TIARA: Structuring further Accelerator R&D in Europe

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Industry Workshop

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2. General Context
3. Building TIARA
4. Conclusion

The use of Accelerators

The development of state of the art accelerators is essential for many many fields of science (fundamental, applied or industrial)

Research accelerators

- **Particle Physics, Nuclear Physics, Research fields using light source, Research fields using spallation neutron sources, Study of material for fusion, Study of transmutation…**

In past 50 years, about 1/3 of Physics Nobel Prizes are rewarding work based on or carried out with accelerators

This « market » represents ~15 000 M€ for the next 15 years, i.e. ~1 000M€/year

Clinical accelerators

- **radiotherapy, electron therapy, hadron (proton/ion)therapy…**

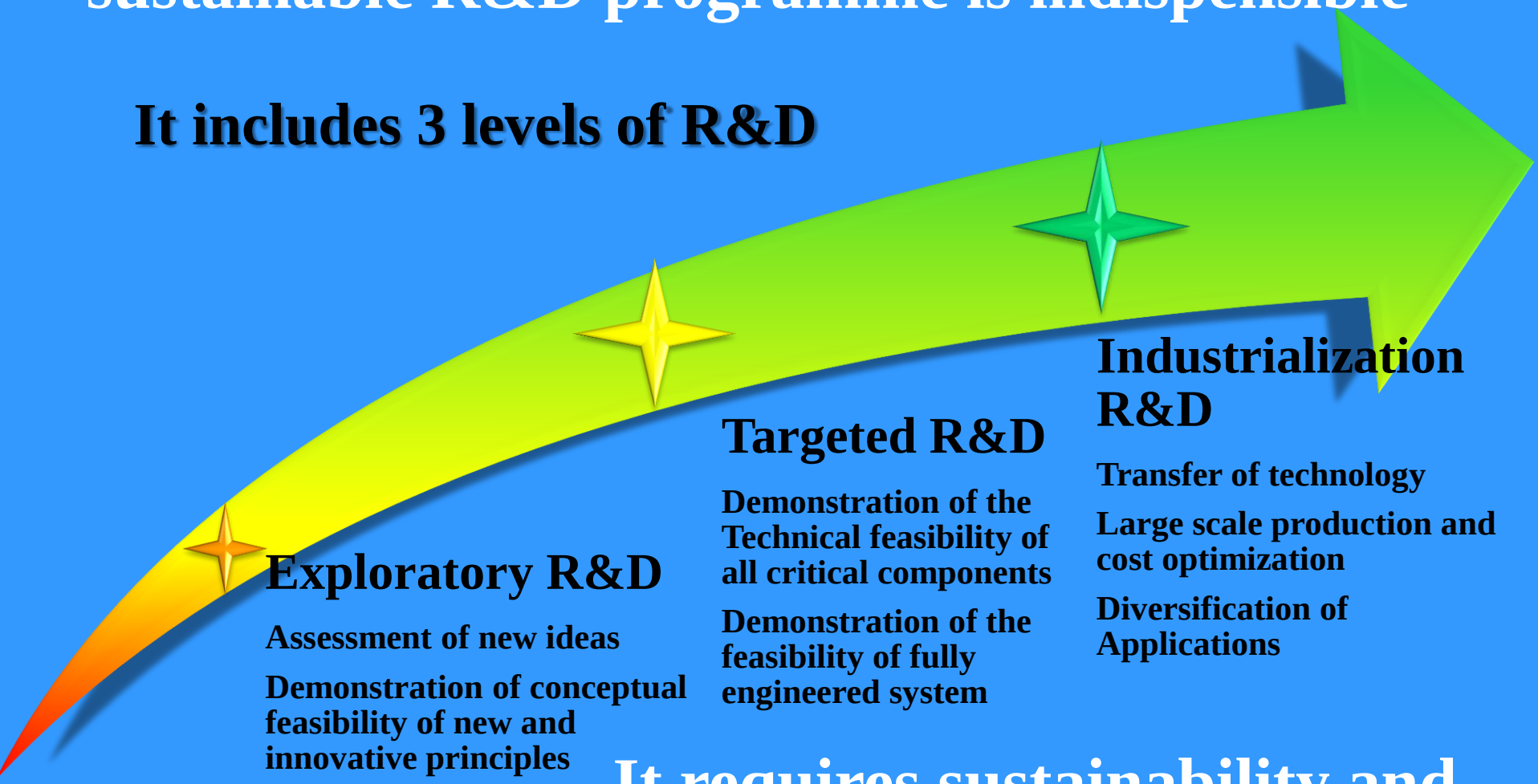
Industrial accelerators

- **ion implanters, electron beam and X-ray irradiators, radioisotope production…**

