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The second NMP call 2007-2008

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OUTLINE

- Analysis of NMP Call 1 (2007)
- FP7 NMP 2nd call 2008 Work Programme
- Proposal submission and evaluation
  - Some best practices

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NMP WP Establishment

Call Main Features

In the first two (2007 and 2008) calls:

- **Strategic use of funding schemes (one scheme per topic)**
- **Calls by funding scheme (Large, Small, SME, CSA)**
- **Budget allocation by call (NOT by Activity / Area)**
- **Two-stage submission for all projects except CSA**
- **One evaluation panel per topic**

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Evaluation results 2007

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Call December 2006

LARGE — 295 M€
- Close Date 04/05/07: 261 prop
- Stage 1 25/05--08/06/07: CP IP = 78 — 645 M€ — ~30% 'GO' rate
- Stage 2 22-26/10/07: 39 — 295 M€ — ~50% pass rate

SME — 75 M€
- 181 prop
- CP TP = 57 — 196 M€ — ~31% 'GO' rate
- 22 — 75 M€ — ~39% pass rate

SMALL — 150 M€
- Close Date 04/05/07: 770 prop
- CP FP = 169 — 529 M€ — ~25% 'GO' rate
- Stage 2 01-05/10/07: 81 — 149,7 M€ — ~30% pass rate
  - 33 Reserve List
  - 48 Main List

Instruments	Received	Selected
LARGE	265	39
SME	181	22
SMALL	770	48

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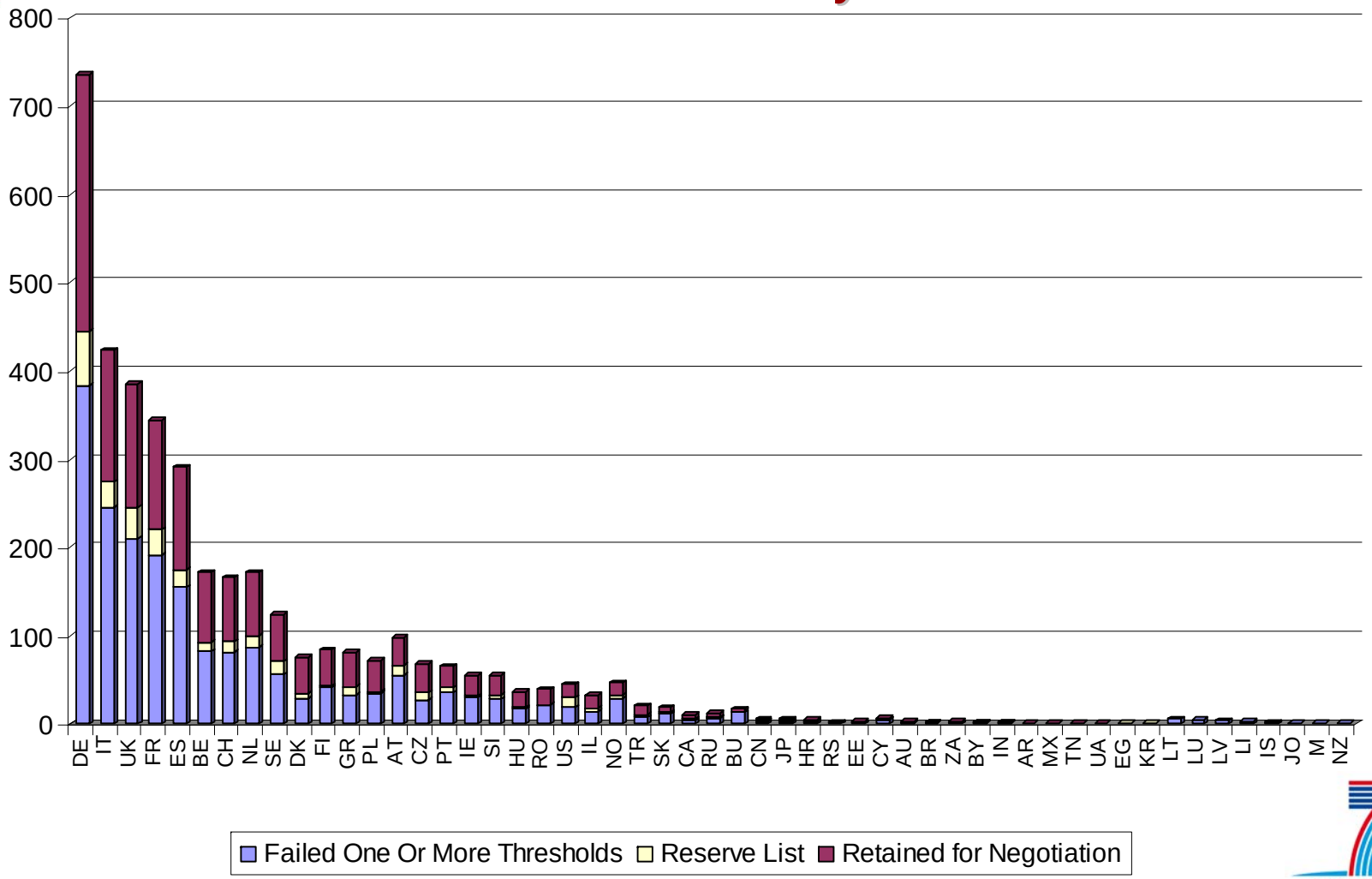
Rejected & retained Proposals By country of Partners



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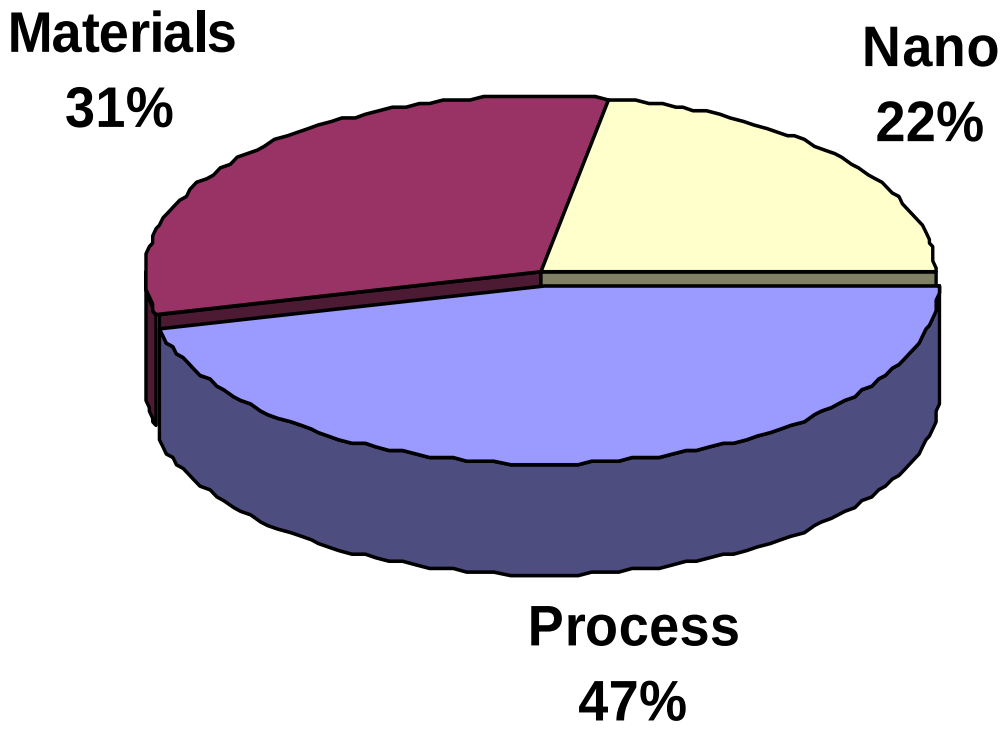
Distribution of budget for retained proposals in NMP



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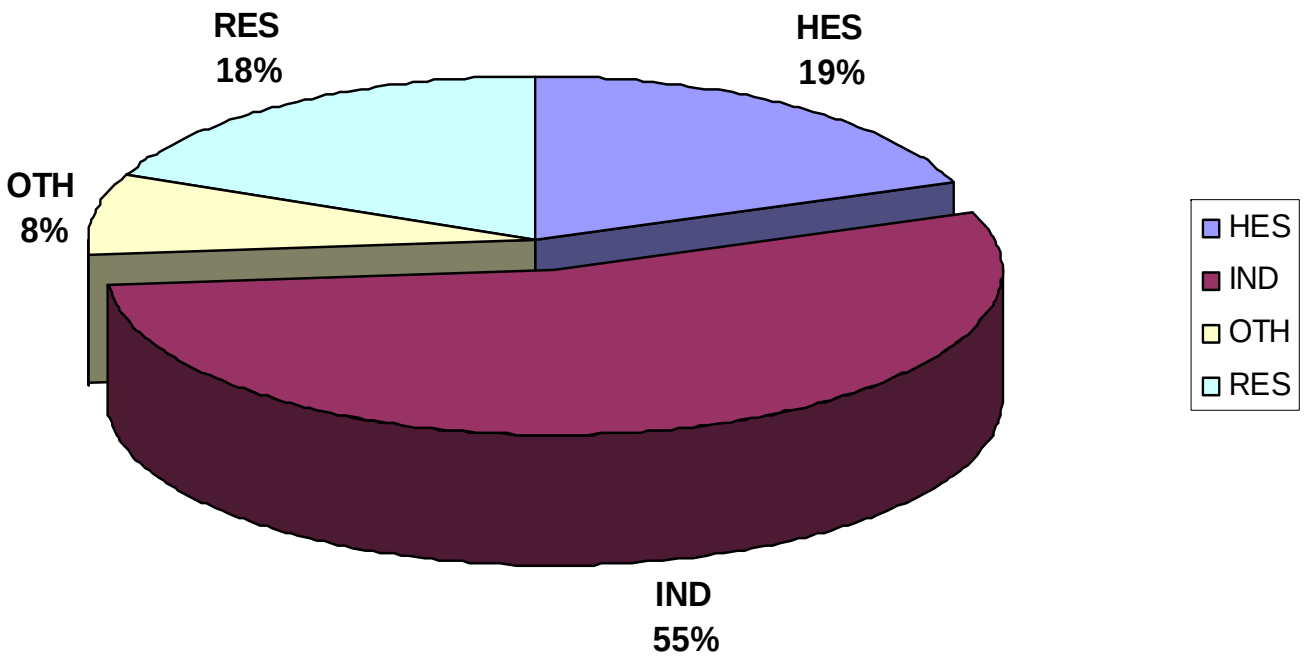
Retained Proposals in Manufacturing by Organisation Type



