


Structuring further Accelerator R&D In Europe

**EuCARD Meeting
R. Aleksan
April 15th, 2010**

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- The background of the slide is a large, waving European Union flag, featuring a blue field with twelve golden stars arranged in a circle.
- 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

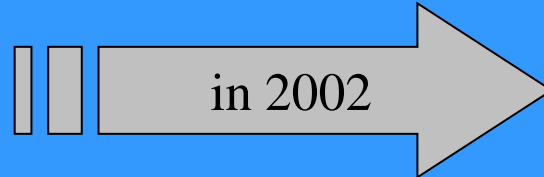
- ion implanters, electron beam and X-ray irradiators, radioisotope production...

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”



<http://esgard.lal.in2p3.fr>

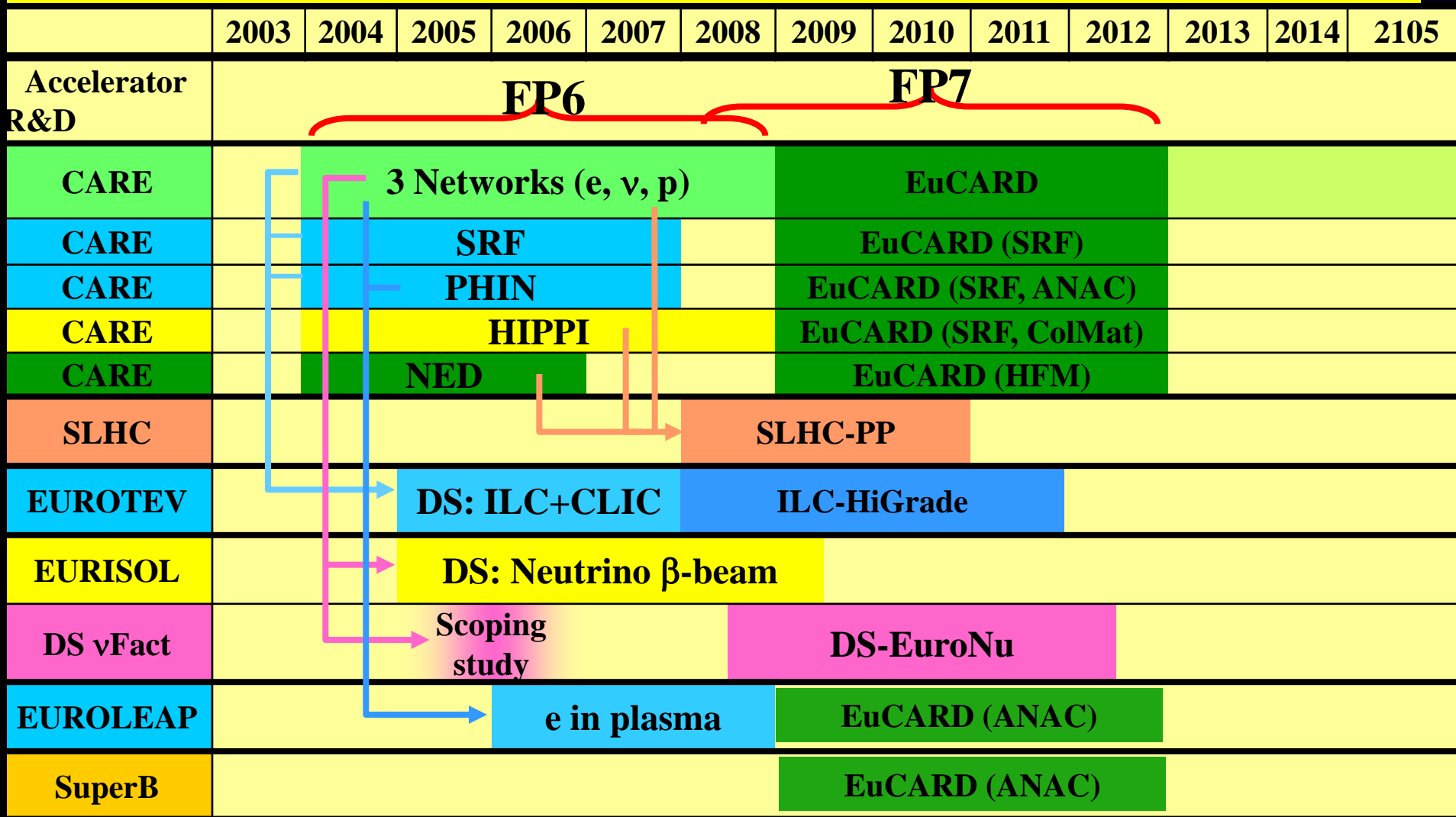
R. Aleksan (Chair), M. Cerrada (CIEMAT),
R. Edgecock (CCLRC), E. Elsen (DESY),
S. Guiducci (LNF), J.-P. Koutchouk (CERN),
F. Richard (IN2P3/Orsay), L. Rivkin (PSI)

