THEME [INFRA-2011-2.3.4. INFRA-2011-2.3.4. INFRA] [Implementation of common solutions for a cluster of ESFRI infrastructures in the field of "Physics, Astronomy and Analytical Facilities" Implementation of common solutions for a cluster of ESFRI infrastructures in the field of "Physics, Astronomy and Analytical Facilities" Research Infrastructures]

Grant agreement for: Combination of CP & CSA*

Annex I - "Description of Work"

Project acronym: CRISP

Project full title: " Cluster of Research Infrastructures for Synergies in Physics "

Grant agreement no: 283745

Session submission date: 2011-07-04

Preparation of the DoW date: 2011-07-04

Table of Contents

Part A

Workplan Tables

A1:
Project summary

Project Number [1]	283745	Project Acronym [2]	CRISP

One form per project

General information

Project title [3]	Cluster of Research Infrastructures for Synergies in Physics		
Starting date [4]	03/10/2011		
Duration in months [5]	36		
Call (part) identifier [6]	FP7-INFRASTRUCTURES-2011-1		
Activity code(s) most relevant to your topic [7]	INFRA-2011-2.3.4.: Implementation of common solutions for a cluster of ESFRI infrastructures in the field of "Physics, Astronomy and Analytical Facilities"	INFRA-2011-2.3.4.: Implementation of common solutions for a cluster of ESFRI infrastructures in the field of "Physics, Astronomy and Analytical Facilities"	INFRA: Research Infrastructures
Free keywords [8]	common solutions, harmonisation of developments, creation of synergies, accelerator components, novel instruments, new data acquisition and management schemes		

Abstract [9]

The objective of the eleven participating Research Infrastructures (RIs) is to build up collaborations and to create long-term synergies to facilitate their implementation and enhance their efficiency and attractiveness. The CRISP proposal focuses on four R&D tasks that are of utmost importance for these RIs: (i) Accelerators, (ii) Instruments & Experiments, (iii) Detectors & Data Acquisition, and (iv) Information Technology (IT) & Data Management. Progress in accelerator technology is essential to provide the RIs with the best possible sources of X-rays, ions and neutrons and to tackle the next challenges in nuclear and high-energy physics. Joint developments for novel experimental schemes and their related instrumentation will create new scientific opportunities at the RIs and offer tremendous potential across all fields of natural sciences. New initiatives and approaches are required to cope with the ever-increasing flow of scientific data, and a joint effort to establish the base elements of adequate platforms for the processing, storage and access to data shall be undertaken.
The RIs will exchange know-how and combine complementary expertise, ensuring cost-efficient and coherent development plans. The generated synergies will be crucial to respond to the rapidly evolving and mobile scientific user community. It will allow the RIs to strengthen their role in the advancement of knowledge and to stimulate scientific and technological progress, indispensable to address the grand challenges of our society in health, environment, sustainable energy, transport and communication. The proposed activities will be of enormous benefit as well to other large scale facilities in the European Research Area, such as regional or national light and x-ray sources, high-energy and nuclear facilities.

A2:
List of Beneficiaries

Project Number [1]	283745	Project Acronym [2]	CRISP

List of Beneficiaries

No	Name	Short name	Country	Project entry month[10]	Project exit month
1	INSTALLATION EUROPEENNE DE RAYONNEMENT SYNCHROTRON	ESRF	France	1	36
2	STIFTUNG DEUTSCHES ELEKTRONEN-SYNCHROTRON DESY	DESY	Germany	1	36
3	EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH	CERN	Switzerland	1	36
4	EUROPEAN SPALLATION SOURCE ESS AB	ESS	Sweden	1	36
5	GRAND ACCELERATEUR NATIONAL D'IONS LOURDS	GANIL	France	1	36
6	GSI HELMHOLTZZENTRUM FUER SCHWERIONENFORSCHUNG GMBH	GSI	Germany	1	36
7	INSTITUT MAX VON LAUE - PAUL LANGEVIN	ILL	France	1	36
8	EUROPEAN X-RAY FREE ELECTRON LASER FACILITY GMBH	XFEL	Germany	1	36
9	UNIVERSITA DEGLI STUDI DI ROMA LA SAPIENZA	ROMA1	Italy	1	36
10	FOUNDATION FOR RESEARCH AND TECHNOLOGY HELLAS	FORTH	Greece	1	36
11	INSTITUTO SUPERIOR TECNICO	IST	Portugal	1	36
12	ISTITUTO NAZIONALE DI FISICA NUCLEARE	INFN	Italy	1	36
13	MAGYAR TUDOMANYOS AKADEMIA SZAMITASTECHNIKAI ES AUTOMATIZALASI KUTATO INTEZET	MTA SZTAKI	Hungary	1	36
14	INSTITUTUL NATIONAL DE CERCETARE -DEZVOLTARE PENTRU FIZICA SI INGINERIE NUCLEARA "HORIA HULUBEI" (IFIN-HH)	IFIN-HH	Romania	1	36
15	THE CHANCELLOR, MASTERS AND SCHOLARS OF THE UNIVERSITY OF OXFORD	UOXF.DB	United Kingdom	1	36
16	PAUL SCHERRER INSTITUT	PSI	Switzerland	1	36

A3:
Budget Breakdown

Project Number [1]	283745	Project Acronym [2]	CRISP

One Form per Project

Participant number in this project [11]	Participant short name	Fund. % [12]	Ind. costs [13]	Estimated eligible costs (whole duration of the project)						Total receipts	Requested EU contribution
				RTD (A)	Coordination (B)	Support (C)	Management (D)	Other (E)	Total A+B+C+D+		
1	ESRF	75.0	T	940,000.00	505,280.00	0.00	538,512.00	0.00	1,983,792.00	0.00	1,588,000.00
2	DESY	75.0	T	2,240,000.00	16,480.00	0.00	6,000.00	0.00	2,262,480.00	0.00	1,697,000.00
3	CERN	75.0	T	1,850,688.00	156,272.00	0.00	6,000.00	0.00	2,012,960.00	0.00	1,498,500.00
4	ESS	75.0	T	985,344.00	21,696.00	0.00	4,000.00	0.00	1,011,040.00	0.00	757,500.00
5	GANIL	75.0	T	1,402,672.00	21,696.00	0.00	6,000.00	0.00	1,430,368.00	0.00	1,072,500.00
6	GSI	75.0	A	1,226,000.00	146,500.00	0.00	5,000.00	0.00	1,377,500.00	0.00	1,071,000.00
7	ILL	75.0	T	1,630,672.00	554,032.00	0.00	6,000.00	0.00	2,190,704.00	0.00	1,599,500.00
8	XFEL	75.0	T	845,344.00	96,464.00	0.00	6,000.00	0.00	947,808.00	0.00	704,500.00
9	ROMA1	75.0	T	596,000.00	21,696.00	0.00	6,000.00	0.00	623,696.00	0.00	467,500.00
10	FORTH	75.0	A	264,000.00	11,872.00	0.00	0.00	0.00	275,872.00	0.00	206,500.00
11	IST	75.0	A	60,000.00	7,488.00	0.00	0.00	0.00	67,488.00	0.00	50,000.00
12	INFN	75.0	T	617,344.00	14,960.00	0.00	4,000.00	0.00	636,304.00	0.00	476,000.00
13	MTA SZTAKI	75.0	T	60,000.00	7,488.00	0.00	0.00	0.00	67,488.00	0.00	50,000.00
14	IFIN-HH	75.0	F	138,672.00	7,860.00	0.00	0.00	0.00	146,532.00	0.00	111,000.00
15	UOXF.DB	75.0	T	582,672.00	21,696.00	0.00	2,000.00	0.00	606,368.00	0.00	453,500.00
16	PSI	75.0	F	0.00	219,816.00	0.00	0.00	0.00	219,816.00	0.00	196,000.00
Total				13,439,408.00	1,831,296.00	0.00	589,512.00	0.00	15,860,216.00	0.00	11,999,000.00

Note that the budget mentioned in this table is the total budget requested by the Beneficiary and associated Third Parties.

*** The following funding schemes are distinguished**

Collaborative Project (if a distinction is made in the call please state which type of Collaborative project is referred to: (i) Small of medium-scale focused research project, (ii) Large-scale integrating project, (iii) Project targeted to special groups such as SMEs and other smaller actors), Network of Excellence, Coordination Action, Support Action.

1. Project number

The project number has been assigned by the Commission as the unique identifier for your project, and it cannot be changed. The project number **should appear on each page of the grant agreement preparation documents** to prevent errors during its handling.

2. Project acronym

Use the project acronym as indicated in the submitted proposal. It cannot be changed, unless agreed during the negotiations. The same acronym **should appear on each page of the grant agreement preparation documents** to prevent errors during its handling.

3. Project title

Use the title (preferably no longer than 200 characters) as indicated in the submitted proposal. Minor corrections are possible if agreed during the preparation of the grant agreement.

4. Starting date

Unless a specific (fixed) starting date is duly justified and agreed upon during the preparation of the Grant Agreement, the project will start on the first day of the month following the entry info force of the Grant Agreement (NB : entry into force = signature by the Commission). Please note that if a fixed starting date is used, you will be required to provide a detailed justification on a separate note.

5. Duration

Insert the duration of the project in full months.

6. Call (part) identifier

The Call (part) identifier is the reference number given in the call or part of the call you were addressing, as indicated in the publication of the call in the Official Journal of the European Union. You have to use the identifier given by the Commission in the letter inviting to prepare the grant agreement.

7. Activity code

Select the activity code from the drop-down menu.

8. Free keywords

Use the free keywords from your original proposal; changes and additions are possible.

9. Abstract

10. The month at which the participant joined the consortium, month 1 marking the start date of the project, and all other start dates being relative to this start date.

11. The number allocated by the Consortium to the participant for this project.

12. Include the funding % for RTD/Innovation – either 50% or 75%

13. Indirect cost model

A: Actual Costs
S: Actual Costs Simplified Method
T: Transitional Flat rate
F :Flat Rate

Workplan Tables

Project number

283745

Project title

CRISP—Cluster of Research Infrastructures for Synergies in Physics

Call (part) identifier

FP7-INFRASTRUCTURES-2011-1

Funding scheme

Combination of CP & CSA

WT1
List of work packages

Project Number [1]	283745	Project Acronym [2]	CRISP

LIST OF WORK PACKAGES (WP)

WP Number [53]	WP Title	Type of activity [54]	Lead beneficiary number [55]	Person-months [56]	Start month [57]	End month [58]
WP 1	Management of the CRISP project	MGT	1	45.00	1	36
WP 2	Dissemination and Industry related activities	COORD	7	18.00	1	36
WP 3	Accelerators: Ion sources and beam diagnostics	RTD	5	173.00	1	36
WP 4	Accelerators: Access to SRF test infrastructures and quality assessment during SRF cavity production	RTD	8	384.00	1	36
WP 5	Accelerators: Fast ramped superconducting magnets	RTD	6	66.00	1	24
WP 6	Accelerators: Novel compact particle sources	RTD	9	58.00	1	36
WP 7	Accelerators: Solid State Amplifiers using cavity combiners	RTD	1	45.00	1	36
WP 8	Instruments & Experiments: Time resolved studies	RTD	8	159.00	1	36
WP 9	Instruments & Experiments: Tools for radioactive nuclear beam environment	RTD	6	92.00	1	36
WP 10	Instruments & Experiments: A common experimental approach for biological scattering	RTD	7	138.00	1	36
WP 11	Instruments & Experiments: Enhancement of neutron beams	RTD	7	161.00	1	36
WP 12	Detectors & DAQ: High-throughput detector data streaming	RTD	1	147.00	1	36
WP 13	Detectors & DAQ: CO2 cooling	RTD	3	140.00	1	36
WP 14	Detectors & DAQ: Innovative solutions for neutron and gamma-ray detectors	RTD	5	119.00	1	36
WP 15	Detectors & DAQ: Large-area thermal neutron detectors using 10B films	RTD	7	103.00	1	36
WP 16	IT & DM: Common User Identity System	COORD	16	85.00	1	36
WP 17	IT & DM: Metadata Management and Data Continuum	COORD	7	111.00	1	36
WP 18	IT & DM: High-speed Data Recording	RTD	8	114.00	1	36
WP 19	IT & DM: Distributed Data Infrastructure	RTD	3	128.00	1	36
			Total	2,286.00		

WT2:
List of Deliverables

Project Number [1]	283745	Project Acronym [2]	CRISP

List of Deliverables - to be submitted for review to EC

Delive-rable Number [61]	Deliverable Title	WP number [53]	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D1.1	Kick-off Meeting	1	1	0.50	O	PU	1
D1.2	Concept Poster	1	1	1.00	O	PU	8
D1.3	CRISP Annual Meeting	1	1	12.00	O	PU	12
D1.4	Notes of the Steering Committee meeting	1	1	0.25	O	CO	13
D1.5	CRISP Report first period	1	1	1.00	R	PP	18
D1.6	CRISP Annual Meeting	1	1	12.00	O	PU	24
D1.7	Notes of the Steering Committee meeting	1	1	0.25	O	CO	25
D1.8	Thematic Posters	1	1	1.00	O	PU	36
D1.9	CRISP Annual Meeting	1	1	13.75	O	PU	36
D1.10	Notes of the Steering Committee meeting	1	1	0.25	O	CO	36
D1.11	CRISP Report second period and Final Report	1	1	3.00	R	PP	36
D2.1	Establishment of public web site	2	7	3.00	O	PU	3
D2.2	Examples of published articles on the CRISP project	2	7	7.00	O	PU	36
D2.3	Summary report of the topical workshops	2	7	8.00	R	PU	36
D3.1	Bunch Shape Monitor realisation + report	3	5	86.00	R	PU	24

WT2:
List of Deliverables

Delive-rable Number [61]	Deliverable Title	WP number [53]	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D3.2	Test at accelerator and usage as diagnostics device approval + report	3	5	86.00	R	PU	36
D3.3	Report on the ECR ion source construction and commissioning	3	5	1.00	R	PU	36
D4.1	Report on performance of high-gradient aspects of QA as required for the ILC	4	8	96.00	R	PU	36
D4.2	Report on performance of industrially produced cavities for XFEL before and after retreatment	4	8	95.00	R	PU	36
D4.3	Experience report on upgraded diagnostic infrastructure for SRF cavity tests at CERN	4	8	95.00	R	PU	36
D4.4	Report on staff training, knowledge and experience transfer	4	8	95.00	R	PU	36
D4.5	Topic Meeting: Accelerators	4	8	0.50	O	RE	6
D4.6	Topic Meeting: Accelerators	4	8	0.50	O	CO	12
D4.7	Topic Meeting: Accelerators	4	8	0.50	O	CO	18
D4.8	Topic Meeting: Accelerators	4	8	0.50	O	CO	24
D4.9	Topic Meeting: Accelerators	4	8	0.50	O	CO	30

WT2:
List of Deliverables

Delive-rable Number [61]	Deliverable Title	WP number [53]	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D4.10	Topic Meeting: Accelerators	4	8	0.50	O	CO	36
D5.1	Manufacturing of a low loss cable	5	6	21.00	P	PU	12
D5.2	Manufacturing of the stainless steel collars completed	5	6	22.00	P	PU	12
D5.3	Collared coil for a curved dipole magnet	5	6	22.00	P	PU	18
D5.4	Final report on manufacturing and testing of the collared coil	5	6	1.00	R	PU	24
D6.1	Report on the design of a proton capture section based on conventional accelerator technology	6	9	29.00	R	PU	24
D6.2	Report on the design and implementation of a laser-driven electron source	6	9	29.00	R	PU	36
D7.1	75 kW / 352 MHz prototype SSA with cavity combiner	7	1	30.00	R	PU	36
D7.2	Design study for solid state amplifiers using cavity combiners for the partner projects	7	1	15.00	R	PU	36
D8.1	Report outlining common needs and instrumentation in time-resolved studies	8	8	79.00	R	PU	36
D8.2	Design report on the detailed status of the prototype	8	8	79.00	R	CO	36

WT2:
List of Deliverables

Delive-rable Number [61]	Deliverable Title	WP number [53]	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
	developments in the RTD subtasks T2.1-2.4.						
D9.1	Compilation of specification	9	6	46.00	R	CO	36
D9.2	Design drawing; delivery	9	6	46.00	R	CO	36
D10.1	Report on feasibility studies of common neutron x-ray procedures	10	7	46.00	R	PU	12
D10.2	Report on implementation of prototype systems for crystal, solution, and fibre diffraction studies.	10	7	46.00	R	CO	24
D10.3	Report on common interface packaging including case studies and dissemination activities.	10	7	46.00	R	PU	33
D11.1	Report on design and realisation of new neutron beam lines at the ILL	11	7	40.00	R	PU	30
D11.2	UCN Reports comparing calculated with measured performance	11	7	39.00	R	CO	33
D11.3	Report on supermirrors with reduced γ-ray production	11	7	40.00	R	CO	33
D11.4	Design Report for directional demonstrator	11	7	39.00	R	CO	36

WT2:
List of Deliverables

Delive-rable Number [61]	Deliverable Title	WP number [53]	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D11.5	Topic Meeting: Instruments & Experiments	11	7	0.50	O	RE	6
D11.6	Topic Meeting: Instruments & Experiments	11	7	0.50	O	RE	12
D11.7	Topic Meeting: Instruments & Experiments	11	7	0.50	O	RE	18
D11.8	Topic Meeting: Instruments & Experiments	11	7	0.50	O	RE	24
D11.9	Topic Meeting: Instruments & Experiments	11	7	0.50	O	RE	30
D11.10	Topic Meeting: Instruments & Experiments	11	7	0.50	O	RE	36
D12.1	Design report and proposal of hardware and software standards for timing interfaces	12	1	73.00	R	PU	36
D12.2	Design report and evaluation of methods for fast on-line reduction of high throughput data streams	12	1	74.00	R	PU	36
D13.1	Creation of web portal (CO2cool4PHYS)	13	3	3.00	O	PU	3
D13.2	Design and construction of cooling systems	13	3	134.00	R	PU	36
D13.3	Topic meeting: Detector & Data Acquisition	13	6	0.50	O	RE	6
D13.4	Topic meeting: Detector & Data Acquisition	13	6	0.50	O	RE	12
D13.5	Topic meeting: Detector & Data Acquisition	13	6	0.50	O	RE	18

WT2:
List of Deliverables

Delive-rable Number [61]	Deliverable Title	WP number [53]	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D13.6	Topic meeting: Detector & Data Acquisition	13	6	0.50	O	RE	24
D13.7	Topic meeting: Detector & Data Acquisition	13	6	0.50	O	RE	30
D13.8	Topic meeting: Detector & Data Acquisition	13	6	0.50	O	RE	36
D14.1	Report on the development of a PCIe pre-processing card	14	5	59.00	R	PU	36
D14.2	Report on measurements of neutron yield in various experimental conditions	14	5	60.00	R	PU	36
D15.1	Fabrication of a large area demonstrator and report on the results	15	7	103.00	R	PU	36
D16.1	AAI Architecture Document	16	16	3.00	O	PU	9
D16.2	AAI Prototype Solution	16	16	82.00	P	PU	23
D17.1	Metadata Catalogue Implementation and Deployment Report	17	7	55.00	R	PU	36
D17.2	Data Continuum Implementation and Deployment Report	17	7	56.00	R	PU	36
D18.1	Report on Prototype System and Future Work	18	8	114.00	R	PU	36
D19.1	Distributed Data Infrastructures Development Plan	19	3	62.50	O	RE	18

WT2:
List of Deliverables

Delive-rable Number [61]	Deliverable Title	WP number [53]	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D19.2	Distributed Data Infrastructures Evolution Roadmap	19	3	62.50	O	PU	30
D19.3	Topic Meeting: IT & Data Management	19	3	0.50	O	RE	6
D19.4	Topic Meeting: IT & Data Management	19	3	0.50	O	RE	12
D19.5	Topic Meeting: IT & Data Management	19	3	0.50	O	RE	18
D19.6	Topic Meeting: IT & Data Management	19	3	0.50	O	RE	24
D19.7	Topic Meeting: IT & Data Management	19	3	0.50	O	RE	30
D19.8	Topic Meeting: IT & Data Management	19	3	0.50	O	RE	36
			Total	2,285.00			

WT3:
Work package description

Project Number [1]	283745	Project Acronym [2]	CRISP

One form per Work Package

Work package number [53]	WP1	Type of activity [54]	MGT
Work package title	Management of the CRISP project		
Start month	1		
End month	36		
Lead beneficiary number [55]	1		

Objectives

Efficient management of the CRISP project, in particular carry out all administrative, legal and financial tasks related to the management of the Grant Agreement; to monitor the progress of the work, and ensure that appropriate actions are taken, within the four topical areas in collaboration with the Topic leaders; to ensure that all Commission rules are correctly communicated and applied by the members of the consortium. Implement the overall mission of CRISP. Foster and maintain a collegiate team spirit.

Description of work and role of partners

T1 Management of project monitoring: through continuously monitoring of performance, receiving regular updates of progress, progress chasing milestones and deliverables.
T2 Communication and interaction with the Commission: to ensure smooth information flow to and from the Commission.
T3 Management of CRISP internal communication: Establish and maintain an effective platform of CRISP internal communication, e.g. via a dedicated web platform, meetings, telephone conferences to ensure smooth implementation of the work and to maximise interaction and synergies both within the four topics and across them.
T4 Management of meetings (preparation, participation, notes): To include: the Kick-off meeting; Executive Group Meetings; Steering Committee Meetings; and CRISP Annual Meetings.
T5 Management of project reporting: Collection of all Deliverables and requested financial reports and monitoring of their compliance with financial rules; Preparation of the Annual Reports.
T6 Production of posters: publicising the concept of CRISP and its technical and scientific accomplishments to be displayed at EU events (ECRI, …) as well as other major events in the scientific fields covered by CRISP (Annual user meetings, big international conferences, ..)
T7 Production of short articles on the CRISP project for the existing periodic newsletters of the RIs: DESYintern, CERN Courier, ILL Bulletin,.....

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	ESRF	45.00
	Total	45.00

WT3:
Work package description

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D1.1	Kick-off Meeting	1	0.50	O	PU	1
D1.2	Concept Poster	1	1.00	O	PU	8
D1.3	CRISP Annual Meeting	1	12.00	O	PU	12
D1.4	Notes of the Steering Committee meeting	1	0.25	O	CO	13
D1.5	CRISP Report first period	1	1.00	R	PP	18
D1.6	CRISP Annual Meeting	1	12.00	O	PU	24
D1.7	Notes of the Steering Committee meeting	1	0.25	O	CO	25
D1.8	Thematic Posters	1	1.00	O	PU	36
D1.9	CRISP Annual Meeting	1	13.75	O	PU	36
D1.10	Notes of the Steering Committee meeting	1	0.25	O	CO	36
D1.11	CRISP Report second period and Final Report	1	3.00	R	PP	36
		Total	45.00			

Description of deliverables

D1.1) Kick-off Meeting: [month 1]

D1.2) Concept Poster: [month 8]

D1.3) CRISP Annual Meeting: [month 12]

D1.4) Notes of the Steering Committee meeting: [month 13]

D1.5) CRISP Report first period: [month 18]

D1.6) CRISP Annual Meeting: [month 24]

D1.7) Notes of the Steering Committee meeting: [month 25]

D1.8) Thematic Posters: [month 36]

D1.9) CRISP Annual Meeting: [month 36]

D1.10) Notes of the Steering Committee meeting: [month 36]

D1.11) CRISP Report second period and Final Report: [month 36]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments

WT3:
Work package description

Project Number [1]	283745	Project Acronym [2]	CRISP

One form per Work Package

Work package number [53]	WP2	Type of activity [54]	COORD
Work package title	Dissemination and Industry related activities		
Start month	1		
End month	36		
Lead beneficiary number [55]	7		

Objectives

Dissemination of the CRISP concepts and the results of the technical work to the CRISP participants, consortium members, the user communities, present and future industry partners, and science policy makers.
Organisation of topical workshops on industry related activities as a forum of exchange of experience.

Description of work and role of partners

T1 Overall coordination and management of dissemination activities.
T2 Establishment of a public web site, to be updated on a regular basis.
T3 Trigger articles on the CRISP project in specialised media widely read by the scientific community and policy makers.
T4 Participation in events organised by the (national) funding bodies of the CRISP consortium with focus on connections to industry (examples are Holland@CERN, Germany@ESO, STFC@ESRF/ILL, …)
T5 Organisation of topical workshops for CRISP partners to exchange experience in relation to industry (procurement issues, technology transfer, ….). This shall as well establish links to the activities going on within other INFRA-2011 projects.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	ESRF	0.50
2	DESY	0.50
3	CERN	0.50
4	ESS	0.50
5	GANIL	0.50
6	GSI	0.50
7	ILL	10.50
8	XFEL	0.50
9	ROMA1	0.50
10	FORTH	0.50
11	IST	0.50
12	INFN	0.50
13	MTA SZTAKI	0.50
14	IFIN-HH	0.50

WT3:
Work package description

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
15	UOXF.DB	0.50
16	PSI	0.50
	Total	18.00

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D2.1	Establishment of public web site	7	3.00	O	PU	3
D2.2	Examples of published articles on the CRISP project	7	7.00	O	PU	36
D2.3	Summary report of the topical workshops	7	8.00	R	PU	36
		Total	18.00			

Description of deliverables

D2.1) Establishment of public web site: [month 3]

D2.2) Examples of published articles on the CRISP project: [month 36]

D2.3) Summary report of the topical workshops: [month 36]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments

WT3:
Work package description

Project Number [1]	283745	Project Acronym [2]	CRISP

One form per Work Package

Work package number [53]	WP3	Type of activity [54]	RTD
Work package title	Accelerators: Ion sources and beam diagnostics		
Start month	1		
End month	36		
Lead beneficiary number [55]	5		

Objectives

Develop and realise improved ion source prototypes and beam diagnostics for SPIRAL2 (GANIL) and FAIR (GSI); common device for non-intercepting bunch shape measurement; new prototype of high performance ECR Ion source fitting common FAIR and SPIRAL2 requirements.

