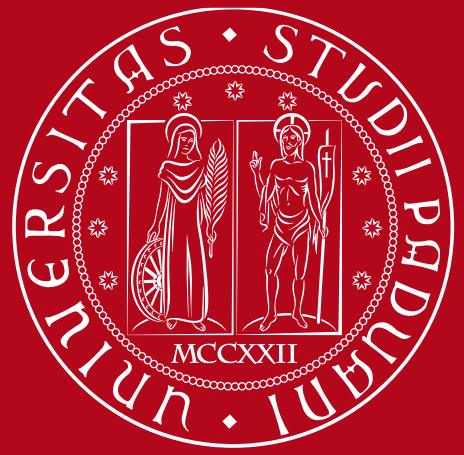

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Technology Transfer models: the case of Fraunhofer Institute

AA 2022/23

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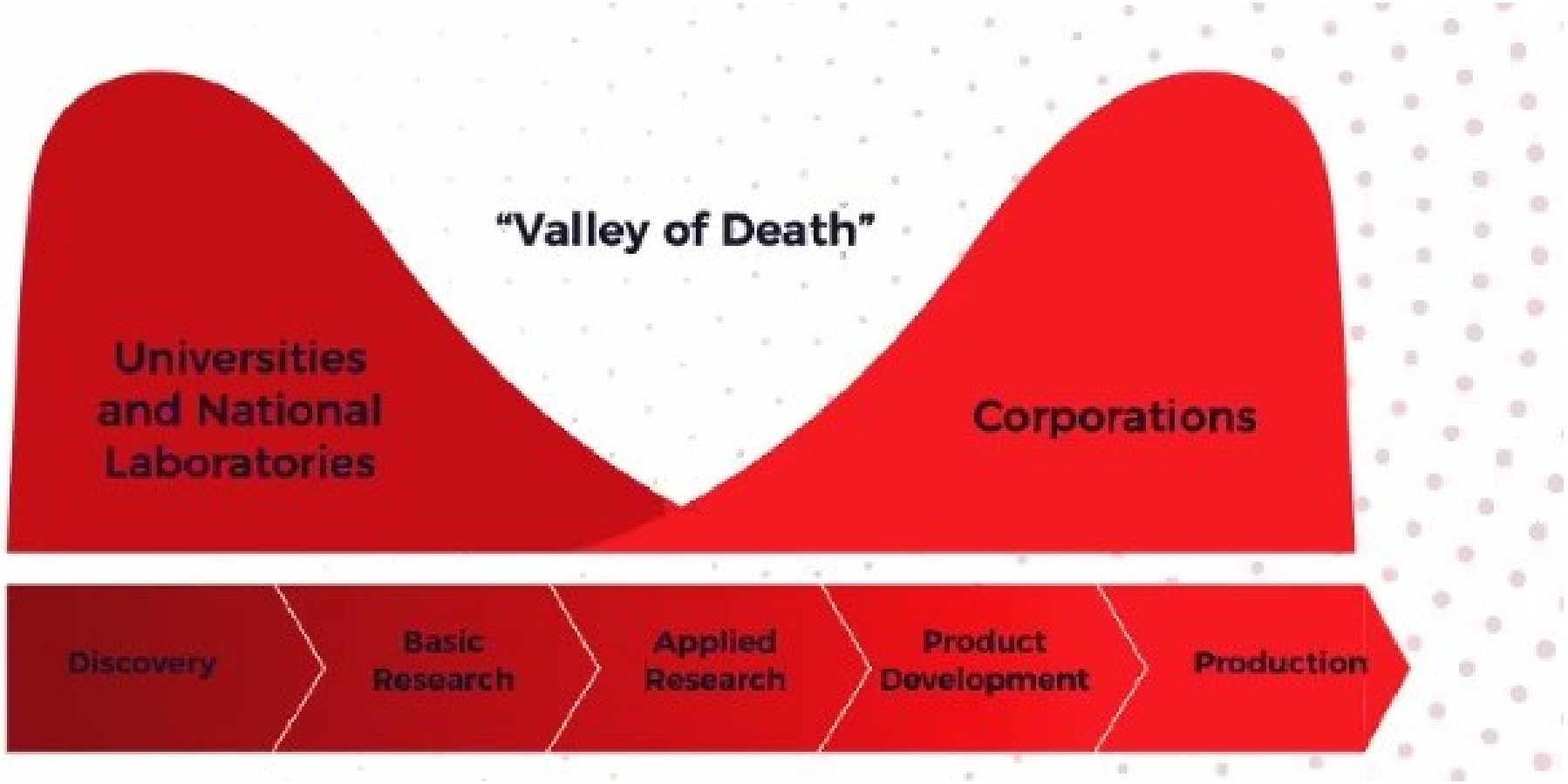
BIG PROBLEM: Overcoming the Valley of Death



