



EUROPEAN FOREST INSTITUTE

Mapping innovations in forest bio-economy

www.efi.int



Background

- Standing Committee on Agricultural Research (SCAR) (established in 1974)
- advice on European agricultural and wider bioeconomy research
- 37 different countries
- 5 SWG (Forest)





Aim

Review and synthesize existing updated information about forest bio- economy research and innovation in Europe.

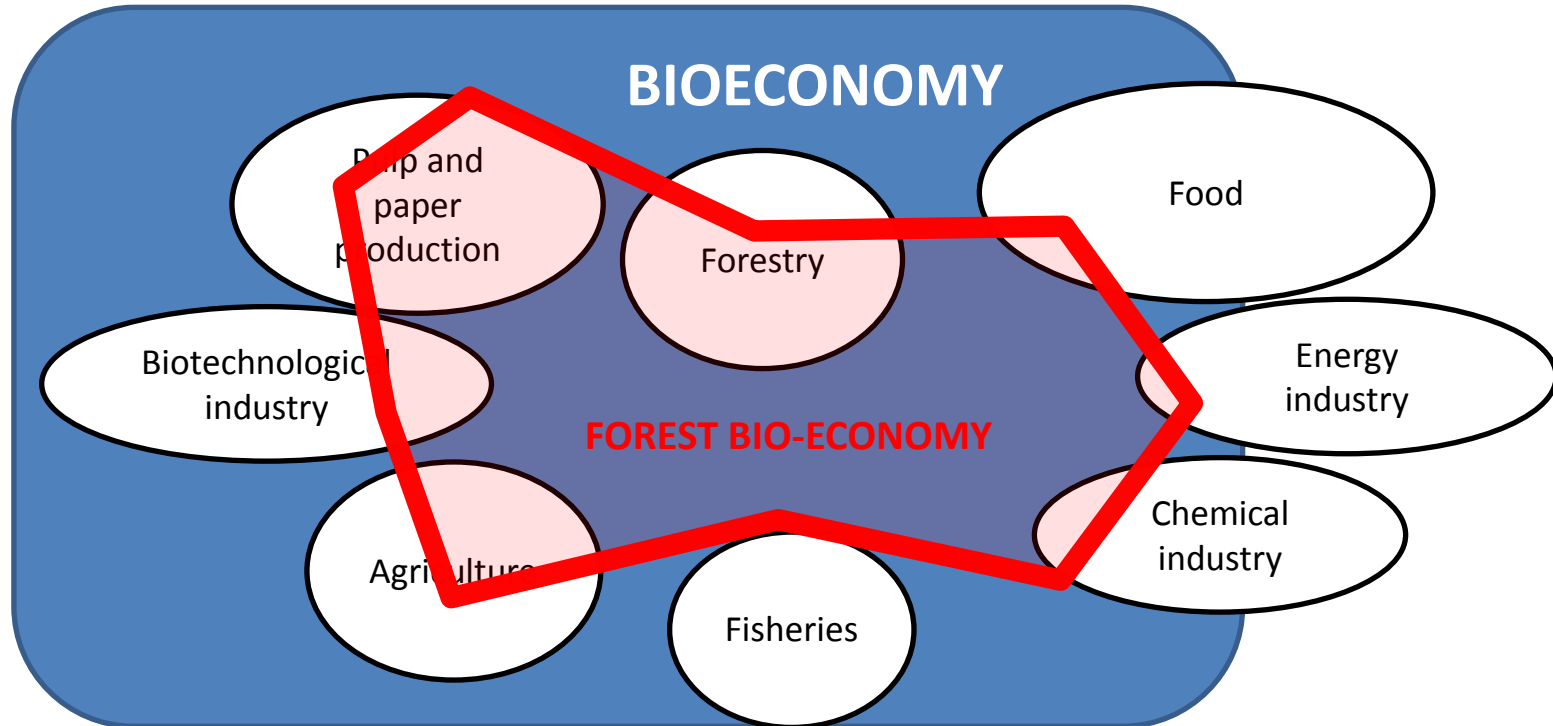


Defining the scope of the study

- Selection of topics from:
 - H2020 project: ERIFORE project
 - Era-Nets: WOODWISDOM, FORESTERRA and SUMFOREST



Defining the scope of the study





Defining the scope of the study

1. FOREST SYSTEMS

- 1.1. Forest inventory and economics
- 1.2. Sustainability assessment
- 1.3. Forest ecosystem services
- 1.4. Non-wood forest products

2. FOREST BIOMASS & RAW MATERIALS

- 2.1. Forest management
- 2.2. Tree breeding and forest biotechnology
- 2.3. Wood properties
- 2.4. Wood supply chain
- 2.5. Recycled wood and fibers

3. PRIMARY PROCESSING

- 3.1. Wood processing
- 3.2. Pretreatment technologies
- 3.3. Pulping
- 3.4. Bioenergy

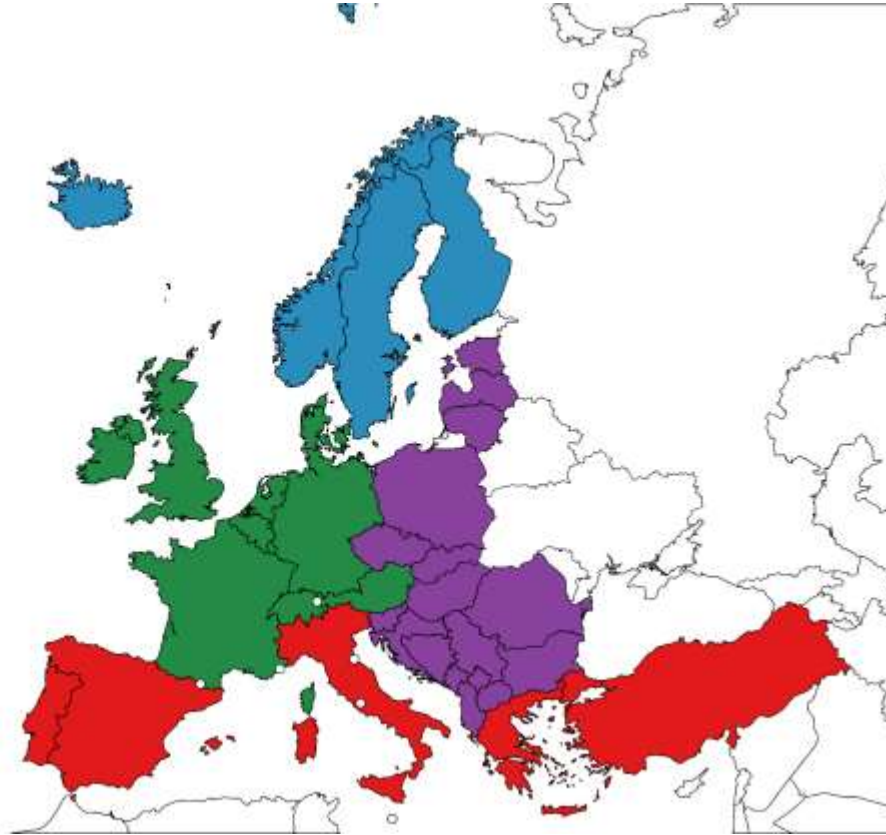
4. SECONDARY PROCESSING

- 4.1. Construction and final wood products
- 4.2. Chemical conversion
- 4.3. Bioprocessing and biotechnology
- 4.4. Biopolymer processing
- 4.5. Fiber technologies
- 4.6. Other bio-based final / high value products
- 4.7. Biorefinery
- 4.8. Downstream processing