Description of work and role of partners

T1 (BSM): Non-intercepting bunch shape monitors (GANIL, GSI)
BSMs allow precise measurements of longitudinal beam parameters and are essential for commissioning and tuning of the SPIRAL2 Linac and p-Linac at FAIR, in particular for the adaption of the longitudinal bunch length to the linac acceptance. SPIRAL2 and FAIR's p-LINAC parameters are quite similar, thus the potential for a common development is very large. Due to the high beam power, a novel non-intercepting or semi-interceptive monitor design is foreseen. Other projects like ESS and IFMIF will benefit from this development. Both GANIL and GSI have long-term experience in Linac beam diagnostics and have existing setups to perform beam tests with the novel BSM.
T1.1 Evaluation of technical solutions and definition of a conceptual design
T1.2 Construction and production of BSM
T1.3 Laboratory based component and full prototype tests without beam
T1.4 Approval of the functionality and use as an advanced diagnostics device
T2 (ECR): New prototype of 28 GHz ECR Ion Source (GANIL, GSI)
FAIR and SPIRAL2 facilities need both a high performance ECR ion source (ECRIS) to create the high intensity beams required by the new generation nuclear physics experiments. The development of such sources is very challenging (see also FP6-EURONS – ISIBHI), so there is a high concern about the availability of a high performance ECRIS at FAIR and GANIL. New ECRIS prototype R&D will be started in an effort to define a common ECRIS design suitable for SPIRAL2 and FAIR. The design of the source will be usable by other European labs, like CERN, and clones could be built with a reduced price.
T2.1 Design the magnetic structure of the ECR ion source
T2.2 Simulate Ion creation in the source and beam extraction
T2.3 Design the mechanical parts of the source
T2.4 Order magnets to industry and follow industrial works
T2.5 Assemble and commission the source

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
5	GANIL	116.00
6	GSI	57.00
	Total	173.00

WT3:
Work package description

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D3.1	Bunch Shape Monitor realisation + report	5	86.00	R	PU	24
D3.2	Test at accelerator and usage as diagnostics device approval + report	5	86.00	R	PU	36
D3.3	Report on the ECR ion source construction and commissioning	5	1.00	R	PU	36
		Total	173.00			

Description of deliverables

D3.1) Bunch Shape Monitor realisation + report: [month 24]

D3.2) Test at accelerator and usage as diagnostics device approval + report: [month 36]

D3.3) Report on the ECR ion source construction and commissioning: [month 36]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS17	Report on the ECR ion source conceptual design	5	24	Requirements document approved by all WP members

WT3:
Work package description

Project Number [1]	283745	Project Acronym [2]	CRISP

One form per Work Package

Work package number [53]	WP4	Type of activity [54]	RTD
Work package title	Accelerators: Access to SRF test infrastructures and quality assessment during SRF cavity production		
Start month	1		
End month	36		
Lead beneficiary number [55]	8		

Objectives

SRF Accelerator Structures for ESS, ILC, SLHC (LHC upgrade) and XFEL, based on optimised cavity surface treatment, using advanced test and preparation infrastructure and state-of-the art diagnostic tools; knowledge transfer as well as training in cryogenics and SRF technology.

Description of work and role of partners

T1 Management of the Accelerator Topic (DESY)
T2 (QA) + T2 (RT): Quality assurance and Re-treatment for industrial cavity production
DESY has implemented a well-defined cavity process for industrial production of cavities suitable for the European XFEL. Detailed diagnostics and modest supple¬men¬tal treatment of the industry produced cavities will be performed and will be essential to guarantee the high performance important for the European XFEL and for any other European large scale SRF projects, such as the European Spallation Source ESS. At the same time International Linear Collider (ILC) R&D will benefit. CERN and DESY have accumulated know-how in the SRF quality assurance field, and will both profit from a common approach and development, in conjunction with the ESS and other projects. All future similar projects world-wide will directly benefit from new quality standards.
T3 (IS) Infrastructure upgrade at CERN (CERN)
The SM18 test facility at CERN was constructed 20 years ago and has since been used for superconducting magnet and RF tests. All SRF tests have involved 4 K technology. To be able to perform the characterisation of a first 4 cavities cryomodule designed for the ESS and the CERN-SPL, the test infrastructure will be upgraded to allow for 2K operation. Today’s standards in terms of ultra-clean work and modern diagnostics tools will be used. CERN will provide the basic test infrastructure for these projects.
T4 (KT) Knowledge Transfer (ESS, CERN)
ESS will join with CERN to build and test a 704 MHz elliptical cavity cryomodule prototype operating at 2 K. A test environment suited to the needs of both projects, and other future European projects will be provided. These activities will enhance the synergies between ESS, CERN and DESY projects, avoiding unnecessary duplication of effort and fostering the provision of common standards. A common test programme will provide essential training in RF and cryogenics technology to newly hired junior staff at ESS and elsewhere. ESS will strongly profit from the experience of an industrialised cavity and module fabrication gathered at European XFEL

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
2	DESY	60.00
3	CERN	144.00
4	ESS	18.00
8	XFEL	162.00
	Total	384.00

WT3:
Work package description

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D4.1	Report on performance of high-gradient aspects of QA as required for the ILC	8	96.00	R	PU	36
D4.2	Report on performance of industrially produced cavities for XFEL before and after retreatment	8	95.00	R	PU	36
D4.3	Experience report on upgraded diagnostic infrastructure for SRF cavity tests at CERN	8	95.00	R	PU	36
D4.4	Report on staff training, knowledge and experience transfer	8	95.00	R	PU	36
D4.5	Topic Meeting: Accelerators	8	0.50	O	RE	6
D4.6	Topic Meeting: Accelerators	8	0.50	O	CO	12
D4.7	Topic Meeting: Accelerators	8	0.50	O	CO	18
D4.8	Topic Meeting: Accelerators	8	0.50	O	CO	24
D4.9	Topic Meeting: Accelerators	8	0.50	O	CO	30
D4.10	Topic Meeting: Accelerators	8	0.50	O	CO	36
		Total	384.00			

Description of deliverables

D4.1) Report on performance of high-gradient aspects of QA as required for the ILC: [month 36]

D4.2) Report on performance of industrially produced cavities for XFEL before and after retreatment: [month 36]

D4.3) Experience report on upgraded diagnostic infrastructure for SRF cavity tests at CERN: [month 36]

D4.4) Report on staff training, knowledge and experience transfer: Report on staff training, knowledge and experience transfer in cryogenics, SRF technology and module fabrication between CERN / XFEL and ESS [month 36]

D4.5) Topic Meeting: Accelerators: [month 6]

D4.6) Topic Meeting: Accelerators: [month 12]

D4.7) Topic Meeting: Accelerators: [month 18]

D4.8) Topic Meeting: Accelerators: [month 24]

D4.9) Topic Meeting: Accelerators: [month 30]

D4.10) Topic Meeting: Accelerators: [month 36]

WT3:
Work package description

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead beneficiary number	Delivery date from Annex I [60]	Comments
MS13	Optimum cavity diagnostics for industrially produced cavities at XFEL defined	8	18	Requirements document approved by all WP members

WT3:
Work package description

Project Number [1]	283745	Project Acronym [2]	CRISP

One form per Work Package

Work package number [53]	WP5	Type of activity [54]	RTD
Work package title	Accelerators: Fast ramped superconducting magnets		
Start month	1		
End month	24		
Lead beneficiary number [55]	6		

Objectives

Ongoing R&D activities at GSI and INFN aim at design and construction of fast ramped (1T/s) superconducting 4.5 T dipole magnets for the SIS300 synchrotron of FAIR. This ramp-rate is orders of magnitude higher than the one used in any existing superconducting synchrotron (e.g. HERA, LHC). Based on a first GSI/INFN prototype a further increased field quality has to be achieved and mechanical issues as e.g. applying an optimum pre-stress to the coil has to be solved. Furthermore resistance control for low-loss conductor development is of highest importance as well as the improved heat transfer from the cable to the helium for all CERN upgrade plans.

Description of work and role of partners

T1. Conductor development incl. new insulation scheme and testing (CERN, INFN, GSI)
In ramped superconductors AC-heat losses are produced which have a negative effect on their performance. For this, the development of new low loss conductors and of new insulation schemes which provide a better cooling of the cable are indispensable for the further development of high ramped superconducting magnets. Based on the experience of the participating institutes a low loss cable with an improved insulation scheme will be built. This cable shall later on be used in the SIS300 synchrotron of FAIR.
T2. Construction of a collared coil of the curved dipole magnet (INFN, GSI)
The manufacturing of a collared coil is an important step towards a complete magnet. Magnetic measurements at this stage already allow making predictions about the field quality of the magnet. Therefore a decision can be taken whether this coil is suitable for a complete magnet or whether a new coil with slightly modified parameter is needed.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
3	CERN	18.00
6	GSI	18.00
12	INFN	30.00
	Total	66.00

List of deliverables

Deliverable Number [61]	Deliverable Title	Lead beneficiary number	Estimated indicative person-months	Nature [62]	Dissemination level [63]	Delivery date [64]
D5.1	Manufacturing of a low loss cable	6	21.00	P	PU	12

WT3:
Work package description

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D5.2	Manufacturing of the stainless steel collars completed	6	22.00	P	PU	12
D5.3	Collared coil for a curved dipole magnet	6	22.00	P	PU	18
D5.4	Final report on manufacturing and testing of the collared coil	6	1.00	R	PU	24
		Total	66.00			

Description of deliverables

D5.1) Manufacturing of a low loss cable: Manufacturing of a low loss cable with new insulation scheme suitable for FAIR´s SIS300 and CERN´s injector chain upgrade [month 12]

D5.2) Manufacturing of the stainless steel collars completed: [month 12]

D5.3) Collared coil for a curved dipole magnet: Collared coil for a curved dipole magnet suitable for operation in FAIR´s SIS300 (Bmax=4.5T, dB/dt=1T/s) [month 18]

D5.4) Final report on manufacturing and testing of the collared coil: [month 24]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS9	New loss cable successfully tested	6	15	Test results reported and approved to/by all WP members

WT3:
Work package description

Project Number [1]	283745	Project Acronym [2]	CRISP

One form per Work Package

Work package number [53]	WP6	Type of activity [54]	RTD
Work package title	Accelerators: Novel compact particle sources		
Start month	1		
End month	36		
Lead beneficiary number [55]	9		

Objectives

Design of compact sources for high brightness electron beams and hybrid laser-driven acceleration schemes for electrons and ions, thus opening new perspectives in the field of compact sources for high brightness electron beams and developing secondary particle sources from high intensity lasers coupled to advanced high brightness linacs for ELI and EuroFEL.

Description of work and role of partners

T1 Compact X-band accelerator (ROMA1, INFN)
X-band particle accelerators benefit from the reduced size, higher accelerating field with respect to the standard S-band accelerators nowadays used for high brightness electron beam production.
T1.1 Design of the hybrid gun from an electromagnetic and beam dynamics point of view.
T1.2 Low power RF characterisation of a preliminary copper prototype of the hybrid gun.
T1.3 Mechanical design, realisation of vacuum tight device and characterisation.
T2 Laser-driven beamlines (ROMA1, IST, INFN)
We intend to develop two different coupling mechanisms for realising this kind of hybrid acceleration scheme: 1) The coupling of a laser-generated proton beam to conventional accelerator devices, 2) The controlled injection, acceleration, transport and diagnostic of laser-driven electron beam (both, electron beams generated by laser-plasma acceleration and electron beams generated by photo-injectors and accelerated by laser-driven plasmas). These acceleration schemes such as the compact X-band accelerator are foreseen to be implemented on research infrastructures such as e.g. ELI, EuroFEL etc. Preliminary tests are performed on laser facilities devoted to laser-driven acceleration such as the SPARC/LI2FE test facility, the Apollon/LULI facility or other suitable facilities
worldwide. The activity includes the following subtasks:
T2.1 To optimise/control the proton source and to design a first capture section based on conventional accelerator technology which includes also high rep. rate targets, micro-lens based focusing systems and beam matching solenoids to be implemented in ELI-Beamlines.
T2.2 To design – using simulation codes - a plasma channel for electron acceleration on ELI (3-5 cm long) for 1-2 GeV energies; design (for implementation) of a plasma source capable of producing plasma channels for electron acceleration of around 1 meter long adequate for electron acceleration in ELI with 50 J laser beams for 10-15 GeV energy gains.
T2.3 To design (for implementation) a possible improved source and transport system to deliver the electron beam to diagnostic station and perform preliminary tests

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
9	ROMA1	48.00
11	IST	10.00
12	INFN	0.00

WT3:
Work package description

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
	Total	58.00

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D6.1	Report on the design of a proton capture section based on conventional accelerator technology	9	29.00	R	PU	24
D6.2	Report on the design and implementation of a laser-driven electron source	9	29.00	R	PU	36
		Total	58.00			

Description of deliverables

D6.1) Report on the design of a proton capture section based on conventional accelerator technology: [month 24]

D6.2) Report on the design and implementation of a laser-driven electron source: [month 36]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS12	Report on beam dynamics calculations and design of the prototype	9	18	Requirements document approved by all WP members

WT3:
Work package description

Project Number [1]	283745	Project Acronym [2]	CRISP

One form per Work Package

Work package number [53]	WP7	Type of activity [54]	RTD
Work package title	Accelerators: Solid State Amplifiers using cavity combiners		
Start month	1		
End month	36		
Lead beneficiary number [55]	1		

Objectives

LDMOS-FET transistors are drawing highest attention for high radiofrequency (RF) power generation. They cover a broad frequency range from 70 to 1300 MHz for accelerator applications requiring 10 to 200 kW of RF power. The goal of this project is to validate an advanced concept to combine the power of, typically, one hundred RF transistor modules by means of a single cavity combiner, instead of current implementations that use networks of coaxial combiners. This would result in a more compact design with improved reliability, enhanced flexibility in the number of RF modules that can be combined, and in lower fabrication costs. Significant impact is expected on the way the large projects ESRFUP, CERN SPS, CERN LHC, CERN SLHC, ESS, and FAIR will envisage the implementation of the high power RF generators that are needed to power their accelerating RF cavities.

Description of work and role of partners

T1 (PT) 75 kW / 352 MHz prototype solid state amplifiers (SSA) using a cavity combiner (ESRF)
ESRF invests 535 k€ to implement and test a 75 kW prototype. The prototype is needed to validate the overall concept and to optimise a number of mechanical design aspects such as tight RF coupling tolerances required for a high combining efficiency, easy and reliable exchange of RF transistor modules, distribution of electrical power and cooling water, and an adjustable output power coupler for an optimised operation with a variable number of RF modules.
T1.1 Preparatory phase: finish design and test of a 10 kW / 352 MHz prototype cavity combiner, combining a limited number of 18 RF power inputs.
T1.2 Design, fabrication and low power test of a full 75 kW/352 MHz prototype cavity combiner.
T1.3 Design, fabrication and test of 140 RF modules operating at 600 W / 352 MHz.
T1.4 Assembly and test of a full 75 kW prototype SSA, combining 132 RF modules.
T2 (DS) Design study for SSA using a cavity combiner, for applications at 108 MHz, 200 MHz, 325 MHz, 352 MHz, 400 MHz, 704 MHz, 800 MHz in pulsed or CW operation (ALL)
Regular progress reports allow optimising technical choices within task T1, in particular in view of an application at different frequencies as required for ESRF, CERN (SLHC, LHC and SPS), ESS, and GSI.
T2.1 Specifications for SSA at 108 MHz, 200 MHz, 325 MHz, 352 MHz, 400 MHz, 704 MHz, 800 MHz in pulsed or CW operation.
T2.2 Detailed electromagnetic design studies for different frequencies in pulsed or CW operation.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	ESRF	36.00
3	CERN	3.00
4	ESS	3.00
6	GSI	3.00
	Total	45.00

WT3:
Work package description

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D7.1	75 kW / 352 MHz prototype SSA with cavity combiner	1	30.00	R	PU	36
D7.2	Design study for solid state amplifiers using cavity combiners for the partner projects	1	15.00	R	PU	36
		Total	45.00			

Description of deliverables

D7.1) 75 kW / 352 MHz prototype SSA with cavity combiner: 75 kW / 352 MHz prototype SSA with cavity combiner – Test results at 75 kW – Final design report including specification and set of drawings. [month 36]

D7.2) Design study for solid state amplifiers using cavity combiners for the partner projects: Design study for solid state amplifiers using cavity combiners for the partner projects: detailed specification, feasibility study and detailed electromagnetic design for each frequency and each application in pulsed or CW operation. [month 36]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS4	Full characterisation of a 10 kW / 352 MHz prototype SSA using a cavity combiner	1	12	Prototype results report approved by all WP members
MS10	Detailed specification and preliminary design of SSA using cavity combiners for the partner projects	1	18	Requirements document approved by all WP members

WT3:
Work package description

Project Number [1]	283745	Project Acronym [2]	CRISP

One form per Work Package

Work package number [53]	WP8	Type of activity [54]	RTD
Work package title	Instruments & Experiments: Time resolved studies		
Start month	1		
End month	36		
Lead beneficiary number [55]	8		

Objectives

This project seeks to develop new scientific tools for optimised sample excitation and emitted x-ray detection in ultrafast pump-probe experiments at the typically high repetition rates existing at synchrotron (ESRF) and FEL facilities (EuroFEL, ESRF). These include ultrafast auto/cross correlators (fs and sub-fs time resolution), wavelength-changing devices (UV-vis) and wavelength dispersive x-ray spectrometers.

Description of work and role of partners

T1 RTD Startup: Building up on previous pilot workshops the goal of the present task is to identify and develop common needs, solutions and instrumentation for time-resolved experiments at storage ring based facilities and free electron laser x-ray sources, but also at neutron facilities (ESS and ILL), where time domain studies are within reach with their planned upgrades/characteristics.
T2 RTD: Samples need to be excited with specific wavelengths throughout the ultraviolet to visible light range. This requires wavelength tuning devices for solid state based lasers, which are not commercially available for high power lasers (e.g., 20 W, 5 MHz). Key repetition rates of ESRF (16 bunch), EuroFEL (FLASH@DESY) and XFEL (burst mode operation) lie in the 1-6 MHz range, thus demanding a suitable noncollinear optical parametric amplifier (NOPA). Likewise, there is a need for the development of single-shot (i.e. wavelength dispersive) x-ray detection schemes at these high repetition rates, as well as precise timing devices between two independent light sources:
T2.1 Develop a prototype NOPA at XFEL which is seeded by the XFEL MHz laser system. NOPA and seed laser are highly mobile, and can be implemented at ESRF, EuroFEL(FLASH@DESY), XFEL, etc. for onsite pump-probe experiments.
T2.2 Develop a single-shot beam arrival monitor with cross correlator. This device should operate with the different wavelengths available from T3.1.2.1 (above) and with FEL radiation.
T2.3 Develop at ESRF an instrument for single-shot x-ray emission spectroscopy (XES) with large acceptance for high efficiency and position sensitive x-ray detection that is compatible with MHz excitation. The design will be adapted for applications at XFEL and EuroFEL (FLASH@DESY).
T2.4 Design a versatile non-linear XUV-x-ray cross-, auto-correlator with >100as resolution, based on ion/EL detection, covering needs of ELI, EuroFEL and XFEL. The project will be initiated with a 10-100 eV HHG source at FORTH (ELI).

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	ESRF	32.00
2	DESY	32.00
4	ESS	1.00
6	GSI	1.00
7	ILL	1.00

WT3:
Work package description

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
8	XFEL	50.00
10	FORTH	42.00
	Total	159.00

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D8.1	Report outlining common needs and instrumentation in time-resolved studies	8	79.00	R	PU	36
D8.2	Design report on the detailed status of the prototype developments in the RTD subtasks T2.1-2.4.	8	79.00	R	CO	36
		Total	158.00			

Description of deliverables

D8.1) Report outlining common needs and instrumentation in time-resolved studies: Report outlining common needs and instrumentation in time-resolved studies at synchrotron, neutron, and free electron laser facilities. [month 36]

D8.2) Design report on the detailed status of the prototype developments in the RTD subtasks T2.1-2.4.: Design report on the detailed status of the prototype developments in the RTD subtasks T2.1-2.4. [month 36]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS11	Report on the status of the cross correlators	8	18	Validation by all the WP members of the technical values obtained for the time resolution

WT3:
Work package description

Project Number [1]	283745	Project Acronym [2]	CRISP

One form per Work Package

Work package number [53]	WP9	Type of activity [54]	RTD
Work package title	Instruments & Experiments: Tools for radioactive nuclear beam environment		
Start month	1		
End month	36		
Lead beneficiary number [55]	6		

Objectives

The aim of the collaboration between the RIs FAIR and SPIRAL2 is to define common strategies, concepts, system designs and related tooling with respect to high-radiation areas. The developments will limit the facilities investments. They will permit to increase the running time of the experiments by an efficient maintenance concept and to reduce the radioactive waste management of the facilities.

Description of work and role of partners

Description of work
T1 Remote handling (RH) mountable/dismountable media supplies (GSI, GANIL) (such as electricity, cooling water, gases for detectors, compressed air, exhausts air, etc.) of the various beam-line components. Design of special tools driven by power manipulators or master-slave manipulators or specific tools to operate these media connectors.
T2 Fail-safe diagnostics (GSI, GANIL) a tool to validate the beam characteristics which is required for the safety authority but also to prevent improper system functioning or damage of sensitive components by miss-operating or any other circuit malfunction.
T3 Survey & Alignment (GSI, GANIL) in radiation dominated zones where human access is either completely forbidden or restricted in time; Definition of specific equipment to ensure the alignment/measurement between different beam-line equipments. This task is a follow up of the FP6 program (NUSTAR2 within the DIRAC Design Study)
T4 Remote handling (RH) (GSI, GANIL) capable vacuum-tight radiation resistant sealing, large-area pillow-seals, quick disconnecting solutions based on metal sealing/couplings (stainless steel links/flanges), waste compatibility.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
4	ESS	1.00
5	GANIL	36.00
6	GSI	54.00
7	ILL	1.00
	Total	92.00

WT3:
Work package description

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D9.1	Compilation of specification	6	46.00	R	CO	36
D9.2	Design drawing; delivery	6	46.00	R	CO	36
		Total	92.00			

Description of deliverables

D9.1) Compilation of specification: [month 36]

D9.2) Design drawing; delivery: [month 36]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS14	Solution studies	6	18	Possibilities to implement the proposed solutions
MS23	Prototype validations (if applicable)	6	36	Validation by all the WP members of the technical values of the prototype

WT3:
Work package description

Project Number [1]	283745	Project Acronym [2]	CRISP

One form per Work Package

Work package number [53]	WP10	Type of activity [54]	RTD
Work package title	Instruments & Experiments: A common experimental approach for biological scattering		
Start month	1		
End month	36		
Lead beneficiary number [55]	7		

Objectives

This work package will implement a common experimental approach for biological neutron and x-ray instrumentation. Such an action will optimise the efficiency and exploitation of ESFRI-funded developments relevant to this area, and widen their scope and impact to the European scientific community. It will develop and implement an interface from sample to analysis that will be essentially identical regardless of the nature of the beam source, making user access conceptually and physically transparent to the large (and rapidly growing) biological user communities in Europe. Specific goals will be to develop a common experimental approach to (a) enhance greatly access to neutron techniques by the larger community of synchrotron x-ray users (b) optimise joint exploitation of neutron and x-ray results (c) build up interactions linking neutron and synchrotron x-ray approaches with emerging biological work at DESY and XFEL (d) develop a framework in this area that will prepare the ground for the arrival of the ESS neutron source at Lund. The project will boost the exposure of the large x-ray community to neutron scattering approaches.