Possible solutions? Technology Transfer activities

Set of processes that allow the technological transfer (and the relative interaction) between two separate entities (organisations, individuals, countries).

Aim: reduce the knowledge gap!

- In a one-to-one ideal model, this implies that one of the two agent transmit to the other the information.
- In the real world, this implies dynamic and multi-directional exchange of information

Common good versus entrepreneurial approch

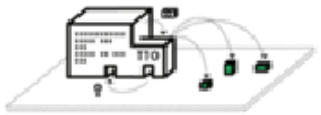
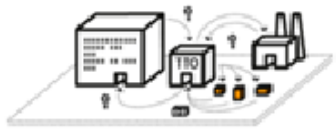
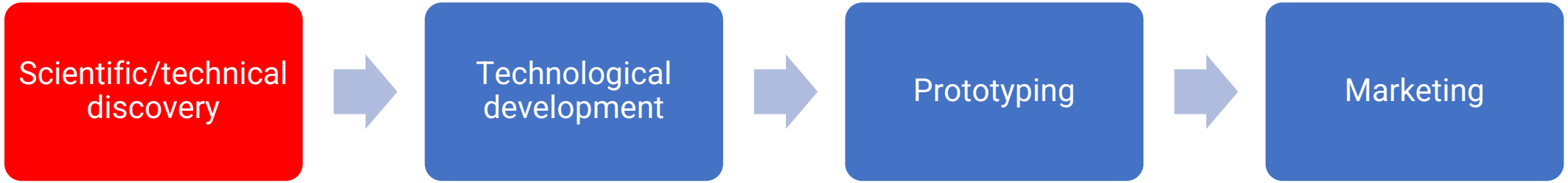
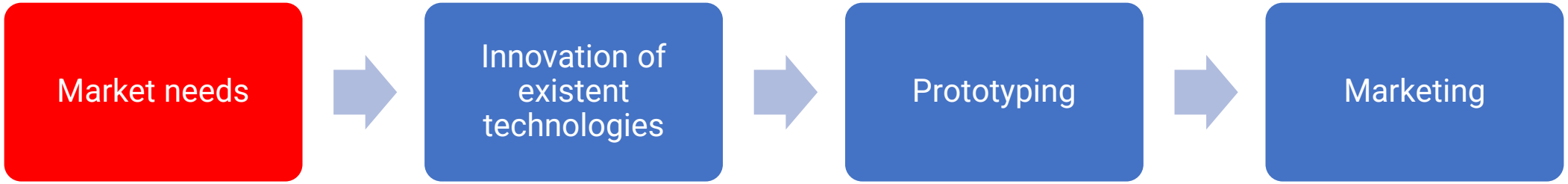
Type	Position and funding	Goals and practices
Common good 	Integrated Non-profit Subsidies from host organisation Third-party (state) funds	Benefits to host organisation and society (optimal) Knowledge transfer Dissemination opportunities IP protection Support to inventors upon request Mediation between inventors and (state) funding programs Opportunities for training and professional development (international) Collaboration with academia and industry Strengthening local ecosystem
Entrepreneurial 	Independent Own income State grants Earmarked foundation grants Start-up revenues	Economic impact (optimal) Commercialisation of findings and inventions Business opportunities Start-up investment Idea scouting Mediation between inventors and industry Staff with industry background Collaboration with industry Strengthening local economy and job market

Figura 2 - Tipi di uffici di trasferimento secondo Sinell (2018)

