TIARA: Structuring further Accelerator R&D in Europe

Uppsala Meeting
R. Aleksan
November 9th, 2011

1. **Introduction**
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

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) ,
S. Guiducci (LNF), J.-P. Koutchouk (CERN),
F. Richard (IN2P3/Orsay), L. Rivkin (PSI)

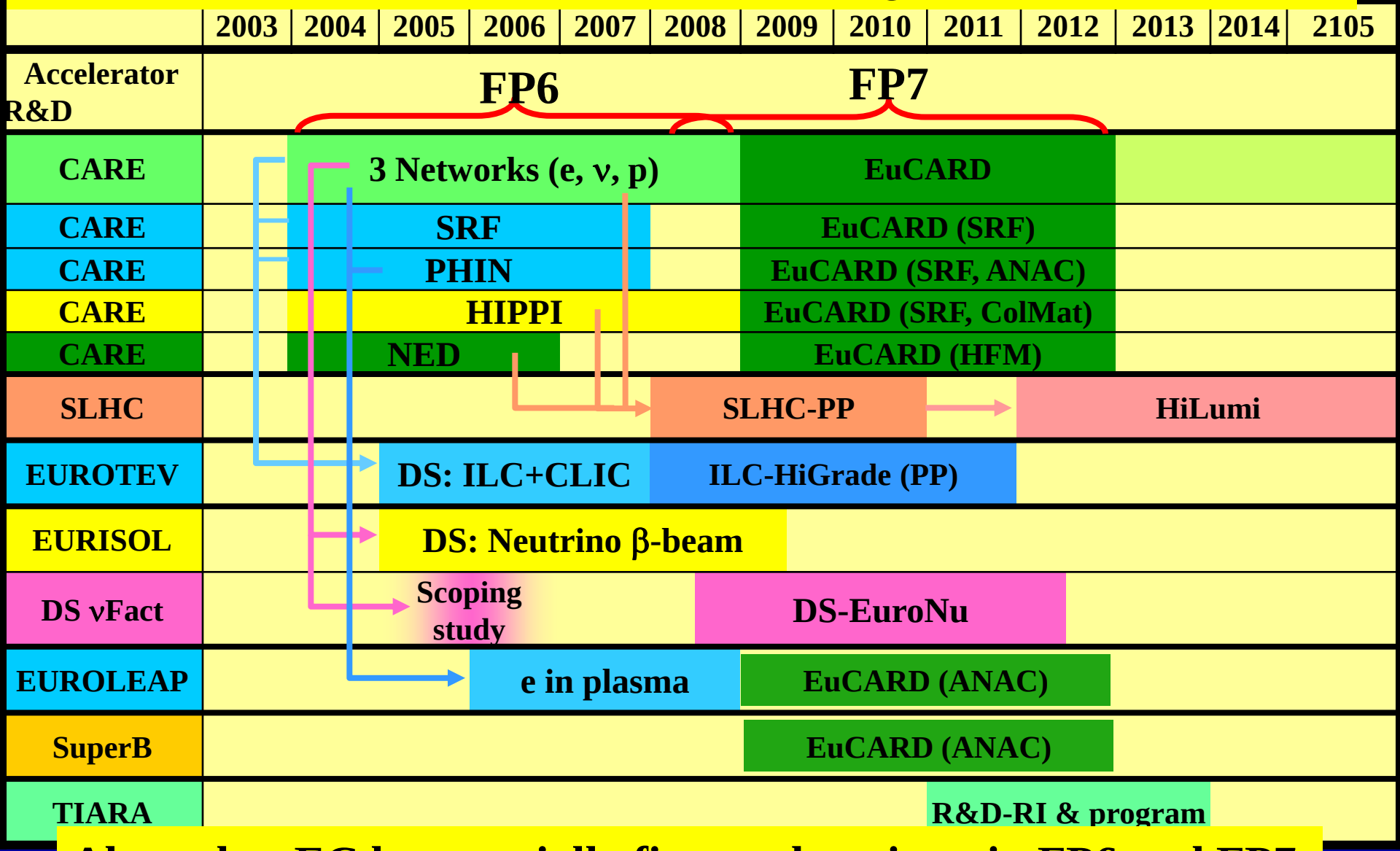
http://www.esgard.org

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

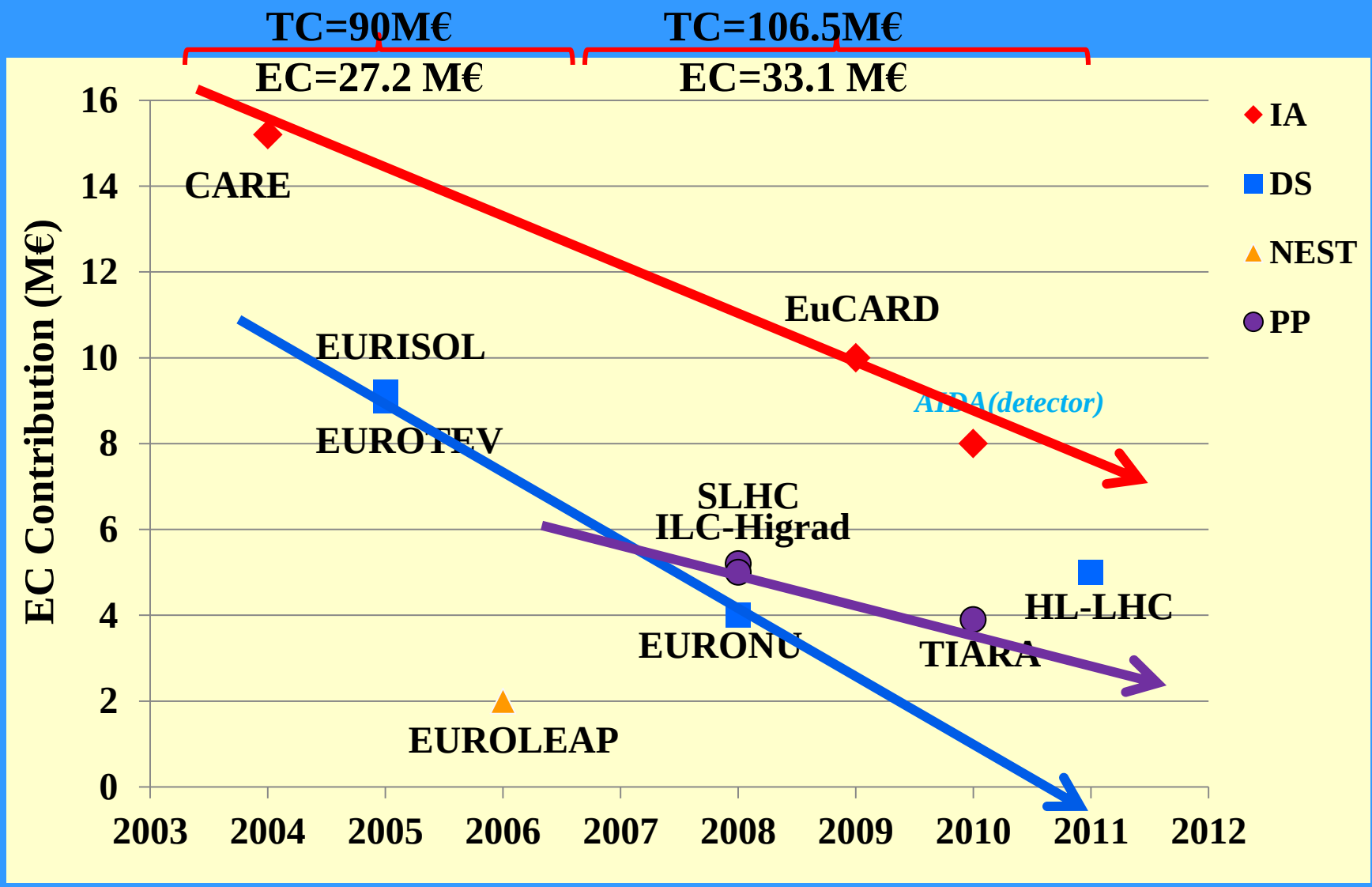
This strategy led to the preparation and implementation of a coherent set of collaborative projects using the incentive funding of the 6th and 7th Framework Programme.