Regions of Europe

- East Europe
- Northern Europe
- Southern Europe
- Western Europe



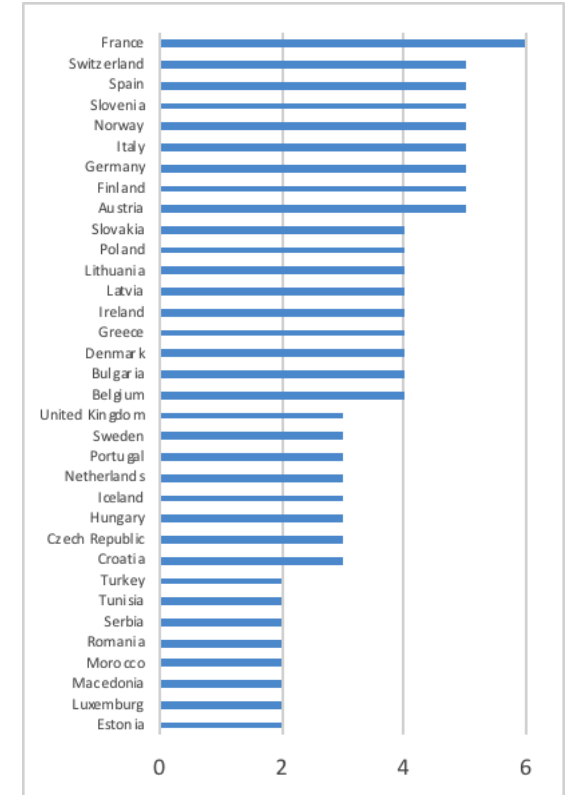


1. Research capacities



Data

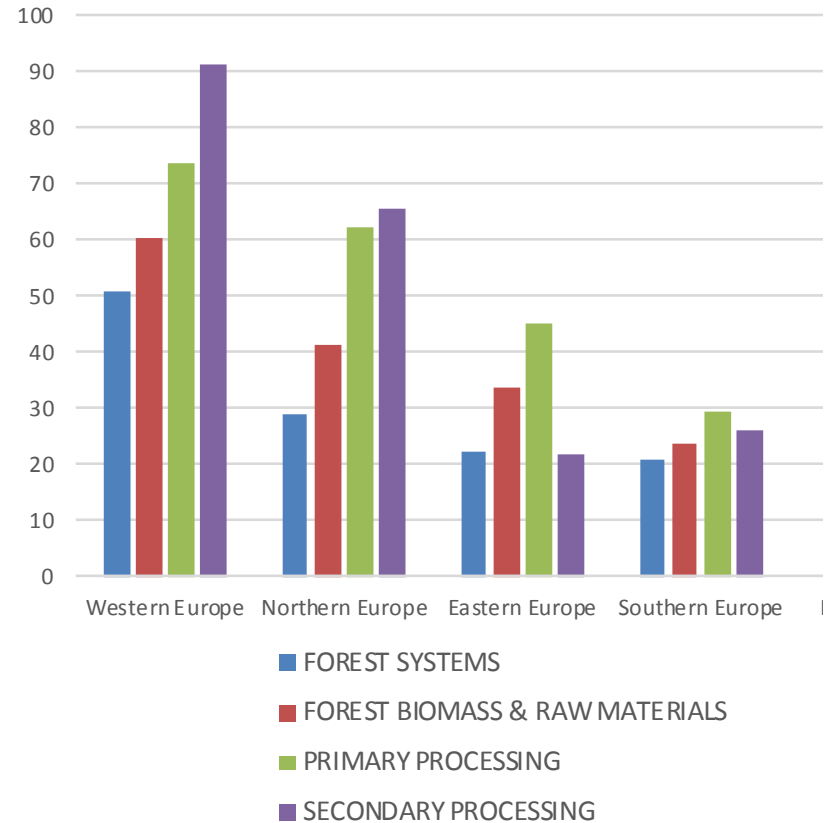
- **Compilation of previous mapping exercises**
 1. Country
 2. Region
 3. Topic
 4. Organization
- **Data normalized by topic and country**





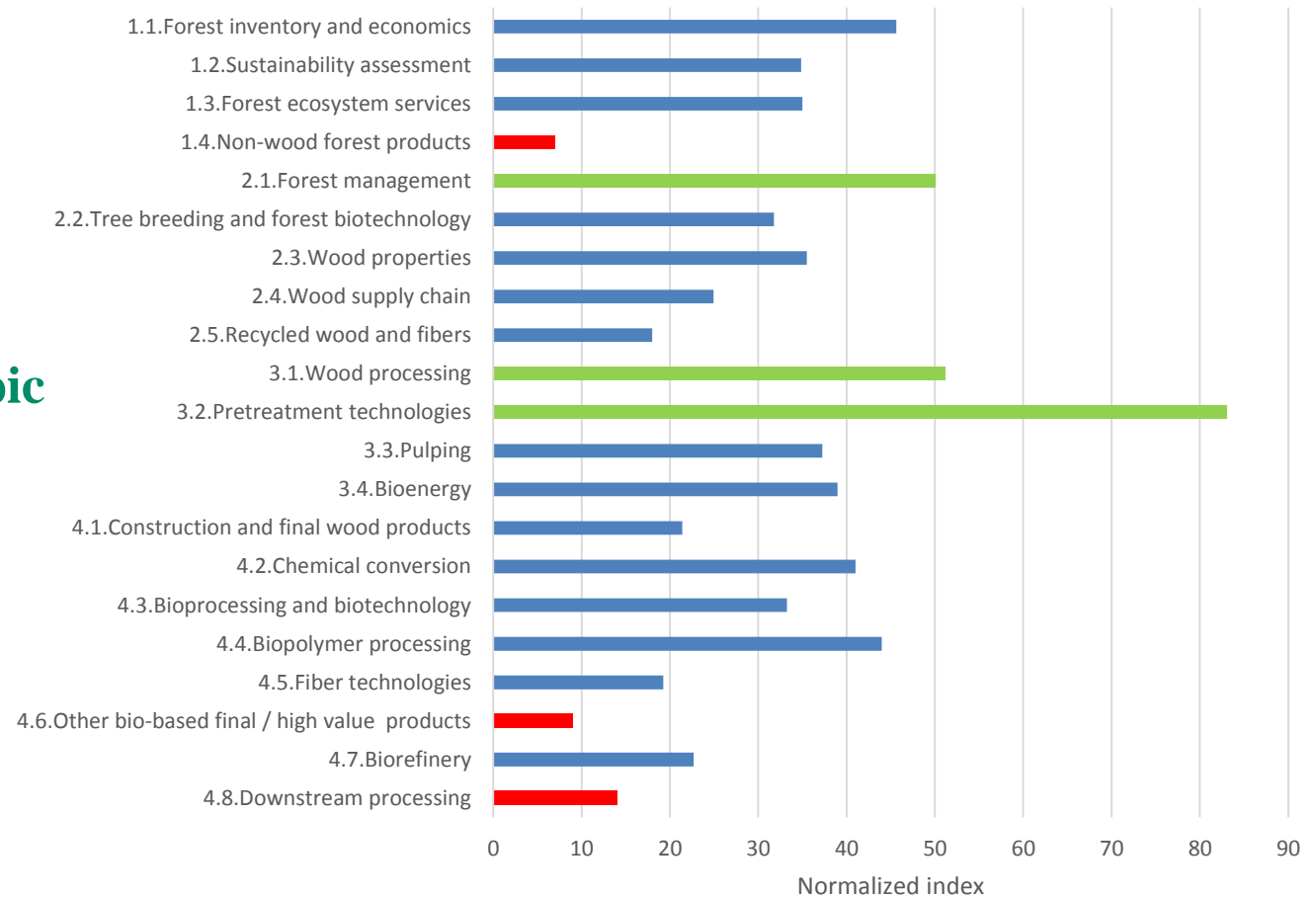
Research capacities by region and category

- All regions have capacities in all areas
- Secondary processing "stronger" in northern and western Europe





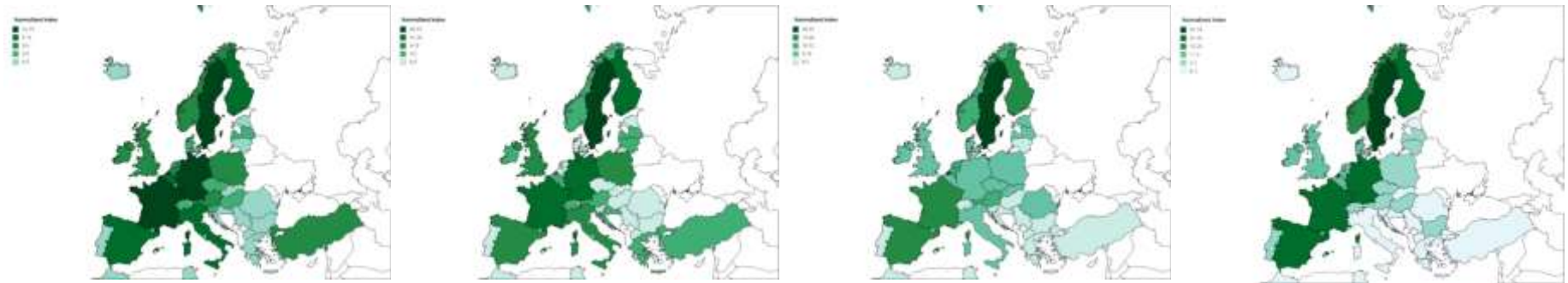
Total capacity by topic





Capacity by countries

- uneven distribution
- Sweden, Germany, Finland, France and Spain account for 49% of research capacities



