Ministério da Ciência, Tecnologia e Ensino Superior

# 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

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

Documento de trabalho, para discussão pública até ao final de 2020

outubro 2020

## Sumário Executivo:

### uma estratégia para reforçar a participação nacional nos programas europeus nas áreas da Investigação e Inovação, Erasmus, Espaço e Digital

Este documento apresenta 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 mobilidades** 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, assim como melhor se afirmar 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 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, 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 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**.

A "Estratégia de Inovação Tecnológica e Empresarial para Portugal 2018-2030", como elemento-chave do Programa Nacional de Reformas, visa 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, nos contextos europeu internacional.

Portugal foi considerado pela Comissão Europeia como um país **"fortemente inovador",** de acordo com a edição de 2020 do *European Innovation Scoreboard* (EIS 2020)[1] divulgada a 23 de junho. Em 2019, Portugal estava classificado no grupo dos países "moderadamente inovadores", estando agora classificado no grupo de países com a Bélgica, Alemanha, Áustria, Irlanda, França e Estónia. Esta evolução está particularmente associada à evolução do desempenho de pequenas e médias empresas e ao nível de internacionalização do sistema científico, assim como do acesso a infraestruturas (acesso a banda larga) e de formação avançada de recursos humanos, com especial destaque para o alargamento da população com ensino superior.

[1] O EIS é uma publicação anual da Comissão Europeia que pretende medir e acompanhar o desempenho dos Estados-membros da União Europeia em termos de inovação. Os resultados são apresentados em forma de *ranking*, resultante do cálculo de um *Summary Innovation Index* para cada um dos países envolvidos no estudo. Esta publicação existe desde 2001, tendo sido criada no âmbito da Estratégia de Lisboa, tendo havido ao longo do tempo alterações na composição dos indicadores, bem como na metodologia utilizada. O EIS 2020 considera 27 indicadores, distribuídos por 10 dimensões de inovação.

**Portugal é agora o 12º país mais inovador na União Europeia**, tendo subido 6 lugares face à posição que ocupava no EIS 2016 (18º lugar), sendo de notar que:

- Portugal foi o país da UE em que o indicador relativo ao investimento empresarial mais cresceu face a 2018;
- Portugal verificou uma melhoria significativa ao nível da valorização económica do conhecimento, sobretudo no que diz respeito ao emprego qualificado em setores intensivos em conhecimento e em empresas de elevado crescimento;
- Portugal foi um dos países com maior crescimento de estudantes estrangeiros, designadamente ao nível de doutoramento.

É ainda de registar que Portugal é o país em que o indicador de inovação mais aumentou entre 2015 e 2019. No entanto, **persistem obstáculos** importantes 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 aumentar 3,5 vezes o investimento privado em I&D, em associação com a promoção de cerca 25 mil empregos qualificados, assim como duplicar o investimento público em I&D até 2030;

- 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, assim como continuar a aumentar a fração dos jovens de 20 anos a estudar no ensino superior dos atuais 50% 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.

Manuel Heitor
Ministro da Ciência, Tecnologia e Ensino Superior

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*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**, 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 mobilidades** no Ensino Superior.

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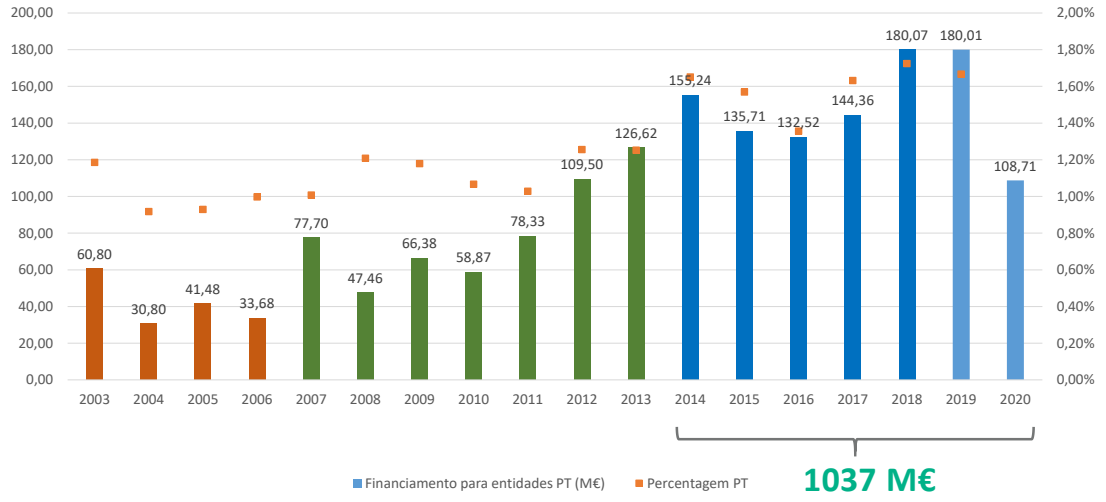
## 1. O Contexto geral: a participação nacional nos Programas-Quadro Europeus

### 1.1 Investigação e Inovação

Através do Programa Horizonte 2020 (2014-2020), as entidades portuguesas captaram, até ao final de agosto 2020, um total de financiamento de cerca de **1037 Milhões de Euros**. Este valor corresponde a uma taxa de retorno do financiamento nacional de **1,67% e,** portanto, superior à contribuição nacional para o Programa Horizonte 2020, de cerca 1,2%, assim como superior à meta de 1,5% fixada em 2014, quando do início deste Programa Quadro. Os dados relativos ao ano de 2020 são ainda provisórios pois a grande maioria dos concursos ainda não encerrou.

No âmbito do programa Horizonte 2020 a participação de entidades nacionais inclui hoje a participação em **2180 projetos**, resultantes de 15120 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.

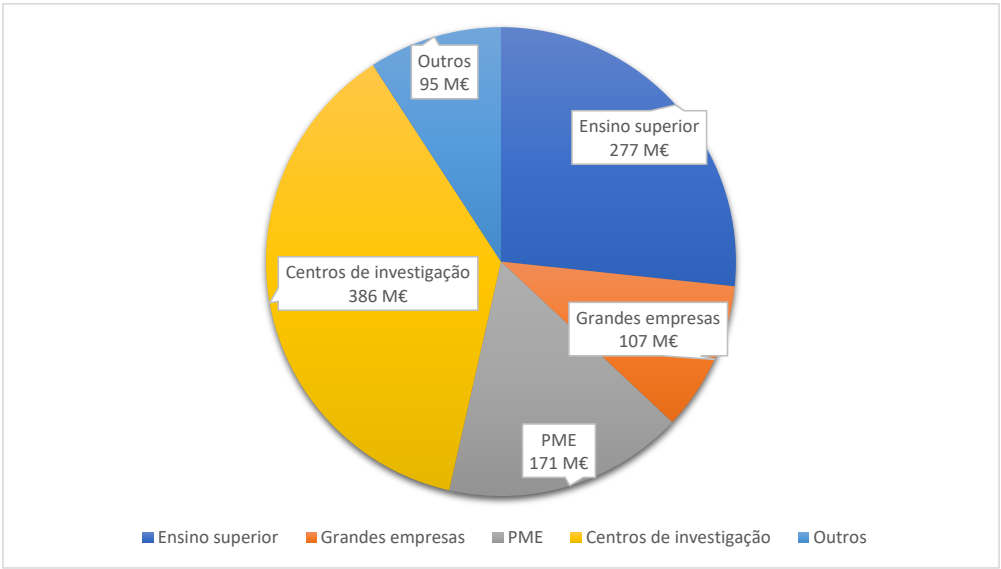
**Figura 1**. Evolução do financiamento europeu captado por instituições portuguesas




Fonte: ANI, setembro 2020, Dados de 2020 apenas referentes ao 1º semestre de 2020

No que respeita à distribuição do financiamento por tipologia de instituições participantes no Horizonte 2020, observa-se que as instituições científicas e de ensino superior são os principais beneficiários, com cerca de 64% (663 M€) de todo o financiamento atribuído a Portugal. As PME atraíram 17% (171 M€) e as grandes empresas cerca de 10% (107 M€).

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




Fonte: ANI, setembro 2020

A **Figura 3** ilustra os programas específicos e temas associadas à participação nacional, com alguns temas claramente acima da média nacional (1,64%), incluindo:

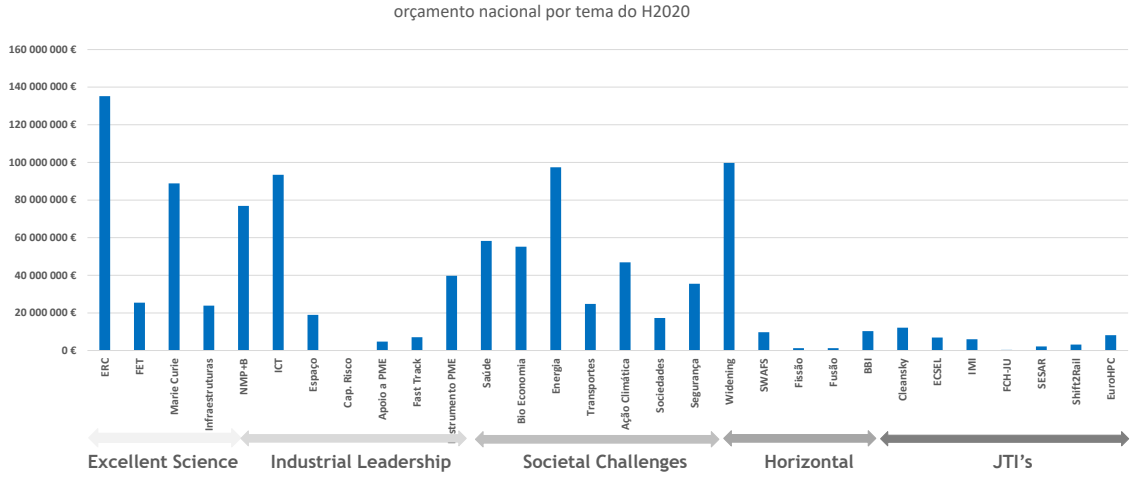
- Nano tecnologias, matérias avançados e biotecnologia;
- Tecnologias de informação e comunicação;
- Espaço e sistemas espaciais;
- Apoio a PMEs
- Bio economia e sistemas para a economia circular;
- Energia e redes inteligentes de energia;
- Acão climática
- Segurança
- Computação avançada (Euro HPC).

Pelo contrário, é claro que a participação nacional tem sido relativamente fraca 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").

Deve ser salientado que na área do Espaço, entre 2014 e 2019, Portugal atraiu 17.25M€ de financiamento, representando uma taxa de retorno de 2.02% (Figura 4). Os projetos relacionados com o programa Copernicus representam cerca de 45% do financiamento captado, seguidos do desenvolvimento de tecnologias espaciais (23%) e o programa SST –"Space Surveilance and Tracking" (com 12%). Nesta área o sector industrial obteve 45% do financiamento estando distribuído entre 30% para grandes empresas e 15% para PME. As instituições científicas e académicas obtiveram 17% e outras entidades, entre as quais entidades públicas como a DGPM e o MDN, obtiveram 34%.

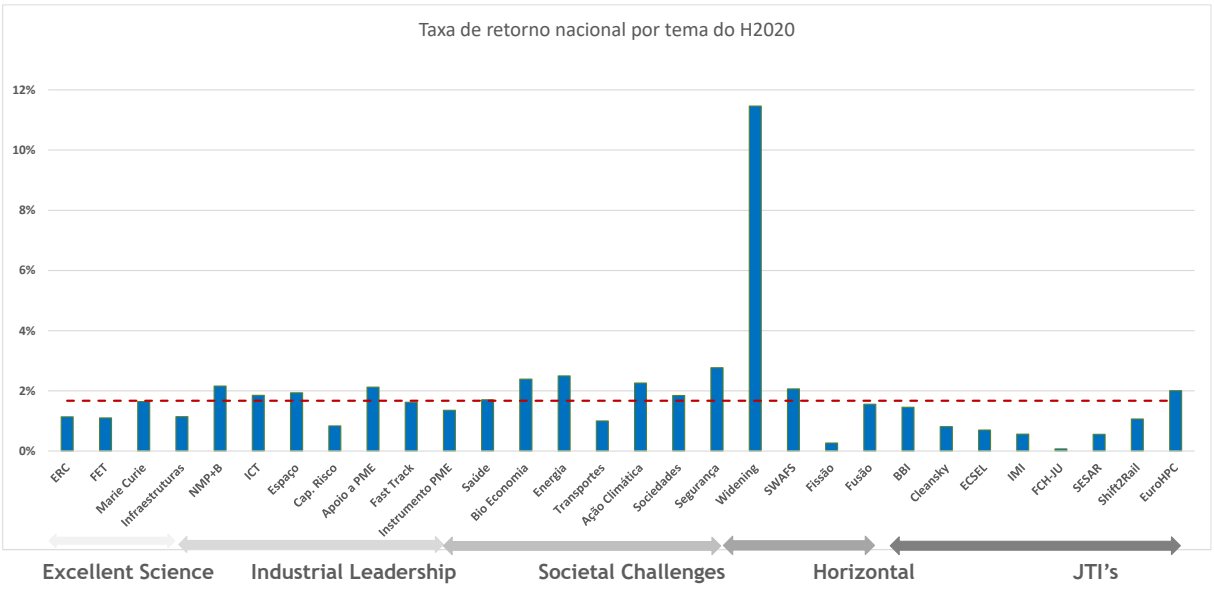
**Figura 3**. Distribuição do financiamento europeu captado por instituições portuguesas por programa

a) Distribuição do financiamento por programa, em milhões de euros, a setembro 2020



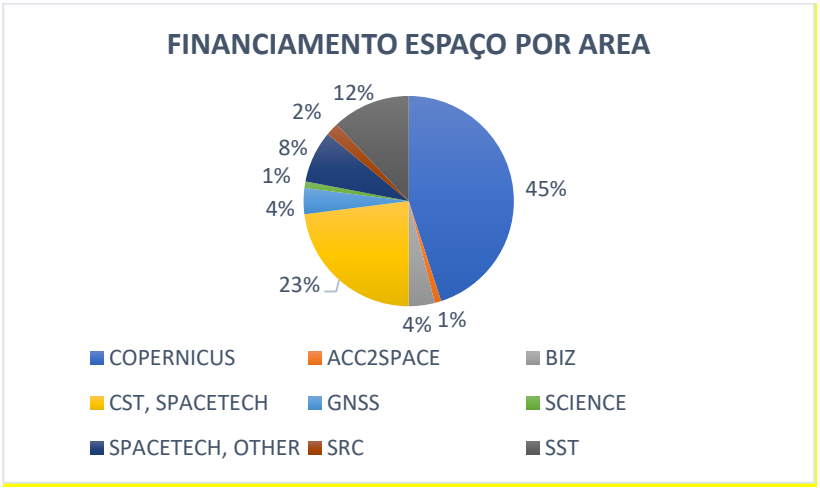

Fonte: ANI, setembro 2020

b) Distribuição do financiamento por programa, em termos da taxa de retorno de financiamento, a setembro 2020




Fonte: ANI, setembro 2020

**Figura 4:** Financiamento no setor Espaço por área (Fonte: ANI)

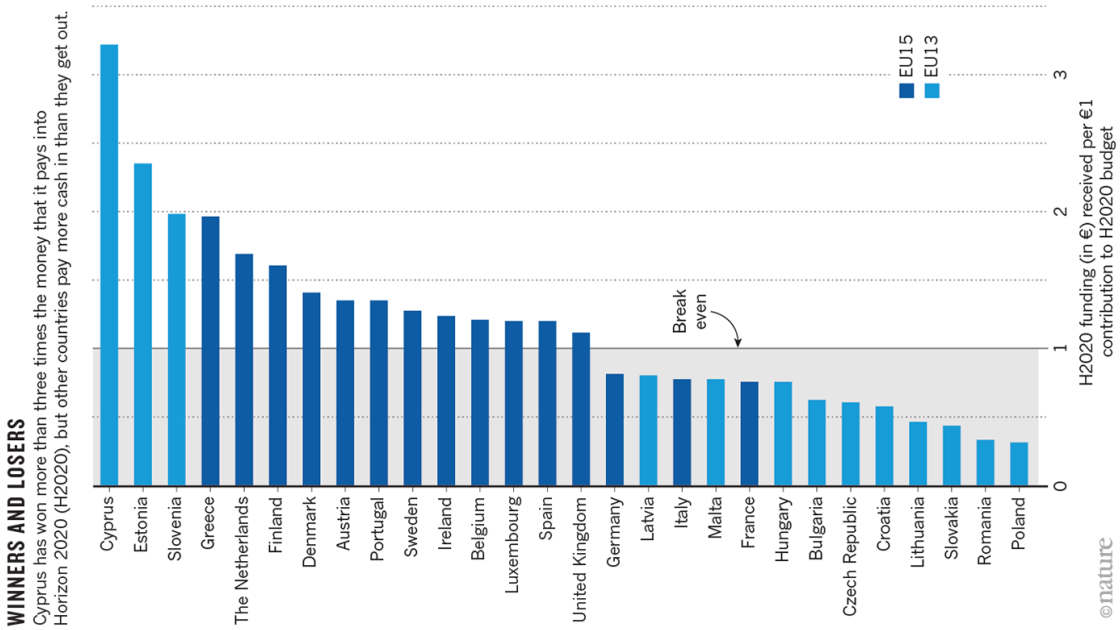



Finalmente, a análise regional mostra que 73% do financiamento europeu foi captado por instituições sediadas na região de Lisboa, tendo o restante financiamento sido captado por instituições sediadas nas regiões Norte e Centro, com um contributo residual para os Açores.

Deve ainda ser notado que no âmbito do Programa H2020, Portugal é o nono estado membro com maior retorno positivo, como ilustrado na Figura 5 [2].

[2] https://media.nature.com/original/magazine-assets/d41586-019-01566-z/d41586-019-01566-z.pdf

**Figura 5.** Taxa de retorno de financiamento europeu, por estado membro, a setembro 2020




## 1.2 Mobilidade e parcerias europeias no Ensino Superior

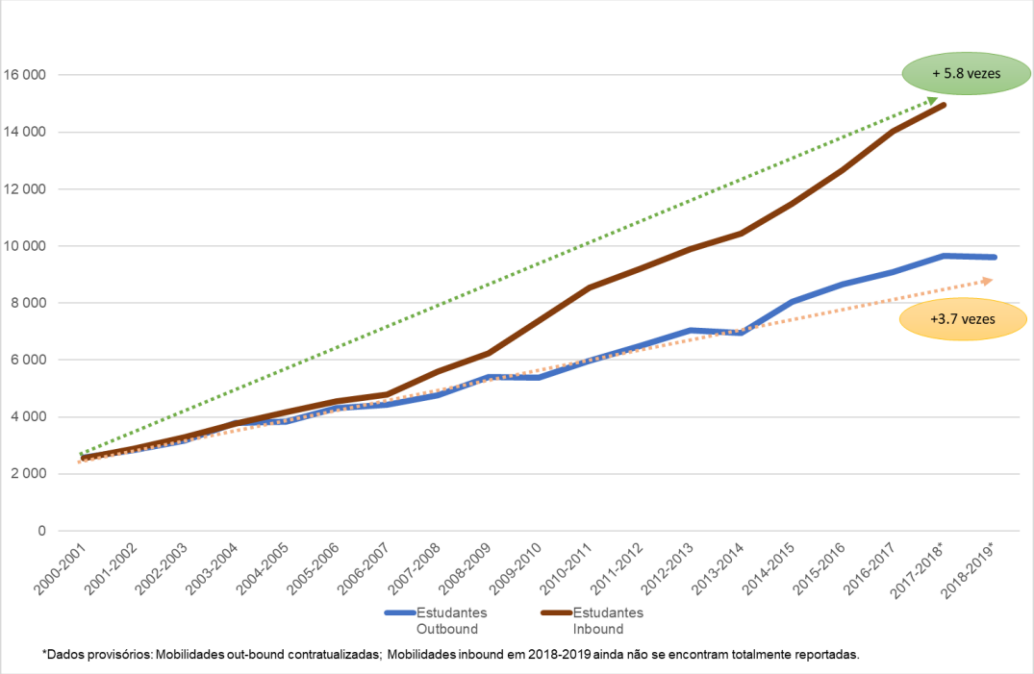
A participação nacional no "Programa Erasmus+" é gerida e promovida pela "Agência Nacional para a Gestão do Programa Erasmus+ Educação e Formação", doravante designada por "Agência Erasmus+" cujo papel na promoção da cooperação europeia na área do ensino e formação profissional, e sobretudo da mobilidade para fins de aprendizagem, interessa reforçar no próximo Quadro Financeiro Plurianual para o período 2021-2027.

O Programa Erasmus+ constitui um elemento central na construção e desenvolvimento da identidade europeia, atuando sobretudo ao nível da mobilidade para fins de aprendizagem, sobretudo de estudantes, formandos e docentes e na promoção de redes europeias de educação e formação.

O sucesso do Programa Erasmus+ no ensino superior constitui um sinal claro, quer do reconhecimento pelos estudantes portugueses nas vantagens académicas, profissionais e pessoais que advém 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, nos últimos vinte anos:

- os **estudantes portugueses a estudar na Europa ao abrigo de programas de mobilidade aumentou cerca de cinco vezes, de cerca dois mil estudantes no ano 2000 para dez mil estudantes no ano 2020**,
- os estudantes estrangeiros a estudar em Portugal ao abrigo de programas de mobilidade **aumentou cerca de seis vezes, de cerca dois mil estudantes para quinze mil estudantes no mesmo período temporal**.

**Figura 6**. Evolução do total de mobilidades Erasmus de Portugal ("outbound") e para Portugal ("Inbound"), 2000-2020




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 critico para o aumento da qualidade, inovação e excelência dos estudantes e das instituições de ensino superior portuguesas.

A participação nacional através no programa Erasmus+ garantiu um financiamento total de **171 milhões de euros** entre 2014 e julho de 2020, desagregados da seguinte forma:

- Mobilidade (KA103 – Student and staff mobility) – 131 M€
- Mobilidade de créditos (KA107- International credit mobility) – 28 M€
- Parcerias estratégicas (KA203 – Strategic partnerships) – 12 M€

**Tabela 1.** Súmula da evolução da participação nacional no Programa ERASMUS + (Candidaturas submetidas e aprovadas) a julho 2020

| Programa ERASMUS+ 2014-2020 OVERVIEW - ENSINO SUPERIOR | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Action Type** | | **2014** | **2015** | **2016** | **2017** | **2018** | **2019** | **2020*** |
| KA103 - Higher education student and staff mobility | Nº Candidaturas Submetidas (received) | 90 | 86 | 84 | 81 | 84 | 85 | 89 |
| | Nº Candidaturas Aprovadas (awarded) | 89 | 86 | 83 | 78 | 84 | 85 | 89 |
| | Nº Candidaturas Aprovadas (S/ Financiamento - lista de reserva) | 0 | 0 | 0 | 0 | 0 | 0 | n/d |
| | Nº Candidaturas Aprovadas (C/ Financiamento - 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 |
| | Partic. (contracted) | 8 060 | 8 891 | 10 137 | 11 572 | 11 873 | 12 574 | 13 511 |
| | Org. (contracted) | 88 | 84 | 83 | 77 | 83 | 84 | 89 |
| KA107 - Higher education student and staff mobility between Programme and Partner Countries** | Nº Candidaturas Submetidas (received) | n/a | 33 | 33 | 31 | 40 | 40 | 41 |
| | Nº Candidaturas Aprovadas (awarded) | n/a | 13 | 16 | 24 | 26 | 28 | 37 |
| | Nº Candidaturas Aprovadas (S/ Financiamento - lista de reserva) | n/a | 7 | 0 | 0 | 0 | 7 | n/d |
| | Nº Candidaturas Aprovadas (C/ Financiamento - contracted) | n/a | 13 | 16 | 23 | 25 | 28 | 37 |
| | Grants (contracted) | n/a | 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) | n/a | 3 155 376,96 € | 3 526 503,00 € | 3 056 479,00 € | n/d | n/d | n/d |
| | Partic. (contracted) | n/a | 961 | 981 | 1 410 | 1 439 | 2 096 | 2 421 |
| | Org. (contracted) | n/a | 13 | 16 | 23 | 25 | 28 | 37 |
| KA203 - Strategic Partnerships for higher education | Nº Candidaturas Submetidas (received) | 37 | 34 | 40 | 26 | 31 | 50 | 49 |
| | Nº Candidaturas Aprovadas (awarded) | 2 | 3 | 2 | 6 | 6 | 8 | n/d |
| | Nº Candidaturas Aprovadas (S/ Financiamento - lista de reserva) | 26 | 28 | 33 | 13 | 18 | 17 | n/d |
| | Nº Candidaturas Aprovadas (C/ Financiamento - contracted) | 2 | 3 | 2 | 6 | 6 | 8 | n/d |
| | Grants (contracted) | 892 730,00 € | 1 062 486,00 € | 828 341,00 € | 1 722 385,00 € | 1 760 411,00 € | 2 734 294,00 € | 2 518 988,00 € |
| | Grants (realised) | 854 345,04 € | 962 716,91 € | 820 466,37 € | 305 390,00 € | n/d | n/d | n/d |
| | Partic. (contracted) | 286 | 821 | 699 | 1 792 | 1 369 | 2 557 | n/d |
| | Org. (contracted) | 25 | 20 | 23 | 34 | 30 | 53 | n/d |

*Dados provisórios
** KA107 teve inicio em 2015
Fonte: Erasmus+ Dashboard, 8 Julho 2020; EC BO EP012, 8 julho 2020; EC BO, 10 julho 2020; E+ Link, 10 julho 2020.

As ações centralizadas que são geridas pela Agência Executiva do Programa ERASMUS em Bruxelas (EACEA) incluem três tipologias de ações, como descrito abaixo.

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

**Tabela 2.** Programas Conjuntos de Mestrado - Erasmus Mundus

| Erasmus Mundus Joint Masters ( 2014-2020) | | | | | | |
|---|---|---|---|---|---|---|
| | Total cand aprovadas | Aprovadas c/ part de PT | Coord PT | financiamento global | Participantes PT | Total particpantes PT |
| 2014 | 11 | 3 | 1 | 17.3 Mio | IST, IPTomar, Lusófona ( coordena) | 3 |
| 2015 | 15 | 4 | 0 | 44.9 Mio | U.Minho, UCP,U.Lisboa,U. Porto | 7 |
| 2016 | 27 | 6 | 1 | 78.8 Mio | U.Coimbra, UNL (2), U.Porto, IPCoimbra,Inst Univ Lisboa ( coordena), U. Algarve | 19 |
| 2017 | 38 | 11 | 2 | 112.6 Mio | U.Évora,COFAC (2, coordena1),IPSantarém, U Algarve ( 2),Inst Univ Lisboa,UCP,U.Aveiro,U.Coimbra, U. Lisboa( coordena), UNL | 42 |
| 2018 | 45 | 14 | 2 | 152 Mio | U.Minho (2 coordena 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 |
| 2019 | 48 | 10 | 1 | 178 Mio | U.Coimbra,U.Minho,IPTomar,U.Porto(3),U.Lisboa,COFAC ( coordena), IPCoimbra, U. Algarve | s.d |
| 2020* | 3 | 1 | 0 | 4.8 Mio | UNL | s.d |
| * call especial para EMJM com Japão | | | | | | |
| dados extraidos dos resultados publicados pela EACEA | | | | | | |

Relativamente aos 2 concursos lançados no quadro da fase piloto das redes das universidades europeias, sendo que no primeiro concurso foram submetidas 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) não coordenando nenhuma das redes. 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 2 com uma participação de 7 IES (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, a Universidade da Beira Interior.

Até ao final de 2020 estarão em funcionamento 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.

## 2. Principais metas a atingir, 2021 e 2027:

### 2.1. Investigação e Inovação

#### *METAS A ATINGIR*

- FP9 – Horizonte Europa e outros (2021-2027): **duplicar a participação nos Programas Europeus, de modo a atrair dois mil Milhões de Euros para Portugal em I&D**.

No período de programação 2021-2027, Portugal tem como objetivo duplicar a presença Portuguesa nos Programas Europeus atingindo cerca de dois mil milhões de euros no final dos 7 anos. No futuro Horizonte Europa a grande maioria do financiamento estará alocado a concursos competitivos abertos, mas Portugal terá um desafio acrescido em aumentar a sua participação nas denominadas Parcerias Europeias.

Neste momento, estão ainda a ser discutidas as 49 Parcerias Europeias com potencial de serem consideradas no 1º período de programação do Horizonte Europa. Só com um significativo esforço de aumento de captação de verbas nas denominadas parcerias institucionalizadas (e.g., JTI) será possível atingir a meta proposta, sendo necessário aumentar a captação de verbas neste segmento do Horizonte.

**Figura 7.** Parcerias europeias em discussão para 21-27

**Horizonte Europa (2021-2027) – Parcerias Europeias (em discussão)**

| Cluster 1 | Cluster 4 | Cluster 5 | Cluster 6 | Other |
|---|---|---|---|---|
| **EU-Africa Global Health Partnership** | **High Performance Computing** | **Transforming Europe's rail system** | Accelerating farming systems transition: agro-ecology living labs and research infrastructures | **Innovative SMEs** |
| **Innovative Health Initiative** | **Key Digital Technologies** | **Integrated Air Traffic Management** | Animal health: Fighting infectious diseases | European Science Cloud (EOSC) |
| European partnership for chemicals risk assessment | **Smart Networks and Services** | **Clean Aviation** | Environmental Observations for a sustainable EU agriculture | *+ 8 existing EIT KICs* |
| Pre-clinical/clinical health research | AI, data and robotics | **Clean Hydrogen** | Rescuing biodiversity to safeguard life on Earth | |
| Large-scale innovation and transformation of health systems in a digital and ageing society | Clean Steel - Low Carbon Steelmaking | Built environment and construction | A climate neutral, sustainable and productive Blue Economy | + KIC Cultural and Creative Industries |
| Personalised Medicine | **European Metrology** | Towards zero-emission road transport (2ZERO) | Safe and Sustainable Food System for People, Planet & Climate | |
| Rare Diseases | Made in Europe | **Mobility and Safety for Automated Road Transport** | **Circular bio-based Europe** | |
| + AntiMicrobial Resistance | Carbon Neutral and Circular Industry | Batteries: Towards a competitive European industrial battery value chain | Water4All: Water security for the planet | |
| + Preparedness and Societal Resilience | Global competitive space systems | Clean Energy Transition | | |

44+5

+ Smart Cities and communities

+ Zero emission waterborne transport

Fonte: ANI, setembro 2020

#### *AÇÕES A IMPLEMENTAR*

- Continuar a reforçar a ação efetiva do PERIN, designadamente através dos Pontos de Contacto Nacionais (NCP) no terreno e da consolidação da rede de gabinetes nas

instituições de ensino superior, de investigação, empresas e associações, assim como do reforço da rede de "ILOs – Industrial Liaison Officers", reforçando a participação de Portugal nas grandes parcerias europeias;
- Garantir a articulação com fundos estruturais;
- Reforçar a participação de empresas, tecnológicas e de setores tradicionais, em todas as parcerias, com um acompanhamento mais direto da evolução das parcerias e reuniões com os elementos da rede nas empresas;
- Garantir a participação efetiva de instituições nacionais nas missões do Horizonte Europa;
- Atuar junto dos Laboratórios Associados, unidades de I&D, Laboratórios Colaborativos (CoLabs), Centros de Interface (CIT) e Clusters setoriais para os incentivar à participação em projetos europeus;
- Potenciar a articulação com os ministérios setoriais para reforçar a participação efetiva e significativa das suas instituições no Horizonte Europa e nas Parcerias Europeias;

## 2.2. Programa Erasmus

A proposta de regulamento do Programa Erasmus+ 2021-2027, onde se inclui a distribuição do orçamento por setores e ações, ainda não foi aprovada. A ser conseguida durante a atual presidência alemã do Conselho da UE, caberá à presidência portuguesa o lançamento do programa, no primeiro semestre de 2021-2027.

Na sequência das conclusões do Conselho Europeu (EUCO 10/20) e consequente redução do QFP, a ambição de quase triplicar o financiamento do Erasmus+ de cerca de 18 mil milhões € em 2014-2020 para 47 milhões € em 2021-2027, foi corrigida para 24 milhões €, representando um aumento de apenas de 30% em relação a 2014-2020.

Este quadro tornou necessário o ajustamento ainda em curso nos valores anteriormente previstos por setores e ações, redobrando o nível de exigência para alcançar as metas ambiciosas preconizadas pelo Erasmus+ para 2021-2027. Neste contexto, **a ambição das instituições nacionais deve ser mantida em termos de triplicar a mobilidade de estudantes e reforçar a participação Portuguesa na iniciativa das Universidades Europeias.**

É neste âmbito que a transição entre o atual Programa Erasmus+, em conclusão até ao final de 2020, e o próximo Programa Erasmus+ para o período 2021-2027 deve ser acompanhada pela modernização e reforço das ações desenvolvidas no âmbito do atual programa, 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+ foi solicitada de preparar até ao final de 2020 **um plano de transição entre o atual Programa Erasmus+, que agora finda, e o Programa Erasmus+ 2021-2027**, de modo a considerar uma proposta de organização da entidade de gestão, a nível nacional, do Programa Erasmus+ 2021-2027 na dimensão de educação e formação, adequada ao prosseguimento dos seguintes objetivos:

a) **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) **Estimular a diferenciação dos padrões de mobilidade entre universidades e politécnicos**, especializando e diversificando a mobilidade de ambos os tipos de instituições;
c) **Reforçar a atração de luso-descendentes** para as instituições de ensino superior portuguesas, em especial através do programa "Estudar e Investigar em Portugal", com ênfase nas regiões europeias com elevada concentração de emigrantes portugueses;
d) **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;
e) **Incentivar a constituição e a participação nas redes europeias** de instituições de ensino superior, designadamente em harmonia com os objetivos da iniciativa "Universidades Europeias";
f) **Reforçar, modernizar e promover a rede de gabinetes Erasmus+** em todas as instituições de ensino superior;
g) **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;
h) **Implementar mecanismos regulares de monitorização e divulgação** da gestão do Programa a nível nacional e de divulgação pública da correspondente informação.

### *METAS A ATINGIR*

- reforçar a participação Portuguesa nas "redes europeias de universidades";
- Triplicar a mobilidade, *incoming* e *outgoing*, no período 2021-27, face ao período 2014-20.
- Reforçar as sinergias dos mestrados no Erasmus+, nos doutoramentos, nas bolsas Marie Curie - MSCA e nas redes das Universidades europeias, incluindo 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 junto 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 universidades portuguesas já selecionadas no contexto da Redes de Universidades Europeias para a concessão de bolsas de doutoramento;
- Reforço das sinergias entre as ações a promover no quadro das atividades da Agência Nacional Erasmus +, Rede PERIN e "Iniciativa Study & Research in Portugal" (www.study-research.pt), na atração de mais estudantes via promoção do ensino e investigação em PT.
- 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 da UE

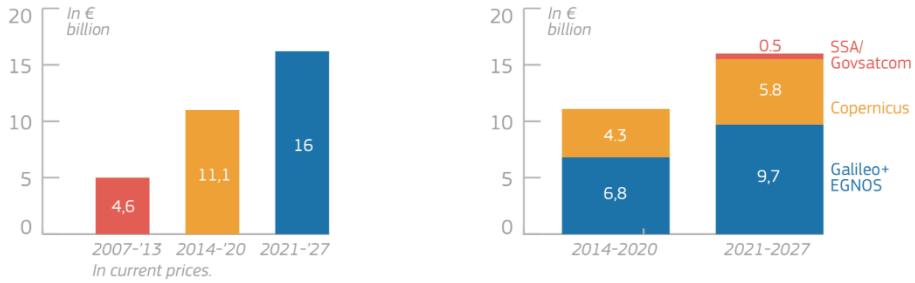
A participação de Portugal no futuro Programa Espaço da UE (2021-27) está a ser preparada desde 2020 pela Agencia Espacial PT Space de modo a valorizar o posicionamento Atlântico de Portugal no Mundo, potenciando a atração de financiamento e mobilizando diversos atores, tanto nacionais como internacionais, em termos de uma abordagem inovadora e integrativa, assim como valorizando a copresidência portuguesa do Conselho da Agência Espacial Europeia, ESA (2020-23).

