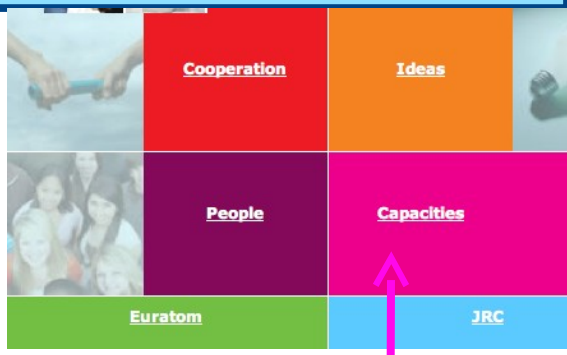
AIDA, EU funding for detector R&D
overview, ILC participation, TB infrastructure

Testbeam session

LCWS10, Beijing, China

Marcel Vos (IFIC Valencia, Spain)

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

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)*

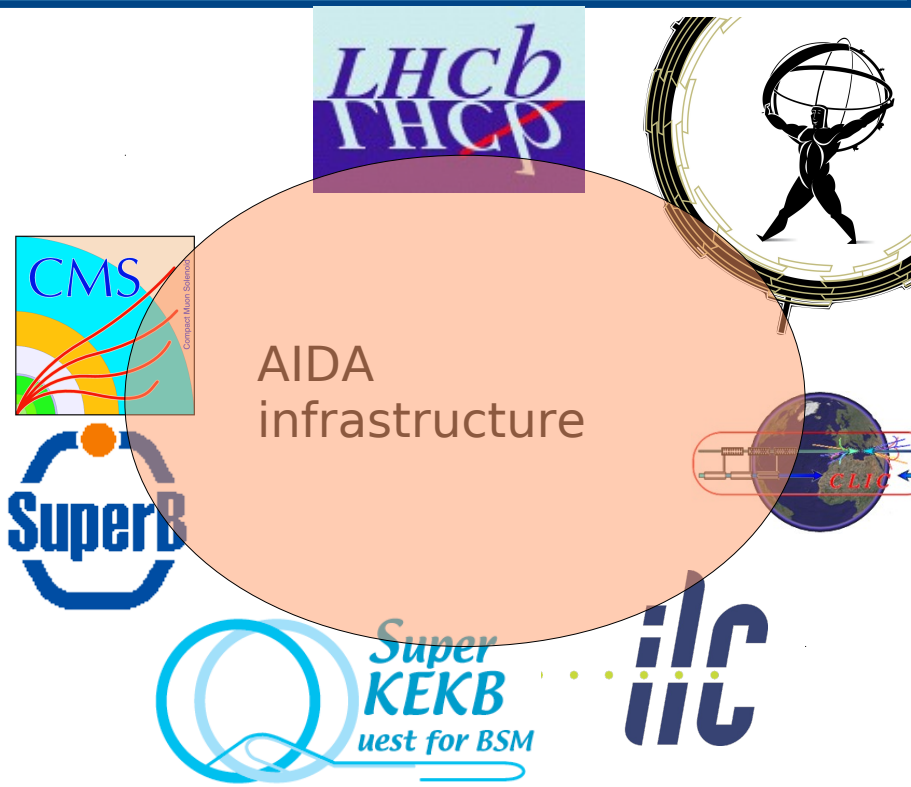
Future e^+e^- machines →

- ✔ *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 requested

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			**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	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

WP9.2 Software

Important opportunity to get some dedicated effort on core software.

- Mostly geared towards geometry and reconstruction in the context of a full detector concept.
- Significant progress here will have an effect on TB analysis.