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



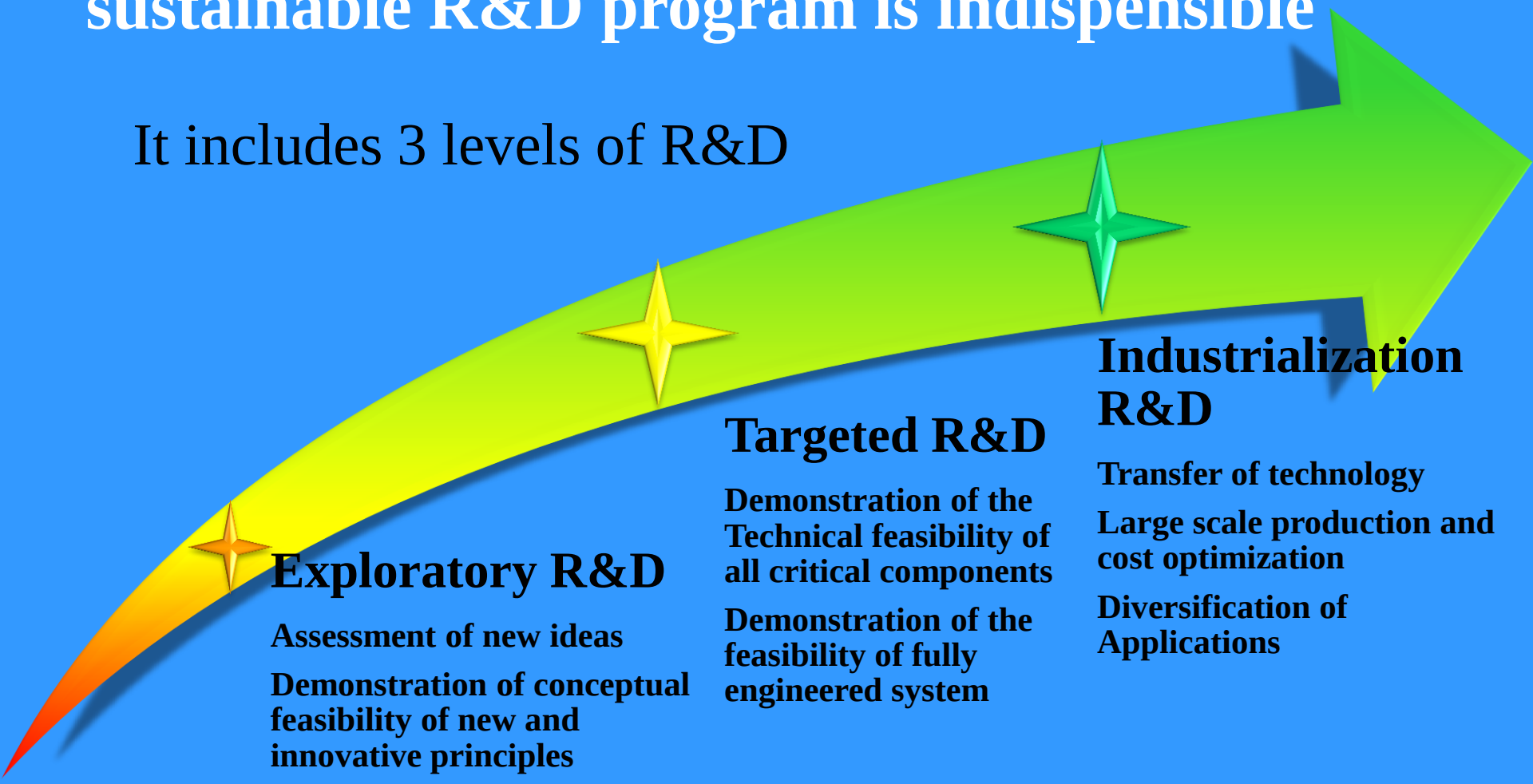
Altogether EC has partially financed projects in FP6 and FP7 with a total budget of ~197 M€ (60 M€ from EC)

But the trend seems that the EC funding is diminishing steadily
For FP8, the EC wishes to support of the implemetation and operation of RI



To be able to build future accelerators, a strong sustainable R&D program 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 large and costly infrastructures

We have to think at the European level, at least

We have to think beyond

ESGARD is already carrying out a coordination leading to development of well organized European wide integrated R&D project for Particle Physics (see the high success rate of FP proposals).

