



HTR-E

High-Temperature Reactor Components and Systems

CONTRACT N°
FIKI-CT-2001-00177

5th EURATOM RTD Framework Programme - HTR- E

Technological Implementation Plan

FRAMATOME ANP SAS, F (coordinator)
Commissariat à l'Energie Atomique, F
University of Applied Sciences Zittau/Goerlitz, D
Nuclear Research and Consultancy Group, NL
Forschungszentrum Juelich GmbH, D
Empresarios Agrupados Internacional, S.A., E
National Nuclear Corporation Limited, UK
Jeumont Industrie, F
Société de mécanique magnétique, F
ANSALDO ENERGIA S.p.A., I
Von Karman Institute, B
Heatric, UK
FRAMATOME ANP GmbH, D
SUB CONTRACTORS:
Aubert et Duval, F
Energie Versorgung Oberhausen, D

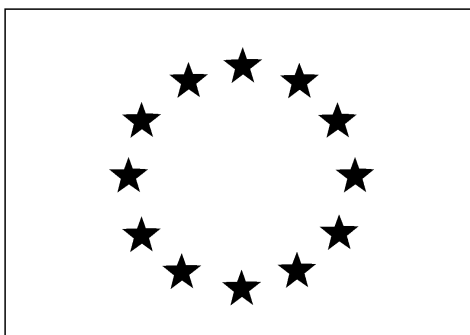
Dissemination level: CO
Document N°: HTR-E-05/05-D-0-0-1

Status : Preliminary

TECHNOLOGICAL IMPLEMENTATION PLAN

*A Framework for the further development, dissemination and use of
the results of EC RTD Projects (including also thematic networks and concerted actions)*

DATA SHEETS



- * Preliminary version at mid-term (optional, programme per programme)
- ☐ Final version before final term (contractual obligation)

Part 1: Overview and description of your project and its results*One form per project***Publishable**

1.1: Executive summary (to be used for an accurate update of the programme synopsis of projects)

1.2: Overview of all results

1.3: Quantified data on the project

1.4.: Assessment of the European interests : This section enables the co-ordinator to explain the interest for the European Union (the competitiveness of its industries, the usefulness for (part of) its population,...) of the achieved results and of their foreseen impacts.

1.5.: Expected project impact

Part 2: Description of each Result - Search for collaboration through Commission services*One form per Result***Publishable**

This section will be used to document your result(s) in CORDIS and to inform any appropriate audience

2.1 : Description of the result(s)

2.2 : Quantified data about the result

2.3 : Further collaboration, dissemination and use of the result : This section enables each partner – individually or as a consortium – to describe its needs in further collaboration in view of the dissemination and use of its results(s).

Part 3: Description of the intentions by each partner*One form per partner***Confidential**

This section enables each partner – individually or as a consortium – to describe its use and dissemination intentions (including a timetable of its future activities).

3.1 : Description of the use and the dissemination of result(s), partner per partner

3.2 : Quantified data for each partner's main result

- ❑ The Technological Implementation Plan data sheets are available as a predefined form in Microsoft Word format. The file may be downloaded from the European Commission's CORDIS web site at: <http://www.cordis.lu/fp5/tip.htm> or may be obtained by e-mail from your EC programme help desk or your Project Officer.
- ❑ The form should be completed electronically and returned preferably by e-mail to your project officer (Firstname.Lastname@cec.eu.int). Alternatively it can be sent on a diskette to the address provided by your Project Officer :
 - ✓ Part 1, 2 by the project co-ordinator;
 - ✓ Part 3 by the project co-ordinator or by each partner individually, as preferred.

Part 1 Overview and description of your project and its results

EC PROGRAMME :
 PROJECT TITLE & ACRONYM:
 CONTRACT NUMBER :
 PROJECT WEB SITE (if any) :
 PARTNERS NAMES :

5th Euratom RTD Framework Programme
High Temperature Reactor Components and Systems
FIKI-CT-2001-00177
SINTER Forum HTR-E
FRAMATOME ANP SAS, F (coordinator) Commissariat à l'Energie Atomique, F University of Applied Sciences Zittau/Goerlitz, D Nuclear Research and Consultancy Group, NL Forschungszentrum Juelich GmbH, D Empresarios Agrupados Internacional, S.A., E National Nuclear Corporation Limited, UK Jeumont Industrie, F Société de mécanique magnétique, F ANSALDO ENERGIA S.p.A., I Von Karman Institute, B Heatric, UK FRAMATOME ANP GmbH, D SUB CONTRACTORS: Aubert et Duval, F Energie Versorgung Oberhausen, D

1.1 Executive summary

Please, synthesise (in 1 or 2 pages) your project original objectives and final outcome.

a) Original research objectives

The original research objective of the work performed for HTR-E was to develop innovative technologies which are needed for the components and systems of a modern HTR with a direct cycle and then contribute to the competitiveness, safety and acceptability of such reactors. The competitiveness of such reactors was based on the use of these technologies for each high efficiency component and system which allow, at the end, to reach a net plant efficiency of around 50 %. Similarly, high performances components and systems in terms of thermo-mechanical resistance, lifetime, maintenance, behaviour in case of failure,... were required to demonstrate the safety and to contribute to the acceptability of such reactors.

The critical and innovative components and systems have been selected by reference to the present projects with a direct cycle concept (GT-MHR, PBMR). These two projects consider indeed design options which lead to select the most innovative technologies for the components to achieve the required performances (turbine material resistance, turbo-machine support by AMBs, recuperator performances).

The components and systems, selected for HTR-E, were really innovative as there is no fully representative feedback experience from former HTRs and also from other industries. In addition the present technologies cannot be easily transferred to a modern HTR considering the specificity of the operating conditions. That is why some components and systems were considered today as critical from a feasibility point of view. An important effort was required to study these technological key issues and the 5th European Framework Program was a very good opportunity to bring together the capabilities of European R&D laboratories and interested industries in order to give fruitful indications of the feasibility of these components.

The key components and systems selected for HTR-E are :

➤ the helium turbine, WP1.

The direct cycle concept was the main feature of a competitive and safe modern HTR. Then the feasibility of a high efficiency helium turbine, inserted in the primary cycle, was the most important technological key issue for the components of a modern HTR.

➤ the helium/helium heat exchanger called recuperator, WP2.

The recuperator is a helium/helium heat exchanger inserted in the primary circuit to recuperate a part of the remaining energy at the turbine outlet to preheat the helium at the core inlet. The main function of this component is to increase as high as possible the efficiency of the cycle.

➤ the large capacity magnetic bearings, WP3.

These components were used to support the rotating shafts of turbo-compressors or turbo-machine inserted in the direct cycle of a modern HTR. This kind of support has been selected for a modern HTR to avoid the risk of leakage and fluid ingress in the primary circuit induced by the concept of mechanical and lubricated bearings.

➤ the helium leak-tightness rotating seal, WP4.

The helium rotating seal is associated with a rotor of the turbo-machine penetrating through the primary vessel. In this case the electric generator was located outside the primary circuit. So this concept can be considered as an alternative of a fully immersed rotor in primary helium and consequently fully supported by magnetic bearings. The feasibility of such a seal is a key issue to increase the competitiveness of a modern HTR by reducing the maintenance campaign duration.

➤ the tribology, WP5.

Sliding and new components (stator seals, hot gas duct seal,...) of a modern HTR with direct cycle are particularly concerned. It must be noted that a bad operating of these sliding components will dramatically impact the safety and availability of the reactor.

➤ the helium purification system, WP6.

The performances of this system impacts directly the safety of a modern HTR as it controls the level of impurities in the primary helium. It is a key system to limit the corrosion risk of the graphite and materials of all components of the primary cycle.

b) Expected deliverables

Work Package	Deliverable Identification	Deliverable Title
Work Package 1 :	D1	Turbine. Work plan report
Helium turbine	D2	Turbine. Design use, system review, integration and ISIR
	D3	Turbine. Review of existing technologies
	D4	Turbine. HHV data and inlet thermal insulation
	D5	Turbine. EVO design data and measurements for specified load cases
	D6	Turbine. HTR-M results analysis
	D7	Turbine. Design study
	D8	Turbine. Thermal and thermo-mechanical analysis
	D9	Turbine. Aerodynamic design-CFD calculations
	D10	Turbine. Experimental tests program definition
Work Package 2 :	D11	Recuperator. Work plan report
Helium/Helium recuperator	D12	Recuperator. Specifications of typical operating conditions for HTR
	D13	Recuperator. Technological survey of high temperature heat exchangers
	D14	Recuperator. Consultation of manufacturers
	D15	Recuperator. Engineering studies-CFD calculations
	D16	Recuperator. Selection of reference concepts
	D17	Recuperator. Definition of small scale units and realisation
	D18	Recuperator. Adaptation of the test rig
	D19	Recuperator. Validation tests
Work Package 3 :	D20	MB. Work plan report
Large capacity magnetic bearings	D21	MB. Functional requirements
	D22	MB. Load analysis
	D23	Permanent MB. Feasibility study
	D24	Catcher bearings. Feasibility study
	D25	Concept proposal for bearings and diagnosis
	D26	MB. Mechanical analyses
	D27	AMB. Experimental validation
	D28	MB. Recommendations and statement
Work Package 4 :	D29	Helium rot. seal. Work plan report
Helium leak-tightness rotating seal	D30	Helium rot. seal. State of the art and specifications
	D31	Helium rot. seal. Canned MB. Feasibility study
	D32	Helium rot. seal. Dry system. Feasibility study
	D33	Helium rot. seal. Liquid, gas, ferro-fluid barrier. Feasibility study
	D34	Helium rot. seal. Dry system. Stability and leakage analysis
	D35	Helium rot. seal. Experimental tests program definition
Work Package 5 :	D36	Tribology. Work plan report
Tribology	D37	Tribology. Review of tribological problems on former HTRs and on FBR technology
	D38	Tribology. Review and identification of typical HTR tribology conditions of components
	D39	Tribology. Review of the existing materials and coatings
	D40	Tribology. Proposal of elementary confirmation or orientation tests
	D41	Tribology. Tests with representative tribological and environmental conditions
	D42	Tribology. Compendium of recommendations
Work Package 6 :	D43	Helium Purification Work plan report
Helium Purification System	D44	Helium Purification Analysis of the helium environments in former HTRs
	D45	Helium Purification Specifications and recommendations for the helium impurities contents

c) Project's actual outcome (in terms of technical achievements or if appropriate task per task)

1. WP1 Turbine :

The design results obtained in terms of aerodynamic and thermo mechanical behaviour analysed the feasibility of a large helium turbine working at 850 °C with a thermal power of 600 MWth. The large disk material (Udimet 720 from Aubert & Duval) should be manufactured for a maximal temperature of metal below 775 °C in operating conditions which requires a disk and foot blades cooling system. Nevertheless, for safety reason related to debating accident, the partners recommended a turbine with a horizontal shaft instead of vertical shaft as proposed in the GT-MHR project. In any case the failure of the disk has to be excluded, which seems difficult to reach.

2. WP2 Recuperator :

The main obtained results from design studies and tests performed in air on CLAIRE loop, valid the concept of plate heat exchangers (based either on PCHE :Printed Circuit Heat Exchanger or PFHE : Plate fin Heat Exchanger) operating at a temperature level of 510 ° C without significant effect of the creep damage. Upgrading of CLAIRE loop has been done.

3. WP3 AMBs (Active Magnetic Bearings)

The design studies and tests performed on FLP500 test facility from Zittau University, valid the algorithms and the numerical model. Seismic loads seem difficult to be controlled by an Active Magnetic Bearing, the use of catcher bearing is recommended by switch off the electrical power. The axial Catcher Bearing (CB) stays a very difficult point from design point of view, if an axial shaft is preferable. In case of horizontal shaft the CB issue is solved.

PMBs (Permanent Magnetic Bearing) conceptual design for small load capacity have been developed and tested.

4. WP4 : Dry rotating seal

Such dry helium rotating seal is feasible, if the pressure fluctuations of the helium is low (0.2 bar). In order to accommodate normal pressure fluctuations of primary helium (2 to 3 bar), improvements of the design have to be done.

Partners recommended a concept based on a buffered gas dry seal with an additional helium circuit. The admissible leak tightness has been defined for this concept (clean helium without any activation is leaking trough this seal)

5. WP5 : Tribology

From the results of all tests performed on tribometers at high temperature (1000°C), specific base materials and coatings have been selected. Friction and wear performances in Helium environment are quantified by these tests.

6. WP6 : HPS

The main recommendations of this work package related to Helium Purification System, are focused on impurity content of the helium for a NPP of 600 MWth.

d) Broad dissemination and use intentions for the expected outputs (such as industrial development, standards, regulations and norms, improvement of environment, health, working conditions, employment, net economic benefits, etc)

The partners will exploit the results of these studies in the development of a European based HTR. Materials and coating options, turbine and heat exchanger design recommendations including validations, helium purification characteristics will be used as a good basis for a new generation of nuclear reactors with high power around 600 MWth (VHTR indirect or direct cycles).

Test facilities (CLAIRE loop, tribometers, FLP500) have been developed or upgraded. They could be used in the next future for specific qualifications or new projects outside nuclear field.

International collaboration has been established to get access data from OKBM on GT-MHR turbine materials (ISTC 1313 project) and on turbo-machine support (ISTC 1261 project)

Broad industrial exploitation of the results depends on the realization of commercial HTR projects such as PBMR and GT-MHR. They can also be used for the Next Generation Nuclear Plant (NGNP) as developed within the Generation IV International Forum (GIF).

1.2 Overview of all your main project results

No.	Self-descriptive title of the result	Category A, B or C*	Partner(s) owning the result(s) (referring in particular to specific patents, copyrights, etc.) & involved in their further use
1	Conceptual design of a helium turbine for HTR	A, B	All partners of WP1
2	Preliminary design of a recuperator heat exchanger for HTR Upgrading of Claire loop.	A, B B	All partners of WP2 CEA
3	Concept proposal for bearings (active magnetic and catcher) and diagnosis of a turbomachine shaft for HTR with FLP500 upgrading.	A, B	All partners of WP3
4	Concept proposal for permanent magnetic bearings of rotating machines for HTR	A, B	All partners of WP3
5	Conceptual design for helium rotating seal for HTR	B	All partners of WP4
6	Concept proposal of materials and coatings for sliding components	B	All partners of WP5
7	Definition of helium impurities contents for HTR	B	All partners of WP6
8	Overall summary report	A	All partners
9			
10			

* A: results usable outside the consortium / B: results usable within the consortium / C: non usable results

1.3 Quantified Data on the dissemination and use of the project results

Items about the dissemination and use of the project results (consolidated numbers)	Currently achieved quantity	Estimated future* quantity
# of product innovations (commercial)	2 (1) Heatric	2 (1) Nordon
# of process innovations (commercial)	1	1 (1) Nordon
# of new services (commercial)	0	0
# of new services (public)	0	0
# of new methods (academic)	0	0
# of scientific breakthrough	0 (1) use of CHE for nuclear industry	0
# of technical standards to which this project has contributed	0	0
# of EU regulations/directives to which this project has contributed	1	0
# of international regulations to which this project has contributed	1	0
# of PhDs generated by the project	0	0
# of grantees/trainees including transnational exchange of personnel	1	0

= number of ... / * "Future" means expectations within the next 3 years following the end of the project

1.4. Comment on European Interest

All projects are expected to meet European interests. This section should provide an appraisal of your project in terms of European added value and support to the implementation of European Union policies.

1.4.1. Community added value and contribution to EU policies

a. European dimension of the problem

(The extent to which the project has contributed to solve problems at European level)

Sustainable energy supply for Europe addresses the issues of safety, resource protection, waste reduction, waste disposal, proliferations resistance and economics. The European R&D HTR projects deals with all of these aspects by investigating safety aspects related to nuclear physics of different fuel cycles which are going to be optimised for efficient Plutonium/Actinide burning and reduced radio toxicity of discharged spent fuel. Such fuel cycles also lead to lower proliferation risk.

Waste reduction needs a qualified investigation of the waste generation processes, as a first step. First proposals for waste minimisation for operational and decommissioning waste are identified.

The behaviour of spent HTR fuel in a final disposal is experimentally simulated to establish geologic models for long-term prediction.

The work is done in collaboration with European partners to take benefit from their expertise. Sustainability of energy systems is a supra-national challenge of European and global dimension.

b. Contribution to developing S&T co-operation at international level. European added value

(Development of critical mass in human and financial terms; combination of complementary expertise and resources available Europe-wide)

In the past, HTR development in Europe has already been performed on an international level and reached a leading role, worldwide. The OECD-funded DRAGON reactor project in UK, as being the very first HTR at all, included most EURATOM members as well as non-European countries (US, Japan). The 300 MWel demonstration reactor THTR also had the status of a European project.

However, most European R&D activities in the HTR field were reduced in the 1990s although international interest in this technology still persisted which lead to the construction of two new HTR test reactors (HTTR, HTR 10) and two commercial projects (PBMR, GT-MHR).

The European HTR-Technology Network (HTR-TN) has been established to recover the European know-how from the past and to advance the HTR-related key technologies. This complementary European collaboration has created a critical mass in human and financial terms which is internationally acknowledged and bound into the Generation IV International Forum (GIF).

c. Contribution to policy design or implementation

(Contribution to one or more EU policies; RTD connected with standardisation and regulation at Community and/or national levels)

The Specific Programme on Energy, Environment and Sustainable Development (EESD) focuses directly on a sustainable development perspective, which addresses objectives like use of natural resources and ecosystems, threats of global climate change, quality of life, and the impact of the production and use of the energy which is essential to European economies, standard of living and environmental issues.

Making use of the knowledge and technologies developed by the HTR development programme will make it possible to contribute to a wide range of social and economic needs so reconciling economic development with environmental sustainability. The results will support policies formulated at Community level or deriving from international commitments by including advanced nuclear energy into the energy supply options. In addition, HTR can supply process heat for highly effective decentralised combined heat and power (CHP) and for hydrogen generation.

1.4.2. Contribution to Community social objectives

a. Improving the quality of life in the Community :

Environmentally benign, safe, secure and economic energy supply is a precondition for quality of life in the Community. CO₂-free, low cost electricity from nuclear power plants allows more capacity of regenerative energy within the European energy mix by compensating their still more expensive electricity generating cost. This strategy should be continued in future by construction of innovative and advanced nuclear stations. Thus, CO₂-free nuclear energy will keep affordable for the European population and enhance quality of life. Modular HTR are designed in a way that radioactive fission products can be kept within the fuel elements even under extreme accident scenarios. They have a very clean primary circuit with very low radiological impact on the plant personnel and the environment. HTR can also provide combined heat and power for heating or process use. Long-lived waste can be burned in HTR without multiple reprocessing. HTR fuel is also very resistant for long-term final disposal.

b. Provision of appropriate incentives for monitoring and creating jobs in the Community (including use and development of skills) :

Same as for regenerative energy systems (e.g. water, wind, solar, biomass), advanced nuclear energy which complies to the criteria of sustainability and of public acceptance will face a considerable market in the future if the CO₂-free energy share in Europe does not imply economic burdens endangering competitiveness of European economy. A 'coalition' of regenerative energy and advanced nuclear energy leading to reasonable cost within the energy mix will therefore contribute to keep jobs in energy intensive manufacturing processes and to create more jobs in the field of CO₂-free energy system construction and application, both for regenerative and nuclear energy.

The present European HTR RTD programme helps to preserve existing know-how and to transfer it to a new generation of engineers and scientists. This paves the way for a broader industrial deployment of HTR in Europe and for participation of European experts in international programmes.

c. Supporting sustainable development, preserving and/or enhancing the environment (including use/conservation of resources) :

Enhanced safety standards - as typical for modular HTR - directly contribute to the preservation of the environment in case of severe accidents. High burn-up, good neutron economy and high thermal efficacy are effective measures to make better use of nuclear fuel resources, natural uranium, thorium and reprocessed actinides. Combined Heat and Power generation additionally reduces waste heat discharges. Large scale hydrogen production by HTR heat will also contribute to the introduction of an hydrogen-based energy system. Currently, there is a general public perception that the wastes generated, decommissioning activities and the liabilities involved, are one of the major weak links of the nuclear industry. A successful waste management solution to HTRs will help to sustain a viable nuclear programme in the decades to come. In turn, this will maintain fuel diversity and promote nuclear power which is currently the predominant practical way of limiting greenhouse gas emission.

1.5. Expected project impact (to be filled in by the project coordinator)

Remark: by replying to the following questions, the coordinator is asked to express his best estimation regarding the impact of the project.

Overall Policy Impact¹

EU Policy Goals	I	II
	SCALE OF EXPECTED IMPACT OVER THE NEXT 10 YEARS ²	other
	-1 0 1 2 3	Not applicable to project Project Impact too difficult to estimate
1. Improved sustainable economic development and growth, competitiveness ⊖	2	
2. Improved employment ⊖	2	
3. Improved quality of life and health and safety ⊖	3	
4. Improved education ⊖	2	
5. Improved preservation and enhancement of the environment ⊖	3	
6. Improved scientific and technological quality ⊖	3	
7. Regulatory and legislative environment ⊖	3	
8. Other _____ ⊖		

¹ Coordinator should respond to section I or, if appropriate, to section II. If the project has had no impact, a "0" should be entered in section I. Scores other than zero in section I will prompt a more detailed subquestion on a separate screen. However, you may access in any case the subquestions by clicking on the symbol" ⊖ "following each main question.

