



Current and Upcoming Accelerator Technology Development Projects

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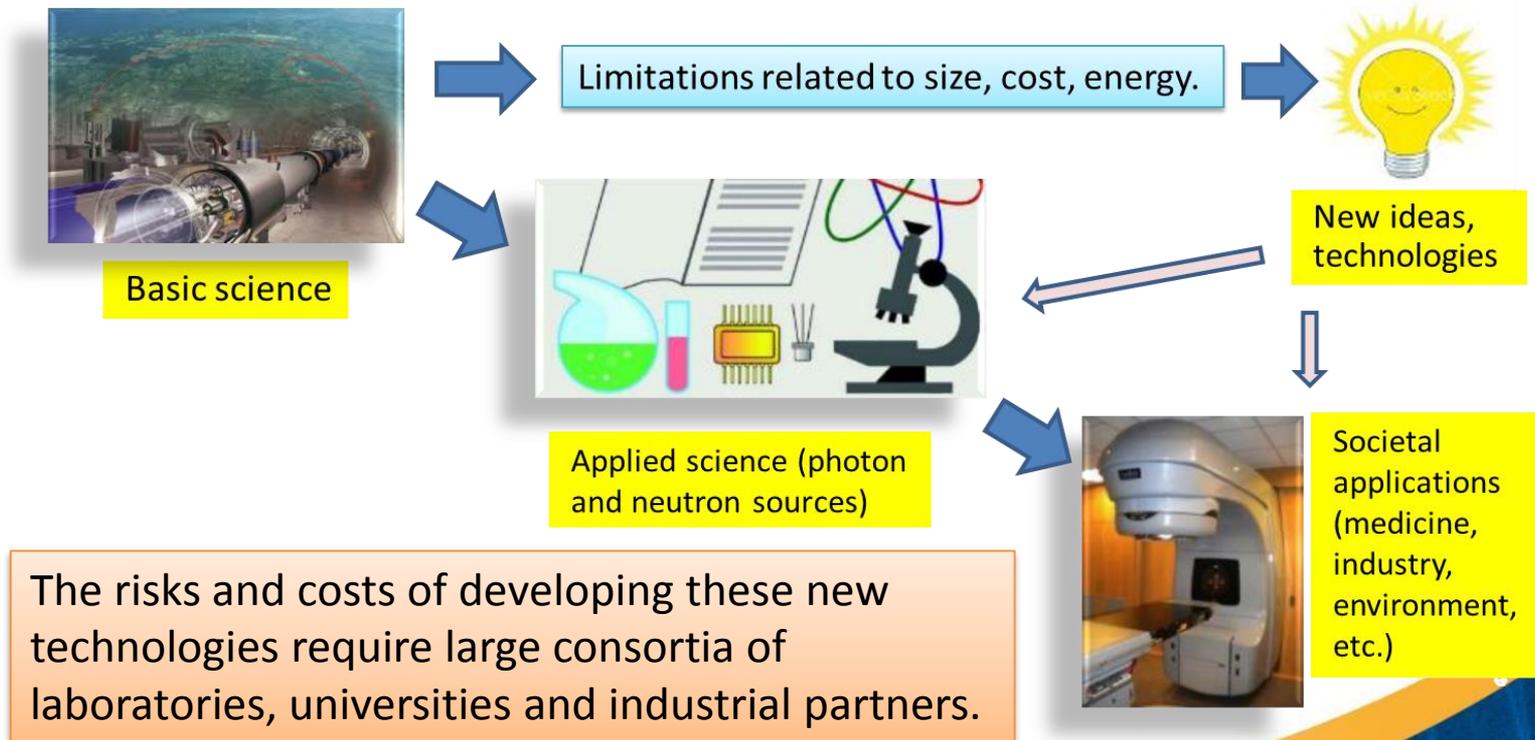
3rd CERN Baltic Group Meeting

29.01.2018

The need for particle accelerator R&D

Particle accelerators need novel and improved technologies :

1. To grow, making the future large accelerator for fundamental research more **sustainable**;
2. To foster the ongoing transition from **basic science** to **applied science** (as X-ray and neutron sources);
3. To spread accelerator technologies from scientific laboratories **to society**, promoting applications in **industry, medicine, environment**, etc.



