INNOVATION IMPACT

The Impact of FP5 and FP6 Projects on Innovation

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Methodology outline

Objectives of the study

- The overall objective of this study was to understand the interface between research, technological advancement and innovation, especially as it relates to the collaborative projects funded by the European Framework Programmes for RTD

Intended outcomes

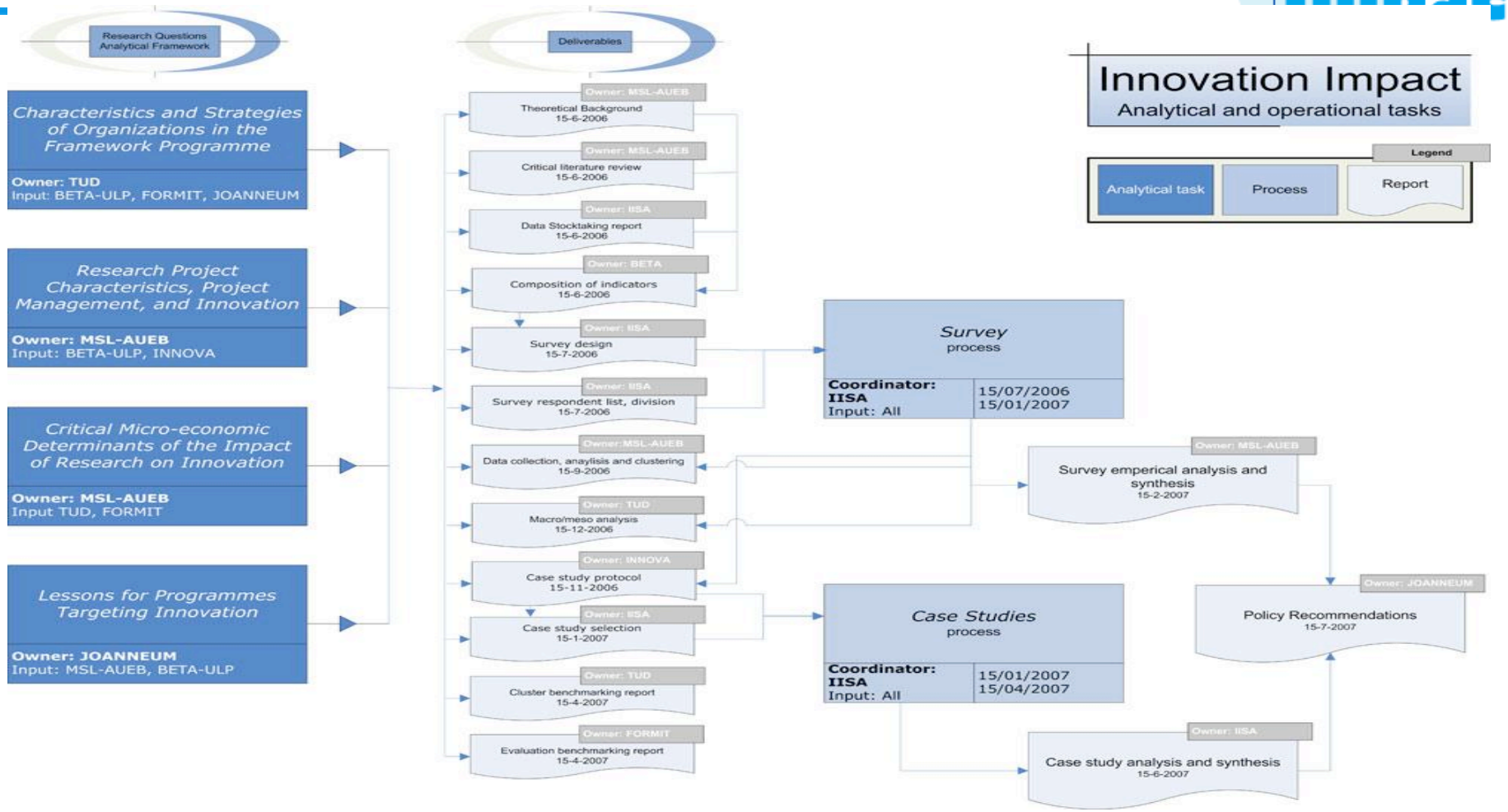
1. Identify the different ways in which RTD projects are managed at all stages
2. Elaborate an understanding of how management aspects affect the exploitation of knowledge created
3. Define and identify other critical factors that can maximize the impact of research activities on innovation
4. Identify and evaluate the impact of RTD projects under the EU Framework Programs on the innovation performance of the participants
5. Contribute to the improvement of Community Research and Innovation Programs (FP, CIP) with respect to their impact on innovation performance.

Analytical approach

To accomplish the objectives of the study we followed four lines of inquiry:

1. Characteristics of the organization
2. Characteristics of the projects
3. Micro-economic determinants of R&D on innovation
4. Lessons for Programmes Targeting Innovation

Analytical and operational framework



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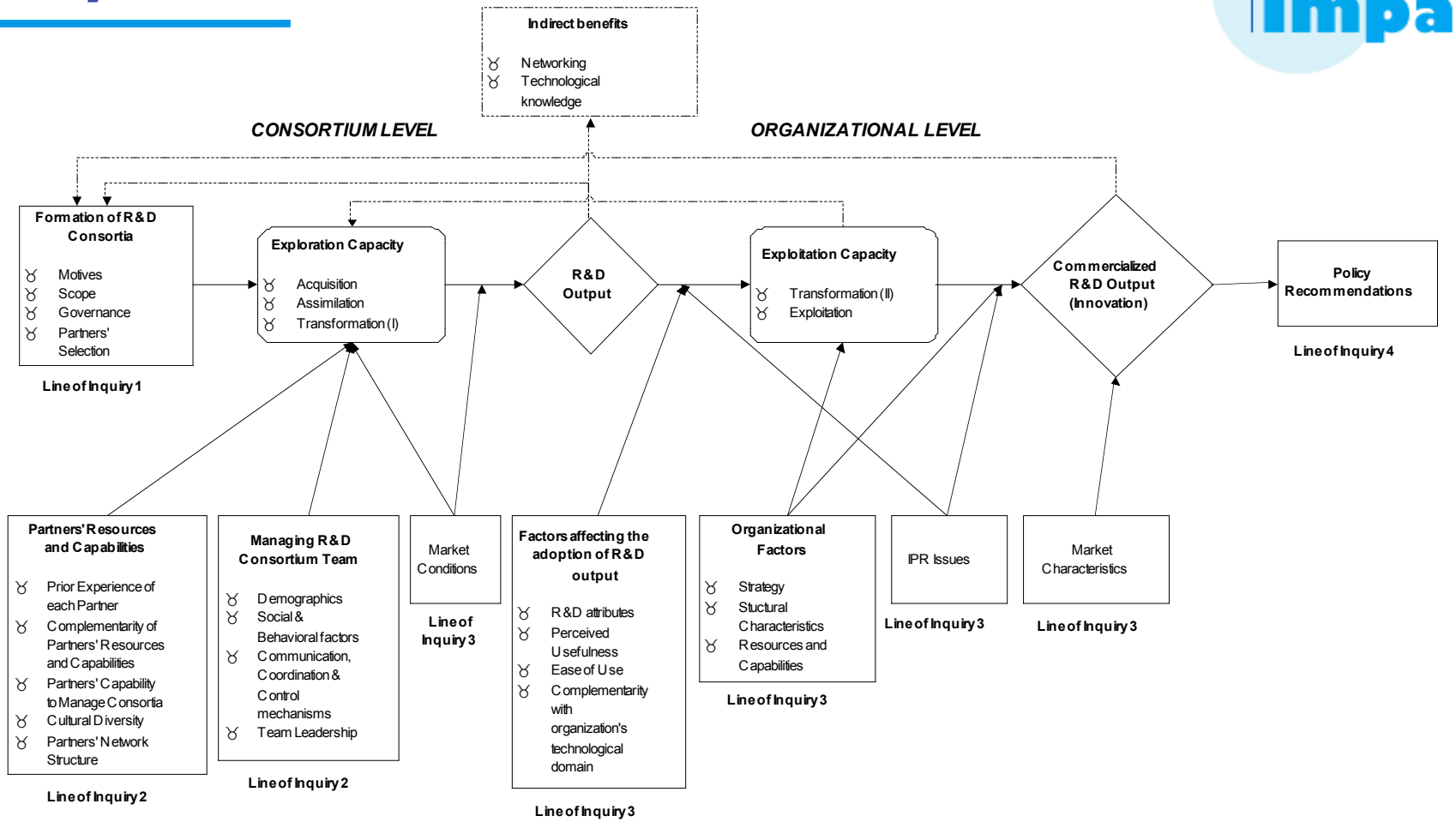
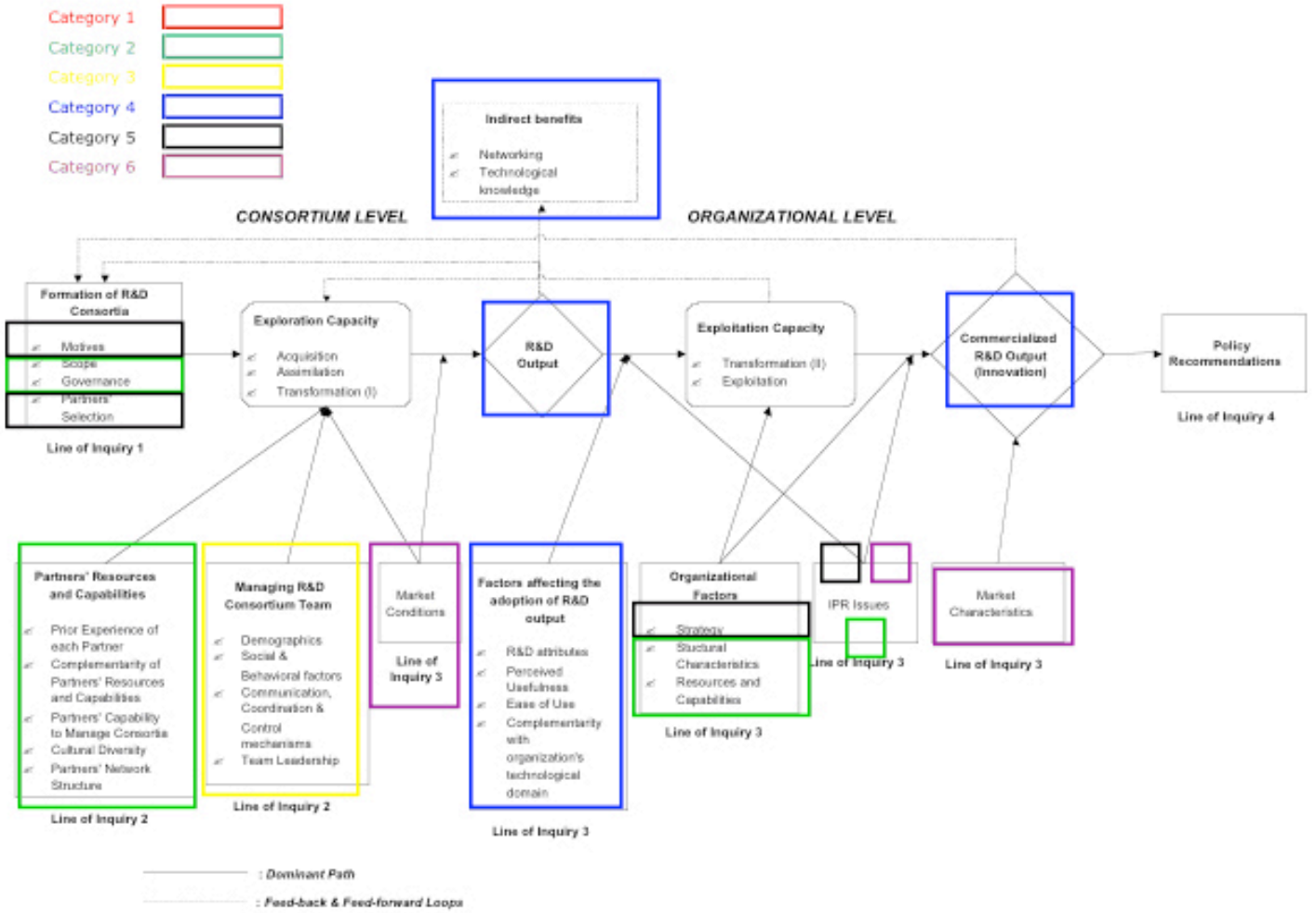
Analytical framework



