Detector R&D, AIDA, CPAN

AIDA overview, Spanish participation, relation to CPAN

Jornadas CPAN 2009

El Escorial

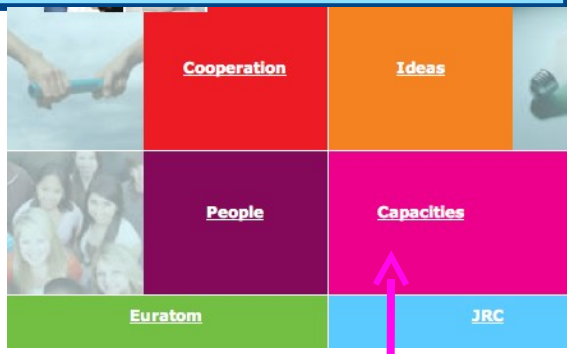
November 25-27, 2009

Marcel Vos (IFIC)

Scope

This is not the overview of Spanish detector R&D that Carlos Lacasta would have presented

Overview of the 2010 FP7 Call for RIs



- Call identifier: FP7-INFRASTRUCTURES-2010-1
- Date of publication: 30 July 2009
- Deadline: Thursday **3 December 2009, at 17:00**
- Activity: 1.1 Support to existing research infrastructures

  1.1.1 Integrating Activities (IA)
- Indicative budget for IAs: 162 M€
- "Targeted" mode for IA projects: only projects in 35 pre-selected fields (topics) are eligible to apply. Only one project per topic expected.
- AIDA will be submitted under topic:
- INFRA-2010-1.1.33: Detectors for future accelerators
- Expected success rate of ~ 60% ⇒average funding of 8 M€ per project (maximum possible funding is 10 M€)

Integrating Activity projects in FP7

- IA = a collaboration of existing Research Infrastructures in a given field of science
  - Normally all major RI in Europe in the field (to avoid fragmentation)
  - Research facilities, laboratories, universities, industry, SMEs,…
- Based on the successful FP6 instrument "I3" = Integrated Infrastructure Initiatives (such as EUDET)
- Objectives:
  - To provide a wider and more efficient access to, and use of the existing research infrastructures in Europe
  - Better integration of the way RI operate, and fostering joint development in terms of capacity and performance
- Three types of activities obligatory for each project (plus management):
  - ✓ Networking activities (NA)
  - ✓ Trans-national Access activities (TA)
  - ✓ Joint Research activities (JRA)

AIDA preparation team

Preparation team established by RECFA (during EPS meeting in Cracow)

Overall definition of AIDA content, definition of Work Packages, selection of WP leaders

Includes important choices like the (minimal) weight of Silicon tracking in the proposal that have only very partially been undone later on

The name: Advanced European Infrastructure for Detectors at Accelerators → AIDA

Infrastructure, for whom?

AIDA must be supported by,
and the proposal must cater to,
the whole detector R&D community
(s)LHC →