EU support to particle accelerator R&D

Integrating Activities

FP6

CARE 01/2004 – 12/2008
5 years, 15.2 M€ EU contribution

FP7

EuCARD 04/2009 – 03/2013
4 years, 10.0 M€ EU contribution

EuCARD-2 05/2013 – 04/2017
4 years, 8.0 M€ EU contribution

H2020

ARIES 05/2017 – 04/2021
4 years, 10.0 M€ EU contribution

Design Studies, Preparatory Phases

EuroNu DS, 2008/12, 4M€

SLHC-PP, 2008/11, 5.2M€

ILC-HiGrade, 2008/12, 5M€

TIARA-PP, 2011/13, 3.9M€

HiLumi LHC, 2011/15, 4.9M€

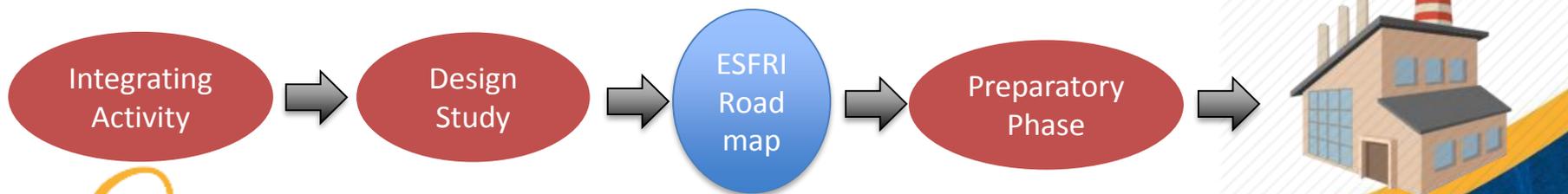
EuroCirCol, 2016/19

EUPRAXIA, 2016/19

ESSnuSB, 2017/20

CompactLight, 2017/20

projects coordinated by the ESGARD and TIARA Committees (excluding nuclear physics)



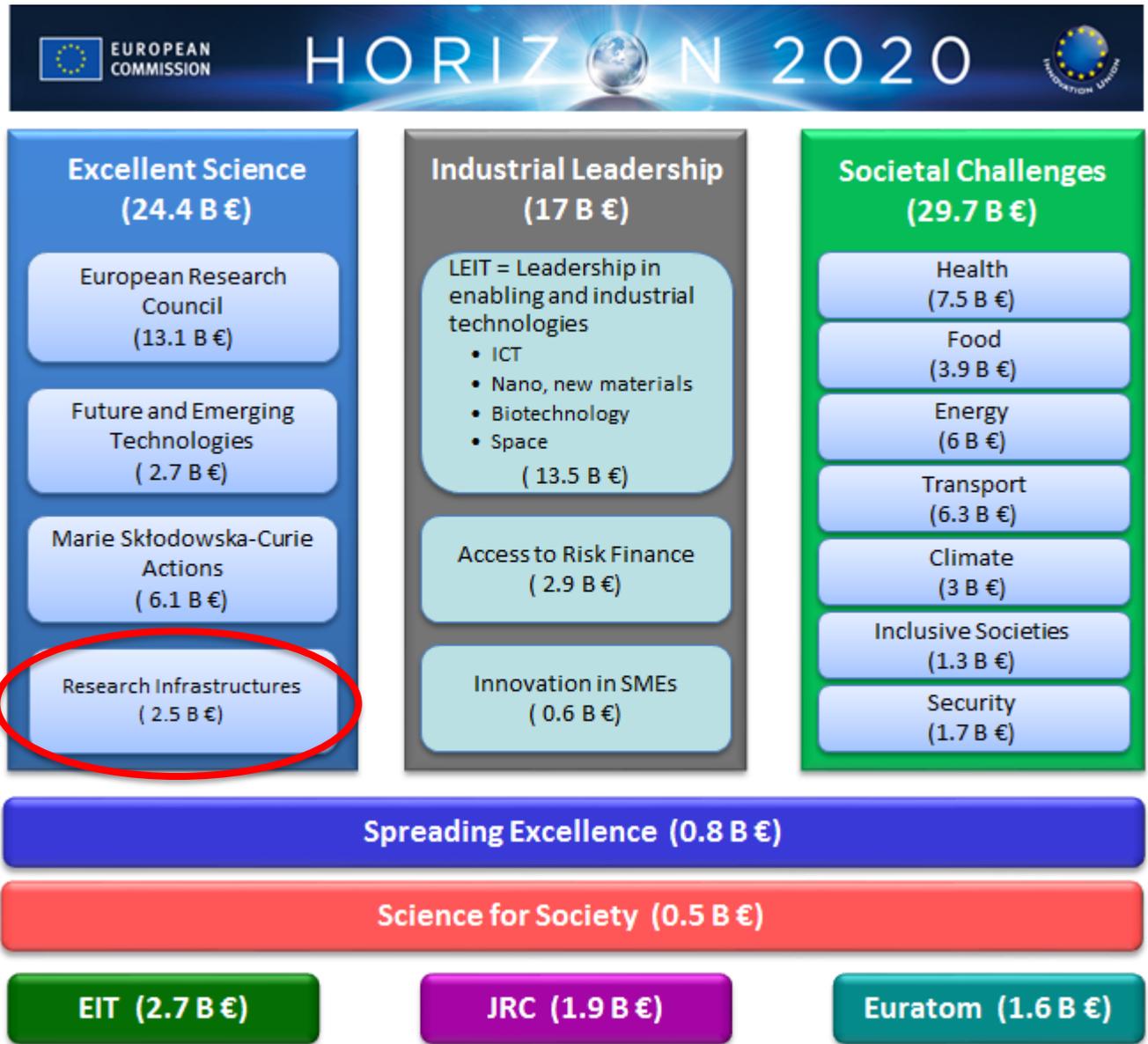
EC support line for new large scientific infrastructures

