SIXTH FRAMEWORK PROGRAMME

Structuring the European Research Area Specific Programme

RESEARCH INFRASTRUCTURES ACTION

Contract for an

INTEGRATING ACTIVITY

implemented as

INTEGRATED INFRASTRUCTURE INITIATIVE (*I3*)

Annex I - "Description of Work"

Project acronym: EUDET

Project full title: Detector R&D towards the International Linear Collider

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A. OVERVIEW OF THE PROJECT

1. Project summary

This project aims at creating a coordinated European effort towards research and development for the next generation of large-scale particle detectors. New and advanced detector technologies are needed to fully exploit the potential of future accelerators like the International Linear Collider (ILC) which is being designed in an emerging worldwide collaboration. The project will develop infrastructures to facilitate experimentation and to enable the analysis of data using shared equipment and common tools. It is based on the use of existing facilities and on plans to improve them as required. Thus the goal is to establish a common European infrastructure for the research on advanced detector concepts for the ILC and to foster collaboration between European partners and associated institutes.

2. Project objectives

While R&D on advanced detector technologies is already being pursued in several institutes their impact is limited by the lack of resources for coordination, networking and common infrastructure. Extensive R&D on detector concepts took place in the past in preparation for the Large Hadron Collider (LHC). The thrust and emphasis of that work were very different from the ones needed for the ILC mainly with respect to resolution and radiation dependence. The project aims to rectify the situation through three actions:

- The establishment of a **European detector development network** will improve communication and interaction between groups involved in detector R&D. Within the network, workshops are organised to improve the information exchange between groups. Tools developed within the network will facilitate the exchange of data and improve the access to information for participants. The creation of a network for central management for detector R&D will help in coordinating the different activities within Europe and will maintain and intensify the relations with the worldwide detector R&D community beyond EUDET.
- The establishment of three dedicated **Joint Research Activities** with specific actions will coordinate and improve existing infrastructures. This will significantly simplify the participation of European groups in this enterprise and enable them to contribute promptly and significantly to detector developments, and thus to the ILC project.
- The instrument of **Transnational Access** is used to grant interested groups access to the different infrastructures provided through this initiative. The improvements achieved as a result of this initiative will thus be made available to a much broader physics community.

In summary the project will help to maintain and extend Europe’s position in advanced detector R&D required for the ILC and beyond.

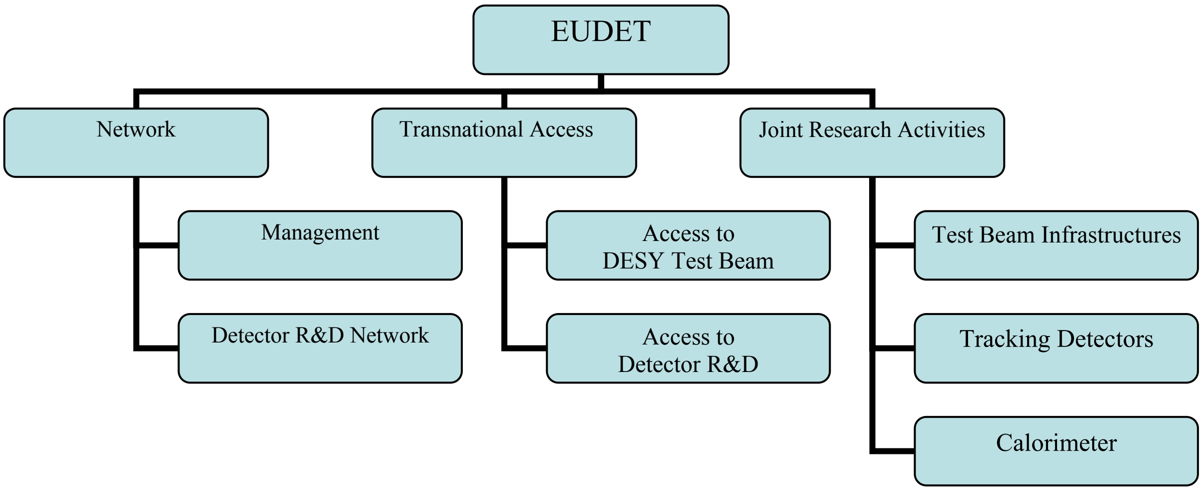


Figure 1: Structure of the I3 "Detector R&D for the International Linear Collider, EUDET"

3. List of participants

Table 1 - List of participants of the I3

Participant No.	Organisation (name, city, country)	Short name	Short description	Specific role in the I3
1	Deutsches Elektronen-Synchrotron, Hamburg and Zeuthen, Germany	DESY	One of the leading institutes in the world for high energy physics, accelerator physics and research with photons.	Coordination of the I3, Coordination of JRA1 and JRA3, Participation in all activities.
2	AGH University of Science and Technology, Cracow, Poland	AGH-UST	Polish university. The group is experienced in luminosity measurement and designed and built, together with INPPAS, the luminosity monitor for the ZEUS experiment at HERA.	Participation in NA2, JRA3.
3	Albert-Ludwigs Universität Freiburg, Germany	ALU-FR	German university. The physics department has a long tradition and broad involvement in accelerator-based particle physics. Among other projects the department is involved in the MediPix project, an X-ray imaging Silicon pixel detector and in Grid computing.	Coordination of NA2, Participation in NA2, JRA2.
4	Commissariat a l'Energie Atomique, Paris, France	CEA	Leading French organisation for research, development, and innovation in the fields of energy, defence, information technologies, communication, and health.	Participation in NA2, JRA1, JRA2.
5	European Organization for Nuclear Research, Geneva, Switzerland	CERN	One of the leading institutes in the world for high energy physics and accelerator physics.	Participation in NA2, JRA1, JRA2.

Participant No.	Organisation (name, city, country)	Short name	Short description	Specific role in the I3
6	**Centre National de la Récherche Scientifique/Institut National de Physique Nucléaire et de Physique des Particules, Paris, France**	**CNRS/IN2P3**	**Leading French organisation for fundamental research.**	
	Laboratoire Leprince-Ringuet, Ecole Polytechnique, Palaiseau, France	*CNRS-EP*	*One of the leading French institutes for High Energy Physics research.*	*Participation in NA2, JRA3.*
	Institut de Recherches Subatomiques, Strasbourg, France	*CNRS-IReS*	*One of the leading French institutes for High Energy Physics research.*	*Participation in NA2, JRA1.*
	Laboratoire de l´Accélérateur Linéaire, Orsay, France	*CNRS-LAL*	*One of the leading French institutes for High Energy Physics research.*	*Coordination of JRA3, Participation in NA2, JRA3*
	Laboratoire de Physique Corpusculaire, Clermont Ferrand, France	*CNRS-LPC*	*One of the leading French institutes for High Energy Physics research.*	*Participation in NA2, JRA3.*
	Laboratoire de Physique Nucléaire et de Hautes Energies, Paris, France	*CNRS-LPNHE*	*One of the leading French institutes for High Energy Physics research.*	*Participation in NA2, JRA2.*
	Laboratoire de Physique Subatomique et de Cosmologie, Grenoble, France	*CNRS-LPSC*	*One of the leading French institutes for High Energy Physics research.*	*Participation in NA2, JRA1*
7	**Consejo Superior de Investigaciones Científicas, Madrid, Spain**	**CSIC**	**Main Spanish research organisation. The group has participated actively in several large collider experiments and is currently responsible for the global alignment system of the tracking detectors for CMS.**	**Participation in NA2, JRA2.**

Participant No.	Organisation (name, city, country)	Short name	Short description	Specific role in the I3
8	Charles University, Prague, Czech Republic	CUPRAGUE	Czech university. The group has been actively participating in the design and construction of the ATLAS silicon strip detector and is particularly experienced in the fields of detector and module testing and quality assessment.	Participation in NA2, JRA2.
9	Stichting voor Fundamenteel Onderzoek der Materie, Amsterdam, Netherlands	FOM/NIKHEF	The funding agency for Fundamental Research on Matter, of which NIKHEF is one of the major research institutes. NIKHEF coordinates and supports all activities in experimental subatomic (high energy) physics in the Netherlands.	Coordination of JRA2, Participation in NA2, JRA2.
10	Helsinki Institute of Physics, Helsinki, Finland	HIP	Leading Finnish institute in theoretical and experimental subatomic physics. The group has a large expertise in semiconductor detector fabrication, testing and assembling. It is actively pursuing applications to new low-dose medical imaging methods.	Participation in NA2, JRA2.
11	The Henryk Niewodniczanski Institute of Nuclear Physics, Polish Academy of Sciences, Cracow, Poland	INPPAS	Institute with nearly fifty years experience in the field of nuclear and high energy physics, collaborates with many scientific research centres in the world. The group is experienced in luminosity measurement and designed and built, together with AGH-UST, the luminosity monitor for the ZEUS experiment.	Participation in NA2, JRA3.
12	Institute of Physics, Academy of Sciences of the Czech Republic, Prague, Czech Republic	IPASCR	Leading institute in Czech Republic in physics research for high energy physics, plasma physics, optics and solid state physics. The institute contributed to calorimeters and the silicon tracker of the H1 experiment at HERA and participates in R&D programme at CERN on instrumentation off silicon detectors.	Participation in NA2, JRA3.

Participant No.	Organisation (name, city, country)	Short name	Short description	Specific role in the I3
13	**Max-Planck-Society for the Advancement of Science**	**MPS**	**Leading German Society for performing basic research in the interest of the general public in the natural sciences, life sciences, social sciences, and the humanities.**	
	Max-Planck-Institut für Physik, Max-Planck-Gesellschaft, Munich, Germany	*MPS-MPI*	*Institute devoted mainly to studies of the fundamental constituents of matter, their interactions, and the role they play in astrophysics.*	*Participation in NA2, JRA1.*
14	**Tel Aviv University, Israel**	**TAU**	**Israeli university. The group of has participated in the last twenty years in many major experiments in Europe such as OPAL at LEP, ZEUS at HERA and presently ATLAS at the LHC.**	**Participation in NA2, JRA3.**
15	**Universität Bonn, Germany**	**UBONN**	**German university. The institute has large experience in the development of semiconductor pixel detectors and dedicated ASIC pixel chip electronics. The group has the technological infrastructure to develop and produce complex and large pixel detectors, as demonstrated for the ATLAS pixel detector.**	**Participation in NA2, JRA1.**
16	**University College London, UK**	**UCL**	**UK university. The group has developed along with ICL the DAQ system for the current prototype calorimeter for the ILC detector and a conceptual design which should be able to provide a solution for the final calorimeter.**	**Participation in NA2, JRA3.**
17	**Universität Hamburg, Germany**	**UHAM**	**German university. The institute has large experience in the development and operation of detectors for collider experiments. For several years the group participates in the R&D work for the linear collider detector, with strong contributions to the TPC and the hadronic calorimeter.**	**Participation in NA2, JRA2, JRA3.**

Participant No.	Organisation (name, city, country)	Short name	Short description	Specific role in the I3
18	**Lunds Universitet, Sweden**	**ULUND**	**Swedish university. One of the leading institutes in Sweden for high energy physics, comprising heavy ion physics and particle physics, with a long experience in developing electronics and data acquisition systems for advanced detectors.**	**Participation in NA2, JRA2.**
19	**Universität Mannheim, Germany**	**UMA**	**German university. The group has provided major contributions to the development of integrated readout electronics for strip- and pixel detectors like the pixel readout chip for the ATLAS experiment implemented in a 0.25 µm technology.**	**Participation in NA2, JRA1.**
20	**Université de Genève, Switzerland**	**UNI-GE**	**Swiss university. The group has a long experience in the design, manufacture and exploitation of silicon tracking detectors for particle physics. Recent projects include the silicon vertex detector for the L3 experiment at CERN, the silicon tracker for the NASA AMS-01 experiment and a silicon strip detector for GSI Darmstadt to be used on multiple ESA space missions.**	**Participation in NA2, JRA1.**
21	**Bristol University, UK**	**UNIVBRIS**	**UK university. The group has a strong tradition of detector development for large collider experiments. Among other projects the group is carrying out research and development into sensor technologies for a vertex detector at the ILC.**	**Participation in NA2, JRA1.**
22	**Universität Rostock, Germany**	**UROS**	**German university. The group has been involved in experiments at major accelerator centres for many years developing novel readout schemes. It is developing a compact readout electronics based on TDC rather than the more conventional FADC readout.**	**Participation in NA2, JRA2.**

Participant No.	Organisation (name, city, country)	Short name	Short description	Specific role in the I3
23	**Istituto Nazionale di Fisica Nucleare, Frascati, Italy**	**INFN**	**Leading Italian institute for high energy physics.**	
	INFN Milano, Milano, Italy	INFN-MI	Leading Italian institute for high energy physics.	Participation in NA2, JRA1.
	INFN Ferrara, Ferrara, Italy	INFN-FE	Leading Italian institute for high energy physics.	Participation in NA2, JRA1.
	INFN Roma III, Roma, Italy	INFN-ROMA	Leading Italian institute for high energy physics.	Participation in NA2, JRA1.
	INFN Pavia, Pavia, Italy	INFN-PV	Leading Italian institute for high energy physics.	Participation in NA2, JRA1.

The project includes 20 institutes participating as associates to the I3 - cf. Table 1bis. These self-supporting institutes are active in the topic of research of the JRAs. It is thus in the interest of the consortium to maintain close contact to these developments. It is foreseen to invite the associates to the regular Annual Meetings and Scientific Workshops to receive their scientific and technological input and to enable them to assist in the experimental progress as required. The respective travel costs have been absorbed in the requested budget of - and are managed by - the hosting institutes.

Table 1-bis: List of Associates of the Integrated Infrastructure Initiative (I3)

Organisation (name, city, country)	Short name	Associated to	Short description	Specific role in the I3
Budker Institute of Nuclear Physics, Novosibirsk, Russia	**BINP**	**DESY**	**One of the leading Russian laboratories for High Energy Physics and Accelerator Science.**	**Participation in JRA2.**
Centro Nacional de Microelectronica, Barcelona, Spain	**CNM-IMB**	**DESY**	**Largest public microelectronics research and development centre in Spain.**	**Participation in NA2, JRA2.**
Imperial College London, London, UK.	**ICL**	**UCL**	**UK university.**	**Participation in NA2, JRA3.**

Organisation (name, city, country)	Short name	Associated to	Short description	Specific role in the I3
Instituto de Fisica Corpuscular, Valencia, Spain	**IFIC**	**DESY**	**One of the most important research laboratory from the Consejo Superior de Investigaciones (CSIC) in particle physics in Spain.**	**Participation in NA2, JRA2.**
State Research Center of Russian Federation Institute for High Energy Physics, Protvino, Russia	**IHEP**	**DESY**	**Leading Russian centre for High Energy Physics and Accelerator Science.**	**Participation in JRA3.**
Alikhanov Institute for Theoretical and Experimental Physics, Moscow, Russia	**ITEP**	**DESY**	**Russian centre for research and education on the fundamental properties of matter.**	**Participation in JRA3.**
High Energy Accelerator Research Organisation, Tsukuba, Japan	**KEK**	**UHAM**	**One of the leading institutes in the world for high energy physics and accelerator physics.**	**Participation in JRA1, JRA2.**
Moscow Engineering Physics Institute, Moscow, Russia	**MEPHI**	**DESY**	**Russian centre for research and education on engineering and fundamental science.**	**Participation in JRA3.**
Moscow State University, Moscow, Russia	**MSU**	**DESY**	**Russian university.**	**Participation in JRA2, JRA3.**
Obninsk State University, Obninsk, Russia	**OSU**	**DESY**	**Russian university.**	**Participation in JRA2, JRA3.**
Rutherford Appleton Laboratory, Oxfordshire, UK	**RAL**	**DESY**	**Central Laboratory of High Energy and Accelerator Physics for the UK.**	**Participation in NA2, JRA1.**

Organisation (name, city, country)	Short name	Associated to	Short description	Specific role in the I3
Royal Holloway and Bedford New College, Egham, UK	**RHUL**	**UCL**	**UK university.**	**Participation in NA2, JRA3.**
Radboud University Nijmegen, Netherlands	**RUN**	**DESY**	**Dutch university.**	**Participation in NA2, JRA1.**
Rheinisch-Westfälische Technische Hochschule Aachen, Germany	**RWTH**	**DESY**	**German university.**	**Participation in NA2, JRA2.**
University of Bergen, Norway	**UBER**	**DESY**	**Norwegian university.**	**Participation in NA2, JRA3.**
The Chancellor, Masters and Scholars of the University of Cambridge, UK	**UCAM**	**UCL**	**UK university.**	**Participation in NA2, JRA3.**
University of Glasgow, Glasgow, UK	**UGLW**	**DESY**	**UK university.**	**Participation in NA2, JRA1.**
University of Liverpool, Liverpool, UK	**ULIV**	**DESY**	**UK university.**	**Participation in NA2, JRA1.**
The University of Manchester, Manchester, UK	**UMAN**	**UCL**	**UK university.**	**Participation in NA2, JRA3.**
The chancellor, Masters and Scholars of the University of Oxford, Oxford, UK	**UOXF**	**DESY**	**UK university.**	**Participation in NA2, JRA1.**

4. List of activities

Table 2 - List of activities of the I3

Activity Number	Descriptive Title	Short description of specific objectives of the activity
Networking activities		
NA1	Management of I3	Coordination of the development of an integrated European infrastructure for ILC detector R&D and its exploitation by the partners of the consortium
NA 2	"Detector R&D Network"	This activity aims at coordinating and integrating the activities of the particle physics community interested in the development of novel detector technologies for the ILC. Tools to facilitate this integration include meetings, conferences and a centralized access to computing resources and deep sub-micron electronics development tools.
Access activities		
TA1	"Access to DESY Test Beam Facility"	The DESY test beam infrastructure, which will be improved under this project will be made available to a wide community of physicists involved with detector developments. Central support of the infrastructure at the test beam should be available to assist the visiting scientists.
TA2	"Access to Detector R&D Infrastructure"	Infrastructure developed and constructed in the framework of this project will be made available to the community to test new detector technologies. The infrastructure will be made available for new groups joining the ILC detector development, for other particle and nuclear physics groups as well as for groups from other fields of science.
Research activities		
JRA1	"Test Beam Infrastructure"	This JRA aims at providing and improving a general test beam infrastructure for detector R&D. The main objectives are to develop and build a large bore magnet, a novel general purpose pixel detector test stand and telescope which improve the test beam infrastructure.

Activity Number	Descriptive Title	Short description of specific objectives of the activity
JRA2	"Infrastructure for Tracking Detectors"	This JRA wants to integrate the efforts of European institutions working on tracking detectors for the ILC. This includes the improvement of existing infrastructures for tracking detectors, the developments of common prototypes, and the development of novel techniques for silicon based tracking detectors.
JRA3	"Infrastructure for Calorimeters"	Calorimeter developments for the ILC rely on sophisticated structures, which can be used to test novel readout schemes. This JRA aims at improving the existing calorimeter prototype stack. This includes the development of novel stack instrumentation, and of novel readout systems to be provided at the infrastructure.

B. IMPLEMENTATION PLAN FOR THE WHOLE DURATION OF THE PROJECT

1. Overall implementation plan

The overall implementation of the project consists of three phases:
Phase 1: Ramp-up phase. In the first six months of the project qualified personnel will be hired. The NAs and JRAs work plans will be prepared and coordinated among the participating institutes.
Phase 2: R&D and production phase. This is the core phase of the project lasting for 3 years where the proposed R&D will be carried out and the infrastructure will be installed.
Phase 3: Consolidation phase. In the last six months, the final report will be prepared. It also serves as a contingency for accumulated delays.
The different JRAs on testbeam infrastructure (JRA1), infrastructure for tracking detectors (JRA2), infrastructure for calorimeters (JRA3) are relatively independent. With only modest interdependence between JRA1 and JRA2 which is reflected in an early installation of the superconducting magnet at the end of month 12. The JRAs run for the whole duration of the project. The Networking activity NA2 ties together and supports the JRAs as well as the European user community. In the installation of the computer cluster and the first version of the software are therefore planned in the first half of the project. The progress of the project will be monitored by an Annual Scientific Workshop.