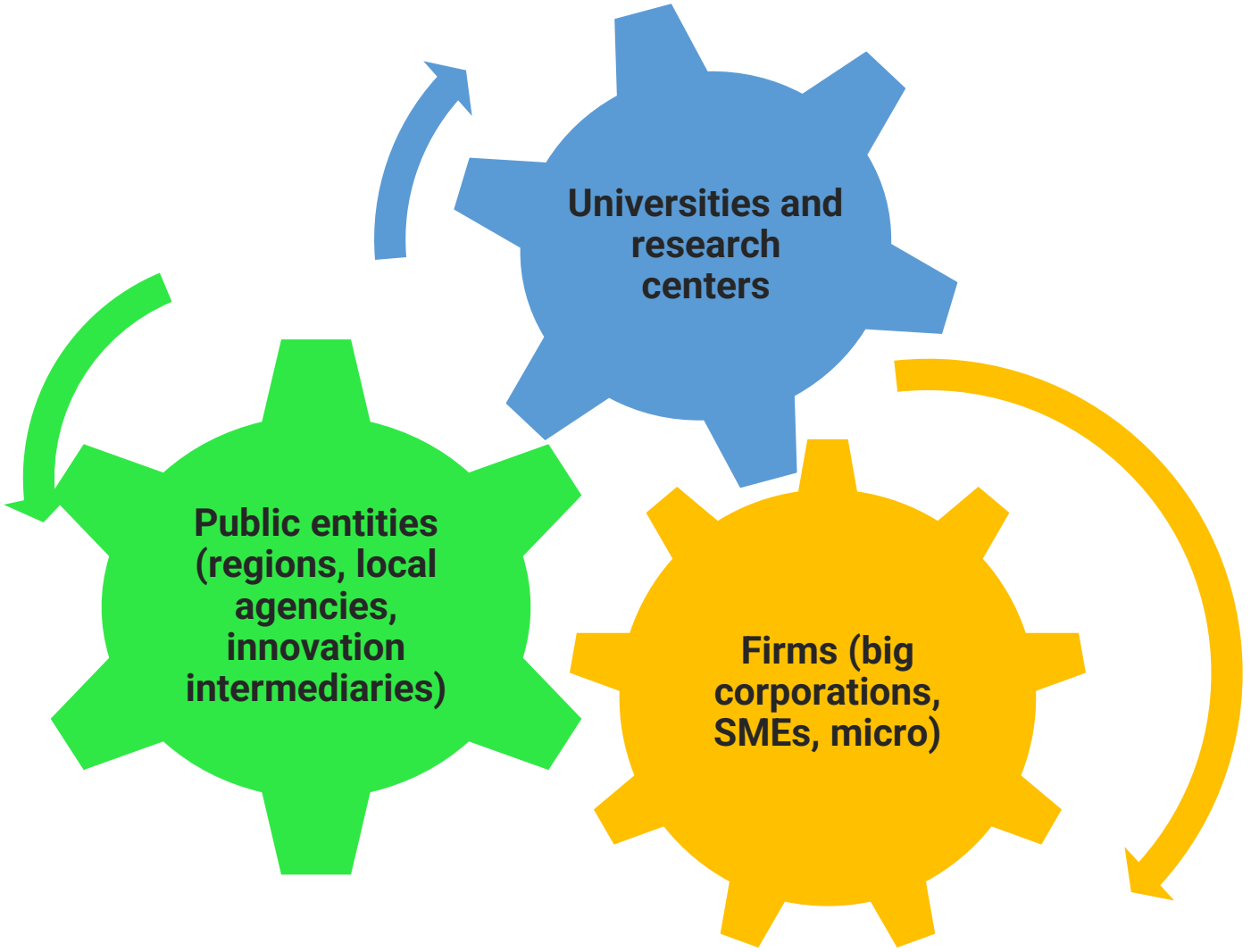
Technology Push model



Demand Pull model



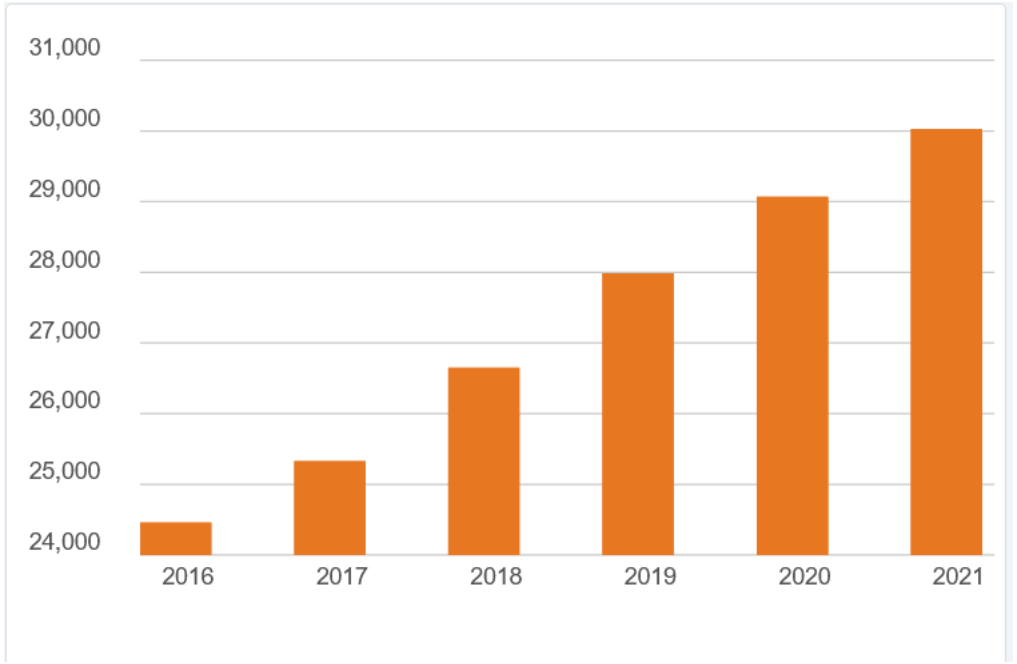
Actors involved