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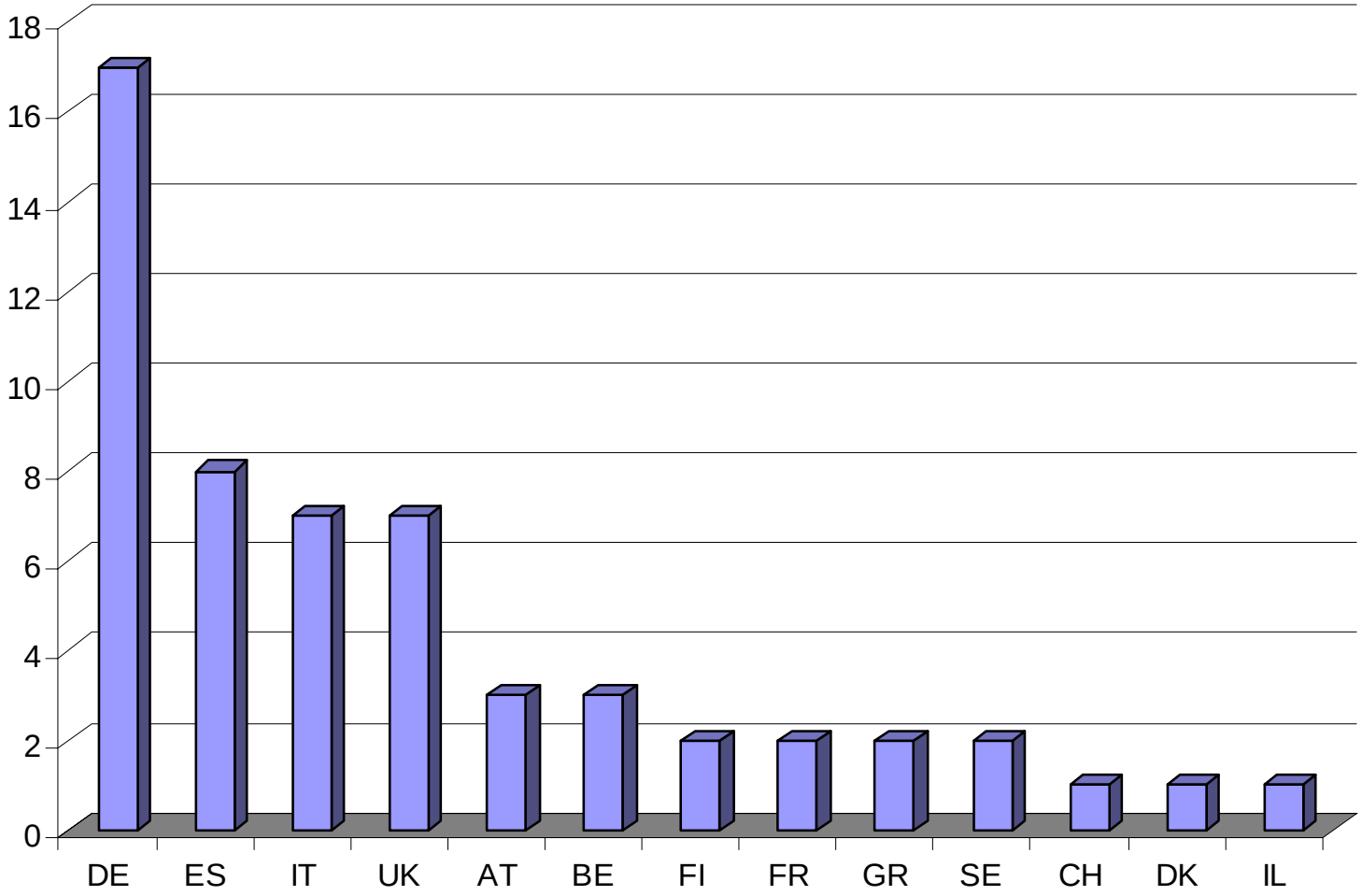
Retained Proposals in Manufacturing by country of Coordinator



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NMP WP Establishment

Lessons Learned First Calls

- **Meaning of open topic versus focused topic in terms of consequences on funding**
- **Participation – increase industrial participation**
- **Coverage – all topics covered, successful small projects not all finance**

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NMP WP Establishment

Useful data

- **Average number of partners for LargeCPs: 22**
- **Average EU funding requested from LargeCPs: 8.3 M€**
- **Average number of partners for SmallCPs: 10**
- **Average EU funding requested from SmallCPs: 3.5 M€**
- **Average number of partners for SME-CPs: 14**
- **Average EU funding requested from SME-CPs: 3.9 M€**

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Cooperation – Collaborative Research

10 themes	Budget (€ million, current prices)
1. Health	6 100
2. Food, agriculture and fisheries, an biotechnology	1 935
3. Information and communication technologies	9 050
4. Nanotechnologies, materials and production	3 475
5. Energy	2 350
6. Environment	1 890
7. Transport	4 160
8. Socioeconomic research	623
9. Space	1 430
10. Security	1 400
Total	32 413

*** Not including non-nuclear activities of the Joint Research Centre: €1 751 million**

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Nanosciences, nanotechnologies, materials and new production technologies

Overall objective:

- Improve the competitiveness of EU industry (including SMEs) and ensure its transformation through:
  - The effective transition from a resource-based to knowledge-based industry
  - Generation of new breakthrough, applicable knowledge
  - Strengthening EU leadership in nano-, materials and production technologies
  - Emphasis on integrating different technologies and disciplines across many sectors
- Importance of Technology Platforms to help establish common research priorities and targets

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Main features of NMP process

- **Strategic use** of funding schemes (one funding scheme per topic)
- Calls by **funding scheme**
- Budget allocation **by call** (not by activity/area)

- **2 Joint Calls** addressing cross-cutting topics and implemented jointly with other themes Energy and Environment
- **1 coordinated call with India** allowing concurrent calls with other Themes on topics/initiatives with complementary objectives, including third countries
- ERANET call – 3 topics (nanomedicine, forestry, micro- & nano-manufacturing)
- ERANET+ call – 1 topic (materials research)

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Funding Schemes - NMP

Collaborative projects

- Small or medium scale focussed projects (**SSRFP**)
  < € 4 million EC funding requested
- Large scale integrating projects (**LSIP**)
  > € 4 million EC funding requested
- SME-targeted projects: at least 35% to SMEs

Networks of Excellence (not in these calls)

Coordination and Support Actions (CSA)

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NMP Programme - Theme 4 - 2ND CALL - 2008

Outline of the FINAL DRAFT Work Programme for NMP

45 topics

	LArge: Large scale cooperative projects	SME: SME-focused cooperative projects	SMall: Small or medium scale cooperative projects	Other: Coordination & Support Actions (CSA)	Other: ERA Net	Other: ERA Net Plus
NANO (9)	2		4	3		
MATERIALS (13)	2		9	1		1
PRODUCTION (8)	3	2	2	1		
INTEGRATION (15)	6	3		3	3	
Totals (45)	***13***	***5***	***15***	***8***	***3***	***1***
TOTAL EC budget:	***240***	***65***	***170****	***15***	***4***	***6***
500 M€ (indicative)						

*including 2 Joint and 1 Coordinated Calls (20 M€)

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Deadlines of the Calls

Collaborative projects

- Closure date of First Stage: 06 MAR 08

  10 page proposal: S&T content + expected impact

  2 pages: consortium+estimated financial resources

- Indicative closure for Second Stage

  SSFRP on 2 SEP 2008

  LSIP, SME-TP on 23 SEP 08

Coord. call with India / CSA 24 APR – one stage

Joint Call with Environment 25 FEB – one stage

Joint Call with Energy 26 FEB

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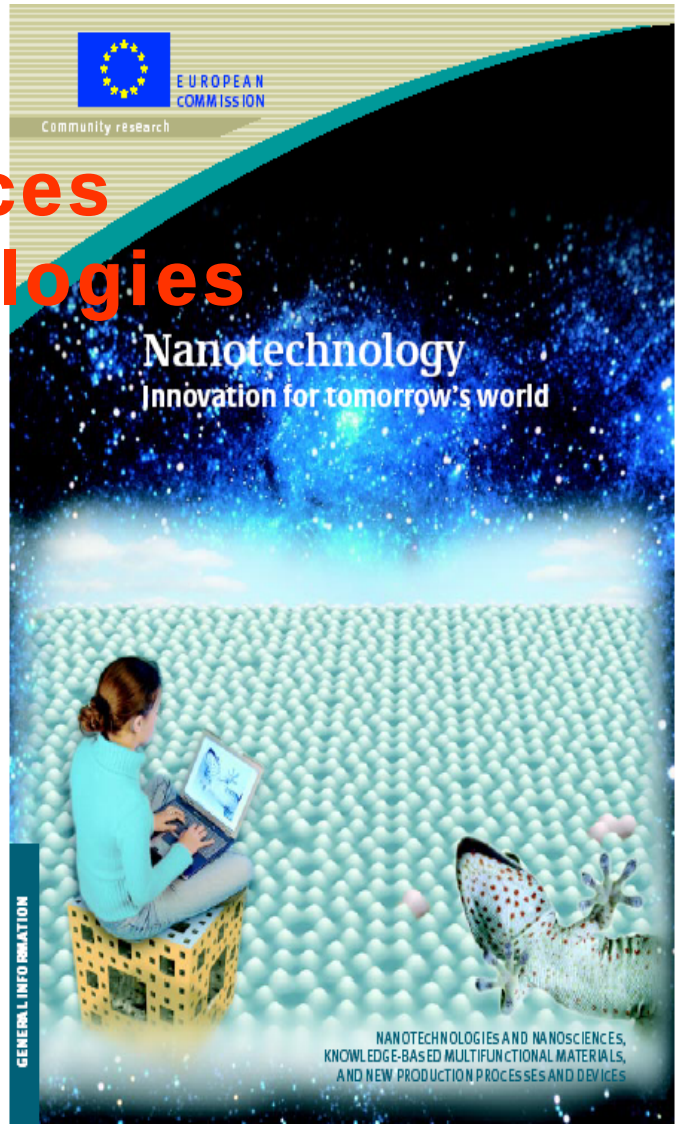
1. Nanosciences & Nanotechnologies



Objective:

Increase and support the take-up of knowledge generated in this revolutionary field for all industrial sectors;

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Activity 4.1 Nanosciences and Nanotechnologies (9 topics)

NMP - Year 2 LArge SMall Other

Comments

4.1.1 Nanosciences and converging sciences (2 topics)

4.1.1-1 Converging sciences and technologies (nano, bio, info, cogni) - SM

4.1.1-2 Support to outreach and communication in nanotechnology – CSA - Support

4.1.1-3 Examining capacity building in nano-bio-technology – CSA - Support

4.1.2 Nanotechnologies and converging technologies (4 topics)

4.1.2-1 Pilot lines to introduce nanotechnology-based processes into the value chain of existing industries - LA

4.1.2-2 Nanotechnology for water treatment - SM Joint call - ENVIRONMENT

4.1.2-3 Development of technologies for the controlled combustion of nano-particles- SM

4.1.2-4 Study about best practices for IPR and license agreements for collaborative research and technological development projects in nano- and converging technologies – CSA - Support

4.1.3 Health and Environmental Impacts (2 topics)

4.1.3-1 Validation, adaptation and/or development of risk-assessment methodology for engineered nanoparticles - LA

4.1.3-2 (Risk assessment) Impact of engineered nanoparticles on health and the environment - SM

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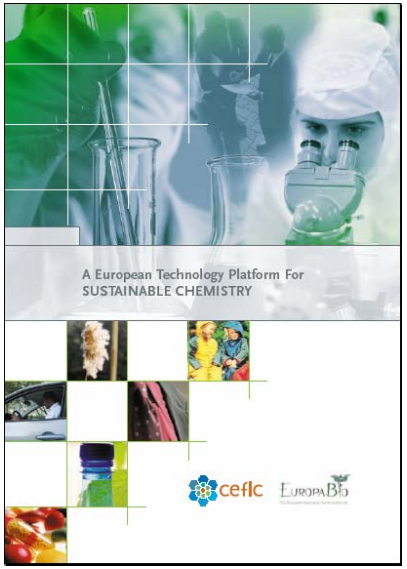
2. Materials

Objective:

Generate new knowledge to enable new industrial products and processes to be achieved,
exploiting the potential of <u>interdisciplinary approaches</u>
in materials research.