O Programa Espaço da UE é dividido em 4 componentes:

- Navegação – Galileo / Egnos
- Observação da Terra – Copernicus
- Comunicações – GOVSATCOM
- Space Situational Awareness (SSA) que inclui:
    - Space Surveillance and Tracking (SST)
    - Space Weather (SW)
    - Near Earth Objects

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 sector na economia europeia é reconhecida, verificando-se um incremento de investimento ao longo dos últimos programas de financiamento.

**Figura 8:** Orçamento estimado para o Programa Europeu do Espaço




Fonte: EU Budget for the future, The EU Space Programme; ET-01-18-584-EM-N doi:10.2873/045582

Para o período 2021-2027, e ainda num cenário em discussão, a Comissão Europeia planeia alocar 9.700M€ (61%) para os programas Galileo e EGNOS, 5.800M€ (36%) para o Copernicus e 500M€ (3%) para os futuros SSA e GOVSATCOM (com divisão desconhecida).[3]

Estes valores correspondem a uma proposta inicial de orçamento, feita em 2018, de 16b€ (em valores atuais), revista pela presidência Finlandesa no final de 2019, onde se reduzia a proposta de financiamento para o Programa Espaço para 12.7b€ (valores referentes a 2018)[4]. A informação mais atualizada, de 27 de Maio de 2020, refere que a proposta da Comissão, que se encontra atualmente em negociação, considera um orçamento de 14.87b€ (valores atuais) não estando ainda definida a verba alocada a cada programa específico (*nota: Esta informação foi disponibilizada verbalmente em reunião informal a 16 Junho de 2020 aquando o PB-EO/Copernicus Committee Seminar on*

[3] https://www.europarl.europa.eu/thinktank/en/document.html?reference=EPRS_BRI(2018)628300
[4] https://www.europarl.europa.eu/legislative-train/theme-new-boost-for-jobs-growth-and-investment/file-mff-eu-space-programme

*Copernicus evolution, realizada pela Comissão Europeia*). Embora haja ainda alguma incerteza relativamente aos valores finais, importa desde já estabelecer estratégias para garantir ou fortalecer a presença de Portugal nos vários subprogramas do Programa Espaço.

### *METAS A ATINGIR*

- Garantir a implementação adequada do programa SST em PT em articulação com o Ministério da Defesa;
- 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 ISLP; 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*

- ações a ser adequadas a cada um dos subprogramas e articuladas entre a agência PT Space, a ESA e a CE;
- articulação na captação de fundos de financiamento europeus adicionais, em complementaridade com a participação nacional na ESA;

## 2.4 CEF 2 (Connecting European Facility – Telecom)

O Programa CEF-Digital (CEF2: 2021-2027), ainda em discussão, com um orçamento total[5] 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 QCI).

[5] Orçamento CEF-Digital:
MFF – CEF- Digital: 2 B €
Recovery and Resilience Facility (Next Generation EU): 3.3 – 6.3 B € (para Implementação infraestrutura 5G e conetividade)
InvestEU (Next Generation EU, financiamento privado): 3.6 – 5 B €

## *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 Africa 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 econômicas.

## 2.5 Programa Europa Digital

O reforço e alargamento do âmbito da implementação do Programa Portugal Digital, designadamente através da iniciativa INCoDe.2020, tem por base uma estratégia nacional para garantir uma participação efetiva nas ações do DEP desde o seu início, consentâneas com as estratégias nacionais de competências digitais, Inteligência Artificial (IA) e computação avançada, em estreita e continuada articulação entre o Governo, a administração pública e as empresas, para além das instituições académicas e científicas, assim como instituições de interface.

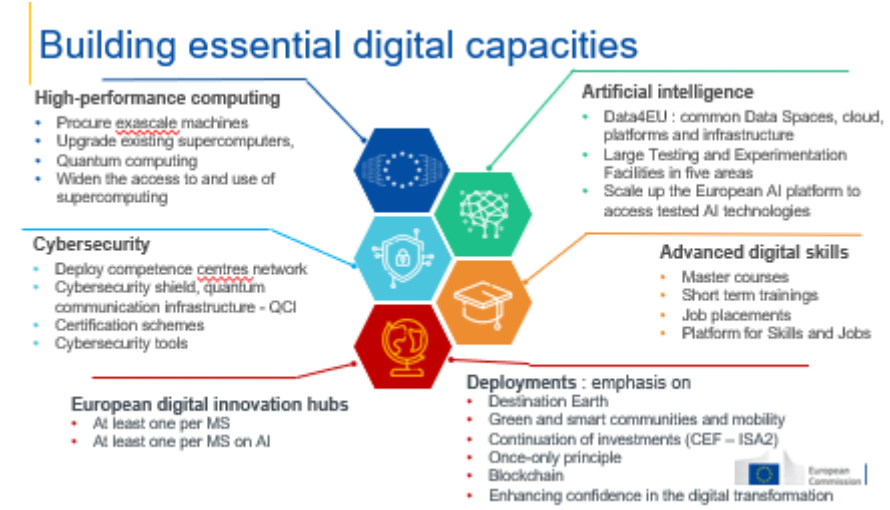
Atualmente o DEP assenta em 5 objetivos específicos: 1 - Computação de Alto Desempenho; 2 - IA, Dados e Cloud; 3 - Cibersegurança; 4 - Competências Digitais Avançadas e, por último, o objetivo transversal 5 - Transformação Digital e Interoperabilidade, no qual se insere a implementação dos Digital Innovation Hubs.

O DEP inclui *procurements* (em especial no 1), mais de 30 ações co-financiadas a 50/75% e 10 financiadas a 100%. Este programa é complementar com outras fontes de financiamento:

- *Horizon Europe* (Cluster 1, Pilar IV - área Digital)
- CEF 2 (Conetividade; 5G; cabos submarinos)
- *Health* (*DataSpace*s, telemedicina)
- Fundos de coesão (conetividade 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)

**Desde** 2019 que o DEP está a ser acompanhado por representantes nacionais nas reuniões de trabalho pela FCT, ANI, AMA, ANACOM e IAPMEI. No caso dos DIHs (SO5) estes estão a ser dinamizados pela parceria DGAE, ANI e COTEC.

**Figura 9**. Diagrama com os 5 Objetivos Específicos (SO, *Specific Objectives*) e ações principais do DEP




Fonte: DEP Expert Group meeting, julho 2020Supercomputação (HPC)

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## Supercomputação (HPC)

### *INTRODUÇÃO*

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 2020 quatro centros operacionais que disponibilizam recursos de HPC a todas as áreas e comunidades interessadas:

- *Minho Advanced Computing Center* | Plataforma Bob (e Deucalion em 2021)
- 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, está já programada na RNCA (Rede Nacional de Computação Avançada) uma rede de 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 DIHs, esta visa dinamizar o uso de HPC, aumentar a competitividade nacional e a eficiência no tratamento de grandes volumes de dados. O interesse e necessidade desta tecnologia torna-se patente com a 1ª. edição do Concurso de Projetos de Computação Avançada em 2020 onde foram contabilizadas mais de 100 candidaturas a recursos computacionais, com representatividade a nível de todos os domínios científicos e regiões NUTII. O DEP, através do SO1, e alinhado com a Estratégia Nacional de Computação Avançada, poderá co-financiar esta infraestrutura promovendo parcerias, sinergias e ações nas áreas-chave de conhecimento: saúde, clima, energia, mobilidade e sociedade.

**Figura 10.** 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, AI, Data storage, Cloud Computing, Quantum computing.
- Instalação na RNCA de pelo menos 6 Centros de Competência e VIsualização distribuídos geograficamente por diversos CCDR.
- Criação do Centro de Competências Nacional na área da Computação Avançada, financiado no âmbito do projeto EuroCC pela EuroHPC com início em 2020 e coordenado pela FCT.
- Instalação dos centros de competência e visualização na Universidade do Porto, Universidade de Lisboa e Universidade do Algarve (este último já em progresso).
- 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 (ver figura).
- Cooperação com os programas já existentes da Go Portugal (UTAustin, MIT, CMU) outras parcerias internacionais como o PRACE e RES/RICA.
- Coordenação esforços com o Centro de Competências co-financiado pelo projeto EuroCC com a rede Nacional e Europeia dos *Digital Innovation Hubs 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*

1. Garantir o acompanhamento direto dos concursos do DEP em articulação com o Horizonte Europa e parcerias com vista a permitir a melhor influenciar as prioridades e estabelecer sinergias com os programas nacionais;
2. Envolver *ab initio* as entidades nacionais, públicas e privadas, ligadas à AI, supercomputação e competências digitais.
3. Desenvolver ações de promoção das oportunidades para os setores industriais e serviços que possam beneficiar da utilização de HPC.
4. 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 instalados).
5. 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).

## Inteligência Artificial

### *INTRODUÇÃO*

O DEP prevê três vertentes de trabalho para a **inteligência artificial** durante os primeiros 2 anos de implementação do programa:

1. **Data4EU –** 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 nuvem federada. O foco será na implantação dos*data spaces* para o *green deal,* mobilidade, manufatura,

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.*

2. A **plataforma *"AI on demand"* -** será consolidada como uma ferramenta central de recursos de AI necessários para a utilização pela indústria e setor público. Financiada a 100%. **Instalações de testes de referência (Testing and Experimentation Facilities)** – serão implementadas em cinco setores de aplicação priorizados (saúde, comunicações inteligentes e verdes, manufatura e edge AI HW). Estas instalações disponibilizarão recursos comuns, altamente especializados a ser partilhados ao nível europeu.

Portugal tem vindo a mostrar consecutivamente bons resultados nos indicadores de inovação (que incluem, mas não estão limitados, à AI), 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 Plano Estratégico para a Inteligência Artificial, publicado no âmbito INCoDe.2030[6].

## *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 AI 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 AI para todos. A AI 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 AI para o crescimento económico será significativo;
- **Excelência Científica** – melhorar a posição da investigação fundamental e aplicada em AI 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. Data4EU**

- estimular parceiras na utilização da Cloud Europeia e DataSpaces, promovendo a soberania Europeia em relação aos dados dos seus cidadãos, promovendo o esforço tecnológico de implementação destas plataformas, incluindo na definição de protocolos de interoperabilidade entre diferentes setores.

[6] https://www.incode2030.gov.pt/sites/default/files/julho_incode_brochura.pdf

- 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 DataSpaces nessas áreas poderão ter acesso a grants de 50% (75% para PMEs).

2. **Plataforma AI *on demand***
   - Mapear entidades nacionais com competências em AI 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 AI.
   - Estimular o envolvimento de entidades nacionais no consórcio que implementa a iniciativa.
3. ***Testing and Experimentation Facilities***
   - Promover o mapeamento das entidades nacionais que possam albergar, participar ou usar uma TEF e decidir onde PT 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 EM.
4. **Manufacturing**
   - Alargar o mapeamento já realizado com recurso ao Produtech sobre infraestruturas tecnológicas com capacidade de desenvolver pilotos à escala real
5. **Saúde**
   - Mobilizar os SPMS para agregar dados de hospitais e estimular instituições, empresas e unidades de IT/Saúde em Portugal para utilizar TEF.
6. **Mobilidade**
   - Mobilizar cidades e casos de projetos piloto para a apropriação de novos sistemas.

## Cibersegurança e Confiança

### *METAS A ATINGIR*

- Estabelecimento de um Centro de Coordenação 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.
- Implementar o Sistema Nacional de Certificação em Cibersegurança estimulando 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 uma rede de polos de inovação digital com competências em Cibersegurança para apoiar os processos de transformação digital das organizações (em ligação com o Objetivo Específico 5 do Programa Europa Digital).

### *AÇÕES*

- 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 de Coordenação Nacional 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 uma maior participação de 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;
- Mobilizar entidades regionais e nacionais pertencentes ao Sistema Científico e Tecnológico Nacional e ao tecido económico, bem como organismos e serviços da Administração Pública, para a criação de sinergias com vista 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 polos de inovação digital em matérias 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 referências 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;
- 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 a Academia de Cibersegurança com vista a qualificar e requalificar profissionais com competências avançadas em Cibersegurança.

### 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;
- Promoção de competências na área das TIC, através da criação de Academias Tecnológicas de empresas tecnológicas nas IES
- Promoção 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.

## 2.5 Sinergias entre programas

O futuro Programa Europeu do Espaço, tal como com o programa Digital Europeu, DEP, são complementares com toda a atividade de I&D a ser desenvolvida no programa Horizonte Europa, requerendo uma ação de articulação continua através do PERIN. Por exemplo, no caso do Espaço, devem ser considerados sectores *up stream* e *down stream* e inclui o desenvolvimento dos dados e serviços produzidos pelas constelações do Galileo e do Copernicus. No caso do DEP, as lógicas de

intervenção são complementares com a componente de I&D do Digital a ser realizado no âmbito do Horizonte Europa incluindo computação avançada, AI, cibersegurança, entre outras áreas. As infraestruturas do DEP 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 EU e as Universidades Europeias são cofinanciadas pelo Horizonte Europa para apoio à dimensão de Investigação e Inovação.

Mas as sinergias com outros programas não se esgotam nestes termos, devendo ser ainda considerados:

- Os programas de apoio à agricultura;
- O programa Connecting Europe Facility (CEF) para apoio à I&D na área dos transportes, energia e no sector das infraestruturas digitais promovendo também o '*deployment*' das tecnologias em fase de adaptação pelo mercado;
- 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.
- 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, 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.

### *META A ATINGIR*

- Melhor explorar as sinergias com outros programas 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.

### *AÇÕES*

- Criação de uma *task force* no âmbito do PERIN para estimular o diálogo com as entidades que gerem outros programas e mandatar os NCP respetivos para explorarem as sinergias com outros programas.

*Parte 2*

*Programmes and Thematic Areas (in English)*

# 1. Pillar 1

## People and Infrastructure

## 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.

Strategically, it is important to highlight:

- **Participation Levels.** Large margin for growth in terms of participation levels, as success in the ERC during H2020 is concentrated in 30 R&D Units, and out of these, 5 R&D Units concentrate more than 50% of the ERC grants. The top-100 R&D Units (Associated Laboratories and R&D Units ranked as "Excellent") concentrate more than 85% of the national capacity to attract European funds and this should be extended to the ERC programme, with each one of these R&D Units ambitioning at least one ongoing ERC grantee throughout Horizon Europe;

- **Success Rates.** 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 Units should be accompanied by an increase in success rates as well;

- **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 with PT participation promoting staff exchange;

- **European Synergies.** Interlink European individual funding schemes, and it is particularly evident the linkages to MSCA and Widening Actions (COST, ERA-Chairs), but also the success stories of Pillar II (Cofunded Actions, for example) with PT participation. For ERC grantees, it is relevant to establish synergies with activities implemented by the Innovation Pillar of Horizon Europe;

- **Societal Impact.** 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). 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, particularly at the Advanced stage. Portugal success rate of 0,6% in the Advanced Grants reflects the need to reform this grant scheme.

## *FACTS*

**Portugal in ERC (selected stats under H2020)**

Number of grants attributed 2014-2020. Data: October 2020.

| | PT Participations | Top-5 Country Status (2014-2019) |
|---|---|---|
| **StG** | 37 (1,3%) | UK (20%); DE (20%); FR (14%); NL (13%); IL (8%) |
| **CoG** | 34 (1,5%) | UK (23%); DE (19%); FR (15%); NL (10%); CH (7%) |
| **AdG** | 12 (1,0%) | UK (22%); DE (17%); FR (12%); CH (9%); NL (8%) |
| **SyG** | 1 | DE (52%); FR (41%); CH (30%); UK (30%); AT (11%) |
| **PoC** | 15 (1,4%) | UK (23%); ES (14%); DE (13%); NL (13%); FR (11%) |
| **Total** | **99** | ------ |

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

## *PROPOSED TARGETS (2021-2027)*

Herein it is assumed the budget proposed in July for HE, as a reference. Data: October 2020.

| | PT Present Status | Total | PT Objective 2027 |
|---|---|---|---|
| Number of Proposals submitted | 901 (1,8%) | 49484 | **1000-1200 (2,2%-2,4%)** |
| Number of Projects | 97 | 7229 | **120-170** |
| Success Rate (average) | 10,0% | 14,6% | **12%-14%%** |
| Global overview on budget allocation to PT | 135 M€ (1,1%) | 11.908 M€ | **150-200 M€ (1,3%-1,6%)** |
| Contribution to the global PT objective of 2.000 M€ | 140 M€* (7%) | ---- | **8-10%** |

*estimated until the end of H2020.

## *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);<br>• Empowers researchers, career development, independence (own idea; own team; grant mobility);<br>• Encourages merit-based HR management standards in R&I and ERA principles implementation;<br>• ERC is the leading EU programme in scientific production (number and quality of scientific papers) and patents;<br>• 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;<br>• Excellent and efficient feedback system to applicants and NCPs; | • Large gap between widening countries and top performers; Top 5 countries get 68% of the budget and account for 47% of the applications;<br>• ERC with limited success on attracting talent to Europe (8% of non-Europeans);<br>• Parity: more men apply; 20% of the AdG candidates are women; PT female grantees: StG: 44%; CoG: 57%; AdG:25%;<br>• Social and Humanities scientists apply less (including the Portuguese);<br>• SyG applications which include ERC grantees are more successful; SyG grantees are typically AdG level (but they are also the ones applying more);<br>• Evaluation system: first step evaluation is made by non-specialist panels but these evaluators are specialists in a given field – unequal assessment of proposals;<br>• NCP training (ERCEA has started to address this issue recently); R&D Units lack professional structures to support candidates; |

| | |
|---|---|
| • Growing interest of the Portuguese research community on ERC; gateway to career stability and to lead new scientific fields;<br>• Good media coverage on ERC grants in Portugal. | • Number of Portuguese applications (1,8% in H2020) and lower success rate than EU average (10,1% vs 14,6% in H2020);<br>• PT lacks talent spotting mechanisms and structures;<br>• 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. |
| **Opportunities** | **Threats** |
| • Portugal seen by the ERCEA as a success case – the most successful widening country (by a great margin) and on par with Ireland and very close to Norway;<br>• 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;<br>• Use nationally funded programmes to spot talents and to increase participation levels in ERC;<br>• Take advantage of the excellent work-life balance and PT being one of the safest countries worldwide to attract foreign talents;<br>• Link success stories in MSCA and Widening instruments to the ERC;<br>• Mobilise training schemes, career development initiatives, use ERC prestige to leverage nationally funded research and to foment national cohesion and convergence;<br>• Huge opportunity for growth in participation levels and success rates – particular focus on associate laboratories and R&D Units ranked as 'excellent' (n=105) and 'very good'(n=118)<br>• Establish linkages between the diaspora and ERC applications (leverage protocols between PARSUK, AGraFr, ASPPA, PAPPs). | • Brexit will impact the HE budget; objective of large increase in the ERC budget in HE is compromised;<br>• Synergy grants are seen as out of reach for most researchers;<br>• 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;<br>• Portuguese research system (e.g. career opportunities, research infrastructures and lack of young established researchers) limit the capacity of hosting and attracting ERC candidates;<br>• Inability of (PT institutions) having financial flexibility to retain talents of the ERC calibre;<br>• Portuguese research community generally believes the ERC is beyond their reach. |

## *MAIN STRATEGIC ACTIONS (2021-2027)*

- Strategic Dissemination. Make use of virtual environments to communicate with the top performing R&D Units, particularly the ones rated as "Excellent". Emphasis on R&D Units of reference coordinated by developing regions;
- 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 100-120 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.

Map nationally funded projects with high impact publications and target specific research teams;

- 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;
- National Complementary Funding. Implement a complementary grant scheme to ERC candidates who reached the interview step of a given Call. A programme providing a financial incentive to prepare a successful application to the following ERC call. Exceptions, modality and conditions would be detailed when appropriate;
- 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);
- Media Coverage. Link to EURAXESS and to Study&Research in Portugal;

## *1.2 MSCA - Marie Skłodowska - Curie Actions*

### *SCOPE*

The Marie Skłodowska-Curie actions (MSCA) has supported researchers at all stages of their careers from across all disciplines. The MSCA also support cooperation between non-academia and academia, international cooperation and innovative training to enhance employability and career development. Individual researchers or institutions of all sectors can apply for funding.

Considering the wide diversity of actions, it is important to distinguish between Post-doctoral Fellowships (formerly IFs), doctoral training networks (formerly ITNs, which target consortiums of institutions), co-funding of doctoral or post-doctoral programmes (CO-FUND, which target funding agencies or competitive programmes) and staff exchange programmes (RISE, which target networks of institutions). Therefore, PT strategic approach should focus on:

- Increasing participation levels - Large margin for growth in terms of participation levels, as success in the MSCA Individual Fellowships (IFs, future Post-Doctoral Fellowships) during H2020 is concentrated in 50 institutions (47 R&D Units, 3 enterprises and 1 state agency), and out of these, 5 R&D Units concentrate more than 40% of the MSCA-IFs. The top-100 R&D Units (Associated Laboratories and R&D Units ranked as “Excellent”) concentrate more than 85% of the national capacity to attract European funds and this should be extended to the MSCAs, with each one of these R&D Units ambitioning at least one ongoing MSCA-IF throughout Horizon Europe;

- Take advantage of the ongoing protocols between FCT and diaspora associations, and stimulate the linkages to other alike associations to attract researchers working abroad to return to PT (via IF), to establish a consortium with people working in PT (via ITN) or to assume the role of ‘ambassadors’/facilitators of PT institutions in their countries of residence;

- Strengthen and empower the supporting structures of R&D Units, and encourage its professionalisation, since applications in MSCA are very dependent on an efficient connection between the applicant and the host institution (in the case of IFs): Portugal lags behind as country of destination, and has a low success rate (9,9%);

- to identify potential connections between MSCA and other funding schemes (e.g., bilateral agreements, COST Actions or ERA-NET projects as a prelude for ITNs or RISE);

- to assure national contribution for CO-FUND schemes, since PT has had a very low number of applications and approved projects (1 out of 14 between 2014-2019).
- 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).

## *FACTS*

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

| 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** | **--** | **--** |

Source: ANI data extraction on September 2020.

## *PROPOSED TARGETS (2021-2027)*

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

| | 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€ | **130 M€ (2,4%)** |
| Contribution to the global PT objective of 2.000 M€ | 90 M€* (4,5%) | --- | **6-7%** |

*estimated including 2020.

Source: ANI data extraction on April 2020.

## *SWOT ANALYSIS*

| Strengths | Weaknesses |
|---|---|
| • Bottom-up; open to all<br>• Support of HR in R&I is structuring and essential for a R&I based society, or at least for R&I based activities, including participation in EU FP for R&I<br>• MSCA enable participation of new actors, typically regarded as only accessible to those already experienced<br>• 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 | • 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<br>• PT institutions usually award Ph.D. degrees after 4 years while ITN can hire Ph. D. students for a maximum of 36 months;<br>• 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) |

| | |
|---|---|
| • Support international collaboration, with a visible PT collaboration with strategic partners outside Europe<br>• Support and promote inter-sectoral collaboration, paving the way for an innovative society | • Very complicated for state labs to hire HR even when they participate in funded MSCA (e.g. ITN that hire Ph.D. students)<br>• 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** |
| • RISE: attractive success rate<br>• IF: may become more attractive if at least part of those that receive the Seal of Excellence are financed<br>• IF: Huge opportunity of growth with diversification of R&D units with fellowships – particular focus on associate laboratories and r&d units ranked as 'excellent' (n=105) and 'very good'(n=118)<br>• COFUND: very versatile funding programme that should be accessible to the community once the source of the matching funds is found (particularly funding agencies should be able to allocate resources)<br>• It is legally possible to use Structural Funds for COFUND actions | • Low success rate of ITN makes it a real challenge to participate in these structuring networks that are very attractive to researchers |

## *STRATEGY – ACTIONS (2021-2027)*

**COFUND**

- Funding agencies should be specifically targeted to submit COFUND applications (e.g., COFUND post-doctoral fellowship actions that attract researchers to come back to Portugal, and/or COFUND actions that allow for working abroad and establishing international networks, with a compulsory return period to PT). This includes Science and Innovation funding agencies, regional governments, and CCDR. It is necessary to support the proposal writing itself in various stages of the process;

- 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 FP 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.

**ITN**

- Raise institutional awareness for supporting an eventual 4$^{th}$ year of Ph.D. students that have been hired for an ITN action (ITN duration of 36 months). Consequently, satisfaction of fellows will increase, which will certainly contribute to higher collaborations in the future and lower brain drain after the Ph.D.;

- Targeting proposals with high score for resuming.

**RISE**

- Supporting hiring of HR for participation in RISE actions would improve ability of PT institutions to participate in RISE actions, since those involved in R&I activities usually have very limited staff. 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

**IF**

- A national strategy and/or support of institutional strategies to support at least a part of those IF 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 and, additionally, researchers that have been working in PT with MSCA are likely to stimulate PT participation, even when working outside PT, 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 actions for returning to PT.

**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 the young researchers;
- Increase awareness among less active R&D Units and to the use of structural funds. To promote the visibility of MSCA actions to increase participation levels;
- Articulate Scientific Employment-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 ITNs/RISE or to send PT researchers to other countries for short periods);
- Spot talent through Transnational Cofunded Calls (traditional ERA-NET schemes) and COST-Actions, namely for ITN and eventually for IFs (to bring researchers from partner institutions to Portugal for post-doc or sabbatical leaves);
- 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 foment the professionalisation 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 (COFUND Actions).

## *1.3 European Research Infrastructures*

### *SCOPE*

PT participation in European projects for Research Infrastructures (RIs) brings multiple benefits to PT scientific community, which are aimed to be amplified. 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 Research Infrastructures and networks in complementary fields.
  - Enhancing connections from European RIs in which Portugal participates with RIs from Third Countries
  - Increasing the opportunities for participation 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 surely upgrade their research, increase their success in obtaining new projects and scholarships, ultimately growing their capacity to attract funds.
- Advertisement of the national RIs and their services, increasing their visibility in the European RI landscape.
- Incentivize the adoption of the highest standards and best practices in the national RIs due to the sharing of experiences with other national nodes of the same European 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 pursue of new promising lines of research.

**The PT scientific community shall aim at increasing their participation in European RI projects;** concretely new connections must be established and new stakeholders shall be engaged, such as SMEs and industry, in order to boost PT participation in innovation projects in which PT was not yet able to participate. Notwithstanding this, PT research infrastructures are participating mainly in European RI "landmarks" (more mature RIs), most of them already established as independent legal entities – ERIC (European Research Infrastructure Consortium) or other type of legal Association. Although these have usually reached their operation stage, they are in general not self-sustainable; continuing to provide funding opportunities for these RIs and their services in Horizon Europe (HE) will enable the PT

community to continue to capitalize on their collaborations and participation, and to promote the construction, implementation and operation of the respective national RIs, therefore promoting science excellence and qualified /highly qualified job creation across the country.

### *FACTS (2014-2020)*

PT participation in the different types of Horizon 2020 calls for Research Infrastructures.

| Types of calls | Type of action | PT participation in funded projects/ total funded projects | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | TOTAL |
| **INFRADEV** | CSA and RIA | 4/16 | 4/15 and 3/3 | 5/10 and 4/11 | 1/9 | 3/4 | 0/1, 10/16, 3/10 | 37/95 (39%) |
| **INFRAIA** | RIA | 11/19 | - | 9/19 | 4/14 | 5/12 | 8/13 | 37/77 (48%) |
| **INFRASUPP** | RIA and CSA | 1/1 and 1/14 | 0/1 and 0/2 | 2/10 | 0/2 | 2/6 | 1/2 | 7/38 (18%) |
| **INFRAINNOV** | RIA and CSA | - | - | 0/2 | 0/1 | - | 0/1 | 0/4 (0%) |
| **EINFRA** | RIA, CSA, FPA | 1/1 and 5/12 | 0/17 | 2/7 and 0/1 | 3/8 | - | - | 11/46 (24%) |
| **INFRAEOSC** | CSA and RIA | - | - | - | - | 0/1, 1/5, 1/5 and 1/2 | 2/5, 0/1 | 5/19 (26%) |
| **INFRAEDI** | RIA | - | - | - | - | 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%) |
| **IBA-INFRA-CONFERENCE** | | - | - | - | 0/1 | - | 0/1 | 0/2 (0%) |
| **SGA-INFRA-FETFLAG-HBP** | | - | - | - | 0/1 | - | - | 0/1 (0%) |
| **IBA-INFRA-SUSTAINABILITY** | | - | - | - | 0/1 | - | - | 0/1 (0%) |
| **IBA-INFRA-NCP** | | - | - | - | - | 0/1 | - | (0/1) (0%) |
| **TOTAL** | | 23/63 (36,5%) | 9/40 (22,5%) | 24/64 (37,5%) | 8/37 (21,6%) | 16/49 (32,7%) | 24/54 (44,4%) | |

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

| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | TOTAL |
|---|---|---|---|---|---|---|---|
| **Total of submitted proposals** | 200 | 167 | 130 | 112 | 100 | 149 | 858 |
| **Total of PT proposals** | 48 | 22 | 30 | 21 | 25 | 54 | 200 |
| **Total of approved projects** | 63 | 40 | 64 | 37 | 50 | 54 | 308 |
| **Approved projects PT** | 23 | 9 | 24 | 9 | 16 | 24 | 105 |
| **N. of PT participations** | 28 | 14 | 29 | 13 | 24 | 34 | 142 |
| **Success rate (PT funded projects / PT submitted proposals)** | 47.92 % | 40.91 % | 80.00 % | 42.86 % | 64.00 % | 44.44% | |
| **Total funding (M €)** | 392.99 | 221.09 | 407.20 | 205.74 | 518.87 | 323.81 | 2,069.70 |
| **PT funding (M €)** | 3.73 | 1.60 | 5.43 | 2.70 | 4.39 | 4.91 | 22.76 |
| **Rate of PT funding** | 0.95% | 0.73% | 1.33% | 1.31% | 0.85% | 1.52% | |

### *PROPOSED TARGETS (2021-2027)*

For Horizon 2020, the mean rate of PT funding through these calls is presently about 1.1 %; however, the picture will be completed only by the end of 2020 with the results of this year's calls. The return rate in 2019 nearly doubled that in 2018. To keep this growing tendency will obviously be the objective for HE; unfortunately, the current pandemic will lead to consequences also in the budget available for HE calls. It is foreseen that the budget available for RI calls will be lower than in Horizon 2020, so HE calls will be more competitive. PT community will have to be even better prepared and connected to have a successful participation in the future calls.

### *SWOT ANALYSIS*

| **Strengths** | **Weaknesses** |
|---|---|
| • Growing tendency for PT participation and success in H2020 RIs calls.<br>• 2019 was the year with the highest rate of PT participation in H2020 funded projects, so far.<br>• Higher success rate in INFRAIA and INFRADEV calls. | • Lowest PT participation in INFRAINNOV and INFRAEDI calls<br>• Low participation in INFRASUPP calls |
| **Opportunities** | **Threats** |
| • Promotion of participation of more national RIs and entities (still) not organized as a national RI, in European RI calls.<br>• Participation of national RIs/entities in RI applications to future updates of the ESFRI Roadmap (thus having access to direct funding for the RI preparatory phase through specific HE calls for RIs)<br>• 16 new RIs on the National Roadmap 2020 with the potential to collaborate with European RIs and participate in HE calls. | • Self-sustainability of RIs are 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<br>• Budget cut in HE due to Covid-19 pandemic |

After a decrease in participation in funded projects in 2017, Portuguese participation in 2018 and 2019 has gradually risen – involvement not only in proposals but also in funded projects have been increasing as shown in the previous table; 2019 was the year with the higher PT funding rate in H2020 so far. This may be explained by a higher number of INFRADEV calls in 2019, which enabled PT participation in more projects, and by a higher success of PT participation in the INFRAIA 2019 call.
Portuguese applicants were more successful in INFRAIA (48%) and INFRADEV (39%) calls. INFRAIA calls were mainly for communities that aimed to organize their RIs to start working together in a cooperative way. This was promoted by funding Networking Activities, Trans-National Access and Joint Research Activities. INFRADEV calls supported projects of RIs at different maturity levels. PT participation was higher in INFRADEV calls targeting RIs in their implementation phase which is coherent with the growing national participation in ESFRI RIs, including several mature ones established as independent entities.

The weaker results regarding PT participation correspond to INFRAINNOV (0%) and INFRAEDI calls (6%). INFRAINNOV calls aimed to promote partnerships between RIs and industry for further development of infrastructures services. In Horizon Europe, 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.
INFRAEDI calls were specific calls for supporting Centers of Excellence for HPC Infrastructures therefore targeting a smaller and more specific community. It is likely that support to HPC infrastructures will continue to be provided in HE. So far, PT participation in EuroHPC projects has been quite reduced (only one project).

