6,88 %	9,26 %
COFUND	1	1,7	1	7,14 %	23,31 %
RISE	155	20,44	90	27,11 %	27,43
NIGHT	27	1,29	8	32,0 %	39,84 %
Total	421	87,31	314		

Portugal in H2020 (2014-2019) - MSCA main numbers

FACTS

PROPOSED TARGETS HORIZON EUROPE (2021-2027)

	PT Present Status	Total	PT Objective 2027
Number of Proposals submitted by PT	3.000 (4,4%)	67.525	5%
Number of Proposals approved by PT	314 (3,2%)	9.888	450-500
Success Rate (average)	10,5%	14,6%	14%
Global overview on budget allocation to PT	87 M€ (1,6%)	5.388 M€	132 M€ (2%)
Contribution to the global PT objective of 2.000 M€	90 M€ (4,5%)		6-7%

Source: extracted from the ANI database in September 2020.

PRELIMINARY RESULTS - 2021 CALLS

In 2021, the first year of the new Framework Programme, there was a decrease in participation in all MSCAs at European level. The decrease in Portuguese participation is in line with the general reduction.

	Total proposals	PT proposals
Individual Fellowships 2020	11573	310 (2.7%)
Postdoctoral Fellowships 2021	8356	243
Reduction	-24%	-22%

	Total proposals	PT proposals (coordination)	PT proposals (beneficiary)
Innovative Training Networks 2020	1509	48 (3.2%)	327
Doctoral Networks 2021	1076	32 (3.0%)	241
Reduction	-29%	-33%	

	Total proposals	PT proposals
COFUND 2020	148	3 (2.0%)

COFUND 2021	116	3 (2.6%)
Reduction	-22%	-

	Total proposals	PT proposals	Total Approved proposals (% success)	PT Approved Proposals (% success)
NIGHT 2020bis	131	7 (5.3%)	44 (33.6%)	3 (42.9%)
MSCA & Citizens 2022	81	7 (8.6%)	48* (59.3%)	2* (28.6%)
Reduction	-38%	-		

* Main list

SWOT ANALYSIS

Strengths	Weaknesses
 Bottom-up; open to all; MSCA enable participation of new actors, typically regarded as only accessible to those already experienced. As a Widening country, PF applications hosted in Portugal are automatically eligible for a second funding opportunity, through Widening Fellowships. This makes PT attractive as host country. MSCA are very often the entry point to other projects, more attractive in terms of total funding, such as the ERC for individual researchers, or any collaborative project. Support international collaboration, with a visible PT collaboration with strategic partners outside Europe. Support and promote inter-sectoral collaboration, paving the way for an innovative society. 	 Inability for the PT community to apply for funding of COFUND due to the lack of institutional funds to cover their obligations in the action; PT institutions usually award Ph.D. degrees after 4 years while DN can hire Ph. D. students for a maximum of 36 months; and we must assume that this will not change, as there is no flexibility from the European Commission nor support from other Member States to increase the maximum duration of fellowships. Difficult to compete with countries/institutions that have an oiled machinery and aggressive strategy to support IF applicants (via proposal writing or additional financing, e.g. Seal of Excellence); Very complicated for state labs to hire HR even when they participate in funded MSCA (e.g. ITN that hire Ph.D. students); Concentration of Individual Fellowships in PT in only a few r&d units – only 47 r&d units with IFs in PT; 5 best performing r&d units have over 40% of fellowships

Opportunities		Threats	
• St • Pl pa E)	taff exchange: attractive success rate; F: may become more attractive if at least art of those that receive the Seal of xcellence are financed.	•	Low success rate of DNs makes it a real challenge to participate in these structuring networks that are very attractive to researchers.
• Pl di fe la 'e	F: Huge opportunity of growth with iversification of R&D units with ellowships – particular focus on associate aboratories and r&d units ranked as excellent' (n=105) and 'very good' (n=118)		
• Co ve bo sc (p al	OFUND: attractive success rate; very ersatile funding programme that should e accessible to the community once the purce of the matching funds is found particularly funding agencies should be ble to allocate resources);		
● It Fu	is legally possible to use Structural unds for COFUND actions.		

STRATEGY – Actions (2021-2027)

COFUND

- There is tremendous and untapped potential for COFUND in Portugal, given the attractive success rate, the absence of a minimum co-fund percentage and the enormous flexibility in creating a doctoral or post-doctoral programme. Recognition of this potential by funding agencies, universities and private foundations is the first step.
- Matching funds should also be available for successful applicants of the national research and technology system, including universities and research institutes.
- Structural Funds can be used to complement the MSCA-COFUND financing. The EC asks Member States to work at national level in order to allocate part of the Structural Funds to support MSCA-COFUND, since this can only be made at national level.

Doctoral Networks

• Consider the innovation in Portugal of creating three-year doctoral programs, in line with the European Union and with many European countries.

Staff Exchange

Identify interdisciplinary and intersectoral lines of research in Portuguese institutions that can lead to an eligible project. This action is key for PT participation in HE since it opens doors to more projects (medium number of partners 8-10), it has an

attractive success rate and it allows for international collaboration.

Postdoctoral Fellowships

- A national strategy and/or support of institutional strategies to support at least a part of those applications that have received the Seal of Excellence;
- A more proactive approach from r&d units to attract more researchers from other countries e.g., integration in existing collective national and international projects.

Working with the Diaspora

- PT researchers, as well as researchers that have been working in PT with MSCA, are likely to stimulate PT participation, even when working outside PT by including PT institutions in their consortiums. Therefore, Diaspora networks should be stimulated, in particular the MC Alumni Association.
- Those researchers that have been working in PT are more likely to return and maintain networks. Therefore, they should be specifically targeted to return, namely via COFUND or PF actions.

Collaboration with Science Managers

- Continuing to provide all information to the Science Managers of the PT institutions on the rules and know-how on writing and submitting MSCA proposals and, if possible, supporting the structures that hire them and their careers;
- Continuing to stimulate the PT community to work as expert evaluators for the EC (many successful proposals have been submitted by researchers that have previously worked as expert evaluators).

Other Broader Institutional Strategies

- Continue to use virtual environments to communicate with the scientific community and to introduce the programme to young researchers;
- Increase awareness among less active R&D Units to promote the visibility of MSCA actions in order to increase participation levels;
- Articulate Scientific Employment and International Partnerships managed by FCT, and other individual schemes funded at the national level, to spot talents and increase participation levels and build success stories (namely for DNs/Staff Exchange or to send PT researchers to other countries for <u>short</u> periods);
- Spot talent through Transnational Cofunded Calls (traditional ERA-NET schemes) and COST-Actions, namely for DNs and eventually for PFs (to bring researchers from partner institutions to Portugal for post-doc);
- Link ERC-MSCA-Infrastructures-Widening (schemes involving individual participations);
- Link to EURAXESS and to Study&Research in Portugal;

 Create a Mirror Group of the MSCA Scientific Council in Portugal (Coordinated by the NCP with 7-10 Members of the scientific community in all domains).

MAIN PRIORITIES

- At the Institutional Level: establish linkages between MSCA and current funding schemes and initiatives involving individual and collective applications (at national and European level); Create a Mirror Group of the Scientific Council composed by 10 people and coordinated by the NCP; Attract the diaspora and leverage ongoing protocols with the respective Associations;
- At the level of R&D Units: to promote further professionalization of the research support structures and awareness, considering their active role in the process of submission of proposals;
- National cohesion and increased participation and success in less research-intensive regions will be addressed through the potential use of structural funds.

1.3 Research Infrastructures

SCOPE

PT participation in European projects from the Research Infrastructures (RIs) programme brings multiple benefits to PT scientific community, which shall be expanded. These benefits are:

- Promotion of the internationalization of scientific communities and expansion of collaborations:
- Being able to start or strengthen collaborations with European RIs in their scientific or thematic field;
- Encouraging collaborations with European RIs and networks in complementary fields;
- Enhancing connections from European RIs in which Portugal participates with RIs from Third Countries;
- Increasing the opportunities for participation of national RIs in other European calls, namely the ones included in pillar 2.
- The increase of the competitiveness and capacitation of the national RIs, including the creation of highly qualified jobs.
- Promotion of a more skilled, more capacitated PT scientific community by enabling access to top-level European RIs, respective training activities and capacity building. Having opportunities to learn new methodologies and have access to top/state-of-the-art technological processes which can contribute to their research, increase their success in obtaining new projects and scholarships, ultimately growing their capacity to attract funds.
- Increased visibility of the national RIs and their services, raising their prominence in the European RI landscape and in the scientific communities in Europe in general.
- Incentivize the adoption of the highest standards and best practices in the national RIs due to the sharing of experiences with other RIs.
- Being in line with top research in their specific scientific subjects, avoiding replications, and being able to identify the best research opportunities within the field; thus, also encouraging the pursuit of new promising lines of research.

The PT scientific community shall aim at increasing their participation in RI projects; this shall be achieved with the engagement of:

- National RIs, with particular attention to the new RIs on the Portuguese Roadmap 2020 which aim at developing their international profile.
- National communities, particularly the ones aiming at developing new networks and RIs.
- Different stakeholders identified as suitable partners in specific projects, for example in the case of innovation projects, where PT was not yet able to participate in Horizon 2020.

FACTS (2014-2020)

PT participation in the different Horizon 2020 Research Infrastructures calls.

Types of calls PT participation in funded projects/ total funded projects								
	2014	2015	2016	2017	2018	2019	2020	TOTA L
INFRADEV	4/16	4/15 and 3/3	5/10 and 4/11	1/9	3/4	1/1, 10/1 6, 3/10	-	38/95 (40%)
INFRAIA	11/19	-	9/19	4/14	5/12	9/15	9/22	47/10 1 (47%)
INFRASUPP	1/1 and 1/14	0/1 and 0/2	2/10	0/2	2/6	1/2	0/1	7/39 (18%)
INFRAINNOV	-	-	0/2	0/1	-	0/1 and 0/1	0/4	0/9 (0%)
EINFRA	1/1 and 5/12	0/17	2/7 and 0/1	3/8	-	-	-	11/46 (24%)
INFRAEOSC	-	-	-	-	0/1, 2/5, 1/5, 1/2	2/5 and 0/1	3/6	9/25 (36%)
INFRAEDI	-	-	-	-	1/12	-	0/4	1/16 (6%)
ADHOC – GEANT	-	2/2	1/3	-	-	-	-	3/5 (60%)
IBA-SGA- INFRA-GEANT	-	-	1/1	-	2/2	-	-	3/3 (100 %)
SGA-INFRA- FETFLAG-HBP	-	-	-	1/1	-	-	-	1/1 (100 %)
IBA-INFRA- SUSTAINABILIT Y	-	-	-	0/1	-	-	-	0/1 (0%)
IBA-INFRA-	-	-	-	0/1	-	0/1	-	0/1

CONF								(0%)
IBA-INFRA- NCP	-	-	-	-	0/1	-	-	(0/1) (0%)
IBA-INFRA- CORONA-2020	-	-	-	-	-	-	1/1	(1/1) 100%
TOTAL	23/63 (37%)	9/40 (23%)	24/64 (38%)	9/37 (24 %)	17/50 (34%)	26/5 3 (49%)	13/3 8 (34%)	

Summary of the outputs and outcomes of PT participation in Horizon 2020 Research Infrastructures calls.

	2014	2015	2016	2017	2018	2019	2020	TOTAL
Total of submitted proposals	200	167	129	112	100	140	99	947
Total of PT proposals	48	22	30	21	25	53	38	237
Total of approved projects	63	40	64	37	50	53	38	345
Approved projects PT	23	9	24	9	17	26	13	121
N. of PT participations	28	14	29	13	24	36	16	160
Success rate (PT funded projects / PT submitted proposals)	47.92%	40.91%	80.00%	42.86%	68.00%	49.06%	34.21%	51.05%
Total funding (M €)	393.66	221.29	407.21	205.74	519.02	320.54	298.62	2,366.08
PT funding (M €)	3.73	1.60	5.46	2.70	4.42	5.98	4.48	28.37
Rate of PT funding	0.95%	0.72%	1.34%	1.31%	0.85%	1.87%	1.50%	1.20%

PROPOSED TARGETS (2021-2027)

For Horizon 2020, the mean rate of PT funding through these calls was about 1.2 %. The main target in Horizon Europe is to increase PT participation and success in all calls of this programme. The 2021 calls' results have been published and indicate a general increasing tendency with a rate of PT funding of 1.97%.

	Horizon 2020		Horizon Europe	
	2020	Total	2021	
Total of submitted proposals	99	947	47	
Total of PT proposals	38	237	20	
Total of approved projects	38	345	29	
Approved projects PT	13	121	16	
Success rate (PT funded projects / PT submitted proposals)	34.21%	51.05%	80.00%	
Total funding (M €)	298.62	2,366.08	232.50	
PT funding (M €)	4.48	28.37	4.59	
Rate of PT funding	1.50%	1.20%	1.97%	

The participation in RI calls will continue to be promoted through major dissemination of the calls together with a targeted approach to suitable potential candidates and strong efforts regarding the type of calls where a higher mobilization of the community and more promotion of networking may be needed. NCPs will regularly follow-up with potential candidates for any needed clarification and support. The linkage between HE RI opportunities and the national and European Roadmaps (ESFRI) will continue to be presented and promoted to potential candidates for their deeper involvement in the RI international landscape.

SWOT ANALYSIS

Strengths	Weaknesses		
 General increasing trend in PT participation and success in RI calls, along the course of H2020 and in the first HE RI calls In H2020, higher success rate in calls supporting integrating activities and development of less mature infrastructures; in HE, higher success rate in the new calls focusing on services access. 	 26 out of 56 National RIs do not yet collaborate with European RIs. Difficulty in enlarging PT participation in particular calls with strong participation from mature communities and well-established consortia. 		

Opportunities	Threats
 Promotion of participation of more national RIs and entities (still) not organized as a national RI, in RI calls. Supporting the participation of national RIs/entities in European RIs, particularly in new RI projects of the ESFRI* Roadmap, and in RI applications to future updates of this Roadmap. Further develop the international profile of the 26 National RIs with no connections to European RIs, particularly for the new RIs on the National Roadmap 2020. Encourage synergies between projects of RI calls and Widening calls 	 Self-sustainability of RIs is to a large extent dependent on national budget and structural funds, with rules that are not homogenized across Europe, leading to disparities between participant member states The decrease in the HE budget due to the Covid-19 pandemic combined with the proliferation of RIs is resulting in more competitive calls The first HE RI calls funded a low number of projects, several of which with very large consortia, which resulted in an unbalanced participation of scientific communities.

*European Strategy Forum on Research Infrastructures

A general positive trend was observed in H2020 regarding PT participation and success in RI calls. Fluctuations in this trend resulted from the different types of calls launched in each year. This positive trend continued for the first year of Horizon Europe and shows the increased general awareness in the PT community for these calls and their improved preparation and capacity for success. The type of calls where PT success was higher in H2020 will, however, not be repeated in HE. Nevertheless, calls with different funding purposes will be launched, covering a large variety of communities and RIs. For example, a new type of call, INFRASERV, targets the access to RI services for promoting research to address specific challenges and will fund very large consortia. The PT community participates in all projects which have been selected for funding in the first INFRASERV call. Nevertheless, as only a few projects are funded and these have very big consortia, relevant engagement with these consortia is challenging, making it difficult to have a significant participation in these important projects.

NCPs will continue to work with the PT community, so they build on their achievements in previous calls and their collaborations with EU RIs to successfully participate in such calls.

On the other hand, in H2020, the PT community was unsuccessful in calls aimed at promoting partnerships between RIs and industry. In HE, the development of RI technologies, tools, scientific instruments and methods will be supported for guaranteeing the excellence, innovation and unique offer of services of the European RIs; interaction of RIs with Technology Infrastructures will also be promoted. These will be great opportunities to engage the scientific community with industrial partners and improve PT participation in calls focusing on innovation.

Opportunities for international cooperation will also be included in the HE RI programme, for which the PT community, particularly in RIs with ongoing international collaborations, will be incentivized to apply.

The national Roadmap of Research Infrastructures was updated in 2020 and 16 new RIs were included, for a total of 56 RIs. Presently, 26 of these do not have collaborations with European RIs; such collaborations often start with participation in EU projects. Targeted dissemination of RI calls to the national RIs will continue to be performed, with close support and follow-up with the most interested and suitable RIs as candidates to the calls being launched. Collaboration between RIs will also be promoted, when adequate, so that the increase in number of national RIs translates into opportunities to join knowledge and capacities which will result in a stronger PT participation in applications, hence avoiding unnecessary competition within the national RI landscape. There are examples of national RIs collaborating and participating in the same European RI: PPBI and BIN in EuroBioImaging ERIC, and PT-NMR and RNEM in Instruct ERIC. Furthermore, this programme includes calls where participation of RIs from different disciplines is aimed, which will also encourage enhanced collaboration and synergies.

Considering that the ESFRI Roadmap of Research Infrastructures is updated regularly, support to the participation of national RIs/entities in RI applications to these updates will also be given, when appropriate, which will facilitate the access to funding for the RI preparatory phase through specific HE RI calls.

The preparation of HE coincided with the Covid-19 pandemic, which caused a major impact particularly on the foreseen increase in the Framework Programme budget. For the RI programme the budget is around 2.4 billion €, which is approximately the same budget the programme had in H2020. With the growing landscape of national and European RIs, an increased competitiveness can be expected for these calls, even more if a low number of projects is funded in each topic, as occurred in the first calls of the RI work programme 2021-2022-. Promotion of PT participation in the strongest consortia preparing applications to such calls will be the key for success.

More generally, the threats identified in the SWOT analysis are conditioning factors to consider and work towards the minimization of their impact in the success of the PT community in RI calls.

Presently, the National Roadmap includes 56 RIs, of which 27 are collaborating with 29 ESFRI Roadmap RIs. Additionally, several national RIs are collaborating with European thematic networks, also eligible for participation in European RI calls.

The next table displays the established collaborations of the National RIs with European RIs or Networks. These include collaborations where Portugal is a formal Member of the RI legal entity (with an annual fee contribution) and collaborations materialized by the participation of the National RIs in European RI projects together with the respective European RI or Network.

DOMAIN	ACRONYM	NAME	ТҮРЕ	COORDINATING INSTITUTION	ROAD MAP ENTRY (YEAR)	RESPECTIVE EUROPEAN RI OR NETWORK
ENERG Y	BBRI	Biomass and Bioenergy Research Infrastructure	Distributed	Laboratório Nacional de Energia e Geologia, I.P. (LNEG)	2014	-

	INIESC	National Research Infrastructure in Solar Energy Concentration	Distributed	Universidade de Évora (U Évora)	2014	EU-SOLARIS
	NZEB_LAB	Research Infrastructure on Integration of Solar Energy Systems in Buildings	Single-Sited	Laboratório Nacional de Energia e Geologia, I.P. (LNEG)	2014	-
	SGEVL	Smart grids and electric vehicles laboratory	Single-Sited	Instituto de Engenharia de Sistemas e Computadores, Tecnologia e Ciência (INESC TEC)	2014	-
	AIR Centre	Atlantic International Research Centre	Distributed	Associação para o Desenvolvimento do Atlantic International Research Centre (AD AIR Centre)	2019	-
	C4G	Collaboratory for Geosciences	Distributed	Universidade da Beira Interior (UBI)	2014	EPOS ERIC
L	COASTNET	Portuguese Coastal Monitoring Network	Distributed	Faculdade de Ciências da Universidade de Lisboa (FCUL)	2014	ETN
IRONMENT	EMBRC.PT	European Marine Biological Resource Centre - Portugal	Distributed	Centro de Ciências do Mar do Algarve (CCMAR)	2014	EMBRC ERIC
ENV	EMSO-PT	European Multidisciplinary Seafloor and Water Column Observatory	Distributed	Instituto Português do Mar e da Atmosfera, I.P. (IPMA)	2014	EMSO ERIC
	FhP - AWAM	Fraunhofer Portugal Research Center for Agriculture and Water Management	Distributed	Associação Fraunhofer Portugal Research (FhP)	2019	-
	PORBIOTA	Portuguese E-Infrastructure for Information and Research on Biodiversity	Distributed	Instituto de Ciências, Tecnologias e Agroambiente da Universidade do Porto (ICETA)	2014	LifeWatch ERIC, ICOS ERIC, eLTER
	BIN	National Brain Imaging Network	Single-Sited	Universidade de Coimbra (UC)	2014	EuroBiolmag ing ERIC
	Biobanco.p t	National Biobanks Infrastructure	Distributed	Instituto de Medicina Molecular João Lobo Antunes (iMM)	2019	-
	Biodata.pt	BioData.pt ELIXIR PT - Portuguese Distributed Infrastructure for Biological Data	Virtual	Fundação Calouste Gulbenkian - Instituto Gulbenkian de Ciência (FCG-IGC)	2014	ELIXIR
	CONGENT O	Consortium for Genetically tractable Organisms	Distributed	Fundação D. Anna de Sommer Champalimaud e Dr. Carlos Montez Champalimaud (FC)	2014	Infrafrontier
& FOOD	CryoEM-PT	National Advanced Electron Microscopy Network for Health and Life Sciences	Distributed	Laboratório Ibérico Internacional de Nanotecnologia (INL)	2019	-
	FOODCHAI N-PT	International Food Chain Alliance – Portugal	Distributed	Universidade de Trás- os-Montes e Alto Douro (UTAD)	2019	-
НЕАLТŀ	Genome Portugal	National Facility for Genome Sequencing and Analysis	Distributed	Universidade de Aveiro (UA)	2014	

		MIA- Portugal	Multidisciplinary Institute of	Single-Sited	Universidade de	2019	
		PPBI	Portuguese Platform of Biolmaging	Distributed	Instituto de Biologia Molecular e Celular - Instituto de Investigação e Inovação em Saúde (IBMC/i3S)	2014	EuroBiolmag ing ERIC
		ProtoTera	The Portuguese Network of Infrastructures for Proton Therapy and Advanced Technologies for Cancer Prevention and Treatment	Distributed	Grupo Hospitalar Instituto Português de Oncologia (GHIPO)	2019	
		PtCAC	Portuguese Network of Clinical Academic Centers	Distributed	Conselho Nacional dos Centros Académicos Clínicos (CNCAC)	2020	
		PtCRIN	Portuguese Clinical Research Infrastructure Network	Distributed	Faculdade de Ciências Médicas da Universidade Nova de Lisboa (NMS/FCM-UNL)	2020	ECRIN ERIC
		Pt- mBRCN/ MIRRI-PT	Portuguese microBiological Resources Center Network / Microbial Resource Research Infrastructure – Portugal	Distributed	Universidade do Minho (UM)	2020	MIRRI
		PT- OPENSCRE EN	PT-OPENSCREEN: National Infrastructure for Chemical Biology and Genetics	Distributed	Instituto de Investigação e Inovação em Saúde (i3S)	2020	EU- OPENSCREE N ERIC
		RNCCC	National Network of Comprehensive Cancer Centres	Distributed	Instituto Português de Oncologia do Porto Francisco Gentil, E.P.E. (IPO Porto)	2019	
		RNEM	Portuguese Mass Spectrometry Network	Distributed	Faculdade de Ciências da Universidade de Lisboa (FCUL)	2014	INSTRUCT ERIC
		TERM RES- Hub	Tissue Engineering and Regenerative Medicine	Distributed	Universidade do Minho (UM)	2014	-
		TRIS-HCP	Translational and Clinical Research Infrastructures Specialisation Platform - Health Cluster Portugal	Virtual	Health Cluster Portugal - Associação do Pólo de Competitividade da Saúde (HCP)	2014	-
		VIASEF	In Vivo Arthropod Security Facility	Single-Sited	Instituto de Higiene e Medicina Tropical, Universidade Nova de Lisboa (NOVA-IHMT)	2014	-
		ViraVector	Viral Vectors for Gene Transfer Core Facility	Single-Sited	Universidade de Coimbra (UC)	2014	-
	EEKING	CECOLAB	CECOLAB Association - Collaborative Laboratory Towards Circular Economy	Single-Sited	BLC3 Evolution, Lda	2019	-
	ENGIN	ENGAGE SKA	ENAbling Green E-science for Square Kilometer Array	Distributed	Instituto de Telecomunicações (IT)	2014	SKA
0 2101	NCES &	ESTHER	European Shock Tube for High- Enthalpy Research	Single-Sited	Instituto Superior Técnico (IST/ UL)	2019	-
	PHYSICAL SCIE	LLPT	LASERLAB-Portugal	Distributed	Associação do Instituto Superior Técnico para a Investigação e Desenvolvimento (IST- ID)	2014	-

	Micro&Na noFabs@P T	Network of Micro and Nano Fabrication Research Facilities in	Distributed	Laboratório Ibérico Internacional de Nanotecnologia (INI.)	2014	-
	NECL	Network of Extreme Conditions Laboratories	Distributed	Universidade do Porto (UP)	2014	-
	ORCIP	Optical Radio Convergence Infrastructure for Communications and Power Delivering	Distributed	Instituto de Telecomunicações (IT)	2014	-
	PAMI	Portuguese Additive Manufacturing Initiative	Distributed	Instituto Politécnico de Leiria (IP Leiria)	2014	-
	Portugal Space	Portuguese Space Agency	Single-Sited	Portuguese Space Agency (PTSpace)	2019	EST
	PTNMR	Portuguese Nuclear Magnetic Resonance Network	Distributed	Associação para a Inovação e Desenvolvimento da FCT NOVA (NOVA.ID.FCT)	2014	INSTRUCT ERIC
	RBCog-Lab	Robotics, Brain and Cognition Laboratory	Single-Sited	Associação do Instituto Superior Técnico para a Investigação e Desenvolvimento (IST- ID)	2014	-
	TEC4SEA	Modular Platform for Research, Test and Validation of Technologies supporting a Sustainable Blue Economy	Distributed	Instituto de Engenharia de Sistemas e Computadores, Tecnologia e Ciência (INESC TEC)	2014	Euro-Argo ERIC
	TEMA	Centre for Mechanical Technology and Automation	Single-Sited	Universidade de Aveiro (UA)	2014	-
	Windscann er.PT	Windscanner Portugal	Distributed	Universidade do Porto (UP)	2014	Windscanner .EU
	CCD	Digital Creativity Center	Single-Sited	Universidade Católica Portuguesa (UCP)	2014	
	DataLab Social Sciences	DataLab	Distributed	Nova School of Business & Economics (Nova SBE/UNL)	2014	SHARE ERIC
OVATION	E-RIHS.PT	Portuguese Research Infrastructure on Heritage Science	Distributed	Universidade de Évora (U Évora)	2014	E-RIHS
VNI INN	PASSDA	Production and Archive of Social Science Data	Distributed	Instituto de Ciências Sociais (ICS/UL)	2014	ESS ERIC, CESSDA ERIC
. & CULTUF	PORTULAN CLARIN	Research Infrastructure for the Science and Technology of Language	Virtual	Faculdade de Ciências da Universidade de Lisboa (FCUL)	2014	CLARIN ERIC
SOCIAL	PRISC	PortugueseResearchInfrastructureforScientificCollectionsScientific	Distributed	Universidade de Lisboa (UL)	2014	DiSSCo
	ROSSIO	Social Sciences, Arts and Humanities	Distributed	Faculdade de Ciências Sociais e Humanas da Universidade Nova de Lisboa (NOVA FCSH)	2014	DARIAH ERIC
IGITAL STRUCTURE S	INCD	Portuguese National Distributed Computing Infrastructure	Virtual	Associação INCD - Infraestrutura Nacional de Computação Distribuída	2014	EGI
D INFRAS	RCTS	Science, Technology and Society Network	Distributed	Fundação para a Ciência e a Tecnologia	2014	GÉANT

			I.P Unidade de Computação Científica Nacional (FCT FCCN)		
RNCA	National Advanced Computing Network	Virtual	Fundação para a Ciência e a Tecnologia I.P Unidade de Computação Científica Nacional (FCT FCCN)	2019	EuroHPC
UC-LCA	Laboratory for Advanced Computing	Single-Sited	Universidade de Coimbra (UC)	2014	PRACE

Furthermore, there are national networks and individual research institutions also collaborating with European RIs and participating with them in European RI projects (ex. The National Health Institute INSA is participating in the ESFRI RI ERINHA; the network EATRIS.PT is the national node in EATRIS ERIC).

Overall, more collaborations of national RIs with European ones and participation in RI calls, including collaborations with new RIs on the ESFRI roadmap, in their preparatory phase projects, shall be strongly promoted, particularly for the national RIs which do not yet collaborate with European RIs or networks. Internationalization will surely play an important part in the implementation and operation of most national RIs. Additionally, promotion of collaborations between national networks and EU RIs, strengthening existing collaborations and increasing participation in EU calls, will be done.

STRATEGY (2021-2027)

Horizon Europe Research Infrastructures Work Programme

The current Framework Programme has brought several novelties to the RI programme, as some types of calls from the H2020 RI programme have been rethought and reshaped.

The RI Work Programmes is now based on five Destinations:

<u>Destination #1:</u> <u>Developing, consolidating and optimising European Research Infrastructures to</u> <u>maintain global leadership</u>

Destination 1 aims to create a coherent and attractive RI landscape in Europe, by ensuring coordination of efforts and alignment of priorities among Member States. This will include opportunities for new RI communities and support to RIs in the first stages of their development. The support to a European strategy for RIs, as well as activities to enhance the role of RIs for international cooperation and science diplomacy, will also be covered. Identification and promotion of these calls to the most suitable candidates shall be done; regarding international cooperation, the Portuguese community shall be encouraged to capitalize on eventual established collaborations with third countries' RIs (including South America, CELAC, Africa and others).

Destination #2: Enabling an operational, open and FAIR EOSC ecosystem

Destination 2 aims to continue to develop the EOSC in order to become a fully operational enabling ecosystem for FAIR research data commons (i.e. data, services, tools), leading to a "Web of FAIR Data and Services" for Science. Projects will also aim at further engaging RIs with EOSC for the adoption of EOSC principles, tools and guidelines. PT participation in these calls will be promoted **mainly to digital RIs and to communities with previous experiences in EOSC calls in H2020**, in cluster projects, and other digital related projects.

Destination #3: RI services to support health research, accelerate the green and digital transformation, and advance frontier knowledge

This Destination promotes the access to RI services assisting research directed at supporting an effective and responsive health system and at accelerating the transition towards a green and digital future, while also contributing to the 5 identified Mission Areas and 49 Partnerships under HE. This Destination has as major topics:

- A challenge-driven provision of RI services.
- "RI services advancing frontier knowledge", which will focus on fundamental science.

These calls aim to fund multidisciplinary consortia with operating services that can be used in research in response to major societal challenges. Due to the multi-disciplinarity aspect, a broad dissemination of these calls to the PT community has been and will continue to be performed, **followed by a more targeted approach regarding the thematic specificity of each call** and considering the small number of expected projects to be funded for each topic.

Destination #4: Next generation of scientific instrumentation, tools and methods and advanced digital solutions

The aim of this Destination is the development of ground-breaking RI technologies, including scientific instruments, tools, methods, and advanced digital solutions, to enable new discoveries and keep Europe's RIs at the highest level of excellence in science, while paving the way for innovative solutions to societal challenges and for new industrial applications, products and services.

The PT scientific community and the national industry related to these themes shall be mobilized and incentivized to participate in these calls as PT has not been successful in similar calls in H2020. Participation in such calls can bring innovation activities to PT RIs, additionally increasing their potential and the demand for their services.

PT community was unsuccessful in innovation calls in H2020. Such projects often involve consortia with big and experienced actors. Nevertheless, in the first call of HE, 50% of the projects selected for funding have PT participation. To further engage new RIs/entities, true added value must be evident. Increasing the visibility and the networking of potential PT candidates shall be promoted as it may be crucial for the successful participation in these calls.

Destination #5: Network connectivity in Research and Education – Enabling collaboration without boundaries

This Destination focuses on the specific support to the National Networks for Research and Education. This support will result in faster, resilient, agile and secure connectivity services which will enable researchers' and students' access to near real-time applications that support evidence-based decisionmaking in society and world-wide effective collaboration of virtual research communities. Promotion will be directed at the relevant national RIs (such as INCD, RCTS).

In addition to the referred opportunities under the RI programme, contributions are expected from RIs to other relevant actions in HE, particularly to <u>Partnerships</u>, <u>Missions and Widening projects</u>. Partnerships will be a key instrument in the implementation of the new ERA narrative. As so, it is aimed that more and different actors will be involved. RIs may play here a valuable role as partners and potential service providers. Portuguese <u>RIs could integrate Partnerships' consortia and potentialize their assets</u>, if they are established as independent legal entities; since at the present most are not, PT participation can and shall be promoted through the participation in the HE Partnerships of the national institutions or the European RIs which PT integrates.

National RIs should make all efforts to engage with the five Missions of HE. They shall closely follow the development and implementation of the Missions to be able to identify synergies and **be ready for** relevant emerging opportunities. For example, regarding the Cancer Mission, several health related National RIs may be engaged at the national level and at the European level.

The HE RI Work Programme also highlights **opportunities in the Widening programme, encouraging synergies** between projects from both programmes.

INSTITUTIONAL STRATEGY (2021-2027)

Funding obtained and number of participations in H2020 RI calls, by type of entity.

Type of entity	Funding	Participations	
Universities	8,725,406.11€	51	
Large Companies	561,897.50 €	2	
SME	1,209,930.00€	7	
Research Centres	16,082,540.36€	82	
Others	1,793,280.30€	18	

PT participation in H2020 RI calls has been mostly by Research Centres and Universities, which was expected, as these are the main types of entities involved in RIs at the national and European levels. Nevertheless, and in agreement with what was proposed above, **promoting the participation of more SMEs and large companies, particularly in innovation calls, can bring huge benefits and a greater return rate to Portugal.** Also, the participation of Public Administration entities should be further explored, specially from those that are already part of National RIs.

PRIORITY

Increasing PT participation in all European calls targeting RIs will be the main action to increase PT return rate. To attain this goal, efforts must be made at European, national and regional levels, improving the articulation between funding sources (HE funds, Structural Funds, National/FCT funds and institutional funds). At national level, **funding and continuous capacity building of existing RIs –** with national and structural funds but also institutional funding – **is essential for enhancing their international competitiveness and ensuring the continuation and expansion of their international collaborations.**

Dissemination and promotion of RI calls is being implemented using two approaches:

a) A broader approach - dissemination of the calls to:

- the scientific community in general, in open events and info sessions;

- **specific scientific communities,** focusing on the potential topics of interest, or specific (groups of) entities, in closed events and meetings;

- National RIs, which are obvious potential candidates to these calls.

b) A more targeted approach: mostly in calls where a very low number of projects are expected to be funded, this approach shall continue to be pursued. Identification and promotion of these calls to the most suitable candidates is being performed through smaller meetings and frequent follow-ups.

Also, **possibilities for building on previous success will be sought**, when appropriate, by engaging with actors that were successful or achieved the reserve lists in H2020 calls and seeking good matching opportunities. Additionally, NCPs will continue to interact with the coordination of European RIs/networks regarding the participation of Portuguese entities in the applications to specific HE RI calls whenever necessary.
Pillar 2

Global challenges & European industrial competitiveness

6 Clusters (includes Partnerships and Missions)

2.1 Cluster 1 | Health

FACTS AND FIGURES – PT PARTICIPATION IN HEALTH: H2020 (2014-2020) AND HE (2021)

The national performance in Societal Challenge 1 – Health of H2020 (SC1) improved in the final three years of H2020. Between 2014 and 2020 Portuguese institutions participated in 16289 projects and raised a total funding of 66,66 M€ (1,56% of the overall EC funding for SC1). A positive trend was registered since 2017, both in number of projects and in funding percentages (Results published by December 2020, regular work programme calls).





In the first year of Horizon Europe (HE), and specifically for Cluster Health calls, 43 Portuguese institutions succeeded in participating in 29 projects and raised a total funding of 19,51M€ (2,19% of the overall EC funding for the CL1 2021 calls). Of the participating organizations, 3 of them are project coordinators (Results published by February 2022, regular work programme calls).

These results indicate a positive participation of the Portuguese health community in Horizon Europe, aligned with the strategy and targets defined in 2020.



SC1 and CL1 - Health Funding - Portuguese Performance

PT participation in the Innovative Medicines Initiative 2 Joint Undertaking (IMI2) was modest (17 projects, 9,73 M€ and 0,3% of total funding for 2014-2020) but nevertheless there was a strong increase compared to its predecessor IMI1 (6 projects, 1 M€, 0,14% of total funding for 2008-2013

Health-related programmes **EIT Health InnoStars** and **Active Assisted Living** (AAL) attracted the **high interest of national** *stakeholders*, and the success rate was very satisfactory (3,5% of the total funding for AAL). Nevertheless, participation might have been limited due to programme rules and national co-funding limitations.

SCOPE AND CONTEXT – HORIZON EUROPE CLUSTER HEALTH

Health and well-being of citizens are central for the European Union, EU-policies and EU-programmes. Cluster Health focuses on **improving and protecting the health and well-being of citizens at all ages**, by generating new knowledge, developing innovative solutions, and ensuring the integration, where relevant, of a gender perspective to prevent, diagnose, monitor, treat and cure diseases and developing health technologies; mitigating health risks, protecting populations and promoting good health and well-being, also in the workplace; making public health systems more cost-effective, equitable and sustainable; preventing and tackling poverty-related diseases; and supporting and enabling patients' participation and self-management. As defined in the Specific Programme of Horizon Europe, **six Areas of Intervention support the implementation of the Cluster Health**:

- 1. Health throughout the life course;
- 2. Environmental and social health determinants;
- 3. Non-communicable and rare diseases;
- 4. Infectious diseases, including poverty related and neglected diseases;
- 5. Tools, technologies and digital solutions for health and care, including personalised medicine;
- 6. Health care systems

Cluster Health is instrumental in the commitment of the EU with the United Nations Strategic Development Goal 3 (Good Health and Well-being for People). Research and innovation actions within the scope of Cluster Health also contribute to initiatives that are part of the political guidelines and mission letters of the Commission 2019-2024, notably to a European Green Deal, to an economy that works for People, to a Europe fit for the Digital Age, to a stronger Europe in the world, and in particular to:

- implementing the European **One Health Action Plan** against Antimicrobial Resistance and combatting vaccination hesitancy;
- contributing to a **Europe's Beating Cancer Plan** to support EU member states in improving cancer control and care;
- creating European Health Data Space to promote health-data exchange and support research;
- developing a new Comprehensive Strategy on Africa.

The COVID-19 crisis underlined that supporting cooperation and coordination among Member States is essential to safeguard the health and well-being of citizens. Research and innovation actions will enhance synergies and cooperation's within this multidisciplinary and complementary ecosystem. In addition, R&I actions will also promote the **uptake of innovative solutions by policy makers and industry that will transform solutions into policies improving wellbeing and health of EU citizens** (see image below).



For the 2021-2024 programming period, research and innovation interventions under Cluster 1 Health are oriented towards the following challenges (targeted impacts):

- 1. Staying healthy in a rapidly changing society;
- 2. Living and working in a health-promoting environment;
- 3. Tackling diseases and reducing disease burden;
- 4. Ensuring access to sustainable and high-quality health care;
- Unlocking the full potential of new tools, technologies and digital solutions for a healthy society;
- 6. Maintaining a sustainable and globally competitive health-related industry.

Each of these challenges (targeted impacts) **covers one or more of the intervention areas** defined for Cluster Health in the Specific Programme of Horizon Europe.

The impacts of the Cluster Health will also be achieved through the implementation of **European Partnerships**. Currently, six proposed **co-funded European Partnerships** are expected to start during the first four years of Horizon Europe:

Co-Funded Health Partnerships	WP Year	Start Year
European Partnership on Assessment of Risk Chemicals (PARC)	2021	2022
European Partnership on Transforming Health & Care Systems	2022	2023
European Partnership Fostering an ERA for Health	2022	2023
European Partnership on Personalized Medicine	2023	2024
European Partnership on Rare Diseases	2023	2024
European Partnership on One Health AMR	2024	2025

In addition, **two institutionalised European Partnerships** (based on Article 185/187 TFEU) were established by Council Regulation (EU) 2021/2085, from 19th November 2021, that establishes the Joint Undertakings under Horizon Europe:

Institutionalised Health Partnerships	Start Year
European Partnership for EU-Africa Global Health	2021
European Partnership for Innovative Health (Initiative)	2021

Additionally, during the first year of Horizon Europe, both Member States and Commission expressed the need to have a Partnership in Pandemic Preparedness. For this, it was established a **Co-Programmed Partnership** that is starting in 2022.

Co-Programmed Health Partnerships	Start Year
European Partnership for Pandemic Preparedness	2022

Portugal communicated to the Commission the intention to participate in these European Health Partnerships. Thematic groups are being arranged to prepare the national community for the successful participation in these Partnerships.

Finally, aiming for the **ambitious** *goal of improving the lives of more than 3 million people by 2030,* the European Commission (EC) as set in motion the Mission on Cancer. The Mission on Cancer is fully in line with the **Europe's Beating Cancer Plan (EBCP)**, that reflects the EC **political commitment to take serious**

actions against cancer. The EBCP is a policy-driven initiative that sets out actions to support, coordinate or supplement Member States' efforts at every stage of the disease: from prevention, early detection, diagnosis and treatment, to an improved quality of life for cancer patients and survivors. The EBCP implementation used a whole range of Commission's funding instruments such as the Mission on Cancer, the EU4Health and the Digital Europe Programme, with a total of \notin 4 billion being earmarked for actions addressing cancer. Together with EBCP, the Horizon Europe Mission on Cancer assigns a central role to **Research and Innovation** in the development of new Health Policies.

NATIONAL PRIORITIES AND INVESTMENTS IN HEALTH RESEARCH AND INNOVATION

Portugal developed an "Agenda for Research and Innovation in Health, Clinical and Translational Research", promoted by the Foundation for Science and Technology (FCT). This agenda specifies emerging and promising areas for Portuguese health research and innovation until 2030. Priorities defined in the national agenda are in line with the areas of intervention in Cluster Health, leveraging the potential of Portuguese stakeholders for the implementation and success of Horizon Europe (see table below).

AREAS OF INTERVENTION IN CLUSTER HEALTH	PRIORITIES IN THE <i>"AGENDA FOR</i> HEALTH, CLINICAL
	AND TRANSLATIONAL RESEARCH" (FCT)
Health throughout the life course	Promotion of Active and Healthy Ageing
Non-communicable and rare diseases	Personalised Medicine and Biomarkers Pharmacology, Drugs and Advanced Therapies
Tools, technologies and digital solutions for health and care, including personalised medicine	Personalised Medicine and Biomarkers Digital Health and Medical Technologies
Environmental and social health determinants	
Infectious diseases, including poverty-related and neglected disease	Pharmacology, Drugs and Advanced Therapies
Health care systems	Health Technology and Intervention Assessment and Rapid Access to Innovation

Horizon Europe has an even stronger focus on **Public Health** than Horizon 2020. The **National Health Plan** and the **eleven Priority Health Programs of the Directorate- General for Health** (DGS) are in line with

Horizon Europe goals to increase knowledge or develop new products and services towards improving European citizens well-being. In agreement, also the National Strategy for the Health Information Ecosystem (ENESIS), coordinated by the Shared Services of the Ministry of Health (SPMS) is aligned with Horizon Europe destinations, namely in what concerns the use of tools, technologies & digital solutions to provide citizens access to high-quality healthcare services.

Portugal has already established nine **Clinical Academic Centres** (CACs) that work as **integrated structures for clinical practice, education and research activities.** The main objective of CACs is to place knowledge and scientific evidence at the service of health. Due to their interdisciplinary nature and strong clinical innovation potential, CACs are privileged stakeholders for Horizon Europe health projects.

Also, the recent valorisation of the **Associated Laboratories (ALs)** must be leveraged, since many ALs are specialized in areas that directly an indirectly contribute to the achievement of the expected impacts in Health. In return, Horizon Europe funds will contribute for the maintenance of LAs.

The national strategy established by the **Interface Programme** to accelerate technology transfer from universities to companies, enabled the creation of seven **Collaborative Laboratories (CoLABs)** and sixteen **Interface Centres** in the areas of Health, Chemistry and Biotechnology. In line with CoLabs and CITs, the Mobilisers Programme funded two large projects in the health area.

More recently, twenty-two Associated Laboratories were approved in the Health area. These contracts should last for ten years, with continuous evaluation.

Finally, the approved **Research Infrastructures Roadmap** is an additional contribute to improving the national capacity to provide innovative services, knowledge, and tools to address societal challenges.

Altogether, in the last years, **Portugal invested more than 155M€ in the above-mentioned initiatives**, **projects and entities of the health sector.** Funding for CACs, in about 1.8M€, is expected to occur soon. These entities are now better positioned to become more competitive in Horizon Europe and other international calls and to generate value with their products, services and technologies.

In parallel, **priority-oriented funding of projects at national level could stimulate the participation in similar areas at European level**. Valorisation of national applications that contribute to the five priorities identified in the "Agenda for Research and Innovation in Health, Clinical and Translational Research", catalysed by the participation in international consortia, would be a measure with high potential to leverage the national participation in highly competitive calls from Horizon Europe. Overall, the Portuguese strengths, weaknesses, opportunities, and threats related to health research and innovation, in the scope of Horizon Europe are identified in the SWOT analysis below.

SWOT ANALYSIS

Positive	Negative
 Strengths A strong and unified Portuguese National Health Service Researchers and health professionals of recognized excellence Engagement of CCDRs and municipalities in research efforts Established clusters and associations supporting the development and commercialization of health- related products and services The Portuguese Roadmap of Research Infrastructures (including several national nodes of the ESFRI Roadmap) The new Agency for Clinical Research and Biomedical Innovation (AICIB) -Establishment of the Clinic Academic Centres 	 Weaknesses Week engagement between the ministry of science and the ministry of health in health-related research topics. Low uptake of research results into health-policy making Lack of institutional support for professionals to identify and pursue funding opportunities Reduced participation in international networks Low investment of the national research and clinical community in participating in large EU R&I consortia Reduced collaboration between researchers and health professionals Weak multidisciplinary research environment
 Opportunities The goals of the Cluster Health and partnerships are in line with the needs of the Portuguese health sector Possibility to use structural funds as the national commitment for cofund actions within the European Partnerships Health became a strategic area for SMEs following COVID-19 	Threats-Partnerships will take over a significant amount of the budget, leaving less money for WP calls-Some partnerships might end up working as 'closed-clubs', making it hard for PT entities to participate-Low presence of national institutions in large and high impact consortia-Slow implementation of transnational health data protection legislation-Funding of high budget projects implemented by small consortia (i.e. with small number of partners)

Portugal faces upcoming challenges for health research and must build on its solid track record in specific scientific areas. It is therefore important to define key domains in health research and innovation that should be pursued by Portugal in the future. Criteria for selection include previous success rate in Horizon 2020 (domains of high success) the current/future high potential and high need at national level (domains of high potential and domains of high need).

National Domains in Health Research

Digital Health and Medical Technologies

Portugal has been very successful in H2020 calls related to digital health, reaching over 5% of the total funding in 2018 and 2019.

The national digital health and medtech community is diverse and complementary, ranging from several SMEs, research institutes, universities, hospitals, social care, etc.

The Shared Services of the Ministry of Health (SPMS) took a leading role in eHealth at European level and have been increasingly involved in H2020 projects and other initiatives and networks.

This is a priority area based on the high success rate achieved so far, the goal is to maintain the good performance.

Non-Communicable and Rare Diseases

Portugal has a solid track-record in specific therapeutic areas such as neurodegenerative diseases, cancer and rare diseases.

The General Directorate of Health develops 11 priority health programs, including brain and oncological diseases, and implements an Integrated Strategy for Rare Diseases.

For these areas, multidisciplinary research communities are well established, international networks are in place and collaboration with industry and with the health system is ongoing.

Despite the many calls related to chronic diseases and co-morbidities, Portuguese participation in H2020 was modest.

This is a priority area based on the strong potential and installed capacity at national level to participate in transnational projects related to non-communicable and rare diseases.

Resilient Health and Care Systems

Portugal has a strong mobilization from stakeholders in the field of healthy and active ageing and integrated care solutions, including research institutes, universities, social sector, hospitals, regional ESIF Managing Authorities, municipalities, among others.

In 2019, 9 regional Portuguese organizations were awarded "Reference Site" status by the European Innovation

Partnership on Active and Healthy Ageing (EIP on AHA) and programmes such as AAL and EIT Health are very appealing to

the Portuguese community.

Value-based healthcare is an opportunity for Portugal, with several pilots' hospital running and research institutions

dedicated to the field.

There is a need for a greater intervention in terms of public health in the areas of disease prevention and health promotion, with a special, but not limited, focus on vulnerable groups.

COVID-19 increased the budgetary burden that Health has been having in the national economy. Innovative processes and uptake of best practices from other countries are needed to improve the structure and management of the national health system.

This is a priority area for Portugal because we need to join forces with other countries in the transition towards more sustainable, resilient, innovative and high-quality people-centered health and care systems.

Global Public Health Threats and Preparedness to Pandemics

Infectious disease threats, including zoonosis, may emerge in the context of climate change, deforestation and biodiversity. These emergent diseases along with migrations (as demonstrated in COVID19) are a real public health issue.

There should be a strengthened coordination for research and innovation at EU level. Portugal has to be part of these collaboration efforts and contribute and take profit of the new knowledge and innovations that would be produced.

Portugal showed a strong mobilization of the R&I stakeholders towards the development of new solutions as a response to the COVID-19 pandemic, including a successful record in Covid19 H2020 dedicated topics.

This is a priority area for Portugal as we will face a demand for advancing knowledge for the clinical and public health response to the COVID-19 pandemic.

NATIONAL STRATEGY FOR CLUSTER HEALTH

PROPOSED TARGETS (2021-2027)

Portugal sets the goal of securing 2% of the total budget of Cluster Health by national entities.

To succeed, Portugal needs to sustain the good performance registered in 2018-2020 and to achieve a strong participation in the future Health Partnerships and in the Mission on Cancer.

PRIORITY AREAS/INITIATIVES

To achieve the proposed goal of securing at least 2% of the total European funding available for Health, Portugal needs to identify **areas of intervention and initiatives (partnerships/missions) that are in line with the key domains** defined above. These areas will be the **major targets for national applications in future open calls**.

Cluster Health (regular work programme calls)

Collaborative projects under Cluster Health are in general an opportunity for the Portuguese community. For the reasons explained in the previous section, PT has particular interest in the following areas of intervention

National Domains	Non-Communicable and Rare Diseases are national priority areas based on the strong potential and installed capacity to participate in collaborative projects.
Digital Health and medical technologies Non-	Tools, Technologies and Digital Solutions for Health and Care . Portugal research and innovation communities have been very successful in previous calls related with digital health, ehealth and medtech. In parallel the national digital community is very diverse and active increasing the potential of successful applications, for instance in digital tools for citizen empowerment and for person-centred care.
and Rare Diseases Resilient Health and Care Systems	Health Care Systems . Portugal has a strong mobilization of stakeholders in the areas of healthy and active aging and integrated care solutions. In parallel value-based healthcare sets as a key opportunity at national level with the setup of the CACs and the initiatives already in the field. There is a great need for evidence-based policies to improve and be more effective in the response to the health needs and decrease existing inequalities.

	European Partnership Innovative Health Initiative (IHI)				
National Domains Digital Health	IHI is the successor of IMI partnership between EU (represented by EC) and health related industries (COCIR, EFPIA, MedTech Europe, EuropaBio, Vaccines Europe).Goal: delivery of innovative products, services and tools that meet patients' and health care systems' needs				

and medical technolo gies Resilient Health and Care Systems Global Public Health Threats and Preparedness to Pandemics Although PT was not very successful in IMI, this is a new opportunity because IHI will include industrial sectors with strong track record in Portugal, such as the biotech and medtech sector that should not only contribute to health promotion and disease prevention through the citizen empowerment in health but could trigger the establishment of new collaborations with the other sectors that could be important in a future pandemics response.