Figure 2: Overall Implementation Plan

ID	Task Name
1	**NA1: Management of the I3 MNGMNT**
2	Start-up, preparation of Kick-Off Meeting
3	Kick-Off Meeting
4	Phase 1
5	Annual Meeting
6	Preparation of Annual Report
7	Phase 2
8	Annual Meeting
9	Preparation of Annual Report
10	Phase 3
11	Annual Meeting
12	Preparation of Annual Report
13	Phase 4
14	Annual Meeting
15	Preparation of Annual Report

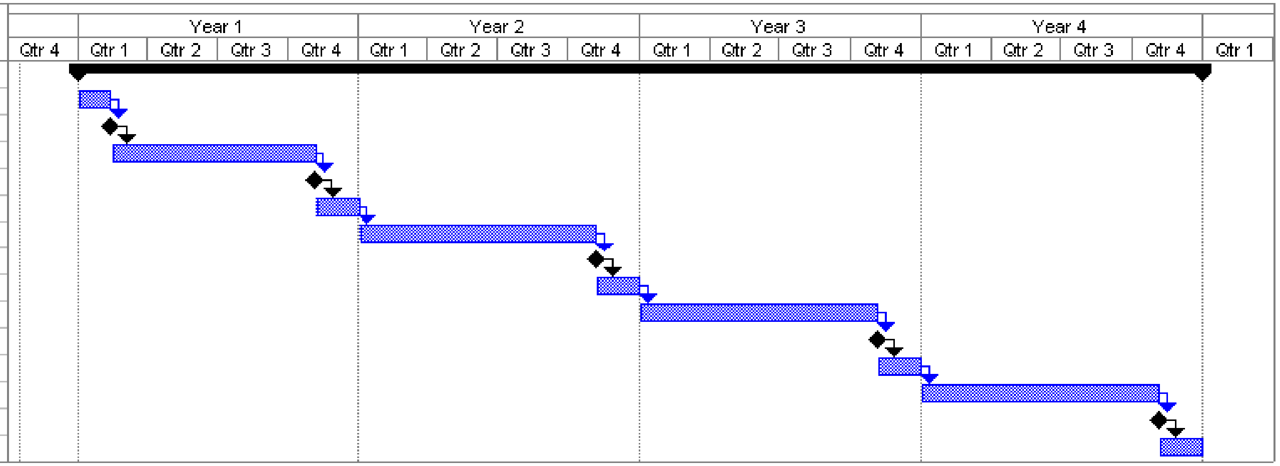
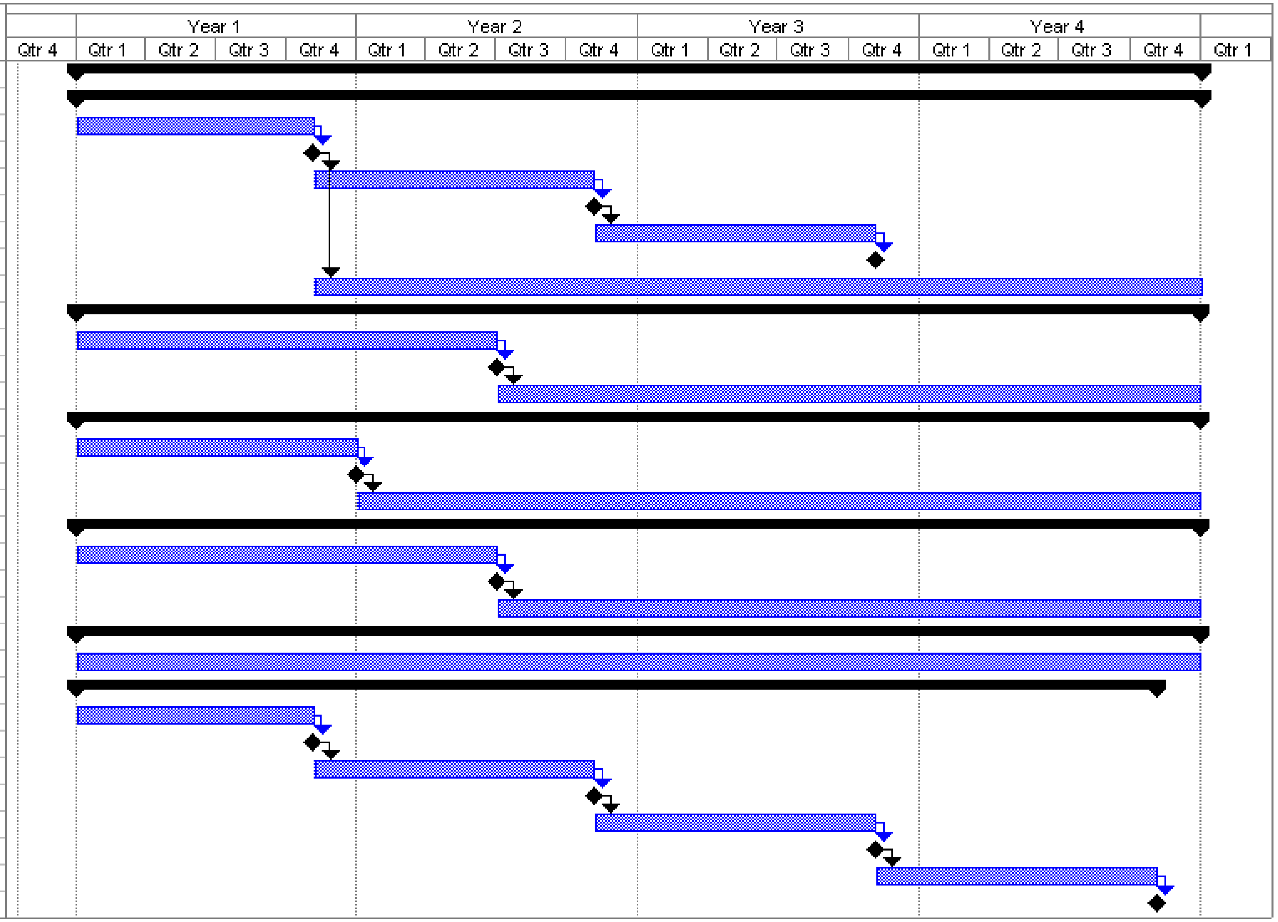


Figure 2: continued

ID	Task Name
16	**NA2: Detector R&D Network DETNET**
17	**Computing network COMP**
18	Installation of 1st stage
19	1st stage ready
20	Installation of 2nd stage
21	2nd stage ready
22	Installation of 3rd stage
23	Full cluster available
24	Production run
25	**Analysis framework ANALYS**
26	Framework development
27	Version 1.0 roll-out
28	Production run
29	**Electronic information system WEBINFO**
30	Information system development
31	Version 1.0 roll-out
32	Production run
33	**Validation of simulation packages VALSIM**
34	Hadronic shower model improvement
35	First release of improved hadronic shower model in GEANT4
36	Improved shower model available to I3
37	**Microelectronics MICELEC**
38	MICELEC service available to I3
39	**Information exchange EXCHG**
40	Phase 1
41	Annual Scientific Workshop
42	Phase 2
43	Annual Scientific Workshop
44	Phase 3
45	Annual Scientific Workshop
46	Phase 4
47	Annual Scientific Workshop



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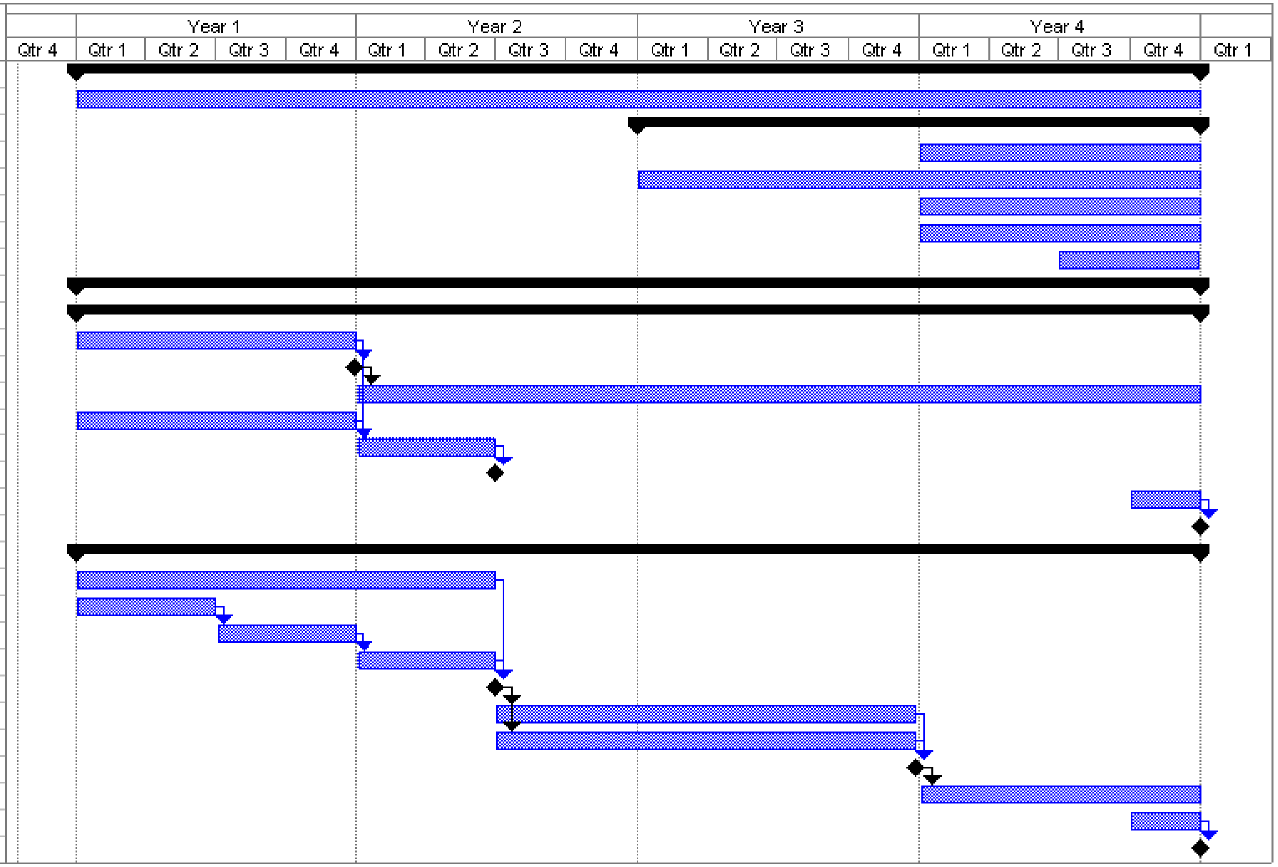
ID	Task Name
48	**TA1: DESY test beam**
49	DESY test beam
50	**TA2: Access to detector R&D infrastructures DETINF**
51	Beam telescope
52	TPC field cage
53	Si-TPC monitor
54	Si-Strip infrastructure
55	Calorimeter infrastructure
56	**JRA1: Test beam infrastructure TBINF**
57	**Magnet**
58	Delivery and installation
59	Magnet ready for operations
60	Magnet operation
61	Field measurement device
62	Field measurement
63	Field map
64	Magnet report
65	Magnet report available
66	**Pixel Telescope Integration**
67	Upgrade of beam line
68	Design of cooling and support
69	Construction of telescope infrastructure
70	Integration of Analogue Telescope
71	Analogue Telescope integrated in beam
72	Analogue Telescope operation
73	Integration of Final Telescope
74	Final Pixel Telescope integrated in beam
75	Pixel Telescope available at beam
76	Pixel Telescope Integration Report
77	Pixel Telescope Integration Report available



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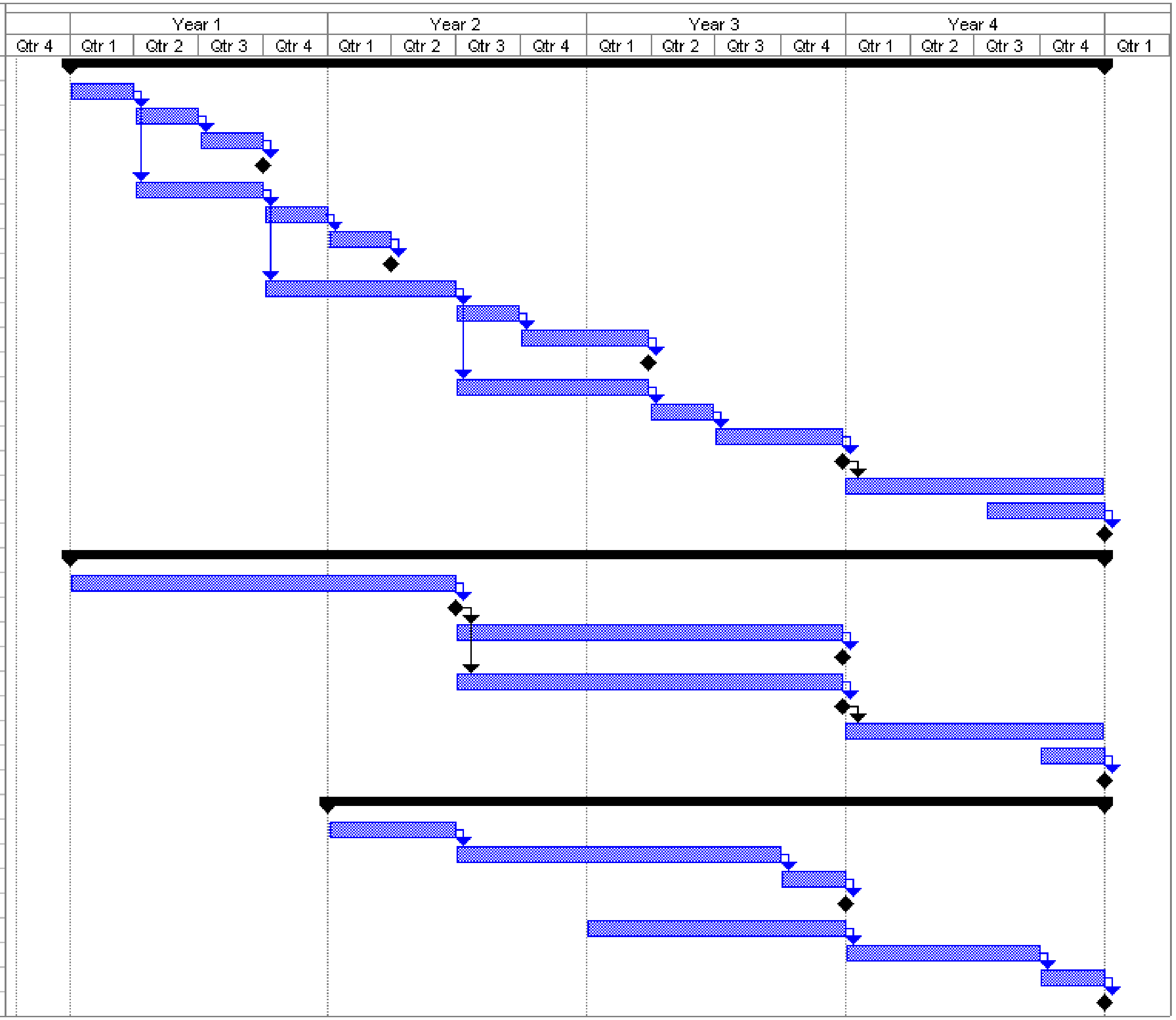
ID	Task Name
78	**Pixel Telescope**
79	SDC prototype 1 design
80	SDC prototype 1 manufacturing
81	SDC prototype 1 test
82	SDC prototype 1 available
83	SDC prototype 2 design
84	SDC prototype 2 manufacturing
85	SDC prototype 2 test
86	SDC prototype 2 available
87	IDC prototype design
88	IDC prototype manufacturing
89	IDC prototype test
90	IDC prototype available
91	TC design
92	TC manufacturing
93	TC test
94	TC ready
95	TC available
96	Pixel Telescope Report
97	Pixel Telescope Report Ready
98	**Data acquisition**
99	System development
100	Readout for prototype available
101	Development of final readout
102	Final readout ready
103	Tracking software development
104	Tracking software available
105	Readout system operation
106	Data Acquistion Report
107	Data Acquistion Report available
108	**Validation of Infrastructure**
109	Integration with prototype telescope
110	Tests with prototype telescope
111	Test Report Analogue Telescope
112	Test Report Analogue Telescope available
113	Integration with final telescope
114	Tests with final telescope
115	Test Report Final Telescope
116	Test Report Final Telescope available



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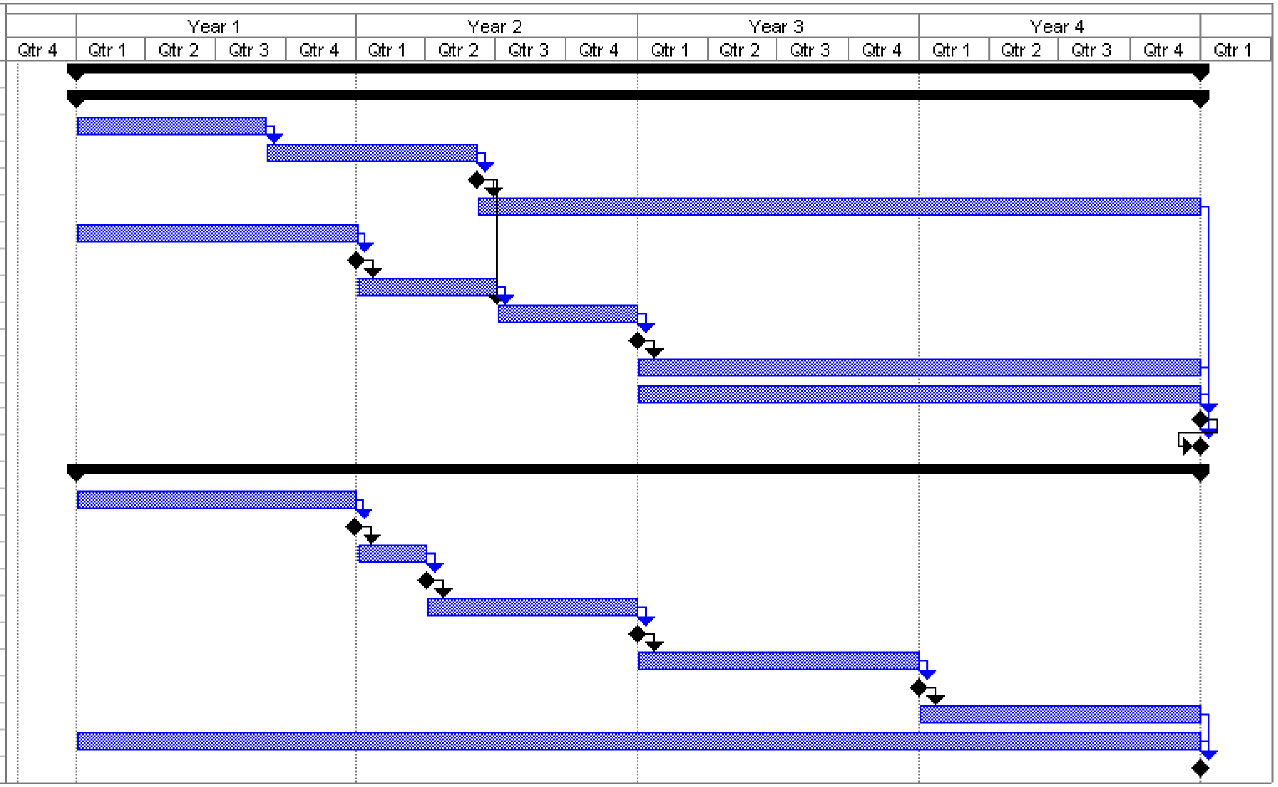
ID	Task Name
117	**JRA2: Infrastructrure for tracking detectors TDET**
118	**TPC development facility**
119	Fieldcage design
120	Fieldcage construction and test
121	Fieldcage available
122	TPC development infrastructure available
123	Preamplifier development
124	Preamplifier board prototype ready
125	Production of multichannel setup
126	Integration of preamplifier and TPC
127	DAQ prototype ready
128	DAQ infrastructure available
129	Development of compact readout system
130	Prototype compact readout system ready
131	Final report
132	**Si-TPC based monitoring system**
133	Development of TimePix
134	TimePix operational
135	Beam tests
136	MIP signals in TimePix and GEM/MicroMegas
137	Endplate development
138	Endplate infrastructure available
139	DAQ development
140	SiTPC infrastructure ready for operation
141	SiTPC infrastructure available
142	TPC Simulation
143	Final report



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ID	Task Name
144	**Silicon Tracking**
145	Mechanical developments
146	Motorised 3D table ready
147	Cooling system development
148	Convection prototype
149	Cooling system development
150	Conduction prototype
151	Front-end electronics development
152	FE chip version 1
153	Front-end electronics development
154	FE chip version 2
155	Off-detector readout system development
156	Central tracker prototype assembly
157	Central tracker prototype
158	Forward tracker prototype assembly
159	Forward tracker prototype
160	SI tracking infrastructure ready
161	Infrastructure available
162	Final report

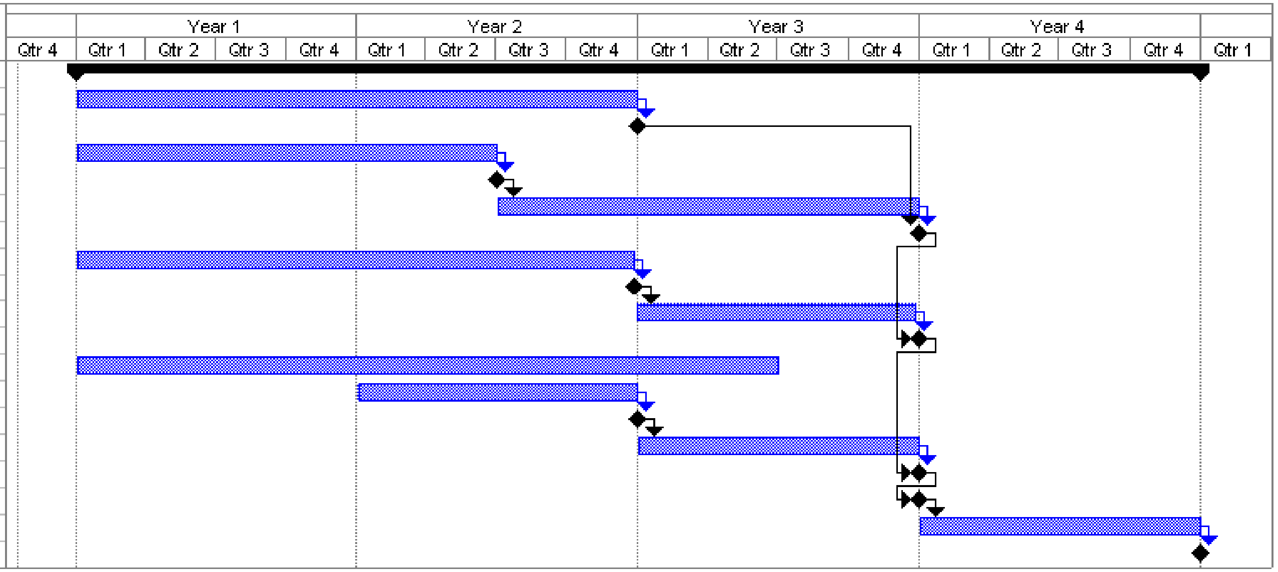
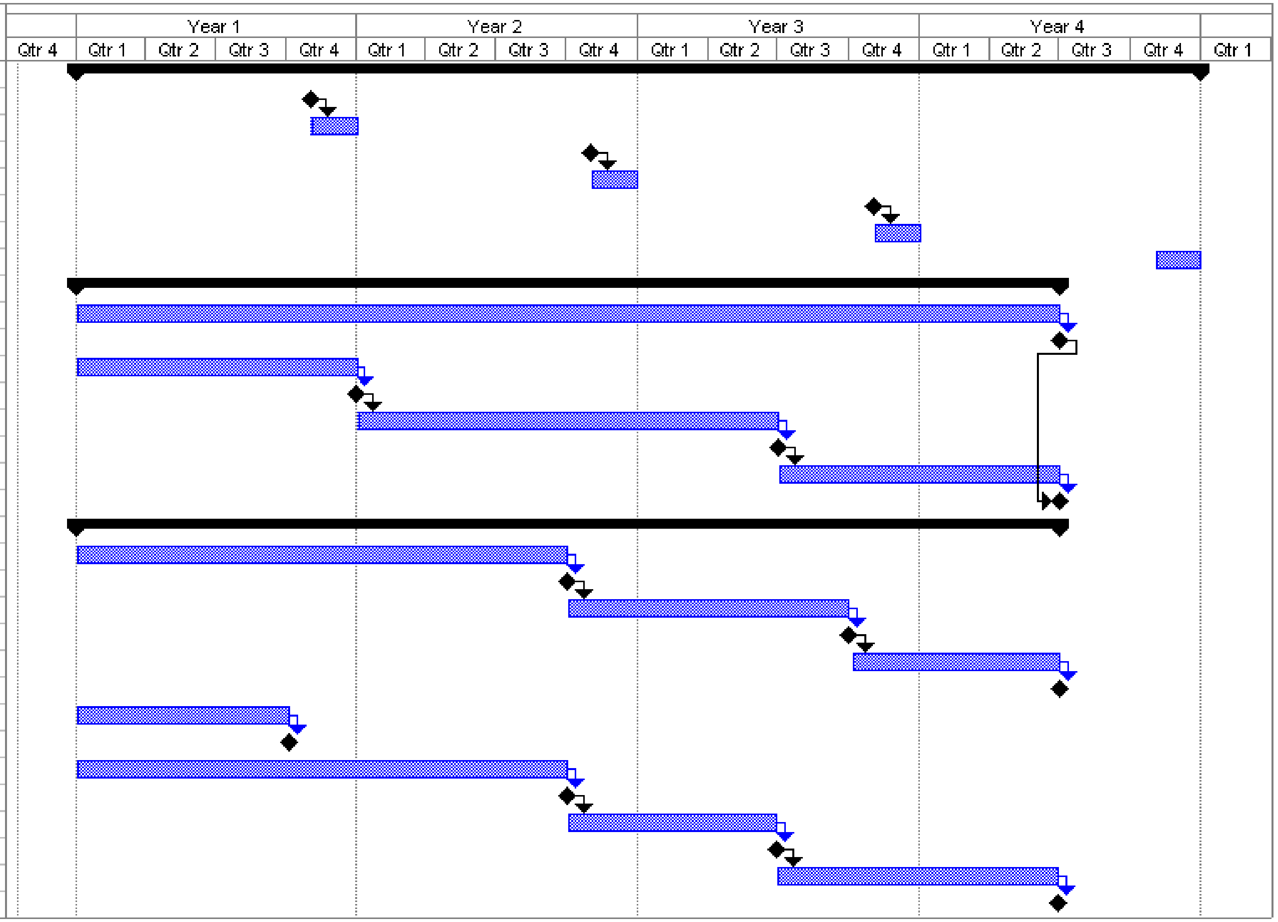