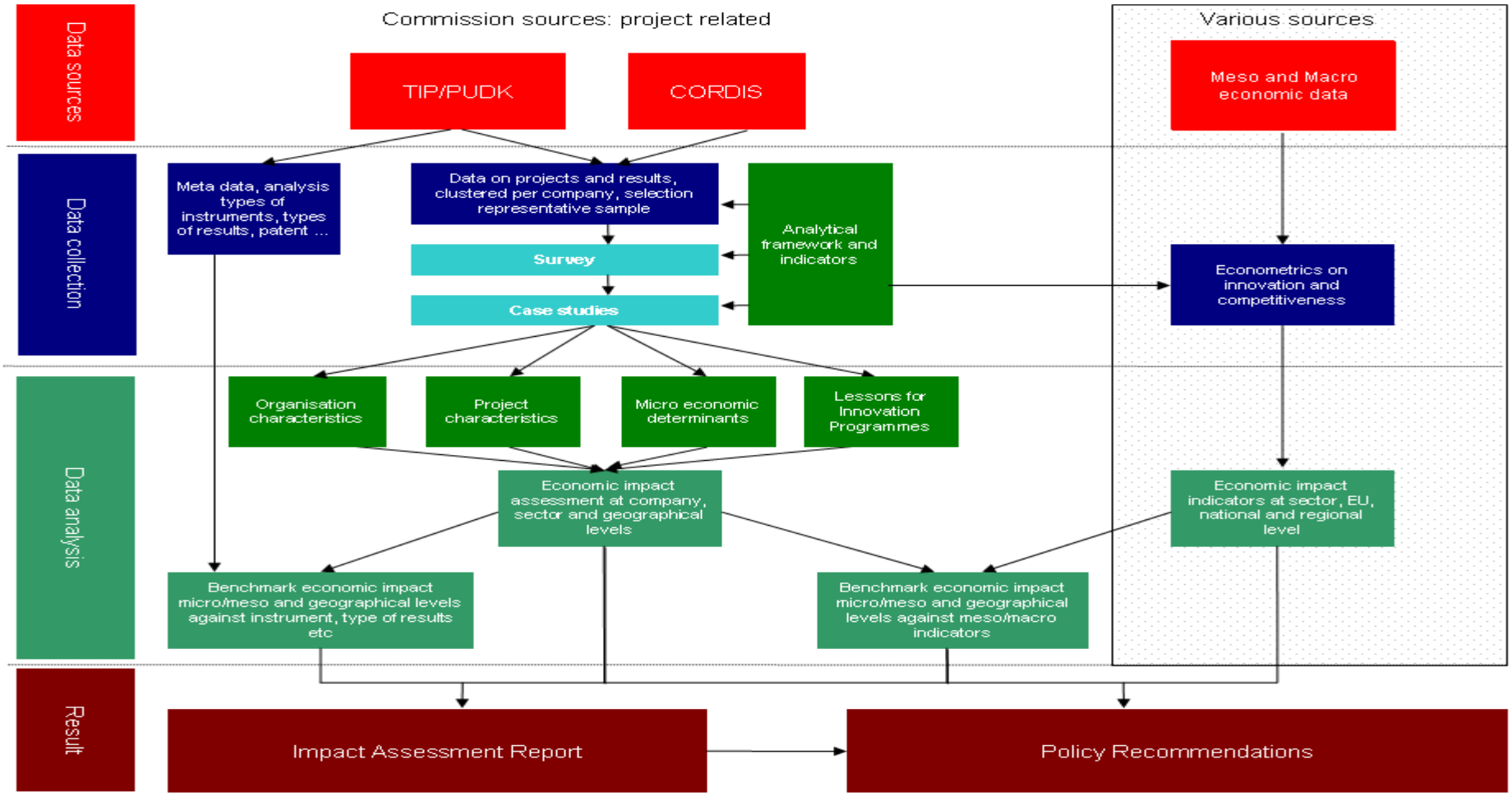
Indicators

- Characterizing the EU collaborative RTD programmes
- EU FP collaborative RTD projects, partners of these projects, consortia set up for these projects
- Characterizing the management of the EU FP collaborative RTD project
- Measuring the level of innovation related performance of EU FP collaborative RTD projects partners
- Characterizing the strategies of the EU FP collaborative RTD projects partners
- Characterizing the market conditions, the industry conditions and the scientific / technological conditions

