

# AIDA WP2

## Common Software

### - The LC perspective -

Frank Gaede, DESY  
EUDET Annual Meeting  
DESY, September 29th, 2010

# The AIDA project

Advanced European Infrastructures for Detectors at Accelerators

<http://www.cern.ch/aida>

- EU project in the 7<sup>th</sup> Framework program for research infrastructure in Europe
- AIDA addresses infrastructures required for the development of detectors for future particle physics experiments. In line with the European strategy for particle physics
  - sLHC, ILC/CLIC, neutrino facilities, B-factories
- project duration: 4 years
- start: Feb. 2011
- total budget: 8 MEUR

# AIDA workpackages

WP#	Type	Task	Description	WP Leaders
1	MGT	<b>Project management and communication</b>		<b>S. Stavrev (CERN)</b> <b>L. Serin (CERN)</b>
		1.1	Project management and administration	
		1.2	Communication and dissemination	
2	COORD	<b>Common software tools</b>		<b>F. Gaede (DESY)</b> <b>P. Mato (CERN)</b>
		2.1	Coordination and communication	
		2.2	Geometry toolkit for HEP	
		2.3	Reconstruction toolkit for HEP	
3	COORD	<b>Microelectronics and interconnection technology</b>		<b>H-G Moser (DESY (MPG-MPP))</b> <b>V. Re (INFN-PV)</b>
		3.1	Coordination and communication	
		3.2	3D Interconnection	
		3.3	Shareable IP blocks for HEP	
4	COORD	<b>Relation with industry</b>		<b>S. Stapnes (CERN)</b> <b>P. Sharp (STFC)</b>
		4.1	Coordination and Network Working Groups	
5	SUPP	<b>Transnational access DESY</b>		<b>I. Gregor (DESY)</b>
		5.1	Test beams	
6	SUPP	<b>Transnational access CERN</b>		<b>H. Breuker (CERN)</b>
		6.1	Test beams and irradiation facilities	
7	SUPP	<b>Transnational access European irradiation facilities</b>		<b>M. Mikuz (JSI)</b>
		7.1	Access to JSI, Slovenia	
		7.2	Access to UCL, Belgium	
		7.3	Access to KIT, Germany	
8	RTD	<b>Improvement and equipment of irradiation and beam lines</b>		<b>M. Moll (CERN)</b>
		8.1	Coordination and communication	
		8.2	Test beams infrastructure at CERN and Frascati	
		8.3	Upgrade of PS proton and neutron irradiation facilities at CERN	
		8.4	Qualification of components and common database	
		8.5	General infrastructure for test beam and irradiation lines	
		8.6	Coordination of combined beam tests and common DAQ	
9	RTD	<b>Advanced Infrastructure for detector R&amp;D</b>		<b>M. Vos (CSIC (IFIC))</b> <b>V. Boudry (CNRS (IN2P3))</b>
		9.1	Coordination and communication	
		9.2	Gaseous Detector Facilities	
		9.3	Precision Pixel Detectors	
		9.4	Silicon Tracking Devices	
		9.5	Highly Granular Calorimetry	

# goal of WP2 – 'Common Software'

develop core software tools that are useful for the HEP community at large and in particular for the next big planned projects: sLHC and Linear Collider (ILC/CLIC)

## Objectives

### Task 2.1: Coordination and communication

- Monitor the progress of the work in the work package
- Coordinate and schedule the execution of the tasks and subtasks
- Prepare progress reports – internal and on deliverables

### Task 2.2: Geometry toolkit for HEP

- Allow the description of complex geometrical shapes, materials and sensitive detectors
- Provide interfaces to full simulation programs (Geant4), fast simulations, visualization tools and reconstruction algorithms
- Allow for the misalignment of detector components
- Provide an interface to calibration constants and conditions data

### Task 2.3: Reconstruction toolkit for HEP

- Tracking toolkit based on best practice tracking and pattern recognition algorithms
- Provide alignment tools
- Allow for pile up of hadronic events
- Calorimeter reconstruction toolkit for highly granular calorimeters based on Particle Flow algorithms