Figure 2: continued

ID	Task Name
163	**JRA3: CALO**
164	Concept review
165	Conceptual report
166	Design review
167	Design report
168	Production readiness review
169	Production readiness report
170	Final report
171	**Electromagnetic calorimeter**
172	Silicon sensor production
173	Silicon sensors
174	Mechanical concept development
175	Mechanical concept available
176	ECAL design and mould
177	ECAL design and mould available
178	ECAL prototype construction
179	ECAL prototype available
180	**Hadronic calorimeter**
181	HCAL mechanical concept design
182	HCAL mechanical concept available
183	HCAL design
184	HCAL design available
185	HCAL prototype construction
186	HCAL prototype available
187	VME test stand installation
188	VME test stand available
189	HCAL calibration single channel prototype
190	HCAL calibration single channel protoype available
191	HCAL calibration multi channel prototype
192	HCAL calibration multi channel protoype available
193	HCAL calibration integration
194	HCAL calibration system available



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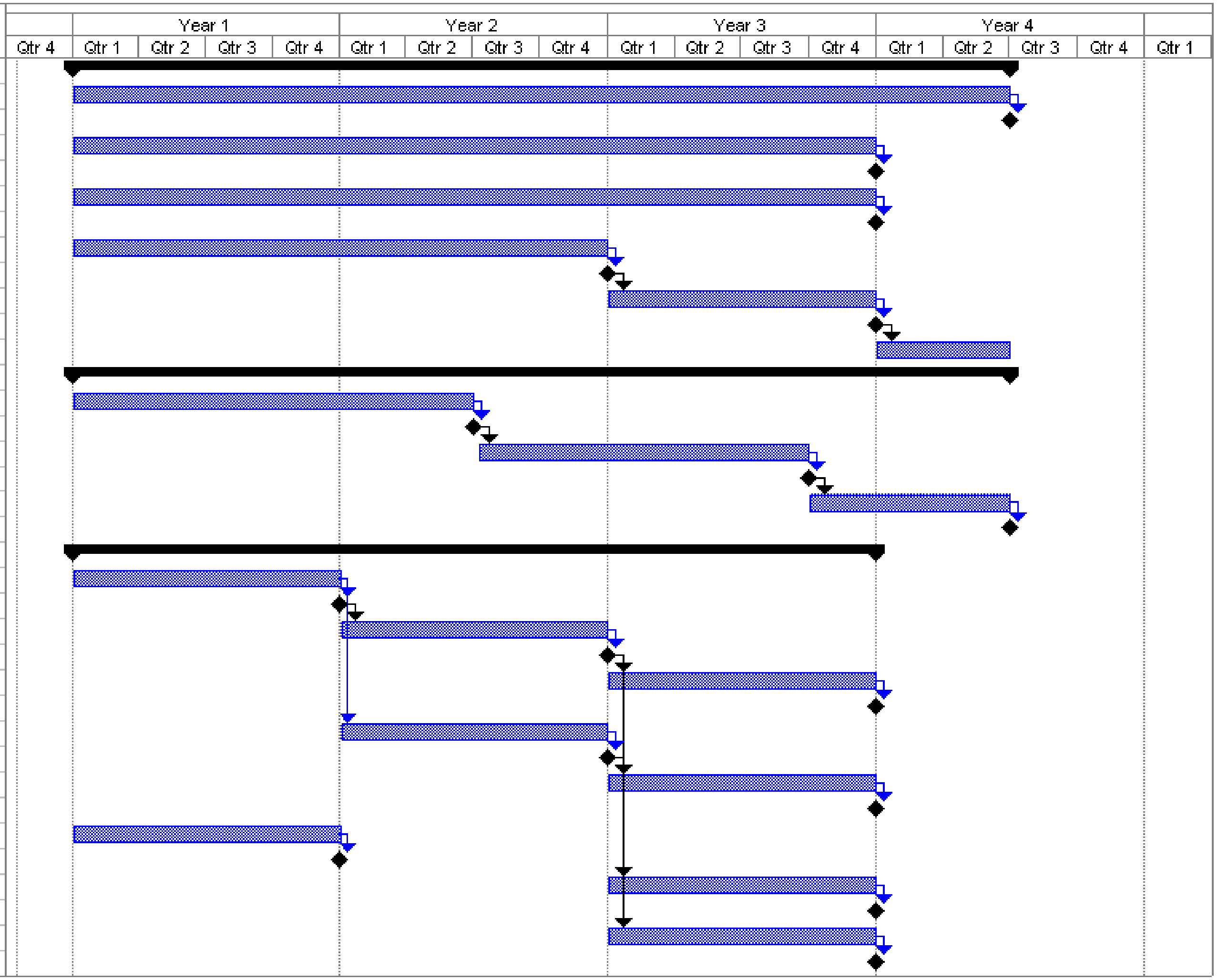
ID	Task Name
195	**Forward calorimeter**
196	Silicon sensor production
197	Silicon sensors available
198	Design of laser positioning system
199	Prototype of laser positioning system available
200	Development of sensor test facilities
201	Sensor test facilities ready
202	Development of readout electronics
203	Design of readout electronics available
204	Production of readout electronics
205	Readout electronics ready
206	Test of readout electronics
207	**Data acquisition**
208	PCI prototype development
209	Prototype available
210	DAQ system prototype development
211	DAQ system prototype available
212	DAQ system production
213	DAQ system available
214	**Front-end electronics**
215	ECAL/AHCAL ASIC prototype TECH1 development
216	TECH1 prototype available
217	ECAL ASIC prototype TECH2 development
218	ECAL ASIC prototype TECH2 available
219	ECAL ASIC production TECH3
220	ECAL ASIC production TECH3 finalised
221	AHCAL ASIC prototype SiPM2 development
222	AHCAL ASIC prototype SiPM2 available
223	AHCAL ASIC production SiPM3
224	AHCAL ASIC production SiPM3 finalised
225	DHCAL ASIC prototype DHCAL1 development
226	DHCAL ASIC prototype DHCAL1 available
227	ECAL PCB production
228	ECAL PCB available
229	HCAL PCB production
230	HCAL PCB available



2. Description of the Networking Activities

2.1 NA1: Management of the I3

2.1.1 Description of the management structure and tasks

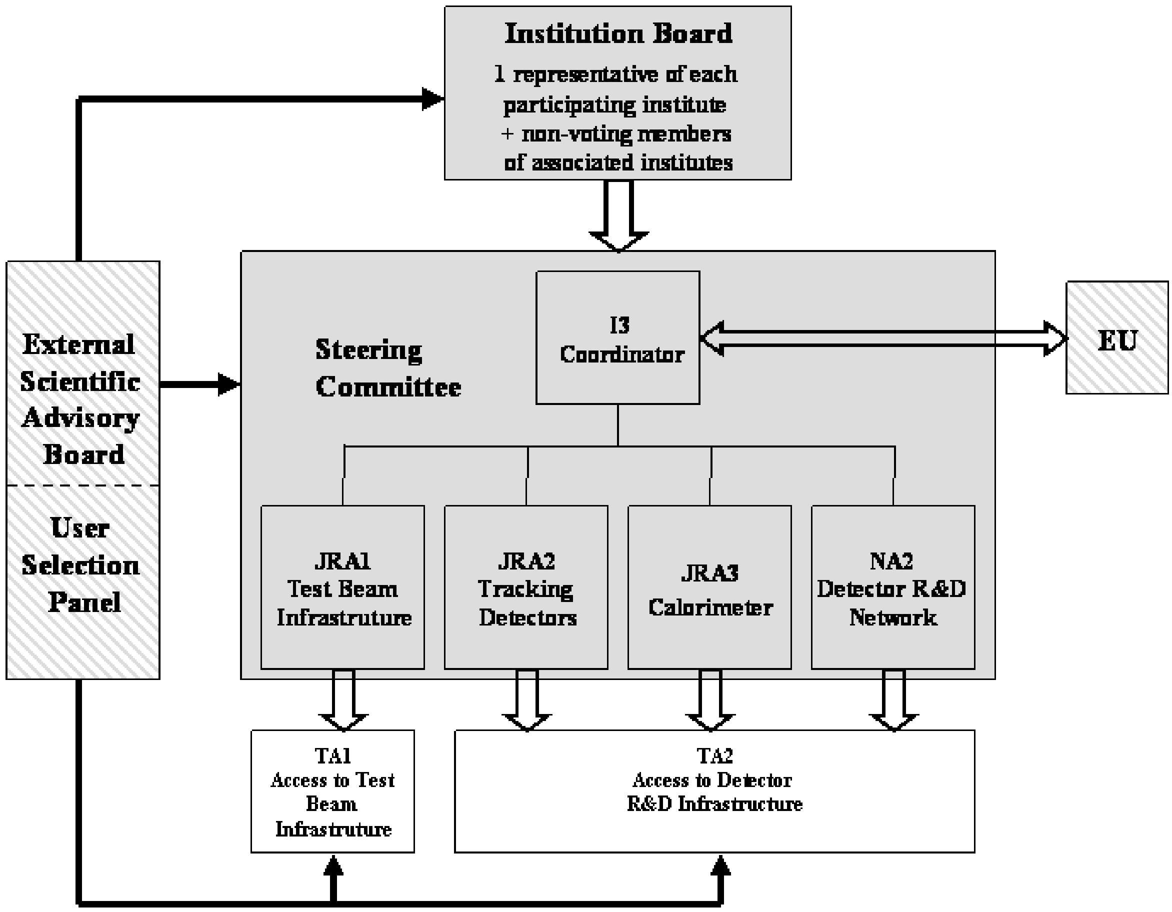


Figure 3: Overview of the proposed management structure of the I3.

EUDET will be coordinated by a central coordinator, who will be assisted and guided by two bodies: the Institution Board (IB) and the External Scientific Advisory Board (ESAB). The participating institutes of EUDET will form a consortium comprising 23 research institutions in Europe, and 20 associated institutions from Europe and outside. It is the goal of the proposed management structure to integrate the individual expertise of the participating institutions while maintaining an effective control and decision making process. The managerial structure of EUDET is sketched in the above figure. Its key elements are the IB, the Coordinator of the I3 (IC), and the Steering Committee (SC) composed of the IC and the Activity Coordinators (AC) of the JRAs and the Detector R&D Networking activity. In addition an international ESAB will advise the management on scientific and strategic questions and provide an important link of the consortium to the international ILC detector community.

At the beginning of the project the participating institutes will formally conclude a Consortium Agreement which sets forth the terms and conditions pursuant to which the participants agree to function and cooperate in the performance of their respective tasks in the project.

Institution Board (IB):
The IB represents the participating institutes of EUDET. It constitutes the principal body of the Consortium and its decisions are legally binding for all participants. The IB will meet regularly during the Annual Meeting of the Consortium and more often if necessary.
The 23 participating institutes are represented by one voting member each. Associated institutes may attend as non-voting members. The IB elects a chair from within its voting members. The chair convenes the meetings. The IC is a non-voting ex-officio member.
The IB is an arbitration and strategic decision body. It is competent to decide on the orientation of the project and significant changes to the programme. The IB approves the activity and financial report of the past period. It discusses and agrees to the forthcoming budget and its implementation plan for the coming reporting period, after requesting adjustments if necessary. It settles all disputes in the case of failure to meet project assignments. The IB delegates executive power and responsibility to the IC in accordance with the EC contract.

I3 Coordinator (IC):
The IC is the single point of contact between EUDET, the European Commission and third parties. The IC is a representative from DESY, which is the coordinating institute. The IC is held responsible for the overall management of the project. He acts as the intermediary between the Consortium and the Commission and assures that the Consortium fulfils its duties in accordance with the European Commission Contract. The IC may request topics to be considered by the IB.
The IC receives the budgetary information from the participating institutes and reports to the IB. He receives and allocates financial resources in accordance with the EC contract. The IC chairs the Steering Committee. He informs the IB of the decisions in the SC and conveys the directives of the IB to the SC. The IC may nominate a Scientific Assistant to aid him in his duties.
The IC is in charge of the administration of the two Transnational Access activities..

Activity Coordinators (AC):
The EUDET project includes three JRAs and the Detector R&D Network that are coordinated by one or two ACs. These entities themselves are subdivided into individual tasks to which a Task Leader will be attached.
The ACs are charged to track and monitor the progress in their respective activity. They report to the SC on the compliance of the parties with the milestones and deliverables agreed with the European Commission and inform the IC of the status. They are responsible for maintaining good communications inside their tasks, between different activities and contact the IC for specific assistance. They make the results of the work in their activity available to the Consortium.
The ACs, together with the Task Leaders, are also responsible for integrating the tasks of the JRAs into the Transnational Access schemes.

Steering Committee (SC):
The SC is the executive board of EUDET. It is responsible for reviewing and ensuring the implementation of the project (subject to the approval by the IB). Its voting members are the I3 Coordinator and the Activity Coordinators of the three JRAs and the Detector R&D Network. The Chair of the ESAB and the AC may participate as non-voting members. The IC chairs the SC.
The SC meets a few times a year in person or through electronic means to receive the report of the ACs on the progress of the individual tasks in their activity. The SC oversees and reviews the work progress and decides on overall technical matters, prepares proposals for approval by the IB, prepares the Consortium budget, consolidates the reports received from the ACs and prepares the reports and deliverables to be submitted to the European Commission.

The SC proposes to the IB the inclusion and exclusion of scientific tasks and decides on the regrouping of sub-tasks therein. The SC nominates replacement Coordinators if and when necessary and submits their nomination for approval to the IB. The SC nominates the members of the ESAB.

External Scientific Advisory Board (ESAB):
The ESAB will be asked to independently assess the progress of the various tasks and their scientific excellence. The members of the ESAB will be nominated by the SC and include renowned international experts on detector developments. The international community plans to set up an international detector R&D review panel. Once in place, at least one member of the ESAB should at any time be also a member of this international detector R&D panel, to ensure a close coordination between the European and the worldwide activities. Another member of the ESAB should represent the ILC accelerator developments, in particular on matters related to the interplay between the accelerator and the detector.
The members of the ESAB will be asked to relate the efforts in EUDET to efforts elsewhere and to critically review the contribution of the project towards the design of detectors for the ILC and possible other applications of interest. The advisors will be invited to participate in the Annual Meeting of the Consortium and base their recommendations on the presentations made at that occasion.
The ESAB will elect a chair from its membership. The Chair of the ESAB may participate in the meetings of the SC as a non-voting member.

Annual Meeting of the Consortium
The Annual Meeting assumes a vital role for the Consortium. It serves the following purpose:

- To critically review the scientific progress of the consortium.
- To inform the members of the IB.
- To inform the members of the ESAB and receive their input.
- To address any outstanding organizational issues for the consortium

The Annual Meeting consists of comprehensive presentations of the achievements of the individual activities and tasks. It includes a meeting of the Institution Board. The Annual Meeting will be hosted by different partners organised towards the end of a 12 month period of the project in conjunction with the Annual Scientific Workshop which is organised in NA2 as part of task F. In case of approval the SC will organize a kick-off meeting of the consortium at the earliest convenience to launch the intensified collaboration and plan the work of the first year.

User selection

The European members of the ESAB will act as User Selection Panel for the Transnational Access activities under this project. The following criteria will be applied in the user selection procedure:

- Scientific excellence
- Scientific relevance for the development of advanced particle detectors
- Optimal use of the infrastructure
- Attracting new user groups from outside the consortium

The SC is responsible for guaranteeing a transparent, fair and impartial access to the infrastructures. It has to report to the IB and the ESAB about the implementation and progress of the TA activities at the Annual Meetings. The IC and the coordinating institute DESY will be charged with the administrative duties of the user selection.

Human effort for the management of the I3

According to the proposed structure the main part of the management tasks will be delivered by the members of the Steering Committee. These members are leading physicists elected among the partners of the consortium. During their term in the SC these physicists are expected to spend a significant portion of their working time on their management tasks. The total human effort for the management of the I3 in the SC corresponds to 96 professional person months (ppm) for the four year duration of the programme and is detailed in table 3. The contribution of the partners to the management amounts to 72 ppm.

Table 3: Total human effort in the management of the I3

<table>
<tr><th colspan="2"></th><th>Percentage of working time</th><th>Person month</th></tr>
<tr><td colspan="2">Coordinator of the I3</td><td>50</td><td>24</td></tr>
<tr><td colspan="2">Administrative Secretary</td><td>50</td><td>21</td></tr>
<tr><td rowspan="4">Co-ordinators</td><td>JRA 1</td><td>25</td><td>12</td></tr>
<tr><td>JRA 2</td><td>25</td><td>12</td></tr>
<tr><td>JRA 3</td><td>25</td><td>12</td></tr>
<tr><td>Detector R&D network</td><td>25</td><td>12</td></tr>
<tr><td colspan="2">Total</td><td></td><td>93</td></tr>
</table>

The management of the programme is assisted by an Administrative Secretary (AS) to aid the SC. The AS will aid the IC in administrative tasks, in the correspondence with the EU and the members of the SC and IB as well as in the organization of management meetings. He or she will organize the Annual Meetings of the consortium and the annual scientific workshop. The AS will also assist the management in the task of dissemination of knowledge. The administration and the regular update of the web pages of the I3 will be part of the charges.

2.1.2 Plan for using and disseminating knowledge

For the internal exchange of information we intend to organize an Annual Scientific Workshop where scientists are supposed to give reports of the status and plans of their work within the different tasks. This will be supplemented by overview talks which summarize the achievements of the individual tasks, activities and the project as a whole. Write-ups of the oral presentations will be prepared which then form the basis of an annual progress report, the proceedings of the EUDET workshops. In addition regular meetings of sub-groups will be organized to discuss day-to-day affairs inside and between the various tasks and activities. We plan to use modern telecommunication technologies where applicable to reduce time and costs spent for travelling. To this end also the rapid development of a web-based information exchange system as part of the NA2 activity will be essential.
The strategic goal of this I3 to create a common infrastructure for advanced detector R&D will stimulate the formation of inter-institutional groups performing common experiments. The

preparation and analysis of these experiments will be performed inside the common software framework which is another focal point of our networking activities. Naturally this tight collaboration will lead to the spreading of skills and information and the sharing of the achievements of the consortium. It should be noted that large scale international collaborations are nowadays typical in High Energy Physics and that all partners in this consortium have a long-standing successful experience in working in such kind of international environment.
The results and achievements of our consortium will be communicated to the interested community outside freely and without charges as it is the tradition in this kind of fundamental research. One measure to spread information and to interact with the scientific community working on the ILC is the active participation in conferences on the ILC as organized on a European scale by the European Committee on Future Accelerators (ECFA) and internationally in the framework of the Linear Collider Workshops (LCWS). These meetings will be used to actively discuss developments and trends with international colleagues. We believe that our consortium can have a large impact on the design decisions for the ILC detector and this way help to prepare a leading role for European participants in its construction and later exploitation.
Because the results of our activities are not limited to the ILC detectors we intend also to participate at international conferences on detector technologies, e.g. the IEEE conference series or other international conferences where advanced detector technologies are part of the programme, and interact with the scientific community. We will give reports on the progress of the intended infrastructure developments, spread information on its capabilities to attract new potential users and present the developments on detector technologies achieved by the consortium. Members of the consortium will also give lectures on developments in advanced particle detectors at schools organized for students. Informal notes will be written and publicized through the web pages to quickly spread information. Finally, all relevant achievements of the consortium will be submitted for publication to scientific journals.
Many aspects investigated are not restricted to the ILC detectors but can be applied to other future collider experiments, and detector applications beyond the immediate area of high energy physics experiments. Even more generally the programme is tailored to create and improve infrastructure for tests of advanced particle detectors and might have impact and application in fields beyond High Energy Physics. For example the Si-TPC pixel CMOS readout ASICs are being studied for their application in large gaseous detectors, but there exists a large synergy between their development and the needs of such systems in new generations of e.g. industrially produced X-ray (medical) imaging detector systems.
The results of our research projects will be freely communicated and therefore we will not apply for patents or licences or conclude business agreements.

Milestones:

We consider the following events to be important milestones in the management of the I3:

Milestone	Date
Kick-off Meeting	2
1st Annual Meeting	10
2nd Annual Meeting	22
3rd Annual Meeting	34
4th Annual Meeting	46

Deliverables:

Deliverable No	Deliverable title	Lead Contractor(s)	Deliverable date	Nature
NA1-D1	1st Annual Report	DESY	12	Report
NA1-D2	2nd Annual Report	DESY	24	Report
NA1-D3	3rd Annual Report	DESY	36	Report
NA1-D4	Final Report	DESY	48	Report

2.2 NA2: Detector R&D Network DETNET

Networking Activity description: Detector R&D Network DETNET								
Activity number	**NA2**	**Start month**	**1**			**End month**	**48**	
Activity Title	Detector R&D Network							
Participant number	3	1	2	4	5	6	7	8
Participant short name	ALU-FR	DESY	AGH-UST	CEA	CERN	CNRS/ IN2P3	CSIC	CUPRAGUE
Total person months	49 (16)	34 (22)			56 (8)			

Activity Title	Detector R&D Network							
Participant number	9	10	11	12	13	14	15	16
Participant short name	FOM/ NIKHEF	HIP	INPPAS	IPASCR	MPI	TAU	UBONN	UCL
Total person months				5 (0)		12 (6)		

Activity Title	Detector R&D Network							
Participant number	17	18	19	20	21	22	23	**TOTAL**
Participant short name	UHAM	ULUND	UMA	UNI-GE	UNIV BRIS	UROS	INFN	
Total person months								**156 (52)**

Numbers on total person months given in parentheses indicate the additional staff for AC contractors.