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NMP - Year 2 Activity 4.2 Materials (13 topics)

LArge SMall Other

Comments

4.2.1	**Mastering nano-scale complexity in materials (2 topics)**	
4.2.1-1	Nano-structured membrane materials - SM	
4.2.1-2	Processing and upscaling of nano-structured materials - SM	
4.2.2	**Knowledge-based smart materials with tailored properties (2 topics)**	
4.2.2-1	Compound semiconductors for electronics and photonics - LA	
4.2.2-2	Nano-structured meta-materials - SM	
4.2.3	**Novel material and bio-inspired materials (1 topic)**	
4.2.3-1	Advanced implants and bioactive materials for critical organs – SM	
4.2.4	**Advances in chemical technologies and materials processing (2 topics)**	
4.2.4-1	Inorganic-Organic Hybrid Materials - LA	
4.2.4-2	Radical advances in the processing of multifunctional films and tapes - SM	
4.2.5	**Using engineering to develop high performance knowledge-base materials (2 topics)**	
4.2.5-1	Functionally graded materials for improved mechanical performance - SM	
4.2.5-2	Modelling of interfaces for high performance materials design - SM	
4.2.6	**Coordinated activities and international cooperation (4 topics)**	
4.2.6-1	Novel materials for Energy applications - SM	Joint call - Theme 5/ENERGY
4.2.6-2	Computational Materials sciences - SM	Coordinated call with INDIA
4.2.6-3	Coordinated actions with Materials researchers in major world regions - CSA	In coordination with world regions
4.2.6-4	ERANET PLUS on Materials Science - ERANet Plus	

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3. New Production

Objective:

Create continuously innovating production capabilities to achieve leadership in industrial products & processes in the global marketplace

… based on a multi-annual implementation plan .. in 2008 follow the already established structure and objectives

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Activity 4.3 New Production (8 topics)

LArge | SME | SMall | Other

Comments

4.3.1 Development and validation of new industrial models and strategies (1 topic)

4.3.1-1 Transformation strategies for SMEs in turbulent global market environments - SMEs — SME

4.3.2 Adaptive production systems (3 topics)

4.3.2-1 Implementation of process intensification strategies in industrial scale - LA

4.3.2-2 Self-learning production systems - SM

4.3.2-3 Coordination and Support of inter-regional manufacturing communities following IMS strategy update – CSA – Coordination & Support

4.3.3 Networked production (1 topic)

4.3.3-1 Supply chain integration and real-time decision making in non-hierarchical manufacturing networks- SM

4.3.4 Rapid transfer and integration of new technologies into the design and operation of manufacturing processes (2 topics)

4.3.4-1 Rapid design and virtual prototyping of factories – LA

4.3.4-2 Industrialisation through new integrated construction processes - LA

4.3.5 Exploitation of the convergence of technologies (1 topic)

4.3.5-1 Volume production process chains for high throughput micro-manufacturing – SMEs — SME

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Integration of technologies for industrial applications

Objectives :

Several cross-cutting dimensions could be considered while handling the vast array of sectors and applications and could further inspire the emergence of topics:

- **Transforming traditional industry, which faces the challenge of low-cost competition. It should increase its productivity through new processes, high-added value products and new business models;**

Forest-Based Sector
Technology Platform

- **Fostering scale-intensive and specialized suppliers industry through the adoption and integration of new advanced technologies thus enabling the improvement of its leadership in the global market;**

- **Promoting Science-based Industry which will play a key role in establishing a high-value European industry.**

- **Towards a sustainable supply industry is another key objective in supporting product & productivity innovation, especially for sectors with a large environmental footprint.**

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Activity 4.4 Integration of technologies for industrial applications (15 topics)

NMP - Year 2

LArge SME SMall Other

Comments

4.4.0-1	Development of nanotechnology-based systems for diagnosis and/or therapy for diabetes, musculo-skeletal or inflammatory diseases - LA	In coordination with HEALTH
4.4.0-2	Catalysts and sustainable processes to produce liquid fuels from coal and natural gas - LA	
4.4.0-3	Nano-technology enabled applications for integrated, cost-effective volume production *- 2008 focus on Nano-structured surfaces for the manufacturing equipment industry* - LA	
4.4.0-4	Expanding the limits of advanced materials processing applications through a new generation of high brilliance lasers - LA	
4.4.0-5	Innovative concepts and processes for strategic mineral supply and new high added value mineral-based products - LA	
4.4.0-6	Sustainable new products and markets through bio-production of green forest-based chemicals and materials - LA	
4.4.0-7	Integration of new technologies and materials for differentiated consumer-centred product capability - SME	SME
4.4.0-8 and	Smart materials for applications in the sectors of construction and of machinery production equipment - SME	SME
4.4.0-9	Reducing the risk of injury in complex systems through advanced personal protective equipment and clothing - SMEs	SME
4.4.0-10	Organisation of events related to the Presidencies of the EU – CSA - Support	
4.4.0-11	NCP transnational activities – CSA - Coordination	
4.4.0-12	Horizontal activities responding to emerging and policy needs in the context of ERA – CSA - Support	
4.4.0-13	ERANET on Nanomedicine	
4.4.0-14	ERANET on trans-national cooperation for new innovative products in the forest-based value chains	
4.4.0-15	ERANET on implementing micro- and nano-manufacturing technologies within Member States industry	

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NMP 2 Stage Approach

- **CPs** will be evaluated using the **2-stage process** (Small, Large, SME)
- **CSAs** will be evaluated in a **single stage**

- Stage 1 proposals **10 +2 pages**
- Evaluation against **limited criteria** (S&T Quality, Impact)
- Stage 1 evaluated **"remotely"**
- **"GO"** proposals will be invited to submit at Stage 2
- Stage 2: **full proposals** evaluated against all criteria

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Stage 1 proposals

Part A

- Single set of budget figures for project submitted by coordinator
- Only coordinator fills in A forms

Part B max page length strictly applied

- 10 + 2 pages
- Stick to numbering used in Guide

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Essentials stage 1 - see Guide for applicants annex 4

Element	Stage 1	Stage 2 (pages)
Title page	Y	1
Table of contents		1
B.1 S & T quality	Y	20+tables
B.2 Implementation		4
2.1 management		5
2.2 individ. participants		1 per participant
2.3 consortium		as required
2.4 resources		2
B.3 Impact	Y	10
B.4 Ethical issues		as required
B.5 Gender aspects		1
Total	10+2	50+tables

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Usual NMP evaluation thresholds unless differently specified

- **Scoring / Thresholds**
- **0 – 5 points per criterion**
- **0 = not addressed, 5 = excellent**
- **Half points may be used by evaluators**
- **Totals will have a resolution of 0.1**

		CPs	CSAs
Stage 1 Thresholds:	Criteria 1 (S&T Quality)	4/5	3/5
	Criteria 2 (Implementation)	-	3/5
	Criteria 3 (Impact)	3/5	3/5
	Overall	**8/10**	**10/15**
Stage 2 Thresholds:	Criteria 1 (S&T Quality)	4/5	-
	Criteria 2 (Implementation)	3/5	-
	Criteria 3 (Impact)	3/5*	-
	Overall	**12/15**	**-**

*** Criteria impact 4/5 for large**

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1st Criterion: S&T quality
(in relation to call topics)

- **Sound concept and quality of objectives**
- **Progress beyond the state-of-the-art (CPs)**
- Quality and effectiveness of the S/T methodology and associated work-plan (CPs at Stage 2)
- Contribution to coordination of high quality research (CAs)
- Quality and effectiveness of the mechanisms, and associated work-plan (CSAs)

Stage 1 sub-criteria shown in bold

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2nd Criterion: Implementation
(quality and efficiency of the implementation & management)

- Appropriateness of the management structure and procedures
- Quality and relevant experience of the individual participants
- Quality of the consortium as a whole (including complementarity, balance)
- Appropriate allocation and justification of the resources to be committed (budget, staff, equipment)

Implementation is not evaluated at Stage 1

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3rd Criterion: IMPACT

(potential impact through the development dissemination and use of project results)

- **Contribution, at European [and/ or international level] to the expected impacts listed in the work programme under the relevant topic**
- Appropriateness of measures for dissemination and/or exploitation of project results and management of intellectual property (CPs at stage 2)
- Appropriateness of measures for spreading exellence, exploiting results and disseminating knowledge, through engagement with stakeholders and the public at large (CSAs)

Stage 1 sub criteria shown in bold

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Some advice

- Begin early (but there will be further calls)
- Read carefully the contents of the Work Programme!
- Take into account the evaluation criteria (from the 1st stage…)
- Submit a draft version on EPSS one week before the deadline!
- Do not leave it until the last minute to present the « Submit » button!

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What proposals should avoid some examples

- Pure software development with no research
- Pure methodology with no research and innovation on technology and/or pilot cases
- Consultancy activities, without any real/proven industrial participation (both solution providers and end users)
- ‘Local' applications with no added value at European level

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NMP information

- EU research: http://europa.eu.int/comm/research
- Seventh Framework Programme: http://europa.eu.int/comm/research/future/index_en.cfm
- Information on research programmes and projects: http://www.cordis.lu
- RTD info magazine:
- http://europa.eu.int/comm/research/rtdinfo/
- Information requests:
- research@cec.eu.int
- Manufuture platform:
- www.manufuture.org

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Thank you for your kind attention

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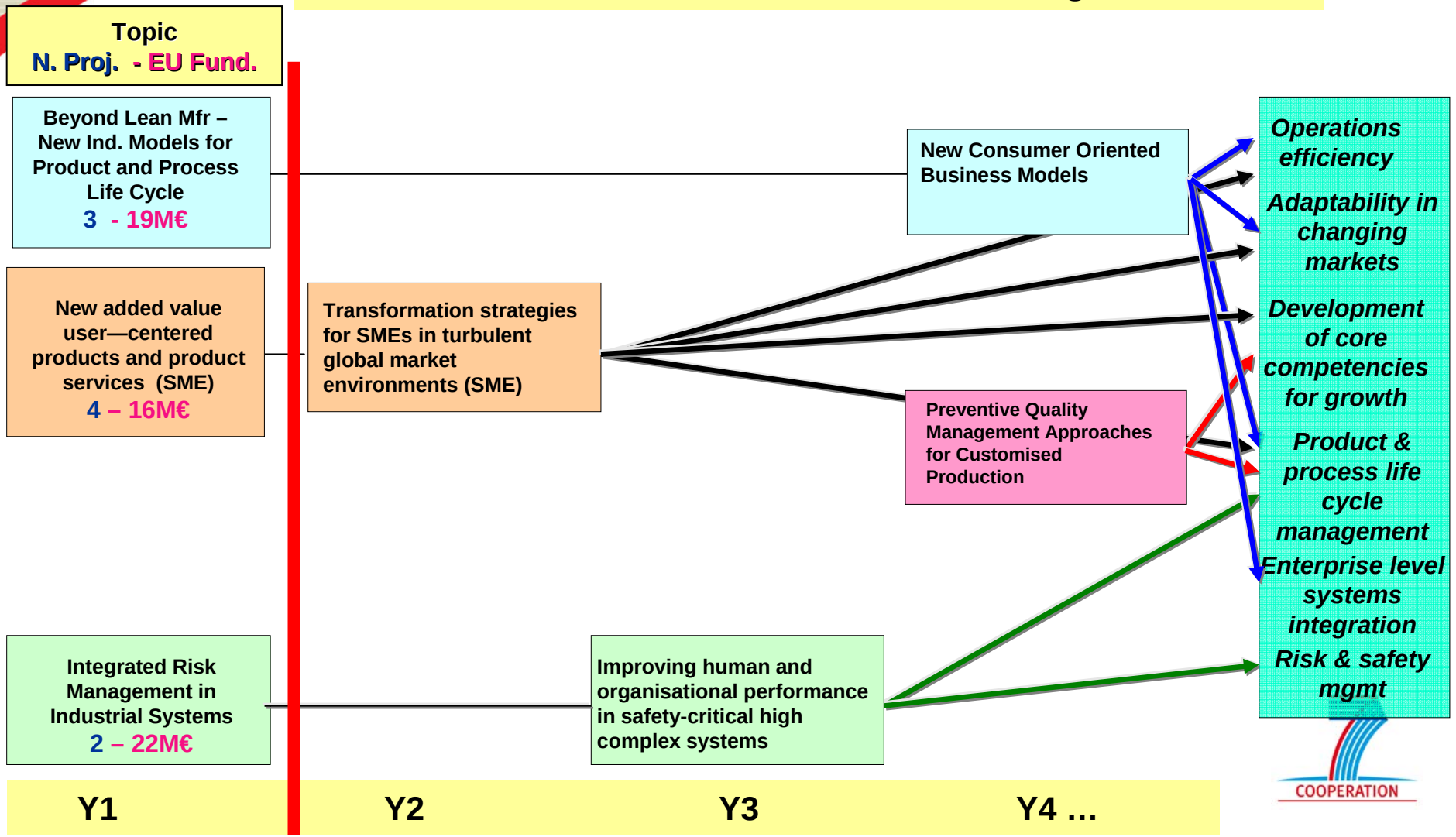
ManufacturinG²