Description of work and role of partners

T1 Common experimental framework for neutron and x-ray diffraction experiments on biological crystals. A four-way standardisation of approaches for biological crystallography will be engineered between ILL, ESRF and DESY. Input from ESS and XFEL will be provided in relation to development of new instrumentation planned at Lund, resp. Hamburg.
T2 Common experimental framework for neutron and x-ray diffraction experiments (static and time-resolved) on biological solutions and nanocrystal suspensions. ILL, ESRF and DESY will devise a common approach for the way in which biological solution scattering studies are handled. ESS will contribute to this development and exploit the conclusions for the development of its new small-angle-scattering instruments.
T3 Common experimental framework for neutron and x-ray diffraction experiments on biological fibres. ILL, ESRF and DESY will develop a framework for neutron and x-ray diffraction studies of filamentous molecules that are normally studied as fibres - including molecules such as the amyloid structures associated with many neurodegenerative conditions. ESS involvement will occur in relation to the instrumentation being planned.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	ESRF	52.00
2	DESY	32.00
4	ESS	1.00
7	ILL	52.00
8	XFEL	1.00
	Total	138.00

WT3:
Work package description

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D10.1	Report on feasibility studies of common neutron x-ray procedures	7	46.00	R	PU	12
D10.2	Report on implementation of prototype systems for crystal, solution, and fibre diffraction studies.	7	46.00	R	CO	24
D10.3	Report on common interface packaging including case studies and dissemination activities.	7	46.00	R	PU	33
		Total	138.00			

Description of deliverables

D10.1) Report on feasibility studies of common neutron x-ray procedures: Report on feasibility studies of common neutron x-ray procedures for crystal, solution, and fibre diffraction studies. [month 12]

D10.2) Report on implementation of prototype systems for crystal, solution, and fibre diffraction studies.: Report on implementation of prototype systems for crystal, solution, and fibre diffraction studies. [month 24]

D10.3) Report on common interface packaging including case studies and dissemination activities.: [month 33]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS15	Feasibility assessment of prototype implementation for crystal, solution, and fibre systems.	7	18	Prototype running in one neutron/x-ray diffractometer

WT3:
Work package description

Project Number [1]	283745	Project Acronym [2]	CRISP

One form per Work Package

Work package number [53]	WP11	Type of activity [54]	RTD
Work package title	Instruments & Experiments: Enhancement of neutron beams		
Start month	1		
End month	36		
Lead beneficiary number [55]	7		

Objectives

Gains, exceeding 2 orders of magnitude in instrument performance can be achieved provided sufficient work is invested into enhancing the performance of neutron sources, moderators and beam delivery systems, which will lead to qualitatively new science. ESS as the next-generation European neutron user facility will work together with the ILL, the world's leading neutron centre to achieve this aim which will become beneficial to all European neutron facilities (TUM, PSI, ISIS, BNC, HZB, and others) and to some extent to particle physics and heavy ions facilities of CRISP. This work brings forward the work completed under the ILL 20/20 project. Three specific areas are targeted:

Description of work and role of partners

T1 Management of the Instruments & Experiments Topic (ILL)
T2 Directional moderators (ESS, ILL): To address the problem posed by existing neutron moderators which emit neutrons with roughly equal intensity in all directions, while only those emitted towards a beam tube are actually useful for neutron experiments. ESS: Provides funding for building a demonstrator. ILL: Provides expertise in neutronics simulations, and access to its own beam lines.
T3 UCN sources (ESS, ILL): To maintain ILL's lead as the provider of the most intense ultra-cold neutrons (UCN) for fundamental physics research; to scale up the volume of the super-fluid helium-4 UCN source and to implement new instruments. ESS: Develops a design optimising the UCN performance of the target and moderators. ILL: Builds a large-volume UCN source and provides a dedicated beam line.
T4 Neutron delivery systems (ESS, ILL): To produce innovative methods and design for the transport of neutrons beams to experiments. The work will address (a) radiation safety & neutron background, (b) neutron transport performance and thereby scientific output and (c) cost and long term maintainability. ESS: Development of neutron supermirrors with reduced γ-ray production. ILL: Design & realisation of cost effective guide mechanics, vacuum housing, shielding, re-alignment system. Radiation life test of supermirror on alternative substrates (metallic...). Identifying competitive suppliers.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
4	ESS	48.00
6	GSI	1.00
7	ILL	112.00
	Total	161.00

WT3:
Work package description

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D11.1	Report on design and realisation of new neutron beam lines at the ILL	7	40.00	R	PU	30
D11.2	UCN Reports comparing calculated with measured performance	7	39.00	R	CO	33
D11.3	Report on supermirrors with reduced γ-ray production	7	40.00	R	CO	33
D11.4	Design Report for directional demonstrator	7	39.00	R	CO	36
D11.5	Topic Meeting: Instruments & Experiments	7	0.50	O	RE	6
D11.6	Topic Meeting: Instruments & Experiments	7	0.50	O	RE	12
D11.7	Topic Meeting: Instruments & Experiments	7	0.50	O	RE	18
D11.8	Topic Meeting: Instruments & Experiments	7	0.50	O	RE	24
D11.9	Topic Meeting: Instruments & Experiments	7	0.50	O	RE	30
D11.10	Topic Meeting: Instruments & Experiments	7	0.50	O	RE	36
		Total	161.00			

Description of deliverables

D11.1) Report on design and realisation of new neutron beam lines at the ILL: [month 30]

D11.2) UCN Reports comparing calculated with measured performance: [month 33]

D11.3) Report on supermirrors with reduced γ-ray production: [month 33]

D11.4) Design Report for directional demonstrator: [month 36]

D11.5) Topic Meeting: Instruments & Experiments: [month 6]

D11.6) Topic Meeting: Instruments & Experiments: [month 12]

D11.7) Topic Meeting: Instruments & Experiments: [month 18]

D11.8) Topic Meeting: Instruments & Experiments: [month 24]

D11.9) Topic Meeting: Instruments & Experiments: [month 30]

D11.10) Topic Meeting: Instruments & Experiments: [month 36]

WT3:
Work package description

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments

WT3:
Work package description

Project Number [1]	283745	Project Acronym [2]	CRISP

One form per Work Package

Work package number [53]	WP12	Type of activity [54]	RTD
Work package title	Detectors & DAQ: High-throughput detector data streaming		
Start month	1		
End month	36		
Lead beneficiary number [55]	1		

Objectives

To select, define and implement techniques and methods to reduce, transmit and process high throughput data streams produced by advanced detectors under development for the participating RIs XFEL, ESRFUP, EuroFEL (DESY), ELI (IFIN-HH), and SKA (UOXF.DB). The main goals are to ease the design and construction of these complex detectors and simplify their deployment across facilities as well as reducing the investment and operation costs:
• by selecting and defining reusable hardware and software interfaces and components.
• by investigating the use of FPGAs, GPUs and multi-core processors in flexible, user-friendly software/firmware stream-processing frameworks that implement data rejection, editing and compression as well as pipeline reduction.
• by identifying and assessing emerging hardware standards for future DAQ applications
The proper use and exploitation of the data generated by these new detectors requires also a highly optimised computing infrastructure as well as advanced data management strategies. This is out of the scope of this work package but is one of the main objectives of WP17 and WP18.

Description of work and role of partners

T1 Define of a common timing interface for detectors for pulsed light sources. Design and prototype a hardware and software API. Proposal of a standard definition of timing signals. (DESY, IFIN-HH and XFEL)
T2 Define conventions for the design of scalable multilink data acquisition systems for area detectors by evaluation of the various alternatives, selection of data transfer protocols and data packaging formats. Build a prototype implementing the main key components. (ESRF, XFEL)
T3 Evaluate techniques for the rejection of non-valid data frames in light pulse applications at the detector front-end to avoid frame digitisation and reduce data payload. Consider the use of VETO-like dedicated signals available from other auxiliary detectors. (DESY and XFEL)
T4 Design and evaluate data rejection and compression schemes of images using FPGA and GPU processing hardware immediately after or on the detector head electronics or in a next downstream computing layer. (DESY, XFEL, and UOXF.DB)
T5 Extend the stream-processing frameworks implemented on SKA pathfinders to accept data inputs from XFEL detectors and evaluate 'plug-and-play' capabilities for pipeline processing. Build a prototype framework. (UOXF.DB, XFEL)

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	ESRF	36.00
2	DESY	14.00
8	XFEL	44.00
14	IFIN-HH	17.00
15	UOXF.DB	36.00

WT3:
Work package description

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
	Total	147.00

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D12.1	Design report and proposal of hardware and software standards for timing interfaces	1	73.00	R	PU	36
D12.2	Design report and evaluation of methods for fast on-line reduction of high throughput data streams	1	74.00	R	PU	36
		Total	147.00			

Description of deliverables

D12.1) Design report and proposal of hardware and software standards for timing interfaces: Design report and proposal of hardware and software standards for timing interfaces for pulsed light sources and multilink data acquisition systems for area detectors. [month 36]

D12.2) Design report and evaluation of methods for fast on-line reduction of high throughput data streams: [month 36]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments

WT3:
Work package description

Project Number [1]	283745	Project Acronym [2]	CRISP

One form per Work Package

Work package number [53]	WP13	Type of activity [54]	RTD
Work package title	Detectors & DAQ: CO2 cooling		
Start month	1		
End month	36		
Lead beneficiary number [55]	3		

Objectives

An efficient and lightweight cooling system is a component of paramount importance for advanced particle detectors, notably trackers requiring low-temperature operation. For example, CO2 two-phase cooling has been chosen as baseline for the upgrade of the tracking systems of the LHC detectors at CERN. It is an important line of research also for the FAIR (GSI), EuroFEL (DESY), and XFEL partners, as it is the most appealing option for the cooling of the silicon imaging and tracking detectors under design in these RIs, featuring high-density electronics. CO2 has excellent thermo-dynamical properties, is much cheaper than fluorocarbons, used up to now in most low-temperature cooling applications, and, most importantly, it is much more environmentally friendly. Fluorocarbons are strong greenhouse gases which for a 100-year time horizon have a global warming potential 3-4 orders of magnitude higher than CO2. For the reasons exposed, CO2 two-phase cooling is likely to be the technological choice for most future particle tracking detectors, as well as for the refrigeration industry in general, while fluorocarbon fluids will be progressively banned by increasingly stringent environmental regulations. Due to its excellent properties for micro-channels, CO2 cooling is also the best candidate technology for research on the integration of cooling and microelectronics.

Description of work and role of partners

The common work plan shall facilitate the adoption of CO2 cooling in different applications, with a large-scale optimisation in the use of resources, and possible future benefits for European Industry. The tasks are:
T1 Management of the Detector & Data Acquisition Topic (GSI)
T2 Laboratory measurements to characterise the process in the relevant domain of CO2 heat transfer and two-phase flow, and improve the existing theoretical models accordingly. (CERN, DESY, GSI)
T3 Study of different options and materials to realise reliable lightweight thermal joints between heat sources and miniature cooling pipes. (CERN, DESY, GSI)
T4 Qualification of pipe fittings and connection techniques for high-pressure operation. (CERN, DESY, GSI)
T5 Study of design options for CO2 cooling plants and their control system, qualification of main components, analysis of safety issues and failure modes. (CERN, DESY, GSI)
T6 Design and construction of cooling units for laboratory activities, to be used as common development platforms in the different participating laboratories. (CERN, DESY, GSI)
T7 Dissemination of information on design rules, system components and material qualification. (CERN, DESY, GSI, XFEL)

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
2	DESY	19.00
3	CERN	72.00
6	GSI	48.00
8	XFEL	1.00
	Total	140.00

WT3:
Work package description

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D13.1	Creation of web portal (CO2cool4PHYS)	3	3.00	O	PU	3
D13.2	Design and construction of cooling systems	3	134.00	R	PU	36
D13.3	Topic meeting: Detector & Data Acquisition	6	0.50	O	RE	6
D13.4	Topic meeting: Detector & Data Acquisition	6	0.50	O	RE	12
D13.5	Topic meeting: Detector & Data Acquisition	6	0.50	O	RE	18
D13.6	Topic meeting: Detector & Data Acquisition	6	0.50	O	RE	24
D13.7	Topic meeting: Detector & Data Acquisition	6	0.50	O	RE	30
D13.8	Topic meeting: Detector & Data Acquisition	6	0.50	O	RE	36
		Total	140.00			

Description of deliverables

D13.1) Creation of web portal (CO2cool4PHYS): Creation of web portal (CO2cool4PHYS) for sharing and dissemination of design rules and qualification of system components, thermal joint techniques and materials [month 3]

D13.2) Design and construction of cooling systems: Design and construction of standardised, self-contained, compact, small and medium-size cooling systems providing refrigeration power from 100W up to 1-2 kW at -40°C, to be used as common development platforms in the different participating laboratories [month 36]

D13.3) Topic meeting: Detector & Data Acquisition: [month 6]

D13.4) Topic meeting: Detector & Data Acquisition: [month 12]

D13.5) Topic meeting: Detector & Data Acquisition: [month 18]

D13.6) Topic meeting: Detector & Data Acquisition: [month 24]

D13.7) Topic meeting: Detector & Data Acquisition: [month 30]

D13.8) Topic meeting: Detector & Data Acquisition: [month 36]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS16	Report on process characterisation, system design rules, and thermal joint techniques	3	18	Process and design validated by a user group

WT3:
Work package description

Project Number [1]	283745	Project Acronym [2]	CRISP

One form per Work Package

Work package number [53]	WP14	Type of activity [54]	RTD
Work package title	Detectors & DAQ: Innovative solutions for neutron and gamma-ray detectors		
Start month	1		
End month	36		
Lead beneficiary number [55]	5		

Objectives

Development of innovative electronics and algorithms for the new advanced European ☐-ray tracking (AGATA, EXOGAM2, PARIS) and neutron arrays/detectors (ERBSS, NEDA) in a close collaboration between the RI projects ELI (INFN, IFIN-HH), FAIR (GSI) and SPIRAL2 (GANIL). The subsequent tests of electronics and calibration/post-processing ERBSS should permit them to be ready for the first experiments at FAIR/NUSTAR and SPIRAL2.

Description of work and role of partners

T1 Innovative digital electronics for advanced gamma and neutron arrays
Digital electronics is a key part of modern gamma-ray and neutron detector arrays. Its main components are the front-end electronics, the early processing of the signals and the trigger decision tree. The digital electronics modules developed for the AGATA and EXOGAM2 advanced Ge-detector arrays were successfully tested in demonstrator experiments, showing that the concept of a full digital chain is feasible and improves considerably the performance of the arrays. The production of these electronics for the future implementation of the arrays in SPIRAL2 and FAIR/NUSTAR requires investment in capital and efforts to integrate hard- and firmware, optimising the production costs, increasing the integration, migrating to new platforms and allowing a broader use of these electronics for fast-scintillator neutron and high-energy gamma-ray detectors like NEDA, PARIS, and others. (GANIL, GSI, INFN, IFIN-HH)

T2 Extended Range Bonner sphere spectrometer (ERBSS)
The ERBSS is widely used in the accelerator community and consists of seven polyethylene spheres with diameters from 2 to 12 in. The central thermal neutron detector is a cylindrical 6LiI(Eu) scintillator with 4 mm diam. and 4 mm height. Using the different response functions of the spheres and unfolding the data using the recently developed FRUIT code allows reconstructing the spectrum with high precision over large neutron energies, e.g. 1.5 meV to 1.16 GeV. The ERBSS and its calibration/post-processing shall be used for measuring neutron production obtained in different conditions. These include neutron production in different accelerator facilities in order to verify safety and radioprotection constraints. They are also potentially useful to study laser-driven neutron production. Our aim is to standardise the use of ERBSS, make it accessible to different facilities and to test there the neutron production (ELI, EuroFEL, SPIRAL2, etc). This will require adaptation of the post-processing software (called FRUIT) to different measuring conditions. (GANIL, GSI, INFN, IFIN-HH, ROMA1)

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
5	GANIL	64.00
6	GSI	14.00
8	XFEL	1.00
9	ROMA1	9.00

WT3:
Work package description

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
12	INFN	12.00
14	IFIN-HH	19.00
	Total	119.00

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D14.1	Report on the development of a PCIe pre-processing card	5	59.00	R	PU	36
D14.2	Report on measurements of neutron yield in various experimental conditions	5	60.00	R	PU	36
		Total	119.00			

Description of deliverables

D14.1) Report on the development of a PCIe pre-processing card: Report on the development of a PCIe pre-processing card ensuring full compatibility with the various systems [month 36]

D14.2) Report on measurements of neutron yield in various experimental conditions: [month 36]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS18	Report: design of the conversion mezzanine board and prototype of the GTS carrier card	5	24	Design validated by a user group; prototype tested and validated in the laboratory.
MS19	Report containing a user-friendly measuring method simulation and a new post-processing software	5	24	Measurement procedure and post-processing software validated in a simulation study.

WT3:
Work package description

Project Number [1]	283745	Project Acronym [2]	CRISP

One form per Work Package

Work package number [53]	WP15	Type of activity [54]	RTD
Work package title	Detectors & DAQ: Large-area thermal neutron detectors using 10B films		
Start month	1		
End month	36		
Lead beneficiary number [55]	7		

Objectives

Neutron instrumentation for condensed matter studies strongly depends on the availability of LADs (Large Area Detectors). Nowadays, most of them are using 3He as the neutron convertor because its high detection efficiency and low gamma sensitivity. But 3He is not available anymore and several planned instruments in neutron institutes have been postponed. Developing 3He -free LADs has been identified as a priority to support the development of new instruments, in particular at ESS and ILL. This work package aims at building a LAD demonstrator based on the “10B thin film Multi-grid” design developed during ILL20/20, and to demonstrate that this technique is competitive in performance and cost with the 3He detectors.

Description of work and role of partners

The following tasks are taking forward innovative design studies completed under the preparatory phase of ILL 20/20 to demonstrate the accessibility of this technique in 5 years from now.
T1 Boron film fabrication study: ESS will study PVD and CVD coating processes and characterise the samples with thin film equipment. ILL will do simulation calculation of the Boron films, and develop the method to do the absorption and uniformity characterisation on a neutron monochromatic beam line. (ESS, ILL)
T2 Detector design study with a small prototype: ILL will study by calculations, Monte Carlo simulation and 3D drawings different geometries based on the Multi-Grid design. ILL will fabricate a small size prototype, equipped with readout electronics to be tested on a neutron beam. ESS will participate to the test of the prototype, and to the data analysis. (ESS, ILL)
T3 Large Area detector study: ESS will investigate the problem of mass production of 10B films optimised in terms of quality and cost. The results of T2 will be used to define a large area demonstrator, whose size will be sufficient to tackle most of the difficulties inherent to a real instrument, including operation in a vacuum chamber. (ESS, ILL)
T4 Demonstrator fabrication: ESS and ILL will build the demonstrator. ESS will be responsible for the B-coated blades, and ILL for the rest of the detector. Tests will be performed in conditions close to those of real time-of-flight instruments. (ESS, ILL)

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
4	ESS	42.00
5	GANIL	1.00
7	ILL	60.00
	Total	103.00

WT3:
Work package description

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D15.1	Fabrication of a large area demonstrator and report on the results	7	103.00	R	PU	36
		Total	103.00			

Description of deliverables

D15.1) Fabrication of a large area demonstrator and report on the results: [month 36]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS5	Fabrication of a prototype and report on preliminary results	7	12	Film production technique and quality validated; Laboratory prototype tested and validated.
MS20	Report on the large area detector design study	7	24	Design study validated by a user group.

WT3:
Work package description

Project Number [1]	283745	Project Acronym [2]	CRISP

One form per Work Package

Work package number [53]	WP16	Type of activity [54]	COORD
Work package title	IT & DM: Common User Identity System		
Start month	1		
End month	36		
Lead beneficiary number [55]	16		

Objectives

Develop and deploy a pan-European system for unique identification (Authentication and authorisation infrastructure: AAI) of users at the infrastructures of the participating RIs EuroFEL (PSI), ESRF, ESS, FAIR (GSI), ILL, and XFEL for the management of local and remote access to facilities, experiments, data, and IT resources.

Description of work and role of partners

Authentication systems are the basis for most of the services for the users at large infrastructures and local systems are already in place at the research institutes hosting the participating RIs. The goal of this work package is to add on top of these local systems a new pan-European layer, which will allow a multitude of novel, additional functionalities, especially remote access to data and other IT resources. This layer will fit in the existing and planned IT landscapes of the participating RIs and these developments will be harmonised with their respective policy regulations.
The project will identify and exploit synergies with related activities in research and education (e.g. TERENA, eduGAIN, various Shibboleth activities, and the Internet2 middleware funded by the US NSF), e-infrastructure projects and similar projects in the commercial (banking, security) and government sectors.
T1 Review (policy and technology) and documentation of the existing AAI approaches and future requests of the participating partners. Identification of cooperation and harmonisation possibilities with related projects. Based on this, propose the architecture of an AAI concept for this community (all participate)
T2 Workshop with project and facility authentication and authorisation experts, where this architecture is discussed. Experts from related academic and commercial activities are invited. Revise the project based on the feedback from the workshop. Develop the final architecture document as basis for the future work (all participate)
T3 Production of a prototype solution for an AAI system permitting local and remote access to data and IT resources. Provide possibilities to test this solution (all participate)
T4 Workshop with project and facility experts, where the solution is presented and discussed. Presentation and decision of the future deployment strategy. Deployment of the defined solution at the partner facilities (all participate).

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	ESRF	8.50
4	ESS	8.00
6	GSI	22.00
7	ILL	7.50
8	XFEL	9.00
16	PSI	30.00
	Total	85.00

WT3:
Work package description

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D16.1	AAI Architecture Document	16	3.00	O	PU	9
D16.2	AAI Prototype Solution	16	82.00	P	PU	23
		Total	85.00			

Description of deliverables

D16.1) AAI Architecture Document: [month 9]

D16.2) AAI Prototype Solution: [month 23]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS1	AAI Proposed Architecture Document	16	6	Architecture document approved by all WP members
MS22	AAI Initial Deployment	16	30	AAI system available to the participating RI users

WT3:
Work package description

Project Number [1]	283745	Project Acronym [2]	CRISP

One form per Work Package

Work package number [53]	WP17	Type of activity [54]	COORD
Work package title	IT & DM: Metadata Management and Data Continuum		
Start month	1		
End month	36		
Lead beneficiary number [55]	7		

Objectives

The main objectives of this work package are (1) to choose and implement metadata management and metadata mining services and (2) to establish an environment permitting a data continuum from raw data to publications across the participating RIs ILL, ESRF, SLHC at CERN, and EuroFEL (DESY).

Description of work and role of partners

From the metadata management perspective, this work package will address two main issues: (1) evaluate and choose metadata catalogue solutions with a query language for metadata mining and (2) adapt and implement them at each of the participating institutes. The metadata catalogues will store a minimal set of metadata tags for experiments to enable searching for experiments which have been conducted by type, sample, author, institute etc. In order to ensure a working implementation, the metadata catalogue will be based on an existing implementation like ICAT adapted to fit the needs of the participating institutes. The metadata catalogues will be connected together so that users see one single reference when they search for experiments. The following tasks are planned:
T1 Evaluate and adapt metadata catalogues according to the RIs requirements;
T2 Prototype of data mining on metadata services;
T3 Deploy and integrate metadata catalogues at each participating institute;
Persistent Identifiers are commonly used since many years to identify publications (ISBN, DOI). Some initiatives for identifying experimental data have been recently set up. The aim of such projects is to seal the links between the publication and the raw data sets. However none of these projects take into account the specificities of the project RIs. The research infrastructures that participate in this work package will be data producers, and therefore face the need to persistently identify their experimental data sets. To address this problem the following tasks are planned:
T4 Identify the PI system which best fits the needs of the partners;
T5 Elaborate a data publication process satisfying data policies of the participating RIs;
T6 Implement the persistent Identifier technology;
T7 Cooperate with the major publishers to ensure that publications, issued from data generated at the facilities, provide reference to the experimental data sets.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	ESRF	48.00
2	DESY	6.00
3	CERN	12.00
7	ILL	45.00
	Total	111.00

WT3:
Work package description

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D17.1	Metadata Catalogue Implementation and Deployment Report	7	55.00	R	PU	36
D17.2	Data Continuum Implementation and Deployment Report	7	56.00	R	PU	36
		Total	111.00			

Description of deliverables

D17.1) Metadata Catalogue Implementation and Deployment Report: [month 36]

D17.2) Data Continuum Implementation and Deployment Report: [month 36]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS6	Proposed Metadata Catalogue Architecture Document	7	12	Architecture document approved by all WP members
MS7	Proposed Data Continuum Architecture Document	7	12	Architecture document approved by all WP members

WT3:
Work package description

Project Number [1]	283745	Project Acronym [2]	CRISP

One form per Work Package

Work package number [53]	WP18	Type of activity [54]	RTD
Work package title	IT & DM: High-speed Data Recording		
Start month	1		
End month	36		
Lead beneficiary number [55]	8		

Objectives

The objective of this work package is to provide solutions for (1) high-speed recording of data to permanent storage and archive, and (2) optimised and secured access to data using standard protocols for the RIs XFEL, ESRF, EuroFEL (DESY), ESS, ILL, and SKA (UOXF.DB).

Description of work and role of partners

Rapid developments and increasingly complex experimental techniques in many scientific domains, as well as the use of highly advanced instruments and detectors, result in extremely high data rates that exceed tens of GB/s. Cost-effective recording of data to storage systems and archives becomes an increasingly complex and challenging task, especially if real-time data reduction is not an option. In many cases, data originate at multiple sources and must be merged to provide a consistent set of information suitable for further processing. Ensuring the integrity of data while it is transferred, stored, and archived becomes difficult when dealing with multiple data streams, very high data rates and large accumulated data volumes. Together with various privacy policies placed on the experiment data, optimal access to data requires the careful selection of appropriate and scalable tools, and the verification of the usability of available network, storage, archive, and data access standards. To address these issues, the following tasks will be tackled:
T1 Assembling requirements and use cases for high-speed data recording to storage systems and data archives. Reviewing available technologies, selecting tools, and investigating their usability for defined use cases
T2 Collecting requirements for data protection and understanding their implications for high-speed data recording and data access. Evaluating existing data-protection schemes, including simple and advanced access-control models (i.e. NFSv4 and POSIX ACLs).
T3 Defining and selecting use case applications requiring high throughput data access. Evaluating the usability of standard access protocols, such as NFS4.1 (pNFS), as well as their implementations and integration issues with storage and computing infrastructures for the selected flagship applications. Identifying possible improvements and optimisations. Defining data-access architecture.
T4 Implementing the prototype system for the selected data-protection and data-access models according to the architecture design. Re-evaluating and refining the system architecture. Improving implementation. Deploying the prototype system and demonstrating its functionality.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	ESRF	12.00
2	DESY	19.00
4	ESS	8.00
5	GANIL	1.00
7	ILL	2.00
8	XFEL	36.00

WT3:
Work package description

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
15	UOXF.DB	36.00
	Total	114.00

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D18.1	Report on Prototype System and Future Work	8	114.00	R	PU	36
		Total	114.00			

Description of deliverables

D18.1) Report on Prototype System and Future Work: [month 36]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS3	Requirements for Data Recording to Storage Media	8	9	Requirements document approved by all WP members
MS8	Identification of Data Protection requirements and Storage Implications	8	12	Requirements document approved by all WP members
MS21	High-speed Data Access Architecture Design	8	24	Architecture document approved by all WP members

WT3:
Work package description

Project Number [1]	283745	Project Acronym [2]	CRISP

One form per Work Package

Work package number [53]	WP19	Type of activity [54]	RTD
Work package title	IT & DM: Distributed Data Infrastructure		
Start month	1		
End month	36		
Lead beneficiary number [55]	3		

Objectives

Analyse the existing distributed data infrastructures from the network and technology perspective. Plan and experiment their evolution to support the expanding data management needs of the set of participating research infrastructures. SLHC at CERN, EuroFEL (DESY), FAIR (GSI), ELI (MTA-SZTAKI) and SKA (UOXF.DB) participate to all tasks.