Building on this experience, we can and need to go further

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

- **The integration of R&D infrastructures and offered services within a general framework (including industry)**
- **The development of a joint R&D program and the launching of a set of consistent integrated accelerator R&D projects**
- **The promotion of the education and training for accelerator sciences**
- **A model for financing all of the above**

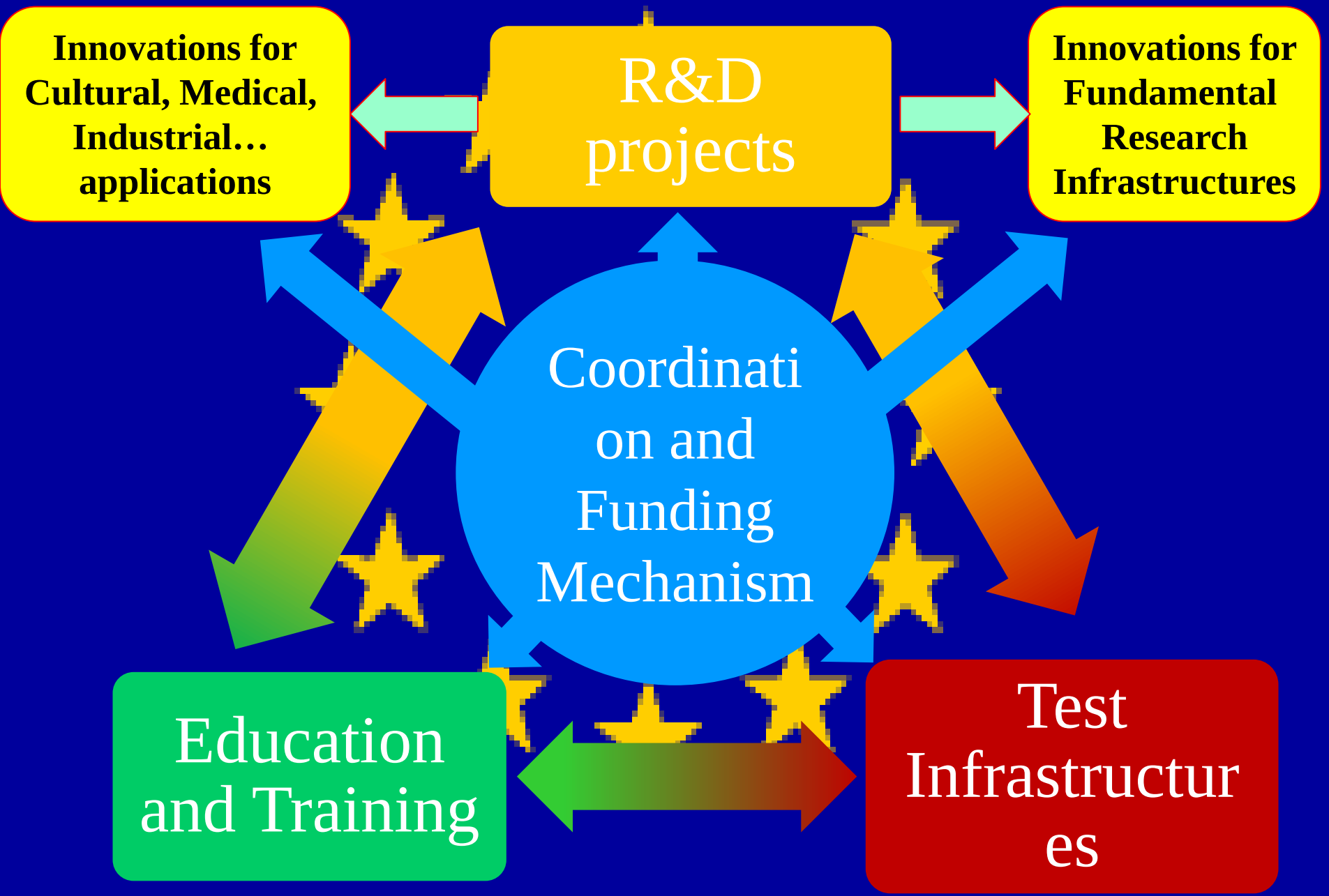
TIARA website: http://www.eu-tiara.eu

Test Infrastructure and Accelerator Research Area

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



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

Test Infrastructure and Accelerator Research Area

Needed Infrastructures

Test accelerators for carrying accelerator R&D	10-100M€	TIER1
Specific large scale equipments	1-10M€	TIER2
Laboratory equipments	0.1-1M€	TIER3

A rough estimate of all these infrastructure is **500-1000 M€**

These infrastructures need to be upgraded and/or new infrastructures are necessary

Tiara

Test Infrastructure and Accelerator Research Area

Creation of a coordinated panEuropean multi-purpose distributed Test Infrastructure

- Monitoring and coordinating the use and the development of the European test infrastructures for accelerator R&D
- Facilitating accesses to R&D RIs, including industry involvement
- Identifying weaknesses and needed upgrades/investments and assessing their costs
- Making recommendations and contributing to upgrade and/or construction of new R&D Infrastructures as well as their corresponding R&D programs

11 participants (8 countries + 1 int. organisation)

Number	Organization Name	Country
1(coordinator)	**CEA**	France
2	**CERN**	International
3	**CNRS**	France
4	**CIEMAT**	Spain
5	**DESY**	Germany
6	**GSI**	Germany
7	**INFN**	Italy
8	**PSI**	Switzerland
9	**STFC**	UK
10	**Uppsala University (rep. Nordic Consortium)**	Sweden
11	**IPJ-PAN**	Poland