² Indication for scale as follows: -1 represents negative impact, 0 no impact, 1 small positive impact, 2 medium positive impact , 3 is a strong positive impact

Indicate your replies below by putting in each box the number corresponding to the score you chose:

1. Economic development and growth, competitiveness		Scale of Expected Impacts over the next 10 years (2)	
		By Project End -1 0 1 2 3	After Project End -1 0 1 2 3
a)	Increased Turnover for project participants - national markets	0	2
	- international markets	1	2
b)	Increased Productivity for project participants	1	2
c)	Reduced costs for project participants	0	1
d)	Improved output quality/high technology content		
e)			

2. Employment		Scale of Expected Impacts over the next 10 years (2)	
		By Project End -1 0 1 2 3	After Project End -1 0 1 2 3
a)	Safeguarding of jobs	2	3
b)	Net employment growth in projects participants staff	0	3
c)	Net employment growth in customer and supply chains	0	3
d)	Net employment growth in the European economy at large	0	2

3. Quality of Life and health and safety		Scale of Expected Impacts over the next 10 years (2)	
		By Project End -1 0 1 2 3	After Project End -1 0 1 2 3
a)	Improved health care	0	1
b)	Improved food, nutrition	0	0
c)	Improved safety (incl. consumers and workers safety)	0	3
d)	Improved quality of life for the elderly and disabled	0	1
e)	Improved life expectancy	0	1
f)	Improved working conditions	0	2
g)	Improved child care	0	2
h)	Improved mobility of persons	0	2

4. Improved education		Scale of Expected Impacts over the next 10 years (2)	
		By Project End -1 0 1 2 3	After Project End -1 0 1 2 3
a)	Improved learning processes including lifelong learning	1	1
b)	Development of new university curricula	1	3

5. Preservation and enhancement of the environment		Scale of Expected Impacts over the next 10 years (2)	
		By Project End -1 0 1 2 3	After Project End -1 0 1 2 3
a)	Improved prevention of emissions	0	3
b)	Improved treatment of emissions	0	2
c)	Improved preservation of natural resources and cultural heritage	0	2
d)	Reduced energy consumption	0	3

6. S&T quality		Scale of Expected Impacts over the next 10 years (2)	
		By Project End	After Project End
		-1 0 1 2 3	-1 0 1 2 3
a)	Production of new knowledge	2	3
b)	Safeguarding or development of expertise in a research area	2	2
c)	Acceleration of RTD, transfer or uptake	2	3
d)	Enhance skills of RTD staff	2	3
e)	Transfer expertise/know-how/technology	2	3
f)	Improved access to knowledge-based networks	2	3
g)	Identifying appropriate partners and expertise	2	3
h)	Develop international S&T co-operation	2	3
i)	Increased gender equality	1	1

7. Regulatory and legislative environment		Scale of Expected Impacts over the next 10 years (2)	
		By Project End	After Project End
		-1 0 1 2 3	-1 0 1 2 3
a)	Contribution to EU policy formulation	2	3
b)	Contribution to EU policy implementation	2	3

8. Other (please specify)		Scale of Expected Impacts over the next 10 years (2)	
		By Project End	After Project End
		-1 0 1 2 3	-1 0 1 2 3

I, **project co-ordinator**, confirm the published information contained in this part 1 of the TIP.

Signature:



Name: D. BESSON

Date: 12/12/2004

Organisation: Framatome anp Lyon France

Part 2 Description of each result

A separate part 2 must be completed for each result. This may be done by the partner responsible for the result or by the project co-ordinator.

The part 2 must be consolidated at the consortium level and transmitted to the Commission by the co-ordinator.

PARTS 2 WILL BE DISSEMINATED BY THE COMMISSION

2.1 : Description of the result(s), one form per result**No. & TITLE OF RESULT** (same as in table 1.2)

No.	Self-descriptive title of the result
1	Preliminary design of a helium turbine for HTR

CONTACT PERSON FOR THIS RESULT

Name	BRIOTTET
Position	Leader of WP1 Turbine Design
Organisation	Commissariat à l'Energie Atomique
Address	17 rue des martyrs, 38054, cedex 9, Grenoble, France
Telephone	(0)4 38 78 33 15
Fax	(0)4 38 78 58 91
E-mail	laurent.briottet@cea.fr
URL	http://www.cea.com (web address)
Specific Result URL	

SUMMARY (200 words maximum)

Provide an overview of the result which gives the reader an immediate impression of the nature of the result, its relevance and its potential; Briefly describe the current status/applications of the result (if appropriate) with non confidential information on entities potentially involved.

The direct cycle concept is one of the main features of a competitive and safe modern HTR. Thus, the feasibility of a high efficiency helium turbine, inserted in the primary cycle, is an important technological key issue for the components of a modern HTR. The work performed in this work package has been mainly based on the careful analysis of two existing projects: the PBMR and the GT-MHR.

Several points have been clarified concerning the turbine :

The use of materials containing cobalt for the blades and the disks has been analysed. It is shown that a certain amount of Cobalt is allowable. This is an important issue since most of the superalloys foreseen to build such components contain cobalt.

A big issue of this work package is the huge experimental feedback collected from HHV helium test loop and EVO turbine plant operating in Germany during the 70ies. Important data concerning the materials, design choices, in-service operating conditions and problems have been analysed.

Safety as well as in-service repair and inspection issues has lead to the conclusion that a horizontal shaft would be more appropriate than the vertical one proposed in the GT-MHR.

The thermal insulation and the design of a helium hot gas duct have been proposed taking into account in particular thermal dilatation and depressurization issues.

It has been showed by a supplier of the foreseen superalloy for the turbine disc, that the proposed geometry of such a large disc seems achievable within 10 years, with some additional developments.

The GT-MHR design has then be carefully analysed since only few data from the PBMR project were available. Although the Russian team proposed that cooling the first discs of the turbine was not necessary, it has been assessed in this work package that a cooling at least down to 750°C is required in order to use the foreseen material (Udimet 720 as discussed in the HTR-M project) in a near future. Moreover, fluid dynamic computations have been performed and have shown that the high efficiencies of the compressors and the turbine required in this project are achievable. Moreover, new 3D designs of the blades have been proposed for the stators of the turbine and the compressor. Finally, thermomechanical computations have been performed to evaluate the stress level in the discs and blades and to give trends concerning the estimated life time of these components.

Use of the result

All the data collected from the EVO turbine plant will allow to validate the thermo hydraulic codes that are developed to model helium reactors.

Results dissemination

Most of the results obtained within this work package have been or will be presented through communications in conferences.

Please categorise the result using codes from Annex 1

Subject descriptors	436 Nuclear	531 Reactor	155 Design	98 CEEC	
----------------------------	-------------	-------------	------------	---------	--

CURRENT STAGE OF DEVELOPMENT

Please tick one category only

Scientific and/or Technical knowledge (Basic research)	☒
Guidelines, methodologies, technical drawings	☒
Software code	☐
Experimental development stage (laboratory prototype)	☐
Prototype/demonstrator available for testing	☐
Results of demonstration trials available	☐
Other (please specify.):	☐

DOCUMENTATION AND INFORMATION ON THE RESULT

List main information and documentation, stating whether public or confidential.

Documentation type	Details (Title, ref. number, general description, language)	Status: PU=Public CO=Confidential
Technical report	HTR-E 02/03-D-1-0-1 Work plan report	CO
Deliverable report	D2 : HTR-Recommendations of Cobalt content in Helium turbine materials, HTR-E 02/12-D-1-1-1-1	CO
Deliverable report	D2 : Design use, system review, integration and In-Service Inspection and Repair, HTR-E 02/12-D-1-1-1-2	CO
Deliverable report	D3a : Review of existing technologies from past experiences and other industries, HTR-E 03/07-D1-1-2-1, 07/2003	CO
Deliverable report	D3b : Manufacture of large disks, HTR-E 04/06-D-1-1-2-2, 06/2004	CO
Deliverable report	D4 : Feedback on thermal insulation, HTR-E 03/12-D-1-1-3-1, 09/2003	CO
Deliverable report	D5 : EVO design data and measurements for specified load cases, HTR-E 03/12-D-1-1-3-2, 12/2003	CO
Deliverable report	D6 : HTR-M results analysis and recommendations, HTR-E 04/06-D-1-1-1-4, 06/2004	CO
Deliverable report	D7a : Design study of the turbine and compressor, HTR-E 03/12-D-1-1-5-1, 12/2003	CO
Deliverable report	D7b : Thermal insulation at the turbine inlet, HTR-E 03/11-D-1-1-5-2, 11/2003	CO
Deliverable report	D8 : Thermal and thermo-mechanical analysis : expected December 2005	CO
Deliverable report	D9 : Aerodynamic design, CFD calculations : expected April 2005	CO
Deliverable report	D10 : Experimental test program definition : April 2005	CO

INTELLECTUAL PROPERTY RIGHTS

Type of IPR	KNOWLEDGE: Tick a box and give the corresponding details (reference numbers, etc) if appropriate				Pre-e Tick a detail appro	
	Current				Foreseen	Ti
	Tick	NoP ¹⁾	NoI ²⁾	Details	Tick	
Patent applied for	☐				☐	☐
Patent granted	☐				☐	☐
Patent search carried out	☐				☐	☐
Registered design	☐				☐	☐
Trademark applications	☐				☐	☐
Copyrights	☐				☐	☐
Secret know-how	☒				☐	☒
Other - please specify :	☐				☐	☐

1) Number of **P**riority (national) applications/patents

2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS

Please describe the possible sectors for application using the NACE classification in Annex 2.

Market application sectors	28	40	73		
----------------------------	----	----	----	--	--

2.2. Quantified data about the result

Items (about the results)	Actual current quantity ^a	Estimated (or future) quantity ^b
Time to application / market (in months from the end of the research project)		-
Number of (public or private) entities potentially involved in the implementation of the result :		
of which : number of SMEs :		-
of which : number of entities in third countries (outside EU) :		-
Targeted user audience: # of reachable people		
# of S&T publications (referenced publications only)	2	1
# of publications addressing general public (e.g. CD-ROMs, WEB sites)		
# of publications addressing decision takers / public authorities / etc.		
Visibility for the general public		

^a Actual current quantity = the number of items already achieved to date.

^b Estimated quantity = estimation of the quantity of the corresponding item or the number of items that you foresee to achieve within the next 3 years.

2.3. Further collaboration, dissemination and use of the result

(Optional; to be completed if partner is willing to set up new collaborations, and seeking dissemination support from the CORDIS services.)

COLLABORATIONS SOUGHT

Please tick appropriate boxes (☒) corresponding to your needs.

R&D	Further research or development	☒	FIN	Financial support	☒
LIC	Licence agreement	☐	VC	Venture capital/spin-off funding	☐
MAN	Manufacturing agreement	☐	PPP	Private-public partnership	☐
MKT	Marketing agreement/Franchising	☐	INFO	Information exchange	☒
JV	Joint venture	☐	CONS	Available for consultancy	☐
			Other	Turbine manufacturer	☒

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

Please, clearly describe your input, the value and interest of the applications and the dissemination and use opportunities that you can offer to your potential partner.

The potential uses of the results are short term and long term exploitation :
For the short term, the feedback results concerning the EVO operating turbine plants will allow to validate the thermo hydraulic codes developed to model helium loops or reactors in a direct as well as indirect cycle.
For the long term, the methodology developed to propose new designs concerning the hot gas ducts and the turbine components are likely to be useful in new applications.

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

Please, clearly describe the profile and the expected input from the external partner(s).

Any industrial partner who wants to develop helium turbine components or components using superalloys at high temperatures and long term.

I confirm the information contained in part 2 of this Technological Implementation Plan and I authorise its dissemination to assist this search for collaboration.

Signature:



Name: Briottet

Date: 27/04/2005

Organisation: CEA / DRT / DTEN / S3ME

2.1 : Description of the result(s), one form per result**No. & TITLE OF RESULT** (same as in table 1.2)

No.	Self-descriptive title of the result
2	Preliminary design of a recuperator heat exchanger for HTR

CONTACT PERSON FOR THIS RESULT

Name	Dr TOCHON Patrice
Position	Leader of the WP 2 Recuperator
Organisation	CEA
Address	CEA/GREThE – 17 avenue des martyrs, 38054 Grenoble cedex 9
Telephone	+33 4 38 78 31 99
Fax	+33 4 38 78 54 35
E-mail	patrice.tochon@cea.fr
URL	www.greth.fr
Specific Result URL	

SUMMARY (200 words maximum)

Provide an overview of the result which gives the reader an immediate impression of the nature of the result, its relevance and its potential; Briefly describe the current status/applications of the result (if appropriate) with non confidential information on entities potentially involved.

Preliminary design of a recuperator heat exchanger for HTR

The global objective of the result is to do a preliminary design of a recuperator heat exchanger for HTR based on compact technologies. Both plate-fins, plates and micro-structural heat exchangers have been considered. Two technologies have then been selected: plate-fins heat exchangers (PFHE, Nordon) and Printed Circuit Heat Exchangers (PCHE, Heatric). For the two technologies, a design has been done for the lab scale and the full unit (using CFD, FEM, design tools). Then, two mock-ups have been developed and installed on the CLAIRE loop, which has been upgraded to fit with the HTR specifications. The loop operates at 510°C on the hot side, and 110°C on the cold side, and is able to produce strong cold/hot shocks. At the end, some recommendations about the most favourable design has been given.

Two main results could be extracted from that project: (1) Compact heat Exchanger design and manufacturing for HTR recuperator application (2) upgrading of CLAIRE loop to test recuperators under representative conditions.

Use of the result

The potential uses of these results are short term exploitation and long term exploitation:

For the short term, the direct exploitation of the results allows to ensure that these new compact technologies could be used for process industry, where the working conditions are closed to the HTR ones (hydrocarbons reforming for example). Then, it leads to an extension of the market for Heatric (partner) or Nordon (subcontractor) companies and a potential expansion of these companies.

For the long term, the direct exploitation of the results allows to be confident in the fact that these new compact technologies could be used also for VHTR design. However, further work is needed.

For the short/long term exploitation, the use of the upgraded CLAIRE loop and methodology could lead to new improved heat exchangers development, in association with heat exchangers manufacturers from the GRETh's club of industrial partners.

Further work

Partners will continue their investigation in the field of compact heat exchangers for high temperature application in order to ameliorate the reliability of the products / model / experiments. In the same time, CEA will build proposals for their club of industrial partners in order to develop new enhanced compact heat exchangers. This following will also been done in the 6th framework program, WP 1 heat exchanger.

Dissemination/Use of the result

CEA/GRETh is a research organisation which runs an European club of Industries. GRETh carry out also single client consultancy work in the field of heat transfer.

The general objective of GRETh is to emphasise its offer to industry in the direction of experimental tests of actual devices. One of the ways resides in a proposal of the use of the multifunctional units, called heat exchangers reactors, where a chemical reaction is combined in the same location with an enhanced heat transfer.

So GRETh envisages an external exploitation with a private-public partnership. Any industrial partner who wants to develop a new concept of compact heat exchangers under high temperature applications, or wants to enhance an existing geometry or process cycle will take benefits of the expertise developed in the present contract.

Results dissemination: A large effort of communication about the methodology for designing, testing compact heat exchangers will be made to the club of industrial partners through the "GRETh information letter" and the "GRETh Technical Manual"; and through communication (PhD thesis, articles).

Please categorise the result using codes from Annex 1

Subject descriptors	202	614	507	155	129
----------------------------	-----	-----	-----	-----	-----

CURRENT STAGE OF DEVELOPMENT

Please tick one category only ▢

Scientific and/or Technical knowledge (Basic research)	☐
Guidelines, methodologies, technical drawings	☐
Software code	☐
Experimental development stage (laboratory prototype)	☒
Prototype/demonstrator available for testing	☐
Results of demonstration trials available	☐
Other (please specify.):	☐

DOCUMENTATION AND INFORMATION ON THE RESULT

List main information and documentation, stating whether public or confidential.

Documentation type	Details (Title, ref. number, general description, language)	Status: <i>PU</i> =Public <i>CO</i> =Confidential
HTR – 2004 conference at Beijing	« The use of compact heat exchangers technologies for the HTRs recuperator application per proper design » P.Tochon, C.Mauget & F.Pra (2004) – Proc. In the Int. Conf. For HTR 2004, Beijing, China.	PU
Deliverable report	Work plan D11 : February 2002	CO
Deliverable report	Specification of the operating conditions D12: July 2002	CO
Deliverable report	Consultation of manufacturers D13: July 2003	CO
Deliverable report	Technology survey D14: February 2003	CO
Deliverable report	Engineering studies (CFD) D15 December 2004	CO
Deliverable report	Selection of a reference concept D16: Dec. 2003	CO
Deliverable report	Definition of a small scale unit D17: expected February 2005	CO
Deliverable report	Adaptation of test rig D18: expected january 2005	CO
Deliverable report	Test and validation D19: expected december 2005	CO

INTELLECTUAL PROPERTY RIGHTS

Type of IPR	KNOWLEDGE: Tick a box and give the corresponding details (reference numbers, etc) if appropriate				Pre-e Tick a detail appro
	Current				Foreseen
	Tick	NoP ¹⁾	NoI ²⁾	Details	Tick
Patent applied for	☐				☐
Patent granted	☐				☐
Patent search carried out	☐				☐
Registered design	☐				☐
Trademark applications	☐				☐
Copyrights	☐				☐
Secret know-how	☒				☒
Other - please specify :	☐				☐

1) Number of **P**riority (national) applications/patents

2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS

Please describe the possible sectors for application using the NACE classification in Annex 2.

Market application sectors	23	73	40	24	
----------------------------	----	----	----	----	--

2.2. Quantified data about the result

Items (about the results)	Actual current quantity ^a	Estimated (or future) quantity ^b
Time to application / market (in months from the end of the research project)		-
Number of (public or private) entities potentially involved in the implementation of the result :		
of which : number of SMEs :		-
of which : number of entities in third countries (outside EU) :		-
Targeted user audience: # of reachable people		
# of S&T publications (referenced publications only)	1	1
# of publications addressing general public (e.g. CD-ROMs, WEB sites)	1	2
# of publications addressing decision takers / public authorities / etc.		
Visibility for the general public		

^a Actual current quantity = the number of items already achieved to date.

^b Estimated quantity = estimation of the quantity of the corresponding item or the number of items that you foresee to achieve within the next 3 years.

2.3. Further collaboration, dissemination and use of the result

(Optional; to be completed if partner is willing to set up new collaborations, and seeking dissemination support from the CORDIS services.)

COLLABORATIONS SOUGHT

Please tick appropriate boxes (☒) corresponding to your needs.

R&D	Further research or development	☒	FIN	Financial support	☐
LIC	Licence agreement	☐	VC	Venture capital/spin-off funding	☐
MAN	Manufacturing agreement	☐	PPP	Private-public partnership	☒
MKT	Marketing agreement/Franchising	☐	INFO	Information exchange	☐
JV	Joint venture	☐	CONS	Available for consultancy	☐
			Other	(please specify)	☐

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

Please, clearly describe your input, the value and interest of the applications and the dissemination and use opportunities that you can offer to your potential partner.

The potential uses of these results are short term exploitation and long term exploitation:

For the short term, the direct exploitation of the results allows to ensure that these new compact technologies could be used for process industry, where the working conditions are closed to the HTR ones (hydrocarbons reforming for example). Then, it leads to an extension of the market for Heatric (partner) or Nordon (subcontractor) companies and a potential expansion of these companies.

For the long term, the direct exploitation of the results allows to be confident in the fact that these new compact technologies could be used also for VHTR design. However, further work is needed.

For the short/long term exploitation, the use of the upgraded CLAIRE loop and methodology could lead to new improved heat exchangers development, in association with heat exchangers manufacturers from the GRETh's club of industrial partners.

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

Please, clearly describe the profile and the expected input from the external partner(s).

Any industrial partner who wants to develop a new concept of high temperature heat transfer, or wants to enhance an existing geometry will take benefits of our expertise developed in the present contract. Also, any industrial partner who wants to have expertise on high temperature testing will take benefits of our expertise.

I confirm the information contained in part 2 of this Technological Implementation Plan and I authorise its dissemination to assist this search for collaboration.

Signature:



Name: TOCHON Patrice

Date: 07/04/2005

Organisation: CEA / DRT / DSEN / GREThE

2.1 : Description of the result(s), one form per result**No. & TITLE OF RESULT** (same as in table 1.2)

No.	Self-descriptive title of the result
3	Concept proposal for bearings (active magnetic and catcher) and diagnosis of a turbomachine shaft for HTR

CONTACT PERSON FOR THIS RESULT

Name	Frank Worlitz, Prof. Dr. - Ing
Position	Work-package-leader WP3
Organisation	University of Applied Sciences Zittau/Goerlitz, Institute of Process Technology, Process Automation and Measuring Technology (IPM)
Address	Theodor-Koerner-Allee 16, 02763 Zittau, Germany
Telephone	+49 (0) 3583 61 1545
Fax	+49 (0) 3583 61 1288
E-mail	mgronek@hs-zigr.de
URL	http://www.hs-zigr.de/ipm/fgms
Specific Result URL	

SUMMARY (200 words maximum)

Active Magnetic Bearings (AMB), compared to conventional bearing concepts, have many advantages. Among others does they work without lubrication and without any points of contact between rotor and stator, consequently they work without mechanical wear. These properties make the use of AMBs interesting for the application on HTRs.

Therefore was proposed a concept for Active Magnetic Bearings, Catcher Bearings and Diagnostics within the HTR-E WP 3 of the 5th Euratom Framework Programme. The investigations were based on the functional requirements of the GT-MHR reactor type with six radial Bearings. For the axial suspension of the vertical arranged rotor shaft was proposed a double disk AMB for carrying the weight of the shaft. The scope of the work contained

- concept proposal for magnetic axial and radial bearings
- the calculation of the bearing loads with the method of Finite Element Dynamic Analysis
- the determination of the dynamic behaviour of the magnetic suspended system, controller algorithms and optimisation were performed with the simulation tool MLDyn,
- a concept proposal for diagnostic algorithms using the systems internal signals from the position sensors
- experimental validation of applicability of the AMBs for the required static and dynamic loads

Recovering former experiences, equalized with the state of the art, a concept proposal for catcher bearings (needed for emergency conditions such as loss of electricity for the AMBs) was also included within the scope of this work-package.

Please categorise the result using codes from Annex 1

Subject descriptors	137	159	187	400	565	
----------------------------	-----	-----	-----	-----	-----	--

CURRENT STAGE OF DEVELOPMENT

Please tick one category only ☐

Scientific and/or Technical knowledge (Basic research)	☒
Guidelines, methodologies, technical drawings	☐
Software code	☐
Experimental development stage (laboratory prototype)	☐
Prototype/demonstrator available for testing	☐
Results of demonstration trials available	☐
Other (please specify.):	☐

DOCUMENTATION AND INFORMATION ON THE RESULT

List main information and documentation, stating whether public or confidential.

Documentation type	Details (Title, ref. number, general description, language)	Status: PU=Public CO=Confidential
--------------------	---	--------------------------------------

List main information and documentation, stating whether public or confidential.