Mapping categories on lines of Inquiry



Operational overview and sources



Innovation Impact

Project Characteristics

INTRASOFT INTERNATIONAL

JOANNEUM RESEARCH

TU Delft

MSL

INNOVA Europe

FORMIT

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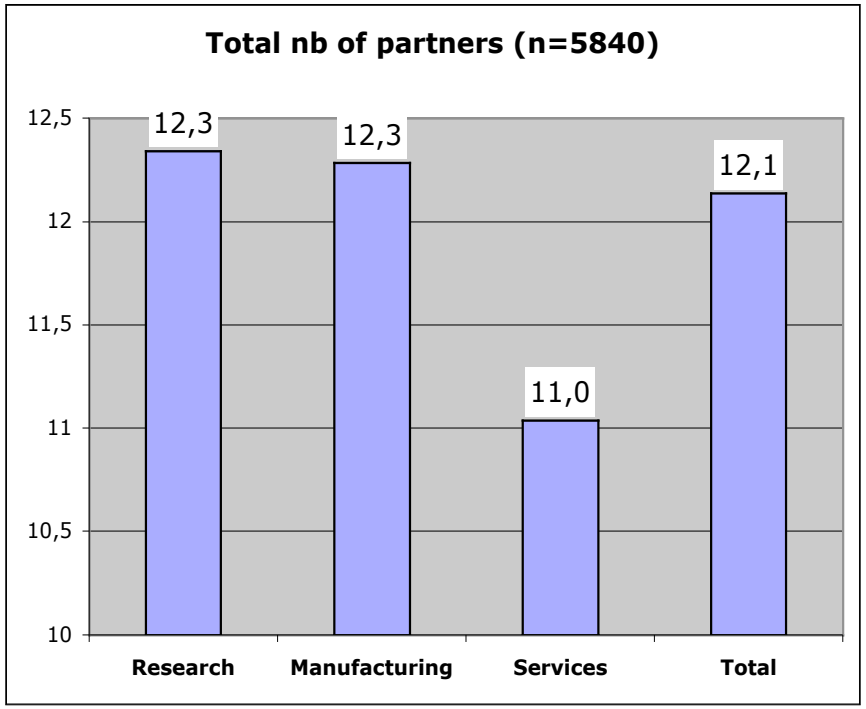
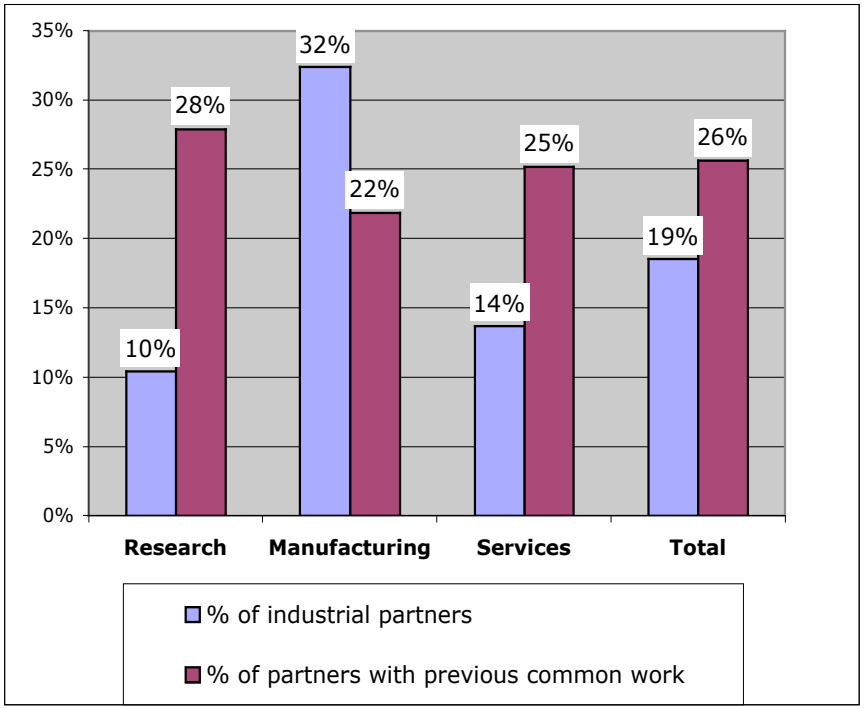
Project partners

- **1/5 from industry, ¼ with ex-ante collaboration experience**





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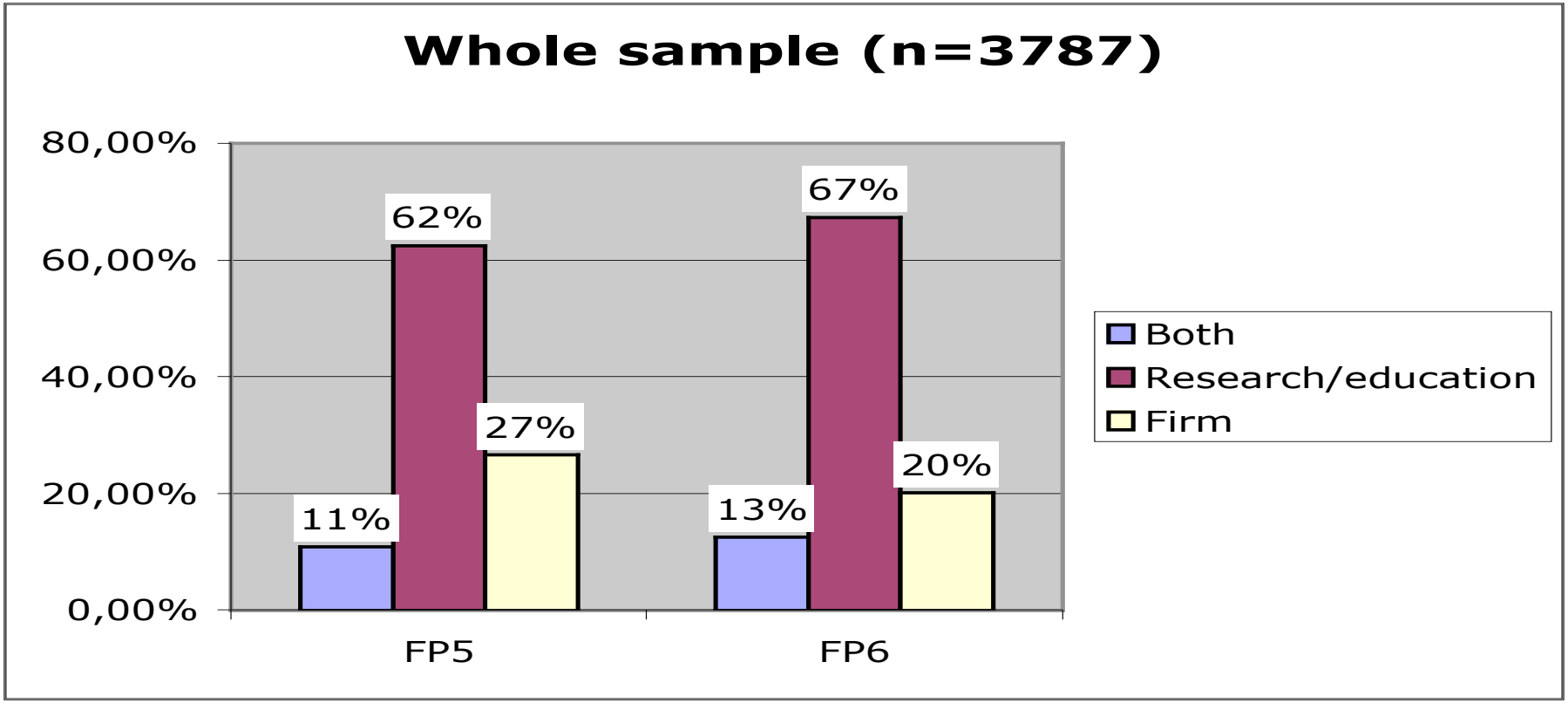
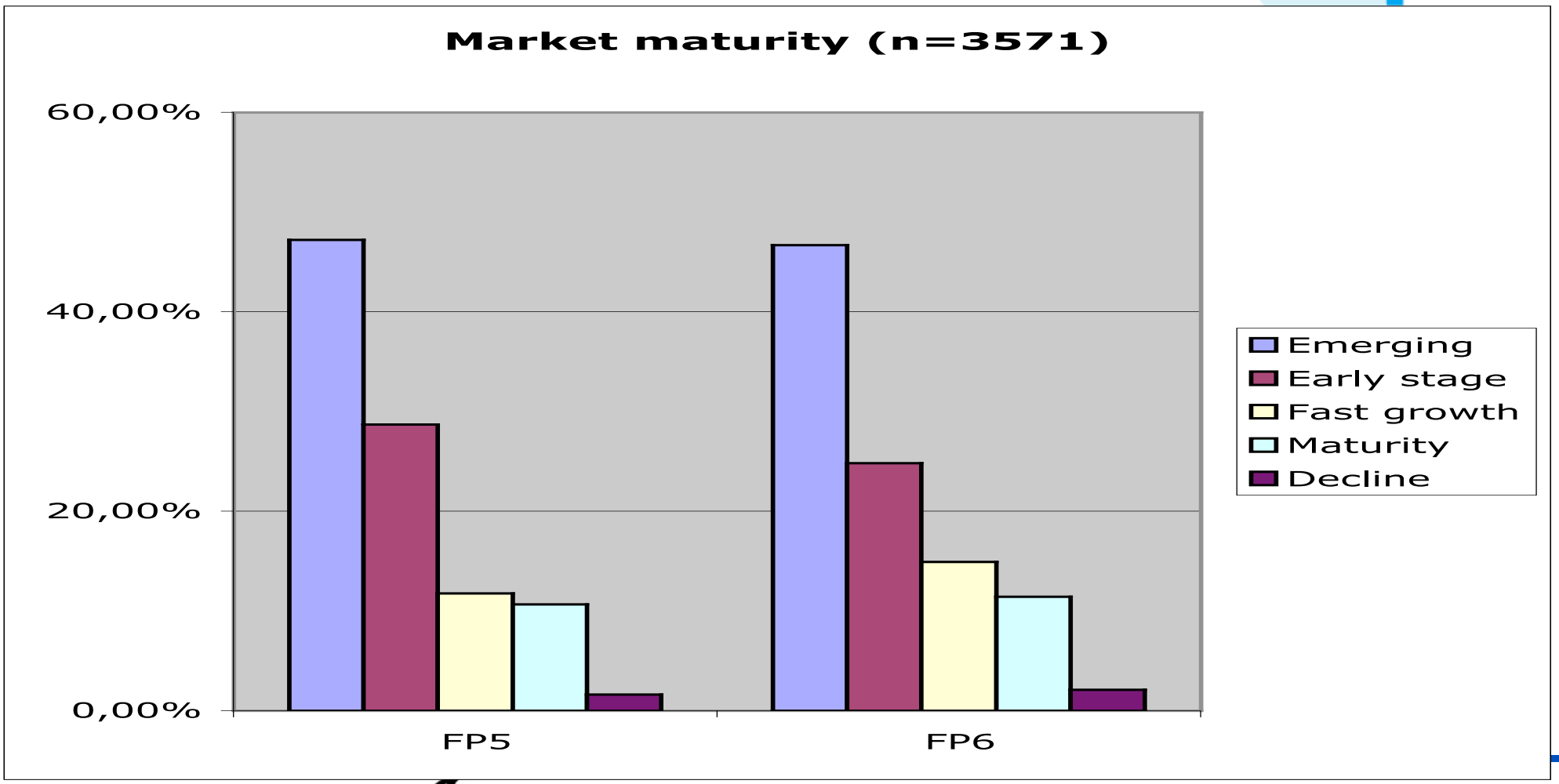
Project origins

