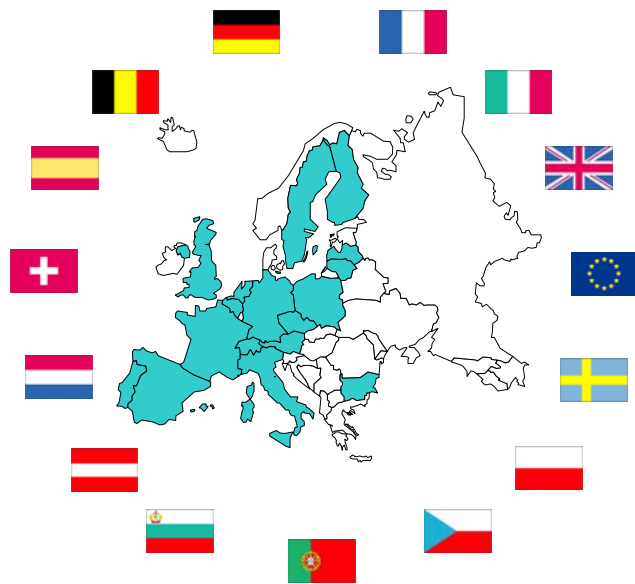


2st Meeting on DM2 ECATS Feasibility Study of EUROTRANS: Integrated Project on European Transmutation



SCK•CEN, Brussels
April 20-21, 2005

2st Meeting on DM2 ECATS: Feasibility Study

Start of Meeting: Wednesday April 20, 11:00

- 11:00 - 11:20 1. Welcome and self-introduction of participants
- 11:20 - 11:30 2. Review of Actions defined during 1st ECATS Meeting on March 3, 2005
- 11:30 - 12:00 3. Overview on EUROTRANS: Objectives, outline of DM2 ECATS, possible international collaborations by IP Co-ordinator
- 12:00 -12:30 4. Status of requirements for coupling experiments by Dankward Struwe

12:30 – 13:30 Lunch break

- 13:30 5. Description of coupling experiment RACE / SAD / YALINA (objectives, working programme, funding, time schedule, status):
- 13:30 - 14:50 5.a) General Overview on TRADE, RACE and RACE-PLUS by George Imel
 - The RACE Programme by Denis Beller
 - The Texas Reactors by Sean O’Kelly
 - The Idaho Accelerators by Alan Hunt
 - RACE-PLUS Experimental Plan by George Imel
- 14:50 - 15:50 5.b) Status of SAD Project by Valery Shvetsov
- 15:50 - 16:20 5.c) Status of YALINA by Hanna Kiyavitskaya
- 16:20 - 17:30 Discussion

End of Meeting: 17:30

Dinner Departure from Central Station at 19h00

2st Meeting on DM2 ECATS: Feasibility Study

Start of Meeting: Thursday April 21, 9:00

- 09:00 6. Evaluation of coupling experiments RACE / SAD / YALINA by EUROTRANS participants :
- 09:00 - 09:30 6.a) Response to the EUROTRANS requests to RACE by George Imel
- 09:30 - 10:45 Status of RACE Neutronic Calculations by Laurence Mandard
Photofission Nuclear Data and First RACE Applications by Henri Safa
First Results on Temperature and Thermal Stresses on Simplified Geometry by Cecile Krakowiak
Core and Target Cooling: First Evaluation by Andre Bergeron
Transient Studies on RACE-TRIGA Reactor Types by Michael Schikorr
- 10:45 - 11:15 6.b) R&D Activities on SAD at FZK by Cornelis Broeders
Current evaluations on SAD by Waclaw Gudowski, Enrique Gonzalez (tbd)
- 11:15 - 11:45 6.c) Current evaluations on YALINA by Peter Baeten
- 11:45 - 12:30 Discussion

12h30 - 14:00 Lunch break

- 14:00 - 14:30 7. Status of TRADE experiments in 2005 by Stefano Monti
- 14:30 - 15:00 8. Discussion on possible joint working programme (major technical topics, major milestones, critical issues, EUROTRANS suggestions for modifications on RACE, SAD, YALINA programme plans)
- 15:00 - 16:00 9. Discussion on possible methods of collaboration between EUROTRANS and RACE / SAD / YALINA
- 16:00 – 16:20 10. Definition of actions and next steps
- 16:20 – 16:30 11. Date of next meeting