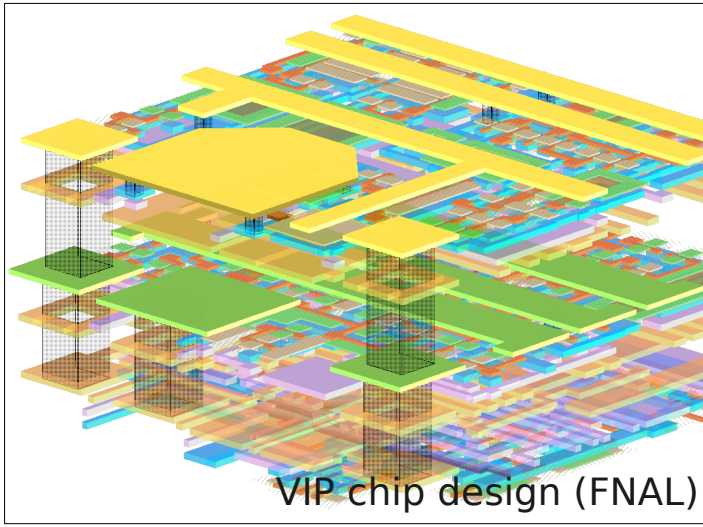
WP3.2 3D interconnections

- 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

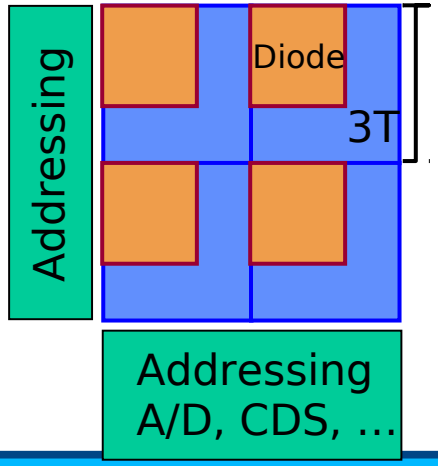
A good example of basic detector R&D

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)

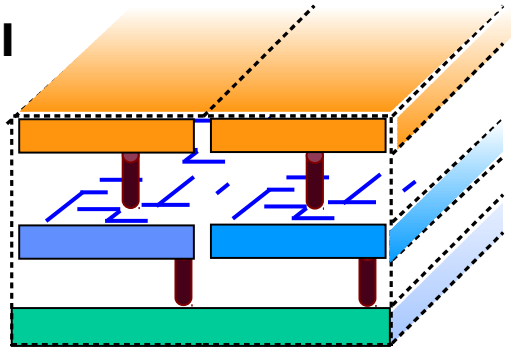
the next “revolution” in HEP detectors?



Conventional MAPS



3-D Pixel



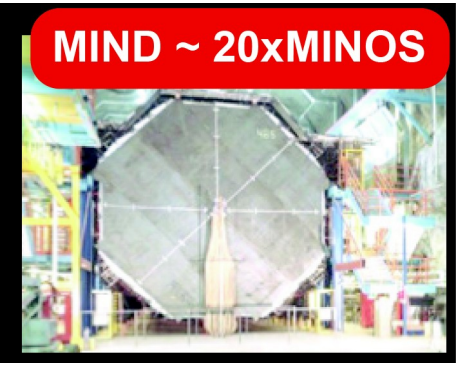
Detector

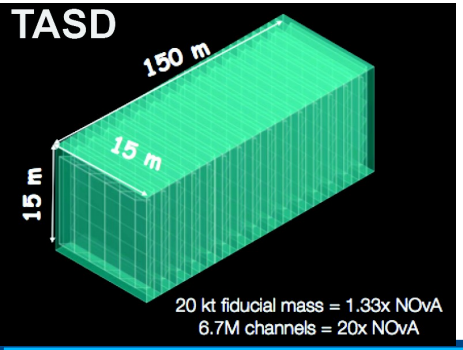
ROIC (front-end)

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

WP9.2 gaseous tracking

Boost to LCTPC infrastructure developed at DESY (under EUDET)

A Time Projection Chamber for a future Linear Collider

Creation of infrastructure for the production of large area Micro Pattern Gas Detectors