This market represents ~3 000M€/year and is increasing at a rate of ~10% /year

To be able to build future accelerators, a strong sustainable R&D programme is indispensible

It includes 3 levels of R&D



Exploratory R&D

Assessment of new ideas

Demonstration of conceptual feasibility of new and innovative principles

Targeted R&D

Demonstration of the Technical feasibility of all critical components

Demonstration of the feasibility of fully engineered system

Industrialization R&D

Transfer of technology

Large scale production and cost optimization

Diversification of Applications

It requires sustainability and large (costly) infrastructures

We have to think at the European level, at least

Accelerator R&D in Europe (History and today's Organization)

1) ECFA 2001 Report "The Future of Accelerator-based Particle Physics in Europe"

"an improved educational programme in the field of accelerator physics and increased support for accelerator R&D activity in European universities, national facilities and CERN"

in 2002

R. Aleksan (Chair), M. Cerrada (CIEMAT),
R. Edgecock (CCLRC), E. Elsen (DESY) , O. Kester (GSI) ,
K. Osterberg (HIP), M. Jezabek (IFJ-PAN),
S. Guiducci (LNF), J.-P. Koutchouk (CERN),
F. Richard (IN2P3/Orsay), L. Rivkin (PSI)

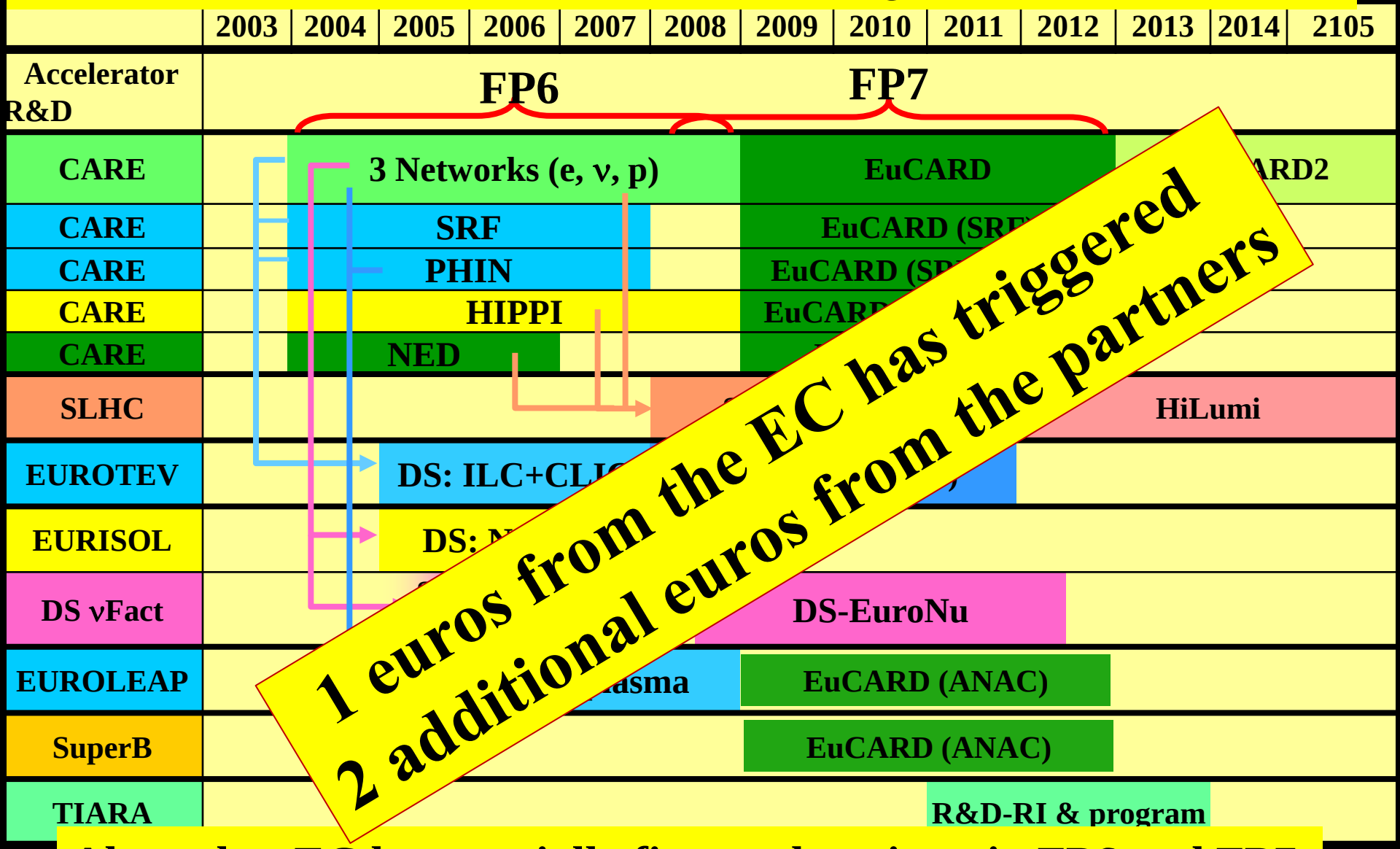
http://www.esgard.org

ESGARD mandate develop and implement a Strategy to optimize and enhance the outcome of the Research and Technical Development in the field of accelerator physics in Europe

2) Absence of HEP in the FP of the EU

This strategy led to the preparation and implementation of a coherent set of collaborative projects using the incentive funding of the 6th and 7th Framework Programme.

ESGARD developed and implemented a strategy to promote Accelerator R&D with the incentive of the EC Framework Programme within ERA



1 euros from the EC has triggered 2 additional euros from the partners

Altogether EC has partially financed projects in FP6 and FP7 with a total budget of ~228 M€ (68 M€ from EC)

We have to think beyond

The Big Issues to be integrated within the next step

- **Coordinated wide scope sustainable programme**
- **Enhanced Collaborative R&D projects**
- **Integration and Access to broad variety of large infrastructures**
- **Enhanced Partnership and Technology Transfer to Industry for boosting innovation**
- **Strong Education &Training in Accelerator Science and Technology**

A structure and mechanism that ensures **the sustainability of accelerator R&D useful for many fields**, which includes