End of Meeting: 16:30

Review of Actions from 1st ECATS Meeting

Aix en Provence, March 3, 2005

- **Action M01/A01:** Dankward Struwe is drafting a reference paper , giving the request list for the outcomes of DM2 ECATS, being consistent with the required input for the design of XT-ADS and EFIT. → done.
- **Action M01/A02:** The IP Co-ordinator contacts the SAD and RACE teams and asks for the nomination of both scientific and administrative contact persons. Deadline: March 15, 05.

scientific contact

administrative contact

SAD:

Valery Shvetsov

RACE: Georges Imel / Denis Beller

Franc Harmon

YALINA: Anna Kiyavitskaya

ISTC:

Lev Tocheny

Review of Actions from 1st ECATS Meeting

Aix en Provence, March 3, 2005

- **Action M01/A03:** Christian Le Brun, being the contact for accelerator issues, specifies a question list to the SAD and RACE teams in order to clarify the time structure of the proton / electron beam of the applied accelerators. → **done for RACE and YALINA.**
- **Action M01/A04:** All data / technical information / reports on SAD / YALINA / RACE, which is presently available with this Feasibility Group, shall be sent to the members of the Feasibility Group until March 11, 05. → **done**

According to the request list of Michael Schikorr (see Appendix 9), a similar request list shall be produced for SAD and YALINA (by Cornelis Broeders, with support of Waclaw Gudowski and Enrique Gonzalez), deadline: March 24, 05.

Review of Actions from 1st ECATS Meeting

Aix en Provence, March 3, 2005

- Action M01/A05: The IP Co-ordinator together with the EUROTRANS Project Office will put all data from Action M01/A04 on the EUROTRANS File Server. → to be finalised.
- Action M01/A06: The IP Co-ordinator contacts the administrative contact persons from the SAD and RACE projects asap, in order to clarify the open issues concerning the time schedule, the budget plan and the envisaged working programme. → see presentations.
In addition, documents such as the design report and the safety report shall be requested for both projects. → to be done.
- Action M01/A07: The results of calculations / evaluations which have been performed by the institutions of this group and which are of importance for the envisaged collaboration with SAD / RACE shall be distributed to the members of this Feasibility Group.
→ done in a satisfactory way?

Status of EUROTRANS

- **Title: EUROpean Research Programme for the TRANSmutation of High Level Nuclear Waste in an Accelerator Driven System**
- **29 Partners from 17 countries, ENEN represents 14 universities, 23.0M€EC contribution, 42.9M€total budget, 4 year duration**
- **Contract with Annexes I, II, III of EUROTRANS sent to Partners for signature. All signatures except for one (Nexia Solutions) received.**
- **Signature by European Commission is pending.**
- **Start of project: April 1, 2005**
- **Kick-off Meeting Governing Council: April 25, 2005**
- **Technical Kick-off Meeting: April 26-27, 2005**