- ✔ *ALICE*
- ✔ *ATLAS (WP9)*
- ✔ *CMS (WP2)*
- ✔ *LHCb (WP9)*

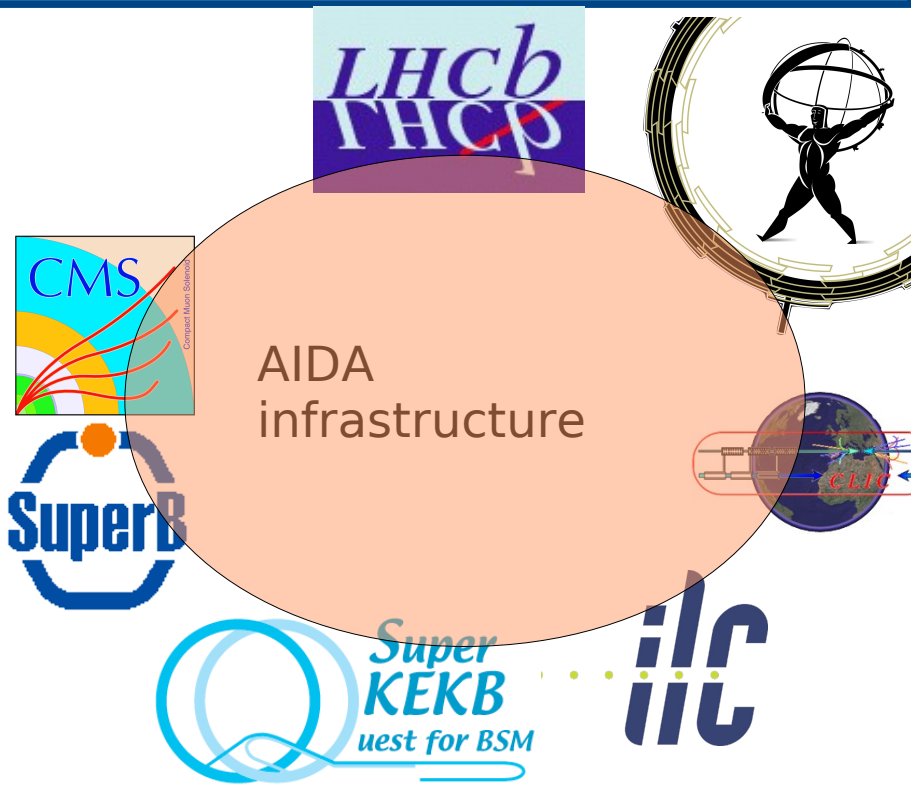
Future e+e- machines →

- ✔ *ILC (WP9)*
- ✔ *CLIC (strong overlap with ILC)*

Super B-factories →

- ✔ *Belle-II (WP9)*
- ✔ *SuperB (WP8)*

Accelerator-based neutrino experiments (WP8)



Caters to communities developing detectors that are to be installed within the AIDA life-time (ATLAS IBL, LHCb VELO upgrade, Belle-II PXD) and to others pursueing exciting new concepts that may yield the detector technology of the next (or next-to-next) generation of experiments)

AIDA

Max. 10 Million Euro in EU contribution

9 work packages:

- 1 MGT
- 3 COORD
- 3 TA
- 2 RTD

WP#	Type	Task	Description	Editors	Budget
1	**MGT**		**Project management and communication**	S. Stavrev (CERN) L. Serin (LAL)	
		1.2	Communication and disseminations		450
2	**COORD**		**Development of common software tools**	F. Gaede (DESY) P. Mato (CERN)	
		2.2	Geometry toolkit for HEP		
		2.3	Reconstruction toolkit for HEP		1100
3	**COORD**		**Micro-electronics and interconnection technology**	H.G. Moser (MPI) V. Re (INFN)	
		3.2	3D interconnections		
		3.3	Shareable IP blocks for HEP		1100
4	**COORD**		**Relation with industry**	S. Stapnes (Oslo) P. Sharp (RAL)	
		4.2	User topical working groups		300
5	**TA**		**Transnational Access DESY**	I. Gregor (DESY)	100
6	**TA**		**Transnational Access CERN**	H. Taureg (CERN)	150
7	**TA**		**Transnational Access Irradiation**	M. Mikuz (Ljubljana)	
		7.2	UCL Louvain-la-Neuve		
		7.3	ForschungsZentrum Karlsruhe		
		7.4	Ljubljana University		600
8	**RTD**		**Improvement and equipment of beam lines**	H. Taureg (CERN) E. Gschwendtner (CERN)	
		8.2	Test beams at CERN and Frascati		
		8.3	Upgrade of proton and neutron irrad. facilities		
		8.4	Component qualification and database		
		8.5	General beam and irradiation equipment		
		8.6	Combined beam tests and DAQ		3,000
9	**RTD**		**Advanced infrastructure for detector R&D**	H. Videau (LLR) M. Vos (IFIC)	
		9.2	Gaseous Tracking		
		9.3	Precision Pixel Detectors		
		9.4	Silicon Tracking		
		9.5	Highly Granular Calorimetry		3,000

WP3.2 3D interconnections

- Creation and coordination of a framework to make 3D interconnection technology available for HEP detectors
- Organisation of a network of contacts with industry to enable fabrication of sensors and electronics optimized for 3D interconnection
- Assess 3D vertical integration techniques enabling the HEP community to advance the state of the art of particle detectors