- **Enterprise initiation: decreasing from FP5 to FP6**



Market context of projects



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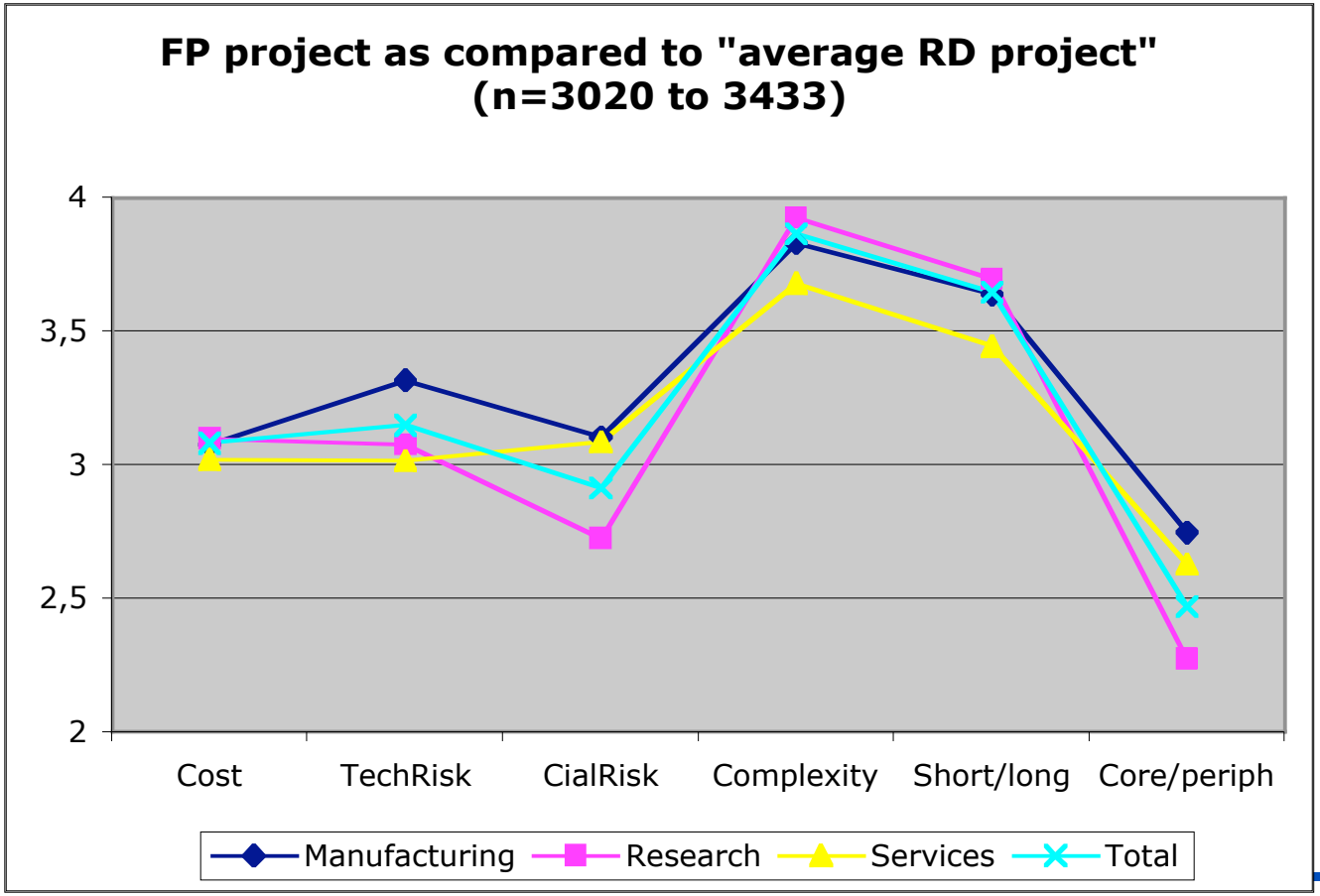
Project characteristics

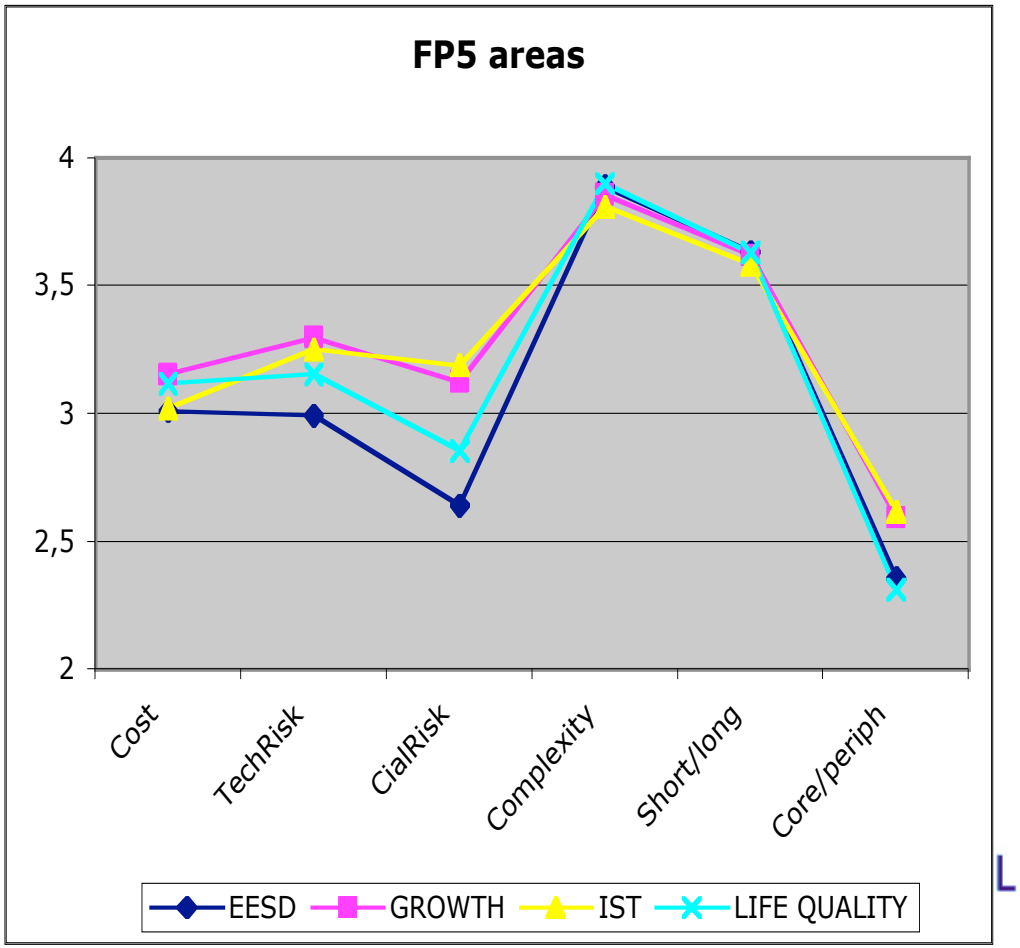
- FP projects compared to 'average R&D projects' have the following characterstics:
  - More complex and more long-term
  - A bit more risky regarding Sci/Tech risk
  - More to the core of activities / less peripheral
  - But look quite similar in terms of costs and commercial risk