Documentation type	Details (Title, ref. number, general description, language)	Status: PU=Public CO=Confidential
Deliverable report	D20: HTR-E 02/03-D-3-0-1 Work plan report	CO
Deliverable report	D21: HTR-E-02/06-D-3-1-1 Magnetic bearing and catcher bearings – functional requirements	CO
Deliverable report	D21: HTR-E-02/06-D-3-1-1-2 Requirements on HTR Helium Circulators	CO
Deliverable report	D22: HTR-E-04/03-D-3-1-2-1 Load Analysis – Modal and Harmonic Analysis	CO
Deliverable report	D22: HTR-E 05/11 D-3-1-2-1-1 Load Analysis – Seismic Analysis	CO
Deliverable report	D22: HTR-E-03/10-D-3-1-2-2 Load Analysis – Real Time Investigations	CO
Deliverable report	D23: HTR-E-03/11-D-3-1-3 Design, construction and analysis of a 1kN permanent-magnetic bearing	CO
Deliverable report	D24: HTR-E-04/10-D-3-1-4-2 Catcher Bearings Tests – Past experience from the German HTR R&D Programme	CO
Deliverable report	D25: HTR-E-03/12-D-3-2-1-1 Magnetic bearing concept proposal	CO
Deliverable report	D25: HTR-E-04/02-D-3-2-1-2 Concept proposal for AMB and Diagnostic	CO
Deliverable report	D26: Mechanical Analysis	CO
Deliverable report	D27: HTR-E-03/01-D-3-3-1 Experimental Validation – Experimental test programme	CO
Deliverable report	D27: HTR-E 05/09-D-3-3-1-1 Experimental Validation	CO
Deliverable report	D28: HTR-E 05/11 D-3-3-2 Recommendations and statements	CO

INTELLECTUAL PROPERTY RIGHTS

Type of IPR	KNOWLEDGE: Tick a box and give the corresponding details (reference numbers, etc) if appropriate				Pre-e Tick a detail appro	
	Current				Foreseen	Ti
	Tick	NoP ¹⁾	NoI ²⁾	Details	Tick	
Patent applied for	☐				☐	☐
Patent granted	☐				☐	☐
Patent search carried out	☐				☐	☐
Registered design	☐				☐	☐
Trademark applications	☐				☐	☐
Copyrights	☐				☐	☐
Secret know-how	☒				☒	☐
Other - please specify :	☐				☐	☐

1) Number of **P**riority (national) applications/patents

2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS

Please describe the possible sectors for application using the NACE classification in Annex 2.

Market application sectors	29	31	40	73l	

2.2. Quantified data about the result

Items (about the results)	Actual current quantity ^a	Estimated (or future) quantity ^b
Time to application / market (in months from the end of the research project)		-
Number of (public or private) entities potentially involved in the implementation of the result :		
of which : number of SMEs :		-
of which : number of entities in third countries (outside EU) :		-
Targeted user audience: # of reachable people		
# of S&T publications (referenced publications only)		
# of publications addressing general public (e.g. CD-ROMs, WEB sites)		
# of publications addressing decision takers / public authorities / etc.		
Visibility for the general public		

^a Actual current quantity = the number of items already achieved to date.

^b Estimated quantity = estimation of the quantity of the corresponding item or the number of items that you foresee to achieve within the next 3 years.

2.3. Further collaboration, dissemination and use of the result

(Optional; to be completed if partner is willing to set up new collaborations, and seeking dissemination support from the CORDIS services.)

COLLABORATIONS SOUGHT

Please tick appropriate boxes (☒) corresponding to your needs.

R&D	Further research or development	☒	FIN	Financial support	☒
LIC	Licence agreement	☐	VC	Venture capital/spin-off funding	☐
MAN	Manufacturing agreement	☐	PPP	Private-public partnership	☐
MKT	Marketing agreement/Franchising	☐	INFO	Information exchange	☒
JV	Joint venture	☐	CONS	Available for consultancy	☐
			Other	(please specify)	☐

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

Please, clearly describe your input, the value and interest of the applications and the dissemination and use opportunities that you can offer to your potential partner.

Test facility FLP500 – large test rig with radial and axial AMBs, possibility for different load insertions (static and dynamic loads, magnetic load device, thermal load device).

MLDyn – special simulation tool for magnetic suspended systems, used for determination of the dynamic behaviour of magnetic suspended systems, controller design and optimisation.

MLDia – tool for diagnostics on AMBs

ANSYS – for FEM-calculations on 3D models

Results to be further evaluated in RAPHAEL SP-CT project

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

Please, clearly describe the profile and the expected input from the external partner(s).

Power Company

RAPHAEL partners

I confirm the information contained in part 2 of this Technological Implementation Plan and I authorise its dissemination to assist this search for collaboration.

Signature:

Name: Prof. Dr.-Ing. Frank Worlitz

2.1 : Description of the result(s), one form per result**No. & TITLE OF RESULT** (same as in table 1.2)

No.	Self-descriptive title of the result
4	Concept proposal for permanent magnetic bearings of rotating machines for HTR

CONTACT PERSON FOR THIS RESULT

Name	Dr. Werner von LENSEA
Position	
Organisation	
Address	
Telephone	
Fax	
E-mail	
URL	
Specific Result URL	

SUMMARY (200 words maximum)

Provide an overview of the result which gives the reader an immediate impression of the nature of the result, its relevance and its potential; Briefly describe the current status/applications of the result (if appropriate) with non confidential information on entities potentially involved.

Please categorise the result using codes from Annex 1

Subject descriptors					
----------------------------	--	--	--	--	--

CURRENT STAGE OF DEVELOPMENT

Please tick one category only ▢

Scientific and/or Technical knowledge (Basic research)	☐
Guidelines, methodologies, technical drawings	☐
Software code	☐
Experimental development stage (laboratory prototype)	☐
Prototype/demonstrator available for testing	☐
Results of demonstration trials available	☐
Other (please specify.):	☐

DOCUMENTATION AND INFORMATION ON THE RESULT

List main information and documentation, stating whether public or confidential.

Documentation type	Details (Title, ref. number, general description, language)	Status: <i>PU</i> =Public <i>CO</i> =Confidential

INTELLECTUAL PROPERTY RIGHTS

<u>Type of IPR</u>	<u>KNOWLEDGE:</u> Tick a box and give the corresponding details (reference numbers, etc) if appropriate				<u>Pre-existing know-how</u> Tick a box and give the corresponding details(reference numbers, etc) if appropriate		
	Current				Foreseen	Tick	Details
	Tick	NoP ¹⁾	NoI ²⁾	Details	Tick		
Patent applied for	☐				☐	☐	
Patent granted	☐				☐	☐	
Patent search carried out	☐				☐	☐	
Registered design	☐				☐	☐	
Trademark applications	☐				☐	☐	
Copyrights	☐				☐	☐	
Secret know-how	☐				☐	☐	
Other - please specify :	☐				☐	☐	

1) Number of **P**riority (national) applications/patents

2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS

Please describe the possible sectors for application using the NACE classification in Annex 2.

Market application sectors					
----------------------------	--	--	--	--	--

2.2. Quantified data about the result

Items (about the results)	Actual current quantity ^a	Estimated (or future) quantity ^b
Time to application / market (in months from the end of the research project)		-
Number of (public or private) entities potentially involved in the implementation of the result :		
of which : number of SMEs :		-
of which : number of entities in third countries (outside EU) :		-
Targeted user audience: # of reachable people		
# of S&T publications (referenced publications only)		
# of publications addressing general public (e.g. CD-ROMs, WEB sites)		
# of publications addressing decision takers / public authorities / etc.		
Visibility for the general public		

^a Actual current quantity = the number of items already achieved to date.

^b Estimated quantity = estimation of the quantity of the corresponding item or the number of items that you foresee to achieve within the next 3 years.

2.3. Further collaboration, dissemination and use of the result

(Optional; to be completed if partner is willing to set up new collaborations, and seeking dissemination support from the CORDIS services.)

COLLABORATIONS SOUGHT

Please tick appropriate boxes (☒) corresponding to your needs.

R&D	Further research or development	☐	FIN	Financial support	☐
LIC	Licence agreement	☐	VC	Venture capital/spin-off funding	☐
MAN	Manufacturing agreement	☐	PPP	Private-public partnership	☐
MKT	Marketing agreement/Franchising	☐	INFO	Information exchange	☐
JV	Joint venture	☐	CONS	Available for consultancy	☐
			Other	(please specify)	☐

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

Please, clearly describe your input, the value and interest of the applications and the dissemination and use opportunities that you can offer to your potential partner.

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

Please, clearly describe the profile and the expected input from the external partner(s).

I confirm the information contained in part 2 of this Technological Implementation Plan and I authorise its dissemination to assist this search for collaboration.

Signature:

Name:

Date:

Organisation:

2.1 : Description of the result(s), one form per result**No. & TITLE OF RESULT** (same as in table 1.2)

No.	Self-descriptive title of the result
5	Preliminary design for helium rotating seal for HTR

CONTACT PERSON FOR THIS RESULT

Name	Frank Worlitz, Prof. Dr.-Ing.
Position	Work-package-leader WP4
Organisation	University of Applied Sciences Zittau/Goerlitz, Institute of Process Technology, Process Automation and Measuring Technology (IPM)
Address	Theodor-Koerner-Allee 16, 02763 Zittau, Germany
Telephone	+49 (0) 3583 61 1548
Fax	+49 (0) 3583 61 1288
E-mail	f.worlitz@hs-zigr.de
URL	http://www.hs-zigr.de/ipm/fgms
Specific Result URL	

SUMMARY (200 words maximum)

The aim of the task “Helium Leaktightness Rotating Seal” was to provide a preliminary design of rotating seals, that are able to prevent the leakage of radioactive contaminated helium from the high pressure side to the low pressure side of the Turbocompressor.

To meet the requirements concerning operating conditions (temperature, pressure, rotational speed) and the leakage requirements, a preliminary Dry Rotating Seal design was proposed, which consists of an assembly of single rotating seals. The stability analysis for this design was performed by FEM calculations. To perform the leakage analysis, the seal assembly was modelled in CFD and calculated for two gap sizes and different design variations.

Additional investigations were focused on canned magnetic bearings with the objective of a general substitution of rotating seals and there caused leakage problems.

In summary the preliminary design for the Dry Rotating Seals meets the leakage requirements given for the TM.

Subject descriptors	155	187	400	600		
----------------------------	-----	-----	-----	-----	--	--

CURRENT STAGE OF DEVELOPMENT

Please tick one category only ▢

Scientific and/or Technical knowledge (Basic research)	☒
Guidelines, methodologies, technical drawings	☐
Software code	☐
Experimental development stage (laboratory prototype)	☐
Prototype/demonstrator available for testing	☐
Results of demonstration trials available	☐
Other (please specify.):	☐

DOCUMENTATION AND INFORMATION ON THE RESULT

List main information and documentation, stating whether public or confidential.

Documentation type	Details (Title, ref. number, general description, language)	Status: PU=Public CO=Confidential
Deliverable report	D29: HTR-E-02/03-D-4-0-1 Work plan report	CO
Deliverable report	D30: HTR-E 02/06-D-4-1-0 State of the art and specifications	CO
Deliverable report	D30: HTR-E-03/10-D-4-1-1 Past experience in German HTR R&D Programme	CO
Deliverable report	D31: HTR-E-04/01-D-4-1-2-1 Canned Magnetic Bearings	CO
Deliverable report	D32: HTR-E 03/07-D-4-2-2 Dry System	CO
Deliverable report	D33: HTR-E 03/10-D-4-2-3 Liquid, Gas, Ferro-fluid barrier	CO
Deliverable report	D34: HTR-E-03/11-D-4-1-2-4-1 CFD Calculations on the Dry Helium Rotating Seal	CO
Deliverable report	D34: HTR-E-04/03-D-4-1-2-4-2 CFD Parameter Study on the Dry Helium Rotating Seal	CO

INTELLECTUAL PROPERTY RIGHTS

<u>Type of IPR</u>	<u>KNOWLEDGE:</u> Tick a box and give the corresponding details (reference numbers, etc) if appropriate				<u>Pre-existing know-how</u> Tick a box and give the corresponding details(reference numbers, etc) if appropriate		
	Current				Foreseen	Tick	Details
	Tick	NoP ¹⁾	NoI ²⁾	Details	Tick		
Patent applied for	☐				☐	☐	
Patent granted	☐				☐	☐	
Patent search carried out	☐				☐	☐	
Registered design	☐				☐	☐	
Trademark applications	☐				☐	☐	
Copyrights	☐				☐	☐	
Secret know-how	☒				☐	☒	
Other - please specify :	☐				☐	☐	

1) Number of **P**riority (national) applications/patents

2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS

Please describe the possible sectors for application using the NACE classification in Annex 2.

Market application sectors	28	29	73		
----------------------------	----	----	----	--	--

2.2. Quantified data about the result

Items (about the results)	Actual current quantity ^a	Estimated (or future) quantity ^b
Time to application / market (in months from the end of the research project)		-
Number of (public or private) entities potentially involved in the implementation of the result :		
of which : number of SMEs :		-
of which : number of entities in third countries (outside EU) :		-
Targeted user audience: # of reachable people		
# of S&T publications (referenced publications only)		
# of publications addressing general public (e.g. CD-ROMs, WEB sites)		
# of publications addressing decision takers / public authorities / etc.		
Visibility for the general public		

^a Actual current quantity = the number of items already achieved to date.

^b Estimated quantity = estimation of the quantity of the corresponding item or the number of items that you foresee to achieve within the next 3 years.

2.3. Further collaboration, dissemination and use of the result

(Optional; to be completed if partner is willing to set up new collaborations, and seeking dissemination support from the CORDIS services.)

COLLABORATIONS SOUGHT

Please tick appropriate boxes (☒) corresponding to your needs.

R&D	Further research or development	☒	FIN	Financial support	☒
LIC	Licence agreement	☐	VC	Venture capital/spin-off funding	☐
MAN	Manufacturing agreement	☐	PPP	Private-public partnership	☐
MKT	Marketing agreement/Franchising	☐	INFO	Information exchange	☒
JV	Joint venture	☐	CONS	Available for consultancy	☐
			Other	(please specify)	☐

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

Please, clearly describe your input, the value and interest of the applications and the dissemination and use opportunities that you can offer to your potential partner.

CFD Calculations – sensitivity analyses, determination of mass flow and pressure distribution
FEM on seals – Stress analysis, influence of loads on the rotating seals
FEM on AMBs – analysis and measurement – influence of can material to the magnetic forces of the AMBs

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

Please, clearly describe the profile and the expected input from the external partner(s).

I confirm the information contained in part 2 of this Technological Implementation Plan and I authorise its dissemination to assist this search for collaboration.

Signature:

Name: Prof. Dr.-Ing. Frank Worlitz

Date: Dec. 9th, 2005

Organisation: University of Applied Sciences Zittau/Goerlitz

2.1 : Description of the result(s), one form per result**No. & TITLE OF RESULT** (same as in table 1.2)

No.	Self-descriptive title of the result
6	Concept proposal of materials and coatings for sliding components

CONTACT PERSON FOR THIS RESULT

Name	Carole FALCAND
Position	Leader of the WP 5 : Tribology
Organisation	FRAMATOME ANP
Address	Centre Technique – NFTM – 1 rue B. Marcet – BP 181 – 71205 LE CREUSOT CEDEX
Telephone	+33 3 85 80 61 58
Fax	+33 3 85 80 61 99
E-mail	carole.falcand@framatome-anp.com
URL	http://www.framatome-anp.com
Specific Result URL	

SUMMARY (200 words maximum)

Provide an overview of the result which gives the reader an immediate impression of the nature of the result, its relevance and its potential; Briefly describe the current status/applications of the result (if appropriate) with non confidential information on entities potentially involved.

Tribology

The objective of WP 5 of HTR-E is to firstly realise an up-dating of the tribological problems met in former HTRs, to review and identify the corresponding tribological environments and finally find possible materials or coatings able to bring a reliable answer to these situations through elementary tests in a representative and tribological Helium environments close to identified components such as control rods, stator seals or hot gas duct.

Bulk materials and coatings have been tested in pure He and in Helium with impurities, representative from HTR gas. The tests have been provided on several devices available in Framatome ANP technical center (in Le Creusot, France) and in CEA (Cadarche, France). The results obtained on Ytria stabilised Zirconia are disappointing in regards of what was attended from litteratre, but tests on Ytria stabilised Zirconia with a solid lubricant integrated are much better and promising.

Two tribometers have been adjusted to perform tribological tests in HTR conditions (temperature and environment)

- CEA tribometer to perform alternative displacements at low velocity
- Framatome ANP tribometer to perform fretting tests (low displacement at high frequency) and alternative displacements at low velocity

Please categorise the result using codes from Annex 1

Subject descriptors	373	99	611	593 / 594		
----------------------------	-----	----	-----	-----------	--	--

CURRENT STAGE OF DEVELOPMENT

Please tick one category only ☐

Scientific and/or Technical knowledge (Basic research)	☐
Guidelines, methodologies, technical drawings	☐
Software code	☐
Experimental development stage (laboratory prototype)	☐ X
Prototype/demonstrator available for testing	☐
Results of demonstration trials available	☐
Other (please specify.):	☐

DOCUMENTATION AND INFORMATION ON THE RESULT

List main information and documentation, stating whether public or confidential.

Documentation type	Details (Title, ref. number, general description, language)	Status: PU=Public CO=Confidential
Technical report	HTR-E 02/03-D-5-0-1 Work Plan Report for: "tribology in Helium Environment"	CO
Deliverable report	Deliverable D37 for "Tribology in Helium Environment" – N° HTR-E-02/12-D-5-1-1 – Review of tribological problems on former HTRs and on FBR	CO
Deliverable report	Deliverable D38 for "Tribology in Helium Environment" – N° HTR-E-02/12-D-5-1-2 – Review and identification of typical HTR tribology conditions of components - English	CO
Deliverable report	Deliverable D39 for "Tribology in Helium Environment" – N° HTR-E-03/12-D-5-1-3 – Review of existing materials and coatings - English	CO
Deliverable report	Deliverable D40 for "Tribology in Helium Environment" – N° HTR-E-04/04-D-5-2-1 – Proposal of elementary tests - English	CO
Deliverable report	Deliverable D41 for "Tribology in Helium Environment" – N° HTR-E-05/12-D-5-3-1 – Realisation of elementary tests – English ⇒ <i>to be issued in October 2005</i>	CO
Deliverable report	Deliverable D42 for "Tribology in Helium Environment" – N° HTR-E-05/12-D-5-3-2 – Tribology: a compendium of recommendations – English ⇒ <i>to be issued in November 2005</i>	CO

INTELLECTUAL PROPERTY RIGHTS

<u>Type of IPR</u>	<u>KNOWLEDGE:</u> Tick a box and give the corresponding details (reference numbers, etc) if appropriate				<u>Pre-existing know-how</u> Tick a box and give the corresponding details(reference numbers, etc) if appropriate	
	Current			Foreseen	Tick	Details
	Tick	NoP ¹⁾	NoI ²⁾	Details	Tick	
Patent applied for	☐				☐	☐
Patent granted	☐				☐	☐
Patent search carried out	☐				☐	☐
Registered design	☐				☐	☐
Trademark applications	☐				☐	☐
Copyrights	☐				☐	☐
Secret know-how	☐ X				☐ X	☐
Other - please specify :	☐				☐	☐

1) Number of **P**riority (national) applications/patents

2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS

Please describe the possible sectors for application using the NACE classification in Annex 2.

Market application sectors	23	73	40	24	
----------------------------	----	----	----	----	--

2.2. Quantified data about the result

Items (about the results)	Actual current quantity ^a	Estimated (or future) quantity ^b
Time to application / market (in months from the end of the research project)		-
Number of (public or private) entities potentially involved in the implementation of the result :		
of which : number of SMEs :		-
of which : number of entities in third countries (outside EU) :		-
Targeted user audience: # of reachable people		
# of S&T publications (referenced publications only)		
# of publications addressing general public (e.g. CD-ROMs, WEB sites)		
# of publications addressing decision takers / public authorities / etc.		
Visibility for the general public		

^a Actual current quantity = the number of items already achieved to date.

^b Estimated quantity = estimation of the quantity of the corresponding item or the number of items that you foresee to achieve within the next 3 years.

2.3. Further collaboration, dissemination and use of the result

(Optional; to be completed if partner is willing to set up new collaborations, and seeking dissemination support from the CORDIS services.)

COLLABORATIONS SOUGHT

Please tick appropriate boxes (☒) corresponding to your needs.

R&D	Further research or development	☐	FIN	Financial support	☐
LIC	Licence agreement	☐	VC	Venture capital/spin-off funding	☐
MAN	Manufacturing agreement	☐	PPP	Private-public partnership	☐
MKT	Marketing agreement/Franchising	☐	INFO	Information exchange	☐
JV	Joint venture	☐	CONS	Available for consultancy	☐
			Other	(please specify)	☐

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

Please, clearly describe your input, the value and interest of the applications and the dissemination and use opportunities that you can offer to your potential partner.

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

Please, clearly describe the profile and the expected input from the external partner(s).

I confirm the information contained in part 2 of this Technological Implementation Plan and I authorise its dissemination to assist this search for collaboration.

Signature: May, 25th 2005

Name: Carole FALCAND

Date:

Organisation: FRAMATOME ANP SAS

2.1 : Description of the result(s), one form per result**No. & TITLE OF RESULT** (same as in table 1.2)

No.	Self-descriptive title of the result
7	Definition of helium impurities contents for HTR

CONTACT PERSON FOR THIS RESULT

Name	NIESSEN (FZJ)
Position	
Organisation	
Address	
Telephone	
Fax	
E-mail	
URL	
Specific Result URL	

SUMMARY (200 words maximum)

Provide an overview of the result which gives the reader an immediate impression of the nature of the result, its relevance and its potential; Briefly describe the current status/applications of the result (if appropriate) with non confidential information on entities potentially involved.

Please categorise the result using codes from Annex 1

Subject descriptors					
----------------------------	--	--	--	--	--

CURRENT STAGE OF DEVELOPMENT

Please tick one category only ▢

Scientific and/or Technical knowledge (Basic research)	☐
Guidelines, methodologies, technical drawings	☐
Software code	☐
Experimental development stage (laboratory prototype)	☐
Prototype/demonstrator available for testing	☐
Results of demonstration trials available	☐
Other (please specify.):	☐

DOCUMENTATION AND INFORMATION ON THE RESULT

List main information and documentation, stating whether public or confidential.

Documentation type	Details (Title, ref. number, general description, language)	Status: PU=Public CO=Confidential

INTELLECTUAL PROPERTY RIGHTS

<u>Type of IPR</u>	<u>KNOWLEDGE:</u> Tick a box and give the corresponding details (reference numbers, etc) if appropriate				<u>Pre-existing know-how</u> Tick a box and give the corresponding details(reference numbers, etc) if appropriate	
	Current				Foreseen	
	Tick	NoP ¹⁾	NoI ²⁾	Details	Tick	Details
Patent applied for	☐				☐	☐
Patent granted	☐				☐	☐
Patent search carried out	☐				☐	☐
Registered design	☐				☐	☐
Trademark applications	☐				☐	☐
Copyrights	☐				☐	☐
Secret know-how	☐				☐	☐
Other - please specify :	☐				☐	☐

1) Number of **P**riority (national) applications/patents

2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS

Please describe the possible sectors for application using the NACE classification in Annex 2.

Market application sectors					
----------------------------	--	--	--	--	--

2.2. Quantified data about the result

Items (about the results)	Actual current quantity ^a	Estimated (or future) quantity ^b
Time to application / market (in months from the end of the research project)		-
Number of (public or private) entities potentially involved in the implementation of the result :		
of which : number of SMEs :		-
of which : number of entities in third countries (outside EU) :		-
Targeted user audience: # of reachable people		
# of S&T publications (referenced publications only)		
# of publications addressing general public (e.g. CD-ROMs, WEB sites)		
# of publications addressing decision takers / public authorities / etc.		
Visibility for the general public		

^a Actual current quantity = the number of items already achieved to date.