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 160 M€ (59.6 M€ from EC)



FP7-Planning of calls and indicative budget

Total operational budget 1665 M€	Call 1 2007	Call 2 2007	Call 3 2008	Call 4 2008	Call 5 2009	Call 6 2010	Call 7 2011
Integrating activities			277		162	100	x
e-Infrastructures	42	50	EuCARD	113	AIDA (detector)		New IA
Design studies	31					20	
Construction – Support to the Preparatory Phase	147				45		New DS
Construction – Support to the Implementation Phase							
Policy Development and Programme Implementation	8	14	5		9.94	9	x
Total per call (M€)	228	64	282	113	216.9		

EuroNu
EuroCrab

EuCARD

AIDA (detector)

New IA

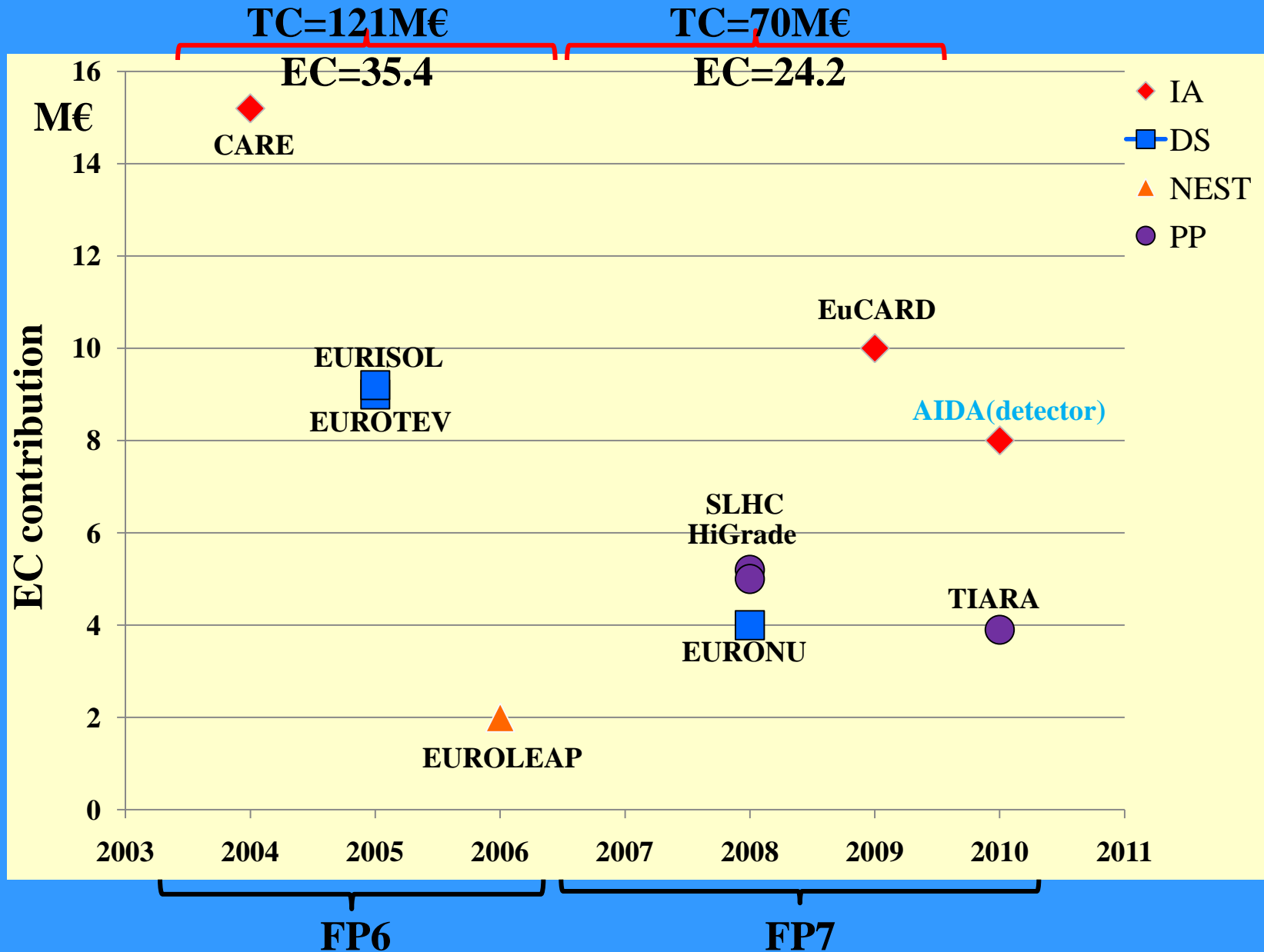
SLHC
HiGrad

TIARA

RSFF (200 M€) + 130 M€

CAPACITIES

But many indications that EC funding will diminish steadily
Trend for FP8 is to finance programme instead of projects



To be able to build future accelerators, a strong sustainable R&D program is indispensable

It includes 3 levels of R&D



Exploratory R&D

Assessment of the validity of the principles

Demonstration of conceptual feasibility of new and innovative idea



Targeted R&D

Demonstration of the Technical feasibility of all critical components

Demonstration of fully engineered system feasibility



Industrialization R&D

Transfer of technology

Large scale feasibility 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 many fields**, which includes

⇒ **The integration of R&D infrastructures and offered services within a general framework**