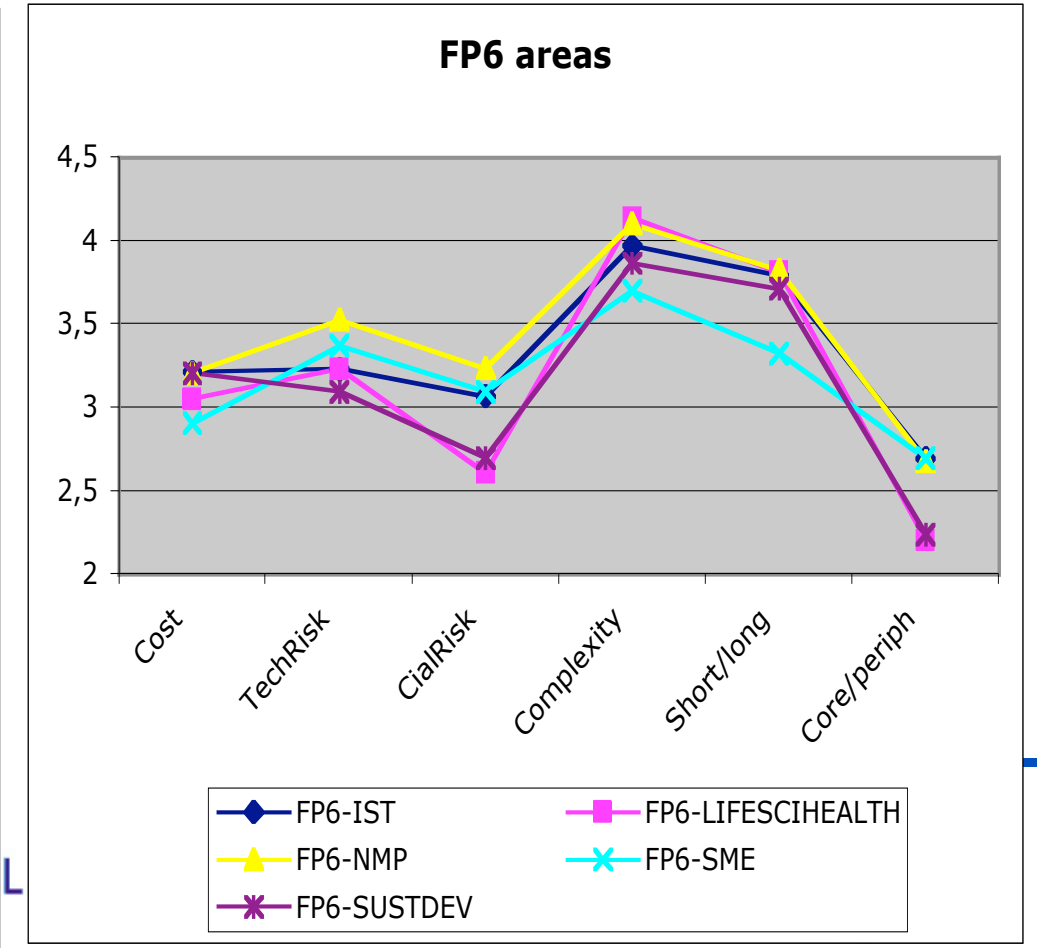


Project characteristics

Quite strinking similarities

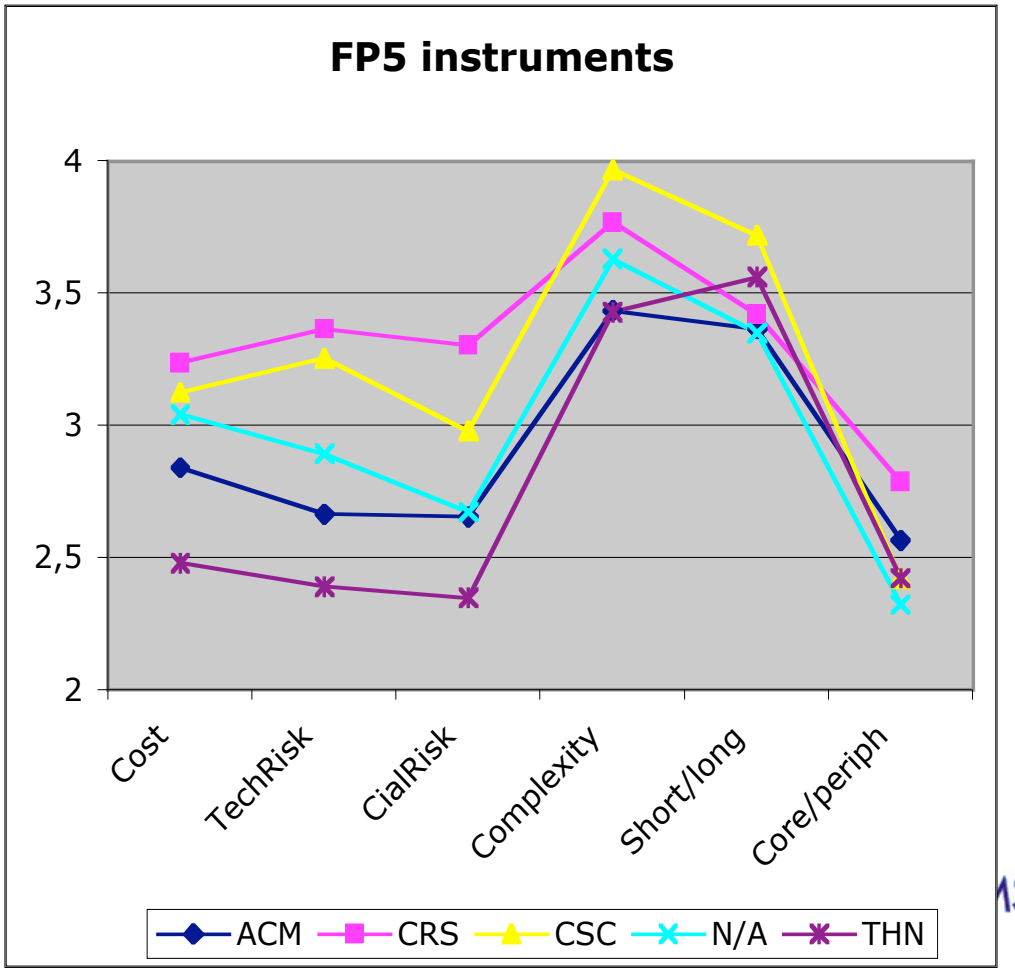
- **between FP5 and FP6 in terms of project characteristic**
- **between the thematic areas within the FPs!**