^b Estimated quantity = estimation of the quantity of the corresponding item or the number of items that you foresee to achieve within the next 3 years.

2.3. Further collaboration, dissemination and use of the result

(Optional; to be completed if partner is willing to set up new collaborations, and seeking dissemination support from the CORDIS services.)

COLLABORATIONS SOUGHT

Please tick appropriate boxes (☒) corresponding to your needs.

R&D	Further research or development	☐	FIN	Financial support	☐
LIC	Licence agreement	☐	VC	Venture capital/spin-off funding	☐
MAN	Manufacturing agreement	☐	PPP	Private-public partnership	☐
MKT	Marketing agreement/Franchising	☐	INFO	Information exchange	☐
JV	Joint venture	☐	CONS	Available for consultancy	☐
			Other	(please specify)	☐

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

Please, clearly describe your input, the value and interest of the applications and the dissemination and use opportunities that you can offer to your potential partner.

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

Please, clearly describe the profile and the expected input from the external partner(s).

I confirm the information contained in part 2 of this Technological Implementation Plan and I authorise its dissemination to assist this search for collaboration.

Signature:

Name:

Date:

Organisation:

2.1 : Description of the result(s), one form per result**No. & TITLE OF RESULT** (same as in table 1.2)

No.	Self-descriptive title of the result
8	Overall summary report

CONTACT PERSON FOR THIS RESULT

Name	BESSON
Position	Project coordinator
Organisation	Framatome-anp, Lyon France
Address	10 rue J. Récamier 69456 Lyon Cedex 06 France
Telephone	33 4 72 74 70 86
Fax	33 4 72 74 70 95
E-mail	daniel.besson@framatome-anp.com
URL	www.framatome-anp.com
Specific Result URL	none

SUMMARY (200 words maximum)

Provide an overview of the result which gives the reader an immediate impression of the nature of the result, its relevance and its potential; Briefly describe the current status/applications of the result (if appropriate) with non confidential information on entities potentially involved.

The main results are design recommendations for components of direct cycle HTR based on experience feedbacks, design studies and experimental tests. These results are as follows:

- As part of the turbine, the design results obtained in terms of aerodynamic and thermo mechanical behaviour analysed the feasibility of a large helium turbine working at 850 °C with a thermal power of 600 MWth. The large disk material (Udimet 720 from Aubert & Duval) should be manufactured for a maximal temperature of metal below 775 °C in operating conditions which requires a disk and foot blades cooling system. Nevertheless, for safety reason related to debating accident, the partners recommended a turbine with a horizontal shaft instead of vertical shaft as proposed in the GT-MHR project. In any case the failure of the disk has to be excluded, which seems difficult to reach.
- As part of the recuperator, the main obtained results from design studies and tests performed in air on CLAIRE loop, valid the concept of plate heat exchangers (based either on PCHE :Printed Circuit Heat eXchanger or PFHE : Plate fin Heat eXchanger) operating at a temperature level of 510 ° C without significant effect of the creep damage. Upgrading of CLAIRE loop has been done.
- As part of the Active Magnetic Bearings (AMB), the design studies and tests performed on FLP500 test facility from Zittau University, valid the algorithms and the numerical model. Seismic loads seem difficult to be controlled by an Active Magnetic Bearing, the use of catcher bearing is recommended by switch off the electrical power. The axial Catcher Bearing (CB) stays a very difficult point from design point of view, if an axial shaft is preferable. In case of horizontal shaft the CB issue is solved. And for PMBs (Permanent Magnetic Bearing) conceptual design for small load capacity have been developed and tested.
- In the frame of dry rotating seal, dry helium rotating seal is feasible, if the pressure fluctuations of the helium is low (0.2 bar). In order to accommodate normal pressure fluctuations of primary helium (2 to 3 bar), improvements of the design have to be done.
Partners recommended a concept based on a buffered gas dry seal with an additional helium circuit. The admissible leak tightness has been defined for this concept (clean helium without any activation is leaking trough this seal)
- In tribology, from the results of all tests performed on tribometers at high temperature (1000°C), specific base materials and coatings have been selected. Friction and wear performances in Helium environment are quantified by these tests.
- And in Helium Purification system (HPS), the main recommendations of this work package related to Helium Purification System, are focused on impurity content of the helium for a NPP of 600 MWth.

Please categorise the result using codes from Annex 1

Subject descriptors	436 Nuclear	531 Reactor	155 design	98 CEEC	
----------------------------	-------------	-------------	------------	---------	--

CURRENT STAGE OF DEVELOPMENT

Please tick one category only ▢

Scientific and/or Technical knowledge (Basic research)	☐ ▢
Guidelines, methodologies, technical drawings	☐ ▢
Software code	☐ ▢
Experimental development stage (laboratory prototype)	☐
Prototype/demonstrator available for testing	☐
Results of demonstration trials available	☐
Other (please specify.): Elementary tests	☐ ▢

DOCUMENTATION AND INFORMATION ON THE RESULT

List main information and documentation, stating whether public or confidential.

Documentation type	Details (Title, ref. number, general description, language)	Status: PU=Public CO=Confidential
Progress report	HTR-E-02/12-D-0-0-2 first annual report	CO
Progress report	HTR-E-04/03-D-0-0-6 Mid term report	CO
Progress report	HTR-E-05/02-D-0-0-9 First three years report	CO
Final progress report	To be defined later	CO
HTR- 2002 conference at Petten	HTR-E project	PU
HTR- 2003 conference at Cordoba	First results of HTR-E project	PU
HTR- 2002 conference at Beijing	Last results of HTR-E project	PU

INTELLECTUAL PROPERTY RIGHTS

<u>Type of IPR</u>	<u>KNOWLEDGE:</u> Tick a box and give the corresponding details (reference numbers, etc) if appropriate				<u>Pre-existing know-how</u> Tick a box and give the corresponding details(reference numbers, etc) if appropriate	
	Current				Foreseen	
	Tick	NoP ¹⁾	NoI ²⁾	Details	Tick	Details
Patent applied for	☐				☐	☐
Patent granted	☐				☐	☐
Patent search carried out	☐				☐	☐
Registered design	☐				☐	☐
Trademark applications	☐				☐	☐
Copyrights	☐				☐	☐
Secret know-how	☐				☐	☐
Other - please specify :	☐				☐	☐

1) Number of **P**riority (national) applications/patents

2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS

Please describe the possible sectors for application using the NACE classification in Annex 2.

Market application sectors	436 Nuclear	531 Reactor	155 Design	98 CEEC	
----------------------------	-------------	-------------	------------	---------	--

2.2. Quantified data about the result

Items (about the results)	Actual current quantity ^a	Estimated (or future) quantity ^b
Time to application / market (in months from the end of the research project)	40	-
Number of (public or private) entities potentially involved in the implementation of the result :		
of which : number of SMEs :	15	-
of which : number of entities in third countries (outside EU) :	0	-
Targeted user audience: # of reachable people	-	
# of S&T publications (referenced publications only)	1	
# of publications addressing general public (e.g. CD-ROMs, WEB sites)	0	
# of publications addressing decision takers / public authorities / etc.	0	
Visibility for the general public	No	

^a Actual current quantity = the number of items already achieved to date.

^b Estimated quantity = estimation of the quantity of the corresponding item or the number of items that you foresee to achieve within the next 3 years.

2.3. Further collaboration, dissemination and use of the result

(Optional; to be completed if partner is willing to set up new collaborations, and seeking dissemination support from the CORDIS services.)

COLLABORATIONS SOUGHT

Please tick appropriate boxes (☐) corresponding to your needs.

R&D	Further research or development	☐	FIN	Financial support	☐
LIC	Licence agreement	☐	VC	Venture capital/spin-off funding	☐
MAN	Manufacturing agreement	☐	PPP	Private-public partnership	☐
MKT	Marketing agreement/Franchising	☐	INFO	Information exchange	☐
JV	Joint venture	☐	CONS	Available for consultancy	☐
			Other	(please specify)	☐

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

Please, clearly describe your input, the value and interest of the applications and the dissemination and use opportunities that you can offer to your potential partner.

Upgrading Claire loop,
Plate heat exchangers (PCHE or PFHE),
Tribometers,
FLP500.

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

Please, clearly describe the profile and the expected input from the external partner(s).

I confirm the information contained in part 2 of this Technological Implementation Plan and I authorise its dissemination to assist this search for collaboration.

Signature:



Name: BESSON

Date: 18/01/2005

Organisation: Framatome-anp Lyon France

Part 3 Description of the intentions by each partner

This part 3 must be completed by each partner who is essential for the dissemination and use (i.e. result owners and/or major project contributors and/or major dissemination and use contributors). Each will detail its own use and dissemination intentions concerning the result(s) they are involved with. This description must be made result by result.

These different parts may be transmitted to the Commission either assembled at the consortium level, or individually by each partner to safeguard confidential matters if necessary (through any appropriate media). Obviously, when all partners are implementing a single dissemination and use scheme all together, a single part 3 is needed.

**PARTS 3 WILL ALWAYS BE KEPT CONFIDENTIAL BY THE
COMMISSION**

3.1 : Description of the use and the dissemination of result(s), partner per partner

MANDATORY INFORMATION :

CONTRACT NUMBER :

FIKI-CT-2001-20177

PARTNER's NAME :

Framatome ANP SAS

CONTACT PERSON(S):

Name	Daniel BESSON
Position/Title	Engineer
Organisation	Framatome ANP SAS
Address	10 rue Juliette Récamier 69456 Lyon Cedex 06 France
Telephone	+33 4 72 74 70 86
Fax	+33 4 72 74 70 95
E-mail	Daniel.besson@framatome-anp.com

No, TITLE AND BRIEF DESCRIPTION OF MAIN RESULT(S)

1	The helium turbine: The design results obtained in terms of aerodynamic and thermo mechanical behaviour analysed the feasibility of a large helium turbine working at 850 °C with a thermal power of 600 MWth. The large disk material (Udimet 720 from Aubert & Duval) should be manufactured for a maximal temperature of metal below 775 °C in operating conditions which requires a disk and foot blades cooling system. Nevertheless, for safety reason related to debating accident, the partners recommended a turbine with a horizontal shaft instead of vertical shaft as proposed in the GT-MHR project. In any case the failure of the disk has to be excluded, which seems difficult to reach.
2	The helium/helium heat exchanger called recuperator: The main obtained results from design studies and tests performed in air on CLAIRE loop, valid the concept of plate heat exchangers (based either on PCHE :Printed Circuit Heat eXchanger or PFHE : Plate fin Heat eXchanger) operating at a temperature level of 510 ° C without significant effect of the creep damage. Upgrading of CLAIRE loop has been done.
3	The large capacity magnetic bearings: -Active Magnetic Bearings:The design studies and tests performed on FLP500 test facility from Zittau University, valid the algorithms and the numerical model. Seismic loads seem difficult to be controlled by an Active Magnetic Bearing, the use of catcher bearing is recommended by switch off the electrical power. The axial Catcher Bearing (CB) stays a very difficult point from design point of view, if an axial shaft is preferable. In case of horizontal shaft the CB issue is solved. - PMBs (Permanent Magnetic Bearing) conceptual design for small load capacity have been developed and tested.
4	Feasibility study of a rotating seal system for the turbocompressor: Such dry helium rotating seal is feasible, if the pressure fluctuations of the helium is low (0.2 bar). In order to accommodate normal pressure fluctuations of primary helium (2 to 3 bar), improvements of the design have to be done. Partners recommended a concept based on a buffered gas dry seal with an additional helium circuit. The admissible leak tightness has been defined for this concept (clean helium without any activation is leaking trough this seal).

5	The tribology in helium conditions: From the results of all tests performed on tribometers at high temperature (1000°C), specific base materials and coatings have been selected. Friction and wear performances in Helium environment are quantified by these tests.
6	The Helium Purification System: The main recommendations of this work package related to Helium Purification System, are focused on impurity content of the helium for a NPP of 600 MWth.

FOR EACH MAIN RESULT:

TIMETABLE OF THE USE AND DISSEMINATION ACTIVITIES WITHIN THE NEXT 3 YEARS AFTER THE END OF THE PROJECT

<i>Mention the use and dissemination related activities, the main associated partners, the related milestones and give an indicative timescale</i>		
Activity	Brief description of the activity, including main milestones and deliverables (and how it relates to data in sections 2.2 and 3.2).	Timescale (months)
1 helium turbine	Results to be used to future activities within HTR-TN on European HTR Development	24
2 recuperator	Idem	24
3 magnetic bearings	Public presentation of the outcome	48
4 rotating seal	Results to be used to future activities within HTR-TN on European HTR Development	12
5 and 6 tribology and helium impurities	Idem	12

FORESEEN COLLABORATIONS WITH OTHER ENTITIES

Please tick appropriate boxes (☒) corresponding to your most probable follow-up.

R&D	Further research or development	☐ ☒	FIN	Financial support	☐
LIC	Licence agreement	☐	VC	Venture capital/spin-off funding	☐
MAN	Manufacturing agreement	☐	PPP	Private-public partnership	☐
MKT	Marketing agreement/Franchising	☐	INFO	Information exchange, training	☐ ☒
JV	Joint venture	☐	CONS	Available for consultancy	☐
			Other	(please specify)	☐

3.2 : Quantified data for each partner's main result

Items	Currently achieved quantity ^a	Estimated future quantity ^b
Economic impacts (in EURO)	0	0
# of licenses issued (within EU)	0	0
# of licenses issued (outside EU)	0	0
Total value of licenses (in EURO)	0	0
# of entrepreneurial actions (start-up company, joint ventures...)	0	0
# of direct jobs created ^c	1	3
# of direct jobs safeguarded ^c	0	0
# of direct jobs lost	0	0

^a The added value or the number of items already achieved to date.

^b Estimated quantity = estimation of the quantity of the corresponding item or the number of items that you foresee to achieve in the future (i.e. expectations within the next 3 years following the end of the project).

^c "Direct jobs" means jobs within the partner involved. Research posts are to be excluded from the jobs calculation

= number of ...

I confirm the information contained in part 3 of this Technological Implementation Plan and I certify that these are our exploitation intentions

Signature: 

Name: D. BESSON

Date: 18/01/2005

3.1 : Description of the use and the dissemination of result(s), partner per partner**MANDATORY INFORMATION :****CONTRACT NUMBER :****FIKI-CT-2001-20177****PARTNER's NAME :****Commissariat à l'Energie Atomique****CONTACT PERSON(S):**

Name	Dominique Barbier
Position/Title	
Organisation	Commissariat à l'Energie Atomique
Address	
Telephone	
Fax	
E-mail	dominique.barbier@cea.fr

No, TITLE AND BRIEF DESCRIPTION OF MAIN RESULT(S)

1	Upgrading of CLAIRE loop for testing compact heat exchangers recuperators under representative HTR conditions
2	
3	
4	
5	

FOR EACH MAIN RESULT:**TIMETABLE OF THE USE AND DISSEMINATION ACTIVITIES WITHIN THE NEXT 3 YEARS
AFTER THE END OF THE PROJECT**

<i>Mention the use and dissemination related activities, the main associated partners, the related milestones and give an indicative timescale</i>		
Activity	Brief description of the activity, including main milestones and deliverables (and how it relates to data in sections 2.2 and 3.2).	Timescale (months)
New proposal	CEA/GREThE will build proposal with industrial partners or institution (UE) based on the use of the new upgraded CLAIRE loop	24
Dissemination	CEA/GREThE will promote the use of compact heat exchangers for HTR applications to their club of industrial partners	12

FORESEEN COLLABORATIONS WITH OTHER ENTITIES

Please tick appropriate boxes (✓) corresponding to your most probable follow-up.

R&D	Further research or development	☐	FIN	Financial support	☐
LIC	Licence agreement	☐	VC	Venture capital/spin-off funding	☐
MAN	Manufacturing agreement	☐	PPP	Private-public partnership	☐
MKT	Marketing agreement/Franchising	☐	INFO	Information exchange, training	☐
JV	Joint venture	☐	CONS	Available for consultancy	☐
			Other	(please specify)	☐

3.2 : Quantified data for each partner's main result

Items	Currently achieved quantity ^a	Estimated future quantity ^b
Economic impacts (in EURO)		
# of licenses issued (within EU)		
# of licenses issued (outside EU)		
Total value of licenses (in EURO)		
# of entrepreneurial actions (start-up company, joint ventures...)		
# of direct jobs created ^c		
# of direct jobs safeguarded ^c		
# of direct jobs lost		

^a The added value or the number of items already achieved to date.

^b Estimated quantity = estimation of the quantity of the corresponding item or the number of items that you foresee to achieve in the future (i.e. expectations within the next 3 years following the end of the project).

^c "Direct jobs" means jobs within the partner involved. Research posts are to be excluded from the jobs calculation

= number of ...

I confirm the information contained in part 3 of this Technological Implementation Plan and I certify that these are our exploitation intentions

Signature: 

Name: D. BARBIER

Date: 01/09/2005

3.1 : Description of the use and the dissemination of result(s), partner per partner

MANDATORY INFORMATION :

CONTRACT NUMBER :

FIKI-CT-2001-20177

PARTNER's NAME :

University of Applied Sciences Zittau/Goerlitz

CONTACT PERSON(S):

Name	Martin Gronek
Position/Title	Engineer
Organisation	University of Applied Sciences Zittau/Goerlitz
Address	Theodor-Koerner-Allee 16 02763 Zittau, Germany
Telephone	+49 (0) 3583 61 1545
Fax	+49 (0) 3583 61 1288
E-mail	mgronek@hs-zigr.de

No, TITLE AND BRIEF DESCRIPTION OF MAIN RESULT(S)

3	Concept proposal for bearings (active magnetic and catcher) and diagnostics of a turbomachine shaft for HTR • real time investigations for analyses of static and dynamic loads • concept for AMB, optimised controller algorithms and diagnostic algorithms • test of dynamic behaviour with simulation tool MLDyn • experimental validation on FLP 500 test facility
5	Conceptual design for helium rotating seal for HTR • investigations on the influence of can material to the magnetic forces of the AMBs

FOR EACH MAIN RESULT:**TIMETABLE OF THE USE AND DISSEMINATION ACTIVITIES WITHIN THE NEXT 3 YEARS
AFTER THE END OF THE PROJECT**

<i>Mention the use and dissemination related activities, the main associated partners, the related milestones and give an indicative timescale</i>		
Activity	Brief description of the activity, including main milestones and deliverables (and how it relates to data in sections 2.2 and 3.2).	Timescale (months)
Simulation calculations	Design, test and optimisation of controller algorithms, Determination of the dynamic behaviour of the magnetic suspended system,	
Diagnostics	Design and test of diagnostic algorithms for the magnetic suspended system	
Experiments	Experimental validation of the AMBs applicability to react the required loads for the GT-MHR reactor type	
FEM analysis and Measurement	Determination of the Influence of Can-Material to the magnetic forces of the AMBs (Canned AMBs were part of the investigations for the preliminary design of dry rotating seals)	

FORESEEN COLLABORATIONS WITH OTHER ENTITIES

Please tick appropriate boxes (☒) corresponding to your most probable follow-up.

R&D	Further research or development	☒	FIN	Financial support	☒
LIC	Licence agreement	☐	VC	Venture capital/spin-off funding	☐
MAN	Manufacturing agreement	☐	PPP	Private-public partnership	☐
MKT	Marketing agreement/Franchising	☐	INFO	Information exchange, training	☒
JV	Joint venture	☐	CONS	Available for consultancy	☐
			Other	(please specify)	☐

3.2 : Quantified data for each partner's main result

Items	Currently achieved quantity ^a	Estimated future quantity ^b
Economic impacts (in EURO)	0	0
# of licenses issued (within EU)	0	0
# of licenses issued (outside EU)	0	0
Total value of licenses (in EURO)	0	0
# of entrepreneurial actions (start-up company, joint ventures...)	0	0
# of direct jobs created ^c	0	0
# of direct jobs safeguarded ^c	1	1
# of direct jobs lost	0	0

^a The added value or the number of items already achieved to date.

^b Estimated quantity = estimation of the quantity of the corresponding item or the number of items that you foresee to achieve in the future (i.e. expectations within the next 3 years following the end of the project).

^c "Direct jobs" means jobs within the partner involved. Research posts are to be excluded from the jobs calculation

= number of ...

I confirm the information contained in part 3 of this Technological Implementation Plan and I certify that these are our exploitation intentions

Signature: 

Name: Martin Gronek

Date: Dec. 9th 2005

3.1 : Description of the use and the dissemination of result(s), partner per partner**MANDATORY INFORMATION :****CONTRACT NUMBER :****FIKI-CT-2001-20177****PARTNER's NAME :****Nuclear Research and Consultancy Group****CONTACT PERSON(S):**

Name	Alik Van Heek
Position/Title	
Organisation	Nuclear Research and Consultancy Group
Address	
Telephone	
Fax	
E-mail	

No, TITLE AND BRIEF DESCRIPTION OF MAIN RESULT(S)

1	
2	
3	
4	
5	

FOR EACH MAIN RESULT:**TIMETABLE OF THE USE AND DISSEMINATION ACTIVITIES WITHIN THE NEXT 3 YEARS
AFTER THE END OF THE PROJECT**

<i>Mention the use and dissemination related activities, the main associated partners, the related milestones and give an indicative timescale</i>		
Activity	Brief description of the activity, including main milestones and deliverables (and how it relates to data in sections 2.2 and 3.2).	Timescale (months)

FORESEEN COLLABORATIONS WITH OTHER ENTITIES

Please tick appropriate boxes (☐) corresponding to your most probable follow-up.

R&D	Further research or development	☐	FIN	Financial support	☐
LIC	Licence agreement	☐	VC	Venture capital/spin-off funding	☐
MAN	Manufacturing agreement	☐	PPP	Private-public partnership	☐
MKT	Marketing agreement/Franchising	☐	INFO	Information exchange, training	☐
JV	Joint venture	☐	CONS	Available for consultancy	☐
			Other	(please specify)	☐

3.2 : Quantified data for each partner's main result

Items	Currently achieved quantity ^a	Estimated future quantity ^b
Economic impacts (in EURO)		
# of licenses issued (within EU)		
# of licenses issued (outside EU)		
Total value of licenses (in EURO)		
# of entrepreneurial actions (start-up company, joint ventures...)		
# of direct jobs created ^c		
# of direct jobs safeguarded ^c		
# of direct jobs lost		

^a The added value or the number of items already achieved to date.

^b Estimated quantity = estimation of the quantity of the corresponding item or the number of items that you foresee to achieve in the future (i.e. expectations within the next 3 years following the end of the project).