In addition, IHI will target a broader stakeholder involvement (patients, healthcare providers, healthcare professionals, regulators, health authorities, ...) included in IHI governance, which should promote citizen engagement and highlight patients' real needs.

Projects under the scope of the IHI will demand for inter-ministerial collaboration (Health and Science and Technology)

	European Partnership on Transforming Health and Care Systems
National Domains Resilient Health and	The partnership will draw on the expertise and experiences from the Member States and network of regions involved in the European Innovation Partnership on Active and Healthy Ageing (EIP AHA), the Second 'Active and Assisted Living' programme (AAL 2), the Stakeholders Network on Smart, Healthy Age-Friendly Environments (SHAFE), and work in synergy with the EIT KIC Health.
Care Systems Digital	Goal: to boost research in policy, uptake and scale up of innovations to accelerate transformation of national/regional health care systems
Health and medical	Portugal has a mobilized community working in this area, with successful performance in EIP-AHA, SHAFE, AAL and EIT-Health
s Global Public Health	This will be the opportunity to leverage the work done in the programmes mentioned previously and to increase the capacity to implement innovation.
Threats and Preparedne ss to	The health and Care systems transformation should also contribute to the preparedness of the health system in a future pandemic situation or facing an emerging disease that threatens the health of many citizens.
Pandemics	Projects under the scope of the Partnership on Transforming Health and Care Systems will demand for inter- ministerial collaboration (Health and Science and Technology)

National Domains Non- Communicabl	European Partnership on Personalised Medicine
	Partnership aligned with priorities and funding for Member States, their regions, international stakeholders and the EC.
e and Rare Diseases Digital Health	Goals: integrating big data and digital health solutions, translating basic research into clinical applications, providing socio economic evidence for the uptake in healthcare systems, developing curricula for healthcare workers and creating new types of jobs
and medical technologies Resilient Health and	Portugal has strong potential for this partnership and can capitalize on the work done within the scope of ICPerMed, the 1+ Million genomes Initiative, EATRIS, and other European initiatives.
Care Systems	This is an opportunity for Portugal, not only to promote personalized treatment, but to build the way to a personalised disease prevention.
	Partnership in line with the recent "Strategic agenda for the future of personalized medicine in Portugal", promoted by the Portuguese Association of Hospital Managers (APAH) and the "Ordem dos Médicos"
	Projects under the scope of the Partnership on Personalised Medicine will demand for inter- ministerial collaboration (Health and Science and Technology)
National Domains	European Partnership on Rare Diseases
Non- Communicabl e and Rare Diseases	Partnership build on lessons learnt from the European Joint Programme on Rare Diseases (EJP-RD) Goals: developing an efficient ecosystem for the faster translation of research results to health care systems and supporting efficient access/sharing of rare diseases data at the EU and at the international level by utilizing the wealth of clinical data at European Reference Networks (ERN) Rare diseases are a strategic area for PT, as described above
	National stakeholders have strongly enrolled in the ERA-Net E-Rare, EJP RD and these efforts should be capitalized
	Projects under the scope of the Partnership for Rare Diseases will demand for inter- ministerial collaboration (Health and Science and Technology)

Mission on Cancer

National Domains Non-Communica ble and Rare Diseases Resilient Health and Care Systems Global Public Health **Threats and** Preparedne to SS Pandemics

The Mission on Cancer is an opportunity to leverage the national research community in this area and to create interactions that drive innovation in the public sector

Projects under the scope of the Mission on Cancer will engage a wide range of stakeholders from the public

and private sector and will demand for inter-ministerial collaboration (Health and Science and Technology, at least)

Cancer is a non-communicable global public health threat. Portugal should find in the Mission Cancer the possibility to contribute with clinical cancer data among many countries and use AI and

Big Data to better understand the disease, to identify biomarkers, to design diagnostics and develop cancer-specific and patient-specific treatments.

Portugal has paved this way with the setup of scientific research infrastructures in the areas of cancer, clinical and translational research, as well as the establishment of the Clinical Academic Centres.

Participation of national stakeholders in EU partnerships like Cancer Core Europe, EACS, OECI, ERN PaedCan (among others) should be capitalized.

It has been created a *National Cancer HUB*, a coordinated response at national level that brings together the relevant stakeholders to cooperate. This structure should coordinate, promote and support the implementation of European initiatives defined in Europe's Beating Cancer Plan, through the promotion of the participation of Portuguese organizations in *Mission on Cancer*, *Digital Europe Programme* (DIGITAL), *EU4Health* and other funding initiatives.

STAKEHOLDER ENGAGEMENT

Cluster Health players create a truly **transversal and multidisciplinary ecosystem of stakeholders with different roles in the Health sector**. Ranging from researchers and health professionals working in research institutes (including research centres, associated laboratories and CoLABs), Higher Education (e.g., Universities, Polytechnique schools), Hospitals and Clinical Academic Centres (CACs), to the industry sector (e.g., SMEs, large companies). Closing the circle of the ecosystem and its connection to society and wellbeing, the stakeholders map is completed with the presence of national and regional governments, citizens and NGOs (e.g. patients, caregivers).

The top-down collaborative research and innovation activities in Cluster Health will require close linkages between discovery, clinical, epidemiological, environmental and socio-economic research as well as with regulatory sciences. They will harness the combined skills of **academia** and **industry** and foster their

collaboration with **health services**, **patients**, and **citizens** in order to leverage on public funding and ensure the **uptake of results in clinical practice**, as well as in health care systems.



Specific engagement actions will be defined according to the type of stakeholder and to its level of maturity/experience in EU funding programmes. **Specific strategies will be defined in co-creation** with the Universities, research centers, industry associations and clusters, hospitals, etc, ranging from **institutional Health information sessions** (large audience, covering all health areas) to **focused workshops** (15-20 people, focus on a sub-set of calls/topics) and **bilateral meetings** (1-5 people, focus on a specific application/need). When existing, supporting funding offices will be actively involved, and each institution will be followed in a "personalised" way.

Health in Horizon Europe involves truly transversal and complementary initiatives; to improve stakeholder engagement sectorial events will be promoted in collaboration with other areas of Horizon Europe. These will include, for example, **initiatives for health-performing SMEs** (Cluster Health + EIC), **initiatives for the Social Sector** (Cluster Health + Cluster Culture, Creativity and Inclusive Society), **initiatives for the Climate and Environment Sector** (Cluster Health + Cluster Climate, Energy and Mobility) and **initiatives for the Digital and Technology Sectors** (Cluster Health + Cluster Digital, Industry and Space).

STRATEGIC ACTIONS

To achieve the target of **securing 2% of the Cluster Health total budget by national entities** four main strategic actions have been defined.

1) Fostering interministerial cooperation

A major strategic step at institutional level is to promote a strong interlink between the Ministry of Science, Technology and Higher Education (MCTES) and the Ministry of Health (MS). The Agency for Clinical Research and Biomedical Innovation (AICIB) is playing a central role as liaison in this combined strategy. Research and innovation goals for Cluster Health are directed towards clinical research, public health and health systems research and therefore close cooperation between the two ministries is crucial. Within the R&I value chain, policy makers play a vital role to ensure the transformation of outputs into policies, potentiating the direct impact in citizens lives and economy.



The European Commission fosters this connection, strongly promoting interactions between the national Delegates to the **Programme Committee for Cluster Health of DG-R&I** ("science side") and the national members of the **Steering Group on Health Promotion, Disease Prevention and Management of Non-Communicable Diseases (SGPP) of DG SANTE** ("health side"). This interministerial interaction will be relevant for the regular calls of the Cluster Health annual work programme and, most importantly, for the successful participation of Portugal in the European Partnerships in Health and in the Mission on Cancer.

• Action: creation of **interministerial taskforces for Health in Horizon Europe**, with representatives from the Cluster Health PC (MCTES) and from SGPP (MS), namely:

I. An interministerial taskforce of Key-decision and Policy Makers in the area of cancer to foster the participation of Portuguese organization in European cancer initiatives and, consequently, the implementation of innovative solutions such as technologies, clinical practices, and methodologies in the National Health System.

II. An interministerial taskforce for the definition of strategic thematic groups to assist in the development of the European Health Partnerships and in the implementation of their outputs.

2) A Network of National nodes of European Health RI and other relevant initiatives

European Health Research Infrastructures (RI) provide resources and services for research communities to conduct research and foster innovation. Portugal is a member of many of these RI, including the European Infrastructure for Translational Medicine (EATRIS), the European Clinical Research Infrastructure Network (ECRIN) and the European life science infrastructure for biological information (ELIXIR). In addition, other relevant European health-related initiatives are ongoing with strong Portuguese involvement, such as the International Consortium for Personalised Medicine (ICPerMed) and the 1+ Million Genomes Initiative. Some of these initiatives already published statements for Horizon Europe, defined strategic plans for the upcoming years or are working together in policy/strategic collaborative projects. These strategic plans and orientations should be discussed synergistically by the national nodes/representatives of these initiatives and shared with the health research community in an integrated perspective, in order to leverage the impact at national level.

• Action: promotion of a **network of national nodes/representatives in healthrelated European initiatives** (e.g., quarterly meetings)

3) Supporting experienced stakeholders in EU health projects

The national performance in the health area has been improving since the beginning of Horizon 2020 and creating already a **solid group of stakeholders with strong track-record in health projects**. This

community, mainly constituted by research institutes and organizations of the social sector, is experienced with the general rules of EU programmes, has an established collaborative network around Europe and applies regularly to open calls. The goal is to keep this experienced community engaged, by **sharing advanced information and giving specialized support** when needed.

• Action: mapping of the most experienced stakeholders and establishment of regular communication channels (bilateral meetings, emails, etc)

4) Engagement of new stakeholders: CACs and SMEs

Results from the national participation in H2020 show that some sectors still have a modest participation. Special actions will be implemented into two specific fronts: **Hospitals** (which secured 3% of the total PT Health funding between 2014-2019) **and SMEs** (which secured 17% of the total PT Health funding between 2014-2019).

Despite difficulties for clinical researchers to engage in European projects, recently created **Clinical Academic Centres** (CACs) can help overcoming these obstacles. CACs are **integrated structures for clinical practice**, **education and research activities**. Due to their multidisciplinary nature and strong clinical innovation potential, CACs represent privileged stakeholders for Horizon Europe health projects

• Action: direct interaction and definition of an engagement methodology, regular communication channels and follow-up process for each of the 8 CACs currently established

National SMEs (and industry in general) also presented a modest participation in Health projects in Horizon 2020 programme. Nevertheless, Portugal has a very **strong ecosystem of research-performing SMEs working in health, biotech, medical technologies and digital health**. This community must be mobilized and guided into the participation in successful proposals for Cluster Health and related initiatives. This work should be done in close collaboration with the **Health Cluster Portugal** (HCP) and **Portugal's Biotechnology Industry Organization** (P-BIO).

• Action: definition of a strategy to engage research-performing SMEs with HCP

and **P-BIO**, including regular communication channels and follow-up process for SMEs.

THE WAY FORWARD

In the last years, National Health stakeholders have proven their potential in securing EU competitive funding. Horizon Europe sets as a pivot tool to empower the community for the next years, ensuring that the value created in R&I impacts positively citizens' lives and wellbeing. By supporting the still existing gaps in the community and catalysing the champion organizations, the strategy presented here sets the methodology and steps towards **securing 2% of the total budget of Cluster Health by national entities.**

2.2. Cluster 2 | Culture, Creativity and Inclusion

SCOPE

Cluster Culture, Creativity and Inclusive Society aims to strengthen democratic governance and citizen participation, safeguarding and promoting cultural heritage and responding to social, economic, technological and cultural changes. The activities within the Cluster will contribute to expanding civic engagement and commitment, increasing transparency, accountability, inclusion and the legitimacy of governance, improving confidence levels and combating political extremism. Projects from this Cluster will also focus on cultural heritage and its protection, enhancement and restoration. Research and innovation will support sustainable growth and job creation, contributing to the European policy for the cultural and creative industries. At the same time, the actions will help to combat social, economic and political inequalities, support the development of human capital and contribute to a comprehensive European strategy for inclusive growth. This also involves understanding and responding to the impacts of technological advances and economic interconnection to increase social resilience. Finally, the Cluster will support EU migration and mobility policies, both internal and external, and promote social integration.

For the SWAFS (SiS in FP7) there was a positive progress from FP7 to H2020 in terms of the number of projects funded, the amount and proportion of secured funding, the number of participant entities, and the participation of the academic sector. Otherwise, there was a lower participation of the industrial sector and the overall success rate decreased (see table below).

	FP7 (2007-2013)	H2020 (2014-2020)	
Nº PT projects	37	60	
Nº PT coordination	3	3	
Nº PT participating entities	47	78	
% academic sector	21%	56%	
% industrial sector	11%	6%	
Budget allocation to PT (M€)	6,79 (1,6%)	11,28 (2.14%)	
Success rate (%)	17,2%	12,63%	

H2020 final data on portuguese participation in SWAFS

OBJECTIVES AND KPIS FOR PT PARTICIPATION IN CLUSTER 2 (2021-2027)

In this table, it is assumed the same budget of the H2020 and DS6 for HEU, as a reference and for the sake of consistency.

	PT H2020 Status	PT Objective 2027	
Number of Proposals submitted	841	1200	
	(20%)		
Number of Projects	77	120	
Success Rate (average)	9,16%	11%	
Global overview on budget allocation to PT			
	20,13 M€	34 M€	
	(1,88%)	(3,7%)	
Contribution to the global PT objective of			
2.000 M€	20,13 M€	34 M€	
	(1%)	(1,7%)	

BACKGROUND INFORMATION

HORIZON EUROPE - FIRST RESULTS (VERY DRAFT)

As preliminary results for the 2021 Calls for Cluster 2, the European Commission allocated **3.89** million euros to **17** Portuguese institutions to carry out **11** collaborative projects in the areas of culture, creativity and inclusive society. Over **50%** of Portuguese Participation is coming from the academic sector and nearly **40%** are from other types of institutions, namely culture and creative industries. Out of these **17** participations, **6** institutions are participating in the framework programme for the first time and **4** out of these **11** projects are in the field of education and learning.

Horizon Europe		#	# coordinated	EC funding	funding rate
		projects	projects	(M€)	(%)
Cluster 2 - Culture, Creativity and Inclusive Society	2021	11	1	3.89 M€	2.36%

H2020 - SC6 final data on the portuguese participation

Portuguese participation in H2020 in SC 6, Europe in a changing world - inclusive, innovative and reflective societies, the relevant area to Cluster 2 was fairly successful. In SC6 over 50% of participants are from the academic sector and 18% are coming from governmental agencies, municipalities and NGOs.

Although PT institutions coordinated a small number of projects, the progress seen from FP7 to H2020 in the SC6 area is staggering (see table below). In H2020 both the number of coordinated proposals and funding have doubled, and industry became an active participant (30% participation). Success rate which was below EU average on FP7 (7,82% vs 9,27%) has increased 1.34% and is now very close to EU average (9,16% vs 9.26%) on H2020. There is a good mix of players in H2020 projects: the academic sector participates in 51% of the projects, industry in 21% and 18% is split by governmental agencies, municipalities and NGOs.

H2020		# projects	# coordinated projects	EC funding (M€)	funding rate (%)
SC6, "europe in a changing world – inclusive, innovative and	2014-2020	77	5	20.13 M€	1.88%
reflective societies	2018-2020	38	2	11.96 M€	2.03%

SC6 final data on portuguese participation

	FP7 (2007-2013)	H2020 (2014-2020)
Nº PT projects	38	77
Nº PT coordination	2	5
Nº PT participating entities	41	104
% academic sector	75%	51%
% industrial sector	0%	21%
Budget allocation to PT (M€)	5,97 (1,03%)	20,13 (1,88%)
Success rate (%)	7,82%	9,16%

SWOT ANALYSIS

Strengths	Weaknesses
 number of coordinating proposals and funding has doubled during H2020; Application success rate higher than EU average (PT: 9.68% vs EU: 9.19%) Industry became is active participant in H2020 (22% participation); Increasing critical mass and research potential: nr. ERC grantees in SSH has more than doubled during H2020; 80% are from the most junior levels (StG and CoG). 	 Small number of PT coordinated projects (4); Low internationalization and competitiveness of SSH research community; SSH researchers seek funding mainly from national sources; Low application levels of SSH scientists to ERC (but it is a global tendency in ERC); SSH with little participation in Widening Actions; lack of professional structures to support candidates in R&D structures
Opportunitie s	Threats
 Growing interest of Social Scientists and institutes/research centres in seeking EU funding; Growing interest of industry (including cultural, municipalities & third sector) to combine efforts with academia 4 seeking EU funding; Contagion effect and best practice exchange: PT great success in Widening actions needs to spill over to SSH; participating more in widening actions will increase networking capacity, and opportunities to form consortia for applying successfull HE projects. National funding programmes to spot talents and to increase participation levels Intensify training and awareness activities of SSH research community to apply national funding schemes to promote the professionalization of grant application support offices at research institutions. 	 Industry and third sector with modest investment in research and innovation and generally unaware of EU funding opportunities in SSH; General belief that applying to European funding is too complex, with low success rates and beyond reach; Research topics for EU Cluster 2 seem too top down and directed, making it difficult for SSH researchers of all SSH areas to apply for funding. Underfunding of the SSH at national level impairs its competitive capacity at international level

STRATEGY FOR IMPROVING PT PARTICIPATION IN CLUSTER 2 (2021-2027)

Overall, the Portuguese SSH community shows rather low internationalization and competitiveness, seeking funding mainly from national sources rather than from European ones. The industry and third sector have still little tradition on investing and engaging in research and innovation and are generally unaware of existing possibilities on EU funding in the SSH field. The funding is concentrated in 3 main cities: Lisbon, Coimbra and Porto.

A significant mindset change is necessary to alter this trend:

- Articulating with other national funding schemes
- Promoting synergies and cross fertilization among sectors (culture, education, science innovation and industry) to respond to multifaceted social, economic, technological and cultural transformations – foster the bridging between institutions from different sectors and science and innovation sectors;
- Bringing in new players widening the scope, skills and geography of PT participation by intensifying awareness of the existing opportunities to a wider community (less active R&D units, 3rd sector, municipalities, public bodies, SMEs, large companies), always keeping a flexible and adaptable strategy. Working closely with the community to identify key research priorities (building on the key emerging and promising areas previously identified in the FCT Thematic Agendas for Research and Innovation) and strategic HE opportunities and promote the construction of national competitive consortia;
- Awareness adapted to the target, depending on the sector and the existing level of participation.

Influencing - promoting preparedness and doing informed lobbying by involving stakeholders in the discussions of Cluster 2 topics. For example, guaranteeing that there is enough flexibility in the Program's actions to include new newcomers such as the creative industries. And in every kind of advisory group created for the whole specific programme there should be experts to represent engagement and reflection (from SSH and Citizen Science) so as to guarantee that effective impact is created from the actions of the program. Moreover, lobbying on the importance of integrating SSH in the other clusters and missions, considering that SSH shall play an important role across all HE.

INSTITUTIONAL STRATEGY (2021-2027)

To widen the Portuguese participation in Cluster 2 we should engage actively with the following stakeholders:

- SSH research centers, including the ones with low participation levels in H2020
- Municipalities
- Third sector (e.g., NGOs, companies, policy making and policy-implementation agencies)
- Cultural industries, cultural NGO's
- Artists Associations
- Museums and Monuments Network
- Science centres Science administrators and managers
- Non-SSH Research Centres with relevant skills for Cluster 2 (e.g., AI, Big Data, Technology)

We aim to strengthen cooperation with institutions which have already experience in obtaining EU funding as well as to establish contacts with new stakeholders with strong potential to participate in HE. We will promote among these stakeholders a very active information dissemination on funding

opportunities, grant writing and management and other relevant topics to increase the number of applications and success rate. Both the approach and communication strategy should be adapted and customized according to the specificities of the target audience.

We will seek synergies with other funding programmes and establish close collaborations with related european funding programmes such as Creative Europe, CERV (Citizens, Equality, Rights and Values), EASI (Employment and Social Innovation) and national programmes like Portugal Inovação. We will join effourts to reach out broader and diverse audiences to widen the range of participants in Cluster 2 Calls.

The identification of key stakeholders should lay on: 1) the identification of entities participating in past and ongoing projects (and for this, different funding programmes will be considered in order to include all types of researchers and innovators, end-users, public agencies, etc.; 2) the identification of individuals who are field experts (e.g., contributors to the FCT Thematic Agendas for Research and Innovation) or young researchers with strong potential (e.g. FCT CEEC funded and ERC grantees); 3) getting support from science administrators and managers (e.g. PERIN National Promotion Network) and other I&I management structures (e.g. non-academic entities) for identifying relevant stakeholders.

We will work closely with the R&I community in order to identify the main obstacles, bottlenecks and difficulties experienced in all processes related to the participation in HE. And together, we will devise strategies and solutions to overcome such difficulties. Furthermore, we will actively support stakeholders in widening their networking capacity and building on collaborative and interdisciplinary research so as to increase their effective capacity to establish and join consortia and participate across all clusters and missions of HE.

Another important action to be undertaken is training, support and capacitation of R&I management support staff aiming at: 1) their professionalization in grant application and management; 2) building collaborative strategies; 3) networking; 4) identifying the needs of the R&I community; 5) identifying stakeholders; 6) reinforcing dissemination and communication; and in this process we will also learn from their experience.

Close cooperation with NCPS from other clusters will be sought to strengthen the work on the integration of SSH across Horizon Europe.

PRIORITY

Target carefully the audiences for raising awareness on the key topics (destinations, in HEurope) of Cluster 2 where Portugal has already installed capacity:

- Cultural Heritage
- Democracy a Governance
- Social and Economic Transformations

Considering the Calls foreseen on Cluster 2 Draft Working Program and the Portuguese institutions that have already participated in these areas in previous FP we point out below the institutions with potential to participate in HE, are the following:

Destination 1 – Innovative Research on Democracy and Governance

Call 1 – Protecting and nurturing democracies (2021) Call 2 – Reshaping democracies (2022)

Which institutions could participate?

All research centres and universities that focus on democracy, politics, AI and Big Data (including institutions with experience and without experience of participation in the FP), NGO's / civic associations working in the area of the quality of democracy and development, participatory democracy and equality and inclusion, Democracy Quality Observatory (ICS), AI and Big Data companies, city councils, government and regional organizations and agencies (including ministries), cultural and creative industries and schools.

Destination 2 – Innovative Research on the European Cultural Heritage and the Cultural and Creative Industries

Call 1 – Research and Innovation on Cultural Heritage and CCIs (2021) Call 2 – Research and Innovation on Cultural Heritage and CCIs (2022)

Which institutions could participate?

All research centers and universities working in this area and the digital area, including entities with experience and without previous experience in the FP, a wide range of City Councils, Artistic and cultural societies / associations, cultural centres, museums, governmental and regional organizations and agencies in the cultural sector, NGOs from defense and promotion of heritage, culture and art, creative, restoration and digital industry, and schools.

Destination 3 – Innovative Research on Social and Economic Transformations

- Call 1: Inclusiveness in times of change (2021)
- Call 2: A sustainable future for Europe (2022)

WHICH INSTITUTIONS COULD PARTICIPATE?

Research centres and universities focusing on the areas of inclusion, poverty, digital, work, social change, sustainable development, migration, etc; NGOs related to equality, insertion of refugees / homeless people, and fighting poverty and exclusion; governmental and regional organizations and agencies; city councils; schools; digital industry related to the use of new technologies in education and social inclusion; Cultural and creative industries.

CONTRIBUTION OF CLUSTER 2 TO OTHER EUROPEAN INITIATIVES

Activities from Cluster 2 are expected to make important contributions to the following European Commission's initiatives:

European Green Deal - is a new growth strategy that aims to transform the EU into a fair and prosperous society, with a modern, resource-efficient and competitive economy where there are no net emissions of greenhouse gases in 2050 and where economic growth is decoupled from resource use. Cluster 2 will contribute to this programme in Area 10 'Empowering citizens for the transition towards a climate neutral, sustainable Europe'.

Adaptation to Climate Change including societal transformation – this Horizon Europe mission area will focus on solutions and preparedness for the impact of climate change to protect lives and assets. It will include behavioural changes and social aspects by addressing new communities beyond usual stakeholders, which help lead to a societal transformation.

New European Bauhaus – is a movement which intends to be a bridge between the world of science and technology and the world of art and culture. It is about a new European Green Deal aesthetic combining good design with sustainability. The New Bauhaus is about bringing the European Green Deal closer to people's minds and homes. And making tangible the comfort and attractiveness of sustainable living.

Culture and Creativity KIC - the European Innovation Council (EIC), plans to launch a new Knowledge Innovation Community (KIC) in 2023 with a focus on the cultural and creative industry (ICC). The new KIC intends to be of strategic importance to powering innovation in the creative and cultural sectors.

2.3 Cluster 3 | Civil Security for Society

OBJECTIVE

Security in H2020 is the area with the second best rate of return for Portugal (after Widening), with 2.86%, which translates to a total of 44.12 M€ that were retained by national entities (2014-2020). It is, therefore, realistic to set the objective for HE-Security close to 4%, which can be achieved with increased participation in projects, namely by the Portuguese Law Enforcement Agencies (LEAS) active members.

BACKGROUND INFORMATION

Overall, in H2020-Security there were 179 participations by Portuguese participants in 104 funded projects resulting from 1298 participations in 738 proposals, for a success rate of 14.09% (compared to 11.26% for the EU overall success rate).

National entities received contracts of 44.12 M€, with 32.5% going to 39 entities from industry (22 of which are SMEs, retaining 21.1%), 43% for 10 RTOs and 7 Universities, and 24.5% for 19 public entities most of which, LEAs and end- users. The national rate return of Security over the 7 years of H2020 is 2.86%, but it is interesting to note that the return rate was only below 2% for the years of 2016 and 2017 (1.87% and 1.73%, respectively), and even reached 4.1% in 2015..

THE CURRENT SITUATION

Portuguese participation is assured by a relatively small number of entities, most of them very well connected to relevant European companies. Almost all the Industries, universities and RTOs working in Security are also active in the defence field.

The most relevant actors in Security are:

The criminal police (PJ) are very well connected internationally (member of EUROPOL) with a very high presence in many projects acting as end-user. They are responsible for bringing to Portugal many projects (29 participations). One RTO (is very well connected and with a very good record in many participations (23) and one Mid Cap is a world leader in border gates and vision technologies. The three military research centres (Army, Navy and Air Force) all work in many civilian projects and technology developments.

	Positive	Negative
Internal	Strengths	Weaknesses
	Very active entities both in Security and Defence. LEAs and practitioners that are very open to R&D activities in European Research.	Small number of relevant entities. Small industries make the fixation of technology in Portugal difficult.
External	Opportunities PT entities are very well placed near European relevant partners. A few entities have a very relevant presence in H2020-Security.	Threats Increase of the participation of entities from Eastern Countries. Big industries from big countries don't help (OCCAR).

SWOT ANALYSIS

THE PROPOSED POLICY DISCUSSION AND PROCESS TO BE PROMOTED

SECURITY

PT entities participating in H2020-Security are, in general, very pleased with the mission orientation of most of the launched topics. PT participates well in topics aimed at achieving concrete results, solving identified problems near the LEAS and practitioners. That is the effective contribution of research to the Security of Europe and its citizens. These types of topics are very appealing to the industries and allow companies to improve their capabilities, strengthening their market potential in technological terms or, simply, enforcing their best positioning in the market.

CYBERSECURITY

The H2020-Security approach to cyber-security presents too many divergences with the needs of LEAS and practitioners with responsibilities in cyber-security. Too many networks have been launched in the area of cyber-security, but with a very small participation of LEAS and practitioners. These entities have limited human resources and they should be focused on R&D topics, not on too many studies and networks.

The European cybersecurity centre is far from LEAS and practitioners interests, being more negative than positive for Europe to allocate budget from HE-Security to any form of organization or partnership (like ENISA, cPPP, ECSO or ECSC) all launched under DG-CONNECT with questionable results for the Security of Europe.

The prevailing position from the Portuguese entities participating in H2020-Security is to enforce the use of a greater budget for cyber-security under the strategy implemented by DG-HOME in H2020-Security. This will have a very positive effect in the fight against cybercrime, not only for Portugal but also for the Security of Europe and its citizens.

THEMATIC PRIORITIES FOR PORTUGAL

- Increase the success rate and achieve a rate of return of 4%, through more relevant participation of industries and end-users in each project, with special relevance to the participation of industries.
- Stimulate participation of Portuguese entities (companies, MID CAPs, SMEs, universities and RTOs) in Horizon Europe projects in partnerships with LEAs and practitioners.
- Create synergies between different clusters by promoting the crossed presence of security, space entities and societal aspects, joining their capacities and technologies.
- To promote and enforce the participation of more software industries and academia in the cybersecurity and cybercrime projects to be launched under HE-Security.
- Reinforce synergies with the EU Defence Fund and PESCO programmes

2.4. Cluster 4 | Digital, Industry and Space

2.4.1 Cluster 4 | Digital

SCOPE

Digital transition creates major opportunities to position Europe as a technology and industrial leader. The coronavirus pandemic has been showing the essential role played by the high-tech sector in ensuring the continuity of social life, businesses and administrations and has accelerated the reflection on the need for sovereign digital technologies.

A **Europe fit for the Digital Age**⁶ is one of the six priorities of the current European Commission. The **objective** is to guarantee that Europe drives the digital transformation of society and economy, bringing benefits to all citizens and businesses: i) reinforcing the EU's digital capacities (computing, data, cybersecurity, AI,..); ii) ensuring their widest possible roll out and maximise their benefits; iii) preparing for and lead the development of next generation technologies; iv) building a world-leading connectivity infrastructure; v) supporting creators and ensure the widespread distribution of their works. Recently, <u>a new Industrial Strategy for a globally competitive, green and digital Europe</u> has been adopted.

The 2021-2027 Multi Financial Framework (MFF) shall bring an holistic approach for digital research, development and deployment spread across 4 funding programmes (with an estimated budget above 25B€): Horizon Europe; Digital Europe; Connecting Europe Facility and Creative Media. Funding opportunities at European level, will be as follows:

Horizon Europe – focuses on Research, development and innovation via:

- a dedicated cluster cluster 4, digital, industry and space, having specific areas of intervention key digital technologies, including quantum technologies; emerging enabling technologies; artificial intelligence and robotics; next generation internet; advanced computing and Big Data;
- digital contribution to other clusters/missions: health, culture, creativity and inclusive society (social and economic transformations and creative industries), civil security for society (cybersecurity), climate, energy and mobility; Information and communication technologies will also be fundamental to the Climate Neutral and Smart Cities Mission.
- dedicated instruments for innovators: pathfinder, accelerator and EIT (KIC Digital) under pillar III; and
- research infrastructures, European Research Council (ERC), Marie Skłodowska-Curie actions (MSCA) and Widening participation and strengthening the European Research Area will remain important actions to fund the first levels of digital centric innovations.

To foster the *stakeholders* involvement and the Member States commitment, some priorities will be implemented through partnerships and initiatives:

• **3 Joint Undertakings (Art. 187):** i) High Performance Computing (continuation of EuroHPC); ii) Key Digital Technologies (an upgrade of the current ECSEL JU) and Smart Networks and Services

(a new partnership).

- 3 co-programmed: i) AI, data and robotics; ii) Photonics Europe and iii) Made in Europe;
- The initiative EuroQCI, the European Quantum Communications Infrastructure (still under discussion how it could evolve into a partnership) aims to foresee in advance the possible threats posed by the development of quantum computing. It aims to provide ultra-secure quantum communication tailored to user needs, permitting the secure exchange of information and data, the long-term protection of stored data, and the protection of critical infrastructures.

Digital Europe Programme (DIGITAL) - focused on building essential digital capacities on: High Performance Computing (HPC), Artificial Intelligence (AI), Data and Cloud initiatives like DATA4EU and Testing and Experimentation facilities, Cybersecurity, Advanced digital skills and a set of deployments on digital transformation and interoperability. On the latter aspect, European Digital Innovation Hubs (EDIH), cofunded by the programme and the Member States, will be the instrument to foster industrial digitisation, which includes collaborative activities between stakeholders.

Connecting Europe Facility - Digital (CEF2) – aims to deploy the Gigabit Society, based on a safe and secure, sustainable, very high capacity digital cross-border infrastructures, to implement the 5G communities (including submarine connectivity of strategic importance), to host digital platforms and solutions (Data, Cloud, HPC and AI) and to improve digital services for the socio-economic drivers and use-cases.

Creative Media – focused on media – for distribution of works and creation.

H2020		# projects	# coordinated projects	EC funding (M€)	funding rate (%)
	2014-2020	193	26	102.58	1.86
ICT H2020	2018-2020	87	14	55.64	2.14

FACTS

- In the ICT part of H2020, PT entities are involved in the activities of 193 projects having received 102.6 M€, which represents 1.86% of the total competitive funding available for the ICT part of the programme (above the average H2020 funding rate, which is currently 1.68%).
- In H2020 as a whole, and since opportunities for the digital sector are spread across the programme: an in-depth analysis allows to infer that PT participation in digital transformation projects is higher, counting on 483 projects (99 coordinations) corresponding to 232.97 M€ of funding (RTOs - 31%; SMEs - 28%, HES -15%, Large Companies – 15% and others - 10%).
- PT is totally committed to the development of innovative digital technologies including by means of strategic investments coordinated at EU level: it is a member of the EuroHPC Joint Undertaking and has signed the "Blockchain partnership declaration",

the "EU Declaration on Cooperation on Artificial Intelligence" and the "EU quantum communication infrastructure initiative".

- PT participation in the two Joint Undertakings (ECSEL and EuroHPC) has been very successful. The results achieved by PT stakeholders are proportional to the national commitment available which, particularly for EuroHPC, resulted in having a petascale supercomputer installed in Portugal (DEUCALION), co-funded by the partnership.
- PT has strong background in the intervention areas of the cluster: key digital technologies, including quantum technologies; emerging enabling technologies; artificial intelligence and robotics; next generation internet; advanced computing and Big Data. PT is involved in 3 AI excellence centres.

PORTUGAL DIGITAL (the action plan for PT digital transition) has recently been established and is being presented as a structured and multi-participated policy approach to address and successfully overcome the challenges from digital transition in Portugal. This policy initiative was designed around 3 pillars: i) training and digital inclusion of people (digital education, professional training and requalification, digital literacy and inclusion); ii) digital transformation of the industrial sector (entrepreneurship and investment attraction, business and SME focus and orientation, transfer of scientific knowledge to the economy); iii) digitalization of the public administration (digital publics services, open and agile government and open and interconnected regional and local public administration). Within this framework, data, connectivity and infrastructures, combined with the necessary regulation, cybersecurity and privacy concerns and with the mobilization of emerging disruptive technological proposals and the synchronization with European digital strategies are set as relevant catalysators for digital transition.

This program follows and intends to make use and take advantage of some instruments established before. In 2017, PT launched the **Strategy for Public Administration's Digital Transformation**, along with other two comprehensive policy initiatives on digital competences and digitisation of the economy: **INCODE.2030** (also acting as Portugal's coalition in the context of the Digital Skills and Jobs coalition) and **Industry 4.0.** In this context, in 2019 and 2020, dedicated strategies were adopted, covering relevant thematic areas:

- AI PORTUGAL 2030;
- ADVANCED COMPUTING PORTUGAL 2030;
- 5G Strategy
- CNCS National Cyberspace Security Strategy

SWOT ANALYSIS

Strengths	Weaknesses
 ICT as young sector, expanding and transforming – ICT companies almost doubled in 10 years in Portugal; By subsector, consultancy and programming companies concentrate the largest number of entities followed by services, commerce, telecommunications and industry. Despite representing only 6% of the nr. of companies, the telecommunications sub sector contributed with 42% of the turnover to the entire sector. 7 PT Unicorn companies Farfetch, Outsystems, Talkdesk, Feedzai, Remote, SWORD Health and Anchorage Digital are ICT-based companies. Proliferation of incubators, accelerators and similar entities Qualification of human resources trained in PT Universities ICT related research is dominant in the Portuguese Enterprises engaged in R&D (In 2018, 65% of total R&D expenditure in the business sector was on engineering sciences and technologies). Digital public services and connectivity dimensions in Digital Economy and Society Index (DESI) 2020 are PT's best performance, driven by a sizable increase in the share of e-government users. Public and Private Funds from Venture Capital, eg. Portugal Ventures, Caixa Capital, Armilar, Pathena and Sonae IM knew how to invest in technology focused companies with a promising future, in some cases only supported by an innovative idea. Installation of a petascale supercomputer DEUCALION at Minho Advanced Supercomputing Centre. 	 Portugal ranks 19th in 28 EU Member States in the EC Digital Economy and Society Index (DESI) 2020. Portugal continues to have one of the smallest shares of professionals with specialized ICT skills in total employment in the EU: 2.2 % (2017) compared to an EU average of 3.7 %. In the same vein, the proportion of ICT specialists in total female employment is roughly half the EU average. The share of ICT graduates in total graduate pool is low by EU standards. Typically, PT SMEs are much less actively engaged in digitisation than their larger counterparts and, while data coverage for microenterprises (i.e. those with fewer than ten employees) is patchy, available evidence suggests that they are significantly lagging behind in this respect. The PT ICT sector has more companies with foreign capital control than the rest of the industrial sector. Among the large ICT companies, more than half are controlled by foreign capital. Digital skills are improving in Portugal (in DESI 2020, Portugal raised its position from 23rd to 21st), but deficits remain a major obstacle for Portugal if its policy goals in terms of both social cohesion and economic competitiveness are to be achieved.

10 years Websummit in Portugal	The fragmentation of the European initiatives and programmer related to
 ICT companies operate today in a highly competitive ecosystem: produce goods and services for a globalized digital market; Fintech sector is growing in a fast pace, more conditions are available in Portugal and there is more cooperation between banks and insurance companies; Good reputation and collaborative networks developed under previous FP; Covid-19 challenges to induce work in education fields, in particular, and to social wellbeing and health; Better public understanding of Science and Technology as real problem solvers (e.g., benefiting from the public exposure of scientists and digital technologies as relevant sources for solutions used in pandemic management & daily life). Promote the participation of recently established entities, such as CoLabs, in European projects and initiatives. Explore the coordination of structural funds for co-funded instruments Articulation between national (including structural funds) and European funds. Particularly critical for the European Partnerships, where structural funds can be considered as national commitment for cofund actions within the European Partnerships. 	 Initiatives and programmes related to digitisation. Covid-19 constraint to mobility (risk of losing potential new knowledge and skills incoming and of losing dynamics established by international cooperation) Covid-19 impact in budget allocation decisions that may reveal negative to necessary availability of national funds for the required relevant co-funded instruments European Partnerships will have approximately 50% of the budget attributed to the Cluster. The Chips Act implementation, especially with the increase in the Chips JU budget, will require higher cofunding commitments from Member States

STRATEGY 2021-2027

To take full advantage of the opportunities, and improve the participation targeting the goal of at least 2% of the total competitive budget available, the following dimensions are established as guidelines for action at national level:

 Promote interdepartmental encounters/dialog and sustain a multiministerial approach for the 4 programmes (e. g. Ciência, Tecnologia e Ensino Superior, Economia e Transição Digital, Coesão Territorial, <u>Modernização do Estado e da Administração Pública</u>) and funding agencies.

This effort will be based in the following actions:

- To outline a governance structure between all the national funding agencies involved in the promotion of the 4 programmes and create a single-entry point on a no wrong door basis principle.
- To measure and evaluate outcomes timely monitoring the results achieved to identify best practices and/or gaps and to review and propose corrections.
- Encourage the alignment between European and national public policy, strategies and funding programmes and guarantee the availability of national funds for the required relevant co-funded instruments, namely, making possible the use of European structural and investment funds (ESIF) as national commitments. Three main actions are to be developed under this objective:
 - To focus on the potential of partnerships (all the digital-centric partnerships and others digital-dependent) - defining a national strategy and implementing an action plan to mobilize relevant actors and appropriate resources (in kind and in cash participation);
 - To implement a competitive set of national Digital Innovation hubs launching the national call for the Digital Innovation hubs and promoting the best of them as European players.
 - To mobilize funds for other initiatives relevant for the Portuguese digital innovation ecosystem.
 - To boost the participation of national stakeholders supported with national and regional funds in European projects and initiatives, namely CoLabs, Technological Demonstrator projects and research infrastructures;
- Mobilize and involve Portuguese stakeholders targeting European initiatives, networks, thematic associations, European Partnerships and their relevant advisory boards and broaden the range of actors that might benefit from the opportunities promoted under Digital Transformation instruments. The success in these objectives depend on how we will be able:
 - To stimulate the participation and the motivation of experienced entities, already performing well in H2020;
 - To attract newcomers with potential to go beyond simple participation, such as large tech-based companies with operations or innovation centres based in Portugal (e. g. Teleperformance, Ericson, Accenture, FARFETCH, OUTSYSTEMS, TALKDESK, BOSH, Mercedes), Fintech (insurance and financial companies), large law and regulatory entities (to address and comply with agile IP and ethical issues) and public sector (e.g. AMA, SNS).
 - To set up a communication campaign for the national community at large in close cooperation with European Commission representatives.
 - To establish a targeted dissemination and capacity building plan to effectively signpost opportunities for specific sectors in close cooperation with CITs, clusters and Colabs.
- Engage citizens and increase the participation of social sciences and humanities in the digital innovation cycles.

2.4.2. Cluster 4 | Industry

SCOPE

European industry is a key driver in the current economical and societal transition. As stated in the <u>European Industrial Strategy of March 2020</u> (updated in 2021) now is a renewed momentum in the EU to tackle its strategic dependencies as well as to boost its resilience across key strategic areas. The Covid-19 crisis revealed the importance of improving production response and preparedness of EU industry, in support of its long-term **competitiveness** and **technological sovereignty**. Industry must lead the digital and green twin transition. Recently, the Industry 5.0, has been published. The new approach provides a vision that aims to go further, reinforcing the role of industry to society and contributes to 3 of the Commission's priorities: "An economy that works for people", "European Green Deal" and "Europe fit for the digital age".

In Horizon Europe (HEU) Industrial technologies are addressed in Cluster 4 – Digital, Industry and Space, and will focus on: 1) Manufacturing Technologies, 2) Advanced Materials, 3) New Emerging Technologies, 4) Circular Industries and 5) Low and Neutral Industries; prioritizing the following two main impacts:

- Global leadership in clean, climate-neutral and resilient industrial value chains, circular economy and climate-neutral and human-centric digital systems and infrastructures (networks, data centres), through innovative production and manufacturing processes and their digitisation, new business models, sustainable-by-design advanced materials and technologies enabling the switch to decarbonisation in all major emitting industrial sectors, including green digital technologies.

- Industrial leadership and increased autonomy in key strategic value chains with security of supply in raw materials, achieved through breakthrough technologies in areas of industrial alliances, dynamic industrial innovation ecosystems and advanced solutions for substitution, resource and energy efficiency, effective reuse and recycling and clean primary production of raw materials, including critical raw materials, and leadership in the circular economy.

The funding opportunities at European level, with special focus on industry, are as follows:

- **a dedicated cluster cluster 4,** digital, **industry** and space, with specific areas of intervention manufacturing industry, construction industry, process industries, raw materials, advanced materials, value-chains, safe and sustainable by design, circularity, and digitalization.
- **contribution to other clusters/missions**: cluster 1 Health (biotech, advanced materials), cluster 2 Culture, Creativity and Inclusive Society (social and economic transformations and creative industries), cluster 3 Civil Security For Society (cybersecurity of industrial systems), cluster 5 Climate, Energy And Mobility (clean industry, resource efficiency, energy systems and renewables integration), cluster 6 Food, Bioeconomy, Natural Resources, Agriculture, Env. (raw materials, supply chains, recycling); also, the industrial processes and technologies, as horizontal technologies they will be very relevant for the missions, especially "Climate Adaptation including Societal
Transformation", "Cancer" and the "Climate-Neutral and Smart Cities".

• **dedicated instruments for innovation**: European innovation Council with Pathfinder and Accelerator (open and challenge calls), and EIT (KIC Digital, KIC Raw Materials, KIC Manufacturing), EUREKA, under pillar III; and

• **research-focused instruments:** research infrastructures, European Research Council (ERC), Marie Skłodowska-Curie actions (MSCA) in pilar I, and Widening participation and strengthening the European Research Area, in Pilar IV, are important actions to fund scientific advancements.

• Enabling initiatives funded by DIGITAL such as AI TEF for manufacturing and Data Spaces for Manufacturings.

In addition, some priorities will be implemented through partnerships and initiatives, aiming to foster the *stakeholder's* involvement and the Member States commitment:

- 1 Joint Undertaking (Art. 185): European Metrology
- **3 co-programmed:** i) Clean Steel; ii) Process4Planet (previous SPIRE) and iii) Made in Europe (previous FoF);
- Other relevant initiatives:
 - **Raw materials**: as major concerns have been increasing on raw material security of supply, the EC has been supporting initiatives to safeguard raw material value chains, including supply, sustainable extraction and use (including critical raw materials). As such, initiatives such as the raw materials alliance, or raw materials platforms have been important to reach these goals, with special interest in magnesium, and rare earth elements, CRMs, and batteries.

• **Chips:** The College of Commissioners approved (8 Feb 2022) COM's proposal to the European Council for the new "Chips for Europe Initiative". Chips4Europe will be based on its own regulation and will be an implementation arising from the EU Chips Act. The proposal was approved without the need for impact assessment and without public consultation, given the urgency and political importance attributed to it by President von der Leyen and Commissioner Breton, given the worldwide shortage of semiconductors in the market for processors and embedded systems (e.g. the automotive industry, medical devices, etc.) The initiative aims to strengthen the European semiconductor ecosystem (and quantum technologies) in terms of research and development, production capacity, technical training, and value chains, and will have respective impacts on cluster 4, but also on clusters 3, 5, and EIC.

• Moreover, the inclusion of social sciences and humanities, and the humancentric perspective, will be of high importance, mainly due to the impact of new industrial technologies and industrial digitalization and the importance of new skills, wellbeing, safe jobs, human-machine interaction, acceptability, and regulation.

FACTS

Horizonte Europa		# projects	# coordinated projects	EC funding (M€)	funding rate (%)
NMBP- H2020	2021	26	3	17.21	2.27

In the recent programme Horizon Europe, PT entities participate in **26 funded projects (3 coordinations)** representing **17.21 M€**. Overall, financing is distributed among Research Centres (47%), Large Enterprises (21%), SMEs (17%), followed by other types of institutions and academia.

H2	020	# projects	# coordinated projects	EC funding (M€)	funding rate (%)
NMBP- H2020	2014-2020	273	151	117.94	1.66
NMBP- H2020	2018-2020	57	6	56.39	1.46

- In the Industry part of H2020, PT entities are involved in the activities of 273 projects having received 117.94 M€, which represents 1.66% of the total competitive funding available for the Industry part of the programme (above EU average).
- Overall, the 117.94 M€ accounted in the PT participation in industry in H2020 were distributed among SMEs (48%), Research Centres (30%), Academia (12%), Large Enterprises (6%), and other institutions.
- PT has excellent scientific and technological competences in nanotechnologies and advanced materials. This is mainly translated in significant participation in research and innovation projects by universities and research centres (representing around 60% of the participation in this area).
- In the manufacturing and processing areas, PT research centres have very good infrastructures and are well connected with industry. For this reason, in the manufacturing and processing areas there is 34% of participation from companies. Moreover, PT has member institutions in the partnerships FOF Factories of the and SPIRE Processing Industries). Industry that participated in the manufacturing and processing area were from plastics, metalworking, automotive, automation, robotics, and cement.
- The Research Fund for Coal and Steel (RFCS) (2014-2020) is also other

initiative important for industry, where PT entities participated in 25 projects representing 4.26 M€, from which coordinated 4 projects.

- There are several national strategies (Industry 4.0, Digital Transition Action Plan[1], Portugal INCoDe.2030[2], AI PT2030[3], Circular Economy Action Plan (PAEC)[4], Carbon Neutral National Plan 2050 (RNBC)[5], Hydrogen National Plan[6], Portugal SPACE 2030, Industry and Manufacturing Research and Innovation Agenda[7]) aligned with European policy objectives and research and innovation agendas.
- Under its National Funding Programme for R&I (PT2020), either funded by ERDF or national funds, Portugal has a rather complete set of funding instruments to address the innovation cycle and to promote synergies R&I European funding Programme, including collaborative R&D, demonstration and pilot lines, market uptake and entrepreneurship. Industry related technologies account for around 42% of the projects in PT2020⁻

SWOT ANALYSIS

Positive	Negative		
 Strengths Large experience in R&D&I projects in industry High qualified human resources (namely in engineering) and competitive costs Capacitation measures in place for enhancing available resources (people and infrastructures) through CoLabs and CITs. Clusters in relevant areas and sectors, e.g. AED - Aeronautics, Space and Defence, MOBINOV – automotive, Mineral resources, Rail, APQuimica, textile, Shoes, ICT, Tooling, PRODUTECH - Production Technologies, etc. National Initiatives aligned with European priorities (e.g. RRF). A good set of funding programmes and instruments, both financial (using ERDF) and fiscal, to support R&D and Innovation. Good experience on synergies between EU and national/regional programmes, with specific instruments and examples in the Manufacturing and Circular Economy areas. Strong presence in Manufacturing, Process industries, and Raw materials European Initiatives e.g. EFRA, SPIRE, Metrology, 	 Weaknesses Low number of research performing industries. Risk aversion culture, and low failure acceptance. Gap between research institutes. and industry still remains relevant Most companies are micro and small, with limited capabilities to invest and manage research and innovation. Limited number of companies with experience of European programmes and initiatives.Limited number of industrial technology providers. Low critical mass due to fragmented R&I national landscape. Lack of national initiatives regarding advanced materials. Low number of materials producers. Low presence in Advanced Materials and circular, carbon neutral European initiatives. Low number of industry actors in Steel sector. 		

 NanoSafety cluster, COSCO. Excellent scientific knowledge in materials sciences and manufacturing. 	
Opportunities	Threats
 Growing culture of Innovators and entrepreneurs. 	 No participation in Steel Partnership
 Take up of research results by industries. Critical Mass and National participation increase through CoLabs and CITs. Increase participation of social actors and social sciences and humanities Develop and implement demonstrators, test beds or pilot 	 No participation in the circular hubs initiative. Complexity of the funding and financing landscape (different rules and timings, burocracy, etc.). Lack of funding/financing for the uptake of technologies. Lack of alignment between EU priorities and initiatives and

STRATEGY 2021-2027

Increasing the amount of European funding requires **good alignment between the research and innovation priorities**, increase networking and the efficiency in building coherent consortia, i.e. increase the participation from national stakeholders, build sound projects with capability to innovate the industry sector.

Consequently, the following targets are proposed:

- Increase participation in Horizon Europe, both from academia and industry with special attention to Mid-Caps, SMEs and start-ups.
- Increase participation of national stakeholders in European initiatives, namely in: ETP Manufuture, EFFRA, A.SPIRE, ESTEP, EuMAT, European Raw Materials Alliance, European Batteries Alliance, European Clean Hydrogen Alliance and European Low Carbon Industries Alliance.
- Establish regional or national representation in Made in Europe²² and Process4Planet²³ governance.
- Increase the success rate and achieve a rate of return of at least 2% on Industry part of Cluster 4.

Moreover, to attain such goals, several guidelines are proposed:

• Promote further synergies between European and National R&I Priorities and programmes.

o Different funding programmes, European and National, are managed by different bodies and different ministeries frequently creating knowledge gap in the opportunities to support industry. As such, interdepartmental and interministerial (e. g. Ciência, Tecnologia e Ensino Superior, Economia e Transição Digital, Coesão Territorial, <u>Modernização do Estado e da Administração Pública</u>) dialog should be increased in order to increase the global efficiency of the funding agencies inn the promotion of the funding opportunities (e.g. ANI, FCT, IAPMEI, etc).

o Additionally, this should include the identification of the gaps in the funding instruments (type of participant institution, type of consortia, budget size, technological maturity), i.e. better alignment with stakeholder needs and European and National priorities.