Forest system

Forest Biomass
& Raw Materials

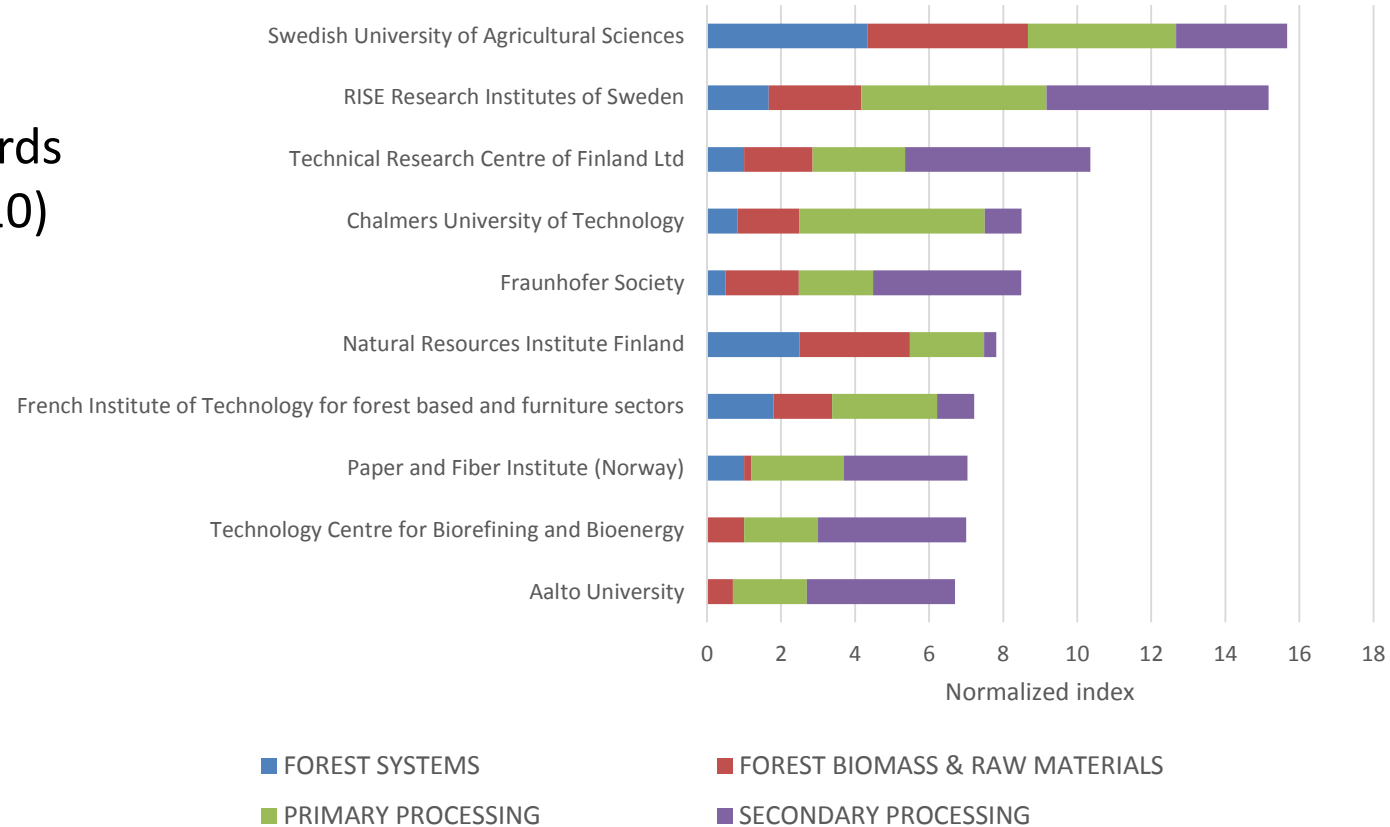
Primary processing

Secondary
processing



Capacity by organizations

- Strong bias towards north (7 of top 10)





2. Research funding

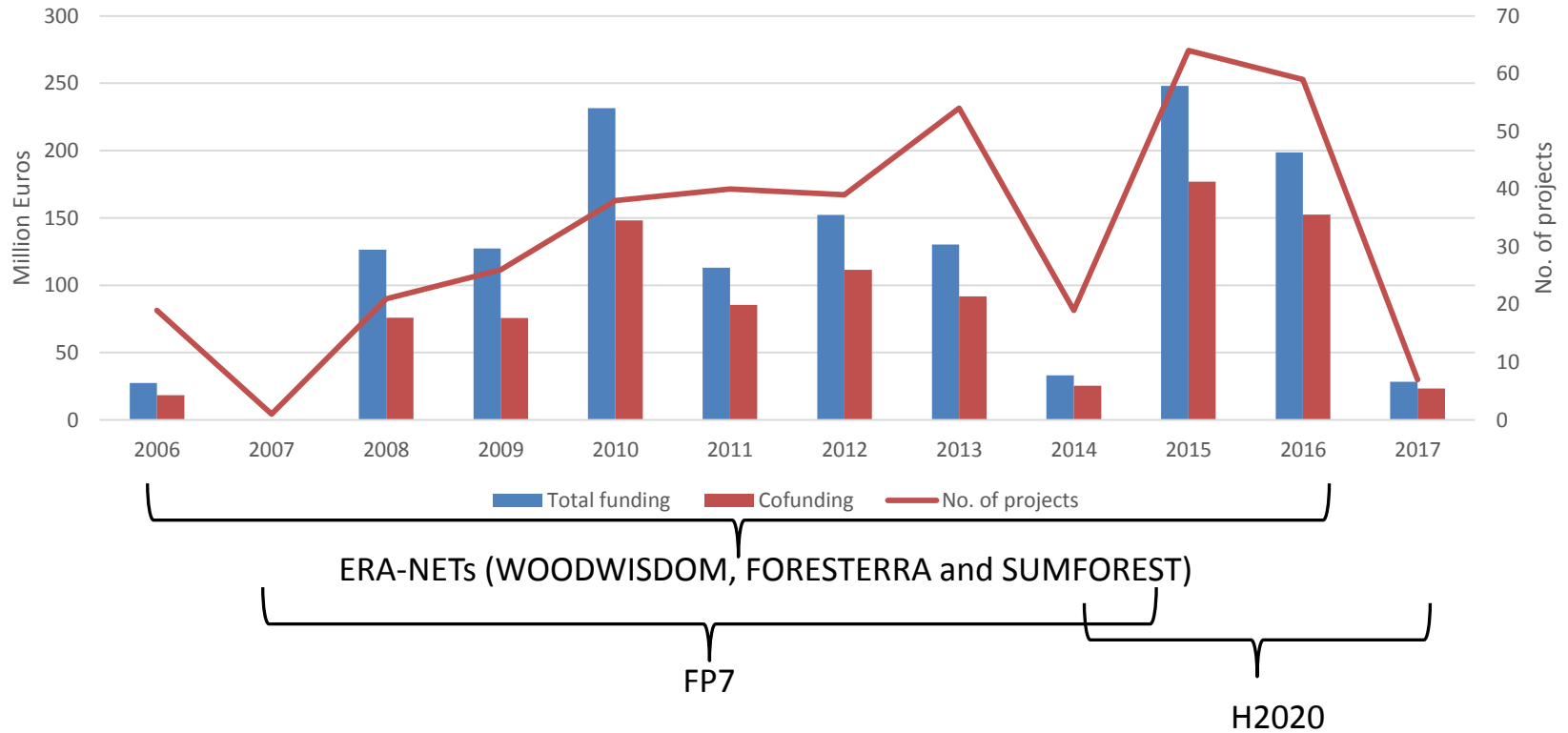


Data

- **Analysis of EC's CORDIS data sets**
 1. Country
 2. Region
 3. Project
 4. Year
 5. Funding framework
 6. Topic
 7. Organization
 8. Total and EC Funding (normalized to 2017 values)
- **Projects selected based on FTP database on forest-based projects and CORDIS database**