Multi-annual implementation plan

(note – all topic titles are tentative & only indicative of future WP priorities)

New Industrial Models and Strategies



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ManufacturinG²

Multi-annual implementation plan

(note – all topic titles are tentative & only indicative of future WP priorities)

Adaptive Production Systems

Topic
N. Proj. - EU Fund.

Rapidly Configurable Machines and Production Systems
5 - 17M€

Self-learning Production Systems

Adaptive Control Systems for Responsive Factories

Plug-and-Play components based on adaptive smart materials

Flexible drive concepts with optimised energy consumption

Process Intensification in Chemicals Production
3 - 9M€

Implementation of process intensification strategies in industrial scale

Innovative pathways for sustainable chemical production

Manufacturing systems and technologies for 3D production of mass customised products based on flexible materials

Coordination and support of inter-regional manufacturing communities following IMS strategy update

Flexible small/single batch production

Optimal production

Continuous adaptation

Affordable intelligent technologies and components

Resource efficient, sustainable production

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Y1 **Y2** **Y3** **Y4 …**

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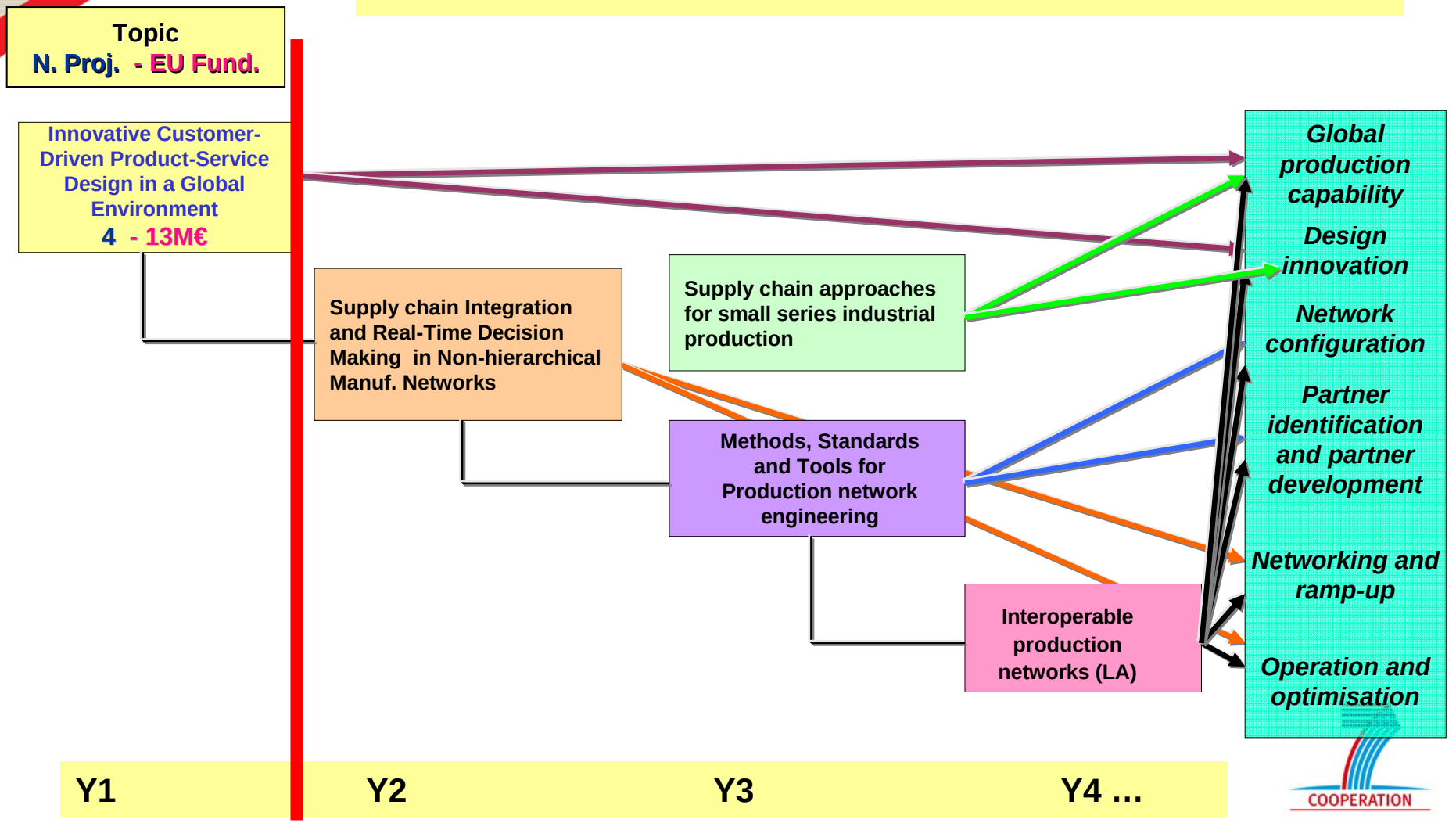
Multi-annual implementation plan

(note – all topic titles are tentative & only indicative of future WP priorities)

Networked Production



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Multi-annual implementation plan

(note – all topic titles are tentative & only indicative of future WP priorities)

Rapid transfer and integration of new technologies into the design and operation of manufacturing processes

Topic
N. Proj. - EU Fund.

Rapid Manufacturing Concepts for Small Series Industrial Production
4 - 15M€

Automation and Robotics for Sustainable Crop & Forestry management

Rapid Design and Virtual Prototyping of Factories

Industrialisation through new integrated construction processes

Innovative Pathways in Synthesis
3 - 10M€

Formulation engineering for designed products with particulate structure

Development of Knowledge based Engineering capacities

Integration of Modeling, simulation and virtual tools

In-depth understanding of machine & process behaviour

Quick and efficient integration of new technologies

Y1 **Y2** **Y3** **Y4 …**

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Multi-annual implementation plan

(note – all topic titles are tentative & only indicative of future WP priorities)

Topic
N. Proj. - EU Fund.

Exploiting the convergence of technologies

Technologies for Industrial Quality Production of 3-Dimensional Nanosurfaces
2 - 19M€

Nano-technology enabled applications for integrated, cost-effective volume production

Automation and economical production of functionalised surfaces and nanolayers

Production Technologies and equipment for Micro-Manufacturing
5 - 31M€

Volume production process chains for high throughput micro-manufacturing

Manufacturing Platforms for integrating micro and nano scale processes and features into meso/micro components and devices

Next generation production technologies and equipment for micro manufacturing

Enable smaller structures and smart surfaces by Industrialised nanoprocesses (high quality, function, flexibility, integration, yield)

A clear strategic contribution to establishing a European high value added nano-manufacturing industry for potentially disruptive high value-added products

Volume production chains, systems and factories for function and meso-/micro-/nano-scale integration in emerging new products

Extending range of µ-fabrication capabilities enabling the future emerging single and multimaterial microcomponents

Y1 **Y2** **Y3** **Y4 …**

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Multi-annual implementation plan

(note – all topic titles are tentative & only indicative of future WP priorities)

Topic
N. Proj. - EU Fund.

Integration

Resource efficient and clean buildings
4 - 29M€

Innovative added-value construction product-services
4 - 11M€

Healthy, safe, accessible and stimulating built indoor environments

Embedded intelligence of products and systems to support use and buildings life cycle mgmt

Innovative use of underground space

Advanced technologies for structural safety and extension of service life

Expanding the limits of advanced processing applications through a new generation of high brilliance lasers

Innovative and knowledge-based tooling industry

Fostering scale-intensive and specialised suppliers industry

Transforming traditional industry

Towards a sustainable supply industry

Promoting science-based industry

Advanced wood-based Composites and their prod
3 - 18M€.

Sustainable new products and markets through bio-production of green forest based chemicals and materials

A new generation of multi-functional fibre-based products by new and flexible manufacturing concepts

New sustainable and resource efficient technologies for the manufacture of paper and board products

Y1 | Y2 | Y3 | Y4 …

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Multi-annual implementation plan

(note – all topic titles are tentative & only indicative of future WP priorities)

Topic
N. Proj. - EU Fund.

Integration

Application of new materials incl. Bio-based fibres in high-added value textile products
4 - 12M€

Reducing the risk of injury in complex systems through advanced personal protective equipment and clothing

New textile products for innovative technical applications

ERANET in Technical textiles

Integration of new technologies and materials for differentiated consumer-centred product capability

Holistic and integrated approach to high performance, reliable and adaptive machine tool design and production.