^c "Direct jobs" means jobs within the partner involved. Research posts are to be excluded from the jobs calculation

= number of ...

I confirm the information contained in part 3 of this Technological Implementation Plan and I certify that these are our exploitation intentions

Signature:

Name:

Date:

3.1 : Description of the use and the dissemination of result(s), partner per partner**MANDATORY INFORMATION :****CONTRACT NUMBER :****FIKI-CT-2001-20177****PARTNER's NAME :****Forschungszentrum Juelich GmbH****CONTACT PERSON(S):**

Name	Werner von Lensa
Position/Title	
Organisation	Forschungszentrum Juelich GmbH
Address	
Telephone	
Fax	
E-mail	

No, TITLE AND BRIEF DESCRIPTION OF MAIN RESULT(S)

1	
2	
3	
4	
5	

FOR EACH MAIN RESULT:**TIMETABLE OF THE USE AND DISSEMINATION ACTIVITIES WITHIN THE NEXT 3 YEARS
AFTER THE END OF THE PROJECT**

<i>Mention the use and dissemination related activities, the main associated partners, the related milestones and give an indicative timescale</i>		
Activity	Brief description of the activity, including main milestones and deliverables (and how it relates to data in sections 2.2 and 3.2).	Timescale (months)

FORESEEN COLLABORATIONS WITH OTHER ENTITIES

Please tick appropriate boxes (☐) corresponding to your most probable follow-up.

R&D	Further research or development	☐	FIN	Financial support	☐
LIC	Licence agreement	☐	VC	Venture capital/spin-off funding	☐
MAN	Manufacturing agreement	☐	PPP	Private-public partnership	☐
MKT	Marketing agreement/Franchising	☐	INFO	Information exchange, training	☐
JV	Joint venture	☐	CONS	Available for consultancy	☐
			Other	(please specify)	☐

3.2 : Quantified data for each partner's main result

Items	Currently achieved quantity ^a	Estimated future quantity ^b
Economic impacts (in EURO)		
# of licenses issued (within EU)		
# of licenses issued (outside EU)		
Total value of licenses (in EURO)		
# of entrepreneurial actions (start-up company, joint ventures...)		
# of direct jobs created ^c		
# of direct jobs safeguarded ^c		
# of direct jobs lost		

^a The added value or the number of items already achieved to date.

^b Estimated quantity = estimation of the quantity of the corresponding item or the number of items that you foresee to achieve in the future (i.e. expectations within the next 3 years following the end of the project).

^c "Direct jobs" means jobs within the partner involved. Research posts are to be excluded from the jobs calculation

= number of ...

I confirm the information contained in part 3 of this Technological Implementation Plan and I certify that these are our exploitation intentions

Signature:

Name:

Date:

3.1: Description of the use and the dissemination of result(s), partner per partner

MANDATORY INFORMATION:

CONTRACT NUMBER:

FIKI-CT-2001-20177

PARTNER's NAME:

Empresarios Agrupados Internacional

CONTACT PERSON(S):

Name	Alfredo Orden
Position/Title	Engineer, Mechanical Department
Organisation	Empresarios Agrupados Internacional
Address	Magallanes,3 28015 Madrid, Spain
Telephone	++ 34 91 3098054
Fax	++ 34 91 5912655
E-mail	aom@empre.es

NO., TITLE AND BRIEF DESCRIPTION OF MAIN RESULT(S)

1	Helium turbine Participation in the predesign activities of the turbine based on: • Thermal and thermomechanical analysis of the turbine blade and disc. Verification of thermal stresses and period of life. • Applicability of the HTR-M results and conclusions regarding the turbine materials. Selection of the candidate materials. • Predesign of the thermal insulation on the turbine inlet. Configuration of the hot gas duct.
2	
3	
4	
5	

FOR EACH MAIN RESULT:**TIMETABLE OF THE USE AND DISSEMINATION ACTIVITIES WITHIN THE NEXT 3 YEARS AFTER THE END OF THE PROJECT**

<i>Mention the use and dissemination related activities, the main associated partners, the related milestones and give an indicative timescale</i>		
Activity	Brief description of the activity, including main milestones and deliverables (and how it relates to data in sections 2.2 and 3.2).	Timescale (months)
Helium turbine	Results could be used in projects such as RAPHAEL, GCFR and EXTREMAT, inside the European 6 th Framework Programme, on European HTR/VHTR development	24

FORESEEN COLLABORATIONS WITH OTHER ENTITIES

Please tick appropriate boxes (4) corresponding to your most probable follow-up.

R&D	Further research or development	☐ X	FIN	Financial support	☐
LIC	Licence agreement	☐	VC	Venture capital/spin-off funding	☐
MAN	Manufacturing agreement	☐	PPP	Private-public partnership	☐
MKT	Marketing agreement/Franchising	☐	INFO	Information exchange, training courses	☐ X
JV	Joint venture	☐	CONS	Available for consultancy	☐ X X
			Other	(please specify)	☐

3.2: Quantified data for each partner's main result

Items	Currently achieved quantity ^a	Estimated future quantity ^b
Economic impacts (in Euros)	0	0
# of licenses issued (within EU)	0	0
# of licenses issued (outside EU)	0	0
Total value of licenses (in Euros)	0	0
# of entrepreneurial actions (start-up company, joint ventures...)	0	0
# of direct jobs created ^c	1	3
# of direct jobs safeguarded ^c	0	0
# of direct jobs lost	0	0

^a The added value or the number of items already achieved to date.

^b Estimated quantity = estimation of the quantity of the corresponding item or the number of items that you foresee to achieve in the future (i.e. expectations within the next 3 years following the end of the project).

^c "Direct jobs" means jobs within the partner involved. Research posts are to be excluded from the jobs calculation.

= number of ...

I confirm the information contained in part 3 of this Technological Implementation Plan and I certify that these are our exploitation intentions

Signature:

Name: Alfredo Orden

Date: 2005-11-03

3.1 : Description of the use and the dissemination of result(s), partner per partner**MANDATORY INFORMATION :****CONTRACT NUMBER :****FIKI-CT-2001-20177****PARTNER's NAME :****National Nuclear Corporation Limited****CONTACT PERSON(S):**

Name	Derek Buckthorpe
Position/Title	Senior Consultant Engineer
Organisation	National Nuclear Corporation Limited
Address	Booths Hall, Chelford Road, Knutsford, Cheshire, UK
Telephone	00 44 1565 84 3845
Fax	
E-mail	Derek.buckthorpe@amecnnc.co.uk

No, TITLE AND BRIEF DESCRIPTION OF MAIN RESULT(S)

1	Investigation of tribology in helium conditions. To provide UK experience and support to tribology investigations performed within HTR-E. To provide advice on coating selection and tests to be carried out by Framatome & CEA in support of HTR & VHTR development. The main results are friction and wear performances of selected materials in helium environments for application to HTR & VHTR.
2	Helium Purification System: The provide UK experience and support towards the development of helium purification system and corrosion issues and specification of helium impurity content for HTR & VHTR. The main results are specification of Helium Impurity System and impurity content of helium.
3	
4	
5	

FOR EACH MAIN RESULT:**TIMETABLE OF THE USE AND DISSEMINATION ACTIVITIES WITHIN THE NEXT 3 YEARS
AFTER THE END OF THE PROJECT**

<i>Mention the use and dissemination related activities, the main associated partners, the related milestones and give an indicative timescale</i>		
Activity	Brief description of the activity, including main milestones and deliverables (and how it relates to data in sections 2.2 and 3.2).	Timescale (months)
Advice on Tribology investigations & UK experience	Results to be used for future activities within HTR-TN, for further investigations within Raphael, support to Generation IV VHTR & GFR and the development of a European VHTR	12
Advice on Helium Impurity Investigations & UK experience	Results to be used for future activities within HTR-TN, support to Generation IV VHTR & GFR and the development of a European VHTR	12

FORESEEN COLLABORATIONS WITH OTHER ENTITIES

Please tick appropriate boxes (✓) corresponding to your most probable follow-up.

R&D	Further research or development	☐ Y	FIN	Financial support	☐ Y
LIC	Licence agreement	☐	VC	Venture capital/spin-off funding	☐
MAN	Manufacturing agreement	☐	PPP	Private-public partnership	☐
MKT	Marketing agreement/Franchising	☐	INFO	Information exchange, training	☐ Y
JV	Joint venture	☐	CONS	Available for consultancy	☐ Y
			Other	(please specify)	☐

3.2 : Quantified data for each partner's main result

Items	Currently achieved quantity ^a	Estimated future quantity ^b
Economic impacts (in EURO)	-	-
# of licenses issued (within EU)	-	-
# of licenses issued (outside EU)	-	-
Total value of licenses (in EURO)	-	-
# of entrepreneurial actions (start-up company, joint ventures...)	0	0
# of direct jobs created ^c	1	1
# of direct jobs safeguarded ^c	2	2
# of direct jobs lost	0	0

^a The added value or the number of items already achieved to date.

^b Estimated quantity = estimation of the quantity of the corresponding item or the number of items that you foresee to achieve in the future (i.e. expectations within the next 3 years following the end of the project).

^c "Direct jobs" means jobs within the partner involved. Research posts are to be excluded from the jobs calculation

= number of ...

I confirm the information contained in part 3 of this Technological Implementation Plan and I certify that these are our exploitation intentions

Signature:

Name: D. Buckthorpe

Date: 4th December 2005

3.1 : Description of the use and the dissemination of result(s), partner per partner**MANDATORY INFORMATION :****CONTRACT NUMBER :****FIKI-CT-2001-20177****PARTNER's NAME :****Jeumont****CONTACT PERSON(S):**

Name	Jean Luc Duez
Position/Title	
Organisation	Jeumont
Address	
Telephone	
Fax	
E-mail	

No, TITLE AND BRIEF DESCRIPTION OF MAIN RESULT(S)

1	
2	
3	
4	
5	

FOR EACH MAIN RESULT:**TIMETABLE OF THE USE AND DISSEMINATION ACTIVITIES WITHIN THE NEXT 3 YEARS
AFTER THE END OF THE PROJECT**

<i>Mention the use and dissemination related activities, the main associated partners, the related milestones and give an indicative timescale</i>		
Activity	Brief description of the activity, including main milestones and deliverables (and how it relates to data in sections 2.2 and 3.2).	Timescale (months)

FORESEEN COLLABORATIONS WITH OTHER ENTITIES

Please tick appropriate boxes (☐) corresponding to your most probable follow-up.

R&D	Further research or development	☐	FIN	Financial support	☐
LIC	Licence agreement	☐	VC	Venture capital/spin-off funding	☐
MAN	Manufacturing agreement	☐	PPP	Private-public partnership	☐
MKT	Marketing agreement/Franchising	☐	INFO	Information exchange, training	☐
JV	Joint venture	☐	CONS	Available for consultancy	☐
			Other	(please specify)	☐

3.2 : Quantified data for each partner's main result

Items	Currently achieved quantity ^a	Estimated future quantity ^b
Economic impacts (in EURO)		
# of licenses issued (within EU)		
# of licenses issued (outside EU)		
Total value of licenses (in EURO)		
# of entrepreneurial actions (start-up company, joint ventures...)		
# of direct jobs created ^c		
# of direct jobs safeguarded ^c		
# of direct jobs lost		

^a The added value or the number of items already achieved to date.

^b Estimated quantity = estimation of the quantity of the corresponding item or the number of items that you foresee to achieve in the future (i.e. expectations within the next 3 years following the end of the project).

^c "Direct jobs" means jobs within the partner involved. Research posts are to be excluded from the jobs calculation

= number of ...

I confirm the information contained in part 3 of this Technological Implementation Plan and I certify that these are our exploitation intentions

Signature:

Name:

Date:

3.1 : Description of the use and the dissemination of result(s), partner per partner**MANDATORY INFORMATION :****CONTRACT NUMBER :****FIKI-CT-2001-20177****PARTNER's NAME :****Société de mécanique magnétique****CONTACT PERSON(S):**

Name	Yves Destombes
Position/Title	
Organisation	Société de mécanique magnétique
Address	
Telephone	
Fax	
E-mail	

No, TITLE AND BRIEF DESCRIPTION OF MAIN RESULT(S)

1	
2	
3	
4	
5	

FOR EACH MAIN RESULT:**TIMETABLE OF THE USE AND DISSEMINATION ACTIVITIES WITHIN THE NEXT 3 YEARS
AFTER THE END OF THE PROJECT**

<i>Mention the use and dissemination related activities, the main associated partners, the related milestones and give an indicative timescale</i>		
Activity	Brief description of the activity, including main milestones and deliverables (and how it relates to data in sections 2.2 and 3.2).	Timescale (months)

FORESEEN COLLABORATIONS WITH OTHER ENTITIES

Please tick appropriate boxes (☐) corresponding to your most probable follow-up.

R&D	Further research or development	☐	FIN	Financial support	☐
LIC	Licence agreement	☐	VC	Venture capital/spin-off funding	☐
MAN	Manufacturing agreement	☐	PPP	Private-public partnership	☐
MKT	Marketing agreement/Franchising	☐	INFO	Information exchange, training	☐
JV	Joint venture	☐	CONS	Available for consultancy	☐
			Other	(please specify)	☐

3.2 : Quantified data for each partner's main result

Items	Currently achieved quantity ^a	Estimated future quantity ^b
Economic impacts (in EURO)		
# of licenses issued (within EU)		
# of licenses issued (outside EU)		
Total value of licenses (in EURO)		
# of entrepreneurial actions (start-up company, joint ventures...)		
# of direct jobs created ^c		
# of direct jobs safeguarded ^c		
# of direct jobs lost		

^a The added value or the number of items already achieved to date.

^b Estimated quantity = estimation of the quantity of the corresponding item or the number of items that you foresee to achieve in the future (i.e. expectations within the next 3 years following the end of the project).

^c "Direct jobs" means jobs within the partner involved. Research posts are to be excluded from the jobs calculation

= number of ...

I confirm the information contained in part 3 of this Technological Implementation Plan and I certify that these are our exploitation intentions

Signature:

Name:

Date:

3.1 : Description of the use and the dissemination of result(s), partner per partner**MANDATORY INFORMATION :****CONTRACT NUMBER :****FIKI-CT-2001-20177****PARTNER's NAME :****Ansaldo Energia****CONTACT PERSON(S):**

Name	Luciano Cinotti
Position/Title	
Organisation	Ansaldo Energia
Address	
Telephone	
Fax	
E-mail	

No, TITLE AND BRIEF DESCRIPTION OF MAIN RESULT(S)

1	
2	
3	
4	
5	

FOR EACH MAIN RESULT:**TIMETABLE OF THE USE AND DISSEMINATION ACTIVITIES WITHIN THE NEXT 3 YEARS
AFTER THE END OF THE PROJECT**

<i>Mention the use and dissemination related activities, the main associated partners, the related milestones and give an indicative timescale</i>		
Activity	Brief description of the activity, including main milestones and deliverables (and how it relates to data in sections 2.2 and 3.2).	Timescale (months)

FORESEEN COLLABORATIONS WITH OTHER ENTITIES

Please tick appropriate boxes (☐) corresponding to your most probable follow-up.

R&D	Further research or development	☐	FIN	Financial support	☐
LIC	Licence agreement	☐	VC	Venture capital/spin-off funding	☐
MAN	Manufacturing agreement	☐	PPP	Private-public partnership	☐
MKT	Marketing agreement/Franchising	☐	INFO	Information exchange, training	☐
JV	Joint venture	☐	CONS	Available for consultancy	☐
			Other	(please specify)	☐

3.2 : Quantified data for each partner's main result

Items	Currently achieved quantity ^a	Estimated future quantity ^b
Economic impacts (in EURO)		
# of licenses issued (within EU)		
# of licenses issued (outside EU)		
Total value of licenses (in EURO)		
# of entrepreneurial actions (start-up company, joint ventures...)		
# of direct jobs created ^c		
# of direct jobs safeguarded ^c		
# of direct jobs lost		

^a The added value or the number of items already achieved to date.

^b Estimated quantity = estimation of the quantity of the corresponding item or the number of items that you foresee to achieve in the future (i.e. expectations within the next 3 years following the end of the project).

^c "Direct jobs" means jobs within the partner involved. Research posts are to be excluded from the jobs calculation

= number of ...

I confirm the information contained in part 3 of this Technological Implementation Plan and I certify that these are our exploitation intentions

Signature:

Name:

Date:

3.1 : Description of the use and the dissemination of result(s), partner per partner**MANDATORY INFORMATION :****CONTRACT NUMBER :****FIKI-CT-2001-20177****PARTNER's NAME :****Von Karmann institute****CONTACT PERSON(S):**

Name	René van den Braembussche
Position/Title	
Organisation	Von Karmann institute
Address	
Telephone	
Fax	
E-mail	

No, TITLE AND BRIEF DESCRIPTION OF MAIN RESULT(S)

1	
2	
3	
4	
5	

FOR EACH MAIN RESULT:**TIMETABLE OF THE USE AND DISSEMINATION ACTIVITIES WITHIN THE NEXT 3 YEARS
AFTER THE END OF THE PROJECT**

<i>Mention the use and dissemination related activities, the main associated partners, the related milestones and give an indicative timescale</i>		
Activity	Brief description of the activity, including main milestones and deliverables (and how it relates to data in sections 2.2 and 3.2).	Timescale (months)

FORESEEN COLLABORATIONS WITH OTHER ENTITIES

Please tick appropriate boxes (☐) corresponding to your most probable follow-up.

R&D	Further research or development	☐	FIN	Financial support	☐
LIC	Licence agreement	☐	VC	Venture capital/spin-off funding	☐
MAN	Manufacturing agreement	☐	PPP	Private-public partnership	☐
MKT	Marketing agreement/Franchising	☐	INFO	Information exchange, training	☐
JV	Joint venture	☐	CONS	Available for consultancy	☐
			Other	(please specify)	☐

3.2 : Quantified data for each partner's main result

Items	Currently achieved quantity ^a	Estimated future quantity ^b
Economic impacts (in EURO)		
# of licenses issued (within EU)		
# of licenses issued (outside EU)		
Total value of licenses (in EURO)		
# of entrepreneurial actions (start-up company, joint ventures...)		
# of direct jobs created ^c		
# of direct jobs safeguarded ^c		
# of direct jobs lost		

^a The added value or the number of items already achieved to date.

^b Estimated quantity = estimation of the quantity of the corresponding item or the number of items that you foresee to achieve in the future (i.e. expectations within the next 3 years following the end of the project).

^c "Direct jobs" means jobs within the partner involved. Research posts are to be excluded from the jobs calculation

= number of ...

I confirm the information contained in part 3 of this Technological Implementation Plan and I certify that these are our exploitation intentions

Signature:

Name:

Date:

3.1 : Description of the use and the dissemination of result(s), partner per partner**MANDATORY INFORMATION :****CONTRACT NUMBER :****FIKI-CT-2001-20177****PARTNER's NAME :****Heatric****CONTACT PERSON(S):**

Name	Nick Johnston
Position/Title	
Organisation	Heatric
Address	
Telephone	
Fax	
E-mail	

No, TITLE AND BRIEF DESCRIPTION OF MAIN RESULT(S)

1	
2	
3	
4	
5	

FOR EACH MAIN RESULT:**TIMETABLE OF THE USE AND DISSEMINATION ACTIVITIES WITHIN THE NEXT 3 YEARS
AFTER THE END OF THE PROJECT**

<i>Mention the use and dissemination related activities, the main associated partners, the related milestones and give an indicative timescale</i>		
Activity	Brief description of the activity, including main milestones and deliverables (and how it relates to data in sections 2.2 and 3.2).	Timescale (months)

FORESEEN COLLABORATIONS WITH OTHER ENTITIES

Please tick appropriate boxes (☐) corresponding to your most probable follow-up.

R&D	Further research or development	☐	FIN	Financial support	☐
LIC	Licence agreement	☐	VC	Venture capital/spin-off funding	☐
MAN	Manufacturing agreement	☐	PPP	Private-public partnership	☐
MKT	Marketing agreement/Franchising	☐	INFO	Information exchange, training	☐
JV	Joint venture	☐	CONS	Available for consultancy	☐
			Other	(please specify)	☐

3.2 : Quantified data for each partner's main result

Items	Currently achieved quantity ^a	Estimated future quantity ^b
Economic impacts (in EURO)		
# of licenses issued (within EU)		
# of licenses issued (outside EU)		
Total value of licenses (in EURO)		
# of entrepreneurial actions (start-up company, joint ventures...)		
# of direct jobs created ^c		
# of direct jobs safeguarded ^c		
# of direct jobs lost		

^a The added value or the number of items already achieved to date.

^b Estimated quantity = estimation of the quantity of the corresponding item or the number of items that you foresee to achieve in the future (i.e. expectations within the next 3 years following the end of the project).

^c "Direct jobs" means jobs within the partner involved. Research posts are to be excluded from the jobs calculation

= number of ...

I confirm the information contained in part 3 of this Technological Implementation Plan and I certify that these are our exploitation intentions

Signature:

Name:

Date:

3.1 : Description of the use and the dissemination of result(s), partner per partner

MANDATORY INFORMATION :

CONTRACT NUMBER :

FIKI-CT-2001-20177

PARTNER's NAME :

Framatome ANP GmbH

CONTACT PERSON(S):

Name	Gerd Brinkmann
Position/Title	General Manager HTR
Organisation	Framatome ANP GmbH
Address	Freyeslebenstrasse 1 91058 Erlangen, Germany
Telephone	+49 9131 189-6630
Fax	+49 9131 189-4872
E-mail	Gerd.brinkmann@framatome-anp.com

No, TITLE AND BRIEF DESCRIPTION OF MAIN RESULT(S)

1	Helium turbine: Design and calculations of insulation parts (hot gas duct)
2	IHX/Recuperator: Not involved
3	Magnetic bearings: Not involved
4	Rotating seal: Not involved
5	Tribology :From the results of all tests performed on tribometeres at high temperature (1000 °C), specific base materials and coatings have been selected. Friction and wear performances in Helium environment are quantified by the tests.
6	Helium purification system: The main recommendations of this work package related to the helium purification system are focused on impurity content of the helium for NPP of 600 MWth.

FOR EACH MAIN RESULT:**TIMETABLE OF THE USE AND DISSEMINATION ACTIVITIES WITHIN THE NEXT 3 YEARS
AFTER THE END OF THE PROJECT**

<i>Mention the use and dissemination related activities, the main associated partners, the related milestones and give an indicative timescale</i>		
Activity	Brief description of the activity, including main milestones and deliverables (and how it relates to data in sections 2.2 and 3.2).	Timescale (months)
Helium Turbine	Results to be used in future activities within HTR-TN on European HTR development	24
Tribology	idem	24
Helium impurities	idem	24

FORESEEN COLLABORATIONS WITH OTHER ENTITIES

Please tick appropriate boxes (X) corresponding to your most probable follow-up.