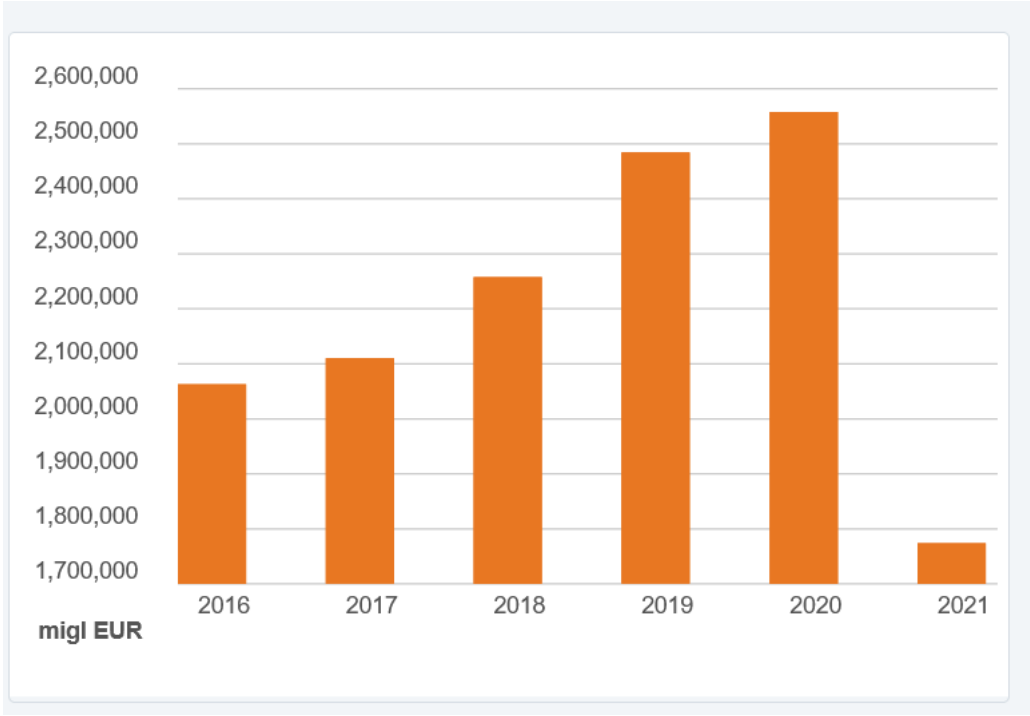
Successful cases : Fraunhofer Institute

- Facts and Figure
- Historical context and vision
- Structure
- Governance
- Challenges