implementation

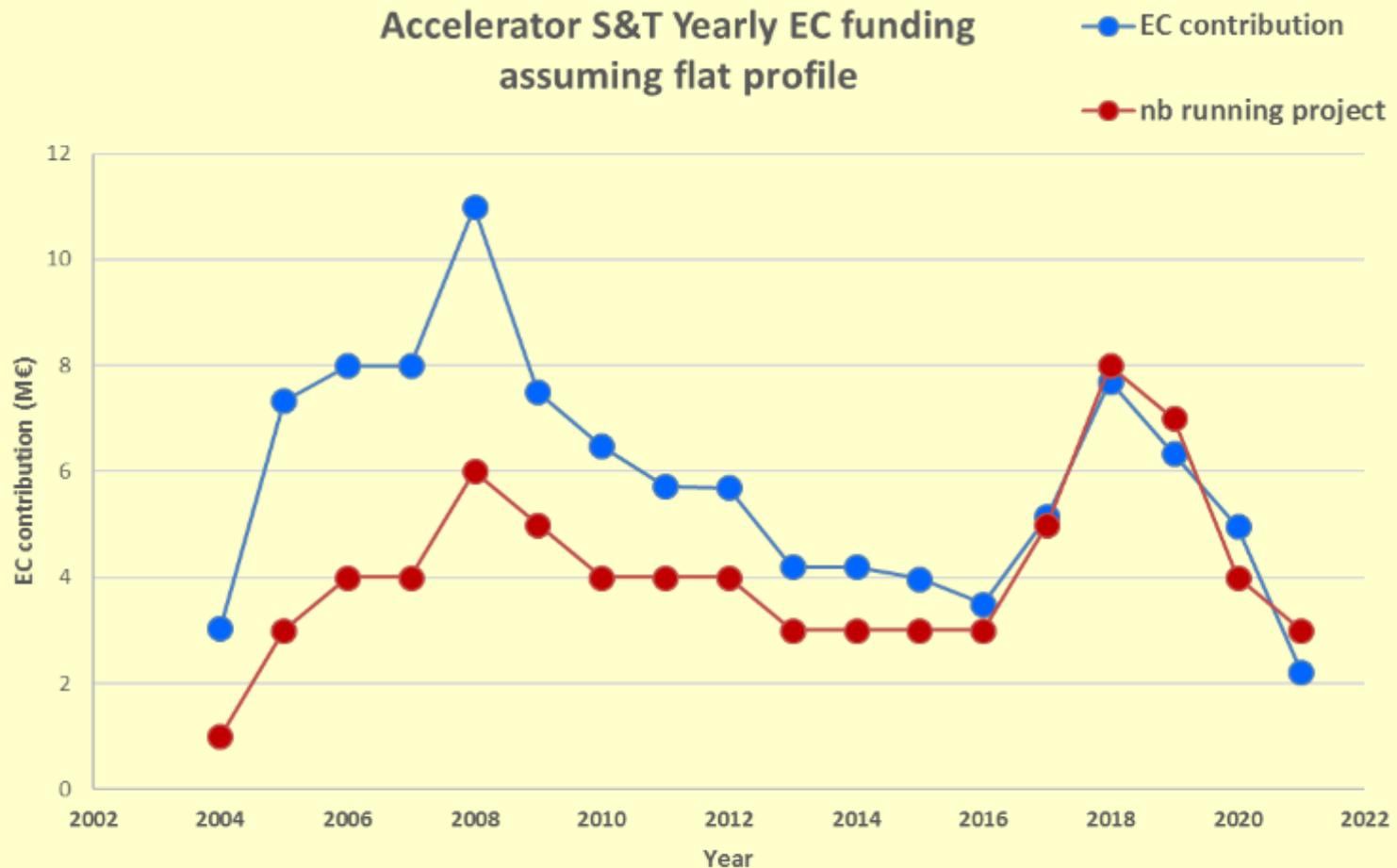


Particle Accelerator R&D in Horizon 2020

Our R&D is required for exploiting and upgrading the European particle accelerators, one of the pillars of EU Research Infrastructure.



Funding history



⇒ 19 projects supported, total cost >305M€, EC contribution 105M€

⇒ More than 100 partners in 21 countries involved

The ongoing project ARIES

ARIES = Accelerator Research and innovation for European Science and Society