R&D	Further research or development	X	FIN	Financial support	☐
LIC	Licence agreement	☐	VC	Venture capital/spin-off funding	☐
MAN	Manufacturing agreement	☐	PPP	Private-public partnership	☐
MKT	Marketing agreement/Franchising	☐	INFO	Information exchange, training	X
JV	Joint venture	☐	CONS	Available for consultancy	☐
			Other	(please specify)	☐

3.2 : Quantified data for each partner's main result

Items	Currently achieved quantity ^a	Estimated future quantity ^b
Economic impacts (in EURO)		
# of licenses issued (within EU)		
# of licenses issued (outside EU)		
Total value of licenses (in EURO)		
# of entrepreneurial actions (start-up company, joint ventures...)		
# of direct jobs created ^c		
# of direct jobs safeguarded ^c		
# of direct jobs lost		

^a The added value or the number of items already achieved to date.

^b Estimated quantity = estimation of the quantity of the corresponding item or the number of items that you foresee to achieve in the future (i.e. expectations within the next 3 years following the end of the project).

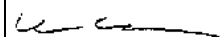
^c "Direct jobs" means jobs within the partner involved. Research posts are to be excluded from the jobs calculation

= number of ...

I confirm the information contained in part 3 of this Technological Implementation Plan and I certify that these are our exploitation intentions

Signature:

Name: Dr. Gerd Brinkmann



Date: 07.07.2005

ANNEX 1: SUBJECT DESCRIPTOR CODES

1	ACARIANS	74	BIOMEDICAL SCIENCES
2	ACCIDENTOLOGY	75	BIOMOLECULES, BIOPLASTICS, BIOPOLYMERS
3	ACCOUNTING	76	BIOPHYSICS, MEDICAL PHYSICS
4	ACOUSTICS	77	BIOREACTORS
5	ADMINISTRATIVE SCIENCES, ADMINISTRATION	78	BIOREMEDIATION
6	ADULT EDUCATION, PERMANENT EDUCATION	79	BIOSAFETY
7	AERONAUTICS	80	BIOSENSORS
8	AGEING	81	BIOTECHNOLOGY, BIOENGINEERING
9	AGRICULTURAL CHEMISTRY	82	BIOTRANSFORMATION
10	AGRICULTURAL ECONOMICS	83	BOREAL FOREST
11	AGRICULTURAL ENGINEERING/TECHNOLOGY	84	BRAIN DEVELOPMENT
12	AGRICULTURAL MARKETING/TRADE	85	BRAIN THEORY, BRAIN MAPPING
13	AGRICULTURAL PRODUCTION SYSTEMS	86	BROADBAND TECHNOLOGIES
14	AGRICULTURAL SCIENCES, AGRICULTURE	87	BROADCASTING
15	AGRI-FOOD, AGRI-ENVIRONMENT	88	BROKERAGE SERVICES
16	AGRONOMY	89	BUILDING CONSTRUCTION, SHELL SUSTAINABILITY
17	AIR TRAFFIC CONTROL OPERATIONS/PROCEDURES/SLOT ALLOCATION	90	BUSINESS COMMUNICATION
18	AIR TRAFFIC MANAGEMENT/FLOW MANAGEMENT	91	BUSINESS ECONOMICS/STUDIES, ORGANISATION AND PROCESSES
19	AIR TRANSPORT TECHNOLOGY	92	CARBOCHEMISTRY, PETROCHEMISTRY, FUELS AND EXPLOSIVES TECHNOLOGY
20	AIRCRAFT	93	CARBOHYDRATES AND OTHER MACROMOLECULES METABOLISM
21	AIRPORT OPERATIONS/PROCEDURES	94	CARBON DIOXIDE CAPTURE/STORAGE/DISPOSAL
22	ALGAE	95	CARDIOVASCULAR SYSTEM
23	ALGEBRA	96	CARE AND HEALTH SERVICES, HELP TO THE HANDICAPPED
24	ALGEBRAIC TOPOLOGY	97	CELL COMMUNICATION
25	ALGORITHMS AND COMPLEXITY	98	CENTRAL AND EASTERN EUROPEAN COUNTRIES
26	ALLERGOLOGY	99	CERAMIC MATERIALS AND POWDERS
27	ALTERNATIVE PROPULSION SYSTEMS	100	CERTIFICATION
28	ANALYTICAL CHEMISTRY	101	CHEMICAL METROLOGY
29	ANIMAL BANKS AND REPOSITORIES	102	CHEMICAL TECHNOLOGY AND ENGINEERING
30	ANIMAL BIOTECHNOLOGY	103	CHEMISTRY/HOMOGENEOUS AND HETEROGENEOUS CATALYSIS/THEORETICAL/NANOCHEMISTRY
31	ANIMAL BREEDING/REPRODUCTION/NUTRITION	104	CHRONOLOGY, DATATION TECHNOLOGY
32	ANIMAL FEED, ANIMAL PRODUCTION	105	CIVIL ENGINEERING (INCL PAVEMENTS AND STRUCTURES)
33	ANIMAL HEALTH, ANIMAL WELFARE	106	CLINICAL GENETICS, BIOLOGY
34	ANIMAL PARASITIC DISEASES	107	CLINICAL PHYSICS, RADIOLOGY, TOMOGRAPHY, MEDICAL INSTRUMENTATION, MEDICAL IMAGING
35	ANIMAL PHYSIOLOGY	108	CLINICAL RESEARCH, CLINICAL TRIALS, COMPUTERISED CLINICAL SYSTEMS
36	ANIMAL PRODUCTS	109	COAL MINING TECHNOLOGIES
37	ANTHROPOGENIC IMPACT ON ECOSYSTEMS	110	COASTAL MORPHOLOGICAL CHANGES AND COASTAL DEFENSE MECHANISMS
38	ANTHROPOLOGY	111	COASTAL ZONE ECOSYSTEMS AND MANAGEMENT
39	ANTIBIOTICS	112	COATS AND SURFACE TREATMENT
40	ANTICANCER THERAPIES	113	COGNITIVE SCIENCE
41	ANTI-FRAUD	114	COLLOIDS
42	APPLIED MATHEMATICS	115	COMBINATORIAL CHEMISTRY
43	APPLIED PHYSICS	116	COMBINED HEAT AND POWER SYSTEMS
44	AQUACULTURE, AQUACULTURE TECHNOLOGY	117	COMBUSTION BASICS AND EFFICIENCY
45	ARCHIVISTICS/DOCUMENTATION/TECHNICAL DOCUMENTATION	118	COMMERCIAL AND INDUSTRIAL ECONOMICS
46	ARCTIC ENVIRONMENT	119	COMMON AGRICULTURAL POLICY
47	ARTIFICIAL INTELLIGENCE	120	COMMUNICATION ENGINEERING/TECHNOLOGY
48	ARTS	121	COMMUNICATION SCIENCES/HUMAN COMPUTER INTERACTIONS
49	ASSESSMENT AND MANAGEMENT OF LIVING RESOURCES	122	COMMUNITY DEVELOPMENT, COMMUNITY STUDIES
50	ASTRONOMY	123	COMPANY RE-ENGINEERING/ORGANISATIONAL DEVELOPMENT
51	ASTROPHYSICS/PLANETARY GEOLOGY	124	COMPOSITE MATERIALS
52	ATOMIC AND MOLECULAR PHYSICS	125	COMPUTATIONAL BIOLOGY
53	AUDIOVISUAL COMMUNICATION	126	COMPUTATIONAL CHEMISTRY AND MODELING
54	AUTOMATION, ROBOTIC CONTROL SYSTEMS	127	COMPUTATIONAL MATHEMATICS/DISCRETE MATHEMATICS
55	BACTERIOLOGY	128	COMPUTATIONAL PHYSICS
56	BANKING	129	COMPUTER SCIENCE/ENGINEERING, NUMERICAL ANALYSIS, SYSTEMS, CONTROL
57	BENCHMARKING TECHNIQUES	130	COMPUTER TECHNOLOGY/GRAPHICS, META COMPUTING
58	BIOASSAYS	131	COMPUTER-BASED TRAINING
59	BIOCATALYSTS	132	CONDENSED MATTER: ELECTRONIC, MAGNETIC AND SUPERCONDUCTIVE PROPERTIES
60	BIOCHEMICAL TECHNOLOGY	133	CONDENSED MATTER: MECHANICAL AND THERMAL PROPERTIES
61	BIOCHEMISTRY, METABOLISM	134	CONDENSED MATTER: OPTICAL AND DIELECTRIC PROPERTIES
62	BIOCOMPUTING, MEDICAL INFORMATICS, BIOMATHEMATICS, BIOMETRICS	135	CONDENSED MATTER: SOFT MATTER AND POLYMER PHYSICS
63	BIODEGRADATION		
64	BIODIVERSITY		
65	BIOFERTILIZERS		
66	BIOGAS PRODUCTION		
67	BIOLOGICAL COLLECTIONS: MUSEA AND RELATED INFORMATION RESOURCES		
68	BIOLOGICAL ENGINEERING		
69	BIOLOGICAL MONITORING/RISK FACTORS AND ASSESSMENT		
70	BIOLOGICAL SCIENCES, BIOLOGY		
71	BIOMASS PROCESS INTEGRATION AND ENVIRONMENTAL IMPACTS		
72	BIOMECHANICS, BIOMEDICAL ENGINEERING		
73	BIOMEDICAL ETHICS		

136	CONSUMER SCIENCES, CONSUMERS' RIGHTS	206	ENTREPRENEURSHIP, SPIN OFFS, NEW TECHNOLOGY BASED BUSINESS
137	CONTROL ENGINEERING	207	ENVIRONMENT, ENVIRONMENTAL SCIENCE
138	COOPERATIVE WORKING	208	ENVIRONMENTAL ECONOMICS/NATURAL RESOURCES ECONOMICS
139	CORROSION	209	ENVIRONMENTAL HEALTH
140	COSMOLOGY	210	ENVIRONMENTAL IMPACTS/INTERACTIONS
141	CRIMINOLOGY	211	ENVIRONMENTAL INDICATORS/MONITORING/RISK ASSESSMENT
142	CROP, CROP INPUTS/MANAGEMENT/YIELD ESTIMATION	212	ENVIRONMENTAL LAW/TREATIES/POLICY
143	CULTURAL HERITAGE: PRESERVATION AND RESTORATION/CULTURAL STUDIES	213	ENVIRONMENTAL TECHNOLOGY/ENGINEERING, POLLUTION CONTROL
144	CULTURE COLLECTIONS: MICROBIAL, CELL, TISSUE, GERMPLASM	214	EPIDEMIOLOGY
145	CURRICULUM STUDIES	215	ERGONOMICS
146	CYBERNETICS	216	EROSION
147	CYTOGENETICS	217	EUROPEAN INTEGRATION
148	CYTOLOGY, CANCEROLOGY, ONCOLOGY	218	EUROPEAN LAW
149	DATA PROTECTION, STORAGE TECHNOLOGY, CRYPTOGRAPHY	219	EUROPEAN STUDIES
150	DATABASES, DATABASE MANAGEMENT, DATA MINING	220	EVALUATION
151	DECENTRALISED GENERATION OF ELECTRICITY/HEAT	221	EXPLOITATION OF RESEARCH RESULTS
152	DECISION SUPPORT TOOLS	222	EXTENSIFICATION
153	DEEP WATER EXPLOITATION	223	EXTERNALITIES
154	DEMOGRAPHY	224	FARMHOUSE CONSTRUCTION
155	DESIGN, DESIGN ENGINEERING	225	FARMING SYSTEMS
156	DEVELOPMENT OF CLEAN FUELS FOR TRANSPORT	226	FERMENTATION
157	DEVELOPMENT POLICIES AND STUDIES	227	FINANCIAL SCIENCE, FINANCE
158	DEVELOPMENT TECHNOLOGY, ANIMAL GROWTH, ONTOLOGY, EMBRYOLOGY	228	FINE CHEMICALS, DYES AND INKS
159	DIAGNOSTICS, DIAGNOSIS	229	FISH/FISHERIES
160	DIGITAL SYSTEMS, DIGITAL REPRESENTATION	230	FISHING METHODOLOGIES/SELECTIVITY
161	DISABILITIES, HANDICAPS AND HANDICAPPED	231	FOOD AND DRINK TECHNOLOGY
162	DISEASES: RARE/CHRONIC/DEGENERATIVE, ETIOLOGIC FACTORS	232	FOOD CHEMISTRY, FOOD INGREDIENTS
163	DIVERSIFICATION IN AGRICULTURE/FORESTRY	233	FOOD MICROBIOLOGY
164	DNA CHIP	234	FOOD PROCESSING/PACKAGING
165	DNA THERAPIES	235	FOOD QUALITY MANAGEMENT/POLICY/LABELLING
166	DOWNSTREAM PROCESSING	236	FOOD TOXICOLOGY
167	"DRILLING TECHNOLOGY; DEEP DRILLING"	237	FOREST ECOSYSTEMS
168	DRUG ABUSE, ADDICTION	238	FOREST GENETICS
169	DRUG DISCOVERY, PROFILING, TARGETING	239	FOREST PHYSIOLOGY AND PATHOLOGY
170	DRYLAND AND ARID ZONE ECOSYSTEMS	240	FOREST POLICY, FOREST MANAGEMENT
171	EARTH OBSERVATION APPLICATIONS AND POLICY	241	FOREST PROTECTION
172	EARTH OBSERVATION TECHNOLOGY AND INFORMATION EXTRACTION	242	FOREST SCIENCES
173	EARTH SCIENCE, EARTH OBSERVATION/STRATIGRAPHY/SEDIMENTARY PROCESSES	243	FORMAL SAFETY AND ENVIRONMENTAL ASSESSMENT
174	EARTH SCIENCES FOR CLIMATE RESEARCH	244	FREIGHT TRANSPORT
175	ECOLOGY, ECOSYSTEMS, ECOLOGICAL EVOLUTION/DYNAMICS	245	FUEL CELLS
176	ECONOMIC AND ENVIRONMENT IMPACTS	246	FUELS: ALTERNATIVE FUELS IN TRANSPORTS
177	ECONOMIC AND SOCIAL SCIENCES	247	FUNCTIONAL FOODS
178	ECONOMICS IN AGRICULTURE/FORESTRY/RURAL DEVELOPMENT	248	FUNGI
179	ECONOMICS OF DEVELOPMENT/GROWTH/INNOVATION	249	FUTURE AND EMERGING TECHNOLOGIES
180	ECONOMICS, ECONOMIC PLANNING	250	GAS CONVERSION
181	ECOSYSTEM RESEARCH AND CONSERVATION	251	GAS TURBINES FOR ENERGY CONVERSION
182	ECOTOXICOLOGY	252	GASES, FLUID DYNAMICS, PLASMAS/ELECTRIC DISCHARGES
183	EDUCATION AND TRAINING, LIFELONG LEARNING, REMOTE LEARNING	253	GASTRO-ENTEROLOGY
184	EDUCATIONAL MULTIMEDIA	254	GENDER ISSUES, GENDER STUDIES
185	EDUCATIONAL SCIENCES	255	GENE THERAPY
186	ELECTRICAL ENGINEERING/TECHNOLOGY	256	GENERAL PATHOLOGY, PATHOLOGICAL ANATOMY
187	ELECTROMAGNETISM	257	GENETIC COMPARATIVE ANALYSIS
188	ELECTRONIC COMMERCE, ELECTRONIC PAYMENT, ELECTRONIC SIGNATURE	258	GENETIC ENGINEERING
189	ELECTRONIC DATA INTERCHANGE	259	GENETIC MAPPING, GENE SEQUENCE
190	ELECTRONIC HEALTH RECORDS	260	GENETIC RESISTANCE
191	ELECTRONIC PUBLISHING, AUTHORING TOOLS	261	GENETIC SELECTION
192	ELECTRONICS, ELECTRONIC ENGINEERING	262	GENETICALLY MODIFIED ORGANISMS
193	EMERGENCY MANAGEMENT	263	GENETICS
194	EMISSION	264	GENOMES, GENOMICS
195	EMPLOYMENT STUDIES	265	GEOGRAPHIC INFORMATION SYSTEMS
196	ENDOCRINOLOGY, SECRETING SYSTEMS, DIABETOLOGY	266	GEOGRAPHY
197	ENERGY AND CLIMATE CHANGE	267	GEOLOGICAL ENGINEERING/GEOTECHNICS
198	ENERGY CONVERSION PROCESSES OR CYCLES/CONVERSION FROM COAL	268	GEOMETRY/TOPOLOGY
199	ENERGY MANAGEMENT SYSTEM	269	GEOPHYSICS, PHYSICAL OCEANOGRAPHY, METEOROLOGY, GEOCHEMISTRY, TECTONICS
200	ENERGY MARKET ANALYSIS	270	GERONTOLOGY AND GERIATRICS
201	ENERGY PRODUCTION FROM BIOMASS / WASTE	271	GLOBAL CHANGE: BIOGEOCHEMICAL AND HYDROLOGICAL CYCLES
202	ENERGY RESEARCH/RTD POLICY	272	GLOBAL CHANGE: CLIMATE CHANGE
203	ENERGY, RENEWABLE ENERGIES, ELECTRICITY STORAGE	273	GLOBAL CHANGE: HUMAN HEALTH
204	ENGINEERING, CONCURRENT ENGINEERING	274	GLOBAL CHANGE: LAND COVER AND DEGRADATION
205	ENTOMOLOGY, PLANT PARASITOLOGY	275	GLOBAL CHANGE: OZONE AND ATMOSPHERIC COMPOSITION
		276	GLOBAL CYCLES OF ENERGY AND MATTER
		277	GREEN TECHNOLOGIES/CHEMICALS
		278	GRID CONNECTION
		279	HAZARDS: INDUSTRIAL
		280	HAZARDS: NATURAL

281	HEALTH AND POPULATION, HEALTH EDUCATION	357	LOGISTICS
282	HEALTH FINANCING / ECONOMICS	358	LOW INPUT PRODUCTION
283	HEALTH RISK EVALUATION	359	MACROECONOMICS (INCL. MONETARY ECONOMICS)
284	HEALTH SCIENCES/POLICIES/LAW	360	MACROMOLECULAR CHEMISTRY/NEW MATERIAL/SUPRAMOLECULAR STRUCTURES
285	HEALTH SERVICE MANAGEMENT	361	MACROSOCIOLOGY
286	HEALTH SYSTEMS RESEARCH	362	MAINTENANCE MANAGEMENT
287	HEALTH, HEALTH PHYSICS	363	MANAGEMENT OF ENTERPRISES
288	HETEROGENEOUS CATALYSIS	364	MANAGEMENT OF URBAN AREAS
289	HIGH CONTAINMENT, HIGH CONTAINMENT FACILITIES	365	MANAGEMENT STUDIES
290	HIGH FREQUENCY TECHNOLOGY, MICROWAVES	366	MARINE ECOSYSTEMS
291	HIGH-THROUGHPUT SCREENING	367	MARINE SCIENCES/MARITIME STUDIES
292	HISTOLOGY, CYTOCHEMISTRY, HISTOCHEMISTRY, TISSUE CULTURE	368	MARINE: INSTRUMENTATION AND UNDERWATER TECHNOLOGY
293	HISTORY	369	MARINE: OCEANOGRAPHY (PHYSICAL AND OPERATIONAL)
294	HISTORY AND PHILOSOPHY OF SCIENCE AND MEDICINE	370	MARITIME SAFETY
295	HOME SYSTEMS	371	MARKET ANALYSIS/ECONOMICS/QUANTITATIVE METHODS
296	HORMONES	372	MARKET STUDY, MARKETING
297	HORTICULTURE, ORNAMENTAL PLANTS	373	MATERIALS TECHNOLOGY/ENGINEERING
298	HUMAN FACTORS IN TRANSPORT	374	MATHEMATICAL ANALYSIS/PARTIAL DIFFERENTIAL EQUATIONS
299	HUMAN GENETICS	375	MATHEMATICAL LOGIC: SET THEORY, COMBINATORICS/SEMANTICS
300	HUMAN RIGHTS	376	MATHEMATICAL PHYSICS
301	HUMAN SCIENCES, HUMANITIES	377	MATHEMATICS
302	HVAC SYSTEMS AND MANAGEMENT	378	MECHANICAL ENGINEERING, HYDRAULICS, VIBRATION AND ACOUSTIC ENGINEERING
303	HYBRID AND ELECTRIC VEHICLES	379	MEDIA STUDIES/LAW/MASS COMMUNICATIONS
304	HYDROBIOLOGY, MARINE BIOLOGY, AQUATIC ECOLOGY, LIMNOLOGY	380	MEDICAL ANTHROPOLOGY
305	HYDROCARBONS EXPLORATION AND PRODUCTION	381	MEDICAL SCIENCES/RESEARCH
306	HYDROELECTRICITY/SMALL HYDRO/HYDROPOWER	382	MEDICAL TECHNOLOGY
307	HYDROGEN	383	MEDICINAL CHEMISTRY
308	HYDROGEOLOGY, GEOGRAPHICAL AND GEOLOGICAL ENGINEERING	384	MEDICINE (HUMAN AND VERTEBRATES)
309	IDENTIFICATION SYSTEMS	385	MEMBRANE TECHNOLOGY
310	IMAGING, IMAGE PROCESSING	386	MENTAL STRESS
311	IMMUNOLOGY, IMMUNOTHERAPY, IMMUNOASSAYS	387	METABOLIC REGULATION AND SIGNAL TRANSDUCTION
312	IN VITRO TESTING/TRIAL METHODS	388	METAL TECHNOLOGY AND METAL PRODUCTS
313	INDUSTRIAL ENGINEERING	389	METALLURGY
314	INDUSTRIAL POLICY/RELATIONS	390	METROLOGY, PHYSICAL INSTRUMENTATION
315	INDUSTRIAL PSYCHOLOGY/SOCIOLOGY	391	MICROBIAL BIOTECHNOLOGY, MICROBIAL MODELLING
316	INDUSTRIAL TECHNOLOGY/ECONOMICS	392	MICROBIAL SYSTEMATICS/DIVERSITY
317	INFECTIONS	393	MICROBIOLOGY
318	INFORMATICS	394	MICROECONOMICS (THEORETICAL AND APPLIED)
319	INFORMATICS LAW	395	MICROELECTRONICS
320	INFORMATION MANAGEMENT	396	MICROENGINEERING, MICROMACHINING
321	INFORMATION TECHNOLOGY/SCIENCE	397	MICROSYSTEMS
322	INFRASTRUCTURE MANAGEMENT	398	MINING
323	INLAND NAVIGATION	399	MOBILE COMMUNICATIONS
324	INNOVATION ASSISTANCE	400	MODELLING/MODELLING TOOLS, 3-D MODELLING
325	INNOVATION FINANCE	401	MOLECULAR BIOLOGY
326	INNOVATION MONITORING	402	MOLECULAR BIOPHYSICS
327	INNOVATION POLICY/STUDIES	403	MOLECULAR DESIGN, DE NOVO DESIGN
328	INNOVATION TRAINING	404	MOLECULAR EVOLUTION
329	INORGANIC CHEMISTRY	405	MOLECULAR GENETICS
330	INSECTS	406	MOLECULAR MARKERS AND RECOGNITION
331	INSTRUMENTATION TECHNOLOGY	407	MONOCLONAL ANTIBODIES
332	INTANGIBLE INVESTMENTS	408	MOTHER AND CHILD HEALTH
333	INTEGRATED ENVIRONMENTAL ASSESSMENT	409	MOTORS AND PROPULSION SYSTEMS
334	INTEGRATED GLOBAL SAFETY	410	MOUNTAIN AND HIGHLAND ECOSYSTEMS
335	INTEGRATION OF RENEWABLE ENERGY SYSTEMS	411	MULTIMEDIA
336	INTELLECTUAL PROPERTY	412	MULTISENSORY TECHNOLOGY, MULTI-SENSING
337	INTELLIGENT AGENTS	413	MUSEUM SCIENCE
338	INTELLIGENT VEHICLES AND WATERBORNE TRANSPORT SYSTEMS	414	MYCOLOGY
339	INTERMODAL TRANSPORT	415	NANOBIOTECHNOLOGY
340	INTERNATIONAL COMMERCE/ECONOMICS	416	NANOFABRICATION, NANOTECHNOLOGY
341	INTERNATIONAL TREATIES / MULTILATERAL AGREEMENTS	417	NARROW BAND TECHNOLOGIES
342	INTERNET TECHNOLOGIES	418	NATURAL GAS
343	INVERTEBRATES	419	NATURAL HISTORY OF DISEASES
344	JOURNALISM	420	NATURAL OILS, FATS AND WAXES
345	KNOWLEDGE ENGINEERING	421	NATURAL RESOURCES EXPLORATION
346	LABOUR MARKET STUDIES/ECONOMICS	422	NATURAL SCIENCES
347	LAND USE PLANNING/LANDSCAPE/LANDSCAPE ARCHITECTURE	423	NEMATODS
348	LANGUAGE SCIENCES/ENGINEERING/TECHNOLOGY, LINGUISTICS	424	NETWORK TECHNOLOGY, NETWORK SECURITY
349	LARGE SCALE GENERATION OF ELECTRICITY/HEAT	425	NETWORKED ORGANISATIONS
350	LASER TECHNOLOGY	426	NEUROBIOLOGY, NEUROCHEMISTRY, NEUROLOGY, NEUROPSYCHOLOGY, NEUROPHYSIOLOGY
351	LAW: INTERNATIONAL / PRIVATE / PUBLIC	427	NEUROINFORMATICS
352	LEARNING MECHANISMS	428	NEUTRON PHYSICS
353	LIBRARY SCIENCE/SYSTEMS	429	NEW MEANS OF TRANSPORT
354	LIFE CYCLE MANAGEMENT	430	NITROGEN FIXATION
355	LIPIDS, STEROIDS, MEMBRANES	431	NOISE AND VIBRATIONS
356	LIQUID BIOFUELS		