Presently, **the National Roadmap for Research Infrastructures, updated in May of 2020**, compiles 56 RIs, of which 23 are collaborating with 25 ESFRI Roadmap RIs. Additionally, several national RIs are collaborating with European thematic networks, also eligible for participation in European RI calls. Other national RIs have preferred collaborations with European Agencies, Associations and other type of entities which may not be eligible for HE RI funding but may bring several other benefits to the respective scientific communities (ex. the national RI ESTHER potential collaboration with ESA).
The next table displays the **established collaborations of the National Research Infrastructures with European Research Infrastructures or Networks** (eligible for the HE RI calls). These include collaborations where Portugal is a formal Member of the RI legal entity (with annual fee contribution) and collaborations materialized by the participation of the National RIs in European RI projects together with the respective European Research Infrastructure or Network.

| DOMAIN | ACRONYM | NAME | TYPE | COORDINATING INSTITUTION | ROADMAP ENTRY (YEAR) | RESPECTIVE EUROPEAN RI OR NETWORK |
|---|---|---|---|---|---|---|
| ENERGY | 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 | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| ENVIRONMENT | 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 |
| | COASTNET | Portuguese Coastal Monitoring Network | Distributed | Faculdade de Ciências da Universidade de Lisboa (FCUL) | 2014 | ETN |
| | EMBRC.PT | European Marine Biological Resource Centre - Portugal | Distributed | Centro de Ciências do Mar do Algarve (CCMAR) | 2014 | EMBRC ERIC |
| | 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 |
| **HEALTH & FOOD** | BIN | National Brain Imaging Network | Single-Sited | Universidade de Coimbra (UC) | 2014 | EuroBioImaging ERIC |
| | Biobanco.pt | 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 |
| | CONGENTO | Consortium for Genetically tractable Organisms | Distributed | Fundação D. Anna de Sommer Champalimaud e Dr. Carlos Montez Champalimaud (FC) | 2014 | Infrafrontier |
| | CryoEM-PT | National Advanced Electron Microscopy Network for Health and Life Sciences | Distributed | Laboratório Ibérico Internacional de Nanotecnologia (INL) | 2019 | - |
| | FOODCHAIN-PT | International Food Chain Alliance – Portugal | Distributed | Universidade de Trás-os-Montes e Alto Douro (UTAD) | 2019 | - |
| | Genome Portugal | National Facility for Genome Sequencing and Analysis | Distributed | Universidade de Aveiro (UA) | 2014 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | MIA-Portugal | Multidisciplinary Institute of Ageing | Single-Sited | Universidade de Coimbra (UC) | 2019 | |
| | PPBI | Portuguese Platform of BioImaging | Distributed | Instituto de Biologia Molecular e Celular - Instituto de Investigação e Inovação em Saúde (IBMC/i3S) | 2014 | EuroBioImaging 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-OPENSCREEN | PT-OPENSCREEN: National Infrastructure for Chemical Biology and Genetics | Distributed | Instituto de Investigação e Inovação em Saúde (i3S) | 2020 | EU-OPENSCREEN 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 | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| PHYSICAL SCIENCES & ENGINEERING | CECOLAB | CECOLAB Association - Collaborative Laboratory Towards Circular Economy | Single-Sited | BLC3 Evolution, Lda | 2019 | - |
| | ENGAGE SKA | ENAbling Green E-science for Square Kilometer Array | Distributed | Instituto de Telecomunicações (IT) | 2014 | SKA |
| | ESTHER | European Shock Tube for High-Enthalpy Research | Single-Sited | Instituto Superior Técnico (IST/ UL) | 2019 | - |
| | LLPT | LASERLAB-Portugal | Distributed | Associação do Instituto Superior Técnico para a Investigação e Desenvolvimento (IST-ID) | 2014 | - |
| | Micro&Nano Fabs@PT | Network of Micro and Nano Fabrication Research Facilities in Portugal | Distributed | Laboratório Ibérico Internacional de Nanotecnologia (INL) | 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 | - |
| | Windscanner.PT | Windscanner Portugal | Distributed | Universidade do Porto (UP) | 2014 | Windscanner.EU |
| SOCIAL & CULTURAL INNOVATION | CCD | Digital Creativity Center | Single-Sited | Universidade Católica Portuguesa (UCP) | 2014 | |
| | DataLab Social Sciences | DataLab | Distributed | Nova School of Business & | 2014 | SHARE ERIC |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Economics (Nova SBE/UNL) | | |
| | E-RIHS.PT | Portuguese Research Infrastructure on Heritage Science | Distributed | Universidade de Évora (U Évora) | 2014 | E-RIHS |
| | PASSDA | Production and Archive of Social Science Data | Distributed | Instituto de Ciências Sociais (ICS/UL) | 2014 | ESS ERIC, CESSDA ERIC |
| | PORTULAN CLARIN | Research Infrastructure for the Science and Technology of Language | Virtual | Faculdade de Ciências da Universidade de Lisboa (FCUL) | 2014 | CLARIN ERIC |
| | PRISC | Portuguese Research Infrastructure for Scientific Collections | 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 |
| **DIGITAL INFRASTRUCTURES** | INCD | Portuguese National Distributed Computing Infrastructure | Virtual | Associação INCD - Infraestrutura Nacional de Computação Distribuída | 2014 | EGI |
| | RCTS | Science, Technology and Society Network | Distributed | Fundação para a Ciência e a Tecnologia I.P. - Unidade de Computação Científica Nacional (FCT\|FCCN) | 2014 | GÉANT |
| | 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 Research Infrastructures and participating with them in European RI projects (ex. INSA is participating in the ESFRI RI ERINHA and the network EATRIS.PT is the national node in EATRIS ERIC).
Overall, more collaborations of national RIs with European ones and participation in European 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.

## *STRATEGY (2021-2027)*

For the next Framework Programme, **PT participation in RI projects addressing innovation shall be further promoted** as in H2020 PT was unsuccessful in these calls, which had up to 8 M€ available per project. Additionally, there is the growing tendency for European RIs to aim towards becoming or integrating Global Research Infrastructures; as so, **the Portuguese community shall be encouraged to capitalize on eventual established collaborations with third countries' RIs** (including South America, CELAC, Africa and others) **and contribute to this globalization**. PT RIs shall tackle these opportunities and increase their participation in calls targeting international cooperation.

**Horizon Europe Research Infrastructures Work Programme**

The first Work Programme (WP) for HE regarding Research Infrastructures is under preparation and the budget that will be available for these calls is still under definition. Nevertheless, the skeleton of this first WP was already presented. The WP will be based on five Destinations.

**Destination #1: Developing, consolidating and optimising European Research Infrastructures to maintain global leadership**

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, while federating and connecting RIs to the EOSC. 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. Likely topics will include:

- RI concept development (generally, a bottom-up approach) – **participation of the PT community will be encouraged**;
- Preparatory phase of new RIs – the **PT scientific community is engaged in nine applications to the ongoing revision of the ESFRI roadmap. If successful, these will receive funds under this topic**;
- Strengthen the bilateral cooperation on research infrastructures with Africa – **PT is a privileged partner for many African countries, so our community shall be able and will be incentivized to capitalize on these potential opportunities;**
- Transition to digital/remote RI service provision: lessons learnt, needs and best practices – aimed at building on the resilience strategies and approaches developed by RIs in Europe in response to the COVID-19 emergency/lockdown. **Calls under this topic may be great opportunities for further development of the PT RIs' capabilities and contributions to major societal challenges, namely of those that were involved in the international response to the Covid-19 pandemic;**
- "A well-integrated European RI ecosystem", which targets more mature RIs, **with which the PT community has most of its collaborations.** Engagement of PT community in applications to these calls is to be expected and shall be further promoted.

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

Destination 2 aims to continue to develop the European Open Science Cloud (EOSC) 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. Topics shall include:

- Open Science practices and a digitally-skilled workforce;

• Supporting EOSC-Core: Enabling access to the Web of FAIR data and services – Development of key functions of EOSC federated core to provide a fully operational environment to discover, access, share, and re-use data and services covering the full cycle of research. **Connection of National RIs to EOSC needs to be strongly promoted in the next Framework Programme;**

• Building with the scientific community a Web of FAIR data for open science – **National RIs need to be encouraged to adopt FAIR principles in their operations.**

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

RI services should be directed to support an effective and responsive health system and to accelerate the transition towards a green and digital future, while also contributing to the identified missions and partnerships under HE. This Destination will have as major topics:

• "A challenge-driven provision of Research Infrastructure services", which will include responses to infectious disease epidemics, cancer and major chronic diseases, agro-ecological transitions, climate-related risks, materials for a circular economy and recovery from socio-economic crises. **These topics will provide very good opportunities for Portuguese RIs to redirect their services to better respond to the present challenges**. Portugal has RIs working in these topics, namely some of those integrated in the National Roadmap in 2019 and 2020. **The national RIs shall embrace these calls as possibilities for further development and dissemination of their services and expansion of their pool of users;**

• "Research Infrastructures services advancing frontier knowledge", which will focus on fundamental science. Depending on the specific thematic areas, **this can also provide great funding opportunities for the National RIs;**

• "EBRAINS - Empowering neuroscience for health and brain inspired technology". **The relevant PT scientific communities will be encouraged to join the EBRAINS distributed digital RI.**

**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 also new industrial applications, products and services. Possible topics include: "Next generation of scientific instrumentation, tools and methods", "Interdisciplinary Digital Twins", and "Artificial Intelligence based pilot solutions to improve data acquisition and quality of data sets for research".

The **PT scientific community and industry related to these themes shall be particularly mobilized and incentivized to participate in these calls as PT has not been successful in similar calls in H2020**. Some examples of National RIs working in AI are AIR Centre, PORTULAN CLARIN and RNCA. **Participation in such calls can bring innovation to PT RIs, additionally increasing their potential and the demand for their services**.

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

Faster, resilient, agile and secure connectivity services will enable researchers' and students' access to near real-time applications that support evidence-based decision-making in society and world-wide effective collaboration of virtual research communities. The possible topics are:

- High quality connectivity and collaboration services for excellence in Research and Education;
- State-of-the-art connectivity for the wider European Digital Infrastructure;
- International connectivity and collaboration.

**It will be fundamental for the PT scientific community in general to continue with the participation in the connectivity networks.**

***

As previously referred in regard to Destination 3, **contributions are expected from RIs to other relevant actions in Horizon Europe, particularly to Partnerships and Missions**. 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. Research Infrastructures may play here a valuable role as partners and potential service providers. Portuguese RIs could integrate Partnerships consortia and potentialize their assets, if they were established as independent legal entities; as most are not, **PT participation can and shall be promoted through the participation in the HE Partnerships of European RIs which PT integrates.**

**Research Infrastructures shall 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 opportunities when they come. For example, regarding the Cancer Mission, several National RIs may be engaged at the national level (Biobancos.pt, PT-CRIN, PtCAC, ProtoTERA and EATRIS.PT) and at the European level (BBMRI ERIC, ECRIN ERIC and EATRIS ERIC).

Notwithstanding these actions, **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, **a continuous capacity building of existing RIs is essential for enhancing their international competitiveness and ensuring the continuation and expansion of their international collaborations.**

## *INSTITUTIONAL STRATEGY (2021-2027)*

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

| Type of entity | Funding | Participations |
|---|---|---|
| **Universities** | 7,361,275.33 € | 44 |
| **Large Companies** | 561,897.50 € | 2 |
| **SME** | 665,680.00 € | 6 |
| **Research Centres** | 13,024,432.11 € | 74 |
| **Others** | 1,142,620.30 € | 16 |

PT participation in H2020 calls for RIs has been mostly from Research Centers and Universities, which is 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 can bring huge benefits and a greater return rate to Portugal.**

## *PRIORITY*

- **Customized dissemination and promotion of RI calls:**
- **a) identification and dissemination of the best/most suitable funding opportunities for the different PT communities and national RIs (particularly the new RIs on the National Roadmap).**
- **c) Promotion of PT participation in all RI calls.**
- **d)** promotion of PT participation in European RI calls targeting the new ESFRI RI projects on the Roadmap (2021 update).
- **Identification of potentially relevant actors with none or low participation in RI calls and promotion of their participation.** This shall be done in particular for types of calls with low PT success in H2020, such as those focused on innovation and globalization.

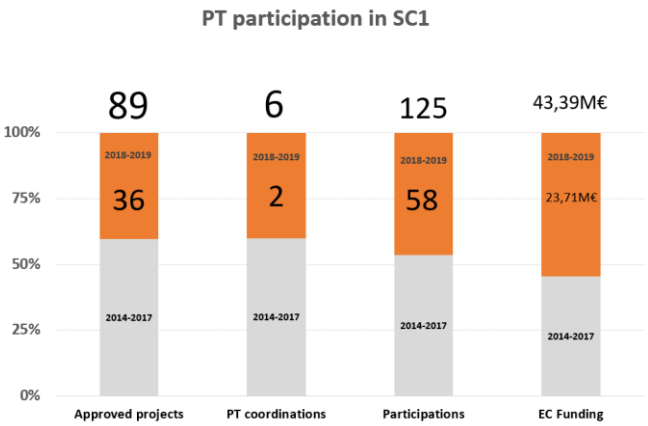
# 2. Pillar 2

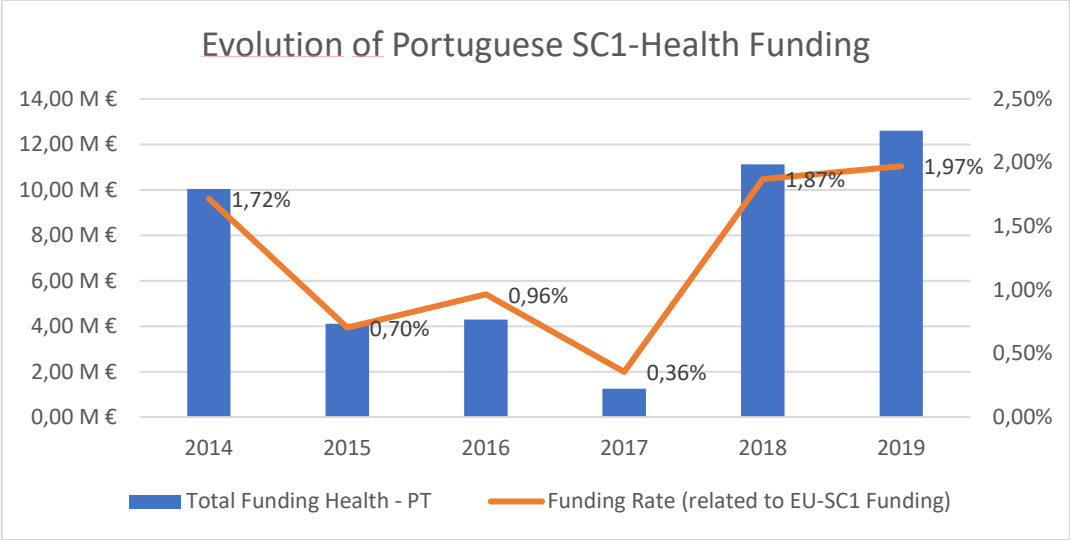
## Clusters (includes Partnerships and Missions)

## 2.1 Cluster 1 | Health

### *FACTS AND FIGURES – PT PARTICIPATION IN HEALTH H2020 (2014-2019)*

**The national performance in Societal Challenge 1 – Health of H2020 (SC1) is improving** and by 2019 Portuguese institutions participated in 89 projects and raised a total funding of 43,4 M€ (**1,4% of the overall SC1 EC funding**). A **positive trend is registered since 2017**, both in number of projects and in funding rates (Results published by December 2019, regular work programme calls).




PT participation in the **Innovative Medicines Initiative 2 Joint Undertaking** (IMI2) is still modest (10 projects, 6 M€ and 0,59% of total funding for 2014-2018) but nevertheless there is a **strong increase compared to its predecessor IMI1** (6 projects, 1 M€, 0,14% of total funding for 2007-2017).

The health-related programmes **EIT Health InnoStars** and **Active Assisted Living** (AAL) attract the **high interest of national stakeholders and the success rate is very satisfactory** (3,5% of the total funding for AAL). Nevertheless, participation is many times limited due to programme rules and national co-funding limitations.

## *SCOPE AND CONTEXT – HORIZON EUROPE CLUSTER HEALTH*

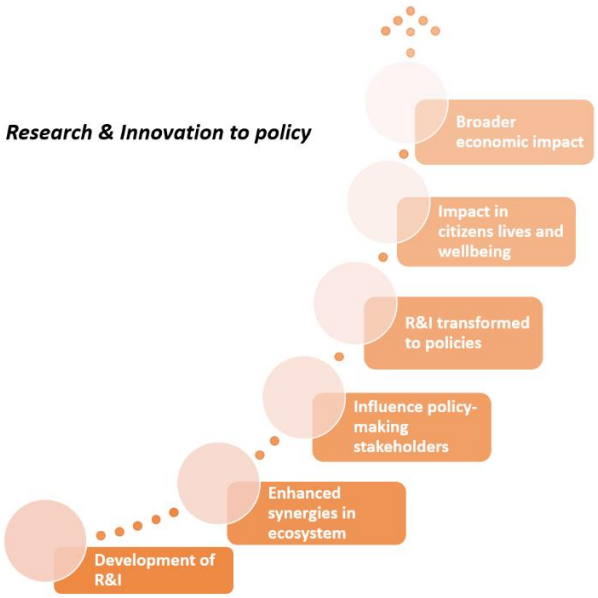
The health and well-being of its people is a central aim of the European Union, its policies and programmes. Cluster Health will focus on **improving and protecting the health and well-being of citizens at all ages**, by generating new knowledge, developing innovative solutions, and ensuring to integrate where relevant 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 work place; 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 will 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 will be 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 will 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 Europe fit for the digital age, and 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 people in the European Union. Research and innovation actions will enhance synergies and cooperation's within this multidisciplinary and complementary ecosystem, as well as 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 will be oriented towards the following six health-related 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;
5. 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 Specific Programme of Horizon Europe.

In addition to these intervention areas, to be addressed through regular annual calls in the work programme, the impacts of the Cluster Health will also be achieved through the implementation of **European Partnerships**. Currently, five out of 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** | TBC | TBC |
| **European Partnership on Personalised Medicine** | 2023 | 2023 |
| **European Partnership on Rare Diseases** | 2023 | 2024 |
| **European Partnership on One Health AMR** | 2023/24 | 2024/25 |

Moreover, **two institutionalised European Partnerships** (based on Article 185/187 TFEU) are proposed:

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

Finally, research and innovation actions to be developed under the scope of the **Mission on Cancer** will contribute to better and more equitable prevention and diagnosis, treatment and care, survival rates and post-cancer quality of life.

## *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. The 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 for the future framework programme (see table below).

| Areas of Intervention in Cluster Health | Priorities in the *Agenda for Health, Clinical and Translational Research* |
|---|---|
| **Health throughout the life course** | Promotion of Active and Healthy Ageing |
| **Non-communicable and rare diseases** | Personalised Medicine and Biomarkers<br>Pharmacology, Drugs and Advanced Therapies |
| **Tools, technologies and digital solutions for health and care, including personalised medicine** | Personalised Medicine and Biomarkers<br>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 |

In addition, Horizon Europe has an even a stronger focus on **Public Health** than Horizon 2020. Favourably, also the **National Health Plan** and the **eleven Priority Health Programs of the Directorate-General for Health** (DGS) are in line with the Horizon Europe goals to increase knowledge or develop new products and services to improve European citizens well-being. Also the **National Strategy for the Health Information Ecosystem** (ENESIS), coordinated by the **Shared Services of the Ministry of Health**

(SPMS) is directly aligned with Horizon Europe destinations, namely regarding the use of **tools, technologies & digital solutions** to provide citizens access to high-quality healthcare services.

Portugal has already established eight **Clinical Academic Centres** (CACs) that work as **integrated structures for clinical practice, education and research activities** and whose main objective is the advancement and application of knowledge and scientific evidence to improve health. Due to their multidisciplinary nature and strong clinical innovation potential, CACs represent privileged stakeholders for Horizon Europe health projects.

Also, the recent valorisation of the **Associated Laboratories** must be leveraged, since many of them are specialized in areas that should contribute to the achievement of the expected impacts in Health. In return, Horizon Europe funds will contribute for the Associated Laboratories maintenance.

The national strategy to accelerate technology transfer from universities to companies established by the **Interface Programme**, enabled the creation of two **Collaborative Laboratories (CoLABs)** and nine **Interface Centres** in the Health area. In the same line of initiatives, the Mobilisers Programme recently funded two big projects in the health area.

Finally, the recently approved **Research Infrastructures Roadmap** improves the national capacity to provide innovative services, knowledge and tools to address societal challenges.

Altogether, in the last few years, **Portugal invested around 65M€ in the above-mentioned initiatives, projects and entities of the health sector** (funding for CACs and Associated Laboratories is expected to occur soon). **These entities are now expected to become strong stakeholders in the Horizon Europe and to bring value to future consortia 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 |
|---|---|---|
| **Internal** | **Strengths**<br>• A strong and unified Portuguese National Health Service<br>• Researchers and health professionals of recognized excellence<br>• Engagement of CCDRs and municipalities in research efforts<br>• Established clusters and associations supporting the development and commercialization of health-related products and services<br>• The Portuguese Roadmap of Research Infrastructures (including several national nodes of the ESFRI Roadmap)<br>• The new Agency for Clinical Research and Biomedical Innovation (AICIB)<br>• Establishment of the Clinic Academic Centres | **Weaknesses**<br>• Week engagement between the ministry of science and the ministry of health in matters related to health research<br>• Low uptake of health research results into policy making<br>• Lack of institutional support for health professionals and other professionals to identify and pursue funding opportunities<br>• Reduced participation in European / international networks<br>• Low investment of the national research and clinical community in participating in large EU R&I consortia<br>• Poor collaboration between researchers and health professionals<br>• Weak multidisciplinary research environment |
| **External** | **Opportunities**<br>• The goals of the Cluster Health and partnerships are in line with the needs of the Portuguese health sector<br>• Possibility to use structural funds as the national commitment for cofund actions within the European Partnerships<br>• Health became a strategic area for SMEs following COVID-19 | **Threats**<br>• Partnerships will take over a significant amount of the budget, leaving less money for WP calls<br>• Some partnerships might end up working as 'closed-clubs', making it hard for PT entities to participate<br>• Low presence of national institutions in large and high impact consortia<br>• Slow implementation of transnational health data protection legislation<br>• Funding of high budget projects implemented by small consortia (i.e. with small number of partners) |

Portugal faces upcoming challenges for health research systems 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*) and also 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).

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.

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

### Response to Pandemics

Portugal has 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

The national health community, together with other stakeholders involved in the response to pandemics (e.g. industry, health authorities, academia) is very dynamic and currently identifying new synergies to tackle the challenges set by the COVID-19 pandemic.

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**.

For this target to be reached, we need to **sustain the good performance registered in 2018-2019** and also to **achieve a strong participation in the future Health Partnerships and in the Mission Area on Cancer**.

### *PRIORITY AREAS/INITIATIVES*

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

**National Domains**
Digital Health and medical technologies
Non-Communicable and Rare Diseases
Resilient Health and Care Systems

**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

| |
|---|
| **Non-Communicable and Rare Diseases** are national priority areas based on the strong potential and installed capacity to participate in collaborative projects. |
| **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 |
| **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. |

**National Domains**
Digital Health and medical technologies
Resilient Health and Care Systems
Response to Pandemics

**European Partnership Innovative Health Initiative (IHI)**

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

| |
|---|
| 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 |
| In addition, IHI will target a broader stakeholder involvement (patients, healthcare providers, healthcare professionals, regulators, health authorities, …) included in IHI governance |
| Projects under the scope of the IHI will demand for inter-ministerial collaboration (Health and Science and Technology) |

**National Domains**
Resilient Health and Care Systems
Digital Health and medical technologies
Response to Pandemics

### European Partnership on Transforming Health and Care Systems

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) and work in synergy with the EIT KIC Health.

Goal: to boost research in policy, uptake and scale up of innovations to accelerate transformation of national/regional health care systems

Portugal has a mobilized community working in this area, with successful performance in EIP-AHA, AAL and EIT-Health

This will be the opportunity to leverage the work done in the programmes mentioned previously and to increase the capacity to implement innovation and to assist Member States to progress at the comparable level

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**
Digital Health and medical technologies
Resilient Health and Care Systems
Response to Pandemics

### European Partnership on Personalised Medicine

Partnership aligned with priorities and funding for Member States, their regions, international stakeholders and the EC.

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

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

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**
Non-Communicable and Rare Diseases

### European Partnership on 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

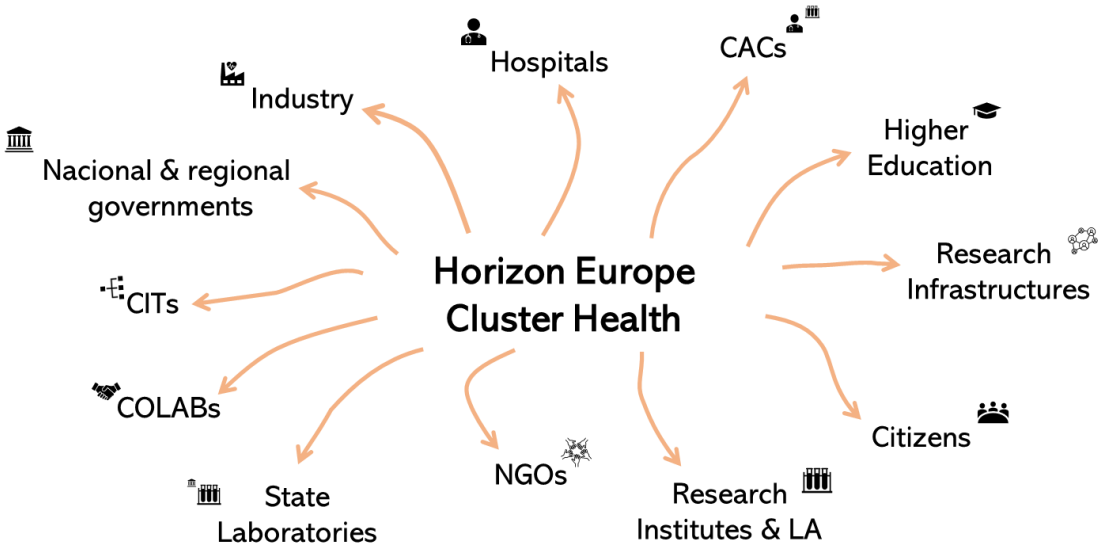
Projects under the scope of the Partnership for Rare Diseases will demand for inter-ministerial collaboration (Health and Science and Technology)

| National Domains<br>Non-Communicable and Rare Diseases<br>Resilient Health and Care Systems<br>Response to Pandemics | **Mission on Cancer** |
|---|---|
| | 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<br>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) |
| | 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. |

## *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**, **policy-makers** 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**.

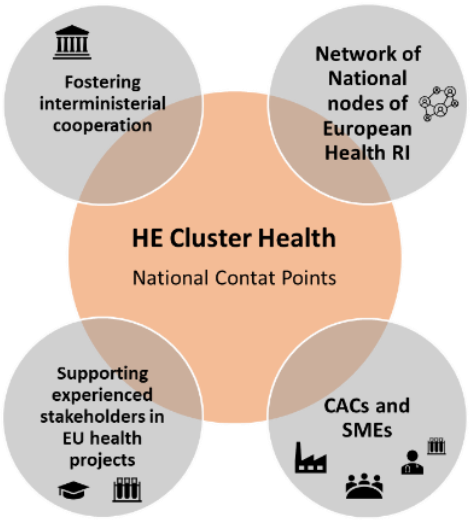


Specific engagement actions will be defined according to the type of stakeholder and to its level of maturity/experience in EU funding programmes. **Specific strategies will be defined in co-creation** with the Universities, research centers, industry associations and clusters, hospitals, etc, ranging 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, **events/actions for health-performing SMEs** (Cluster Health + EIC), **events/actions for the Social Sector** (Cluster Health + Cluster Culture, Creativity and Inclusive Society), **events/actions for the Climate and Environment Sector** (Cluster Health + Cluster Climate, Energy and Mobility) and **events/actions for the Digital and Technology Sectors** (Cluster Health + Cluster Digital, Industry and Space).

## *SRATEGIC ACTIONS*

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




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 recently implemented **Agency for Clinical Research and Biomedical Innovation (AICIB)** will play a basilar 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 not only for the regular calls of the Cluster Health annual work programme but, and most importantly, for the successful participation of Portugal in the European Partnerships in Health and in the Mission on Cancer.

- Action: creation of an **interministerial taskforce for Health in Horizon Europe**, with representatives from the Cluster Health PC (MCTES) and from SGPP (MS).

**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 health-related European initiatives** (e.g., quarterly meetings)

**Supporting experienced stakeholders in EU health projects**

The national performance in the area of health in Horizon 2020 is improving and Portugal has already a **solid group of stakeholders with strong track-record in health projects** in the scope of the EU Framework Programme. 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)

**Engagement of new stakeholders: CACs and SMEs**

The results of the national participation in H2020 show that some sectors of the ecosystem still have a modest participation, thus special actions will be taken into two specific fronts: **Hospitals** (with a

modest participation by securing 3% of the total PT Health funding between 2014-2019) **and SMEs** (securing 17% of the total PT Health funding between 2014-2019).

Several obstacles still make it difficult for clinical researchers to engage in European projects. The recently created **Clinical Academic Centres** (CACs) can contribute to overcome 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 low participation in Health projects in Horizon 2020. 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** for the engagement of research-performing SMEs with **HCP** and **P-BIO**, including regular communication channels and follow-up process for SMEs.

### *THE WAY FORWARD*

In the last two years the National Health stakeholders proven their potential in securing EU competitive funding. Horizon Europe sets as a pivot tool to empower the community for the next 7 years, ensuring that the value created in R&I has a true impact in citizens' lives and wellbeing. By supporting the still existing gaps in the community and catalyzing 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 strengthening 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.

PORTUGUESE PARTICIPATION IN SOCIETAL CHALLENGE 6, "EUROPE IN A CHANGING WORLD – INCLUSIVE, INNOVATIVE AND REFLECTIVE SOCIETIES (SC6) AND SCIENCE WITH AND FOR SOCIETY (SWAFS)

Although there is a limited number of coordinated projects in Portugal, 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%) increased by nearly 3%, being above EU average (10,24% vs 9.26%) on H2020. There is a good mix of players in H2020 projects: academic sector participates in 50% of the projects and 50% is split by governmental agencies, municipalities, NGOs and companies.

### DATA ON THE PORTUGUESE PARTICIPATION IN DS6

| | **FP7 (2007-2013)** | **H2020* (2014-2020)** |
|---|---|---|
| **Nº PT projects** | 39 | 73 |
| **Nº PT coordination** | 2 | 4 |
| **Nº PT participating entities** | 41 | 91 |
| **% academic sector** | 75% | 50% |
| **% industrial sector** | 0% | 30% |
| **Budget allocation to PT (M€)** | 5,97 (1,03%) | 17,33% (1,85%) |
| **Success rate (%)** | 7,82% | 10,24% |

* data from 11th September 2020

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

### *DATA ON PORTUGUESE PARTICIPATION IN SWAFS*

| | **FP7(2007-2013)** | **H2020* (2014-2020)** |
|---|---|---|
| **Nº PT projects** | 37 | 54 |
| **Nº PT coordination** | 3 | 2 |
| **Nº PT participating entities** | 47 | 68 |
| **% academic sector** | 21% | 63% |
| **% industrial sector** | 11% | 8% |
| **Budget allocation to PT (M€)** | 6,79 (1,6%) | 9,76 (2.07%) |
| **Success rate (%)** | 17,2% | 7,82% |

* data from 11th September 2020

### *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** | 589 (19%) | 1200 |
| **Number of Projects** | 57 | 120 |
| **Success Rate (average)** | 9,68% | 11% |
| **Global overview on budget allocation to PT** | 17,33 M€ (1,85%) | 34 M€<br>(3,7%) |
| **Contribution to the global PT objective of 2.000 M€** | 17,33 M€*<br>(0,86%) | 34 M€<br>(1,7%) |

*until 11th September 2020

### *SWOT ANALYSIS*

| **Strengths** | **Weaknesses** |
|---|---|
| • The number of coordinating proposals and funding have doubled during H2020;<br>• Application success rate slightly higher than EU average (PT: 9.68% vs EU: 9.19%)<br>• Industry became an active participant in H2020 (22% participation);<br>• Increasing critical mass and research potential: number of 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);<br>• Low internationalization and competitiveness of SSH research community;<br>• SSH researchers seek funding mainly from national sources;<br>• Low application levels of SSH scientists to ERC (but it is a global tendency in ERC);<br>• SSH with little participation in Widening Actions;<br>• R&D Units lack professional structures to support and encourage candidates. |
| **Opportunities** | **Threats** |
| • Growing interest of Social Scientists and institutes/research centres in seeking EU funding;<br>• Growing interest of industry (including cultural), municipalities and the third sector to combine efforts with academia in seeking EU funding;<br>• Contagion effect and best practice exchange: Portuguese 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 successfully to HE projects.<br>• Use nationally funding programmes to spot talents and to increase participation levels in HE;<br>• Intensify training and awareness activities of SSH research community to apply successfully to HE;<br>• Through national funding schemes 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;<br>• General belief that applying to European funding is too complex, with low success rates and beyond reach;<br>• 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. |

### *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;
- 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);
- Working closely with the community to identify key research priorities 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, guarantee 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.

### *INSTITUTIONAL STRATEGY (2021-2027)*

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

- SSH research centres which low participation levels in H2020
- Municipalities
- Third sector
- Cultural industries, cultural NGO's
- Artists Associations
- Museums
- Science centres

### *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 and Governance
- Social and Economic Transformations

Taking into account 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.

***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), 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.

## *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 theme with best rate of return for Portugal (after Widening and Fusion), close to 3% and 35,4M€ for national entities (2014-2019). It is, therefore, realistic, to set the objective for HE-Security close to 4,5%, which is achievable by stronger participations in projects, namely from the Portuguese Law Enforcement Agencies (LEAS) active members.

### BACKGROUND INFORMATION

In H2020-Security themes, Portuguese participants have reached 145 participations in 84 projects, resulting from 1045 participations in 595 proposals, for a success rate of 14.2% (compared to 11.2% in the EU).

National entities received contracts of 35,4M euros, being 30,4% for 31 industries (15 SMEs, 17,9%), 43,4% for 8 RTOs and 6 Universities and 26,2% for 13 public entities most of which, LEAs and end-users. The national rate of return on H2020 is 2.8% (the highest after Widening and Fusion).

### 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 defense field.

The most relevant actors in Security are:

Criminal police (PJ) very well connected internationally (member of EUROPOL) has a very high presence in many projects acting as end-user, is responsible for bringing to Portugal many projects (26 participations). One RTO (is very well connected and with a very good record in many participations (18) 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.

### SWOT ANALYSIS

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

## *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 type 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 the cyber-security presents too many divergencies 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 center is being proposed 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 more than 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 and space entities, joining their capabilities and technologies.
- To promote and enforce the participation of more software industries in the cybersecurity and cybercrime projects to be launched under HE-Security.

## 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**[7] 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, a new Industrial Strategy for a globally competitive, green and digital Europe 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** – focused 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.**

[7] In the New Strategic Agenda for 2019–2024, this ambition is supported through the priority "Developing a strong and vibrant economic base"

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 (DEP)** - 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.