Description of work and role of partners

There are a wide variety of capabilities required across the participating RIs for which a single model of data access will not meet all their needs. The basic services of connectivity and the underlying e-Infrastructure technologies should provide a common platform on which a variety of data management services can be built to address these different access needs. In particular, the issues around potential use of commercial, private, and public cloud providers must be understood and the related policy issues addressed. This work package will analyse how the existing e-infrastructures must evolve to meet these needs by looking at the following aspects:
T1 Management of the Information Technology & Data management Topic (CERN)
T2 Networking: Work with network providers (National Research and Education Networks) TERENA, GEANT3 project, etc.) to produce a roadmap for networking that ensures the connectivity and bandwidth required by all participating RIs. Understand and take into account the expected changes in the models of data access during the time until the RIs instruments come online.
T3 Data management: Analyze the needs of the participating RIs for data management services and tools. Identify, develop, and deploy an initial set of prototype services and tools to support the identified common requirements. Work directly with other e-infrastructure projects (EUDAT, EMI, EGI-InSPIRE) to ensure a coherent strategy for these tools.
T4 Evolution of distributed e-infrastructures: Follow the evolution of the existing grid technology-based e-infrastructures from a long-term perspective to create a sustainable model capable of supporting the workflows and use cases of the different participating RIs. Identify the commonalities and common use cases for future production distributed data infrastructures.
To implement these three aspects, the work package will gather and analyse requirements from the participating RIs in terms of distributed data management and how they map on the existing e-Infrastructures and other ESFRI clusters. From this analysis, provide a plan for the deployment of prototype data management tools and services during the project lifetime. Taking into account the results of this prototype deployment, develop a roadmap for the use of data management facilities beyond the end of the project.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
2	DESY	19.00
3	CERN	34.00
6	GSI	27.00
13	MTA SZTAKI	12.00

WT3:
Work package description

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
15	UOXF.DB	36.00
	Total	128.00

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D19.1	Distributed Data Infrastructures Development Plan	3	62.50	O	RE	18
D19.2	Distributed Data Infrastructures Evolution Roadmap	3	62.50	O	PU	30
D19.3	Topic Meeting: IT & Data Management	3	0.50	O	RE	6
D19.4	Topic Meeting: IT & Data Management	3	0.50	O	RE	12
D19.5	Topic Meeting: IT & Data Management	3	0.50	O	RE	18
D19.6	Topic Meeting: IT & Data Management	3	0.50	O	RE	24
D19.7	Topic Meeting: IT & Data Management	3	0.50	O	RE	30
D19.8	Topic Meeting: IT & Data Management	3	0.50	O	RE	36
		Total	128.00			

Description of deliverables

D19.1) Distributed Data Infrastructures Development Plan: [month 18]

D19.2) Distributed Data Infrastructures Evolution Roadmap: [month 30]

D19.3) Topic Meeting: IT & Data Management: [month 6]

D19.4) Topic Meeting: IT & Data Management: [month 12]

D19.5) Topic Meeting: IT & Data Management: [month 18]

D19.6) Topic Meeting: IT & Data Management: [month 24]

D19.7) Topic Meeting: IT & Data Management: [month 30]

D19.8) Topic Meeting: IT & Data Management: [month 36]

WT3:
Work package description

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead beneficiary number	Delivery date from Annex I [60]	Comments
MS2	Physics Use Cases and Requirements for Data Infrastructures	3	9	Requirements document approved by all WP members

WT4:
List of Milestones

Project Number [1]	283745	Project Acronym [2]	CRISP

List and Schedule of Milestones

Milestone number [59]	Milestone name	WP number [53]	Lead beneficiary number	Delivery date from Annex I [60]	Comments
MS1	AAI Proposed Architecture Document	WP16	16	6	Architecture document approved by all WP members
MS2	Physics Use Cases and Requirements for Data Infrastructures	WP19	3	9	Requirements document approved by all WP members
MS3	Requirements for Data Recording to Storage Media	WP18	8	9	Requirements document approved by all WP members
MS4	Full characterisation of a 10 kW / 352 MHz prototype SSA using a cavity combiner	WP7	1	12	Prototype results report approved by all WP members
MS5	Fabrication of a prototype and report on preliminary results	WP15	7	12	Film production technique and quality validated; Laboratory prototype tested and validated.
MS6	Proposed Metadata Catalogue Architecture Document	WP17	7	12	Architecture document approved by all WP members
MS7	Proposed Data Continuum Architecture Document	WP17	7	12	Architecture document approved by all WP members
MS8	Identification of Data Protection requirements and Storage Implications	WP18	8	12	Requirements document approved by all WP members
MS9	New loss cable successfully tested	WP5	6	15	Test results reported and approved to/by all WP members
MS10	Detailed specification and preliminary design of SSA using cavity combiners for the partner projects	WP7	1	18	Requirements document approved by all WP members
MS11	Report on the status of the cross correlators	WP8	8	18	Validation by all the WP members of the technical values obtained for the time resolution

WT4:
List of Milestones

Milestone number [59]	Milestone name	WP number [53]	Lead beneficiary number	Delivery date from Annex I [60]	Comments
MS12	Report on beam dynamics calculations and design of the prototype	WP6	9	18	Requirements document approved by all WP members
MS13	Optimum cavity diagnostics for industrially produced cavities at XFEL defined	WP4	8	18	Requirements document approved by all WP members
MS14	Solution studies	WP9	6	18	Possibilities to implement the proposed solutions
MS15	Feasibility assessment of prototype implementation for crystal, solution, and fibre systems.	WP10	7	18	Prototype running in one neutron/x-ray diffractometer
MS16	Report on process characterisation, system design rules, and thermal joint techniques	WP13	3	18	Process and design validated by a user group
MS17	Report on the ECR ion source conceptual design	WP3	5	24	Requirements document approved by all WP members
MS18	Report: design of the conversion mezzanine board and prototype of the GTS carrier card	WP14	5	24	Design validated by a user group; prototype tested and validated in the laboratory.
MS19	Report containing a user-friendly measuring method simulation and a new post-processing software	WP14	5	24	Measurement procedure and post-processing software validated in a simulation study.
MS20	Report on the large area detector design study	WP15	7	24	Design study validated by a user group.
MS21	High-speed Data Access Architecture Design	WP18	8	24	Architecture document approved by all WP members
MS22	AAI Initial Deployment	WP16	16	30	AAI system available to the participating RI users
MS23	Prototype validations (if applicable)	WP9	6	36	Validation by all the WP members of the technical values of the prototype

WT5:
Tentative schedule of Project Reviews

Project Number [1]	283745	Project Acronym [2]	CRISP

Tentative schedule of Project Reviews

Review number [65]	Tentative timing	Planned venue of review	Comments, if any
RV 1	20	Brussels	

WT6:
Project Effort by Beneficiary and Work Package

Project Number [1]	283745	Project Acronym [2]	CRISP

Indicative efforts (man-months) per Beneficiary per Work Package

Beneficiary number and short-name	WP 1	WP 2	WP 3	WP 4	WP 5	WP 6	WP 7	WP 8	WP 9	WP 10	WP 11	WP 12	WP 13	WP 14	WP 15	WP 16	WP 17	WP 18	WP 19	Total per Beneficiary
1 - ESRF	45.00	0.50	0.00	0.00	0.00	0.00	36.00	32.00	0.00	52.00	0.00	36.00	0.00	0.00	0.00	8.50	48.00	12.00	0.00	270.00
2 - DESY	0.00	0.50	0.00	60.00	0.00	0.00	0.00	32.00	0.00	32.00	0.00	14.00	19.00	0.00	0.00	0.00	6.00	19.00	19.00	201.50
3 - CERN	0.00	0.50	0.00	144.00	18.00	0.00	3.00	0.00	0.00	0.00	0.00	0.00	72.00	0.00	0.00	0.00	12.00	0.00	34.00	283.50
4 - ESS	0.00	0.50	0.00	18.00	0.00	0.00	3.00	1.00	1.00	1.00	48.00	0.00	0.00	0.00	42.00	8.00	0.00	8.00	0.00	130.50
5 - GANIL	0.00	0.50	116.00	0.00	0.00	0.00	0.00	0.00	36.00	0.00	0.00	0.00	0.00	64.00	1.00	0.00	0.00	1.00	0.00	218.50
6 - GSI	0.00	0.50	57.00	0.00	18.00	0.00	3.00	1.00	54.00	0.00	1.00	0.00	48.00	14.00	0.00	22.00	0.00	0.00	27.00	245.50
7 - ILL	0.00	10.50	0.00	0.00	0.00	0.00	0.00	1.00	1.00	52.00	112.00	0.00	0.00	0.00	60.00	7.50	45.00	2.00	0.00	291.00
8 - XFEL	0.00	0.50	0.00	162.00	0.00	0.00	0.00	50.00	0.00	1.00	0.00	44.00	1.00	1.00	0.00	9.00	0.00	36.00	0.00	304.50
9 - ROMA1	0.00	0.50	0.00	0.00	0.00	48.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.00	0.00	0.00	0.00	0.00	0.00	57.50
10 - FORTH	0.00	0.50	0.00	0.00	0.00	0.00	0.00	42.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.50
11 - IST	0.00	0.50	0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.50
12 - INFN	0.00	0.50	0.00	0.00	30.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.00	0.00	0.00	0.00	0.00	0.00	42.50
13 - MTA SZTAKI	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.00	12.50
14 - IFIN-HH	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.00	0.00	19.00	0.00	0.00	0.00	0.00	0.00	36.50
15 - UOXF.DB	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.00	0.00	0.00	0.00	0.00	0.00	36.00	36.00	108.50
16 - PSI	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.00	0.00	0.00	0.00	30.50
Total	45.00	18.00	173.00	384.00	66.00	58.00	45.00	159.00	92.00	138.00	161.00	147.00	140.00	119.00	103.00	85.00	111.00	114.00	128.00	2,286.00

WT7:
Project Effort by Activity type per Beneficiary

Project Number [1]	283745	Project Acronym [2]	CRISP

Indicative efforts per Activity Type per Beneficiary

Activity type	Part. 1 ESRF	Part. 2 DESY	Part. 3 CERN	Part. 4 ESS	Part. 5 GANIL	Part. 6 GSI	Part. 7 ILL	Part. 8 XFEL	Part. 9 ROMA1	Part. 10 FORTH	Part. 11 IST	Part. 12 INFN	Part. 13 MTA SZT	Part. 14 IFIN-HH
1. RTD/Innovation activities														
WP 3	0.00	0.00	0.00	0.00	116.00	57.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WP 4	0.00	60.00	144.00	18.00	0.00	0.00	0.00	162.00	0.00	0.00	0.00	0.00	0.00	0.00
WP 5	0.00	0.00	18.00	0.00	0.00	18.00	0.00	0.00	0.00	0.00	0.00	30.00	0.00	0.00
WP 6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.00	0.00	10.00	0.00	0.00	0.00
WP 7	36.00	0.00	3.00	3.00	0.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WP 8	32.00	32.00	0.00	1.00	0.00	1.00	1.00	50.00	0.00	42.00	0.00	0.00	0.00	0.00
WP 9	0.00	0.00	0.00	1.00	36.00	54.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WP 10	52.00	32.00	0.00	1.00	0.00	0.00	52.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
WP 11	0.00	0.00	0.00	48.00	0.00	1.00	112.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WP 12	36.00	14.00	0.00	0.00	0.00	0.00	0.00	44.00	0.00	0.00	0.00	0.00	0.00	17.00
WP 13	0.00	19.00	72.00	0.00	0.00	48.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
WP 14	0.00	0.00	0.00	0.00	64.00	14.00	0.00	1.00	9.00	0.00	0.00	12.00	0.00	19.00
WP 15	0.00	0.00	0.00	42.00	1.00	0.00	60.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WP 18	12.00	19.00	0.00	8.00	1.00	0.00	2.00	36.00	0.00	0.00	0.00	0.00	0.00	0.00
WP 19	0.00	19.00	34.00	0.00	0.00	27.00	0.00	0.00	0.00	0.00	0.00	0.00	12.00	0.00
Total Research	168.00	195.00	271.00	122.00	218.00	223.00	228.00	295.00	57.00	42.00	10.00	42.00	12.00	36.00
2. Demonstration activities														
Total Demo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

WT7:
Project Effort by Activity type per Beneficiary

3. Consortium Management activities														
WP 1	45.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Management	45.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Work Packages for Coordination activities														
WP 2	0.50	0.50	0.50	0.50	0.50	0.50	10.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
WP 16	8.50	0.00	0.00	8.00	0.00	22.00	7.50	9.00	0.00	0.00	0.00	0.00	0.00	0.00
WP 17	48.00	6.00	12.00	0.00	0.00	0.00	45.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Coordination	57.00	6.50	12.50	8.50	0.50	22.50	63.00	9.50	0.50	0.50	0.50	0.50	0.50	0.50

4. Other activities														
Total other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Work Packages for Support activities														
Total Support	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Total	270.00	201.50	283.50	130.50	218.50	245.50	291.00	304.50	57.50	42.50	10.50	42.50	12.50	36.50

WT7:
Project Effort by Activity type per Beneficiary

Activity type	Part. 15 UOXF.DB	Part. 16 PSI	Total
1. RTD/Innovation activities			
WP 3	0.00	0.00	173.00
WP 4	0.00	0.00	384.00
WP 5	0.00	0.00	66.00
WP 6	0.00	0.00	58.00
WP 7	0.00	0.00	45.00
WP 8	0.00	0.00	159.00
WP 9	0.00	0.00	92.00
WP 10	0.00	0.00	138.00
WP 11	0.00	0.00	161.00
WP 12	36.00	0.00	147.00
WP 13	0.00	0.00	140.00
WP 14	0.00	0.00	119.00
WP 15	0.00	0.00	103.00
WP 18	36.00	0.00	114.00
WP 19	36.00	0.00	128.00
Total Research	108.00	0.00	2,027.00
2. Demonstration activities			
Total Demo	0.00	0.00	0.00
3. Consortium Management activities			
WP 1	0.00	0.00	45.00
Total Management	0.00	0.00	45.00

WT7:
Project Effort by Activity type per Beneficiary

Work Packages for Coordination activities			
WP 2	0.50	0.50	18.00
WP 16	0.00	30.00	85.00
WP 17	0.00	0.00	111.00
Total Coordination	0.50	30.50	214.00

4. Other activities			
Total other	0.00	0.00	0.00

Work Packages for Support activities			
Total Support	0.00	0.00	0.00

Total	108.50	30.50	2,286.00

WT8:
Project Effort and costs

Project Number [1]	283745	Project Acronym [2]	CRISP

Project efforts and costs

Beneficiary number	Beneficiary short name	Estimated eligible costs (whole duration of the project)							Total receipts (€)	Requested EU contribution (€)
		Effort (PM)	Personnel costs (€)	Subcontracting (€)	Other Direct costs (€)	Indirect costs OR lump sum, flat-rate or scale-of-unit (€)	Access costs (€)	Total costs		
1	ESRF	270.00	1,052,070.00	68,000.00	145,300.00	718,422.00	0.00	1,983,792.00	0.00	1,588,000.00
2	DESY	201.50	1,031,670.00	6,000.00	378,630.00	846,180.00	0.00	2,262,480.00	0.00	1,697,000.00
3	CERN	283.50	1,066,370.00	6,000.00	187,980.00	752,610.00	0.00	2,012,960.00	0.00	1,498,500.00
4	ESS	130.50	580,880.00	4,000.00	48,520.00	377,640.00	0.00	1,011,040.00	0.00	757,500.00
5	GANIL	218.50	483,370.00	6,000.00	406,860.00	534,138.00	0.00	1,430,368.00	0.00	1,072,500.00
6	GSI	245.50	712,730.00	5,000.00	190,440.00	469,330.00	0.00	1,377,500.00	0.00	1,071,000.00
7	ILL	291.00	1,307,270.00	6,000.00	58,170.00	819,264.00	0.00	2,190,704.00	0.00	1,599,500.00
8	XFEL	304.50	526,960.00	6,000.00	61,670.00	353,178.00	0.00	947,808.00	0.00	704,500.00
9	ROMA1	57.50	297,530.00	6,000.00	88,530.00	231,636.00	0.00	623,696.00	0.00	467,500.00
10	FORTH	42.50	119,000.00	0.00	43,822.00	113,050.00	0.00	275,872.00	0.00	206,500.00
11	IST	10.50	35,210.00	0.00	6,970.00	25,308.00	0.00	67,488.00	0.00	50,000.00
12	INFN	42.50	2,800.00	4,000.00	392,390.00	237,114.00	0.00	636,304.00	0.00	476,000.00
13	MTA SZTAKI	12.50	36,880.00	0.00	5,300.00	25,308.00	0.00	67,488.00	0.00	50,000.00
14	IFIN-HH	36.50	112,800.00	0.00	9,310.00	24,422.00	0.00	146,532.00	0.00	111,000.00
15	UOXF.DB	108.50	311,700.00	2,000.00	66,030.00	226,638.00	0.00	606,368.00	0.00	453,500.00
16	PSI	30.50	166,360.00	0.00	16,820.00	36,636.00	0.00	219,816.00	0.00	196,000.00
Total		2,286.00	7,843,600.00	119,000.00	2,106,742.00	5,790,874.00	0.00	15,860,216.00	0.00	11,999,000.00

WT9:
Summary of transnational access / service provision per installation

Project Number [1]	283745	Project Acronym [2]	CRISP

Summary of transnational access / service provision per installation

Part. num.	Org. short name	Short name of infrastructure	Installation									
			Num.	Name	Operator country code	Unit of access	Total Estimated costs	Estimated unit cost	Min. quantity of access to be provided	Access costs charged to the GA	Est. num. of users	Est. num. of proj.
Grand Total							0.00			0.00		

1. Project number

The project number has been assigned by the Commission as the unique identifier for your project. It cannot be changed. The project number **should appear on each page of the grant agreement preparation documents (part A and part B)** to prevent errors during its handling.

2. Project acronym

Use the project acronym as given in the submitted proposal. It cannot be changed unless agreed so during the negotiations. The same acronym **should appear on each page of the grant agreement preparation documents (part A and part B)** to prevent errors during its handling.

53. Work Package number

Work package number: WP1, WP2, WP3, ..., WPn

54. Type of activity

For all FP7 projects each work package must relate to one (and only one) of the following possible types of activity (only if applicable for the chosen funding scheme – must correspond to the GPF Form Ax.v):

• **RTD/INNO =** Research and technological development including scientific coordination - applicable for Collaborative Projects and Networks of Excellence

• **DEM =** Demonstration - applicable for collaborative projects and Research for the Benefit of Specific Groups

• **MGT =** Management of the consortium - applicable for all funding schemes

• **OTHER =** Other specific activities, applicable for all funding schemes

• **COORD =** Coordination activities – applicable only for CAs

• **SUPP =** Support activities – applicable only for SAs

55. Lead beneficiary number

Number of the beneficiary leading the work in this work package.

56. Person-months per work package

The total number of person-months allocated to each work package.

57. Start month

Relative start date for the work in the specific work packages, month 1 marking the start date of the project, and all other start dates being relative to this start date.

58. End month

Relative end date, month 1 marking the start date of the project, and all end dates being relative to this start date.

59. Milestone number

Milestone number:MS1, MS2, …, MSn

60. Delivery date for Milestone

Month in which the milestone will be achieved. Month 1 marking the start date of the project, and all delivery dates being relative to this start date.

61. Deliverable number

Deliverable numbers in order of delivery dates: D1 – Dn

62. Nature

Please indicate the nature of the deliverable using one of the following codes

R = Report, **P** = Prototype, **D** = Demonstrator, **O** = Other

63. Dissemination level

Please indicate the dissemination level using one of the following codes:

• **PU =** Public

• **PP =** Restricted to other programme participants (including the Commission Services)

• **RE =** Restricted to a group specified by the consortium (including the Commission Services)

• **CO =** Confidential, only for members of the consortium (including the Commission Services)

• **Restreint UE =** Classified with the classification level "Restreint UE" according to Commission Decision 2001/844 and amendments

• **Confidentiel UE =** Classified with the mention of the classification level "Confidentiel UE" according to Commission Decision 2001/844 and amendments

• **Secret UE =** Classified with the mention of the classification level "Secret UE" according to Commission Decision 2001/844 and amendments

64. Delivery date for Deliverable

Month in which the deliverables will be available. Month 1 marking the start date of the project, and all delivery dates being relative to this start date

65. Review number

Review number: RV1, RV2, ..., RVn

66. Tentative timing of reviews

Month after which the review will take place. Month 1 marking the start date of the project, and all delivery dates being relative to this start date.

67. Person-months per Deliverable

The total number of person-month allocated to each deliverable.

PART B

COMBINATION OF COLLABORATIVE PROJECT & COORDINATION AND SUPPORT ACTION

Table of Contents

B1. CONCEPT AND OBJECTIVES, PROGRESS BEYOND STATE-OF-THE-ART, S/T METHODOLOGY AND WORK PLAN

B1.1 Concept and project objective(s)

The Cluster of Research Infrastructures and Synergies in Physics (CRISP) purpose is to create synergies and develop common solutions for an initial group of eleven ESFRI-PPs (European Strategy Forum on Research Infrastructure preparatory phase) projects in the field of Physics, Astronomy, and Analytical Facilities. Its ultimate aim is to supply the best service to the rapidly growing and largely diversified user community, and to ensure that the large investments made at the national and international levels result in significant progress in science.

CRISP's participating partners comprise operating facilities currently undergoing major upgrades (ESRFUP, FAIR, ILL 20/20, SLHC, and SPIRAL2), new Research Infrastructures (RIs) which have entered the implementation stage (ESS and XFEL), and RIs well advanced in their preparatory phase and ready to progress towards implementation (ELI, EuroFEL, ILC-HiGrade, and SKA). Their common intent is to provide a word-class level service to the European Research Area: sensitive to the needs of a broad range of user communities, responsive to diverse and changing demands in a highly dynamic environment. They cover a variety of scientific goals together with a range of experimental methods and techniques.

CRISP is a cooperative project. It offers the partners opportunity to enhance their own infrastructures whilst sharing research and development efforts. CRISP will enable a greater exchange of ideas and expertise: to better serve user communities; to retain the lead in technological progress and scientific sophistication; to achieve enhanced levels of development; and to exploit complementary know-how.

Through the mutual exchange of test and commissioning results, an improved and accelerated learning curve shall be achieved, leading ultimately to faster implementation. Joining expertise and experience will avoid fragmented approaches and uncoordinated efforts; furthermore it will significantly reduce risks associated with individual RI projects.

The scientific and technical work to be completed as part of the CRISP project reflects the main challenges the RIs are facing or will face in the near future. Their solution requires a concerted action amongst the RIs, rather than the individual effort of single RIs, and thereby supports the implementation of these RIs. Key topics identified within these challenges have been clustered into Topic Groups (as shown in Table B1.1 below) namely: 1) Accelerators, 2) Instruments & Experiments, 3) Detectors & Data Acquisition, and 4) Information Technology & Data Management.

	ELI	ESRFUP	ESS	EuroFEL	FAIR	ILC-HiGrade	ILL 20/20	SKA	SLHC	SPIRAL2	XFEL
Accelerators	x	x	**X**	x	**X**	**X**			**X**	**X**	**X**
Instr & Exp	**X**	**X**	**X**	x	x		**X**			x	**X**
Det & DAQ	x	**X**	x	**X**	**X**		**X**	**X**	x	**X**	x
IT & DM	**X**	x	x	**X**	x	**X**	x	**X**	**X**	x	x

Table B1.1 Participation of ESFRI projects to the four CRISP topics Accelerators, Instruments & Experiments, Detectors & Data Acquisition, Information Technology & Data Management (small crosses). The bold crosses indicate their major areas of activity within the CRISP project.

B1.2 Progress beyond the state of the art

In all four technological areas of CRISP significant progress beyond the state of the art shall be achieved. More specifically:

1 Accelerators

The development of novel accelerator components and their characterisation is a pre-requisite to reach beyond state-of-the-art performance of accelerator complexes which are in turn one of the key elements for the majority of the participating RI projects. The planned developments constitute the basis to deliver beams with superior intensity, operate accelerators with high reliability, and achieve beam characteristics which will allow opening new perspectives and opportunities for the next generation of nuclear and high energy physics projects and experiments in photon, neutron and ion beam science. Within the accelerator topic nine of the ESFRI projects are participating in the following tasks:

1.a) The development of an ion source and related beam diagnostics is of central importance for FAIR and SPIRAL2. The FAIR and SPIRAL2 facilities both need a high performance electron cyclotron resonance ion source (ECRIS) to create the high intensity beams required for the envisaged nuclear studies. The two former ion sources financed in the framework of the FP6-EURONS – ISIBHI (MS-ECRIS, A-PHOENIX) are both facing R&D challenges, while the foreseen start of beam delivery is approaching very fast (2012 for SPIRAL2 and 2014 for FAIR). A new design of ECRIS is required by both facilities. SPIRAL2 and FAIR shall engage themselves in the joint development and construction of a new prototype 28 GHz ECR ion source. Joining efforts and expertise is particularly important for the construction of a cost-effective ECRIS and to minimise the project risk of the superconducting magnet design. A second task is related to the common development of a diagnostic device for the non-intercepting bunch shape measurement for the linear accelerator section of the FAIR and SPIRAL2 projects. No standard device for the determination of this

important beam parameter exists. Due to the comparable beam parameters for the FAIR and SPIRAL2 machines, development and construction costs can be reduced.

1.b) Superconducting radio-frequency (SRF) technology is used for almost all future large scale accelerator projects. New accelerator structures with improved characteristics were or are to be developed for the participating projects ESS, ILC-HiGrade, SLHC, and XFEL. Highest accelerator performance requires optimised production, surface treatment, and diagnostics of the accelerating structures. The knowledge and mastering of these technologies becomes even more important since large scale production involves large scale series production in industry. The accumulated know-how of EuroFEL, ILC-HiGrade, SLHC (at CERN) and XFEL (at DESY) shall be exploited to further improve the quality of the SRF accelerator cavities by pushing further the detailed diagnostics tools and the surface treatment of the cavities. At DESY an optimised procedure for a second surface treatment required to improve the performance of returns will be investigated and established as a critical element to reach the performance goals of XFEL. At CERN the upgrade of the SM18 test facility is a central ingredient for the common activities. A comprehensive transfer of knowledge to new projects e.g. ESS and SLHC is an essential part of the work, thus guaranteeing an optimum sharing of the acquired know-how and ensuring the best performance of the accelerators at these and other future facilities.

1.c) The development of fast ramped superconducting magnets is of central importance for the planned synchrotron SIS300 at the FAIR facility. For SLHC it is important to assess whether the technology is suitable and adapted to the construction of the future injector chain of the LHC. The common development is furthermore of key importance as well for accelerator-based medical applications (e.g. hadron therapy). ELI, FAIR and SLHC (at INFN, GSI and CERN, respectively) engage themselves in a joint effort to further optimise the design of the magnet. Future accelerator facilities will rely on the use of these magnets in order to meet their ambitious goals.

1.d) The joint design of a compact high brightness electron beam and of laser-induced secondary particle sources is of direct benefit to ELI and EuroFEL. It shall create synergies between the “classical” and the laser-based accelerator community. Its interest is to overcome limits that both communities are facing. The high intensity laser community is proposing a laser induced secondary particle source as the next generation of particle accelerators able to produce within the same scheme high quality electron beams as well as protons or other ions with an accelerating gradient of the order of TV/m which cannot be achieved with conventional accelerators. Similarly, other novel acceleration schemes rely on high brightness electrons, presently used in conventional free-electron lasers (FEL), to be fed by plasma accelerators. Moreover, there is a growing interest in developing compact (e.g. X band structures) high brightness electron sources directly for FEL applications as well as more innovative ones. The development of laser induced particle sources and compact electron sources aims at joining the competences of ELI and EuroFEL demonstrating and implementing groundbreaking solutions for the particle accelerators of the next generation.