Innovative concepts & products for HVA mineral-based product

Reducing environmental footprint of energy intensive industries

Technologies for a sustainable access and transformation of raw materials

Fostering scale-intensive and specialised suppliers industry

Transforming traditional industry

Towards a sustainable supply industry

Promoting science-based industry

Y1 **Y2** **Y3** **Y4 …**

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Topic 3.1-1 Beyond Lean Manufacturing – New Industrial Models for Product and Process Life Cycle

Proposal	Objectives	Strategy/Technology	Application/Sector
FUTURE SME	To develop and validate an architecture and a set of tools, methodologies and structures assisting European companies (especially those in the 50-150 employee range) operating in High Mix Low Volume manufacturing environment to attain a competitive position in the world markets.	Deliver and demonstrate **solutions for SMEs in relation to strategic planning**, cultural and structural issues preventing adoption of best practises, modified lean and six sigma tools tailored for SMEs, virtual manufacturing and collaboration methods etc.	**Approach multi-sectoral** 13 individual end users (mainly SMEs) + a sub-supply network representing e.g. Components Machinery Vehicles Electronics
MANUVAR	To develop an innovative technology platform and a methodological framework for supporting all aspects of manual work throughout the system life cycle.	Employment of virtual and augmented reality technologies for an efficient and natural **communication between the human and the system**, enabling a bi-directional flow of knowledge and its accumulation and re-use throughout the entire life cycle.	**Approach multi-sectoral** End-users represent Space Heavy machinery Nuclear power Assembly lines
LEANPPD	A new production model based on lean thinking that will cover the entire product life cycle as opposed to manufacturing phase only	Development of novel set-based lean design tools that ensure the concurrent consideration and **development of lean product design as well as its lean manufacturing system**.	**Approach multi-sectoral** End-users represent Aeronautics Automotive White goods

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Topic 3.1-2 New added value user-centred products and product services

Proposal	Objectives	Strategy/technology	Application/sector
MADE4U	**Business modelling methods** focusing on the personalisation of spectacles.	Combination of new business models and rapid manufacturing technologies enabling real personalisation.	Ophthalmology (Spectacles)
Open Garments	A system and a new business model that will enable the customer to act more directly in the garment supply chain.	Applying open innovation and creating **open manufacturing concepts enabling the creation of individualised garments** and accessories	Clothing
AHAVA	The main goal is to develop **personalised products** for skin diseases treatment based on consumer's biological multifunctional skin diagnostics.	A combination of different disciplines, nanotechnologies and ICT technologies, are correctly integrated to achieve a product/service for diagnosis and treatment of skin diseases.	Cosmetics
SERVIVE	Introducing **customer co-design philosophy and networked SME** manufacturing in the garment supply chain.	Development of personalised applications and services to specific target groups (style oriented, disabled, professional, XXL, sports)	Clothing and accessories

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Topic 3.1-3 Integrated Risk Management in Industrial Systems

Proposal	Objectives	Strategy/Technology	Application/Sector
iNTeg-Risk	**Management of emerging risks in the innovative industry** by building a new risk management paradigm based on a set of principles supported by a common language, agreed tools and methods and integrated Key Performance Indicators.	The project will be initiated from 17 individual emerging risk issues and generalize solutions addressing new technologies, products, materials, production and policies.	Chemical – petrochemical Hydrogen Nanotechnology industry Energy Construction
IRIS	Focus on diverse industrial safety problems and transform industry requirements into integrated, knowledge-based safety technologies, standards and services. The **new safety concepts relate to technical, human, organisational and cultural aspects**.	Risk reduction is to be achieved by a total safety concept based on integrated risk assessment and management, on-line monitoring of facilities and work environment, remote sensoring, pattern recognition, damage detection and other ICT technologies.	Nuclear energy Chemical, petrochemical Construction Oil and mining Energy production

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Topic 3.2-1 Rapidly Configurable Machines and Production Systems

Proposal	Objectives	Strategy/technology	Application/sector
CHAMELEON	To develop a new concept of machine tool completely configurable and adaptive, based on mechatronic devices in order to deal with multiple and even opposing requirements of machining operations, so that the range of target machining operations is increased.	Focus on creating radically new, self-adaptive machine structures with online self-optimisation based on mechatronic concepts. Development of “adaptronic” modules and interfaces	Machine tool
ADAMOD	To develop a generic modular **adaptive control platform for metal cutting processes** which is expected to facilitate quicker response to market and production changes.	A number of research challenges are addressed including strategy, position, parameter and machine state adaptation. Development of an adaptive control scheme which integrates on-line manufacturing control strategies with sensor and actuator systems.	Machine tool
MODSIMTex	To develop a **simulation system of the physical properties of the textile structures** with the purpose of rapid set-up of the machines involved in the whole textile manufacturing process.	Simulation, FE, AI for predicting weaving scenario and reconfiguring manufacturing plant.	Textile
ADACOM	To develop a generic modular adaptive control platform for metal cutting processes which is expected to facilitate quicker response to market and production changes.	A number of research challenges are addressed including strategy, position, parameter and machine state adaptation. Development of an adaptive control scheme which integrates on-line manufacturing control strategies with sensor and actuator systems.	Machine tool
SwarmItFIX	To develop swarms of robotic fixtures which can freely move on a bench repositioning itself under an object needing support using a flexible sustain/clamp tool.	Development of a **self optimising and adaptable robotic swarm fixture**. Each fixture operates autonomously, given "higher goals" from a coordination level.	Machine tool

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Topic 3.2-2- Process Intensification in Chemicals Production

Proposal	Objectives	Strategy/technology	Application/sector
PILLS	To develop and validate a design **methodology & criteria for dealing with two-phase liquid/liquid-reactions** leading to a new generation of flexible and high-performance process equipment for continuous manufacturing	A state-of-the-art experimental research facility will be designed and constructed; this will be modular, flexible and expandable (micro through to meso structured) to ensure flexibility of process and operation.	Continuous production of added value chemicals.
ROC	To design, manufacture and implement **a microdevice able to synthesise radiopharmaceuticals** for Positron Emission Tomography (PET) analysis	Multidisciplinary approach to develop a modular microfluidic architecture which can be used for standard synthesis protocols as well as for R&D of new radiopharmaceuticals	Production of radiopharmaceuticals, new intensified device
CAEC	To provide a powerful tool for the separation of a wide range of both neutral and charged components	Combination of high separation efficiency of capillary electrophoresis with high performance liquid chromatography	Production of fine chemicals and pharmaceuticals

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Topic 3.3-1 Innovative Customer-Driven Product-Service Design in a Global Environment

Proposal	Objectives	Strategy/technology	Application/sector
CORONA	Develop a novel MNT (Micro-Nano-Technology) product engineering methodology to assist in sharing and distributing design & fabrication knowledge for a strong customer-driven approach.	Provide **product engineering methodology and tools to reduce time-to-market** and support rapid manufacturing processes.	Micro-Nano Technology production industry
DOROTHY	Develop a methodology and create **platforms**, systems, interfaces and databases **for the integration of shoe manufacturers directly with their customers** by empowering the consumer in respect of shoe style and design features.	Focus on three different research clusters, i.e. design tools for customer driven and customer fit shoe, design tools for advanced industrial engineering of multi-site multi-nation production systems and factories, new business models for the multi-site multi-nation shoe industry.	Shoe manufacturing & Wood Processing sectors. **International collaboration through the IMS scheme is foreseen**
TIPPS	Development of suitable tools to enable toolmakers to improve their local and global performance. The planned solutions will allow a synchronising of the tool manufacturing process with the customer's product development process by means of an early and **continuous simultaneous engineering**.	Development and establishment of customer specific ICT-supported networks. It is focused on the need to fill the gap between localised and global markets for European Tool and Die makers.	**Tool and Die industry.** The consortium includes organisations from International countries which should participate through the IMS scheme.
ECO-TEX_DESIGN	Develop a platform supporting **knowledge based virtual collaborative design** and secure partnership building, addressing the whole product life cycle dedicated to the Clothing & Leather/Footwear SMEs.	The integration of a decision making support derived from a knowledge based environment related to performance, environmental, health and toxicological aspects will allow SMEs operating more productively and bringing projects to market more quickly.	**Textile, clothing, leather & footwear** sectors.

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Topic 3.4-1- Rapid Manufacturing concepts for small series industrial production

Proposal	Objectives	Strategy/technology	Application/sector
COMPOLIGHT	Develop new rapid manufacturing methods and solutions to **improve the design of complex lightweight parts with internal channels or porous structures**	Multiprocess (**3D printing, DMLS, SLM, DLF, DMLS)** / Design rules, optimised process parameters, software interface / Demonstration pieces, training & exhibition	Metallic components / Automotive, aerospace, medical and electronics
STEPUP	Develop new systems, i.e. materials design and development, **through the mechano-chemical modification, based on the high energy ball milling** technology in polymers, for RM applications.	**Advanced SLS/SMS** processes / User needs, material properties & process technology / tests pieces with geometry & size effects	Polymers / Automotive, medical and MEMS
DirectSpare	Deliver **spare parts** on-demand in large industries using RM techniques, so reducing the need for large store houses, wasted spare parts and large inventories	Multiprocess (**EBM, IserCUSING, Prometal, SLM & SLS, etc**) / Design and simulation, material specifications, process optimisation business models / Case studies	Metals & polymer / Automotive, aerospace, medical and electronics
IMPALA	Develop a rapid manufacturing process using a laser-based process to **produce customized small and medium volume parts from powders**.	**Advanced Laser Manufacturing** (bed & powder) Processes / Material specification & characterisation, software, process & equipment development / Demonstrators	Metals, ceramics & polymers / Tools & dies, dental, biomedical, mechanical components & MEMS

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Topic 3.4-2 Innovative Pathways in Synthesis – Improving efficiency by smart synthesis, design and reduction of the number of reaction steps

Proposal	Objectives	Strategy/technology	Application/sector
EFECTS	preparation of ceramic coatings by an alternative synthesis technique called Chemical Solution Deposition (CSD).	Application of so called Chemical Solution Deposition based on **ink-jet printing**	Chemistry, engineering, electronics, physics
EUMET	discovering new, and more active, metathesis catalysts synthesis of fine chemicals useful in a number of industrial applications	Development of **new metathesis catalysts**, comparative screening, molecular modelling, catalyst anchoring, microreactors	Petrochemistry, fine chemistry, agrochemistry, pharmaceuticals, material engineering
INTENANT	developing general protocols to improve and optimise the **synthesis and purification of single enantiomers** of biologically active substances such as drugs, flavours, fragrances, food additives, and agrochemicals.	Development of new technologies and tools, using advanced concepts and flexible production systems	Fine chemistry, pharmaceuticals, food, cosmetics, agrochemistry

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Topic 3.5-1 Processes and equipment for high quality industrial production of 3-dimensional nanosurfaces

Proposal	Objectives	Strategy/Technology	Application/Sector
N2P	Atmospheric **plasma based equipment** for in line production of 3D functionalized surfaces exploring new materials,	Elimination of vacuum for in the plasma process can strongly impact their industrialization and create a new market for low cost and flexible surface functionalisation. Approach includes etching for nanostructures, and CVD coatings.	Demonstrators focus on structures for **solar cell** surfaces, **biocidal surface** structures and direct growth of aligned carbon nanotubes on **electrode surfaces**. End-user industries represent **photovoltaics, aeronautics, automotive, steel**
NaPaNIL	Develops **nanoimprinting lithography for 3D nanosurfaces on large area** surfaces for production of any kind of topographically 3-dimensional nanostructured surfaces in the area of **optical surfaces.**	Investigating thermal nanoimprint (hot embossing) and UV imprint technologies.	Key application are 1) a **diffuser** to provide warm light with homogeneous intensity using only a few **LEDs** as a source for housing, theatres and sunlight manipulation, 2) an emissive **headup display** for automotive applications or other type of displays, and 3) diffractive optical element for **LED illumination** needs, e.g., in mobile devices, street lamps and general illumination.