Objectives and expected impact:

An essential part of this project is to create a network of European institutions which are participating in detector R&D for the ILC. This network will strengthen the European part of the worldwide efforts towards a detector at the ILC. Thus an important aspect of this project, apart from networking within the participating institutes, is to ensure close cooperation with other activities around the world.

The main objective here is to provide a common framework for the exchange of information and a platform for coherent R&D on particle detectors in Europe. This network has therefore three components: Firstly through the organisation of the Annual Scientific Workshops, through travel to partner institutions and common experimental programmes, a human network will be created. Secondly a common software framework will be developed to simulate and analyse the experiments with prototype detectors at test beam and other facilities. Thirdly, facilitated access to commercial deep sub-micron electronics technologies for radiation-tolerant microelectronics developments for front-end and readout ASICs will be provided.

All partners of the consortium and the associates will actively participate in this activity. This includes the use of the common computer hardware and software infrastructure to exchange data and to perform common analyses and simulations. Visits of partner institutes and the participation at the Annual Scientific Workshop are other aspects of this activity to which all members of the consortium contribute. Five institutes – ALU-FR, DESY, CERN, IPASCR and TAU – will contribute to the creation of this networking infrastructure.

We expect that the proposed Detector R&D Network will have a very positive impact on the international research efforts for the ILC. It facilitates the exchange and the common use of software for simulation, reconstruction and interpretation of experiments and thus avoids parallel developments for identical and similar tasks. Acquired data can be easily compared and analysed by different groups. The network encompasses all sub-components for which

massive R&D efforts are necessary and thus is the pre-requisite to achieve an optimum design for the overall ILC detector performance.
The Activity Coordinator is responsible for the monitoring of the success and impact of the network. He or she will report on results and the compliance with milestones and deliverables to the Steering Committee. The AC is aided in this process by the Task Leaders.

Description of work:
The work necessary to arrive at the proposed network consists of the following tasks:

A. COMP
   A high performance dedicated computer cluster for the common data analysis and simulation work must be set up. This cluster will be located at the three contributing institutes Freiburg University, DESY and Tel Aviv University making use of their infrastructure and data network connections. These centres will be interconnected and connected to the rest of the consortium using GRID technology enabling transparent sharing and coherent use of the resources in the consortium. The technical infrastructure needed to operate the computer and the technical service will be provided by the three laboratories. The full computing capacity will become available during the third year of the project. Participants contributing to this task are ALU-FR, DESY, IPASCR and TAU.
B. ANALYS
   This task comprises the development of a common data analysis and simulation infrastructure. It sub-divides into
   - Development of a software framework using modern software technology to exchange test beam data and software for common analysis and comparison of measurements;
   - Development of a software framework for the simulation of test beam experiment needed for the interpretation of the measurements;
   - The creation of a repository for experimental and simulation data;
   - Embedding into existing GRID infrastructure to allow easy exchange of data and a transparent exploitation of other available computing resources.

   Documentation and its regular update are of utmost importance here to spread the information and to enable all potential users to profit from the developments. The participants in this Networking Activity will contribute by properly defining the requirements of the framework, providing and interfacing simulation and reconstruction software for the various detector technologies and by testing the framework. We expect to have a first version of the common data analysis and simulation framework ready after 18 month. This development however must continue throughout the whole duration of the project to cope with the increasing demands caused by the accumulation of data and the expected increasing complexity of the experiments. Participants contributing to this task are ALU-FR, DESY and IPASCR.
C. WEBINFO
   The development of a web-based information system to exchange information between the partners and to provide easy access to documents. Likewise it will facilitate the interaction with other international partners. The participants will contribute to these tasks by providing information in a suitable form. We believe that a first useable version of this system can be created within one year but that it must be maintained and improved over the full duration of this project. One participant contributes to this task: TAU.
D. VALSIM
   The goal of this work is to improve the simulation tool's modelling of hadronic showers and create the validation tools for fine-grained calorimeters. These improvements and tools will be implemented in the Geant4 toolkit and made available to the ILC community. The use of detailed shower simulation is well established in the life-cycle of complex HEP detectors, with significant roles in the design and optimization, in calibration and in interpretation of results. The validation of the detailed simulation is a challenge, requiring

systematic work of comparison with the results of established experiments and facilities and with test beam results of prototype detectors in order to assure the reliability and systematic errors of the simulation.
One participant contributes to this task: CERN.

E. MICELEC
Facilitate access to deep submicron technologies for radiation-tolerant microelectronics developments for front-end and readout ASICs. Design support and ILC coordinated access to a commercial silicon foundry for prototyping and production of integrated circuits in deep submicron CMOS technologies will be provided. This task consists of the following parts:
  - Characterization, validation and monitoring of the radiation tolerance of the selected technologies and development of a radiation-tolerant design methodology;
  - Provision of a design kit, including a digital library, to customize Europractice based CAE tools to the radiation-tolerant design methodology;
  - Adaptation of analogue models for ILC front-end electronics applications;
  - Provision of the commercial and technical interface to the silicon foundry for:
  * organization of shared multi-project wafer and/or mutli-project reticle runs;
  * organization of engineering and production runs;
  * liasing with the manufacturer for post-production diagnostics and failure analysis.

One participant contributes to this task: CERN.

F. EXCHG
In addition to the electronic information exchange personal contact and discussions between all participating researchers will be very important. To this end we foresee to encourage visits of physicists at partner institutes to intensify the collaboration and the organisation of an Annual Scientific Workshop where all participants are supposed to present the status of their work.

Milestones:

We consider the following events to be important milestones in the assembly of the proposed Detector R&D Network:

Milestone	Date	Task
1st stage of computing network installed	10	A
1st Annual Scientific Workshop	10	F
Version 1.0 of electronic information system ready	12	C
Version 1.0 of analysis framework ready	18	B
First release of improved version of the hadronic processes and physics lists in Geant4	18	D
2nd stage of computing network installed	22	A
2nd Annual Scientific Workshop	22	F
Full computer cluster available	34	A
3rd Annual Scientific Workshop	34	F

4th Annual Scientific Workshop	46	F

Deliverables:

Deliverable No	Deliverable title	Task	Lead Contractor(s)	Deliverable date	Nature
NA2-D1	Version 1.0 of electronic information system	C	TAU	12	Web page
NA2-D2	Proceedings of 1st EUDET workshop	F	DESY	12	Report
NA2-D3	Version 1.0 of analysis framework	B	DESY	18	Software
NA2-D4	First release of improved version of the hadronic processes and physics lists in Geant4	D	CERN	18	Software
NA2-D5	Proceedings of 2nd EUDET workshop	F	DESY	24	Report
NA2-D6	Full computer cluster	A	ALU-FR	34	Hardware
NA2-D7	Proceedings of 3rd EUDET workshop	F	DESY	36	Report
NA2-D8	Final report	A,B,C,D,E	ALU-FR, CERN,DESY,TAU	48	Report
NA2-D9	Proceedings of 4th EUDET workshop	F	DESY	48	Report

3. Description of the Transnational Access Activities

This project comprises two Transnational Access activities. In TA1 access to the DESY test beam is provided. It consists of one installation (DESY-TB) for which support for unit costs and travel expenses for users is requested. This activity lasts for the full duration of the project.
The second activity (TA2) provides access to the detector R&D infrastructures developed in the JRAs. The short name for this infrastructure is DRD-INF and it consists of the following five installations:

1. BTELE: A high precision beam telescope with fast readout capabilities (JRA1). It will be developed and originally installed at the DESY test beam but can later be moved to other facilities.
2. TPC: A large and low mass field cage for a TPC providing a highly homogenous electric field (JRA2, task A). It includes high voltage and gas supplies and a fast readout system suited for modern micropattern gas detectors.
3. SI-TPC: A silicon based system to precisely measure the amplification and charge transfer properties of gaseous detectors (JRA2, task B).
4. SI-STRIP: Readout, mechanical structure, cooling and alignment systems for the development of Si-strip tracking detectors (JRA2, task C).
5. CALO: The installation to test composite calorimeter prototypes consists of an electromagnetic shower detector, an absorber for the hadronic part and the DAQ system.

The TA2 installations are mobile and can be used at different places. Among those are the test beam facilities at CERN and DESY but also larger laboratories of our consortium like CEA, CNRS-EP, CNRS-LAL, CNRS-LPNHE or FOM/NIKHEF without beam. The unit costs will

be covered by the laboratory where the installation is used. The EC request therefore consists of support for travel and subsistence expenses of user groups. This activity starts after the completion of the installations in the JRAs in year 3 (TPC) and year 4 for the others until the end of the project.
Under this contract, access for user groups will be provided to the infrastructures/installations indicated in the table below. This table gives the minimum quantity of access to be provided by each infrastructure/installation for the whole duration of the project, and the corresponding estimated number of users and user groups:

Participant number	Organisation short name	Short name of infrastructure	Installation		Operator country code	Cost model for access	Unit of access	Unit cost (€)	For the whole duration of the project		
			Number	Short name					Min. number of access to be provided	Estimated number of users	Estimated number of projects
1	DESY	DESY-TB	1	DESY-TB	DE	UF	TB-week	2300	36	40	8
1	DESY	DRD-INF	2	BTELE	(DE, FR, NL,CH)*	UF	Exp-week	0	6	18	6
			3	TPC				0	11	33	11
			4	SI-TPC				0	5	15	5
			5	SI-STRIP				0	5	15	5
			6	CALO				0	3	9	3

* The rules of Transnational Access are applied with respect to the location where the installation is used.

The units of access shown in the above table are defined as follows:

- TB-week: The unit of access to the DESY test beam (DESY-TB) infrastructure is one week of occupation of the test beam area. This includes the preparatory work of the external group at the facility, assembling and disassembling of experimental set up as well as radiation and general safety briefings as required by local laws. A TB-week comprises 7 days of 24 hours access to the experimental installation.
- Exp-week: The unit of access to the DRD-INF installations BTELE, TPC, SI-TPC, SI-STRIP, CALO is one week (5 working days) of experimentation. It comprises five days of 8 hours institutional support during working hours.

As described in the management section (see section 2.1) the European members of the ESAB will form the User Selection Committee for the TA activities. It will select the users from the applications based on the scientific merit of the proposed experiment. The SC will advertise the infrastructure by electronic means (web page, e-mail) and on relevant conferences and workshops. The I3 Coordinator is in charge of the TA administration and negotiates with the selected applicants the date and the length of access, in close cooperation with the CERN and DESY test beam coordinator where applicable.

The DESY test beam coordinator is the contact person for the experimenter at DESY, and ensures the proper support of the experimenter during the time at DESY. This includes access to technical services, safety instructions, assistance during the setup up and dismantling phase. DESY provides access to shop services according to the standard conditions for DESY users, access to stores, office and IT infrastructure.

In addition to the test beam coordinator, who is responsible for all three DESY beams, EUDET provides assistance to the user in the special improved beam area, assigned to EUDET. This person instructs and supports the user in the use of the additional equipment. During the planning stages he is available to ensure that the interfaces are properly designed, so that optimal use can be made of the infrastructure.

User accounts for the central computing facilities are granted on request including internet access. A scientific library is on site. There are several guesthouses on the DESY site providing accommodations at cost price. External users are an integral part of the life and are invited to seminars and other scientific events at the laboratory. They profit from the highly international and stimulating atmosphere at the laboratory.

The consortium is open to new groups utilizing the infrastructures and sharing the knowledge. New users of the common infrastructure will have the same impact on the scheduling of common experiments as the other participants. Decisions on priorities will be taken as outlined in the description of the management. Every new group has a complete autonomy in deciding on which detector component or technology choice it wants to contribute. Even though our project is targeted mainly at the ILC detector as the probable next large collider facility to be constructed all the above applies equally well to groups working on R&D for other detector applications. They may apply if access to the infrastructures is of use and interest to them.

In general new users will be invited to perform common experiments with members of the consortium to become acquainted to the use of the infrastructure. They will profit from documentation and from the common analysis and simulation framework and the access to deep-submicron technology. As it is the custom in large High Energy Physics collaborations knowledge will be shared among all participants and support will be given in the same way as among other collaborators. New groups are invited to visit participating laboratories to prepare experiments. They will be invited to participate at the Annual Scientific Workshop to present results and discuss problems and to prepare future experiments.

This consortium will actively participate in workshops and conferences on new detector technologies and report the progress of this project. This will spread the information about the new experimental possibilities at this facility to the international community and invite interested researchers. A web site will be created which describes the facility and its potential in detail to invite also new users outside the particle and nuclear physics communities. We intend to publicize this regularly also in scientific journals.

4. Description of the Joint Research Activities

4.1 JRA1: Test Beam Infrastructure

Activity Number	**JRA1**		**Start month**		**1**		**End month**	**48**
Activity Title	**Testbeam Infrastructure**							
Participant number	1	4	5	6	13	15	19	
Participant short name	DESY	CEA	CERN	CNRS/ IN2P3	MPS-MPI	UBONN	UMA	
Total person months	84 (18)	42	8 (0)	60	36 (18)	36 (18)	24 (12)	
Participant number	20	21	23					
Participant short name	UNI-GE	UNIV BRIS	INFN					**TOTAL**
Total person months	72 (36)	48 (24)	91 (34)					**501 (160)**

Numbers on total person months given in parentheses indicate the additional staff for AC contractors.

Objectives and expected impact:

The goal of this JRA is to provide a test beam with a large bore high field magnet and a high precision, fast beam telescope by upgrading an existing facility in Europe. Beam tests of future detectors in a magnetic field are crucial to determine the characteristics of these devices in a realistic environment. In addition an optimal determination of the spatial resolution of the device under test is among the most important tasks in this context. Currently no facility with quick and easy access for the different European groups developing these detectors exists.
Facilities at DESY and at CERN have been used so far. DESY provides electron beams up to 6 GeV. CERN has beams with electrons up to 100 GeV and hadrons up to 180 GeV. Groups that presently use these beams have to bring most of their own dedicated testing equipment. This greatly increases the effort and the time required to do these measurements and it makes the results difficult to compare between groups and competing technologies. In addition the usefulness has been limited by the lack of a sufficiently strong magnetic field, and the absence of a high precision beam telescope.
The DESY test beam facility has already been intensively used for the test and development of different detector components for the ILC. At the moment three multi-purpose beam areas are available for work at DESY. We propose to set aside one of them and specially equip it for ILC related work. The proposed upgrade of the DESY test beam facility will hence enable participating institutes to perform necessary tests of their detector developments.
After the completion and commissioning, an initial round of experiments is foreseen at the DESY test beam within the four years duration of this project. However, the proposed infrastructure upgrade is movable so that it can later be used at other laboratories like CERN.
This JRA consists of the following tasks:

A. **Magnet**: Integration of a large bore high field magnet into the existing test beam line.
B. **Pixel Telescope Integration**: Integration of all components required for a precision beam line, including improvement of the existing beam line, mounting and cooling infrastructure, and setup and integration of the pixel telescope. This will be done in such

a way so that a wide range of different devices can be quickly installed and easily operated.

C. **Pixel Telescope**: Development of monolithic active pixel sensors (MAPS) for an ultra high precision beam telescope that allows to fully evaluate the precision properties of new detectors.
D. **Data Acquisition and Evaluation Software**: Development of a general purpose read out system that can be quickly adapted to individual devices under test and that provides fast concurrent readout of the beam telescope and the device under study.
E. **Validation of Infrastructure**: The full test beam infrastructure will be evaluated by collaborating with research teams developing competing pixel detector technologies to test their devices in the newly developed infrastructure.

The Activity Coordinator is responsible for the monitoring of the success and impact of the JRA. He or she will report on results and the compliance with milestones and deliverables to the Steering Committee. The AC is aided in this process by the Task Leaders.

Description of work:

A. Magnet

A superconducting, large bore magnet (inner diameter 86 cm, active length 100 cm, max. B-field 1.5 T) will be installed in the test beam. It will be mounted on a movable platform to allow easy repositioning of the magnet relative to the beam. The magnet will be provided to the consortium through one of its associate members, KEK, for the duration of the project. The device planned to be used can be operated with a minimum of cryogenic infrastructure. The main installation needed is a proper control system, which will be installed based on standard components.

To fully exploit the beam and to be able to really test the different detectors at the precision needed, the magnetic field needs to be known to a precision of a few times 10^{-4}. R&D is needed in this project to reach that precision. It consists of the development of precise Hall-sensors which generate higher currents. Positioned very closely to each other on a ceramic substrate, they provide almost point-like 3D measurements. By aligning the sensors precisely on the measuring arm, e.g. by laser, the required precision will be achieved.

This requires R&D to develop a proper measurement device and algorithm. Once available the magnet will be a major asset of the test beam infrastructure and allow detailed studies of large scale prototypes for the ILC detector in a large magnetic field.

The partners, CERN and DESY, and the associate, KEK, contribute to this task.

Risk assessment:

The main risk is driven by the magnet itself. The magnet is a unique device and will be provided free of charge by one of the associated institutes of this project, KEK. Negotiations with the KEK laboratory about the lending of the magnet are proceeding well and a contract between DESY and KEK is about to be signed. If, nevertheless, the magnet should not be available, a number of normal conducting magnets with slightly smaller field strengths exist at one of the partners, DESY. These could be used with a small compromise on the scope of the project.

The field mapping will be of central importance. If the proposed development of the 3D point-like probes should fail, existing equipment at one of the partners (CERN) will be used initially at the expense of a slightly reduced precision. More precise measurements will then be made later.

B. Pixel Telescope Integration:

The existing beam line at DESY will be improved and upgraded to become a truly general purpose test environment. In particular, this applies to the mounting and cooling devices. For high precision silicon sensors the requirements with respect to these issues are stringent. The pixel telescope will be set up, installed and integrated with the general test beam infrastructure. As part of this trigger counters and trigger electronics will be provided. Transverse positioning of the sensors with a precision of 1 μm and angular positioning with a precision of 0.1 mrad will be provided. Devices under test can be operated in a well controlled environment under a nitrogen atmosphere at constant temperatures ranging from room temperature to -70 centigrade. Mobility of the facility will be ensured by modular construction so that it can be disassembled and reassembled in a different location.
One partner, DESY, will contribute to this task.

Risk assessment:
The main risk is associated with the availability of the beam line at DESY. DESY as the coordinating partner of EUDET has committed itself to provide the test beam and the required beam line. However, the operation of the beam line depends on the operation of the PETRA synchrotron at DESY. A major hardware failure in PETRA could result in the test beam line not being available for longer periods. In this case the mobility of the setup allows to move the infrastructure to another test beam line, for instance at CERN, thus minimizing the risk.

C. Pixel Telescope
A beam telescope with four measurement planes and one plane for a device under test will be constructed. Each measurement plane will be equipped with monolithic active pixel sensors constructed in CMOS technology. This particular technology is chosen because it is one of the competing technologies for a vertex detector for the ILC. Several members of the consortium are already actively involved in R&D with these devices and the technology is advanced enough so that the telescope can be built within the timeframe of the project. However, some additional R&D on the devices themselves as well as on thinning and on mounting has to be performed within the project.
In order to minimize the risk, the construction of the telescope will proceed in two stages. In the first stage existing CMOS pixel sensors with an analogue readout will be used. Analogue to digital conversion and signal processing will be realized using fast processors in the readout front-end. These devices will not satisfy the final requirements with respect to readout speed. However, they will be necessary for two reasons:

- A first test facility will be available quickly to satisfy the immediate and urgent test needs of various research groups working on pixel detectors in Europe.
- The risk involved to fully understand all the aspects of the facility will be minimized by this iterative approach.

The final beam telescope will be constructed using CMOS chips with fully digital readout and with integrated “Correlated Double Sampling” and data sparsification. In order to reach this goal for a full size 20x20 mm^2 device three intermediate test chips and one final chip are foreseen within the project, two small scale devices with 128 x 32 pixels, one intermediate chip with 128 x 128 pixels and the final large chip with 1024 x 1024 pixels. These chips are called Small Digital Chip (SDC) prototype 1 and 2, Intermediate Digital Chip (IDC) and Telescope Chip (TC). The consumable spending in this subpart of the JRA is allocated to producing the masks for these prototype chips and for financing the chip production of the final telescope chip.
The partners CNRS-IReS, CNRS-LPSC, CNRS-LPC, CEA and INFN contribute to this task.

Risk assessment:

The risk for this task is driven by the chip production. For this reason an iterative approach with several prototypes and intermediate chips has been chosen. The different stages of the project are planned such that even if the production of the final chip fails a telescope can be built with one of the intermediate chips or one chip using alternative chip technology which is also part of this JRA. Of course this would compromise the ultimate power of the device.

D. Data Acquisition and Evaluation Software

A general purpose data acquisition system with state of the art interfaces will be designed and built. As far as the beam telescope is concerned, the system will communicate with the front-ends of the CMOS pixel sensors to trigger the readout, filter data on the fly and extract cluster features for each significant hit. It will also define tracks by a simple algorithm such that on-line extrapolation to the sensor under study is feasible.

As far as the sensor under study is concerned, the system will accommodate a wide range of different pixel sensors that will be studied at test beams. The viability of the system will be demonstrated by supporting two competing pixel sensor technologies, namely DEPFETs and CCDs. In contrast to the beam telescope, these sensors will be fully read out to allow detailed studies of cluster formation and feature extraction.

The data acquisition is developed synchronously with the beam telescope. Therefore, on top of the final readout additional components to handle the analogue read out of the first telescope prototype will be developed.

The partners UNI-GE and INFN contribute to this task.

E. Validation of Infrastructure

A systematic validation of the test beam infrastructure is foreseen as part of the project. The objective here is to ensure that the infrastructure fully satisfies the goals. For that purpose it will be shown that the system can be used to full advantage by pixel devices with a different technology. Two technologies, CCDs and DEPFETs are used. These differ significantly from the MAPS technology used for the telescope and are therefore ideally suited to validate its performance.

The partners MPS-MPI, UBONN, UMA and UNIVBRIS and the associates RAL, RUN, UGLW, ULIV and UOXF contribute to this task.

Risk assessment:

This task should minimize the risk involved with other tasks in this JRA. There is no direct risk.