1.e) The ESFRI projects ESRFUP, ESS, FAIR and SLHC all require Megawatts of radio-frequency (RF) power to accelerate particles. Conventionally, this power is generated by klystrons, but in recent years LDMOS-FET transistors have become an attractive alternative. The CRISP project aims to take forward the preparatory phase by elaborating a new efficient way to combine the power of many RF transistor modules by means of a single cavity combiner. This concept will result in a more compact,

flexible and cost effective design with improved operation reliability. Within the frame of CRISP, a prototype will be built for ESRFUP and design studies for ESS, FAIR and SLHC shall be performed; these will have a significant impact on the way these projects will envisage the implementation of the high power RF generators that are needed to power their accelerating RF cavities.

Existing synergies within the accelerator based research infrastructures will be strongly supported by the tasks defined within the CRISP project. Superconducting technology, either applied to radio-frequency cavities or to beam transport magnets, will be used for most of the upcoming large scale accelerator projects; the use of solid state amplifiers adapted to a variety of accelerating structures strongly supports this. All participating projects require ambitious particle sources design, either for high intensity ion beams or to drive free-electron lasers with their high brilliance electron beams. These initiatives will push accelerator facilities to performances beyond state-of-the-art.

2 Instruments & Experiments

Parallel to the further development of accelerators, new concepts and technological advances beyond the current state of knowledge need to be developed for the scientific experiments and their related instrumentation in order to keep pace with the more performing sources. During the past decade the research community has witnessed a trend to more sophisticated experimental set-ups, increasingly complex sample environments, and a suite of novel applications in a broad range of scientific disciplines. This has often stimulated new developments, which have been undertaken, to a large extent, within a single research infrastructure. In order to fully exploit the capabilities of the upgraded and new facilities, a joint effort needs to be made, aimed at common developments and deployment of common protocols, tools and equipment. This shall offer unity to a portfolio of experimental stations offering unprecedented performances to the rapidly growing user community. Added to this, it shall facilitate the user migration from one RI to another. Within the Instruments & Experiments topic eight RI projects are participating and the work shall focus on four main aspects.

2.a) The advent of free-electron lasers has opened the door to time-resolved studies with femto-second resolution, considerably extending the nano- to pico-second time regime available at storage ring based synchrotron radiation sources. The study of phenomena on the *μs to fs* time scale is of central relevance across all disciplines of natural science and is one of the most rapidly growing research fields. Time resolved studies will impact the design of the new instruments for ESRFUP, EuroFEL, and XFEL, and prepare perspectives for ESS and ILL 20/20. The central aim is to consolidate the needs and the new tools for time resolved studies, as only a concerted approach will be able to unify the different user communities and provide them with the best instrumentation and expertise. The work comprises the establishment of a white book on common needs and instrumentation for time-resolved studies at free-electron laser, synchrotron, and neutron facilities and the joint development of specific electronic devices.

2.b) The success of the currently operating facilities is the motivation for the new projects at ESS, FAIR, ILL 20/20 and SPIRAL2. The research to be performed at these RIs covers a broad range of physics including nuclear structure, astrophysics, neutrino and plasma physics, applied science like material and biophysical research, and many more. One

of the common features of all these future facilities is the tremendous increase of beam intensities of several orders of magnitude compared to the present situation. In general this requires new concepts, methods, and equipment to be used in highly-activated areas with very restricted access which can only be jointly developed. Innovative solutions for remote handling will allow an efficient maintenance of equipment and will lead to an optimisation of the facilities operation in terms of, for example, secondary beam delivery time. The participating RI projects will profit from an advanced radioactive waste management by avoiding the amount of radioactive waste as much as possible already from the outset, i.e. from the overall conception to the engineering detail design of equipment, consumables, and tools required to operate the experiments. All the achievements of the CRISP project will be implemented directly into the conceptions and the construction phase of the upcoming facilities and will thus contribute to a limitation of investment costs.

2.c) The explosion of interest in the study of biological systems over the past decade has been driven by rapid developments in biotechnology as well as increased exploitation of physical techniques in studying biological phenomena and inspiring rational design of biomedical and functional materials. The trend towards integrative approaches in characterising biological systems is clearly set to grow rapidly in the coming decade. These approaches place increasing demands on the combined and synergistic deployment of neutron and x-ray methods in structural characterisation. It is evident that efficient exploitation will benefit hugely from the development of common environments involving standardised approaches at all levels of experimental investigation, regardless whether experiments require neutrons or X-rays, and regardless of the facility at which they are carried out. The ESRFUP, ESS, EuroFEL and ILL 20/20 partners involved in this task shall develop an environment that will put x-ray and neutron biological experiments on a common experimental interface such that everything from sample mounting to data collection, reduction and analysis will be carried out in a standardised way. The ILL20/20 partner will benefit from combined neutron/x-ray capabilities, adding considerable value to neutron measurements alone. In the case of high-resolution macromolecular crystallography and fibre diffraction, this will occur through the ability of joint x-ray/neutron datasets to enhance data/parameter ratios. Furthermore, x-ray data, used alongside neutron datasets, provide powerful insights arising from the use of much smaller beams (micro and nano beams) - this is of particular importance for the study of partially ordered biological systems where structural heterogeneity is often a key aspect relating structure to function. ESRFUP will benefit from joint exploitation of neutron and x-ray results; high resolution crystallographic neutron data provides information on the location of hydrogen atoms and the specific orientation of water molecules that for the vast majority of cases is simply inaccessible to x-ray crystallography. At low resolution, neutron small-angle solution scattering allows contrast variation to be used to distinguish between different domains of a macromolecular system, strongly complementing small-angle x-ray scattering data and providing structural envelope information required for x-ray FEL structure determination and inferred dynamics. This work will be essential for EuroFEL to exploit the potential of free electron lasers for the study of biological systems.

2.d) The expected increased performance of existing and future neutron sources critically depends on joint efforts in instrumentation. The goal within this project is to develop instrumentation which will increase the intensity of neutron beams by up to two orders of magnitude. This task will focus on three major issues: the feasibility of directional neutron moderators, the design of optimised ultra cold neutron (UCN) sources and innovative neutron delivery devices. Experimental tests and numerical simulations will be performed to check the feasibility of neutron moderators, especially in the range of cold neutrons that will make neutron sources more directional, therefore

increasing the brightness of the sources. The current design for UCN sources ought to be enhanced by increasing existing volume and density of super fluid ^{4}He as neutron moderator. Finally, more efficient neutron supermirrors with reduced γ–ray emission and long lifetime will be developed at ILL20/20 and ESS. Such developments will strongly impact the performance of the instruments at the two facilities, and in conjunction with the detector developments, offer the neutron user community completely new perspectives in their research fields.

3 Detectors & Data Acquisition

The need for efficient and high performance detectors and their associated instrumentation is common to essentially all RI projects. Some of the new RIs in preparation heavily rely on the construction of new detector systems that go beyond current, well established technologies. Other RIs need to develop completely new approaches. Research and development efforts, undertaken by individual facilities, are, however, cost intensive; and common developments and sharing of expertise and know-how are often key ingredients for significant progress. Furthermore, with the expected increased performance of the upgraded and new RIs, novel and more performing data acquisition and signal processing standards need to be developed. Ten of the ESFRI projects take part in the Detectors & Data Acquisition topic as follows:

3.a) High-throughput detector data streaming is of direct relevance to ELI, ESRFUP, EuroFEL, SKA, and XFEL. The tremendous improvements promised by the new or upgraded light sources (storage rings, FELs, lasers) will be compromised if the detectors do not cope with the timing and/or information rates that are likely to be produced by the very intense photon beams produced at those facilities. In a similar way, the performance of radio telescope arrays is also directly related to the capability of processing in real time the very large data records produced by the thousands of sensing elements and antennas that constitute this kind of instrument. The work will address the selection, definition and development of various techniques and methods to reduce, transmit and process high throughput data streams produced by the last generation detector systems. In addition to technical and scientific performance, the aim is to establish a certain level of standardisation of methods and interfaces. The implementation of common interfaces for the data streams will have a substantial impact on interoperability of the detector systems, both within and across the facilities, and therefore should imply a substantial reduction of deployment and operation costs.

3.b) The development of CO_2 cooling systems is indispensable for the next generation of particle detectors. SLHC is the driving project in this development, and EuroFEL and FAIR will strongly benefit for their own applications of this technology, in particular for high-performance silicon tracking detector systems and highly integrated electronic assemblies where efficient low-mass cooling is a key prerequisite for novel system concepts. In comparison to fluorcarbon based cooling fluids, CO_2 two-phase cooling possesses superior thermodynamic properties, is less expensive, and is much more environment-friendly. This cooling scheme, whilst serving the CRISP participants, will find wide-spread applications well beyond the CRISP project. The common work plan shall join forces and expertises in the design and construction of these devices.

3.c) The common development of advanced electronics and software for neutrons and γ-ray detectors is of direct benefit to ELI, FAIR, and SPIRAL2 for their upcoming accelerator facilities. Nuclear structure and radioactive ion beam experiments at these facilities require

modern data acquisition electronics and algorithms adapted to the advanced γ-ray tracking and neutron detection systems that will become operational on a time scale of a few years. Common solutions for the realisation of the experimental set-ups are planned by expanding the developments and standards performed during the SPIRAL2 preparatory phase and making them applicable also for ELI and FAIR. The work shall focus on the preparation of front-end electronics cards with improved data throughput, calibration and post-processing performance to be deployed across the facilities.

3.d) Neutron detectors require the use of neutron absorbing elements. Until recently, ^{3}He was widely exploited because of its easy use and the high neutron capture efficiency. However, ^{3}He has become a very scarce and highly expensive material for several reasons: decrease in the production rate (most of the nuclear reactors producing tritium from which ^{3}He is generated have been stopped) and the increase in the demand for neutron science (large area detectors) and homeland security in the United States. All neutron facilities worldwide are impacted by this situation. Finding a substitute to ^{3}He is a formidable task which is to be tackled in the long term by the whole neutron scattering community. However, both ILL20/20 and ESS projects rely on rapid progress on a new detector technology. Several technological options exist (solid ^{10}B, ^{10}B in highly toxic gaseous BF_3, scintillators). ILL20/20 and ESS will establish collaborative plans for the design and feasibility studies of a neutron detector based on solid ^{10}B films technology as a substitute to ^{3}He gas. Once the feasibility of this technology is demonstrated in terms of efficiency, and manufacturing & maintenance costs, a global evaluation of the different methods will be done at the European and worldwide levels.

4 Information Technology & Data Management

The importance of experimental data for modern science is growing daily, and new initiatives are required to cope with the resulting “data deluge”. The rapid development and increasing complexity of experimental techniques, instruments and detectors requires developments beyond the current state-of-the-art. To fully justify the huge investments made in scientific instruments, the data produced by these instruments must be securely and efficiently stored, archived, annotated, queried, and linked.

A number of concrete examples can be easily identified. A sustainable and interdisciplinary metadata management service bridging a federation of data catalogues across RIs can significantly enhance scientific progress by reducing the time to discover distributed resources. Proper curation of open scientific data, linked to corresponding publications, can help to foster a wider public understanding of fundamental scientific achievements. An authentication and authorisation mechanism common to all users of different RIs can greatly simplify the access to distributed resources. These examples show how a common IT platform for the storage, discovery, access, and processing of data can improve the current status of research in Europe.

These needs are of common interest to all the ESFRI projects involved in CRISP. They will participate in the development and prototype deployment of solutions for IT and Data Management (DM) co-operating in different aspects as follows:

4.a) The development of a common user identity system, Authorisation and Authentication Infrastructure (AAI), permitting access to data and IT resources of the following RIs: ESRFUP, ESS, EuroFEL, FAIR, ILL 20/20, and XFEL will follow a modular design to allow its incorporation with minimal effort into existing and future IT systems. Because of its federated structure, this solution will be cost and resource effective and will allow for the first time a single user identification system between the participating RIs. A prototype of a unique user identification system is developed in EuroFEL by PSI.

4.b) Selection and implementation of metadata management and data mining services common to ESRFUP, ILL 20/20, and SLHC will enable an efficient discovery of the

data produced by the participating RIs instruments. Such services will also contribute to the set up of a data continuum environment where published scientific results are connected to raw data. The development and deployment of common metadata services and a data continuum environment will provide concrete tools to support new scientific methods and paradigms while improving both the efficiency of the scientific process and its impact across distributed RIs.

4.c) Development of a common solution for the high-speed recording of data to permanent storage and its long-term archival within a single site will be undertaken by ESRFUP, ESS, EuroFEL, ILL 20/20, SKA and XFEL. This work will: (i) address the challenges faced by increased data volumes and data rates delivered by the latest generation of scientific instruments; (ii) improve the availability of data by properly archiving it for many years; and (iii) enable an easy integration of domain-specific software by exploiting standard data-access protocols. The development of a common approach for all RIs will enable knowledge transfer and the deployment of cost-effective solutions.

4.d) Analysis and deployment of prototype distributed computing data infrastructures, to support the expanding data management needs for ELI, EuroFEL, FAIR, SKA, and SLHC will be carried out. The work will focus not only on data management services and tools but also on the associated network aspects, which will result in the experimentation and the definition of a roadmap of a common distributed data infrastructure among the participating RIs. This target is of central importance for researchers which utilise several RIs and need to have access to their personal computing environment, collected data and results, quickly and as easily as possible.

All the previously mentioned aspects are important points in the internal programme of work of the different participating RIs. Working together on the delivery of common solutions brings two immediate advantages: internally, the deployed IT solutions represent complete solutions resulting from a larger development effort; externally, the deployed IT solutions are not limited to the RIs scope but have instead concrete links to other RIs.

The CRISP project will also contribute to the on-going activity to develop a European Roadmap on e-infrastructure and the adoption of open standards. This will include availability within the project to contribute to workshops and other dissemination activities in the FP7 SIENA project. Representing a domain cluster of leading RIs, which all have stringent requirements will also contribute to an e-infrastructure use case that is relevant to the user community. Where appropriate contact shall be made with the ongoing efforts in Standards Development Organisations to ensure that the standards developed within them are relevant to our use case. This may occur either through supporting e-infrastructure providers or directly for community groups relevant to our users.

B 1.3 S/T Methodology and associated work plan

B 1.3.1 Overall strategy and general description

The overall strategy as contained in the work plan, Gantt charts, and tables is summarised as follows:

WP1 Management: The Coordinator, ultimately responsible for the implementation of the CRISP project, will ensure delivery of the project through the conduct of rigorous legal and financial administration. Procedural mechanisms will be established by the Coordinator to facilitate performance monitoring and reporting; detect problems and execute corrective actions; and provide good communication and sound decision making.

WP2 Dissemination and Industry Related Activities: Will be managed in close collaboration with the Coordinator, the Topic Leaders (see below), the participating RIs and the Beneficiaries. This will ensure full communication of the achievements across the CRISP project and facilitate outreach and dissemination activities, including: non-academic publications, engagement in promotion events, communication via a dedicated website, and topical workshops on industry related activities. In particular the establishment of relations with industry shall provide the essential link between the technological achievements within CRISP and its exploitation and further development by European industries.

WP3 to WP19 Scientific and Technical Activity:

Concept: The eleven ESFRI projects initially involved in the CRISP project cover a diverse range of methodologies forming a heterogeneous group. They however share a collective interest in the CRISP topics, albeit with variable geometry, and are therefore formed into *Topics*, namely: Accelerators (WP3 – WP7), Instruments & Experiments (WP8 – WP11), Detectors & Data Acquisition (WP12 – WP15), and Information Technology & Data Management (WP16 – WP19) to reflect the natural flow of scientific and technical activity of the RIs.

Work Packages: Each WP within a Topic Group (TG) will be supervised by a manager (WPM) responsible for leading the work package team, to execute the defined tasks, to produce the WP's deliverables, and to liaise with the respective Topic Leader.

Topic Leaders (TL): Will form a layer between the Steering Committee and individual work packages by acting as mentors within their TG to: encourage common solutions and create synergies between WPs; hold 6-monthly Topic Meetings; provide the conduit between the WP managers and the Executive Group; and attend the Steering Committee meetings.

Executive Group: Will be responsible for the overall management of operations and report to the Steering Committee. It will be led by the Coordinator and shall comprise the WP2 leader and the four Topic Leaders.

The Steering Committee: Will meet on an annual basis and shall guide the project within the parameters of the Grant Agreement. It shall receive reports of activity through the Executive Group and oversee the direction and delivery of the project. Its voting members, being the beneficiaries of the involved eligible ESFRI projects participating in CRISP, shall form the decision-making body of the consortium.

Reporting Flow: The activities of the WPs will be monitored to ensure compliant use of allocated funds. The WPMs will report performance on a regular basis to their Topic Leaders to enable early detection of problems/delays in the execution work. This will be reported to the Executive Group. Where corrective action is required, this shall be communicated to the Steering Committee: if of material importance, the SC's formal decision shall be called for.

Financial Control: Funds shall be distributed to the beneficiaries by the Coordinator in accordance with the Grant Agreement and its Annexes. In addition to the obligatory financial declarations at the end of each year, the Coordinator shall request provisional expenditures from the beneficiaries every other six months, in order to detect significant deviation.

The consortium has a large experience with cutting-edge technological developments and the implementation of novel solutions. The involved partners have a very broad expertise in a diversified field of Science & Technology, potential risks can therefore be minimised.

The work plan is an ensemble of well-tested technologies, techniques under development, and exploration of new fields. The organisational structure of the CRISP project with the concept of topic leaders, guiding and supervising the work package managers, and who are part of the Executive Group, ensures a close and continuous monitoring. The Executive Group, in close interaction with the Steering Committee, will guarantee timely corrective actions, if required.

A careful analysis of potential risks has been done for the technical work performed within

the four topics, and the most relevant ones are presented in a listed form below, together with the associated contingency plans. Here, *internal* refers to risks which are identified within the project, and which will be managed by the Executive Group. *External* pertains to risks which are outside of the project, and which require close follow-up by the Steering Committee and may involve the respective RI managements.

Topic: Accelerators (WP3 – WP7)

Type: Internal

Description: (i) Optimum diagnostic tools not available when required for the accelerator commissioning.
(ii) Development of low loss cable and prototype R&D needs more time.
(iii) Measured characteristics of prototype does not match results of the design study.

Probability: low/medium – low/medium - low

Impact: medium – medium - medium

Remedies: (i) + (ii) Frequent information exchange and regular reports to the project management of the participating RIs. Strong cooperation among participating partners and sufficient support by the project management.
(iii) Improve design study and anticipate possible problems, choose a flexible mechanical design for the prototype, giving room for fast and cheap modifications, frequent exchange of information and feedback between the participants.

Type: External

Description: (i) Low loss wire production in industry needs more time.

Probability: medium

Impact: high

Remedies: Close collaboration with company at each production step. Change to a wire design which is easier to manufacture.

Topic: Instruments & Experiments (WP8 – WP11)

Type: Internal

Description: (i) Development of NOPA or autocorrelator with 100as resolution not reaching the planned technical characteristics or important delays.
(ii) Fail safe diagnostics or remote handling equipment not available when the rest of the system is ready to operate
(iii) Delays in the implementation of common experimental framework for neutron and x-ray experiments on biological solutions.
(iv) Directional moderator and/or UCN source not performing as expected
(v) New supermirror coating shows low lifetime under strong radiation level

Probability: Low/Medium – Low/Medium – Low - Low/Medium – Low/Medium

Impact: Medium – Medium – Low - Medium – Medium

Remedies: (i) Strong cooperation among RIs and frequent information exchange and regular reports to the project management of the participating institutes.

Close contact with the research activities in WP12 and WP18.
(ii) Strong cooperation among RIs. Early definition of common standards and continuous contact/report to the safety authorities. Alternative diagnostic tools foreseen from the beginning, opening collaboration with industrial partners.
(iii) Simplification of the sample environment requirements to implement for initial test experiments.
(iv) Early definition of common standards and continuous contact/report to the participating RIs. Alternative/simplified solutions foreseen from the beginning, opening collaboration with industrial partners or equivalent research institutions in USA (SNS) or Japan (J-Park).
(v) Strong cooperation among RIs and early lifetime measurements under severe conditions. Alternative substrates foreseen from the beginning, opening collaboration with industrial partners or equivalent research institutions in USA (SNS) or Japan (J-Park).

Topic: Detectors & Data Acquisition (WP12 – WP15)

Type: Internal

Description: (i) Highly optimised computing infrastructure for processing the data stream not available on time.
(ii) Large-scale deployment of digital readout chains for broad applications in research with neutron and gamma rays not yielding the cost efficiency goal.
(iii) Mass production of ^{10}B thin films not yielding the quality/cost goal.

Probability: Low/ Medium – Low/Medium – Low/Medium

Impact: Low-Medium – Low/Medium – Low/Medium

Remedies: (i) Strong cooperation among RIs. Close contact with the research activities within the IT & DM topic.
(ii) Strong cooperation among RIs. Early definition of common standards.
(iii) Strong cooperation with experienced laboratories. Early start with the set-up of mass production.

Topic: Information Technology & Data Management (WP16 – WP19)

Type: Internal

Description: (i) Disagreement between partners on common IT&DM solutions resulting in implementation of the services only in some research infrastructures.
(ii) One or more project partners are not performing as expected and do not produce results according to the agreed schedule.
(iii) Data resources not provided by the participating research infrastructure. The IT&DM solutions cannot be tested/validated.
(iv) Unstable and/or unclear requirements.
(v) Delay in the implementation and deployment of the selected IT&DM solutions.

Probability: Low/Medium – Low – Low – Medium – Low

Impact**:** Medium - Medium/High – Medium – High - Medium/High

Remedies: (i) Regular follow-up. Promote a strong coordination between the work package manager and the research infrastructure IT responsible.
(ii) Careful monitoring of the progress of each partner must be put in place.

Common metrics have to be used to periodically measure the partners' productivity and efficiency.
(iii) Define regular meetings between the work package manager and the IT responsible of the research infrastructure to report on progress and update plans related to the required data sets.
(iv) Involvement of all concerned people during the requirements definition phase. Keep the end-users involved during the implementation phase to synchronise on intermediate progress.

(v) Project's work plan can tolerate minor delays of a few weeks. Beyond this limit it is required to severely reconsider the team to which the work was initially assigned and implement an effort reassignment.

Type: External

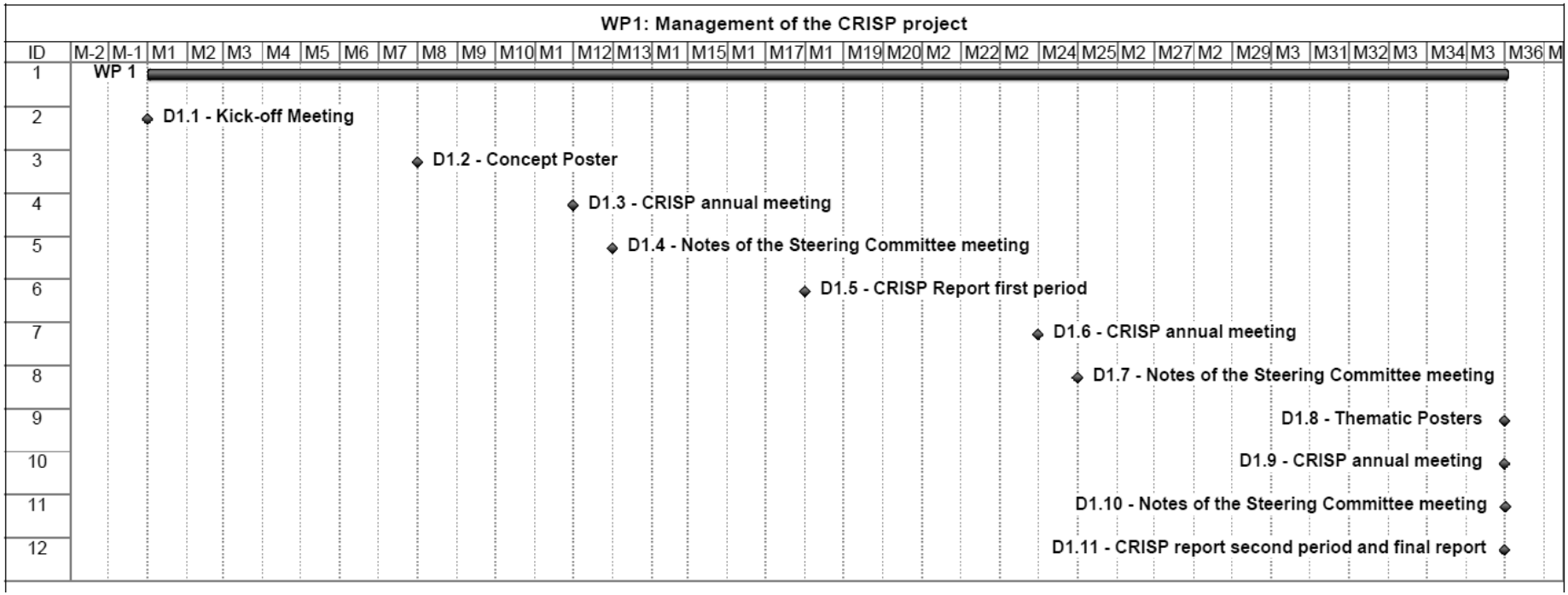
Description: (i) Lack of coordination with other European initiatives working on complementary functionalities, which prevent adoption by the research infrastructures.
(ii) Dependencies to external components are broken. The external dependencies of the IT&DM solutions became not available.