A good example of basic detector R&D

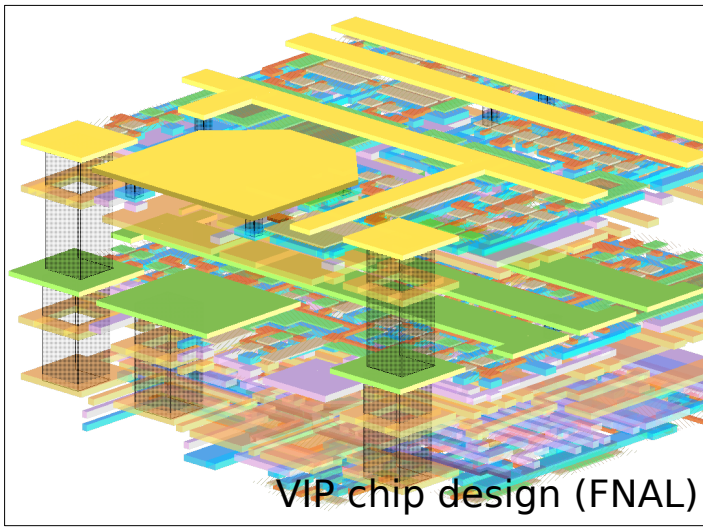
3D interconnections, 3D IC, Wikipedia: In electronics, a three-dimensional integrated circuit is a chip with two or more layers of active electronic components, integrated both vertically and horizontally into a single circuit. The semiconductor industry is hotly pursuing this promising technology in many different forms, but it is not yet [in 2008] widely used)

the next "revolution" in HEP detectors?

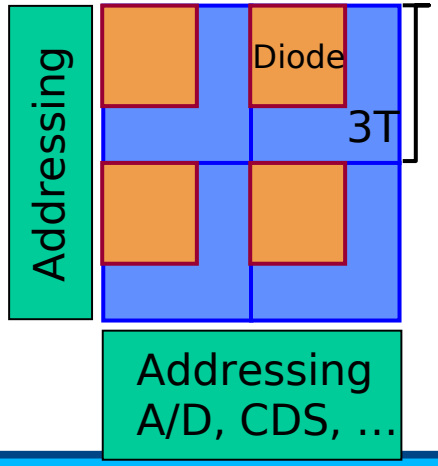
Spanish involvement:

CNM → 50.000 €

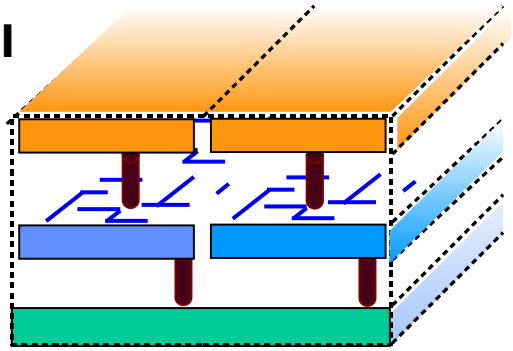
UB → 10.000 €



Conventional MAPS



3-D Pixel



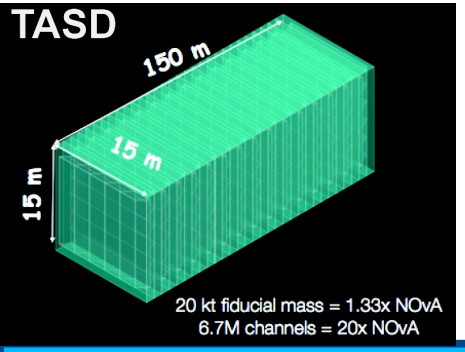
Detector

ROIC (front-end)

Processor

WP8.5 General infrastructure for TB and irradiation lines

Subtask 5.2
For feasibility studies of future neutrino detectors a prototype of the Totally Active Scintillating Detector (TASD) Target will be constructed and tested in the H8 beam line (UNIGE, INRNE, IFIC, INFN, STFC). The device will allow electron charge identification and will be available as well for other users afterwards.
The prototype of the Magnetised Iron Neutrino Detector (MIND) will be assembled and placed at the end of the H8 lines for muon charge identification (UNIGE, INRNE, IFIC, INFN, STFC). After studying its performance the module will be available for other users of the beam.