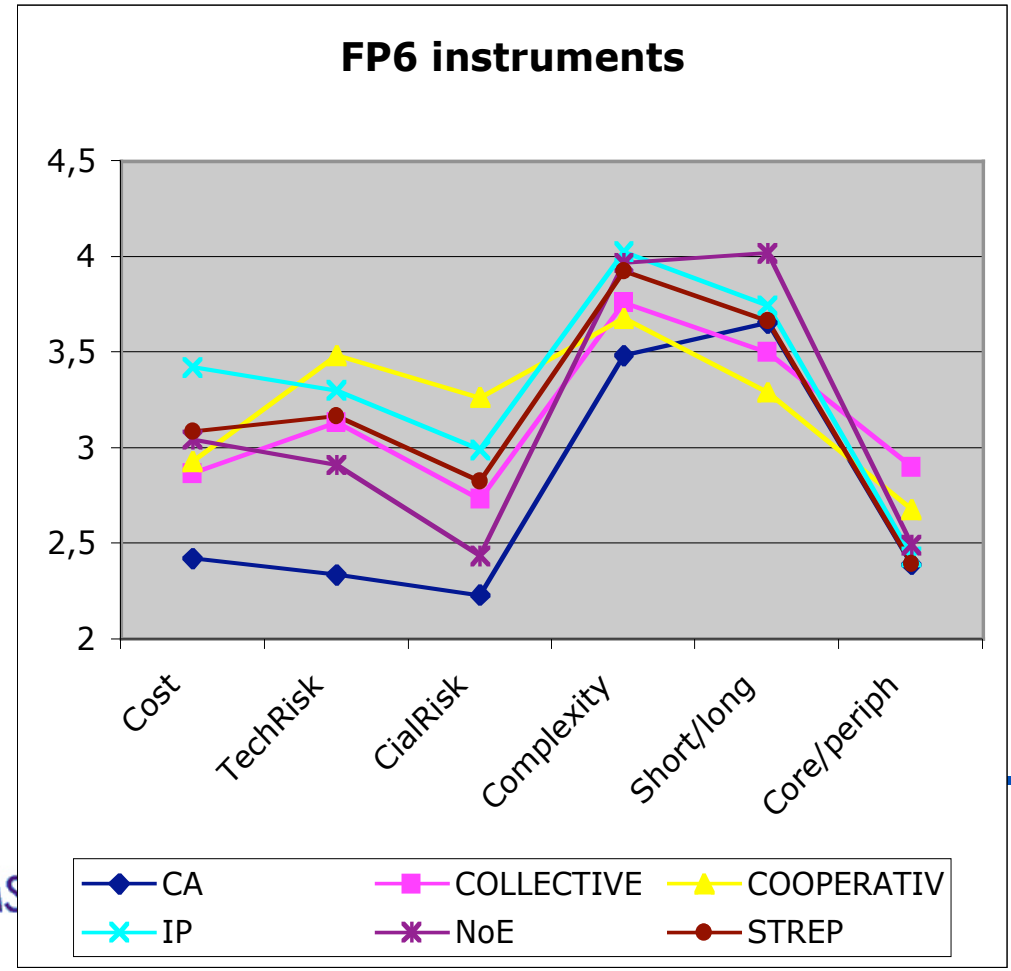




Project characteristics

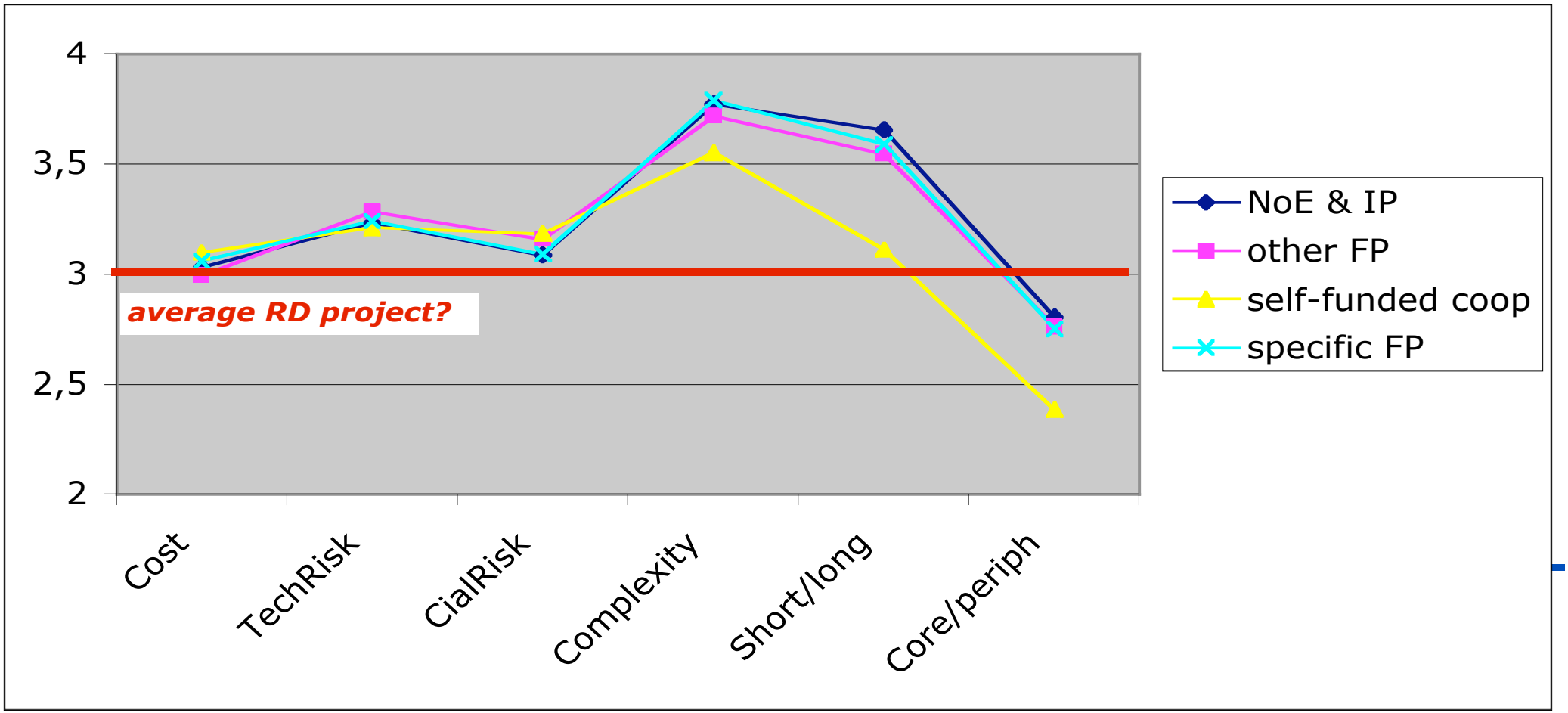
- There are some differences with respect to the different instruments, a diversity which gets more pronounced in FP6 !



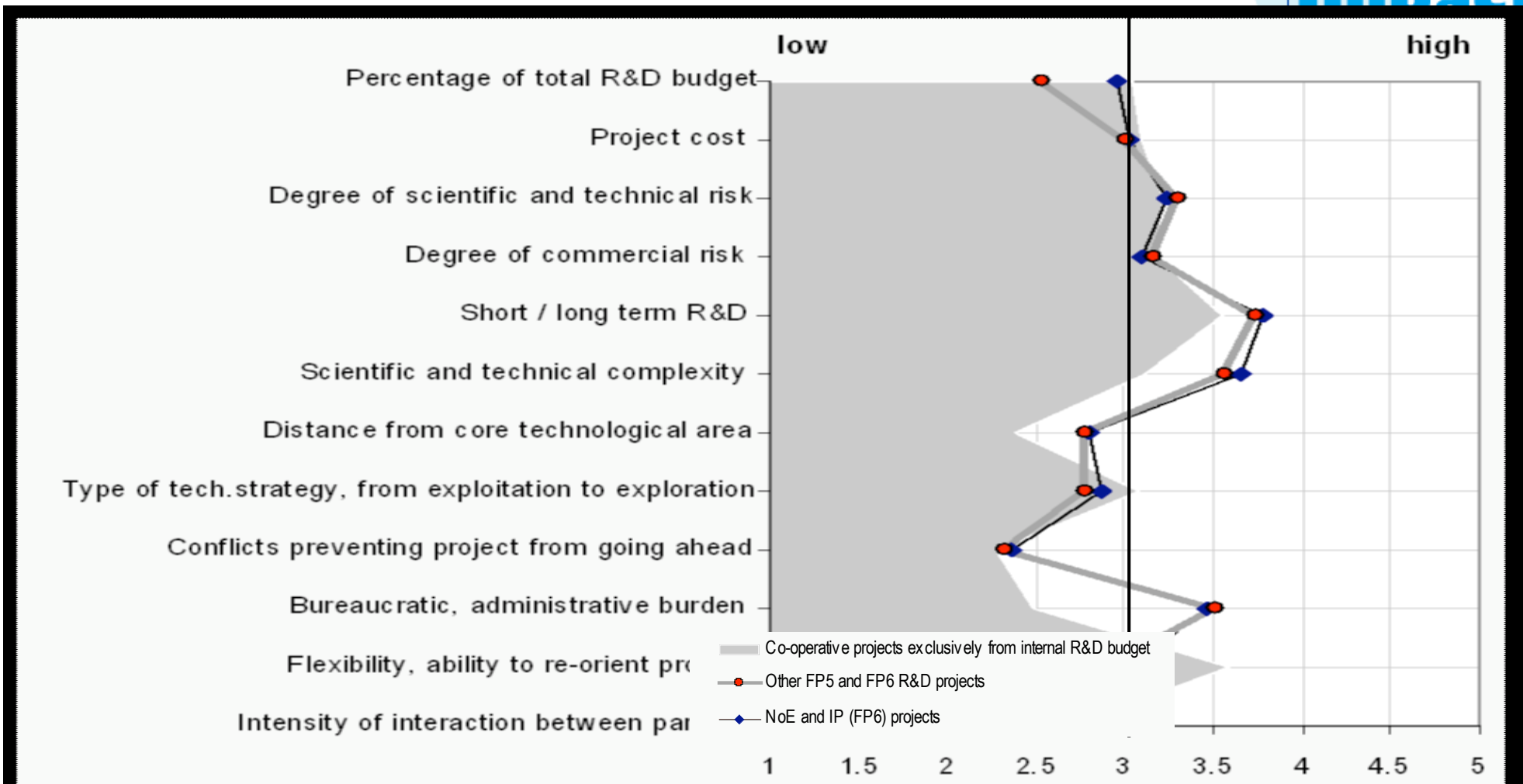


Project characteristics in comparison

- Project characteristics are very similar, except for differences in self-funded project



Project characteristics



(rem.: multiple answers were possible)

Diagram 6: Profiles of cooperative R&D projects (08; n=684-1244)

Project characteristics

- Profiles of projects are quite similar between FP5 and FP6, but different from cooperative projects carried out without public support
  - FP projects being more bureaucratic, less flexible
  - Less short-term, more complex and somewhat in distance to the core technological area

Project characteristics

- Most projects are part of a 'chain' of research

Diagram 1: past R&D, enterprises (Q13; n=1472)