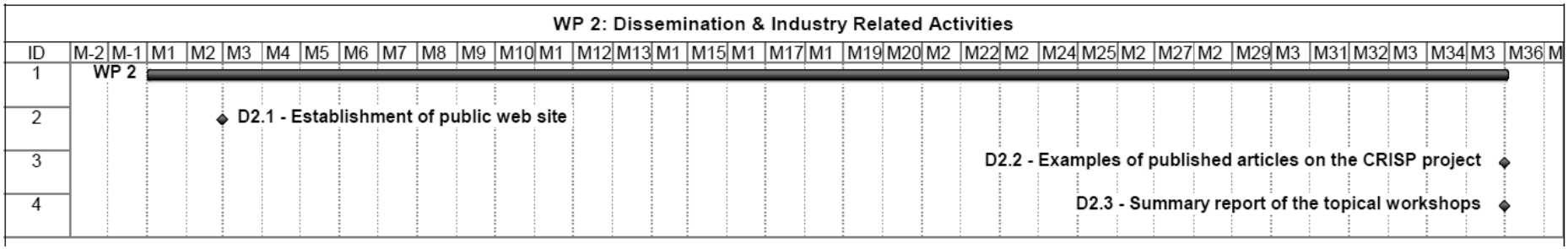
Probability: Low/Medium - Low/Medium

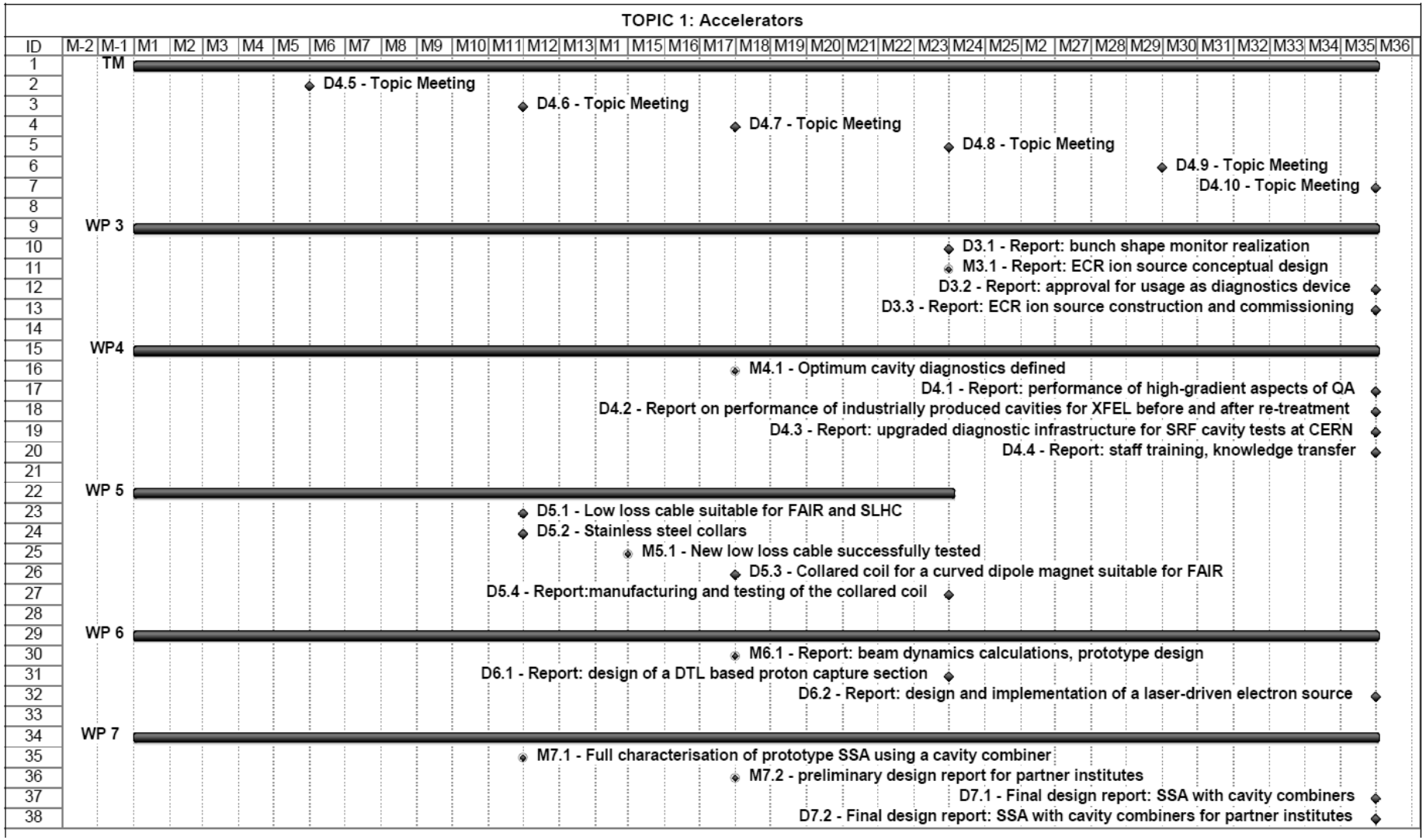
Impact: Medium/ High - Medium

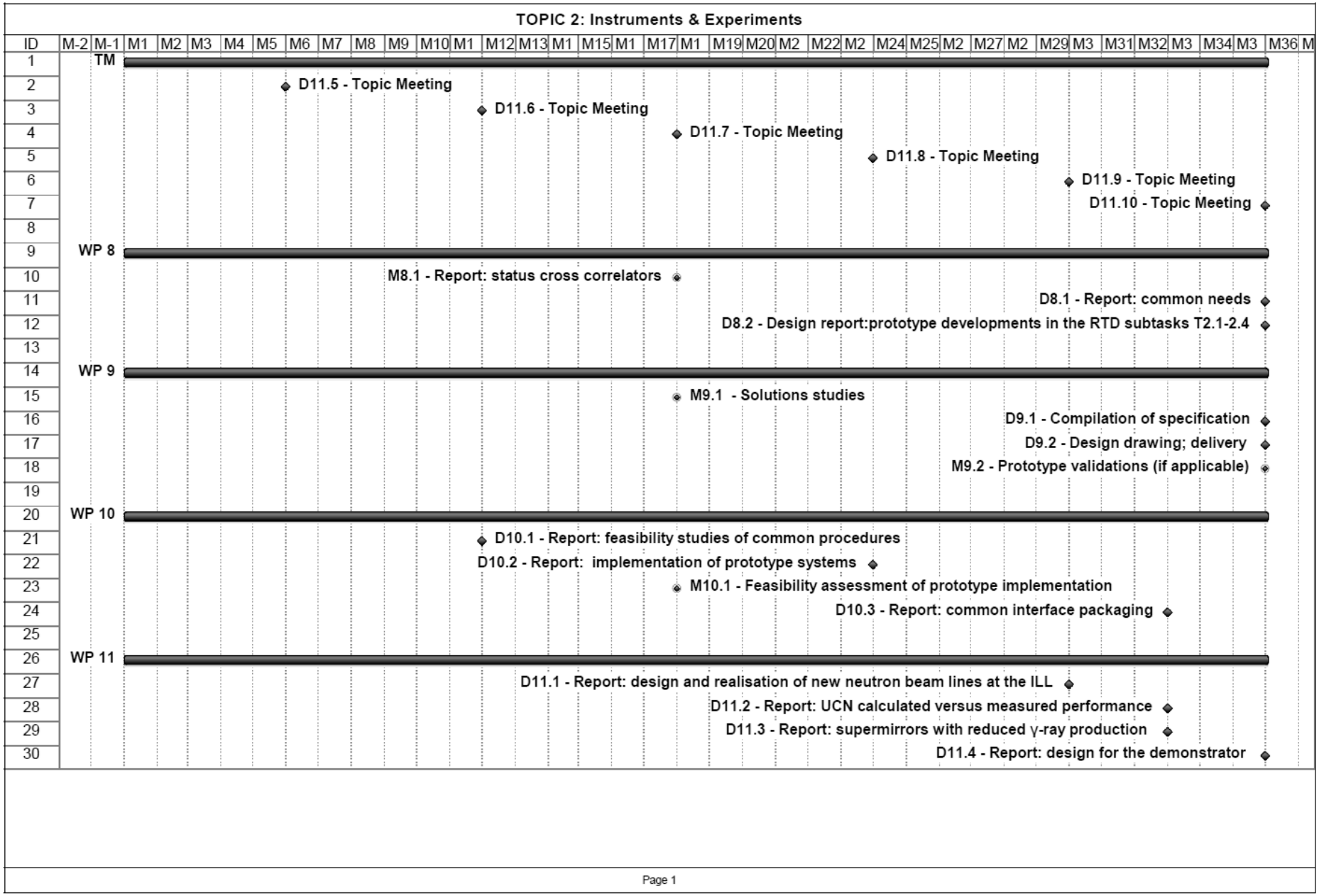
Remedies: (i) Regular coordination meetings between all concerned projects leading to written agreements to align the projects' work plans.
(ii) Identify the impact of removing the affected functionality. Identify the availability of other similar external components to replace the unavailable components.

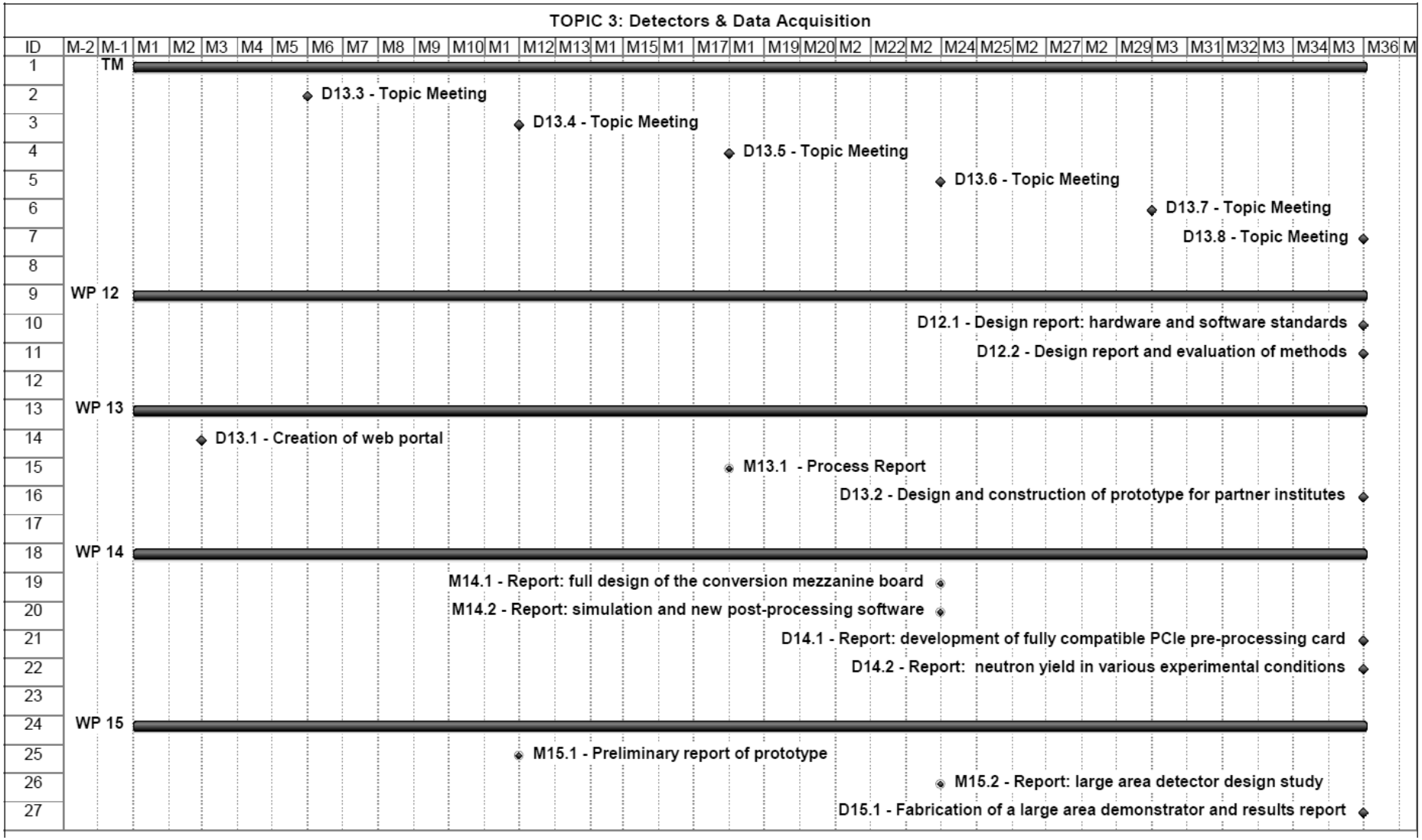
B 1.3.2 Timing of work packages and their components

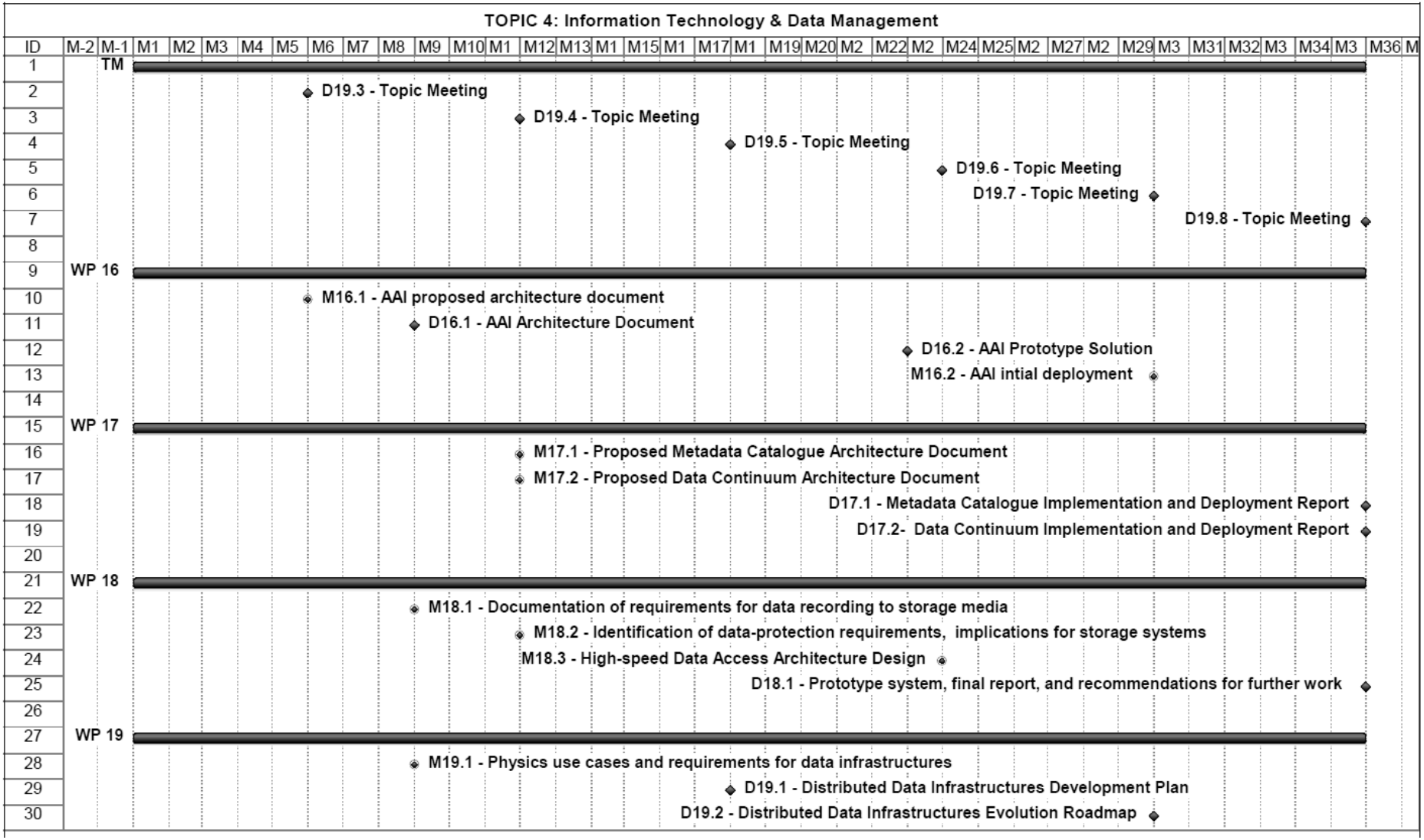





TOPIC 1: Accelerators
ID
M-2 M-1 M1 M2 M3 M4 M5 M6 M7 M8 M9 M10 M11 M12 M13 M1 M15 M16 M17 M18 M19 M20 M21 M22 M23 M24 M25 M2 M27 M28 M29 M30 M31 M32 M33 M34 M35 M36
1 TM
2 D4.5 - Topic Meeting
3 D4.6 - Topic Meeting
4 D4.7 - Topic Meeting
5 D4.8 - Topic Meeting
6 D4.9 - Topic Meeting
7 D4.10 - Topic Meeting
8
9 WP 3
10 D3.1 - Report: bunch shape monitor realization
11 M3.1 - Report: ECR ion source conceptual design
12 D3.2 - Report: approval for usage as diagnostics device
13 D3.3 - Report: ECR ion source construction and commissioning
14
15 WP4
16 M4.1 - Optimum cavity diagnostics defined
17 D4.1 - Report: performance of high-gradient aspects of QA
18 D4.2 - Report on performance of industrially produced cavities for XFEL before and after re-treatment
19 D4.3 - Report: upgraded diagnostic infrastructure for SRF cavity tests at CERN
20 D4.4 - Report: staff training, knowledge transfer
21
22 WP 5
23 D5.1 - Low loss cable suitable for FAIR and SLHC
24 D5.2 - Stainless steel collars
25 M5.1 - New low loss cable successfully tested
26 D5.3 - Collared coil for a curved dipole magnet suitable for FAIR
27 D5.4 - Report:manufacturing and testing of the collared coil
28
29 WP 6
30 M6.1 - Report: beam dynamics calculations, prototype design
31 D6.1 - Report: design of a DTL based proton capture section
32 D6.2 - Report: design and implementation of a laser-driven electron source
33
34 WP 7
35 M7.1 - Full characterisation of prototype SSA using a cavity combiner
36 M7.2 - preliminary design report for partner institutes
37 D7.1 - Final design report: SSA with cavity combiners
38 D7.2 - Final design report: SSA with cavity combiners for partner institutes


TOPIC 2: Instruments & Experiments
ID
M-2 M-1 M1 M2 M3 M4 M5 M6 M7 M8 M9 M10 M1 M12 M13 M1 M15 M1 M17 M1 M19 M20 M2 M22 M2 M24 M25 M2 M27 M2 M29 M3 M31 M32 M3 M34 M3 M36 M
1 TM
2 D11.5 - Topic Meeting
3 D11.6 - Topic Meeting
4 D11.7 - Topic Meeting
5 D11.8 - Topic Meeting
6 D11.9 - Topic Meeting
7 D11.10 - Topic Meeting
8
9 WP 8
10 M8.1 - Report: status cross correlators
11 D8.1 - Report: common needs
12 D8.2 - Design report:prototype developments in the RTD subtasks T2.1-2.4
13
14 WP 9
15 M9.1 - Solutions studies
16 D9.1 - Compilation of specification
17 D9.2 - Design drawing; delivery
18 M9.2 - Prototype validations (if applicable)
19
20 WP 10
21 D10.1 - Report: feasibility studies of common procedures
22 D10.2 - Report: implementation of prototype systems
23 M10.1 - Feasibility assessment of prototype implementation
24 D10.3 - Report: common interface packaging
25
26 WP 11
27 D11.1 - Report: design and realisation of new neutron beam lines at the ILL
28 D11.2 - Report: UCN calculated versus measured performance
29 D11.3 - Report: supermirrors with reduced γ-ray production
30 D11.4 - Report: design for the demonstrator
Page 1


TOPIC 3: Detectors & Data Acquisition
ID
M-2 M-1 M1 M2 M3 M4 M5 M6 M7 M8 M9 M10 M1 M12 M13 M1 M15 M1 M17 M1 M19 M20 M2 M22 M2 M24 M25 M2 M27 M2 M29 M3 M31 M32 M3 M34 M3 M36 M
1 TM
2 D13.3 - Topic Meeting
3 D13.4 - Topic Meeting
4 D13.5 - Topic Meeting
5 D13.6 - Topic Meeting
6 D13.7 - Topic Meeting
7 D13.8 - Topic Meeting
8
9 WP 12
10 D12.1 - Design report: hardware and software standards
11 D12.2 - Design report and evaluation of methods
12
13 WP 13
14 D13.1 - Creation of web portal
15 M13.1 - Process Report
16 D13.2 - Design and construction of prototype for partner institutes
17
18 WP 14
19 M14.1 - Report: full design of the conversion mezzanine board
20 M14.2 - Report: simulation and new post-processing software
21 D14.1 - Report: development of fully compatible PCIe pre-processing card
22 D14.2 - Report: neutron yield in various experimental conditions
23
24 WP 15
25 M15.1 - Preliminary report of prototype
26 M15.2 - Report: large area detector design study
27 D15.1 - Fabrication of a large area demonstrator and results report


TOPIC 4: Information Technology & Data Management
ID
M-2 M-1 M1 M2 M3 M4 M5 M6 M7 M8 M9 M10 M1 M12 M13 M1 M15 M1 M17 M1 M19 M20 M2 M22 M2 M24 M25 M2 M27 M2 M29 M3 M31 M32 M3 M34 M3 M36 M
1 TM
2 D19.3 - Topic Meeting
3 D19.4 - Topic Meeting
4 D19.5 - Topic Meeting
5 D19.6 - Topic Meeting
6 D19.7 - Topic Meeting
7 D19.8 - Topic Meeting
8
9 WP 16
10 M16.1 - AAI proposed architecture document
11 D16.1 - AAI Architecture Document
12 D16.2 - AAI Prototype Solution
13 M16.2 - AAI intial deployment
14
15 WP 17
16 M17.1 - Proposed Metadata Catalogue Architecture Document
17 M17.2 - Proposed Data Continuum Architecture Document
18 D17.1 - Metadata Catalogue Implementation and Deployment Report
19 D17.2- Data Continuum Implementation and Deployment Report
20
21 WP 18
22 M18.1 - Documentation of requirements for data recording to storage media
23 M18.2 - Identification of data-protection requirements, implications for storage systems
24 M18.3 - High-speed Data Access Architecture Design
25 D18.1 - Prototype system, final report, and recommendations for further work
26
27 WP 19
28 M19.1 - Physics use cases and requirements for data infrastructures
29 D19.1 - Distributed Data Infrastructures Development Plan
30 D19.2 - Distributed Data Infrastructures Evolution Roadmap

B2. IMPLEMENTATION

B 2.1 Management structure and procedures

2.1.A Parties to the CRISP project

2.1A.1 *Beneficiaries*

Eligible (see below) participating Research Infrastructures within the ESFRI cluster of Physics, Astronomy and Analytical Facilities shall enter into a Grant Agreement with the European Commission to carry out the CRISP project and shall hereafter be referred to as the *Beneficiaries*.

The European Synchrotron Radiation Facility (ESRF), as *Coordinator* and representative of the *Beneficiaries*, shall sign the Grant Agreement with the European Commission and be contractually liable for the financial administration of the project. All other *Beneficiaries* shall accede to the Grant Agreement and shall assume the rights and obligations established by the Grant Agreement by signature of Form A countersigned by the *Coordinator*.

The *Beneficiaries* shall sign a consortium agreement and carry out the project jointly and severally *vis-à-vis* the European Community.

2.1A.2 *Project Partners*

The *Project Partners* shall comprise existing and future European Research Infrastructures which have successfully completed FP7 preparatory phase ESFRI "physics cluster" projects and are eligible, according to the Commission's criteria, to apply for European Commission funding, through one or more *Beneficiaries*, to support the implementation phase[1].

- Where the Research Infrastructure is a legal entity in its own right, the *Beneficiary* and *Project Partner* will be a single organisation, and shall be called *Project Partner Beneficiary* (PPB).
- In the case where a RI may be represented by several *Beneficiaries*, the *Project Partner* designates one of these *Beneficiaries* to act on its behalf for all issues related to the content development of the CRISP project, namely strategic and project policy decisions. This necessitates that the *Project Partner* grants fully delegated power to this *Designated Beneficiary (DB)* with respect to decision making and voting rights on the aforementioned issues.

Concerning financial decisions, each *PPB* and *DB* shall have one vote. *Beneficiaries* directly affected by a financial decision and their contribution to CRISP shall have a right to veto. For further details see 2.1B.1 below.

[1] A cluster is intended to include all ESFRI projects in a given field that have sufficiently progressed in their preparatory phase and that have ensured a clear commitment for their construction from Member States and International Organisations.

2.1B MANAGEMENT STRUCTURE

The organisational approach is bottom-up and participatory in order to reflect the needs of the project participants, but with a strong lead provided by the Steering Committee in order to create continuity and purpose.

The participating ESFRI RIs are of a diverse nature; hence the structure of the CRISP project needs to take proper account of such a heterogeneous environment. Consequently, the classical structure of a layer of parallel work packages is not appropriate in this context. Instead an additional layer is introduced between executive bodies and the work package layer, the *Topics*, grouping together thematically related work packages. These topics shall be coordinated by *Topic Leaders*, responsible for overseeing the proper functioning of a sub-set of work packages and for insuring proper communication between executive bodies and work packages.