• Increase alignment between European and National policies and guarantee the availability of national funds for the required relevant co-funded instruments

o Industrial Technologies in HEU are very aligned with the Industry and Manufacturing 2030 R&I Agenda, developed by FCT in collaboration with the national research and innovation stakeholders, which indicates a research and innovation community prepared to capture funding from this European program. Nevertheless, several steps might be of high importance to increase policy alignment, i.e.:

- o Increase PT representation in European partnerships and working groups
- o Promote dialogue with stakeholders and representatives from National and European policies

• **Mobilize and involve Portuguese** *stakeholders* targeting European initiatives, funding instruments, networks, thematic associations, European Partnerships and their relevant advisory boards and broaden the range of actors that might benefit from the opportunities promoted under Industry related instruments. In order to attain such goals, the following steps should be taken:

o Further stimulate national stakeholders to know the existence and participate in initiatives that are of high importance, by engaging in information and capacitation activities.

o Share good practices, successful methods, and do's and don't's, with the help of experienced stakeholders in participating in such initiatives.

o Engage catalytic actors, such as, CITs, COlabs, Associations, Technological infrastructures, Hubs, that help to reach a broader range of stakeholders. This may include large project consortia in relevant areas, e.g. MOBILIZADORES, DIGITAL HUBS, PRR.

o Promote funding instruments and networking events, as well to encourage participation

• Social Sciences and humanities. As stated in Industry 5.0 initiative, SSH are of great importance in ensuring the sustainable development in the industrial sector – industrial and digital evolution should be done alongside with human-centric perspectives, i.e. wellbeing, skills, health, safety. PT is focused on adopting a human centred production approach and can take advantage of its expertise already in, qualification and requalification processes of human resources, recruiting and integrating human resources and models for their valorization in the factories of the future and models of behavioral orientation and welfare and safety of human resources. As an example, the recently established CoLABOR CoLab as well as experienced social sciences research centres related with this area can also contribute to increase PT participation.

2.4.3. Cluster 4 | Space

SCOPE

Research and Innovation are fundamental elements to maintain the competitiveness and reinforce the autonomy of the European Space ecosystem. As an overreaching document, the Strategic Research and Innovation Agenda (SRIA) for EU-funded Space research supporting competitiveness was prepared during the last years in order to provide coordinated guidance and recommendations for Horizon Europe on the strategic R&I needs to support competitiveness of the EU Space Sector and reinforce independent access and use of space. Research on these topics will complement the activities related to the Union Space Programme components and should be coordinated with other on-going activities, namely those arising from R&D within the European Space Agency and the efforts carried out at a national level by each Member State.

In Horizon Europe, Space is included in Destination 5 of Cluster 4 (Pillar 2). Topics will focus on a diversity of areas based on the guidelines of the SRIA including fostering competitive space systems, upstream and downstream technologies, reinforcement of EU capacity to access and use space, and also on the needs of the EUSP components, including the evolution of Galileo and EGNOS space and ground infrastructure, Copernicus and EGNSS applications and services, SSA, Secure Satellite-based connectivity and Quantum technologies as well as space entrepreneurship, space science and critical technologies.

From the above-mentioned topics, a Globally Competitive Space Systems Co-Programmed Partnership is being proposed whose scope will focus on topics related to Fostering the Competitiveness of Space Systems as well as those related to Reinforcing the Access to Space.

Furthermore, it is also important to highlight that space technologies applications are very transversal and benefit many sectors such as agriculture, forestry, urban planning, mobility, banking, health or fisheries, among others. For this reason, it is also essential to articulate with other clusters within Horizon Europe, creating synergies that will leverage Space applications.

In addition, it is crucial to articulate different funding sources (National, ESIF – PT2030, PRR, Horizon Europe, European Space Programme or ESA) towards specific challenges such as an Atlantic Constellation, space enabled connectivity or the promotion of downstream applications by Public and Private sectors from all domains. Different funding sources should serve to grow competences, increase TRL of key products and services with the goal to commercialize these activities and bring benefit to the ecosystem and the society.

FACTS (2014 - 2020)

In the area of Space, Portugal attracted between 2014 and 2021, 22.61 M€ of Horizon 2020 Funding, representing a return coefficient of 2.05%. From it, it is worth mentioning that Portugal received 2.36M€ in ESA managed GNSS calls. Figure XX illustrates the distribution of funding per domain, Copernicus representing nearly 42% of the funding received, followed by the development of space technologies (24%) and GNSS with 22%.





Source: ANI, February 2022 & ESA contracts database, Dec 2021

Concerning the distribution of funding per type of entity, 43% of the funding went to industry, distributed between 28% for large companies and 15% for SMEs. Research and Academic institutions received 31% of the funding and other entities, including public entities such as DGPM or MDN accounted for 26%.

Furthermore, the geographical distribution of funding shows a concentration in the region of Lisbon with over 70% of the total funding, the rest corresponding to institutions located either at the região Centro and Norte. Finally the Azores and Alentejo received a marginal percentage.

Analyzing the Portuguese participation in space related calls (excluding ESA managed calls), in H2020 there were 69 Portuguese participations in 49 projects that were selected which resulted from an overall participation of 370 participants in 255 proposals. This represents a success rate on the proposals with Portuguese entities of 19.22% (compared to 19.20% in the EU).

Furthermore, space related entities have participated in H2020 calls inserted in topics other than space, therefore creating synergies with different sectors. With these participations, Portuguese entities have had success in 27 proposals, resulting in a total additional funding for space related activities (upstream, downstream and science) of 9.8M€. The yearly funding and success rates are

depicted in the image below:



Figure 1: Portuguese Yearly funding and success rate space related calls.

Source: ANI, February 2022 & ESA contracts database, Dec 2021. (*) Success Rate for Space Calls only

At a European level, the last years have seen many significant milestones accomplished in the space sector. In 2021 the Financial Framework Partnership Agreement (FFPA) between the European Union, the EU Agency for the Space Programme (EUSPA) and the European Space Agency (ESA) was signed. This also marked a milestone for the creation of the Union Space Programme and the EU Agency for the Space Programme.

In November 2021, Portugal held the ESA Intermediate Ministerial Meeting in Matosinhos from which resulted the "Matosinhos Manifesto" on Accelerating the use of space in Europe, endorsed by ESA Member States on November 19 2021.

In addition, in February 2022, the European Union initiated a satellite-based connectivity system by proposing a regulation and boosted action on Space Traffic Management.

At a national level, it is worth noting that Portugal expanded its network of ESA BICs, going from three to fifteen centers in 2020. The incubation centers are now located all over the country (including Azores and Madeira), thus promoting and allowing for greater levels of participation through distributed epicenters of innovation. It has been noted though that participation of start-ups in Horizon 2020 projects remains small.

Ultimately, during this period a series or political initiatives have taken place in the Portuguese Space sector starting from the development of the national space strategy "Portugal Space 2030", the creation of the Portuguese Space Agency, the approval of the first legal regime for space activities (developed by ANACOM as the current Portuguese Space Authority), as well as the creation of the AIR Center to promote the socio-economic development of the Atlantic region as a multi-disciplinary and multi-national endeavor.

PROPOSED TARGETS (2021-2027)

- Launch the Atlantic constellation in international cooperation by 2025, with a focus on the socio-economic development of the Atlantic region by enabling development of innovative services and promoting the blue economy, and contributing to advance multidisciplinary scientific research on space-climate-ocean interactions;
- Develop "Planeta Digital", as a platform that should aggregate different types of data, including those that originate from the constellation, in order to retrieve and provide information and feed applications, targeting a wide range of sectors;
- Position Portuguese entities in the value chain of satellite based connectivity both at the upstream and downstream segments. Increase participation in EC programs, both upstream and downstream of the space sector;
- Increase private finance of space activities leveraging EU initiatives such as InvestEU and CASSINI;
- Foster world-class space science via ESA, ESO, SKA and EU programmes;
- Foster the space downstream activities in Earth Observation and GNSS with a focus on Ocean and Space interactions. Promote the commercialization of innovative ideas and the expansion of markets in and outside Europe;
- Building of R&D capabilities, along with capacity through the whole commercial space value chain;
- Increase the success rate, with special relevance to the participation of start-ups and SMEs.

SWOT ANALYSIS

Strengths	Weaknesses
 Strong articulation and partnerships between research institutions and the space industry. Consolidated knowledge in a wide range of technical areas. Articulation of all space activities through one single governmental organization. Strong political support to the space sector and rapid decision making. Well defined National Strategy with clear objectives and priority areas. Space stimulates innovation and inspires (through science and technology) students to follow STEM subjects, fostering the next generation of professionals of the space sector. 	 Lack of a completely developed value chain for space services. Multiple funding sources for space activities with different governing rules. Difficulties for start-ups to participate in H2020 programmes. Most SMEs lack experience of participation in European calls. Difficulties to enter major European consortiums working in EU programmes such as Copernicus and Galileo. Difficulties to raise private funds.
Opportunities	Threats
 The advent of New Space provides business opportunities for new Portuguese players. Many of the priority research areas identified in the SRIA and to be included in HE are aligned with the National Strategy. To capture private funding through Venture Capitals, in order to fund innovative ideas applied to the downstream space sector, serving different important economic sectors. Portugal is an attractive country for space related companies due to the high level of qualification of its professionals and its competitive economic conditions. National geographical position (i.e. Azores) allows better access to space in Europe. To promote and create competences regarding SSA and satcoms in order to potentiate long term opportunities 	 Lose window of opportunity if action is not taken promptly. Fail to engage Portuguese entities in space partnerships or in European consortiums working on Galileo/EGNOS/Copernicus/Secure Connectivity programmes.

STRATEGY (2021-2027)

In order to successfully implement the Portuguese Space Strategy in conjunction with the SRIA and the European Space Programme it is fundamental to promote the participation of Portuguese entities in space related activities within Horizon Europe, articulating this research with other funding mechanisms at a National, EU, ESIF or ESA level.

The Portuguese strategy for space is being implemented by the Portuguese Space Agency – Portugal Space – and is defined in the document Portugal Space 2030. The national strategy focuses on the development, construction and operation of space equipment, systems and infrastructures, namely in the area of small satellites and launchers, the exploitation of space data through space-based services and applications, such as Earth observation activities, and the development of scientific capabilities through research and education, allowing for long term sustainability of products and infrastructures.

From a policy and market point of view, the main challenges that have been identified are:

- Promotion and uptake of data, information and services and the development of the space ecosystems and downstream sectors including the development of new space services;
- Develop an innovative legal framework in Portugal to support the licensing and insurance of space activities;
- Foster the growth of NewSpace activities and approaches.

Four great programmatic challenges have been identified for the upcoming years:

- Establish, maintain and guarantee the operation of the Atlantic constellation, in international cooperation.
- The establishment of a national space innovation ecosystem, especially in the Azores.
- A downstream "Digital Planet" platform capable of integrating multiple sources of data, including space and extracting relevant information to be put at the service of public and private entities.
- Development of a connectivity ecosystem for the development of the Atlantic and the innermost remote regions of Portugal.

In addition, Space Traffic Management (STM) and space sustainability are also topics of high relevance for the country.

This is complemented by a series of priority objectives for industrial policy which aim at the development of increased capabilities towards system and subsystem leadership:

- Creation of one (or more) system integration for small satellites and high-altitude platforms relying on Portuguese suppliers.
- Foster system competences in integration of Artificial Intelligence and Earth Observation data.
- Development of system and subsystem competence in key space technology areas.
- Development of operational capabilities combined with well-developed ground segment.
- Position Portugal strategically in the field of space sustainability and space safety.
- Establish mechanisms to stimulate the collaboration between academia, scientific and R&D entities with industrial players.

Synergies with the SRIA:

In order to maximize the participation and output of Horizon Europe activities it is fundamental to foster the synergies between the National and European Union strategies in different topics such as but not limited to:

- Fostering competitiveness of end-to-end systems and associated services: R&I in stateof-the-art end-to-end Telecommunication, Earth Observation, Ground segment and data chain aspects, as identified on the SRIA, are the backbone of the three of the National programmatic challenges.
- Future space ecosystems: Priority topics identified in SRIA such as future space ecosystems and concepts (e.g. space debris mitigation) are also important elements at a National level and should be articulated with other funding sources such as ESA

programmes.

- New Industrial processes and tools and enabling technologies: the National Strategy targets as well the technological capacitation of the space ecosystem acquiring system and subsystem competences in key technology areas.
- Reinforce Access to Space. Topics related to access to space, mainly those related to microlaunchers and new launch facilities, but also those related to new technologies and concepts are also very relevant at a National level.

European Space Programme Components

Programmes such as Copernicus, EGNOS and Galileo are fundamental for the daily activities of our society and are the basis of the thriving Portuguese downstream ecosystem. In the coming years, these programmes will be complemented by new components such as Satellite based secure connectivity and SSA which combined with the later form the basis of the European Space Programme.

In order to promote the growth and success of the downstream ecosystem but also to ensure the participation in the European Space Programme components it is important that Portuguese entities early engage in the different topics related to R&I for the EUSP. These range from the evolution of the space and ground components as well as the derived services and downstream applications of Copernicus and EGNSS, research and development activities for Satcoms and SSA, space entrepreneurship, space science and critical technologies.

ACTIONS

- Promote the participation and success of Portuguese entities in Horizon Europe calls, particularly start-ups and SMEs. To this end Horizon Europe programme will be presented to the different groups of the space ecosystem and there will be a continuous update on open calls and possibilities.
- Foster synergies between different clusters of Horizon Europe by promoting the utilization of space data and technologies in other areas that do not relate directly to space but can widely benefit from space-based data and technologies.
- Foster the **participation** of Portuguese entities in a possible **space partnership**.
- Promote the **participation** of Portuguese entities to the different **missions of Horizon Europe**, through the utilization of space-based data and technology.
- Promote the **interaction** between the Portuguese ecosystem **with European space related organizations** such as EUSPA, EMSA, EUMETSAT, ECMWF, EEA, Mercator Ocean, Frontex or SatCen in order to foster the participation of Portuguese entities in procurements and grants from these entities.
- Promote the **commercialization of products and services** in national, European and international markets leveraging the investments from National (including ESA) and European funds via the promotion of Portuguese entities.
- Foster articulation of funds for the space innovation ecosystem (ESA BICs, EU funds, National funding).
- Promote collaboration between R&D and industry players to enable excellence in research and science via the definition, production and exploitation of world class

scientific instruments.

OTHER CHALLENGES

• Additional funding opportunities at European level should be considered such as the ones related to the European Quantum Communications Infrastructures initiative (EuroQCI).

2.5. Cluster 5 | Climate, Energy and Mobility

SCOPE

The main objectives of this cluster are to fight climate change, improve the competitiveness of the energy and transport industry as well as the quality of the services that these sectors bring to society.

Cluster 5 evolves from the Horizon 2020 Societal Challenges 3 - Secure, clean and efficient energy, 4 - Smart, green and integrated transport and 5 - Climate action, environment, resource efficiency and raw materials. It is expected to be implemented through packages of actions (called 'Destinations') aimed at contributing to the objectives and expected impacts set out in the strategic orientations.

Building on the previous performance of the national community in Horizon 2020 calls for these thematic areas, several challenges have been identified, including the need to:

- Create synergies and constitute a national community by bringing together the three main areas of the Cluster 5 (climate, energy and mobility) that up until now have worked in separate silos;
- Guarantee an active involvement in the European Partnerships where Portuguese stakeholders can have a role and benefit (currently the COM is proposing 11 European Partnerships for this Cluster);
- Boost the Portuguese engagement in the design of the Missions within the two Areas directly related to Cluster 5: Adaptation to climate change including societal transformation and Climate-neutral and smart cities;
- Enlarge the Portuguese stakeholder's engagement in successful proposals with a more active participation of stakeholders like CoLabs, Municipalities, Associations, Polytechnic Institutions;
- Increase the number of Portuguese coordination's and facilitate the access to international networks;
- A multi-ministerial approach is fundamental to effectively address the challenges within Cluster 5.
- Enlarge the Portuguese stakeholder's engagement in successful proposals with a more active participation of stakeholders like CoLabs, Municipalities, Associations, Polytechnic Institutions;
- Increase the number of PT coordination's and facilitate the access to international networks;
- A multi-ministerial approach is fundamental to effectively address the challenges within Cluster 5.

FACTS

Preliminary results from the first calls of Cluster 5 in Horizon Europe are encouraging. Out of the 135 proposals submitted, 29 were selected for funding (revealing a success rate of 21.48%), reaching a total of 1.59% of the EU available funding. Out of the 15.56M€ of funding, 37% was awarded to R&D centres, 18% to large companies, 14% to Higher University institutions, and 30% to SMEs and other institutions. Of the 29 winning projects with Portuguese entities, 1 is coordinated by a national institution.

Horizon Europe	#	# coordinated	EC funding	funding rate
	projects	projects	(M€)	(%)
Cluster 5 - Climate, Energy and 2021 Mobility	29	1	15.56 M€	1.59%

H2020		# projects	# coordinated projects	EC funding (M€)	funding rate (%)
SC5 - Climate action,	2014-2020	127	9	63.24 M €	2.20%
and raw materials	2018-2020	53	5	29.69 M €	1.89%
SC3 - Secure, clean and efficient	2014-2020	192	21	115.95 M €	2.70%
energy	2018-2020	99	14	60.94	3.06%
SC4 - Smart, Green and	2014-2020	68	4	29.85 M €	1.11%
Integrated Transport	2018-2020	29	1	12.08 M €	1.08%

- Portuguese participation in H2020 on the three areas that constitute this Cluster was uneven. Climate and Energy were clearly above the national average (which was 1,68%), while the mobility sector showed a lower performance rate. This is mainly due to the fact there are no big companies in the area of mobility with an active participation in H2020, with Portuguese participation being quite scattered among small SMEs, research centers and universities.
- The Portuguese participation in the area of energy has been very good, with some big companies (including the main utility, EDP) being active participants and representing a significant share of the national participation in H2020. One of the areas in which the Portuguese stakeholders have been more successful as of late has been the area of Smart Cities and Communities.
- Portuguese participation in the JTIs in the area of energy and mobility (Fuel Cells and Hydrogen, CleanSky2, SESAR and Shift2Rail) was quite limited, with funding rates close to 1% in CleanSky2 and Shift2Rail, half of that in SESAR, and close to zero in the Fuel Cells and Hydrogen.
- There are three main national Clusters in the area of mobility that can help to bring together and increase collaboration between the many small entities that operate in this area: the aeronautics cluster (Cluster AED), the automotive cluster (MOBINOV) and the railway cluster (PFP).
- Portuguese participants in climate action are mainly focused on adaptation aspects. There is a need to enlarge Portuguese scope towards the priorities under HE, namely GHG emission scenarios, climate services, and the interactions with biodiversity.
- Overall, it is understood that the current situation will serve as a good starting point for the goal of capturing around 2.5% of the total budget of Cluster 5 for Portuguese entities, which

will only be achievable with a stronger participation in the European Partnerships and an active involvement in the Mission Areas directly related to this Cluster.

SWOT ANALYSIS

Strengths	Weaknesses
 Strong PT participation in the areas of climate and energy Solid track record in the area of Smart Cities and Communities National funding to a number of entities that promote the link between industry and academy (for example, CoLabs and Clusters) fostering knowledge transfer and highly qualified jobs 	 Weak PT participation in the area of mobility Limited PT participation in European Partnerships in general PT participants in climate action are mainly focused in adaptation aspects Lack of synergies between national sectorial funds and EU funding programmes
Opportunities	Threats
 The area of Smart Cities and Communities will offer many opportunities with a Mission Area and a proposed Partnership Articulation between national funds (including structural funds) and European funds. Particularly critical for the European Partnerships, where structural funds can be considered as national commitment for cofund actions within the European Partnerships. The recent funding of important mobilizing projects (<i>Projetos Mobilizadores</i>) in the area of mobility, which can be used to leverage the PT participation in that area. 	 Large Cluster where Climate issues can be overshadowed by Energy and Mobility European Partnerships will have approximately 50% of the budget attributed to the Cluster. In the area of mobility, it is expected that European Partnerships will probably take over the majority of the HE budget It is possible that most European Partnerships will end up working as 'closed- clubs', making it hard for small PT entities to participate

STRATEGY 2021-2027

In order to increase the Portuguese participation in this Cluster, there is a need for a clear multiministerial and multi-action approach, based on the following proposed actions:

- Mobilize the national resources (in kind and in cash) towards the European Partnerships seen as more strategic. A game-changing action is the potential use of structural funds as the national commitment for cofund actions within the European Partnerships;
- Align the Smart Specialization Strategy priorities with the more strategic European Partnerships, at national and regional level, in order to make it possible to use ESIF as national commitments;
- Design the Operational Programmes (e.g., successor of POSEUR, FSE) and their related priorities at national and regional level in a way that anticipates linkages with future European Partnerships and that is sufficiently open to be flexible;
- Mobilize and involve Portuguese stakeholders in targeting European initiatives, networks, thematic industrial associations, European Partnerships and their relevant advisory boards;
- Take advantage of the fact that there is a good track record in the area of Smart Cities and

Communities by actively participating in the Mission Area of Climate-neutral and smart cities and in the proposed Partnership in this area;

- Harness the power of Clusters, Associations or other entities that aggregate multiple entities to make small SMEs in the area of mobility collaborate more and increase their participation in HE. Promote networking actions between research institutions and industry, establish contacts for possible partnerships, allowing to increase and improve the articulation within the I&I ecosystem.
- Leverage the participation of the national Clusters that are funded via mobilizing projects (Projetos Mobilizadores);
- Leverage the participation of the main players that are active in the areas of energy and mobility, using them as 'lighthouses' with the potential to attract new Portuguese stakeholders to HE;
- Enlarge the Portuguese stakeholder's engagement in successful proposals with the more active participation of stakeholders like CoLabs, Municipalities, Associations, Polytechnic Institutions, etc.

Within the three thematic areas of Cluster 5, the following national priorities have been identified:

- Climate services and decision support systems there is a potential for companies and research centres to increase their engagement in these areas of the Cluster 5;
- Green Hydrogen explore the synergies of the priorities defined by the national strategy for hydrogen²⁴, published in July 2020, with the EU hydrogen strategy:
 - Promote a strong engagement of Portuguese stakeholders, namely CoLabs, in the Clean Hydrogen for Europe partnership;
 - Maximize the impact of Portugal's participation on an IPCEI in Hydrogen;
 - Use structural funds to leverage the participation of Portuguese entities in European; initiatives in the area of Hydrogen;
- Batteries explore the synergies of national infrastructures and natural resources with the EU partnership on Batteries and the opportunities for the industry and transport sectors;
- Smart Cities and Communities this is an area in which Portuguese participation has been quite robust, and which will offer many opportunities in HE, with a dedicated Mission Area and a proposed Partnership:
 - Involve as many Portuguese cities as possible in the initiatives deployed within the Mission Area of Climate-neutral and smart cities.
- The railway sector rail transport is of crucial importance for the future of the mobility sector, as it is one of the more sustainable ways of transportation and it will play a fundamental role in the reduction of the carbon footprint of the transport sector;
- The aeronautics sector there has been a robust participation in the Clean Sky 2 partnership from the most active players in the Portuguese aeronautics sector. It is important to explore the potential to expand this participation under the new Clean Aviation partnership and to bring in new players.

2.6. Cluster 6 | Food, Bioeconomy, Natural Resources, Agriculture and Environment

SCOPE

Cluster 6 will contribute to advance the knowledge, the development of capacities and innovative solutions towards a sustainable management of terrestrial and aquatic (both oceans and inland waters) natural resources, including measures for fighting climate mitigation, biodiversity decline and for reducing environmental degradation and pollution in the frame of a circular bioeconomy. Cluster 6 mainly evolves from the H2020 societal challenges (SC) 2 (Bioeconomy, including BBI) and 5 (Climate Action) thematic areas, and the Biotech part of the NMBP programme. It is expected to be implemented through packages of actions (called 'Destinations'²⁵) aimed at contributing to the objectives and expected impacts set-out in the strategic orientations.

Given the good performance of the national community in the H2020 calls of the above-mentioned programmes, it is considered that these thematic areas in HEU will bring new challenges by:

- Bringing together several fields and actors, from the areas of Environmental and Rural Economies, Environmental and Earth Observation, Biodiversity, Natural Resources, Circular Systems, which creates a challenge as they must create new communities, synergies and networks in order to ensure a positive participation.
- Demanding a lot in terms of national resources and different participation approaches in the large amount of partnerships (Accelerating farming systems transition; Animal health & welfare; Environmental observations; Biodiversity; Blue Economy; Safe and sustainable food system; Water4all; Circular Bio-based Europe) that cross-over with this cluster.
- 3. Contributing towards all five missions envisaged for the first period of HEU, which creates both opportunities and a possible fragmentation in participation.
- 4. Articulating national and European strategies and funding instruments, through the identification of potential participation opportunities in this Cluster.

This document drafts a strategy for supporting national participation not only in HEU, but also in the framework of the Green Deal and the Next Generation EU – the recovery programme for the pandemic COVID-19 crisis.

BACKGROUND INFORMATION | FACTS

Data of PT participation in H2020 thematic areas that are relevant to Cluster 6 (latest officially published call results, 2014-2020) and in the first Horizon Europe call (preliminary results)

Horizon Europe		# projects	<pre># coordinated projects</pre>	EC funding (M€)	funding rate (%)
Cluster 6 - Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the	2021	57	2	23.9	2.4
bioeconomy					

H2020		# projects	<pre># coordinated projects</pre>	EC funding (M€)	funding rate (%)
SC2 - Food security, sustainable	2014-2020	167	5	63.1	2.4
maritime and inland water research and the bioeconomy	2018-2020	78	3	33.2	2.2
SC5 - Climate action,	2014-2020	119	9	62.9	2.2
environment, resource efficiency and raw materials	2018-2020	52	5	30	1.9
	2014-2020	14	2	10.4	3.6
BIOTEC (NMBP)	2018-2020	5	1	4.7	4.1
Bio-Based Industries	2014-2020	26	4	13	1.6
Partnership (BBI JU)	2018-2020	15	3	8.9	2.8

**Values of funding rate percentage in green are above the PT investment 1.6 %, in red are below

- SC2 and SC5 have high success rates when compared to the national average, with actors that bring a solid participation experience into HEU.
- In SC2 over 50% of participants are from the academic sector (most of which with experience in previous Framework Programmes (FPs), some taking on the role of coordinator). Over the last years of H2020, there was an interesting growing trend of participation of actors in the different value chains from the industrial sector (~30%, of which >80% SME) and from other entities, such as farmer and forester associations, public administration, regional authorities, municipalities, farmers, foresters and other innovators (15%).
- PT is especially successful in the area of blue economy/blue growth: 40 projects approved (totalling 69 participations), with 3 national coordination's. This amounts to 17,7 M€ retained by national entities, which corresponds to a national return rate of 3.7%
- In SC5 there was a strong participation in areas such as water and waste, both potentially interesting areas for Cluster 6. This is reflected in the participation of large utilities companies.
- One particularity of PT participation in SC5 is that the weight of companies is low (28%) particularly when compared to the weight of actors from academia (~45%). The amount of funding captured by Municipalities is particularly relevant in demonstration projects, where Lisbon and Porto took the role of leading cities (~67% of the 7 M€). The potential of creating diversified national consortia in these cases is significant.
- The interactive innovation model (MAA, Multi-actor approach) promoted during H2020 in both SC2 and SC5 contributed to bridge the gap between science and practice, thus increasing the participation of entities such as non-governmental and user associations, and continues in HEU. The potential to attract other entities such as municipalities, users' associations is far from being exhausted.

- PT has a strong base of actors in the Biotechnology sector²⁶ with a high success rate particularly in the area of blue biotechnology, which in H2020 appeared under SC2. The fragmentation of the Biotech sectors across different areas of H2020 (for example green, red and white appeared under SC5 + SC2, SC1 and NMP+B, respectively) hindered national participation. Under Horizon Europe Cluster 6 the Biotech blue, green and white sectors will appear together.
- In the Biobased Industries partnership (BBI) PT has a good participation, which has been increasing in the later years. In addition to some newcomers, the actors have the same profile as those usually participating in biotechnology-related calls (white and blue biotechnology). The initial focus of this partnership on forest-based feedstock was enlarged, now encompassing areas such as agri-food and aquatic, which proved to be beneficial for PT stakeholders, as for example for a biotechnology SME that became BIC member and is now coordinating a 6.6 M€ Demo project.
- In addition to the traditional calls for collaborative projects under the above-mentioned programmes, PT has also been actively involved in 14 cofund instruments in thematic areas related to this cluster, and this experience should leverage PT's participation in the future partnerships and missions under HEU:
 - SC2: 4 ERA-NETs (Animal production, Marine technologies, EU-Africa R&I on food & nutrition, Blue economy) and 2 EJP (One Health and Soil)
 - SC5: 7 ERA-NETs (Biodiversity, Water, Earth observation, Climate services, Aquatic pollutants)
 - NMBP: 1 ERA-NET (Biotechnologies)
- The successful participation of the PT community in other parts of H2020 (ERC, MSCA, INFRA) are also expected to leverage future participation in this Cluster.
- Lastly, PT's involvement and experience in the PRIMA²⁷ programme (2018-2028), directly managed by the PRIMA foundation, focusing activities in areas dealing with water, farming systems and agri-food value chains, should also contribute to a successful future in HEU.
- Preliminary results from the first Cluster 6 calls under Horizon Europe, show very promising results for the PT community. A total of 199 proposals were submitted, of which 57 were selected for funding (success rate of 28.6%, in line with the overall success rate), corresponding to 2.4% of the EU available funding. Out of the 84 entities participating in the selected projects, 15 are participating for the first time in the European R&I Framework Programs and ~48% of the total funding allocated to PT entities (23.9 M€) is directed to companies (11.4 M€).

SWOT ANALYSIS

Positive	Negative
 Strengths Builds-on entities, communities and networks with good track records in H2020 National strategies²⁸ and action plans (e.g. Circular Economy, Climate Adaptation and Forests), with the bioeconomy concept appearing in several of the strategies. These strategies involve active participation of the R&I community. A set of national entities intending to facilitate the link between industry and academy [Collaborative Laboratories (CoLab), Competitiveness Clusters, Technological Innovation Centres (CIT), Incubators, Competence Centres (CC) and Operational Groups (OG)]²⁹. Dedicated R&D agencies such as PT Space and Air Centre that facilitate the dynamization of communities and provide specific national support. Existence of a large pool of highly qualified researchers with H2020 experience. High participation in national R&D funding programs such as the ones managed by Portugal 2020. Existence of sectorial funds (eg. Fundo do Ambiental, Fundo das Florestas, Fundo Azul) and prizes. European and international funding programs focused on themes important for the cluster (e.g. Life, Blue Ocean). The EEA grants is a particular example of bilateral cooperation mechanism. The participation of the PT Bioeconomy sector in the BBI JTI 	Weaknesses• Traditionally, a small percentage of private sector participation: • Not enough large companies • PT SMEs are not well connected with PT large companies• Complicated landscape of opportunities that paints an unclear pathway to a successful participation• Lack of sustainability over time in the different types of structures at national level• Fragmented ecosystem at national level with some overlap of roles an unclear perception of the national system by international counterparts• Lack of strategy in HEU participation in most institutions, in some cases due to lack of specialised HR• Researcher careers do not sufficiently value participation in EU projects• Lack of synergies between national sectorial funds and EU funding programmes• In the past, the PT participation in partnerships suffered from the budget limitations• Lack of clear signposting of opportunities between all funding programmes
 Opportunities The cluster approach invites a cross-fertilisation of actors and a synergetic approach between value chains allowing the creation of new networks and lowering the entrance barrier. A National Action Plan for a Sustainable Bioeconomy Horizon 2025, developed in collaboration with entities from different areas and aiming to accelerate the transition of the Portuguese economy to a sustainable and circular bioeconomy model, aligned with the Recovery and Resilience Plan. A new set of partnerships allows for an early engagement The use of ESIF partnership participation as national commitment under more favourable conditions Use of sectorial funds to catapult synergies among national and international instruments. 	 <u>Threats</u> Difficulty in participating in partnerships as a strategic tool by national entities A high proportion of the Cluster's budget allocated to partnerships may be less open to national participants as not all the budget will be allocated to transparent competitive schemes. Difficulty in mobilizing national financial resources that would allow for a more efficient participation in partnerships Poor alignment of regulations between HEU and ESIF that hinders easy access to structural funds for national contributions and other synergies

STRATEGY 2021-2027

This cluster builds-on strong existing entities, communities and networks, that need to work together and upon which the strategy is envisioned. Of these the following are highlighted:

- Water community that has created a national partnership that is able to mobilize its members to take advantage of international opportunities. It aggregates the research entities, private sector and associations.
- Earth Observation community, with a good track record in international networks has a significant number of SME that may help to increase the private sector in this cluster. A good articulation with PT Space and the Space Cluster AED is being promoted.
- End-users that have participated in big demonstration projects (such as municipalities or others), which makes them de facto hubs of national networks, opening-up opportunities for leveraging new networks and international projects. Some municipalities such as Almada, Évora, Cascais, Torres Vedras, Guimarães and Águeda have already begun to follow the examples of Lisbon and Oporto
- Agro-Food and forestry community is dominated by a group of high education institutions that closely collaborate with research and sectorial competence centres. Many innovative SMEs are extremely active in this area (several of them are H2020 SME instrument winners) despite the limited attractiveness of the top-down approaches.
- Marine and maritime sector aggregates a very diverse and strong set of skills and competences with high success rates in dedicated instruments. The ocean, including climate interactions, are considered a national strategic area both in Smart regionalization strategies and R&I national strategy. The PT community in this area has the potential to be further expanded and valued at international level.

• **Industrial biotechnology and circular economy community** has a demonstrated good track record with good international networks, with the potential to improve when considering the scope of this cluster.

A six-tiered strategy is proposed:

- 1) Building on PT strengths
 - a. Continuing networking with the scientific and private sector communities that already participate, communicating the new Cluster and destination format as well as signalling opportunities in Missions and Partnerships.
 - b. Engaging the different networks and communities in the implementation of the current mission areas, namely promoting the active involvement of PT communities.
 - c. Utilizing national networks of <u>Collaborative Research Labs</u> (CoLabs), Technological Innovation centres (CIT) <u>Competence Centres</u>, <u>Competitivity Clusters</u> (such as Agrofood, AED space, Wine and Vines, Sea, Sustainable Habitats, Smart Cities,) and municipalities to identify opportunities.
 - d. Working closely with entities from relevant Ministries, such as the Ministry for Agriculture, Ministry for Environment, Ministry for Seas, and Ministry for Cohesion, Ministry for Health, as well as with state research laboratories (INIAV, INSA and IPMA) and other relevant institutions (DGADR, DGAV, DGPM, ICNF) that are not only potential participants but are also responsible for developing and implementing national policies.
- 2) Engaging newcomers:
 - a. Using the various CoLabs to promote the opportunities in the Cluster as well as those in the Missions and partnerships
 - b. Working in synergy with autonomous EU structures such as EIT and Europe Enterprise Network to attract both businesses and research institutions.
 - c. Cooperating within the scope of PERIN to ensure the cross-fertilization of stakeholders between Pillars and Clusters.
 - d. Engaging the Earth Observation community showcasing opportunities for the sector.
- 3) Increasing private sector participation:
 - a. Engaging the strong and diverse landscape of thematic actors that intend to link the industrial and academic communities (e.g. CoLabs, Competitiveness Clusters, incubators and accelerators).
 - b. Increasing the synergies with EIT KICs such as climate, food and digital and the future KIC on Water, Marine and Maritime Sectors and Ecosystems.
 - c. Promoting international opportunities that can boost the participation in European Programmes, whilst exploring the already existing support networks like Enterprise Europe Network.

- d. Engaging SMEs, with those cluster-related winners of the highly competitive SME instrument (SMEi) (33/110 SMEi phase-1 winners and 5/24 phase-2 winners are SMEs with competencies relevant to this Cluster.).
- 4) Highly targeted dissemination and capacity building plan
 - a. Clearly signposting opportunities that exist in both the partnerships and missions that are of interest for this sector
 - b. Creating networking activities to integrate the different communities targeted by this cluster.
 - c. Ensuring interdisciplinarity, including social sciences and humanities, within the cluster's community through the organization of cross thematic dissemination events.
- 5) Ensuring there are synergies and funding complementarities to catapult the participation of PT entities in HEU:
 - Building on projects from other funding sources [e.g., the LIFE (Environment and Climate Action programme), the Blue Growth programme (DG MARE & EEA Grants) and FCT (e.g., the recently funded programmes for the <u>Vale do Coa Region</u> (2019) and <u>Montesinho</u> (2020)]
 - b. Creating synergies with projects funded by national sources, R&D in co-promotion and the mobilizing programmes, by working closely with ANI teams
 - c. Building synergies with the operational groups, financed by the Rural Development Programme – as in the H2020 Societal Challenge 2, participants in these groups have easier access into HEU Consortia (MAA projects).
 - d. Promoting the involvement in initiatives such as EIP AGRI and EIP Water³⁰, where PT has been very successful/active in the past
 - e. Building synergies with CAP, namely through the national strategic plan
 - f. Ensuring synergies with national sectorial funds (Fundo das Florestas, Fundo Ambiental, Fundo Azul)
 - g. Ensuring synergies with the areas for Earth Observation, Space and Digital in HEU Cluster 4 Digital, Industry and Space.

³⁰ European Innovation Partnerships (EIP) bring together relevant parties at EU, national and regional levels to streamline, simplify and better coordinate existing financial instruments and initiatives. They focus on challenges that can benefit society, modernize sectors and markets. PT community has been mobilized to participate in these partnerships and national stakeholders are actively involved in their respective implementation structures (by the end of 2019: in 28 out of 38 Focus Groups in the EIP-AGRI; in 9 out of 29 Action Groups in EIP- Water, including 1 coordination).

- 6) Promoting with the Smart Specialisation Strategy (in development), the new Innovation Strategy of the Ministry for Agriculture (and the related Competence centres R&I agendas) and the Cluster 6 destinations (targeted impacts). This entails:
 - a. A good communication with the CCDRs and policy related governmental agencies
 - b. Increased contacts with new entity-types such as municipalities and city councils, which have been showing an increase in participation.

PT PARTICIPATION IN PARTNERSHIPS

<u>8 partnerships are proposed</u>. in this Cluster (7 Cofund and 1 Article 187) that will impose a great demand for PT to participate)

An inter-ministerial approach will be of benefit in order to:

- Align the European Partnerships with the Smart Specialization Strategy priorities, at national and regional level, to be able to use ESIF as national commitments
- Design Operational Programmes (e.g., successor of POSEUR or FSE), at national and regional level, and related priorities in a way to anticipate linkages with future European Partnerships and are sufficiently open to contribute
- Continue the good network and performance developed under the current BBI and mobilizing more national actors to get involved in the European Bio-based Consortium

Table	1	-	Partnerships	for	Cluster	6:	https://ec.europa.eu/info/horizon-europe/european-partnerships-	<u>horizon-</u>
<u>europe</u>	<u>/ca</u>	ind	<u>idates-food-sec</u>	urity	en			

Partnership	Type of Partnership promoted
Accelerating farming systems transition: AgroEcology	CoFund
Animal health: Fighting infectious diseases	CoFund
Environmental Observations for a sustainable EU agriculture	CoFund
Rescuing biodiversity to safeguard life on Earth	CoFund
A climate neutral, sustainable and productive Blue Economy	CoFund
Safe and Sustainable Food System for People, Planet & Climate	CoFund
Circular bio-based Europe	Art. 187
Water4All	CoFund

PT PARTICIPATION IN MISSIONS

Four of the five missions proposed for HEU have a clear overlap with this Cluster:

- 1) Adaptation to climate change including societal transformation
- 2) Healthy oceans, seas coastal and inland waters
- 3) Climate-neutral and smart cities
- 4) Soil health and food

The 5th mission area, for Cancer, while not directly related, is also of interest for this Cluster.

A national participation in R&I opportunities that will emerge in these missions is of strategic interest. The national delegates that accompany these missions are also NCPs, thus ensuring that the opportunities will be known and signposted to the PT communities in a timely fashion.

PRIORITIES

- Promote a clear and synchronized articulation between structural funds and partnerships to allow their use for national participation in EU partnerships.
- Map the possibilities for synergies between the partnerships and missions as well as of the open calls in order to clearly signpost opportunities for stakeholders.
- Promote national participation in the partnerships and missions.
- Engage the participation of national actors in Ocean and water-related matters (including coastal and inland waters), namely the need for Ocean-Climate-Space-interactions, promoting new observation methods and solutions (Copernicus, EGNSS and digital transformation tools) across all the Clusters 6 destinations, in alignment with the national priorities;
- Broaden the range of actors that might benefit from the initiatives promoted under this cluster, including civil society representatives as well as the engagement in CoLabs, Competitiveness Clusters, incubators and accelerators and cross thematic and multi- stakeholder structures at national level.
- Promote an adequate articulation with the relevant national strategies under the ministries for Agriculture, Sea and Environment.

Pillar 3

Innovative Europe

SCOPE

To increase the Portuguese participation in Pillar 3 "Innovative Europe" of Horizon Europe (HE), PT should focus efforts and resources in four main areas (considering the state of play of the national ecosystem and the specificities of Horizon Europe (HE) instruments):

- 1. Promote the participation and connectedness of new actors: innovators, investors, knowledge transfer officers, incubators and accelerators;
- 2. Overcome funding gaps for early stage innovators and start-ups through the alignment between European and national strategies;
- 3. Undertake an ambitious promotion of instruments and branding of national actors.
- 4. Align with national thematic R&D strategies to promote the creation of specific support at national level

BACKGROUND INFORMATION

With a foreseen budget of 13.300M€, Pillar 3 of HE will focus on innovation. It will have 3 main programmes: the European Innovation Council (EIC), the European Innovation Ecosystems (EI Ecosystems) and the European Institute of Innovation and Technology (EIT).

The EIC focuses on supporting innovators (I.e., SMEs, startups, scaleups, entrepreneurs) with breakthrough ideas and market creating innovation. With a budget of ~10.000M€, the EIC includes 2 complementary instruments – the Pathfinder (projects between TRL 1-2 and 5-6 for the development of emerging technology, flexible grant-based support, mainly proof-of-concept and prototypes for technology validation) and the Accelerator (projects starting from TRL 5-6 up to market deployment and scaleup, combination of grants, financial instruments and private investment to fund extremely promising but high-risk projects, including Pathfinder projects).

It is through the EI Ecosystems that the Union will co-fund joint programmes and will implement funding schemes to support the innovation ecosystem f. So far, Eurostars 3.0 (an instrument managed by the EUREKA Association) is Pillar 3's single partnership, named Innovative SMEs. Until 2018, Portugal participated annually with 500k€ and received a top-up of ~23% from the Commission. Since 2019, a call from Portugal 2020 has allowed to increase the national contribution to the programme, although the projects funded by European Structural Invest Funds don't receive the Commission's top-up. The EI Ecosystems strand not devoted to the Eurostars-type of partnership should primarily complement EIC support and improve its performance (e.g., EIC Forum, mentoring, coaching, technical assistance and other soft skills and services for innovators).

Under Pillar 3, EIT Knowledge Innovation Communities (KICs) will continue to support entrepreneurs, innovators and researchers. EC will launch coordination actions between EIT KICs funding schemes and the EIC. At the same time, EIT KICs should be more open to all EU players, including SMEs, start-ups and entrepreneurs.

Table 2 Dortuguese	narticination in	concorning the Dillar	2 instruments (*)
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# projects			
	#Coordinated	EC funding (M€)	Funding rate (%)
Instruments	projects		

	2021	2021	2021	2021
EIC Pathfinder	9	3	7.09	8.28
EIC Transition	1	0	n/a	n/a
EIC Accelerator	2	2	9.36	2.57
European Innovation Ecosystems	6	4	2,13	2,55

(*) For the EIT KICs there is no data available

According to available data regarding the Portuguese participation in HORIZON EUROPE, the following main conclusions can be drawn:

- In the EIC Pathfinder, the majority of participants are research institutions and academy mostly due to the focus of the instrument which has the goal to finance low maturity solutions with research activities associated - nonetheless, research driven SMEs are also an important part of the participant share;
- The results of the Accelerator show a low number of funded projects but a significant funding amount. The two projects funded are led by SME: Rubynanomed and Arborea, in the field of health and biotech.
- The transition scheme is only open to the exploration of results created by previously funded H2020 projects. And the funding data by partner has not been released.
- In 2021, the participation in the European Innovation Ecosystems calls resulted in 2 PT projects approved out of 50 financed in the Women TechEU topic. On the SCALEUP-01 topic 5 projects were financed and PT participated in 3 proposals with 2 coordinations. PT also participates in the INNOVSMES project that will support the EUREKA EUROSTARS program in Portugal. The success rate of PT projects approved over the total retained for funding was 23% (6 approvals, out of 26 submissions).

Table 2 shows the Portuguese participation in HORIZON 2020 under the EIC pilot support instruments (SME Instrument Phase 1 and 2, FET schemes, Fast Track to Innovation), the EIT and Eurostars between 2014 and 2019, with focus on the years of 2018 and 2019 (last available data) and compares the % of funding rates of projects with Portugal's average turnover of 1,65%.

Table 3 - H2020 - EIC PILOT, EIT, EUROSTARS

	# projects	#Coordinated	FC fundina (M€)	Funding rate (%)
Instruments		projects		
	2014 - 2020	2014 - 2020	2014 - 2020	2014 - 2020
SME-i – Phase 1	110	108	5.35	2.54
SME-i – Phase 2	20	20	28,86M	1.33
Accelerator EIC Pilot*	4	4	5.54	1.06
FET	74	16	33.03	1.27
Fast Track to Innovation	19	5	9.22	1.82
EIT	105	n.a.	29,68	1.12
Eurostars**	28	3	0,628**	na

* The Accelerator EIC Pilot started in 2019

**Only projects funded by State budget receive EC contribution ("top-up" 23,5%) Some projects were exclusively funded by PT 2020.

According to available data regarding the Portuguese participation in HORIZON 2020, the following main conclusions can be drawn:

- The most successful instrument among Portuguese participants targeted early stage SMEs (*SMEi- Phase1* ended in September 2019);
- The successful participation of SMEs has increased, with potential to grow;
- There is low participation of companies on the FET schemes;
- In 2019, the participation in Eurostars increased with the use of structural funds (Portugal 2020);
- Low participation in some EIT Innovation Communities (Digital, Food and Raw Materials).

CURRENT SITUATION

During the last decade, a set of governmental measures to boost the entrepreneurial ecosystem (e.g. StartUp Portugal, Websummit) has emerged. The latter, together with civil society initiatives, have played an important role to foster the emergence of dynamic tech-based SMEs, with a significant weight of start-

ups. The most successful are from the ICT sector (low initial investment). Other sectors include clean tech and industry 4.0.

Nevertheless, some national specificities, which represent some real challenges to the development of a dynamic ecosystem, remain:

- The size of the national market requires an internationalization strategy for all actors. Brandi ng to amplify the best cases and change of stereotypes is needed at an international scale;
- Business development talent is increasing but is still a bottleneck.

OBJECTIVES FOR HORIZON EUROPE

The highly ambitious objective is to **reach 2%** of the funding in Pillar 3. The ambition level is revealed when considering that the rate achieved in Horizon 2020 for the themes to be included under Pillar 3 was \sim 1.5%.

In Pillar 3 the biggest opportunities will be in EIC as the budget dedicated to Innovation Ecosystems is much smaller compared (Eurostars 3 is the biggest opportunity) and the EIT model makes it difficult to monitor opportunities transparently. EIC's emphasis on innovators and companies promises to increase its attractiveness. However, it is necessary to increase national support to companies and the national ecosystem to be better prepared to compete on a European scale.

To achieve this goal, the specificities of the theme described in the following SWOT analysis should be reflected in the proposed strategy:

SWOT ANALYSIS

 Strong national strategy to support the entrepreneurial ecosystem (e.g. StartUp Portugal, Websummit); Dynamic tech-based SMEs with a significant weight of startups. The most successful are from the ICT sector (low initial investment); Increasing entrepreneurial experience; Highly qualified talent in STEM areas; Excellent participation of Financial intermediaries on InnovFin (HORIZON 2020) Financial instruments. Woltenstein Structure in the instruments and the instruments are significant disparity between male (90.3%) and female (9.7%) founders; Not adequate IP regulation to protect knowledge and its commercial exploitation. Knowledge of IP regulations is not widely available in organizations. The costs of submitting a patent are high but it is even higher to maintain it; Insufficient mechanisms for public procurement of innovation.

Opportunities	Threats
 HE focus on individual innovators and SMEs brings new opportunities for early stage ideas; The use of short evaluation cycles and focus on the needs of innovators; The integration of FET schemes in EIC (Pathfinder) may shorten evaluation cycles in this scheme. This could attract more companies since the scheme would be more aligned with market cycles; Modernize the IP regulation and give adequate financial support to SME; Increased synergies with other funds may allow to improve the alignment among EU and National funding schemes; The ecosystem is maturing at a fast pace and could use the EIC to leapfrog; Crowding the European VC market with more involvement of Portuguese Corporates in the VC game; Use of ESIF to fund Seal of Excellence. Creation of a national Competence Centre to support public procurement of innovation 	 The focus on DeepTech that still exists in the HE may limit the number of SMEs; Low international awareness and recognition about Portuguese tech companies and ecosystem places Portuguese entrepreneurs in a low-tech stereotype; Crowd out of the VC market by the EIC fund; Difficult compatibilization among risk and business potential evaluations

ROADMAP TO ACHIEVE THE PARTICIPATION GOAL

The strategy is based on the four main areas identified in the scope to achieve the participation goal:

1. Promote the participation and connectedness of new actors:

- a. Increase the participation of SMEs in Pathfinder, through the engagement of incubators and accelerators in the promotion of such instruments;
- b. In collaboration with Knowledge and Technology Transfer Offices from Universities and Research Centers, identify ideas and project results with potential to submit a Pathfinder project both in individual or consortia modalities;
- c. Promote synergies and prepare the community of innovative SMEs that participate in EUREKA and EUROSTARS projects for participation in EIC/HE instruments.
- d. Monitoring EIC projects results and identifying potential bridges to calls of Pilar2.
- e. Work closely with actors in the national innovation ecosystem, such as TTO, CIT, Colabs and consultants, to identify new business projects;
- f. Promote good practices in writing proposals, in collaboration with evaluators and consultants;
- g. Promote the participation on EEN activities and instruments that are directed to matchmaking of consortium partners;

- h. Work in close collaboration with Science and Innovation Interface professionals and structures to support their activities.
- i. Promote the EIC fund with Investors (Banco Português do Fomento, Venture Capitals and Business Angels);
- j. Increase the participation of Universities, research centers and companies on the EIT KICs as official partners

2. Overcome funding gaps for early stage innovators and start-ups:

- a. In the next set of structural funds (Portugal 2030), create instruments to support the initial phases of startups. There is a lack of seed and pre-seed funding in the national ecosystem. Portugal Ventures' call together with ANI, Inova-id is a first step;
- b. Creation of Vouchers in the framework of Portugal 2030 to support the preparation of applications to HE. These vouchers can pay consultancy for the preparation of applications and the development of studies and business plans;
- c. The next set of structural funds (Portugal 2030), includes funding instruments to support IP protection of Universities (and research centers) and Companies to promote future commercial exploitation.
- d. Ensure the continuity of the financing instrument dedicated to the Seals of Excellence (SoE) of the EIC Accelerator.
- e. Increase the formal participation of national companies in the EIT Innovation Communities and explore the EIT instruments;

3. Undertake an ambitious promotion of instruments and branding of national actors:

- a. Create an EIC community composed by "alumni" of previous instruments and promising beneficiaries and investors;
- b. Work with the networks of the Portuguese Diaspora of Scientists and Entrepreneurs to increase the awareness and networking of national actors.