Development of a common read-out system for gaseous detectors

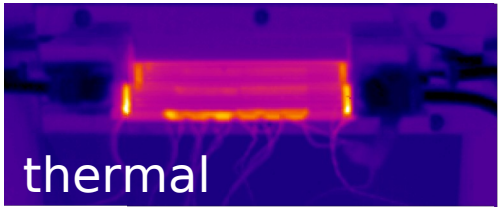
WP9.3 Precise Pixel Detectors

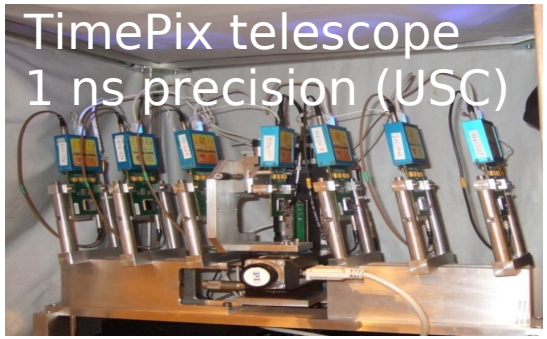
Document by I. Gregor, H. Pernegger, M. Winter, I. Vila, M. Vos on inputs received from a very large group of people

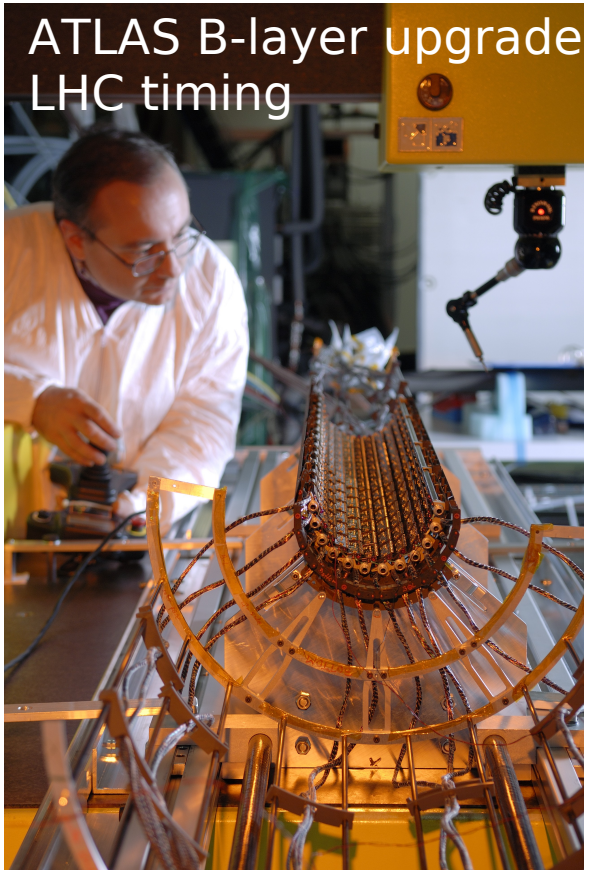
The main infrastructure is a beam telescope for characterization of prototypes

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

Infrastructure for thermo-mechanical characterization envisaged at DESY



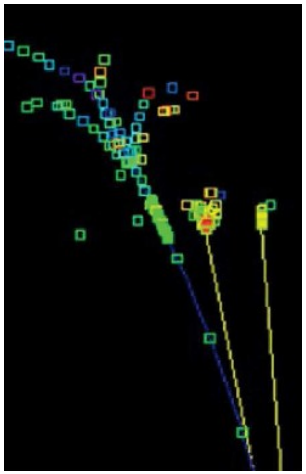




Clients: all pixel & strip detector R&D collaborations, including slice of ATLAS IBL, first full-scale Belle-II layers, 3D sensors for sLHC, prototypes from WP3, etc., etc.)