*FACTS*

| **H2020** | | ***# projects*** | ***# coordinated projects*** | ***EC funding (M€)*** | ***funding rate (%)*** |
|---|---|---|---|---|---|
| ***ICT H2020*** | **2014-2019** | 156 | 22 | 85.29 | **1.87** |
| | ***2018-2019*** | 52 | 10 | 39.15 | **2.37** |
| ***Digital Transformation**** | **2014-2019** | 483 | 99 | 232.97 | - |

* Data corresponds to the catalogue of all the digital projects with PT participation

- In the ICT part of H2020, PT entities are involved in the activities of 156 projects having received 81.5 M€, which represents 1.87% of the total competitive funding available for the ICT part of the programme (above the average H2020 funding rate, which is currently 1.67%).
- 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 stablished 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 is a young sector, constantly expanding and transforming – ICT companies almost doubled in 10 years in Portugal;<br>• By subsector, consultancy and programming companies concentrate the largest number of entities followed by services, commerce, telecommunications and industry.<br>• Despite representing only 6% of the number of companies, the **telecommunications subsector contributed with 42% of the turnover of the entire sector**.<br>• **3 PT** Unicorn companies Farfetch, Outsystems and **Talkdesk** are ICT-based companies.<br>• Proliferation of incubators, accelerators and similar entities<br>• Qualification of human resources trained in PT Universities<br>• ICT related research is dominant in the Portuguese R&I system, being quite relevant for the Portuguese Enterprises engaged in R&D Activities (In 2018, 65% of total R&D expenditure in the business sector respected engineering sciences and technologies).<br>• **Digital public services** and the connectivity dimensions in the Digital Economy and Society Index (DESI) 2020 are Portugal's best performance, are driven by a sizeable increase in the share of e-government users.<br>• Public and Private Funds from Venture Capital, such as 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.<br>• Installation of a petascale supercomputer DEUCALION at Minho Advanced Supercomputing Centre. | • Portugal ranks 19$^{th}$ out of the 28 EU Member States in the European Commission's Digital Economy and Society Index (DESI) 2020.<br>• Portugal continues to have one of the smallest shares of professionals with specialised ICT skills in total employment in the EU: 2.2 % in 2017 compared to an EU average of 3.7 %.<br>• In the same vein, the proportion of ICT specialists in total female employment is roughly half the EU average.<br>• The share of ICT graduates in the total graduate pool is very low by EU standards.<br>• 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.<br>• 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.<br>• Digital skills are improving in Portugal (in DESI 2020, Portugal raised its position from 23$^{rd}$ to 21$^{st}$), 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. |

| Opportunities | Threats |
|---|---|
| • **10 years of Websummit in Portugal** – stimulate the digital entrepreneurship ecosystem<br>• ICT companies operate today in a highly competitive ecosystem, since they produce goods and services for a globalized digital market;<br>• Fintech sector is growing in a fast pace, more conditions are available in Portugal and there is more cooperation between banks and insurance companies;<br>• Good reputation and collaborative networks developed under previous FP;<br>• Covid-19 challenges posed to work and education fields, in particular, and to social wellbeing and health;<br>• Better public understanding of Science and Technology as real problem solvers (e.g., beneficiating from the public exposure of scientists and digital technologies as relevant sources for solutions used in the pandemic management and day-by-day life).<br>• Promote the participation of recently established entities, such as CoLabs, in European projects and initiatives.<br>• Explore the coordination of structural funds for co-funded instruments<br>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. | • The fragmentation of the European initiatives and programmes related to digitisation.<br>• Covid-19 constrains to mobility (risk of losing potential new knowledge and skills incoming and of losing dynamics stablished by international cooperation)<br>• Covid-19 impact in budget allocation decisions that may reveal negative to necessary availability of national funds for the required relevant co-funded instruments<br>• European Partnerships will have approximately 50% of the budget attributed to the Cluster. |

### *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 stablished 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, Modernização do Estado e da Administração Pública) 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 - Clean and Smart Industry

*SCOPE*

In Horizon Europe (HEU) **Industrial technologies** are addressed in Cluster 4 – Digital, Industry and Space. They will be especially relevant to achieve a **technology sovereignty** of Europe and contribute to the **recovery of Europe** from the current COVID-crisis.

Industrial technologies are also very important to make sure our industries comply with the **Green Deal** targets and become **carbon neutral** following the current trend in energy transition.
That is why, for the seven-year period Industry part of Cluster 4 will focus on: **1) Manufacturing Technologies, 2) Advanced Materials, 3) New Emerging Technologies, 4) Circular Industries and 5) Low and Neutral Industries.**

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".
Some of industrial technologies thematic areas will be implemented by new partnerships: **Made in Europe** (ex-FoF) for Manufacturing Technologies, **Process4Planet** (ex-SPIRE) and **Clean Steel** for Circular Industries and Low and Neutral Industries, and **Metrology.**
Moreover, the **social impact of these technologies** (new forms of work, upskilling and regulation) and **valorisation of results** will be very strong in this area because of the need for technologies that work for people and that will create a real economic impact.

| | # projects | | # coordinated projects | | EC funding (M€) | | Funding rate (%) | |
|---|---|---|---|---|---|---|---|---|
| | 2014-2019 | 2018-2019 | 2014-2019 | 2018-2019 | 2014-2019 | 2018-2019 | 2014-2019 | 2018-2019 |
| **NMP** | 64 | 18 | 7 | 1 | 30 | 8 | 2,14 | 1,82 |
| **Biotech** | 11 | 3 | 2 | 1 | 9 | 3 | 3,66 | 4,52 |
| **FOF**[8] | 34 | 20 | 4 | 1 | 18 | 9 | 3,29 | 4,33 |
| **EEB**[9] | 8 | 2 | 3 | 1 | 4 | 0,7 | 1,32 | 0,74 |
| **SPIRE**[10] | 12 | 5 | 2 | 0 | 7 | 3 | 1,43 | 1,63 |
| **Total** | **129** | **48** | **18** | **4** | **68** | **24** | **2,14** | **1,88** |

- **PT has excellent scientific and technological knowledge in nanotechnologies and advanced materials** as well as research centres with **very good infrastructures**. This is mainly translated in the research and innovation developed by universities and research centres some of which have already a very good participation (INL, INEGI, CENTI, UA, UM, ISQ, UNINOVA) having

[8] Partnership FOF – Factories of the Future: addressing discrete manufacturing in all industrial sectors; launched in 2010; will evolve to Made in Europe in HEU
[9] Partnership EEB – Energy Efficient Buildings; addressing advanced materials solutions for energy efficiency in the construction sector; launched in 2010; will not continue in HEU
[10] Partnership SPIRE – Sustainable Process Industry: addressing process industries (continuous manufacturing); launched in 2013; will evolve to Process4Planet in HEU

NB: NMP and Biotech are regular calls, FOF, EEB and SPIRE are co-programmed Partnerships

captured above 60% of the funding. However, there is still room for improvement (ex. UP, IST, PIEP, UNL).

- Although only 21% of the funding goes to industry there are companies (ex. Sonae Group, Amorim Group, Visabeira Group, CUF Group, Caetano Aeronautic, Embraer, Vangest Group, Simoldes, Inapal Plásticos, etc) that could take more advantage of the European funding. Furthermore, despite most of the funding is going to SMEs because of the recently boost of the Portuguese innovation ecosystem there are many start-ups that have a big chance of success in these areas.
- **In the manufacturing and processing areas PT research centres have very good infrastructures and are well connected with industry** some of which already have a good participation (UNINOVA, INEGI, ISQ, IST, UP, IPB**).** For this reason, in the manufacturing and processing areas there is 34% of participation from companies (18% SMEs and 16% big industry). And that is why, with the creation of partnerships (FOF – Manufacturing and SPIRE – Processing Industries) which objective was to accelerate the transfer of research results to industries by aligning the research priorities with industry needs, it was possible for PT organizations to take advantage of this partnerships focused on applied research at pilot and industrial scale. Industry that participated in the manufacturing and processing area were from plastics, metalworking, automotive, automation, robotics, and cement.
- There are several national strategies (Industry 4.0, Digital Transition Action Plan[11], Portugal INCoDe.2030[12], AI PT2030[13], Circular Economy Action Plan (PAEC)[14], Carbon Neutral National Plan 2050 (RNBC)[15], Hydrogen National Plan[16], Portugal SPACE 2030, Industry and Manufacturing Research and Innovation Agenda[17]) 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[18].

[11] https://www.portugal.gov.pt/download-ficheiros/ficheiro.aspx?v=06d1f49b-8bb3-4fec-b25c-4faad12d87da
[12] https://www.incode2030.gov.pt/
[13] https://www.incode2030.gov.pt/sites/default/files/julho_incode_brochura.pdf
[14] https://eco.nomia.pt/contents/documentacao/rcm190-2017.pdf
[15] https://www.apambiente.pt/_zdata/DESTAQUES/2012/RNBC_COMPLETO_2050_V04.pdf
[16] https://www.portugal.gov.pt/pt/gc22/comunicacao/documento?i=plano-nacional-do-hidrogenio
[17] https://doi.org/10.34621/fct.edicoes.agendastematicas-3
[18] ANI Dashboard: https://www.ani.pt/pt/avalia%C3%A7%C3%A3o-emonitoriza%C3%A7%C3%A3o/monitoriza%C3%A7%C3%A3o/indicadores-da-atividade-ani/

## *PROPOSED TARGETS (2021-2027)*

- Increase participation in Horizon Europe, both from academia and industry but also from other organizations such as sectorial associations, trade unions, …
- Increase participation in HEU related initiatives, namely in: ETP Manufuture[19], EFFRA[20], A.SPIRE[21], ESTEP[22], EuMAT[23], European Raw Materials Alliance, European Batteries Alliance[24], European Clean Hydrogen Alliance[25] and European Low Carbon Industries Alliance.
- Regional or national representation in Made in Europe[26] and Process4Planet[27] governance.
- Increase the success rate and achieve a rate of return of at least 2% on Industry part of Cluster 4

| Positive | Negative |
|---|---|
| **Strengths**<br>• Excellent scientific knowledge in materials sciences and manufacturing<br>• Human resources with very good skills (namely in engineering) and competitive costs<br>• Capacitation measures in place for enhancing available resources (people and infrasctrutures) through CoLabs and CITs<br>• Clusters in relevant areas and sectors<br>• National Initiatives aligned with European priorities<br>• A good set of funding programmes and instruments, both financial (using ERDF) and fiscal, to support R&D and Innovation.<br>• Good experience on synergies between EU and national/regional programmes, with specific instruments and examples in the Manufacturing and Circular Economy areas<br>• Strong presence in Manufacturing and Raw materials European Initiatives | **Weaknesses**<br>• Low number of research performing industries<br>• Most companies are micro and small, with limited capabilities to invest and manage research and innovation<br>• Limited number of companies with experience of European programmes and initiatives<br>• Limited number of industrial technology providers<br>• Low critical mass due to fragmented R&I national landscape<br>• Lack of national initiatives regarding advanced materials<br>• Low number of materials producers<br>• Low presence in Advanced Materials and circular, carbon neutral European initiatives<br>• Low number of industry actors in Steel sector |
| **Opportunities** | **Threats** |
| • Newcomers participation<br>• Take up of research results by industries<br>• Critical Mass and National participation increase through CoLabs and CITs<br>• Increase participation of social actors and social sciences and humanities<br>• Develop and implement demonstrators, test beds or pilot lines | • No participation in Steel Partnership<br>• No participation in the circular hubs initiative<br>• Complexity of the funding and financing landscape (different rules and timings, burocracy, etc.)<br>• Lack of funding/financing for the uptake of technologies<br>• Lack of alignment between EU priorities and initiatives and the national/regional R&I for advanced materials |

[19] http://www.manufuture.org/
[20] https://www.effra.eu/
[21] https://www.spire2030.eu/
[22] https://www.estep.eu/
[23] https://www.eumat.eu/en
[24] https://www.eba250.com/
[25] https://www.ech2a.eu/
[26] https://ec.europa.eu/info/publications/made-europe_en
[27] https://ec.europa.eu/info/sites/info/files/research_and_innovation/funding/documents/ec_rtd_he-partnerships-industry-for-sustainable-society.pdf

## *STRATEGY FOR Cluster 4 - Industry (2021-2027)*

Increasing the amount of European funding going to Industry related technologies at national level requires **good alignment between the research and innovation priorities**, be part of **good consortia**, write **good proposals** and increase the **participation from national stakeholders**.

- Tailored Activities

Only with a strategy with activities addressing the different needs of experienced participants and newcomers, different approaches according to the thematic areas and funding instruments will be possible to succeed in achieving the targets defined for Cluster 4 – (Digital), **Industry**, (Space).

- Alignment between European and National R&I Priorities

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 an innovation community prepared to capture funding from this European program.
To make sure national research and innovation priorities are translated into calls for proposals the PT delegation will:

- **Articulate with different Ministries**: METD – industry needs/economic impact; MAAC – raw materials, energy transition
- **Representation from PT** (ex. CCDR, ANI) **in Made in Europe and Process4Planet partnerships governance structure**;
- Take in consideration **national strategies, action plans, R&I agendas;**
- Take in consideration **Mobilizadores' projects and from other funding instruments;**
- do **regular consultations to stakeholders on their research and innovation needs**.

- Participate in good consortia

For stakeholder´s to be part of consortia with big chances of success their **presence and active participation in European initiatives is necessary**. **In some European initiatives, PT representation** can be an asset with benefits that go beyond attraction of funding such as increasing economic impact at national level and promoting cross-fertilization.

- Thematic Areas

For the **manufacturing technologies area**, PT strengths are in**:**

- **digital transformation** (naturally programmed/learned manufacturing systems, virtual environments and tools/cyber-physical systems; multi-process modelling and simulation tools, sensing/intelligent sensor networks in manufacturing);
- **production technologies (**Materials bonding processes and technologies, continuous biomanufacturing, customized production, additive manufacturing)**,**
- **smart robotics** (human-robot collaboration, autonomous robotics, soft robotic systems)[10].

There are also several **Mobilizadores' projects** that have a structuring effect and on which Portuguese participation in the European Program can be built on.

- TOOLING4G – Advanced Tools for Smart Manufacturing;
- TexBoost - Less Commodities more Specialities;
- FAMEST - Footwear, Advanced Materials, Equipment's and Software Technologies;
- Add.Additive - Add additive manufacturing to Portuguese industry;
- INOVSTONE 4.0 – Advanced Technologies for Natural Stone;
- PRODUTECH SIF – Solutions for the Industry of the future;
- GreenShoes 4.0 - Footwear, Leather Goods, Advanced Materials, Equipment and Software Technologies;
- INOVMINERAL 4.0 – Advanced Technologies for mineral resources;
- S4Plast - Sustainable Plastics Advanced Solutions;
- PRODUTECH SUSTENTÁVEL & CIRCULAR – Solutions innovative, sustainable and circular for manufacturing;
- REV@CONSTRUCTION – Digital Construction Revolution)

The ecosystem around manufacturing is very well organized and are many experienced stakeholders in this area. Therefore, its **participation in European initiatives should be strengthened**:

- ETP Manufuture;
- EFFRA;
- EIT Manufacturing;
- World Manufacturing Forum.

Despite of the already good participation in this area, it is important to promote the **participation of:**

- **industry from industrial sectors** (textiles, tooling, equipment, plastics, metalworking, automotive, food, aerospace and aeronautics) and,
- **Colabs** (DTx and BUILT CoLab).

To increase industry participation **articulation with:**

- **Clusters** (PRODUTECH, Engineering & Tooling, TICE.PT, MOBINOV, AED, Textile Cluster);
- **Associations** (ex. AIMMAP) and,
- **Technological infrastructures** (ex. CATIM, CITEVE), **should be established in a formal way**.

PT is focused on adopting a **human centred production** approach and can take advantage of its expertise already in the learning factories concept (ex. IPL), qualification and requalification processes of human resources, recruiting and integrating human resources and models for their valorisation in the factories of the future and models of behavioural orientation and welfare and safety of human resources.
The recently established **CoLABOR CoLab** as well as experienced **social sciences research centres** related with this area can also contribute to increase PT participation.
Most of the activities of this area will be implemented by the Partnership **Made in Europe**.

For the **advanced materials/critical materials area,** there is excellence science in:

- **advanced materials technologies** and
- applications of **materials for health, energy, and construction**.

The expertise is in multi-functionality and material compatibility, composites of polymeric, ceramic, metallic or another basis, hybrid materials, nanoelectronics and sensors, biomaterials and fabrics, replacement of scarce materials; minerals (Li, Cu, W)[10]. There is also an opportunity for batteries.

Material technologies ecosystem is fragmented by application area with some links to some industrial sectors which makes it difficult to address the area in a holistic way. However, one Mobilizador project (On-Surf – Technological competences on surface engineering) can be used as a basis for a strategic approach to the European program.
Given the expertise in Portuguese research and innovation community there is:

- **room for improvement for academia** (ex. UP, IST, PIEP, UNL);
- a **need to improve industry's participation** (ex. Sonae Group, Amorim Group, Visabeira Group, CUF Group, Caetano Aeronautic, Embraer, Vangest Group, Simoldes, Inapal Plásticos, etc),
- **continue to support the participation of SME**s (ex. YD Invisible, Frezite High Performance, Optimal, Critical Materials, Active aerogels, Biofabic,).

Furthermore, **the participation of CoLAbs in this area** (CemLab, VectorB2B, Vasco da Gama CoLab*)* **should be fostered as an opportunity to include also industrial partners** in HEU. However, a **good articulation with clusters** (Portugal Mineral Resources Cluster, AED, Mobinov) **should be promoted**. In addition, **European initiatives should be closely followed**:

- EUMAT,
- EIT Raw Materials,
- European Raw Materials Alliance,
- EMIRI,
- NanoFutures,
- European Batteries Alliance.

In the **new emerging technologies area** research groups working on neurosciences, graphene and biomanufacturing should be stimulated to participate. At the same time, it will be important to **do a close monitoring of research projects funded at national and regional level as well as from Pillar I and III of Horizon Europe** (EIC, EIT – KIC Raw Materials, KIC Manufacturing, KIC Digital) which can impact industry and **can be further developed and have follow-up funding under this cluster**.

Regarding **low and neutral Industries area**, PT has excellence science and technological knowledge in industrial symbiosis, waste management, reuse and recycling/green materials, circular and integrated management of resources in industrial processes; predictive maintenance systems; design, industrial analytics[10]. There is also some emerging capacity in synthetic fuels.

Mobilizers' projects (BETTER PLASTICS - PLASTICS IN A CIRCULAR ECONOMY; Move2LowC – Bio-based fuels) can also have a role in creating a critical mass relevant for this area.
Although Portugal has not many processing industries there are some academic and industrial capacity installed. Thus, **participation should be stimulated and the level of:**

- **academia** (ex. UP, IST, UM, ISQ, CVR, CTCV);
- **industry** (ex. SECIL, The Navigator Company, Galp Group, Chemical plants, Celoplás, etc) **should be stimulated**;

- **CoLabs** (*eCOLab, NET4CO2*);
- **Clusters** (APQuímica and PRODUTECH) and,
- **Associations** (ex. AMITEQ, CELPA).

**Participation in European initiatives should be increased:**

- A.SPIRE;
- European Hydrogen Alliance;
- European Raw Materials Alliance;
- European Low Carbon Industries.

Most of the activities of this cluster will be implemented through **Process4Planet** and **Clean Steel**.

- Articulation of R&I stakeholders between different Clusters

Industrial technologies are horizontal and can be applied in several vertical sectors, thus, there are several end-users that can participate in Cluster 4 and several technology providers that can participate in sectorial clusters.
Industrial related technologies are relevant for:

- **Space** area (manufacturing of microsatellites, advanced materials for harsh environments, etc);
- **Health** area (biomaterials, medical devices, medical technologies),
- **Energy** area (industrial symbiosis, energy efficiency, materials for energy capture and storage);
- **Mobility** area (lightweight materials, production technologies).

- Partnerships

**National or regional representation** (ex. CCDR Centro, Norte and Alentejo, ANI) in the **governance structure of Made in Europe and Process4Planet partnerships** can help increase Portuguese participation through:

- co-programming and alignment with ERDF funding;
- aligning R&D and Innovation strategies and agendas;
- supporting complementary development and market uptake of technologies/results;
- promote dissemination, demonstration, cross fertilization;
- follow-up in the development of training programmes on the necessary skills and,
- alignment of regulation.

Not only this will contribute to a better capacitation of the Portuguese organizations, but it will also increase chances of accessing European funds and increase valorisation of the research results leading to a positive economic impact at national level.

Despite PT not having a relevant steel industry it has some research capacity. Therefore, the approach to the **Clean Steel Partnership** will be to stimulate the participation of the research community on steel technologies and low emissions for the steel sector.

To have an increase of the participation in **Metrology partnership** and reap the benefits of this initiative it will be necessary to create incentives at regional or national level because the funding rates associated with this program are very low, especially for industry.

- Writing Good Proposals

**Training activities on proposal writing** should be reinforced due to the strong link with industry in this area and industrial nature of the projects. Focus should be in preparing **case studies, exploitation strategies, business planning, technology assessment**.
Specifically, to newcomers, **coaching activities** regarding **European landscape and European initiatives** can help to overcome the myths associated with European funding.

### 2.4.3 Cluster 4 | Space

#### SCOPE

In Horizon Europe, Space is included in Destination 5 of Cluster 4 (Pillar 2). Activities will focus on a diversity of areas including fostering competitive space systems, upstream and downstream technologies, reinforcement of EU capacity to access and use space, evolution of Galileo and EGNOS space and ground infrastructure, Copernicus and EGNSS applications and services, SSA, Govsatcom and Quantum technologies as well as space entrepreneurship, space science and critical technologies.

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, Horizon Europe, European Space Programme or ESA) towards specific challenges such as an Atlantic Constellation, space enabled 5G 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)

Regarding space related calls, in H2020 (up to July 2020) there were 59 Portuguese participations in 44 projects resulting from 369 participations in 254 proposals. This represents a success rate on the proposals of 17.32% (compared to 19.16% in the EU). National entities received contracts of 18,9 M euros in space related calls, being:

1. 43.90% for 26 companies (12 SMEs, 16,4%);
2. 24,65% for 19 R&D Centers and 4 Higher Education Institutes; and
3. 31,45% for 10 public entities and others, one of them European (EMSA).

The national rate of return on H2020 is 1.93% (above the national average of 1.65%).

Analyzing the last years (2018-2020), there were 27 national participations in 21 projects approved, with a success rate of 14,79% (compared to 20,67% in the EU). Portuguese entities received contracts of 6,15M euros, which translates into a national rate of return of 1,47%.

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 9.5M€.

Portugal has also expanded its network of ESA BICs, going from three to fifteen in 2020. The incubation centres 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 still small.

At a national level, a number of companies are now working towards the goal of establishing, maintaining and guaranteeing the operation and exploitation of an Atlantic constellation through ESIF funded projects such as INFANTE, MAGAL, ASTRIIS and AEROS.

In this period, other major projects are also being implemented that will build system and subsystem competence in space related domains such as CARAVELA and VIRIATO.

In addition to the previously identified major projects there are currently nearly 15 other on-going ESIF funded initiatives in several topics such as technology development for launchers, satellite avionics platforms, downstream applications, or fundamental science.

Academia and research centres are also an essential part of the ecosystem, having their research work funded mostly by FCT. FCT has provided funding of over 6.4M€ for projects that are currently ongoing in a wide range of space related subjects (upstream and downstream), from physics and astronomy, to clean tech energy and marine biology.

These initiatives are complemented with the national contribution to ESA via which the different programmes such as Future-EO, INCUBED+, GSTP or ARTES are building-up Portuguese capabilities and competences contributing as well and as part of other programmes to relevant international missions such as the High Priority Copernicus Missions with 10M€ of industrial contracts for Portuguese entities (ESA and EU funding).

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 multi-disciplinary 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 5G 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;
- 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 space industry.<br>• Consolidated knowledge in a wide range of technical areas.<br>• Articulation of all space activities through one single governmental organisation.<br>• Strong political support to the space sector and rapid decision making.<br>• Well defined National Strategy with clear objectives and priority areas.<br>• 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.<br>• Lack of public Earth Observation high resolution satellite data which limits some crucial applications for public services.<br>• Difficulties for start-ups to participate in H2020 programmes.<br>• Most SMEs lack experience of participation in European calls.<br>• Difficulties to enter major European consortiums working in EU programmes such as Copernicus and Galileo.<br>• Difficulties to raise private funds. |
| **Opportunities** | **Threats** |
| • The advent of New Space provides business opportunities for new Portuguese players.<br>• To capture private funding through Venture Capitals, in order to fund innovative ideas applied to the downstream space sector, serving different important economic sectors.<br>• Portugal is an attractive country for space related companies due to the high level of qualification of its professional and its competitive economic conditions. National geographical position (i.e. Azores) allows better access to space in Europe.<br>• To promote and create competences regarding SSA and GOVSATCOM in order to potentiate long term opportunities | • Lose window of opportunity if action is not taken promptly.<br>• Fail to engage Portuguese entities in space partnerships or in European consortiums working on Galileo/EGNOS/Copernicus programmes. |

## *STRATEGY (2021-2027)*

Content:
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 5G ecosystem for the development of the Atlantic and the innermost remote regions of Portugal.

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.

### *ACTIONS*

- Promote the participation and success of Portuguese entities in Horizon Europe calls, particularly start-ups and SME's.
- Create synergies between different clusters of Horizon Europe by promoting the utilisation 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.
- Assist Portuguese companies in proposal writing, focusing especially on less experienced participants.
- 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 utilisation of space-based data and technology.
- 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.
- Promote the interaction between the Portuguese ecosystem with European space related organizations such as the future 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.

### *INSTITUTIONAL STRATEGY (2021-2027)*

- Promote the participation of Portuguese companies (with a focus on SMEs), research institutions and major stakeholders in different European programmes.
- Promote collaboration between R&D and industry players to enable excellence research and science via the definition, production and exploitation of world class scientific instruments.

- Foster articulation of funds for the space innovation ecosystem (ESA BICs, EU funds, National funding).
- Stimulate interaction and establish relationships between space and non-space sectors through the integration of space-based services and technologies as part of the solution to tackle current challenges of public and private entities.
- Support the participation of public administration entities in relevant projects with, if suitable, the participation of industry and R&D institutions.

### *OTHER CHALLENGES*

- Additional funding opportunities at European level should be considered such as the ones related to the European Quantum Communications Infrastructures initiative (EuroQCI).
- Foster uptake of research and innovation activities carried out in Horizon Europe. Research on activities related to satellites systems and ground segment could complement those carried out via ESIF funds and ESA activities in order to materialize the great programmatic challenges.

### *PRIORITIES*

- Increase the participation of Portuguese entities in European programmes leveraging national skills and addressing national needs;
- Create synergies between different clusters of Horizon Europe by promoting the utilisation 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 participation in upstream R&D projects, acquiring competences that can then positively impact the position of Portuguese entities in the value chain of ESA programmes and also benefit nationally funded initiatives, such as the Atlantic Constellation or the Space Ecosystem in Santa Maria.
- Promote participation of Portuguese entities in calls related to space based 5G and quantum communications, in order to build capacity and, in the long term, contribute to creating an ecosystem of reference in future disruptive technologies.
- Foster space related innovation for social economic development based on scientific excellence and competitive industrial capabilities.

Portugal is very pleased to see the launch of topics aimed at achieving concrete results, particularly those that allow companies to improve their capabilities, whether in technological terms or aimed at their best assertion in the market. Portugal Space is establishing synergies between different sectors, to generalize the use of space-based data and technologies. Thus, Portugal is strongly committed in investing in space, and EC funds are an essential component to reach its goals.

## 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, a number of 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 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

| **H2020** | | ***# projects*** | ***# coordinated projects*** | ***EC funding (M€)*** | ***funding rate (%)*** |
|---|---|---|---|---|---|
| **SC5 - *Climate action, environment, resource efficiency and raw materials*** | **2014-2019** | 100 | 6 | 46.22 M € | ***2.25%*** |
| | ***2018-2019*** | *26* | *2* | *12.68 M €* | ***1.70%*** |
| **SC3 - *Secure, clean and efficient energy*** | **2014-2019** | 155 | 15 | 83.92 M € | **2.42%** |
| | ***2018-2019*** | *62* | *8* | *31.14 M €* | ***2.68%*** |
| **SC4 - *Smart, Green and Integrated Transport*** | **2014-2019** | 56 | 4 | 22.13 M € | **1.00%** |
| | ***2018-2019*** | *17* | *1* | *4.47 M €* | ***0.70%*** |

- PT participation in H2020 on the three areas that constitute this Cluster is uneven. Climate and Energy are clearly above the national average (currently at 1,67%), while the mobility sector shows 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 PT participation being quite scattered among small SMEs, research centers and universities.

- The PT 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 PT stakeholders have been more successful as of late has been the area of Smart Cities and Communities.
- PT participation in the JTIs in the area of energy and mobility (Fuel Cells and Hydrogen, CleanSky2, SESAR and Sift2Rail) is 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).
- PT participants in climate action are mainly focused in adaptation aspects. There is a need to enlarge PT 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 PT 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<br>• Solid track record in the area of Smart Cities and Communities<br>• 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<br>• Limited PT participation in European Partnerships in general<br>• PT participants in climate action are mainly focused in adaptation aspects<br>• 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<br>• 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.<br>• The recent funding of important mobilizing projects (*Projetos Mobilizadores*) 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<br>• 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<br>• 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 PT participation in this Cluster, there is a need for a clear multi-ministerial 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
- 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 PT stakeholders to HE
- Enlarge the PT 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 hydrogen[28], 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 PT entities in European initiatives in the area of Hydrogen

28 https://participa.pt/contents/consultationdocument/Estrate%CC%81gia%20Nacional%20para%20o%20Hidroge%CC%81nio%20DRAFT%20publicac%CC%A7ao.pdf

- 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 PT participation has been quite robust, and which will offer many opportunities in HE, with a dedicated Mission Area and a proposed Partnership
    - Envolve as many PT cities as possible in the initiatives deployed within the Mission Area of Climate-neutral and smart cities
    - Engage with the Portuguese expert (Prof. Paulo Ferrão) in the Mission Board
- 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.

## 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 (SG) 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'[29]) aimed at contributing to the objectives and expected impacts set-out in the strategic orientations.

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

1) The bringing together of several areas and actors, from 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
2) The large amount of partnerships (Accelerating farming systems; Animal health; Environmental observations; Biodiversity; Blue Economy; Safe and sustainable food system; Circular bio-based Europe; Water4all) that cross-over with this cluster, which demands a lot in terms of national resources and different participation approaches
3) Contributing towards all five missions envisaged for the first period of HEU, which creates both opportunities and a possible fragmentation in participation.
4) The articulation of 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

Data of PT participation in H2020 thematic areas that are relevant to Cluster 6 (latest officially published call results)

| H2020 | | *# projects* | *# coordinated projects* | *EC funding (M€)* | *funding rate (%)* |
|---|---|---|---|---|---|
| *SC2 - Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy* | 2014-2019 | *138* | *3* | *48,8* | *2,4* |
| | *2018-2019* | *49* | *1* | *18,9* | *2,2* |

[29] At this time, the destination areas are: 1) Biodiversity and Ecosystem Services, 2) Fair, healthy and environmentally-friendly food systems from primary production to consumption, 3) Circular economy and bioeconomy sectors, 4) Clean environment and zero pollution, 5) Land, oceans and water for climate action, 6) Resilient, inclusive, healthy and green rural, coastal and urban communities, 7) Innovative governance, environmental observations and digital solutions in support of the Green Deal.

| | | | | | |
|---|---|---|---|---|---|
| SC5 - *Climate action, environment, resource efficiency and raw materials* | 2014-2019 | *91* | *6* | *45,9* | *2.2* |
| | *2018-2019* | *25* | *2* | *12,5* | *1.7* |
| BIOTEC (NMBP) | 2014-2019 | *12* | *2* | *9,0* | *3,5* |
| | *2018-2019* | *3* | *1* | *3,3* | *4,5* |
| Bio-Based Industries Partnership (BBI JU) | 2014-2019 | *22* | *3* | *10,4* | *1,5* |
| | *2018-2019* | *11* | *2* | *6,2* | *3,0* |

**Values of funding rate percentage in green are above the PT investment 1,65%, in red are below

- SC2 and SC5 have a 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: 37 running projects (totaling 62 participations), with 2 national coordination's. This amounts to 15,7 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 (22%) particularly when compared to the weight of actors from academia (~29%). The amount of funding captured by Municipalities is particularly relevant in demonstration projects, where Lisbon and Porto took the role of leading cities (~49% of the 29%). The potential of creating diversified national consortia in these cases is significative.
- 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, which is expected to continue 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 sector[30] 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

[30] Due to the wide range of applications, colours have been used to differentiate the main areas of research, such as white (industrial), green (agricultural, environmental), blue (marine and fresh water) and red (health), among others.

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 participations of the PT community in other parts of H2020 (ERC, MSCA, INFRA) are also expected to leverage future participations in this Cluster.
- Lastly, PT's involvement and experience in the PRIMA[31] 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.

[31] Partnership for R&I in the Mediterranean Area: joint programme created through an Article 185 initiative under H2020 (http://prima-med.org/)

*SWOT ANALYSIS*

| | Positive | Negative |
|---|---|---|
| Internal | Strengths<br>• Builds-on entities, communities and networks with good track records in H2020<br>• National strategies[32] 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.<br>• 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)][33].<br>• Dedicated R&D agencies such as PT Space and Air Centre that facilitate the dynamization of communities and provide specific national support.<br>• Existence of a large pool of highly qualified researchers with H2020 experience.<br>• High participation in national R&D funding programs such as the ones managed by Portugal 2020.<br>• Existence of sectorial funds (eg. Fundo do Ambiental, Fundo das Florestas, Fundo Azul) and prizes.<br>• 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.<br>• The participation of the PT Bioeconomy sector in the BBI JTI | Weaknesses<br>• Traditionally, a small percentage of private sector participation:<br>  ○ Not enough large companies<br>  ○ PT SMEs are not well connected with PT large companies<br>• Complicated landscape of opportunities that paints an unclear pathway to a successful participation<br>• Lack of sustainability over time in the different types of structures at national level<br>• Fragmented ecosystem at national level with some overlap of roles an unclear perception of the national system by international counterparts<br>• Lack of strategy in HEU participation in most institutions, in some cases due to lack of specialised HR<br>• Researcher careers do not sufficiently value participation in EU projects<br>• Lack of synergies between national sectorial funds and EU funding programmes<br>• In the past, the PT participation in partnerships suffered from the budget limitations<br>• Lack of clear signposting of opportunities between all funding programmes |
| External | Opportunities<br>• 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.<br>• A National Bioeconomy Strategy Planning is under development alongside the Common Agriculture Policy Strategic Plan<br>• A new set of partnerships allows for an early engagement<br>• The use of ESIF partnership participation as national commitment under more favourable conditions<br>• Use of sectorial funds to catapult synergies among national and international instruments. | Threats<br>• Difficulty in participating in partnerships as a strategic tool by national entities<br>• 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.<br>• Difficulty in mobilizing national financial resources that would allow for a more efficient participation in partnerships<br>• Poor alignment of regulations between HEU and ESIF that hinders easy access to |

[32] The new Innovation Agenda for Agriculture, recently presented (11 Sept 2020), is a strategy outlined for 10 years aiming to innovate agriculture, with more citizens awareness, providing more income to farmers, with more future, more health, more inclusion and more innovation

[33] It is possible to identify as related to the thematic areas of this Cluster the creation of 13 CoLab, 6 CIT, 21 CC, 5 Clusters and more than 100 OG.

| | | |
|---|---|---|
| | • Proximity between industry, end-users, academia and researchers through the well-developed networks of operational groups, clusters, CoLabs, incubators and CITs, in addition to the European-level networks such as the Climate and Food and Digital KICs<br>• Opportunity to influence European R&I priorities through the social capital that Portuguese entities already have in initiatives such as EIP AGRI.<br>• Participation in large demonstration projects leverages the participation of non-traditional actors, with opportunities for missions<br>• The combination of knowledge and skills of existing collaborative platforms [competitiveness clusters (eg. Portuguese Agro-Food cluster) and industrial associations (eg. P-BIO)] increases private sector internationalization opportunities<br>• The cluster includes strategic areas of the National R&I policy such as Ocean, Space (earth observation) and Digital | structural funds for national contributions and other synergies among funds<br>• The partnership models and their governance are unclear<br>• The top-down opportunities and the need for international collaboration are not considered attractive for many PT stakeholders<br>• Difficulties in project execution, namely legal barriers to talent recruitment particularly in public organizations.<br>• The complexity of the funding instruments in this cluster: the high number of partnerships, missions and overlap of clusters themes with other clusters, may obscure opportunities for stakeholders particularly newcomers.<br>• Long decision process and heavy bureaucratic procedures may demotivate stakeholders particularly SME. |

### *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 to be 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 design of the mission areas under discussion so there will be calls targeting specific PT communities.
    c. Utilizing national networks of Collaborative Research Labs (CoLabs),Technological Innovation centres (CIT) Competence Centres, Competitivity Clusters (such as Agro-food, 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.
    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, in particular with those cluster-related winners of the highly competitive SME instrument (SMEi) (33/111 SMEi phase-1 winners and 5/34 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.

d. Promoting high level engagement alongside the upcoming PT presidency of the Council of the EU, through the organization of two High-level Conferences:

   i. Azores High Level Conference: Sustainable Oceans, to be held in Ponta Delgada on the 3-4 of June 2021. It is envisaged that the conference results in the signature of an Azores declaration focusing on the connection Oceans- Space-Climate, building upon the Galway Statement on Atlantic Cooperation (2013) and Belem Statement on Atlantic Research and Innovation Cooperation (2017).

   ii. Towards a climate-resilient economy – making the best of innovation and space-based tools

5) Ensuring there are synergies and funding complementarities to catapult the participation of PT entities in HE:

   a. 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 Vale do Coa Region (2019) and Montesinho (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 Water[34], where PT has been very successful/active in the past

   e. Building synergies with CAP, namely through the national strategic plan currently under development

   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.