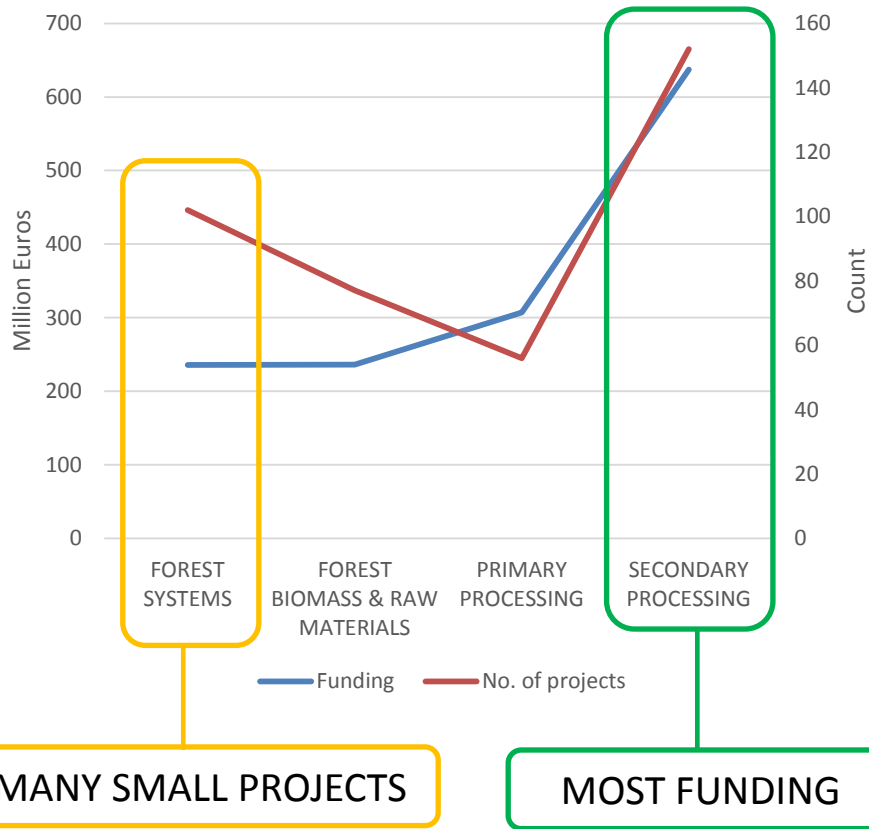


Financing

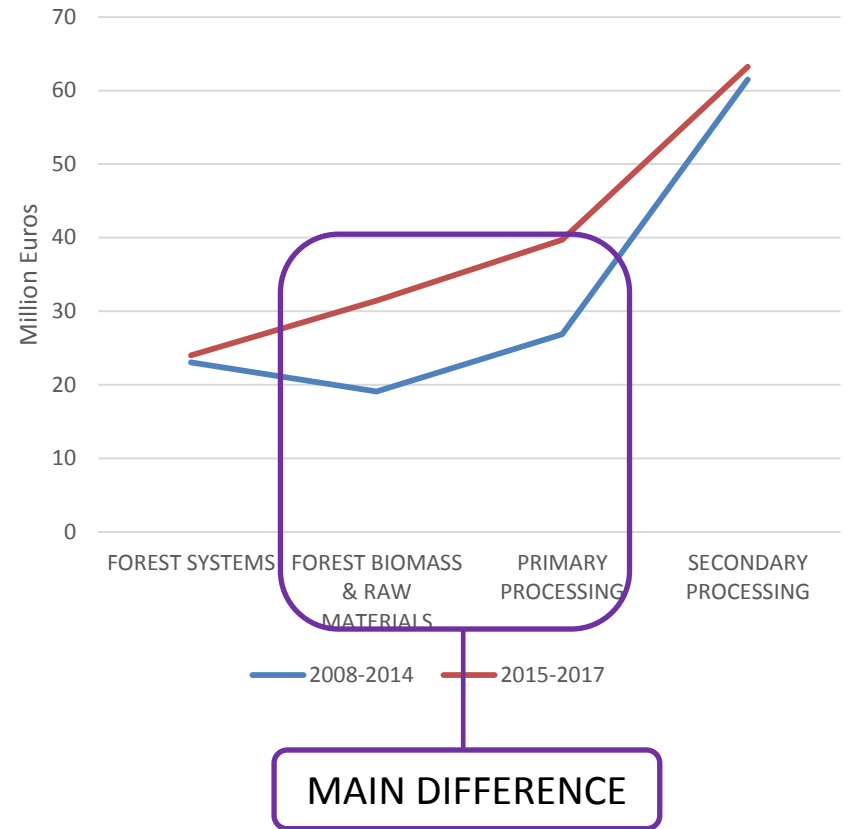


- Considered 387 projects, 1.4 billion EUR, 1978 partner organisations

Total funding and number of projects

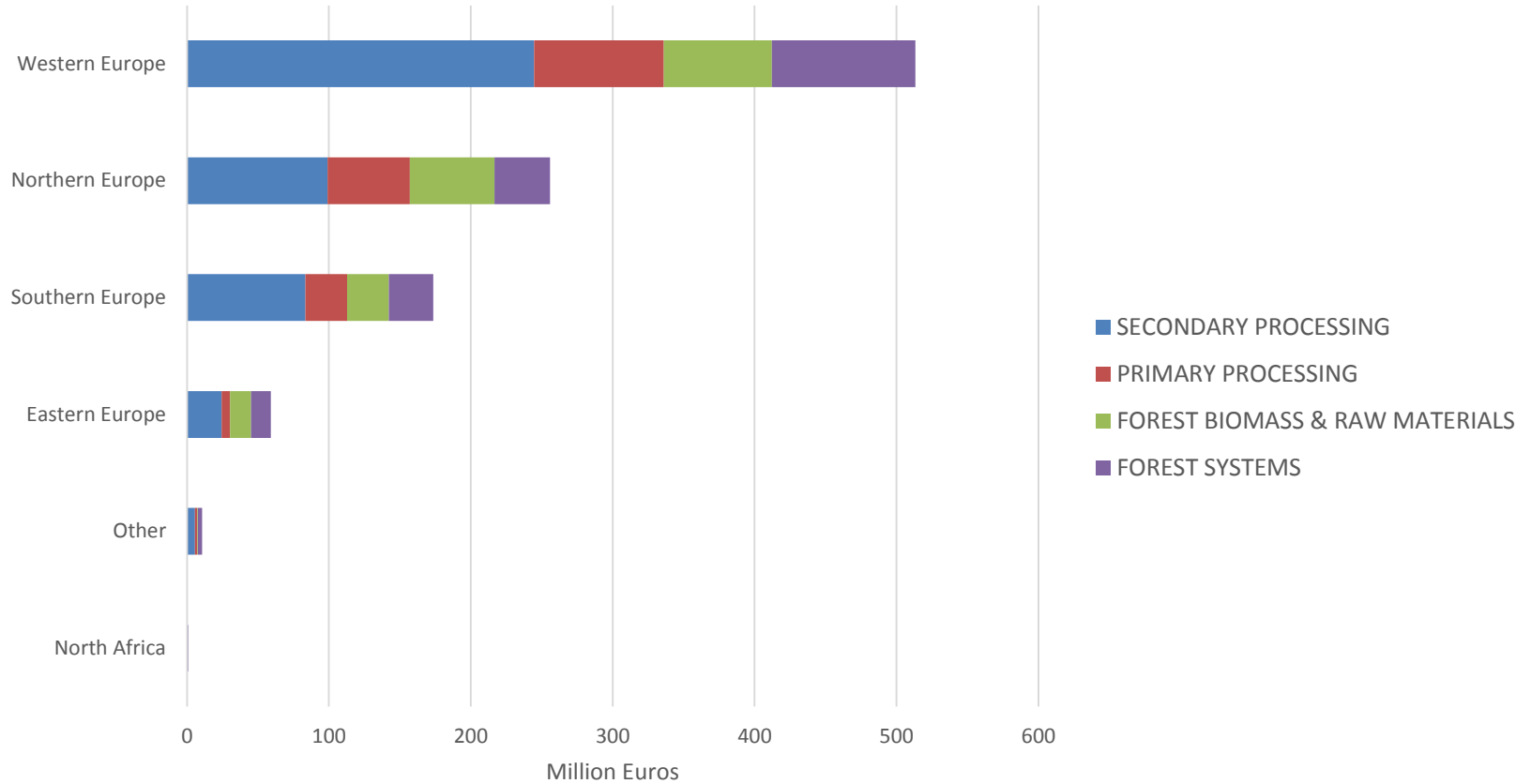


