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# The Assessment of the Socioeconomic Impacts of Public R&D programmes :

## The BETA methodology

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Presentation

## BETA evaluation method

- Scope & level of evaluation
- Scope & type of effects evaluated
- Quantification principles
- Results
- Main limitations
- Conclusions

## What can we evaluate with the BETA method :

### Public R&D Programme

- funded at least partly by State
- R&D activity is carried out
- agreement on R&D topic(s) and on operational goals
- limited in time
- (very often) broken down in projects

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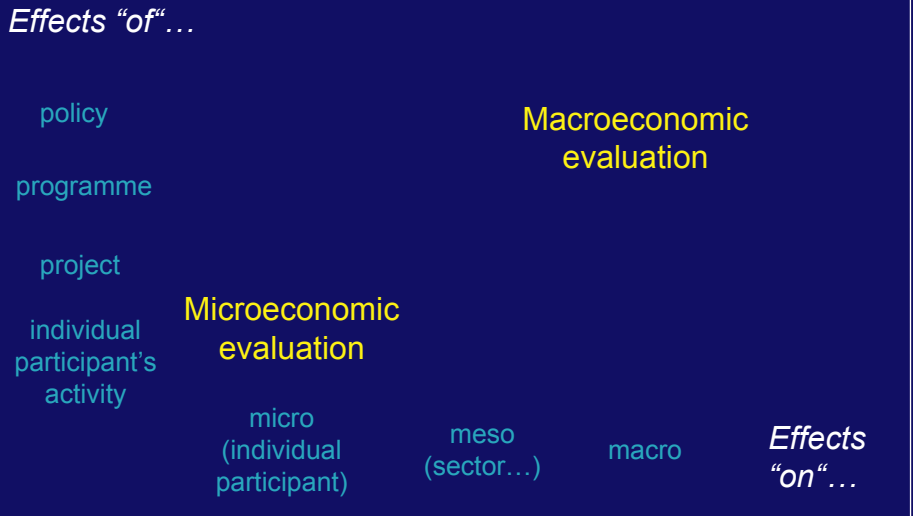
BETA method - general

Level of evaluation…two dimensions



## BETA method - general
Level of evaluation…two dimensions

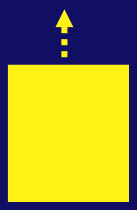
*Effects "of"…*

policy

programme

project

individual participant's activity



Scope of BETA method : Evaluation of effects for participants ONLY

micro (individual participant)

meso (sector…)

macro

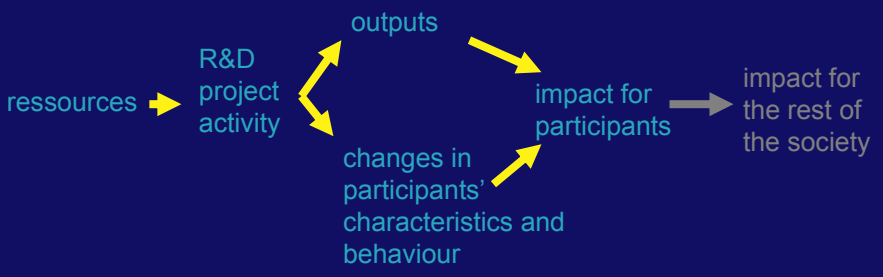
*Effects "on"…*



## BETA method - general
Data collection

- first hand data collected through direct interviews (with different staff)
- confidentiality agreement : no diffusion of individual results
- representative sample of programme participants

## BETA method - effects
Scope of effects




R&D activity corresponds to different learning processes leading to the creation/acquisition of a variety of new knowledge

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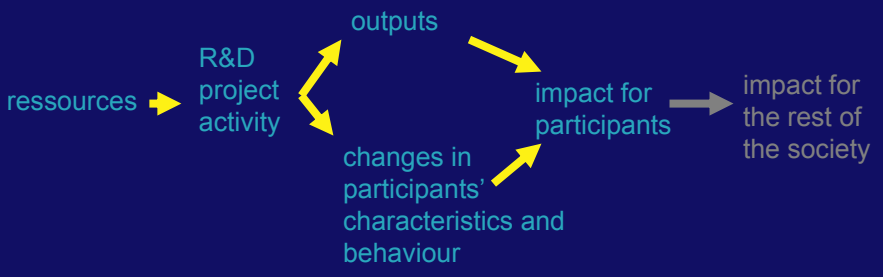
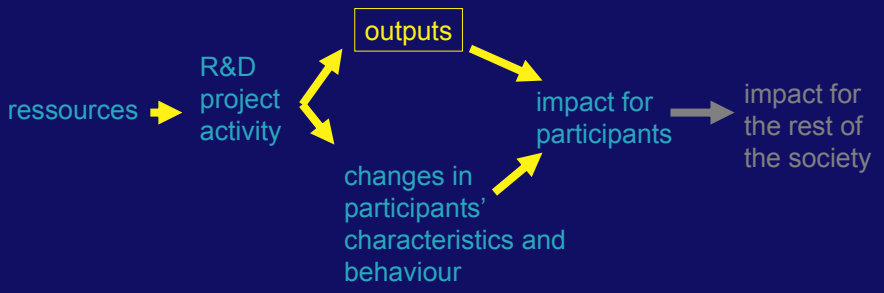
## BETA method - effects
Scope of effects