4. Align with national thematic R&D strategies to promote the creation of specific support at national level

- a. Promote the creation of specific funding support for sectors such as Health, which will support phases such as clinical trials, in cooperation with AICIB;
- Promote, within the scope of the Eureka Network, multilateral cooperation initiatives for sectors such as Space in alignment with the "Portugal Space 2030" strategy and in collaboration with PT Space and the Air Center;

In addition to these actions, maintain the discussions in international fora (e.g. Programme Committees, EIC forum, EIT and Eureka):

- Defend bottom-up approaches and SME friendly implementation procedures (short evaluation cycles and low bureaucratic requirements);
- Ask for accountability of Pathfinder Program Managers to member states to increase the alignment of national and European strategies;

- Promote and defend policies supportive of emergent ecosystems (such as the Portuguese) and their international connections. The Portuguese presidency of the council in the first semester of 2021 and the Portuguese Chairmanship of Eureka (2021-2022) are privileged opportunities;
- Propose a fast track between the EIC Fund and the InvestEU: The SME Funded by EIC should be visible and attractive for the Invest EU community.

Horizontal Pillar

Widening Participation and Strengthening the ERA
Widening Participation and Strengthening the ERA (WIDERA) encourages leadership and the fulfilment of the collective and individual R&I potential through **mentoring**, **networking**, **communication** and **partnering** activities. Assuming the role of pre-portal to other funding schemes, synergies with other types of funding are particularly relevant, namely National and European Structural and Investment funds (and other types of HE funds). The WIDERA programme is under continuous design and update, and new funding instruments may be introduced throughout WIDERA lifetime and in line with the New ERA Communication. The WiDERA has a budgetary allocation totaling *ca*. 3,400 M€, out of which *ca*. 3,000 M€ to the section of *Widening Participation and Spreading Excellence*. Activities with linkages to the other three Pillars of Horizon Europe will be implemented, as well as complementary instruments to the Erasmus+ Programme to build synergies between the ERA and EEA. The strategic design of WIDERA is schematically described below (Figure 1 and Figure 2).



Figure 1. Overall strategic approach and rationale behind the design of activities to be implemented in WIDERA.

• Disparities between national R&I systems (R&I divide is a reality), which translate into low participation levels and below average success rates;

- · Information and language barriers;
- · Lack of professional contacts and research networks, as well as supporting management/administrative structures;
- Lack of leadership experience and specialised training at research organisations in proposal submission and transnational collaborative projects;
- Low connectivity and little experience in cross-country cooperation;
- · Generally, low focus on R&I in policy and in business and few options for exploitation of research results at the national level.

Capitalising on synergies with other policy domains and funding programmes;

- Consider other parts of the Framework Programme and cover also actions to be undertaken by MS and regions themselves;
- Strive towards more excellence and promote a more inclusive approach in which all can participate and from which all can benefit.



Figure 2. Type of activities to be implement in WIDERA.

Considering the current state of the art regarding the Work Programme and budgetary allocation, the following sections concern main widening actions, which account for more than 80% of the budget of WIDERA. Nevertheless, from a global strategic perspective, it is important to highlight the need to establish synergies with the other 3 Pillars of Horizon Europe, and a streamlined national strategy and culture of collaboration as follows:

- COST, Twinning and ERA-Talents: institutional, individual networking and intersectoral mobility. All instruments represent an entry point to the European Research Area considering its objectives, and they all are stepping-stones towards instruments/programmes of another dimension within widening itself, namely European Universities Initiative, ERA-CHAIRs, Excellence Hubs, Teaming or Hop On. Also important in the context of the "ERA Part" of the Work Programme, namely the Calls on Reforming and Enhancing the European R&I Systems, it is important to make use of COST and Twinning to establish strong consortia for the different Calls, due to their strong alignment with the New ERA Communication. On the other hand, these networking tools will allow for higher participation levels and success rates in Pillar II and III of Horizon Europe;
- **ERA-CHAIRs: establishing research groups of reference in widening countries.** Attracting (and maintaining) excellence researchers to widening institutions and to establish long term institutional strategies according to this funding scheme are at the core of ERA-CHAIRs. However, it is critical that this is connected to Twinning, or anticipates or complements Teaming, Excellence Hubs, ERC or MSCA proposals (including the Balanced Brain Circulation scheme);
- **Excellence Hubs and Excellence Universities:** both instruments are introduced in horizon Europe to fulfill identified gaps in the linkages between academia and industry and the whole regional innovation ecosystem, and between the ERA and the EEA, respectively. Regarding the Excellence Universities, it is complementary to the European Universities Initiative (funded

under Erasmus). Important are the connections between the Excellence Universities and the Calls on Reforming and Enhancing the European R&I Systems (e.g. Acceleration Services, Gender, Ethics, Communication). Excellence Hubs builds on the consolidation and transnational cooperation between widening ecosystems (local or regional). Links to CoLABs and Science and Technology Parks implemented at the local or regional level represents a priority. Local authorities play an important role in Excellence Hubs, also as a pre-portal to Teaming or to the internationalization of ecosystems in Portugal;

- Teaming: institutional building. This is the funding scheme of larger dimension and the one that demands a strong articulation with the three main Pillars of HE, as the successful implementation of a Centre of Excellence depends on the capacity to attract highly qualified human resources, competitiveness in R&I at the international level, links to research infrastructures, and a consolidated local/regional ecosystem of research and innovation. In addition, it epitomizes the need to engage the whole knowledge value chain and articulate funding sources (national, structural and European), including the Regional Authorities. It is fundamental to ensure legislation and regulations at the national/regional/local level that are compatible and adapted to the demands of Teaming. Teaming will have more than 800 M \in available in Horizon Europe, almost 1/3 of the Widening Programme, and the widening countries more capable of efficiently implementing synergies between funding sources will win the race in this emblematic instrument for reform and transformation of national systems of science, technology and innovation;
- **Hop On. Joining selected consortia in Pillar II and the EIC:** although the model of implementation is limited to the mentoring of widening partners, this instrument will allow PT to join selected projects under Pillar II and the EIC Pathfinder that are willing to welcome widening participants. This can represent a preliminary step towards the leadership of European consortia, and it will allow for benefiting from a training platform for research support offices, and an alternative entry point to the ERA;
- . Reforming and Enhancing the European R&I Ecosystem. Competitive Calls, without particular emphasis on widening countries: this is commonly known as the "ERA Part" of the Horizontal Activity, and it is foreseen a proliferation of Calls in flagship topics, namely gender equality, ethics, open access, knowledge transfer and IPR, science communication, citizen science, higher education, research managers, and policy making. From a strategic standpoint, discussion groups will be established taking advantage of the National Promotion Network, which in turn will result in strong intranational consortia. Aligned with the participation of national institutions and national researchers and innovators in networking instruments, this will lead to higher success rates in these open and competitive Calls.

MAIN WIDENING ACTIONS:

1. Teaming, Twinning, ERA-Chairs, Excellence Hubs, European Excellence Initiative

SCOPE

Herein, it is provided an overview and analysis of the Widening main actions. COST is analysed in detail in a separate section. From a strategic standpoint, it is important to highlight:

- **Participation Levels and Inclusiveness.** Acting under the principle that excellence is everywhere, and that asymmetries exist due to the lack of established networks, infrastructures, and resources, Portugal will make use of the main widening actions to empower institutions and individuals, with a particular emphasis on less connected regions and with lower participation levels (mimicking the principles of WIDERA at the national level);
- Leveraging and Articulating Funding Sources. Considering the type of funding offered by the main widening actions, where the main focus is not on research itself, it is relevant to leverage and articulate national funding (at the level of human resources, research projects, R&D Units and the National Roadmap of RIs), as well as exploring, when appropriate, the use of structural and investment funds (e.g. Teaming, ERA-Chairs, and Excellence Hubs). Less than 25% of the R&D Units funded by FCT concentrate more than 85% of the European funds. Structural funds dedicated to R&I are executed at 65% rate, ranking Portugal as one of the top performers in this respect. Both factors describe the potential for growth in terms of diversification of participation and synergies of funding sources. Primary condition for success is to ensure legislation and regulations at the national scale are compatible with the demands of WIDERA;
- **Synergies and the Pathfinder Character.** It is important to establish bridges and take advantage of the complementarity of all widening actions. PT participation in the main widening actions should provide a stepping-stone towards other funding schemes (across all HE Pillars and other Programmes). Important to use the full potential of the pathfinder character of WIDENING actions, and to analyse the short/medium term effect in the participation in other FP instruments (and to build success stories with Widening activities as a starting point);

MAIN WIDENING ACTIONS IN GENERAL

- The Main Widening Actions represented 1,1% of the overall Horizon 2020 budget, i.e. ca. 900 M€ (2014-2020); Total number of projects funded in H2020: 499 (122 with PT participation and Portugal was able to attract, under H2020, 107 M€, 11.7% of the available funding);
- In Horizon Europe, Widening will have its budget tripled to around 3.000 M€. Teaming, ERA-CHAIRS, COST, Twinning, Excellence Hubs and European Excellence Initiative accounting for the majority of the budgetary allocation. Teaming, as mentioned above, will have around 850 M€;
- Major projects: Teaming (around 40-50 M€ for 6 years, but only 15 M€ coming from Widening), Excellence Hubs (5 M€, 4 years), ERA-CHAIRS (2,5 M€, 5 years), European Excellence Initiative (2 M€, 3-4 years), Twinning (1,5 M€, 3 years).

FACTS: Widening during H2020, current Status and Objectives to 2027

Portugal in Widening (stats under H2020,)

Data: Extraction on January 2022.

	Horizon 2020		Horizon Europe		
	PT Status	Total	PT Objective	PT Status	Total
Number of Proposals submitted	593 (17%)	3526	1000-1200 (15%)	20	138
Number of Projects Approved	122 (24%)	499	150	6	24
Success Rate (average)	20,6%	14,2%	15%	30%	17%
Global overview on budget allocation to PT	107 M€ (11,7%)	920 M€	300 M€ (10%)	2.3 M€ (6%)	39.7 M€
Contribution to the glo	bal PT objective of 2.0	15%			

SWOT ANALYSIS

Strengths	Weaknesses
 Very targeted actions addressing gaps in international networking, institutional building and attraction and retention of human capital; All R&D institutions are a potential applicant and Widening objectives are diverse enough to accommodate different institutional strategies; Portugal is an outlier in the EU13 picture, and takes great advantage of the funding instruments (corresponds to 11.5% of total EU funding PT receives; 17% of applications and 24% of total projects funded with PT participation); 	 Restrictive budget in all actions (in essence they do not fund research itself); Lack of synergy and articulation between European structural and investment funds, national funds, HE funds, at the moment; Less developed regions generally excluded from Widening funding; Although Widening countries directly benefit from the programme, there is still a significant share of the budget being directed at the benefit of non-widening entities; Insufficient focus on institution governing and management; PT: Low participation levels in Teaming (8 proposals submitted and 3 funded in H2020; half the projects compared to Cyprus); PT: Social and Humanities with little participation in Widening Actions; PT: Diversification of participation levels is critical. Not only the less developed R&D institutions should participate. Institutional growth is a dynamic process
Opportunities	Threats
 Pre-Portal to other FP programmes and funding schemes: higher success rate for those who are active participants in widening actions (including COST); Structural change and talent attraction will boost the Portuguese research system and will help connecting our pockets of reference, including building national cohesion and convergence in R&I Teaming offers a very significant funding opportunity for the creation of new national centres of reference. Dedicated support strategies and policies from government and regional authorities, using structural and regional funds can foster and leverage Teaming proposals; Raise awareness in the community, particularly Social Sciences and Humanities, and Environmental sciences; Participation levels can be increased: several institutions with high research potential and critical mass are not successful in Widening. Particular attention dedicated to the Outermost Regions; Health Sciences has the largest share of funded projects (PT): 54% (establish links to Pillar I and Pillar II and take advantage of the PERIN cooperative framework) 	 Teaming: difficulty to unlock the complexity normally associated to complementary funding and to the dependence on national legislation and regulations. Administrative procedures, flexibility and simplicity are necessary; Need for national and regional strategies to take advantage of the Teaming funding scheme; Greece is now part of the Widening community (a strong competitor) and Poland is now unlocking their potential, as well as other widening countries who have been benefitting from the programme over the last years; Insufficient NCP training in proposal pre-checking and in business plan writing; In a post-pandemic era, how to go back to the short-mobility levels of 2019 and how new ways of networking will affect the Widening Programme?

MAIN STRATEGIC ACTIONS (2021-2027)

- PT should be able to take advantage of the conceptual design of Horizon Europe and the definition of Widening as an horizontal pillar. All Widening Actions should be linked to the other 3 Pillars, and from a strategic point of view the visibility of the programme in attaining this goal should be increased;
- Participation Levels. Promote the decentralisation of candidatures at the national level. Increase support to less active R&D Units and raise awareness to the use of structural funds. Capitalise the experience gained during H2020 to increase participation levels, considering the budget will at least duplicate in Horizon Europe;
- Synergies and Leveraging Different Funding Sources. Teaming and Twinning: establish synergies with the Roadmap of National R&I Infrastructures, and top performing R&D Units (at least the top 200 funded by FCT), and COST (PT participants). Explore the linkages to the Erasmus Programme and the European Universities Initiative (via Twinning and Teaming or via Excellence Universities Initiative). Leverage the FCT Protocols with the Diaspora and make use of Programme REGRESSAR in the context of the ERA-Chairs;
- Success Rates in Larger Projects. Widening budget has tripled and this increase is only notorious in instruments promoting large projects like Teaming, Excellence Hubs and ERA-CHAIRs. Portugal has had a high success rate in Widening (almost 25% of the total projects approved had PT participation) but this is not accompanied by funds transferred to Portugal (11%). Success in Teaming, Excellence Hubs and ERA-CHAIRs will be critical to attain the objectives proposed;
- Widening Advisory Board. Create an Advisory Group for Widening composed by H2020 success stories and coordinated by the Widening Delegate (include at least one Twinning, one Teaming Phase 2 and one ERA-Chair);

2. European Cooperation in Science and Technology (COST)

SCOPE

COST funds networking activities and individual applications in a consortium environment, privileging young researchers, and with a specific commitment to the widening countries. COST, as other Widening instruments, acts as a pre-portal to other funding schemes.

Thus, PT strategic approach to maximise the benefits of the programme focuses on:

- Young Researchers and Spotting Talent. Empowerment of the young generations in all scientific and technological domains, and on the increase of their participation levels in COST (currently at 37% of PT participants). COST provides a scouting platform to spot talent in articulation with national PhD. grantees, Scientific Employment Junior Researchers, and other beneficiaries of individual programmes funded at the national level;
- Leverage National Projects. Leverage nationally funded projects and provide a European and International environment to PT researchers making use of COST networking tools as a complement to the nationally funded research. Continue linking individual participations in COST to nationally funded projects;
- Brain Circulation and Collaborative Patterns. Analyse the collaborative patterns of PT participants in COST by interlinking leadership positions in COST activities and brain circulation with the scientific domains of COST Actions, to build critical mass in emerging scientific fields, help the decision-making process of bilateral and multilateral agreements, and anticipate PT participation and leadership in other funding schemes. Currently, Portugal attracts 2500 researchers per year from more than 50 different countries, and approximately 1500 researchers based in Portugal going abroad;
- Leadership and Career Development. PT participation in COST networking activities (including training and career development) should provide a stepping stone towards other funding schemes, embodying its horizontal nature (across all HE Pillars), and also to empower PT leadership skills in other Widening instruments. COST activities should be linked to career development, and success stories should be disseminated;
- **Complementarity to Other Programmes.** COST in Horizon Europe should reinforce the synergies with other widening instruments (namely Teaming and Twinning), and with the ERC, MSCA and Erasmus+, and act as a pre-portal to the New ERA.

COST BENEFICIARIES AND ITS LEVERAGING EFFECT AT THE NATIONAL AND EUROPEAN LEVEL

- With an annual budget of EUR 135,000, each running network (COST Action) mobilises on a yearly basis more than EUR 10 million of nationally-funded research and innovation projects.
 There are currently more than 250 running COST Actions;
- In total COST annual budget of EUR 60 million mobilise EUR 2.5 billion of research and innovation funds per year;
- Every year, more than 45,000 researchers (of which more than 45% are early career investigators) are involved in COST networking activities;
- 88% of survey respondents stated COST has a strong impact on their careers. More than 90% of the young researchers said COST was of great importance for their careers;
- Participation in COST increases the chances of success in H2020 proposals. Presently the average success rate is of 12%, but it strikingly increases to 33% for COST participants;
- In 2018, it was approved more than EUR 480 million in projects spinning off from COST networks;
- One Euro invested in COST generates twelve Euros in return, which underpins the role of COST as a pre-portal for follow-up European funding for research and innovation. COST connects complementary funding schemes ranging from Erasmus+ to ERC grants.

FACTS: Portugal in COST (main stats under H2020, as of 2019) *

	Portugal	Average Top-5 countries (ES,IT,DE,UK,FR)
Country representation in running COST Actions	99%	99%
Number of individual participations on a yearly basis	ca. 1600 researchers	ca. 2100 researchers
Funds Transferred to Participants	ca. 1.8 M€ (2019)	ca. 2.1 M€ (2019)

Portugal ranks 6th in COST (with NL), among its current 39 Full Members.

*Source: the COST Administration only provides data internally and due to the signature of annual Grant Agreements, the information is frequently outdated. Data during the pandemic does not translate the potential of COST, and so the numbers of 2018 were kept.

PROPOSED TARGETS (2021-2027)

In this table, it is assumed the budget will increase for HEU (factor of 1,5).

	PT Present Status (2014-2020)	Top-5 Country Status (average)	PT Objective 2027
Country Participation in COST Actions	99%	99%	Maintain
Number of Individual Participations per Year	1500	2100	1800-2500
Funds directly transferred to PT participants per year	1,5 M€	2,0 M€	1,8 M€-2,3 M€
Global Overview on the budget of COST Actions	5,5%	8%	7%
Contribution of COST to the 2.000 M€ Objective	12 M€*	18 M€	18 M€-22 M€ (~1%)

*estimated by the end of 2020

SWOT ANALYSIS

Strengths	Weaknesses
 Bottom-up; Open to all; PT benefits from being a Widening Country and for being an outlier among Widening Countries; 50% of COST Budget in HEU will be directly transferred to Widening participants; 80% of COST Activities have to be widening- inclusive; Particular attention to career development and Young Researchers; Leverages nationally funded projects; Increases the success rates in other FP instruments; 	 2/3 of running COST Actions are led by the top-5 countries, which also dominate the number of proposals submitted (including the number of people in the initial consortia); More than 50% of the mobility schemes are among the top-5 countries, so brain circulation is not balanced; Top-5 countries have more people benefiting from the funds than the others. No justification compared to other countries with the same % of participation in running COST Actions (e.g. Portugal); The COST Administration does not provide information in an e-CORDA compatible format. COST should reflect collaborative and mobility patterns in Europe and beyond;

Opportunities	Threats
 COST Actions can map the internationalisation of nationally funded projects; Leverage of nationally funded research through networks; Inclusion of young researchers in networks of reference; Promote Scientific Employment and PhD. Grants through COST; Track participation in COST and subsequent success in other FP Programmes and Instruments; Increase number of proposals submitted by PT taking advantage of the Widening status; Bilateral agreements with EURAXESS on top of the one with the JRC; Link to ERC, MSCA, Erasmus+, Teaming and Twinning; Pre-Portal to Pillar II and Pillar III actions; Promote top-down COST Actions linked to Missions and/or Partnerships. 	 Increase in PT's participation is strongly dependent on the budget for 2021-2027; The fact COST does not provide information to its Member Countries diminishes its visibility; National regulations have to be fully compatible with receiving complementary funding from HE to benefit from shortmobility schemes (including MSCA Staff Exchange); Need to quickly adapt the funding scheme to virtual environments. COST needs to justify its existence in a post-pandemic era;

MAIN ACTIONS TO BE IMPLEMENTED (2021-2027):

- Continue to use virtual environments to communicate with the scientific community and to introduce the programme to the young researchers;
- Promote and stimulate the community to apply to COST funding schemes and mobility instruments dedicated to the young researchers and to avoid focusing their efforts on simple meetings;
- Map nationally funded projects participating in COST to establish synergies between EU funds and National funds;
- Articulate Scientific Employment PhD. Grants National Projects COST Action participations;
- Attract PT ERC grantees to COST in order to create a mobilising effect on the rest of the community, and transfer the individual knowledge and capacity building of the ERC to the young researchers participating in COST;
- Create synergies with MSCA and Erasmus+ at an individual level, and with other main widening actions to extend this individual growth to institutional capacity building;

- Link COST PT Participants to Pillar II and Pillar III Clusters, making use of COST as a pre-portal to larger projects and its ability to increase success rates; Increase the number of submitted proposals in every open Call with PT leadership (currently between 12-18 with a success rate of 12% in every call, above COST average);
- Guarantee access to the information PT is entitled to have and on a compatible format with the database built for H2020 and HEU. COST data should be used by Member States and its beneficiaries to understand collaborative and mobility patterns.

II. ERASMUS+

Erasmus+

SCOPE

The success of the Erasmus+ Programme at higher education level is a clear sign of recognition by Portuguese students of the personal, academic and professional advantages of their mobility for studies or training abroad. On the one hand, in the last twenty years, Portuguese students studying in Europe under mobility programmes have increased about five times, from about two thousand students in 2000 to ten thousand students in 2020. On the other hand, foreign students studying in Portugal under mobility programmes increased about six times, from about two thousand students to fifteen thousand students in the same period. This growth is associated with the recognition of a progressively integrated higher education System in European networks, oriented towards excellence. This process recently originated the European Universities Initiative, which the Erasmus+ Education and Training Agency will carry on promoting within Portuguese higher education institutions, for further development for the 2021-2027 programme.

Erasmus+ will continue to reinforce and encourage integration into European networks as a critical path to rising quality, innovation and excellence of students as well as Portuguese higher education institutions. Transition between the Erasmus+ Programme completed by the end of 2020, and the new Erasmus+ Programme for the period 2021-2027 is accompanied by modernization and reinforcement of the actions developed within the Programme scope. Thus, a strategy and an organizational and management structure were ensured, reflecting growing challenges of the programme and, above all, the reinforcement of Portugal's participation.

Mobility projects in the field of education and training are one of the actions supported under Key Action 1 – Learning Mobility of Individuals.

Education and training activities play a key role in providing people of all ages with the necessary means to participate actively in the labor market and in society at large. Projects under this Action promote transnational mobility activities targeting learners (students, trainees, apprentices, young people), and staff (professors, teachers, trainers, youth workers, and people working in organizations active in the education, training and youth fields) and aiming to:

- 2.1. support learners in the acquisition of learning outcomes (knowledge, skills and competences) with a view to improving their personal development, their involvement as considerate and active citizens in society and their employability in the European labor market and beyond;
 - 2.2. support the professional development of those who work in education and training with a view to innovating and improving the quality of teaching and training work across Europe;
 - 2.3. enhance notably the participants' foreign languages competence;
 - 2.4. raise participants' awareness and understanding of other cultures and countries, offering them the opportunity to build networks of international contacts, to actively participate in society and develop a sense of European citizenship and identity;
 - 2.5. support lifelong learning and continuous professional and personal development as a way to enhance employment and social cohesion; also vital for Europe to overcome economic challenges and respond to the demand for <u>new skills</u> and sustained productivity in an increasingly digitalised world economy;

- 2.6. increase the capacities, attractiveness and international dimension of organizations active in the education and training fields so that they can offer activities and programmes that better respond to the needs of individuals, within and outside Europe;
- 2.7. reinforce synergies and transitions between formal, non-formal education, vocational training, employment and entrepreneurship;
- 2.8. ensure a better recognition of competences achieved through learning and training periods abroad.

This Action also supports international mobility activities from or to Partner Countries in the field of higher education. It also contributes to cooperation between the EU and eligible Partner Countries and reflects the EU external action objectives, priorities, and principles:

- 2.9. enhance the attractiveness of higher education in Europe and support European higher education institutions in competing on the higher education market worldwide;
- 2.10. support the priorities identified in the "New European Consensus on Development" and the "European Higher Education in the World" Communication;
- 2.11. support the internationalization, attractiveness quality, equity of access and modernisation of higher education institutions outside Europe in view of promoting the development of Partner Countries;
- 2.12. promote the development and external policy objectives and principles including national ownership, social cohesion, equity, proper geographical balance, and diversity. Special attention will be given to the least developed countries as well as to disadvantaged students from poor socio-economic backgrounds and to students with special needs;
- 2.13. promote non-formal learning and cooperation in the field of youth with Partner Countries.

Organizations active in the fields of education and training will receive support from the Erasmus+ Programme to carry out projects promoting different types of mobility.

Erasmus+, more than in the past programmes:

- 2.14. reinforces the support offered to the participants of mobility activities in improving their foreign language competences before and during their stay abroad. A European online linguistic support service was gradually introduced by the European Commission starting from the year 2014
- 2.15. offers space for developing mobility activities that involve partner organizations with different backgrounds and active in different fields or socio-economic sectors (e.g. traineeships of university students or VET learners in enterprises, NGOs, public bodies; teachers in schools following professional development courses in companies or training centers; business experts giving lectures or training in higher education institutions, etc.)

2.16. allows participating organizations to organize mobility activities within a broader strategic framework and in the medium term. Through a single grant application, covering a period of up to two years, the coordinator of a mobility project will be able to organize several mobility activities, allowing many individuals to go abroad to different countries. As a consequence, the applicant organizations will be able to conceive their project in line with the needs of participants, but also according to their internal plans for internationalization, capacity building and modernisation.

MOBILITY PROJECTS FOR HIGHER EDUCATION STUDENTS AND STAFF

Mobility projects can take place:

2.16.1. within Programme Countries;

2.16.2. between Programme and Partner

Countries,

and comprise one or more of the following activities:

- 2.16.3. **Student mobility:** either one or a combination of **a study period** abroad at a partner higher education institution (HEI) (SMS); **a traineeship (work placement)** abroad in an enterprise or any other relevant workplace (SMT).
- 2.16.4. **Staff mobility:** either one or a combination of **teaching periods** allowing HEI teaching staff or staff from enterprises to teach at a partner HEI abroad; **training periods** supporting the professional development of HEI teaching and non-teaching staff as well as the development of involved institutions. In the grant allocation for mobility of staff between Programme Countries, emphasis will be put on training periods for HEI teaching staff that allow them to develop pedagogical and curriculum design skills.

Most of the budget of this Action supports activities involving mobility between Programme Countries. However, a limited amount of the budget available for this Action can fund international activities between Programme and Partner Countries.

Funding for mobility between Programme and Partner Countries comes from several financial instruments of the European Union for external cooperation. To ensure that this action follows the EU's external priorities, the Commission has set several targets and rules for cooperation with Partner Countries.

This Action falls under the decentralised actions of the Erasmus+ Programme, therefore being managed by *Agência Nacional Erasmus+ Educação e Formação*.

PORTUGUESE PARTICIPATION IN MOBILITY PROJECTS FOR HIGHER EDUCATION STUDENTS AND STAFF

Overall participation in higher education student and staff mobility within programme countries has consistently increased from 2014 to 2020.

Regarding student mobility, SMS is significantly higher that SMT, both outbound and inbound. Inbound SMS outweighs outbound SMS, even with numbers for 2020 inbound SMS not being available yet.

As for staff mobility, there is a smaller gap between STA and STT, both outbound and inbound, although

more pronounced for staff outbound mobility.

DATA ON THE PORTUGUESE PARTICIPATION IN

	2014	2015	2016	2017	2018	2019	2020*
Applications received	90	86	84	81	84	85	89
Applications awarded	89	86	83	78	84	85	89
Applications awarded without funding – reserve list	0	0	0	0	0	0	n/d
Applications awarded with funding – contracted	88	84	83	77	83	84	89
Grants contracted	14 830 712,04 €	14 787 676,80 €	15 368 547,73 €	17 750 256,28 €	20 257 464,91 €	23 513 801,24 €	24 832 135,00 €
Grants realised	13 520 599,24 €	13 616 783,34 €	14 744 530,60 €	15 920 719,98 €	n/d	n/d	n/d
Participants contracted	8 060	8 891	10 137	11 572	11 873	12 574	13 511
Organisations contracted	88	84	83	77	83	84	89

HIGHER EDUCATION STUDENT AND STAFF MOBILITY WITHIN PROGRAMME COUNTRIES

* Provisional data. Source: Erasmus+ Dashboard, 8 July 2020; EC BO EP012, 8 July 2020; EC BO, 10 July 2020; E+ Link, 10 July 2020.

	OUTBO	OUTBOUND STUDENT MOBILITY			INBOUND STUDENT MOBILITY			
Year	SMS (Studies)	SMT (Traineeships)	TOTAL	SMS (Studies)	SMT (Traineeships)	TOTAL		
2014	5 785	2 248	8 033	9 497	2 000	11 497		
2015	6 175	2 471	8 646	10 182	2 483	12 665		
2016	6 553	2 537	9 090	10 976	3 044	14 020		
2017	7 061	2 572	9 633	11 699	3 238	14 937		
2018*	7 492	2 898	10 390	12 402	3 609	16 011		
2019*	7 274	2 640	9 914	11 262	2 031	13 293		
2020*	7 668	2 657	10 325	n/d	n/d	n/d		
TOTAL	48 008	18 023	66 031	66 018	16 405	82 423		

* Provisional data: contracted for Outbound; to date for Inbound. Source: Mobility Tool+ and Erasmus+ Dashboard, July 2020.

Veer	OUTBOUND STAFF MOBILITY			INBOUND STAFF MOBILITY		
rear	STA STT (Training) TOTAL S		STA (Teaching)	STT (Training)	TOTAL	
	(Teaching)					
2014	1 106	447	1 553	1 723	1 076	2 799
2015	1 154	559	1 713	1 984	1 308	3 292
2016	1 250	707	1 957	2 020	1 455	3 475
2017	1 525	1 053	2 578	2 085	1 845	3 930
2018*	1 458	977	2 435	2 234	2 315	4 549
2019*	1 660	1 038	2 698	926	901	1 827
2020*	1 890	1 296	3 186	n/d	n/d	n/d
TOTAL	10 043	6 077	12 934	10 972	8 900	19 872

* Provisional data: contracted for Outbound; to date for Inbound. Source: Mobility Tool+ and Erasmus+ Dashboard, July 2020.

Overall participation in higher education student and staff mobility between programme and partner countries (ICM) has consistently increased from 2015, which is when this Action started, to 2020. Like with Mobility between Programme countries, incoming learner mobility between Programme and Partner countries is significantly higher than outgoing learner mobility. Incoming staff mobility is also higher than outgoing staff mobility, although the gap is smaller.

Unlike ICM, and worth noting, staff mobility outweighs learner mobility both incoming and outgoing.

Data on the Portuguese Participation in ICM Higher Education Student and Staff mobility between programme and partner countries

Contracted	2015	2016	2017	2018	2019	2020*
Applications received	33	33	31	40	40	41
Applications awarded	13	16	24	26	28	37
Applications awarded without funding – reserve list	7	0	0	0	7	n/d
Applications awarded with funding – contracted	13	16	23	25	28	37
Grants contracted	3 187 705,96 €	3 589 656,00 €	3 902 896,00 €	4 485 667,00 €	6 466 103,00 €	6 748 899,00 €
Grants realised	3 155 376,96 €	3 526 503,00 €	3 056 479,00 €	n/d	n/d	n/d
Participants contracted	961	981	1 410	1 439	2 096	2 421
Organisations contracted	13	16	23	25	28	37

* Provisional data

Source: Erasmus+ Dashboard, 8 July 2020; EC BO EP012, 8 July 2020; EC BO, 10 July 2020; E+ Link, 10 July 2020.

	Total participants		Incoming to Programme Country			Outgoing from Programme Country			
Year	Total Participants Awarded	Total Learner	Total Staff	Total Inbound Participants	Learner	Staff	Total Outbound Participants	Learner	Staff
2015	986	365	621	690	307	383	296	58	238
2016	1115	361	754	678	322	356	437	39	398
2017	1410	385	1025	848	276	572	562	109	453
2018*	1439	377	1062	837	269	568	602	108	494
2019*	2096	636	1460	1275	473	802	821	163	658
2020*	2421	577	1844	1449	475	974	972	102	870
Total	9467	2701	6766	5777	2122	3655	3690	579	3111

* Provisional data from 2017 to 2020: includes contracted and awarded inbound/outbound mobilities for 2020. Source: EC, BO EP017: 08/07/2022

Objectives and KPI for portuguese participation in mobility projects for Higher Education Students and Staff (2021-2027)

While aiming to increase incoming and outgoing mobility (with national additional funding for outgoing), setting a concrete goal is connected to the amount of funding that will be allocated to PT, up to 2027, and what will be the distribution by sectors and by actions. While this is the case for Mobility between Programme countries, in relation to Mobility between Programme and Partner countries, the situation is even more complex as such funding comes from several financial instruments of the European Union for external cooperation.

SWOT ANALYSIS

The Strengths and Weaknesses relate to the national context The Opportunities and Threats refer to the European and/or international context

Strengths	Weaknesses
 Erasmus+ is acknowledged as long standing flagship Programme of the EU Erasmus+ ranks high in the internationalization strategy of PT and PT HEI High demand for mobility PT supports disadvantaged SMS and SMT who have been awarded Erasmus grants 	 Lack of national funding to complement EU funding Not all HEI may be prepared to make the most of the opportunities afforded by the Erasmus+ Programme
Opportunities	Threats
 The Erasmus+ Programme 2021-2027 budget almost doubled in relation to 2014-2020 The opportunity afforded by the new programme to rethink national infrastructure in charge of managing Erasmus+ Phased in implementation of Erasmus Without Paper Network allows time to adapt and is expected to streamline mobility processes and decrease administrative burden 	 The breakdown between centralised and decentralised actions Uncertainty as to how the expected raise in funding under the Programme will be translated into the budget allocated to PT and the budget across sectors and actions Uncertainty as to how the recovery from COVID-19 pandemic will impact incoming and outgoing mobility Impact of the situation in Ukraine

STRATEGY FOR IMPROVING PT PARTICIPATION IN MOBILITY PROJECTS FOR HIGHER EDUCATION STUDENTS AND STAFF (2021-2027)

Overall and recovering from the COVID-19 pandemic, mobility projects show a positive level of awarded mobilities, especially regarding student mobility. SMT mobility will be encouraged in the framework of the CTeSP, since the traineeship component in these courses is mandatory and without prejudice to the linkages with the local and regional businesses. Likewise, outbound and inbound staff mobilities – STA and STT – undoubtedly have room for improvement and will be encouraged. The mobility action between Programme and Partner countries is deployed in the 2022 call.

INSTITUTIONAL STRATEGY (2021-2027)

The award of an Erasmus Charter for Higher Education (ECHE) is a prerequisite for all HEI established in a Programme Country that wish to participate in a Higher Education mobility project either as a single HEI or as a member of a national mobility consortium.

A national mobility consortium in higher education can be composed of higher education institutions holding a valid ECHE and any public or private organization active in the labor market or in the fields of education, training and youth. Therefore, in order to raise participation levels, HEI yet not holding the ECHE will be encouraged to apply to it.

Likewise, national mobility consortia will be encouraged for the diversity of institutions they allow and for the possibility of such mobility consortia applying to different actions under the Erasmus+ Programme and/or other EU and international programmes and projects.

Potential complementarities and synergies regarding common objectives between Erasmus+ and other EU instruments and flagship Programmes are foreseen. As so, better synergies and complementarities will increase coherence between expenditure Programmes and allow effective cooperation to respond adequately to societal challenges. These programmes are supported by different instruments, with independent *modus operandi* and intervention logic, different modes of management and architecture. For these reasons their interaction can generate converging effects. Synergies should be sought whenever feasible and bringing more added value. With the "Seal of Excellence" (whose terms of application are still under internal analysis), to be awarded to projects that although meeting the required quality criteria cannot be funded due to budgetary restrictions, projects may apply for alternative funding, as foreseen within the framework of the Erasmus+ Programme 2021-2027.

EUROPEAN UNIVERSITIES INITIATIVE

SCOPE

The European Universities Initiative is a flagship initiative of the European Education Area. It enables a new generation of Europeans to cooperate across languages, borders and disciplines, developing a strong European identity.

Demand for highly skilled people is increasing; by 2025, half of all jobs will require high-level qualifications. The COVID-19 pandemic has accelerated the digital transformation of higher education institutions. Yet, much more needs to be done for deep technological and structural changes to the benefit of learning and teaching, allowing for more inclusion and flexible learning approaches.

The fast-changing labor market and societal transitions require higher education institutions (HEI) to provide students, staff and researchers with the skills they need to navigate the twin green and digital transition and build a resilient society. Beyond their core tasks of teaching, research and innovation, universities are key actors in Europe, able to address big societal challenges, become true engines of development for cities and regions and promote civic engagement. The transformation of universities needs to be accelerated so young people are prepared for the jobs of tomorrow in a fast-changing society, and future generations are empowered to find solutions to big societal challenges that Europe and the world are facing. This requires a much deeper level of cooperation between universities. With its European Universities initiative, the European Commission aims at fostering excellence, innovation and inclusion in higher education across Europe, accelerating the transformation of higher education institutions into the universities of the future with structural, systemic and sustainable impact.

European Universities Alliances

European Universities are ambitious transnational alliances of higher education institutions developing long-term structural and strategic cooperation.

Alliances need a joint long-term strategy for education with, where possible, links to research and innovation to drive systemic, structural and sustainable impact at all levels of their institutions Alliances must create a European inter-university 'campus', where:

- students, staff and researchers enjoy seamless mobility (physical, virtual or blended) to study, train, teach, do research, work or share services at cooperating partner institutions
- transdisciplinary and transnational teams of students, academics and external stakeholders tackle big issues facing Europe (such as climate protection, democracy, health, big data, migration).

As a result of two calls in the framework of a pilot phase, 41 alliances are cooperating, involving more than 280 HEI, and a total budget of about \in 287 million. Each Alliance is granted up to \in 5 million coming from the Erasmus+ Programme and up to \in 2 million from the HORIZON Europe for a 3-year period. This funding agreed between the European Education Area and the European Research Area is a milestone in identifying synergies and a common agenda for the future.

Portuguese participation in European Universities Alliances

The results of the first call were announced in July 2019 and the 17 Alliances selected started cooperating in November 2019. Another 24 Alliances were selected under the second call and all 41 Alliances will be cooperating by November 2020.

The following table provides an overview of the Portuguese participation in the European Universities Alliances.

It should be noted that 3 of the 24 European Universities Alliances selected under the second call are coordinated by Portuguese higher education institutions.

		1st call	2nd call	Total
Applicant PT HEI		1 6	21	37
Selected F	PT HEI	3	7*	10
	Partner	3	6	9
Alliances with PT HEI	Coordinator	0	3	3
Total Alliances		1	24	41
		7		

* 2 HEI participate in the same Alliance

PT HEI selected in the 1st call:

- Universidade de Aveiro ECIUN
- Universidade do Porto EUGLOH
- Universidade de Lisboa UNITE!

PT HEI selected in the 2nd call:

- Instituto Politécnico do Porto ATHENA as Coordinator;
- Instituto Politécnico de Setúbal E3UDRES2;
- Universidade de Coimbra EC2U;
- Universidade Lusófona FILMEU as Coordinator;
- Instituto Politécnico de Leiria as Coordinator and Instituto Politécnico do Cávado e Ave (both in the same Alliance) – RUN-EU;
- Universidade da Beira Interior UNITA

Data on the Portuguese Participation in European Universities Alliances

In the light of the demanding requirements European Universities Alliances must meet in order to be selected, the huge interest shown by higher education institutions from across Europe and the limited funding available for the two calls held under the pilot phase $- \in 85$ million for the 1st call and $\in 120$ Million Euro for the 2st call coming from Erasmus+ – this is a highly competitive process. As a result, 35% of the eligible applications were selected under the 1st call with a slight increase to 39% under the 2nd call.

	1 st call	2 nd call	Total
Applications	54	62	116
Eligible applications	48	61	109
Selected Alliances	17	24	41

Regarding eligible applications and participating higher education institutions per country, Portugal ranks fifth in the top five performing countries in both calls, as shown in the following graphs.





The following tables provide an overview of the participation and selection rates out of the number of eligible HEI in both calls. Given that there are major discrepancies in the number of eligible HEI between participating countries, cross-country comparisons are not straightforward.

Regarding regions, the low participation and selection rates of Southern and Western Europe despite have the highest numbers of participating and selected HEI also reflects the large number of eligible HEI in these regions. If we look at the results of Portuguese HEI, the participation rate increases from 16% in the 1st call to 21% in the 2nd call, and more importantly the selection rate raises from 3% in the 1st call to 7% in the second call.

Overview of the participation and selection rates out of the number of eligible higher education institutions in the first call

	N° of higher education institutions with a ECHE	N° of higher education institutions participating in the call	% participation rate ³²	N° of selected higher education institutions	% selection rate ³³
AT	76	8	11%	2	3%
BE	74	9	12%	4	5%
BG	51	5	10%	0	0%
CY	35	3	9%	1	3%
CZ	82	7	9%	2	2%
DE	382	33	9%	15	4%
DK	42	3	7%	2	5%
EE	23	3	13%	0	0%
EL	44	8	18%	3	7%
ES	1697	33	2%	11	1%
FI	38	11	29%	4	11%
FR	1350	42	3%	16	1%
HR	46	3	7%	2	4%
HU	54	7	13%	5	9%
IS	7	0	0%	0	0%
IE	36	4	11%	2	6%
IT	291	30	10%	12	4%
LT	39	9	23%	3	8%
LI	1	0	0%	0	0%
LU	8	1	13%	0	0%
LV	50	9	18%	2	4%
MT	7	1	14%	1	14%
NL	66	11	17%	4	6%
PL	306	11	4%	5	2%
РТ	97	16	16%	3	3%
МК	25	0	0%	0	0%
RO	78	14	18%	3	4%
RS	26	2	8%	0	0%
SE	41	11	27%	6	15%
SI	89	6	7%	1	1%
SK	34	2	6%	0	0%
UK	209	5	2%	3	1%

32 Defined as the percentage of applying higher education institutions compared to the total number of eligible higher education institutions

NO	39	5	13%	2	5%
TR	190	3	2%	0	0%
TOTAL	5633	315	6%	114	2%

Northern Europe	272	51	19%	19	7.0%
Southern Europe	2361	94	4%	31	1.3%
Central and Eastern Europe	798	57	7%	18	2.3%
Western Europe	2202	113	5%	46	2.1%
TOTAL	5633	315	6%	114	2.0%

Overview of the participation and selection rates out of the number of eligible higher education institutions in the second call³⁴

	N° of higher education institutions with a ECHE	N° of higher education institutions participating in the call	% participation rate ³⁵	N° of selected higher education institutions	% selection rate ³⁶
AT	77	8	10%	6	8%
BE	76	9	12%	6	8%
BG	52	12	23%	5	10%
CY	35	3	9%	1	3%
CZ	81	7	9%	2	2%
DE	385	45	12%	20	5%
DK	42	5	12%	4	10%
EE	18	8	44%	3	17%
EL	34	14	41%	4	12%
ES	1754	34	2%	13	1%
FI	37	17	46%	6	16%
FR	1424	38	3%	16	1%
HR	45	2	4%	1	2%
HU	53	8	15%	6	11%
IE	36	10	28%	6	17%
IS	7	1	14%	1	14%
IT	302	29	10%	12	4%
u	1	0	0%	0	0%

³⁴ Note on the total number of HEIs with ECHE for France and Spain: France and Spain decided to integrate the short-cycle degrees into uppersecondary schools. As a result, *lycées* (France) and *Institutos de Enseñanza Secundaria* (Spain) which provide this type of degrees are considered Higher Education Institutions by their National Authorities. Given the high number of this type of institutions, they represent roughly 70% of the Charter holders for each country. These upper-secondary schools implement mainly outgoing mobility.

roughly 70% of the Charter holders for each country. These upper-secondary schools implement mainly outgoing mobility. 35 Defined as the percentage of applying higher education institutions compared to the total number of eligible higher education institutions ³⁶ Defined as the percentage of selected higher education institutions compared to the total number of eligible higher education institutions

LT	38	10	26%	2	5%
LU	5	1	20%	1	20%
LV	52	7	13%	2	4%
МК	25	1	4%	0	0%
MT	7	0	0%	0	0%
NL	66	14	21%	9	14%
NO	38	7	18%	3	8%
PL	309	19	6%	5	2%
PT	94	21	22%	7	7%
RO	79	19	24%	7	9%
RS	38	3	8%	1	3%
SE	41	10	24%	5	12%
SI	91	2	7%	1	1%
SK	34	8	24%	3	9%
TR	195	6	3%	3	2%
UK	208	8	4%	4	2%
TOTAL	5779	386	7%	165	3%

OBJECTIVES AND KPIS FOR PORTUGUESE PARTICIPATION IN EUROPEAN UNIVERSITIES (2021-2027)

In 2021-2027 this Initiative will be rolled-out under the Erasmus+ Programme, in synergy with Horizon Europe and other EU instruments.

As already mentioned, the year 2022 marks the beginning of the roll-out of the European Universities initiative, under the Erasmus+ 2021-2027, aimed at ensuring the continuity and sustainability of the current funded networks as well as to expand the number of participating higher education institutions, either allowing networks in operation to increase the number of partners, or through the establishment of new networks.

PT HEI should work with their European counterparts in developing strong and successful partnerships.

SWOT ANALYSIS

The Strengths and Weaknesses relate to the national context The Opportunities and Threats refer to the European and/or international context

Strengths	Weaknesses
 This being a highly competitive initiative, the approval rate of PT HEI is good Boost the international dimension and activity of PT HEI Increased synergies between education and research at institutional level PT awards additional support to the selected HEI through FCT managed PhD grants 	 Lack of national funding to complement EU funding No support for HEI either not selected or not participating
Opportunities	Threats
 New Erasmus+ Programme budget European Universities provide ground for either testing or driving forward issues such as legal entity, digital solutions and tools, quality assurance for joint degrees, European degrees Explore interlinkages with other EU programmes and instruments The political momentum highlighting the European Universities initiative: Synergies between the European Education Area, European research Area and European Higher Education Area; "Higher Education Package" adopted by the European Commission; conclusions and Recommendations at EU Council level 	 Uncertainty as to how the COVID-19 pandemic will impact European Universities, also in terms of incoming and outgoing mobility Impact of the situation in Ukraine

STRATEGY FOR IMPROVING PT PARTICIPATION IN EUROPEAN UNIVERSITIES ALLIANCES (2021-2027)

INSTITUTIONAL STRATEGY (2021-2027)

In order to raise awareness to this initiative and thereby increase the number of applicant PT HEI, it is important to:

- Disseminate and promote events targeted to PT HEI
- Assist PT HEI whose applications were not selected to successful reapplications
- Establish contact points to liaise with HEI and support those wishing to apply through FCT.

OTHER CHALLENGES

Unlike the mobility under Erasmus+, the remit for European Universities is to create inter-university "campi", where students, staff and researchers enjoy seamless mobility (physical, virtual or blended). Therefore, although the COVID-19 pandemic unarguably impacted their activity, European Universities were already keen on moving forward with digitalisation.

According to a survey among the first 17 European Universities, the majority agreed that being in a European University Alliance helped them to cope with the COVID-19 pandemic effects. Likewise, the majority also agreed that they would be better prepared if their network was already fully operational.

However, interlinking digital infrastructures across countries raises a whole new set of challenges, including choice of software, development of new tools, and data protection issues.

III. Connecting Europe Facility 2 (CEF2)

SCOPE

The Connecting Europe Facility (CEF) – Digital Programme (2021-2027; CEF2), aims to deploy the Gigabit Society, based on a safe and secure, sustainable, very high capacity digital cross-border infrastructures, hosting digital platforms and solutions (Data, Cloud, HPC, AI and Quantum Communications infrastructure) to improve digital services for the socio-economic drivers and use-cases.

CEF2 is still under discussion, but it is expected that the total budget should range from 9 to 11 B \in . Projects funded under the CEF2 Digital work programme will deploy Gigabit networks which, through their inherent cross-border nature and end-to-end quality of connectivity, will foster greater economic, social and territorial cohesion; strengthen the strategic autonomy of the Union; and contribute to competitiveness and smart, sustainable and inclusive growth throughout the EU.

CEF2 will be implemented in two Pillars:

Pilar I –5G infrastructure deployment: 5G corridors along transport paths; Gigabit and 5G connectivity for socio-economic drivers.

Pilar II – cross-border data infrastructures: sub-submarine cables of strategic importance, terabit connectivity for HPC, Pan-European cloud federation, and advanced quantum communications infrastructures (QCI).

FACTS

CEF2 is following previous the CEF Programme (2014-2020), funding three components energy, transport and Telecom (the last being accompanied by FCT/FCCN, AMA and ANACOM).

Since 2014, CEF-Telecom funded more than 40 projects, involving Portuguese entities, who have received so far, a total funding of 9,4 M \in (and additional 0,9 M \in are expected under 2nd 2019 call).

CEF- Telecom	Funding (2014-2019)
Safer Internet	1 491 636 €
Cyber Security	1 418 310 €
eInvoicing	1 251 308 €
eldentification and eSignature	1 121 016 €
Public Open Data	1 030 804 €
eTranslation	797 434 €
eProcurement	657 813 €
European e-Justice Portal	655 800 €
eHealth	638 530 €
Europeana	223 978 €
Business Registers Interconnection System (BRIS)	178 820€
TOTAL	9 465 448,70 €

The WiFi4EU initiative (vouchers to support the deployment of free WiFi access points in public open places) was implemented, so far, in about 85% of the Portuguese municipalities (a total of 308), corresponding to an investment of about 4 M \in .

PROPOSED GOALS (2021-2027)

- 3.1. CEF2 Digital implementation is expected to contribute to an increase of the coverage with fibre and **5G connectivity** of households, businesses, education institutions, healthcare centres and other socio-economic drivers, located in areas where such networks do not exist and where public support is needed. A stimulating effect on innovative 5G use cases for smart community, or business applications is also expected.
- **3.2.** CEF2 Digital is designed to lead also to a significant additional coverage with uninterrupted **cross-border 5G connectivity of transport corridors**, dedicated to use cases such as **connected automated mobility.**
- 3.3. CEF2 Digital will also contribute to the **deployment of critical**, **state of the art terabit connectivity** between infrastructures of European strategic importance such as **cloud and data infrastructure**, or **high-performance computing**. This will allow for instance, the implementation of various **data-intensive Al applications**. The aim is to make exascale computing capacity accessible to all Member States and users, including industrial ones.
- 3.4. CEF2 Digital support for **submarine cables** will result in adequate access to very high-speed affordable internet access to EU citizens and businesses located in **remote areas or islands**, or add capacity, or redundancy to EU's backbone connectivity.
- 3.5. CEF2 Digital will indirectly contribute to the European Green Deal and the EU's decarbonisation objectives by supporting **smart green ICT infrastructures** using energy-efficient optical fibre networks and state-of-the-art high capacity networks, including 5G, as enablers for the greening of many societal and economic activities.

SWOT ANALYSIS

	Strengths	Weaknesses
•	Already approved installation of petascale HPC system (Deucalion) in Portugal. New generation submarine cables linking Portugal with other continents: ELLA.LINK to Latin America, EQUIANO to Africa, etc.	 Considering DESI 2020, PT has been lowering its rank since 2018; from 9th to 12th on the component of connectivity, 23rd to 24th in use of internet services and from 12th to 16th in integration of digital technologies and from 12th to 13th in digital public services.
•	Interest of HPC and AI users in Portugal as seen in requests to use current national platforms and grants in PRACE calls Engagement with European Data and Cloud federated infrastructures	• It takes a considerable public investment and the engagement of the private funding to deploy and update the national submarine cable infrastructures linking Madeira and Azores to the Continent.
		 Lack of funding to infrastructures, including cloud services
	Opportunities	Threats
•	PT in putting into place a comprehensive strategy to promote the landing of new submarine cables (ex. Sines Tech south of Lisbon, and promoting PT along major sea cable players);	 Other Atlantic EU countries might compete to capture the new centrality in the submarine cables
•	Sectors highly dependent on international connectivity (e.g. finance, research, HPC);	
•	Leverage with several national initiatives: PT Space, AIR Centre, ELLA.LINK GeoLAB.	