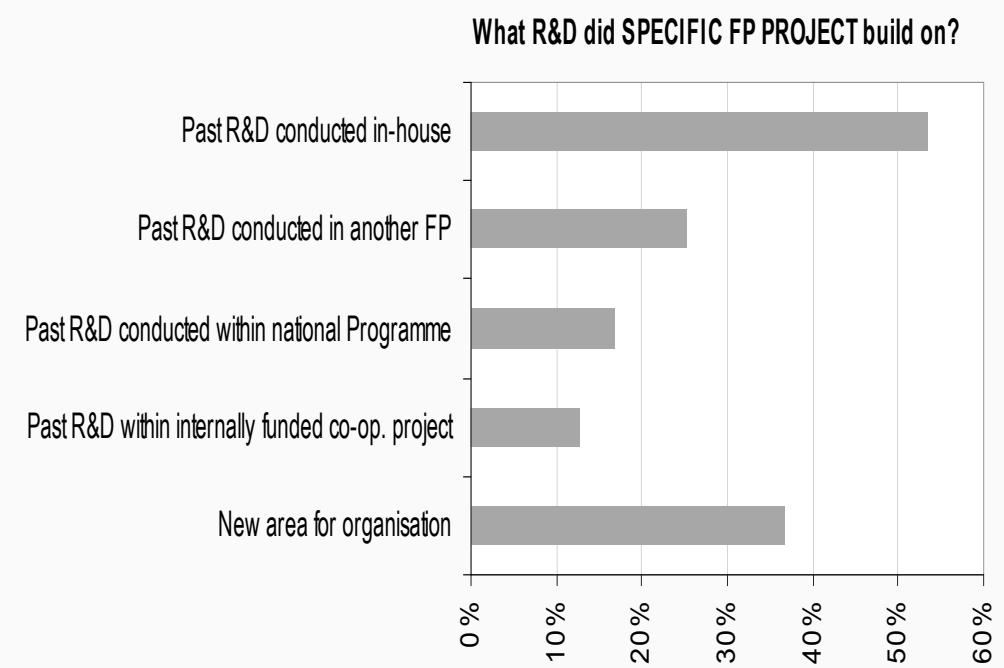
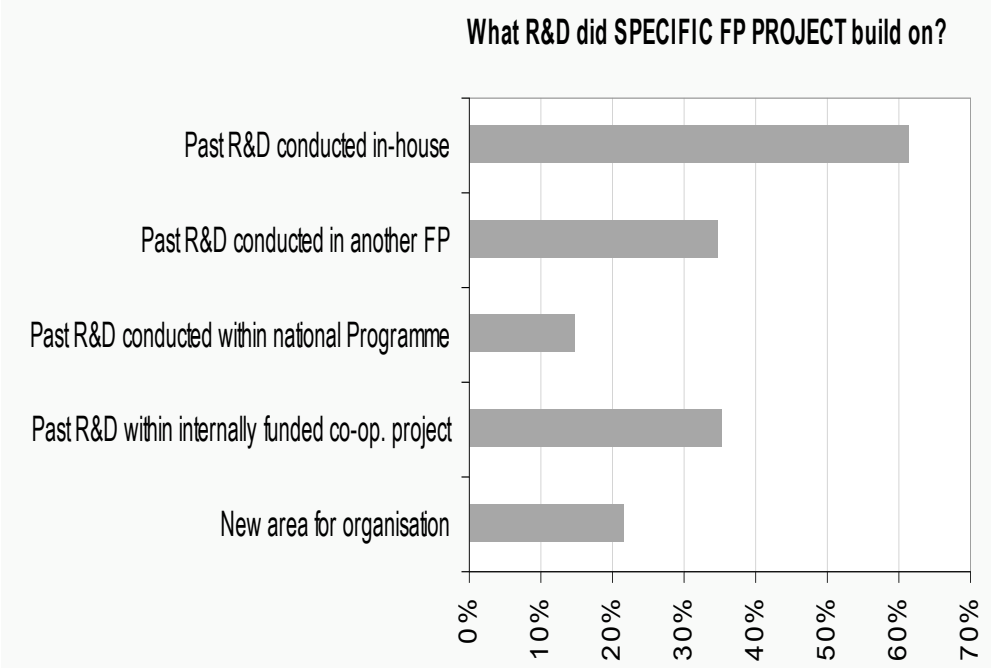


Diagram 2: past R&D, academics (Q13; n=2196)



Policy relevant observations

- Research Institutions are the main source of projects, Enterprise initiation is decreasing from FP5 to FP6 !
- Majority of projects in emerging and early stage development, no differences between FPs
- The FP projects have very similar characteristics
  - With respect to risk, complexity etc
  - Across different instruments, size classes, thematic areas, etc (WITH NOTEABLE EXCEPTIONS)
- ...but they differ from other (self-funded) collaborative projects
- Projects have a history and are part of a larger project portfolio

Project, Firm, Market Factors

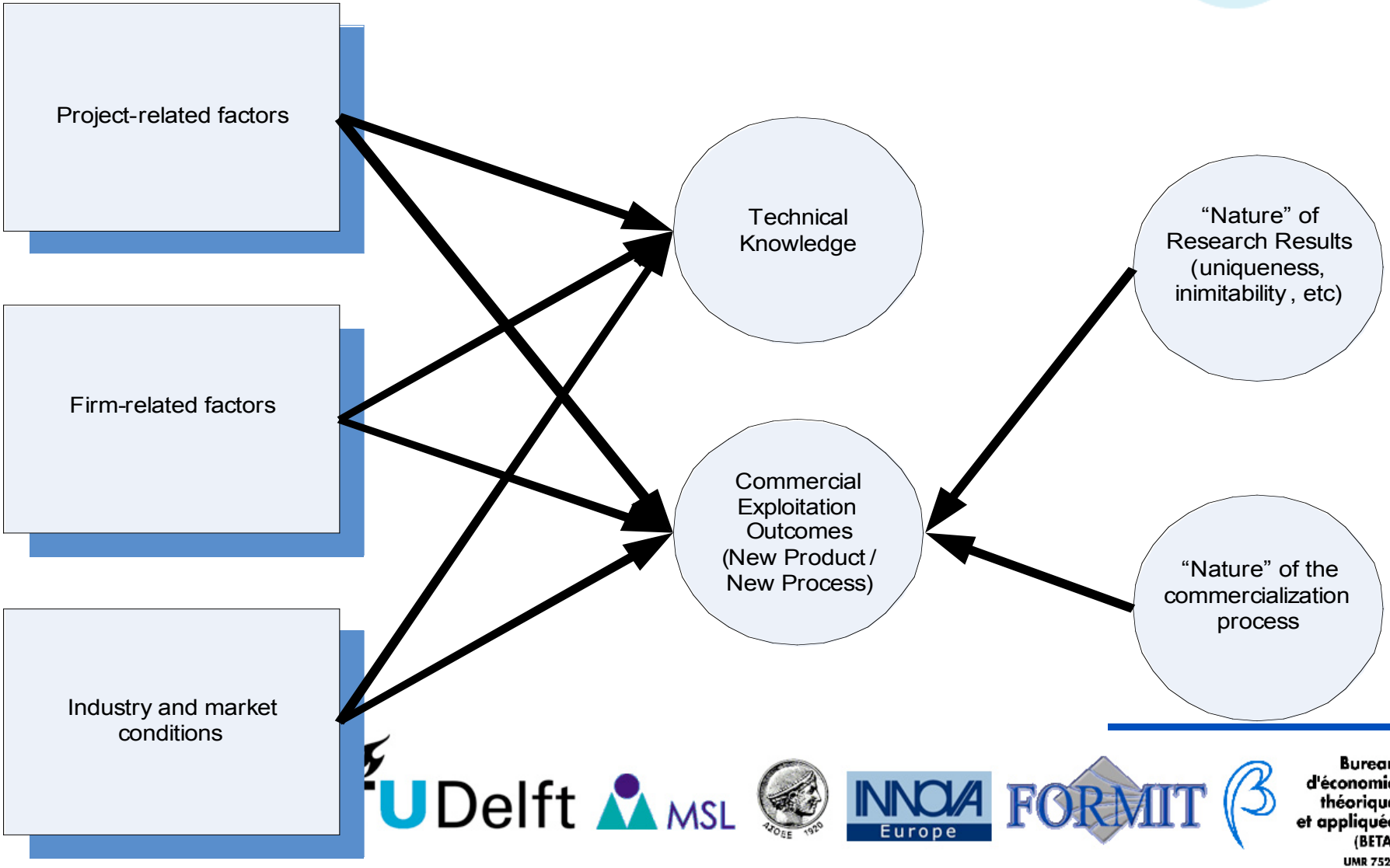
Which factors affect the performance of FP R&D projects?

- Our basic proposition:
  - *(a) the ways a project is managed;*
  - *(b) the resources, experience and capabilities of partners;*
  - *(c) market conditions;*
  - *(d) the character of the commercialization effort and problems confronted during the process; and*
  - *(e) the nature of the technology resulting from the project* ***significantly affect the innovation impacts of FP-funded R&D projects****.*

Innovation Impacts defined:

- ***commercially exploited outputs*** (products, production processes)
- ***technical knowledge*** obtained by the responding organization as a result of its involvement in a specific cooperative R&D project.
- Taken together, product/process innovation and creation of new technical knowledge will be considered to constitute ***project success***.