BETA approach attempts to identify those learning processes and the related knowledge, and to evaluate their actual or potential value for the participants (= impact for participants)

## BETA method - effects
### Scope of effects




Outputs : intermediate S&T outputs, products, processes, services = different forms of S&T knowledge
(codified vs tacit, embodied, embrained, etc)

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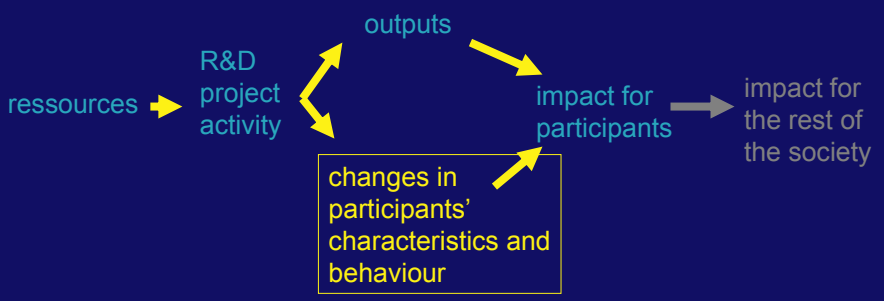
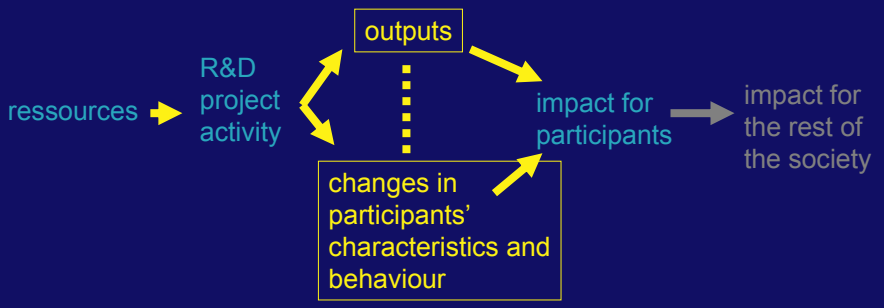
## BETA method - effects
### Scope of effects




changes in participants' characteristics and behaviour : methods, procedures, organisation, networking, image = different forms of process & relational knowledge

## BETA method - effects
### Scope of effects




Not only actual achievements but also changes in participants' capacity

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## BETA method - effects
### Direct vs indirect effects

- DIRECT EFFECTS : correspond to the objectives of the projects (defined at project's level)

- INDIRECT EFFECTS : correspond to all the other different learning processes experienced by the participants during the projects
  => 4 categories

## Technological effects

• Transfer of scientific and technical knowledge acquired or developed during the evaluated project to other activities of the participant.

• What is transferred can be of a very diverse nature: scientific expertise, workers know-how, artefact, new theories etc.

• The transfers lead to the design of new or improved products, processes or services which allow the participant to achieve new sales, to get new revenues from technologies, to protect existing market shares, to obtain new research contracts, or lead to the granting of new patents.

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BETA method - effects
Typology of effects

## Network effects

• Network effects : refer to the impact of projects on the creation and/or the reinforcement of cooperation with project partner or other entities, which results in other cooperations than the evaluated project itself.

## Reputation effects

• Reputation effects : by working on behalf of a given public programme, participants sometimes acquire a quality label or a good image, which is afterwards used as a marketing tool.

## Organisation and method effects

• transfer of organisational or procedural knowledge acquired or developed during the evaluated project to other activities of the participant : they occur when experience gained through the project allows the participant to modify its internal organization and/or to apply new methods in project management, quality management, industrial accounting and so on.

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BETA method - effects
Typology of effects

## S&T critical mass effects

• describe the impact of the project on the 'critical mass' relative to the human capital of the partner ie the range of competences related to more or less diversified scientific and technological fields, which are considered to be critical for the future development of the organisation.