Test Infrastructure and Accelerator Research Area

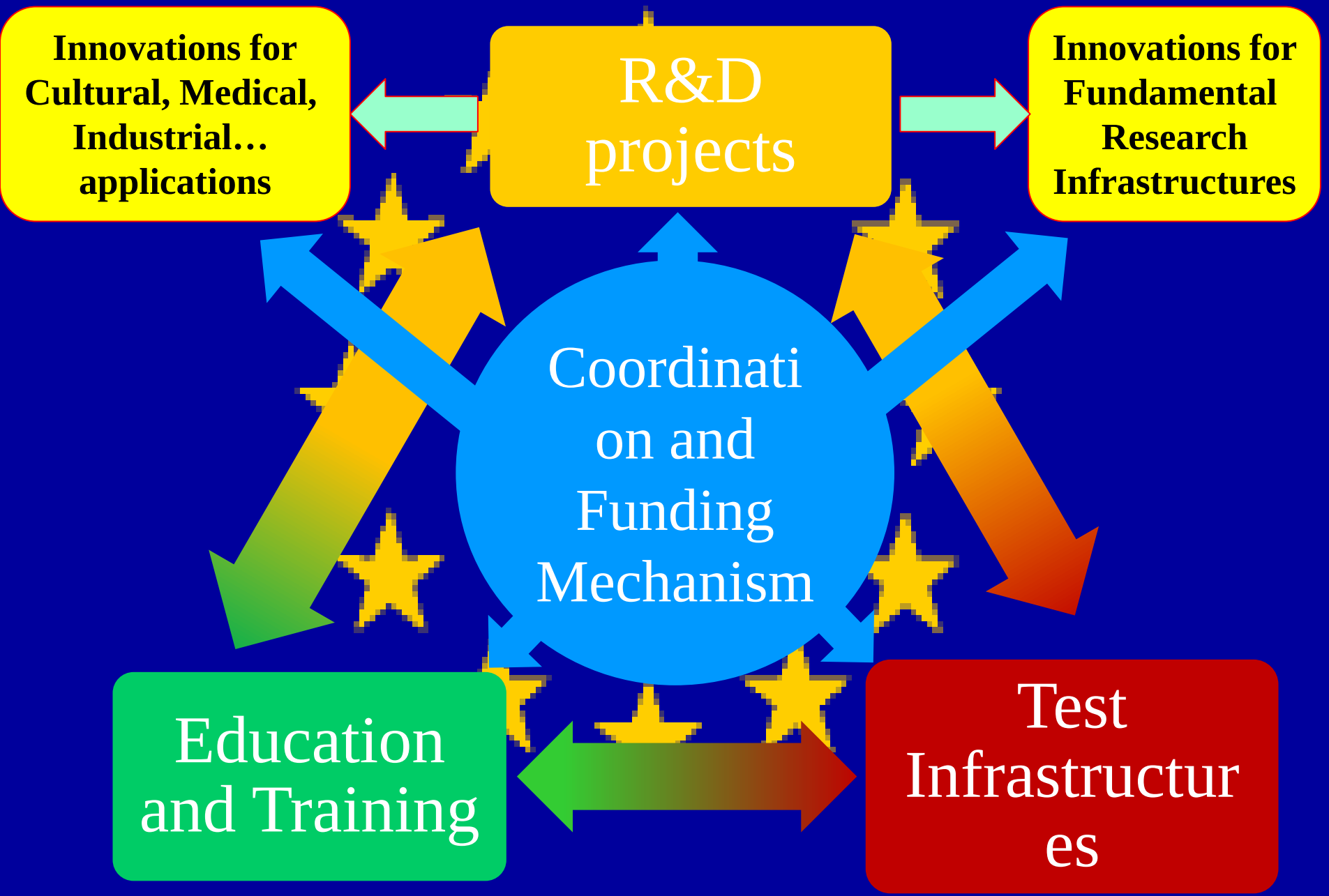
TIARA website: http://www.eu-tiara.eu

Accelerating Knowledge and Innovation

A multi-field, coordinated pan-European distributed infrastructure

Joint particle accelerator ***R&D programming*** in Europe and the ***integration of the required infrastructures***

The Virtuous Triangle



Tiara

Test Infrastructure and Accelerator Research Area

Creation of a coordinated panEuropean multi-purpose distributed Test Infrastructure

Joint Strategic Analysis of the accelerator needs and perspective for the development of R&D RI

Joint R&D programming and launching of a set of consistent integrated accelerator R&D projects

Promotion of the education and training for accelerator science

Strengthening the collaboration with the industry to boost innovation

11 participants (8 countries + 1 int. organisation)

Number	Organization Name	Representative	Country
1(coord.)	**CEA**	R. Aleksan	France
2	**CERN**	S. Myers	Internat.
3	**CNRS**	A. Müller	France
4	**CIEMAT**	J. Perez-Morales	Spain
5	**DESY**	R. Brinkmann	Germany
6	**GSI**	H. Eickhoff	Germany
7	**INFN**	U. Dosselli	Italy
8	**PSI**	L. Rivkin	Switzerland
9	**STFC**	J. Womersley	UK
10	**Uppsala University (for Nordic Consortium)**	T. Ekelöf	Sweden
11	**IPJ-PAN**	M. Jezabek	Poland