Milestones:

Milestone	Date	Task
SDC prototype 1 ready	9	C
Magnet available	12	A
SDC prototype 2 ready	15	C
Field map available	18	A
Analogue Telescope integrated in beam	18	B

Readout for prototype available	18	D
IDC prototype ready	27	C
Final Pixel telescope integrated in beam	36	B
TC ready	36	C
Final readout ready	36	D
Tracking software available	36	D
Test report Analogue Telescope available	36	E
Final project reports	48	A,B,C,D,E

Deliverables:

Deliverable No	Deliverable title	Task	Lead Contractor(s)	Deliverable date	Nature
JRA1-D1	SDC prototype 1	C	CNRS-IReS	9	Prototype
JRA1-D2	SDC prototype 2	C	CNRS-IReS	15	Prototype
JRA1-D3	Field map	A	CERN	18	Software
JRA1-D4	Analogue prototype telescope	B,C,D	DESY,UNI-GE,CNRS-IReS	18	Hardware
JRA1-D5	IDC prototype	C	CNRS-IReS	27	Prototype
JRA1-D6	Test report Analogue Telescope	E	MPS-MPI	36	Report
JRA1-D7	Final telescope	B,C,D	DESY, UNI-GE, CNRS-IReS	36	Hardware
JRA1-D8	Final report	A,B,C,D,E	CNRS-IReS ,DESY, UNI-GE, MPI	48	Report

4.2 JRA2: Infrastructure for Tracking Detectors

Activity Number	**JRA2**		**Start month**		**1**		**End month**	**48**
Activity Title	**Infrastructure for Tracking Detectors (TDET)**							
Participant number	9	1	3	4	5	6	7	
Participant short name	FOM/ NIKHEF	DESY	ALU-FR	CEA	CERN	CNRS/ IN2P3	CSIC	
Total person months	72	66 (0)	95 (29)	54	35 (9)	224	62	
Participant number	8	10	17	18	22			
Participant short name	CUPRA-GUE	HIP	UHAM	ULUND	UROS			**TOTAL**
Total person months	128 (32)	48 (0)	48 (24)	77 (29)	80 (32)			**989 (155)**

Numbers on total person months given in parentheses indicate the additional staff for AC contractors.

Objectives and expected impact:

The proposed detector for the international linear collider contains several advanced tracking detectors. Both silicon-based technologies and advanced time projection chamber (TPC) designs are considered. The objective of this JRA is to develop and provide the means that efficient R&D on these different technologies can be performed. This encompasses the development of novel and advanced monitoring techniques and devices, particularly to be used for the investigation of the gaseous tracking detectors, the development of prototypes structures, which can be used to test new tracking systems, and the provision of a broad range of services needed to further develop and test Si-based tracking devices. Altogether the actions will help to integrate the different European activities and help maintain their leading role within the worldwide activities. We propose three projects to improve the infrastructures for developing such devices: A general purpose TPC development facility, a Si-TPC based monitoring facility, and a Si-tracking development facility.
The Activity Coordinator is responsible for the monitoring of the success and impact of the JRA. He or she will report on results and the compliance with milestones and deliverables to the Steering Committee. The AC is aided in this process by the Task Leaders.

Description of work:

The work necessary to arrive at the proposed network consists of the following tasks:

A. TPC development facility

A large TPC is one of several proposals for the central tracking system at the ILC detector. A TPC at the ILC needs to have a particularly thin field cage, provide excellent resolution (both single hit and double track resolutions) and be able to operate extremely reliable and robustly. Current R&D concentrates on the development of novel readout gas amplification schemes for a TPC, based on micro-pattern gas detectors like GEMs or Micromegas.
The goal of the TPC development facility is to provide a commonly available field cage and readout electronics infrastructure, which can then be used by the participants and other groups

to test and study different readout systems, develop novel instrumentation of the endplates, and understand the integrated system field cage – end plate.
The field cage will be built as a light composite structure, to minimize the material and optimize the mechanical and electrical strength. R&D is needed to optimize the isolation properties of the field cage for extremely high voltages, while maintaining the required electrical and mechanical properties. A structure will be developed and engineered to meet both the electrical and the mechanical requirements. It will then be built at DESY using the existing workshop infrastructure. In close cooperation with the other members of the consortium and its associated members, the layout of the interface between the field cage and the endplate will be defined to provide maximum flexibility.
External services needed to use the field cage encompass a High Voltage system, capable of providing up to 100 kV to the cathode, and a second system used to power the anodes at somewhat lower voltages. Both will be setup and integrated in a test-DAQ system, to allow ease of operation and a high degree of availability to the user. One of the core requirements is that the anode HV system is capable of supplying voltage to the anode with floating ground. This will require special developments, which will be done in cooperation with the technical department at DESY and be based on previous experience. The field cage will be equipped with an extensive slow controls monitoring system, to allow close monitoring of its performance.
The field cage will be supplemented by a general purpose readout system and DAQ, which will be developed with a view on usability for a wide range of TPC endplate technologies. One of the challenges of the readout electronics for such devices is to provide many channels at low cost and with a very high packing density. It is foreseen to develop and construct a prototype system of several hundred channels. New developments will include a specialized preamplifier developed in deep sub-micron technology for compactness. In a first iteration the system will be based on existing digitizer modules to provide a digital output to the DAQ. These digitizer modules are alternatively based on ADC and TDC technology. While for the initial test facility the final goal of a footprint of a complete channel below 1 mm^2 will not be needed, still significant reductions compared to currently available systems are required to allow the efficient operation of large scale prototypes in the magnet provided by JRA1 and at other test installations. Therefore, the readout system will subsequently be developed further to fulfil the aim of compactness. This will be based on conventional FADC technology, and/or on a – for TPCs – novel approach using TDC and time-to-charge conversion techniques.
Participants contributing to this task are CERN, DESY, UHAM, ULUND and UROS.

Risk assessment:
The main risk associated with the development and building of the new and generic TPC prototype field cage are the following:

- Failure to deliver the appropriate HV stability of the field cage:
  As we aim for a very thin and light structure, novel materials should be used to optimize the HV stability and behaviour. In case these material do not deliver on their promises, fall-back solutions based on conventional materials are available. They would result in a slightly increased material budget of the field cage, which will not seriously hamper the project. Careful monitoring of the progress during the design phase will make sure that no significant delays are encountered in such cases
- Failure to attract sufficient person power to construct this device:
  The proposed project depends on person power from the main contributor, DESY, and some person power to be financed through the project. If the full amount of person power is not available, the project will be delayed accordingly.

The main risks connected with developing and providing a central DAQ are:

- Failure to attract sufficient person power into the project
- There are no other major risks associated to this part.

B. Si-TPC based monitoring system

The optimization of the TPC based tracking detector depends critically on the detailed understanding of the properties of gases and of the understanding of the charge transfer properties within a TPC and its associated gas amplification systems. The SI-TPC task aims to do the R&D needed to construct a precision diagnostic device to measure the electron cloud arriving at the readout plane of a TPC with unprecedented accuracy both spatially and time resolved. This will be achieved by equipping a TPC like detector with highly pixelated integrated CMOS amplifiers and digitization ASICs as replacement for the conventional pad plane. Once developed such readout system can either be used for diagnostics purpose in the generic TPC system, developed with task A of this JRA, or it can be implemented into a dedicated monitoring TPC. Results from this device will be of broad interest to each group involved in the development work of a TPC at the ILC, and more generally to the gaseous tracking detector community as a whole.

In such a setup, the charge is directly collected at the input gate of a charge-sensitive amplifier attached to each pixel. Since the Si-sensor directly forms the endplate unprecedented pad sizes of a few 10×10 μm^2 are possible. First small scale tests of this approach using both Micromegas and GEM's have been successful. These tests use the MediPix2 readout chip as charge-sensitive device. While clear signals both from Fe^{55} sources and minimum ionizing particles have been observed, the MediPix2 chip does not offer the possibility to detect the charge time-resolved. For operation in a TPC, this feature is mandatory.

In order to arrive at the proposed diagnostic infrastructure the following steps have to be undertaken:

1. Development of a modified MediPix2 chip (TimePix) which is capable of registering the arrival time of the signals.
2. Implementation of the TimePix chip into diagnostic endplate systems both using Micromegas and GEMs as gas amplification device.
3. Perform initial measurements of the performance of the systems within the test infrastructure at DESY.
4. Develop a simulation framework for these systems which can be easily employed by the users of the EUDET test infrastructure.
5. Develop a data acquisition system and integrate this system into the overall DAQ system of the EUDET test infrastructure.

Participants contributing to this task are ALU-FR, CEA, CERN and FOM/NIKHEF.

Risk assessment:

Although being a novelty in TPC readout, the SiTPC project is of very limited risk. This is due to the availability of prototypes for all necessary components and due to viable alternatives in case of failure of one component. Furthermore the already existing R&D results on prototypes both for MicroMegas and GEMs are very encouraging.

Possible risk factors are:

- Failure of a submission of the TimePix chip: unlikely since modifications with respect to the MediPix chip are small. Nevertheless in case of a failure this may lead to a delay in TimePix delivery of about six months.
- Cross talk or noise level too high in TimePix: very unlikely since high-frequency signals are also present on Medipix which do not lead to prohibitive noise levels. It may need a redesign of TimePix (several months delay) or investigation of alternatives, e.g. pixel chips of the LHC experiments ATLAS and CMS.
- Unstable operation of double-GEM or MicroMegas structures: option to move to triple-GEM structures or improved MicroMegas structures.

C. Silicon Tracking

Within the ILC detector Si-tracking is investigated as an option to supplement or replace the information in the detector available from the TPC-based tracking. Compared to previous silicon tracking detectors the reduction of the material present in the detector, while maintaining the excellent resolution, is the main difference and requires R&D effort. This leads to the proposal of Si-detectors with very long and thin ladders. The goal of this task is to enable groups to contribute to the development of such challenging detector components by providing common tools needed to test and simulate these sensors under real life conditions. The main issues to be addressed in these developments and to be tested at the test beam set-up are:

- A very light and large size mechanical structure where the tiles and long strips modules will be located. Performances of this structure with respect to vibrations, magnetic fields, humidity, temperature changes etc. will be studied and compared to simulations.
- A highly multiplexed, deep submicron front-end electronics with low power consumption and the possibility for power cycling will be developed. It will be used to equip part of these detectors. Another part will be equipped with conventional reference electronics. This front-end readout electronics will be connected to the DAQ chain that we assume will be standardized at a certain point for all the sub-detectors.
- Prototypes of the cooling systems that we are studying and intend to test in a realistic environment will be made available. They include both cooling by convection and by conduction.
- A prototype of the alignment system to work out the alignment challenges, the distortions handling and calibrations for the overall tracking system. The alignment prototype will be based on a system developed for LHC, using laser beam and Si-sensors to measure the detector position with high precision.
- Study of the effect of the magnetic field on the response of the detectors (Lorentz angle). Thus it will be requested to place the Si-tracking prototypes in a high magnetic field.
- Development of a front-end readout system.

Participants contributing to this task are CNRS-LPNHE, CSIC, CUPRAGUE and HIP.

Risk assessment

No particular risks are expected in this area. The development of the front-end chip might be influenced by the very short development cycle in the commercial chip market. However as two different versions of the chip are going to be developed there is a fall back option in case one fails. Silicon strip detectors in general have proven to be very reliable and robust in general.

Milestones:

Milestone	Date	Task
Preamplifier prototype board ready	12	A
TimePix operational	12	B
MIP signals in TimePix and GEM/MicroMegas	15	B
Field cage available	18	A
Convection cooling system prototype ready	18	C
DAQ prototype available	24	A

Endplate infrastructure available	24	B
Motorized 3D table ready	24	C
FE chip version 1	24	C
Central tracker prototype	24	C
SiTPC infrastructure ready for operation	36	B
Conduction cooling system prototype ready	36	C
FE chip version 2	36	C
Forward tracker prototype	36	C
Silicon tracking infrastructure available	36	C
Prototype compact readout system ready	48	A
Final report	48	A,B,C

Deliverables:

Deliverable No	Deliverable title	Task	Lead Contractor(s)	Deliverable date	Nature
JRA2-D1	Preamplifier prototype	A	CERN,ULUND,UROS	12	Hardware
JRA2-D2	TimePix chip	B	CERN,FOM/NIKHEF	12	Prototype
JRA2-D3	TPC fieldcage	A	DESY	18	Hardware
JRA2-D4	Convection cooling system prototype	C	CNRS-LPNHE	18	Prototype
JRA2-D5	2nd version of TimePix chip	B	CERN,FOM/NIKHEF	21	Prototype
JRA2-D6	DAQ prototype available	A	ULUND,UROS	24	Hardware
JRA2-D7	Endplate infrastructure	B	CEA	24	Hardware
JRA2-D8	Motorised 3D table	C	CNRS-LPNHE, CUPRAGUE	24	Hardware
JRA2-D9	Central tracker prototype	C	CNRS-LPNHE, CUPRAGUE	24	Prototype

JRA2-D10	FE chip version 1	C	CNRS-LPNHE	24	Prototype
JRA2-D11	SiTPC Infrastructure	B	FOM/NIKHEF	36	Hardware
JRA2-D12	Forward tracker prototype	C	CNRS-LPNHE, CUPRAGUE	36	Prototype
JRA2-D13	Conduction cooling system prototype	C	CNRS-LPNHE	36	Prototype
JRA2-D14	Silicon tracking infrastructure	C	CNRS-LPNHE	36	Hardware
JRA2-D15	FE chip version 2	C	CNRS-LPNHE	36	Prototype
JRA2-D16	Prototype compact readout system	A	CERN,UROS	48	Prototype
JRA2-D17	Final report	A, B,C	DESY, FOM/NIKHEF, CNRS-LPNHE	48	Report

4.3 JRA3: Infrastructure for Calorimeters

Activity Number	**JRA3**	**Start month**		**1**	**End month**	**48**
Activity Title	**Infrastructure for Calorimeters**					
Participant number	6	1	2	11	12	14
Participant short name	CNRS/ IN2P3	DESY	AGH-UST	INPPAS	IPASCR	TAU
Total person months	454	186 (54)	42 (18)	42 (18)	80 (13)	36 (18)
Participant number	16	17				
Participant short name	UCL	UHAM				**TOTAL**
Total person months	87.6 (24)	48 (0)				**975.6 (145)**

Numbers on total person months given in parentheses indicate the additional staff for AC contractors.

Objectives and expected impact:

The calorimeter plays a central role in the detector for a linear collider. The proposed designs feature unprecedented detector granularities which require the exploration of novel technologies (e.g. for photo-sensors). Significant developments are ongoing in the world to develop these technologies. In particular the CALICE collaboration has formed over the past few years, with the goals of building and testing a first version of a “particle flow” calorimeter.
A comprehensive optimization of the calorimeter for the ILC depends on a number of factors. The ansatz of a “particle flow” calorimeter first proposed for the ILC by a European group requires to obtain the best possible separation between photons, neutral and charged hadrons. For the first about 20 radiation lengths of calorimeter a baseline solution exists based on the use of tungsten as absorber and Si-sensors for the readout. For the largest part of the calorimeter however many different options exist, with very different trade-offs between performance and cost. Progress in the field of large area readout systems, either through gaseous systems like resistive plate chambers (RPC) or through scintillator based systems, is extremely rapid. Groups in this consortium and groups associated to the consortium are involved in key positions in the development of novel sensor systems.
To support these developments and to enable more and different technologies to be developed and tested we propose to setup a calorimeter test infrastructure, consisting of a fully equipped electromagnetic calorimeter, and a complete infrastructure for testing novel schemes for a granular calorimeter, including a versatile calorimeter stack, a readout system and a data acquisition system. The complete infrastructure will be developed in such a way that it is portable and can be combined e.g. with the tracking infrastructure described in JRA2, brought to the test beam presented in JRA1, or used at other facilities available worldwide.
A special role within the calorimeters for the ILC detector is played by the very forward calorimeters. The instrumentation in this region is particularly challenging in terms of precision and radiation hardness. This implies the development and use of special, radiation hard and extremely fast sensors, and the related readout systems. For these purposes we propose to develop a common infrastructure containing assembly and test-facilities for such

sensors, and the equipment for beam tests to be shared then between all participating laboratories.

Description of work:

A: Electromagnetic Calorimeter

A central part of the proposed infrastructure is the development of a compact and dense electromagnetic prototype, equipped with Tungsten absorbers, Si-sensors and readout chips.

Compared to existing systems the mechanics needs to be significantly improved to allow for a denser overall design in order to provide a prototype which presents the adequate properties of compactness and granularity. In front of possible hadronic calorimeters, this will provide information on hadronic shower developments, longitudinal and transverse sizes, cell occupancies etc.

This requires, apart from an improved mechanical engineering concept, new and highly integrated front-end electronics, which is properly interfaced to the common calorimeter DAQ developed under task D of this JRA.

In detail, a prototype will be developed that is scalable to the final calorimeter in terms of number of layers (30) and length of the barrel (1.80 m), which will allow to study all the mechanical, thermal and connectivity questions. The consumables will cover the mechanical structure of tungsten slabs wrapped in carbon-fibre and enough motherboards equipped with tungsten core and silicon detectors to have one full layer in length and one full tower in depth. The modularity should allow completing the module with own funds and subsequent partners and/or finance.

Two participants contribute to this task: CNRS-EP and IPASCR.

Risk assessment:

The main risk in the ECAL construction is ageing of the glue connecting Si-wafers to the readout board. Failure of the proposed technique might result in delays of a few months, to develop alternative methods.

B: Hadronic Calorimeter

To allow the efficient test of different readout technologies, a hadronic calorimeter stack will be developed and built. Compared to existing ones, the absorber structure should be significantly improved, made denser, mechanically more realistic (i.e. scalable), and generic enough that it can be used easily by different groups for different readout technologies. Only subsections of the structure need to be instrumented with readout devices.

An important part of every calorimeter is a proper calibration and monitoring system. The large number of channels needed for a granular calorimeter, and the wide dynamic range required by the various calibration functionalities present a sizeable challenge. We propose to develop a multi purpose calibration system which can be used for a wide variety of light-sensing calorimeter readout schemes.

Participants contributing to this task are DESY, IPASCR and UHAM.

Risk assessment:

The main risks connected with the readout and the calibration system are connected with the photo detectors. These devices are being developed by groups from Russia, associated to this project. The industrialization of the sensor production is ongoing at present, such that the quality and delivery schedule are still subject to uncertainties. Depending on the quality of the sensors, the requirements on the front-end electronics and on the stability of the calibration system might increase significantly. In this case extra funding will be needed to develop front-end electronics with lower noise and higher gain, and calibration systems with improved stabilities. The risks will be controlled by a close and careful monitoring of the progress and the quality of the sensors, to constantly update the requirements of the system.

C: Very Forward Calorimeter

The instrumentation of the very forward region is a particular challenge in terms of precision and radiation hardness. To properly instrument the forward region, calorimeters have to be fast and very resistant to radiation. At the same time the devices need to be compact and have a very fine segmentation. Several technologies are currently under study, among them industrially produced diamond sensors.

To support the R&D for radiation hard and fast calorimetry we propose to develop and build up a common infrastructure which will support all participating institutions:

- Laser-based positioning and position monitoring of large area sensors with sub-micrometer precision.
- Facility for the measurement of the homogeneity and linearity of the response from silicon and diamond sensors.
- Test facility for functionality diagnostics and parameter measurements on partly assembled detectors.
- Highly specialised integrated readout electronics with high linearity and large dynamic range for test beam measurements of calorimeter prototypes.

Participants contributing to this task are DESY, AGH-UST, INPPAS, IPASCR and TAU.

Risk assessment:

Depending on the properties of commercially available sensors the readout electronics might require a redesign. This would cause a delay of the programme which we will try to minimize by careful monitoring of the progress of this task.

D: Data acquisition

The design for a calorimeter for a future ILC detector poses challenges to the data acquisition system mainly due to the large number of channels to be read out. The goal of this task is to develop and build a DAQ system which can be used for a large variety of calorimeter readout systems. It should be generic to provide the data acquisition for new prototype calorimeters in general, and to serve as a basis for a common DAQ system for the international linear collider. Within this project a suitable number of readout channels will be made available in the context of the calorimeter development infrastructure.

In the UK, a conceptual design has been formulated for the DAQ system. One of the underlying design considerations is to use as much as possible commodity components, supplemented by special developments only where necessary. This will allow for ease of scalability and simple procurement of additional pieces of equipment.

Data from the front-end electronics will be transferred, via a switch, to an off-detector receiver which will be PCI cards in a PC farm. The switch will ensure a very high up-time of the system, as it selects only available nodes. The system will provide a means to synchronize to an external clock, to time the readout with the collisions in the accelerator. This requirement is a particular challenge to meet, as it means that time critical information has to be integrated into a by nature asynchronous system.

Participants contributing to this task are UCL and associated UK institutes.

Risk assessment:

The risks associated with this part of the project are considered to be rather small as the system depends nearly entirely on commercial component.

E: Front-end electronics

One very difficult and completely new aspect of the proposed analog calorimeters is that the electronics readout will be embedded inside the detector. This greatly reduces the electronics noise by reducing the parasitic capacitance and minimizes the number of connections to the outside, bringing only out one digital data line per 100 channels. Furthermore this design keeps dead space to a minimum, thus minimizing the Molière radius and allowing more compact showers which is essential for the particle flow algorithm.

This puts severe constraints on the front-end electronics which must handle large dynamic range signals with extremely low electronics noise while operating at extremely low power, through a scheme of pulsed power mode. Also digitization will be performed inside the front-end chip to minimize the transmission of sensitive analog signals and preserve data integrity. This results in a complex and sophisticated read-out ASIC, which will advance the state of the art of calorimeter front-end electronics. This newly developed front-end ASIC would be adapted to different detectors, e.g. the Si-detectors of the proposed ECAL or the SiPM photo detectors for the proposed analogue HCAL. Two prototypes are foreseen in 0.35 µm SiGe technology and several blocks have already been tested by the microelectronics groups in CALICE. Then, a prototype of the final configuration could be fabricated to be integrated and tested in the modules described in tasks A and B. This will also require the development of prototype motherboards that are integrated inside the detector and hold these ASICs and the silicon detector. They would be "stitchable" so that identical motherboards would be assembled in a slab and used everywhere in the calorimeter for cost efficiency.

Depending on the application the chips will be integrated into different types of readout boards. For the ECAL they will be inside the active area, for the HCAL they can either be mounted very close to the active planes, or also be mounted inside the active area. The chip will be designed as being highly configurable, so that it can be adapted to a wide range of analogue HCAL readout systems.

The digital version of the hadronic calorimeter needs a much simpler read out, the signal from a gaseous detector being kept in one or two bits. The idea for the one bit read out is to use comparators and do the zero suppression and the formatting in FPGAs; a digital ASIC for this purpose is also under consideration. These in turn will be read through a token ring. For the prototype the number of pads will be few 100 000.

Participants contributing to this task are CNRS-EP, CNRS-LAL and DESY.

Risk assessment:

Locating the readout inside the active area might put the electronics at risk inside high energetic showers. The thermal management of the electronics might put high strains on the device. In either case careful and close monitoring of the progress will alert us of potential problems, in time to redesign the chips if necessary. The allocated time to this task is such that even a slight redesign should not delay the project.