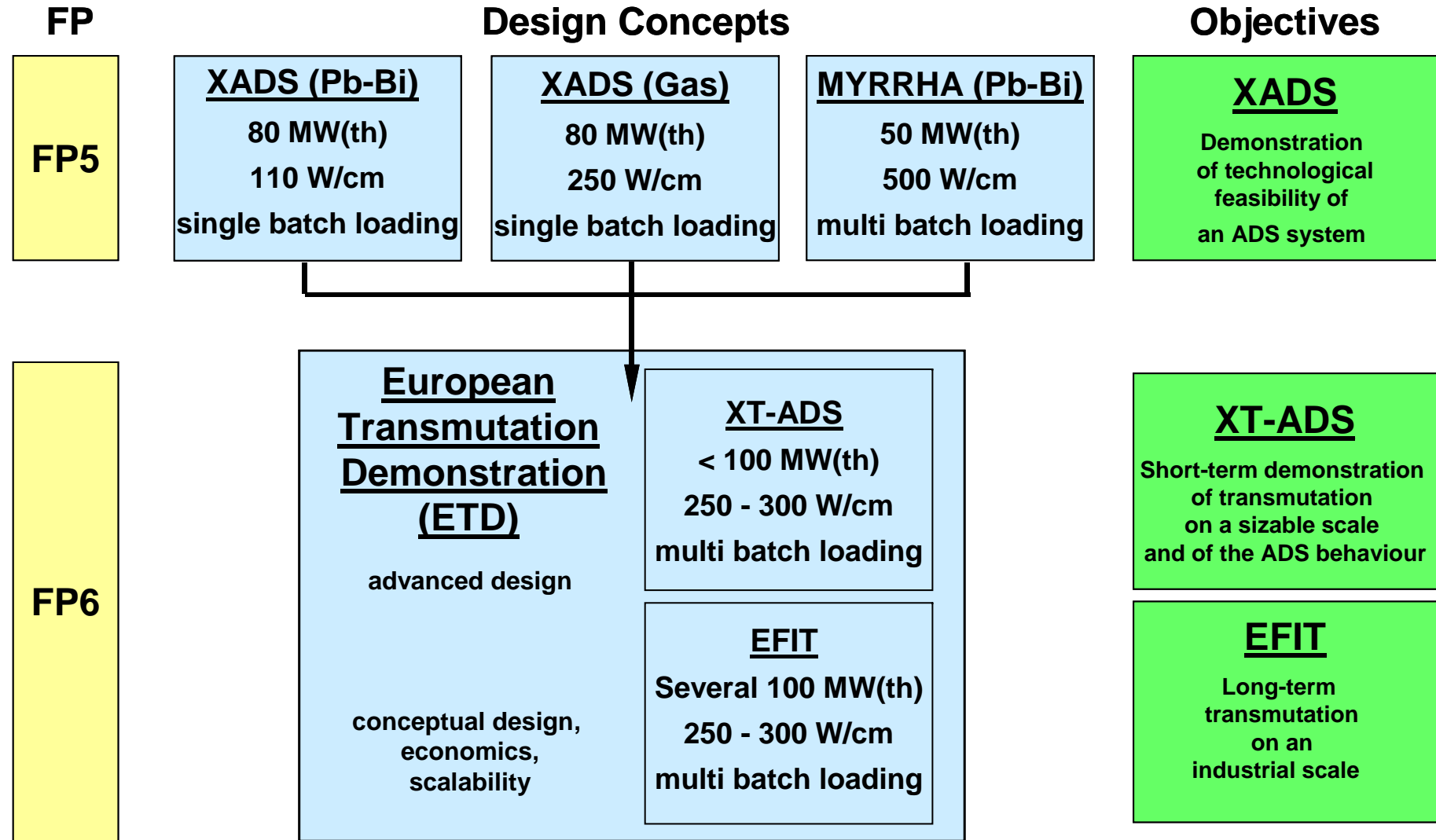
Framework and Strategy of P&T

- The implementation of P&T of a large part of the high-level nuclear wastes in Europe needs the demonstration of its feasibility at an “engineering” level. The respective R&D activities could be arranged in four “building blocks”:
 - Demonstration of the capability to process a sizable amount of spent fuel from commercial LWRs in order to separate plutonium (Pu), uranium (U) and minor actinides (MA),
 - Demonstration of the capability to fabricate at a semi-industrial level the dedicated fuel needed to load in a dedicated transmuter,
 - **Design and construction of one or more dedicated transmuters,**
 - Provision of a specific installation for processing of the dedicated fuel unloaded from the transmuter, which can be of a different type than the one used to process the original spent fuel unloaded from the commercial power plants, together with the fabrication of new dedicated fuel.