# partner involved from LC community

- **task2: Geometry toolkit**
  - CERN, LLR, DESY, STFC
  - task leader: CERN
- **task3: Reconstruction toolkit**
  - **Tracking toolkit**
    - DESY, OeAW
  - **Particle Flow Algorithms**
    - UCam, CERN, LLR
  - task leader: DESY

# Deliverables for WP2

## Deliverables

blue: responsible partner

Del no.	Description/title	Partners:	Delivery
D2.1.1	Project web infrastructure to document software packages	CERN, DESY	M3
D2.1.2	Central code repositories and other infrastructure required for the software development	CERN, DESY	M4
D2.2.1	Software design for geometry toolkit including the interfaces for the reconstruction toolkits	CERN, DESY, LLR, UniGla, STFC	M12
D2.2.2	Software toolkit for detector geometry, materials and detection technologies	CERN, DESY, LLR, UniGla, STFC	M38
D2.3.1	Software design for tracking toolkit	DESY, OeAW, KFKI	
D2.3.2	Software design for PFA tools	Ucam, LLR, CERN,	M12
D2.3.3	Design for handling the pile-up in sLHC	INFN, NTU, KFKI	M18
D2.3.4	Software toolkit with tracking algorithms	DESY, OeAW, KFKI	
D2.3.5	Particle Flow software tools	Ucam, LLR, CERN,	M38
D2.3.6	Alignment tools software tools	UniGla, PU	M38
D2.3.7	Trigger simulation software tool	STFC, PU	M38

# WP2 - Milestones

Partners:

blue: responsible partner

Milestone number <sup>59</sup>	Milestone name	Lead beneficiary number	Delivery date from Annex I <sup>60</sup>	Comments
MS10	Running first prototype of the particle flow algorithm.		UCAM, LLR	Application to LC detector (Task 2.3)
MS11	Running prototype of tracking toolkit including some algorithms		DESY, OeAW	Application to ILD-TPC simulation (Task 2.2)
MS12	Running prototype of the geometry toolkit		CERN, DESY, LLR	Application to ILD detector simulation (Task 2.2)
MS13	Running prototype of the tracking code for the pile-up		INFN, NTU, KFKI	Application to sLHC simulation (Task 2.3)
MS14	Integration of tracking toolkit into LC software framework		DESY	Validation of physics performance (Task 2.3)
MS15	Application of PFA tools to sLHC detectors		UCAM, LLR	Demonstration of concept (Task 2.3)

milestones chosen such, that integration w/ LC software is key ingredient

# The LC perspective

- development of detector and framework independent software tools for geometry description and reconstruction fits nicely into current LC situation w/ three detector concept groups
- milestones include adaption to LC framework(s)
- => we keep doing what we planed to do anyhow and gain from AIDA :
  - (additional) manpower
  - community strengthening
  - need for proper software design !



# a proposed strategy for AIDA WP2 (LC)

- different timescales with AIDA project and upcoming documents: CDR, DBD
- implement and improve the needed tools now
  - GEAR, improved tracking, PFA, ...
- start thinking about definition of '**abstract interfaces**' now  
crucial for success -> we have to get it right !
- further develop and improve the tools in the context of LC software with general application and interfaces in mind
- not everyone involved in AIDA - only EU partners
  - keep up close communication and collaboration with international partners outside AIDA
  - everything we do for LC software within AIDA has to fit into the international context of the LC software

# AIDA WP2 and LC test beam

- in EUDET we have successfully integrated the software requirements for the test beam communities with the activities for the full detector simulation and optimization
- also the LC activities in AIDA WP2 are mainly targeted at the detector concepts we will continue to tightly collaborate with the test beam groups
- e.g.:
- the new geometry system needs to address the requirements for test beam setups (as in GEAR)
- ideally integrate geometry and conditions data (validity time intervals)
- also alignment task (targeted at sLHC) should be of interest for the test beams

# Summary

- AIDA WP2 – Common Software
  - development of generic geometry and reconstruction software tools
  - important topics for LC software
  - integrate with existing software frameworks
  - keep tight collaboration between detector concept software tools and test beam frameworks