Milestones:

Milestone	Date	Task
VME test stand available	B	9
Concept review	10	A,B,C,D,E
Mechanical concept available	12	A

TECH1 prototype available	12	E
DHCAL ASIC prototype DHCAL1 available	12	E
DAQ system prototype available	18	D
HCAL mechanical concept available	21	B
HCAL calibration single channel prototype available	21	B
Design review	22	A,B,C,D,E
Design of readout electronics available	24	C
ECAL ASIC prototype TECH2 available	24	E
AHCAL ASIC prototype SiPM2 available	24	E
ECAL design and mould available	30	A
HCAL calibration multi channel prototype available	30	B
HCAL design available	33	B
DAQ system prototype available	33	D
Production readiness review	34	A,B,C,D,E
Prototype of laser positioning system available	36	C
Sensor test facilities ready	36	C
Readout electronics ready	36	C
ECAL ASIC production TECH3 finalised	36	E
AHCAL ASIC prototype SiPM3 finalised	36	E
ECAL PCB available	36	E
HCAL PCB available	36	E
Silicon sensors available	42	A
ECAL prototype available	42	A
HCAL prototype available	42	B
HCAL calibration system available	42	B
Silicon sensors available	42	C
DAQ system available	42	D

Deliverables:

Deliverable No	Deliverable title	Task	Lead Contractor(s)	Deliverable date	Nature
JRA3-D1	Conceptual report	A,B,C,D,E	DESY,CNRS-LAL	12	Report
JRA3-D2	DHCAL ASIC	E	CNRS-LAL	12	Prototype
JRA3-D3	Design report	A,B,C,D,E	DESY,CNRS-LAL	24	Report
JRA3-D4	Production readiness report	A,B,C,D,E	DESY,CNRS-LAL	36	Report
JRA3-D5	ECAL ASIC	E	CNRS-LAL	36	Prototype
JRA3-D5	HCAL ASIC	E	CNRS-LAL	36	Prototype
JRA3-D7	VFCAL laser system	C	INPPAS	36	Prototype
JRA3-D8	VFCAL sensor test facility	C	DESY	36	Prototype
JRA3-D9	VFCAL electronics	C	TAU	36	Prototype
JRA3-D10	DAQ System	D	UCL	42	Prototype
JRA3-D11	ECAL prototype	A	CNRS-EP	42	Prototype
JRA3-D12	HCAL prototype	B	DESY	42	Prototype
JRA3-D13	HCAL calibration system	B	IPASCR	42	Prototype
JRA3-D14	Final report	A,B,C,D,E	DESY,CNRS-LAL	48	Report

C. PROJECT RESOURCES AND BUDGET OVERVIEW FOR THE WHOLE DURATION OF THE PROJECT

1. Personnel effort for the whole duration of the project

Total human effort needed for the full duration of the project (person-months)

Activities	Participant Nr.1 DESY	Participant Nr.2 AGH-UST	Participant Nr.3 ALU-FR	Participant Nr.4 CEA	Participant Nr.5 CERN	Participant Nr.6 CNRS/IN2P3
NA1: Consortium management activity	63 (21)		12 (0)			6

	Participant Nr.1 DESY	Participant Nr.2 AGH-UST	Participant Nr.3 ALU-FR	Participant Nr.4 CEA	Participant Nr.5 CERN	Participant Nr.6 CNRS/IN2P3
NA 2	34 (22)		49 (16)		56 (8)	
TA 1						
TA2						
JRA 1	84 (18)			42		60
JRA 2	66 (0)		95 (29)	54	35 (9)	224
JRA 3	186 (54)	42 (18)				454
Total (incl. NA1)	**433 (115)**	**42 (18)**	**156 (45)**	**96**	**99 (17)**	**744**

Numbers on total person months given in parentheses indicate the additional staff for AC contractors.

Total human effort needed for the full duration of the project (person-months) (continued)

Activities	Participant Nr. 7 CSIC	Participant Nr.8 CUPRAGUE	Participant Nr.9 FOM/NIKHEF	Participant Nr.10 HIP	Participant Nr.11 INPPAS	Participant Nr.12 IPASCR
NA1: Consortium management activity			12			

	Participant Nr. 7 CSIC	Participant Nr.8 CUPRAGUE	Participant Nr.9 FOM/NIKHEF	Participant Nr.10 HIP	Participant Nr.11 INPPAS	Participant Nr.12 IPASCR
NA 2						5 (0)
TA 1						
TA2						
JRA 1						
JRA 2	62	128 (32)	72	48 (0)		
JRA 3					42 (18)	80 (13)
Total (incl. NA1)	**62**	**128 (32)**	**84**	**48 (0)**	**42 (18)**	**85 (13)**

Numbers on total person months given in parentheses indicate the additional staff for AC contractors.

Total human effort needed for the full duration of the project (person-months) (continued)

Activities	Participant Nr.13 MPS	Participant Nr.14 TAU	Participant Nr.15 UBONN	Participant Nr.16 UCL	Participant Nr.17 UHAM	Participant Nr.18 ULUND
NA1: Consortium management activity						

	Participant Nr.13 MPS	Participant Nr.14 TAU	Participant Nr.15 UBONN	Participant Nr.16 UCL	Participant Nr.17 UHAM	Participant Nr.18 ULUND
NA 2		12 (6)				
TA 1						
TA2						
JRA 1	36 (18)		36 (18)			
JRA 2					48 (24)	77 (29)
JRA 3		36 (18)		87.6 (24)	48 (0)	
Total (incl. NA1)	**36 (18)**	**48 (24)**	**36 (18)**	**87.6 (24)**	**96 (24)**	**77 (29)**

Numbers on total person months given in parentheses indicate the additional staff for AC contractors.

Total human effort needed for the full duration of the project (person-months) (continued)

Activities	Participant Nr.19 UMA	Participant Nr.20 UNI-GE	Participant Nr.21 UNIVBRIS	Participant Nr.22 UROS	Participant Nr.23 INFN	Total
NA1: Consortium management activity						**93 (21)**

	Participant Nr.19 UMA	Participant Nr.20 UNI-GE	Participant Nr.21 UNIVBRIS	Participant Nr.22 UROS	Participant Nr.23 INFN	Total
NA 2						**156 (46)**
TA 1						
TA2						
JRA 1	24 (12)	72 (36)	48 (24)		91 (34)	**501 (160)**
JRA 2				80 (32)		**989 (155)**
JRA 3						**975.6 (145)**
Total (incl. NA1)	**24 (12)**	**72 (36)**	**48 (24)**	**80 (32)**	**91 (34)**	**2714.6 (527)**

Numbers on total person months given in parentheses indicate the additional staff for AC contractors.

2. Description of other resources needed

Twenty institutes are associated to EUDET (see Table 1 bis List of Associates). These self-supporting institutes are active in topics of the JRAs. It is thus in the interest of the I3 project to maintain close contact to these developments. It is foreseen to invite the associates to the Annual Scientific Workshops to receive their scientific and technological input and to enable them to assist in the experimental progress as required. The respective travel costs have been absorbed in the requested budget of and are managed by the hosting institutes.

3. Overall budget for the whole duration of the project

Remark concerning the table following this section:

- all partners have the intention to subcontract the audits such that indirect costs are not applicable for this cost item

Contract Preparation Forms

EUROPEAN COMMISSION

6th Framework Programme on Research, Technological Development and Demonstration

Support for Research Infrastructures
Integrating Activities / Communication
Network Development

Integrated Infrastructure Initiative

A3.1

Proposal Number	026126	Proposal Acronym	EUDET

Financial information - whole duration of the project

Participant n°	Organisation Short Name	Cost model used: For Transnational Access	Cost model used: For any other activities	Estimated eligible costs and requested EC contribution (whole duration of the project)		Costs and EC contribution per type of activities: RTD activities (1)	Demonstration activities (2)	Consortium Management activities (3)	Other Specific Activities: Coordination/ Networking (4)	Other Specific Activities: Trans national access (5)	Other Specific Activities: Connectivity (6)	Other Specific Activities: Other incl. Specific Service Activities for CND (7)	Total (8)=(1)+(2)+(3)+(4)+(5)+(6)+(7)	Total receipts
1	DESY	UF	AC	Eligible costs	Direct Costs (a)	532,800.00	.00	171,282.14	243,050.00	68,995.36	.00	177,000.00	1,193,127.50	.00
					of which subcontracting	.00	.00	4,000.00	.00	.00	.00	.00	4,000.00	
					Indirect costs (b)	106,560.00	.00	33,456.43	48,610.00	13,799.07	.00	35,400.00	237,825.50	
					Total eligible costs (a)+(b)	639,360.00	.00	204,738.57	291,660.00	82,794.43	.00	212,400.00	1,430,953.00	
				Requested EC contribution		639,360.00	.00	204,738.57	291,660.00	82,794.43	.00	212,400.00	1,430,953.00	
2	AGH-US		AC	Eligible costs	Direct Costs (a)	70,750.00	.00	4,000.00	3,500.00		.00	.00	78,250.00	.00
					of which subcontracting	.00	.00	4,000.00	.00		.00	.00	4,000.00	
					Indirect costs (b)	14,150.00	.00	.00	700.00		.00	.00	14,850.00	
					Total eligible costs (a)+(b)	84,900.00	.00	4,000.00	4,200.00	.00	.00	.00	93,100.00	
				Requested EC contribution		84,900.00	.00	4,000.00	4,200.00	.00	.00	.00	93,100.00	
3	ALU-FR		AC	Eligible costs	Direct Costs (a)	187,735.00	.00	9,200.00	139,083.33	.00	.00	.00	336,018.33	.00
					of which subcontracting	.00	.00	4,000.00	.00	.00	.00	.00	4,000.00	
					Indirect costs (b)	37,547.00	.00	1,040.00	27,816.67	.00	.00	.00	66,403.67	
					Total eligible costs (a)+(b)	225,282.00	.00	10,240.00	166,900.00	.00	.00	.00	402,422.00	
				Requested EC contribution		225,282.00	.00	10,240.00	166,900.00	.00	.00	.00	402,422.00	
4	CEA		FC	Eligible costs	Direct Costs (a)	734,000.00	.00	4,000.00	8,000.00		.00	.00	746,000.00	.00
					of which subcontracting	.00	.00	4,000.00	.00		.00	.00	4,000.00	
					Indirect costs (b)	412,000.00	.00	.00	.00		.00	.00	412,000.00	
					Total eligible costs (a)+(b)	1,146,000.00	.00	4,000.00	8,000.00	.00	.00	.00	1,158,000.00	
				Requested EC contribution		350,000.00	.00	4,000.00	8,000.00	.00	.00	.00	362,000.00	
5	CERN		AC	Eligible costs	Direct Costs (a)	153,908.33	.00	4,000.00	95,316.67		.00	.00	253,225.00	.00
					of which subcontracting	.00	.00	4,000.00	.00		.00	.00	4,000.00	
					Indirect costs (b)	30,781.67	.00	.00	19,063.33		.00	.00	49,845.00	
					Total eligible costs (a)+(b)	184,690.00	.00	4,000.00	114,380.00	.00	.00	.00	303,070.00	
				Requested EC contribution		184,690.00	.00	4,000.00	114,380.00	.00	.00	.00	303,070.00	
6	CNRS/IN		FCF	Eligible costs	Direct Costs (a)	4,886,716.67	.00	46,700.00	62,000.00		.00	.00	4,995,416.67	.00
					of which subcontracting	.00	.00	4,000.00	.00		.00	.00	4,000.00	
					Indirect costs (b)	977,343.33	.00	8,540.00	12,400.00		.00	.00	998,283.33	
					Total eligible costs (a)+(b)	5,864,060.00	.00	55,240.00	74,400.00	.00	.00	.00	5,993,700.00	
				Requested EC contribution		1,424,060.00	.00	10,240.00	74,400.00	.00	.00	.00	1,508,700.00	
7	CSIC		FC	Eligible costs	Direct Costs (a)	250,000.00	.00	4,000.00	5,167.00		.00	.00	259,167.00	.00
					of which subcontracting	.00	.00	4,000.00	.00		.00	.00	4,000.00	
					Indirect costs (b)	160,600.00	.00	.00	.00		.00	.00	160,600.00	
					Total eligible costs (a)+(b)	410,600.00	.00	4,000.00	5,167.00	.00	.00	.00	419,767.00	
				Requested EC contribution		167,000.00	.00	4,000.00	5,167.00	.00	.00	.00	176,167.00	

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EUROPEAN COMMISSION

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Support for Research Infrastructures
Integrating Activities / Communication
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Integrated Infrastructure Initiative

A3.1

Proposal Number	026126	Proposal Acronym	EUDET

Financial information - whole duration of the project

Partici pant nº	Organi sation Short Name	Cost model used: For Transna tional Access	Cost model used: For any other activi ties	Estimated eligible costs and requested EC contribution (whole duration of the project)		RTD activities (1)	Demonstr- ation activities (2)	Consortium Manage ment activities (3)	Other Specific Activities: Coordi nation/ Networ king (4)	Other Specific Activities: Trans national access (5)	Other Specific Activities: Connec tivity (6)	Other Specific Activities: Other incl. Specific Service Activities for CND (7)	Total (8)=(1)+(2)+ (3)+(4)+(5) +(6)+(7)	Total receipts
8	CUPRAC		AC	Eligible costs	Direct Costs (a)	109,600.00	.00	4,000.00	10,666.67		.00	.00	124,266.67	.00
					of which subcontracting	.00	.00	4,000.00	.00		.00	.00	4,000.00	
					Indirect costs (b)	21,920.00	.00	.00	2,133.33		.00	.00	24,053.33	
					Total eligible costs (a)+(b)	131,520.00	.00	4,000.00	12,800.00	.00	.00	.00	148,320.00	
				Requested EC contribution		131,520.00	.00	4,000.00	12,800.00	.00	.00	.00	148,320.00	
9	FOM		FC	Eligible costs	Direct Costs (a)	471,150.00	.00	85,200.00	7,000.00		.00	.00	563,350.00	.00
					of which subcontracting	.00	.00	4,000.00	.00		.00	.00	4,000.00	
					Indirect costs (b)	94,230.00	.00	16,240.00	1,400.00		.00	.00	111,870.00	
					Total eligible costs (a)+(b)	565,380.00	.00	101,440.00	8,400.00	.00	.00	.00	675,220.00	
				Requested EC contribution		259,380.00	.00	10,240.00	8,400.00	.00	.00	.00	278,020.00	
10	HIP		AC	Eligible costs	Direct Costs (a)	43,330.00	.00	4,000.00	4,000.00		.00	.00	51,330.00	.00
					of which subcontracting	.00	.00	4,000.00	.00		.00	.00	4,000.00	
					Indirect costs (b)	8,666.00	.00	.00	800.00		.00	.00	9,466.00	
					Total eligible costs (a)+(b)	51,996.00	.00	4,000.00	4,800.00	.00	.00	.00	60,796.00	
				Requested EC contribution		51,996.00	.00	4,000.00	4,800.00	.00	.00	.00	60,796.00	
11	INPPAS		AC	Eligible costs	Direct Costs (a)	70,750.00	.00	4,000.00	3,500.00		.00	.00	78,250.00	.00
					of which subcontracting	.00	.00	4,000.00	.00		.00	.00	4,000.00	
					Indirect costs (b)	14,150.00	.00	.00	700.00		.00	.00	14,850.00	
					Total eligible costs (a)+(b)	84,900.00	.00	4,000.00	4,200.00	.00	.00	.00	93,100.00	
				Requested EC contribution		84,900.00	.00	4,000.00	4,200.00	.00	.00	.00	93,100.00	
12	IPASCR		AC	Eligible costs	Direct Costs (a)	98,700.00	.00	4,000.00	7,083.33		.00	.00	109,783.33	.00
					of which subcontracting	.00	.00	4,000.00	.00		.00	.00	4,000.00	
					Indirect costs (b)	19,740.00	.00	.00	1,416.67		.00	.00	21,156.67	
					Total eligible costs (a)+(b)	118,440.00	.00	4,000.00	8,500.00	.00	.00	.00	130,940.00	
				Requested EC contribution		118,440.00	.00	4,000.00	8,500.00	.00	.00	.00	130,940.00	
13	MPI		AC	Eligible costs	Direct Costs (a)	105,400.00	.00	4,000.00	3,000.00		.00	.00	112,400.00	.00
					of which subcontracting	.00	.00	4,000.00	.00		.00	.00	4,000.00	
					Indirect costs (b)	21,080.00	.00	.00	600.00		.00	.00	21,680.00	
					Total eligible costs (a)+(b)	126,480.00	.00	4,000.00	3,600.00	.00	.00	.00	134,080.00	
				Requested EC contribution		126,480.00	.00	4,000.00	3,600.00	.00	.00	.00	134,080.00	
14	TAU		AC	Eligible costs	Direct Costs (a)	92,750.00	.00	4,000.00	39,000.00		.00	.00	135,750.00	.00
					of which subcontracting	.00	.00	4,000.00	.00		.00	.00	4,000.00	
					Indirect costs (b)	18,550.00	.00	.00	7,800.00		.00	.00	26,350.00	
					Total eligible costs (a)+(b)	111,300.00	.00	4,000.00	46,800.00	.00	.00	.00	162,100.00	
				Requested EC contribution		111,300.00	.00	4,000.00	46,800.00	.00	.00	.00	162,100.00	

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Proposal Number	026126	Proposal Acronym	EUDET

Financial information - whole duration of the project

Partici pant n°	Organi sation Short Name	Cost model used: For Transna tional Access	Cost model used: For any other activi ties	Estimated eligible costs and requested EC contribution (whole duration of the project)		Costs and EC contribution per type of activities: RTD activities (1)	Demonstr- ation activities (2)	Consortium Manage ment activities (3)	Other Specific Activities: Coordi nation/ Networ king (4)	Other Specific Activities: Trans national access (5)	Other Specific Activities: Connec tivity (6)	Other Specific Activities: Other incl. Specific Service Activities for CND (7)	Total (8)=(1)+(2)+ (3)+(4)+(5) +(6)+(7)	Total receipts
15	UBONN		AC	Eligible costs	Direct Costs (a)	105,400.00	.00	4,000.00	3,000.00		.00	.00	112,400.00	.00
					of which subcontracting	.00	.00	4,000.00	.00		.00	.00	4,000.00	
					Indirect costs (b)	21,080.00	.00	.00	600.00		.00	.00	21,680.00	
					Total eligible costs (a)+(b)	126,480.00	.00	4,000.00	3,600.00	.00	.00	.00	134,080.00	
				Requested EC contribution		126,480.00	.00	4,000.00	3,600.00	.00	.00	.00	134,080.00	
16	UCL		AC	Eligible costs	Direct Costs (a)	256,916.67	.00	4,000.00	14,466.67		.00	.00	275,383.34	.00
					of which subcontracting	.00	.00	4,000.00	.00		.00	.00	4,000.00	
					Indirect costs (b)	51,383.33	.00	.00	2,893.33		.00	.00	54,276.66	
					Total eligible costs (a)+(b)	308,300.00	.00	4,000.00	17,360.00	.00	.00	.00	329,660.00	
				Requested EC contribution		308,300.00	.00	4,000.00	17,360.00	.00	.00	.00	329,660.00	
17	UHAM		AC	Eligible costs	Direct Costs (a)	159,000.00	.00	4,000.00	8,000.00		.00	.00	171,000.00	.00
					of which subcontracting	.00	.00	4,000.00	.00		.00	.00	4,000.00	
					Indirect costs (b)	31,800.00	.00	.00	1,600.00		.00	.00	33,400.00	
					Total eligible costs (a)+(b)	190,800.00	.00	4,000.00	9,600.00	.00	.00	.00	204,400.00	
				Requested EC contribution		190,800.00	.00	4,000.00	9,600.00	.00	.00	.00	204,400.00	
18	ULUND		AC	Eligible costs	Direct Costs (a)	177,410.00	.00	4,000.00	6,416.67		.00	.00	187,826.67	.00
					of which subcontracting	.00	.00	4,000.00	.00		.00	.00	4,000.00	
					Indirect costs (b)	35,482.00	.00	.00	1,283.33		.00	.00	36,765.33	
					Total eligible costs (a)+(b)	212,892.00	.00	4,000.00	7,700.00	.00	.00	.00	224,592.00	
				Requested EC contribution		212,892.00	.00	4,000.00	7,700.00	.00	.00	.00	224,592.00	
19	UMA		AC	Eligible costs	Direct Costs (a)	67,800.00	.00	4,000.00	2,000.00		.00	.00	73,800.00	.00
					of which subcontracting	.00	.00	4,000.00	.00		.00	.00	4,000.00	
					Indirect costs (b)	13,560.00	.00	.00	400.00		.00	.00	13,960.00	
					Total eligible costs (a)+(b)	81,360.00	.00	4,000.00	2,400.00	.00	.00	.00	87,760.00	
				Requested EC contribution		81,360.00	.00	4,000.00	2,400.00	.00	.00	.00	87,760.00	
20	UNI-GE		AC	Eligible costs	Direct Costs (a)	212,500.00	.00	4,000.00	6,000.00		.00	.00	222,500.00	.00
					of which subcontracting	.00	.00	4,000.00	.00		.00	.00	4,000.00	
					Indirect costs (b)	42,500.00	.00	.00	1,200.00		.00	.00	43,700.00	
					Total eligible costs (a)+(b)	255,000.00	.00	4,000.00	7,200.00	.00	.00	.00	266,200.00	
				Requested EC contribution		255,000.00	.00	4,000.00	7,200.00	.00	.00	.00	266,200.00	
21	UNIVBRI		AC	Eligible costs	Direct Costs (a)	128,750.00	.00	4,000.00	4,000.00		.00	.00	136,750.00	.00
					of which subcontracting	.00	.00	4,000.00	.00		.00	.00	4,000.00	
					Indirect costs (b)	25,750.00	.00	.00	800.00		.00	.00	26,550.00	
					Total eligible costs (a)+(b)	154,500.00	.00	4,000.00	4,800.00	.00	.00	.00	163,300.00	
				Requested EC contribution		154,500.00	.00	4,000.00	4,800.00	.00	.00	.00	163,300.00	

Please use as many copies of form A3.1 as necessary for the number of participants. | ***Form A3.1 page*** | ***3 of 4***

Contract Preparation Forms

EUROPEAN COMMISSION

6th Framework Programme on Research, Technological Development and Demonstration

Support for Research Infrastructures
Integrating Activities / Communication
Network Development