Beam test in CERN H8 line of “baby” prototype versions of massive detectors for ν_μ and $\overline{\nu}_e$ appearance in future oscillation experiments

Spanish participation:
IFIC (Anselmo Cervera) → 30.000 € (EU request)

WP9.3 Precise Pixel Detectors, Spanish participation

WP9.3 Precise Pixel Detectors

Document by I. Gregor, H. Pernegger, M. Winter, I. Vila, M. Vos on inputs received from a very large group of people

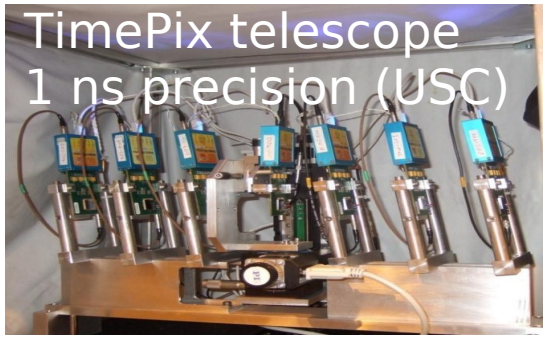
The main infrastructure is a beam telescope for characterization of prototypes

- Continuation of the EUDET telescope and surrounding infrastructure,
- Catering to sLHC needs (CO2 cooling plant, fast telescope arms)

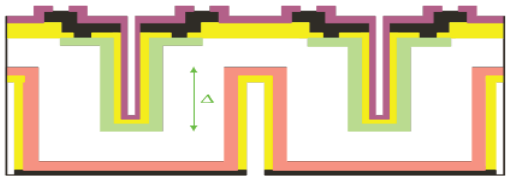
Spanish participation:

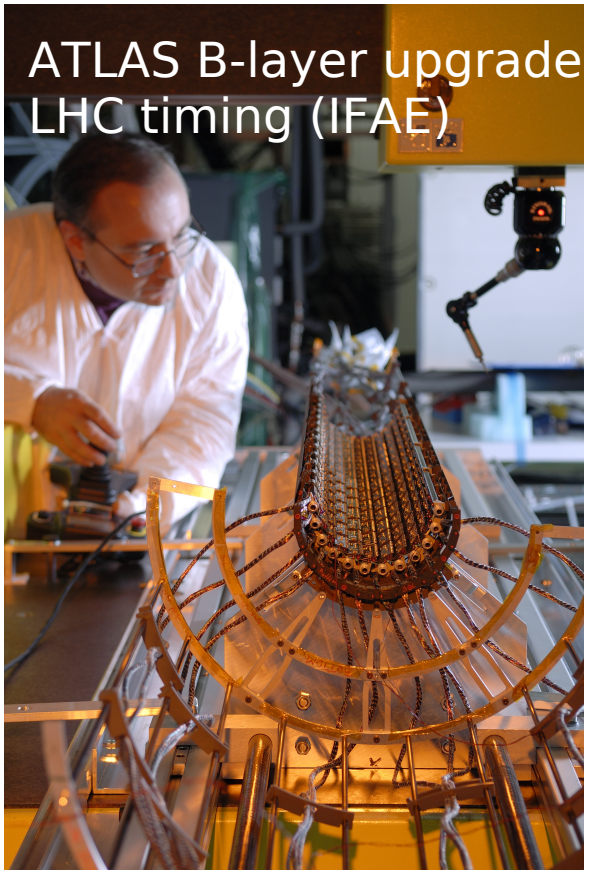
USC (TimePix reference arm, Abraham Gallas) → 35.000 €

IFAE (FE-I4 reference arm, Cristobal Padilla) → 30.000 €



3D sensor (CNM)





Clients: all pixel & strip detector R&D collaborations, including slice of ATLAS IBL, first full-scale Belle-II layers, 3D sensors for sLHC, prototypes from WP3, APDs, etc., etc.)