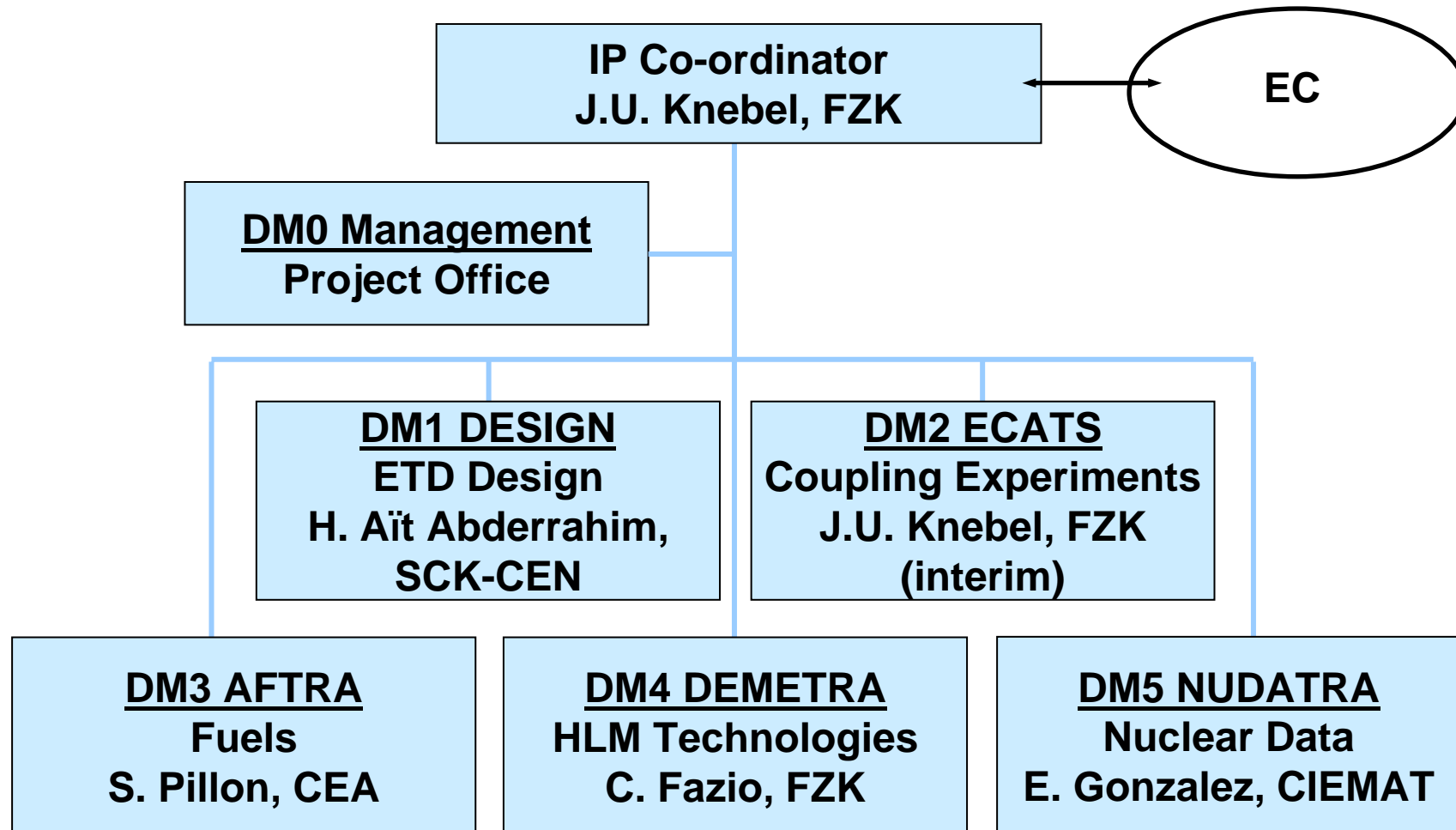
Overall Objectives of EUROTRANS

- EUROTRANS aims to the demonstration of the technical feasibility of transmutation using an ADS (3rd building block):
 - Advanced design of an eXperimental facility demonstrating the technical feasibility of Transmutation in an Accelerator Driven System (XT-ADS), and conceptual design of the European Facility for Industrial Transmutation (EFIT),
 - Provide validated experimental input from relevant coupling experiments of accelerator / spallation target / sub-critical blanket,
 - Development and demonstration of the associated technologies, especially fuels, heavy liquid metal technologies, and nuclear data,
 - To prove its overall technical feasibility, and
 - To carry out an economic assessment of the whole system.

Overall Objectives of EUROTRANS



Structure of EUROTRANS



Modified Budget Requested from EC

Table 1: Involvement of the participating institutions within the DMs and Corresponding Budget Required from EC.