- Integrating Activity for Particle Accelerator R&D, co-funded by the European Commission under the Horizon 2020 programme, Grant Agreement 730871.
- Duration: 4 years, 1 May 2017 – 30 April 2021.
- EC contribution 10 M€, total cost 24.9 M€, funding rate 40%.
- 42 beneficiaries from 18 EU countries

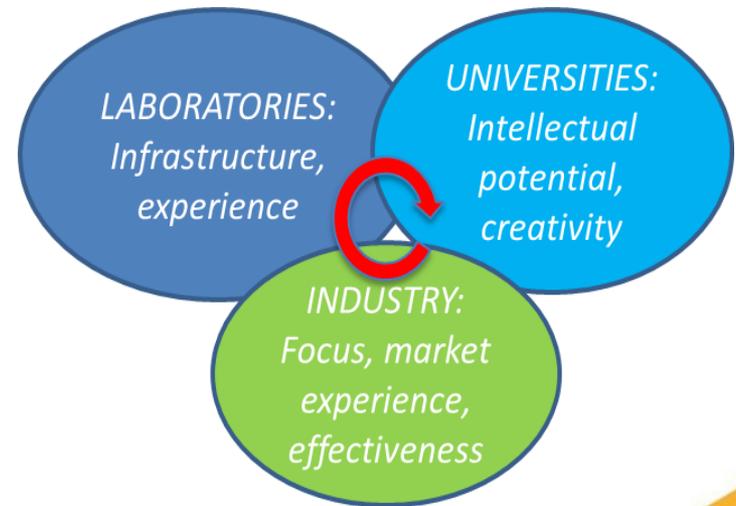
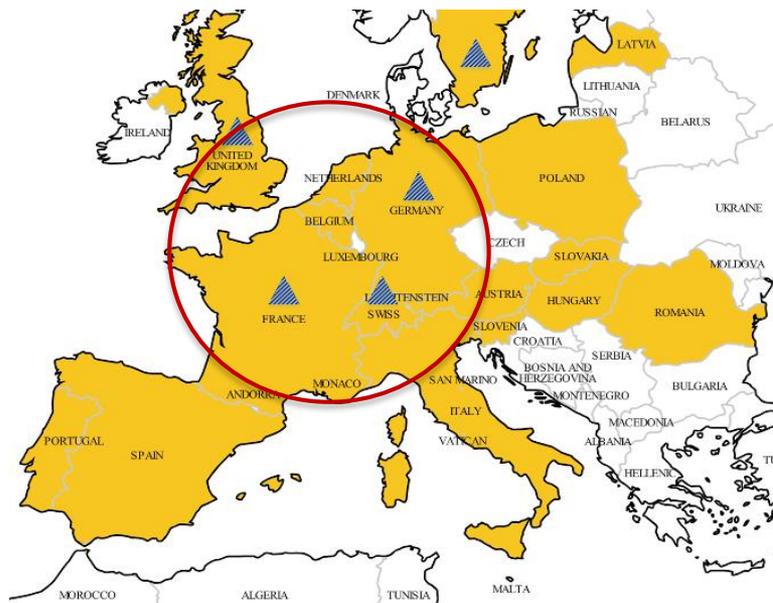
<https://aries.web.cern.ch/>