432	NON-COMMUNICABLE DISEASES	502	POST HARVEST TREATMENT - FOOD
433	NON-LINEAR DYNAMICS AND CHAOS THEORY	503	POST HARVEST TREATMENT - NON-FOOD
434	NON-METALLIC MINERAL TECHNOLOGY	504	PRECISION ENGINEERING
435	NUCLEAR CHEMISTRY	505	PRION DISEASES
436	NUCLEAR ENGINEERING AND TECHNOLOGY	506	PROBABILITY THEORY
437	NUCLEAR MEDICINE, RADIOBIOLOGY	507	PROCESS EFFICIENCY
438	NUCLEAR PHYSICS	508	PROCESS ENGINEERING
439	NUCLEIC ACID METABOLISM	509	PRODUCTION TECHNOLOGY
440	NUCLEIC ACIDS, POLYNUCLEOTIDES, PROTEIN SYNTHESIS	510	PROGRAMMING/INFORMATION SYSTEMS
441	NUMBER THEORY, FIELD THEORY, ALGEBRAIC GEOMETRY, GROUP THEORY	511	PROJECT ENGINEERING
442	NUTRITION	512	PROTEINS, ENZYMOLOGY, PROTEIN ENGINEERING
443	OBSERVATION SYSTEMS / CAPACITY / DATASETS / INDICATORS	513	PROTEOMES, PROTEOMICS
444	OCCUPATIONAL HEALTH, INDUSTRIAL MEDICINE	514	PSYCHIATRY, MEDICAL PSYCHOLOGY, PSYCHOSOMATICS
445	OCEAN / ENERGY	515	PSYCHOLOGICAL SCIENCES, PSYCHOLOGY
446	ODONTOLOGY, STOMATOLOGY	516	PUBLIC ADMINISTRATION
447	OFFSHORE TECHNOLOGY, SOIL MECHANICS, HYDRAULIC ENGINEERING	517	PUBLIC HEALTH
448	ON-LINE INFORMATION SERVICES, ON-LINE DEMOCRACY, ON-LINE BUSINESS	518	PUBLIC PERCEPTION, PUBLIC RELATIONS
449	OPERATIONS RESEARCH, ACTUARIAL MATHEMATICS	519	PUBLIC POLICY STUDIES
450	OPTICAL MATERIALS	520	PUBLISHING
451	OPTICS	521	PULP TECHNOLOGY
452	OPTRONICS	522	QUALITY, QUALITY CONTROL, TRACEABILITY
453	ORGANIC CHEMISTRY	523	QUANTUM INFORMATION PHYSICS
454	ORGANIC FARMING	524	QUANTUM MECHANICS
455	ORGANIC WASTE	525	QUANTUM TECHNOLOGY
456	ORGANOMETALLIC CHEMISTRY	526	R&D POLICY AND PROGRAMME EVALUATION AND IMPACT ASSESSMENT
457	ORPHAN DRUGS	527	RADIODIAGNOSTICS, RADATION BIOLOGY
458	OTHER RENEWABLE ENERGY OPTIONS	528	RADIOECOLOGY
459	OTORHINOLARYNGOLOGY, AUDIOLOGY, AUDITIVE SYSTEM AND SPEECH	529	RAILWAY TRANSPORT TECHNOLOGY
460	PALEOCLIMATOLOGY	530	REACTION MECHANISMS AND DYNAMICS
461	PALEONTOLOGY/PALEOECOLOGY	531	REACTOR SAFETY
462	PAPER TECHNOLOGY, RECYCLING	532	REFERENCE MATERIALS/METHODS
463	PARASITOLOGY (HUMAN AND ANIMAL)	533	REFRIGERATION AND COOLING
464	PARTICLE PHYSICS/FIELDS THEORY	534	REGIONAL ECONOMICS/STUDIES/DEVELOPMENT
465	PASSENGER TRANSPORT	535	REHABILITATION SYSTEMS
466	PATENTS, COPYRIGHTS, TRADEMARKS	536	REMOTE SENSING
467	PATHOLOGY	537	REPRODUCTIVE HEALTH
468	PATHOPHYSIOLOGY	538	REPRODUCTIVE MECHANISMS
469	PERIPHERALS TECHNOLOGIES (MASS DATA STORAGE, DISPLAY TECHNOLOGIES)	539	RESEARCH METHODOLOGY IN SCIENCE
470	PERI-URBAN AGRICULTURE	540	RESEARCH NETWORKING
471	PESTICIDES, BIOPESTICIDES	541	RESEARCH POLICY
472	PETROCHEMISTRY, PETROLEUM ENGINEERING	542	RESERVOIR CHARACTERISATION AND MONITORING
473	PETROLOGY, MINERALOGY, GEOCHEMISTRY	543	RESIDUES
474	PHARMACEUTICALS AND RELATED TECHNOLOGIES	544	RESPIRATORY SYSTEM
475	PHARMACOLOGICAL SCIENCES, PHARMACOGNOSY, TOXICOLOGY	545	RE-STRUCTURING OF PUBLIC ADMINISTRATIONS
476	PHOTONIC NETWORKS	546	ROAD SAFETY
477	PHOTOVOLTAIC SYSTEMS, CELLS AND MODULES MANUFACTURING, TECHNOLOGY DEVELOPMENT	547	ROAD TRANSPORT TECHNOLOGY
478	PHYSICAL CHEMISTRY/SOFT MATTER	548	RTD SYSTEMS AND POLICIES AND THEIR INTERACTION WITH OTHER RELATED POLICIES
479	PHYSICAL GEOGRAPHY, CARTOGRAPHY, CLIMATOLOGY	549	RURAL DEVELOPMENT, RURAL SOCIOLOGY AND SOCIO-ECONOMICS
480	PHYSICAL MEDICINE, KINESITHERAPY, REVALIDATION, REHABILITATION	550	SAFETY TECHNOLOGY
481	PHYSICAL SCIENCES	551	SAMPLE BANKS
482	PHYSICAL STRESS	552	SATELLITE (TECHNOLOGY, SYSTEMS, POSITIONING, COMMUNICATION)
483	PHYSICS OF FLUIDS	553	SCIENCE AND TECHNOLOGY INDICATORS
484	PHYSIOLOGICAL DISORDERS	554	SCIENCE POLICY
485	PHYSIOLOGY	555	SCIENCE, TECHNOLOGY AND THE MEDIA
486	PHYTOREMEDIATION	556	SEA FOOD
487	PHYTOTECHNOLOGY, PHYTOPATHOLOGY, CROP PROTECTION	557	SEARCH AND RESCUE
488	PIPELINE TECHNOLOGY	558	SECURITY SYSTEMS
489	PLANT AND ASSOCIATED MICROORGANISM BIOTECHNOLOGY	559	SEMICONDUCTOR PHYSICS AND TECHNOLOGIES
490	PLANT BIOCHEMISTRY	560	SENSORY SCIENCE, SENSORS, INSTRUMENTATION
491	PLANT BIOLOGY	561	SEROLOGY AND TRANSPLANTATION
492	PLANT GENETICS/SELECTION/BREEDING	562	SET ASIDE
493	PLANT HEALTH/PROTECTION	563	SIGNAL PROCESSING
494	PLANT INPUTS/NUTRITION/PRODUCTION	564	SILVICULTURE, FORESTRY, FOREST TECHNOLOGY
495	PLANT PHYSIOLOGY	565	SIMULATION, SIMULATION ENGINEERING
496	PLANT PRODUCTS	566	SIMULATOR TRAINING
497	POLITICAL SCIENCES/THEORY/ECONOMY/COMPARATIVE POLITICS	567	SKELETON, MUSCLE SYSTEM, RHEUMATOLOGY, LOCOMOTION
498	POLYMER TECHNOLOGY, BIOPOLYMERS	568	SMART CARDS
499	POPULATION GENETICS	569	SOCIAL ECONOMICS
500	PORT MANAGEMENT	570	SOCIAL LAW
501	POSITIONING AND GUIDANCE SYSTEMS	571	SOCIAL MEDICINE
		572	SOCIAL SHAPING OF TECHNOLOGY
		573	SOCIETAL BEHAVIOUR
		574	SOCIO-ECONOMIC ASPECTS OF ENVIRONMENTAL CHANGE
		575	SOCIO-ECONOMIC RESEARCH
		576	SOCIO-ECONOMICAL IMPACTS IN AGRICULTURE/FORESTRY/RURAL DEVELOPMENT

577	SOCIO-ECONOMICS	650	URBAN: TECHNOLOGIES FOR THE BUILT ENVIRONMENT
578	SOCIOLOGY	651	UROLOGY, NEPHROLOGY
579	SOFTWARE ENGINEERING, MIDDLEWARE, GROUPWARE	652	USER CENTRED DESIGN, USABILITY
580	SOIL SCIENCE, AGRICULTURAL HYDROLOGY, WATER PROCESSES	653	USER MODELLING
581	SOLAR CONCENTRATING TECHNOLOGIES AND APPLICATIONS	654	VACCINES
582	SOLID STATE PHYSICS	655	VACUUM/HIGH VACUUM TECHNOLOGY
583	SOUND ENGINEERING/TECHNOLOGY	656	VEHICLE TECHNOLOGY
584	SPACE TECHNOLOGY	657	VENTURE CAPITAL
585	SPATIAL INTEGRATION IN BUILT ENVIRONMENT	658	VESSEL TRAFFIC MANAGEMENT
586	SPEECH COMMUNICATION	659	VETERINARY MEDICINE
587	SPEECH PROCESSING/TECHNOLOGY	660	VIRTUAL ORGANISATIONS
588	STANDARDISATION, STANDARDISATION OF NEW TECHNOLOGIES	661	VIRTUAL REALITY
589	STATISTICAL PHYSICS	662	VIRUS, VIROLOGY
590	STATISTICS	663	VULCANOLOGY/SEISMOLOGY
591	STRUCTURAL BIOLOGY/DETERMINATION/FUNCTION	664	WASTE BIOTREATMENT
592	SUPERCONDUCTORS	665	WASTE MANAGEMENT/RECYCLING
593	SURFACE CHEMISTRY	666	WATER RESOURCE MANAGEMENT/ENGINEERING
594	SURFACE PHYSICS	667	WATER TRANSPORT TECHNOLOGY, SHIPBUILDING
595	SURVEILLANCE	668	WATER: FRESH WATER ECOSYSTEMS
596	SURVEYING	669	WATER: HYDROLOGY
597	SYNTHESIS AND NEW MOLECULES	670	WATER: MONITORING / QUALITY / TREATMENT
598	SYSTEMS ANALYSIS AND MODELS DEVELOPMENT	671	WATER: RATIONAL AND EFFICIENT USE
599	SYSTEMS DESIGN/THEORY	672	WATERBORNE TRANSPORT
600	SYSTEMS ENGINEERING	673	WAVE/TIDAL ENERGY
601	SYSTEMS, CONTROL, MODELLING, AND NEURAL NETWORKS	674	WEEDS
602	TECHNOLOGICAL SCIENCES	675	WELFARE STUDIES
603	TECHNOLOGY ACCEPTABILITY	676	WETLAND ECOSYSTEMS
604	TECHNOLOGY ASSESSMENT AND FORESIGHT	677	WIND ENERGY MANUFACTURING/TECHNOLOGIES
605	TECHNOLOGY EVALUATION/MANAGEMENT	678	WIND TURBINE ENVIRONMENTAL IMPACT
606	TECHNOLOGY POLICY	679	WIRELESS SYSTEMS, RADIO TECHNOLOGY
607	TECHNOLOGY TRANSFER	680	WOMEN'S STUDIES
608	TECHNOLOGY WATCH/VALIDATION	681	WOOD ENGINEERED PRODUCTS, PARTICLE AND FIBRE BOARDS
609	TELECOMMUNICATION ENGINEERING/TECHNOLOGY	682	WOOD PROCESSING BY MECHANICAL MEANS
610	TELESERVICES, TELE-WORKING, TELE-PAYMENT, TELE-MEDICINE	683	WORLD TRADE ORGANISATION
611	TESTING, CONFORMANCE TESTING		
612	TEXTILES TECHNOLOGY		
613	THERAPEUTIC SUBSTANCES		
614	THERMAL ENGINEERING, APPLIED THERMODYNAMICS		
615	THERMODYNAMICS		
616	TIMBER ENGINEERING		
617	TISSUE BANKS/ENGINEERING		
618	TOTAL QUALITY MANAGEMENT		
619	TOWN AND COUNTRY PLANNING		
620	TOXICITY AND TOXINOLOGY		
621	TRACTION/PROPULSION SYSTEMS		
622	TRAFFIC CONTROL SYSTEMS		
623	TRAFFIC ENGINEERING/INFRASTRUCTURE/MANAGEMENT SYSTEMS		
624	TRANSACTION SYSTEMS		
625	TRANSGENE EXPRESSION		
626	TRANSGENIC CROP PLANT		
627	TRANSHIPMENT SYSTEMS		
628	TRANSPORT DEMAND MANAGEMENT		
629	TRANSPORT ECONOMICS		
630	TRANSPORT INFORMATION SYSTEMS, FLEET MANAGEMENT		
631	TRANSPORT INFRASTRUCTURE/MANAGEMENT SERVICES		
632	TRANSPORT MODELLING/SCENARIOS		
633	TRANSPORT OF GAS AND LIQUID FUELS		
634	TRANSPORT POLICY/LAW		
635	TRANSPORT SAFETY/SECURITY		
636	TRANSPORT TECHNOLOGY/ENGINEERING		
637	TRANSPORT TELEMATICS		
638	TRANSPORT, TRANSMISSION AND DISTRIBUTION OF ELECTRICITY		
639	TROPICAL AGRICULTURE		
640	TROPICAL ECOSYSTEMS		
641	TROPICAL FORESTRY		
642	TROPICAL MEDICINE		
643	URBAN DEVELOPMENT/ECONOMICS		
644	URBAN FORESTRY		
645	URBAN GOVERNANCE AND DECISION MAKING		
646	URBAN QUALITY OF LIFE		
647	URBAN SOCIOLOGY		
648	URBAN TRANSPORT		
649	URBAN: SUSTAINABLE CITIES AND RATIONAL RESOURCE MANAGEMENT		

ANNEX 2:

NACE codes for business activities

Division	Description
<i>Section A</i>	<i>Agriculture, hunting and forestry</i>
01	Agriculture, hunting and related service activities
02	Forestry, logging and related service activities
<i>Section B</i>	<i>Fishing</i>
05	Fishing, operation of fish hatcheries and fish farms; service activities incidental to fishing
<i>Section C</i>	<i>Mining and quarrying</i>
10	Mining of coal and lignite; extraction of peat
11	Extraction of crude petroleum and natural gas; service activities incidental to oil and gas extraction, excluding surveying
12	Mining of uranium and thorium ores
13	Mining of metal ores
14	Other mining and quarrying
<i>Section D</i>	<i>Manufacturing</i>
15	Manufacture of food products and beverages
16	Manufacture of tobacco products
17	Manufacture of textiles
18	Manufacture of wearing apparel; dressing and dyeing of fur
19	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear
20	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
21	Manufacture of pulp, paper and paper products
22	Publishing, printing and reproduction of recorded media
23	Manufacture of coke, refined petroleum products and nuclear fuel
24	Manufacture of chemicals and chemical products
25	Manufacture of rubber and plastic products
26	Manufacture of other non-metallic mineral products
27	Manufacture of basic metals
28	Manufacture of fabricated metal products, except machinery and equipment
29	Manufacture of machinery and equipment n.e.c.
30	Manufacture of office machinery and computers
31	Manufacture of electrical machinery and apparatus n.e.c.
32	Manufacture of radio, television and communication equipment and apparatus
33	Manufacture of medical, precision and optical instruments, watches and clocks
34	Manufacture of motor vehicles, trailers and semi-trailers
35	Manufacture of other transport equipment
35.1	Building and repairing of ships and boats
35.2	Manufacture of railway and tramway locomotives and rolling stock
35.3	Manufacture of aircraft and spacecraft
a	<i>Manufacture of helicopter</i>
b	<i>Manufacture of aeroplanes for the transport of goods or passengers, for use by the defence forces, for sports or other purposes</i>
c ¹	<i>Manufacture of parts and accessories of the aircraft of this class</i>

¹ Includes: major assemblies such as fuselages, wings, doors, control surfaces, landing gear, fuel tanks, nacelles, airscrews, helicopter rotors and propelled rotor blades, motors and engines of a kind typically found on aircraft, parts of turbojets and turbopropellers

TECHNOLOGICAL IMPLEMENTATION PLAN - PRESENTATION

Division	Description
d ²	<i>Others</i>
36	Manufacture of furniture; manufacturing n.e.c.
37	Recycling
<i>Section E</i>	<i>Electricity, gas and water supply</i>
40	Electricity, gas, steam and hot water supply
41	Collection, purification and distribution of water
<i>Section F</i>	<i>Construction</i>
45	Construction
<i>Section G</i>	<i>Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods</i>
50	Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel
51	Wholesale trade and commission trade, except of motor vehicles and motorcycles
52	Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods
<i>Section H</i>	<i>Hotels and restaurants</i>
55	Hotels and restaurants
<i>Section I</i>	<i>Transport, storage and communication</i>
60	Land transport; transport via pipelines
61	Water transport
61.1	Sea and coastal water transport
e	<i>Transport of passenger or freight over water</i>
f	<i>Operation of excursion, cruise or sightseeing boats</i>
g	<i>Operation of ferries, water taxis, etc.</i>
62	Air transport
h	<i>Transport of passenger or freight by airlines</i>
63	Supporting and auxiliary transport activities; activities of travel agencies
63.1	<i>Cargo handling and storage</i>
63.2	<i>Other supporting transport activities</i>
i	<i>Operation of terminal facilities such as harbours and piers, waterway locks etc.</i>
j	<i>Airport and air-traffic control activities</i>
63.3	Activities of travel agencies and tour operators; tourist assistance activities n.e.c.
63.4	Activities of other transport agencies
k	<i>Forwarding of freight</i>
64	Post and telecommunications
<i>Section J</i>	<i>Financial intermediation</i>
65	Financial intermediation, except insurance and pension funding
66	Insurance and pension funding, except compulsory social security
67	Activities auxiliary to financial intermediation
<i>Section K</i>	<i>Real estate, renting and business activities</i>
70	Real estate activities

² This includes: manufacture of gliders, hang-gliders, manufacture of dirigibles and balloons, manufacture of spacecraft and spacecraft launch vehicles, satellites, planetary probes, orbital stations, shuttles, manufacture of aircraft launching gear, deck arresters, etc.

manufacture of ground flying trainers However 35.3 should **exclude**: manufacture of parachutes, military ballistic missiles, ignition parts and other electrical parts for internal combustion engines, instruments used on aircraft, and air navigation systems.