Average annual funding



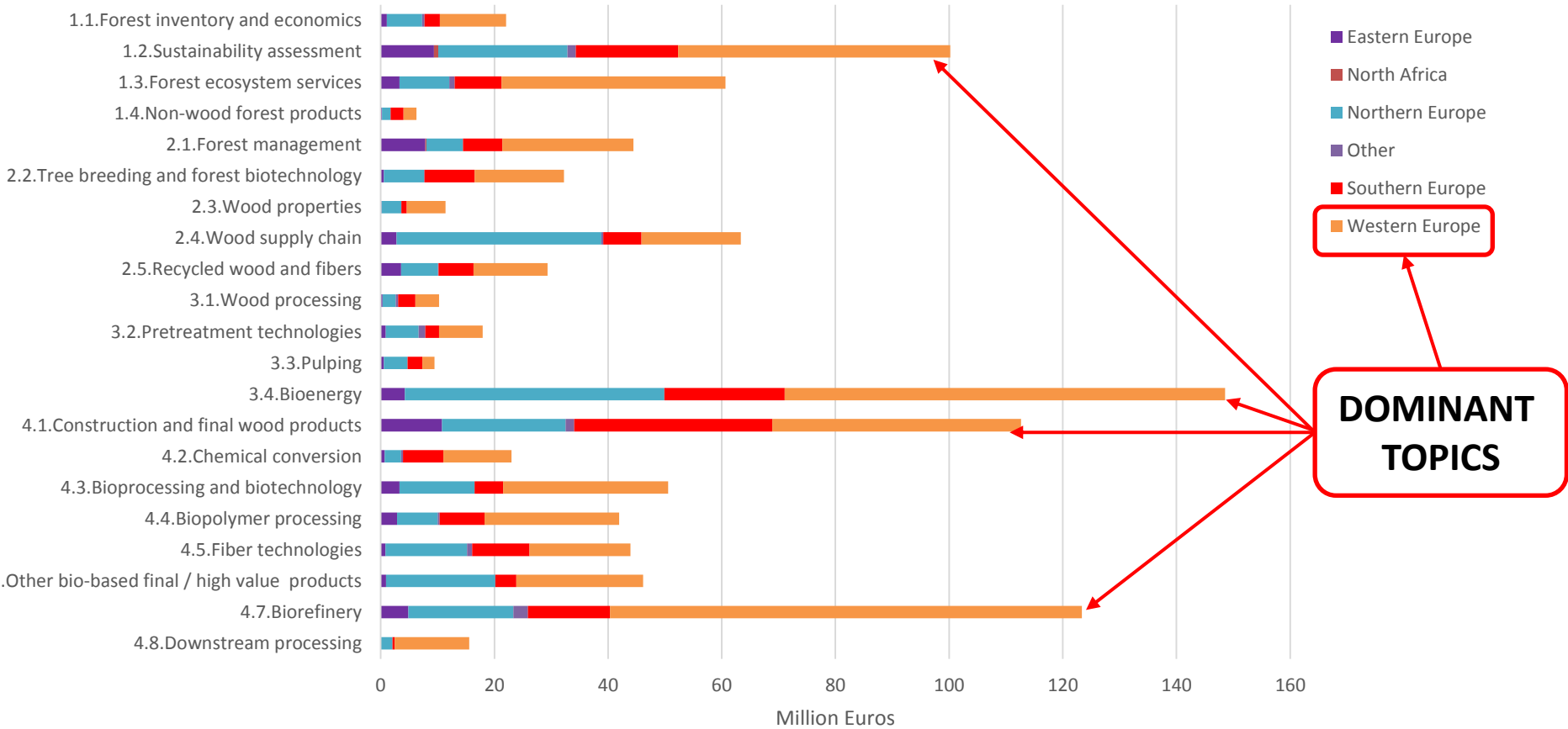


EC funding by region





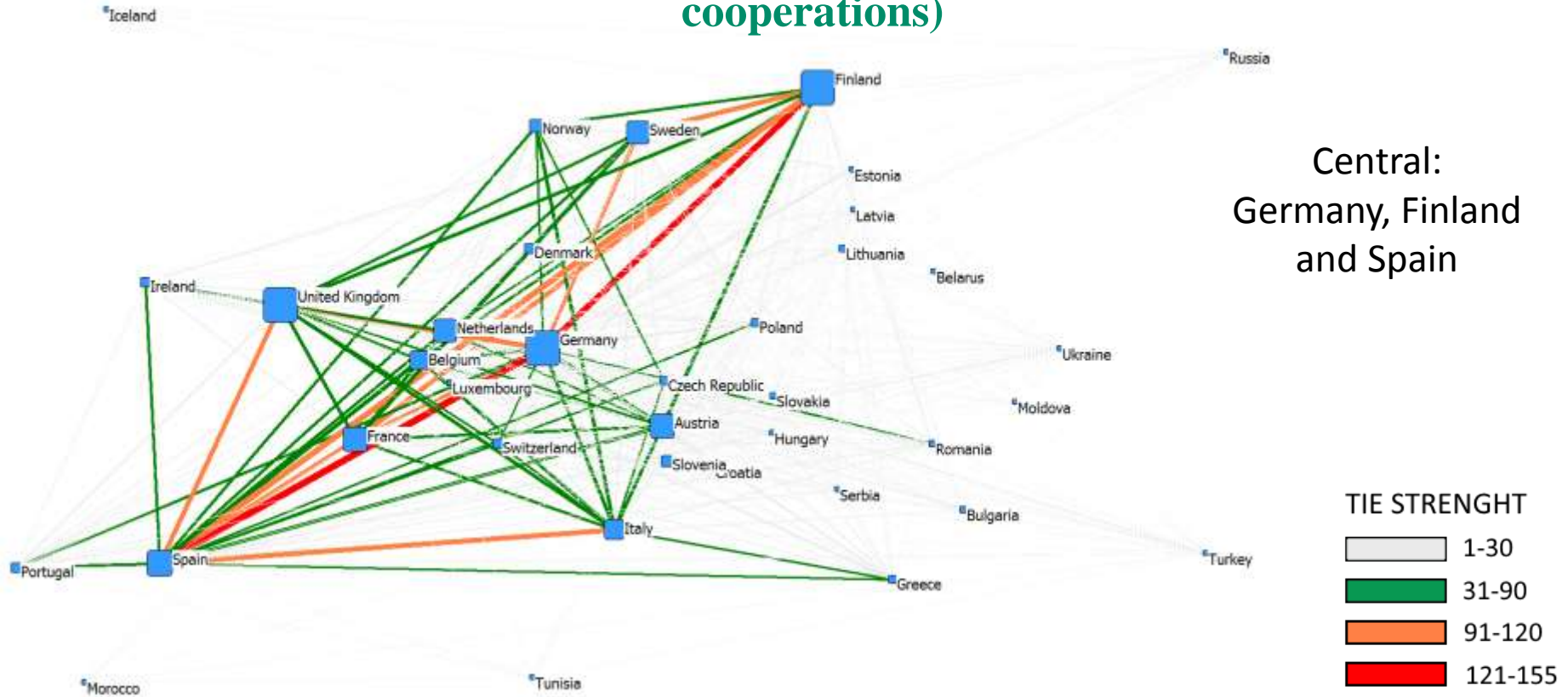
EC funding by region and topic



DOMINANT TOPICS



Cooperation between countries in **Forest systems** (count of project cooperations)