STRATEGY - ACTIONS (2021-2027)

- 3.6. (2021 2023) Promote Portugal as the strategic submarine cable anchoring centre to ensure the intercontinental connection between South America and Africa to Europe.
- 3.7. (2021 2023) In this context, ensure funding to renovate and implement the Madeira-Azores-Portugal Continental submarine cable network (led by ANACOM).
- 3.8. Implementation of the national HPC component connectivity (synergies with submarine cables, with technology for data acquisition).
- 3.9. Support in the implementation of the EU Cloud Federation by Portuguese operators.
- 3.10. Monitor other opportunities / activities related to the program, with relevance to the community and national infrastructures.

STRATEGY - INSTITUTIONAL

- 3.11.Promotion of program funding opportunities under Pillar II (Transnational Data Infrastructures), with the national community, through the National Contact Point (NCP), with support activities for grant application and project implementation.
- 3.12. Promotion and reinforcement the participation of national entities / initiatives, by promoting their articulation with other key entities and infrastructures.
- 3.13.Incorporation of national requirements and improvement of the applying conditions, in annual work programmes, to ensure and create more advantageous opportunities for national entities, according to the information received by the national active community (community support activities by the NCP).
- 3.14.Coordination of CEF-Digital activities with the other entities that make up the national delegation (SEAC, ANACOM and REPER), in the areas of Pillar II.

PRIORITIES

- 3.15. Strategic terabit connectivity for HPC (linked EuroHPC joint undertaking)
- 3.16. Strategic backbone networks for cross-border and sustainable cloud federations
- 3.17. Submarine connectivity of strategic importance
IV. Digital Europe Programme (DEP)

The general objective of DEP is to support the digital transformation of industry and to foster better exploitation of the industrial potential of policies of innovation, research and technological development, for the benefit of businesses and citizens all over the Union, including the outermost as well as economically disadvantaged regions.

The Programme, implemented in close coordination with other Union funding programmes as applicable, will:

(a) strengthen and promote Europe's capacities in key digital technology areas through largescale deployment;

(b) widen their diffusion and uptake in the private sector and in areas of public interest, promoting their digital transformation and access to digital technologies.

The Programme will have five interrelated specific objectives (SO):

Capacity Building

- Specific Objective 1: High Performance Computing
- Specific Objective 2: Artificial Intelligence
- Specific Objective 3: Cybersecurity and Trust
- Specific Objective 4: Advanced Digital Skills
- Specific Objective 5: Deployment, best use of digital capacity and interoperability.

All SOs support industry, including SMEs, and public administration in their digital transformation with a reinforced network of European Digital Innovation Hubs. Digital Europe will accelerate the recovery and drive the digital transformation of Europe.

SCOPE

SO1 – High Performance Computing (HPC)

This specific objective shall pursue the following operational objectives:

(a) deploy, coordinate at the Union level and operate an integrated demand-oriented and application driven world-class exascale supercomputing and data infrastructure in the Union that shall be easily accessible to public and private users, notably SMEs

(b) deploy ready to use/operational technology resulting from research and innovation to build an integrated Union high performance computing ecosystem, with a high level of security and data protection;

(c) deploy and operate a post-exascale infrastructure, including the integration with quantum computing technologies and research infrastructures for computing science;

The actions under this Specific Objective shall be primarily implemented through the Joint Undertaking established by Council Regulation (EU) 2018/1488 of 28 September 2018 establishing EuroHPC, the European High-Performance Computing Joint Undertaking.

SO2 – Artificial Intelligence

This specific objective includes three main work strands in the first two years of implementation:

1) Pan-European Federated Cloud will contribute to a safe, ethical, unbiased treatment and storage of data within Member States.

2) Data4EU will offer businesses and the public sector access to AI tools and components, as well as data resources in key industrial and societal sectors, based on a cloud federated infrastructure.

3) The "AI on demand platform" will be consolidated as a central toolbox of AI resources needed for industry and public sector use.

Reference testing and experimentation facilities (TEF) will be deployed in five prioritized application sectors (i.e. health, smart and green communities, manufacturing, agriculture and edge AI HW). These facilities will provide common, highly specialized resources to be shared at European level. Main goal is testing mature AI technologies in a controlled but industrial environment accelerating the deployment of these technologies. TEF should be sector oriented but with some geographic distribution.

SO3 – Cybersecurity and Trust

One of the main goals of the Digital Europe Programme is to set the conditions for a strategic autonomy of the European Union in the digital domain. Cybersecurity is key to achieve such condition. But especially when it comes to dealing with cyberthreats, vulnerabilities and cyber incidents, this strategic autonomy at European level very much depends on the Member States' preparedness and ability to cooperate and establish synergies at national and European level, as well as providing the conditions for the deployment of research and innovation effort's outcomes.

SO4 - Advanced Digital Skills

This specific objective shall support the development of advanced digital skills, especially regarding high performance and cloud computing, big data analytics, cybersecurity, distributed ledger technologies (e.g. blockchain), quantum technologies, robotics, artificial intelligence.

In SO4 DIGITAL shall pursue the following objectives:

(a) support the design and delivery of higher quality long-term trainings and courses, including blended learning, for students and the workforce;

(b) support the design and delivery of higher quality short-term trainings and courses for the workforce, in particular SMEs and in the public sector;

(c) support high quality on-the-job trainings and work placements for students, including traineeships and the workforce, SMEs and in the public sector.

SO5 - Deployment, best use of digital capacity and interoperability

This specific objective shall achieve the following operational objectives:

(a) support the public sector and areas of public interests, such as health and care, education, judiciary, customs, transport, mobility, energy, environment, cultural and creative sectors, including relevant businesses established within the Union, to effectively deploy and access state-of-the-art digital technologies, such as high-performance computing, artificial intelligence and cybersecurity;

(b) deploy, operate and maintain trans-European Digital Service Infrastructures across the Union (including related services) in complementarity with national and regional actions;

(c) facilitate the development, update and use of solutions and frameworks by European public administrations, businesses and citizens;

(d) offer to the public sector and the Union industry, notably SMEs, easy access to testing and piloting of digital technologies including in particular high-performance computing, artificial intelligence, cybersecurity, other leading edge and future technologies, such as distributed ledgers (e.g. blockchain), also promoting their cross-border use;

(e) support the design, testing, implementation, and deployment and maintenance of interoperable digital solutions, including digital government solutions, for EU level public services delivered through a data-driven reusable solutions platform

(f) support cooperation towards achieving a European ecosystem for trusted data sharing and digital infrastructures, including support for interoperability and standardisation and fostering the deployment of EU cross-border applications based on security and privacy by design, respecting consumer and data protection legislation;

(g) build up and strengthen the European Digital Innovation Hubs and their network.

A European Digital Innovation Hub is a single entity or a coordinated group of entities with complementary expertise and a not-for-profit objective to support the digital transformation of companies (especially SMEs and mid-caps) and/or public sector organisations on a large scale. EDIHs provide services such as test before investing, skills and training, support to find investments, networking and access to ecosystems.

The first two years of the programme will contribute to the setting up of an initial network of European DIHs and the early stages of the network's expansion. The objective is to have at least one European DIH per Member State at the start of the network, with the aim of ultimately reaching all European regions, including the outermost regions, in subsequent years.

FACTS (2013-2020)

SO1 – High Performance Computing (HPC)

Regarding High Performance Computing activities, the creation of the JU EuroHPC in Oct 2018 provided the aggregation and implementation institution that is supposed to continue when DIGITAL is legally created. The projects that already were launched by EuroHPC in 2019 and where national beneficiaries competed successfully for funds, were the following:

Eur	roHPC JU	# projects	# coordinated projects	EC funding (M€)	JU funding rate (%)		
Work	Pilar I - Infrastructure ³⁷	2	1	18,33	33%		
programme 2019	Pilar II – Research & Innovation	3	0	1,42	50%		

³⁷ Petascale and pre-exascale calls that awarded a petascale system (Deucalion) to a consortium with Portugal (coord.) and Spain and a preexascale system (Mare Nostrum 5) to a consortium with Spain (coord.), Portugal, Turkey and Croatia.

Portugal continues to be a PRACE member, through the Laboratory of Advanced Computing at University of Coimbra. Navigator will be the first national platform to host projects approved in the 17th PRACE DECI call from 2021. In parallel over 300 M core.hours have been used by Portuguese researchers in PRACE supercomputing machines so far and for the first time a Portuguese industry project - TOOLING4G at CENTIMFE - has been awarded a SHAPE PRACE project to use HPC.

At national level, on the 2nd semester of 2020 FCT launched the 1st call on Advanced Computing Projects that shall bring more users and provide an easier access to HPC technologies in Portugal involving a wide range of projects and entities. Current HPC platforms operating in Portugal that made their resources available – around 35.300.000 core.hours - in this call were: Bob (MACC), Navigator (LCA-UC), Oblivion (HPC-UE) and Cirrus (INCD).

SO2 – Artificial Intelligence

Work developed in 2020-21:

1) Cloud

Several actions have supported the Union digital strategic autonomy and the safe and ethical treatment of all generated data. EOSC – European Open Science Cloud – has paved the way in many aspects and further uses of a European Cloud are to be expected for other public and private sectors too.

2) Data4EU

In the context of DataSpaces, the European Atlantic Platform was implemented as part of the Portugal Space 2030 strategy. There is an agency (PTSPACE) which oversees monitoring and implementation of this strategy and the SPACE programme.

3) "AI on demand Platform" and TEFs

This platform will build on the H2020 project AI4EU (https://www.ai4europe.eu/). Two PT organisations (IST and UC) are part of this project. Funding will be 100%.

To define priorities and gather interest from MS, EC has conducted 5 workshops on TEFs in the beginning of 2020 around the five priorities mentioned in the DIGITAL orientation document. There is the intention of EC invest 1 500 M \in in this initiative matched by equal sum by MS.

Portugal has been represented in all the workshops either from an institutional perspective or a stakeholder perspective.

TEF on Agriculture

• There are already several projects funded through H2020 or organizations on which a TEF can be built on and PT is part of two projects.

Projects/Presentations	websit e	PT Participation
IOF – Internet of Food and Farm	https://www.iof2020.eu	Unparallel
DEMETER	http://h2020-demeter.eu/	INIAV (3 pilots) INESCTEC UBIWHERE
API-AGRO	https://api-agro.eu/	
ATLAS	https://www.atlas-h2020.eu/fraunhofer/	
AgriFood Lithuania DIH		
Agroscope strategy		

TEF on Manufacturing

• There are already some examples in place or in construction that can be used as a TEF. PT does not have any big facility in real setting to test AI for Manufacturing.

Projects/Presentations Website							
CEA TECH	Test-Bed FFLOR: Future factory @Lorraine, DIGIHALL						
Smart Factory open Robotic labs of SZTAKI (HU)							
LNI 4.0 Testcenters using national hosts (DE)							
Demo center of the Smart Factory LASIM (SI)							
ARENA 2036 (DE) Siemens							
Digital Factory (EASI) AIM, NL – Brainport Industries Campus							

TEF on Health

- Sweden and AT have a landscape of initiatives in place in this area.
- PT has a good participation in Ambient Assisted living (AAL) and SPMS has an excellent track record of participating in projects of digital health.

TEF on Smart cities

- Focus on smart cities or autonomous driving and some references to logistics and energy.
- PT referred to the ocean and DG-CONNECT suggested PT to do something in that area.
- PT has off-shore platforms that can be used as TEFs (José Almeida)
- Despite the Atlantic Ocean is not the best test-bed for autonomous shipping it can be interesting for underwater navigation (Eduardo Silva, INESCTEC)
- Many European cities have smarticities initiatives (Lighthouse cities projects); mapping done by Rotterdam ERASMUS Centre and PT was in the map.

SO3 – Cybersecurity and Trust

The Portuguese businesses landscape is mostly composed by SMEs. The technological innovation and entrepreneurial environment are well known worldwide as one of the best to start up and do business³⁸. Parallel to this, a great number of traditional businesses is implementing digital transformation processes. Despite the growing concerns to consider cybersecurity in such processes, several studies show that cybersecurity is relegated to a second level of priority when it comes to investment – it is foreseen as an operational cost and not a strategical asset.

Since 2015 the number of incidents annually recorded by CERT.PT³⁹ has consistently increased⁴⁰, very much in line with the global tendency. Although recent surveys show that in comparison with EU's average businesses in Portugal recognize less to suffer cybersecurity incidents⁴¹, it is not possible to attribute this bias it to less cyberthreats or attempts or intentions from malicious actors.

Observatory.

Cybersecurity

³⁸ <u>http://www.portugalin.gov.pt/why-portugal/tech-innovation-hub/</u>

³⁹ The Portuguese Computer Security Incident Response Team under the National Cybersecurity Centre Portugal
⁴⁰ Report Cybersecurity in Portugal – Risks & Conflicts 2020, Portuguese

⁴⁰ Report Cybersecurity in Portugal – Risks & Conflicts 2020, Portuguese <u>https://www.cncs.gov.pt/content/files/relatorio_riscos.conflitos2020_observatoriociberseguranca_cncs.pdf</u>

⁴¹ Eurostat (2020a) Security incidents and consequences. Code: isoc_cisce_ic



Figure 3. Number of incidents annually recorded by CERT.PT (source: Report Cybersecurity in Portugal -

The transposition of the Directive (EU) 2016/1148 of the European Parliament and of the Council of 6 July 2016 concerning measures for a high common level of security of network and information systems across the Union to the national legislative framework⁴² also laid out a set of requirements that need to be attended to fully achieve the Directive's goals.

SO4 - Advanced Digital Skills

Qualifying the Portuguese population in digital competences is a huge challenge, with several political, economic, cultural and social dimensions. This challenge led to the creation of the National Digital Competences Initiative – INCoDe.2030⁴³. INCoDe.2030 is an inter-ministerial program that brings together the governmental areas of Administrative Modernization, Science, Technology and Higher Education, Education, Planning and Infrastructure, Labor and Economy, and which aims to reinforce the digital skills of the Portuguese population, preparing it for emerging digital-based job opportunities

In this context, the Government has established a set of goals for its term in office covering factors such as social inclusion and digital literacy, and physical and cognitive access to digital services for the entire population, analytical capacity in the context of big data, production and dissemination of information, privacy and security, intensive use of ICT in the process of lifelong learning and R&D aimed at the production of knowledge and advanced forms of scientific computing.

The aim is to put Portugal among the leading European countries in digital competences, by overcoming three big challenges:

CITIZENSHIP - Generalise digital access, use and literacy, in order to fully exercise citizenship and to promote inclusion in an increasingly dematerialised society, where many social interactions happen on the internet and are increasingly mediated by electronic devices.

EMPLOYMENT - Stimulate employability and professional training and specialisation in digital technologies and applications, in order to respond to an increasing market demand and to promote qualified jobs in a higher value-added economy.

⁴² Law No. 46/2018, of 13 August, which establishes the legal regime for cyberspace security, transposing Directive (EU) 2016/1148, of the European Parliament and of the Council, of 6 July 2016, on measures designed to ensure a high common level of network and information security across the Union.

https://dre.pt/web/guest/home/-/dre/116029384/details/maximized?jp=true.

⁴³ https://www.incode2030.gov.pt/en/

KNOWLEDGE - Ensure strong participation in international R&D networks and the production of knowledge in digital areas.

SO5 - Deployment, best use of digital capacity and interoperability

- In Portugal, 25% of the companies are highly digitised. Of these 24% are SMEs vs. 61% of large enterprises. Most of companies work in the sector of Repair of computers and telecom equipment vs. 10% in metal products companies.
- At least two national European Digital Innovation Hubs (EDIHs) will be selected among the 16 proposals that were submitted to the first call on EDIHs of the DIGITAL programme.
- PT has an Action Plan for the Digital Transition that includes Industry 4.0 program where a national network of Digital Innovation Hubs for entrepreneurship is mentioned.
- A national Working Group (GT-EDIH) has been set-up to implement this initiative, including the launch of the national selection process for PT to be able to reply to the EC Expression of interest call and present a list of designated potential EDIHs.
- The GT-EDIH is coordinated by Competitiveness and Innovation Agency (IAPMEI) and it includes Directorate General for Economic Activities (METD-DGAE), National Innovation Agency of Portugal (ANI), Innovation Business Association (COTEC Portugal) and Portugal Digital Management Structure.
- An Information Day and discussion workshop about this initiative with the stakeholders was organised in July 2020.
- Regarding Blockchain there are also a couple of broader initiatives focused on innovation:
- Aliança Portuguesa de Blockchain and Portugal Fintech.

- Research: In the past, Portuguese researchers have made major contributions to blockchain technology, mainly to permissioned blockchain software. The most cited permissioned blockchain consensus algorithm, PBFT, was designed by a Portuguese as part of his PhD thesis at MIT. One of the most used software that implements a consensus algorithm, BFT-Smart, has been being developed at FC ULisboa. There are also strong research groups on Computer Science / Informatics actively working in the area today (FC ULisboa, INESC-ID / IST) and several others with expertise to do it (NOVA LINCS, UCoimbra, INESC TEC, UMinho, UBI, etc.). There is also some activity more related to Business Administration and Industrial Engineering. There are at least two Horizon 2020 projects ongoing with Portuguese teams involved (QualiChain, RIA, call H2020-SC6-TRANSFORMATIONS-2018-2019-2020; DE4A, RIA, call H2020-SC6-GOVERNANCE-2018-2019-2020) and one of two Portuguese competing projects will be soon selected in a third call (call CEF-TC-2020-1).
- Innovation: the notion of blockchain appeared in 2008 but took several years to attract attention. Today, its commercial applications are still scarce; most of the effort is being placed in pilots and use cases in order to understand the benefits of the technology, i.e., on innovation. In Portugal there are research centers and several companies developing use cases, pilots and products in the area, for other companies and public institutes. There are also a couple of broader initiatives focused on innovation: Aliança Portuguesa de Blockchain and Portugal Fintech.
- o This scenario shows that there is interest in Portugal to participate in R&D calls in the area and that we have the know-how and ability to do it successfully. The stronger research topics seem to be first Informatics, second Business Administration and Industrial Engineering. Research on legal topics seems to exist but not as developed as the previous topics. Moreover, Portugal is one of the signatories of the agreement that established the EBP, has been represented in its meetings since the beginning, and one of the current co-chairs of the groups in now Portuguese, so we have internal knowledge about the EBSI. Therefore, Portugal seems to be better prepared to participate in activities related to the EBSI than to the regulatory sandbox, that is mostly a legal topic.

PROPOSED GOALS (2021-2027)

SO1 – High Performance Computing (HPC)

In a short summary, Portugal proposed goals in HPC should be the following:

- To have the same level of Total Cost of Ownership (TCO) funding, across the several classes of HPC supercomputers, namely with Petascale systems having the same TCO funding (50%) as pre-exascale systems.
- To be an active member of the new European HPC Ecosystem.
- To have a broad and coherent participation from national entities in Quantum Computing and related services and technologies.
- To interconnect Deucalion with existing European network and other supercomputers.

• To upgrade the National Research and Education Network (NREN) to support the National Network for Advanced Computing (NNAC, same as RNCA) to maximize funding opportunities for RNCA.

SO2 – Artificial Intelligence

This specific objective shall pursue the following operational objectives:

- Build up and strengthen core artificial intelligence capacities and knowledge in the Union, including quality data resources and corresponding exchange mechanisms and libraries of algorithms while guaranteeing a human-centric and inclusive approach respecting European values. In full compliance with data protection legislation, artificial intelligencebased solutions and data made available shall respect ethical excellence, including the principle of privacy and security by design;
- Make those capacities accessible to businesses, especially SMEs and start-ups, civil society, not-for-profit organisations, research institutions, universities, and public administrations to maximise their benefit to European society and economy;
- Reinforce and network artificial intelligence testing and experimentation facilities in Member States, in order to develop and reinforce commercial application and production systems, facilitating integration of technologies in value chains, development of innovative business models, and shortening the time passed from innovation to industrialisation; and to foster the take up of AI-based solution in areas of public interest and society.
- Keep reviewing the necessary ethical and legal aspects for data treatment and storage in the regulations, paying special attention to how Machine Learning works around Human interaction and AI.

SO3 – Cybersecurity and Trust

This specific objective shall pursue the following operational objectives:

- Support, together with Member States, the build-up and procurement of advanced cybersecurity equipment, tools and data infrastructures in order to achieve a common high level of cybersecurity at the European level, in full compliance with data protection legislation and the fundamental rights while ensuring EU strategic autonomy;
- Support the build-up and best use of European knowledge, capacity and skills related to cybersecurity; and the sharing and mainstreaming of best practices;
- Ensure a wide deployment of effective state of the art cybersecurity solutions across the European economy;
- Reinforce capabilities within Member States and private sector to help them meet Directive (EU) 2016/1148 (NIS) concerning measures for a high common level of security of network and information systems across the Union including through measures aiming at developing a cybersecurity culture within organisations;
- Enhance cooperation between the civil and defence spheres regarding dual use projects, services, competences and applications in cybersecurity, in accordance with future European Cybersecurity Industrial, Technology and Research Competence Centre and the Network of National Coordination Centres.

SO4 - Advanced Digital Skills

This specific objective shall pursue the following operational objectives:

- Upgrade existing and create higher and graduate courses in key areas of digital technologies
- Increased training for the requalification of graduates and unemployed in the area of digital technologies
- Creation of modular training in ICTE
- Implementation of MOOC (Massive open online courses) in advanced technologies
- Creation of internship and doctoral scholarships
- Maintaining and populating the national platforms for Skills and Jobs

SO5 - Deployment, best use of digital capacity and interoperability

This specific objective shall pursue the following operational objectives:

- To have, at least one EDIHs co-funded by DIGITAL (DIGITAL will cover 50% of direct and indirect eligible costs. The other 50% can be in-kind or cash contribution by MS, regions or private actors).
- Articulate national, structural and European funds to co-finance DIGITAL calls.
- Cooperate with existent initiative "Internet Segura" and LUSA agency regarding Internet Trust and fake news global spread.

SWOT ANALYSIS

Strengths	Weaknesses								
 Existent HPC clusters already working and providing good quality results in research and innovation communities (MACC, INCD, LCA-UC, ENGAGE-SKA, others) High interest of HPC and AI Portuguese users as seen in requests to use national HPC platforms, number of candidates on the 1st call on Advanced Computing Projects (FCT/CPCA/2020/01) and several grants in PRACE calls National and International connectivity with RCTS, broadband and new submarine cables (CEF2). Several key experts in tech areas that can train-the-trainers. Better alignment of national and European priorities through the European Cybersecurity Industrial, Technology and Research Competence Centre and the Network of National Coordination Centres to better align national and European priorities End-to-end view of the research and development life-cycle. Existent DIH funded in H2020 PT participation in relevant European initiatives to set-up EDIHs under DIGITAL. Existing Programmes and policy priorities under which EDIHs fit 	 The fragmentation of the European initiatives and programmes related to digitisation. Lack of infrastructure - I.e. funded state-of-the-art datacenters Not many companies taking advantage of these powerful digital tools. Still not enough STEM education in schools and media, creating barriers for the general public in understanding why and how HPC is a big asset Portugal still has a shortage of qualified human resources in advanced technological areas. Portugal also has a small percentage of graduates in Information and Communication Technologies Lack of clarity on the link between crosscutting topics of the Specific Objectives of the DIGITAL Lack of specific national funding for EDIHs; Lack of policy orientation to EDIHs technology or sectoral priorities 								

Opportunities	Threats
 Digital as a major tool and part of recovery in COVID-19 pandemic, as seen with the exponential increase in the use of digital tools during COVID-19 Installation of a petascale supercomputer DEUCALION at Minho Advanced Supercomputing Centre in 2021 Participation of Portugal (5%) in pre- exascale supercomputer MARENOSTRUM 5 at Barcelona Supercomputing Centre. Creation in 2019 of RNCA – Rede Nacional of Computação Avançada Development of RICA – Rede Ibérica de Computação Avançada, bringing together resources from RNCA and RES.ES - Red Española de Supercomputacion. National Competence Center (EuroCC) approved project to start in 2020 Portugal as an example of green computing Establishment of a National Coordination Centre on Cybersecurity Strength the National Cybersecurity advance skills Approval of the Digital Transition Action Plan in 2020 Increased demand for higher education Funding from Recovery Plan to the national co-funding of EDIHs GT-EDIH from several policy areas already working together to implement the DIH national network Accelerate the Digital Transformation of Portuguese Industry Accelerate the digital ecosystem in PT 	 Not enough CAPEX/OPEX funds for operation of petascale computers like DEUCALION Lengthy processes and Technology high turnover, requiring continuous update (human resources and infrastructure) Insufficient co-financing capacity from potential DIGITAL beneficiaries Possibility of high usage of DIGITAL's budget to support EuroQCI when comparing to other topics within the OE3 Lack of understanding between different policy actors Lack of national funding to cover the MS cofunding of EDIHs Lack of competitiveness at European level

STRATEGY - ACTIONS (2021-2027)

Roadmap actions to achieve DIGITAL funded opportunities in Portugal:

SO1 – High Performance Computing (HPC) ⁴⁴

- Implement Advanced computing 2030 strategy in all 5 sectors: Health, Earth, Mobility, Social and Science.
- Launch regular national calls for Advanced Computing Projects in all areas of knowledge;
- Install and operate Deucalion, while interconnect it with other existing supercomputers;
- Participate in the 5% of Mare Nostrum 5, installed at BSC;
- Map and develop Quantum computing initiatives;
- Liaise with PRACE and EuroHPC to share resources and competencies through the EuroCC project and RNCA infrastructure;
- Promote national participation in the EuroHPC work programme calls.

SO2 – Artificial Intelligence

- Portugal will be one of the first European Union countries to adopt a National Cloud Strategy for Public Administration. In order to support this implementation, a special attention and promotion (within the national community) will be done regarding methodological tool to support the acquisition of cloud and for the evaluation of cloud services options; models for evaluating, monitoring and managing cloud contracts; and human resources qualification plan for Public Administration that guarantees the capacity to face the new challenges raised by the contracting, operation, evaluation, etc of the cloud services, among others (in coordination with SO4).
- Align synergies with Federated cloud-to-edge-based services.
- Data4EU Articulation with AMA and PTSPACE to get to the best placed stakeholders to take advantage of this initiative (possibly interacting with the AIR CENTER)
- Al on demand Platform (AI4EU) investment on connecting and opening Portuguese Al resources with the Strategic Research Innovation Agenda for Europe.
- TEFs
 - Mapping of technological infrastructures with real settings pilots and stakeholders that can be users of TEFs, in articulation with Clusters and ANI;
 - Articulate with sectorial ministries (Agriculture, Economy and Digital Transition, Health and Environmental and Climate Action, Ocean,) to decide if hosting a TEF is strategic for PT, in which sector and if funds are available;
 - Organize a workshop with stakeholders to promote the initiatives and evaluate the demand from organizations;
 - Mobilize cities to Exchange best practices and experiences (Lisboa, Porto, Cascais, Évora).

⁴⁴ The EuroHPC Joint Undertaking (JU) is the partnership to implement HPC by combining funds from DIGITAL, HEu and CEF2. Its Governing Board will prepare a dedicated work programme for activities to be supported, as specified in the EuroHPC legislation and in Article 4.2 of the Digital Europe Regulation.

SO3 -Cybersecurity and Trust

- Promotion of European funding opportunities for cybersecurity topics in coordination with the national community, through the DIGITAL Experts and NCPs (National Contact Points), with support activities for grant application and project implementation.
- Foster the national stakeholders' participation in the Cybersecurity Community both at national and European level;
- Encourage organizations to adopt cybersecurity standards, frameworks and best practices regarding technologies, processes, and people.
- Support the deployment of cyber infrastructures (including EuroQCI)

SO4 - Advanced Digital Skills

- Align with the Portugal INCoDe.2030 strategy
- Upgrade of existing and creation of courses, modular training, scholarships in key areas of digital technologiesCreate courses for human resources qualification on Cloud Services, regarding contracting, operation, evaluation, etc of the cloud services.
- Increase training for the requalification of graduates and unemployed in the area of digital technologies.
- Invest on Advanced training of industrial sectors by promoting PhD programmes and job upskilling focused in DIGITAL technologies (HPC, AI, Cloud, Cybersecurity, etc..), through synergies with funding from HE (MSCA - Initial Training Networks or MSCA - Individual Fellowships).
- Promote job placements in key DIGITAL areas: advanced computing, artificial intelligence and cybersecurity. Promote national training and dissemination actions designed for professionals of different sectors that specifically tackle how to capture and complement EU funds for their projects.

SO5 - Deployment, best use of digital capacity and interoperability

- Launch of the national selection process by IAPMEI to identify the potential EDIHs to be designated for the European call
- Articulate with the GT-EDIHs on the list of designated potential EDIHs
- Support potential EDIHs from PT to network with EDIHs from other MS
- Support to proposal preparation to DIGITAL's restricted call on EDIH
- Support EDIHs from PT to articulate with the network of HPC and Cybersecurity centres
- Explore the Blockchain initiativeArticulate national, structural and European funds
- Cooperate with existent initiative "Internet Segura" and LUSA agency regarding Internet Trust
- and fake news global spread.
- Promote a wide implementation of DIGITAL's digital services infrastructures.

STRATEGY - INSTITUTIONAL FOR ALL SPECIFIC OBJECTIVES IN DIGITAL

- Promote and disseminate DIGITAL funding opportunities in coordination with other funding instruments, with the national community, through the DIGITAL Experts and Horizon Europe NCPs (National Contact Points), with support activities for grant application and project implementation.
- Promote and reinforce the participation of national entities / initiatives, by promoting their articulation with other key entities and infrastructures. Examples: FCT promoting supercomputers network through implementation of RNCA;
- Incorporate national requirements and improvement of the applying conditions, in annual work programmes, to ensure and create more advantageous opportunities for national entities, according to the information received by the national active community.
- Establish a Digital Innovation Hubs network addressing cybersecurity topics in close cooperation with the Cybersecurity National Coordination Centre and the national Cybersecurity Competence Centres network;
- Promote participation in Destination Earth actions, such as Digital Twin;
- Foster the national stakeholders' engagement with the objectives and actions carried out by
- the Portuguese Safer Internet Centre.
- Create synergies with national, regional and other international programmes funds to cofinance DIGITAL calls, most of them at 50%.
- Unify and coordinate all DIGITAL activities with the other entities that make up the national delegation (FCT, ANI, AMA, ANACOM, IAPMEI) in all specific objectives (SO1-5).

OTHER CHALLENGES FOR ALL SPECIFIC OBJECTIVES IN DIGITAL

- Upgrade existing Datacenters and Supercomputers (related to SO1: HPC)
- Synergies will be explored with the Erasmus+ programme (digital masters) (related to SO4)
- Promote Portuguese participation in the Blockchain calls, namely through Aliança Portuguesa de Blockchain and Portugal Fintech.
- Due to the strategic geographical position of Portugal, including its intercontinental links with Africa and America, Portugal could play a key role in expanding the external dimension of the EU data hub, increasing in this way Europe's potential to become a global Cloud and digital services provider to the rest of the World.

PRIORITIES FOR ALL SPECIFIC OBJECTIVES IN DIGITAL

SO1 – High Performance Computing (HPC)

- Support the implementation of the National Strategy for Advanced Computing
- Support DEUCALION and MARENOSTRUM 5 approved projects
- Establishment of a National Competences Centre (EuroCC) managed by FCT
- Promote RNCA Rede Nacional de Computação Avançada a centralized network for HPC, AI, Data, Cloud and Competence and Visualization Centers, in close cooperation with National Center on Cybersecurity (SO3) and Digital Innovation Hubs (DIHs) developed under SO5.
- Continue to launch regular public calls on advanced computing resources using current HPC platforms of RNCA (Bob, Navigator, Oblivion, Cirrus) widening the access for research, industry and public administration communities.
- Create masters/ specialized training programmes in Advanced Computing

SO2 – Artificial Intelligence

- Support the implementation of the National Strategy for AI
- Support the implementation of the National Cloud Strategy for Public Administration.
- Articulation with AMA and PTSPACE to take advantage of Data4EU
- Promote "AI on demand Platform" to align with the European Strategy
- Define the appropriate national co-funding mechanism for TEFs.
- Analyse cost-benefits of Portugal participation in existent and future TEFs, possibly promoting partnerships with other countries (Eg: Spain)

SO3 - Cybersecurity and Trust

- Support the implementation of the National Strategy for CyberSpace
- Set a National Coordination Centre fully aligned with the European Cybersecurity Industrial, Technology and Research Competence Centre and the Network of National Coordination Centres;
- Establish a national network of Cybersecurity Competence Centres in coordination with national Digital Innovation Hubs;
- Mobilize national stakeholders to nurture the Cybersecurity Community;
- Set a National Framework of Cybersecurity Certification in line with the Cybersecurity Act;
- Implement a Cybersecurity Academy and adapt formal education courses, at all levels, to address cybersecurity challenges and emergent technologies.

SO4 - Advanced Digital Skills

- Support INCoDe.2030 actions
- Creation of higher and graduate courses in key areas of digital technologies
- Increased training for the requalification of graduates and unemployed in the area of digital technologies

SO5 - Deployment, best use of digital capacity and interoperability

- Promote the creation of European and local Digital Innovation Hubs (maximum of 8 DIHs in Portugal funded by DIGITAL)
- Explore the Blockchain initiative
- Avoid the spread of fake news using existent resources (Eg: LUSA actions)

V. Space

+Space in Portugal and Europe with ESA

Prepared by Portugal Space (the Portuguese Space Agency) in collaboration with the Office of the Minister for Science, Technology and Higher Education

EXECUTIVE SUMMARY

Fostering space economy and innovation in Portugal requires diversifying and articulating funding sources and this document sets the target of attracting **2500 million Euros for 2020-2030** with a 50/50 balance between public and private sectors, including national and European, public and private sources in space-related activities in Portugal, according to:

- 5.1. **public sector**: about 1240 M€ which includes FCT, ESA, and EU and assumes that the EU finances around half of the total, the other 50% being financed by companies involved in addition to 50% through Joint Undertakings and public markets; and
- 5.2. **private sector**: about 1260M€ which includes investments made by companies and commercial markets.

This target considers increasing by a factor of 10 the overall level of investment in space in Portugal until 2030, including the following main challenges:

- Increase the annual outcome of space related activities in Portugal to about 500 million Euros by 2030;
- Create and promote about one thousand skilled jobs in Portugal in the period 2020-2030;
- Attract major players to operate in Portugal and promote new entrepreneurial projects to help promote new high-added-value activities;
- Strengthen space research in close cooperation among academia, scientists, the public administration and, above all, the business sector, together with the development of new skills and the advanced training of qualified human resources.

The successful ESA Ministerial Meeting, Space19+ (November 27-28, 2019), and the related discussions and approval of the ESA budget for 2020-24, together with the ongoing preparation of the financial perspectives for Europe for 2021-27, including the preparation of the next European framework program for research and innovation and the European Structural and Investment Funds (ESIF), as well as the emerging forms of fundraising in Europe (including Joint Undertakings, JUs), represent a new opportunity and a great challenge for Portugal to take the next step and, building on what has been achieved so far, develop new ambitions in specific space fields and related applications in non-space sectors.

Following the development, and current process of implementation of the national strategy for space, "Portugal Space 2030", fields of focus are: Earth Observation, Space Safety, Space Transportation, and Telecommunications, including related downstream activities, working towards the vision for Portugal – an Atlantic nation, with a rich and global maritime tradition – to be recognised, by 2030, as a global authority in the science and economics of Space-Earth-Climate-Oceans interactions for the benefit of society and economy.

It is in this context that this document approaches "Democratization of Space" in terms of the full integration of space into economy and society in a sustainable manner, both environmental as well as

economic, and therefore a growth of the sector beyond public sector funding on which is has mostly relied thus far. Space19+ was a major milestone for Portugal on the way to this challenging target.

The 22 ESA Member States endorsed the most ambitious plan in the history of ESA, accounting for 14.4 billion euros over five years. The Portuguese contribution has also increased significantly from 73 million euro subscribed in 2016 to 102 million for the next years. In a time in which Space is no longer seen as a way for countries to show off their technological prowess and sovereignty, but rather as an added value to society and a competitive advantage for industries and economy, ESA's Council at Ministerial Level, Space19+, came to an end this Thursday, with the approval of the most ambitious plan to date for the future of the European Space Agency and the whole European space sector. The current document, which is split into three parts, presents the overall implementation strategy for "Portugal Space 2030" and describes the main decision elements for Space19+, including:

- Part I presents the Portuguese context in which the ESA Ministerial Meeting has taking place and describes the strategic approach both from a content as well as from a funding point of view with the aim of implementing an evolution in the space strategy from one driven by technology capacity building to one driven by programmatic aims in the various fields of interest and of implementing this evolution not only in the frame of ESA but closely articulated with the national and European frameworks available through public and private funding instruments;
- Part II provides a summary of the Portuguese approach to the ESA co-presidency for the next three years, 2020-2023;
- Part III provides a summary of the main decision of Space19+ as well as the corresponding financial elements.

The document includes a set of Annexes that provide background information such as: i) a high level summary of the main objective of the Portuguese space strategy, "Portugal Space 2030"; ii) an overview of the developments in Portugal in space over the last two years; iii) a financial overview of the past 20 years of Portuguese involvement in ESA; and iv) a summary of the programmatic approach followed in deriving the subscriptions at the ESA Ministerial Meeting, Space 19+.

Part I: Implementing the strategy "Portugal Space 2030"

Current Actions and Future Main "Great Challenges"

Space should be considered as a common good, to be associated with our institutions and collective ambitions, as clearly considered in "Portugal Space 2030". Space provides the infrastructure for personal mobility, communication for work or when on vacation, weather forecasting, precision farming to maximise crop harvesting and crop rotation, banking transactions, management of precious resources such as potable water, monitoring of forest fires, archaeological investigations..., scientific knowledge and the dream of expanding the reach of humanity. These and many more activities rely today on space data and the infrastructure to generate this data and enable its use.

Beyond being a growing sector, space is a sector that supports and enables the success and competitiveness of many other sectors. More can be done, and the potential is far from being fully exploited. The possibilities are beyond what we can imagine today. These have spurred the emergence of a buoyant new space sector and actors aiming to exploit these opportunities, changing the environment for space activities in general.

The relevance of Space is based on the alignment of the space agenda with major trends and drivers that will determine the evolution of our society. One vivid example is climate change: it is clear that climate change will have wide scale impacts on natural and human systems that are important to be monitored. Unprecedented changes in our society add to the complexity of this issue. In this context, the space sector provides an essential tool to: monitor the weather and enable accurate forecasting; to assess climate change impacts and vulnerabilities; and to support information-based decision making on mitigation and adaptation policies and measures. Global challenges are not limited to climate change and space should likewise be used to address migration, resource management, health, among others.

Space and the development of the technologies that are associated with or derived from it, are now recognised as a **driver of innovation**, as well to attract youngsters and world talent, by several nations, representing an imperative for the promotion of **social and economic progress and for international safety and security**. In fact, the safety, security and well-being of our society are increasingly dependent on information and services provided from Space and it is important to point out the increasing **impact of space systems on many sectors**.

The sectors that can profit from space-based solutions are **agriculture**, **fisheries**, **infrastructure**, **urban development** (including land register, land usage and urban mobility), **transportation**, **maritime**, **shipping**, **communication**, **tourism**, **banking**, **defence and security**, **and even the public health sector and epidemic monitoring**, amongst others.

It is in this context that we talk about Democratisation of Space to mean the full integration of space into economy and society in a sustainable manner, both environmental as well as economic, and therefore a growth of the sector beyond public sector funding on which is has mostly relied thus far. Indeed, beyond any technological development, the first breakthrough in space was the recognition that space was more than just a way to demonstrate national pride and superiority, but that space can actively, through data and its derived information, help tackle global challenges and solve problems of users and thus contribute significantly to economic growth.

The next breakthrough will come when it will be widely recognised that space is not just a passive provider of information, but that space activities can go **from observation to action**. From observing natural catastrophes and supporting aid efforts, to predicting them and avoiding loss of human life. From observing the effects of climate change, to working against the contribution of man to climate change and the environment in general by optimising travel routes for low fuel consumption, to supporting the optimisation of alternative green energy sources, to the use of space technologies for production of energy. From observing the effects of space weather on assets in space and on ground, to preventing the consequences of events such as the Carignton event of 1859 or the March 1989 geomagnetic storm which caused multi-billion-euro damages to entire nations. From observing the safety of the space operating environment and further enabling manufacturing and recycling in space integrating Space in the economic sphere of influence of the Earth.

1. A strategy for attracting and enlarging investments in space: diversification and articulation of funding sources and the role of Portugal Space

The aim and mandate of the Portuguese Space Agency, "Portugal Space" (founded in 2019) is to foster space economy and innovation in Portugal, with the target of increasing by a factor of 10 the overall level of investment in space in Portugal until 2030. This target includes the following main challenges:

- Increase the annual outcome of space related activities in Portugal to about 500 million Euros by 2030;
- Create and promote about one thousand skilled jobs in Portugal in the period 2020-2030;
- Attract major players to operate in Portugal and promote new entrepreneurial projects to help promote new high-added-value activities;
- Strengthen space research in close cooperation among academia, scientists, the public administration and, above all, the business sector, together with the development of new skills and the advanced training of qualified human resources.

This set of targets and challenges requires and represent a major collective effort to guarantee the following processes of diversifying and articulating the attraction of funding sources:

- **1. Global investment level**: An overall level of national and European, public and private, investment in space related activities of **2500 million euros for 2020-2030**;
- 2. Portuguese Recovery Plan, 2021-26: An overall level of investment of 200 million euros for 2021-2026 in association with a major industrialization agenda oriented towards the four great challenges listed in this document;
- 3. ESA: An overall level of national investment in ESA of 250 million euros for 2020-2030 (including about 120 million euros in 2020-2025), with the related return in procurement activities to main stakeholders operating in Portugal in close articulation with other national

and, above all, European funding sources, in a way to guarantee a "multiplication factor" of **10 regarding the impact of ESA in the capacity to raise other sources of funding** for space related activities in Portugal;

- **4. Beyond ESA**: the challenge of better using the national investment in ESA to help raise other sources of funding for space related activities in Portugal requires a correct articulation of the national participation in the various ESA programs with the following sources of funding:
 - a. Horizon Europe (HE), following the experience with H2020 and the past European framework programs for research and innovation, under the coordination of EC-DGRTD, including:
 - i. Advanced training and scientific employment, through doctoral research contracts to be established under Marie Curie Fellowships and ERC Grants;
 - ii. Collaborative R&D projects, involving European networks;
 - iii. Research Missions, including above all those in non-space sectors that require space driven data;
 - iv. Partnerships, mainly in aerospace;
 - v. International cooperation in aerospace;
 - b. **European Space program (ESP)**, for 2021-2027, under the coordination of a new EC-DG Space and Defence Industries, to be created by the EC, including:
 - i. Collaborative innovation projects, involving European networks;
 - ii. Navigation and Earth Observation main programs;
 - iii. Transportation, through the development of micro launchers;
 - iv. Access to space, through a future generation of space ports, including the potential funding of Azores ISLP;
 - c. **Digital Europe Program (DIGITAL)**, for 2021-2027, under coordination of EC-DG Connect, including:
 - i. Collaborative innovation projects, involving European networks;
 - ii. Navigation and Earth Observation main programs;
 - iii. Integration of space data and AI for the digitalization of non space sectors;
 - d. **European Defence funds**, under the coordination of a new EC-DG Space and Defence Industries, to be created by the EC, in close articulation with the Portuguese Ministry of Defence, including:
 - i. Collaborative defence related projects, involving European networks;
 - ii. Navigation and Earth Observation activities for security and defence;
 - iii. Integration of space data and AI for the digitalization of defence and security sectors;
 - e. European Structural and Investment Funds (ESIF) and, above all, the design and implementation of the program PT2030 (2021-2027), following the experience of the implementation of PT2020 (2014-2020), which includes national and regional, to be coordinated by the Portuguese Ministers of Planning and Territorial Cohesion, respectively, and involving the national agencies ANI (innovation) and AICEP; (foreign trade), including:
 - i. Advanced training, through doctoral fellowships;
 - ii. Skilled employment;
 - iii. R&D and innovation projects, including "mobilizing projects";

- iv. Interface and Innovation Institutions, including Associate Labs, Collaborative Labs and technology centres, through basic and programmatic funding;
- f. **Emerging forms of fund raising and investment in Europe** (including the Joint Undertakings, JUs), under development by the European Commission;
- g. FCT: national competitive programs for research and advanced training, including:
 - i. Advanced training, through doctoral fellowships;
 - ii. Scientific employment, through doctoral research contracts;
 - iii. Research and academic careers, through invited chairs;
 - iv. R&D projects;
 - v. Research Institutions, Associate Labs and Collaborative Labs, through basic and programmatic funding;
 - vi. International cooperation in S&T;
- h. **Business expenditure by private firms**, including foreign firms operating in Portugal and Portuguese firms;
- i. Other sources of funding, including venture and investment funds.

Table 1 provides a brief summary of main targets for the coming decade, which should be considered as a guide for the positioning of Portugal Space, including for the definition of the way Portugal will contribute in the various ESA and EU programs.

Further assumptions behind the numbers in *Table 1* are as follows:

- 1. FCT scientific research related to space science and other planetary bodies, space weather, physics of the atmosphere, Earth observation and GNSS science, quantum and encrypted communication, and propulsion physics;
- 2. EU HE technology R&D around topics of future business fields, i.e. space weather and space debris, applications, and transportation, with some general technology development;
- 3. European Space Programme, ESP Earth observation in Copernicus and with third party missions contributing to Copernicus, Govsatcom, Galileo;
- 4. Digital Europe Programme, DIGITAL big data and AI around both EO data as well as space science missions and activities (ground and space);
- 5. European Defence funds SST, space weather for GNSS purposes, EO data for defence purposes and safe and secure communications;
- 6. Markets with respect to commercial activities the highest multiplication factor is for telecom and navigation followed by Earth observation as well as the emerging market of space safety (with larger potential in the second half of the decade and following decade); and new joint ventures, including Public Private Partnerships (PPPs) with national and international funding sources and investments funds, including transatlantic initiatives and the investment of European Agencies, such as EMSA, GSA, and defence related agencies, as well as non-space funding sources (agriculture funds, city councils, maritime agencies, defence authorities).

PT Space Strategy 2020-2030 (November 2019)		Portuguese Public Investment						European Competitive Funds (centralised mgt, by EC)					ESIF - EU structural funds	Potential JUs	Markets		
		FCT - Portuguese S&T Foundation	Mobilizadores	European Space Agency	SKA	EST	ESO	EU Space Programme (in addition to possible new elements)	EC H2020-Horizon Europe	Economic Recovery	Digital Europe Programme, DEP	European Defence funds	ESIF: PT2020-PT2030	Emerging forms funding in Europe (Joint Undertakings)	Commercial	PT and EU public markets and procurement	GLOBAL (million Euros)
Science and Basic Activities (incl. Prodex)	9%	100		100	30	20	30				10			25			315
Space Exploration	1%	20		5											5	5	35
Space Safety	13%	20		23				30	25		5	20	50	15	60	30	278
Earth Observation	35%	55	30	55				100	40	200	20	35	100	35	110	140	920
Telecom	24%	30		37				60	40	200	10	20	60	30	90	100	477
Navigation	9%	20		10				40	15		10	10	20	5	80	20	230
Transportation	7%		30	10				20	20				30	5	50	30	195
Technology	2%		50	10				20	5					5		10	50
Global (million Euros)	100%	245	60	250	30	20	30	270	145	200	55	85	260	120	395	335	2500
	100/0	635				755				260	120	73	30	2500			
% global		10%	2%	10%	1%	1%	1%	11%	6%	8%	2%	3%	10%	5%	16%	13%	100%
/ Broom		25%					30%				10%	5%	29	%	100%		

Table 1 - Prospective analysis of the evolution of investment in space systems in Portugal

Portugal is in a unique position, having achieved several milestones as described above in addition to holding now, or in the near future, a number of politically important positions, namely:

- the co-presidency of ESA with France, 2019-2022;
- the upcoming EU Presidency in the first half of 2021;
- the EUREKA Presidency, 2021-22.

With this unique alignment, the dedication to completing such great challenges will bear fruits with significant international impact, contributing not only to strengthening Portugal but also Europe on a global scale.

From a policy and market point of view, the great challenges to be tackled are:

- promotion of use and of uptake of the data, information, and services and development of the space ecosystems and downstream sectors, including the development of new space services oriented to non-space sectors;
- fostering the growth of "New Space" activities and approaches, as well as fostering the growth of demand for space-based data, which requires the update of the free and open Copernicus data policy towards a system of higher resolution data generation

These issues will frame the Portuguese EU Presidency, in addition to bringing forward conclusions that will result from the November 2020 Space Council.

Portugal has the advantage of being rapid in decision making and being geo-politically well placed strategically. Exploiting its voice in international fora and organisation is a must. The size of the delegation, compared with larger countries represented by agencies many times the size of the Portuguese network of delegates active in space-related fora and organisations, requires that Portuguese delegates and representatives be very well networked and in continuous contact with the government to ensure sound decision making.

In the context of the national space strategy "Portugal Space 2030", which sees **Portugal developing space capabilities to work towards becoming a globally recognised authority in Space-Climate-Ocean interactions with a focus on the Atlantic and its socio-economic exploitation**, the development of key focus areas which rely on the articulation of efforts and funding across all available sources is a must. In this context Portugal Space has been mandated to implement such articulation on behalf of the government for each of the funding sources – ESA, national (including EU structural funds implemented through national calls), ESO, EU.

From a programmatic point of view, the overarching vision is that before the end of 2025 an open multi-purpose system is established making use of dedicated low- orbit satellite constellation(s) with different types of sensors to provide Earth observation and telecommunication capabilities, in combination to navigation as well as already existing space and in-situ data sources, stimulating scientific research and business growth, thus contributing to the socio-economic development of "Blue Worlds", including the Atlantic Ocean and its sub-areas as well as the in-land Portuguese territory. And to do so in international collaboration.

The FOUR GREAT PROGRAMMATIC CHALLENGES to be tackled are:

1. **GREAT CHALLENGE 1:** establish, maintain, and guarantee the operation of an "**Atlantic constellation**", in international cooperation and under the coordination of the "**Atlantic International Research Center - AIR Center**", before 2025.



In order to establish, maintain and guarantee the operation of the "Atlantic constellation", in international cooperation before 2025, in the form of a single versatile satellite platform to be used for a range of different applications, a number of elements need to be developed ranging from the flight to the user segments.

The Atlantic constellation, while being a Portuguese ambition, must be pursued in an international framework, working closely with leading industries that have declared interest as well as with countries that have likewise declared a strategic interest – notably the United Kingdom, Norway

and Spain. International companies have already declared their interest in this constellation. In order to foster and ensure the international dimension, the implementation of the overall constellation should and will be pursued in the frame of the European Space Agency, through the Earth Observation Incubed+ Programme. Working with the AIR Center, the reach of the activities will be expanded to Brazil, Mexico, South Africa, and other countries around the Atlantic (north and south).

Currently there are on-going projects implemented through national funding frameworks, that their objectives are aligned with this goal, which contribute with various elements to the overall system.

Together with new industrial partnerships and setups the projects can be evolved to contribute specific systems and subsystem to the constellation as a whole working under the umbrella of a contractual and programmatic framework provided by Incubed+ as depicted in the figure below. Through the Incubed+ Programme, an industrial consortium will be established to which the projects above will contribute with in-kind elements.