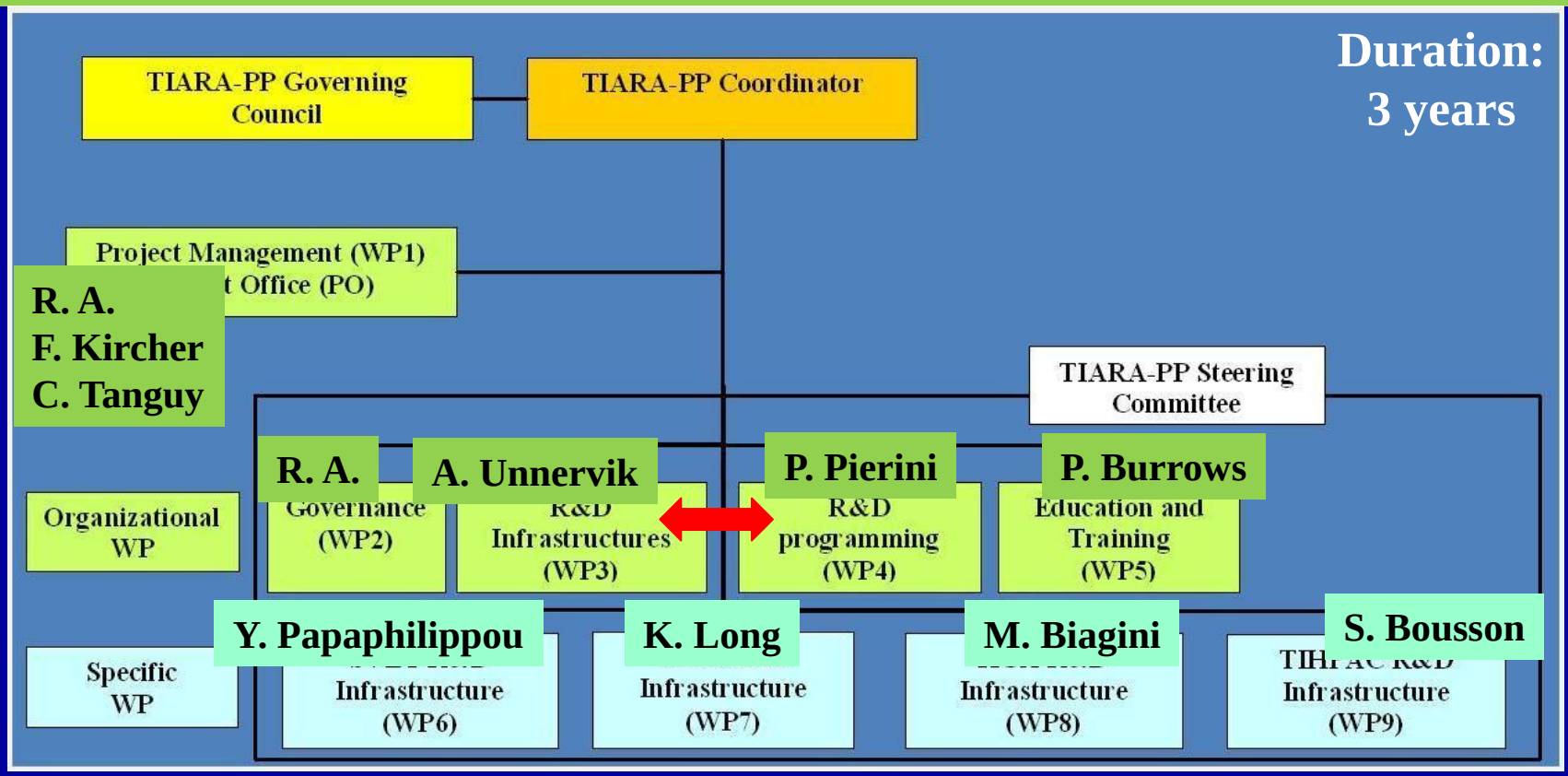
Tiara

http://www.eu-tiara.eu

Test Infrastructure and Accelerator Research Area

2009, Sept. 18th **: TIARA has been presented and approved by the CERN Council at the European session of the Council**