## BETA method - quantification
General procedure

Direct effects

Indirect effects
- T N&R O&M
- T S&T CM

SALES
- New sales of new or existing products/services
- Sales due to lead time advantage
- Protected market shares for existing products/services
- New R&D contracts
- New revenues from S&T outputs

COST REDUCTIONS
- on purchase of materials, components, services
- on internal cost (incl. labor costs)
- time saved on other projects

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## BETA method - quantification
General procedure

Direct effects

Indirect effects
- T N&C O&M
- T S&T CM

SALES

COST REDUCTIONS

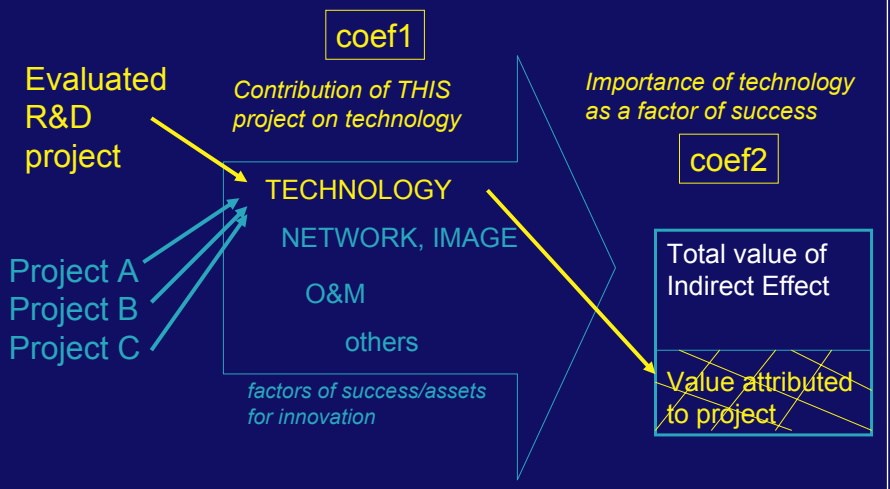
ADDED VALUE

Proxy value of S&T capacity = cost of building it up

Cost of holding non used patents

Salarial cost incl. overheads

## BETA method - quantification
### Project Fallacy & « Fatherhood »






## BETA method - quantification
### Minimal estimation

- systematic collection of minimal estimates for several data
- forgetfulness phenomenon
- impossibility to quantify some identified effects
- impossibility to indentify all effects

## BETA method
### Studies performed

| | |
|---|---|
| DENMARK (ESA Prog.) | 1987 |
| EUROPEAN SPACE AGENCY | 1980, 88 |
| CANADA - ESA Prog. (with HEC Montreal) | 1990, 1994 |
| EUROPEAN SPACE AGENCY - Techno Transfer | 1991, 1996, 2000 |
| Private Company - France | 1992 |
| EU / BRITE EURAM | 1993-1995 |
| ANVAR - France | 1995 |
| MATERIALS IRELAND -Ireland | 1995 |
| EU / ESPRIT-HPCN | 1997 |
| Petrobras Co - Brazil (with DPCT Unicamp) | 1999 |
| BRAZILIAN Space Prog. (DPCT Unicamp) | 2001 |
| EUROPEAN SPACE AGENCY – SMEs | 2003 |
| Japan R&D prog for medical equipmt (PREST) | 2003 |

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## BETA method - results
### Presentation of results

Quantitative results :
- collection of effects which are added for the sample of participants

Qualitative results :
- effects crossed with participants and/or projects characteristics (ex. SMEs vs Big firms vs public labs; type of research; type of collaboration between partners; etc)

## Quantitative results

| | |
|---|---|
| Number of projects surveyed | 50 |
| Number of participants | 176 |
| Number of measured economic effects | 632 |
| Ratio of direct effects/EEC fundings | 13.3 |
| Total direct effects in MECU 91 | 522.5 |
| Ratio of indirect effects/EEC fundings | 4.1 |
| Total indirect effects in MECU 91 | 160.8 |
| Technological | 76.5 (47.6 %) |
| Network, Reputation | 16.5 (10.3 %) |
| Organisation & Methods | 18.6 (11.6 %) |
| Critical mass | 49.2 (30.6 %) |

*Brite-Euram study for EC-1993/95*

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BETA method - results
Presentation of results

## Qualitative results

- Firms associated with university generate more DE and IE than firms not associated.
- Presence of PRO in a consortium allows process of generating IE to be accelerated
- Big firms obtain better results than SMEs in terms of effect generated
- Coordinating the project (prime partner) is not an advantage in terms of effect

- scope of effects
  - restricted to partners involved in evaluated programmes
  - => effects for the whole society ?
- evaluation process
  - amount of work (interviews)
  - risk of forgetfulness phenomenon (cf minimal estimates)
  - risk of subjectivity (cf multi-interviewees)

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BETA method - general
Main limitations

- still limited tools to take into account effects related to changes in participants' capacity
- complexity of the method :
  - problem for presenting results and data acquisition process,
  - misinterpretation of results,
  - comparison with other results,
  - appropriation problem

## Conclusion

- If goal of evaluation is to obtain a set of helpful indicators => Not use BETA method
- If goal of evaluation is to understand impact of a specific programme on the evolution of firms' innovation capacity => BETA method
- Quantification should be used in relative terms to explain differences of behaviour between various actors (not in absolute terms – not indicator)