ARIES mobilizes more than 400 physicists and engineers from 18 European countries



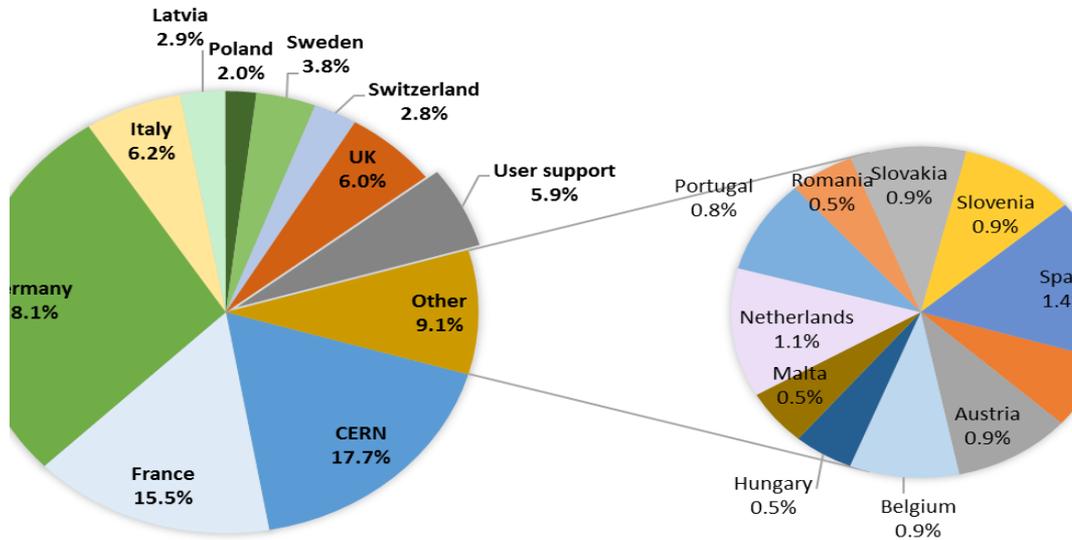
Connecting Europe, connecting academia with industry

- 42 partners from 18 European countries
- Goals: connect the **technological core of Europe** with its **dynamic periphery**, connect the **large laboratories** with **universities, research centers and industries**.
- 12 Laboratories and research institutions, 21 Universities and research centres, 8 industries.



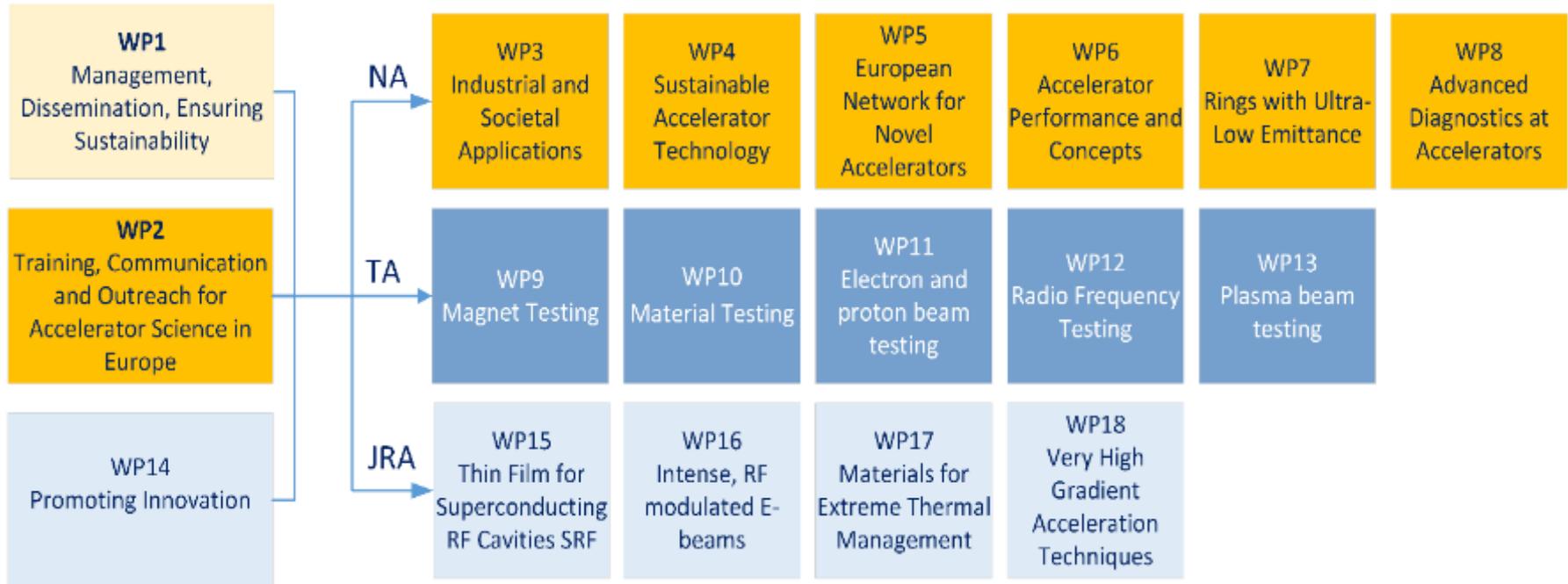
80% of EU Research Infrastructure
is based in only 4 countries