Pi	DM0 IP Man. [k€]	DM1 [k€]	DM2 [k€]	DM3 [k€]	DM4 [k€]	DM5 [k€]	PM* [Months]	Budget [k€]
1: FZK	1427,4**	280,0	5500,3***	98,5	1023,5	54,0	382****	8383,7
2: AAA		0,0		0,0	31,0	0,0	6	31,0
3: ANSALDO		1000,0		0,0	20,0	0,0	193	1020,0
4: BNFL		0,0		192,4	0,0	0,0	38	192,4
5: CEA		615,0		169,7	827,0	178,0	250	1789,7
6: CIEMAT		40,0		0,0	232,5	123,7	100	396,2
7: CNR		0,0		0,0	0,0	0,0	0	0,0
8: CNRS		855,0		0,0	313,5	67,5	322	1236,0
9: CRS4		30,0		0,0	35,0	0,0	13	65,0
10: CSIC		0,0		0,0	0,0	20,3	5	20,3
11: EA		210,0		0,0	0,0	0,0	35	210,0
12: ENEA		185,0		0,0	882,0	0,0	199	1067,0
13: ENEN		394,0		59,5	350,0	322,6	182	1126,1
14: F-ANP SAS		245,0		0,0	0,0	0,0	33	245,0
15: FZJ		0,0		0,0	0,0	60,3	10	60,3
16: FZR		0,0		0,0	117,5	0,0	17	117,5
17: GSI		0,0		0,0	0,0	36,9	17	36,9
18: IBA		191,0		0,0	0,0	0,0	18	191,0
19: INFN		585,0		0,0	0,0	20,3	54	605,3
20: INRNE		0,0		0,0	0,0	22,5	72	22,5
21: ITN		95,0		0,0	0,0	0,0	17	95,0
22: JRC		50,0		1673,0	0,0	76,5	318	1799,5
23: NRG		50,0		814,5	329,0	117,0	107	1310,5
24: NRI		0,0		0,0	81,0	0,0	18	81,0
25: OTL		105,0		0,0	0,0	0,0	18	105,0
26: PSI		115,0		39,5	387,0	15,8	89	557,3
27: PTB		0,0		0,0	0,0	0,0	0	0,0
28: SCK.CEN		900,0		218,4	621,5	4,5	214	1744,4
29: Studsvik		0,0		0,0	0,0	0,0	0	0,0
30: Suez-Trac.		120,0		0,0	0,0	0,0	16	120,0
31: F-ANP GmbH		41,5		0,0	0,0	0,0	6	41,5
32: NNC		30,0		0,0	0,0	0,0	4	30,0
Educ.&Training	300,0							300,0
Total	1727,4	6136,3	5500,3	3265,5	5250,3	1120,0	2753	23000,0

Table 1: Involvement of the participating institutions within Domain 2 ECATS and Corresponding Budget Required from EC.

Pi	WP2.1 [k€]	WP2.2 [k€]	WP2.3 [k€]	WP2.4 [k€]	WP2.5 [k€]	WP2.6 [k€]	PM [Months]	Budget [k€]
1								5500,3*
2								
3								
4								
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31								
32								
Total								5500,3

Objectives of DM2 ECATS

Experimental activities on the Coupling of an Accelerator, a spallation Target and a Sub-critical blanket

- With a view to assisting the design of XT-ADS and EFIT, provide validated experimental input from relevant experiments at sufficient power (20-100 kW) on the coupling of an accelerator, a spallation target and a sub-critical blanket.

These experiments should provide design input on the dynamics and experimental techniques of such a coupled system with feedback effects, together with shielding, safety and licensing issues.

The work programme of this domain will be specified after the completion of a **feasibility study** from April to June 2005.

- Set aside EC budget: 5.5 M€, Interim Domain Co-ordinator: FZK, DE

Expected Outcome of Feasibility Study (1/3)

(a) Description of required input for the design of XT-ADS and EFIT:

According to the objectives originally specified for DM2, and in full consultation with the design team of DM1 DESIGN, the feasibility study should summarise the agreed, validated input data base requirements, which concern, *inter alia*:

- Validation of generic dynamic behaviour of an ADS in a wide range of sub-critical levels, sub-criticality safety margins and thermal feedback effects,
- Qualification of subcriticality monitoring,
- Qualification of the proton beam reliability and the beam transport line,
- Pb-Bi or Pb-spallation target design in association with relevant proton beam and the effects of spallation residues including that of polonium,
- Validation of the core power/beam current relationship,
- Safety and licensing issues of different component parts as well as that of the integrated system as a whole,
- Start-up and shut-down procedures,
- Instrumentation validation and specific dedicated experimentation,
- Interpretation and validation of experimental data,
- Benchmarking and code validation activities etc.