Figure 1. Programmatic Setup for the Atlantic Constellation

In addition, several additional projects developing specific technologies and competences will support the constellation development and exploitation, this includes for example:

The launch segment will require to be addressed in a dedicated manner and presents opportunities for the space access activities also pursued.

2. **GREAT CHALLENGE 2:** Build, promote and operate a downstream digital platform, "**Digital Planet**", capable of integrating multiple sources of data, including space, and extracting information by making use of advanced digital technologies, such as AI, to be put at the service of entities (public and private) across the country.

In the coming months, Portugal Space, will be addressing all governmental public sector entities to understand their needs and requirements. The Digital Planet aims to address the latter and will bring together data from different sources to be analysed by advanced data processing tools. The Digital Planet demands an interdisciplinary approach bringing together competence of different fields to respond to user and customer needs.



The Atlantic constellation will be contributing data to the Digital Planet. International companies have likewise declared and interest in contributing to this great challenge.



Figure 2. Digital Planet Overview

3. **GREAT CHALLENGE 3**: Develop a **5G ecosystem** for the development of the Atlantic and innermost regions of Portugal.



The next-generation mobile network, the so-called 5G, aims to achieve three main goals: very high speed, very low latency, and massive connectivity. 5G communications will allow. 5G is more than just the next generation of terrestrial mobile services, it will drive a convergence of fixed and mobile services, define new standards and create a network of networks, enabling "anyone and anything to be connected at anytime and anywhere"⁴⁵ and it is expected to allow new and disrupt applications. It **promises to be a key foundation of the digital transformation of society and industry**.

Current mass-market mobile networks are mainly deployed using terrestrial infrastructures (such as cell towers). 5G will also rely on terrestrial networks for different use cases. However, the promise to deliver "anytime and anywhere", which implies resilience, requires different implementation strategies. Space can and must also play an important role in 5G.

Satellite systems provide resilience, security, coverage, mobility and cost-effective solutions for remote areas and non-terrestrial areas, i.e. oceans (where terrestrial networks are not economically viable or not viable at all). In the scope of 5G, satellite communication services would be seamlessly integrated into the 5G network and the choice of communications technology.

The aim is to work towards building a 5G ecosystem to be built starting with pilot projects around the following regions of interest such as the Vale do Côa as well as to cover the 200 miles Portuguese Atlantic platform. The ambition is to also establish a 5G operator (new) with HQ in Portugal (considering possible international collaboration if and where appropriate).

4. **GREAT CHALLENGE 4:** the establishment of a **space innovation ecosystem,** specifically in Azores, Santa Maria, that may include:

⁴⁵ https://www.europarl.europa.eu/RegData/etudes/BRIE/2016/573892/EPRS_BRI(2016)573892_EN.pdf

- the development of a spaceport infrastructure through the "Azores International Satellite Launch Program Azores ISLP";
- the establishing of a landing site and processing facilities for the European Space Rider, in close collaboration with ESA, the Italian Space agency, and leading Italian industry, Avio. Space Rider is an ESA project that will allow Europe to have operational transportation for in-space operations and return from space, whereby empowering European industry to open new markets.

The Space Rider system, built to be the first European reusable space transportation system, will offer an operational re-entry and landing capacity based on a multi-purpose unmanned free-flyer platform. Italy is leading the flight and ground segments with the support of some other European countries and Portugal is seeking to support the success of this critical project through substantial involvement in the ground segment and downstream activities. A central element of the Portuguese contribution to this unique project is the creation of a landing site on Island of Santa Maria, in the Azores, equipped with a landing control centre in addition to payload processing and analysis through well-equipped facilities and expertise;

• the further evolution of a **teleport** to attract both institutional and commercial customers, exploiting the recently installed 15 meters antenna;



Working closely with ESA the projects above will be pursued.

These four great challenges should be considered in close articulation with the development of new markets for the "New Space"; as well as the major sources of funding for Portugal and Europe in coming years, namely:

• the Portuguese (and European) Recovery Plans, 2021-26;

- The Portuguese Multiannual Funding Framework, through EU decentralized funds (i..e, structural funds, FEDER, ESF), 2021-27;
- The European Multiannual Funding Framework, through EU centralized funds (Horizon Europe, EU Space Program; EU digital Program), 2021-27;
- ESA relationships and procurement, including "ESA Space19+" for 2020-23, which implementation plan defines several priority objectives for industrial policy which aim at the development of increased capabilities towards subsystem and system leadership.

From a value-chain point of view with the aim of enabling the great challenges above as well as developing competence for the strategic positioning of Portuguese entities in new markets:

- the creation of one (or more) system integrators for small satellites and high-altitude platforms in Portugal able of relying on Portuguese suppliers and of being a reliable partner for international actors industrial and otherwise;
- Foster system competences in the integration of AI and Earth Observation systems, with high and very high-resolution images;
- the **development of system/subsystem competence** in key space technology areas, including:
 - versatile in-orbit platform/microlauncher kickstage;
 - guidance, navigation, and control subsystem;
 - o structural, mechanical, thermal subsystem;
 - propulsion subsystem;
- the development of operations capabilities combined with a well-developed ground segment;
- position Portugal strategically in the field of **space sustainability and space safety** to achieve leadership and ensure commercial success in the near/mid-term in specific products and in-space competence (specifically in the domain of Active Debris Removal and In-Orbit Servicing and a low-cost Space Weather radiation sensor for integration on any satellite);
- establishing the necessary mechanism to stimulate the collaboration between academia, scientific and R&D entities with industrial players.

Part II: Summary of Ongoing Projects

The new implementation strategy as presented in "+Space in Portugal and Europe with ESA" and following developments at a national and international level have resulted in a number of projects and initiatives, some of which are summarized here below following the aims prepared for Space19+ and presented in the document mentioned above. A list of on-going projects can be found in the table in Annex 2.

- 1. Towards advancing the scientific competence and increasing the scientific and technical capabilities required to develop instrumentation for new discoveries and the advancement of knowledge:
 - (a) in the frame of the Scientific Programme at ESA, main missions and elements include PLATO, ARIEL, Comet Interceptor and EUCLID. Portugal has an active role in these mission by participating in the science teams and by being responsible for different activities, from GSE and payload to data centre elements;
 - (b) in the frame of ESO Portugal has been participating in the development of advanced instrumentation, particularly in various instruments for both the Extremely Large Telescope (ELT), and the Very Large Telescope (Interferometer) VLT (I);
 - (c) in addition, the European Solar Telescope is currently moving forward, and Portugal has recently joined the Board of Directors of the initiative, having reaffirmed its support to the initiative, that is looking to secure funding. Portuguese involvement in the EST has the goal to lead to industrial participation and privileged access to scientific data that will allow advancing in subjects such as solar physics and space weather.
- 2. To lead the effort of democratization of access to space data and service, responding to the great challenge of establishing a constellation for the Atlantic as well as to that of establishing subsystem and system competence:
 - (a) through the Incubed+ ESA Programme and via a dedicated call making the first steps towards the dedicated development of a private-sector driven Earth Observation constellation of small satellites and associated downstream applications focused on the socio-economic development of the Atlantic (a "Blue World");
 - (b) contribution to the Arctic Weather Satellite programme;
 - (c) contribution to the Space Weather Lagrange 5 mission with a contribution towards the instrument suite, as well as the development of a super low-cost sensor for integration on all satellites for radiation monitoring;
 - (d) through multiple projects (please refer to Annex 1 for a complete list) in the frame of ESA as well as through the Copernicus User Uptake activities and European Financed projects), Portugal is investing into increasing the awareness of potential users as well as the development of downstream applications and services connecting space to non-space sectors and engaging into new business models;
 - (e) the establishing and exploitation of the 15-m antenna on the island of Santa Maria, with the aim of Portuguese companies to provide services to the ESA Proba 3 mission as well as

other missions and programmes including Copernicus in the frame of a service contract to Portugal Space;

- (f) in the frame of the ESA financed Copernicus Space Component, Portuguese companies have been assigned contracts for 10 M€ to contribute to the six High Priority Missions (that represent at least 12 new European satellites), working along with the six existing Sentinel missions (Sentinel 1 to Sentinel 6);
- (g) To trigger the use of space in telecommunications by larger telecommunications operators as well as develop a new ecosystem in the country to address European and Portuguese needs allowing Portugal to lead in new topics such as encrypted quantum, optical communication, 5G, and fostering the in-orbit market, a number of projects are underway including pre-programmatic activities on establishing a 5G line of activities in the frame of ESA and articulated beyond including both 5G pilot projects covering the 200 miles Portuguese Atlantic platform and innermost regions as well as a 5G constellation to provide services to augment terrestrial-based services, extending coverage, adding resilience and enable new applications;
- (h) in the frame of European Structural Funds, Portuguese entities are undertaking a series of major projects that will increase national competences in systems and subsystems and that will also contribute to the fundamental building blocks of an Atlantic Constellation.
- 3. To **foster the development of demand and markets**: several activities and initiatives are underway:
 - (a) to stimulate the use of the microgravity environment by non-space companies and sectors and foster the exploitation of Space Rider thereby contributing to the success of the vehicle and to develop payload processing infrastructure and competence to accompany the landing site infrastructure investments, a microgravity workshop will take place early November;
 - (b) to foster the uptake of Copernicus data through FPCUP activities a series of initiatives are under way including workshops and training events for Portuguese public entities and private companies, the preparation of a Copernicus user data base and further activities are being proposed linked to educational modules and competitions in schools and universities, international coordinated activities focused on coastal areas and market place instruments or activities aiming at increasing Copernicus user uptake in Africa and the promotion of Portuguese companies in new markets;
 - (c) to stimulate links between space and non-space across Europe (industry, agro-businesses, climate, city councils, among others; involving politics, academia, research entities):
 - the extension of the ESA Business Incubation Centre from 3 to 15 centres spread across the country (mainland and islands);
 - the support of multiple start-up and business ideas;
 - (d) a mapping of all public sector entities and their needs is underway to be used at the basis

of developments done for "Digital Planet"

- 4. To **lead the effort of democratization of access to space**, several projects and studies have been followed and initiated by Portugal Space:
 - (a) a study and recommendation conducted with the European Space Agency to assess the safety radius as a function of location and microlauncher size when launching from Santa Maria to support the drafting of final tender documents in the AISLP process;
 - (b) the first steps, financed through the ESA Commercial Space Transportation Services Programme, towards industry-led public-private-partnership developments for the provision of launch services by contributing with major subsystems to microlauncher(s) to be launched from the Azores;

and

- (c) supporting the success of Space Rider by ensuring its landing in Santa Maria as well as targeting the vehicle's exploitation by bringing in non-space sectors such as the pharma industry to foster research and development of products in a microgravity environment, thus leading space into a new era of commercialisation;
- 5. to reinforce space as a fundamental infrastructure that serves economic growth (in-space and on Earth) and that needs to be evolved and protected by deciding to co-lead in active debris removal/in-orbit servicing enabling a world 1st, 1st, European leadership and competitive advantage in one of the largest future markets in space, the following projects are underway:
 - (a) the development of the Guidance, Navigation and Control subsystem of ADRIOS, the first active debris removal/in-orbit servicing service mission worldwide to be furthered as a business;
 - (b) de-risk activities to establish new activities and establish a start-up to address collision risk estimation and avoidance as a service.

In the frame of national calls, several projects have been approved which, in coordination and under the overall c by Portugal Space will be evolved to work towards the great challenges presented in Part I. A way forward is provided in the following Part III.

Part III: Guide for the Future beyond the Great Programmatic Challenges

In the process of tackling the great challenges set above, key elements that today are missing in Portugal will need to be addressed and established, some of which will require additional attention and effort.

POLICY DIMENSION

European Perspectives

In the frame of the **France-Portugal Co-Presidency of ESA Council, 2020-22** the main issues to be addressed – as are as follows:

- In the constantly evolving relationship between governments and industry, which ranges from government leadership to governments merely acting as catalysts, frequent exchanges are fundamental in securing a vibrant and diverse space ecosystem fully interconnected to its users. Portugal should therefore engage industry and business leaders in a series of dialogues together with ambassadors, national delegates, space agencies and experts on topics of importance for the future of Europe and the European Space Agency, ESA (despite Covid19)
- The preparation of the next Ministerial Meeting in 2022 and working towards it facilitate major initiatives currently developed at ESA across all its four main programmatic pillars Science and Exploration, Safety and Security, Applications, and Enabling and Support;
- Strengthen the contribution of space in emerging opportunities such as modern 5G communications, which should consider fund raising beyond public sector funding;

In addition, throughout the co-presidency, **space diplomacy** will help foster Government-Industry dialogues on "**More Space for a better Europe with ESA – boosting the European entrepreneurial space landscape**"

In the frame of the **Portuguese EU Presidency in 2021 the main issues to be addressed have been very briefly mentioned in part I of this document and will be addressed more widely in the final version of this document, which will also include a brief overview of the main lines of action for attracting funds in the frame of the EU Space Programme and Horizon Europe.**

To better value the Portuguese contribution to **ESO** the main issues to be addressed are as follows:

- 2 Increase the participation of Portuguese industry to the development of the ELT;
- 2 Maximise the in-kind contribution in the form of technical experts;
- Foster, through dedicated national activities, a stronger and larger collaborative work between the scientific community and industry in the design and development of instruments.

ADDRESSING THE GREAT PROGRAMMATIC AND VALUE CHAIN CHALLENGES

To address value chain challenges presented above a systematic approach across the national projects approved should be implemented. This approach is presented here below in as much as has been developed thus far.
DEVELOPING SYSTEM COMPETENCE

Other projects contribute the development of **system competence for versatile in-orbit platform – kickstage/satellite**. These projects will require a slight re-orientation and are:

- VIRIATO: reusable suborbital vehicle to foster research in orbital technologies, led by OMNIDEA (funded through PT2020-COMPETE/POR, 2020-23);
- CARAVELA: building blocks for micro-launchers, led by TEKEVER (funded through PT2020-COMPETE/POR, 2019-22);

In addition to:

GSTP Building Blocks

These projects were originally intended as working towards a suborbital first and orbital rocket later. The envisaged re-orientation is towards a versatile in-orbit platform - a hybrid between a satellite and a kick-stage (see Photon of RocketLabs as a reference).

This should be on the one hand a satellite but on the other a dispender for smaller cubesats that can be mounted on the platform itself. This will also allow some of the partners that are developing cubesats to share a ride if a launching opportunity arises.

The development and integration of a complete kickstage in Portugal is underway and the work conducted with AICEP as well as the activities pursued in the frame of ESA's CSTS Porgramme must be continued to ensure its success.

DEVELOPING TECHNICAL COMPETENCE FOR NEW MARKETS AND A STRONGER END-TO-END ECOSYSTEM

The democratisation of space implies the emergence of new market and opportunities.

LCRM - low-cost radiation sensor update, led by EFACEC (co-funded by ESA, 2019-2023);



Figure 3. Low Cost Radiation Monitor for Space Weather

- uPGRADE: development of a cubesat, led by SpinWorks (Funded through UT Austin-Portugal Program, by FCT and PT2020-COMPETE/POR, 2020-23);
- NewSat: COTS (commercial-off-the-shelf) and development of other innovative elements for cubesats, led by Stratosphere (former Critical Materials) (Funded through MIT-Portugal Program by FCT PT2020 and PT2020-COMPETE/POR, 2020-23);
- **ADRIOS**: Portuguese contribution to the first active debris removal and in-orbit service worldwide, led by Deimos and Critical Software (co-funded by ESA, 2020-2025);

To further develop the space ecosystem in Portugal the following should be pursued:

- The building up of competence in the design, development and operation of instruments. This capability will allow Portugal to discover and investigate into phenomena today not yet explored and develop new products beyond its capability to design, integrate and operate full systems. It will be important to explore missions of opportunities that will allow Portuguese instruments to fly on larger missions of partnering countries and entities. In this context it will be fundamental to stimulate the growth of the centres of scientific excellence across the country, bringing these together with other centres worldwide and closer to industry to develop cutting edge sensor technologies and digital/IT competences, making of Portugal a centre of excellence in topics of unquestioned future significance; as well as stimulate new partnerships between universities across Portugal and industrial and international entities.
- 6. Strengthening of the scientific "mining" of exploration activities;

Longer-term goals should include:

7. stimulating commercial activities built on synergies between space and non-space sectors such as sea/deep-sea sectors or Earth mining sectors;

PROMOTE NEW MARKETS IN NON-SPACE SECTORS

The development of a platform responding to user requirements and raising of customers in agriculture, fisheries, city councils (urban registrants), territory (territory and forest registrants), natural parks, mobility, infrastructures (dams, bridges, ports, highways, airports), insurance companies and more will be fundamental. Initial activities through the EO4MAAC initiatives should be pursued across the national and its public and private sector.

Fostering system competences in the integration of AI and Earth Observation systems (but not only), will be a key in this development and the steps made through the Moonshot Challenge should be followed by further initiatives and additional applied research activities.

OTHER POSSIBLE LINES OF ACTION

In addition to expanding international partnerships, further actions proposed include:

- Beyond the articulation of funds, the creation of a dedicated Venture Capital fund for space;
- Act as a promoter of awareness and responsible action both towards Portuguese speaking countries and new space actors working together with ESA, the EU as well as other entities such as the Secure World Foundation and in the frame of the UN.

Part IV: Portugal in ESA and the France-Portugal Co-Presidency

1. France-Portugal Co-Presidency of ESA Council, 2020-23

The interest of France and Portugal to take over the ESA presidency after Spain is to commit to do the utmost in order to keep pursuing a consistent and ambitious European Space Policy, with ESA at its core.

THE PROCESS: ENGAGING MEMBER STATES AND OTHER STAKEHOLDERS

In order to help achieving these goals, France and Portugal will propose to the ESA Council the implementation of annual Meetings of the Ministers, to improve the process of "stock taking" and a close interaction with Member States as "shareholders" of ESA. At the same time, France and Portugal propose to guarantee the budgets for a period of 5 years (as the logic of the mandatory programme) in order to allow more strategic space activities.

It is foreseen to establish a real **co-presidency for the next 3 years among the two member states**, with an up-front agreement of who is chairing what subject **according to the four programmatic pillars of ESA**.

Space19+, in Seville, will approve an ambitious portfolio of space programmes and will address the challenges linked to the sector. It is critically important that:

- All ESA Member States are seriously engaged in taking stock of space activities in a continuous way and strengthen the role of ESA in Europe in close articulation with the European Commission;
- In addition, all ESA Member States should work with ESA to take the necessary steps towards modernising ESA's industrial policy and guarantee the Agency evolves in a way to match a constantly changing environment, changing markets and a fast rate of digital transformation of our societies.

THE CONTENT: FORWARD LOOKING

The main issues to be promoted in association with the ESA co-presidency are as follows:

- Facilitate major initiatives currently developed at ESA across all its four main programmatic pillars Science and Exploration, Safety and Security, Applications, and Enabling and Support;
- Strengthen the contribution of space in emerging opportunities such as modern 5G communications, which should consider fund raising beyond public sector funding;
- Stimulate links between space and non-space across Europe (industry, agro-businesses, climate, city councils, among others; involving politics, academia, research entities), through the promotion of:
 - a proactive and positive approach to addressing global challenges and contributing to UN Sustainable development goals;
 - the diversification and new businesses opportunities in "New Space", Earth Observation areas, data processing, digital transformation and Artificial Intelligence, as well as related needs for mini- and micro-launchers and the democratization of the access to space;
 - o growth of human capital.

- Strengthen the downstream and transfer activities by establishing a organizational gateway across and possibly on the level of the directorates.
- Strengthen the role of Member States as "shareholders" of ESA to foster Space-related entrepreneurship and economic growth in Europe, together with a clear orientation to benefit European actors at large, including citizens, scientific organizations and industry;
- Strengthen a coherent European space policy including EU-ESA relationship, in particular:
 - Optimizing ESA-EU relation, especially ESA-GSA-successor through structured links;
 - Revive the EU Space Council;
 - Broaden the European participation to all European States to strengthen the overall European competitiveness on a global scale;
- **Develop ESA further as a lean and agile New Space Agency**, which acts as an agency, broker, facilitator, enabler and mediator as it leverages its unique industrial policy and implements different and new instruments tailored to the activity type;

In addition, throughout the co-presidency, **space diplomacy** will help foster Government-Industry dialogues on "**More Space for a better Europe with ESA – boosting the European entrepreneurial space landscape**"

The preparation of these dialogues requires the involvement of all stakeholders, especially industry and entrepreneurs, so that a strong partnership may be built to boost new competitive services to address emerging needs across all our economies and societies. The aim is to engage industry and business leaders in a series of dialogues together with ambassadors, national delegates, space agencies and experts on topics of importance for the future of Europe and the European Space Agency, ESA, and centered on job creation.

A constantly evolving relationship between governments and industry, which ranges from government leadership to governments merely acting as catalysts, is fundamental in securing a vibrant and diverse space ecosystem fully interconnected to its users.

Details concerning the distribution of the different programmes within the pillars are to be discussed. Together, France and Portugal, in close collaboration with ESA, will prepare by January 2020 a plan for:

- a series of events to raise space awareness across Europe and abroad;
- a series of events for fund raising in collaboration with known venture capitalists European and global;
- interaction with other entities worldwide;

Questions to be addressed include the following:

- Earth Observation, Telecommunication and Navigation and their contribution to addressing, preparing for and forward-looking advancement in the energy sector, in food, water, resource and waste management;
- Downstream and transfer gateway;
- Space as a Sector:
 - Satellite Manufacturing, e.g. Industry 4.0, e.g. Telecommunications, facing significant hurdles and where the window of opportunity is open now and only now for European industry to take up leadership in 5G and in optical communication and secured

communication for diverse European users; and incentivizing to moving toward a captive market of scale and well as a more vibrant commercial market;

• Space Transportation, where in addition to facing current challenges by delivering and increasing competitiveness, the aim should also be to democratize the access to space.

SHARED RESPONSIBILITIES AMONG THE FR-PT CO-PRESIDENCY

Portugal will take the main responsibility to push forward:

- ESA-EU-MS relations;
- ESA Next Generation;
- Ensuring the sustainability of Space as a Sector: Space Transportation

and proposes that France take the main responsibility to push forward:

- Space4Globe: Applications of space to addressing UN SDGs and global challenges, tying in with initiatives such as Space Climate Observatory under French leadership;
- Ensuring the sustainability of Space as a Sector: Satellite Manufacturing;

Part V: Portugal in ESA and the Space19+ Ministerial Meeting

1. The Portuguese participation in Space19+: Programmatic Decisions

In the frame of ESA's Space19+, 27th and 28th November in Seville, **Portugal increased in the annual subscription to ESA by about 20%, with a global subscription for the next five years to 102 million euros** under the following approach:

- 8. Strengthen the Portuguese and European technology innovation and scientific leadership by investing into an increase of the early technology development activities and the scientific programme including missions such as LISA, the Comet Interceptor, Ariel, Athena in which both Portuguese industry and research institutions can play a stronger role (Strengthen the access of Portuguese entities to early technology development and space science activities while at the same time strengthening Europe in the global context both as a leader and a valuable partner, by enhancing scientific leadership and exploration reach and by continuing to inspire generations young and old) as well as enabling and supporting dedicated technology development activities of Portuguese entities [Programme(s): Mandatory Activities, GSTP];
- 9. Commit to lead the effort of democratisation of access to space data through, primarily:
 - (a) making the first steps towards the dedicated development of a private-sector driven Earth Observation constellation of small satellites and associated downstream applications focused on the socio-economic development of the Atlantic (a "Blue World") including investigating into related aspects, such as Arctic Weather and contributing to the strategic goals of partner countries [Programme(s): FutureEO and Incubed+]; and
 - (b) investing into the development of downstream applications and services connecting space to non-space sectors and engaging into new business models [Programme(s): Telecommunication and Integrated Applications, ARTES];
- 10. Commit itself to lead the effort of democratisation of access to space through, primarily:
 - (a) the support of industry-led public-private-partnership developments for a spaceport and microlauncher to be launched from the Azores for small satellites [Programme(s): Commercial Space Transportation Services] in complementarity to supporting the fly-European policy and contributing to the success and competitiveness of European launchers in the making [Programmes(s): Commercial Space Transportation Services]; and
 - (b) supporting the success of **Space Rider** by targeting, above all, the vehicle's exploitation by bringing in non-space sectors such as the pharma industry **to foster research and development of products in a microgravity environment, thus leading space into a new era of commercialisation** [Programmes(s): Space Rider].
- 11. Reinforce space as a fundamental infrastructure that serves economic growth (in-space and on Earth) and that needs to be evolved and protected by deciding to co-lead in active debris removal/in-orbit servicing enabling a world 1st, European leadership and competitive advantage in one of the largest future markets in space (under the theme of "clean Oceans with clean Space") as well as supporting the first steps towards an operational Space

Weather System [Programme(s): Space Safety];

- Trigger the use of space in the telecommunications sectors by larger telecommunications operators in the country to address European and Portuguese needs allowing us **lead in new topics such as encrypted quantum, optical communication, and 5G** [Programme(s): Telecommunications and Integrated Applications, ARTES];
- 13. **Reinforce Europe and the successful ESA-EU partnership** to the benefit of Portuguese and European society, economy, and autonomy by securing the continuity and evolution of the Copernicus Space Component [Programme(s): Copernicus Space Component] and supporting the development of a new ESA-EU partnership in Space Safety and Security;

Table 2 below summarises the subscriptions at the ESA Ministerial Meeting in 2017, CM16 and the subscriptions at Space19+, and reflects the current understanding of the space sector and should be updated dynamically as new elements arise. Figures 1 and 2 depict the subscriptions to Space19+ as per the table below.

(Amounts in M€)						
TOTAL OVERVIEW by DOMAIN	PT CM16 (M€, 2016 ec / cec)	PT Space19+				
Earth Observation	5.5	15				
Telecommunication – Artes*	7.25	12.5				
Space Transportation	2	3.5				
Space Exploration	1.4	1.5				
Navigation	1	1.5				
Space Safety	0.55	13.3				
Technology**	8.5	2				
Prodex	0.75	3				
Basic Activities***	13.48	47.4				
Scientific Programmes***	30.55	47.4				
CSG***	2.71	3				
TOTAL (M€)	73.69	102.7				

Table 2 - CM16 and Space19+ subscriptions

*ANACOM

** IAPMEI - SME and Innovation Development Institute

*** Mandatory Activities, decided on a 3 years + 2 years basis, i.e. the numbers reported are for a period of 5 years, whereas optional programme subscriptions are variable and depend on the specific activities and vary between 3 to 5 years.



Figure 4. Space19+ Optional Programme Subscriptions in M€



Space19+ Optional Programmes in M€

Figure 5. Space19+ subscription distribution between optional and mandatory

Portugal in the EU Space Programme

The Portuguese participation in the EU Space Programme (2021-27) has been prepared and coordinated by the Portuguese Space Agency since 2020 in order to enhance Portugal's Atlantic positioning in the world, boosting the attraction of funding and mobilizing various actors, in terms of an innovative and integrative approach, as well as enhancing the Portuguese co-presidency of the Council of the European Space Agency, ESA (2020-23).

The EU Space Programme is divided in **4 components:**

- i. Copernicus Programme Earth Observation
- ii. GNNS Programmes: Galileo and EGNOS NAVIGATION
- iii. Secure Satellite Communications (including GOVSATCOM)
- iv. Space Situational Awareness (SSA) including:
 - 1. Space Surveillance and Tracking (SST)
 - 2. Space Weather (SW)
 - 3. Near-Earth Objects

Technology, data and services associated with space assets play a key role in the European strategy, with Europe being one of the world leaders in the space industry. The relevance of this sector in the European economy is recognised, with an increase in investment verified over the last funding programmes.

TARGETS TO ACHIEVE

- Ensure the proper implementation of the SST program in PT in articulation with the Defense;
- Ensure more direct involvement of national entities in Copernicus services, as well as stimulate new opportunities within Galileo and Govsatcom;
- Promote the creation of new companies, expansion of the current ones and capture of direct foreign investment, increasing the sector's turnover from 40-50 M eur to 500 M eur by 2030, as considered in the national strategy for Space;
- Promote the "Atlantic Interactions" agenda, especially with the strengthening of Earth Observation activities, with particular focus on the oceans, in view of contributing to solve societal problems such as disaster prevention and climate change, in Portugal and other countries, especially in Africa.
- Promote the "Azores ISLP" program; through the attraction of public and private, national and European funds, to co-participate in the construction and promotion of the future space port of the Azores (in articulation with the Horizon Europe program);

- Given the nature of this programme, the actions will have to be appropriate for each subprogram and articulated between the PERIN network and the PT Space agency;
- Guarantee the involvement of the PT Space agency in raising additional European funding, in complementarity with national participation in ESA;
- Ensure a greater involvement of the academia, the business sector and the international agencies.

a) Copernicus Programme - Earth Observation

The Copernicus Programme is the Earth Observation programme of the European Union that provides free, open and global data of the land, atmosphere and ocean, making use of 7 satellites currently in operation (the Sentinel-1 A&B, Sentinel-2 A&B, Sentinel-3 A&B and Sentinel-5-P).



Figure 1: Chronogram of deployment of the Copernicus constellation Source: Copernicus Market Report; Issue 2, February 2019; Prepared by PwC; ISBN 978-92-79-98973-5; doi 10.2873/011961

This programme divides in **3** components:

- a) The Space component whose entrusted entities are ESA and EUMETSAT;
- b) The in-situ component, where terrestrial sensors are used to complement and validate the satellite data, entrusted to the European Environmental Agency;
- c) The Services component, which includes 6 services that generate specific products, also freely distributed, focusing:
 - o Agriculture and land resources (Copernicus Land Monitoring Service CLMS);
 - o Marine resources (Copernicus Marine Environment Monitoring Service CMEMS),
 - Atmosphere (Copernicus Atmosphere Monitoring Service CAMS),
 - Climate change (Copernicus Climate Change Service C3S)
 - Emergency (Copernicus Emergency Management Service Copernicus EMS)
 - Security (Copernicus Security Service).

In this component the entrusted entities are:

- a) European Environmental Agency (EEA) for CLMS, with the *Joint Research Centre* (JRC) responsible for the *Global Land* component and for the Copernicus EMS;
- b) European Centre for Medium-Range Weather Forecasts (ECMWF) for CAMS and C3S;
- c) Mercator Ocean for CMEMS;
- d) The security servisse is ensured by:
 - *European Maritime Safety Agency* (EMSA) for the maritime sector;
 - o European Border and Coast Guard Agency (Frontex) for borders; and
 - European Union Satellite Centre (SatCen) for foreign affairs.

Date at which the Copernicus services were operational (Source: ESA, EC)



Figure 2: Chronogram of operationalization of Copernicus Services

Source: Copernicus Market Report; Issue 2, February 2019; Prepared by PwC; ISBN 978-92-79-98973-5; doi 10.2873/011961

SPACE COMPONENT

In general terms, for the period 2014-2019, and including all the contracts signed by the entities responsible for implementing their activities until 31/12/2019, approximately 82% of the funds were allocated to the space component $(3,02b \in)$, and the remainder to services.



Source: EC on March 2020 at the Copernicus Committee

Overall, for the period 2014-2019, Portugal obtained a budget funding rate of 0,2%, with Germany and France obtaining more than 55% of the value of contracts and Spain approximately 6%.



Figure 4: Budget secured by each country in the Copernicus programme Source: EC on March 2020 at the Copernicus Committee

When considering Portugal's budget funding only in the space component, the rate is 0,1% (approximately 3M€).





It is important to recall that the entity responsible for contracting the space componente of this programme is mostly ESA in coordination with the Commission, with one phase of the programme funded directly by ESA and part by EUMETSAT.

Portugal's participation in this componente must therefore be articulated with ESA programes. Within this contexto, Portugal has subscribed $5M \in$ in the CSC4 – *Copernicus Space Component* programme, in which the contracts for the six new missions of the Copernicus program, the *High Priority Candidate Missions* – HPCM, have already been approved. Portuguese companies have obtained contracts $10M \in$, with participation in all missions, with emphasis on the CIMR – *Copernicus Imaging Microwave Radiometer* mission, where it secured 7,4 M \in in contracts. These contracts for the HPCM include Phases B2/C/D of the *Prototype Flight Model* (PFM) and Phase D of one *Recurrent Model* (FM2) per

mission, being financed by ESA up to phase B2 and dependent on the Commission Copernicus programme budget (2021-2027) for the conclusion of the contracted works. With these contracts, Portugal secures already budget from the Copernicus Programme 2021-2027. It is important to ensure that this funding is expanded by participaton in more missions, such as the Copernicus Next Generation (the next generation of Sentinel satélites), and activity included in ESA's Future EO-Segment q programme, for which Portugal has subscribed 4M€.



Source: European Space Agency, Industrial Policy Committee, ESA/IPC (2020)88, rev.1

SERVICES COMPONENT

In the services component, the Portuguese participation for the 2014-2019 period was 0.9% (approximately 5.6M euros), with a greater distribution of funds between countries. In order to increase budget raising in this component, it will be necessary to strengthen contact points with the entities responsible for the services, identify future needs of the services and articulate with national capacities.



Figure 6: Budget secured per country in services component *Source: EC on March 2020 at the Copernicus Committee*

Another area that should be taken into consideration, in addition to the space component and services contracted directly with the responsible entities, is the market generated around the data linked to applications developed by service providers/companies (intermediate users) and use of products with added value by end users in different economic sectors.

According to the latest market study46, intermediate users are the main link between Copernicus data and end users; these value-added service providers process and transform the data into useful information for the end user. In 2018, the benefits of Copernicus in this service market were assessed at 125-150M Euros; having increased greatly compared to the 54M Euros estimated in 2015. The main driver for the growth of these markets is the need for products adapted to the specific needs of end users, and the progressive increase of Earth Observation data in the solutions adapted by some industries and sectors, with ocean monitoring and agriculture being the sectors with the highest annual growth, 23% and 20%, respectively.

Considering only the impact on end users, the highest growth rate (estimated for 2020) is in the forest sector and the agricultural sector (46% and 31%, respectively), with economic benefits in the order of 77M euros and 318M euros, respectively, estimated for 2018.

According to the European Association of Remote Sensing Companies (EARSC), in 2016, the number of companies connected to Earth Observation (EO) services increased by 13% compared to 2015 data, and by 65% with 2012 data. Of the 460 companies in Europe identified with EO services, about 25% were users of Copernicus data, and every year the number of companies using Copernicus data to develop their services has increased annually. Of these companies, about 60% use Copernicus data directly, but 32% use Copernicus products provided by the Services, being the products most sought by companies of the CLMS service.



Figure 7: Industry interest in the Copernicus programme per service Source: Copernicus Market Report; Issue 2, February 2019; Prepared by PwC; ISBN 978-92-79-98973-5; doi 10.2873/011961

⁴⁶ Copernicus Market Report; Issue 2, February 2019; Prepared by PwC; ISBN 978-92-79-98973-5; doi 10.2873/011961

While revenues for the space component tend to vary over the years, depending on the fluctuating needs of large satellites, the services market shows steady growth, with expected growth of 7% by 2022⁴⁷. However, strong trends in this market are seen in recent years, such as changes in business models for near-real time applications, with increasingly integrated solutions, cloud computing and the use of artificial intelligence. As the Copernicus program is one of the main data originators within Earth Observation, it is important to take into account and stimulate at a national level this market of Big Data Analysis.

TARGETS TO ACHIEVE

- Increase the Portuguese participation in the Copernicus program;
- Increase the national network of Copernicus Relays and Academies;
- To guarantee the Portuguese participation in the next Copernicus Sentinel NG missions in articulation with ESA programs;
- Ensure the involvement of national institutions in Copernicus services. (possible attraction of the organization ECMWF to Portugal)
- Increase the number of Portuguese companies providing services using Copernicus Program data

- Articulate ESA funding with the Space Programme, not only for the space component, but also for the services component;
- Articulate the Copernicus program with the Horizon Europe program;
- Carry out actions to promote national capacity with the intergovernmental organizations of the Copernicus program (European roadshow);
- Survey the national capacities for Copernicus data processing including public administration, academia and industry (in terms of services).
- In articulation with the AIR Centre to promote Copernicus uptake activities in the maritime sector.
- Promote new services and markets, fostering greater interaction between end users, academia and industry, namely between the communities of Big Data and Artificial Intelligence and specialists in remote satellite detection for the development of new services and products.
- Organize workshops with the entities responsible for Copernicus services to disseminate funding opportunities, identify priority areas and disseminate national capabilities;
- Promote the Copernicus Program at the national level, including public administration, academia and industry, in articulation with the actions of the FP-CUP (Copernicus User Uptake) funding program;
- Develop capacity building actions and pilot projects in Africa and South America, with a view to expanding markets and within the Atlantic Connections in articulation with the FP-CUP actions to be carried out in collaboration with the AIR Centre.

⁴⁷ Copernicus Market Report; Issue 2, February 2019; Prepared by PwC; ISBN 978-92-79-98973-5; doi 10.2873/011961

b) GNNS Programmes: Galileo and EGNOS - NAVIGATION

BACKGROUND FOR THE CURRENT PROGRAMME 2014-2020

Galileo and EGNOS are two flagship projects of the European Union. The current estimated cost of these two satellite navigation programmes is 13 244M€ (the following table shows the current cost breakdown).

Year	Total	Galileo			ECNIOS	Othor	
		Definition	Development	Deployment	Operation	EGNUS	Other
EU		-					
1990s	42.5	42.5				- ?***	
2000	550		550				
2007 2008	1 000 2 480		560	2 407		417	96
2013	7 072			1 930	3 000	1 580	562
FP*	603.5				5		603.5
Total EU	11 748	42.5	1 110	4 337	3 000	1 997	1 261.5
ESA**	1 496	86	1 075			273	62
TOTAL	13 244	128.5	2 185	4 337	3 000	2 270	1 323.5

Figure 8: Galileo and EGNOS estimated cost, *Source*: <u>https://www.europarl.europa.eu/thinktank/fr/document.html?reference=EPRS_BRI%282017%2959940</u> <u>6</u>

The Multiannual Financial Framework (MFF) for the period 2014-2020 defined a budget of 7 700 M€ for Galileo and EGNOS. 7 071M€ were allocated to cover the financial needs of the Management and Monitoring of Galileo and EGNOS, the Exploitation of EGNOS, and the Completion of the Deployment Phase of Galileo.



Figure **9:** *Finantial commitement (2014-2020) for Galileo and EGNOS* Source: Regulation (EU) No 1285/2013

Historically these programmes have been dominated by France, Germany, Italy and the United Kingdom, with Spain playing an increasing role in recent years (the figure below). Brexit also creates

an opportunity for other European suppliers to take the activities typically performed by British suppliers.



Figure 10: Retorno económico da implementação e exploração do EGNOS e Galileo em 2018 por estado membro. *Source: <u>https://ec.europa.eu/budget/graphs/revenue_expediture.html</u>*

According to the EU expenditure and revenue for the 2014-2020 data published in <u>https://ec.europa.eu/budget/graphs/revenue expediture.html</u>, Portugal had an average financial return of less than 0.02% for the European GNSS Programmes (see the following figure). The reported financial return does not include activities subcontracted by large European players to Portuguese industry. Portuguese industry contributed to different elements of Galileo and EGNOS programmes, including maintenance of ground infrastructure, contributions for ground and space segment. The main obstacle encountered by Portuguese industry to increase the participation in these programmes relates to the difficulty of finding the appropriate points of contact in the consortium primes, that can be exploited to promote the national industry and facilitate its entry into contracts.



Evolução da participação PT no Egnos e Galileo

Figure 11: Portuguese financial return for the EGNOS and Galileo Programmes, according to <u>https://ec.europa.eu/budget/graphs/revenue_expediture.html</u>

BACKGROUND AND STRATEGY FOR GALILEO AND EGNOS PROGRAMMES 2021-2027

Portuguese industry has the technical capability (acquired and demonstrated in past activities both within the ESA and the European Commission) to provide elements for the different segments of Galileo and EGNOS, whether in terms of hardware, software or consultancy. Moreover, the industry is open to participating in these programmes.

The national strategy for these programmes should be to identify open opportunities and link them with national expertise and products. Continue to explore expertise development in the scope of ESA Satellite Navigation and Satellite Telecommunication activities, to better place Portuguese industry to contribute to Galileo and EGNOS.

TARGETS TO ACHIEVE

- Establish contact points in the European contracting organisations and potential leaders of winning consortia.
- Ensure the participation of national entities in the Galileo and EGNOS programmes;
- Promote the growth of national companies to enable them to take on contracts of increasing size.
- Increase the relevance of ground infrastructure in Portugal.

- Expand the network of contacts linked to Galileo and EGNOS (both industrial and public);
- Map national capabilities that can be applied to these programmes;
- Promote national capabilities among consortium leaders;
- Promote the engagement of Portuguese industry in Galileo and EGNOS;
- Promote Portugal as a host country for the installation of terrestrial infrastructure, taking advantage of the country's geographical location.
- Promote the sustainable growth of qualified employment opportunities in the satellite navigation field, to be able to meet the established objectives.

c) GOVSATCOM Programme - Communications

GOVSATCOM is a new programme which, in the short term, will rely on the pooling and sharing of existing capabilities of member states or commercial operators. Nevertheless, as the programme evolves, it is expected that it will become more relevant, given the importance of secure communications in an increasingly digital society.

For MFF 2021-27, the European Commission proposes to allocate EUR 442M to GovSatCom (to be shared with SSA). Compared to other programmes, the budget available is low, and the return for Portugal in this first phase of the programme should focus on the strategic positioning of national entities as contributors of elements to GovSatCom. Portugal participates in the Entrusted project, which will gather user requirements and define use cases to help steer the development of GovSatCom. It will be essential to promote and evolve defence and governmental entities in this programme.

TARGETS TO ACHIEVE

- Ensure the presence of Portugal in GovSatCom;
- Build a network of potential GovSatCom users in Portugal, identifying their needs and use cases;
- Promote the engagement of Portuguese industry and governmental entities in different elements of GovSatCom.

- Identify the user requirements of potential national GovSatCom users;
- Identify national capabilities;
- Carry out actions to promote national expertise among major European players;
- Explore the capacities developed in GovSatCom precursor activities, such as ESA PACIS Projects, to position national entities in GovSatCom at EU level.

d) Space Situational Awareness (SSA)

The Space Situational Awareness (SSA) programme addresses activities to improve knowledge of the space environment, including space object monitoring and space weather. As mentioned in the previous section, the European Commission for MFF 2021-2027 proposes to allocate 500M€ to be shared between SSA and GovSatCom.

This programme is divided into the following areas:

- SST Space Surveillance and Tracking, of human-made objects.
- SWE Space Weather, for space weather monitoring and forecasting.
- NEO Near-Earth Objects, for monitoring natural space objects.

Currently, the national component of the SST programme is managed by Defence, through which articulation is essential within this programme.

TARGETS TO BE ACHIEVED

- Ensure proper implementation of the SST programme in Portugal (in conjunction with Defence);
- Attract 5M of investment.

- Seek synergies with the Space Surveillance and Tracking Project Group, to boost activities in the SST area;
- Identify national niche competencies in this sector;
- Carry out actions to promote national expertise among consortium leaders (European roadshow).

Annexes

Annex 1: Portugal Space 2030 Strategy

GUIDING PRINCIPLES

The Portuguese strategy in terms of investments must therefore be based on the following principles:

- 1. balance consolidating and continuation of acquired and proven competences with investments in new fields of growth and new markets;
- develop subsystem and system competence to increase the Portuguese presence along the whole value chain, implement Portuguese goals in a European frame and strengthen the European space-based economy across all nations;
- 3. stimulate user uptake commercial and institutional by addressing user needs and including the user in the strategic definition process;
- concentrate main efforts in a few strategic fields and support other fields by opening opportunities to businesses which may profit from space/non-space sector interactions and synergies;
- 5. build strong international partnerships and implement concrete projects in the frame of these partnerships;
- 6. build synergies between national-ESA-EU funding for space and other sectors; and
- 7. increase the science output in all fields.

OBJECTIVES FOR THE TIMEFRAME 2020-2025

In order to successfully implement the Portugal Space 2030 Strategy and achieve the above objectives, in line with Joint Statement the following major objectives are set for Portugal to achieve during the years 2020-2025 through targeted subscriptions made at the ESA Ministerial, Space19+, in November 2019:

- develop subsystem and system competence through concrete projects and products working with international partners in the field of Applications and specifically Earth observation;
- contribute to European leadership in space-based solutions through the diversification of the fleet of satellites and high-altitude platforms available to end-users to develop applications and services by developing small systems to complement large ones whilst contributing to large systems;
- establish an open space port in the Azores contributing to the democratisation of access to space and to the competitiveness of European access to space for a wide range of payloads;
- support end-users in integrating space in solutions to their specific problems;
- strengthen scientific leadership and visibility, by enabling the scientific community to lead in key fields in science in and from space;
- enable the future via early elements of the seamless grid of innovation with the motto: failure is just a data point (i.e. experience and failure are hard but good teachers).
- develop, preserve and disseminate knowledge, competences, and skills for capacity building and sustainable growth, inspiring and promoting creativity with the motto: free and open access

PORTUGAL SPACE 2030: PRIORITY GOALS

Having recognised the potential of space, Portugal has developed a 2030 Strategy which defines four priority goals:

- **Objective 1: Promote economic growth and the creation of skilled jobs** in Portugal by promoting space-related markets, namely through market uptake and exploitation of satellite data and signals cutting across multiple activity sectors and addressing societal challenges, including in agriculture, fisheries & ocean and climate monitoring; in monitoring infrastructures, in urban development, in defence and home security, and in the public health sector;
- Objective 2: Foster the generation of satellite data through new space technologies and space-related infrastructures in Portugal, leveraging international scientific and technological cooperation and turning Portugal into a stronger player in the space sector, with emphasis on new space industries (i.e. "New Space").
- Objective 3: Contribute to the development of the country and to the strengthening of diplomatic relations and international scientific cooperation, taking into account the advantages of Portugal's geo-strategic position for the Space sector, and also with a view to sharing the return of space activities with countries and not yet developed capacities in the space domain, with emphasis on Portuguese-speaking countries;
- Objective 4: Ensure the development and evolution of the legal, financial, institutional, cultural/educational internationalization frameworks capable of boosting the development of the space sector in Portugal through national initiatives and international cooperation for the next decade.

These objectives are framed by the goals and objectives for space activities in Europe for the years to come, provided by the 2016 ESA-EU Joint Statement setting out the "Shared vision and goals for the future of Europe in space":

- Foster a globally competitive European space sector, by supporting research innovation, entrepreneurship for growth and jobs across all Member States, and seizing larger shares of global markets;
- Maximise the integration of space into European society and economy, by [...] strengthening synergies between civilian and security activities in the field of navigation, communication and observation, including through monitoring borders, land and maritime security conditions;
- Ensure European autonomy in accessing and using space in a safe and secure environment, and in particular consolidate and protect infrastructures, including against cyber threats;

The joint statement further recognises that "these are underpinned and possible only through excellence in science and technology expressed through an environment of outstanding education and skills and a thorough knowledge base."

Annex 2: The last two years: space in Portugal, 2018-2019 - Main actions undertaken in Portugal

The gradual recognition of the Space sector that emerges in Portugal has been the target of recent public policies and strategies of strengthening scientific diplomacy and international scientific and technological cooperation, based on 5 lines of action, as briefly described in the following paragraphs.

 First, the "Portugal Space 2030" strategy, approved by the Government in February 2018 with the ambition of multiplying by ten the volume of activities in Portugal in the area of Space, naturally within the scope and in articulation with the "Innovation Strategy for Portugal 2018-2030, which aims to "effectively converge to Europe by 2030 and achieve R & D investment of 3% of GDP", creating about 25,000 skilled jobs in the period 2018-2030. The need to stimulate new markets, public and private partnerships in Portugal in the international context implies the development in Portugal of pilot projects of international relevance and a demonstrative context in diverse sectors, including agriculture, fisheries, monitoring of major infrastructure, urban development, defense and security.

The implementation of the "Portugal Space 2030" strategy includes three complementary instruments, as follows: i) A new legal regime through the "Space Law" approved in 2018; ii) The creation of a space agency, "Portugal Space" (www.ptspace.pt), installed in March 2019 ; and iii) Ongoing development of a foreign direct investment attraction strategy.

In particular, the "New Space Industries" sector considers a new wave of actors and business models in the international space sector characterized by the capacity to attract private financing, in view of predominantly commercial markets and in need of communication and information systems based on mega-constellations of micro and nanosatellite. New Space opens up new opportunities for Portugal, as well as other small and medium-sized countries, namely at the level of production and use of data, based on specific technological platforms dedicated to Earth observation for social and economic activities, and at generation level of data and infrastructures. It includes the need and challenge of developing and producing satellites, mainly micro and nano-satellites, and the development of mega-constellations, with developments expected to democratize access to low-altitude orbits (LEO) and synchronized with the sun (ie, Sun Synchronized Orbits, SSO).

- 2. Second, the development and promotion of the "Atlantic Interactions" agenda and the Atlantic International Research Center AIR Center, in the form of an innovative network institution driven by an international R & D cooperation program to strengthen knowledge on space-climate-ocean interactions through North-South / South-North cooperation. It includes the installation of an Earth observation center on Terceira Island, in conjunction with ESA and in the form of an ESA_Lab@Azores.
- 3. Third, the launch of the "Azores International Satellite Launch Program Azores ISLP" (www.azoresislp.pt) and the procedures for the installation and operation of a space infrastructure for the launch of mini and micro satellites in the Autonomous Region of the Azores. Its location on European Union territory in the Schengen Area, as close to Continental Europe as it is to the American continent and with extensive ocean cover over 1500 km in any direction, offers absolutely unique advantages for the promotion and development of "New Space" in Europe. It builds on the ongoing reinforcement of ground stations for satellite

monitoring and stimulates a new challenge for Europe at large in terms of the need to consider and stimulate a new generation of launchers in terms of safety and environmental impact, as well as ensuring the unprecedented worldwide installation of a space port open to all international actors and operators. In other words, the installation of a new generation of environmentally sustainable and safe satellite launcher services, open to the world, can create a new positioning of Portugal and Europe at the world level.

Increasing international competition in this context has emerged rapidly, requiring a new strategy in the process of valuing the positioning of Atlantic and the real opportunities that Azores have in this area. Portugal's positioning of the Atlantic is thus critical and opens new opportunities in the international context. It facilitates the installation of observation and measurement infrastructures in a spectrum not reachable or replicable in any other country, which represents an effective comparative advantage.

4. Fourth, the promotion of Portugal in the world through the reinforcement of international partnerships through the "Go Portugal - Global Science and Technology Partnerships Portugal" Program. The international prestige already achieved demands that Portugal, in the near future, position itself as a knowledge driven economy, with the capacity to take on the new challenges at the frontiers of the production and diffusion of knowledge. It is under this context that Space plays a fundamental role. This is, moreover, imperative for a country that seeks to affirm itself in the international scenario for science and innovation.

Activities under development include: the expansion of the MIT-Portugal Program and the UT Austin-Portugal Program with a specific re-orientation for space research and innovation; a formal agreement for a specific partnership with the Chinese Academy of Sciences, CAS, for micro satellite development, through the installation in Portugal of "STARIab" in close cooperation with business companies operating in Portugal.

5. Fifthly, the promotion of the "PERIN-Portugal in Europe Research and Innovation Network", aimed at guaranteeing an effective convergence strategy for the "Europe of Knowledge" by 2030 and facilitating the implementation of the "Innovation Strategy for Portugal 2018-2030", through a joint and profound debate throughout the country and in priority areas for the promotion of research and development (R&D) activities, including health, artificial intelligence, production and agri-food technologies.

In this context, the PERIN 2019 "+ Science, + Europe" journeys were held between March and April 2019, with the intention to reinforce and double Portugal's participation in the next European Research and Innovation Framework Program (i.e., "Horizon Europe") and related programs relevant to research and innovation activities (i.e., the European Space Program and the "Europa Digital", among others).