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) currently under design. This entails:

   a. A good communication with the CCDRs and policy related governmental agencies

[34] 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).

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*

This is a Cluster where, to date 8 partnerships are proposed. The proposed European Partnerships (7 Cofund and 1 Article 187) will impose a great demand for PT to participate (**Erro! A origem da r eferência não foi encontrada.**)

In order to do this, 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 mobilising 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-next-research-and-innovation-framework-programme/european-partnerships-horizon-europe/candidates-food-security_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 synchronised articulation between structural funds and partnerships in order 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 the 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 as set-out during the Portuguese presidency;
- 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

## 3.1 Pillar “Set Sail for Innovative Portugal”

How Portugal will innovate by using the European Innovation Council (EIC), European Innovation Ecosystems (EI Ecosystems) and European Institute of Innovation & technology (EIT)

## *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 connectiveness 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 ~ 10.500M€ (still to be approved), 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 foreseen budget of ~8.000M€, 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 Pilar 3's single partnership, named Innovative SME. 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 1** 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%.

**Portuguese participation in HORIZON 2020 under the EIC pilot instruments, EIT and Eurostars**

| Instruments | *# projects* | | *# coordinated projects* | | *EC funding (M€)* | | *Funding rate (%)* | |
|---|---|---|---|---|---|---|---|---|
| | ***2014-2019*** | ***2018-2019*** | ***2014-2019*** | ***2018-2019*** | ***2014-2019*** | ***2018-2019*** | ***2014-2019*** | ***2018-2019*** |
| ***SME-i – Phase 1*** | 110 | 36 | 108 | 36 | 5.35 | 1.80 | **2.54** | **2.02** |
| ***SME-i – Phase 2*** | 23 | 13 | 22 | 12 | 33.3 | 18.79 | **1.33** | **1.41** |
| ***FET*** | 38 | 24 | 12 | 6 | 20,52 | 11.10 | **0.97** | **1.10** |
| ***Fast Track to Innovation*** | 16 | 11 | 4 | 3 | 6.74 | 4.37 | **1.67** | **1.45** |
| ***EIT*** | 105 | 38 | n.a. | n.a. | 14,95 | 5.08 | **1.12** | **1.45** |
| ***Eurostars*** | 21 | 14 | 2 | 2 | 0,348* | 0,165* | na | na |

**Only projects funded by State budget receive EC contribution ("top-up" 23,5%) Some projects where 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. Branding 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 high 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 ~1.5%.

The biggest opportunities will be in the 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*

| **Strengths** | **Weaknesses** |
|---|---|
| • Strong national strategy to support the entrepreneurial ecosystem (e.g. StartUp Portugal, Websummit);<br>• Dynamic tech-based SMEs with a significant weight of startups. The most successful are from the ICT sector (low initial investment);<br>• Increasing entrepreneurial experience;<br>• Highly qualified talent in STEM areas;<br>• Excellent participation of Financial intermediaries on InnovFin (HORIZON 2020) Financial instruments. | • Risk aversion culture, and low failure acceptance;<br>• Business development talent is increasing but is still a bottleneck. Portuguese founders are highly skilled and qualified, but the majority do not have previous experience in business;<br>• Few role models;<br>• Insufficient support on financial needs of companies in different maturity levels;<br>• The national instruments lack flexibility, companies need to assume all the risk;<br>• National agencies lack soft support measures to innovators;<br>• Some Universities support offices are still too focused on supporting researchers leaving innovators with less support;<br>• Gender imbalance with significant disparity between male (90.3%) and female (9.7%) founders;<br>• Not adequate IP regulation to protect knowledge and its commercial exploration.<br>• The costs of submitting a patent are high but it is even higher to maintain it;<br>• Insufficient mechanisms for public procurement of innovation. |
| **Opportunities** | **Threats** |
| • HE focus on individual innovators and SMEs brings new opportunities for early stage ideas;<br>• The use of short evaluation cycles and focus on the needs of innovators;<br>• The integration of FET schemes in EIC (Pathfinder) may shorten evaluation cycles in this scheme. This could attract more | • The focus on DeepTech that still exists in the HE may limit the number of SMEs;<br>• Low international awareness and recognition about Portuguese tech companies and ecosystem places Portuguese entrepreneurs in a low-tech stereotype;<br>• Crowd out of the VC market by the EIC fund; |

| | |
|---|---|
| companies since the scheme would be more aligned with market cycles;<br>• Modernize the IP regulation and give adequate financial support to SME;<br>• Increased synergies with other funds may allow to improve the alignment among EU and National funding schemes;<br>• The ecosystem is maturing at a fast pace and could use the EIC to leapfrog;<br>• Crowding the European VC market with more involvement of Portuguese Corporates in the VC game;<br>• Use of ESIF to fund Seal of Excellence.<br>• Creation of a national Competence Centre to support public procurement of innovation | • 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:

5) **Promote the participation and connectiveness 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 Transfers Officers 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. Work closely with actors in the national innovation ecosystem, such as CIT, Colabs and consultants, to identify new business projects;
   e. Promote good practices in writing proposals, in collaboration with evaluators and consultants;
   f. Promote the EIC fund with Investors (Banco Português do Fomento, Venture Capitals and Business Angels);

6) **Overcome funding gaps for early stage innovators and start-ups:**
   - 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;
   - 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;
   - Ensure the continuity of the financing instrument dedicated to the Seals of Excellence (SoE) of the EIC Accelerator.
   - Increase the formal participation of national companies in the EIT Innovation Communities and explore the EIT instruments;

- **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.

- **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;
    b. 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.

# Pillar 4

## Widening Participation and Strengthening the ERA

The Horizon Europe Horizontal Activity is still under design (as of September 2020). The work programme is under discussion and although a tentative budgetary allocation has been made totaling *ca.* 3,000 M€, out of which ca. 2,500 M€ to the section of *Widening Participation and Spreading Excellence*, Member States are yet to discuss the individual budget for each instrument. Other 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 the Horizontal Activity of Horizon Europe 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 the context of the Horizontal Activity of Horizon Europe.


- 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**.

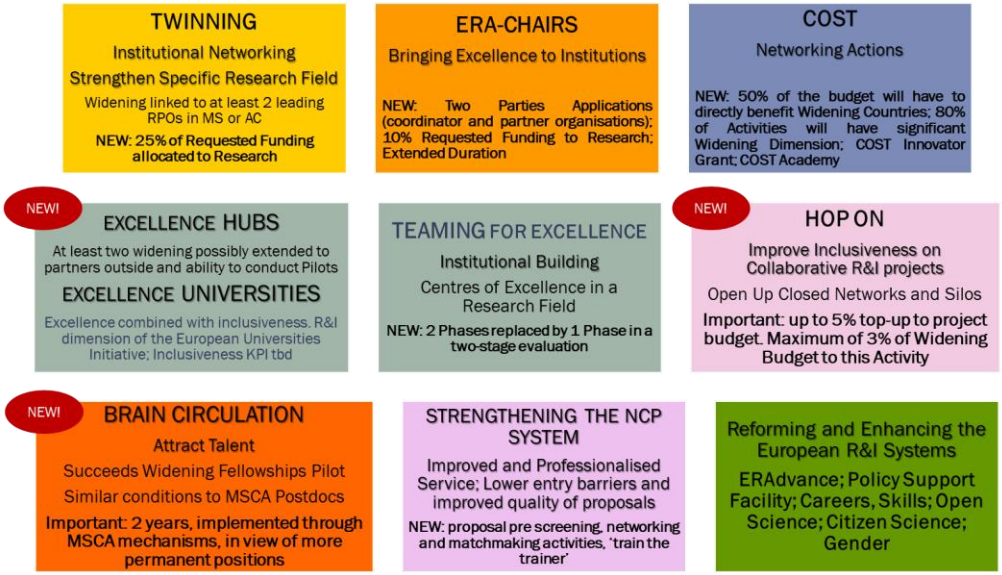



**Figure 2. Type of activities to be implement in the Horizontal Activity of Horizon Europe.**

Considering the current state of the art regarding the Work Programme and budgetary allocation, the following sections concern only the four main widening actions (Teaming, Twinning, ERA-Chairs and COST).

## 4.1 Teaming, Twinning, ERA-Chairs

### *SCOPE*

Widening Participation and Strengthening the ERA 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). Herein, it is provided an overview and analysis of the three main actions, i.e. Teaming (Phase 1 and Phase 2), Twinning and ERA Chairs. COST is addressed independently, considering Portugal's current privileged position. 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 this horizontal pillar at the national level);
- **Leveraging and Articulating Funding Sources.** Considering the type of funding offered by the three main widening actions (not focused on research itself), it is relevant to leverage 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 (Teaming, Twinning and ERA-Chairs). 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 funding sources;
- **Synergies and the Pathfinder Character.** As it is also mentioned in the section dedicated to COST, 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 these 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: 442 (99 with PT participation and Portugal was able to attract, under H2020, 100 M€);
- Teaming Projects: Phase 1 (400 K€, 12 months); Phase 2 (15 M€, 5-7 years); Twinning Projects: ca. 1M € for up to 3 years; ERA-Chairs: up to 2,5 M€ for up to 5 years.

## *FACTS*

Portugal in Widening Main Actions (selected stats under H2020, updated on September 2020)

Data: Extraction on September 2020

| | PT Present Status | Total | PT Objective 2027 |
|---|---|---|---|
| Number of Proposals submitted | 630 (16%) | 3921 | **16%** |
| Projects Approved | 99 (21%) | 481 | **200** |
| Success Rate (average) | 15,7% | 12,2% | **16%** |
| Global overview on budget allocation to PT | 100 M€ (11,5%) | 870 M€ | **200-250 M€ (12%)**** |
| Contribution to the global PT objective of 2.000 M€ | 100 M€ (5%) | ---- | **10%** |

*includes data of 2020

** considering the budget for Widening Participation and Spreading Excellence will (at least) duplicate in Horizon Europe for these 3 Main Widening Actions, it is calculated a figure based on maintaining success rates.

## *SWOT ANALYSIS*

| Strengths | Weaknesses |
|---|---|
| • Supports countries and regions that are lagging behind in terms of research and innovation performance (EU13) to develop their research and innovation potential (Portugal included in the EU13 list, commonly known as Widening countries);<br>• Promotes the implementation of ERA priorities across EU13 countries;<br>• Very targeted actions addressing gaps in international networking, institutional building and attraction and retention of human capital;<br>• 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; 16% of applications); | • Limited and restrictive budget in all actions (in essence they do not fund research itself);<br>• Lack of synergy and articulation with European structural and investment funds;<br>• Less developed regions generally excluded from Widening funding;<br>• Insufficient focus on institution governing and management;<br>• PT: Low participation levels in Teaming (8 proposals submitted and 3 funded; half the projects compared to Cyprus);<br>• PT: Social and Humanities with little participation in Widening Actions;<br>• Some key research centres are not very successful in Widening. |
| **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);<br>• 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;<br>• 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; | • Teaming: difficulty to unlock the complexity normally associated to the application process;<br>• Lack of information (and perceived complexity) on how to access regional and structural funds, which reduces the number of applications (particularly for Teaming);<br>• Need for national and regional strategies to take advantage of the Teaming funding scheme;<br>• Greece will be part of the Widening community (a strong competitor) and success of Portugal will depend on participation levels;Greece is currently designing policies and strategies to use structural funds to leverage their widening applications;<br>• Insufficient NCP training in proposal pre-checking and in business plan writing; |

| | |
|---|---|
| • Raise awareness in the community, particularly Social Sciences and Humanities, and Environmental sciences;<br>• Participation levels can be increased: several institutions with high research potential and critical mass are not successful in Widening;<br>• Health Sciences has the largest share of funded projects (PT): 54% (establish links to Pillar I and Pillar II) | • Under COVID, how to adapt to the natural dependence on mobility schemes? |

## *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.** Increase participation levels in Widening Actions with larger budgets (e.g. Teaming), considering the present discrepancy between the percentage of the total projects funded (22%) and the percentage of overall funding (12%) transferred to Portugal;
- **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);
- **Training of NCPs and Research Support Officers (Structural Funds).** Provide training on the use of structural funds in order to empower the scientific community and its institutions in order to maximise their candidatures for institutional and regional growth.

## 4.2 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 2018) **

| | **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. 1500 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.*

## *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;<br>• PT benefits from being a Widening Country and for being an outlier among Widening Countries;<br>• 50% of COST Budget in HEU will be directly transferred to Widening participants;<br>• 80% of COST Activities have to be widening-inclusive;<br>• Particular attention to career development and Young Researchers;<br>• Leverages nationally funded projects;<br>• 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);<br>• More than 50% of the mobility schemes are among the top-5 countries, so brain circulation is not balanced;<br>• 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);<br>• 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;<br>• Leverage of nationally funded research through networks;<br>• Inclusion of young researchers in networks of reference;<br>• Promote Scientific Employment and PhD. Grants through COST;<br>• Track participation in COST and subsequent success in other FP Programmes and Instruments;<br>• Increase number of proposals submitted by PT taking advantage of the Widening status;<br>• Bilateral agreements with EURAXESS on top of the one with the JRC;<br>• Link to ERC, MSCA, Erasmus+, Teaming and Twinning;<br>• Pre-Portal to Pillar II and Pillar III actions;<br>• 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;<br>• The fact COST does not provide information to its Member Countries diminishes its visibility;<br>• If COST moves from an intergovernmental association to an agency similar to ERC, it will loose its appeal and interest, as Pillar II instruments may mimic COST networking instruments;<br>• COST cannot envision a simple increase in the number of COST Actions if a larger budget is granted. The priority should be for a larger budget for each COST Action so that more mobility schemes can be funded (e.g. currently 60% of the budget of a COST Action is dedicated to meetings, which normally benefit the same person throughout the 4 year period of a COST Action). This will be then aligned with PT's priorities.<br>• Need to quickly adapt the funding scheme to virtual environments. COST needs to justify its existence in a "coronavirus environment". |

### *INSTITUTIONAL STRATEGY – 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 Teaming and Twinning 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;
- 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.

### *MAIN PRIORITIES*

- Budget negotiations for HE, Ministerial Conference in 2021 in Portugal, and now the positioning of the programme under the COVID “cloud”;
- Full disclosure of the database on the participation on COST Activities and to oblige COST to send the information on an e-CORDA type format: this will allow the understanding of brain circulation and leverage participation in other FP instruments;
- 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);
- Increase the number of young researchers participating in COST (currently at 37% of all PT’s participants) and their leadership capacities by analysing complementary national funding mechanisms.

# 5 ERASMUS

## 5.1 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 instituitions, for further development for the next 2021-2027 programme.

Erasmus+ will continue to reinforce and encouraging 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 current Erasmus+ Programme, completed by the end of 2020, and the next Erasmus+ Programme for the period 2021-2027 must be accompanied by modernization and reinforcement of the actions developed within the scope of the current programme. Thus, a strategy and an organizational and management structure must be 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 labour 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 organisations active in the education, training and youth fields) and aiming to:

- 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 labour market and beyond;
- 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;
- enhance notably the participants' foreign languages competence;
- 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;

- 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 new skills and sustained productivity in an increasingly digitalised world economy;
- increase the capacities, attractiveness and international dimension of organisations active in the education and training fields so that they are able to offer activities and programmes that better respond to the needs of individuals, within and outside Europe;
- reinforce synergies and transitions between formal, non-formal education, vocational training, employment and entrepreneurship;
- 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:

- enhance the attractiveness of higher education in Europe and support European higher education institutions in competing on the higher education market worldwide;
- support the priorities identified in the “New European Consensus on Development” and the "European Higher Education in the World" Communication;
- support the internationalisation, attractiveness quality, equity of access and modernisation of higher education institutions outside Europe in view of promoting the development of Partner Countries;
- 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;
- promote non-formal learning and cooperation in the field of youth with Partner Countries.

Organisations 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:

- 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.
- offers space for developing mobility activities that involve partner organisations 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 centres; business experts giving lectures or training in higher education institutions, etc.)

- allows participating organisations to organise 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 organise several mobility activities, allowing many individuals to go abroad to different countries. As a consequence, the applicant organisations will be able to conceive their project in line with the needs of participants, but also according to their internal plans for internationalisation, capacity building and modernisation.

### *MOBILITY PROJECTS FOR HIGHER EDUCATION STUDENTS AND STAFF*

Mobility projects can take place:

- within Programme Countries (KA103)
- between Programme and Partner Countries (KA107)

and comprise one or more of the following activities:

- **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).
- **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.

The majority 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 a number of 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 HIGER EDUCATION STUDENTS AND STAFF*

Overall participation in higher education student and staff mobility within programme countries (KA103) has consistently increased from 2014 to 2020.

With regard to 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**

KA103 HIGHER EDUCATION STUDENT AND STAFF MOBILITY WITHIN PROGRAMME COUNTRIES

| | 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 |

* Provisional data

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

| Year | OUTBOUND STUDENT MOBILITY | | | INBOUND STUDENT MOBILITY | | |
|---|---|---|---|---|---|---|
| | 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.

| Year | OUTBOUND STAFF MOBILITY | | | INBOUND STAFF MOBILITY | | |
|---|---|---|---|---|---|---|
| | STA (Teaching) | STT (Training) | TOTAL | STA (Teaching) | STT (Training) | TOTAL |
| 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 (KA107) has consistently increased from 2015, which is when this Action started, to 2020.

Similar to KA103, incoming learner mobility is significantly higher than outgoing learner mobility. Incoming staff mobility is also higher than outgoing staff mobility, although the gap is smaller.

Unlike KA013, and worth noting, staff mobility outweighs learner mobility both incoming and outgoing.

## *DATA ON THE PORTUGUESE PARTICIPATION IN KA107 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 KPIS FOR PT PARTICIPATION IN MOBILITY PROJECTS FOR HIGHER EDUCATION STUDENTS AND STAFF (2021-2027)*

While aiming to increasing incoming and outgoing mobility (with national additional funding for outgoing), setting a concrete goal is countered by the fact that there is no indication yet as what to amount of funding will be allocated to PT, and what will be the distribution by sectors and by actions. While this is the case for KA103, in relation to KA107 the situation is even more complex as funding for mobility between Programme and Partner Countries comes from several financial instruments of the European Union for external cooperation.

The European target was 20% by 2020; in 2017/18 there were 49 708 foreign students in Portugal, one sixth of the total of ES, according to the Portuguese American Journal of 27 November 2018. A target of 25% by 2027 would be adequate.

## *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 longstanding flagship Programme of the EU<br>• Erasmus ranks high in the internationalisation strategy of PT and PT HEI<br>• High demand for mobility<br>• PT supports disadvantaged SMS and SMT who have been awarded Erasmus grants | • Lack of national funding to complement EU funding<br>• Not all HEI may be prepared to make the most of the opportunities afforded by the Erasmus Programme |
| **Opportunities** | **Threats** |
| • New Erasmus+ Programme whose budget is expected to double<br>• The opportunity afforded by the new programme to rethink national infrastructure in charge of managing Erasmus<br>• Phased in implementation of Erasmus Without Paper allows time to adapt and is expected to streamline mobility processes and decrease administrative burden | • New Erasmus+ Programme still not approved<br>• The breakdown between centralised and decentralised actions<br>• Uncertainty as to how the expected raise in funding under the new Programme will be translated into the budget allocated to PT and the budget across sectors<br>• Uncertainty as to how the COVID-19 pandemic will impact incoming and outgoing mobility |

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

Overall, KA103 mobility projects show a good level of performance, especially with regard to student mobility. However, since many outbound SMS are not awarded grants due to limited grant funding, PT could consider the possibility of allocating additional funding for mobility to allow more students to take part in this Action. On the other hand, the outbound SMT seems to be underperforming. This mobility could be especially 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 should be encouraged.

On top of that and building upon the experience of some north European countries, a pilot could put in place under which volunteering PT HEI could implement mandatory mobility activities to assess the feasibility of such a scheme in the national context.

## *INSTITUTIONAL STRATEGY (2021-2027)*

The award of an Erasmus Charter for Higher Education (ECHE) is a pre-requisite 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 organisation active in the labour market or in the fields of education, training and youth.

Therefore, in order to raise participation levels, HEI yet not holding the ECHE should be encouraged to apply to it.

Likewise, national mobility consortia should 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, it is hoped that 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. Therefore, synergies should be sought whenever feasible and bringing more added value. In this regard, it should be noted that the “Seal of Excellence”, to be awarded to projects that although meeting the required quality criteria cannot be funded due to budgetary restrictions, so that such projects may apply for alternative funding, is foreseen within the framework of the Erasmus+ Programme 2021-2027.

## 5.2 European Universities Initiative

# Mobility Projects in the field of education and training

### *SCOPE*

In November 2017, the 28 EU leaders debated the future of education at the Gothenburg Social Summit in Sweden.

In the same month, the European Commission set out a vision for a European Education Area to be built by 2025 “in which learning, studying and doing research would not be hampered by borders”. The European Universities Initiative is a flagship initiative of the European Education Area. It will enable 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 suddenly 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 labour market and societal transitions require higher education institutions 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 our 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 will soon be cooperating, involving more than 280 HEI, and a total budget of about € 287 million. Each Alliance will be granted up to € 5 million coming from the Erasmus+ Programme and up to € 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 2 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 | | 16 | 21 | 37 |
| Selected PT HEI | | **3** | **7*** | **10** |
| Alliances with PT HEI | Partner | 3 | 6 | 9 |
| | Coordinator | 0 | 2 | 2 |
| Total Alliances | | 17 | 24 | 41 |

* 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:

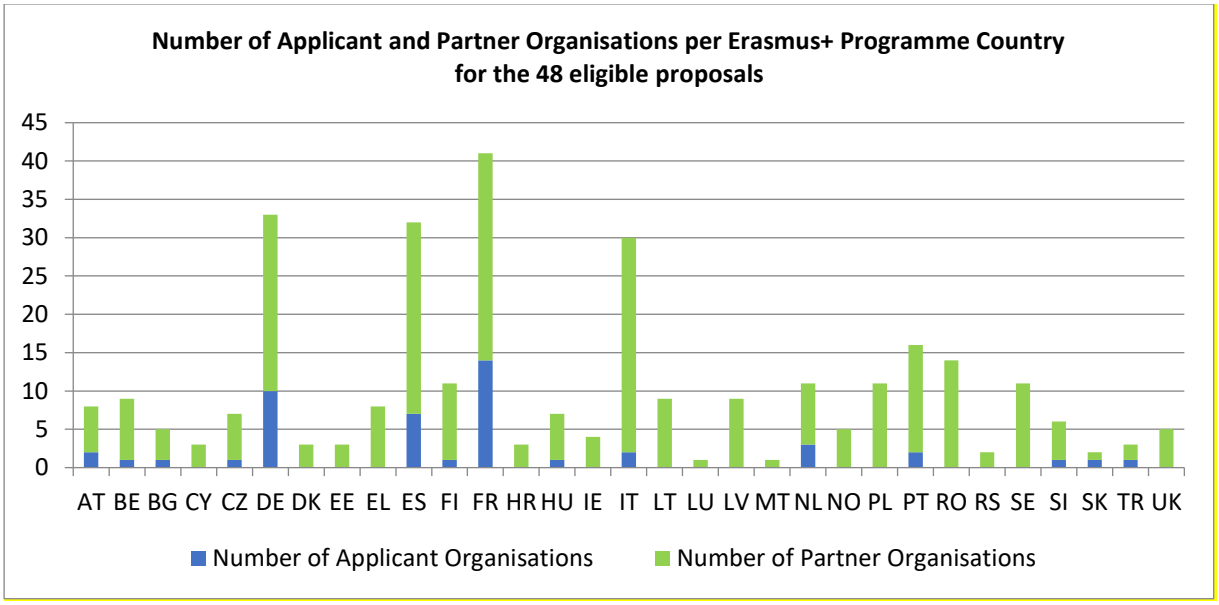
- Instituto Politécnico do Porto – ATHENA;
- Instituto Politécnico de Setúbal – E3UDRES2;
- Universidade de Coimbra – EC2U;
- Universidade Lusófona – FILMEU as Coordinator;
- Instituto Politécnico de Leiria – as Coordinator - and Instituto Politécnico do Cávado e Ave (both in the same Alliance) – RUN-EU;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

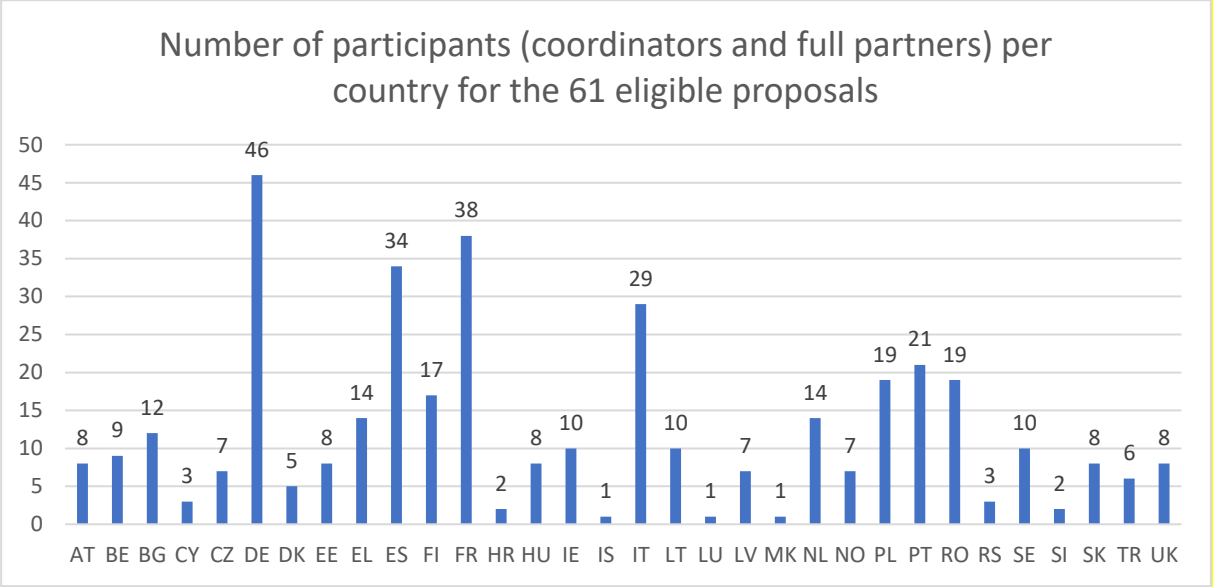
## *DATA ON THE PORTUGUESE PARTICIPATION IN EUROPEAN UNIVERSITIES ALLIANCES*

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 – € 85 million for the 1st call and € 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.

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

With regard to 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. In the first call, French HEI take the lead, followed by German, Spanish and Italian HEI, whereas in the second call German HEI outweigh French HEI, again followed by Spanish, Italian HEI.






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. As an example, France and Spain which are on the four top performing countries with regard to eligible applications do not seem to do as well in terms of participation and selection rates on account of having very high numbers of eligible institutions. At the other end of the spectrum, Malta with only 7 eligible HEI and 1 HEI participating that was also selected, reaches a good participation rate and the best selection rate in the 1st call.

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[35]** | **N° of selected higher education institutions** | **% selection rate[36]** |
|---|---|---|---|---|---|
| AT | 76 | 8 | 11% | 2 | 3% |
| BE | 74 | 9 | 12% | 4 | 5% |
| BG | 51 | 5 | 10% | 0 | 0% |
| CY | 35 | 3 | 9% | 1 | 3% |

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

| | | | | | |
|---|---|---|---|---|---|
| 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% |
| PT | 97 | 16 | 16% | 3 | 3% |
| MK | 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% |
| 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 call[37]

| | N° of higher education institutions with a ECHE | N° of higher education institutions participating in the call | % participation rate[38] | N° of selected higher education institutions | % selection rate[39] |
|---|---|---|---|---|---|
| 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% |
| LI | 1 | 0 | 0% | 0 | 0% |
| LT | 38 | 10 | 26% | 2 | 5% |
| LU | 5 | 1 | 20% | 1 | 20% |
| LV | 52 | 7 | 13% | 2 | 4% |
| MK | 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% |

[37] Note on the total number of HEIs with ECHE for France and Spain: France and Spain decided to integrate the short-cycle degrees into upper-secondary 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.

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

[39] Defined as the percentage of selected higher education institutions compared to the total number of eligible higher education institutions

| | | | | | |
|---|---|---|---|---|---|
| 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 PT PARTICIPATION IN EUROPEAN UNIVERSITIES (2021-2027)*

There will be no more calls under the pilot phase. In 2021-2027 this Initiative will be rolled-out under the future Erasmus+ Programme, in synergy with Horizon Europe and other EU instruments.

While aiming to increasing participation of PT HEI in this Initiative, setting a concrete goal is countered by the fact that there is no indication yet as what amount of funding will be earmarked by which programme and/or instrument in order to support European Universities Alliances.

However, this should not deter PT HEI from either fine-tuning applications that were not selected previously or taking the necessary steps to work with their European counterparts in developing a strong partnership with a view to being well prepared to submit applications likely to be successful under future calls.

### *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<br>• Boost the international dimension and activity of PT HEI<br>• Increased synergies between education and research at institutional level<br>• PT awards additional support to the selected HEI through FCT managed PhD grants | • Lack of national funding to complement EU funding<br>• No support for HEI either not selected or not participating |
| **Opportunities** | **Threats** |
| • New Erasmus+ Programme whose budget is expected to double<br>• 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<br>• Explore interlinkages with other EU programmes and instruments<br>• In the context of the Trio Presidency of the Council of the EU, Council Conclusions on the European Universities are being prepared | • New Erasmus+ Programme still not approved<br>• Unknown EU budget to support this initiative<br>• Uncertainty as to how the COVID-19 pandemic will impact European Universities, also in terms of incoming and outgoing mobility |

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

A significant number of MS allocates additional funding for their HEI that are selected for European Universities Alliances. In the light of the feedback that could be gathered from PT HEI already participating in European Universities Alliances as to what type of support they felt could be beneficial to their work, other forms of support could be equated in addition to the support already provided through FCT.

### *INSTITUTIONAL STRATEGY (2021-2027)*

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

- Hold dissemination and promotion events targeted to PT HEI
- Assist PT HEI that applied and were not selected in overcoming the likely causes that led to their exclusion
- Establish a contact point to liaise with HEI and support those wishing to apply
- Assuming that not all PT HEI will eventually become members of a European University Alliance, consider how this might impact such HEI

### *OTHER CHALLENGES*

Unlike the mobility under Erasmus, the remit for European Universities is to create inter-university 'campus', 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.

In fact, according to a recent 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.

### *PRIORITY*

Taking into account that most of the funding for this initiative came from the Erasmus+ Programme, the priority is working within the Trio Presidency of the Council of the European Union to get the approval of the next Erasmus+ Programme (2021

# 6. 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 €. 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, 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 € (and additional 0,9 M € 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 € |
| eIdentification 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€.

### *PROPOSED GOALS (2021-2027)*

- 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.
- 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.
- 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 AI applications. The aim is to make exascale computing capacity accessible to all Member States and users, including industrial ones.
- 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.
- 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.<br>• New generation submarine cables linking Portugal with other continents: ELLA.LINK to Latin America, EQUIANO to Africa, etc.<br>• Interest of HPC and AI users in Portugal as seen in requests to use current national platforms and grants in PRACE calls<br>• Engagement with European Data and Cloud federated infrastructures | • 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.<br>• 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.<br>• 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);<br>• Sectors highly dependent on international connectivity (e.g. finance, research, HPC);<br>• Leverage with several national initiatives: PT Space, AIR Centre, ELLA.LINK GeoLAB.<br>• Brexit will create pressure for EU have cables fully in its own domains. | • Other Atlantic EU countries might compete to capture the new centrality in the submarine cables |

## *STRATEGY - ACTIONS (2021-2027)*

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

### *STRATEGY - INSTITUTIONAL*

- 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.
- Promotion and reinforcement the participation of national entities / initiatives, by promoting their articulation with other key entities and infrastructures.
- 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).
- 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*

- Strategic terabit connectivity for HPC (linked EuroHPC joint undertaking)
- Strategic backbone networks for cross-border and sustainable cloud federations
- Submarine connectivity of strategic importance

# 7. Digital European Programme

The general objective of the Programme 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 large-scale 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.

*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) 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..

2) 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 with regard to high performance and cloud computing, big data analytics, cybersecurity, distributed ledger technologies (e.g. blockchain), quantum technologies, robotics, artificial intelligence . In SO4 DEPshall 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, in particular 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 DEP is legally created. The projects that already were launched by EuroHPC in 2019 and where national beneficiaries competed successfully for funds, were the following:

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

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

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 27.300.000 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) Data4EU
European Atlantic Platform - This platform is part of the Portugal Space 2030 strategy. There is an agency (PTSPACE) which oversees monitoring and implementation of this strategy.

2) "AI on demand Platform"
This platform will build on the H2020 project AI4EU (https://www.ai4eu.eu/). Two PT organization (IST and UC) are part of this project. Funding will be 100%.

3) TEFs (Testing and Experimentation facilities)

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 DEP orientation document. There is the intention of EC invest 1 500 M€ 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 | website | PT Participation |
|---|---|---|
| **IOF – Internet of Food and Farm** | https://www.iof2020.eu | Unparallel |
| **DEMETER** | http://h2020-demeter.eu/ | INIAV (3 pilots)<br>INESCTEC<br>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 | PT Participation |
|---|---|---|
| **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 Hardware AI

- Need to fill in the gap for chips/processors production in Europe; neuromorphic computing as an opportunity for EU.

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.
- HU has a track for autonomous driving tests

### *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 business[40]. 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.PT[41] has consistently increased[42], 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 incidents[43], it is not possible to attribute this bias it to less cyberthreats or attempts or intentions from malicious actors.

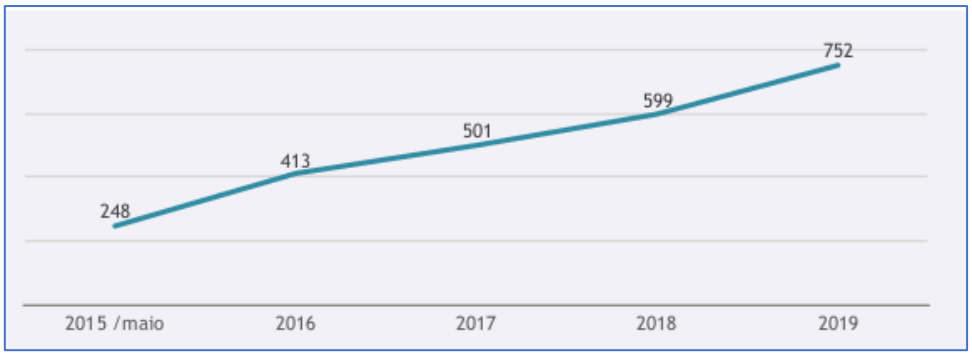



Figure 1 - Number of incidents annually recorded by CERT.PT (source: Report Cybersecurity in Portugal – Risks & Conflicts 2020, Portuguese Cybersecurity Observatory)

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 framework[44] 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.2030[45]. 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

[40] http://www.portugalin.gov.pt/why-portugal/tech-innovation-hub/
[41] The Portuguese Computer Security Incident Response Team under the National Cybersecurity Centre Portugal
[42] Report Cybersecurity in Portugal – Risks & Conflicts 2020, Portuguese Cybersecurity Observatory, https://www.cncs.gov.pt/content/files/relatorio_riscos.conflitos2020__observatoriocibersegurança_cncs.pdf
[43] Eurostat (2020a) Security incidents and consequences. Code: isoc_cisce_ic
[44] 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.
[45] https://www.incode2030.gov.pt/en/

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.