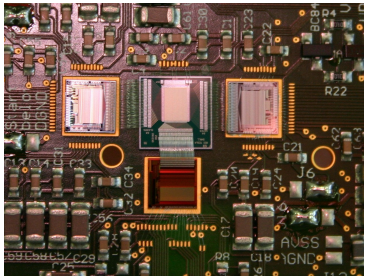
WP9.3 Precise Pixel Detectors

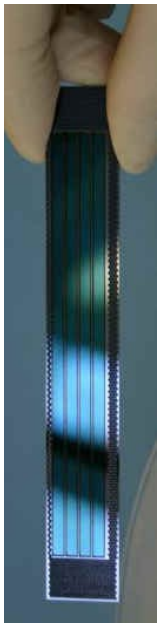
Providing off-beam infrastructure for the evaluation of thermo-mechanical properties of integrated detectors

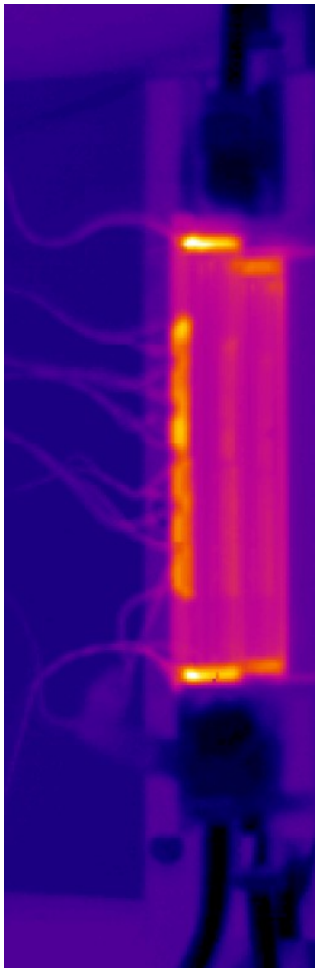
Sophisticated optical and infra-red instruments to monitor deformations, misalignment, etc.

IFIC (power supply, thermal imager, Carlos Lacasta/M.V.) → 35.000

IFCA (optical fiber system, Ivan Vila) → 35.000







Step I: Measure “idealized” spatial resolution of small prototype, surrounded by excessive auxiliary electronics, mechanics, etc. (photo: DEPFET prototype test board)

Step II: Monitor deformation of full-scale, thinned sensor (photo: DEPFET mechanical dummy)

Step III: Maintain performance under full thermal load (photo: DEPFET thermal mock-up)

WP9.4 Silicon Tracking

Providing multi-layer Si μ-strip coverage for the calorimeter stack of WP9.5

Precise entry point as a reference for study of overlapping showers

Spanish participation

CNM → 25.000 (thin, short sensors)
IFIC → 53.000 (read-out electronics)
IFCA → 53.000 (read-out electronics)
UB → 40.000 (Front-End design)

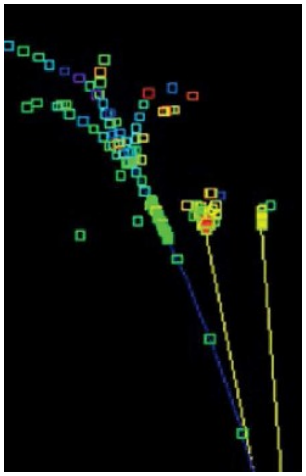
Beneficiary short name (all costs in €)	Person-Months	Personnel direct costs	Personnel indirect costs	Sub-contracting cost	Material direct costs	Travel direct costs	Material and travel indirect costs	Total direct costs	Toal indirect costs	Total costs (direct +indirect)	EC requested funding
CNM	5	21,000	37,380	0	20,000	5,000	0	46,000	37,380	83,380	25,000
IFCA	24	100,800	66,528	0	0	5,000	0	105,800	66,528	172,328	53,000
IFIC	24	100,800	63,504	0	0	5,000	0	105,800	63,504	169,304	53,000
UB	18	72,000	43,200	0	0	5,000	3,000	77,000	46,200	123,200	40,000
URL	0	0	0	0	0	0	0	0	0	0	0
OEAW	28	106,400	93,632	0	0	5,000	0	111,400	93,632	205,032	62,000
CUNI	36	75,600	45,360	0	0	0	0	75,600	45,360	120,960	40,000
IPASCR	14	29,400	17,640	0	20,000	5,000	15,000	54,400	32,640	87,040	27,000
Totals:	**149**	**506,000**	**367,244**	**0**	**40,000**	**30,000**	**18,000**	**576,000**	**385,244**	**961,244**	**300,000**
FIXED TARGETS (MAXIMUM)										900,000	300,000
CHECKING THE CONDITION										OK	OK

Spain is the main partner of this task. CNM, IFCA, IFIC, UB and URL perceive half of the budget.