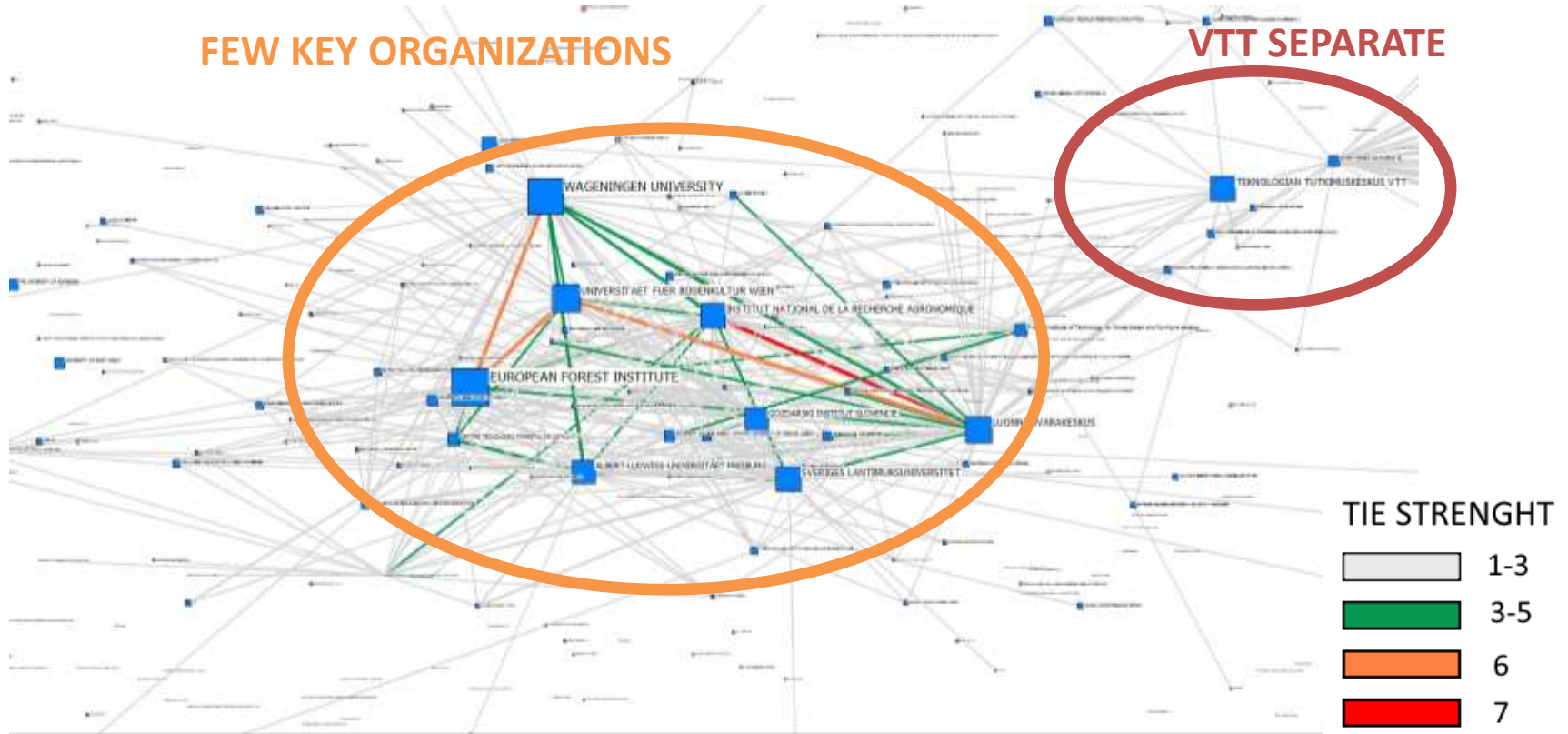




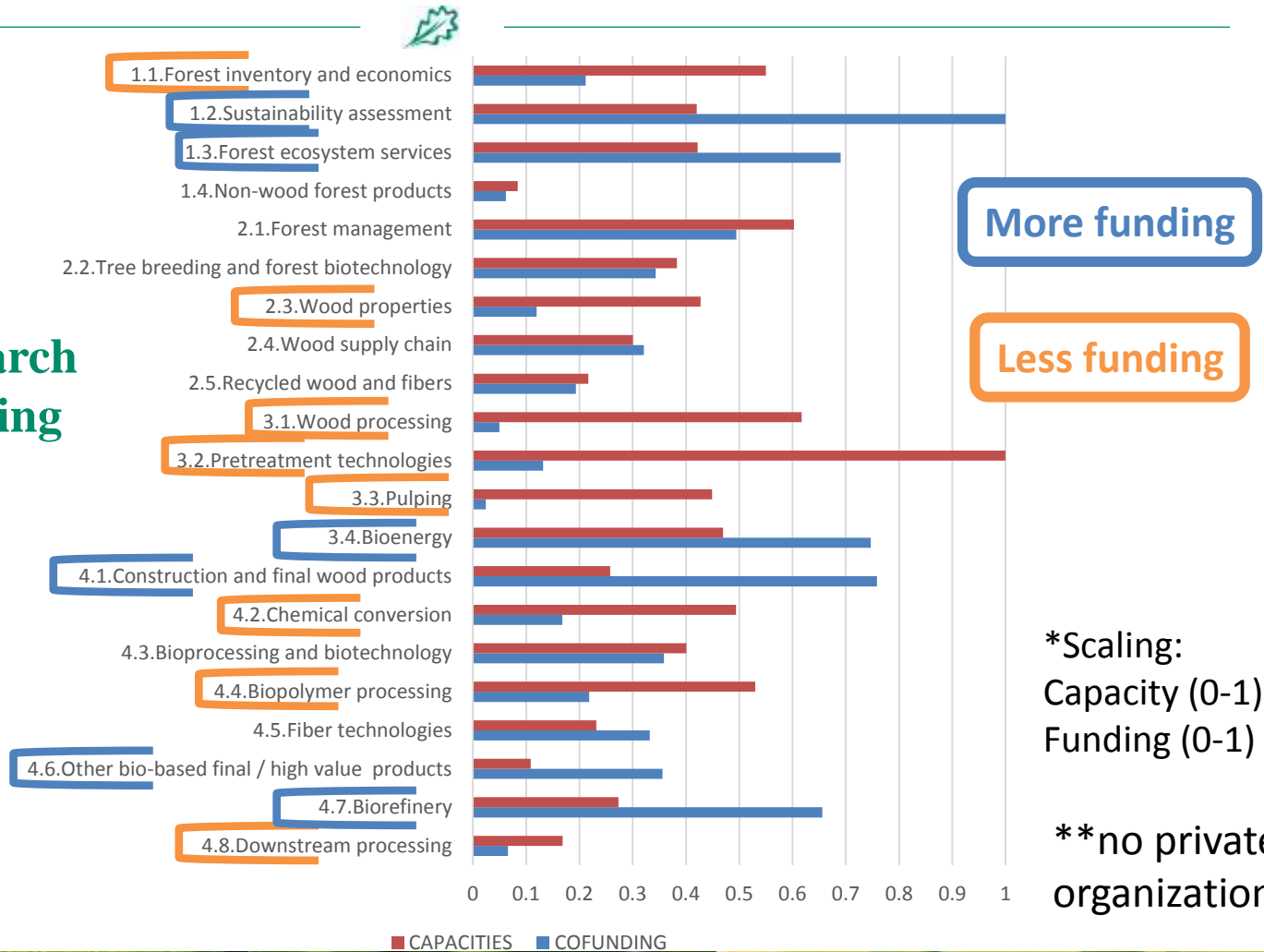
Cooperation between institutions in Forest systems (count of project cooperations)

FEW KEY ORGANIZATIONS

VTT SEPARATE



Comparison of research capacities and funding





Conclusions

Research capacities

- capacities increase along the supply chain and from SE to NW
- each region has capacities in each segment of supply chain

EC funding

- increases through time and supply chain
- more capacities than financing in the beginning of supply chain
- less capacities than financing towards the end of the supply chain
- share of industry greatly increases in primary and secondary processing
- central actors in different supply-chain categories are not really connected



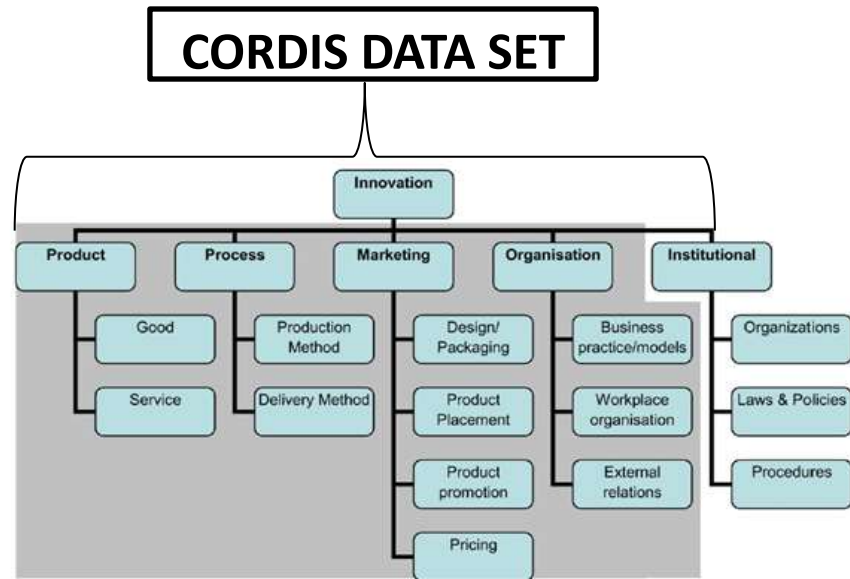
3. Mapping of innovation



Methodology

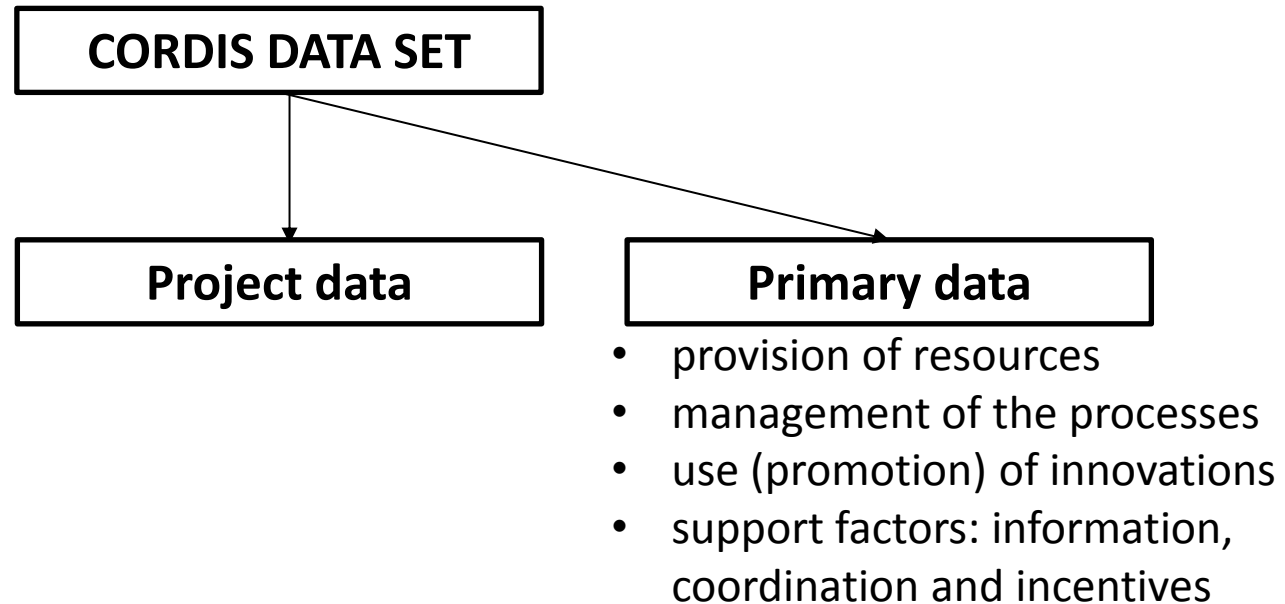
Aim: Mapping existing innovation examples