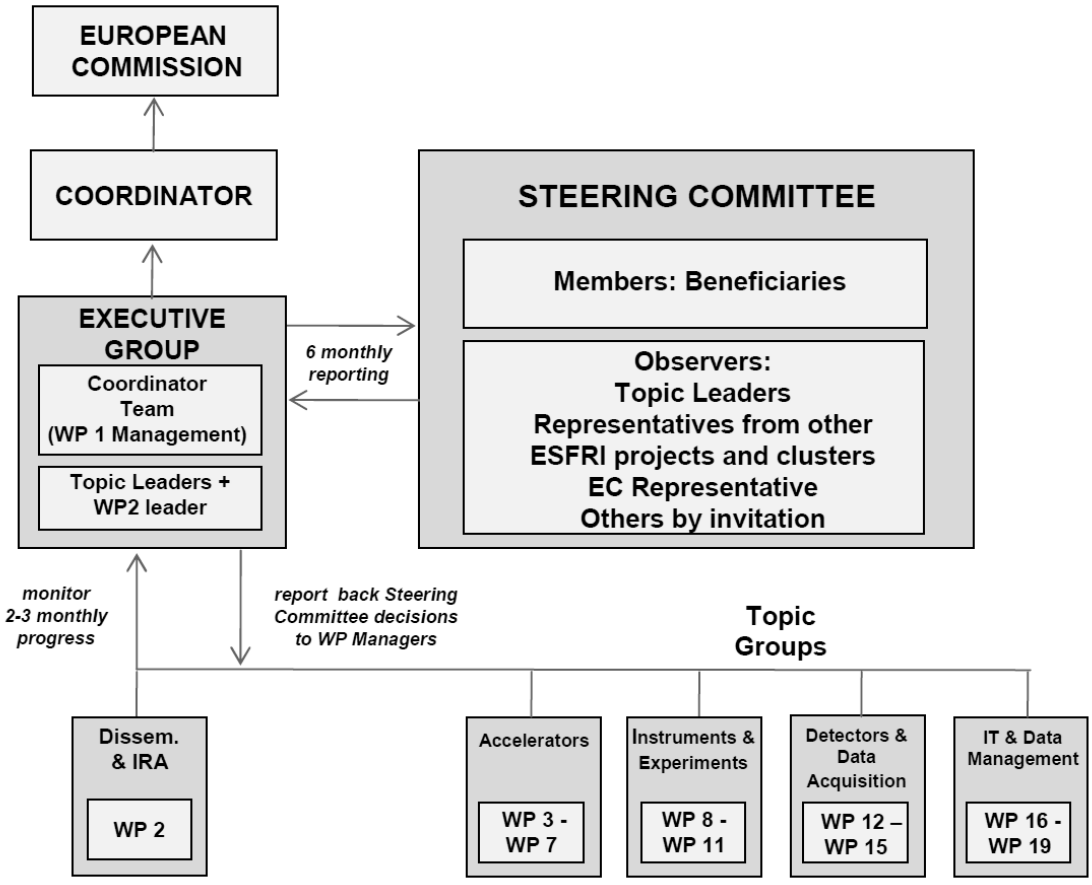


Figure 2.1B Project Management Structure

2.1B.1 Steering Committee

Function

The Steering Committee (SC) is the ultimate decision-making body of the consortium. It shall be responsible for project policy and the definition of the programme of activities. It shall have oversight of the project's targets and time schedules; project planning and control; dissemination and exploitation activities; and financial planning. It shall review reported progress, approve corrective actions where necessary, and validate proposed plans for future activities.

Composition

The Steering Committee shall comprise:

– The *Steering Committee Members* (SCM) being one representative per *Beneficiary*, with one vote each per *Project Partner Beneficiary* and *Designated Beneficiary*. For details on voting rights see below.

– *Steering Committee Observers* (SCOs) being the leaders of the four topic groups and the WP2 leader; one representative per non-participating ESFRI roadmap project in the Physics Cluster, and one representative each from the other three ESFRI clusters; the European Commission's representative; and any other person who may assist to a good delivery of the project, upon the nomination of a *SCM* and subsequent invitation by the Chairman of the SC.

The *SCMs by majority vote* may decide that the Steering Committee shall meet in closed session, in which case *SCOs* shall be invited to absent the room.

The SCMs shall receive prior to its first meeting nominations for the chair of the Steering Committee. The chair of the Steering Committee will then be elected by SCMs at its first meeting. The *Coordinator* shall act as secretary to the Steering Committee.

Decision Making

Decisions shall be made by consensus. Where consensus fails to be achieved, a decision shall be made by vote as provided for in the Consortium Agreement. The following cases may be highlighted:

i. Decisions on strategic and project policy issues such as, e.g. modifications of the Consortium Agreement, amendment or changes of the technical Annex I, shall be taken by the PPBs and the DBs each having one vote.

ii. Decisions on budget issues shall be taken by the PPBs and the DBs with each having one vote.

iii. Every Beneficiary shall have a veto right only with respect to decisions which directly affect its organisation.

The detailed practical aspects of voting and veto rights shall be agreed upon by the *Beneficiaries* and laid down in the Consortium Agreement.

Meetings

The *Coordinator* shall convene one face-to-face meeting of the Steering Committee per year, and additional meetings in-between by Telephone Conference. On request of either the Chairman of the Steering Committee or the Coordinator, further face-to-face meetings shall be organised. The Agenda of each meeting shall be delivered to the members of the

SC two weeks before the meetings. Minutes of each Steering Committee meeting will be distributed by the *Coordinator.*

2.1B.2 The Executive Group

Function

The Executive Group (EG) is the body which shall assist the Coordinator in the management of the CRISP project and ensure the correct and timely implementation of the "Description of Work" in Annex I of the Grant Agreement. The Executive Group will receive 3-monthly progress reports from the individual *Topic Leaders* and monitor performance against the requirements of the contract. In instances of serious deviation it shall inform the Steering Committee through the SC Chair straightaway.

Composition

The Executive Group shall be composed of:
- the Coordinator team from the ESRF.
- the four *Topic Leaders*
- the Dissemination & Industry related Activities work package leader

The EG shall be chaired by the Coordinator.

Decisions shall be made by consensus. In case of disagreement the Coordinator has interim decision authority until the final decision is taken by the Steering Committee. The matter shall be brought to the attention of the SC within 1 week, and the SC committee shall render a decision within 3 weeks of such notification.

Meetings

The Executive Group shall be convened mainly through teleconferences, held on a 2-3-monthly basis, further meetings e.g. face-to-face may be organised on request of the Coordinator or a Topic Leader.

2.1B.3 Coordinator

The *Coordinator* shall be contractually liable for the financial administration of the project and shall duly carry out the tasks attributed to the Coordinator in the Grant Agreement. The *Coordinator's* representative will be the focal interface, and thus ensure proper communication, between the consortium and the Commission. The *Coordinator* shall carry out the coordination and management tasks as specified in the Management work package.

2.1B.4 Topic Leaders

Function

Each *Topic Leader* shall oversee performance within his or her own Topic Group. This will entail:

- Monitoring the activity of each work package within his or her group with the aim of ensuring proper communication and interaction between the individual work packages, as well as between the Steering Committee and the work packages within a Topic as a whole.

- Liaison with the *Work Package Managers*, to record any delay or under-performance and identify issues arising therefrom.

A project management tool shall be established by the *Coordinator*, granting specific read/write access to each of the project participants, and will enable *Topic Leaders* to carry out the above tasks.

The *Topic Leaders* shall represent the *WP Managers* both within the Executive Group and at Steering Committee meetings: they shall feed forward collated information as described above, and report back to the *WP Managers* the outcome of discussions within the Executive Group and decisions of the Steering Committee.

Meetings

Topic Leaders shall take part in all Executive Group Meetings and attend Steering Committee meetings as Observers. They shall arrange meetings with their respective *WP Managers* mainly through teleconferences, held on a 2-3 monthly basis, and twice per year face-to-face.

2.1B.5 Work package Managers

The *Work Package Managers* are responsible for the organisation and coordination of their own individual Work Packages. They shall use the on-line project management tool, available through a dedicated CRISP website set-up and maintained by the *Coordinator*, to report activity and any matters arising on a 2 or 3-monthly basis. This shall enable *Topic Leaders* to monitor progress against the work plan and deliverables' schedule, and to report the same to the Executive Group. *WP Managers* and all people involved in the technical work conducted will meet with their own respective *Topic Leaders* mainly through teleconferences, but at least twice per year in a face-to-face meeting.

2.1B.6 Addition of beneficiaries during the lifetime of the project.

The CRISP project will be open to all the remaining six ESFRI-PP projects in the cluster of Physics, Astronomy and Analytical Facilities, being: CTA-PP, E-ELT, EMFL, KM3net, PRINS and TIARA, at such time as they would wish to join the project as beneficiaries, and have reached the stage of moving from preparatory to implementation phase. They are invited to join the Steering Committee as observers (see above).

B 2.2 Beneficiaries

P No.	ESFRI-PP Projects	ELI	ESRFUP	ESS	EuroFEL	FAIR	ILC-HiGrade	ILL 20/20	SKA	SLHC	SPIRAL2	XFEL
CRISP Beneficiaries												
1	ESRF – Coordinator		**CO ORD**									
2	DESY				**CO ORD**		**CO ORD**					P
3	CERN									**CO ORD**		
4	ESS			**CO ORD**								
5	GANIL										**CO ORD**	
6	GSI					**CO ORD**						
7	ILL							**CO ORD**				
8	XFEL											**CO ORD**
9	ROMA1	P			P							
10	FORTH	P										
11	IST	P										
12	INFN	P			P	P				P		
13	MTA SZTAKI	P										
14	IFIN-HH	P									P	
15	UOXF.DB								**CO ORD**			
16	PSI				P							

Table B2.2 Overview of initially participating ESRFI projects and involved beneficiaries: Coordinators (COORD) and participating beneficiaries (P) are indicated.

P1 The European Synchrotron Radiation Facility (ESRF) was created by an International Convention, signed on 16 December 1988 and is a French Société Civile subject to French law. ESRF is supported and shared by 18 European countries and Israel. ESRF has about 600 staff members. ESRF's prime mission is to provide a portfolio of world-class instruments to its large user community. To this purpose it undertakes a continuous effort to upgrade its accelerator complex and the experimental facilities, as well as to improve its IT & data management structure, in order to efficiently handle the increasing demands of the user community. Consequently, the ESRF has a long standing expertise in all the four technical topics addressed by CRISP. It shall take the lead in work related to the solid state amplifiers, on high-throughput detector data streaming and participates in a large portion of work performed within the IT & Data Management package. The ESRF shall be the coordinator of the CRISP project. In this context the ESRF has participated in and managed numerous European projects: (ESRF: coordinating XTIP and ESRFUP, and participating in BIOXHIT, ELISA, PanDATA, RAMIRI, ….). The following key staff will be involved in the project:

Michael Krisch – WP1 leader - holds a PhD in Physics and has over 25 years experience in synchrotron radiation research. He currently heads the Dynamics and Extreme Conditions group within the ESRF Experiments Division. He is the coordinator of the ESRFUP project, and shall act as scientific coordinator of the CRISP project.

Ian Lishman - WP1 - holds a Batchelor's Degree in Economics and has 20 years of financial and administrative experience in research institutes. In the past 5 years he has been involved in over 20 FP6 projects and is currently involved in 7 FP7 projects. He is coordinating, with Michael Krisch, the ESRFUP project, and shall assist Michael Krisch in the coordination of the CRISP project.

Jörn Jacob – WP7 manager - holds a PhD in Electrical Engineering and is working for more than 23 years at the ESRF, in the RF Group of the Accelerator and Source Division.

Pabo Fajardo – WP12 manager - is the Head of the Detectors and Electronics Group, and has more than twenty years of experience in digital electronics and detectors.

Andrew Götz – WP17 - heads the Software group within the Instrumentation Support and Development Division. His expertise comprises beamline control, data acquisition, on-line data analysis and Grid technology.

P2 Deutsches Elektronen Synchrotron Hamburg (DESY) is one of the world leading laboratories for particle physics and photon science. DESY has long-standing experience in the design and operation of accelerators for high energy physics and synchrotron radiation research. DESY is operating the storage rings DORIS III and PETRA III as well as the free electron laser (FEL) FLASH. All three installations are operating independently for approximately 2200 synchrotron radiation and 200 FEL users per year. FLASH is the first free-electron laser world-wide to produce femtosecond pulses of UV- and soft X-ray radiation with fundamental wavelengths down to ~4 nm. FLASH will be one of the partner facilities of EuroFEL. DESY has developed the proposal for the European XFEL and is responsible for the construction and future operation of the European XFEL accelerator complex. The European XFEL employs the superconducting RF technique, which has been developed in the TESLA collaboration at DESY. The same technique forms the basis for the technical design of the International Linear Collider (ILC), the next big project for particle physics. DESY's expertise in this project is represented by ILC-HiGrade, coordinated at DESY. DESY is also the coordinator of Pre-XFEL, ILC-HiGrade, and IRUVX-PP, the preparatory phase projects for the ESFRI-PP projects European XFEL, ILC-Higrade and EuroFEL, respectively. Personnel involved in the project will include:

Hans Weise – Accelerators Topic Leader - Accelerator physicist, leading scientist in the accelerator division of DESY; DESY Project Leader European XFEL , and coordinator of the accelerator consortium for the European XFEL.

Detlef Reschke – WP4 - Accelerator physicist with nearly 20 years of experience in preparation, handling and testing of superconducting accelerator cavities used for FLASH, XFEL and ILC-HiGrade.

Stefan Düsterer – WP8 - Laser physicist, leader of the Laser group at FLASH and responsible for laser development and operation and time-resolved experiments at FLASH.

Henry Chapman – WP10 – one of the CFEL directors who has pioneered biological application at FELs.

Heinz Graafsma – WP12, WP13 - Physicist, Leader of the laboratory for high resolution detector development for photon science and other applications.

Frank Schlünzen – WP16, WP17, WP19 - Physicist, IT staff member with a strong background in synchrotron radiation.

P3 CERN, the European Organisation for Nuclear Research, is the largest particle physics laboratory in the world and is an international organisation with its headquarters in Switzerland. It is one of Europe's first joint ventures (1954) for fundamental research and technology developments. CERN operates the LHC collider, which is to be upgraded in energy and luminosity at a later date (SLHC). Several options for this upgrade will be investigated in the CRISP project including fast cycling magnets (for the SPS), crab cavities (for the LHC), and a proton driver as a new injector chain completing the Linac4 currently under construction. For these projects CERN is participating in WP4, WP5 and WP7. CERN has furthermore extensive expertise in detector developments, and will take the leading role in the activities related to the development of novel cooling schemes for low-temperature particle detectors (WP13). CERN has decades long expertise in IT& data management, acquired by the necessity to handle large amounts of data and make them rapidly available to a user community throughout the world. CERN will lead the IT & Data management topic. The following key staff will participate in CRISP:

Edmond Ciapala – WP4 - is a member of the senior scientific staff at CERN, and is involved in all topics of RF superconductivity (proton driver study, refurbishment of test stations, fundamental research).

Luca Bottura – WP5 – is deputy group leader of the TE/MSC group, involved in all aspects of superconducting accelerator magnets.

Duccio Abbaneo – WP13 manager - is currently SLHC-PP Deputy Project Leader, and he coordinates the developments for the CMS Tracker Upgrade.

Laurence Field – IT & DM Topic leader – is an expert in distributed data e-Infrastructures, Grid computing systems, infrastructures deployment and policies.

Ian Bird – WP19 manager - is currently the LHC Computing Grid Project Leader, and has line management responsibility in the IT Department for Physics Computing activities.

P4 The European Spallation Source (ESS) project is being realised in the ESS AB, a research organisation in the form of a public shareholding company, at present formally owned by the Swedish and Danish Government, but open for other European countries to join as co-owners. The ESS AB is situated in Lund, Sweden, and has at present 60 persons in its staff. ESS will participate within the Accelerator topic in the activities related to the superconducting RF cavity developments, and will in particular profit from the CERN test facilities in order to train their own personnel. ESS will participate within the Instruments & Experiments topic and will provide its expertise in neutron instrumentation (WP11). It will furthermore work closely together with the ILL in the development of a novel neutron

detector, where ESS provides its expertise in thin film deposition techniques. Furthermore, ESS shall be participating, as all other partners as well, in the IT & Data management topic. The following staff will participate in CRISP:

Dimitri Argyriou, Science Director, will with the help of Dr Patrik Carlsson, Machine Director, take the overall leadership and responsibility for the ESS contribution to the CRISP.

Håkan Danared – WP4 - Senior Beam Physics specialist, will lead the efforts of ESS on the Accelerator WP.

Ken Andersen and Feri Mezei – WP11 -, experts in neutron delivery systems and long standing experience in neutron instrumentation, including detectors.

Kim Lefmann – WP16 and WP18 - Instrument simulations specialist, and Sig Skelboe, Project Leader for the ESS Data Management and Software Centre, will contribute to the Information Technology and Data Management topic.

P5 The Grand Accélérateur National d'Ions Lourds (GANIL) has been funded at Caen, France, in 1983 as an institute for fundamental research to investigate and consolidate knowledge about the atomic nucleus. The laboratory is operated jointly by the National Institute of Nuclear and Particle Physics (IN2P3) belonging to the National Centre for Scientific Research (CNRS) and the Direction des Sciences de la Matière (DSM) of the Commissariat à l'Energie Atomique (CEA). The accelerator complex of GANIL comprises Electron Cyclotron Resonance (ECR) ion sources and five cyclotrons: two injectors and two sector-separated cyclotrons put in a cascade delivering stable beams and CIME large-acceptance cyclotron for the acceleration of radioactive ion beams at the SPIRAL facility operating since 2001. GANIL has 245 full-time employees. About 700 researchers from 30 different countries visit GANIL each year to perform experiments. Ganil participates with the following key staff in the CRISP project:

Thomas Thuillier - WP3 manager - Engineer, responsible for the development and construction of advanced ion sources for the SPIRAL2 linear accelerator with more than 10 years of experience.

Mathieu Quiclet – WP9 - Engineer with long-standing expertise in instrumentation used in highly hostile environments, robotics and nuclear waste management.

Marek Lewitowicz – WP14 manager - physicist with more than 25 years of experience in nuclear physics.

P6 GSI Helmholtzzentrum für Schwerionenforschung GmbH is a German research institute with more than 1000 employees that has a unique role in the planning, design and construction of FAIR. It is well recognised as a world leading institute in nuclear structure physics, super heavy elements, plasma physics and applied sciences. One major recent success was the development of a method for cancer treatment with heavy ions. The IP-portfolio and the know-how of the irradiation technique and facility have been licensed and are further developed in several collaboration contracts with industry. GSI is strongly involved in the Accelerator topic which relies on the experience of GSI with heavy ion acceleration and rapidly cycling superconducting magnets. GSI is leading the detectors & data acquisition topic. GSI has a long tradition of developing detectors not only for GSI but for example also for ALICE at LHC. GSI also operates a large Tier-2 computing centre for ALICE; within this context GSI will in particular contribute to work within WP16 on the common user identity system. The following key staff will participate in CRISP:

Peter Forck – WP3 manager – physicist, deputy group leader of the GSI Beam Diagnostics Group.

Hans Müller – WP5 manager - member of the magnet technology group at GSI, responsible for the development of SIS300 magnets.

Martin Winkler – WP9 manager - member of the nuclear physics department at GSI and machine coordinator of the new fragment separator Super-FRS at FAIR.

Johann Heuser – Detector & DAQ Topic Leader – physicist, is project leader at GSI for the development of the Silicon Tracking Detector System of the CBM experiment at FAIR.

P7 The Institut Max von Laue – Paul Langevin (ILL) is the world leading facility for neutron techniques, operating a neutron continuous source with the highest neutron flux in the world. ILL is a non-profit research organisation operated under private French law. It was founded in 1967 by France and Germany; and joined by the UK in 1974. Today ILL is further supported by 12 European countries holding the status of Scientific Members. The mandate of ILL is to operate the neutron source, as well as 40 specialised neutron instruments covering different research fields in a wide range of scientific topics and societal challenges. The excellence in neutron instrumentation, research and staff selection is the driving force of the facility. Consequently ILL has a long experience and a leading position in three of the topics covered by CRISP. In particular, the technical neutron developments achieved at ILL in neutron polarisation techniques, such as spin-echo, neutron delivery system, large area detectors (30-50 m^2) and new types of cold and ultra-cold neutron equipment are now widely used in the different neutron facilities around the world. Moreover, the long experience cumulated in data management created in many cases the standard for neutron techniques data analysis. The following staff will contribute to CRISP:

Eileen Clucas – WP2 leader – MA(Essex) and HNC Business Studies, has over 20 years experience in the coordination, management and delivery of many EU funded projects.

José Luis Martínez Peña – Instruments & Experiments Topic Leader - is Associate Director of ILL with long-standing experience in neutron research.

Trevor Forsyth – WP10 manager - has extensive experience in the study of macromolecular systems using neutrons and X-rays.

Jerôme Beaucour – WP11 manager - is Head of Service Mechanics and Experiments at ILL and has led ILL's programme of neutron beams enhancement since 2004.

Bruno Guerard – WP15 manager - is Head of the Service Neutrons Detectors since 1995 and was coordinator of a JRA on detector development in the NMI3 project in FP6.

Jean-François Perrin – WP17 manager - is Head of the IT Service and responsible for the maintenance and improvement of the general aspect of informatics and telecommunication at ILL.

P8 The European X-RAY Free-Electron Laser Facility GmbH (XFEL) based in the Hamburg area, is charged to construct, commission and operate the European XFEL facility. In addition to the European XFEL GmbH several research institutes in the participating countries contribute to the European XFEL project. Likewise the superconducting electron accelerator is provided by an international accelerator consortium coordinated by DESY, Hamburg. The European XFEL staff primarily works on aspects related to the x-ray and user program. These are x-ray generation, transport, and diagnostics plus the scientific instrumentation including detectors, data acquisition and storage, and sample environments. European XFEL in this project has leading tasks in the areas of time-resolved experiments, fast DAQ systems and related data storage and access issues. Albeit being newly created the European XFEL GmbH already has very experienced researchers in these areas. Following short profiles for these people are given:

Thomas Tschentscher – WP4 – Physicist with a background in synchrotron radiation and solid-state research. As scientific director he is responsible for the realisation of the design goals of XFEL. He has several years of experience in coordination of large scale projects and of large collaborations.

Christian Bressler – WP8 manager – Physicist working on ultrafast reaction chemistry. He is responsible for one of the instruments and has been working for more than 10 years with lasers and x-ray beams and possesses large experience in related instrumentation aspects.

Christopher Youngman – WP12 - Physicist with training in particle physics. He is responsible for the data acquisition systems part of the European XFEL x-ray instrumentation and has more than 20 years of experience in high performance electronics design.

Krzysztof Wrona – WP18 manager - Physicist with training in particle physics. He is responsible for the management of scientific data in the frame of the user program of the European XFEL and has more than 10 years of experience in data storage, processing, and in general IT issues.

P9 The University of Rome La Sapienza (ROMA1) is the biggest university in Europe. It consists of 23 Faculties, and about 5000 employees. The Department of Basic and Applied Sciences for Engineering and Physics joins Researchers in the field of general, atomic and nuclear physics, in recent years focusing on FEL photoinjectors for the new generation of coherent radiation sources and laser-based secondary sources. ROMA1 takes part in the SPARC and SPARX collaborations with INFN and ENEA and is participating in the European Projects EuroFEL and ELI. ROMA1 deploys its expertise via two key staff:

Luigi Palumbo – WP6 - is Director of the Department of Basic and Applied Sciences. He is involved in EuroFEL as Director of the SPARX project (part of the consortium) and in ELI as Scientific Advisory Board member. His research interests are beam dynamics, FEL-physics and high-brightness beams.

Mauro Migliorati – WP6 - is assistant professor at the Faculty of Engineering of “La Sapienza” in Experimental Physics. His main field of research is related to particle accelerators and beam dynamics for high-energy physics and for interdisciplinary applications.

P10 The Foundation for Research and Technology Hellas (FORTH) is the parent institute of the Institute of Electronic Structure and Lasers (IESL). IESL consists of the following three research divisions and an administration services team: the Laser and applications, the Materials and structures, and the Theoretical and Computational Physics and Chemistry division. It has about 250 employees. FORTH-IESL has been operating since 1990 as a European Research Infrastructure under the Access to Large Scale Installations Program (LIP, HCM, TMR and IHP) and today as partner of the Laser Lab Europe.

In particular in the field of the generation and exploitation of coherent XUV radiation and atto-second pulses the host institution has a high degree of expertise and prominent international presence from its very birth. FORTH-IESL was one of the first institutions in Europe to initiate and successfully implement research projects in non- linear XUV optics. The expertise of FORTH-IESL is particularly valuable for WP8, and the following people shall participate:

Paraskevas Tzallas – WP8 - is researcher at FORTH-IESL, working on XUV attosecond pulse generation, characterisation and applications.

Dimitrios Charalambidis – WP8 – is an expert in short-pulse/short-wavelength generation and characterisation, attosecond science, and coherent XUV sources.

P11 The Instituto Superior Técnico (IST) is the largest school of engineering in Portugal, with long tradition in teaching, and excellence in research, innovation and training activities. The Grupo de Lasers e Plasmas (GoLP) is a research group of Instituto de Plasmas e Fusão Nuclear (IPFN) at IST. GoLP develops experimental, numerical and theoretical research in plasma science. GoLP has two main facilities: the laboratory for Intense Lasers (L2I) and a massively parallel computational facility. L2I contains a multi-terawatt laser and an interaction area equipped for high-intensity laser-plasma interaction and the experimental activity includes laser science, electron acceleration, new sources of radiation and plasma diagnostics. The theoretical and numerical activities cover a wide range of laser and plasma science, including plasma based acceleration, compact radiation sources, laser-driven fusion, and astrophysical phenomena. The following people will participate in the CRISP project:

Nelson Lopes – WP6 - Physicist working on development on plasma acceleration and laser technology.

Jorge Vieira – WP6 - Physicist working on the interaction of intense lasers with matter with applications on particle based acceleration and radiation generation.

P12 The Istituto Nazionale di Fisica Nucleare (INFN) is an Italian Public Research Institution dependent on the Ministry of University, Education and Research. Since its creation in 1951 INFN acts as a large multidisciplinary organisation, with main focus on fundamental research on Nuclear, Particle and Astroparticle Physics as well as Applied Research. INFN coordinates the Italian contribution to CERN activities and in other HEP laboratories around the world and operates four large National Laboratories: an Underground Research Centre (LNGS under the Gran Sasso mountain) and three laboratories (LNF in Frascati, LNL in Legnaro and LNS in Catania) where well-established accelerator R&D on cutting-edge activities are carried out. In particular, the Frascati laboratory is currently operating a test FEL facility (SPARC), in preparation of the SPARX-FEL facility scheduled to be built in Frascati. INFN is also deeply involved in the ELI-PP project. INFN's main expertise within CRISP relates to work within the accelerator and detector & data acquisition topic:

Andrea Mostacci – WP6 manager – expert in particle accelerators, in particular in the design, construction and commissioning of beam manipulation devices in the context of high energy physics.

Adolfo Esposito – WP14 - Specialist in accelerators facility design from a radioprotection point of view with particular scientific activity in gamma and neutron spectrometry.

P13 Magyar Tudomanyos Akademia Szamitastechnikai es Automatizalasi Kutato Intezet (MTA SZTAKI) is one of the largest IT research institutes in the Central European region with more than 300 employees. The institute plays a leading rule in Grid computing related research, development, and training in Hungary as the funding member of the Hungarian Grid Competence Centre, and as the member of CoreGrid (2004-2008) and S-CUBE (2008-2012) European Networks of Excellence.