This is how the national agenda "Portugal Space 2030" mobilizes various sectors of society for Space, as valued as a common good, fostering new opportunities for institutional, industrial and international cooperation and contributing to the development of innovative and competitive technologies in the international market.

Annex 3: 20 years of Portugal at ESA, 1999-2019

Portugal joined ESA on the 14th of November 2000, making it the 15th of now 22 Member States. Since its ascension to ESA, Portugal has seen an increase in capacity building activities in the space sector and hence an increase in competence of Portuguese industry thanks to dedicated initiatives which the European Space Agency has for new Member States.

Portugal is however, still far from exploiting its potential in space. In the frame of ESA, Portugal sees an uneven distribution between the mandatory and optional programmes when compared to other Member States.

Figure A1 below gives and overview of the ratio between optional programme and mandatory subscriptions levels of Member States at CM16.

Successful Member States such as Germany, France, the United Kingdom, Italy have a relationship of 2:1 and above between the optional to mandatory activities today.



Figure A1: Ratio of Optional to Mandatory Subscriptions at CM16 for different Member States (on a 3-year basis)

The figure above does not include Luxemburg which has a ratio of 21.

Portugal's investments are at a ratio of 0.9:1 and shows that Portugal has significant room from improvement in going from basic research and early technology development and capacity building to developing systems and using these systems to provide solutions (downstream) for end-users. Figure A2 depicts the Portuguese contribution to ESA over the period 2000-2019.



Figure A2: Portuguese Contribution to ESA during the period 2000-2019 in M€ and c.e.c.

The figure shows an increase over the initial period with an increased contribution at the occasion of the ESA Ministerial Meeting of 2016. The ambition to strengthen the space sector will be continued with a proposed increase of 20% in the Portuguese contribution at the ESA Ministerial Meeting of 2019, Seville, to achieve about 20 million per year during coming years.

It is however clear that the Portuguese contribution is not expected to have a large increase in coming years and, therefore, it is mandatory to have a much better articulation with other national and EU funding sources, as well as private business investments (see Part I of this document).



Figure A3: Distribution of Contributions to ESA per Member State for the year 2019

Figure A3 depicts the percentage distribution of contributions per Member State for the year 2019. Space activities in Portugal account for an annual outcome of about 40 to 50 million Euros, while they represent about 600 million Euros in smaller countries such as Norway. In Spain, space sector is about 200 M€/year (and growing) in the frame of ESA alone.

These figures show an enormous potential for Portugal to grow a space economy and to attempt to multiply current outcome by 10 times in the coming decade, aiming to achieve an overall annual outcome of 500 million euros by 2030.

This requires a clear strategy to raise and attact about 2500 million euros in the coming decade, 2020-2030, as explained in this document and make use of an integrated and holistic approach, together with a strategy to diversify and articulate funding sources and investment funds.

Annex 4: ESA's Space 19+ Ministerial Summit

The European Space Agency is presenting its programmatic content organised according to four main programmatic pillars and including the downstream as follows:

- Space Science and Exploration
- Safety and Security, with Space Safety, Safety and Security Applications, and Cybersecurity
- Applications, with Earth observation, Telecommunications, and Navigation
- Enabling and Support, with Space Transportation, Technology, Operations



Figure A4: Four Programmatic Pillars

Provides a summary of the main decision of Space19+ as well as the corresponding financial elements. Space19+ Programmatic approach

MANDATORY PROGRAMME

Portugal should support these objectives and implement concrete actions for their implementation. Examples of specific elements are:

- Stimulate the development of new ideas addressing specific user-needs to be submitted to ESA to address for example: forest fires, autonomous shipping and optimised shipping routes, and the development of green energy sources. Technology development is to be favoured over studies.
- Stimulate the growth of the centres of scientific excellence across the country, bringing these
 together with other centres worldwide and closer to industry to develop cutting edge sensor
 technologies and digital/IT competences, making of Portugal a centre of excellence in topics of
 unquestioned future significance;
- Stimulate the use of ESA installations by Portuguese institutions; and
- Stimulate new partnerships between universities across Portugal and industrial and international entities.

OPTIONAL PROGRAMMES Science and Exploration

STOCK TAKING

Portugal contributes to the European Exploration Envelope Programme, with a view of receiving 1.5 M€ worth of industrial contracts for Portuguese industry for some technology elements.

This funding amount is not enough for Portugal to develop significant expertise or contribute in a significant manner to the hardware of any individual mission.

Like space science mission (such as Rosetta), exploration activities are important in inspiring the younger generations and Portugal should not neglect this dimension of space activities to attract young people to study STE(A)M and aim for high-qualification jobs.

WAY FORWARD

A new age of exploration is at its verge with new and renewed destinations. The next big breakthrough in exploration is expected through the commercialisation (at least partial) of activities and as well as a broader interaction not limited to a selected few partners as is the case today on the International Space Station.

The use of microgravity for the development of pharma products or specialised manufacturing process are only some of the commercialisation activities that might see an increase in the coming years.

Robotic activities and specifically activities associated with in-situ resource utilisation and in-space manufacturing will be the next technological breakthroughs in space – with all aspects such as power or AI will be enablers.

In view of the limited capacity to lead large exploration missions, Portugal should:

- grasp opportunities to strengthen acquired competences; but complemented with:
- strengthening of the scientific "mining" of exploration activities;
- stimulating commercial activities built on synergies between space and non-space sectors such as sea/deep-sea sectors or Earth mining sectors;
- raising awareness of commercial opportunities for end-users and facilitate their entrance in the space landscape;
- invest in in-situ resource utilisation and in-space manufacturing opportunities

Space Safety and Security GENERAL

Space Safety and Security are of civilian, governmental and defence relevance and Portugal must position itself now and in doing so: strengthen its infrastructure resilience; become an early entrant in new markets of huge proportion; and strengthen Europe as a whole.

Space Safety and Security is the next big topic in space and on Earth and early positioning in this field and associated markets will ensure leadership and economic growth.

The European Space Agency is the only agency worldwide that has made the first steps towards tackling safety and security is all its breadth. This is a unique opportunity that should not be missed. The overarching aim of the activities is: "A resilient society capable of identifying and addressing hazards and threats originating in space, of fully exploiting space to counteract Earthly threats (human-made and natural) and of fully benefitting from space activities being cyber resilient."

National and EU activities will be fully complementary to support users of the following sectors: defence, energy, air, government communications, ...

Indeed, current developments worldwide have put an increased focus on safety and security aspects – from migration to autonomous shipping, to air traffic management, search and rescue and border control. The expectation is that the public sector be at the forefront of many of these activities with, however, private entities involved in this field both as users as well as investors. The public sector engagement will be paramount, with consequences of commercial importance. The increased reliance of other sectors on space assets and services for their own success and competitiveness magnifies the incumbent need to address threats (man-made or natural) originating in space which endanger critical assets in space and on Earth or even threat humankind – space debris and clean space, planetary defence, space weather (Space Safety). Worldwide, the public sector is expected to lead these efforts. Likewise, the expectation is that the public sector will take the necessary steps to enable commercial aspects and future markets associated with Space Safety (such as service provision and in-orbit servicing). Failing to do so will cripple the future competitiveness of industry.

Cyber resilience is already and will continue to be a concern. The global security framework is evolving. Cyber-attacks and accidents can target individuals, companies and public institutions/services (e.g. energy grids, financial markets, unmanned vehicles etc.), but also democracies. Space systems are a central link in this new intertwined safety and security continuum. The cyber security market totalled USD 101 billion in 2017, of which 90% were of a civilian and commercial nature. The civil segment increased by 12% in 2018, and 4% in defence. The compound annual growth rate of the global cyber security market is expected to be of 8.5% until 2022. Investing specifically in the cyber security of space infrastructure (ground and space segments) is of critical importance to the further growth and competitiveness of European space industry. Safety and security of space assets and activities will be an ever-increasing priority as space becomes more strongly integrated in all other sectors – both of public as well as of private relevance. Public entities will be judged on their ability to counter cyberthreats and private entities' survival will depend on their cyber resilience capabilities.

Space can contribute to the field of Safety and Security by investing in its own safety and security as well as in providing new services for the safety and security of others. Awareness and readiness to react to emerging needs and markets will be key to success for the public and private space sector alike. Timeliness to implement will make the difference between make or break.

Space Weather (SWE)

Moderate space weather events happen frequently during every 11-year solar cycle. Strong events causing substantial impacts on the infrastructure take place in the average once per cycle. During the last solar cycle, several fast coronal mass ejections from the Sun barely missed the Earth. Warning systems and mitigation activities yield multiple benefits:

- **Social:** They can mitigate disruption or damage to critical systems on which society continuously relies, such as navigation and telecom satellites, electric power grids and terrestrial radio communication systems. Even routine solar activity can have a significant and costly effect on satellites and sensitive infrastructure on ground.
- Economic: The socio-economic cost of moderate space weather events over a period of 15 years could be up to 13000 M€. The socio-economic cost of a single extreme event is estimated to become up to 30000 M€ after 2030, when many commercial applications, including aviation, are dependent on satellite based navigation and telecommunication services. Although we cannot prevent space weather, costly ground infrastructure and satellites and the critical services they provide can be protected.
- **Geopolitical:** Loss of critical infrastructure and services could disrupt economic activity and daily life across Europe and worldwide, leading to serious upheaval.
- Scientific: Improve our understanding of the Sun-Earth system and its many interactions leading to space weather effects on Earth and other planets. Solar- and Heliophysics and space weather forecasting go hand in hand.

Europe needs to ensure the supply of timely, accurate and actionable information on Space Weather to build a reliable early warning system and develop responses to solar events.

Activities in this area will empower institutional, industrial and governmental users, by supporting a wide range of sectors to mitigate the effects of space weather on their systems, by producing robust data for owners/operators of satellites and infrastructure on the ground, and by putting in place a long-term maintenance and enhancement plan. Examples of potential users include:

- Institutional users: specialised agencies ensuring the safety of flight operations, such as the UN's International Civil Aviation Organization (ICAO) or Eurocontrol;
- Governmental users: securing public health, safety and security by providing early warnings that help protect governmental satellite navigation, communication and data relay systems by issuing timely warnings, and manage the threat of large-scale blackouts;
- Industry: apart from the space industry (e.g. satellite designers/operators, launch service operators, satellite navigation service providers), potential users include commercial aviation companies, air traffic control (NAV specifically), power grid operators, and road and maritime transport providers.

Space Debris and Clean Space

There are more than 750 000 pieces of debris in orbit with a size larger than 1 cm, which are all potentially mission-ending. Of the 4500 satellites that are currently in orbit, only 1500 are active. Daily collision avoidance manoeuvres are required to avoid catastrophic events from happening that can result in cascading effects. ESA alone receives a few hundred collision alerts in a day for its fleet, with a single collision event in 2009 having doubled its avoidance efforts. There is one major uncontrolled

re-entry event every week amounting to 100t in a year. This makes the benefits of space debris mitigation and clean space activities manifold:

- **Social:** Unchecked growth in space debris could make specific orbits unusable, such as those used by vital climate, Earth observation and telecom satellites, permanently and catastrophically limiting critical services on which society relies. At the same time, collision avoidance warnings will enable satellite operators to take protective measures. The drive for sustainability and the protection of the environment is a value also shared by many in Europe, especially the youth.
- Economic: The destruction of individual satellites or permanent loss of specific orbits due to unchecked debris growth would have devastating global effects. For Europe this could mean the loss of economic activity in space which are directly worth over 8 000 M€. In addition, global satellite operators today spend 15 M€ annually on debris impact avoidance manoeuvres. With the increase of space activities so will this number increase if nothing is done. Developing technologies to automate collision warnings provide highly accurate orbit data and mitigate debris and investing into the removal of debris can create a variety of jobs and business opportunities for European industry including supporting the new market of space servicing. Furthermore, the next breakthrough in space will be in-space production/manufacturing/recycling and capabilities for tackling debris are the same as those needed for in-orbit servicing and manufacturing.
- **Geopolitical:** Space is an enabler for the global economy and any loss of free and open use of space due to uncontrolled debris growth would undermine international economic stability, and by extension, endanger international public order.
- Scientific: Safeguarding our space assets against the risk of debris requires studying debris causation, and developing new statistical models, technologies, techniques and systems. Innovative technological solutions need to be studied to evolve satellites so that they do not become debris and removing debris requires a step forward in technical solution for proximity operations.

Accurate, timely and comprehensive situational awareness is instrumental for the protection and safe operation of all critical European (and indeed global) space infrastructure.

Activities in this area will empower institutional, industrial and governmental users, by supporting sustainable space traffic management including monitoring, risk assessments and reduction, in-orbit servicing and debris mitigation, as well as designing to decrease environmental impacts, reduce the production of space debris and deorbiting large pieces of space debris. Examples of potential users include:

- Institutional and governmental users: Data processing, cataloguing and automation tools and software enabling timelier, more actionable information, and improving the ability of ESA, national space agencies and institutional partners to protect satellite fleets; and
- Industry: European industry can gain long-term competitive advantage by developing technologies and platforms that are effectively compliant with debris mitigation regulation. Precursors for active debris removal can build new European industrial capabilities needed to perform in-orbit servicing.

STOCK TAKING

Portugal has so far not taken real interest in the safety and security dimension of space with only very limited investments going towards the topic of planetary defence and some activities linked to services developed in the frame of Copernicus.

In the frame of the EU, Portugal is part of the SST consortium.

WAY FORWARD

A strengthening of this field is a must in the field of both in safety and security IN and FROM space. Space Weather will become as common place as Earth weather forecasts and in-space manufacturing will extend the economic sphere of influence of nations to space for those nations that will invest in this field early. Furthermore, safety and security applications will be required by the public and private sector alike.

Space Safety and Security will result in operational systems for Europe of equal importance as Copernicus and Galileo and investments in this field will lead to a high return of investments when these operational systems will be in place. The expectation is that this will happen in the next 10 years with investments required in both the upstream as well as the downstream.

Portugal should:

- support the whole Space Safety and Security field as a unique opportunity for Europe;
- Develop specific space weather capabilities, scientific as well as industrial;
- Raise awareness of the consequences of space weather on all fields/sectors: from defence, to power grids, to health, communication and more;
- Contribute to the forecasting and now casting of space weather by contributing to the large pre-operational missions and with the development of small satellites to monitor space weather impacts on the Earth's atmosphere and Earth vicinity;
- Contribute to address the topic of space debris through tracking but by also addressing active debris removal and by that develop in-orbit servicing/manufacturing capabilities which is the next frontier of space activities and markets;
- Act as a promoter of awareness and responsible action both towards Portuguese speaking countries and new space actors working together with ESA, the EU as well as other entities such as the Secure World Foundation and in the frame of the UN;
- Contribute to a global effort to address threats from asteroids and at the same time strengthen the scientific community around the topic linking it also to in-situ resource utilisation;
- Engage users across the country to develop safety and security related "intelligence" and services. Examples are:
 - Within the areas of radiation protection and nuclear safety, it would be interesting to stimulate the following:
 - Identify, characterize and evaluate the technical and commercial feasibility of space services to support NRBQ (Nuclear Radiological, Biological and Chemical) operations, namely the development of communication modules responsible for the implementation of a high-level communication system

bandwidth and low latency to transmit both control information and CBRN sensor data in real time through a robust space-based communication network, improving quality and operational response;

- In terms of climate monitoring and meteorological forecasting, the fact that the space sector provides essential tools for adaptation and mitigation to climate change, namely at the level of:
 - Knowledge of the territory and support to the evaluation of sectoral impacts and vulnerabilities;
 - Identification of vulnerable zones and sectors;
 - Monitoring of impacts (e.g. effects of droughts and floods, coastal erosion, etc.);
 - Support for informed decision-making, both in policymaking and in support of actors implementing adaptation measures (eg intelligent irrigation systems, design of flood protection systems, etc.);

Applications: Earth Observation, Telecommunications, and Navigation GENERAL

The field of applications is certainly the one that brings, today, the most immediate return on investment through the development of space-based downstream services to address urban development, the needs of fisheries, shipping routes, agricultural needs, civil services and protection, search and rescue, and more.

In the field of telecommunications, the following major developments within 2020-2025 will require dedicated efforts:

- Market: With a digital economy requiring an all-pervasive connectivity, there are new
 opportunities for satcom, to become part of the global telecommunication's 'fabric'. This
 requires close-to-market support to the integration of space-based communications into
 terrestrial networks, with the emergence of next generation mobile networks, 5G. The
 established space industry needs to be more than ever sustained in this endeavour of
 transformation and new players especially SMEs need to be supported in entering the Space
 business
- Societal: New societal challenges are emerging, regarding the safety and security of European citizens (see next pillar).
- Technological: 30 years after fibre-based terrestrial networks lay the foundation of the Internet, optical communication technologies in space are expected to achieve major impacts on the satcom sector in the next decade. Through disruptive technology developments Member States industries need to derive the necessary knowhow to fuel their competitiveness in the next generation solutions. This requires leadership in the introduction of comprehensive support on high risk optical technologies.

The public sector will also continue to be a key player in the field of satnav and more broadly for Positioning Navigation and Timing (PNT) technologies and services. All efforts of the EU, ESA, and at national level are of relevance and, in combination, will support the growth of a wide variety of business opportunities. The PNT domain allows to develop economic activities, particularly in the downstream innovation markets. Investment in innovation and competitiveness into PNT concepts,
technologies and services is essential for European industrial stakeholders to hold their place and seize market opportunities as they arise. These investments are also fundamental to follow and anticipate the evolution of technical needs in order to offer attractive space solutions for the future.

The expectation will be that investments contribute to further increase European industry's innovation and competitiveness, addressing the end-to-end PNT value chain with a view to enhance Member States' industrial capabilities. In view of the highly competitive and rapidly evolving global market for satnav and PNT, these enhanced capabilities will enable new applications but will also help adequately address evolving and increasing requirements, such as increase resilience and robustness of PNT solutions.

The creation of new markets that will contribute to enlarging Europe's captive market will simultaneously support its competitive edge, its economic success, its stability, and its autonomy in the pillars of Applications and Enabling and Support (specifically autonomous access to space). Public sector investments in strategic partnership with the private sector will be a must as many new opportunities present themselves.

STOCK TAKING

Portugal has invested in the past mostly in Earth observation, contributing successfully to the development of large satellites through equipment and subcomponents.

The DGT is one of the few entities in the Public Administration with a solid experience in Earth Observation, already using, in an operational manner, products derived from satellite images in the process of production of soil occupation cartography (COS). The COS follows open data policies and has a transversal use in the Central and Local Public Administration. The DGT is currently in a paradigm shift in the monitoring of soil occupation, and is developing methodologies for COS thematic enrichment based on attributes derived from satellite images (e.g. irrigated and non-irrigated areas, density of the built-up tissue, density of forest cover, forest areas with shallow cuts). On the other hand and considering that the COS has a scheduled period of 3 years, the DGT is also developing methodologies for the creation of annual soil occupation products based on satellite images. These developments have been made in the context of projects funded by various programs funded by the FCT, European Commission, ESA and Environmental Fund, and funding is now needed to develop a unique and structured program to add, consolidate and operationalize the developments that have been carried out in DGT.

Together with the IPMA, DGT coordinates the IPSentinel platform that provides satellite images of the Copernicus Program (i.e. Sentinels) to Portugal. (<u>https://ipsentinel.pt</u>).

This platform was built with EEA Grants funding and based on technology developed by ESA, constituting a Collaborative Solo Segment (CollGS) of the Copernicus Program. The portal has been in operation since April 2017 and has about 500 registered users. However, it does not currently have specific funding for its maintenance. For more details on the framework, architecture, functionalities

and statistics of the IPSentinel infrastructure publication: <u>http://revistamapping.com/wp-content/uploads/2018/03/Revista-MAPPING-187_A3.pdf</u>.

The interest in developing the sector of telecommunications and PNT has been very modest, with however industrial interest and expertise growing over the past years driven from an increased demand from all other sectors.

The business incubation centre established (ESA BIC in Coimbra) has been recognised as a new unique model of success within the ESA framework.

WAY FORWARD

The transformation of the telecommunication sector through 5G and optical communication is underway, and the Portuguese supply chain and operators should drive the transformation.

Tackling climate change is a societal and economic priority that Portugal should support both a supplier as well as system integrator, and as user as well as provider of solutions. Space-based data and information can complement in-situ gathered information to provide services to address many areas, assisting Portugal to reach 2050 carbon neutrality compromise.

Portugal's participation in ESA should be defined based on the interests and priorities of all actors related to space, not forgetting the potential Public Administration entities users of products derived from space technologies, namely Earth Observation. Only by involving the end users can it be ensured that the investment in ESA materializes in real benefits for the Public Administration. ESA's Earth Observation programs should enable to:

- 1. to develop and implement a national soil occupation monitoring program that will benefit the entire Public Administration.
- 2. to reinforce and maintain, together with IPMA, the IPSentinel platform, optimizing the availability of satellite images to the entire Public Administration.

With the goal of for example:

- Provision of satellite-related services, which support an entire infrastructure linked to digital communications, allowing for resource efficiency improvements (eg mobility, increased agricultural productivity, resource management such as potable water, monitoring of forest fires, ... water resources, floods, water availability, control of volumes raised by agriculture and the issue of transboundary basins, in particular the Guadiana basin...);
- Contribute to Portugal's commitment to achieving carbon neutrality by 2050, facilitating its implementation.

Portugal should therefore:

- Contribute to the next generation Copernicus and FutureEO programmes to maintain and further develop its thus-far acquire competence
- Develop subsystem and system competence through concrete projects which are user driven and/or industry proposed in co-funded schemes in as much as possible (InCubed+) and through

that contribute to European leadership in space-based solutions through the diversification of the fleet of satellites available to end-users to develop applications and services by developing small systems to complement large ones whilst contributing to large systems;

- Lead and foster "Blue Worlds" activities and initiatives with a special focus on the Atlantic but in close collaboration with European and non-European countries to address water bodies and their understanding and sustainable socio-economic development and exploitation;
- Support end-users (in integrating space in solutions to their specific problems) through the amplification of the BIC/Incubator concept to centres across the nation;
- Invest in a new generation of services based on Earth observation systems as well as PNT.

Enabling and Support: Technology and Space Transportation STOCK TAKING

Portugal has thus far invested mostly in capacity building and technology development and this has allowed to achieve the current status.

Activities related to space transportation have been dedicated to Space Rider to allow microgravity research.

WAY FORWARD

Developing new basic ideas and investing in technological development is at the base of any sector. Technology development should aim at early demonstration and validation in orbit to allow early adoption of innovative ideas.

Democratisation of access to space is a key enabler and Portugal should strengthen initiatives started at a national level with international partnerships.

Portugal should therefore:

- Invest in developing and testing of basic ideas and early in-orbit validation and demonstration to quicker times to market;
- Engage in international partnerships to guarantee the success of the spaceport initiative and to support the democratisation of space through the development of a microlauncher with a Portuguese contribution in both the space and ground segments;
- Support the development of Space Rider and foremost its exploitation in view of the contribution it will bring to the use of space for microgravity research and product development as well in view of the economic growth of the region of the Azores as well its synergetic elements to the spaceport initiative;
- Contribute to the increased competitiveness of the existing family of launchers in an industry driven approach rather than government pushed;
- Act as a catalyst for an industrial restructuring in the domain of space transportation in line with decisions made in 2014 to hand over the governance to industry.

Annex 5: Way Forward for the Establishing of Space for Defence in Portugal

PRINCIPLES OF PT INVESTMENTS IN SPACE

Financial capability of the country is modest mandating the setting of clear priorities of development derived from clear needs and gaps, i.e. address concrete identified needs for defence and civil protection with the aim of fully integrating space as a source of intelligence in the defence. The clever articulation of the needs of all stakeholders in the country in as much as possible should be done.

These needs should then be flown down in technical requirements for systems – exploring "dual-use" and "pooling and sharing" concepts – and with a view to develop industrial and value-chain capabilities and foster economic growth. Building strong international partnerships and implement concrete projects in the frame of these partnerships should also be part of the strategy implemented.

The driver behind "dual-use" and "pooling and sharing" approaches need not be cost-saving only but also the need to have highly resilient and reliable systems, as well as a more customer-oriented attitude of the public sector to trigger new sustainable markets rather than one-off investments.

Questions that need to be answered for each defence, national security or civil protection investment and activity are therefore:

- What is the level of autonomy required? i.e. is there a large and diverse enough set of offers that guarantees an independent access to data and services allowing a customer approach (i.e. multiple sources safeguarding against failure) rather than an "autonomous" and "self-sufficient" approach?
- What is the required level of resilience?

Furthermore space-based systems and solution need not to be seen as stand-alone elements and should rather be part of an overall architecture and therefore be one of many integrated systems.

DRAFT OBJECTIVES

Objectives - to be further explored/revised following a needs-exercise - could be as follows:

- 1. contribution to a dedicated Earth observation focused on the Atlantic;
- 2. development of a resilient communication system for the Atlantic through for example using small satellites and deployable HAPS (high altitude platforms) and with intersatellite links and specific communication protocols (tailored for the use UAVs, naval, etc...);
- 3. High-resolution satellite imagery of Portugal and other locations as needed, in real-time (or according to defined needs) to support mission success;

Clearly the four programmatic challenges identified in the main body of this document should be pursued in as much as possible in a "dual-use" perspective.

FUNDAMENTALS OF THE WORKING PROCESS, INCLUDING ROLES AND RESPONSIBILITIES

A seamless and coordinated national effort

A strong national stance on space is needed. Being a small country, Portugal does not have the funding capacity to develop elements to outpower other nations, let alone disperse competence and effort within the nation. The strength of small countries is their agility in communication and decision making.

Portugal must capitalise this opportunity and coalesce as much as possible around a central nucleus for space. This central nucleus must then be closely interconnected to all stakeholders and actors in such a way that from strategic direction to implementation and operation the steps are fast and efficient. Portugal is becoming, with the creation of the national space agency, a role model for smaller nations. This it must continue to do.

Part 3

Organization

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1. PERIN Network

Despacho nº. 5911 /2019 de 27 de junho de 2019

Diário da República, 2ª série – Nº 171 – 27 de junho de 2019

"Considerando a prioridade nacional que a promoção das atividades de investigação e desenvolvimento (I&D) e de inovação tem assumido no quadro das políticas públicas e que a sua inserção no contexto europeu é crucial para o futuro dos portugueses e da Europa;

Considerando o sucesso da crescente participação portuguesa no atual programa-quadro europeu de Investigação e Inovação, «Horizonte 2020», relativo ao período 2014-2020, e a ambição de reforçar e tentar duplicar a participação de Portugal no próximo programa-quadro europeu de Investigação e Inovação (9.º Programa Quadro Europeu para Investigação e Inovação, denominado de «Horizonte Europa») e programas afins relevantes para as atividades de investigação e inovação e digital em Portugal (o Programa Europeu para o Espaço e os programas «Europa Digital» e «Interligar Europa», entre outros), no âmbito do próximo quadro financeiro plurianual da União Europeia que decorrerá entre 2021-2027;

Considerando a necessidade de iniciar, desde já, a preparação da presidência portuguesa do Conselho da União Europeia, que ocorrerá no primeiro semestre de 2021, inserida no trio de presidências que engloba a Alemanha e a Eslovénia, e a oportunidade que representa no sentido de promover um melhor posicionamento de Portugal no contexto da política europeia de investigação e inovação, espaço e digital, importa adotar uma estratégia que promova e facilite o acesso por parte de promotores nacionais às iniciativas e aos programas europeus, garantindo, simultaneamente, a articulação entre essas entidades e as autoridades de gestão dos programas operacionais e respetivos organismos intermédios;

Considerando que a promoção e a gestão corrente da participação portuguesa nos últimos programasquadro europeus de Investigação e Inovação têm sido concretizadas pelo Gabinete de Promoção do Programa-Quadro de I&DT (GPPQ), criado através de um contrato-programa celebrado em 2007 entre a Fundação para a Ciência e a Tecnologia, I. P. (FCT), e a Agência de Inovação (ADI) — Inovação Empresarial e Transferência de Tecnologia, S. A. (atualmente ANI — Agência Nacional de Inovação, S. A.), com o objetivo de promover e apoiar a participação das comunidades científica e empresarial nacionais no 7.º Programa-Quadro de Investigação e Desenvolvimento Tecnológico da União Europeia (2007-2013);

Considerando que é inegável que o lançamento do 7.º Programa-Quadro de Investigação e Desenvolvimento Tecnológico da União Europeia, que decorreu entre 2007 e 2013, especificamente orientado para o apoio à investigação, através do cofinanciamento de projetos de investigação, desenvolvimento tecnológico e demonstração, suscitou a necessidade de o país dispor de uma estrutura profissional dedicada à promoção da participação das suas comunidades científicas e empresariais;

Considerando que foi neste contexto que o GPPQ continuou a desempenhar as suas funções, no âmbito do "Horizonte 2020", em conformidade com o disposto na Resolução do Conselho de Ministros n.º 64/2015, publicada no *Diário da República*, 1.ª série, n.º 166, de 26 de agosto;

Considerando, também, que, entretanto, a avaliação conduzida pela OCDE, em 2016 e 2017, aos sistemas de formação superior, ciência, tecnologia e inovação em Portugal, cujos resultados foram apresen- tados a 9 de fevereiro de 2018 em Lisboa, reconhece os esforços em curso e recomenda, não só, que Portugal continue a alargar e melhorar a capacidade científica e tecnológica do país e a reforçar a capacidade de exploração do potencial social e económico resultante da produção e difusão do conhecimento, mobilizando as empresas, os centros de produção, difusão e transferência de conhecimento, potenciando sinergias, aproveitando recursos e reforçando novas vantagens competitivas num contexto internacional, e ainda que reforce a promoção da cultura científica e tecnológica e dos instrumentos de internacionalização do conhecimento, o aumento de emprego

científico para jovens doutorados e a estabilidade do financiamento das instituições científicas e tecnológicas;

Considerando, ainda, que a OCDE indicou a necessidade de adoção de uma estratégia nacional no sentido de mobilizar e articular, de forma efetiva, recursos públicos e privados com vista a gerar uma maior competitividade da economia portuguesa e inserção das empresas em cadeias de valor internacionais, estratégia que foi aprovada pela Resolução do Conselho de Ministros n.º 25/2018, «Estratégia de Inovação Tecnológica e Empresarial para Portugal 2018-2030», publicada no *Diário da República* n.º 48/2018, Série I, de 28 de março, como elemento-chave do Programa Nacional de Reformas, visando garantir a convergência de Portugal com a Europa até 2030, tendo por objetivo principal o aumento da competitividade da economia portuguesa, através da investigação, desenvolvimento e inovação, assim como do aumento da qualificação da população portuguesa, fomentando o investimento global em I&D e melhorando as condições de emprego qualificado em Portugal no contexto internacional;

Considerando, por último, que a Estratégia de Inovação Tecnológica e Empresarial para Portugal 2018-2030, inclui linhas de orientação para o aumento do investimento público e, sobretudo, privado em I&D; a valorização sustentável do emprego, qualificado e científico; a intensificação da colaboração entre empresas, especialmente pequenas e médias empresas (PME), e entre estas e os Centros Interface; o incentivo à aplicação dos resultados de atividades de I&D em novos produtos, processos, modelos organizacionais ou marketing e direcionando-os ao mercado; a promoção da capacidade de estimular a criação e crescimento de novas empresas de base tecnológica; e, ainda, a promoção da participação de empresas e redes em dinâmicas internacionais visando intensificar a disseminação dos resultados científicos e empresariais;

Determino:

- A criação da rede PERIN Portugal in Europe Research and Innovation Network, entre a Fundação para a Ciência e a Tecnologia, I. P. (FCT), a Agência Nacional de Inovação (ANI), S. A., e a Direção-Geral do Ensino Superior (DGES), tendo por missão reforçar e duplicar a participação de Portugal no próximo programa-quadro europeu de Investigação e Inovação («Horizonte Europa») face ao atual programa-quadro («Horizonte 2020»), bem como garantir uma estratégia de convergência efetiva para a Europa do conhecimento, no período 2019-2030, facilitando a concretização da «Estratégia de Inovação Tecnológica e Empresarial para Portugal 2018-2030»;
- 2. Determinar que são objetivos do PERIN, entre outros:
 - a) Acompanhar a preparação, a promoção e a execução dos Programas-Quadro de Investigação e de Inovação da União Europeia e de outros instrumentos relevantes em matéria de Investigação e Inovação, desig- nadamente, as atividades nas áreas do Espaço, da Transformação Digital, da Computação Avançada, da I&D na área da defesa e segurança, entre outras, bem como atividades especificamente dirigidas para empresas, tais como o European Innovation Council (EIC), no âmbito do Horizonte Europa, e o Programa EUREKA/EUROSTARS;
 - b) Articular e promover as atividades referidas no ponto anterior, com destaque para a preparação e a execução dos Programas da União Europeia na área do ensino superior e formação pós-secundária, em estreita colaboração com a DGES e as agências com as quais se relaciona, incluindo a Agência Nacional ERASMUS+ Educação e Formação, designadamente, em relação à mobilidade de docentes e estudantes e a formações e graus conjuntos;
 - c) Coordenar a preparação da presidência portuguesa do Conselho da União Europeia no primeiro semestre de 2021, na área da ciência, tecnologia e ensino superior, incluindo espaço e digital, inserida no trio de presidências que engloba a Alemanha

e a Eslovénia, na sequência do Programa de trabalho acordado entre Portugal e estes Estados Membros.

- 3. Incluir no PERIN cinco tipo de serviços especializados:
 - b) Grupo de Delegados e Pontos de Contacto Nacionais nos Programas Europeus;
 - c) Grupo de Peritos dos Programas Europeus;
 - d) Gabinete de Ligação Portugal-Europa em Investigação e Inovação («Portugal in Europe Research and Innovation Liaison Office»);
 - e) Rede de elementos de ligação em Investigação e Inovação («Portugal in Europe Liaison Officers»);
 - f) Rede de Núcleos de Promoção de Investigação e Inovação no âmbito de Programas Europeus.
- 4. Mobilizar e reforçar o Grupo de Delegados e Pontos de Contacto Nacionais nos Programas Europeus, a instalar na ANI, auscultada a FCT, em resultado da dinamização em instituições nacionais de Ciência, Tecnologia e de Ensino Superior, incluindo universidades e institutos politécnicos, unidades de investigação, centros de interface, incubadoras e empresas ou associações empresariais, e a quem compete a promoção do atual programa-quadro, incluindo:
 - a) A divulgação dos concursos aprovados;
 - apoio a candidatos na elaboração de propostas e identificação de possíveis parceiros internacionais;
 - c) acompanhamento e a análise de resultados;
 - A coordenação da Rede de Núcleos de Promoção de Investigação e Inovação no âmbito de Programas Europeus nas instituições nacionais.
- 5. Mobilizar e reforçar o Grupo de Peritos dos Programas Europeus, a designar pela FCT, a quem compete colaborar ativamente, em estreita cooperação com os delegados nacionais nos Comités do Programa, nos programas de trabalho temáticos dos programas-quadro europeus, tendo em conta as competências e interesses nacionais e incluindo:
 - a) Apoio presencial aos Delegados Nacionais nas reuniões dos comités de programa;
 - b) Apoio aos Delegados e Pontos de Contacto nacionais na divulgação dos concursos aprovados;
 - c) Apoio, através dos Pontos de Contacto Nacionais, quando para tal solicitados, na elaboração de propostas e identificação de possíveis parceiros internacionais.
- 6. Promover o Gabinete de Ligação Portugal-Europa em Investigação e Inovação («Portugal in Europe Research and Innovation Liaison Office», PERILO), em Bruxelas, no âmbito da rede PERIN Portugal in Europe Research and Innovation Network, que tem por missão estimular e reforçar a participação de investigadores, gestores de ciência e tecnologia, instituições científicas e de ensino superior e empresas portuguesas nas redes especializadas de informação em Bruxelas, com vista a:
- a) desenvolvimento de um sistema de informação antecipada em benefício dos potenciais proponentes em Portugal, em coordenação com os Pontos de Contacto Nacionais dos programas supracitados;
- b) A promoção de proponentes junto das instituições europeias e outras redes relevantes em Bruxelas;
- c) A ligação a empresas e entidades nacionais representadas em Bruxelas, bem como a associações de confederações industriais europeias de que Portugal faz parte;
- A articulação sistemática com a Representação Permanente de Portugal junto da União Europeia (REPER), nomeadamente no reforço da visibilidade a nível nacional dos projetos europeus, bem como no apoio e no desenvolvimento da participação nacional em projetos e parcerias estratégicas;

- e) A representação nacional na rede de Gabinetes de Ligação em Bruxelas para a Investigação e Inovação.
- 7. Mobilizar e reforçar a Rede de Elementos de ligação em Investigação e Inovação («Portugal in Europe Liaison Officers») que visa garantir a presença regular e continuada de portugueses em diferentes parcerias e organismos internacionais, envolvendo peritos destacados por períodos específicos, identificados em função das disponibilidades e das áreas estratégicas para Portugal, com o apoio financeiro e institucional conjunto da FCT e da ANI.
- 8. Mobilizar e reforçar a Rede Núcleos de Promoção de Investigação e Inovação no âmbito de Programas Europeus das instituições nacionais, os quais têm acesso regular e atempado a informação relevante sobre os programas europeus, através dos pontos de contacto nacionais, por forma divulgar de forma mais eficiente a informação pelos seus stakeholders, promovendo localmente a preparação de propostas mais adequadas e competitivas.
- 9. Determinar que o PERIN, incluindo o PERILO, deve prosseguir a sua atividade em estreita articulação com a Representação Permanente de Portugal junto da União Europeia (REPER), e demais serviços e organismos tutelados pelo membro do Governo responsável pela área dos Negócios Estrangeiros.
- 10. Atribuir o financiamento integral da rede «PERIN Portugal in Europe Research and Innovation Network» à FCT, em colaboração, sempre que for considerado adequado, com a ANI e a DGES, as quais suportam os respetivos custos de funcionamento e garantem o apoio logístico e de secretariado nos termos do contrato-programa acima referido, devendo a FCT e a ANI garantir, ainda, cofinanciamento por fundos nacionais e fundos comunitários para as diferentes atividades do PERIN, incluindo atividades a desenvolver pelos promotores para acesso a redes, assim como o apoio à preparação de propostas a programas competitivos europeus de ciência e inovação.
- 11. Designar a Equipa de Coordenação do PERIN, com a seguinte composição inicial:
- a) Carlos Borrego, Professor Catedrático da Universidade de Aveiro, como coordenador-geral, não executivo;
- b) Um vice-coordenador, não executivo, a nomear pelo coordenador-geral;
- c) Carla Alexandra Matias Santos, adjunta do meu Gabinete, como coordenadora executiva, função a exercer em estreita articulação com a FCT e a ANI;
- d) presidente do conselho diretivo da FCT, ou um elemento por si designado;
- e) presidente do conselho de administração da ANI, ou um elemento por si designado;
- f) Diretor-Geral do Ensino Superior, ou um elemento por si designado.
- 12. Determinar que a Equipa de Coordenação funciona em estreita articulação e colaboração com a FCT, a ANI e a DGES, com o apoio da SGEC.
- 13. Determinar a criação e manutenção atualizada de um sítio da Internet próprio que contenha todas as informações relevantes da área de atuação do PERIN, evoluindo a partir do atual sítio da Internet do GPPQ, com interligações adequadas aos sítios da Internet da FCT, da ANI e da DGES.
- 14. Determinar que a Equipa de Coordenação, em estreita articulação com a SGEC, a FCT, a ANI e a DGES, apresenta ao membro do Governo responsável pela área da Ciência, Tecnologia e Ensino Superior, relatórios anuais da atividade desenvolvida, tendo por base as metas incluídas na «Estratégia de inovação para Portugal 2018-2030» e a ambição de duplicar a participação de Portugal no próximo programa-quadro europeu de Investigação e Inovação, incluindo o Programa«Horizonte Europa», o Programa Europeu para o Espaço, e os

programas «Europa Digital» e «Interligar Europa», que decorrerão entre 2021-2027), face ao Programa Horizonte 2020 (que está a decorrer desde 2014 e até 2020.

15. Determinar que a Equipa de Coordenação, em articulação com a FCT, a ANI e a DGES, apresenta aos membros do Governo responsáveis pelas áreas dos Assuntos Europeus e da Ciência, Tecnologia e Ensino Superior, até ao final de 2020, relatórios trimestrais sobre a preparação da presidência portuguesa em 2021 do Conselho da União Europeia na área da ciência, tecnologia e ensino superior, incluindo espaço e digital, e, até dezembro de 2021, um relatório final.

6 de junho de 2019. — O Ministro da Ciência, Tecnologia e Ensino Superior, *Manuel Frederico Tojal de Valsassina Heitor.*"

Despacho nº. 3165/2020 de 10 de março de 2020

Diário da República, 2ª série – № 49, Parte C – 10 de março de 2020

Considerando o sucesso da crescente participação portuguesa no atual programa-quadro europeu de investigação e inovação, «Horizonte 2020», relativo ao período 2014-2020, e a intenção de Portugal reforçar a sua participação no próximo programa-quadro europeu de investigação e inovação e programas afins relevantes para as atividades de investigação e inovação em Portugal no âmbito do próximo quadro financeiro plurianual da União Europeia que decorrerá entre 2021-2027 (i. e., o 9.º Programa Quadro Europeu para Investigação e Inovação, denominado de «Horizonte Europa», assim como o Programa Europeu para o Espaço e os programas «Europa Digital» e «Interligar Europa», entre outros);

Considerando a instalação em curso da rede PERIN — Portugal in Europe Research and Innovation Network (PERIN, como criada através do Despacho n.º 5911/2019, de 27 de junho), aproveitando as estruturas já existentes de promoção da participação nacional em programas europeus nos domínios em referência, fortalecendo-as, com a missão de reforçar e duplicar a participação de Portugal no próximo programa-quadro europeu de investigação e inovação («Horizonte Europa») face ao atual programa-quadro («Horizonte 2020»), bem como garantir uma estratégia de convergência efetiva para a Europa do Conhecimento, no período 2019-2030, facilitando a concretização da «Estratégia de Inovação Tecnológica e Empresarial para Portugal 2018-2030».

Atendendo a que a «Estratégia de Inovação para Portugal 2018-2030» visa gerar uma maior competitividade da economia portuguesa e inserção das empresas em cadeias de valor internacionais, importa reforçar a difusão e a transferência de conhecimento, potenciando sinergias, aproveitando recursos e reforçando novas vantagens competitivas num contexto internacional, fortalecendo a promoção da cultura científica e tecnológica e dos instrumentos de internacionalização do conhecimento, designadamente através do envolvimento das instituições de ensino superior na rede PERIN através de núcleos próprios para apoiar redes e projetos europeus.

Considerando que, para o cumprimento da sua missão, a rede PERIN inclui serviços especializados, entre os quais delegados e pontos de contacto nacionais nos programas europeus, nos termos do regime jurídico das instituições que se dedicam à investigação e desenvolvimento, I&D (i. e., a Lei da Ciência, Decreto-Lei n.º 63/2019, de 16 de maio) e demais intervenientes no sistema nacional de ciência e tecnologia, e que define que a participação nacional em programas europeus de apoio às atividades de I&D deve ser coordenada e articulada entre diferentes grupos de delegados, pontos de contacto, peritos e outros elementos de ligação, de modo a valorizar um posicionamento nacional integrado e a potenciar a intervenção das instituições de I&D nacionais.

Considerando ainda que, nos termos do «Contrato de Legislatura entre o Governo e as Instituições de Ensino Superior Públicas (Universidades e Politécnicos), 2020-2023», de 29 de novembro de 2019, é necessário garantir a mobilização de todas as instituições de ensino superior no reforço da sua participação efetiva nas iniciativas e atividades a desenvolver no âmbito da rede PERIN, designadamente através da profissionalização dos atuais serviços de apoio a participação de redes e projetos europeus, incluindo pontos de contacto da rede PERIN nos gabinetes de transferência de tecnologia, assim como de estímulos internos a condições de participação dos docentes, investigadores e estudantes em redes e projetos europeus (por exemplo, na avaliação de desempenho docente ou distribuição de serviço docente).

Neste contexto, importa, agora, mobilizar e reforçar delegados e pontos de contacto nacionais nos programas europeus, no âmbito da prossecução da missão da rede PERIN, em resultado da dinamização em instituições nacionais de ciência, tecnologia e de ensino superior, incluindo universidades e institutos politécnicos, unidades de investigação, centros de interface, incubadoras e empresas ou associações empresariais, visando garantir uma estratégia de convergência efetiva para a Europa do Conhecimento até 2030 e facilitando a concretização da «Estratégia de Inovação para

Portugal 2018-2030», no que diz respeito à promoção das atividades I&D em Portugal.

Procede-se, assim, ao reforço da atual rede PERIN através da designação de 36 delegados e pontos de contacto nacionais, e mobilizando as principais agências e instituições nacionais associadas à governação, financiamento e avaliação do sistema nacional de ciência, tecnologia e inovação, designadamente a Fundação para a Ciência e a Tecnologia, I. P. (FCT), a Agência Nacional de Inovação, S. A. (ANI), a Agência Espacial Portuguesa - Portugal Space (PT Space), a Agência para a Investigação Clínica e Inovação Biomédica (AICIB), a Agência Nacional Erasmus+ Educação e Formação (ERASMUS+), a Direção-Geral do Ensino Superior (DGES) e a Ciência Viva - Agência Nacional para a Cultura Científica e Tecnológica (Ciência Viva). Inclui 9 colaboradores da FCT, 14 da ANI, 6 da PT Space, 2 da AICIB, 1 da ERASMUS+, 1 da DGES e 1 da Ciência Viva. Este reforço representa duplicar, especializar e diversificar a lista de delegados e pontos de contacto nacionais face a 2019, de modo a reforçar o nível de especialização da rede PERIN.

Cabe à coordenação executiva da rede PERIN promover a divulgação dos resultados associados à participação nacional em programas europeus, assim como estimular a capacitação dos delegados e pontos de contacto nacionais nos programas europeus, dotando-os da formação adequada, associada às prioridades nacionais, assim como às orientações e princípios de atuação provenientes dos atores estratégicos do setor, designadamente da Representação Permanente de Portugal junto da União Europeia (REPER) e da Comissão Europeia, designadamente no âmbito da «NCP Academy».

Importa, ainda, assegurar o acompanhamento e promoção da informação relativa às iniciativas e atividades a desenvolver no âmbito da rede PERIN, através do «Observatório da participação nacional nos programas europeus».

Assim,

Nos termos do disposto no artigo 12.º do Decreto-Lei n.º 63/2019, de 16 de maio, determino:

- São designados delegados e pontos de contacto nacionais (National Contact Points NCPs) nos programas europeus da rede PERIN — Portugal in Europe Research and Innovation Network (PERIN) os constantes do anexo ao presente despacho, e que dele faz parte integrante.
- 2. Com vista à prossecução da sua atividade, a coordenação executiva organiza ações de formação com vista ao desenvolvimento das suas competências, de acordo com um plano de formação a determinar pela rede PERIN.
- 3. A coordenação executiva do PERIN, em estreita articulação com todos os responsáveis das entidades envolvidas na prossecução da sua atividade, assegura a continuidade e promoção futura do envolvimento de todos os NCPs nos programas europeus da rede PERIN nas redes de NCPs temáticas a nível europeu, a iniciar em fevereiro 2020, assim como a participação nacional na «NCP Academy» e em todos os instrumentos a promover pela Comissão Europeia neste âmbito.
- 4. A coordenação executiva da rede PERIN, em articulação com os coordenadores temáticos, supervisiona o «Observatório da participação nacional nos programas europeus», a manter e a promover pela ANI em colaboração com a FCT, incluindo perito(s) em gestão de dados a contratar pela ANI, de modo a manter atualizada a base de dados da participação nacional e a garantir a sua divulgação.
- 5. No âmbito do «Observatório da participação nacional nos programas europeus» referido no ponto anterior, a ANI e a FCT asseguraram a disponibilidade da informação, numa base trimestral, a divulgar pelos sítios da Internet da rede PERIN, da FCT, da ANI, da PT Space, da AICIB, da ERASMUS+, da DGES.

6. Designo Ana Cristina Ferreira Amoroso das Neves, adjunta do meu Gabinete, como coordenadora executiva, função a exercer em estreita articulação com a FCT, a ANI, a PT Space, a AICIB, a ERASMUS+, a DGES e a Ciência Viva, com o apoio da SGEC.

7. É revogada a alínea c) do n.º 11 do Despacho n.º 5911/2019, de 27 de junho.