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.
- EDIHs can be built on several DIHs projects funded under H2020.
- PT is involved in several of European DIHs projects (*n* = 19) and is part of relevant European initiatives to set up this new type of DIH – EDIHs:
    - H2020 projects
    - DIH Catalogue
    - AI DIH Network
    - DIH Capacitation Program - DIHelp
- 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.**

## *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 supercomputers.

**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 intelligence based solutions and data made available shall respect 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.

**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 with regard to 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 SO in DEP has as main goals:

- 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
- Creation of modular training in ICTE
- Implementation of MOOC 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.**

List of designated potential EDIHs to present to EC

- To have, at least 2 EDIHs co-funded by DEP (DEP 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)
- Explore the Blockchain initiative

*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)<br>• 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<br>• National and International connectivity with RCTS, broadband and new submarine cables (CEF2).<br>• Several key experts in tech areas that can train-the-trainers.<br>• Better alignment of national and European priorities through the European Cybersecurity Industrial, Technology and Research Competence Centre and the Network of National | The fragmentation of the European initiatives and programmes related to digitisation.<br>• Lack of infrastructure - I.e. funded state-of-the-art datacenters<br>• Not many companies taking advantage of these powerful digital tools.<br>• 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<br>• Portugal still has a shortage of qualified human resources in advanced technological areas.<br>• Portugal also has a small percentage of graduates in Information and Communication Technologies<br>• Lack of clarity on the link between crosscutting topics of the Specific Objectives of the DEP<br>• Lack of specific national funding for EDIHs; |

| | |
|---|---|
| Coordination Centres to better align national and European priorities<br>• End-to-end view of the research and development life-cycle.<br>• Existent DIH funded in H2020<br>• PT participation in relevant European initiatives to set-up EDIHs under DEP.<br>• Existing Programs and policy priorities under which EDIHs fit | • 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<br>• Installation of a petascale supercomputer DEUCALION at Minho Advanced Supercomputing Centre in 2021<br>• Participation of Portugal (5%) in pre-exascale supercomputer MARENOSTRUM 5 at Barcelona Supercomputing Centre.<br>• 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.<br>• National Competence Center (EuroCC) approved project to start in 2020<br>• Portugal as an example of green computing<br>• Establishment of a National Coordination Centre on Cybersecurity<br>• Strength the National Cybersecurity Community<br>• Efforts on developing cybersecurity advance skills<br>• Approval of the Digital Transition Action Plan in 2020<br>• Increased demand for higher education | • Not enough CAPEX/OPEX funds for operation of petascale computers like DEUCALION<br>• Lengthy processes and Technology high turnover, requiring continuous update (human resources and infrastructure)<br>• Insufficient co-financing capacity from potential DEP beneficiaries<br>• Possibility of high usage of DEP's budget to support EuroQCI when comparing to other topics within the OE3<br>• Lack of understanding between different policy actors<br>• Lack of national funding to cover the MS co-funding of EDIHs<br>• Lack of competitiveness at European level |

| | |
|---|---|
| • Funding from Recovery Plan to the national co-funding of EDIHs<br>• GT-EDIH from several policy areas already working together to implement the DIH national network<br>• Accelerate the Digital Transformation of Portuguese Industry<br>• Accelerate the digital ecosystem in PT | |

### *STRATEGY – ACTIONS (2021-2027)*

Roadmap actions to achieve DEP funded opportunities in Portugal:

**SO1 – High Performance Computing (HPC)**

- 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**

- 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)
- AI on demand Platform (AI4EU) - investment on connecting and opening Portuguese AI resources with the Strategic Research Innovation Agenda for Europe.
- 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).
- 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).

**SO3 -Cybersecurity and Trust**

- Promotion of European funding opportunities for cybersecurity topics in coordination with the national community, through the DEP 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.

**SO4 - Advanced Digital Skills**

- Alignment with the Portugal INCoDe.2030 strategy
- Creation of courses, modular training, scholarships in key areas of digital technologies
- Creation of courses for human resources qualification on Cloud Services, regarding contracting, operation, evaluation, etc of the cloud services.
- Increased training for the requalification of graduates and unemployed in the area of digital technologies
- Promotion of job placements in key DEP areas: advanced computing, artificial intelligence and cybersecurity.

**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 DEP's restricted call on EDIH
- Support EDIHs from PT to articulate with the network of HPC and Cybersecurity centres
- Explore the Blockchain initiative
- Articulate 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 DEP’s digital services infrastructures.

### *STRATEGY – INSTITUTIONAL FOR ALL SPECIFIC OBJECTIVES IN DEP*

- Promotion of DEP funding opportunities in coordination with other funding instruments, with the national community, through the DEP Experts and Horizon Europe NCPs (National Contact Points), with support activities for grant application and project implementation.
- Promotion and reinforcement 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;
- 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.
- 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;
- Foster the national stakeholders’ engagement with the objectives and actions carried out by the Portuguese Safer Internet Centre.
- Coordination of DEP 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 DEP*

- 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 DEP*

**SO1 – High Performance Computing (HPC)**

- 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**

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

**SO3 - Cybersecurity and Trust**

- 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**

- 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 DEP)
- Explore the Blockchain initiative
- Combat the spread of fake news using existent resources (Eg: LUSA actions)

## H2020 Projects

| # | Project Topic Code | Project Acronym |
|---|---|---|
| **1** | DT-ICT-02-2018 | agROBOfood |
| **2** | DT-ICT-03-2020 | AI REGIO |
| **3** | DT-ICT-03-2020 | AI REGIO |
| **4** | FoF-09-2015 | BEinCPPS |
| **5** | FoF-09-2015 | BEinCPPS |
| **6** | FoF-09-2015 | BEinCPPS |
| **7** | DT-ICT-03-2020 | Better Factory |
| **8** | DT-ICT-03-2020 | Better Factory |
| **9** | ICT-14-2016-2017 | Data Pitch |
| **10** | ICT-04-2017 | DIATOMIC |
| **11** | ICT-04-2017 | DIATOMIC |
| **12** | DT-ICT-03-2020 | DIGITbrain |
| **13** | DT-ICT-02-2018 | DIH² |
| **14** | DT-ICT-01-2019 | DIH4CPS |
| **15** | DT-ICT-01-2019 | DIH4CPS |
| **16** | DT-ICT-01-2019 | DIH4CPS |
| **17** | DT-ICT-03-2020 | DIH-World |
| **18** | ICT-14-2016-2017 | EDI |
| **19** | ICT-14-2016-2017 | EDI |
| **20** | ICT-14-2016-2017 | EDI |
| **21** | DT-ICT-01-2019 | HUBCAP |
| **22** | ICT-32-2017 | MY-GATEWAY |
| **23** | DT-ICT-05-2020 | REACH |
| **24** | DT-ICT-05-2020 | REACH |
| **25** | EINFRA-6-2014 | SESAME NET |
| **26** | DT-ICT-01-2019 | SMART4ALL |
| **27** | DT-RUR-12-2018 | SmartAgriHubs |
| **28** | DT-RUR-12-2018 | SmartAgriHubs |
| **29** | DT-RUR-12-2018 | SmartAgriHubs |
| **30** | DT-RUR-12-2018 | SmartAgriHubs |
| **31** | DT-RUR-12-2018 | SmartAgriHubs |
| **32** | DT-RUR-12-2018 | SmartAgriHubs |
| **33** | DT-ICT-01-2019 | SmartEEs2 |
| **34** | ICT-32-2017 | Startup Lighthouse |

## DIH Catalogue

| Hub name | City | NUTS2 region |
|---|---|---|
| **Algarve Smart Destination, Digital Innovation Hub** | Faro | Algarve |
| **DIATOMIC Health** | Coimbra | Centro |
| **HUB for Agriculture (HUB4AGRI)** | Lisbon | Área Metropolitana de Lisboa |
| **iMan Norte Hub - Digital Innovation Hub for Customer-Driven Manufacturing @ Norte** | Porto | Norte |
| **INSTITUTO NACIONAL DE INVESTIGAÇAO AGRARIA E VETERINARIA** | OEIRAS | Área Metropolitana de Lisboa |
| **Madeira Digital Innovation HUB** | Funchal | Região Autónoma da Madeira |
| **NOVA ID FCT - ASSOCIACAO PARA A INOVACAO E DESENVOLVIMENTO DA FCT** | CAPARICA | Área Metropolitana de Lisboa |
| **Portugal Centro Region Digital Hub** | Coimbra | Centro |
| **PRODUTECH Digital Innovation Hub National Platform** | Porto | Norte |

| | | |
|---|---|---|
| **UNINOVA-INSTITUTO DE DESENVOLVIMENTO DE NOVAS TECNOLOGIAS-ASSOCIACAO** | CAPARICA | Área Metropolitana de Lisboa |

AI DIH Network

| **Hub name** |
|---|
| **PRODUTECH Digital Innovation Hub National Platform** |

DIH Capacitation Program - DIHelp

| **Hub name** | **City** | **role** |
|---|---|---|
| **Regional Digital Innovation Hub for Health** | Coimbra | user |

- 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.

## *PROPOSED GOALS (2021-2027)*

**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 board and coherent participation from national entities in Quantum Computing and related services and technologies.
- To interconnect Deucalion with existing supercomputers.

**ARTIFICIAL INTELLIGENCE**

This specific objective shall pursue the following operational objectives:

1) 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 intelligence based solutions and data made available shall respect the principle of privacy and security by design;

2) 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;
3) 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. European Commission vision is based on creating infrastructure and capacity, at the level of platforms and data, on which technology tests will be performed through World Reference Testing and Experimenting Facilities (TEF) and, finally, take advantage of European Digital Innovation Hubs (EDIH) to spread these technologies across SMEs.

**CYBERSECURITY AND TRUST**

This specific objective shall pursue the following operational objectives:

1) 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;
2) Support the build-up and best use of European knowledge, capacity and skills related to cybersecurity; and the sharing and mainstreaming of best practices;
3) Ensure a wide deployment of effective state of the art cybersecurity solutions across the European economy;
4) 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;
5) Enhance cooperation between the civil and defence spheres with regard to 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.

**ADVANCED DIGITAL SKILLS**

This SO in DEP has as main goals:

- 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
- Creation of modular training in ICTE
- Implementation of MOOC courses in advanced technologies
- Creation of internship and doctoral scholarships
- Maintaining and populating the platform for Skills and Jobs (INCoDe.2030)

**DEPLOYMENT, BEST USE OF DIGITAL CAPACITY AND INTEROPERABILITY.**

- List of designated potential EDIHs to present to EC

- To have, at least 2 EDIHs co-funded by DEP (DEP 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
- Explore the Blockchain initiative
- 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)<br>• 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<br>• National and International connectivity with RCTS, broadband and new submarine cables (CEF2).<br>• Several key experts in tech areas that can train-the-trainers.<br>• 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<br>• End-to-end view of the research and development life-cycle.<br>• Existent DIH funded in H2020<br>• PT participation in relevant European initiatives to set-up EDIHs under DEP.<br>• Existing Programs and policy priorities under which EDIHs fit | • The fragmentation of the European initiatives and programmes related to digitisation.<br>• Lack of infrastructure - I.e. funded state-of-the-art datacenters<br>• Not many companies taking advantage of these powerful digital tools.<br>• 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<br>• Portugal still has a shortage of qualified human resources in advanced technological areas.<br>• Portugal also has a small percentage of graduates in Information and Communication Technologies<br>• Lack of clarity on the link between crosscutting topics of the Specific Objectives of the DEP<br>• Lack of specific national funding for EDIHs;<br>• 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 | • Not enough CAPEX/OPEX funds for operation of petascale computers like DEUCALION |

| | |
|---|---|
| with the exponential increase in the use of digital tools during COVID-19<br>• Installation of a petascale supercomputer DEUCALION at Minho Advanced Supercomputing Centre in 2021<br>• Participation of Portugal (5%) in pre-exascale supercomputer MARENOSTRUM 5 at Barcelona Supercomputing Centre.<br>• 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.<br>• National Competence Center (EuroCC) approved project to start in 2020<br>• Portugal as an example of green computing<br>• Establishment of a National Coordination Centre on Cybersecurity<br>• Strength the National Cybersecurity Community<br>• Efforts on developing cybersecurity advance skills<br>• Approval of the Digital Transition Action Plan in 2020<br>• Increased demand for higher education<br>• Funding from Recovery Plan to the national co-funding of EDIHs<br>• GT-EDIH from several policy areas already working together to implement the DIH national network<br>• Accelerate the Digital Transformation of Portuguese Industry<br>• Accelerate the digital ecosystem in PT | • Lengthy processes and Technology high turnover, requiring continuous update (human resources and infrastructure)<br>• Insufficient co-financing capacity from potential DEP beneficiaries<br>• Possibility of high usage of DEP's budget to support EuroQCI when comparing to other topics within the OE3<br>• Lack of understanding between different policy actors<br>• Lack of national funding to cover the MS co-funding of EDIHs<br>• Lack of competitiveness at European level |

## *STRATEGY – ACTIONS (2021-2027)*

Roadmap actions to achieve DEP funded opportunities in Portugal:

**HPC**

- 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;
- 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

**ARTIFICIAL INTELLIGENCE**

- 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)
- AI on demand Platform (AI4EU) - investment on connecting and opening Portuguese AI 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)

**CYBERSECURITY AND TRUST**

- Promotion of European funding opportunities for cybersecurity topics in coordination with the national community, through the DEP 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

**ADVANCED DIGITAL SKILLS**

- Alignment with the Portugal INCoDe.2030 strategy
- Creation of courses, modular training, scholarships in key areas of digital technologies
- Increased training for the requalification of graduates and unemployed in the area of digital technologies
- Promotion of job placements in key DEP areas: advanced computing, artificial intelligence and cybersecurity.

**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 DEP's restricted call on EDIH
- Support EDIHs from PT to articulate with the network of HPC and Cybersecurity centres

### *STRATEGY – INSTITUTIONAL*

- Promotion of DEP funding opportunities in coordination with other funding instruments, with the national community, through the DEP Experts and Horizon Europe NCPs (National Contact Points), with support activities for grant application and project implementation.
- Promotion and reinforcement 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;
- 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.
- 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;
- Foster the national stakeholders' engagement with the objectives and actions carried out by the Portuguese Safer Internet Centre.
- Coordination of DEP activities with the other entities that make up the national delegation (FCT, ANI, AMA, ANACOM, IAPMEI) in all specific objectives.

### *OTHER CHALLENGES*

- Upgrade existing Datacenters and Supercomputers (related to HPC)
- Synergies will be explored with the Erasmus+ programme (digital masters)
- Blockchain (included on SO5), explained in the following paragraphs:

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.

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.

## PRIORITIES

**HPC**

- 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

**Artificial Intelligence**

- Articulation with AMA and PTSPACE to take advantage of Data4EU
- Promote “AI on demand Platform” to align with the European Strategy
- Analyze cost-benefits of Portugal participation in existent and future TEFs, possibly promoting partnerships with other countries (Eg: Spain)

**Cybersecurity and Trust**

- 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.

**Advanced Digital Skills**

- 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

**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 DEP)
- Explore the Blockchain initiative
- Combat the spread of fake news using existent resources (namely 'Internet Segura' and LUSA actions)

# 8. Space

## 8.1 +Space in Portugal and Europe with ESA

### Part I: Implementing the strategy "Portugal Space 2030"

#### Democratisation of Space - Space as a Common Good

**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 as a way 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 multiplication of space debris, to avoiding collisions from happening and actively addressing 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. Current actions and future main "Great Challenges"

After 20 years of significant investments in technology development and capacity building in space, Portugal has increased its programmatic and policy ambitions in space systems with great success in recent years. Examples of this process include:

- the definition and promotion of a *national space strategy* "**Portugal Space 2030**", since 2018;
- the creation of the national *Portuguese Space Agency*, **Portugal Space**, since 2018;
- the approval of the first *legal regime of space activities*, "**Portuguese Space Law**", since 2019;
- the definition of an implementation strategy **"+Space in Portugal and Europe with ESA**", for the Portuguese participation in the 2019 ESA´s Ministerial Meeting, in November 2019;
- the articulation of the latter with EU funds as well as European Structural funds[46] (as managed and articulated in Portugal by AICEP, ANI, COMPETE) and national funds and projects[47], by FCT and through national and International partnerships in terms of the re-orientation of the **Program Go Portugal** (*Global Science and Technology Partnerships Portugal*, including the MIT-Portugal Program and the UT Austin – Portugal Program), since 2018;
- the definition and promotion since 2016 of an international research and innovation agenda on "Atlantic Interactions", which resulted in the creation of the "**Atlantic International Research**

46 As managed and articulated by Agência para o Investimento e Comércio Externo de Portugal- AICEP, Agência Nacional de Inovação - ANI S.A. e COMPETE 2020.

47 By Fundação para a Ciência e Tecnologia I.P. - FCT, through national and International partnerships i.e. Go Portugal, including the MIT-Portugal Program and the UT Austin – Portugal Program.

**Center - AIR Center**", since 2017, as an international network research and innovation organisation to explore and exploit space for the socio-economic development of the Atlantic as a multi-disciplinary and multi-national endeavour, including and **ESAlab@Azores** at the island of Terceira in Azores, focused on earth observation related systems and maritime surveillance;

- the definition and promotion of the "**Azores International Satellite Launch Program – Azores ISLP**", since 2018, oriented towards the installation and operation of a *small and open space port* in the island of Santa Maria in Azores, which is expected to be operational before the end of 2023;
- the promotion of additional **space related infrastructures in the island of Santa Maria**, Azores, including: i) a teleport with a 15 meters antenna (prepared since 2016 and operational since 2020), complementing the existing 3 meters antenna (operational since 2009); ii) testing facilities for engines to be associated with micro-launchers (to be operational in 2020); and additional landing facilities and payload preparation for future space aircrafts (to be operational in 2022).

**Figure 1** quantifies the increase in the national and European public funds associated with the actions mentioned above, showing that the public investment level more than double in the last 4 years, from about an overall level of 25 million euros in 2016 to an estimated level above 52 million euros in 2021. In association of with this increase, the sources of funding were considerably diversified, mainly by attracting European centralized (i.e., H2020) and decentralized funds (i.e., structural funds, FEDER, ESF) in addition of ESA related procurement.

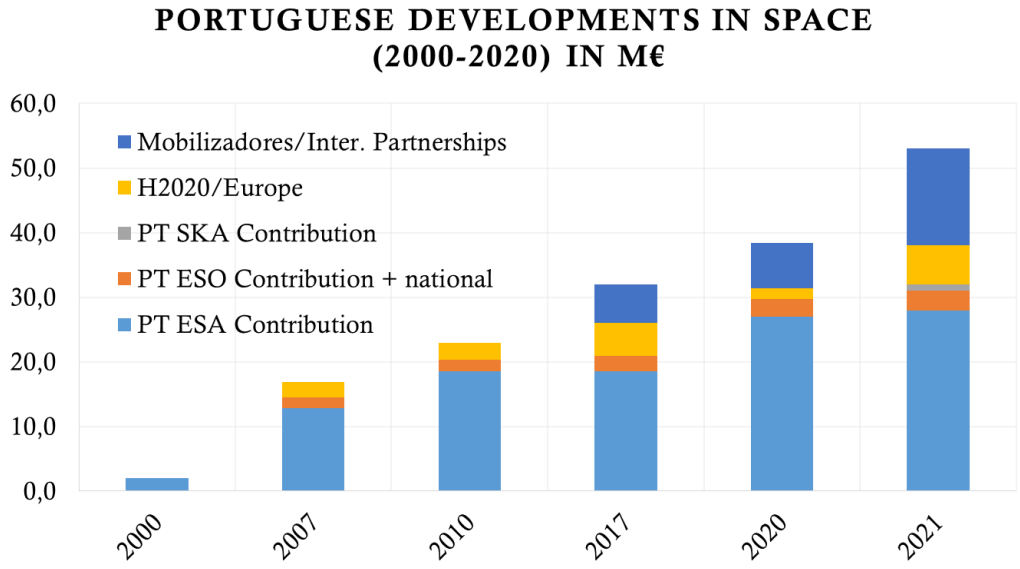



**Figure 1**. Summary of the evolution of national and European public funds invested in space systems in Portugal

In terms of funding, the overall target is to **multiplying the space sector by at least 10 times, with distribution of 30/30/30 between national/European/commercial investment (60/30 public/private), and creating 1000 high-skilled jobs by 2030**, which requires setting great challenges by Portugal Space in close articulation with the Portuguese government, as summarized in Table 1. 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.

## 2. 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 (DEP)**, 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, DEP – 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).

Table1: Prospective analysis of the evolution of investment in space systems in Portugal

| **PT Space Strategy 2020-2030** (November 2019) | | **Portuguese Public Investment** | | | | | | **European Competitive Funds** (centralised mgt, by EC) | | | | | **ESIF - EU structural funds** | Potential **JUs** | **Markets** | | **GLOBAL (million Euros)** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 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 | |
| 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 | | 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% | | | 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** |
| | | **635** | | | | | | **755** | | | | | **260** | **120** | **730** | | **2500** |
| % global | | 10% | 2% | 10% | 1% | 1% | 1% | 11% | 6% | 8% | 2% | 3% | 10% | 5% | 16% | 13% | **100%** |
| | | 25% | | | | | | 30% | | | | | 10% | 5% | 29% | | **100%** |

Portugal is in an unique position, having achieved a number of 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.

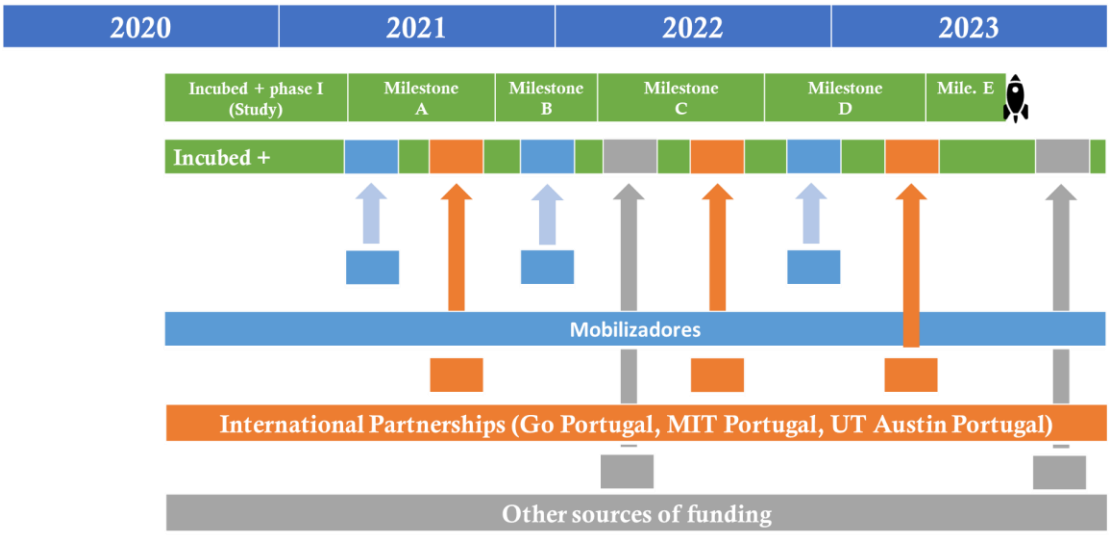
The Atlantic constellation, while being a Portuguese ambition, must be pursued in an international framework, working closely with leading industries that have declared interest as well as with countries that have likewise declared a strategic interest – notably the United Kingdom, Norway and Spain. 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 2.** Programmatic Setup for the Atlantic Constellation




In addition, a number of additional projects developing specific technologies and competences will support the constellation development and exploitation, this includes for example:

- **PROBA 3 Intersatellite Link**: led by Tekever (funded through ESA, 2019-2021);
- **Blue Economy: Innovation Clusters, Atlantic Natural Resources Management and Maritime Spatial Planning**: led by GMV (funded through ESA, 2020-2021);

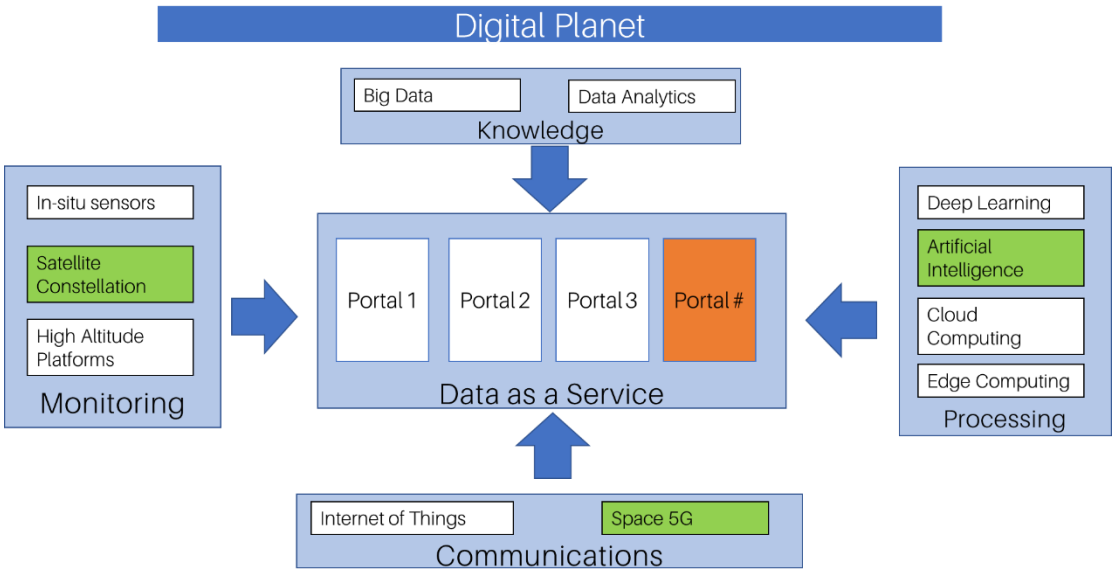
The launch segment will require to be addressed in a dedicated manner and presents opportunities for the space access activities also pursued.

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 3.** 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"[48] 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).

[48] https://www.europarl.europa.eu/RegData/etudes/BRIE/2016/573892/EPRS_BRI(2016)573892_EN.pdf

4. **GREAT CHALLENGE 4:** the establishment of a **space innovation ecosystem,** specifically in Azores, Santa Maria, that may include:

    - 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 a number of 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;
    - 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 summarised 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 democratisation 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 also 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**: a number of 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. A comprehensive list can be found in Annex 1;

(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”;

(e) the preparation of a proposal for attracting ECMWF to Portugal. The relocation of this centre to Portugal would contribute to strengthening the position of Portugal as a reference in space-climate-ocean interactions fostering synergies between national renowned entities and a world class weather forecast organization.

4. To **lead the effort of democratisation of access to space**, a number of 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, a number of 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 t**he 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:

- Increase the participation of Portuguese industry to the development of the ELT;
- 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.

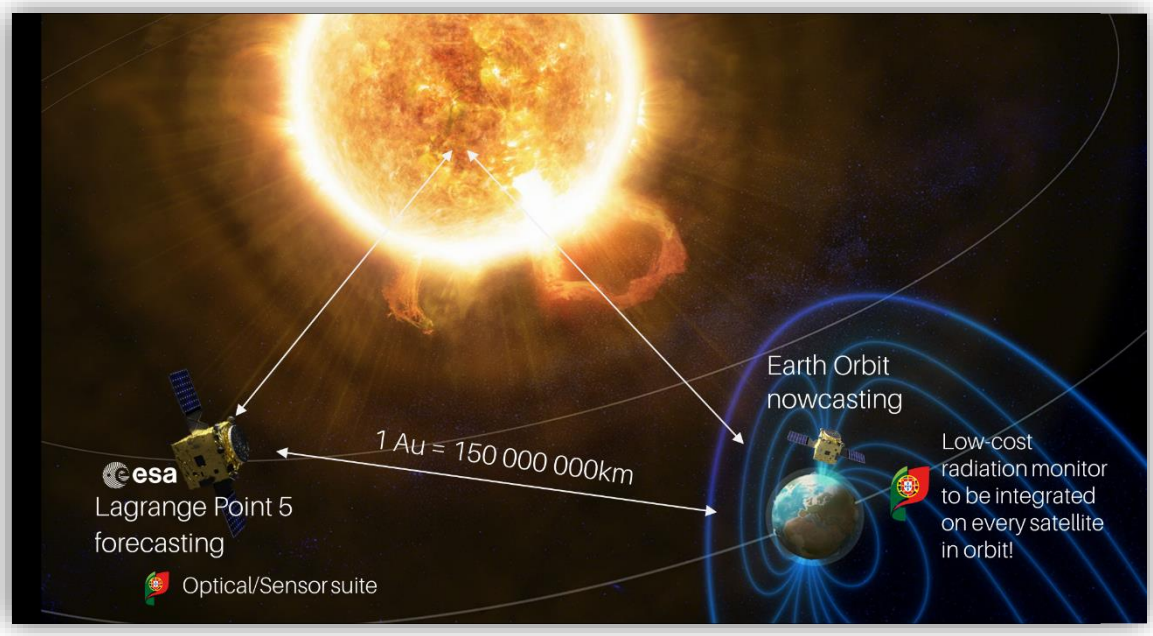
The development and integration of a complete kickstage in Portugal is underway and the work conducted with AICEP as well as the activities pursued in the frame of ESA's CSTS Porgramme must be continued to ensure its success.

## 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 4**. 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;
    - 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];

12. 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.

**Table 2:** CM16 and Space19+ subscriptions
(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 | |
| CSG*** | 2.71 | 3 |
| **TOTAL (M€)** | **73.69** | **102.7** |

*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.

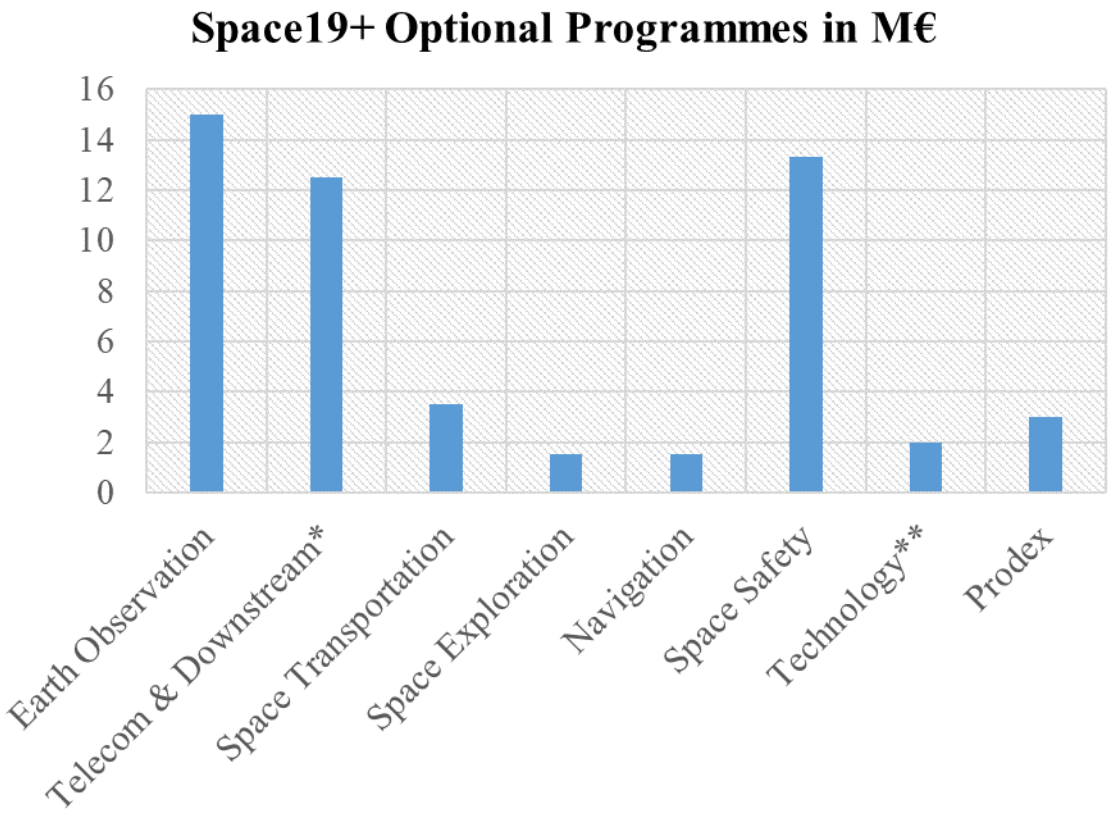



Figure 1: Space19+ Optional Programme Subscriptions in M€

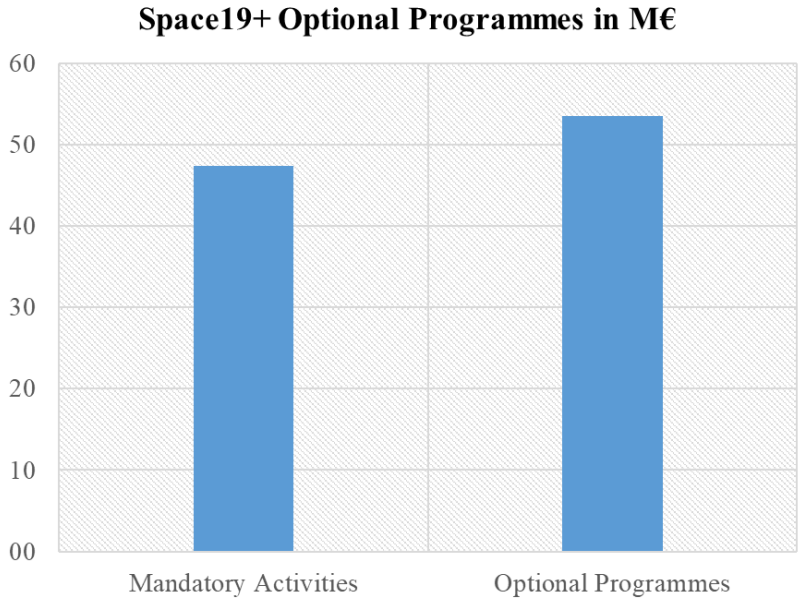



Figure 2: Space19+ subscription distribution between optional and mandatory

## 8.2. Portugal in the EU Space Programme

The Portuguese participation in the future EU Space Programme (2021-27) should be prepared 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:

a) Earth Observation – Copernicus
b) Navigation – Galileo / Egnos
c) Communications – GOVSATCOM
d) Space Situational Awareness (SSA) including:
    - Space Surveillance and Tracking (SST)
    - Space Weather (SW)
    - Near-Earth Objects

Technology, data and services associated to 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.