1. Identify innovations!





Method

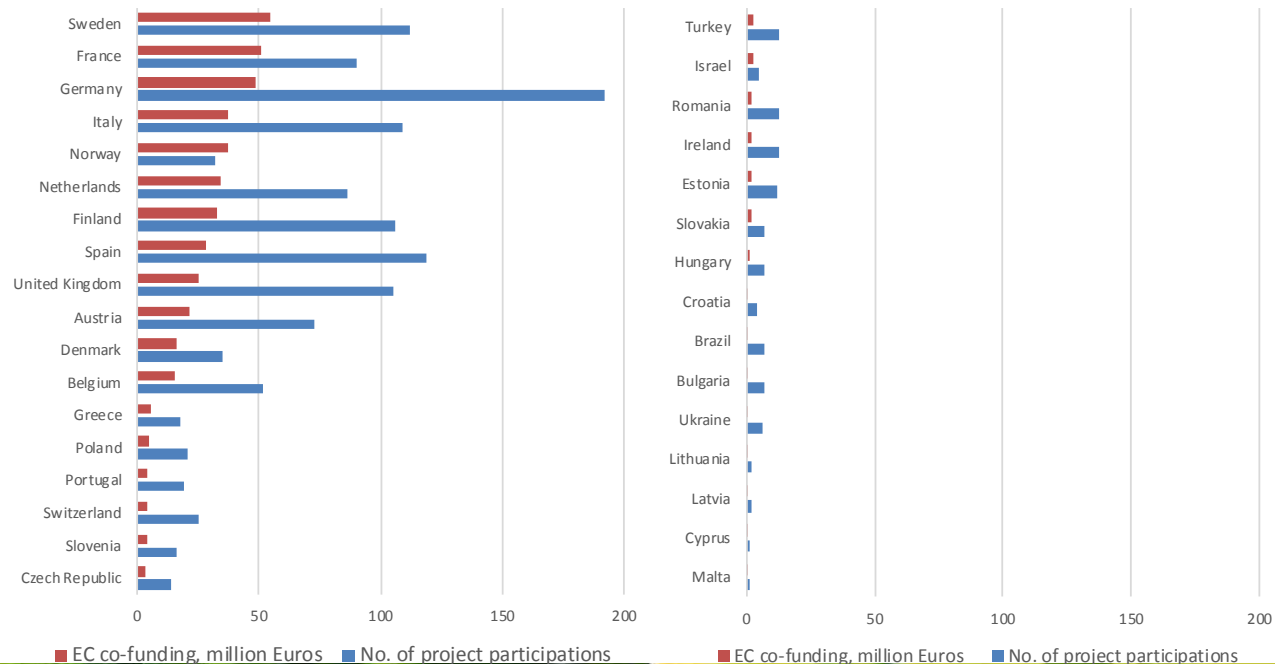


2. Gather data



Number of project participations and EC's funding (mil. Euros) for private companies in CORDIS data sets

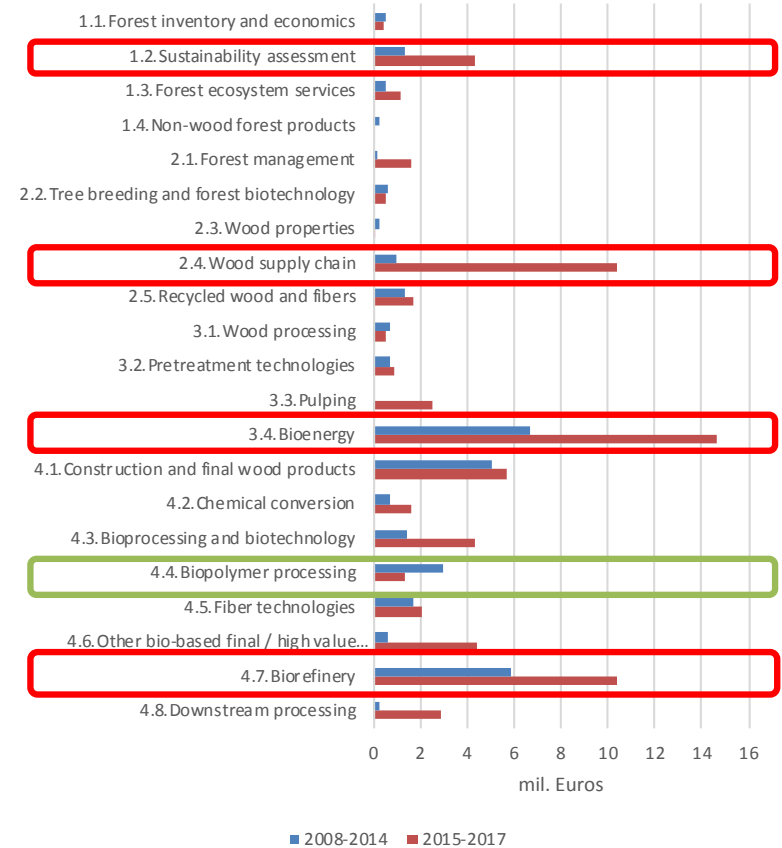
- Participation of private organisation in analysed EC funded projects lower in eastern countries





Annual EC's funding for private companies per topic

- Major increases in funding (H2020 vs. FP7):
 - biorefineries
 - bioenergy
 - wood supply chain





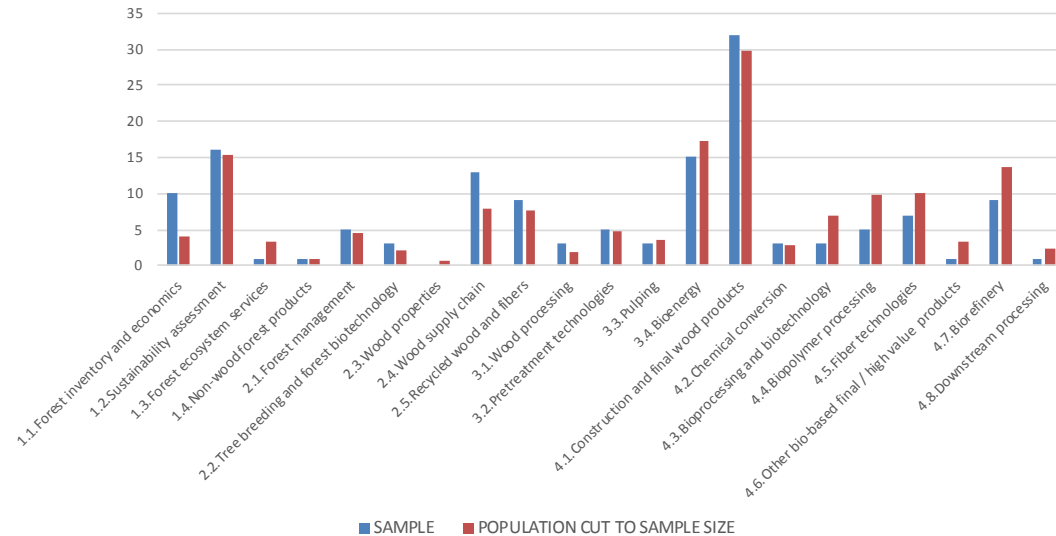
Innovation survey description

Targeted population:

- all private companies participating in FP7, H2020 and ERA-NET projects (n=1333)

Sampling frame

- Companies with valid contacts (n=1265)
- 145 valid responses (no significant differences between sample and population)





Questionnaire content

DESCRIPTION + INTERNAL VARIABLES + EXTERNAL VARIABLES = OUTPUTS OF INNOVATION

- Type
- Stage
- TRL

- Disruptiveness
- Knowledge base
- Degree of cooperation
- Policy framework
- Multistep process

- Support from different actors
- Resource-based support

- Organizational culture
- Management and leadership
- Project team
- Appropriation strategy
- Organizational capacities
- Relationships