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Topic 3.5-2 Production technologies and equipment for micro-manufacturing

Proposal	Objectives	Strategy/Technology	Application/Sector
MICROFLEX	Fabrication of flexible materials in the form of high added value smart fabrics/textiles which are able to sense stimuli and react or adapt in a predetermined way.	Add advanced functions to textiles **incorporating MEMS structure on flexible textile/fabrics using micro-fabrication** (i.e. thick film printing/sacrificial etching) to produce, using custom printing processes, active functions in a cost efficient way.	**Textile and Clothing.**
COTECH	The development of new approaches of micro manufacturing based on advanced technology convergence processes in order to propose hybrid solutions for high added value cost effective manufacturing.	The strategy is to generate new technology convergence processes through the integration of technologies related to **micro-manufacturing such as compression injection moulding, embossing, laser structuring, and wet coating.**	**Transport, bio-medical and energy.**
INTEG-MICRO's	The development of a new high precision manufacturing technologies to respond cost efficiently and eco-friendly to the mass customisation paradigm within the production of complex shape micro parts, embedded systems and miniaturized products at micro/meso-scale level.	The strategy is to develop **hybrid reconfigurable multitasking machines and combined processes** using the Integration of different ultra high precision techniques for the generation of 3D complex shape micro-components showing a complex shape and made from different kinds of materials.	Medical and bio-medical, automotive, environmental monitoring, **aeronautic and aerospace**
FLEXPAET	The development of a highly flexible process for the patterning of large area complex micro structure, allowing the low cost, **high volume production of large area micro structured surfaces for the use in diffractive optics** (DO).	The strategy is to develop flexible patterning of complex micro structures using adaptive embossing and micro machining technologies.	**Optics**
MULTILAYER	Development of **low cost mass production technologies** for manufacturing complex non silicon multifunctional 3D-micro parts.	The "rolled multi material layered 3D shaping technology" will be used together with concepts of tape casting and advanced printing techniques. This would open up a new process for the large-scale production of complex non-silicon micro products.	**White goods, optics, construction, chemical** and medical.

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Topic 4.0-1 Advanced Wood-Based Composites and their production

Proposal	Objectives	Strategy/Technology	Application/Sector
BioStruct	Creating new types of composites by replacing petrochemical polymers with **natural polymers in Wood Plastic Compounds**	New cost-efficient materials and processes	Demanding, high-value technical applications in various sectors
Woody	**New laminates and sandwich panels** reinforced with continuous long wood fibers	Find optimal sources of raw materials for matrix and fibre of laminates, and core of sandwich panels. Definition of laminates and sandwich panels' structures, fibre sizing and bonding elements.	Building, Construction, transportation and other fields
SustainComp	development of a series of completely **new wood-based sustainable composite** materials for use in a wide array of market sectors	The approach is to better utilize the inherent properties of cellulosic fibres and nano-cellulose fibrils in such materials. E.g. tailoring of fibres & nano-reinforced foams	Wood-based high end-value products in medical applications, transport and packaging

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Topic 4.0-2 Application of new materials including bio-based fibres in high-added value textile

Proposal	Objectives	Strategy/technology	Application/sector
NoTeReFiGa	**New fiber generation with temperature regulation**, bio-degradability, strength and durability characteristics.	Introduction of a large amount of phase change materials (PCM) into fibers for thermal management	**Conventional clothing** with special features,home textiles, sports, leisure
BIOAGROTEX	**100% renewable and biodegradable agrotextiles**, via natural fibres and bio-based polymers	Extrusion processes processing into knitted, woven or non-woven structures; a number of test/demonstration cases.	**Agriculture** (webs for soil covering)
DEPHOTEX	**Flexible photovoltaic cells** (development of novel conductive fiibers) directly on textile substrates	Selection of suitable deposition techniques and final characterization of the resulting solar cells.	**Home textiles**, sports, leisure power generating textiles, outdoor applications such as garments or tents
NATEX	Bio composite materials from modified natural fibers combined with thermoplastics and thermosets	New processing technologies in the whole chain of production from the fibers extraction and modification, to the development of the composite,	Structural application in **transport**, energy, agricultural machinery and shipbuilding

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Topic 4.0-6 Innovative added-value construction product-services

Proposal	Objectives	Strategy/technology	Application/sector
MEMSCON	Development of a novel **device for low cost monitoring of the building** structure	Radio Frequency Identification (RFID) technology, Micro-Electro-Mechanical Systems, lower-power wireless networking	Construction, Building Structural safety
EASIE	Improvement of sandwich panel design and design tools, **energy savings during production and installation**, prediction of product lifecycle	Multidisciplinary approach with material testing, assembling and design competences united	Construction, Building Sandwich panels
STONECORE	**Nanomaterials to be used in retrofitting technologies** for natural and artificial stones	Development and application of nano materials	Construction, Building Nanomaterials, Natural and Artificial Stones
H-KNOW	**Innovative solutions for collaborative SME-RTD communities** for knowledge creation / reusing, bidirectional learning	ICT solution, SOA based platform integrating existing knowledge into a knowledge management tool for a group of specialized companies	Construction, Building ICT application for SMEs-RTD communities

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Topic 4.0-5 Resource efficient and clean buildings

Proposal	Objectives	Strategy/technology	Application/sector
MESSIB	A affordable **energy storage management systems** for buildings	Integration of Phase change materials (PCM), ground storage, flywheels and vanadium batteries	Reducing peak demands and total energy requirements both at a building and district level.
Clear-up	**To optimise indoor air quality and climate conditions** whilst minimising overall energy consumption	Intelligent and multifunctional windows, multifunctional insulated exterior walls, clean air-conditioning systems and advanced sensors and control systems.	The project will commence at laboratory level, but will also consider large-scale tests before implementing real world applications
Cost-Effective	Reduction to CO2-emissions through the achievement of energy savings, the use of renewable energy sources (RES)	Transparent solar thermal façade collectors, glazing with integrated PV, façade integrated solar thermal vacuum tube collectors, unglazed opaque façade collectors and a façade integration ventilation	All kind of **new energy gaining multi-functional components which will be incorporated into the façade of large buildings.** These facades will be used for energy conversion
H2SUSBUILD	Development of an intelligent self-sustained and **zero CO2 emission hybrid system for residential/commercial buildings** and districts buildings	Energy will originate from RES and will flow through hydrogen as an energy carrier to cover its electrical, heating and cooling needs	The design, implementation, operation and monitoring of RES (Renewable energy sources) such as sun, wind and hydro power at building and district level.

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3.1-1 Transformation strategies for SMEs in turbulent global market environments (1/2)

Technical Content/Scope: The business environment of the enterprise in global economy is tough and turbulent. While many of the external factors, e.g. demand for products in global markets; the strategies of competitors; and the regional level of wage and reward systems are beyond the direct control of any enterprise, companies which are robust enough and have the capability to continuously transform can survive and be successful in this dynamic environment. Yet, many companies are lacking proper production and transformation strategies. Often the choice of production is dictated by the installed technology base and traditional competencies. These problems are particularly acute for SMEs, which do not have the scale and resources to address all the changes in their environment, and which are present in traditional as well as in new technology manufacturing sectors.

The main objective is the development of competitive **production and service concepts & strategies** for manufacturing SMEs, responding to the evolution of the manufacturing business environment. The production and service concepts should aim at leveraging the strengths of European manufacturing: customer orientation, flexibility, productivity, quality, design and positive brand image.
Research challenges include: the identification of methods for small businesses to recognise and respond to external threats; determining and assessing candidate production concepts and strategies for SMEs to assist in their survival and transformation; defining mechanisms that allow SMEs to take similar advantage from manufacturing in the enlarged Europe compared to those accessible to large companies, e.g. by utilising outsourcing networks; determining the required competences and mechanisms to form or join cooperative transient production networks, increasing the range of business opportunities; determining and disseminating best practice survival and transformation mechanisms developed by successful SME businesses or agencies; and generating tools and techniques that support transformation. The proposals should develop approaches for different SME sectors: (i) SMEs in traditional sectors in need of a structural change; (ii) Globally competing technology oriented SMEs; (iii) SMEs operating in niche markets.

The developed production concepts and strategies should be demonstrated in pilot implementations.

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3.1-1 Transformation strategies for SMEs in turbulent global market environments (1/2)

Funding scheme*:* Collaborative projects targeted to SMEs.

Special features: In order to ensure industrial relevance and impact of the research effort, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation. SME dedicated collaborative projects are specifically designed to encourage SME participation in research and innovation representing the complete value added of the targeted sectors. Research and innovation activities need to be covered by the projects. At least 35% of the requested EC contribution should be allocated to the participating SMEs. Proposals not addressing this requirement will be considered ineligible. To ensure a larger industrial impact, priority will be given to proposals showing that the projects will be led by SMEs with R&D capacities (the coordinator does not need to be an SME but the participating SMEs should have the decision making power in the project management and the output should be for the benefit of the participating SMEs and the targeted SME dominated industrial communities.)

The following specific requirements will be reflected in the evaluation: (i) to ensure complementarity of the consortium, proposals are expected to include a wide range of competences, including management of SMEs, technology, economy, finance, public organisations (e.g. in charge of industrial development); (ii) as regards the S/T quality & objectives, proposals are expected to take a holistic view on production of products and product services as opposed to developing individual production methods/technologies or products in the interest of a single company; (iii) to enhance the potential impact, development of further take-up measures in collaboration with Eureka Pro-Factory is requested.

Expected impact: The new production and service concepts & strategies should enable SMEs to align their production strategy better with their business strategy. This should enable SMEs to continue to operate regionally but with a global reach thus reinforcing the socio-economic climate at regional level. Improved organisation of production and services should contribute to shorter time to profit and improved overall financial results. Strategic SME tailored planning processes will enable SMEs to move up the value chain more easily. Projects should demonstrate the potential to improve flexibility and customer satisfaction through innovative production strategies. Collaboration processes are expected to allow

SMEs to enhance their own core competences while fostering collaboration in a manufacturing network.

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3.2-1 Implementation of process intensification strategies in industrial scale (1/2)

Technical Content/Scope:

One of the major drivers for required changes in the European manufacturing businesses is competition from emerging countries where large quantity production is cheaper and sometimes even more flexible. In addition, changing customer needs driven by market reaction time requires a higher product diversification and more fast and flexible future production strategies. A European industrially lead initiative involving research and demonstration of new concepts is needed for holistic product and process development. The flexible integration of inherently safe process technologies with small hold-up volumes will be a key to success for future products.

Expected projects should aim at the development of new, intensified process and plant concepts for speeding up the market penetration, for enhancing the product life-cycle and improving sustainable production. The main development tasks are to:

- Develop new production concepts, with a special focus on new start-up and shut-down strategies, which increase process operability;
- exploit the full potential of micro process technologies, such as heat and mass transfer and energy efficiency, with focus on the integration of different unit operations in one apparatus and standardisation of such modules;
- create flexible systems, which are adaptable to the dynamic range of product output during all phases of life cycle management
- minimize the use of resources and improve the eco-efficiency;
- create a methodology based on framework data from model reactions, which enables a profound economic as well as technical evaluation of the new production processes and use these methodology to identify transfer-potential of the new processing concepts for innovative products.

Project objectives should encompass the construction and operation of flexible demonstration plants in which the above scientific concepts will be integrated and implemented. Integrated process units and combined unit operations must be linked with process modeling tools, in-line monitoring, model-based process management and advanced process control to form a centre of gravity for fast process development. This highly integrated technology demonstration platform will generate new opportunities and will lead to future factory concepts for chemical production plants made in Europe.

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3.2-1 Implementation of process intensification strategies in industrial scale (2/2)

Funding scheme*:* Large-scale integrating collaborative projects .

Special features: In order to ensure industrial relevance and impact of the research effort, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation. The following specific requirements will also be reflected in the evaluation: (i) to ensure proper exploitation and dissemination of project results, industrial leadership and significant demonstration activities are required; (ii) as regards the S/T quality & objectives, existing activities and initiatives (e.g. by the technology platforms) in the area of process intensification should be taken into account; (iii) in particular, pharmaceutical active ingredients are not considered a priority for this call.