FP7-PP call in Dec. 2009, accepted in 2010 and started in 2011



Total Cost: € 9 139 196 EC contribution: € 3 900 000

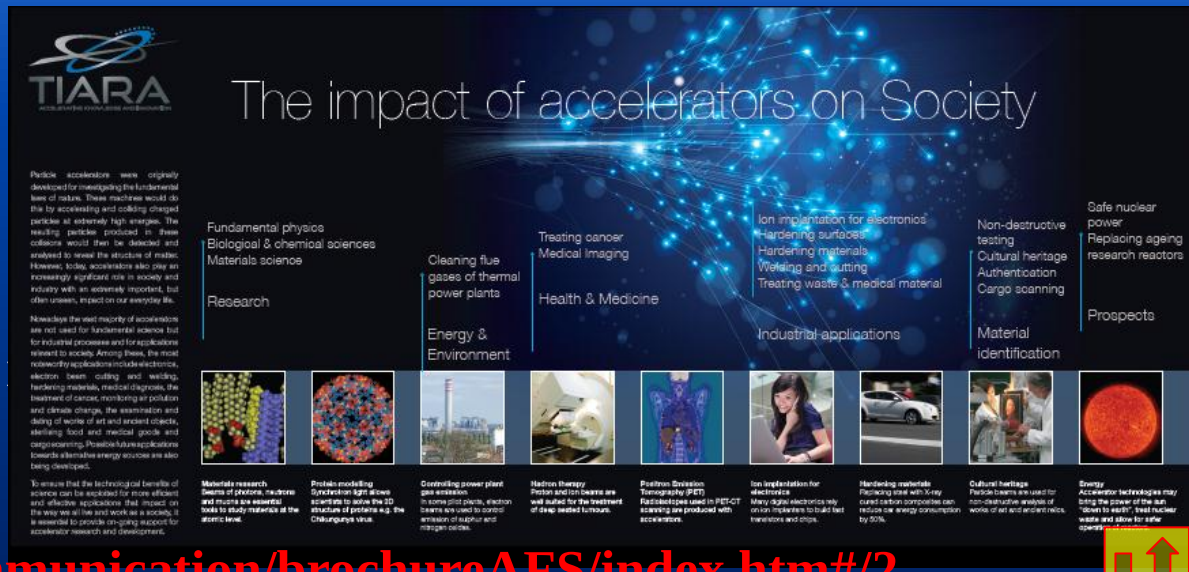
WP1

- **WP1: Besides the maintenance of external and internal Websites http://www.eu-tiara.eu as well as the documentation database (38 documents so far), some other achievements for communication:**

Newsletter

http://www.acceleratingnews.eu/

Development of Brochure & Website « Accelerators for Society »



http://www.eu-tiara.eu/Communication/brochureAFS/index.htm#/2

Interactions with concerned communities

Strong Interest for TIARA from many communities

- ESRF (visited on February 14th)
- ESS (see P. Carlson talk at TIARA Meeting)
- ITER/F4E (discussion with R. Heidinger on April 18th)
- PTCOG (discussion . A. Mazal ⇨ strong letter of interest and support)
- NuPPECC (TIARA presentation at NuPPECC meeting on June 16th ⇨ strong letter of interest and support)
- ECFA (TIARA presentation at RECFA meeting on November 22nd)
- TIARA presentation at ESLS meeting on November 20

Possible advantages for industry

Some (non exhaustive) items:

- Access to research infrastructures and associated expertise on state-of-the-art technologies will be made easier,
- Collaborative R&D activities and related funding will be more sustainable and adapted to needs of the context
  - TIARA aims to complete the calls for proposal managed by the European Commission with more appropriate scope and timely manner
- Access to TIARA's coordinated communication, dissemination and outreach activities.
  - Documentation, publication, newsletter, brochure…
  - Education and training programme
  - Specific events, Workshops…

TIARA activities related to Industry

One of the goals of TIARA is to strengthen relations with industry.

Several aspects of TIARA concern industry

WP2:

- ***How associate the industrial sector in TIARA's activities?***
- ***How to interact with industry in most efficient way?***

WP3:

- ***Study options for sharing R&D infrastructures and developing joint R&D Infrastructures with industry***
- ***Define technology roadmap for the development of future accelerator components in industry.***
- ***Develop an Industry workshop programme***

WP4:

- ***Develop an accelerator R&D programme in Europe***

WP5:

- ***Survey of the numbers of students, courses, and teaching resources***
- ***Evaluation and Study of the development of the market for Accelerator Sciences***
- ***Establish a plan of action for promoting Accelerator Science and Technology***

Conclusions

After having established an accelerator R&D strategy, implemented through several projects in FP6 & FP7, ESGARD proposed to go one step further with the TIARA Concept.

The EC has approved TIARA as a Preparatory Phase project with an EC funding of 3.9 M€.
The project has started on 1/1/2011 and is on track.

TIARA will hopefully establish the groundbase for supporting sustainably Accelerator R&D and infrastructures in Europe through “program funding” in Horizon2020

Accelerator science is a powerful mean toward scientific, technical and industrial breakthroughs and innovations…

TIARA will strengthen significantly this potential