Integrated Infrastructure Initiative

A3.1

Proposal Number	026126	Proposal Acronym	EUDET

Financial information - whole duration of the project

Participant n°	Organisation Short Name	Cost model used: For Transnational Access	Cost model used: For any other activities	Estimated eligible costs and requested EC contribution (whole duration of the project)		Costs and EC contribution per type of activities: RTD activities (1)	Demonstration activities (2)	Consortium Management activities (3)	Other Specific Activities: Coordination/ Networking (4)	Other Specific Activities: Trans national access (5)	Other Specific Activities: Connectivity (6)	Other Specific Activities: Other incl. Specific Service Activities for CND (7)	Total (8)=(1)+(2)+(3)+(4)+(5)+(6)+(7)	Total receipts
22	UROS		AC	Eligible costs	*Direct Costs (a)*	171,100.00	.00	4,000.00	6,666.67		.00	.00	181,766.67	.00
					of which subcontracting	.00	.00	4,000.00	.00		.00	.00	4,000.00	
					Indirect costs (b)	34,220.00	.00	.00	1,333.33		.00	.00	35,553.33	
					Total eligible costs (a)+(b)	205,320.00	.00	4,000.00	8,000.00	.00	.00	.00	217,320.00	
				Requested EC contribution		205,320.00	.00	4,000.00	8,000.00	.00	.00	.00	217,320.00	
23	INFN		AC	Eligible costs	*Direct Costs (a)*	63,183.33	.00	4,000.00	7,583.33		.00	.00	74,766.66	.00
					of which subcontracting	.00	.00	4,000.00	.00		.00	.00	4,000.00	
					Indirect costs (b)	12,636.67	.00	.00	1,516.67		.00	.00	14,153.34	
					Total eligible costs (a)+(b)	75,820.00	.00	4,000.00	9,100.00	.00	.00	.00	88,920.00	
				Requested EC contribution		75,820.00	.00	4,000.00	9,100.00	.00	.00	.00	88,920.00	
TOTAL				Eligible costs		**11,355,380.00**	**.00**	**447,658.57**	**823,567.00**	**82,794.43**	**.00**	**212,400.00**	**12,921,800.00**	**.00**
				Requested EC contribution		**5,569,780.00**	**.00**	**311,458.57**	**823,567.00**	**82,794.43**	**.00**	**212,400.00**	**7,000,000.00**	

Please use as many copies of form A3.1 as necessary for the number of participants.	*Form A3.1 page*	*4 of 4*

4. Estimated breakdown of the EC contribution per reporting period

Contract Preparation Forms

EUROPEAN COMMISSION

6th Framework Programme on Research, Technological Development and Demonstration

Support for Research Infrastructures
Integrating Activities / Communication Network Development

Integrated Infrastructure Initiative

A3.2a

Proposal Number	026126	Proposal Acronym	EUDET

Estimated breakdown of the EC contribution per reporting period

Reporting Periods	Start month	End month	Estimated Grant to the Budget	
			Total	in which first six months
Reporting Period 1	1	12	1,752,475.00	
Reporting Period 2	13	24	2,380,044.00	1,271,579.00
Reporting Period 3	25	36	1,974,669.00	927,115.00
Reporting Period 4	37	48	892,812.00	502,077.00
Reporting Period 5				
Reporting Period 6				
Reporting Period 7				

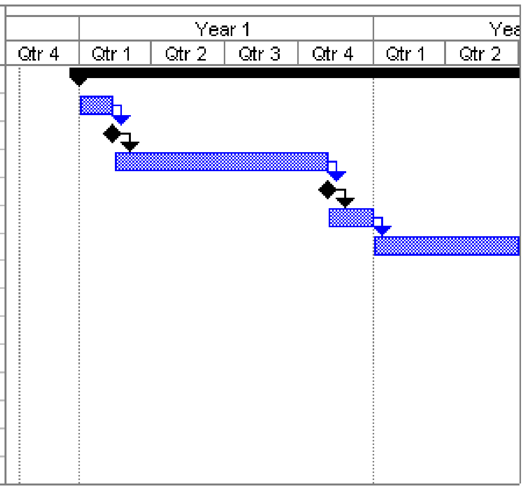
D. OTHER ISSUES

There are no gender issues involved in the activities of the consortium. All participating institutes are equal opportunity, affirmative actions employers and encourage the applications from women. The project does not raise sensitive ethical questions related to human beings, human biological samples, personal data, genetic information or animals. The project does not involve research activities aimed at human cloning for reproductive purposes, intended to modify the genetic heritage of human beings which could make such changes heritable, intended to create human embryos solely for the purpose of research or for the purpose of stem cell procurement, including by means of somatic cell nuclear transfer.

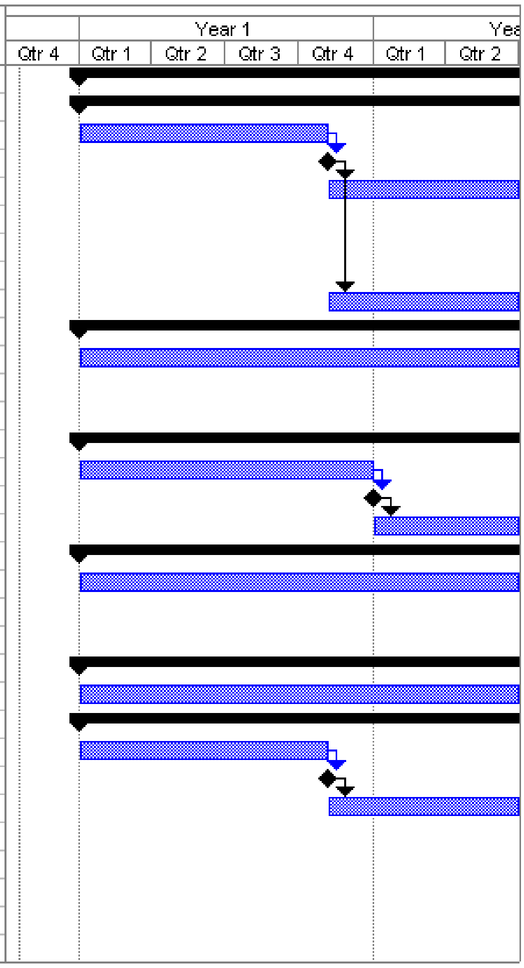
E. DETAILED IMPLEMENTATION PLAN AND PROJECT RESOURCES FOR THE FIRST 18 MONTHS

1. Detailed implementation plan of the Networking Activities for the first 18 months

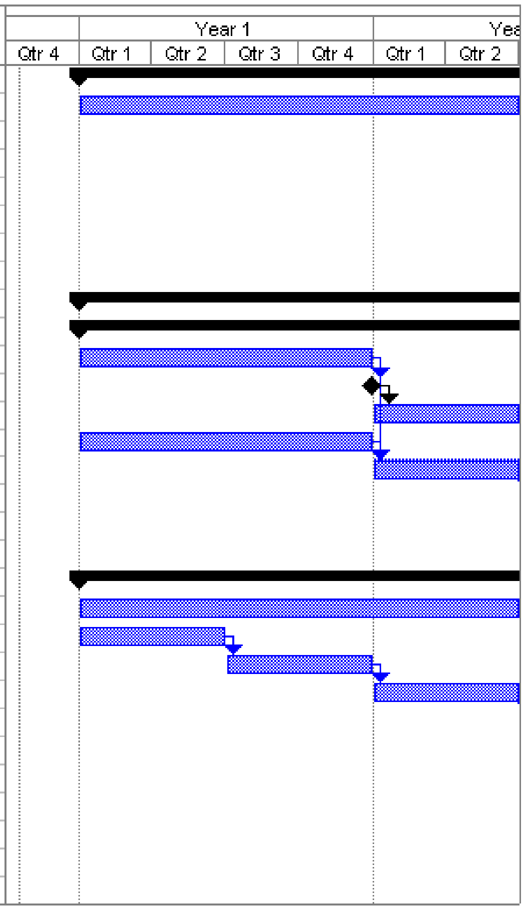
ID	Task Name
1	**NA1: Management of the I3 MNGMNT**
2	Start-up, preparation of Kick-Off Meeting
3	Kick-Off Meeting
4	Phase 1
5	Annual Meeting
6	Preparation of Annual Report
7	Phase 2
8	Annual Meeting
9	Preparation of Annual Report
10	Phase 3
11	Annual Meeting
12	Preparation of Annual Report
13	Phase 4
14	Annual Meeting
15	Preparation of Annual Report



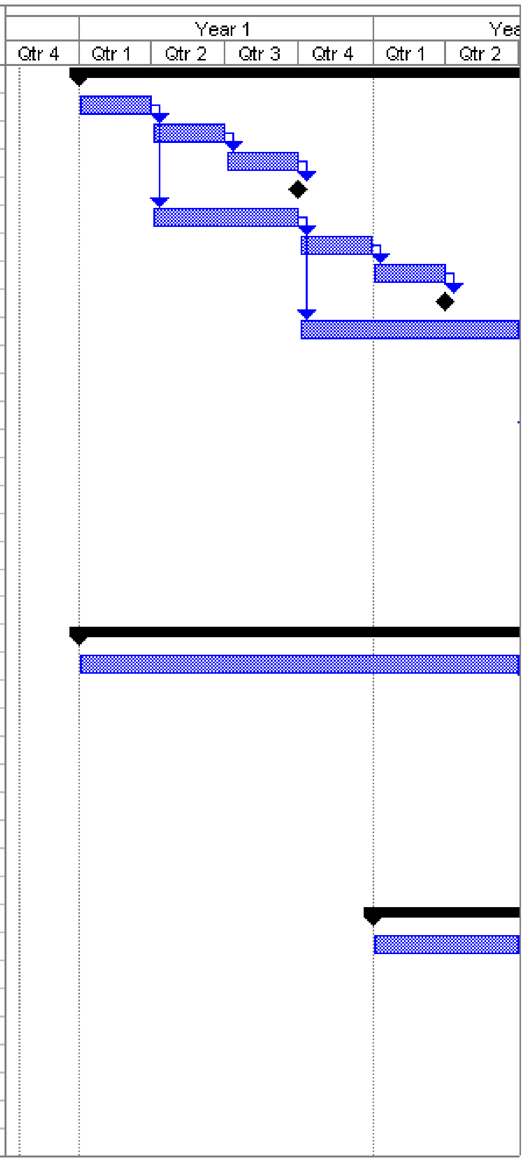
ID	Task Name
16	**NA2: Detector R&D Network DETNET**
17	**Computing network COMP**
18	Installation of 1st stage
19	1st stage ready
20	Installation of 2nd stage
21	2nd stage ready
22	Installation of 3rd stage
23	Full cluster available
24	Production run
25	**Analysis framework ANALYS**
26	Framework development
27	Version 1.0 roll-out
28	Production run
29	**Electronic information system WEBINFO**
30	Information system development
31	Version 1.0 roll-out
32	Production run
33	**Validation of simulation packages VALSIM**
34	Hadronic shower model improvement
35	First release of improved hadronic shower model in GEANT4
36	Improved shower model available to I3
37	**Microelectronics MICELEC**
38	MICELEC service available to I3
39	**Information exchange EXCHG**
40	Phase 1
41	Annual Scientific Workshop
42	Phase 2
43	Annual Scientific Workshop
44	Phase 3
45	Annual Scientific Workshop
46	Phase 4
47	Annual Scientific Workshop



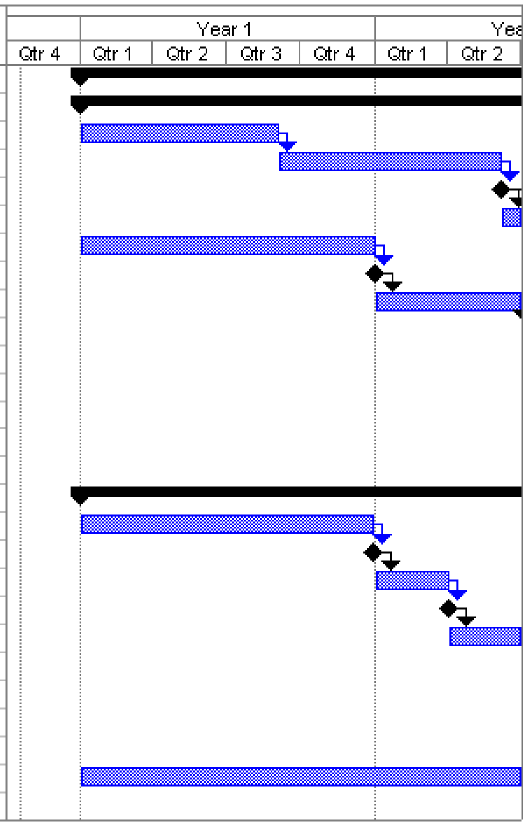
ID	Task Name
48	**TA1: DESY test beam**
49	DESY test beam
50	**TA2: Access to detector R&D infrastructures DETINF**
51	Beam telescope
52	TPC field cage
53	Si-TPC monitor
54	Si-Strip infrastructure
55	Calorimeter infrastructure
56	**JRA1: Test beam infrastructure TBINF**
57	**Magnet**
58	Delivery and installation
59	Magnet ready for operations
60	Magnet operation
61	Field measurement device
62	Field measurement
63	Field map
64	Magnet report
65	Magnet report available
66	**Pixel Telescope Integration**
67	Upgrade of beam line
68	Design of cooling and support
69	Construction of telescope infrastructure
70	Integration of Analogue Telescope
71	Analogue Telescope integrated in beam
72	Analogue Telescope operation
73	Integration of Final Telescope
74	Final Pixel Telescope integrated in beam
75	Pixel Telescope available at beam
76	Pixel Telescope Integration Report
77	Pixel Telescope Integration Report available



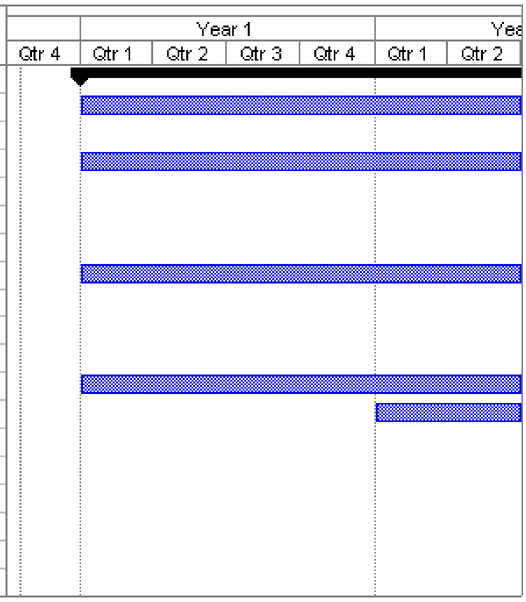
ID	Task Name
78	**Pixel Telescope**
79	SDC prototype 1 design
80	SDC prototype 1 manufacturing
81	SDC prototype 1 test
82	SDC prototype 1 available
83	SDC prototype 2 design
84	SDC prototype 2 manufacturing
85	SDC prototype 2 test
86	SDC prototype 2 available
87	IDC prototype design
88	IDC prototype manufacturing
89	IDC prototype test
90	IDC prototype available
91	TC design
92	TC manufacturing
93	TC test
94	TC ready
95	TC available
96	Pixel Telescope Report
97	Pixel Telescope Report Ready
98	**Data acquisition**
99	System development
100	Readout for prototype available
101	Development of final readout
102	Final readout ready
103	Tracking software development
104	Tracking software available
105	Readout system operation
106	Data Acquistion Report
107	Data Acquistion Report available
108	**Validation of Infrastructure**
109	Integration with prototype telescope
110	Tests with prototype telescope
111	Test Report Analogue Telescope
112	Test Report Analogue Telescope available
113	Integration with final telescope
114	Tests with final telescope
115	Test Report Final Telescope
116	Test Report Final Telescope available



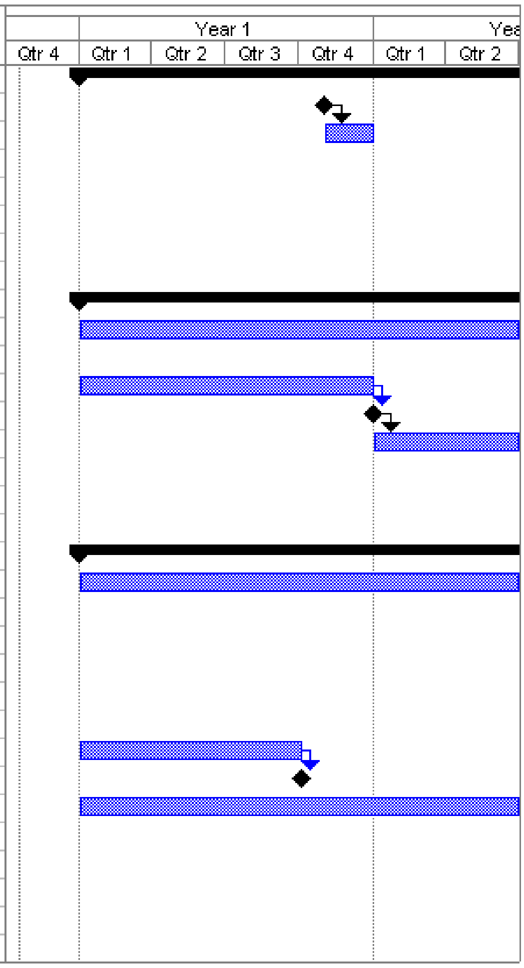
ID	Task Name
117	**JRA2: Infrastructrure for tracking detectors TDET**
118	**TPC development facility**
119	Fieldcage design
120	Fieldcage construction and test
121	Fieldcage available
122	TPC development infrastructure available
123	Preamplifier development
124	Preamplifier board prototype ready
125	Production of multichannel setup
126	Integration of preamplifier and TPC
127	DAQ prototype ready
128	DAQ infrastructure available
129	Development of compact readout system
130	Prototype compact readout system ready
131	Final report
132	**Si-TPC based monitoring system**
133	Development of TimePix
134	TimePix operational
135	Beam tests
136	MIP signals in TimePix and GEM/MicroMegas
137	Endplate development
138	Endplate infrastructure available
139	DAQ development
140	SiTPC infrastructure ready for operation
141	SiTPC infrastructure available
142	TPC Simulation
143	Final report



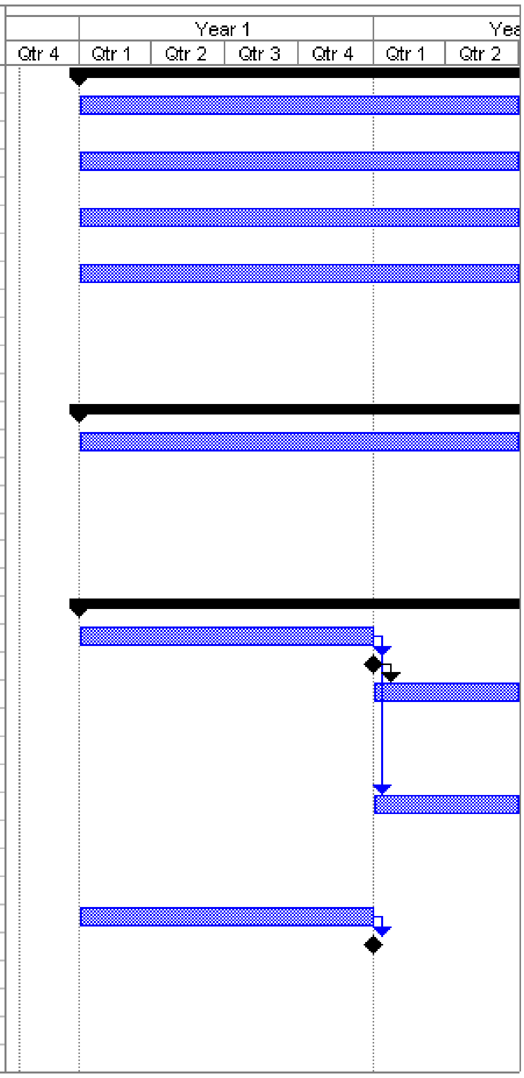
ID	Task Name
144	**Silicon Tracking**
145	Mechanical developments
146	Motorised 3D table ready
147	Cooling system development
148	Convection prototype
149	Cooling system development
150	Conduction prototype
151	Front-end electronics development
152	FE chip version 1
153	Front-end electronics development
154	FE chip version 2
155	Off-detector readout system development
156	Central tracker prototype assembly
157	Central tracker prototype
158	Forward tracker prototype assembly
159	Forward tracker prototype
160	SI tracking infrastructure ready
161	Infrastructure available
162	Final report



ID	Task Name
163	**JRA3: CALO**
164	Concept review
165	Conceptual report
166	Design review
167	Design report
168	Production readiness review
169	Production readiness report
170	Final report
171	**Electromagnetic calorimeter**
172	Silicon sensor production
173	Silicon sensors
174	Mechanical concept development
175	Mechanical concept available
176	ECAL design and mould
177	ECAL design and mould available
178	ECAL prototype construction
179	ECAL prototype available
180	**Hadronic calorimeter**
181	HCAL mechanical concept design
182	HCAL mechanical concept available
183	HCAL design
184	HCAL design available
185	HCAL prototype construction
186	HCAL prototype available
187	VME test stand installation
188	VME test stand available
189	HCAL calibration single channel prototype
190	HCAL calibration single channel protoype available
191	HCAL calibration multi channel prototype
192	HCAL calibration multi channel protoype available
193	HCAL calibration integration
194	HCAL calibration system available



ID	Task Name
195	**Forward calorimeter**
196	Silicon sensor production
197	Silicon sensors available
198	Design of laser positioning system
199	Prototype of laser positioning system available
200	Development of sensor test facilities
201	Sensor test facilities ready
202	Development of readout electronics
203	Design of readout electronics available
204	Production of readout electronics
205	Readout electronics ready
206	Test of readout electronics
207	**Data acquisition**
208	PCI prototype development
209	Prototype available
210	DAQ system prototype development
211	DAQ system prototype available
212	DAQ system production
213	DAQ system available
214	**Front-end electronics**
215	ECAL/AHCAL ASIC prototype TECH1 development
216	TECH1 prototype available
217	ECAL ASIC prototype TECH2 development
218	ECAL ASIC prototype TECH2 available
219	ECAL ASIC production TECH3
220	ECAL ASIC production TECH3 finalised
221	AHCAL ASIC prototype SiPM2 development
222	AHCAL ASIC prototype SiPM2 available
223	AHCAL ASIC production SiPM3
224	AHCAL ASIC production SiPM3 finalised
225	DHCAL ASIC prototype DHCAL1 development
226	DHCAL ASIC prototype DHCAL1 available
227	ECAL PCB production
228	ECAL PCB available
229	HCAL PCB production
230	HCAL PCB available



1.1 NA1: Management of the I3

Total human effort in the management of the I3 for the first 18 month

		Percentage of working time	Person month
Coordinator of the I3		50	9
Administrative Secretary		50	6
Co-ordinators	JRA 1	25	4.5
	JRA 2	25	4.5
	JRA 3	25	4.5
	Detector R&D network	25	4.5
Total			33

1.2 NA2: Detector R&D Network DETNET

Networking Activity description: Detector R&D Network DETNET								
Activity number	**NA2**	**Start month**	**1**		**End month**	**48**		
Activity Title	Detector R&D Network							
Participant number	3	1	2	4	5	6	7	8
Participant short name	ALU-FR	DESY	AGH-UST	CEA	CERN	CNRS/ IN2P3	CSIC	CUPRAGUE
Total person months	37 (12)	30 (20)			35 (5)			

Activity Title	Detector R&D Network							
Participant number	9	10	11	12	13	14	15	16
Participant short name	FOM/ NIKHEF	HIP	INPPAS	IPASCR	MPI	TAU	UBONN	UCL
Total person months				2 (0)		6 (3)		

Activity Title	Detector R&D Network							
Participant number	17	18	19	20	21	22	23	**TOTAL**
Participant short name	UHAM	ULUND	UMA	UNI-GE	UNIV BRIS	UROS	INFN	
Total person months								**110 (40)**

Numbers on total person months given in parentheses indicate the additional staff for AC contractors.
All numbers are rounded to full ppm.