The Laboratory of Parallel and Distributed Systems (LPDS) in MTA SZTAKI has long running experience in establishing and operating production-level Grid infrastructures in several projects for different purposes. The following staff will participate in CRISP:

Peter Kacsuk – WP19 - is the Director of the Laboratory of the Parallel and Distributed Systems in the Computer and Automation Research Institute of the Hungarian Academy of Sciences.

Miklos Kozlovsky – WP19 - is working as Research Fellow at the Laboratory of the Parallel and Distributed Systems in the Computer and Automation Research Institute of the Hungarian Academy of Sciences.

P14 The Horia Hulubei National Institute of Physics and Nuclear Engineering (IFIN-HH) is one of the most important R&D organisations in Romania, contributing with almost 10% to the national scientific output. The institute is dedicated to the research and development in physical and natural sciences, and is involved in numerous international collaborations in the field of nuclear physics. It is the main contributor of the Romanian participation to FAIR (GSI) and ISOLDE (CERN), and is involved in INDRANAP (FP5), HadronPhysics (FP6), EURONS (FP6) and EURISOL DS (FP6). IFIN-HH will host the Nuclear Physics Pillar of the ELI European Project, a large scale facility, with an investment of about 300 M€. IFIN-HH will contribute with its expertise in nuclear detector technology.

Florin Negoita – WP12 - is a nuclear physicist and an expert in the study of nuclei far from stability using complex detectors. He had a leading role in the elaboration of the ELI-NP White Book. At present he is deputy of Head of Dept. of Nuclear Physics.

Nicu Marginean – WP14 - is a nuclear physicist with wide experience in gamma spectroscopy using large arrays of Ge detectors like e.g. AGATA. At present he is the Head of Dept. of Nuclear Physics and is deeply involved in the ELI-NP project.

P15 The University of Oxford is one of the world's leading research universities. The Department of Physics is one of the largest physics departments in Europe pursuing forefront research. Research at Oxford spans a wide range of astronomy and astrophysics, from the largest scales in the Universe to observational work on galaxies, stars and planets. Its involvement in the SKA project comprises an interdisciplinary team that is working on the project with appropriate skills in each area. The relevant groups include Astrophysics (within the Physics Department), the Oxford e-Research Centre (OeRC) and the Engineering Department. The Oxford e-Research Centre researches new ICT for problems with scale and complexity, facilitating interdisciplinary research and creating appropriate e-Infrastructure for the support of research. The following staff will lead contributions from SKA to CRISP:

Mike Jones (Astrophysics) and David Edwards (Engineering) – WP12 - have expertise in mechanical and electronic engineering, radio astronomy and all aspects of signal processing.

Stephen Rawlings – WP18 and WP19 - is current-Chair of the European SKA Consortium (ESKAC) and global scientific coordinator for the FP7 PrepSKA project.

David Wallom – WP18 and WP19 - is Technical Manager of the Oxford e-Research Centre and Technical Director of the UK National Grid Service, the UK NGI.

P16 The Paul Scherrer Institut (PSI) plays a special role as a user laboratory, developing and operating large, complex research facilities within the Swiss research and education landscape. The two large-scale PSI facilities, the Swiss Light Source (SLS) for photon science and the Neutron Spallation Source (SINQ). The PSI X-ray Free Electron Laser (SwissFEL) is a new development in laser and accelerator technology, to go into operation in 2015.

PSI is strongly engaged in several EU projects (e.g. EuroFEL/IRUVX-PP, PaN-Data, Elisa, NMI3), which are aiming at offering to the users of the Photon/Neutron large research facilities novel IT capabilities (authentication, common proposal handling, remote data access, remote experiment login, publication management). Within the CRISP project PSI takes the lead in further developing and harmonising work on the common user identity system (WP16), and participates in the other activities of the IT& data management topic,

which are all of central importance for this user facility. The key staff involved in the CRISP project is:

Heinz J. Weyer – WP16 manager - has led the group that developed the Digital User Office (DUO) package, in use at many European research facilities. He leads the development of the prototype for the EU-wide, unique user identification system in EuroFEL.

Stephan Egli – WP16 – is the head of the PSI Information Technology division with large experience in the needs of researchers in particular in the area of efficient mass data handling.

B 2.3 Consortium as a whole

#	**Project Partners**	**Status**
1	ESRFUP	Implementation
2	EuroFEL	Commitment
3	ESS	Implementation
4	ELI	Moving towards implementation
5	FAIR	Implementation
6	ILC-Higrade	Commitment
7	ILL 20/20	Implementation
8	SKA	Commitment
9	SLHC	Moving towards implementation
10	SPIRAL2	Implementation
11	XFEL	Implementation

Table 2.3.1 List of initial participating ESRFI projects and their status of advancement

Table 2.3.1 lists the ESFRI projects represented within CRISP. These are either in their implementation phase, according to the ESFRI Implementation Report 2009, moving towards implementation (ELI and SLHC), or have demonstrated a clear commitment for their construction from Member States or International Organisations through letters from Ministries or signed MoUs (EuroFEL, ILC-HiGrade and SKA).

The participating RIs and the other involved institutes constitute an ideal blend of experience and competence with an often decades-long know-how in the four technical topic areas addressed within this project.

Well established and world-wide renowned facilities such as CERN, DESY, ESRF, GANIL, GSI, ILL and PSI run extremely successful research programmes and have contributed significantly, for example, to the design and construction of more and more performing accelerator complexes, neutron instrumentation and installations for nuclear research. They catalysed the development of a multitude of novel experimental techniques and associated instrumentation, new detector concepts, and have contributed significantly to the advancement of information technology and data management. Their accumulated know-how forms the solid basis for this project consortium.

The new RI projects, in particular the Free Electron Laser (FEL) project XFEL and ESS, but

as well the distributed RIs EuroFEL, ELI, and SKA are the natural emergence out of the established RIs, as testified by the migration of staff, in particular for the x-ray and neutron sources, to the new upcoming facilities, and the rapidly acquired focused expertise in the domains specific to the challenges of these new projects.

The project consortium includes partners from the convergence regions (Portugal, Greece, and Romania) which provide relevant input in the field of accelerators (IST), fast electronics (FORTH), data acquisition and detectors (IFIN-HH), and distributed data infrastructures (SZTAKI).

The vast expertise in accelerator related issues of CERN, DESY, GANIL, GSI, and INFN is essential to tackle the relevant tasks. ROMA1 and IST contribute the necessary know-how in laser and plasma physics; ESRF brings in its particular know-how in the cavity combiner RF source which shall be shared with CERN, ESS, and GSI. The superconducting RF (SRF) technology test and diagnostics facilities will be jointly developed by XFEL, DESY, and CERN and will allow the ESS to train their own personnel at the CERN site.

XFEL and DESY are spear-heading research on ultra-fast phenomena, FORTH has the expertise in the development of the associated fast electronics, and ESRF offers its experimental stations to perform benchmark experiments. Fast detector signal treatment is an entailing requirement, and for this the University of Oxford and IFIN-HH contribute with their expertise.

The complementary know-how at GANIL and GSI is required to develop the new electron cyclotron resonance Ion Source, novel tools for remote handling in high-radiation areas, and novel neutron- and gamma-ray detectors. For the latter task IFIN-HH feeds in its expertise in relation to the AGATA detector.

ESS will profit from 40 years experience of the ILL in the design of neutron beam delivery systems and the construction of gas detectors, while ESS contributes with the know-how in boron thin-film technology.

ESRF and ILL share their experience in operating a highly efficient research program in biology with the upcoming facilities at DESY, XFEL and ESS, bringing together the x-ray and neutron user communities in this research field.

All participating RIs operate or will operate user programmes with large user communities and data volumes to manage. The acquired expertise of the operating large scale user facilities (CERN, DESY, ESRF, GSI, ILL, and PSI) will ensure that the tasks within this topic are efficiently tackled and that new projects such as ESS, SKA and XFEL can optimally benefit.

In view of the technical nature of the engaged tasks, industrial suppliers are naturally involved.

Strong industrial involvement is foreseen within the Accelerators topic, most notably for the new Electron Cyclotron Resonance ion source and the fast ramped superconducting magnets. Technology transfers are envisaged for the surface treatment techniques of the superconducting radiofrequency cavities, the fast ramped magnet design, and the solid state amplifiers using cavity combiners.

Within the Instruments & Experiments topic industry involvement is required for the neutron delivery systems; a technology transfer of the MHz parametric amplifier to the laser industry could be envisaged.

The development of CO_2 cooling (within the Detector & Data acquisition topic) involves direct participation of industry with a complete technology transfer, thus enabling further developments in the future. The digital electronics for work within WP14 will be fully designed and produced by research centers and companies within Europe. Technology transfer is foreseen for the ^{10}B thin film neutron detector to be developed within WP15.

Finally, a number of the Information technology infrastructures are of potential interest to industry, most notably the common user identity system (AAI) and the persistent identifier registry.

i) Sub-contracting:

A very small fraction of the work shall be subcontracted, as detailed below:

WP1:

54 k€ for audit certificates.

21 k€ for the production of articles on the CRISP project for the existing periodic newsletters of the participating RIs (WP2, task 6). Experience shows that the quality of such articles requires a professional science writer

21 k€ for the production of concept and thematic posters publicising the concept of CRISP and its technical and scientific accomplishments (WP1, task 7). This requires a professional layouter to ensure adequate quality.

WP2:

20 k€ Trigger articles on the CRISP project in specialised media widely read by the scientific community and policy makers (WP2, task 3). This work shall be subcontracted to a media relations agency having the appropriate connections in the media world.

ii) Other countries:

N/A

B 2.4 Resources to be committed

The internal organisational structure with divisions covering the relevant technological and scientific expertise of the upgraded and new RIs, and/or the scientific environment in which these RIs are embedded, ensures the availability and commitment of highly skilled staff covering all the relevant expertises required for the project.

A large part of the work relies on technical and scientific infrastructure already available at the participating RIs. This is particular true for the work on accelerator components, neutron delivery systems, test stands for detector & electronics developments, and most naturally for IT & data management.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
01:ESRF	34						715	348		271		131				14	101	35		***1649***
02:DESY		15		520				1350				24						54	54	***2017***
03:CERN				1880	326		45						644				67		281	***3243***
04:ESS							45	8	8	8					250	112		14		***445***
05:GANIL			1482						330					591	8			8		***2419***
06:GSI		4	320		164		45	8	221		8		121	50		34			84	***1059***
07:ILL								8	8	271	4684				348	27	168	16		***5530***
08:XFEL				1635				822		18		228	11	8				333		***3055***
09:ROMA						82														***82***
10:FORTH		9						44												***53***
11:IST		14				10														***24***
12:INFN		7			250	48								43						***348***
13:MTASZTAKI		14																	7	***21***
14:IFIN-HH		11										20		55						***86***
15:UOXF												21						150	150	***321***
16:PSI																66				***66***
	34	***74***	***1802***	***4035***	***740***	***140***	***850***	***2588***	***567***	***568***	***4692***	***424***	***776***	***747***	***606***	***253***	***336***	***610***	***576***	***20418***

Table B2.4 Partner contributions in k€

The total cost of the project will be 36.3 M€. In addition to the 12.0 M€ of EC requested contribution, the beneficiaries commit 3.9 M€ to cover the short-fall between the total indicative cost and the Commission's contribution, and provide an additional direct expenditure of 20.4 M€ (see Table B2.4), in order to achieve the objectives of the CRISP project.

Large investments occur within the Accelerator topic and relate to the new prototype electron cyclotron resonance ion source (1.23 M€), the superconducting radio-frequency cavities test infrastructure at CERN and DESY (1.31 M€), and the cavity combiners at the ESRF (0.55 M€). Further important investments relate to three femtosecond laser systems supplied by XFEL and DESY (1.8 M€) which are required for the fast time-resolved studies, and investments in neutron guides and supports by ILL (4.3 M€), within the Instruments & Experiments topic. Investment within the other topics amount to a total of 0.62 M€.

In view of the above said, the EC contribution is very strongly leveraged (Commission 33%, Beneficiaries 67%).

B3. IMPACT

B 3.1 Strategic impact

The work programme in CRISP is a concerted plan to achieve more efficient implementation of ESFRI projects. The eleven participating ESFRI projects will join their resources and expertise to develop concerted actions. The expected impacts are summarised as follows:

- Enabling of key technologies that are essential to meet current and emerging scientific and technical challenges (new ion and neutron sources and accelerator components, development of fast real-time techniques, rapid digestion and transfer of huge flow of data, …).
- Creating synergies between experimental methods and techniques enabling innovation and new solutions to scientific questions (joint approaches in structural biology, transfer of accelerator technologies to parallel projects, handling of highly-activated areas, ….).
- Fostering interactions between fundamental research and industry, facilitating collaborations, building knowledge and understanding of complementary needs and demands (IT efforts, structural biology, accelerator components, …).
- Promoting the development and implementation of common solutions to the challenges faced by ESFRI partners (performances, cost efficiency, responsiveness to users' needs, access, data management …).
- Enhancing the capacity and performance not only of the participating RIs, but of all other national RIs in the field of Physics, Astronomy and Analytical Facilities.

Close collaborations and continuous exchanges of experience within the four scientific topics of CRISP and across them, an optimal exploitation of the complementary expertises will allow a successful completion of the project. Interaction with and careful monitoring of similar national and international activities shall ensure that the novel developments elaborated within CRISP are truly complementary and comply with the challenges faced by the ERA and their expected evolution in the next decade and beyond.

Apart from the global impact of CRISP each topic will create its own impacts as follows:

Accelerators: Many of the participating RIs rely on significant developments of accelerator and source components. Over the years, a high level of expertise has been accrued at the participating facilities. To further push the technology forward these skills have to be joint, and test facilities and equipment need to be shared. The goal is to jointly develop, test and deploy these components in order to provide the best possible sources to the RIs with an important benefit for other existing and future accelerator projects. Within the CRISP project these common developments comprise:

- The common realisation of a bunch shape monitor and a new ion source will exploit skills, know-how and infrastructures available at SPIRAL2 and FAIR to a maximum extent. This is in particular true for the ion source where important expertises are put together (SPIRAL2 in the magnetic and mechanical design, FAIR in the ion beam extraction). The future source will be usable by CERN at the LHC to upgrade the heavy ion beam current in order to reach the full ion beam performances.

- The work on superconducting radio-frequency cavities (SRF) brings together the expertises of SLHC, ILC-HiGrade and XFEL, and will provide a substantial knowledge transfer to new projects (ESS, SLHC, etc.) in optimum cavity production, surface treatment and diagnostic techniques. The work extends the preparatory work of the ESFRI-PP project ILC-HiGrade, and complements the EuCARD funded manufacture of cavities for proton and heavy ion linacs. Complementary, a collaboration on an ESS cryostat design is foreseen (proposed as

part of the contributions of the German Helmholtz-Centres and in collaboration with the Superconducting Proton Linac study at CERN). XFEL has proceeded to procure a large number of accelerator cavities. This procedure showed an apparent issue with performance guarantees and quality assurance. Since the performance is an important aspect likewise an additional task has been developed for the project. An important impact of this project therefore will be to develop QA and test schemes to be transferred to European industry. This work thus provides an outstanding example about how the technical development by the RIs supports European industry improving their skills in cutting edge technology and to improve their chances on the global market. Furthermore this activity should lead to significant cost saving for future procurement procedures of the projects under implementation.

- FAIR and SLHC join their efforts in the development of fast ramped superconductor magnets necessary for their future accelerator facilities. All parts will be built and developed in close collaboration with the European industry. The technology for the production of a low loss superconducting Rutherford cable, a curved cos theta coil, collar and yoke will be transferred to industry.

- The work on compact electron beam sources and hybrid laser-driven acceleration schemes creates synergies between two accelerator communities (combining the laser-based and the conventional accelerator approach). Complementary R&D funding requests with the aim of implementation are filed in other EC initiatives, namely in the proposal Laserlab and EuCARD. Within the former, additional R&D is foreseen for improving the current proposal of the WP, while in the latter, the diagnostics shall be implemented as used in the present project.

- The work on solid-state amplifiers promotes synergies between radio-frequency (RF) experts by gathering ESFRI projects around an important development in the field of RF power generation. It carries forward work, performed within ESRFUP, on strongly higher-order mode (HOM) damped normal conducting cavities, which shall be powered using the novel cavity combiner concept. A later transfer of technology to European industry is planned for a future large scale production of solid state amplifiers using cavity combiners.

Instruments & Experiments: The present and future generation of RIs will have to cope with an increasing demand for more performing instruments with advanced and increasingly sophisticated sample environments. Joint efforts, standardised equipment and common protocols and procedures are a key requisite to allow the user community to optimally exploit the new experiments and capabilities as well as to use different kind of facilities easier. Within the Instruments & Experiments topic common developments shall be engaged in the following fields:

- Time-resolved studies require the development of specialised optical amplifiers, electronics and novel experimental techniques. Efforts and competences of ELI, ESRFUP, EuroFEL and XFEL shall be brought together to engage in a common development of these components. Further synergies are created by the necessity to implement MHz DAQ schemes and to rapidly store large data sets, aspects which are tackled in WP12 and WP18. Bringing all this expertise together shall significantly speed up the development of time-resolved studies at FELs and synchrotron sources as well as pave the way for the upgraded neutron facilities.

The creation of synergies in biological research between the neutron and x-ray communities will considerably widen the scope of the user community to carry out novel cutting edge research at all the RIs in the ERA with significant societal (health) and industrial (mainly pharmaceutical sector) impact. The project will provide a decisive boost in the exposure of the large x-ray community to neutron scattering approaches for biology that have arisen during ESFRI-PP funding, optimising natural synergies for the study of biological systems and without doubt having a very strong impact on efficiency and interoperability. The work is complementary to WP18 of NMI3 (biological deuteration), and to BIOSTRUCT (which

focuses principally on *access* to synchrotron radiation, but does not include neutron facilities).

- The increased performance of the FAIR and SPIRAL2 facilities will require new concepts, methods, and equipment to be used in highly-activated areas. Only innovative solutions will guarantee an efficient operation of the upcoming facilities later on (e.g. secondary beam delivery time, radioactive waste management, …). Synergies between FAIR and SPIRAL2 will be achieved in the conception of high-radiation areas and the associated equipment. GSI/FAIR will participate in an ITN Marie Curie project (PURESAFE-264336) which addresses logistic issues in relation to remote handling, thus complementing the developments within CRISP. The activities in this WP can account for maintaining the pioneering role of the European nuclear industry and can contribute to extend its scope towards related subjects of basic science and technology.

- A joint effort of ESS and ILL20/20 in designing novel moderators and ultra cold sources will be mutually beneficial to improve both steady-state and pulsed neutron sources. ESS will benefit from 40 years experience of the ILL in beam delivery systems to design an innovative and cost effective suite of beam lines. The EC NMI3 programme addresses instrument improvements, but not in the areas of directional moderators, ultra cold neutron sources, or neutron transport systems. By contrast, some of the tasks are natural extensions of previous ESFRI projects such as, for example, ILL20/20.

Detectors & Data Acquisition: Detector performance, data acquisition electronics, and the capability to rapidly "digest" large amounts of data represent a potential bottleneck for all involved RIs. Common solutions need to be undertaken, and fertilised with the advancement of data management tools, in order to ensure a cost-effective implementation at the facilities:

- Detector systems at forthcoming FEL and astronomy facilities will generate large amounts of fast-streaming data that cannot be managed appropriately with the acquisition techniques currently established for these applications. The development of common solutions and standards for fast on-line data reduction building up on modern computing hardware like FPGAs, GPUs and multi-core processors in flexible, user-friendly software/firmware stream-processing frameworks and their deployment across facilities are of high importance to reach the scientific aims put forward by the RIs and will furthermore be beneficial to a vast number of facilities in the ERA. This development will reduce the investment, deployment and operation costs of those detectors.

- The development of CO_2 two-phase cooling systems exploits complementary expertise at SLHC, EuroFEL, and FAIR. It involves direct participation of industry for the development and qualification of system components, and of instrumentation for process monitoring and control. All data collected and all knowledge developed in the fields of process modelling, system design rules and the study of materials will be available for further developments of CO_2 cooling in European industry.

- Common solutions for the realisation of data acquisition electronics and algorithms adapted to the advanced gamma-ray tracking and neutron detection systems at SPIRAL2 are planned by expanding the developments and standards performed during the SPIRAL2 preparatory phase and making them applicable also at ELI, EuroFEL and FAIR.

- The two neutron RIs will collaborate in a very complementary manner for the implementation of a new detector: ESS has unique expertise in Boron film technology while ILL20/20 has a well established experience in neutron gas detectors. Both fields of expertise are essential to develop the Multi-Grid detector, and to bring it to the stage of large scale production. The work is complementary to a JRA dedicated to detector development proposed within the NMI3 FP7 project (2010 call). ILL20/20 and ESS will participate as observers of the NMI3 project to ensure that an effective synergy is maintained between NMI3 and CRISP.

Information Technology & Data management: All participating RIs need to process, store, and make accessible large volumes of data generated by their instruments. The quantity and complexity of this data is significantly higher than from the previous generation of installations. Therefore, common solutions need to be developed by adapting best practice solutions available throughout the participating RIs and industry. These solutions will then be assessed and deployed beyond the lifetime of the CRISP project, enabling multi-disciplinary research by making many datasets from the RIs accessible across the ERA. In addition, it will also simplify the open access movement engaged by many of the ESFRI RIs. In particular the following common points and synergies with other projects, infrastructures, and ESFRI clusters will be explored:

- The Authorisation and Authentication Infrastructure (AAI) will allow single user identification on a European scale. This will be the basis for RIs to access remote data and IT systems. Due to the similarities with other Independent Duty Personnel (IDP) requirements, this solution will naturally aim at synergies with projects in the research and education area, e.g. eduGAIN (http://www.edugain.org/), TERENA (http://www.terena.org/), Internet2(http://www.internet2.edu/).

The participating RIs have very heterogeneous organisational structures, which in most cases results in heterogeneous user identification systems. Despite this fact, users of the participating RIs collaborate on a European and international level in a very efficient way. A unique user identification system will foster this pan-European character and improve the collaboration within the ERA.

- The development and deployment of a common metadata catalogue and the establishment of a data continuum environment represents an essential step towards improving the query and access to data and standardising persistent identifiers to allow sealing the link between experiment data and publications.

The metadata catalogue will be built on the PanDATA (http://pan-data.nd.rl.ac.uk/) EC project where some institutions of the participating RIs already participate (ILL20/20, ESRFUP etc.). This collaboration will bring the participating RIs closer to each other and will promote an easier and more efficient sharing of metadata products describing the data produced by the RIs instruments.

At the same time, the data continuum effort will establish synergies in the e-Science digital repositories domain by identifying common solutions for data persistent identifiers. This will provide a solution to a problem faced by several RIs: the need for a system capable to navigate the data evolution by linking the different stages of the data lifecycle, from raw data to publication. The work on the data continuum can also be a solution for industry to facilitate searching for experimental data.

- The involved RIs will work together to develop a common IT solution for data acquisition and data archive. This will require the sharing of expertise between the IT and detector teams of the participating RIs. An important aspect of the work on high-speed data recording is the development of advanced and optimised solutions for data recording based on mainstream standards-based technologies. This approach will offer more opportunities to develop suitable products and services to the European industry.

- The development of a common roadmap for a distributed data infrastructure, based on reliable connectivity and bandwidth between sites operating common data management services and tools, will be carried out in close collaboration with other existing pan-European e-infrastructures to ensure that the IT services identified and developed by the project are supported by these external projects/infrastructures. In particular: (i) Links with GEANT (http://www.geant.net) will be established to provide networking expertise and services for high-speed reliable data transfer. (ii) Data management services and tools will follow the developments on the middleware stack deployed by EGI-InSPIRE (http://www.egi.eu/projects/egi-inspire/) which is being partially developed in the context of the EMI (http://www.eu-emi.eu/) project. (iii) A limited number of applications could make use

of supercomputing facilities that are part of the DEISA (http://www.eu-emi.eu/) and PRACE (http://www.prace-project.eu/). A close collaboration with all the above-mentioned projects is important for the achievement of sustainable results.

By working in collaboration with such a broad set of project and infrastructures to deliver IT solutions addressing common requirements of different RIs, the project will give a major contribution to improve the collaboration within the European Research Area. For example, the resulting IT and DM solutions could be considered by other ESFRI clusters.

EC funding will complement financial efforts towards the CRISP tasks made by the participating RIs to ensure a large leverage effect. National efforts are not sufficient to build up the synergetic effects; consequently CRISP will contribute prominently to the further development of the attractiveness of the ERA in a territorial-balanced manner.

B 3.2 Plan for the use and dissemination of foreground

CRISP intends to engage in the full range of dissemination activities including: publications in scientific journals, placement of articles in specialised media widely read by the scientific community and policy makers; public communication via a dedicated website; participation in events, and advertising the CRISP project through posters.

It shall place special emphasis on engaging with industry: raising awareness of the technological and scientific developments accomplished within the CRISP project; promoting its activities and output; presenting opportunities for collaborative work; and soliciting specific commissions. In particular it will organise topical workshops for CRISP partners to exchange experience in relation to industry – inviting industry participation and specialists. These will serve not just as a platform to explore often tendentious issues, such as procurement practices, improvement of business acumen, exploring intellectual property and legal issues, they will provide the opportunity to build relationships and increase the impact towards industry as described in more detail in Section B3.1.

The CRISP Annual meetings shall provide an important forum for project dissemination exchange and outreach. Open to all participants of the CRISP project, other ESFRI cluster projects, EU representatives and the scientific community. They shall be well advertised to attract the participation of other (national) RIs in the fields of Physics, Astronomy and Analytical Facilities, in order to share the progress achieved within CRISP, and to create links and synergies with these facilities.

Concerning intellectual property, current standard practises and regulations – including EC rules – offer adequate solutions. The Consortium Agreement (based on the DESCA model) will give careful attention to intellectual property rights and obligations. Most of the participating RIs have a long-standing experience with the transfer of intellectual property and intellectual property rights between facilities, individuals, and external parties, and, looking to the past, these facilities have been largely spared from litigation.

B4. ETHICAL ISSUES (IF APPLICABLE)

There are no ethical issues, as described in the guidelines, which need to be addressed.

B5. GENDER ASPECTS (OPTIONAL)

All CRISP participants are equal opportunities employers and are particularly vigilant in recruiting female candidates in fields where there is an under-balance of female employees.