Distribution of ARIES EC contribution



Only Baltic partner is RTU (Latvia),
2.9% of EC contribution

The ARIES Structure and Themes



5 Networks on strategic themes: applications, sustainability, new concepts, extreme designs and instrumentation

5 Pools of testing facilities to prove new concepts

5 Joint Research Activities for experimental validation of selected technologies

Budget (4 years): 15 M€ from the partners, 10 M€ from the European Commission

Structure of projects and funding model

- Integrating Activities structured in:
 - **Networks:** *Thematic studies, workshops*
 - **Transnational Access:** *supported international access to test facilities*
 - **Joint Research Activities:** *R&D and prototyping on selected topics.*
- **Co-funding:** about 50% of the cost covered by the EC contribution and 50% covered by the participating institute matching funds, which include the 20% overhead of H2020.
- These projects have traditionally started from accelerators for **particle physics**, extended to **high-energy nuclear physics, synchrotron light facilities** and **accelerator applications**.

A follow-up for ARIES in a wider strategy

- ARIES will be completed in **April 2021**.
- A follow-up of ARIES is in preparation, to be **submitted in 2020**.
- The Research Infrastructure Programme Committee has defined a new instrument accordingly to new guidelines and priorities for super-advanced communities: the **Innovation Pilot**.
- It is intended to be a pilot for larger programmes that could follow in the new Framework Programme, **Horizon Europe**, due to start in 2021.



Innovation pilot – formulation being finalised

INFRAINNOV-04-2020: Innovation pilots

Specific Challenge: Pan-European Research Infrastructures use more and more sophisticated technologies not available on the market, which require ad-hoc developments and often the use of large-scale platforms combining R&D (Research and Development), integration and validation. These platforms can also provide longer-term visibility and involvement of industry in scientific and technological advancements and therefore ensure greater socio-economic impact.

Scope: Funding will be provided to research infrastructure networks to kick-start the implementation of a common strategy/roadmap for technological developments required for improving their services through partnership with industry. Proposals should then involve research infrastructures, industry and SMEs to promote innovation and knowledge sharing through co-creation of needed technical solutions and make use, when appropriate, of large-scale platforms combining R&D (Research and Development), integration and validation for the technological developments.

Proposals should address:

- if not already done, the identification of key techniques and trends which are crucial for future construction and upgrade of the involved Research Infrastructures and the definition of roadmaps and/or strategic agendas for their development, in close partnership with the industrial partners, especially with innovative SMEs;
- the development of the identified fundamental technologies or techniques underpinning the efficient and joint use of the involved research infrastructures, taking into due account resource efficiency and environmental (including climate-related) impacts.

the prototyping of higher performance methodologies, protocols, and instrumentation, including the testing of components, subsystems, materials, and dedicated software, needed to upgrade the involved research infrastructures or construct their next generation.