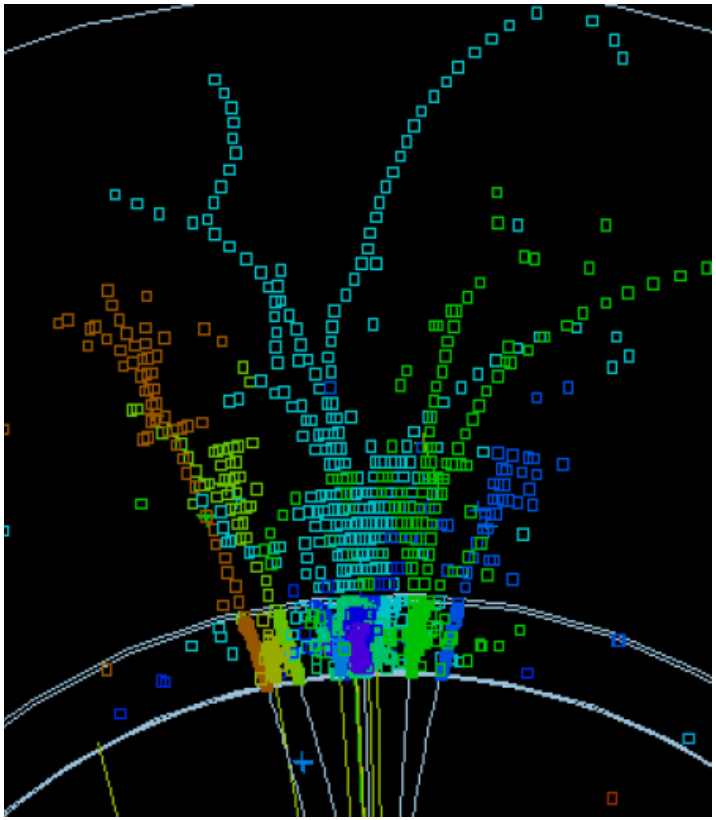
WP9.5 Granular Calorimetry

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



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

SiD simulation: SiW calorimeter response to a 250 GeV jet



WP9.4 Silicon micro-strips

Relatively small sub-package to create an “entry point” detector in front of the calorimeter. Explore some concepts in u-strip detector technology and in tracker-calorimeter integration.

AIDA evaluation

First phase results became available early March:

AIDA scored 14.5 points out of 15 possible

AIDA proceeds to next round (57 projects remain of which 42 will be funded)

"Much better than DEVDET, probably enough to get funded"

Europe has and needs to preserve a preeminent position in particle physics. The Large Hadron Collider, which had first collisions in November 2009 at CERN near Geneva, is the world's flagship particle physics project. The European Strategy for Particle Physics, adopted by CERN Council, gives priority to the following future projects: the LHC upgrade (sLHC), Linear Colliders (ILC/CLIC), accelerator-driven Neutrino facilities and B-physics facilities (Super-B). These projects aim to answer the most challenging outstanding questions in particle physics.

While these accelerators and their experiments are quite different, there is a need for common high technology intensive detector R&D. The AIDA proposal, "Advanced European Infrastructures for Detectors at Accelerators", aims to constitute an Integrating Activity to improve the key infrastructures required for detector development, with trans-national access to test beams and irradiations facilities. It includes also networking activities enabling collaborative development of new technologies in software and microelectronics. To guarantee a coordination and continuation of the efforts, in view of an expected decision to start construction of large scale detectors for new experiments, a dedicated network also aims to enforce links with European industry.
AIDA has two other key objectives: increased scientific cooperation and synergies between the four project communities (sLHC and LC in particular), and enhanced European integration within each of them. R&D for specific key technologies willalso contribute to upgrades of the infrastructures participating in AIDA.

The project gathers the whole European detector community (more than 70 institutes in 20 countries) and includes infrastructures providing access for the benefit of several thousand users in Europe and beyond. This timely proposal will enable Europe to secure the lead in development of advanced instrumentation and detectors for particle physics.

AIDA evaluation

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“Much better than DEVDE[T] enough to get funded”

News flash (yesterday evening): AIDA formally admitted to negotiation phase, unfortunately with some reduction of the requested funding

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Conclusions

AIDA should provide common infrastructure for European detector R&D for accelerator-based experiments

- Follow-up for EUDET, but catering to a much broader community
- Infrastructure benefits ILC detector R&D world-wide

Test beam infrastructure is one of its main objectives

- A good fraction of WP8
- Most of WP9

Prospects for funding are good

- Final report and further details to follow soon

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 ?