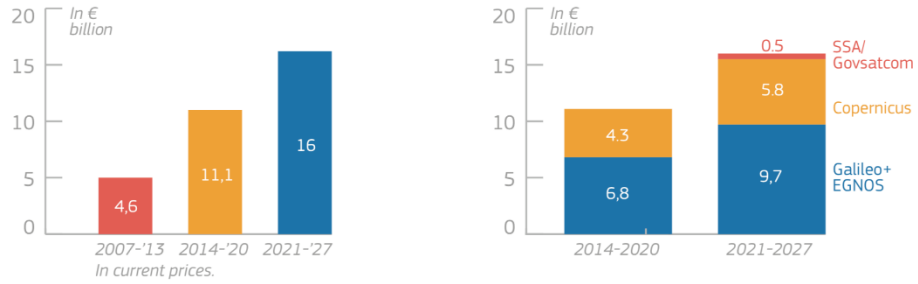



*Figure 1: Estimated budget*
*Fonte: EU Budget for the future, The EU Space Programme; ET-01-18-584-EM-N doi:10.2873/045582*

For the period 2021-2027, and still in a pre-pandemic (COVID-19) scenario, the European Commision plans to allocate 9700M€ (61%) for the Galileo and EGNOS programmes, 5800M€ (36%) for Copernicus e 500M€ (3%) for the future SSA and GOVSATCOM (with an unknown division).49

These values correspond to an initial budget proposal, done in 2018, of 16b€ (in current values), revised by the Finnish presidency in the end of 2019, where the initial proposal for the Space Programme was reduced to 12.7b€ (in 2018 e.c.) 50. Information from May 27 2020, mentioned a proposal of 14.87b€ (in current values) from the Commission, under negotiation, with no specific allocation per sub-programme (*note: information made available in an informal meeting PB-EO/Copernicus Committee Seminar on Copernicus evolution on 16th June 2020 organized by the European Commission*). On 20 July 2020, the European Council adopted its proposal for MFF 2021-2027 confirming a proposed allocation of 4.81b€ (in 2018 e.c.) to the Copernicus programme pending consent of the European Parliament. Although there is still some uncertainty regarding the final

[49] https://www.europarl.europa.eu/thinktank/en/document.html?reference=EPRS_BRI(2018)628300
[50] https://www.europarl.europa.eu/legislative-train/theme-new-boost-for-jobs-growth-and-investment/file-mff-eu-space-programme

figures, it is important to define strategies to guarantee or strengthen Portugal's presence in the various sub-programmes of the Space Programme.

### *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);

### *ACTIONS*

- Given the nature of this programme, the actions will have to be appropriate for each sub-program 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.

### *COPERNICUS PROGRAMME*

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).

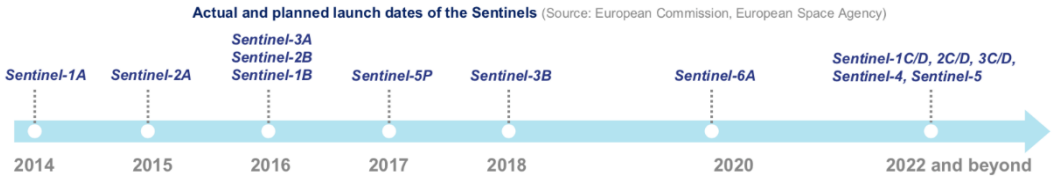



*Figura 2: Chronogram of deployment of the Copernicus constellation*
*Fonte: Copernicus Market Report; Issue 2, February 2019; Prepared by PwC; ISBN 978-92-79-98973-5; doi 10.2873/011961*

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:
    - Agriculture and land ressources (*Copernicus Land Monitoring Service* - CLMS);
    - Marine ressources (*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;
    - *European Border and Coast Guard Agency* (Frontex) for borders; and
    - *European Union Satellite Centre* (SatCen) for foreign affairs.

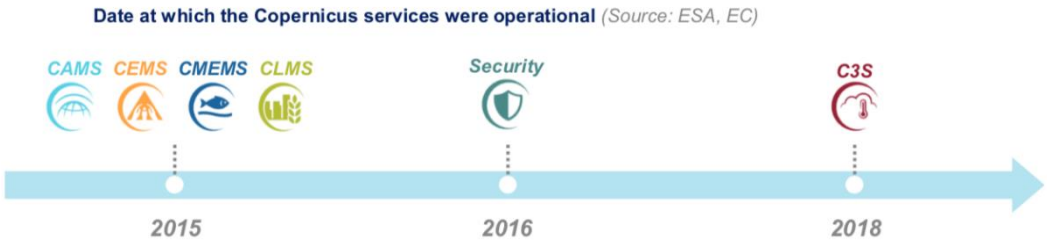



Figura 3: Chronogram of operationalization of Copernicus Services
*Fonte: Copernicus Market Report; Issue 2, February 2019; Prepared by PwC; ISBN 978-92-79-98973-5; doi 10.2873/011961*

## *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€), and the remainder to services.

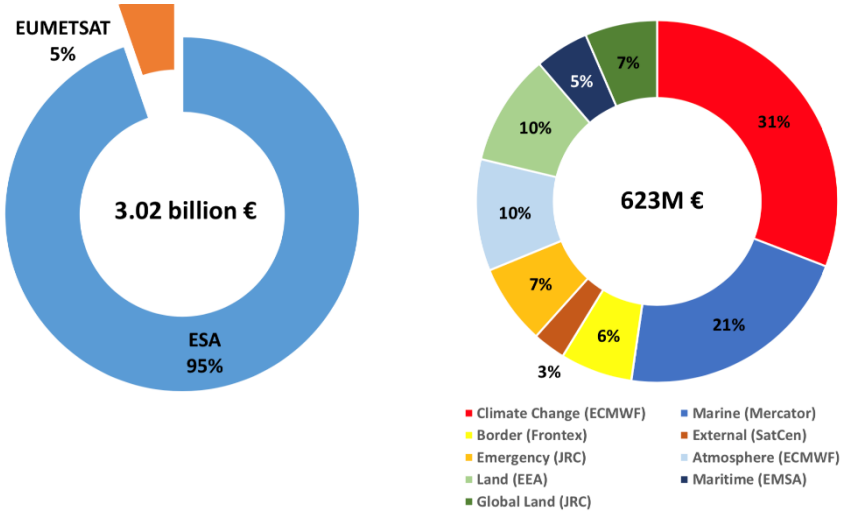



*Figura 4: Copernicus budget distribution*
*Fonte: EC on March 2020 at the Copernicus Committee*

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%.

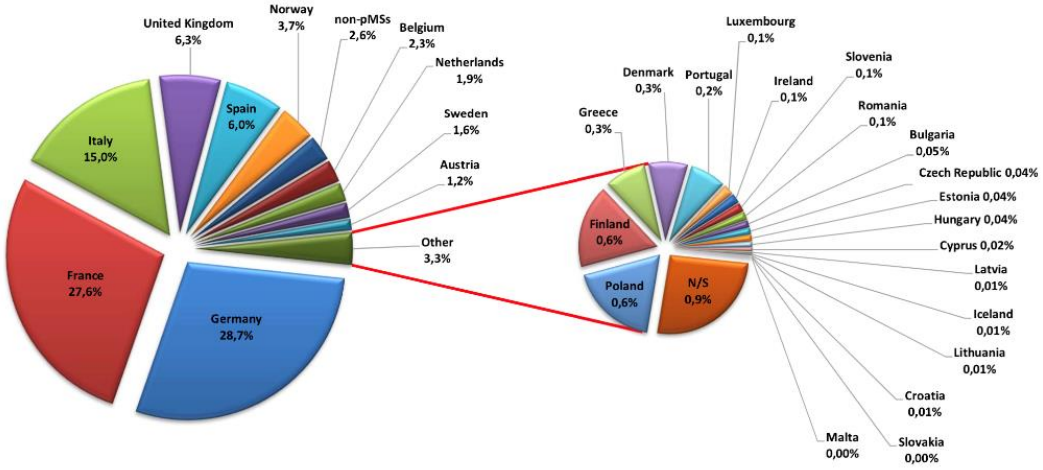



Figura 5: Budget secured by each country in the Copernicus programme
*Fonte: EC on March 2020 at the Copernicus Committee*

When considering Portugal's budget funding only in the space component, the rate is 0,1% (approximately 3M€).

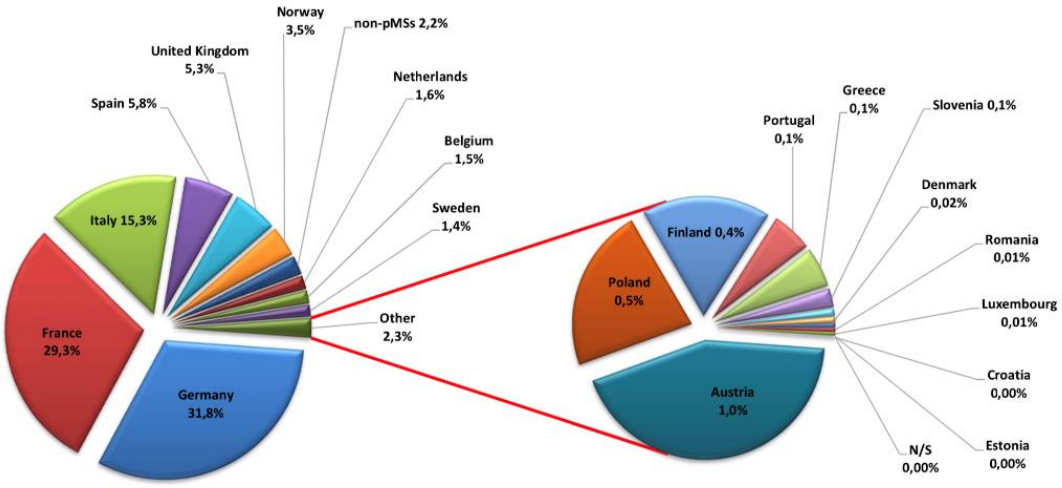
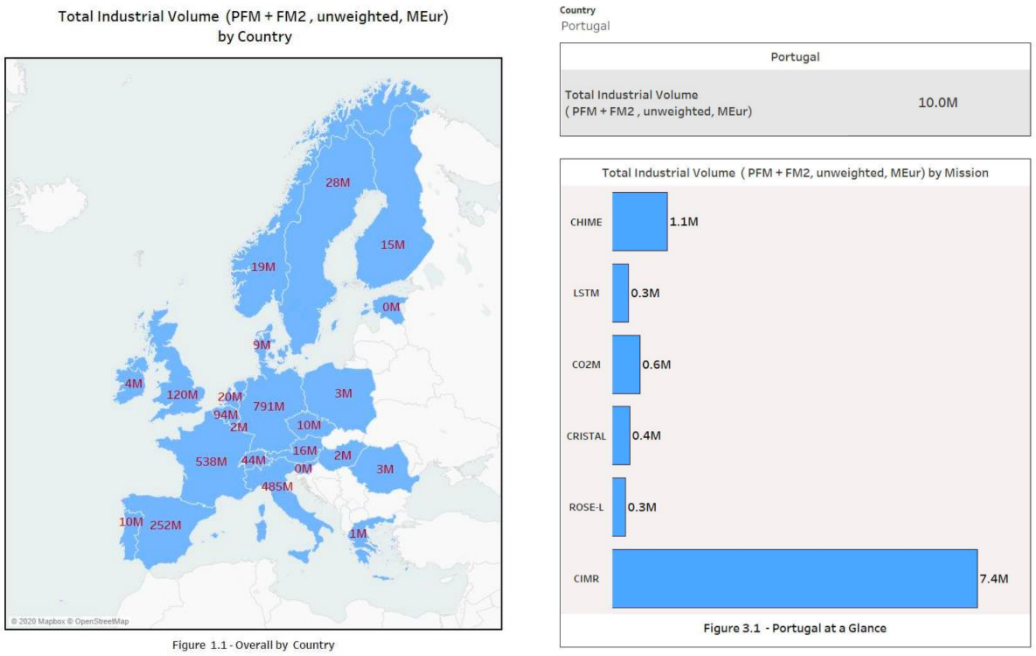



Figura 6: Budget secured by each country in the space component
*Fonte: EC on March 2020 at the Copernicus Committee*

It is important be recall that the entity responsible for contracting the space componente of this porgramme 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 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€, with participation in all missions, with particular emphasis on the CIMR – *Copernicus Imaging Microwave Radiometer* mission, where it secured 7,4 M€ 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€.




*Fonte: 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.

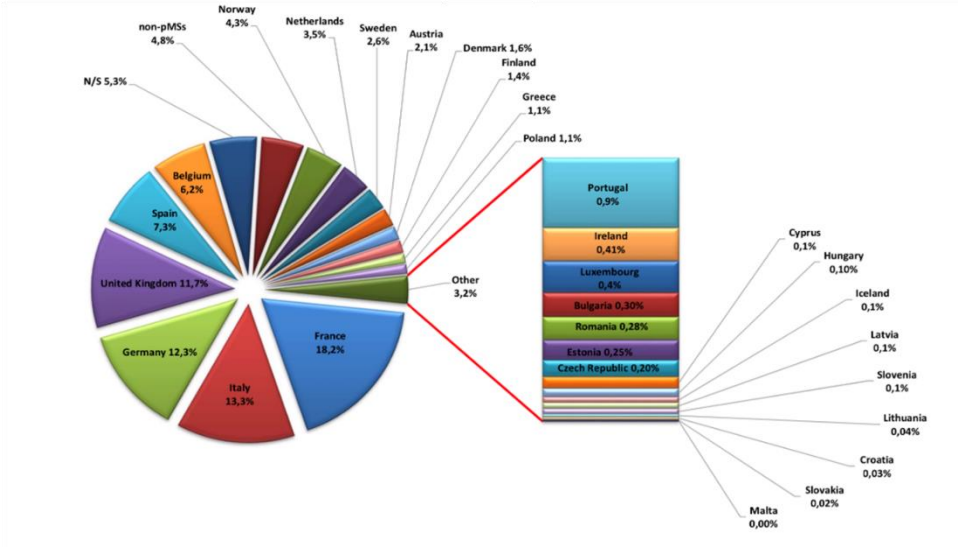



*Figura 7: Budget secured per country in services component*
*Fonte: EC on March 2020 at the Copernicus Committee*

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 study[5], 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%[5], 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.[5]

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.

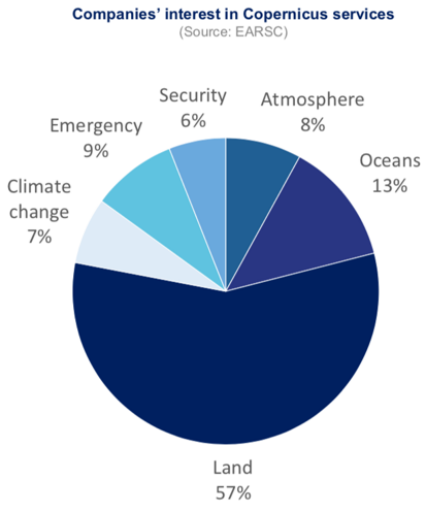



Figura 8: Industry interest in the Copernicus programme per service
*Fonte: Copernicus Market Report; Issue 2, February 2019; Prepared by PwC; ISBN 978-92-79-98973-5; doi 10.2873/011961*

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 2022[51]. 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 to 2%;
- 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

### *ACTIONS*

- 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 road-show);
- 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.

[51] Copernicus Market Report; Issue 2, February 2019; Prepared by PwC; ISBN 978-92-79-98973-5; doi 10.2873/011961

**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 | | | | EGNOS | Other |
|---|---|---|---|---|---|---|---|
| | | Definition | Development | Deployment | Operation | | |
| **EU** | | | | | | | |
| 1990s | 42.5 | 42.5 | | | | ?*** | |
| 2000 | 550 | | 550 | | | | |
| 2007<br>2008 | 1 000<br>2 480 | | 560 | 2 407 | | 417 | 96 |
| 2013 | 7 072 | | | 1 930 | 3 000 | 1 580 | 562 |
| FP* | 603.5 | | | | | | 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 9: Galileo and EGNOS estimated cost, *source:* *https://www.europarl.europa.eu/thinktank/fr/document.html?reference=EPRS_BRI%282017%29599406*

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.

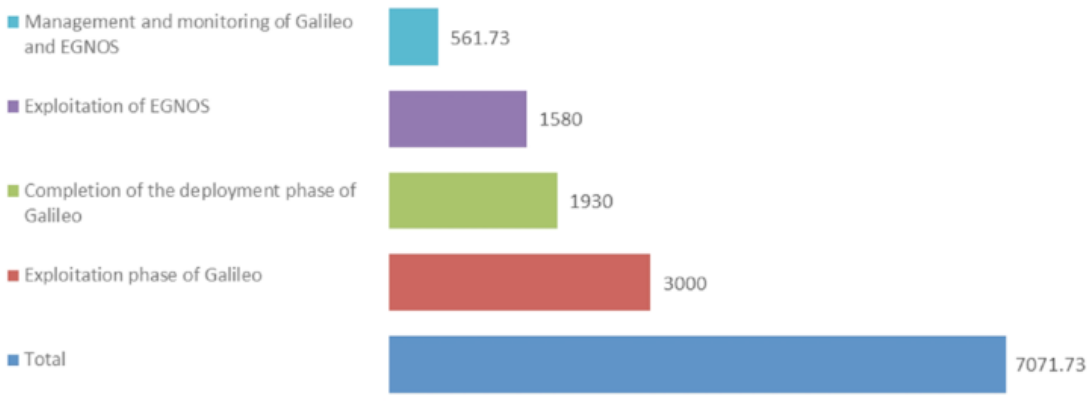



*Figura 10: Finantial commitement (2014-2020) for Galileo and EGNOS,*
*Fonte: Regulation (EU) No 1285/2013*

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.

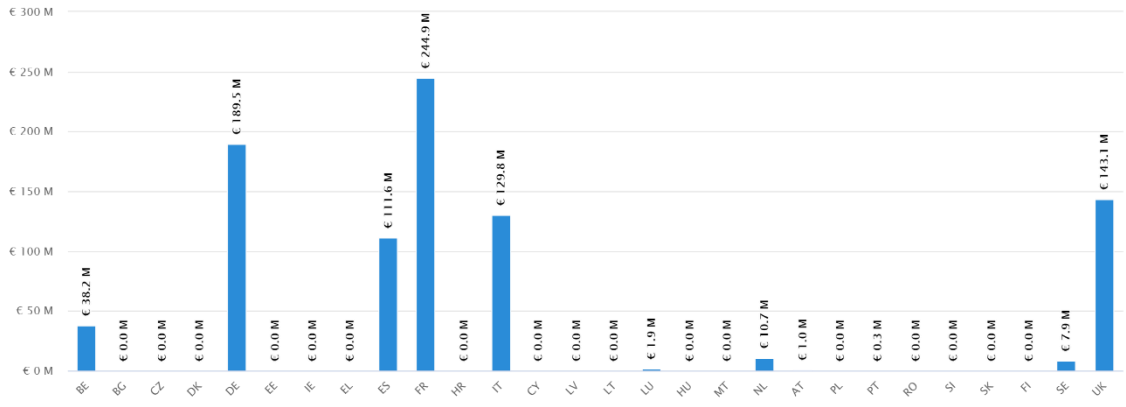



*Figure 11: Retorno económico da implementação e exploração do EGNOS e Galileo em 2018 por estado membro. Fonte: https://ec.europa.eu/budget/graphs/revenue_expediture.html*

According to the EU expenditure and revenue for the 2014-2020 data published in https://ec.europa.eu/budget/graphs/revenue_expediture.html, 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.

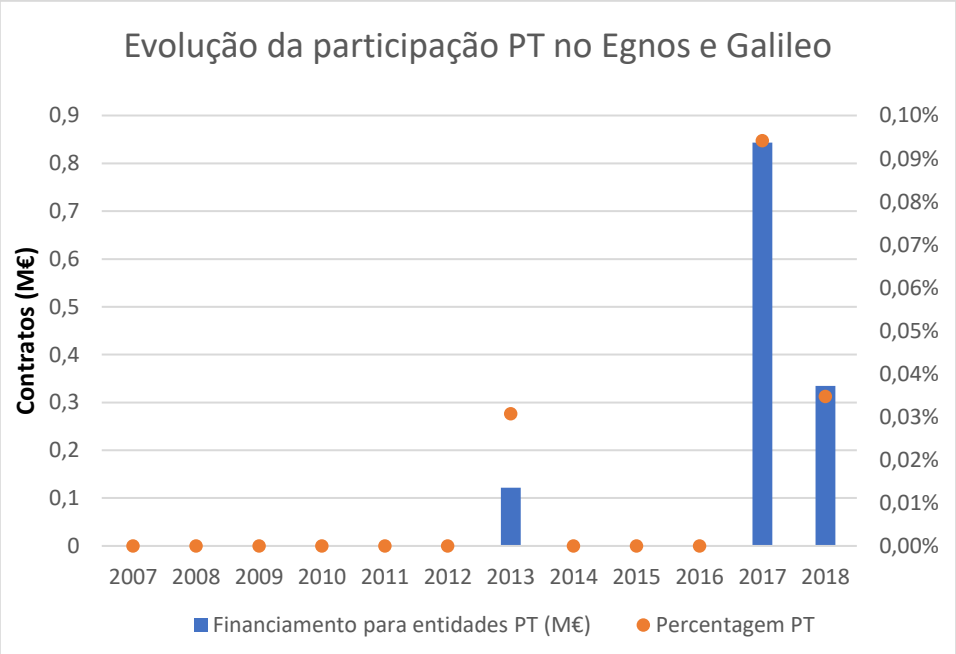



Figure 12: *Portuguese financial return for the EGNOS and Galileo Programmes, according to* https://ec.europa.eu/budget/graphs/revenue_expediture.html

### *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.

### *ACTIONS*

- 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.

### *GOVSATCOM PROGRAMME*

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 500M 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.

### *ACTIONS*

- 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.

## *SPACE SITUATIONAL AWARENESS PROGRAMME*

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 with Defence 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.

### *ACTIONS*

- 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 road-show);

# 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;
2. 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;
4. 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.

1. 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 “STARlab” 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.

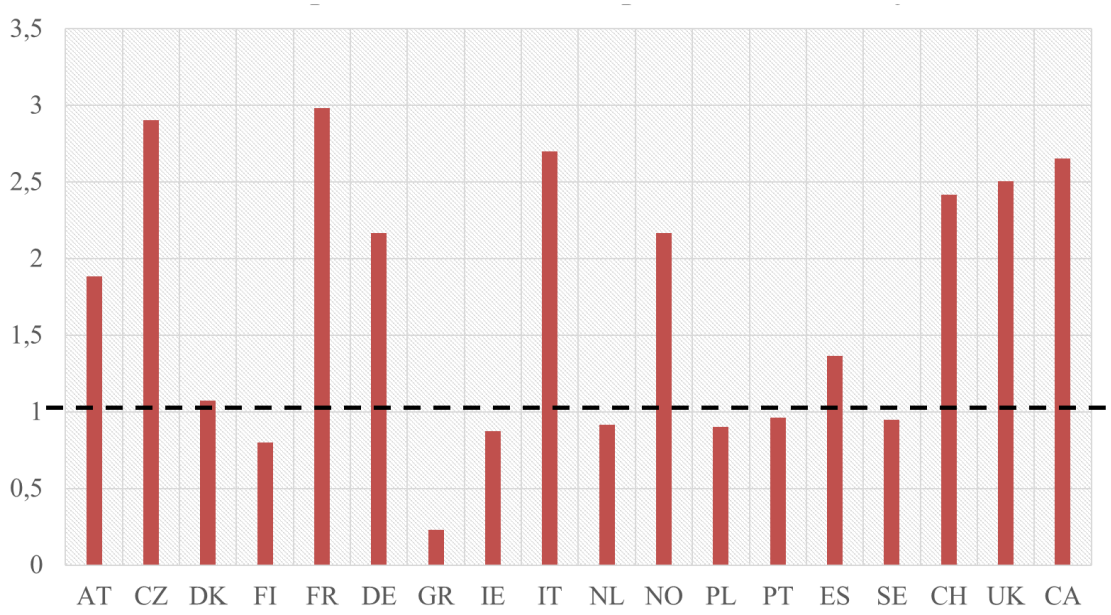



Figure A1: Ratio of Optional to Mandatory Subscriptions at CM16 for different Member States (on a 3-year basis)

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.

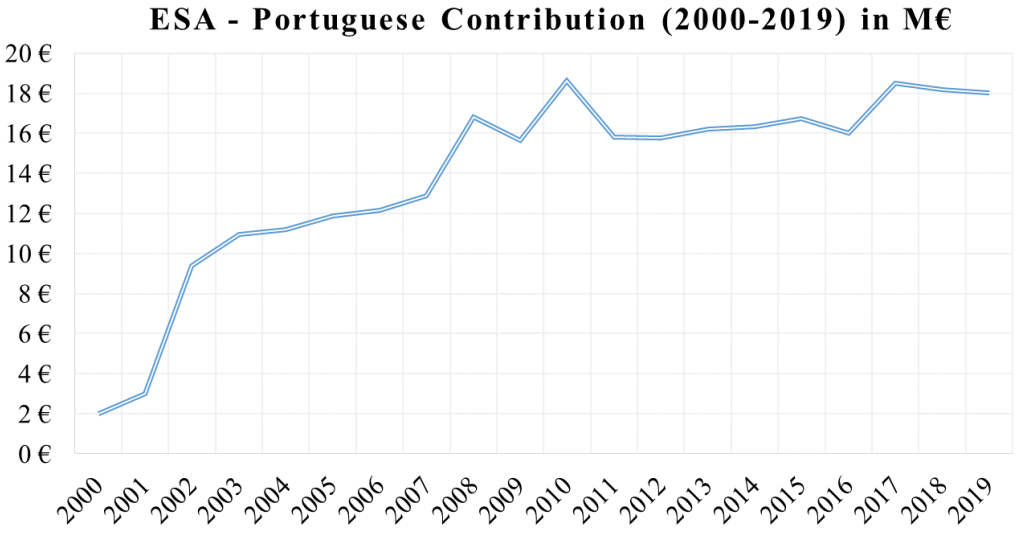



Figure A2: Portuguese Contribution to ESA during the period 2000-2019 in M€ and c.e.c.

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).

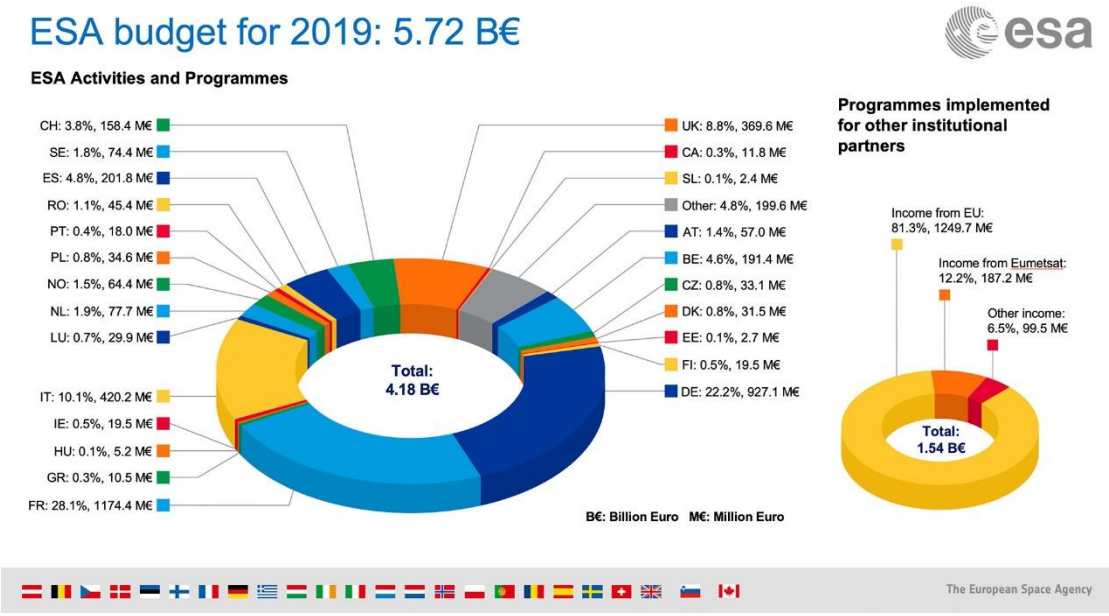



**Figure A3: Distribution of Contributions to ESA per Member State for the year 2019**

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 millions Euro, while they represent about 600 million Euro 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

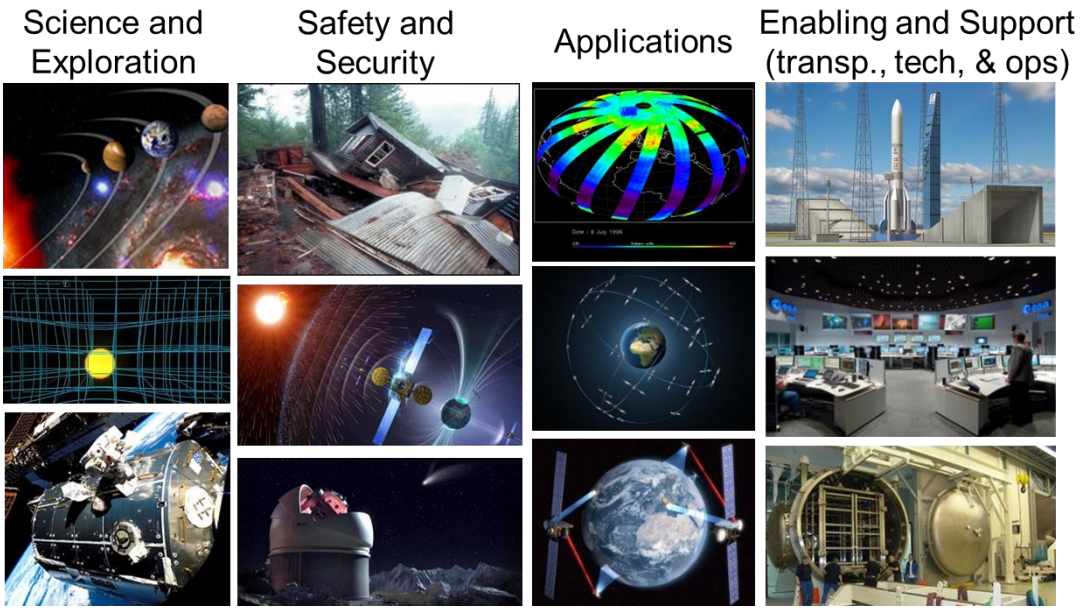



Figure A4: Four Programmatic Pillars

**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 close 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 policy-making 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, in particular 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, in particular 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. (https://ipsentinel.pt ).