26 de fevereiro de 2020. — O Ministro da Ciência, Tecnologia e Ensino Superior, *Manuel Frederico Tojal de Valsassina Heitor.*"

2. NCPs and Delegates Network

2.1 National Contacts Points (NCPs) for Horizon Europe

List updates <u>here</u>

List of Portuguese National Contacts Points (NCPs) to the Horizon Europe										
NCP function		Contac	Organisation							
NCP function	Name	First name	Position in organisation	Email address	Organisation name					
NCP Coordinator	Neves	Ana	PERIN Executive Coordinator	ana.neves@mctes.gov.pt	PERIN - Portugal in Europe Research and Innovation Network					
NCP Coordinator - Alternate	Dourado	Mafalda	Director	mafalda.dourado@ani.pt	ANI - Agência Nacional de Inovação					
NCP Coordinator - Alternate	Munhá	Rui	Science Officer	rui.munha@fct.pt	FCT-Fundação para a Ciência e a Tecnologia					
Legal and Financial aspects (Including legal and financial aspects related to gender equality, open access and open science, R&I integrity and ethics)	Marques	Alexandre	Senior Officer	alexandre.marques@ani.pt	ANI - Agência Nacional de Inovação					
Legal and Financial aspects (Including legal and financial aspects related to gender equality, open access and open science, R&I integrity and ethics)	Eiriz	Francisca	Junior Officer	francisca.eiriz@ani.pt	ANI - Agência Nacional de Inovação					

Legal and Financial aspects (Including legal and financial aspects related to gender equality, open access and open science, R&I integrity and ethics)	Amaral Lopes	José	Advisor to the Board	jamaral.lopes@fct.pt	FCT-Fundação para a Ciência e a Tecnologia
European Research Council (ERC)	Munhá	Rui	Science Officer	rui.munha@fct.pt	FCT-Fundação para a Ciência e a Tecnologia
European Research Council (ERC)	Marçal	David	Science Officer	david.marcal@fct.pt	FCT-Fundação para a Ciência e a Tecnologia
Marie Skłodowska-Curie Actions (MSCA)	Marçal	David	Science Officer	david.marcal@fct.pt	FCT-Fundação para a Ciência e a Tecnologia
Research Infrastructures	Abrantes	Marta	Science Officer	marta.abrantes@fct.pt	FCT-Fundação para a Ciência e a Tecnologia
Research Infrastructures	Carapau	Daniel	Science Officer	daniel.carapau@fct.pt	FCT-Fundação para a Ciência e a Tecnologia
Health (including related missions and partnerships)	Isidro	Anabela	Member of the Board	anabela.isidro@aicib.pt	AICIB - Agência de Investigação Clínica e Inovação Biomédica
Health (including related missions and partnerships)	Carvalho- Oliveira	Isabel	Science Manager	isabel.oliveira@aicib.pt	AICIB - Agência de Investigação Clínica e Inovação Biomédica
Health (including related missions and partnerships)	Duarte	Afonso	Science Manager	afonso.duarte@aicib.pt	AICIB - Agência de Investigação Clínica e Inovação Biomédica
Culture, creativity and Inclusive Society (including related missions and partnerships)	Dourado	Mafalda	Director	mafalda.dourado@ani.pt	ANI - Agência Nacional de Inovação

Culture, creativity and Inclusive Society	Dias	Natália	Senior Officer	natalia.dias@ani.pt	ANI - Agência Nacional de Inovação
(including related missions and partnerships)					
Culture, creativity and Inclusive	Amaral Lopes	José	Advisor to the Board	jamaral.lopes@fct.pt	FCT-Fundação para a Ciência e a
Society					Tecnologia
(including related missions and					
partnerships)					
Culture, creativity and Inclusive	Oliveira	Margarida	Junior Officer	margarida.oliveira@ani.pt	ANI - Agência Nacional de Inovação
Society					
(including related missions and					
partnerships)					
Culture, creativity and Inclusive	Ferreira	Susana	Senior Officer	sferreira@cienciaviva.pt	Ciência Viva - Agência Nacional Para a
Society					Cultura Científica e Tecnológica
(including related missions and					
partnerships)					
			с : о(;;		
Civil Security for Society	Sutcliffe	Ana	Senior Officer	ana.sutcliffe@ani.pt	ANI - Agencia Nacional de Inovação
(Including related missions and					
Civil Convritu for Conintr					
Civil Security for Society	Doroiro	Dolina	lupior Officer	nolina noroira@ani.nt	ANI Agância Nacional do Inovação
(including related missions and	Pereira	POIIId	Junior Officer	pointa.perena@ani.pt	ANI - Agencia Nacional de movação
partiterships)					
Civil Security for Society					ANI - Agência Nacional de Inovação
(including related missions and	Leandro	Cristiana	Senior Officer	cristiana.leandro@ani.pt	
partnerships)					
Civil Security for Society		Margarida	Junior Officer	margarida.oliveira@ani.pt	ANI - Agência Nacional de Inovação
(including related missions and	Oliveira				
partnerships)					

Civil Security for Society (including related missions and partnerships)	Azevedo	Sofia	Senior Officer	sofia.azevedo@ani.pt	ANI - Agência Nacional de Inovação
Digital, Industry and Space (including related missions and partnerships)	Azevedo	Sofia	Senior Officer	sofia.azevedo@ani.pt	ANI - Agência Nacional de Inovação
Digital, Industry and Space (including related missions and partnerships)	Ribau	João	Junior Officer	joao.ribau@ani.pt	ANI - Agência Nacional de Inovação
Digital, Industry and Space (including related missions and partnerships)	Leandro	Cristiana	Senior Officer	cristiana.leandro@ani.pt	ANI - Agência Nacional de Inovação
Digital, Industry and Space (including related missions and partnerships)	Ferreira	João Nuno	General Coordinator	ferreira@fccn.pt	FCT-Fundação para a Ciência e a Tecnologia
Digital, Industry and Space (including related missions and partnerships)	Fernandes	Sandra	Science Officer	sandra.fernandes@fct.pt	FCT-Fundação para a Ciência e a Tecnologia
Digital, Industry and Space (including related missions and partnerships)	Ferreira	Daniel	Science Officer	daniel.ferreira@fct.pt	FCT-Fundação para a Ciência e a Tecnologia
Digital, Industry and Space (including related missions and partnerships)	Costa	Hugo	Director	hugo.costa@ptspace.pt	Agência Espacial Portuguesa - Portugal Space
Digital, Industry and Space (including related missions and partnerships)	Alabart	Joan	Industrial Relations and Project Officer	joan.alabart@ptspace.pt	Agência Espacial Portuguesa - Portugal Space
Digital, Industry and Space (including related missions and partnerships)	Gonçalves	Marta	Science and Education Officer	marta.goncalves@ptspace.pt	Agência Espacial Portuguesa - Portugal Space

Climate, Energy and Mobility (including related missions and partnerships)	Carvalho	Anabela	Head of Unit	anabela.carvalho@ani.pt	ANI - Agência Nacional de Inovação
Climate, Energy and Mobility (including related missions and partnerships)	Maia	Luis	Senior Officer	luis.maia@ani.pt	ANI - Agência Nacional de Inovação
Climate, Energy and Mobility (including related missions and partnerships)	Leandro	Cristiana	Senior Officer	cristiana.leandro@ani.pt	ANI - Agência Nacional de Inovação
Climate, Energy and Mobility (including related missions and partnerships)	Eiriz	Francisca	Junior Officer	francisca.eiriz@ani.pt	ANI - Agência Nacional de Inovação
Food, Bioeconomy, Natural Resources, Agriculture and Environment (including related missions and partnerships)	Fernandes	Maria João	Senior Officer	mariajoao.fernandes@ani.pt	ANI - Agência Nacional de Inovação
Food, Bioeconomy, Natural Resources, Agriculture and Environment (including related missions and partnerships)	Sutcliffe	Ana	Senior Officer	ana.sutcliffe@ani.pt	ANI - Agência Nacional de Inovação
Food, Bioeconomy, Natural Resources, Agriculture and Environment (including related missions and partnerships)	Santos	Margarida	Senior Officer	margarida.santos@ani.pt	ANI - Agência Nacional de Inovação

Food, Bioeconomy, Natural Resources, Agriculture and Environment (including related missions and partnerships)	Carvalho	Anabela	Head of Unit	anabela.carvalho@ani.pt	ANI - Agência Nacional de Inovação
Food, Bioeconomy, Natural Resources, Agriculture and Environment (including related missions and partnerships)	Gouveia	Cristina	Senior Officer	cristina.gouveia@ani.pt	ANI - Agência Nacional de Inovação
The European Innovation Council (EIC) and European Innovation ecosystems	Dourado	Mafalda	Director	mafalda.dourado@ani.pt	ANI - Agência Nacional de Inovação
The European Innovation Council (EIC) and European Innovation ecosystems	Gouveia	Cristina	Senior Officer	cristina.gouveia@ani.pt	ANI - Agência Nacional de Inovação
The European Innovation Council (EIC) and European Innovation ecosystems	Ribau	João	Junior Officer	joao.ribau@ani.pt	ANI - Agência Nacional de Inovação
The European Innovation Council (EIC) and European Innovation ecosystems	Marques	Alexandre	Senior Officer	alexandre.marques@ani.pt	ANI - Agência Nacional de Inovação
The European Innovation Council (EIC) and European Innovation ecosystems	Bravo	Sofia	Senior Officer	sofia.bravo@ani.pt	ANI - Agência Nacional de Inovação
The European Innovation Council (EIC) and European Innovation ecosystems	Silva	Rita	Senior Officer	rita.silva@ani.pt	ANI - Agência Nacional de Inovação

The European Innovation Council (EIC) and European Innovation ecosystems	Dantas	Bibiana	Senior Officer	bibiana.dantas@ani.pt	ANI - Agência Nacional de Inovação
Widening Participation and ERA (Including funding opportunities related to gender equality, open access and open science, R&I integrity and ethics)	Munhá	Rui	Science Officer	rui.munha@fct.pt	FCT-Fundação para a Ciência e a Tecnologia
Widening Participation and ERA (Including funding opportunities related to gender equality, open access and open science, R&I integrity and ethics)	Marçal	David	Science Officer	david.marcal@fct.pt	FCT-Fundação para a Ciência e a Tecnologia
Fission	Cavaleiro	Rita	Science Officer	rita.cavaleiro@fct.pt	FCT-Fundação para a Ciência e a Tecnologia
Fission	Igreja	Luísa	Science Officer	luisa.igreja@fct.pt	FCT-Fundação para a Ciência e a Tecnologia
Fusion	Cavaleiro	Rita	Science Officer	rita.cavaleiro@fct.pt	FCT-Fundação para a Ciência e a Tecnologia
Fusion	Igreja	Luísa	Science Officer	luisa.igreja@fct.pt	FCT-Fundação para a Ciência e a Tecnologia
Joint Research Centre	Zagalo	Gonçalo	Science Officer	goncalo.zagalo@fct.pt	FCT-Fundação para a Ciência e a Tecnologia
European Institute of Innovation and Technology (EIT)	Marques	Alexandre	Senior Officer	alexandre.marques@ani.pt	ANI - Agência Nacional de Inovação
European Institute of Innovation and Technology (EIT)	Eiriz	Francisca	Junior Officer	francisca.eiriz@ani.pt	ANI - Agência Nacional de Inovação

2.2 Horizon Europe Delegates/Experts

List updates @ <u>here</u>

HORIZON EUROPE - PORTUGAL Representatives and Experts								
Programme Committee Configuration		Co	ntact / Individual's coordina	ates	Organisation			
PC Configuration	Name	First name	Representative / Expert	Email address	Organisation name			
Strategic configuration: Strategic overview of the implementation of the whole programme, coherence across the individual work programmes of the different parts of the programme, including missions	Neves	Ana	Representative	ana.neves@mctes.gov.pt	PERIN - Portugal in Europe Research and Innovation Network			
Strategic configuration: Strategic overview of the implementation of the whole programme, coherence across the individual work programmes of the different parts of the programme, including missions	Dourado	Mafalda	Representative Alternate	mafalda.dourado@ani.pt	ANI - Agência Nacional de Inovação			
Strategic configuration: Strategic overview of the implementation of the whole programme, coherence across the individual work programmes of the different parts of the programme, including missions	Munhá	Rui	Representative Alternate	rui.munha@fct.pt	FCT-Fundação para a Ciência e a Tecnologia			
Strategic configuration: Strategic overview of the implementation of the whole programme, coherence across the individual work programmes of the different parts of the programme, including missions	Carvalho	Anabela	Representative Alternate	anabela.carvalho@ani.pt	ANI - Agência Nacional de Inovação			

Strategic configuration: Strategic overview of the implementation of the whole programme, coherence across the individual work programmes of the different parts of the programme, including missions	Mendonça	José Manuel	Senior Expert	presidente.cncti@fct.pt	Conselho Nacional de Ciência, Tecnologia e Inovação
European Research Council (ERC)	Munhá	Rui	Representative	rui.munha@fct.pt	FCT-Fundação para a Ciência e a Tecnologia
European Research Council (ERC)	Marçal	David	Representative Alternate	david.marcal@fct.pt	FCT-Fundação para a Ciência e a Tecnologia
Marie Skłodowska-Curie Actions (MSCA)	Marçal	David	Representative	david.marcal@fct.pt	FCT-Fundação para a Ciência e a Tecnologia
Research Infrastructures	Abrantes	Marta	Representative	marta.abrantes@fct.pt	FCT-Fundação para a Ciência e a Tecnologia
Research Infrastructures	Carapau	Daniel	Representative Alternate	daniel.carapau@fct.pt	FCT-Fundação para a Ciência e a Tecnologia
Health	lsidro	Anabela	Representative	anabela.isidro@aicib.pt	AICIB - Agency for Clinical Research and Biomedical Innovation
Health	Oliveira	Isabel	Representative Alternate	isabel.oliveira@aicib.pt	AICIB - Agency for Clinical Research and Biomedical Innovation
Health	Duarte	Afonso	Representative Alternate	afonso.duarte@aicib.pt	AICIB - Agency for Clinical Research and Biomedical Innovation
Culture, creativity and Inclusive Society	Dourado	Mafalda	Representative	mafalda.dourado@ani.pt	ANI - Agência Nacional de Inovação

Culture, creativity and Inclusive Society	Dias	Natália	Expert	natalia.dias@ani.pt	ANI - Agência Nacional de Inovação
Culture, creativity and Inclusive Society	Amaral Lopes	José	Expert	jamaral.lopes@fct.pt	FCT-Fundação para a Ciência e a Tecnologia
Culture, creativity and Inclusive Society	Oliveira	Margarida	Expert	margarida.oliveira@ani.pt	ANI - Agência Nacional de Inovação
Culture, creativity and Inclusive Society	Ferreira	Susana	Expert	sferreira@cienciaviva.pt	Ciência Viva - Agência Nacional Para a Cultura Científica e Tecnológica
Civil Security for Society (including related missions and partnerships)	Sutcliffe	Ana	Representative	ana.sutcliffe@ani.pt	ANI - Agência Nacional de Inovação
Civil Security for Society (including related missions and partnerships)	Pereira	Polina	Expert	polina.pereira@ani.pt	ANI - Agência Nacional de Inovação
Civil Security for Society (including related missions and partnerships)	Leandro	Cristiana	Expert	cristiana.leandro@ani.pt	ANI - Agência Nacional de Inovação
Civil Security for Society (including related missions and partnerships)	Oliveira	Margarida	Expert	margarida.oliveira@ani.pt	ANI - Agência Nacional de Inovação
Civil Security for Society (including related missions and partnerships)	Azevedo	Sofia	Expert	sofia.azevedo@ani.pt	ANI - Agência Nacional de Inovação

Digital, Industry and Space (including related missions and partnerships)	Azevedo	Sofia	Representative	sofia.azevedo@ani.pt	ANI - Agência Nacional de Inovação
Digital, Industry and Space (including related missions and partnerships)	Ribau	João	Expert	joao.ribau@ani.pt	ANI - Agência Nacional de Inovação
Digital, Industry and Space (including related missions and partnerships)	Leandro	Cristiana	Expert	cristiana.leandro@ani.pt	ANI - Agência Nacional de Inovação
Digital, Industry and Space (including related missions and partnerships)	Fernandes	Sandra	Expert	sandra.fernandes@fct.pt	FCT/FCCN - Fundação para a Ciência e a Tecnologia/Computação Científica Nacional
Digital, Industry and Space (including related missions and partnerships)	Ferreira	João Nuno	Representative	ferreira@fccn.pt	FCT/FCCN - Fundação para a Ciência e a Tecnologia/Computação Científica Nacional
Digital, Industry and Space (including related missions and partnerships)	Ferreira	Daniel	Expert	daniel.ferreira@fct.pt	FCT-Fundação para a Ciência e a Tecnologia
Digital, Industry and Space (including related missions and partnerships)	Costa	Hugo	Representative	hugo.costa@ptspace.pt	Agência Espacial Portuguesa - Portugal Space
Digital, Industry and Space (including related missions and partnerships)	Alabart	Joan	Expert	joan.alabart@ptspace.pt	Agência Espacial Portuguesa - Portugal Space

Digital, Industry and Space (including related missions and partnerships)	Gonçalves	Marta	Expert	marta.goncalves@ptspace. p t	Agência Espacial Portuguesa - Portugal Space
Climate, Energy and Mobility (including related missions and partnerships)	Carvalho	Anabela	Representative	anabela.carvalho@ani.pt	ANI - Agência Nacional de Inovação
Climate, Energy and Mobility (including related missions and partnerships)	Maia	Luis	Expert	luis.maia@ani.pt	ANI - Agência Nacional de Inovação
Climate, Energy and Mobility (including related missions and partnerships)	Leandro	Cristiana	Representative Alternate	cristiana.leandro@ani.pt	ANI - Agência Nacional de Inovação
Climate, Energy and Mobility (including related missions and partnerships)	Eiriz	Francisca	Expert	francisca.eiriz@ani.pt	ANI - Agência Nacional de Inovação
Food, Bioeconomy, Natural Resources, Agriculture and Environment (including related missions and partnerships)	Fernandes	Maria João	Representative	mariajoao.fernandes@ani. p t	ANI - Agência Nacional de Inovação
Food, Bioeconomy, Natural Resources, Agriculture and Environment (including related missions and partnerships)	Sutcliffe	Ana	Expert	ana.sutcliffe@ani.pt	ANI - Agência Nacional de Inovação
Food, Bioeconomy, Natural Resources, Agriculture and Environment (including related missions and partnerships)	Santos	Margarida	Expert	margarida.santos@ani.pt	ANI - Agência Nacional de Inovação
Food, Bioeconomy, Natural Resources, Agriculture and Environment (including related missions and partnerships)	Carvalho	Anabela	Representative Alternate	anabela.carvalho@ani.pt	ANI - Agência Nacional de Inovação

Food, Bioeconomy, Natural Resources, Agriculture and Environment (including related missions and partnerships)	Gouveia	Cristina	Expert	cristina.gouveia@ani.pt	ANI - Agência Nacional de Inovação
The European Innovation Council (EIC) and European Innovation ecosystems	Dourado	Mafalda	Representative	mafalda.dourado@ani.pt	ANI - Agência Nacional de Inovação
The European Innovation Council (EIC) and European Innovation ecosystems	Gouveia	Cristina	Expert	cristina.gouveia@ani.pt	ANI - Agência Nacional de Inovação
The European Innovation Council (EIC) and European Innovation ecosystems	Ribau	João	Expert	joao.ribau@ani.pt	ANI - Agência Nacional de Inovação
The European Innovation Council (EIC) and European Innovation ecosystems	Marques	Alexandre	Representative Alternate	alexandre.marques@ani.pt	ANI - Agência Nacional de Inovação
The European Innovation Council (EIC) and European Innovation ecosystems	Bravo	Sofia	Expert	sofia.bravo@ani.pt	ANI - Agência Nacional de Inovação
The European Innovation Council (EIC) and European Innovation ecosystems	Silva	Rita	Expert	rita.silva@ani.pt	ANI - Agência Nacional de Inovação
The European Innovation Council (EIC) and European Innovation ecosystems	Dantas	Bibiana	Expert	bibiana.dantas@ani.pt	ANI - Agência Nacional de Inovação
Widening participation and strengthening the European Research Area	Munhá	Rui	Representative	rui.munha@fct.pt	FCT-Fundação para a Ciência e a Tecnologia

Widening participation and strengthening the European Research Area	Marçal	David	Representative Alternate	david.marcal@fct.pt	FCT-Fundação para a Ciência e a Tecnologia
Euratom - Fission	Cavaleiro	Rita	Representative	rita.cavaleiro@fct.pt	FCT-Fundação para a Ciência e a Tecnologia
Euratom - Fission	Igreja	Luísa	Representative Alternate	luisa.igreja@fct.pt	FCT-Fundação para a Ciência e a Tecnologia
Euratom - Fission	Vaz	Pedro	Expert	pedrovaz@ctn.tecnico.uLisb oa.pt	Instituto Superior Técnico- Campus Tecnológico e Nuclear
Euratom - Fusion	Cavaleiro	Rita	Representative	rita.cavaleiro@fct.pt	FCT-Fundação para a Ciência e a Tecnologia
Euratom - Fusion	lgreja	Luísa	Representative Alternate	luisa.igreja@fct.pt	FCT-Fundação para a Ciência e a Tecnologia
Euratom - Fusion	Alves	Luís	Expert	llalves@tecnico.uLisboa.pt	Instituto Superior Técnico

2.3 National Contacts Points (NCPs) and Delegates for Horizon Europe, ERASMUS+, Space Programme, Digital Programme and Connecting European Facility 2-Digital

List updates @ <u>www.perin.pt</u>

	Thematic Com	mittees	2021-2027: Horizon Europe - ERASMUS+ - Space Programme - Digital Programme		
	Coordinator NCPs		Ana Neves (MCTES - PERIN) Deputies: Rui Munhá (FCT), Mafalda Dourado (ANI), Anabela Isidro (AICIB), Ana Cristina Perdigão (Agência Nacional Erasmus + E&F), Pedro Esteves (DGES), Hugo Costa (PT Space), João Nuno Ferreira (FCT/FCCN)		
	Legal and Financia	al Aspects	Alexandre Marques (ANI) Francisca Eiriz (ANI), José Amaral Lopes (FCT)		
		Coordinator	Rui Munhá (FCT)		
		European Research Council (ERC)	Rui Munhá (FCT) David Marçal (FCT)		
	Pillar I – Excellent Science	Marie Skłodowska-Curie Actions (MSCA)	David Marçal (FCT)		
		Research Infrastructures	Marta Abrantes (FCT) Daniel Carapau (FCT)		
		Coordinator	Mafalda Dourado (ANI)		
	Pillar II -	Health (ex: Health, Demographic Change and Well-Being)	Anabela Isidro (AICIB) Afonso Duarte (AICIB), Isabel Carvalho-Oliveira (AICIB),		

	Global Challenges & European Industrial Competitiveness (includes <i>Partnerships</i> and	Culture, Creativity and Inclusive Society	Mafalda Dourado (ANI) Natália Dias (ANI), José Amaral Lopes (FCT), Margarida Oliveira (ANI), Susana Ferreira (Ciência Viva)
	Missions)	Civil Security for Society	Ana Sutcliffe (ANI) Polina Pereira (ANI), Cristina Leandro (ANI), Margarida Oliveira (ANI)
		Digital, Industry and Space	Digital: Sofia Azevedo (ANI) João Ribau (ANI), Cristina Leandro (ANI), Sandra Fernandes (FCT/FCCN), (ANI), João Nuno Ferreira (FCT/FCCN), Daniel Ferreira (FCT)
			Industry: João Ribau (ANI), Sofia Azevedo (ANI)
			Space: Hugo Costa (Portugal Space) Joan Alabart (Portugal Space), Marta Goncalves (Portugal Space)
		Climate, Energy and Mobility	Climate: Anabela Carvalho (ANI) Cristiana Leandro (ANI), Francisca Eiriz (ANI)
			Energy: Cristiana Leandro (ANI) Luis Maia (ANI), Francisca Eiriz (ANI)
		Mobility: Luis Maia (ANI) Francisca Eiriz (ANI), Cristiana Leandro (ANI)	
		Food, Bioeconomy, Natural	Food, Agriculture: Maria João Fernandes (ANI) Margarida Santos (ANI)
Environ	Environment	Bioeconomy: Ana Sutcliffe (ANI) Margarida Santos (ANI)	

		Nat. Resources, Agric. & Environment: Anabela Carvalho (ANI) Cristina Gouveia (ANI)		
	Coordinator	Mafalda Dourado (ANI)		
	EIC (European Innovation Council), EIE (European Innovation Ecosystems; ex - SME Instrument) and EUREKA	EIC: Mafalda Dourado (ANI) Cristina Gouveia (ANI), Alexandre Marques (ANI), Sofia Bravo (ANI)		
Pilar III – Innovativo Europo		EIE: Mafalda Dourado (ANI) Bibiana Dantas (ANI), Rita Silva (ANI)		
Pliar III – Innovative Europe		EUREKA: Rita Silva (ANI)		
	EIT	Alexandre Marques (ANI) Francisca Eiriz (ANI)		
Pillar IV – Widening participation &	Coordinator	Rui Munhá (FCT)		
strengthening the ERA	Widening Participation & Spreading Excellence	Rui Munhá (FCT) David Marçal (FCT)		
			Fission: Rita Cavaleiro (FCT) Luísa Igreja (FCT)	
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	EURATOM	Fission/Fusion	Fusion: Rita Cavaleiro (FCT) Luísa Igreja (FCT)	
		Joint Research Centre	Gonçalo Zagalo (FCT)	
	Coordinator Space (HE + European Space Programme)		Hugo Costa (Portugal Space) Joan Alabart (Portugal Space), Marta Gonçalves (Portugal Space)	
Space Programme	Access to Space (Launchers, ports)		Hugo Costa (Portugal Space)	
	Satellites, sensors plataforms	Space safety + weather (Govsatcom; SSA)	Tiago Peres (Portugal Space)	
	Earth Observation	Navigation	Earth Observation (Copernicus): Hugo Costa (Portugal Space) Carolina Sá (Portugal Space)	
	(EO) and downstrea m	(Galileo/EGNOS); EO (Copernicus)	Navigation (Galileo/EGNOS): Tiago Peres (Portugal Space)	

	Coordinator		Mário Amaral, Susana Caetano (FCT/FCCN)
Digital Europe	High Performance Computing Artificial Intelligence, data and cloud Cybersecurity and trust		João Nuno Ferreira (FCT/FCCN)
Programme			Sofia Azevedo (ANI), Cristiana Leandro (ANI), Ana Costa Paula (DGAE), Raúl do Vale Martins (Portugal Digital), Filipe Batista (ANACOM), José Pedro Borrego (ANACOM), Patrícia Nogueira (ANACOM)
			Pedro Matos (CNCS)
	Advanced Digital Skills		José Pedro Antunes (INCoDe.2030), Sandra Martins (INCoDe.2030)
	Accelerating the best use of digital technologies	European Digital Innovation Hubs (EDIH)	Pedro Cilínio (IAPMEI); Ana Costa Paula (DGAE/METD); Sofia Azevedo (ANI); Cristiana Leandro (ANI)
		Green deal/Destination Earth Initiative	Carolina Sá (PT Space), Emanuel Dutra (IPMA)
		Public Services and Government Interoperability & Blockchain	Claúdia Barroso (AMA), Tiago Mendonça (AMA)
		Confidence in digital transformation	Pedro Matos (CNCS)

CEE 2	Coordinator	Sandra Fernandes (FCT/FCCN)
elnfrastructures - HPC		João Nuno Ferreira (FCT/FCCN)
	5G/Wifi	АNACOM
ERASMUS+	Programme Committee	Pedro Esteves (DGES, setor Educação: Ensino Superior) Marília Neres (SGEC, setor Educação: Ensino Pré-escolar; Ensino Escolar; Educação de Adultos; EFP) Susana Tavares (Gabinete MTSSS) e Conceição Matos (IEFP) Carlos Pereira e Jorge Queirós (IPDJ, setores Juventude e Desporto)
Other	DG DEV (together with DGs RTD & CNECT)	Ana Neves (MCTES - PERIN) Rui Munhá (FCT), Mafalda Dourado (ANI), Hugo Costa (Portugal Space), Maria João Pinto (MCTES), Susana Catita (Ciência LP)
	DG RTD - External relations	Ana Neves (MCTES - PERIN) Rui Munhá (FCT), Mafalda Dourado (ANI), Hugo Costa (Portugal Space), Maria João Pinto (MCTES), Susana Catita (Ciência LP)

3. National Network of Research and Innovation Promotion Offices

List updates <u>here</u>

Instituição	Designação do Gabinete de	Tipo de Instituição	E-mail	Telefone
ARDITI - Agência Regional para o	ARDITI	R&D Institutions	arditi@arditi.pt	291721220
Desenvolvimento da Investigação.				
Tecnologia e Inovação				
CEIS20	CEIS20	R&D Institutions	ceis20@ci.uc.pt	239708870
Centro de Estudos Internacionais do ISCTE -	CEI-IUL (apoiado pelo	R&D Institutions	cei@iscte-iul.pt	
Instituto Universitário de Lisboa	Gabinete de Apoio à			
	Investigação e Projectos do			
	ISCTE-IUL)			
Centro de Estudos Sociais	Gabinete de Gestão de	R&D Institutions	gagep@ces.uc.pt	239855570
	Projetos			
Centro de Investigação e Estudos de	Gabinete de Comunicação e	R&D Institutions	gcp.cies@iscte-iul.pt	
Sociologia (CIES-IUL) / Instituto	Planeamento			
Universitário de Lisboa (ISCTE-IUL)				
Comissão de Coordenação e	Direcção de Serviços de	Public Administration	DSDR@ccdr-n.pt	
Desenvolvimento Regional do Norte	Desenvolvimento Regional			
DINÂMIA'CET-IUL (ISCTE-Instituto	DINÂMIA'CET-IUL	R&D Institutions	dinamia@iscte-iul.pt	
Universitário de Lisboa)				
Escola Superior de Tecnologia da Saúde de	Gabinete de Projetos	Higher Education	investigacao@estesl.ipl.pt	
Lisboa	Especiais, Investigação e	Institutions		
	Inovação			
Faculdade de Letras da Universidade de	Divisão de Apoio à	Higher Education	dai@letras.ulisboa.pt	
Lisboa	Investigação	Institutions		
FCiências.ID - Associação para a	Núcleo de Projetos	R&D Institutions	internacionaisID@fciencias-id.pt	
Investigação e Desenvolvimento de	Internacionais			
Ciências				
FCT NOVA	Gabinete de Gestão de	Higher Education	gest-cnmt@campus.fct.unl.pt	
	Projectos	Institutions		
FCT NOVA	Gabinete de Gestão de	Higher Education	cenimat.gestao@fct.unl.pt	
	projetos de I&D	Institutions		
FEUP – UPORTO	Unidade INOV – Europe	Higher Education	europe@fe.up.pt	
		Institutions		

FPCEUP	CRIA	Higher Education	projetos@fpce.up.pt	
		Institutions		
Fundação Champalimaud	Pre-Award	R&D Institutions	preaward.osp@research.fchampalimaud.org	
Fundação Gaspar Frutuoso		R&D Institutions	fgf@uac.pt	
iMM - Instituto de Medicina Molecular	Funding Office	R&D Institutions	imm-funding@medicina.ulisboa.pt	
João Lobo Antunes				
INESC TEC	Serviço de apoio as parcerias	R&D Institutions	sape@inesctec.pt	
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INESC TEC - Instituto de Engenharia de	Serviço de Apoio à	R&D Institutions	saaf@inesctec.pt	
Sistemas e Computadores, Tecnologia e	Angariação de			
Ciência	Financiamentos			
INESC TEC - Instituto de Engenharia de	Serviço de Apoio à	R&D Institutions	pdnf@inesctec.pt	222094059
Sistemas e Computadores, Tecnologia e	Angariação de			
Ciência	Financiamentos			
Instituto de Ciências da Saúde da	CREATING HEALTH -	Higher Education	geral.creatinghealth@ics.lisboa.ucp.pt	
Universidade Católica Portuguesa	Research and Innovation	Institutions		
	Funding			
Instituto de Ciências Sociais da	Gestão de I&D	Higher Education	gestao.id@ics.ulisboa.pt	
Universidade de Lisboa		Institutions		
Instituto de Tecnologia Química e Biológica	Gabinete de Financiamento	R&D Institutions	itqb.funding@itqb.unl.pt	
António Xavier (ITQB NOVA), Universidade	à Ciência			
Nova de Lisboa				
Instituto Hidrográfico	Gabinete de Projetos	R&D Institutions	gabproj@hidrografico.pt	
Instituto de Medicina Molecular João Lobo	Funding Office (Finance and	R&D Institutions	imm-funding@medicina.ulisboa.pt	
Antunes	Operations)			
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Nova de Lisboa				
Instituto Nacional de Investigação Agrária e	Gabinete de Apoio a	R&D Institutions	gap@iniav.pt	
Veterinária	Projetos - GAP			
Instituto Politécnico da Guarda	Unidade de Investigação	Higher Education	diretor.udi@ipg.pt	
	para o Desenvolvimento do	Institutions		
	Interior			

Instituto Politécnico de Beja	Gabinete de Projectos	Higher Education Institutions	gabinetedeprojectos@ipbeja.pt	284314400
Instituto Politécnico de Bragança	Gabinete de Apoio a Projetos	Higher Education Institutions	apoio.investigacao@ipb.pt	
Instituto Politécnico de Leiria	Gabinete de Projetos	Higher Education Institutions	gabinete.projectos@ipleiria.pt	
Instituto Politécnico de Lisboa	Gabinete de Projetos Especiais e Inovação	Higher Education Institutions	gpei@sp.ipl.pt	
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Instituto Superior de Engenharia de Lisboa	Núcleo de Gestão de Projetos	Higher Education Institutions	projetos@isel.pt	218317043
Instituto Superior de Engenharia do Porto	Gabinete de Apoio a Projetos	Higher Education Institutions	info-projetos@isep.ipp.pt	
Instituto Superior Técnico	Gabinete de Apoio Técnico a Projetos e ao Investigador (GATPI) da Direção de Projetos	Higher Education Institutions	dprojetos@tecnico.ulisboa.pt	
ISCTE - Instituto Universitário de Lisboa	Gabinete de Apoio à Investigação	Higher Education Institutions	gai@iscte.pt	
ISCTE-IUL	CIES-IUL	Higher Education Institutions	cies@iscte-iul.pt	
ISCTE-IUL	Business Research Unit (BRU-IUL)	R&D Institutions	bru-unide@iscte-iul.pt	
ISCTE-IUL	CIS-IUL	Higher Education Institutions	cis@iscte-iul.pt	

ISPA - Instituto Universitário	Centro de Gestão de	Higher Education	cgi@ispa.pt	
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Laboratório Nacional de Engenharia Civil	Gabinete de Gestão de	R&D Institutions	ggp@lnec.pt	
	Projetos			
NOVA - Escola Nacional de Saúde Pública	GAIDI - Gabinete de Apoio à	Higher Education	gaidi@ensp.unl.pt	
	Investigação,	Institutions		
	Desenvolvimento e Inovação			
NOVA FCSH	Balcão do Investigador - pre-	Higher Education	research@fcsh.unl.pt, coliveira@fcsh.unl.pt	
	award da NOVA FCSH	Institutions		
Nova School of Business & Economics	Research Office	Higher Education	research.office@novasbe.pt	
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NOVA.id.FCT	Management Department	R&D Institutions	gestao7@novaidfct.pt	212948553
NOVA.id.FCT - Associação para a Inovação	Departamento de Gestão de	R&D Institutions	sd.almeida@fct.unl.pt	212948553
e Desenvolvimento da FCT	Projetos			
Politécnico de Lisboa	Projetos Especiais e	Higher Education	gpei@sp.ipl.pt	
	Inovação (GPEI)	Institutions		
Ubimedical Universidade da Beira Interior	Ubimedical	Higher Education	ubimedical@ubi.pt	
		Institutions		
Universidade Católica Portuguesa	Gabinete de Investigação e	Higher Education	gii@ucp.pt	
	Inovação	Institutions		
Universidade Católica Portuguesa - Centro	AGCP - Apoioà Gestão de	Higher Education	acprojectos@porto.ucp.pt	
Regional do Porto	Candidaturas e Projetos	Institutions		
Universidade Coimbra	Divisão Apoio Promoção da	Higher Education	dapi@uc.pt	
	Investigação	Institutions		
Universidade da Madeira	Unidade de Projetos e	Higher Education	projetos@mail.uma.pt	
	Cooperação	Institutions		
Universidade de Aveiro	Gabinete de Apoio à	Higher Education	research@ua.pt	
	Investigação	Institutions		
Universidade de Coimbra	Instituto de Investigação	Higher Education	iii@uc.pt	239247013
	Interdisciplinar da	Institutions		
	Universidade de Coimbra			
Universidade de Évora	Serviço de Ciência e	Higher Education	investigar@scc.uevora.pt	
	Cooperação	Institutions		

UTAD - Universidade de Trás-os-Montes e	Gabinete de Apoio a	Higher Education	gap@utad.pt	
Alto Douro	Projetos	Institutions		
Universidade do Algarve	Divisão de informação e Estatística - Unidade de Apoio à Investigação Científica (UAIC)	Higher Education Institutions	uaicfunding@ualg.pt	
Universidade do Porto	Unidade de Apoio à Investigação	Higher Education Institutions	uai@reit.up.pt	
Universidade Lusófona de Humanidades e Tecnologias	ILIND - Instituto Lusófono de Investigação e Desenvolvimento	Higher Education Institutions	ilind@ulusofona.pt	
Universidade Nova de Lisboa	Gabinete de Apoio à Investigação	Higher Education Institutions	nova.investigacao@unl.pt	
Universidade Nova de Lisboa	Divisão de Projetos	Higher Education Institutions	funl.projectos@unl.pt	
UTAD - Universidade de Trás-os-Montes e Alto Douro	CITAB	Higher Education Institutions	citab@utad.pt	
PRODUTECH - Pólo das Tecnologais de Produção	PRODUTECH	Competitive Cluster	geral@produtech.org	
PFP - Plataforma Ferroviaria Portuguesa	Cluster da Ferrovia	Competitive Cluster	info@ferrovia.pt	
Instituto Gulbenkian de Ciência	Research Funding Affairs Unit (RFA Unit)	R&D Institutions	rfaunit@igc.gulbenkian.pt	
InnovPlantProtect - Associação (CoLAB)	Coordenação InnovPlantProtect CoLAB	Colabs	innovplantprotect@itqb.unl.pt	
INEGI	Projetos Integrados	Technological Infrastructure	integratedprojects@inegi.up.pt	
CTCV - Centro Tecnológico da Cerâmica e do Vidro	Unidade de Inovação e Desenvolvimento	Technological Infrastructure	inovacao@ctcv.pt	
CESPU	Balcão de Transferência de Tecnologia	Technology Transfer Office	btc.iinfacts@cespu.pt	
i3S - Instituto de Investigação e Inovação em Saúde	Research & Innovation Unit	R&D Institutions	international-projects@i3s.up.pt	
LIP – Laboratório de Instrumentação e Física Experimental de Partículas	RH e Gestão Projetos	R&D Institutions	natalia@lip.pt	933736453

Faculdade de Arquitectura da Universidade do Porto	Centro de Estudos de Arquitectura e Urbanismo	R&D Institutions	ceau@arq.up.pt	220 425 407
Instituto Universitário de Lisboa (ISCTE-IUL)	ISTAR – Information Sciences and Technologies and Architecture Research Center	R&D Institutions	sara.eloy@iscte-iul.pt	+351969954190
NOVA School of Science and Tecnology	IRIS – Innovation Research & Impact Strategy Office	Higher Education Institutions	jfb.monteiro@fct.unl.pt / aj.frazao@fct.unl.pt / b.hourmat@fct.unl.pt	+351965083187
Applied Molecular Biosciences Unit	Science Management & Communication Office	R&D Institutions	tsc@fct.unl.pt	212948575
CICECO-Aveiro Institute of Materials	CDTM – Centre for Materials Design & Technology	R&D Institutions	cdtm@ciceco.ua.pt	+351 234 372586
Faculdade de Belas Artes da Universidade do Porto	i2ADS – Research Institute in Art, Design and Society	R&D Institutions	i2ads@fba.up.pt	225192429
Associated Laboratory for Green Chemistry	Science Management Office	R&D Institutions	laqv@requimte.pt	220408860
ICVS/3B's- Associate Laboratory	ICVS/3B's- Associate Laboratory	R&D Institutions	info@i3bs.uminho.pt / icvs.sec@med.uminho.pt	253510900
INOVA+	International Unit	Technology Transfer Office	ana.costa@inova.business	+351913499388
INOVA+	Antunes	Technology Transfer Office	claudia.antunes@inova.business	913628327
University of Aveiro	ESAN	Higher Education Institutions	hfaria@ua.pt	+351 256 666 960
INESC-ID – Instituto de Engenharia de Sistemas e Computadores, Investigação e Desenvolvimento em Lisboa	IM4EU – Innovation Management for Europe	R&D Institutions	im4eu@inesc.pt	963063819
INESC MN – Instituto de Engenharia de Sistemas e Computadores Microsistemas e Nanotecnologias	IM4Europe – Innovation Management for Europe	R&D Institutions	im4eu@inesc.pt	963063819
Labcom – Communication & Arts	Beira Interior University	R&D Institutions	agradim@gmail.com	918969013
Communication and Society Research Centre	University of Minho	R&D Institutions	cecs@ics.uminho.pt	938657438

CECOLAB – Collaborative Laboratory	Management Support	Colabs	gestao@cecolab.pt	+351
Towards Circular Economy				238011400
CBQF – Centro de Biotecnologia e Quimica	Research & Innovation	R&D Institutions	jcortez@porto.ucp.pt	936346021
Fina	Funding Office			
Universidade de Coimbra	UC Business	Technology Transfer	ucbusiness@uc.pt	239247742
		Office		
Faculdade de Letras da Universidade do	REMA – Research	Higher Education	rema@letras.up.pt	226077163
Porto	Management & Science	Institutions		
	Communication Hub			
Universidade da Beira Interior	GAPPI - Gabinete de Apoio a	Higher Education	ppserrao@ubi.pt	275329147
	Projetos e Promoção da	Institutions		
	Investigação			
ISPUP	Science and Technology	R&D Institutions	claudia.antunes@ispup.up.pt	+351 222 061
	Management Office			820
NOVA School of Science and Technology	Department of Apllied Social	Higher Education	ima@fct.unl.pt	(+351) 212 948
	Sciences	Institutions		573
University of Coimbra	International Relations Unit	Higher Education	liliana.moreira@uc.pt	239857003
		Institutions		
CESAM – Centro de Estudos do Ambiente e	Science and Technology	R&D Institutions	anas@ua.pt	(+351) 234 372
do Mar, Universidade de Aveiro	Management Office			594
Polo de Literacia Digital e Inclusão	Polo de Literacia Digital e	Higher Education	mariapbarbas@gmail.com	917570614
Social_IPSantarem_CIAC_Universidade do	Inclusão Social	Institutions		
Algarve				
Maiêutica – Cooperativa de Ensino	Projects Office	Higher Education	projetos@maieutica.pt	+351936444239
Superior CRL		Institutions		
IPSantarém	Presidência do IPSantarém	Higher Education	joao.moutao@ipsantarem.pt	936258983
		Institutions		
Collaborative laboratory – Mountains of	Business and management	Colabs	ateixeira@morecolab.pt	+351 934 538
Research				413
IST-ID	Pre-Award	R&D Institutions	marta.candeias@tecnico.ulisboa.pt	
AlmaScience (Colab)	Funding and Business	Colabs	tatiana.costa@almascience.pt	910073244
	Development Department			

Associação Fraunhofer Portugal Research - AICOS	R&D Support	R&D Institutions	rui.castro@fraunhofer.pt / joao.rodrigues@fraunhofer.pt / maria.costa@fraunhofer.pt	
IPN – Instituto Pedro Nunes	Hole Institution	R&D Institutions	ajegundo@ipn.pt	910003870
Food4Sustainability Colab	Directorate	Colabs	goncalo.amorim@food4sustainability.org	+351965707983
Associação RAEGE Açores	Wallenstein	R&D Institutions	francisco.lw.macedo@azores.gov.pt	966423135
Instituto Politécnico do Porto	Divisão de Apoio a	Higher Education	projects@portic.ipp.pt / portic@portic.ipp.pt	225571088
	Programas e Projetos	Institutions		
Porto Research Technology & Innovation Center – Polytechnic of Porto	R&D Support	R&D Institutions	portic@portic.ipp.pt	225571020
Universidade Fernando Pessoa	Institutional Development	Higher Education Institutions	pro-reitoria-diri@ufp.edu.pt	225071349
Escola Superior de Saúde Dr. Lopes Dias –	Gabinete de Projetos e	Higher Education	patriciacoelho@ipcb.pt	(+351) 272 340
Instituto Politécnico de Castelo Branco	Investigação	Institutions		560
Instituto de Nanoestruturas,	Gabinete de Gestão do	Higher Education	p.manteigas@fct.unl.pt	914584838
Nanomodelação e Nanofabricação	CENIMAT i3N da FCT NOVA	Institutions		
INfAST	Institute for Anthropocene	R&D Institutions	instituteforanthropocenestudies@protonmail.com	960036645
	Studies			
Value for Health CoLAB	NOVA University	Colabs	ana.londral@vohcolab.org	3,51963E+11
Instituto de Ciências Biomédicas Abel	Serviço de Apoio à	Higher Education	dfferreira@icbas.up.pt	220428061
Salazar	Investigação, Inovação,	Institutions		
	Desenvolvimento e			
	Transferência Tecnológica			
Instituto Politecnico da Guarda	Escola Superior de Saúde	Higher Education Institutions	mrmartins@ipg.pt	965255795
CEU – Cooperativa de Ensino Universitário,	Gabinete de Apoio à	Higher Education	gaid@autonoma.pt	+351
CRL / Universidade Autónona de Lisboa	Investigação e	Institutions		213177644
(UAL)	Desenvolvimento (GAID)			
Faculdade de Ciências da Universidade de	Gabinete de Apoio à	Higher Education	projectos@fc.ul.pt	217500720
Lisboa	Investigação	Institutions		
i3N	INSTITUTE FOR	R&D Institutions	emf@fct.unl.pt	+351212948562
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	NANOMODELLING AND			
	NANOFABRICATION			

Centro de Estudos em Educação e Inovação	Centro de Investigação e Desenvolvimento	R&D Institutions	cidei@sc.ipv.pt	232480700
Centro de Investigação em Serviços Digitais (CISeD)	Centro de Investigação e Desenvolvimento	R&D Institutions	cised@sc.ipv.pt	232480700
Instituto Politécnico de Viseu	Instituto Politécnico de	Higher Education	ipv@sc.ipv.pt	232480700
Instituto Politécnico De Leiria	Center of Applied Research in Management and Economics	R&D Institutions	eleonora.santos@ipleiria.pt	244830010
CIIMAR – Interdisciplinary Centre of Marine and Environmental Research	Science and Innovation Office	R&D Institutions	smmoreira@ciimar.up.pt	+351223401827
iMed – Instituto do Medicamento	Faculdade de Farmácia da Universidade de Lisboa	R&D Institutions	imed.ulisboa@ff.ulisboa.pt	21 794 6400
B2E Associação para a Bioeconomia Azul – Laboratório Colaborativo	Colab B2E	Colabs	b2e@b2e.pt	916346959
FeedInov CoLab	Research and Innovation	Colabs	ana.santos@feedinov.com	3,51936E+11
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FARM-ID – Associação da Faculdade de Farmácia para a Investigação e Desenvolvimento	Faculdade de Farmácia da Universidade de Lisboa	R&D Institutions	geral@farm-id.pt	217 946 400
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CEDOC – Centro de Estudos de Doenças Crónicas	NOVA Medical School – Universidade Nova de Lisboa	R&D Institutions	cedoc.dir@nms.unl.pt	+351218803101
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International Iberian Nanotechnology Laboratory (INL)	Business & Strategic Relations (BSR)	R&D Institutions	grants@inl.int	253140112
INOV – Instituto de Engenharia de Sistemas e Computadores Inovação	IM4Europe – Innovation Management for Europe	R&D Institutions	im4eu@inesc.pt	
IDMEC – Instituto de Engenharia Mecânica	Department of Mechanical Engineering	R&D Institutions	antonio.ramos.andrade@tecnico.ulisboa.pt	+351 218 417 351

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Centre for Neuroscience and Cell Biology	Research Funding & Project	R&D Institutions	grants@cnc.uc.pt	+351
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ICArEHB	Research Support	R&D Institutions	gdevevey@ualg.pt	968684941
Fundação Ensino e Cultura Fernando	FP-I3ID	Higher Education	i3id@fundacaofernandopessoa.pt	225071300
Pessoa		Institutions		
Center for Responsible Business	CRB	Higher Education	filipa.pa@ucp.pt	936442053
		Institutions		
Universidade Aberta_UAb	GAPID_Gabinete de Apoio a	Higher Education	iuab.geral@uab.pt	+351 300 007
	Projetos de Investigação e	Institutions		692
	Desenvolvimento			
Faculdade de Medicina da Universidade do	RISE – Health Research	Higher Education	rise@med.up.pt	(+351) 22 551
Porto	Network	Institutions		3600
Pedro Principe	Gabinete de Gestão de	Higher Education	pedro.principe@usdb.uminho.pt	919959508
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	Repositórios e Ciência			
	Aberta – Serviço de			
	Documentação e Bibliotecas			
Escola Superior de Enfermagem S. José de	Gabinete de Investigação e	Higher Education	tmlourenco@esesjcluny.pt	291743444
Cluny	Desenvolvimento Cluny	Institutions		
	(GIDeC)			
CUBE – Unidade de Investigação em	Research Office	R&D Institutions	daniela.guerra@ucp.pt	217214122
Economia e Gestão da CATÓLICA-LISBON				
INESC TEC – Instituto de Engenharia de	Serviço de Apoio à	R&D Institutions	aurora.l.teixeira@inesctec.pt	222094065
Sistemas e Computadores, Tecnologia e	Angariação de			
Ciência	Financiamentos			
Centro de Ciências do Mar do Algarve	Business Unit	R&D Institutions	ccmarfunding@ualg.pt	931676971
CONSULAI	Projetos Estratégicos	Technology Transfer	dlopes@consulai.com	3,51911E+11
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Universidade Nova de Lisboa		Higher Education	anapego@campus.fcsh.unl.pt	964145626
		Institutions		
Centro de Investigação do ISCPSI	ICPOL	R&D Institutions	ci.iscpsi@psp.pt	213613900

PARSUK – Portuguese Association of	External Team	Technology Transfer	vp.externa@parsuk.pt	
Researchers and Students in the United		Office		
Kingdom				
ESESFM – Escola Superior de Enfermagem	RICH – Research &	Higher Education	deniseccsantos@gmail.com	+351962454749
S. Francisco das Misericórdias	Innovation Center for Health	Institutions		
Universidade da Beira Interior	Vice-Reitoria para a	Higher Education	vrinvestigacao@ubi.pt	275319021
	Investigação, Inovação e	Institutions		
	Desenvolvimento			
Coimbra Institute for Clinical and	Research Management	R&D Institutions	ggi@fmed.uc.pt	239480066
Biomedical Research	Office			
Instituto de Telecomunicações	Project Management	R&D Institutions	cbarbosa@av.it.pt	3,51234E+11
STATUS – Escola Profissional da Lousã	Project Manager	Higher Education	ana.verissimo@status.edu.pt	968179862
		Institutions		
Centro de Recursos Naturais e Ambiente	Pre-Award Office	R&D Institutions	mariana.santa-marta@tecnico.ulisboa.pt	+351
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ISEC Lisboa	CEAL – Centro de Estudos da	Higher Education	arnaldo.costeira@iseclisboa.pt	+351 938 773
	Administração Local	Institutions		556
Observatório das Indústrias Criativas	Research & Development	Competitive Cluster	contact@industriascriativas.pt	938773556
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FPCEUP	CRIA	Higher Education Institutions	projetos@fpce.up.pt	
Fundação Champalimaud	Pre-Award	R&D institutions	preaward.osp@research.fchampalimaud.org	
Fundação Gaspar Frutuoso		R&D institutions	fgf@uac.pt	
iMM - Instituto de Medicina Molecular João Lobo Antunes	Funding Office	R&D institutions	imm-funding@medicina.ulisboa.pt	
INESC TEC	Serviço de apoio as parcerias empresariais	R&D institutions	sape@inesctec.pt	
INESC TEC - Instituto de Engenharia de Sistemas e Computadores, Tecnologia e Ciência	Serviço de Apoio à Angariação de Financiamentos	R&D institutions	saaf@inesctec.pt	
INESC TEC - Instituto de Engenharia de Sistemas e Computadores, Tecnologia e Ciência	Serviço de Apoio à Angariação de Financiamentos	R&D institutions	pdnf@inesctec.pt	222094059
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Instituto de Medicina Molecular João Lobo Antunes	Funding Office (Finance and Operations)	R&D institutions	imm-funding@medicina.ulisboa.pt	
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Instituto Politécnico de Santarém	Gabinete de Projetos do Instituto Politécnico de Santarém	Higher Education Institutions	gabinete.projetos@ipsantarem.pt	
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PRODUTECH - Pólo das Tecnologais de Produção	PRODUTECH	Competitive Cluster	geral@produtech.org	
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Value for Health CoLAB	NOVA University	Colabs	ana.londral@vohcolab.org	3,51963E+11
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Centro de Estudos em Educação e Inovação (CI&DEI)	Centro de Investigação e Desenvolvimento	R&D institutions	cidei@sc.ipv.pt	232480700
Centro de Investigação em Serviços Digitais (CISeD)	Centro de Investigação e Desenvolvimento	R&D institutions	cised@sc.ipv.pt	232480700
Instituto Politécnico de Viseu	Instituto Politécnico de Viseu	Higher Education Institutions	ipv@sc.ipv.pt	232480700

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CIIMAR – Centro Interdisciplinar de	Moreira	R&D institutions	smmoreira@ciimar.up.pt	+351223401827
Investigaçao Marinha e Ambiental				
CIIMAR – Interdisciplinary Centre of	Science and Innovation Office	R&D institutions	smmoreira@ciimar.up.pt	+351223401827
Marine and Environmental Research				
iMed – Instituto do Medicamento	Faculdade de Farmácia da	R&D institutions	imed.ulisboa@ff.ulisboa.pt	21 794 6400
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				254242222642
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(IMS)		Institutions		
FARM-ID – Associação da Faculdade de	Faculdade de Farmácia da	R&D institutions	geral@farm-id.pt	217 946 400
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Desenvolvimento				
Faculdade de Farmácia da Universidade	Faculdade de Farmácia da	Higher Education	geral@ff.ulisboa.pt	217 946 400
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CEDOC – Centro de Estudos de Doenças	NOVA Medical School –	R&D institutions	cedoc.dir@nms.unl.pt	+351218803101
Crónicas	Universidade Nova de Lisboa			
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4. National Erasmus+ Offices

List updates <u>here</u>

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