WP9.5 Granular Calorimetry

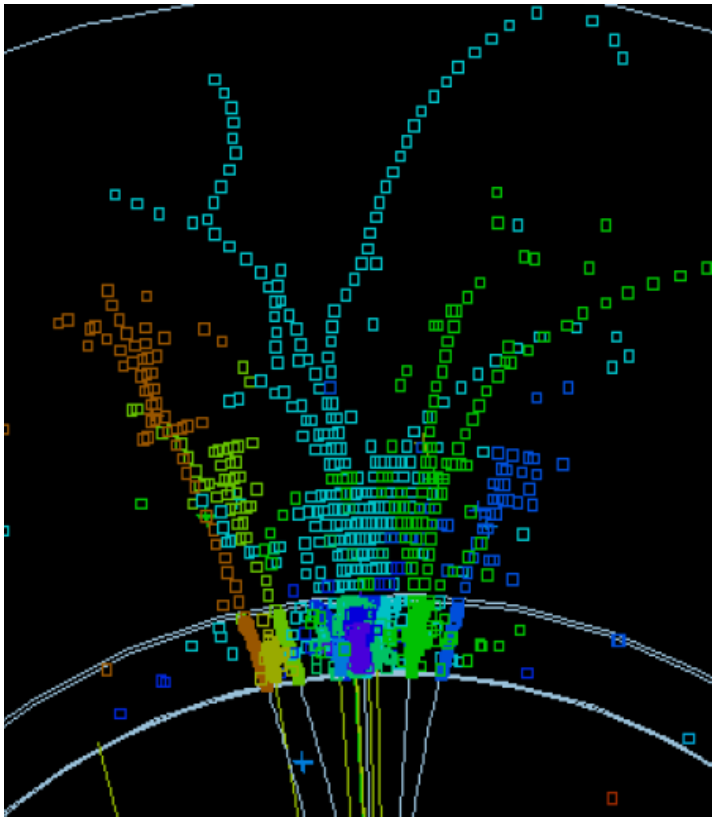
Creation of a versatile calorimetric infrastructure to test the interactions of particles with tungsten compared to iron and their signature in different detecting media.

CIEMAT → 30.000 € (mechanical structure to support HCAL stack)



SiD simulation (from LoI)
$\rho \rightarrow \pi^{+}\pi^{0}$ decay in SiD

SiD simulation: SiW calorimeter response to a 250 GeV jet



Spanish participation; the numbers

Spanish participation:

- 7 institutes
- 3 Work Packages
- 5 tasks
- 476.000 € EU contribution ~ 5 %

Still a bit behind the big guys:

CERN → 2.651.900 €
Germany (DESY + Helmholtz alliance) → 1.632.300 €
France (CNRS + CEA) → 786.600 + 310.000 €
UK (many different partners) → 1.000.000 €
Italy → 862.000 €
University of Geneva → 500.000 €

But, well before Austria (114.300 €), The Netherlands (FOM + VU) → 170.000 €

Spanish participation – a word about umbrellas

A large # of institutes in AIDA (33 on the latest count),

Fortunately, most countries enter as a consortium

- France → CNRS
- Italy → INFN
- Germany → Helmholtz alliance

Coverage of the “umbrella” organization is not always complete:

- CEA Saclay is not part of CNRS

DevDet envisaged using CSIC, but IFAE, UB and CIEMAT need a different solution

All Spanish AIDA participants are in CPAN!