Our conceptual model



Methods

- Data
  - A total of 3379 enterprises (from manufacturing and services industries) had provided data at the time of this analysis, but we had a very large proportion of missing values
- Variables and measures validation
  - Scales and a number of categorical (dummy-coded) variables
  - CF analyses to establish construct validity
    - Tests of common-method bias: not a serious issue for this study

- Analytical methodology
  - Logistic regression for the dummy coded product / process innovation variables
  - OLS for technical knowledge
- Effective sample: 280 observations for the logistic regressions, and 526 for OLS

Main Conclusions

Main Results

- FPs attract the **'elite' of innovators** in Europe

- Firms do not consider the FP primarily as a channel for developing outputs that could be immediately commercializable. The dominant **objectives for participation** were reported to be

  "access to complementary knowledge and skills"

  "keeping up with state-of-the-art technological development"

  "explore different technological opportunities"

  There are differences in this respect between **large** and **small** firms. Indirect benefits (above) tend to reflect more the interests of larger companies. Closer attention to commercializable results is paid by smaller companies.

Main results

- FP projects tend to be viewed by participating organizations as vehicles for **exploring new areas**. More than forty percent of the projects were reported to be related to emerging markets.

  In contrast, self-funded cooperative R&D projects which are primarily used by the respondents for technology **exploitation** (closer to the market).

- Networks of Excellence and Integrated Projects appear to be used for projects of more exploratory nature.

Main results

- Compared to cooperative R&D projects funded exclusively with own internal funds, **FP projects** were reported, on average, to be characterised by:
  - longer term R&D horizon
  - greater interest in peripheral (read new area) technologies
  - more explorative nature
  - lower degree of flexibility and higher administrative burden

- Compared to the average R&D project, **FP projects** were reported, on average, to be characterized as:
  - more complex
  - more long-term oriented
  - riskier from a scientific and technical point of view
  - similar in terms of commercial risk

Main results

- Surveyed organizations were not very keen in keeping knowledge private with traditional **intellectual property protection** mechanisms such as patents. Firms appeared set on continuing with their regular IP protection strategies and not change them drastically for the FP.

- The **origin of the idea** for FP projects is overwhelmingly with research and education partners and has gradually shifted more in that direction in FP6. There are, however, differences between programmes.

Main results

- **Enterprises in competitive markets** with high innovation/ technology intensity seem best able to take advantage of EU FP funding for their innovation purposes.

- **Medium sized enterprises** seem to have reaped the largest innovation benefits from FP project participation.

- **First-timers** report to be relatively more successful in FP projects.

Main results

- **Prior experience of an organization with R&D** positively and significantly affects the likelihood of obtaining product innovation from FP projects.
- Projects that are **commercially driven**, **risky**, **complex**, and in a **new area** tend to be more successful in terms of innovation.
- A strong relationship between explicit **intention to commercialize from the outset of the R&D project** and project success.
- There is variety in the ways the results of FP projects are being taken further. Unfortunately, several cases indicated that often projects end up in a kind of dead-end with respect to commercialization.
- Case studies indicate that **project management** is a key enabling factor of project success.

Main results

- Substantial **input additionality** among smaller firms. Participation in FP4 and/or FP5 was associated with a significant jump in R&D intensity between 2000 and 2004 among firms of up to 100 employees.

- Several types of commercial outputs were reported by a large number of firms.

- Higher Risk (Sci/Tech, commercial), novelty of technology area, and new combination of partners (newcomers) increase the chance of **output additionality**

- Reported output additionality is not different between FPs and not markedly different between instruments.

  Differences reported between thematic areas in terms of output additionality. Higher in new areas (e.g., NANO)

Policy Implications

Policy insights

- Directly commercialisable output is not a core objective of the Framework Programme. Yet we find significant impact on innovation. Caution should be exercised in extensively modifying the Programme to further enhance direct innovation impact.

- Keep funding instruments simple. Maintain instrument continuity. Deep changes increase costs of Programme administration without demonstrably significant benefits.

- Rather than focusing too much on differences among instruments applied horizontally across all thematic areas, pay closer attention to the needs of the broad thematic areas and associated markets, and the needs of participating organizations.

- The current setup of the Framework Programmes carries the risk of occasionally being dominated by large companies in oligopolistic sectors – whether technology- and innovation-intensive, or not. Enhance the role of SMEs in the strategic development of the Programmes.

Policy insights

- The role of the traditional IP protection mechanisms (patents) as a general instrument to promote innovation must be qualified: take into account industry effects.

- Perceive the individual FP R&D project for what it really is: a single research instance among many for participating organizations. Do not expect huge (additional) impacts either on innovation or on the 'behaviour' of large participating organizations.

- SMEs indicate more positive results in terms of innovation in FP projects than their larger counterparts. They may deserve more attention on that basis.

Policy insights

- Successful – in terms of innovation – collaborative research projects often include:

  (i) one or more partners with strong research and innovation experience

  (ii) highly motivated partners that may include smaller companies that depend much on the specific project and/or new participants

  (iii) experienced coordinators who manage to align the diverse interests of the various partners with the needs of the collaborative research project

- Encourage commercialisation thinking at the proposal stage. Possibly provide the opportunity to innovators for a follow-up stage – or a follow-up project – where the commercialization of the research results is the core priority.

- Promote projects that are risky, technically complex, and in new areas.

Analyzing and Evaluating the Impact on Innovation of Publicly-funded Research Programmes

Wolfgang Polt and Nicholas Vonortas

Objectives

The overall objective of this study is to understand the interface between research, technological advancement and innovation, especially as it relates to the collaborative projects funded by the European Framework Programmes for RTD.

This objective will be studied along the following two broad lines:

- ***The impact of research management on the propensity to innovate:*** Identify and analyze the different ways in which RTD projects are managed through their life-cycle and understand if and how these management aspects affect the rate of commercial exploitation of the knowledge created.

- ***The impact of firm, industry, technology, and market characteristics on the effective utilization of research results for innovation:*** Identify and analyze the critical micro-economic factors other than R&D project management affecting the likelihood that research will lead to the introduction of new/improved products, services, or production process. These factors include the set of organization-specific, market, technology, and industry characteristics pertinent to innovation.

For this purpose, this study will:

1. Identify the different ways in which RTD projects are *managed* at all stages

2. Elaborate an understanding of how management aspects affect the *exploitation* of the knowledge created.

3. Define and identify other *critical factors* that can maximize the impact of research activities on innovation.

4. Identify and evaluate the impact of RTD projects under the EU Framework Programmes on the innovation performance of the participants.

5. On the basis of these findings, contribute to the improvement of Community Research and Innovation Programmes (FP, CIP) with respect to their impact on innovation performance.

2. Four Lines of Inquiry

I. Characteristics and Strategies of Organizations in the Framework Programme

The first line of inquiry looks at three very important questions: who participates, why, and how do they think about the FP projects in the overall scheme of things.

- **Q1:** *Which organizations* have participated in the FP and how can they be differentiated from those that have not participated, including both those who tried and failed and those who have never tried?

- **Q2:** *Why* did these organizations take part in the FP and what benefits did they actually receive from their participation?

- **Q3:** What role do the FP projects play in the overall innovation strategy of the organization? How do companies manage their RTD portfolios inclusive of FP projects?

II. Research Project Characteristics, Project Management, and Innovation

The second line of inquiry focuses on the collaborative RTD projects and the ways they are managed for more effective innovation.

- **Q4:** *What kinds of projects* did the participating organizations undertake in the FP and how do these projects compare, or relate to, others that they undertook either independently or in collaboration with others but with no subsidy?

- **Q5:** *Management practice* for collaborative RTD projects at all stages (design, application, implementation, post-project monitoring and exploitation of results)

- **Q6:** How do *project-level characteristics*, including consortium characteristics, type of prime contractor, managerial practice, and project-team dynamics affect the chances for research success and the chances of research result uptake for innovation and commercialization?

III. Critical Micro-economic Determinants of the Impact of Research on Innovation

The third line of inquiry concentrates on factors at the level of the organization and of the industry – including factors relating to the technological context as well as both the supply and the demand for innovative products and processes.

- **Q7:** How do firm-level characteristics including resources/capabilities, internal organization and management influence the likelihood of research result uptake for innovation and commercialization?

- **Q8:** How do industry and market characteristics affect the likelihood of research result uptake for innovation and commercialization?

IV. Lessons for Pogrammes Targeting Innovation

The fourth line of inquiry draws lessons for the improvement of innovation-related Programmes of the Community.

- **Q9:** What types of additionality with specific emphasis on innovation can be observed in FP5 and FP6? What can be done to improve additionality?

- **Q10:** What are the lessons for improving the RTD projects funded by the Community Research and Innovation Programmes (FP, CIP)?