Expected Outcome of Feasibility Study (2/3)

(b) Description of salient features

Description of salient features of relevant coupling experiments world-wide:
The feasibility study should provide detailed technical features of the relevant experiments which could be considered for collaboration. The information should include, *inter alia*:

- Objectives of the experimental facility or facilities and their relevance with respect to the objectives of Domain 2 ECATS,
- Technical description of the device, its capabilities and prospects,
- Status of its implementation, detailed time-schedule, commitment of funding to meet its goals, and critical milestones,
- Flexibility in terms of accepting special, dedicated experimentation and modified or enlarged experimental plan to meet EUROTRANS purposes,
- Preparedness of the respective experimental teams to collaborate with EUROTRANS and readiness to exchange the knowledge gained by mobility of personnel etc.

Expected Outcome of Feasibility Study (3/3)

(c) Summary of recommendations

The feasibility study should outline its recommendations focusing on the prospects of mutual benefits and value for money, which arise from establishing one or more collaborations between such experimental facilities and EUROTRANS.

The feasibility study has to demonstrate how these one or more collaborations can fulfil the objective to base the design of the XT-ADS and EFIT facilities on a sound experimental footing.

(d) Structured proposal of work packages

As result of the feasibility study a structured proposal of work packages will be established which defines details of the work to be performed subsequently within this Domain.

Time Duration and Reporting:

The final report should be submitted to the IP Co-ordinator at the end of June 2005.

What can be Funded by ECATS?

- **All tasks performed by third parties in their national programme or in any other ongoing project cannot be funded.**
- **Preferably, personnel costs shall be requested from ECATS only. This is in agreement with the practice followed in EUROTRANS.**
- **In order to strengthen the collaboration, to guarantee good information exchange, and to ensure hands-on-experience with the experiments SAD / RACE, the partners shall delegate staff to these experiments, preferably young scientists.**
- **In general, hardware and infrastructure which is applied outside of the consortium, cannot be funded.**
- **If hardware / additional third-party staff (e.g. instrumentation, modifications to existing / planned experimental equipment or programme, additional operational staff) is speeding up the experimental programme of SAD / RACE, or is required to produce additional EUROTRANS-relevant results, this hardware / staff can be requested as eligible costs.**

Participants to Feasibility Study

Participants:

- **Co-ordination:**
J.U. Knebel
- **Link to SAD experiment:**
C. Broeders FZK, W. Gudowski KTH, E. Gonzalez CIEMAT
- **Link to RACE experiment:**
G. Granget CEA, G. Imel USA, M. Salvatores FZK
- **Link to DM1 DESIGN:** H. Aït Abderrahim SCK-CEN
- **Link to industry issues:** L. Cinotti Ansaldo
- **Link to accelerator issues:** A. Mueller CNRS
- **Link to TRADE experiment:** S. Monti ENEA

Time Schedule of Feasibility Study

Time	Issues
March 3, 2005	Agreement on Objectives
March 25, 2005	Draft Report
By the end of March	Technical content finalised for both programmes
Middle of April	Technical Meeting and Report Meeting with „Third Parties“
By end of May	Agreement on complementarities and on proposed share of resources
End of May	Report of agreed work plan
Middle of June	Negotiation among partners on agreement of the work plan
	Preparation of final report
End of June	Forwarding final feasibility study to EC

Proposed Work Programme of DM2

(see Annex 1, part 2)

Work Package WP2.1: Feasibility study

T2.1.1: Required input for the design of XT-ADS and EFIT

T2.1.2: Salient features

T2.1.3: Recommendations

D2.1: Final report on the feasibility study including working programme with details on milestones, deliverables, financial issues and recommendations (month 3), Documents showing the preparedness of “new partners” to collaborate with EUROTRANS

M2.1: Assessment on experimental programmes regarding accelerator / spallation target / subcritical blanket experiments in relation to the DM2 original objectives and relevant for ETD. (month 3)

Next Steps / Meetings

Next Steps:

- See minutes
-

Other Meetings:

- 3rd Annual Idaho Workshop on Accelerator-Driven Subcritical Systems (ADSS) Experiments, Pocatello Idaho, June 1 & 2, 2005
- IAEA Technical Meeting on Liquid Metal Cooled Fast Reactor Fuel Cycles and Fuels, October 3-7, 2005, Obninsk Russia

Next ECATS Meeting:

- Date: June 2005
- Location: CEA Paris