Spanish participation - CPAN

propose “all Spanish groups join AIDA as a single Joint Research Unit”

- ✔ Avoid single institute threshold of 50.000 €
- ✔ Important reduction of burocracy
- ✔ (Yet) another incentive to collaboration at the national level
- ✔ The impact of CPAN is likely to be larger than the sum of participating institutes

Example: coordinated Spanish effort on detector R&D for future e^+e^- colliders

Not like (s)LHC detector R&D, where most institutes are firmly embedded in (different) experiment's networks.

Detector R&D for future e^+e^- colliders in Spain: second or third priority efforts of many institutes. A serious impact in ILC/CLIC requires quite heavy involvement. Any individual effort is easily sub-critical.

Institutes are grouped by research interest, detector technology AND by nationality (whether we want to or not)

In this situation, national-level coordination (“Red tematica Española de Futuros Aceleradores” by Alberto Ruiz) is proving to be very beneficial

For instance, travel budget (money, time and physical resistance): Since 2007-2009 we have presented our work in ILC meetings in Beijing, DESY (Hamburg), Chicago, Sendai, Warsaw, Chicago, Tsukuba, and Albuquerque, at CLIC meetings at CERN (twice), detector concept meetings in Oxford, Stanford, DESY (Zeuthen), Cambridge and Seoul and thematic meetings in Orsay (twice). Not counting the “political” events and frequent detector R&D collaboration meetings.

AIDA & CPAN continuity

EC will evaluate the validity of CPAN as a JRU in the negotiation phase

- ✔ if AIDA is funded
- ✔ in ~4 months

The CPAN “convenio” seems to meet all requirements to be considered a JRU, but one:

AIDA extends until the end of 2014, well beyond the life-time of the current consolider project of CPAN.

(We don't stand alone: the Helmholtz alliance in Germany faces the same problem)

The CERN EU projects office suggests we manifest CPANs continuity beyond the end date of the Consolider project.

To be discussed in “particle physics” parallel session (Alberto Ruiz)

Summary

AIDA proposal to be submitted next week!

- Could provide max. of 10,000,000 euro of EU contribution for R&D infrastructure
- Cannot satisfy large demand for EU funding (despite 2:1 funding ratio)
- Most of the added value of this proposal is in the networks
- Meeting place for sLHC and FLC community, new concepts meet real detectors
- AIDA is something of a “who's who” of detector R&D for HEP experiments

Spanish participation:

- 7 institutes
- 3 Work Packages
- 5 tasks
- 476.000 Euro in EU contribution ~ 5 %

AIDA and CPAN:

- CPAN is the consortium under which the Spanish institutes participate in AIDA
- CPAN life-time must exceed that of AIDA

Information

Information

General:	http://cordis.europa.eu/fp7/
AIDA Call:	http://cordis.europa.eu/fp7/capacities/research-infrastructures-highlights_en.html
Financials:	ftp://ftp.cordis.europa.eu/pub/fp7/docs/financialguide_en.pdf
	http://www.finance-helpdesk.org
AIDA Web:	http://www.cern.ch/AIDA *(access: kate.kahle@cern.ch)*

Admin Questions

CERN EU Projects Office:	Svetlomir.Stavrev@cern.ch
Proposal Coordinator:	Serin@lal.in2p3.fr
...	
Spanish National Contact:	vila@ifca.unican.es

Transnational Access activities (TA)

- Opening of the RIs and providing (additional) transnational access of researchers or research teams to one or more infrastructures among those operated by the participants:
  - "Hands on" access and on-site experiments (e.g. test beams)
  - Remote access (e.g. sending of samples, sample analysis, etc.)
- EC contribution based on the estimated cost of units of access which may include the operational costs of the RI, but not capital investments.

  Example: a unit cost of 20 k€ for 2 day access to a test beam
- EC contribution may not exceed 20% of the annual operating cost of each infrastructure (not to make it dependent on the IA).
- Travel and subsistence for the users are not included in the unit cost and may be reimbursed separately.
- TA should be advertised and subject to peer review.