Expected impact: European based chemical production meeting the challenges of increased product diversification, substantially shorter time to process/market and flexible production capacity in accordance with product and market development. A substantial drop in capital expenditure for new plant and/or for retrofit of high–performance intensified devices into existing infrastructure for the high value-added product market (production below 100.000 t/yr).

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3.2-2 Self-learning production systems (1/2)

Technical Content/Scope:

Process control, coupled with quality control, must be able to react in time to changes of process parameters and to disturbance variables. Furthermore the machines and production systems must be able to react flexibly to different product variants in whole or in part.

The main development targets are:

(I) **Development of methods for adaptive and scalable tools for representation of complex production processes**.

(II) **Development of data analysis methods / procedures / tools, which are open with respect to the process and necessary analysis algorithm**. These procedures should be self-learning, self-configuring and self-optimising, nevertheless taking into consideration the "human element" in the production system.

(III) **Development of application methodologies for the deployment of modular, adaptive production systems.**

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3.2-2 Self-learning production systems (2/2)

Funding scheme*:* Small or medium-scale focused research projects.

Special features: Industrial impact of the research effort must be ensured through participation of relevant partners.

specific requirements:

(i) ensure wide industrial impact, proposals are expected to include component manufacturers and OEMs for future take-up of the new technologies

(ii) relevant standardisation and interoperability issues to be taken into account

(iii) take-up measures in collaboration with Eureka Pro-Factory is requested

(iv) regarding S/T quality & objectives, developments within an engineering platform framework that would be able to demonstrate the potential of adaptive manufacturing systems, to be included; Synergies, coordination and collaboration with the ICT thematic priority, in particular Objective Networked Embedded and Control Systems, should be sought, where appropriate.

Expected impact: Expected increased competitive advantage of European manufacturers' by 10 to 30 percent in the medium to long term. Reduced down times during product exchange and conflict situations; improved product quality; increased machine availability and reduced maintenance; improved efficiency.

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3.2-3 Coordination and support of inter-regional manufacturing communities following IMS strategy update (1/2)

Technical content/scope: This coordination activity aims to strengthen international co-operation under the Intelligent manufacturing Systems (IMS) initiative. It seeks to provide an effective interface to ongoing European roadmapping activities of European Technology Platforms and to create research synergies at international level through establishment of inter-regional manufacturing communities in key activity areas of IMS. The activities are expected to include: mapping of on-going major research activities in the five priority topics, ensuring effective inter-regional exchange of results and knowledge community building; preparation of ground for future collaborative research activities in IMS regions; preparation of a coherent roadmap 2020 for future manufacturing research within the IMS framework. The following topics have been identified as areas of activity with international partners from IMS participant countries[1]:

- Sustainable manufacturing: Technology solutions for manufacturing processes and manufactured products which are efficient with respect to resource use (including. energy) and lead to minimal pollution (waste). Measurement and assessment technologies and methodologies to ensure occupational safety including ergonomics, industrial disaster prevention and mitigation and in particular safety of nanomaterials and related manufacturing processes should also be addressed.
- Energy efficient manufacturing: Solutions to improve efficiency and reduce the carbon footprint in energy utilisation for manufacturing and operational processes. This will result in reduced manufacturing costs and global warming impact.
- Key technologies: Technologies that will yield a high impact on the next generation of manufacturing. These technologies include model-based enterprise, nanotechnology, and smart materials.
- Standards: Manufacturing research issues that can benefit from standardization to create open manufacturing and product standards that are accessible to everyone and enhance innovation globally. IMS involvement in standards would also focus on key areas where the lack of standards is impeding progress in any of the other areas of activities.
- Education: Manufacturing education is a major driver for promoting excellence in manufacturing in the years to come. As such, education should address a number of emerging challenges related to industry, academia and the society in general. It should generate new education paradigms, through direct involvement of all stakeholders and utilise new delivery mechanisms, such as e-Learning and Technology Enhanced Learning. Key issues of manufacturing education are: embedding entrepreneurship and innovation spirit into education, the promotion of interdisciplinary thinking and multicultural working, balancing the loss of a large number of low-skilled jobs by training high-level personnel for new manufacturing jobs, and promoting an integrated approach to education, research and technology transfer.

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3.2-3 Coordination and support of inter-regional manufacturing communities following IMS strategy update (2/2)

Funding scheme:

Coordination and Support actions aiming at coordinating research activities.

Specific features:

As an eligibility criterion, the consortia must include partners at least from two other IMS countries/regions. Collaboration with the ICT theme will be ensured.

Expected impact:

Activities will demonstrate and increase global visibility for the competence of European factory assets suppliers as well as establish global and standardised curricula for manufacturing education. They should also provide societal benefits by leading to global targets in industrial security and safety. The activities should also contribute towards attaining environmental objectives as set out in the European Environmental Technologies Action Plan (ETAP).

[1] IMS participant countries/regions are: EU and Norway, Japan, South Korea, USA and Switzerland

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3.3-1 Supply chain integration and real-time decision making in non-hierarchical manufacturing networks

Technical Content/Scope: To develop **models and tools for collaborative planning, management and optimisation of production resources** including material flow management, integrated production planning and monitoring as well as capacity management including equipment monitoring and maintenance, **for supporting non-centralised decision making production processes within a changing environment**. Securing of information and knowledge should also be given a special emphasis. Deliverables will take the form of pilot implementations.

Specific features: **Active participation of industrial** partners represents an added value to the activities. **International collaboration**, in particular within the IMS scheme, and standardisations are key elements for the developed solutions. **Synergies, coordination and collaboration with the ICT thematic priority** and in particular Objective Networked Embedded and Control Systems, will be sought, where appropriate.

Expected impact: To **increase the capacity of industrial SMEs to operate globally in an agile manner**, in order to adapt to the rapid evolutions of existing and future markets. Tools for overcoming the complexity of operating in several production networks at the same time should facilitate an increase in the business volume by significant reduction of logistics costs, high inventories of current assets and lead times of material and information.

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3.4-1 Rapid design and virtual prototyping of factories (1/2)

Technical Content/Scope: Consumer needs and expectations of the future will require a continuously and rapidly evolving production framework: thus **production systems, from small to large scale and integrated factories, shall be conceived and set up in shorter and shorter times**. This will require conception and development of new methodologies and innovative tools, which enable and support the rapid design and prototyping of the entire production system. The creation of a holistic, integrable, up-gradable, **scalable Virtual Factory** can foster high cost savings in the implementation of new manufacturing facilities thanks to the effective virtual representation of buildings, resources –process- and products. Decision makers and designers can benefit from the **closer integration of product, process and plant development through dynamic modelling**, **optimisation, simulation and visualisation**. The ability to better manage complex automation through development of integrated e-factory solutions will support rapid New Product Introduction development and reduce the time to market.
The main development targets are: a complete detailed framework for the Virtual Factory and tools for the quick, reliable and optimized creation of knowledge-based manufacturing systems and factory, enabling collaborative, interdisciplinary and multicultural design/analysis and optimisation of processes to be executed effectively and efficiently. The required tools should consist of software using intelligent databases and data analysis and presentation methods, complemented by models, processes and guidelines enabling their usage.
Their capability needs to be proven through successful pilot cases in European manufacturing companies, resulting in as well in significant measurable improvements of business success indicators like time-to-market, customer satisfaction, market share and revenue as in improved
soft factors like working climate, quality of life, environmental protection and innovativeness.

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3.4-1 Rapid design and virtual prototyping of factories (2/2)

Funding scheme: Large-scale integrating collaborative projects.

Specific features: In order to ensure **industrial relevance** and impact of the research effort, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation. The following specific requirements will also be reflected in the evaluation: (i) the consortia should include **larger international companies which develop products in international distributed and delocalized teams**, smaller scale companies (**SMEs), such as suppliers who operate both in local and international scale** as well **IT technology/services** providers, to ensure complementarity of the consortium as well as a wider industrial impact. All manufacturing production systems can be addressed. It is likely that only one project would be funded under this topic. Should several proposals receive funding, effective collaboration between the projects must be established for ensuring the compatibility of the solutions and for avoidance of overlaps. Synergies, coordination and collaboration with the ICT thematic priority and in particular Objective Networked Embedded and Control Systems, will be sought, where appropriate.

Expected impact: The target is the improvement of the easy plant reconfiguration and reengineering (reduction of 50% of the actual time) through the improvement of the integration of heterogeneous data and the enhancement of the human being interactions. This will speed up the ramp-up phase (target is 30% at least) as well it will allow the collaboration both between people as well among them and machine. The projects will also to **create opportunities for SME to be the main provider**
of these new services.

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3.4-2 Industrialisation through new integrated construction processes

Technical Content/Scope: Innovation is needed to support the transformation of a supply-driven sector into a sustainable knowledge based demand-driven sector fulfilling users and clients demands, together with the growing trend towards integrated construction teams and long-term supply chain collaboration. A challenge here is to re-engineer the construction process towards a manufacturing process integrating the entire supply and value chain, in order to transform a supply-driven sector into a sustainable demand-driven sector. This could be done by applying the most advanced high technology design/manufacturing methods into off-site construction production. New industrial "nD" models, interoperable methods/tools for analysis, simulation, validation, optimisation of the use of resources, monitoring, visualisation, decision support systems re-using existing knowledge, procurement, configuration and logistics management of manufactured components inline with on-site WIP are likely to be developed and integrated.

Funding scheme: Large-scale integrating collaborative projects.

Specific features: Industrial relevance will be ensured with an active participation of industrial partners in addition and in order to achieve the targeted industrial impact, the active participation of SMEs is required and the proposals should also include actions for demonstrating the operation of the new integrated process chain in practise.

Expected impact: The ultimate goal must be resource efficiency. More than 50% of customised construction products are producible industrially; 0% rework ; safe and attractive work places; all process steps are 100% connectable to corporate information networks; 100% of manufactured construction products are offered on the EU wide open market.

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3.5-1 Volume production process chains for high throughput micro-manufacturing

Technical Content/Scope: To develop integrated processes for micro-production and finishing for emerging micro-products with a high, demonstrated market impact, and encompassing a wider range of materials and geometric forms that can satisfy the specific functional and technical requirements of new emerging multi-material micro-products

Specific features: Active participation of industrial partners with SMEs in leading role and minimum 35% of funding. Holistic process chain lifecycle coverage with adaptive applications to different types of products and industrial sectors.

Expected impact: Contribute to the European Micro-Manufacturing industry capturing a 1/3 share of the world market by a clear strategic contribution to reaching targets of cost effective, automated and high quality manufacturing of new Microsystems-based products. Processes should provide a higher flexibility for seamless integration into new micro/nano manufacturing platforms.

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4.0-3 Nano-technology enabled applications for integrated, cost-effective volume production

Technical Content/Scope: Develop production equipment, associated components and products that are characterised by highly functionalised nano-structured surfaces; that are defined as surfaces containing at least one dimensional feature smaller than 100nm. Applications of nano-surfaces inside manufacturing equipment are driven by the need to avoid surface damage on the manufactured components, eliminate sources of contamination, reduce cleaning chemical consumption, and improve equipment reliability

Special Features: The following specific requirements will be reflected in the evaluation: (i) in order to ensure industrial relevance and impact of the research effort, the active participation of industrial partners represents an added value to the activities (ii) to widen the industrial impact, proposals should ensure the involvement from the European Manufacturing equipment industry, involve all relevant end-user groups in the nano-micro-manufacturing value chain and demonstrate that proposed research maintain the strong position of this important industry.