Main contents:

- Innovation Networks for R&D roadmaps
- Joint development of prototypes with industry (but not exclusively)
- both basic science and applications

Proposed EC contribution 10 M€

Expected opening: 28 Nov 2019

Deadline: 17 March 2020

Non-competitive (innovation in accelerator technologies one of the three topics for the 30M call)



Contents of the new Innovation Pilot for accelerators

It is time to start preparing **co-innovation subjects** for the new project. Procedure:

- ***Bottom-up consultation*** of all previous partners (and potential new) managed by ARIES, to make proposals for sub-projects to be part of the new Innovation Pilot. Will take place between April and June 2019.
- A Committee set up by ARIES and TIARA under the authority of the European accelerator laboratory directors will ***select the proposals*** and formulate a coherent project between summer and autumn 2019.
- An Editorial Team will ***write the Project proposal***, between November 2019 and March 2020.

First idea on the contents and structure of the new project:

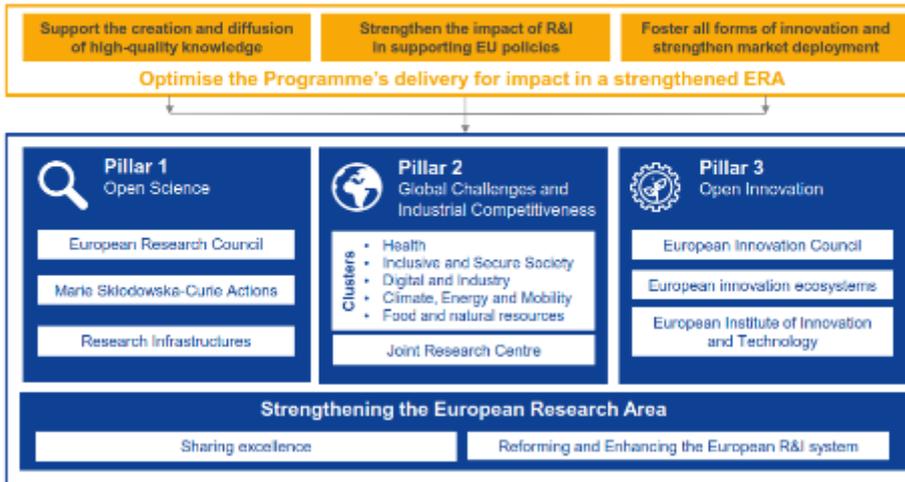
- Thematic Networks on technological roadmaps;
 - Feasibility studies, low TRL technologies, ~100 k€ EC contribution;
 - Advanced projects, high TRL technologies, ~500 k€ EC contribution;
- Two calls for projects, before the start (2019) and after the start (2021).

Note: the new project will have less beneficiaries (receiving EC funding), but should be easier to become partners (participating in the activities, receiving some EC funding indirectly via a beneficiary).

More opportunities in Horizon Europe (FP9)

Horizon Europe: evolution not revolution

Specific objectives of the Programme



- HEurope in preparation, expected budget 86.6 B€ (H2020: 77 B€).
- With respect to H2020, will support **programs more than projects** = longer term initiatives to support European scientific excellences.
- As in H2020 a strong accent on innovation and industry participation.

- Our community is well placed for a long-term multi-million programme, possibly within one of the “missions” announced in the HE programme.
- The Innovation Pilot of H2020 is an experiment to test new funding schemes.
- We need to show that we are a strong and integrated community, able to set its priorities internally (and possibly to distribute funding).

R&I Missions

Relating EU's research and innovation better to society and citizens' needs; with strong visibility and impact

A mission is a portfolio of actions intended to achieve a **bold and inspirational as well as measurable goal** within a set timeframe, with impact for science and technology, society and citizens that goes beyond individual actions

Horizon Europe proposal defines mission characteristics and elements of governance

Specific missions will be **co-designed with Member States, stakeholders and citizens** and programmed within the Global Challenges and Industrial Competitiveness pillar (drawing on inputs from other pillars)

Another project in preparation

Preparation of another Horizon2020 application is starting:

Design Study (development of key technologies in preparation for the construction of a new European research infrastructure)

Subject: **technologies for a new generation of cancer therapy accelerators using ions.**

Possible funding: 3 M€

Call opening: 25 July 2019

Deadline: 12 November 2019

Intended as support to a new accelerator research infrastructure to be based in the South East Europe (to be built with structural funds for new EC members) – SEEIIST: South East Europe International Institute for Sustainable Technologies.

Main partners: CERN, GSI, SEEIIST

Thank you for your attention

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