⇒ **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>

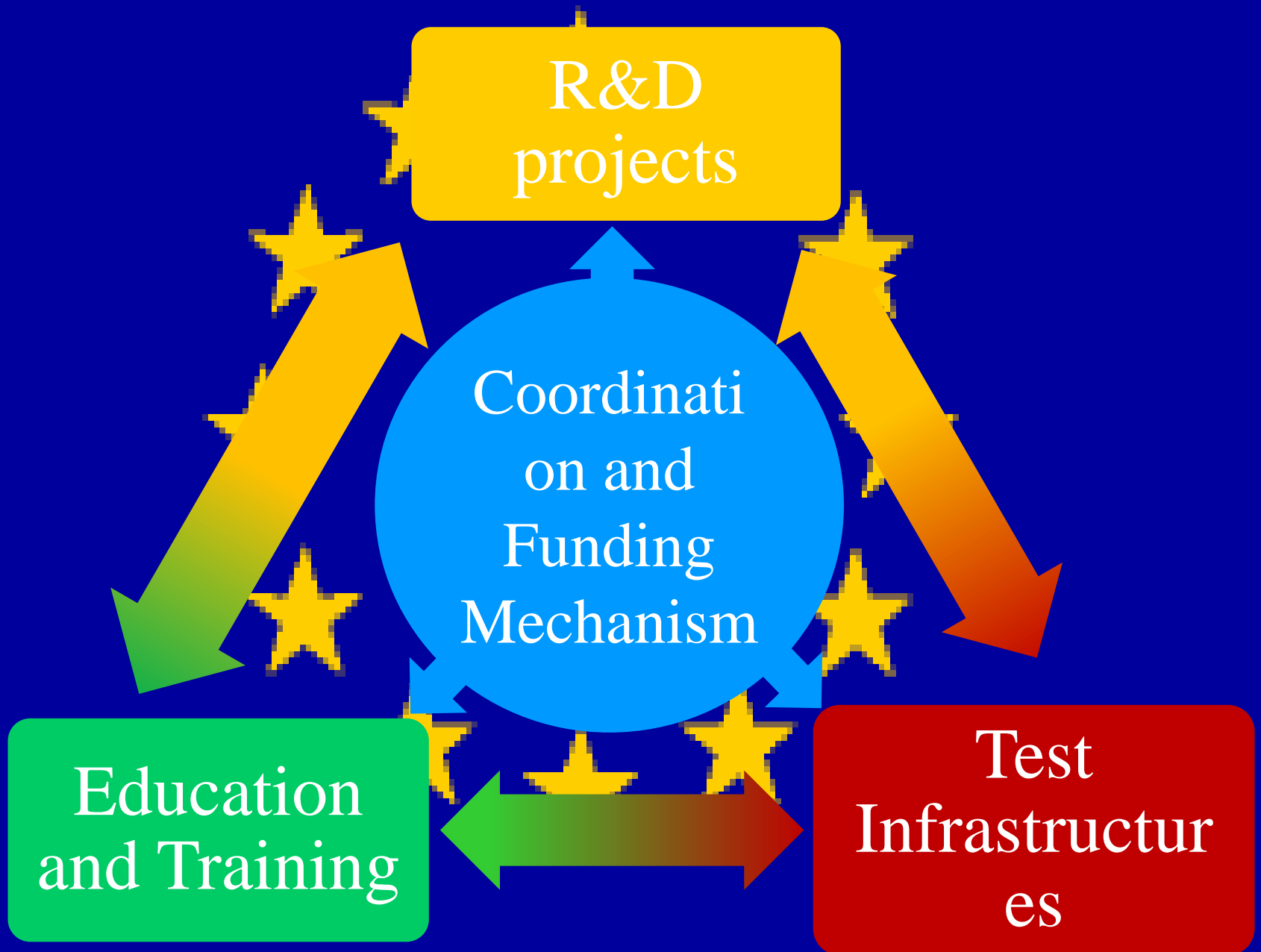


Test Infrastructure and Accelerator Research Area

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*



Joint Strategic Analysis of the accelerator needs and perspective & joint strategy toward their development



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



Promotion of the education and training for accelerator science



Strengthening the collaboration with the industry



Creation of a coordinated panEuropean multi-purpose distributed Test Infrastructure



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**



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



Monitoring accesses, 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



Test Infrastructure and Accelerator Research Area

11 participants (8 countries + 1 int. organisation)