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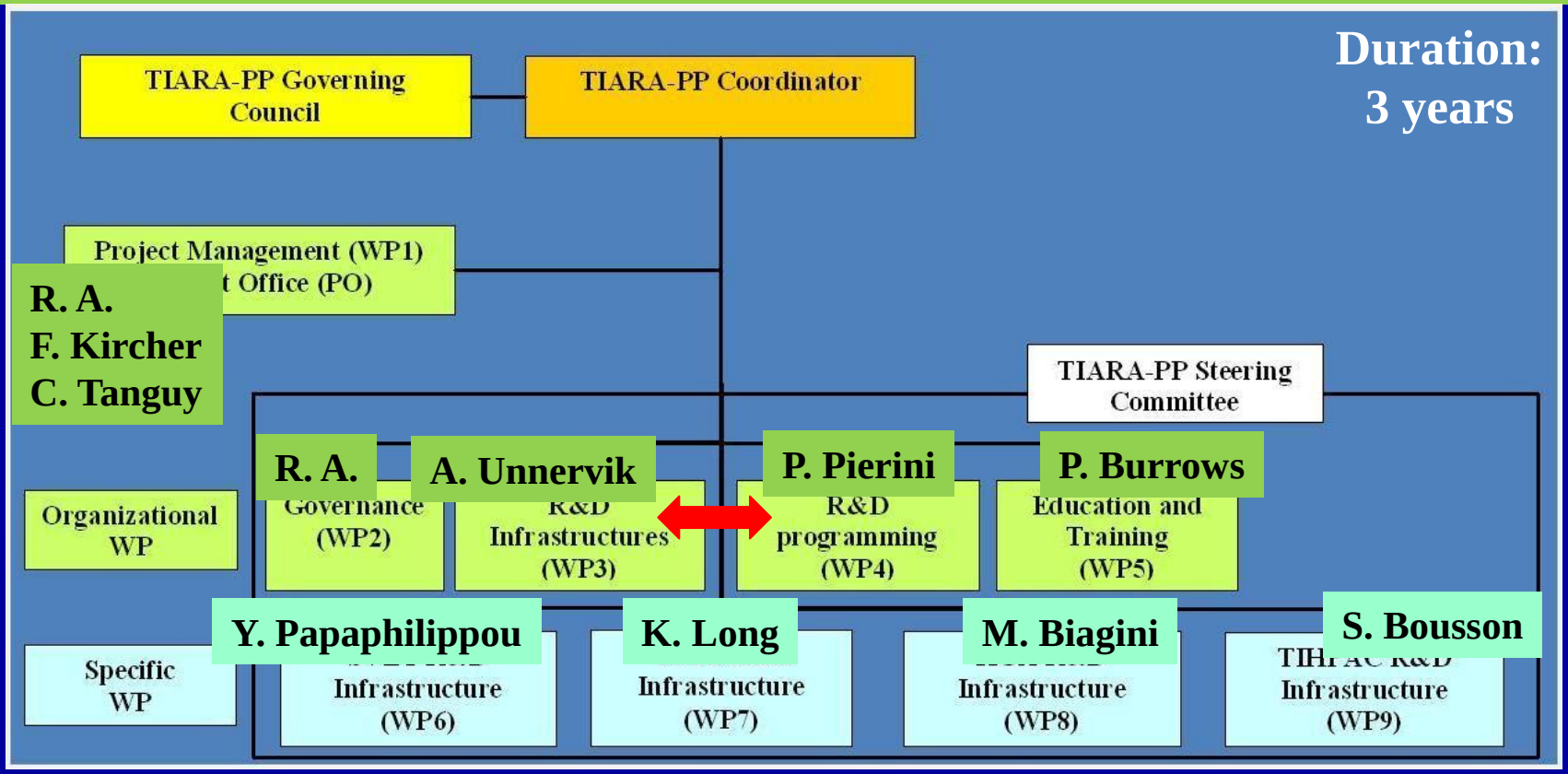
Test Infrastructure and Accelerator Research Area

http://www.eu-tiara.eu

September 18th **: TIARA has been presented and approved by the CERN Council at the European session of the Council**

TIARA proposed to the PP call in Dec. 2009 and accepted in 2010



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

Status

- ***Official start 1/1/2011***
- ***February 23-24, 2011*: TIARA-PP *Kickoff meeting at CERN***
- ***November 8-9, 2011: Governing Council meeting in Uppsala***

Deliverables

Num	Nat[1]	Short name	Description	month	
D1.1	O	OWSF	Overall Web Site Frame ready	1	PU
D1.2	O	CAP	Consortium Agreement between participants ready	1	CO
D1.3	O	CCE	Contract of the Consortium with the EC signed	1	CO
D1.4	O	OKM	Organization of the Kickoff meeting	1	CO
D1.5	O	IWSF	Internal Web Site Frame Ready	2	CO
D4.1	R	KIR	General Report on Key Accelerator Research Areas and Key R&D Issues	5	PU
D6.1	R	D_SLS_NOW	Report on existing hardware limitations and needed upgrades.	9	PU
D5.1	R	ETR	Education and Training Survey Report	10	PU
D2.1	O	MoA-GI	Memorandum of Agreement on General Issues	12	CO
D3.1	R	ISR	Infrastructure Survey Report.	12	PU
D5.2	O	ETD	Education and Training resources Database	14	PU
D7.1	R	RFSysV-Spec	Report on the design and specification of ICTF RF power distribution system for MICE Step V	15	PU
D3.2	O	IWD	Infrastructure Web-based Database.	16	PU
D1.6	R	TTR	Midterm Report	18	CO
D2.3	R	COB	Report on Collaboration with Other Bodies	18	CO
D6.2	R	D_SPEC	Specifications ready	18	PU

➢ ***June, 2012*: TIARA-PP *Mid-Term meeting in Madrid***

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 FP8

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

TIARA will strengthen significantly this potential