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: http://revistamapping.com/wp-content/uploads/2018/03/Revista-MAPPING-187_A3.pdf

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 th e 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 in an attempt 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*

# *Organisation*

# *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 programas-quadro 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:

1. 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;
    b) apoio a candidatos na elaboração de propostas e identificação de possíveis parceiros internacionais;
    c) acompanhamento e a análise de resultados;
    d) 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;
d) 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,anomear 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 – Nº 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:

1. 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. Delegates / NCPs Network*

## Portugal - Representatives to the Horizon Europe Shadow Thematic Configurations

| | | Contact Data | | | | Organization |
|---|---|---|---|---|---|---|
| | | **Name** | **First Name** | **Representative & alternate** | **Email** | **Name** |
| **Coordination of NCPs** | | **Neves** | **Ana** | Representative | ana.neves@mctes.gov.pt | GMCTES |
| | | **Munhá** | **Rui** | Alternate | rui.munha@fct.pt | FCT-Fundação para a Ciência e a Tecnologia |
| | | **Dourado** | **Mafalda** | Alternate | mafalda.dourado@ani.pt | ANI - National Innovation Agency |
| | | **Costa** | **Hugo** | Alternate | hugo.costa@ptspace.pt | PT-Space |
| | | **Calado** | **Patrícia** | Alternate | patricia.calado@aicib.pt | AICIB - Agência de Investigação Clínica e Inovação Biomédica |
| **Pillar** | 'shadow' thematic configurations | | | | | |
| **Pillar 1** | European Research Council (ERC) | **Munhá** | **Rui** | Representative | rui.munha@fct.pt | FCT-Fundação para a Ciência e a Tecnologia |
| | | **Mota** | **Luís** | Alternate | luis.mota@fct.pt | FCT-Fundação para a Ciência e a Tecnologia |

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|---|---|---|---|---|---|---|
| | Marie Skłodowska-Curie Actions (MSCA) | **Mota** | **Luís** | Representative | luis.mota@fct.pt | FCT-Fundação para a Ciência e a Tecnologia |
| | | **Marçal** | **David** | Alternate | 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 |
| | | **Carapau** | **Daniel** | Alternate | daniel.carapau@fct.pt | FCT-Fundação para a Ciência e a Tecnologia |
| **Pillar 2** | Health | **Calado** | **Patrícia** | Representantive | patricia.calado@aicib.pt | AICIB - Agência de Investigação Clínica e Inovação Biomédica |
| | | **Duarte** | **Afonso** | Alternate | afonso.duarte@aicib.pt | AICIB - Agência de Investigação Clínica e Inovação Biomédica |
| | | **Carvalho-Oliveira** | **Isabel** | Alternate | isabel.oliveira@aicib.pt | AICIB - Agência de Investigação Clínica e Inovação Biomédica |
| | Culture, creativity and Inclusive Society | **Dourado** | **Mafalda** | Representative | mafalda.dourado@ani.pt | ANI - National Innovation Agency |

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|---|---|---|---|---|---|---|
| | | **Dias** | **Natália** | Alternate | natalia.dias@ani.pt | ANI - National Innovation Agency |
| | | **Amaral Lopes** | **José** | Alternate | jamaral.lopes@fct.pt | FCT-Fundação para a Ciência e a Tecnologia |
| | | **Ferreira** | **Susana** | Alternate | sferreira@cienciaviva.pt | Ciência Viva - Agência Nacional Para a Cultura Científica e Tecnológica |
| | Civil Security for Society | **Carvalho** | **Fernando** | Representative | fernando.carvalho@ani.pt | ANI - National Innovation Agency |
| | | **Azevedo** | **Sofia** | Alternate | sofia.azevedo@ani.pt | ANI - National Innovation Agency |
| | Digital, Industry and Space | **Azevedo** | **Sofia** | Representative - Digital | sofia.azevedo@ani.pt | ANI - National Innovation Agency |
| | | **Leandro** | **Cristiana** | Alternate - Digital | cristiana.leandro@ani.pt | ANI - National Innovation Agency |
| | | **Fernandes** | **Sandra** | Alternate - Digital | sandra.fernandes@fct.pt | FCT/FCCN - Fundação para a Ciência e a Tecnologia/Computação Científica Nacional |

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|---|---|---|---|---|---|---|
| | | **Ferreira** | **João Nuno** | Alternate - Digital | ferreira@fccn.pt | FCT/FCCN - Fundação para a Ciência e a Tecnologia/Computação Científica Nacional |
| | | **Ferreira** | **Daniel** | Alternate - Digital | daniel.ferreira@fct.pt | FCT-Fundação para a Ciência e a Tecnologia |
| | | **Candeias** | **Marta** | Representative - Industry | marta.candeias@ani.pt | ANI - National Innovation Agency |
| | | **Azevedo** | **Sofia** | Alternate - Industry | sofia.azevedo@ani.pt | ANI - National Innovation Agency |
| | | **Costa** | **Hugo** | Representative - Space | hugo.costa@ptspace.pt | PT-Space |
| | | **Alabart** | **Joan** | Alternate - Space | joan.alabart@ptspace.pt | PT-Space |
| | | **Gonçalves** | **Marta** | Alternate - Space | marta.goncalves@ptspace.pt | PT-Space |
| | Climate, Energy and Mobility | **Carvalho** | **Anabela** | Representative - Climate | anabela.carvalho@ani.pt | ANI - National Innovation Agency |

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|---|---|---|---|---|---|---|
| | | **Leandro** | **Cristiana** | Alternate -Climate | cristiana.leandro@ani.pt | ANI - National Innovation Agency |
| | | **Leandro** | **Cristiana** | Representative - Energy | cristiana.leandro@ani.pt | ANI - National Innovation Agency |
| | | **Maia** | **Luis** | Alternate - Energy | luis.maia@ani.pt | ANI - National Innovation Agency |
| | | **Maia** | **Luis** | Representative - Mobility | luis.maia@ani.pt | ANI - National Innovation Agency |
| | | **Leandro** | **Cristiana** | Alternate - Mobility | cristiana.leandro@ani.pt | ANI - National Innovation Agency |
| | Food, Bioeconomy, Nat Resources, Agri and Env | **Fernandes** | **Maria João** | Representative - Food, Agriculture | mariajoao.fernandes@ani.pt | ANI - National Innovation Agency |
| | | **Sutcliffe** | **Ana** | Representative - Bioeconomy | ana.sutcliffe@ani.pt | ANI - National Innovation Agency |
| | | **Santos** | **Margarida** | Alternate - Food, Bioeconomy, Agriculture | margarida.santos@ani.pt | ANI - National Innovation Agency |

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|---|---|---|---|---|---|---|
| | | **Carvalho** | **Anabela** | Representative - Nat. Resources, Environment | anabela.carvalho@ani.pt | ANI - National Innovation Agency |
| | | **Gouveia** | **Cristina** | Alternate - Nat. Resources, Environment | cristina.gouveia@ani.pt | ANI - National Innovation Agency |
| **Pillar 3** | European Innovation Council (EIC) & European Innovation Ecosystems | **Dourado** | **Mafalda** | Representative - EIC | mafalda.dourado@ani.pt | ANI - National Innovation Agency |
| | | **Gouveia** | **Cristina** | Representative - EIC | cristina.gouveia@ani.pt | ANI - National Innovation Agency |
| | | **Marques** | **Alexandre** | Representative - EIT | alexandre.marques@ani.pt | ANI - National Innovation Agency |
| | | **Bravo** | **Sofia** | Representative - EIE | sofia.bravo@ani.pt | ANI - National Innovation Agency |
| | | **Silva** | **Rita** | Alternate - EIC | rita.silva@ani.pt | ANI - National Innovation Agency |
| | | **Dantas** | **Bibiana** | Alternate - EIE | bibiana.dantas@ani.pt | ANI - National Innovation Agency |

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|---|---|---|---|---|---|---|
| **Pillar IV** | Widening participation and strengthening the European Research Area | **Munhá** | **Rui** | Representative | rui.munha@fct.pt | FCT-Fundação para a Ciência e a Tecnologia |
| | | **Mota** | **Luis** | Alternate | luis.mota@fct.pt | FCT-Fundação para a Ciência e a Tecnologia |
| **EURATOM** | Fission/Fusion | **Mota** | **Luis** | Representative | luis.mota@fct.pt | FCT-Fundação para a Ciência e a Tecnologia |
| | | **Cavaleiro** | **Rita** | Alternate | rita.cavaleiro@fct.pt | FCT-Fundação para a Ciência e a Tecnologia |

## 2.1 List of Portuguese National Contacts Points (NCPs) and Delegates (HE, ERASMUS+, Space, DEP, CEF2)

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| | **PERIN** - *Portugal in Europe Research and Innovation Network* (FCT+ANI+PT Space+AICIB+Ciencia Viva+ERASMUS+) | | |
| | **List of Portuguese National Contacts Points (NCPs) and Delegates** | | |
| | **Thematic Committees** | | **2021-2027: HE + Space + DEP + ERASMUS+** |
| | **Coordination NCPs** | | **Ana Neves** (MCTES - PERIN) \| Deputies: Rui Munhá (FCT), Mafalda Dourado (ANI), Hugo Costa (PT Space), Patrícia Calado (AICIB), Ana Mateus (DGES), Ana Cristina Perdigão (Agência Nacional Erasmus + E&F) |
| **Horizon Europe** | **Pilar I - People and Infrastructures** | Coordination **Pillar 1** + **4** | **Rui Munhá** (FCT) |
| | | European Research Council (ERC) | **Rui Munhá** (FCT) \| Deputy: Luís Mota (FCT) |
| | | Marie Skłodowska-Curie Actions (MSCA) | **Luís Mota** (FCT) \| Deputy: David Marçal (FCT) |
| | | Research Infrastructures | **Marta Abrantes** (FCT) \| Deputy: Daniel Carapau (FCT) |
| | **Pilar II - Clusters (includes *Partnerships* and *Missions*)** | Coordination **Pilar 2+3** | **Mafalda Dourado** (ANI) |
| | | Health (ex - Health, Demographic Change and Well- Being | **Patrícia Calado** (AICIB) \| Deputies: Afonso Duarte (AICIB), Isabel Carvalho-Oliveira (AICIB) |
| | | Culture, Creativity and Inclusive Society | **Mafalda Dourado** (ANI) \| Deputies: Natália Dias (ANI), José Amaral Lopes (FCT), Susana Ferreira (Ciência Viva) |

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|---|---|---|---|
| | | Civil Security for Society | **Fernando Carvalho** (ANI) \| Deputy: Sofia Azevedo (ANI) |
| | | Digital, Industry and Space | Digital: **Sofia Azevedo** (ANI) \| Deputies: Cristina Leandro (ANI) Sandra Fernandes (FCT-FCCN), João Nuno Ferreira (FCT-FCCN), Daniel Ferreira (FCT) |
| | | | Industry: **Marta Candeias** (ANI) \| Deputy: Sofia Azevedo (ANI) |
| | | | Space: **Hugo Costa** (PT Space) \| Deputies: Joan Alabart (PT Space), Marta Goncalves (PT Space) |
| | | Climate, Energy and Mobility | Climate: **Anabela Carvalho** (ANI) \| Deputy: Cristiana Leandro (ANI) |
| | | | Energy: **Cristiana Leandro** (ANI) \| Deputy: Luis Maia (ANI) |
| | | | Mobility: **Luis Maia** (ANI) \| Deputy: Cristiana Leandro (ANI) |
| | | Food, Bioeconomy, Nat. Resources, Agri. and Environ. | Food, Agriculture: **Maria João Fernandes** (ANI) \| Deputy: Margarida Santos (ANI) |
| | | | Bioeconomy: **Ana Sutcliffe** (ANI) \| Deputy: Margarida Santos (ANI) |
| | | | Nat Resources & Environment: **Anabela Carvalho** (ANI) \| Deputy: Cristina Gouveia (ANI) |
| | **Pilar III - Innovation** | EIC and European Innovation ecosystems (ex - SME Instrument) | EIC: **Mafalda Dourado** (ANI), **Cristina Gouveia** (ANI) \| Deputy: Rita Silva (ANI)<br><br>EIT: **Alexandre Marques** (ANI) |

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| | | | European Innovation ecosystems: **Sofia Bravo** (ANI) \| Deputy: Bibiana Dantas (ANI)<br><br>EUREKA: **Rita Silva** (ANI) |
| | **Pilar IV - Widening** | Widening participation/strengthening the ERA | **Rui Munhá** (FCT) \| Deputy: Luis Mota (FCT) |
| | **EURATOM** | Fission/Fusion | **Luis Mota** (FCT) \| Deputy: Rita Cavaleiro (FCT) |
| | **JRC** | Joint Research Centre | **Luis Mota** (FCT) |
| | **ERIC** | European Research Infrastructure Consortium | **Marta Abrantes** (FCT) |
| **Space** | **Coordination Space (HE + European Space Programme)** | | **Hugo Costa** (PT Space)\| Deputies: Joan Alabart (PT Space), Marta Goncalves (PT Space) |
| | **Access to Space (Launchers, ports)** | | **Hugo Costa** (PT Space) \| Deputies: Manuel Wilhelm (PT Space), Inês Ávila (PT Space) |
| | **Satellites, sensors plataforms** | Space safety + weather (Govsatcom; SSA) | **Tiago Peres** (PT Space) \| Deputy: Luis Serina (PT Space) |
| | **EO and downstream** | Navigation (Galileo/EGNOS); EO (Copernicus) | Earth Observation (Copernicus): **Hugo Costa** (PT Space) \| Deputy: Carolina Sá (PT Space) |
| | | | Navigation (Galileo/EGNOS): **Tiago Peres** (PT Space) |

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| **Digital - DEP** | **High Performance Computing** | | **João Nuno Ferreira** (FCCN-FCT) \| Deputies: Sofia Azevedo (ANI), Cristiana Leandro (ANI) |
| | **Artificial Intelligence** | | **Marta Candeias** (ANI), Deputies: Sofia Azevedo (ANI), Cristiana Leandro (ANI) |
| | **Cybersecurity and trust** | | CNCS \| Deputy: Sofia Azevedo (ANI) |
| | **Advanced Digital Skills** | | **Sandra Martins** (FCT-FCCN) \| Deputy: Susana Caetano (FCT-FCCN) |
| | **Accelerating the best use of digital technologies** | Green Deal | **Susana Caetano** (FCT-FCCN) \| Deputy: Sandra Fernandes (FCT-FCCN) |
| | | European Digital Innovation Hubs (EDIH | **Marta Candeias** (ANI) \| Deputies: Sofia Azevedo (ANI), Cristiana Leandro (ANI) |
| | | Blockchain | **Miguel Pupo Correia** (UL - IST) |
| | | Digital Transformation of areas of public interest | **AMA** |
| | | Confidence in Digital transformation (Safer Internet + Fighting fake news) | **CNCS** |
| **CEF 2** | **eInfrastruct - HPC** | | **Sandra Fernandes** (FCT-FCCN) \| Deputy: João Nuno Ferreira (FCT-FCCN) |
| | **5G/Wifi** | | **ANACOM** |
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|---|---|---|---|
| **ERASMUS** | **Erasmus, Programme Committee and others** | | tbd |
| **EU Defence Programme** | **R&D** | | **Ricardo Conde** (PT Space) \| Deputy: Fernando Carvalho (ANI) |
| | **Deployment** | | **DGRDN - MDN** |
| **Other** | **DG DEV (together with DGs RTD & CNECT)** | | **Ana Neves** (MCTES - PERIN) \| Deputies: Rui Munhá (FCT), Mafalda Dourado (ANI), Hugo Costa (PT Space) |
| | **DG RTD - External relations** | | **Ana Neves** (MCTES - PERIN) \| Deputies: Maria João Pinto (MCTES), Rui Munhá (FCT) Susana Catita (Ciencia LP) |

# *3. National Network of Research and Innovation Promotion Offices*

| Instituição | Designação do Gabinete de Apoio | Tipo de Instituição | Email | Telefone |
|---|---|---|---|---|
| Applied Molecular Biosciences Unit | Science Management & Communication Office | Centro de Investigação | tsc@fct.unl.pt | +351 212948575 |
| ARDITI - Agência Regional para o Desenvolvimento da Investigação, Tecnologia e Inovação | ARDITI | Centro de Investigação | arditi@arditi.pt | +351 291721220 |
| Associated Laboratory for Green Chemistry | Science Management Office | Colabs | laqv@requimte.pt | +351 220408860 |
| CBQF - Centro de Biotecnologia e Química Fina | Research & Innovation Funding Office | Centro de Investigação | jcortez@porto.ucp.pt | |
| CECOLAB - Collaborative Laboratory Towards Circular Economy | Management Support | | gestao@cecolab.pt | +351 238011400 |
| CICECO - Aveiro Institute of Materials | CDTM - Centre for Materials Design & Technology | Centro de Investigação | rocha@ua.pt | +351 234370730 |
| CEIS20 | CEIS20 | Centro de Investigação | ceis20@ci.uc.pt | +351 239708870 |
| Centro de Estudos Internacionais do ISCTE - Instituto Universitário de Lisboa | CEI-IUL (apoiado pelo Gabinete de Apoio à Investigação e Projectos do ISCTE-IUL) | Centro de Investigação | cei@iscte-iul.pt | |
| Centro de Estudos Sociais | Gabinete de Gestão de Projetos | Centro de Investigação | gagep@ces.uc.pt | +351 239855570 |
| Centro de Investigação e Estudos de Sociologia (CIES-IUL) / Instituto Universitário de Lisboa (ISCTE-IUL) | Gabinete de Comunicação e Planeamento | Centro de Investigação | gcp.cies@iscte-iul.pt | |
| CESPU | Balcão de Transferência de Tecnologia | Gabinete de Transferência de Tecnologia | btc.iinfacts@cespu.pt | |
| Comissão de Coordenação e Desenvolvimento Regional do Norte | Direção de Serviços de Desenvolvimento Regional | Administração Pública e Poder Local | DSDR@ccdr-n.pt | |
| CTCV - Centro Tecnológico da Cerâmica e do Vidro | Unidade de Inovação e Desenvolvimento | Centros de Interface Tecnológico | inovacao@ctcv.pt | |

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|---|---|---|---|---|
| Escola Superior de Tecnologia da Saúde de Lisboa | Gabinete de Projetos Especiais, Investigação e Inovação | Ensino Superior - Politécnico | investigacao@estesl.ipl.pt | |
| Faculdade de Arquitetura da Universidade do Porto | Centro de Estudos de Arquitetura e Urbanismo (CEAU/FAUP) | Ensino Superior - Universidade | ceau@arq.up.pt | +351 220425407 |
| Faculdade de Belas Artes da Universidade do Porto | i2ADS - Research Institute in Art, Design and Society | Centro de Investigação | i2ads@fba.up.pt | +351 225192429 |
| Faculdade de Letras da Universidade de Lisboa | Divisão de Apoio à Investigação | Ensino Superior - Universidade | dai@letras.ulisboa.pt | |
| FCiências.ID - Associação para a Investigação e Desenvolvimento de Ciências | Núcleo de Projetos Internacionais | Instituição Privada de Investigação | internacionaisID@fciencias-id.pt | |
| FCT NOVA | Gabinete de Gestão de Projectos | Ensino Superior - Universidade | gest-cnmt@campus.fct.unl.pt | |
| FCT NOVA | Gabinete de Gestão de projetos de I&D | Ensino Superior - Universidade | cenimat.gestao@fct.unl.pt | |
| FEUP - UPORTO | Gabinete H2020 (Unidade de Apoio à Investigação e Inovação) | Ensino Superior - Universidade | h2020@fe.up.pt | |
| FPCEUP | CRIA | Ensino Superior - Universidade | projetos@fpce.up.pt | |
| Fundação Champalimaud | Pre-Award | Centro de Investigação | preaward.osp@research.fchampalimaud.org | |
| Fundação Gaspar Frutuoso | | Instituição Privada de Investigação | fgf@uac.pt | |
| ICVS/3B's- Associate Laboratory | ICVS/3B's- Associate Laboratory | Centro de Investigação | info@i3bs.uminho.pt | +351 253510900 |
| iMM - Instituto de Medicina Molecular João Lobo Antunes | Funding Office | Outros | imm-funding@medicina.ulisboa.pt | |
| INEGI | Projetos Integrados | Centros de Interface Tecnológico | integratedprojects@inegi.up.pt | |

| | | | | |
|---|---|---|---|---|
| INESC- ID - Instituto de Engenharia de Sistemas e Computadores, Investigação e Desenvolvimento em Lisboa | IM4EU - Innovation Management for Europe | Centro de Investigação | im4eu@inesc.pt | |
| INESC MN - Instituto de Engenharia de Sistemas e Computadores Microsistemas e Nanotecnologias | IM4Europe - Innovation Management for Europe | Centro de Investigação | im4eu@inesc.pt | |
| INESC TEC | Serviço de Apoio às Parcerias Empresariais | Centro de Investigação | sape@inesctec.pt | |
| INESC TEC - Instituto de Engenharia de Sistemas e Computadores, Tecnologia e Ciência | Serviço de Apoio à Angariação de Financiamentos | Centro de Investigação | saaf@inesctec.pt | |
| INESC TEC - Instituto de Engenharia de Sistemas e Computadores, Tecnologia e Ciência | Serviço de Apoio à Angariação de Financiamentos | Centro de Investigação | pdnf@inesctec.pt | +351 222094059 |
| INIAV, I.P. | Gabinete de Apoio a Projetos | Laboratórios de Estado | gap@iniav.pt | |
| INOVA+ | International Unit | Centro de Interface Tecnológico | ana.costa@inova.business | |
| INOVA+ | International Unit | Centro de Interface Tecnológico | claudia.antunes@inova.business | |
| InnovPlantProtect - Associação (CoLAB) | Coordenação InnovPlantProtect CoLAB | Laboratórios Colaborativos | innovplantprotect@itqb.unl.pt | |
| INOV INESC Inovação | UGIILx - Unidade de Gestão da Inovação do INESC em Lisboa | Centro de Investigação | ugiilx@inesc.pt | |
| Instituto de Ciências da Saúde da Universidade Católica Portuguesa | CREATING HEALTH - Research and Innovation Funding | Ensino Superior - Universidade | geral.creatinghealth@ics.lisboa.ucp.pt | |
| Instituto de Ciências Sociais da Universidade de Lisboa | Gestão de I&D | Ensino Superior - Universidade | gestao.id@ics.ulisboa.pt | |
| Instituto de Tecnologia Química e Biológica António Xavier (ITQB NOVA), Universidade Nova de Lisboa | Gabinete de Financiamento à Ciência | Centro de Investigação | itqb.funding@itqb.unl.pt | |

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|---|---|---|---|---|
| Instituto Gulbenkian de Ciência | Research Funding Affairs Unit (RFA Unit) | Centro de Investigação | rfaunit@igc.gulbenkian.pt | |
| Instituto Hidrográfico | Gabinete de Projetos | Laboratórios de Estado | gabproj@hidrografico.pt | |
| i3S - Instituto de Investigação e Inovação em Saúde | Research & Innovation Unit | | international-projects@i3s.up.pt | |
| Instituto de Medicina Molecular João Lobo Antunes | Funding Office (Finance and Operations) | Centro de Investigação | imm-funding@medicina.ulisboa.pt | |
| Instituto de Tecnologia Química e Biológica António Xavier (ITQB NOVA), Universidade Nova de Lisboa | Gabinete de Financiamento à Ciência | Centro de Investigação | itqb.funding@itqb.unl.pt | |
| Instituto Nacional de Investigação Agrária e Veterinária | Gabinete de Apoio a Projetos - GAP | Laboratórios de Estado | gap@iniav.pt | |
| Instituto Politécnico da Guarda | Unidade de Investigação para o Desenvolvimento do Interior | Ensino Superior - Politécnico | diretor.udi@ipg.pt | |
| Instituto Politécnico de Beja | Gabinete de Projectos | Ensino Superior - Politécnico | gabinetedeprojectos@ipbeja.pt | |
| Instituto Politécnico de Beja | Gabinete de Projectos | Ensino Superior - Politécnico | gabinetedeprojectos@ipbeja.pt | +351 284314400 |
| Instituto Politécnico de Bragança | Gabinete de Apoio a Projetos | Ensino Superior - Politécnico | apoio.investigacao@ipb.pt | |
| Instituto Politécnico de Leiria | Gabinete de Projetos | Ensino Superior - Politécnico | gabinete.projectos@ipleiria.pt | |
| Instituto Politécnico de Lisboa | Gabinete de Projetos Especiais e Inovação | Ensino Superior - Politécnico | gpei@sp.ipl | |
| Instituto Politécnico de Santarém | Gabinete de Projetos do Instituto Politécnico de Santarém | Ensino Superior - Politécnico | gabinete.projetos@ipsantarem.pt | |
| Instituto Politécnico de Setúbal | Unidade de Apoio à Inovação, I&D e Empreendedorismo (UAII&DE) | Ensino Superior - Politécnico | uaiide@ips.pt | |
| Instituto Politécnico de Viana do Castelo | OTIC | Ensino Superior - Politécnico | otic@ipvc.pt | |

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|---|---|---|---|---|
| Instituto Superior de Engenharia de Lisboa | Núcleo de Apoio à Investigação e Desenvolvimento | Ensino Superior - Politécnico | nucleo.id@isel.pt | |
| Instituto Superior de Engenharia de Lisboa | Núcleo de Gestão de Projetos | Ensino Superior - Politécnico | projetos@isel.pt | +351 218317043 |
| Instituto Superior de engenharia de Lisboa - ISEL | Núcleo de Apoio à Investigação e Desenvolvimento | Ensino Superior - Politécnico | núcleo.id@isel.pt | +351 218317000 |
| INSTITUTO SUPERIOR DE ENGENHARIA DO PORTO | GABINETE DE APOIO A PROJETOS | Ensino Superior - Politécnico | info-projetos@isep.ipp.pt | |
| Instituto Superior Técnico | Gabinete de Apoio Técnico a Projetos e ao Investigador (GATPI) da Direção de Projetos | Ensino Superior - Universidade | dprojetos@tecnico.ulisboa.pt | |
| ISCTE - Instituto Universitário de Lisboa | Gabinete de Apoio à Investigação | Ensino Superior - Universidade | gai@iscte.pt | |
| ISCTE-IUL | CIES-IUL | Ensino Superior - Universidade | cies@iscte-iul.pt | |
| ISCTE-IUL | Business Research Unit (BRU-IUL) | Centro de Investigação | bru-unide@iscte-iul.pt | |
| ISCTE-IUL | CIS-IUL | Ensino Superior - Universidade | cis@iscte-iul.pt | |
| ISCTE-IUL | ISTAR - Information Sciences and Technologies and Architecture Research Center | Centro de Investigação | sara.eloy@iscte-iul.pt | |
| ISPA - Instituto Universitário | Centro de Gestão de Investigação | Ensino Superior - Universidade | cgi@ispa.pt | |
| Labcom - Communication & Arts | Beira Interior University | Ensino Superior - Universidade | agradim@gmail.com | |
| Laboratório Nacional de Engenharia Civil | Gabinete de Gestão de Projetos | Laboratórios de Estado | ggp@lnec.pt | |
| LIP - Laboratório de Instrumentação e Física Experimental de Partículas | RH e Gestão Projetos | | natalia@lip.pt | |

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|---|---|---|---|---|
| NOVA - Escola Nacional de Saúde Pública | GAIDI - Gabinete de Apoio à Investigação, Desenvolvimento e Inovação. | Ensino Superior - Universidade | gaidi@ensp.unl.pt | |
| **Instituição** | **Designação do Gabinete de Apoio** | **Tipo de Instituição** | **Email** | **Telefone** |
| NOVA FCSH | Balcão do Investigador - pre-award da NOVA FCSH | Ensino Superior - Universidade | research@fcsh.unl.pt | |
| NOVA School of Science and Technology | IRIS - Innovation Research & Impact Strategy Office | Ensino Superior - Universidade | jfb.monteiro@fct.unl.pt | |
| Nova School of Business & Economics | Research Office | Ensino Superior - Universidade | research.office@novasbe.pt | |
| NOVA.id.FCT | Management Department | Associação | gestao7@novaidfct.pt | +351 212948553 |
| NOVA.id.FCT - Associação para a Inovação e Desenvolvimento da FCT | Departamento de Gestão de Projetos | Outros | gestao5@novaidfct.pt | +351 212948553 |
| PFP - Plataforma Ferroviaria Portuguesa, Cluster da Ferrovia | Cluster da Ferrovia | Clusters | info@ferrovia.pt | |
| Politécnico de Lisboa | Projetos Especiais e Inovação (GPEI) | Ensino Superior - Politécnico | gpei@sp.ipl.pt | |
| PRODUTECH | PRODUTECH | Clusters | geral@produtech.org | |
| Ubimedical Universidade da Beira Interior | Ubimedical | Ensino Superior - Universidade | Ubimedical@ubi.pt | |
| Universidade de Aveiro | ESAN | Ensino Superior - Universidade | hfaria@ua.pt | +351 256666960 |
| Universidade de Aveiro | Gabinete de Apoio à Investigação | Ensino Superior - Universidade | research@ua.pt | |
| Universidade Católica Portuguesa | Gabinete de Investigação e Inovação | Ensino Superior - Universidade | gii@ucp.pt | |

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|---|---|---|---|---|
| Universidade Católica Portuguesa - Centro Regional do Porto | AGCP – Apoio à Gestão de Candidaturas e Projetos | Ensino Superior - Universidade | acprojectos@porto.ucp.pt | |
| Universidade Coimbra | Divisão Apoio Promoção da Investigação | Ensino Superior - Universidade | dapi@uc.pt | +351 239247013 |
| Universidade da Madeira | Unidade de Projetos e Cooperação | Ensino Superior - Universidade | projetos@mail.uma.pt | |
| Universidade de Coimbra | Instituto de Investigação Interdisciplinar da Universidade de Coimbra | Ensino Superior - Universidade | iii@uc.pt | |
| Universidade de Évora | Serviço de Ciência e Cooperação | Ensino Superior - Universidade | investigar@scc.uevora.pt | |
| Universidade de Trás-os-Montes e Alto Douro | Gabinete de Apoio a Projetos | Ensino Superior - Universidade | gap@utad.pt | |
| Universidade do Algarve | Divisão de informação e Estatística - Unidade de Apoio à Investigação Científica (UAIC) | Ensino Superior - Universidade | uaicfunding@ualg.pt | |
| Universidade do Porto | Unidade de Apoio à Investigação | Ensino Superior - Universidade | uai@reit.up.pt | |
| Universidade Lusófona de Humanidades e Tecnologias | ILIND - Instituto Lusófono de Investigação e Desenvolvimento | Ensino Superior - Universidade | ilind@ulusofona.pt | |
| Universidade Nova de Lisboa | Gabinete de Apoio à Investigação | Ensino Superior - Universidade | nova.investigacao@unl.pt | |
| Universidade Nova de Lisboa | Divisão de Projetos | Ensino Superior - Universidade | funl.projectos@unl.pt | |
| UTAD - Universidade de Trás-os-Montes e Alto Douro | CITAB | Ensino Superior - Universidade | citab@utad.pt | |

# *4. National Erasmus Offices*

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| ASSOCIAÇÃO DE JARDINS ESCOLAS JOÃO DE DEUS | Jaime | Santos | jaime.santos@escolasjoaodeus.pt |
| ASSOCIAÇÃO DE PEDAGOGIA INFANTIL | Cecília | Moreira | cecilia.moreira@emulrich.org; dora.batalim@emulrich.org |
| C.E.U - COOPERATIVA DE ENSINO UNIVERSITARIO CRL | Carolina | Peralta | cperalta@autonoma.pt |
| CENIL CENTRO DE LÍNGUAS LDA / ISAL | José Nelson | Abreu | erasmus@isal.pt |
| CENTRO DE INVESTIGACAO E FORMACAO EM ARTES E DESIGN LDA | Antonino Jorge; Marta Varzim | | martavarzim@esad.pt; antoninojorge@esad.pt; |
| COFAC COOPERATIVA DE FORMACAO E ANIMACAO CULTURAL CRL | Elisabete Lourenço; Gonçalo Calado | | elisabete.lourenco@ulusofona.pt; goncalo.calado@ulusofona.pt |
| COOPERATIVA DE ENSINO SUPERIOR DE SERVIÇO SOCIAL | Sandra | Pinho | sandra.pinho@isssp.pt |
| COOPERATIVA DE ENSINO SUPERIOR POLITÉCNICO E UNIVERSITÁRIO, CRL. (CESPU) | Sara Gama; Luís Manuel Silva | | erasmus@cespu.pt |
| CRUZ VERMELHA PORTUGUESA | Luís Janeiro; Margarida Ourô | | ljaneiro@esscvp.eu; mouro@esscvp.eu |
| EGAS MONIZ - COOPERATIVA DE ENSINO SUPERIOR, CRL | Carla | Ascenso | erasmus@egasmoniz.edu.pt |
| EIA - ENSINO E INVESTIGACAO E ADMINISTRACAO SA | Cátia | Ramalhete | catiar@uatlantica.pt |
| ENSILIS - EDUCACAO E FORMACAO, UNIPESSOAL LDA | Liliana Rosalino; Sofia Mendes; Mafalda Homem de Melo | | lrosalino@universidadeeuropeia.pt; sofia.mendes@universidadeeuropeia.pt; mafalda.h.melo@universidadeeuropeia.pt |
| ENSINUS - ESTUDOS SUPERIORES SA | Marta Santos; Rui Caldeira | | ruicaldeira@isg.pt; marta.santos@ensinus.pt |
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| ESCOLA SUPERIOR ARTÍSTICA DO PORTO | Liliana | Garcês | erasmus@esap.pt |
| ESCOLA SUPERIOR DE ENFERMAGEM CRUZ VERMELHA PORTUGUESA - ALTO TÂMEGA | Eduardo | Cruz | gmci@esecvpaltotamega.pt |
| ESCOLA SUPERIOR DE ENFERMAGEM DE COIMBRA | António Fernando | Salgueiro Amaral | erasmus@esenfc.pt |
| ESCOLA SUPERIOR DE ENFERMAGEM DE LISBOA (ESEL) | Cláudia Bacatum; Helena Bronze | | coordenacaoerasmus@esel.pt; gri@esel.pt |
| ESCOLA SUPERIOR DE ENFERMAGEM DO PORTO | Maria | Figueiredo | henriqueta@esenf.pt |
| ESCOLA SUPERIOR DE ENFERMAGEM S. JOSÉ DE CLUNY | Cristina | Pestana | cpestana@esesjcluny.pt |
| ESCOLA SUPERIOR DE ENFERMAGEM S. FRANCISCO DAS MISERICÓRDIAS | Ana | Trindade | ana.trindade@esesfm.pt |
| ESCOLA SUPERIOR DE HOTELARIA E TURISMO DO ESTORIL | Nuno Ricardo Dias; Teresa Oliveira | | ricardo.dias@eshte.pt; teresa.oliveira@eshte.pt |
| ESCOLA SUPERIOR DE SAÚDE DE SANTA MARIA | Mariana | Silva | mariana.silva@santamariasaude.pt |
| ESCOLA SUPERIOR NAUTICA INFANTE D. HENRIQUE | Olga | Delgado | olgadelgado@enautica.p.t |
| ESE, ENSINO SUPERIOR EMPRESARIAL, LDA. | Sofia | Gomes | rel.internacionais@isag.pt |
| ESPAÇO ATLÂNTICO FORMAÇÃO FINANCEIRA SA | Ana Lisa Moutinho<br>José Machado | | amoutinho@iesf.pt; jose.machado@controlplan-consulting.pt; jose.machado@abs.pt |
| ESTADO-MAIOR-GENERAL DAS FORÇAS ARMADAS (EMGFA) | Tenente-Coronel Ângelo Marques Simões | | simoes.amm@ium.pt |
| FORÇA AÉREA PORTUGUESA | Major Luís Félix | | lffelix@emfa.pt; lffelix@academiafa.edu.pt |
| FUNDACAO CONVENTO DA ORADA-FUNDACAO PARA A SALVAGUARDA E REABILITACAO DO PATRIMONIO ARQUITECTONICO | Beatriz | Sousa | gaa@esg.pt |
| FUNDAÇÃO FERNANDO PESSOA-UNIVERSIDADE FERNANDO PESSOA | Nadine | Rombert Trigo | pro-reitoria-diri@ufp.edu.pt |

| | | | |
|---|---|---|---|
| FUNDACAO PARA O ESTUDO E DESENVOLVIMENTO DA REGIAO DE AVEIRO (FEDRAVE) | Raquel | Pedrosa | rcp@iscia.edu.pt |
| FUNDAÇÃO TERRAS DE SANTA MARIA DA FEIRA / ISVOUGA | Paulo | Marcelo | direccao@isvouga.pt; smi@isvouga.pt paulo.marcelo@isvouga.pt |
| IESF-INSTITUTO DE ESTUDOS SUPERIORES DE FAFE, LDA | Nataliya | Klimenko | internacional@iesfafe.pt |
| INSTITUTO DE TECNOLOGIAS AVANÇADAS PARA A FORMAÇÃO LDA | Dora | Lourenço | dlourenco@istec.pt |
| INSTITUTO PIAGET - COOPERATIVA PARA DESENVOLVIMENTO HUMANO INTEGRAL E ECOLÓGICO, CRL | José | Bronze | mobilidade@lisboa.ipiaget.pt |
| INSTITUTO POLITECNICO DA GUARDA | Anabela | Pires | gmc@ipg.pt |
| INSTITUTO POLITECNICO DE BEJA | João Leal; Cristina Palma; Ana Mestre | | gri@ipbeja.pt |
| INSTITUTO POLITECNICO DE BRAGANCA | Wagner do Rosário; Inês Rodrigues | | wagner@ipb.pt; inesrodrigues@ipb.pt |
| INSTITUTO POLITECNICO DE CASTELO BRANCO | Maria da Conceição | Baptista | cbaptista@ipcb.pt |
| INSTITUTO POLITECNICO DE COIMBRA | Sandra Marina Ferreira Martins | Duvergé | dga.sri@ipc.pt |
| INSTITUTO POLITÉCNICO DE GESTÃO E TECNOLOGIA -- GAIA - ENSIGAIA | Elisabete | Lourenço | elisabete.lourenco@ulusofona.pt; |
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| INSTITUTO POLITECNICO DE SANTAREM | Céu | Martins | ceu.martins@sc.ipsantarem.pt |
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| INSTITUTO POLITECNICO DE TOMAR | Maria | Catroga | c.catroga@ipt.pt |

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| INSTITUTO POLITECNICO DE VIANA DE CASTELO | Sónia | Simas | ssimas@ipvc.pt |
| INSTITUTO POLITECNICO DE VISEU | Sandra | Familiar | sfamiliar@sc.ipv.pt |
| INSTITUTO POLITECNICO DO CAVADO E DO AVE | Adriana | Lago de Carvalho | gri@ipca.pt |
| INSTITUTO POLITECNICO DO PORTO | José | Quadrado | jcq@sc.ipp.pt |
| INSTITUTO PORTUGUÊS DE ADMINISTRAÇÃO DE MARKETING (LISBOA) - ENSILIS - EDUCAÇÃO E FORMAÇÃO, UNIPESSOAL LDA | Liliana Rosalino; Sofia Mendes; Mafalda Homem de Melo | | lrosalino@universidadeeuropeia.pt; sofia.mendes@universidadeeuropeia.pt; mafalda.h.melo@universidadeeuropeia.pt |
| INSTITUTO PORTUGUÊS DE ADMINISTRAÇÃO DE MARKETING (PORTO) ENSILIS - EDUCAÇÃO E FORMAÇÃO, UNIPESSOAL, LDA. | Liliana Rosalino; Sofia Mendes; Mafalda Homem de Melo | | lrosalino@universidadeeuropeia.pt; sofia.mendes@universidadeeuropeia.pt; mafalda.h.melo@universidadeeuropeia.pt |
| INSTITUTO SUPERIOR DE CIÊNCIAS DA ADMINISTRAÇÃO - SESC | Elisabete | Lourenço | elisabete.lourenco@ulusofona.pt; |
| INSTITUTO SUPERIOR DE LEIRIA - ISLA LEIRIA | Elisabete | Lourenço | elisabete.lourenco@ulusofona.pt; |
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