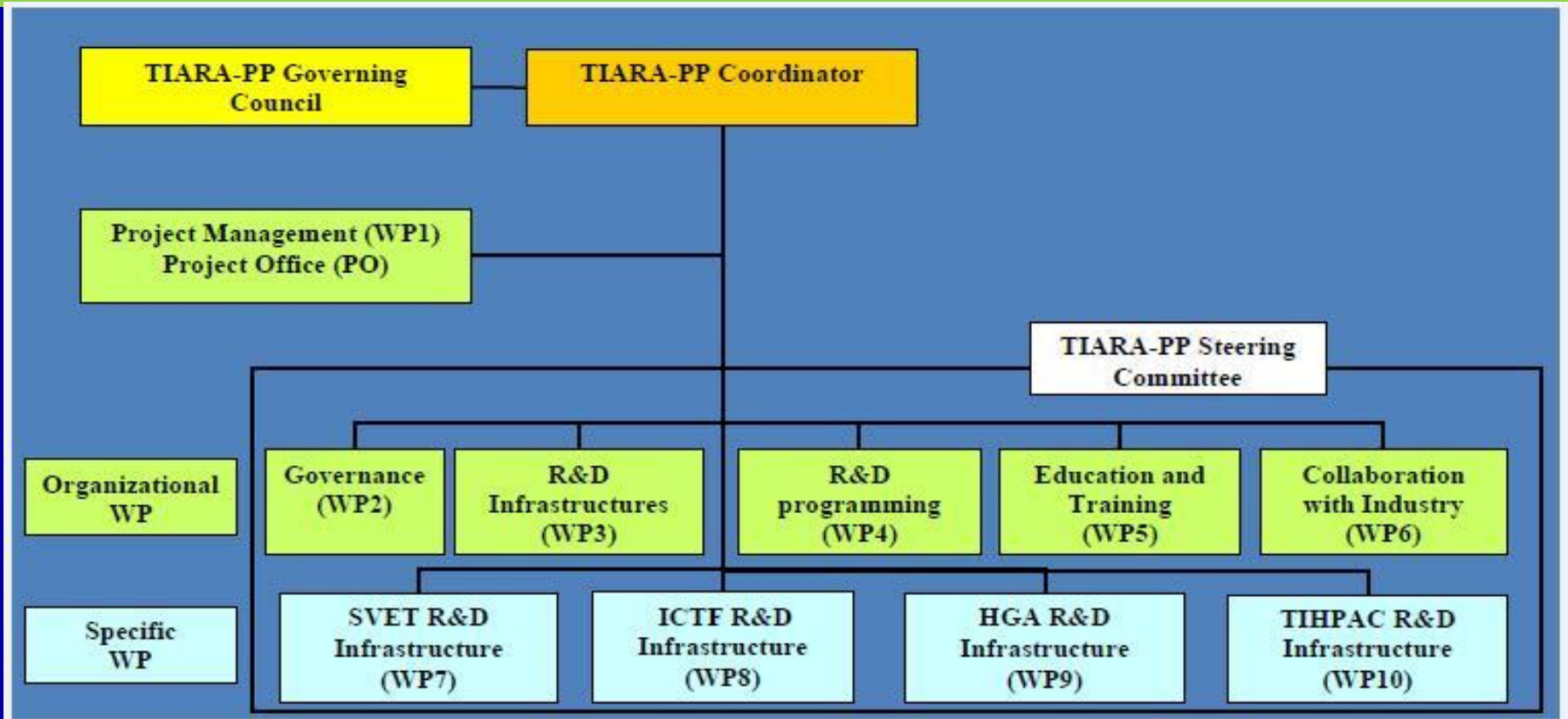
Number	Organization Name	Country
1 (coordinator)	CEA	France
2	CERN	International
3	CNRS	France
4	CIEMAT	Spain
5	DESY	Germany
6	GSI	Germany
7	INFN	Italy
8	PSI	Switzerland
9	STFC	UK
10	Uppsala University (rep. Nordic Consortium)	Sweden
11	IPJ-PAN	Poland



Test Infrastructure and Accelerator Research Area

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

TIARA was proposed to the PP call in 2009



Total Cost: € 11 802 570; Requested: € 5 999 970



Status



- *Response from the EC on March 26, 2010*
*TIARA approved with max EC funding of **3.9 M€***
- *Meeting of funding agencies on April 22, 2010*
Decide the strategy for negotiations with the EC

Depending upon negotiations

- *June/July 2010: Final Work Plan and contract with the EC*

Depending on progress

- *Fall 2010: TIARA-PP Kickoff meeting*

Conclusions

★ ESGARD has promoted and coordinated the elaboration of a collaborative Accelerator R&D program in Europe

★ Accelerator R&D is now fully part of the Particle Physics programme in Europe

★ We need to go beyond and develop a sustainable structure & mechanism ensuring a vivid more comprehensive accelerator R&D programme: the TIARA project is aiming at this

★ We propose to work out the details and implementation of TIARA within a FP7 Preparatory Phase



With TIARA
Accelerator science could be a powerful mean
toward scientific, technical
and industrial breakthroughs... i.e toward
building a society and economy of knowledge