2. Detailed implementation plan of the Transnational Access Activities for the first 18 months

Participant number	Organisation short name	Short name of infrastructure	Installation		Operator country code	Cost model for access	Unit of access	Unit cost (€)	For the first 18 months		
			Number	Short name					Min. number of access to be provided	Estimated number of users	Estimated number of projects
1	DESY	DESY-TB	1	DESY-TB	DE	UF	TB-week	2300	13	15	3
1	DESY	DRD-INF	2	BTELE	(DE, FR, NL, CH)*	UF	Exp-week	0	0	0	0
			3	TPC				0	0	0	0
			4	SI-TPC				0	0	0	0
			5	SI-STRIP				0	0	0	0
			6	CALO				0	0	0	0

* The rules of Transnational Access are applied with respect to the location where the installation is used. The country of the installation (=country of operator) will be specified with the annual update.

3. Detailed implementation plan of the Joint Research Activities for the first 18 months

3.1 JRA1: Test Beam Infrastructure

Activity Number	**JRA1**		**Start month**	**1**		**End month**	**48**
Activity Title	**Testbeam Infrastructure**						
Participant number	1	4	5	6	13	15	19	
Participant short name	DESY	CEA	CERN	CNRS/ IN2P3	MPS-MPI	UBONN	UMA	
Total person months	28 (6)	12	3 (0)	21	12 (6)	18 (9)	6 (3)	
Participant number	20	21	23					
Participant short name	UNI-GE	UNIV BRIS	INFN					**TOTAL**
Total person months	24 (12)	12 (6)	15 (6)					**151(48)**

Numbers on total person months given in parentheses indicate the additional staff for AC contractors.
All numbers are rounded to full ppm.

3.2 JRA2: Infrastructure for Tracking Detectors

Activity Number	**JRA2**		**Start month**	**1**		**End month**	**48**
Activity Title	**Infrastructure for Tracking Detectors (TDET)**						
Participant number	9	1	3	4	5	6	7	
Participant short name	FOM/ NIKHEF	DESY	ALU-FR	CEA	CERN	CNRS/ IN2P3	CSIC	
Total person months	27	25 (0)	64 (20)	32	35 (9)	85	24	
Participant number	8	10	17	18	22			
Participant short name	CUPRA-GUE	HIP	UHAM	ULUND	UROS			**TOTAL**
Total person months	51 (13)	18 (0)	18 (9)	31 (12)	27 (11)			**436 (73)**

Numbers on total person months given in parentheses indicate the additional staff for AC contractors.
All numbers are rounded to full ppm.

3.3 JRA3: Infrastructure for Calorimeters

Activity Number	**JRA3**		**Start month**	**1**	**End month**	**48**
Activity Title	**Infrastructure for Calorimeters**					
Participant number	6	1	2	11	12	14	
Participant short name	CNRS/ IN2P3	DESY	AGH-UST	INPPAS	IPASCR	TAU	
Total person months	172	83 (24)	14 (6)	14 (6)	25 (4)	14 (7)	
Participant number	16	17					
Participant short name	UCL	UHAM					**TOTAL**
Total person months	35 (10)	18 (0)					**374 (56)**

Numbers on total person months given in parentheses indicate the additional staff for AC contractors.
All numbers are rounded to full ppm.

4. List of deliverables for the first 18 months

Activity	Deliverable Nr.	Deliverable title	Workpackage /Task Nr.	Lead Contractor(s)	Delivery date	Nature
JRA1	JRA1-D1	SDC prototype 1	C	CNRS-IReS	9	Prototype
NA1	NA1-D1	1st Annual Report		DESY	12	Report
NA2	NA2-D1	Version 1.0 of electronic information system	C	TAU	12	Web page
NA2	NA2-D2	Proceedings of 1st EUDET workshop	F	DESY	12	Report
JRA2	JRA2-D1	Preamplifier prototype	A	CERN,ULUND, UROS	12	Hardware
JRA2	JRA2-D2	TimePix chip	B	CERN,FOM/NIKHEF	12	Prototype
JRA3	JRA3-D1	Conceptual report	A,B,C,D,E	DESY,CNRS-LAL	12	Report
JRA3	JRA3-D2	DHCAL ASIC	E	CNRS-LAL	12	Prototype
JRA1	JRA1-D2	SDC prototype 2	C	CNRS-IReS	15	Prototype
NA2	NA2-D3	Version 1.0 of analysis framework	B	DESY	18	Software

NA2	NA2-D4	First release of improved version of the hadronic processes and physics lists in Geant4	D	CERN	18	Software
JRA1	JRA1-D3	Field map	A	CERN	18	Software
JRA1	JRA1-D4	Analogue prototype telescope	B,C,D	DESY,UNI-GE, CNRS-IReS	18	Hardware
JRA2	JRA2-D3	TPC fieldcage	A	DESY	18	Hardware
JRA2	JRA2-D4	Convection cooling system prototype	C	CNRS-LPNHE	18	Prototype

5. Financial information for the duration of the detailed implementation plan (first 18 months)

Contract Preparation Forms

EUROPEAN COMMISSION

6th Framework Programme on Research, Technological Development and Demonstration

Support for Research Infrastructures
Integrating Activities / Communication
Network Development

Integrated Infrastructure Initiative

A3.4

Proposal Number	026126	Proposal Acronym	EUDET

Financial information - "Reporting period 1 + first six months of Reporting period 2"

Partici pant n°	Organi sation short name	Cost model used: For Transnational Access	Cost model used: For any other activities	Estimated eligible costs and requested EC contribution (first 18 months of the project)		Costs and EC contribution per type of activities: RTD activities (1)	Demonstr-ation activities (2)	Consortium Manage ment activities (3)	Other Specific Activities: Coordi nation/ Networ king (4)	Other Specific Activities: Trans national access (5)	Other Specific Activities: Connec tivity (6)	Other Specific Activities: Other including Specific Service Activities for CND (7)	Total (8)=(1)+(2)+(3)+(4)+(5)+(6)+(7)	Total receipts
1	DESY	UF	AC	Eligible costs	*Direct costs (a)*	286,794.17	.00	59,215.00	133,976.67	25,873.33	.00	22,500.00	528,359.17	.00
					of which subcontracting	.00	.00	.00	.00	.00	.00	.00	.00	
					Indirect costs (b)	57,358.83	.00	11,843.00	26,795.33	5,174.67	.00	4,500.00	105,671.83	
					Total eligible costs (a)+(b)	344,153.00	.00	71,058.00	160,772.00	31,048.00	.00	27,000.00	634,031.00	
				Requested EC contribution		344,153.00	.00	71,058.00	160,772.00	31,048.00	.00	27,000.00	634,031.00	
2	AGH-US'		AC	Eligible costs	*Direct costs (a)*	23,250.00	.00	.00	875.00	.00	.00	.00	24,125.00	.00
					of which subcontracting	.00	.00	.00	.00	.00	.00	.00	.00	
					Indirect costs (b)	4,650.00	.00	.00	175.00	.00	.00	.00	4,825.00	
					Total eligible costs (a)+(b)	27,900.00	.00	.00	1,050.00	.00	.00	.00	28,950.00	
				Requested EC contribution		27,900.00	.00	.00	1,050.00	.00	.00	.00	28,950.00	
3	ALU-FR		AC	Eligible costs	*Direct costs (a)*	140,919.17	.00	1,950.00	104,813.33	.00	.00	.00	247,682.50	.00
					of which subcontracting	.00	.00	.00	.00	.00	.00	.00	.00	
					Indirect costs (b)	28,183.83	.00	390.00	20,962.67	.00	.00	.00	49,536.50	
					Total eligible costs (a)+(b)	169,103.00	.00	2,340.00	125,776.00	.00	.00	.00	297,219.00	
				Requested EC contribution		169,103.00	.00	2,340.00	125,776.00	.00	.00	.00	297,219.00	
4	CEA		FC	Eligible costs	*Direct costs (a)*	359,485.00	.00	.00	2,000.00	.00	.00	.00	361,485.00	.00
					of which subcontracting	.00	.00	.00	.00	.00	.00	.00	.00	
					Indirect costs (b)	176,375.00	.00	.00	.00	.00	.00	.00	176,375.00	
					Total eligible costs (a)+(b)	535,860.00	.00	.00	2,000.00	.00	.00	.00	537,860.00	
				Requested EC contribution		218,610.00	.00	.00	2,000.00	.00	.00	.00	220,610.00	
5	CERN		AC	Eligible costs	*Direct costs (a)*	138,325.00	.00	.00	63,520.83	.00	.00	.00	201,845.83	.00
					of which subcontracting	.00	.00	.00	.00	.00	.00	.00	.00	
					Indirect costs (b)	27,665.00	.00	.00	12,704.17	.00	.00	.00	40,369.17	
					Total eligible costs (a)+(b)	165,990.00	.00	.00	76,225.00	.00	.00	.00	242,215.00	
				Requested EC contribution		165,990.00	.00	.00	76,225.00	.00	.00	.00	242,215.00	
6	CNRS/IN		FCF	Eligible costs	*Direct costs (a)*	1,761,335.83	.00	16,013.33	15,500.00	.00	.00	.00	1,792,849.16	.00
					of which subcontracting	.00	.00	.00	.00	.00	.00	.00	.00	
					Indirect costs (b)	352,267.17	.00	3,202.67	3,100.00	.00	.00	.00	358,569.84	
					Total eligible costs (a)+(b)	2,113,603.00	.00	19,216.00	18,600.00	.00	.00	.00	2,151,419.00	
				Requested EC contribution		516,103.00	.00	2,340.00	18,600.00	.00	.00	.00	537,043.00	

Contract Preparation Forms

EUROPEAN COMMISSION

6th Framework Programme on Research, Technological Development and Demonstration

Support for Research Infrastructures
Integrating Activities / Communication Network Development

Integrated Infrastructure Initiative

A3.4

Proposal Number	026126	Proposal Acronym	EUDET

Financial information - "Reporting period 1 + first six months of Reporting period 2"

Participant n°	Organisation short name	Cost model used: For Transnational Access	Cost model used: For any other activities	Estimated eligible costs and requested EC contribution (first 18 months of the project)		Costs and EC contribution per type of activities: RTD activities (1)	Demonstration activities (2)	Consortium Management activities (3)	Other Specific Activities: Coordination/ Networking (4)	Other Specific Activities: Transnational access (5)	Other Specific Activities: Connectivity (6)	Other Specific Activities: Other including Specific Service Activities for CND (7)	Total (8)=(1)+(2)+(3)+(4)+(5)+(6)+(7)	Total receipts
7	CSIC		FC	Eligible costs	*Direct costs (a)*	96,000.00	.00	.00	1,292.00	.00	.00	.00	97,292.00	.00
					of which subcontracting	.00	.00	.00	.00	.00	.00	.00	.00	
					Indirect costs (b)	62,050.00	.00	.00	.00	.00	.00	.00	62,050.00	
					Total eligible costs (a)+(b)	158,050.00	.00	.00	1,292.00	.00	.00	.00	159,342.00	
				Requested EC contribution		66,700.00	.00	.00	1,292.00	.00	.00	.00	67,992.00	
8	CUPRAC		AC	Eligible costs	*Direct costs (a)*	43,740.00	.00	.00	2,666.67	.00	.00	.00	46,406.67	.00
					of which subcontracting	.00	.00	.00	.00	.00	.00	.00	.00	
					Indirect costs (b)	8,748.00	.00	.00	533.33	.00	.00	.00	9,281.33	
					Total eligible costs (a)+(b)	52,488.00	.00	.00	3,200.00	.00	.00	.00	55,688.00	
				Requested EC contribution		52,488.00	.00	.00	3,200.00	.00	.00	.00	55,688.00	
9	FOM		FC	Eligible costs	*Direct costs (a)*	219,500.00	.00	30,450.00	1,750.00	.00	.00	.00	251,700.00	.00
					of which subcontracting	.00	.00	.00	.00	.00	.00	.00	.00	
					Indirect costs (b)	43,900.00	.00	6,090.00	350.00	.00	.00	.00	50,340.00	
					Total eligible costs (a)+(b)	263,400.00	.00	36,540.00	2,100.00	.00	.00	.00	302,040.00	
				Requested EC contribution		143,400.00	.00	2,340.00	2,100.00	.00	.00	.00	147,840.00	
10	HIP		AC	Eligible costs	*Direct costs (a)*	17,231.67	.00	.00	1,000.00	.00	.00	.00	18,231.67	.00
					of which subcontracting	.00	.00	.00	.00	.00	.00	.00	.00	
					Indirect costs (b)	3,446.33	.00	.00	200.00	.00	.00	.00	3,646.33	
					Total eligible costs (a)+(b)	20,678.00	.00	.00	1,200.00	.00	.00	.00	21,878.00	
				Requested EC contribution		20,678.00	.00	.00	1,200.00	.00	.00	.00	21,878.00	
11	INPPAS		AC	Eligible costs	*Direct costs (a)*	23,250.00	.00	.00	875.00	.00	.00	.00	24,125.00	.00
					of which subcontracting	.00	.00	.00	.00	.00	.00	.00	.00	
					Indirect costs (b)	4,650.00	.00	.00	175.00	.00	.00	.00	4,825.00	
					Total eligible costs (a)+(b)	27,900.00	.00	.00	1,050.00	.00	.00	.00	28,950.00	
				Requested EC contribution		27,900.00	.00	.00	1,050.00	.00	.00	.00	28,950.00	
12	IPASCR		AC	Eligible costs	*Direct costs (a)*	36,500.00	.00	.00	1,770.83	.00	.00	.00	38,270.83	.00
					of which subcontracting	.00	.00	.00	.00	.00	.00	.00	.00	
					Indirect costs (b)	7,300.00	.00	.00	354.17	.00	.00	.00	7,654.17	
					Total eligible costs (a)+(b)	43,800.00	.00	.00	2,125.00	.00	.00	.00	45,925.00	
				Requested EC contribution		43,800.00	.00	.00	2,125.00	.00	.00	.00	45,925.00	

Contract Preparation Forms

EUROPEAN COMMISSION

6th Framework Programme on Research, Technological Development and Demonstration

Support for Research Infrastructures
Integrating Activities / Communication Network Development

Integrated Infrastructure Initiative

A3.4

Proposal Number	026126	Proposal Acronym	EUDET

Financial information - "Reporting period 1 + first six months of Reporting period 2"

Partici pant nº	Organi sation short name	Cost model used: For Transnational Access	Cost model used: For any other activities	Estimated eligible costs and requested EC contribution (first 18 months of the project)		Costs and EC contribution per type of activities: RTD activities (1)	Demonstration activities (2)	Consortium Management activities (3)	Other Specific Activities: Coordination/ Networking (4)	Other Specific Activities: Trans national access (5)	Other Specific Activities: Connectivity (6)	Other Specific Activities: Other including Specific Service Activities for CND (7)	Total (8)=(1)+(2)+(3)+(4)+(5)+(6)+(7)	Total receipts
13	MPI		AC	Eligible costs	*Direct costs (a)*	35,900.00	.00	.00	750.00	.00	.00	.00	36,650.00	.00
					of which subcontracting	.00	.00	.00	.00	.00	.00	.00	.00	
					Indirect costs (b)	7,180.00	.00	.00	150.00	.00	.00	.00	7,330.00	
					Total eligible costs (a)+(b)	43,080.00	.00	.00	900.00	.00	.00	.00	43,980.00	
				Requested EC contribution		43,080.00	.00	.00	900.00	.00	.00	.00	43,980.00	
14	TAU		AC	Eligible costs	*Direct costs (a)*	46,500.00	.00	.00	23,500.00	.00	.00	.00	70,000.00	.00
					of which subcontracting	.00	.00	.00	.00	.00	.00	.00	.00	
					Indirect costs (b)	9,300.00	.00	.00	4,700.00	.00	.00	.00	14,000.00	
					Total eligible costs (a)+(b)	55,800.00	.00	.00	28,200.00	.00	.00	.00	84,000.00	
				Requested EC contribution		55,800.00	.00	.00	28,200.00	.00	.00	.00	84,000.00	
15	UBONN		AC	Eligible costs	*Direct costs (a)*	51,275.00	.00	.00	750.00	.00	.00	.00	52,025.00	.00
					of which subcontracting	.00	.00	.00	.00	.00	.00	.00	.00	
					Indirect costs (b)	10,255.00	.00	.00	150.00	.00	.00	.00	10,405.00	
					Total eligible costs (a)+(b)	61,530.00	.00	.00	900.00	.00	.00	.00	62,430.00	
				Requested EC contribution		61,530.00	.00	.00	900.00	.00	.00	.00	62,430.00	
16	UCL		AC	Eligible costs	*Direct costs (a)*	64,469.17	.00	.00	3,616.67	.00	.00	.00	68,085.84	.00
					of which subcontracting	.00	.00	.00	.00	.00	.00	.00	.00	
					Indirect costs (b)	12,893.83	.00	.00	723.33	.00	.00	.00	13,617.16	
					Total eligible costs (a)+(b)	77,363.00	.00	.00	4,340.00	.00	.00	.00	81,703.00	
				Requested EC contribution		77,363.00	.00	.00	4,340.00	.00	.00	.00	81,703.00	
17	UHAM		AC	Eligible costs	*Direct costs (a)*	59,625.00	.00	.00	2,000.00	.00	.00	.00	61,625.00	.00
					of which subcontracting	.00	.00	.00	.00	.00	.00	.00	.00	
					Indirect costs (b)	11,925.00	.00	.00	400.00	.00	.00	.00	12,325.00	
					Total eligible costs (a)+(b)	71,550.00	.00	.00	2,400.00	.00	.00	.00	73,950.00	
				Requested EC contribution		71,550.00	.00	.00	2,400.00	.00	.00	.00	73,950.00	
18	ULUND		AC	Eligible costs	*Direct costs (a)*	80,250.00	.00	.00	1,604.17	.00	.00	.00	81,854.17	.00
					of which subcontracting	.00	.00	.00	.00	.00	.00	.00	.00	
					Indirect costs (b)	16,050.00	.00	.00	320.83	.00	.00	.00	16,370.83	
					Total eligible costs (a)+(b)	96,300.00	.00	.00	1,925.00	.00	.00	.00	98,225.00	
				Requested EC contribution		96,300.00	.00	.00	1,925.00	.00	.00	.00	98,225.00	

Contract Preparation Forms

EUROPEAN COMMISSION

6th Framework Programme on Research, Technological Development and Demonstration

Support for Research Infrastructures
Integrating Activities / Communication Network Development

Integrated Infrastructure Initiative

A3.4

Proposal Number	026126	Proposal Acronym	EUDET

Financial information - "Reporting period 1 + first six months of Reporting period 2"

Participant n°	Organisation short name	Cost model used: For Transnational Access	Cost model used: For any other activities	Estimated eligible costs and requested EC contribution (first 18 months of the project)		Costs and EC contribution per type of activities: RTD activities (1)	Demonstration activities (2)	Consortium Management activities (3)	Other Specific Activities: Coordination/ Networking (4)	Other Specific Activities: Transnational access (5)	Other Specific Activities: Connectivity (6)	Other Specific Activities: Other including Specific Service Activities for CND (7)	Total (8)=(1)+(2)+(3)+(4)+(5)+(6)+(7)	Total receipts
19	UMA		AC	Eligible costs	*Direct costs (a)*	18,425.00	.00	.00	500.00	.00	.00	.00	18,925.00	.00
					of which subcontracting	.00	.00	.00	.00	.00	.00	.00	.00	
					Indirect costs (b)	3,685.00	.00	.00	100.00	.00	.00	.00	3,785.00	
					Total eligible costs (a)+(b)	22,110.00	.00	.00	600.00	.00	.00	.00	22,710.00	
				Requested EC contribution		22,110.00	.00	.00	600.00	.00	.00	.00	22,710.00	
20	UNI-GE		AC	Eligible costs	*Direct costs (a)*	79,410.00	.00	.00	1,500.00	.00	.00	.00	80,910.00	.00
					of which subcontracting	.00	.00	.00	.00	.00	.00	.00	.00	
					Indirect costs (b)	15,882.00	.00	.00	300.00	.00	.00	.00	16,182.00	
					Total eligible costs (a)+(b)	95,292.00	.00	.00	1,800.00	.00	.00	.00	97,092.00	
				Requested EC contribution		95,292.00	.00	.00	1,800.00	.00	.00	.00	97,092.00	
21	UNIVBRI		AC	Eligible costs	*Direct costs (a)*	33,775.00	.00	.00	1,000.00	.00	.00	.00	34,775.00	.00
					of which subcontracting	.00	.00	.00	.00	.00	.00	.00	.00	
					Indirect costs (b)	6,755.00	.00	.00	200.00	.00	.00	.00	6,955.00	
					Total eligible costs (a)+(b)	40,530.00	.00	.00	1,200.00	.00	.00	.00	41,730.00	
				Requested EC contribution		40,530.00	.00	.00	1,200.00	.00	.00	.00	41,730.00	
22	UROS		AC	Eligible costs	*Direct costs (a)*	60,050.00	.00	.00	1,666.67	.00	.00	.00	61,716.67	.00
					of which subcontracting	.00	.00	.00	.00	.00	.00	.00	.00	
					Indirect costs (b)	12,010.00	.00	.00	333.33	.00	.00	.00	12,343.33	
					Total eligible costs (a)+(b)	72,060.00	.00	.00	2,000.00	.00	.00	.00	74,060.00	
				Requested EC contribution		72,060.00	.00	.00	2,000.00	.00	.00	.00	74,060.00	
23	INFN		AC	Eligible costs	*Direct costs (a)*	11,298.33	.00	.00	1,895.83	.00	.00	.00	13,194.16	.00
					of which subcontracting	.00	.00	.00	.00	.00	.00	.00	.00	
					Indirect costs (b)	2,259.67	.00	.00	379.17	.00	.00	.00	2,638.84	
					Total eligible costs (a)+(b)	13,558.00	.00	.00	2,275.00	.00	.00	.00	15,833.00	
				Requested EC contribution		13,558.00	.00	.00	2,275.00	.00	.00	.00	15,833.00	
TOTAL				Eligible costs		**4,572,098.00**	**.00**	**129,154.00**	**441,930.00**	**31,048.00**	**.00**	**27,000.00**	**5,201,230.00**	**.00**
				Requested EC contribution		**2,445,998.00**	**.00**	**78,078.00**	**441,930.00**	**31,048.00**	**.00**	**27,000.00**	**3,024,054.00**	