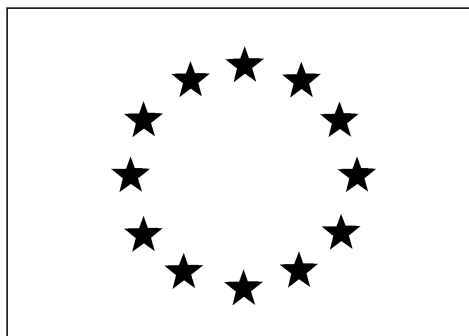
TECHNOLOGICAL IMPLEMENTATION PLAN - PRESENTATION

Division	Description
71	Renting of machinery and equipment without operator and of personal and households goods
72	Computer and related activities
73	Research and development
l	<i>Research and experimental development on natural sciences and engineering</i>
m	<i>Research and experimental development on social sciences and humanities</i>
74	Other business activities
Section L	<i>Public administration and defence; compulsory social security</i>
75	Public administration and defence; compulsory social security
Section M	<i>Education</i>
80	Education
Section N	<i>Health and social work</i>
85	Health and social work
Section O	<i>Other community, social and personal service activities</i>
90	Sewage and refuse disposal, sanitation and similar activities
91	Activities of membership organisations n.e.c.
92	Recreational, cultural and sporting activities
93	Other service activities
Section P	<i>Private households with employed persons</i>
95	Private households with employed persons
Section Q	<i>Extra-territorial organisations and bodies</i>
99	Extra-territorial organisations and bodies

TECHNOLOGICAL IMPLEMENTATION PLAN

*A Framework for the further development and use of
the results of EC RTD Projects (including also thematic networks and concerted actions)*

GUIDELINES



WHAT IS THE TECHNOLOGICAL IMPLEMENTATION PLAN?

Purpose

Activities linked with dissemination and use of RTD results are essential parts associated with the life cycle of Community RTD projects. Therefore, proper documentation of the RTD results is in your and your partners' interest. Also it will benefit European industry and society in general. The datasheets provided here have been designed to support this documentation and dissemination process and assist you in fulfilling your contractual obligations.

Completed forms are requested by the Specific Programmes as a standard tool for describing and detailing the activities planned for the use of the results achieved during RTD projects and ensuring the link with the objectives on which the project was selected. They cater for results from basic research, social actions or upstream RTD projects as well as applied, near-market or demonstration projects.

How can it assist the dissemination and use planning process?

The T.I.P. should cover the intentions of all partners related to the potential knowledge generated under the project. As mentioned in the EC Model Contract³, such a Technological Implementation Plan should be submitted at, or before, the end of the project. It is suggested that, throughout the project duration and especially at mid-term, a draft version of the T.I.P. be regularly used and updated. This practice is particularly useful when results are achieved before the contractual end of the project and/or when the consortium detects the need for additional partners.

The questions raised in the Technological Implementation Plan are also ideally suited to assist the drawing up of a co-operation agreement. They include:

- What are the results (knowledge including information) of your project?
- What needs do they address? What are the potential applications?
- What stage have you reached in the development of the results and what resources do you need for further (market, environment or policy-related) development?
- Are the results usable – either commercially, socially or scientifically?
- What are your dissemination and use intentions and potential routes?
- What part does each of your partners take in the dissemination and use process (manufacturing, sales and marketing, further R&D, licensing, standards, etc.)?
- Do you envisage dissemination and use and/or support from outside the project team?
- What information is useful for attracting potential collaborators?

Extent of information

If you do not intend to use or disseminate all of the results yourself (or not exclusively) or if you are looking for additional partners for further dissemination and use, it is in your interest – and in the interest of the European Union – to provide third parties with adequate information. This of course excludes information which must not be disclosed to safeguard intellectual or industrial property, confidentiality or legitimate commercial interests.

In addition, the information gathered in the Technological Implementation Plan can be used to attract funding for further R&D or market development – be it from venture capitalists or banks, or under national or community programmes. This may apply to results where

³ see Annex II, General conditions.

TECHNOLOGICAL IMPLEMENTATION PLAN - PRESENTATION

- your consortium requires additional resources and expertise to use or disseminate your results fully;
- part of the results might be transferred to other applications outside the consortium's main markets (generic technologies).

Examples for the extent of information to be provided

- For basic research, you should indicate how the project output(s) could lead to applied research.
- If your result offers potential for further economic, environmental or 'quality of life' benefits, this result should be detailed in view of benefitting other social projects.
- If you have a laboratory prototype, you should give detailed information on the financial and human resources necessary for producing an industrial prototype, and the possible risks involved in further development (for example, scaling up).
- If you are at the pre-series stage, you may discuss the risks involved in scaling up the production.
- If you have a generic technology available, you should concentrate on possible additional applications outside the existing ones without forgetting to assess the real needs and risks involved.

How to fill in the form?

The project co-ordinator is responsible for preparing consolidated forms 1 and 2. Individual partners are responsible for preparing part 3.

Be further aware that:

The Community has a number of activities to assist the transfer of your results and their further dissemination and use. The CORDIS RTD Results database and Technology Marketplace Web Service, Programme-specific tools and the Innovation Relay Centres publicise RTD results for technology transfer and assist in finding partners for external dissemination and use. The information required for publication will be extracted by these services directly from Parts 1 and 2 of the Technological Implementation Plan. This cuts down on the amount of form-filling required for projects.

On the Technology Marketplace Web Service we showcase some of the latest and best of the results we receive. It contains technology offers that could be taken up by other companies or organisations. So, if you want to exploit your results through licensing, consultancy, or other agreements you should make every effort to present the information in your TIP so that it maximises the chance of being selected for Technology Marketplace. This means describing the exploitation potential and explaining as much as you can about the applications that are possible. You can see Technology Marketplace at www.cordis.lu/marketplace.

**GUIDELINES FOR COMPLETING THE
TECHNOLOGY IMPLEMENTATION PLAN
DATA SHEETS**

Part 1 Overview and description of your project and its results

1.1 : Executive summary

This summary should be as comprehensive and clear as possible. Its main goal is to inform the Commission, but also appropriate audience on the obtained results and their future uses. It will be incorporated in regularly updated issues of the “Project synopses” of the Programme (via the CORDIS database) and possibly edited on electronic media such as CD-ROM.

1.2 : Overview of all your project results

If your project has generated a number of different results, you should identify those which logically belong together as part of a larger product, process or service and which would therefore be exploited as a single result. Results, which do not logically belong to or depend on each other, should be treated separately.

Examples

A project dealt with improving a production-control process using an innovative new sensor (Partner A) and adapting innovative new process control software (Partner B). The overall system was produced by Company C and tested at end-user sites of Companies D and E. Distinct dissemination and use routes could be:

- 1) Exploitation of overall project result (sensor, software and application know-how) by Partner C (e.g. production of pre-series, marketing, etc.).
- 2) Application of sensor to another market sector via further development by Partner A with additional, external partners X,Y (with possible RTD funding – CRAFT, INNOVATION programme).
- 3) Adaptation of software result to other applications and licensing to third parties by partner B.

Information on all results should contain the following :

- Title of the result:

This should be as informative as possible. Describe what the result is (sensor, process, program, material, device, etc.), what it does (detection, preparation, conservation, etc.) and possibly include elements highlighting the difference from the state of the art (more efficient, resistant, inexpensive, etc.).

- Category

Identify the category (A, B or C) of your result and specify it here. See the glossary for definition of categories.

- Partners (result owners) involved

Identify the partners in the project consortium who are owners of this result and indicate those involved in its dissemination and use. This may include external third parties already identified.

1.3 : Quantified data on the project

The quantities asked for in this table tackle aspects of the dissemination and use of the project results as a whole and not aspects at particular result or partner level. The quantified data collected here (as well as in 2.2 and 3.2) are meant to be aggregated by the Commission services for a large number of projects (be it at sectoral or Key Action or Programme levels) and not used individually. They are requested together with your result description in order to avoid contacting you again later for providing them.

TECHNOLOGICAL IMPLEMENTATION PLAN - GUIDELINES

1.4 : Comment on European interest

Every project has been selected, not only according to its scientific and technological merit, but also because of its potential interest for the European Union. Here is the place to explain in which respect that interest for Europe has been achieved. You should present the added value brought in, for example in terms of combination of expertise and skills, critical mass, problem-solving approach, reduction of risk, strategic importance for Europe of the problem tackled, influence on standards and regulations, etc.

1.5 : Expected project impact

This part of the e-Tip should allow a more systematic qualitative and statistical exploitation of the results produced by your project, leading to a better global estimate of the programmes. Therefore it is important to fill it in as thoroughly as possible in order to allow valid statistical interpretation. The more answers, the more precise the analysis. We rely on your insight to identify, qualify and possibly quantify your results.

We are aware how difficult it is to estimate socio-economic impact of research. We know that uncertainties will appear when quantifying the relation between results and their multiple causes. This is a well-known problem met in a way or in another when relying on this kind of questionnaire. However, the stipulation of a large number of answers will allow us to establish a good correlation of results, which eliminates partly these uncertainties.

The first table (Overall policy impact) of the questionnaire is rather general and can be filled in by each one, whatever the level of the results. Even if your results are unexpected or more negative than you had expected, it is important that you describe them as precisely as possible. This is very common when assessing a research project - it would no longer be research if results were ensured beforehand. That is why it is important that we have input on deviations from your expectations in order to make a realistic assessment.

The following tables require more detail, and are therefore of the utmost importance for the analysis. It will probably require more effort, but will often prove, for the person who fills in the questionnaire, to be a source of a great deal of satisfaction when discovering a part of the process which was not identified with all its potential impact before the questions were raised.

The impact concept is a dynamic one, which will continue to evolve from the end of your project. We choose a 3-year period as a development basis. It does not mean we will ask you to anticipate on what will be your situation precisely in 3 years but we would request an overall estimate of the expected developments for the coming years. Often indeed, impact at the end of the project is still negligible, but the results are potentially a source of future exploitation: we would like you to quantify impact from this dynamic point of view. This is particularly difficult, as we know, especially in connection with social impact. Even if the forecasts seem still dubious, please fill in the questionnaire: no one can predict the future with certainty but the amount of the results will enable us to identify the most significant tendencies.

Part 2 Description of each result

A separate part 2 must be completed for each result. This may be done by the partner responsible for the result or by the project co-ordinator.

The part 2 must be consolidated at the consortium level and transmitted to the Commission by the co-ordinator.

PARTS 2 WILL BE DISSEMINATED BY THE COMMISSION

2.1. Description of the result

SUMMARY

The summary should provide a concise overview of the commercial, social or scientific result in terms of result description, dissemination and use potential, key innovative features of the result, current status and use of the result and its expected benefits. The following aspects should be tackled in this section:

- **What are the potential applications for this result?**

Depending on the nature and status of your results, there might be only one – clearly defined – application or several applications in different sectors.

Examples

A sensor developed for a special application might be used in a totally different environment if its performance and/or price is competitive. New mathematical algorithms used in a software tool for an expert system in the foundry industry might also be applied in the area of plastic moulding. You, as a technology provider, should reflect on these possible applications and describe the potential use of your technology for these applications.

- **Who are the end-users of this result?**

For each application, there may be several user groups and market sectors. Try to present as many unique – but realistic – combinations of application/user/market-sector as possible so as to give a comprehensive view of the possible end users profile of your result.

- **What are the main innovative features/benefits? (technical/commercial success factors)**

Correlate novel features of your result with expected (commercial) benefits, keeping in mind the critical success factors (user needs, market demands, price, etc.) which apply to your result.

CHECKLIST FOR CRITICAL SUCCESS FACTORS

To find out about critical success factors you should try to see your result from the user (demand) side and ask yourself the following questions:

- Do you have a better solution than the state-of-the-art ?
- How does your technology affect the price of the product/process ?
- Does the product/process save on environmental/energy resources ?
- Is reliability improved / maintenance reduced ?

TECHNOLOGICAL IMPLEMENTATION PLAN - GUIDELINES

- **Analysis of the market or application sectors**

Give a brief analysis of the sector by describing the needs and market size or application potential. If you are at an early innovation stage and you do not have clear market figures available, then try to think about the needs of the users of your usable result: e.g. Why do some products or processes sell well in this market and others not? Are there regulatory, legal or social constraints that could affect the dissemination and use of your result? Describe your strengths and weaknesses compared with other technologies. Give any other information that is relevant to successful dissemination and use of the result.

- **Potential barriers**

Are there potential barriers to overcome? Especially when your results have not yet reached the prototype phase and you are looking for additional partners, you should examine critically possible obstacles to further dissemination and use that could occur in prototyping, pre-series or production phases. The chances for successful market introduction or transfer of a new technology are raised if the technology supplier is aware of the numerous barriers for dissemination and use, and considers these problems by giving a realistic description of the potential advantages of his technology.

Example

For high-speed microelectronic devices, for instance, the GaAs-material was, is, and always will be the most innovative and promising material. However, except from some niche markets, silicon-based devices have always dominated the market. One of the main reasons is that the know-how of the complex and capital-intensive production processes cannot simply be applied to a new material. For the same reason, optical lithography is still used in the production process, despite what the experts thought ten years ago.

DOCUMENTATION AND INFORMATION ON THE RESULT

Note : *This section is important if you want to use the infrastructure (e.g. CORDIS) set up by the Commission. You may also provide promotional material (photographs, video clips, etc.) for publicity use and you might also make interested parties aware that there is more confidential information available (e.g. business plans, patent applications, technical drawings, etc.) that may be disclosed after a confidential disclosure agreement has been signed.*

Examples include technical reports or drawings, patent files, test reports, results of market research, business plans, brochures, user manuals, user surveys, prototypes, samples, video clips and photographs.

Examples		
Documentation type	Details (Title, ref. number, general description, language)	Status: PU=Public IN=Internal
patent application	PCT Appl. No. WO0645 from 01.04.2004	IN
process manual	detailed technical manual (in English)	IN
article	“Advanced semiconductor technologies for above THZ high-frequency, broadband amplifiers”, <i>Scientific American</i> 12/2005, pp.1-10	PU
prototype	laboratory prototype for demonstration	PU
.....		

TECHNOLOGICAL IMPLEMENTATION PLAN - GUIDELINES

INDUSTRIAL AND INTELLECTUAL PROPERTY RIGHTS

These are the rights applying to the result you are currently describing. The “current” column refers to the current actual period : which protection has been achieved so far. The “foreseen” one refers to the expected or intended protections foreseen within the next 3 years.

The “Knowledge/ Pre-existing know-how” column refers to determining to which knowledge this protection applies, whether a previously (to the project) detained knowledge or a newly acquired one (during the project).

2.2 : Quantified data on the result and visibility for the general public

Here, the European Commission requests precise figures, whenever possible. The quantities asked for tackle aspects related to the result just described in chapter 2.1. The question on “Visibility for the general public” aims at detecting those results which:

- ✓ can be “seen”, “touched”, “used”, “experienced”, “understood” by the general public,
- ✓ is an application which can have an impact in the daily life.

Examples

- A former Brite-Euram project achieved a device based on a laser enabling the cleaning of building façades. It has a sufficiently high precision to reach small surfaces such as the details of sculpture on historical monument. It has already been used on several historical sites in Europe, attracting attention from the general public at European level.
- Another project developed a new envelope for drugs making its ingestion and transit through the human digestion organs more efficient and less painful for the patient.

2.3. Further collaboration, dissemination and use of the result

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

Use the free-text box to describe the business, use and dissemination opportunities that you can offer to potential partners when entering into collaboration. Describe the benefits of using the result as it is or the potential benefits when investing in further development of the result. Describe the terms and conditions for using the results.

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

If you are looking for additional partners and/or you want to have the dissemination and use carried out by third parties, describe in detail the necessary resources, skills and capabilities that these third parties should have to guarantee dissemination and use. Answers to the following topics would be useful:

- **Describe the skills necessary for the dissemination and use of the result**

Describe the necessary steps to be taken in order to use or disseminate your result fully (e.g. building a prototype, market research, product testing, developing new features, adapting the product or process, technology dissemination) and identify the partner to do this – one of the consortium or a third party. If you are searching for additional partners, describe in detail the “ideal profile” of the partner.

TECHNOLOGICAL IMPLEMENTATION PLAN - GUIDELINES

- **Estimate the investments and costs involved**

What are the skills required and the amount of labour? List the equipment, facilities and materials required to develop further the result or to use or disseminate it. This may be equipment that has to be purchased by the consortium, use of external testing services or access to equipment provided by potential collaborators. If the dissemination and use of the result will involve large investments (either in production, marketing or further development) please give a short indication how this is going to be financed (internally from one of the project partners or from a third party).

- **Return on investment**

If the use of results includes commercialisation, compare the investments necessary for further market development, marketing and other costs with the projected total turnover summed over the project lifetime (usually 5-8 years). Compare the cost side with the revenue side. When does the return on investment begin and how high is it going to be at the end ? For any other use, give a cost/benefit analysis of the exploitation activity.

- **What are the potential risks involved ?**

Describe any technological risks involved in further R&D development or prototyping, or any market risks (e.g. minimum market share required for producing at a competitive price). Depending on the stage in development, focus more on technological risks, risks involved in market introduction or others.

TECHNOLOGICAL IMPLEMENTATION PLAN - GUIDELINES

Part 3 Description of the intentions by each partner

This part 3 must be completed by each partner who is essential for the dissemination and use (i.e. result owners and/or major project contributors and/or major dissemination and use contributors). Each will detail its own intentions for dissemination and use of the result(s) they are involved with. This description must be made result by result.

These different parts may be transmitted to the Commission either assembled at the consortium level or individually by each partner to safeguard confidential matters if necessary (through any appropriate media). Obviously, when all partners are implementing a single dissemination and use scheme all together, a single part 3 is needed.

PARTS 3 WILL ALWAYS BE KEPT CONFIDENTIAL BY THE COMMISSION

3.1 : Description of the dissemination and use of result(s), partner per partner

MANDATORY INFORMATION

Please make sure that contact details are provided for an appropriate contact person in your company, able to answer questions on the use / dissemination of the result(s).

Nº, TITLE AND BRIEF DESCRIPTION OF MAIN RESULT(S)

Please use the same numeration and the same title used in section 1.2. The result(s) concerned here are those for which your organisation is involved for the dissemination and use phase.

FOR EACH MAIN RESULT, TIMETABLE OF THE USE AND DISSEMINATION ACTIVITIES WITHIN THE NEXT THREE YEARS AFTER THE END OF THE PROJECT

Please mention and describe the main activities (and possible partners) foreseen for the use or dissemination of the concerned result (e.g. testing, prototyping, scaling up, market analysis, value analysis, licensing, production of guidelines, web site development, ...). In the description of each activity, please mention its main milestones and the expected deliverables. Mention also, when relevant, the relation between the activity and the quantified data you are providing in section 1.5 and 2.2.

FORESEEN COLLABORATION WITH OTHER ENTITIES

The appropriate dissemination and use strategy depends not only on the structure, financial/human resources and market access of the partners but also on the stage of development of the project and the need for co-operation with additional partners.

3.2 : Quantified data for each partner's main result

Here, the European Commission requests precise figures, whenever possible. The quantities asked for here tackle aspects related to the partner who has just described his dissemination and use intentions.

ANNEX: USEFUL SERVICES AND SUPPORT

The European Commission has developed a range of initiatives and services that are relevant to dissemination and use activities. Some of these are summarised below.

CORDIS – Community Research & Development Information Service

CORDIS promotes participation in European research and the dissemination and use of research results. Through the service you can promote the results of research to potential investors and collaborators. You can also find out about people working in similar areas of interest to your own. There is a service for finding partners and promoting you as a potential partner. The information service is available on-line on the World Wide Web (at <http://www.cordis.lu>). There are also regular printed publications.

Technology Marketplace is CORDIS' virtual marketplace that offers a direct access to latest research results and support for innovators to better connect people with technology: <http://www.cordis.lu/marketplace>

Network of Innovation Relay Centres

The network of Innovation Relay Centres has been established to assist in the identification of technologies, the dissemination and use of results and the promotion of innovation. As well as encouraging participation in EC RTD Programmes, the Relay Centres undertake a range of activities and events designed to improve the supply and flow of technologies – for example, seminars, training, awareness meetings, partner search, confidential and public dissemination of RTD results and networking with other European countries. The IRCs also provide direct support for individual Specific Programmes for their dissemination and promotions activities. More information can be found on the World Wide Web at <http://www.cordis.lu/irc/>.

Help Desk on Intellectual Property Rights

The goals of this service are:

- ❑ to assist project contractors to deal with IPR matters via :
 - ✓ advice by patent lawyers on IPR issues relating to EC funded projects such as how to protect results,
 - ✓ an assistance to search through a network of patent databases (multilingual access to 25 million technical documents).

The service is entirely free of charge. Contractors or assistant contractors of an RTD project can access it. They will be requested to provide their contract number (cross-checked within CORDIS) and the name of the Project Officer (so that a feedback from the service provider to the Commission can be organised). "Future contractors" or organisation intending to submit proposals are also entitled to access the service for information only. Further information and access to this service at : <http://www.cordis.lu/ipr-helpdesk/home.html>

GLOSSARY

<u>Partners:</u>	The term “partners” usually means the contractual partners within a Community-funded RTD project. These are sometimes termed “internal partners” to distinguish them from external partners, sometimes necessary for further dissemination and use
<u>Exploitation:</u>	Use of available results by yourself or others for creating and marketing a product or process or for creating and providing a service
<u>Dissemination:</u>	Divulging of knowledge (other than publication) resulting from knowledge protection formalities with a view to promoting scientific and technical progress
<u>Deliverable:</u>	What is produced during the execution of the contract (be it document, guidelines, software code, product, samples, prototype, certified material, standard, etc.). A deliverable is usually conceived to allow the transition from one workpackage to another or to be exchanged between partners.
<u>Report:</u>	Management tool aiming at informing – the partners and the European Commission – of the progress of the work and of the deliverables.
<u>RTD result:</u>	Product, process, service, know-how, methodology or software achieved thanks to the RTD project and which arises from the completion of all deliverables. This RTD result is described confidentially in the Final Technical Report and, non-confidentially, in the Technological Implementation Plan (TIP), together with the planning for its dissemination and use.
<u>Project outputs:</u>	Set of benefits generated by the project, i.e. the RTD results first, but also patents, publications, standards, etc. This set of outputs is collected through the T.I.P.
<u>Impacts:</u>	Set of direct and indirect consequences – scientific, technical and socio-economic – due to the projects outputs and, furthermore, to their use and dissemination. These impacts will be measured at the end of the projects and 3 to 5 years after with an appropriate methodology (carried out by external experts).
<u>Categories:</u>	Results can be any marketable or transferable product, process, service, standard, know-how, methodology, network experience, result of clinical trial or software. Project results fall into three basic categories, depending on your intention for dissemination and use (you can have a set of results of different categories):
Category A:	<i>Externally usable results.</i> These are of commercial, social or scientific interest, but <u>you</u> do not intend to use them exclusively, or you do not have sufficient resources within your consortium. It is of mutual interest to make information on such results available for dissemination and further use at European level.
Category B:	<i>Internally usable results.</i> These are of commercial, social or scientific interest to all or some partners who will use or disseminate them exclusively <u>themselves</u> . The writing of the Technological Implementation Plan will therefore help the partners to clarify and detail their strategy. The TIP would also help the Commission services to advise and check how they plan to do it
Category C:	<i>Non-usable results.</i> These might be of interest to other researchers in particular if the TIP helps to identify R&D routes that are unfruitful.

NOTE: for more definitions see Annex II of the Model RTD contract.