Expected Impact: The proposed research should show a clear strategic contribution to establishing a new European manufacturing industry fully exploiting the potential of the new nano-technology based processes and materials, including making these technologies industrially relevant by reducing their time and cost for integration.

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4.0-4 Expanding the limits of advanced materials processing applications through a new generation of high brilliance lasers

Technical Content/Scope: To expand the limits of advanced materials processing applications utilising laser technology; development of a new generation of low cost laser concepts with high brilliance, high efficiency and premium beam quality for industrial material processing applications; development of optical-radiation-hard optical materials and functional tailored optical materials for improving the reliability of optical components. In addition, in order to integrate the above mentioned laser sources into material processing systems, suited beam delivery components and integrated advanced diagnostics are **required**.

Special Features: Industrial leadership; application trials; mature laser technologies excluded

Expected Impact: Continued growth of the laser market; broader tolerance windows; better wall plug efficiency; increased reliability

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4.0-5 Innovative concepts and processes for strategic mineral supply and for new high added value mineral-based products

Technical Content/Scope: to increase the European capability of sustainable mineral supply, and at creating new market opportunities through the development of new eco-efficient, high value added mineral particle based (industrial, construction and metallic minerals) products with enhanced and diversified functional properties for applications in traditional, but also in high technology sectors. Proof of concept is required.

Specific features: active industrial lead and participation; significant demonstration, technology transfer, training and dissemination activities, which should benefit from initiatives of mineral sector and activate the mineral community across the EU; effective integration of the key players of the supply chain throughout the product life cycle; point solutions, or partial solutions are excluded; the products for energy applications are not a priority for this call.

Expected impact: a significant reduction of the EU trade deficit of the minerals sector; reduction of energy consumption for major industrial operations; multiplication of application areas for mineral based products; and better use of mineral by-products by reducing processing wastes.

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4.0-6 Sustainable new products and markets through bioproduction of green forest-based chemicals and materials (1/2)

Technical Content/Scope: Global competition decreases wood pulp prices by on average 1% per year. At the same time, the price of wood as a feedstock has become increasingly correlated with energy price. As a result, the European forest-based industry is loosing in profitability. However, the potential revenues from using wood for production of green chemicals, fuels and polymers can many times be higher than the revenues from the pulp itself. Upgrading the pulp and paper mills of today into the forest biorefineries of the future can potentially double revenues from forest-based materials while at the same time mitigate the green-house effect. Also the wood based industry is characterised by a well developed logistic chain for raw material, energy, power, water and the resulting products with which a stand alone biorefinery can not compete.

Further research activities should be directed towards functional materials and production technologies that are considered essential for the industry's effort to pursue the developments of products and markets characterised respectively by high added value and growth potential.

Main development issues and targets are:

- New process technology for adaptable production of side-stream chemicals from wood based feed stocks.
- Development of more selective and milder separation conditions or reactions, such as low temperature delignification, novel routes in sulphur and chlorine free pulping, and enzymatic processes, and separation by ionic liquids and supercritical fluids.
- Optimisation of thermo-chemical processes, such as steam explosion, pyrolysis and gasification for specific applications.
- Combinations of traditional technologies with bio- and nanotechnologies for the production of base chemicals.
- Development of new and selective isolation methods for various wood constituents (such as lignin and hemicelluloses), based on high performance membrane technologies and chromatographic techniques.

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4.0-6 Sustainable new products and markets through bioproduction of green forest-based chemicals and materials (2/2)

Funding scheme: Large-scale integrating collaborative projects.

Specific features: In order to ensure industrial relevance and impact of the research effort, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation. The following specific requirements will also be reflected in the evaluation: (i) To ensure a wider industrial impact, significant industrial participation of key players from the whole supply chain is required, including industries and SMEs capable of implementing the new technologies; (ii) in this context, significant demonstration activities are foreseen, with the aim of establishing a pilot biorefinery plant, demonstrating flexibility of input and capability of processing a wide range of products. Synergies, coordination and collaboration with the KBBE thematic priority topics related to biorefineries, will be sought, where appropriate.

Expected impact:

(1) Enabling European industry to within the next 10 years double its revenues from pulp production or similar production processes where wood is the main feed stock by efficient and adaptable extraction of high added value green chemicals, polymers and biofuels.
(2) Decrease Europe's dependency on fossil fuels for production of energy and chemicals.
(3) The commercialisation of advanced, zero-waste bio-refinery concept integrated with chemical pulp production.
(4) Increase utilisation of different forest residues such as bark and stubs that are not integrated with pulp production through similar processes

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4.0-7 Integration of new technologies and materials for differentiated consumer-centred product capability – SME (1/2)

Technical content/scope: The topic addresses the development and demonstration of new sustainable production capabilities for high added value consumer-centred product concepts and the conception and definition of industrial paradigms and infrastructures which relate to the relevant industry characterised by large numbers of SMEs exposed to global competition (for example, sporting goods and footwear).

It aims to capitalise on new competitive strategies that demand product differentiation and personalisation to deliver high quality to individual consumers over a range of industrial sectors.
Comfort, health, welfare, affordability and sustainability are some of the quality and service-to-customer attributes to be targeted. The integrating effort should be based on the development of an engineering framework for both products & processes that combine new design and production technologies, new functional high-tech devices/components and new materials, for the complete satisfaction of consumer requirements/needs.
In particular, such key technical contents should be addressed as: innovative design tools and solutions dedicated (where appropriate) to personalised biomechanical and biomedical aspects; adaptive production processes and technologies guaranteeing quality, safety and health; micro and nano devices providing the product with innovative sensing and actuating functionalities, such as comfort, ease of use, control and modification of product properties; innovative high-performing materials with self-adaptive capabilities to optimally fit consumers physique and ergonomics, whilst guaranteeing comfort and aesthetic quality; emphasis on materials and production processes to achieve full eco sustainability of the product.

The expected outcomes of proposed projects will represent a technology framework for the engineering of such products (less than 15 days time-to-market criterion), whose features and technological contents will dramatically innovate the addressed industry sectors.

New differentiated consumer-centred products which should be delivered as fully engineered prototypes, including integrated demonstration actions of project results with new pilot factories.

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4.0-7 Integration of new technologies and materials for differentiated consumer-centred product capability – SME (2/2)

Funding scheme: Collaborative projects targeted to SMEs.

Specific features: In order to ensure industrial relevance and impact of the research effort, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation. SME dedicated collaborative projects are specifically designed to encourage SME participation in research and innovation representing the complete value added of the targeted sectors. Research and innovation activities need to be covered by the projects. At least 35% of the requested EC contribution should be allocated to the participating SMEs. Proposals not addressing this requirement will be considered ineligible. To ensure a larger industrial impact, priority will be given to proposals showing that the projects will be led by SMEs with R&D capacities (the coordinator does not need to be an SME but the participating SMEs should have the decision making power in the project management and the output should be for the benefit of the participating SMEs and the targeted SME dominated industrial communities.)

Expected impact: Project outcomes are expected to impact the high value added global market segment for consumer goods with high-growth potential, thus representing a major challenge and opportunity for the European SME manufacturers in sectors such as footwear and sporting goods. The availability of affordable, personalised products should have a positive impact on the quality of life of consumers, in particular in comfort and health related applications. Advanced technologies and knowledge-based products will support the fight against counterfeiting and prevent relocation of activities to other areas of the world.

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4.0-9 Reducing the risk of injury in complex systems through advanced personal protective equipment

Technical content/scope:

A new generation of intelligent personal protective systems is needed to respond to the increasing societal concerns for personal safety and security.

Projects should address entire system solutions for application areas such as work safety, construction, fire fighting, emergency operations and civil protection and be attuned to holistic industrial strategies of industrial risk minimisation and mitigation. The activities include the integration of state of the art materials, components and ICT solutions and the development of new speciality and high-performance protective materials and components such as technical textiles and smart materials. The research includes ergonomic design and usability tests of new products, such as clothing, reassuring operator's safety, comfort and high-level performance/productivity. Manufacturing concepts of the new products including prototyping and customisation should also be adequately addressed. Practicable normative solutions and support mechanisms in the form of pre-normative research and training are needed in order to avoid delays in translating new developments into generally used innovative products.

Specific features: Active participation of industrial partners especially SMEs is required. Research and innovation activities need to be covered by the projects. At least 35% of the requested EC contribution should be allocated to the participating SMEs. To ensure a larger industrial impact, priority will be given to proposals showing that the projects will be led by SMEs with R&D capacities. The projects are expected to set up an engineering framework for the new product and process concepts.

Expected impact: The strategy of performance driven development should lead to an expected growth of at least 50% in turnover in the sector of personal protective equipment (PPE) alone in real terms in the next 10 years. The development and integration of new technologies for advanced personal protective systems will lead to significant reduction of work-related accidents and occupational diseases including emergency and rescue operations. The research should also reinforce European leadership in terms of quality and innovation of personal protective systems and contribute positively to the Lead Market Initiative in the domain.

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4.X: Holistic and integrated approach to high performance, reliable and adaptive machine tool design and production. 1/2

Technical content / scope: Because of the demand for customised products with short delivery times, business must shift from designing and selling physical products to supplying a system of products and services that are jointly capable of fulfilling users' demands, while also **reducing total life-cycle costs and environmental impacts**.

The machine-tool and production systems industrial sector should base its industrial transformation in the future on its capacity to propose, through a holistic approach in the global market, high added value products and services in which the product is not the machine tool itself, but a capacity of production at the best total-life-cycle cost..

In order to achieve this objective, new ways of **interdisciplinary system modelling for the design** phase have to be developed and then exploited.

The research proposed should focus on the holistic approach to machine tool design, production and use, with complete integration of machine and processes. This will include the development of:

- **fast, usable, robust and affordable digital design and manufacturing strategies**, methodologies and tools establishing the right conceptual system design format
- **new machine-tool and machining processes concepts** and design environment, with intelligent link of machine process and product simulation and animation that fulfil new product demands (short delivery time, reduced life-cycle costs, low environmental impact, suitability for **SMEs**…)
- new technologies and processes to **link machine, process and product simulation** (suitable for SME manufacturing businesses) aiming at total life cycle cost optimisation by co-design, considering also environmental and robustness issues.

The challenge related to the design and development of the desired environment resides in the complexity of **integration of heterogeneous methodologies and tools,** which maintain their own business models, procedures and data locally and in the requirement of dynamical data exchange.

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4.X: Holistic and integrated approach to high performance, reliable and adaptive machine tool design and production. 2/2

Funding scheme: Large collaborative projects

Specific features: The topic is aimed for industrially driven projects with significant demonstration elements. Moreover, the research topic addresses innovative technological developments which impacts should be measured as regards their contribution for the new European paradigm in machining industry, with high added value processes and products, in particular for the support of the emergence of new business models and dynamic networking and the technological foundations of new machining industry capable to propose on the market place word-wide an adaptive capacity of production.

Expected impact:

The transformation of the European manufacturing industry into a knowledge-based sector, capable of competing successfully in the globalise marketplace, depends largely on a sustainable presence, in Europe, of robust and affordable capabilities in machining.

Such radical innovation should result in an ambitious quantified impact whereby:

- There is 100% **recycling of machine materials**;
- **Energy consumption** is reduced by 30-40%;
- **Productivity** is increased, through reduced cycle time, by 3-5 times;
- **Reliability** of high precision processes and machine tools is increased by 50%;
- Process transparency is higher by 100% through extension of the human/ machine interface capability;
- Machine design and build **lead time to** market is reduced by 50%.

Cooperation with IMS regions regarding environmental and industrial safety issues is welcome.

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