Joint Research activities (JRA)

- **Collaborative R&D activities** in fields of common interest to (some of) the participating RIs
- Should be innovative and explore **new technologies and/or techniques** for the efficient and joint use of the participating RIs
- JRAs should aim to **improve the services** provided by the infrastructures (in quality and/or quantity)
- **Examples** (non-exhaustive list):
  - Prototype development
  - Development and testing of new components, subsystems, materials, and techniques
  - Development of higher performance instrumentation
  - Development of software, middleware, algorithms and protocols

Participants in IA projects

- **Beneficiaries (full partners):** sign the Grant Agreement (contract) with the EC and receive EC contribution.

  Typically 20-30 beneficiaries for IA projects. Larger consortia are difficult to manage, both for the Coordinator and for the EC Project Officer.

- **Third parties:** do not sign the Grant Agreement with the EC, and may or may not receive EC contribution:

  1. Sub-contractors: non-core work may be subcontracted, provided it is described in the proposal and agreed by the EC (*example: chip production sub-contracted to IBM*).
  2. Third parties with financial contribution: institutes that are linked to a beneficiary and receive some EC funding through the beneficiary.

     Note: possible only for institutes that are involved in a formal collaboration with the beneficiary, going beyond the scope of the IA project. Agreement of EC is necessary.

     Example: CNRS is a beneficiary; University of Nantes is involved in a Joint Research Unit with CNRS. It may be a third party with EC contribution.
  3. **Associated partners: institutes that are associated / contributing to the work programme but do not receive directly EC funding.**

     Some of their travel costs for participation to meetings and workshops may be reimbursed under the Networking Activities, provided a budget for that is reserved, described in the proposal, and approved by the EC

Funding for IA projects

The Integrating Activity projects contain 4 types of activities which have different reimbursement rates:

- **Management activities:**
  - **Direct costs** may be reimbursed at max. 100%
  - **Overheads:** full overhead rate (e.g. 20% or 60% of the direct costs).

AIDA ~40%

- **JRA activities:**
  - **Direct costs** may be reimbursed at max. 75% for public research organizations and universities, and at max. 50% for industry partners
  - **Overheads:** full overhead rate (e.g. 20% or 60% of the direct costs).

AIDA ~30%

- **Coordination (networking) activities:**
  - **Direct cost:** may be reimbursed at max. 100%
  - **Overheads:** max. 7% for overheads.

AIDA ~30%

- **Support (transnational access) activities:**
  - **Direct costs:** may be reimbursed at max. 100%
  - **Overheads:** max. 7% for overheads.

AIDA ~75%
To cover travel & subsistence for users

Funding for IA projects

Overheads (indirect costs) rates:

Institute dependent. For a given institute, Rates are fixed for all FP7 EC projects!

- Actual overheads – according to the real overhead costs, identified and recorded in the accounting system of the participant (no limit!);
- Standard flat rate of 20% – can be used by any organisation, no questions asked (preferred by the EC);
- **Special flat rate of 60%** – reserved for non-profit public bodies, research organisations, and SMEs, with accounting systems that do not allow the precise identification of the direct and indirect costs of the project.

The use of the 60% rate means that a large fraction of the EC funding may be with-held by the organisation to cover its overhead costs.

Funding for IA projects

Example (for JRA activities):

*Direct costs (personnel + material + travel) = **200 k€***
Overheads 60% = 120 k€
Total Costs = 320 k€

*Agreed Funding Ratio for JRA: **~ 30%***
*EC contribution will be 30% of **320 k€** = 96 k€*

At the end…

- *Provided you can keep overheads for the project:*
  - *EC contribution = 96 k€*
  - *OWN contribution = **200** – 96 = 104 k€*

- *Otherwise:*
  - *EC contribution = 96 k€*
  - *EC overheads = 36 k€ (30% of total overheads)*
  - *EC funding available = 96 – 36 = 60 k€*
  - *OWN contribution = **200** – 60 = 140 k€*

Expected Timeline for this Call

- Submission: December 2009
- Proposal Evaluation; results available within 4 months ~ 3 months
- Negotiation Phase between EC and Coordinator: ~ 2 months
- Preparation of the Grant Agreement by the EC: ~ 2 months
- All documents (Grant Agreement and Consortium Agreement) signed: + 2-3 months
- Start Project Implementation (project duration 4 years max, <2.5 M€/y)
- Funds at Beneficiaries Bank Accounts: + 1 month

END 2010 ?