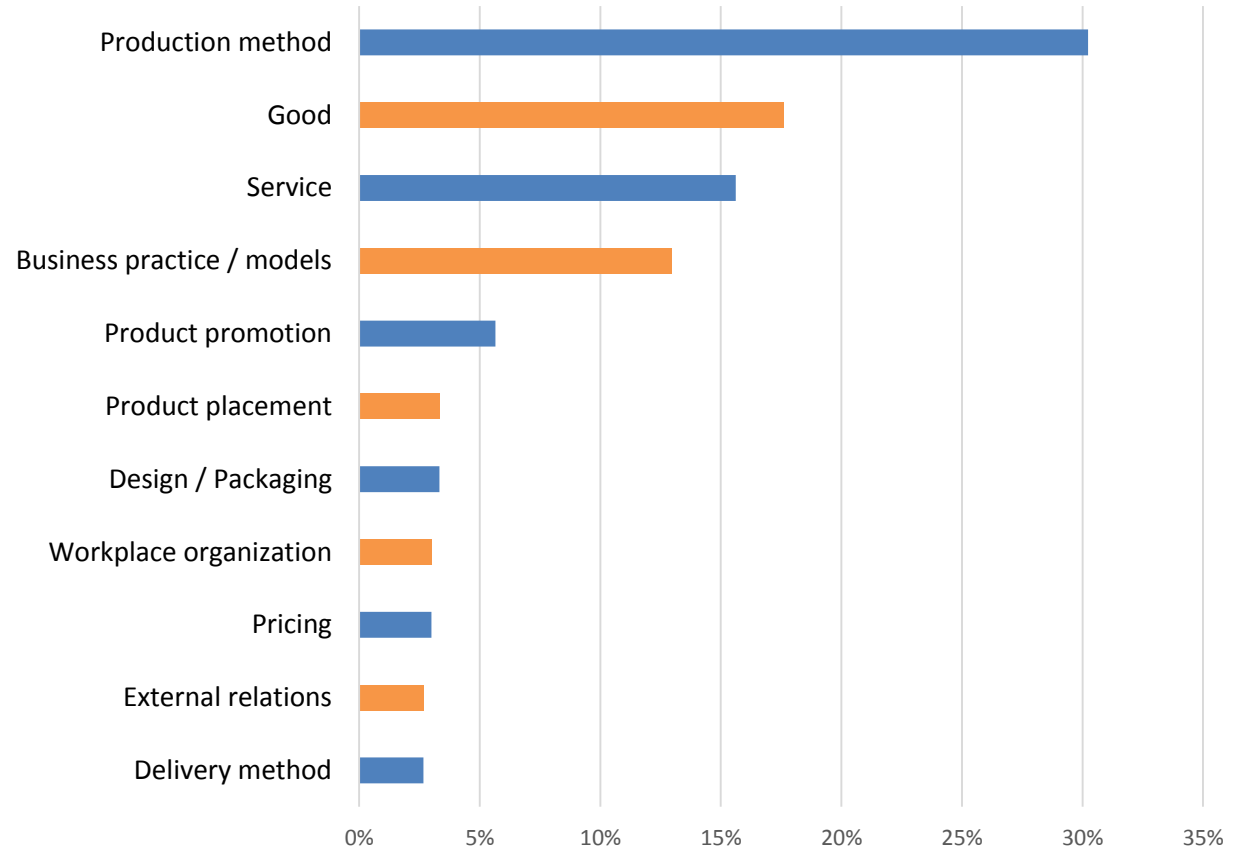
- Success or failure?
- EU projects useful or not
- Innovation expenditure
- No. of patents
- No. of products and services
- Revenue from innovation

+ GENERAL INFO

- No. of employees
- Annual revenue



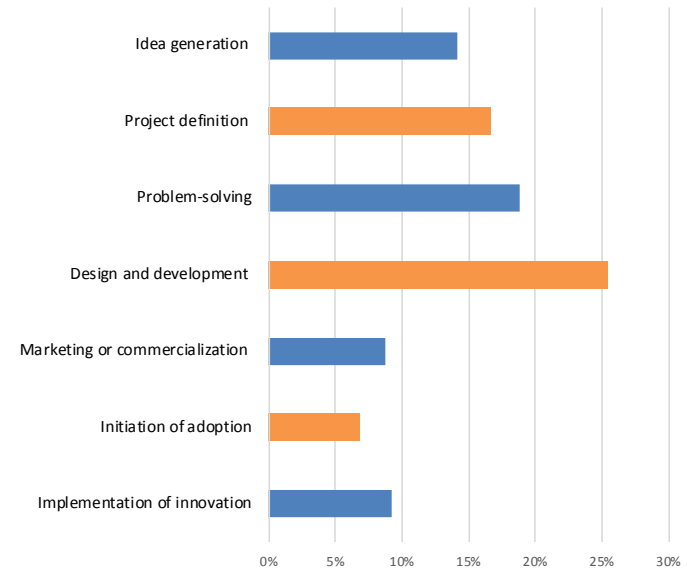
Type of innovation





Stage of innovation

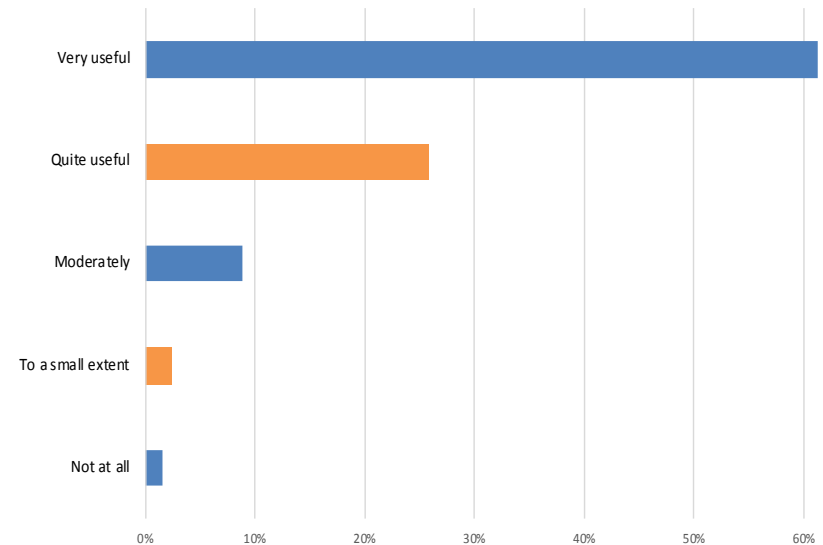
- Most of the innovations in the earlier stages of development (TLR 1-4)





Descriptors of innovation

- High degree of cooperation with different actors (research, users and customers)
- Requires complex knowledge base
- EC funded projects proved to be beneficial for the innovation development



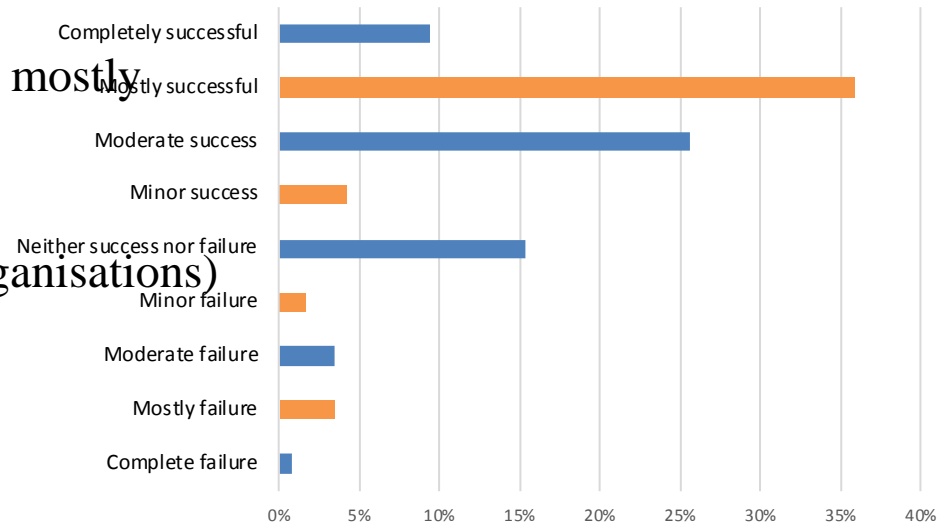


Successful innovations

- Innovations in EC funded projects are mostly successful

Require:

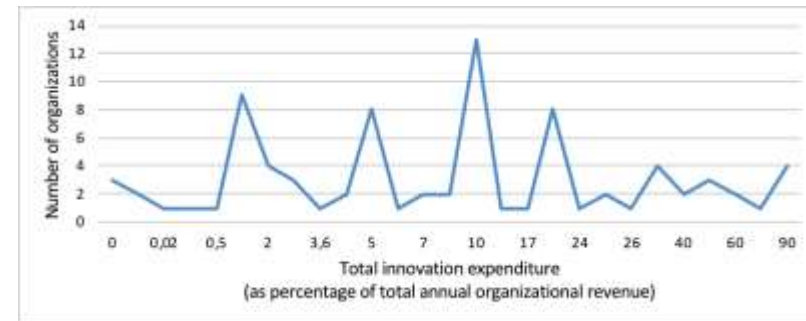
- Support from management (within organisations)
- Adequate financial support
- Iterative (complex) development
- Being really innovative (radical)





Direct economic impact

- 171 mil € annual revenue from innovation cases
- On average: 1 € invested in EC projects creates 6.23 € in direct revenues





Conclusions

Most frequent type of innovations: Production methods, goods and services

Other findings:

- most innovation cases in earlier stages of development
- Most pronounced collaboration is with universities and research institutes
- EU projects are perceived as useful
- mostly successful innovations, require input from (research) and other actors (e.g., policy), but also financial support (e.g., seed money)
- good potential for high economic impact



THANK YOU