Fraunhofer: facts and figures

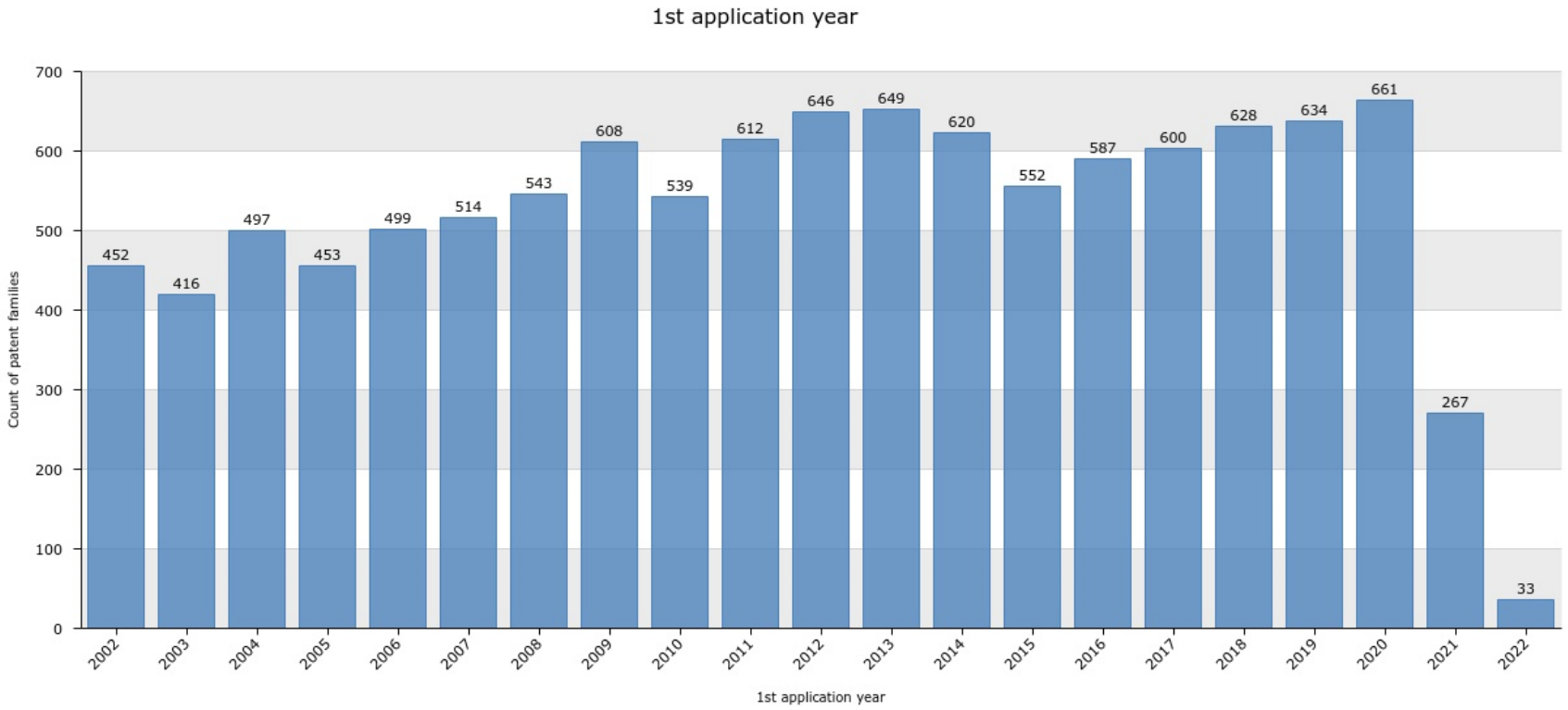


Number of employees



Turnover

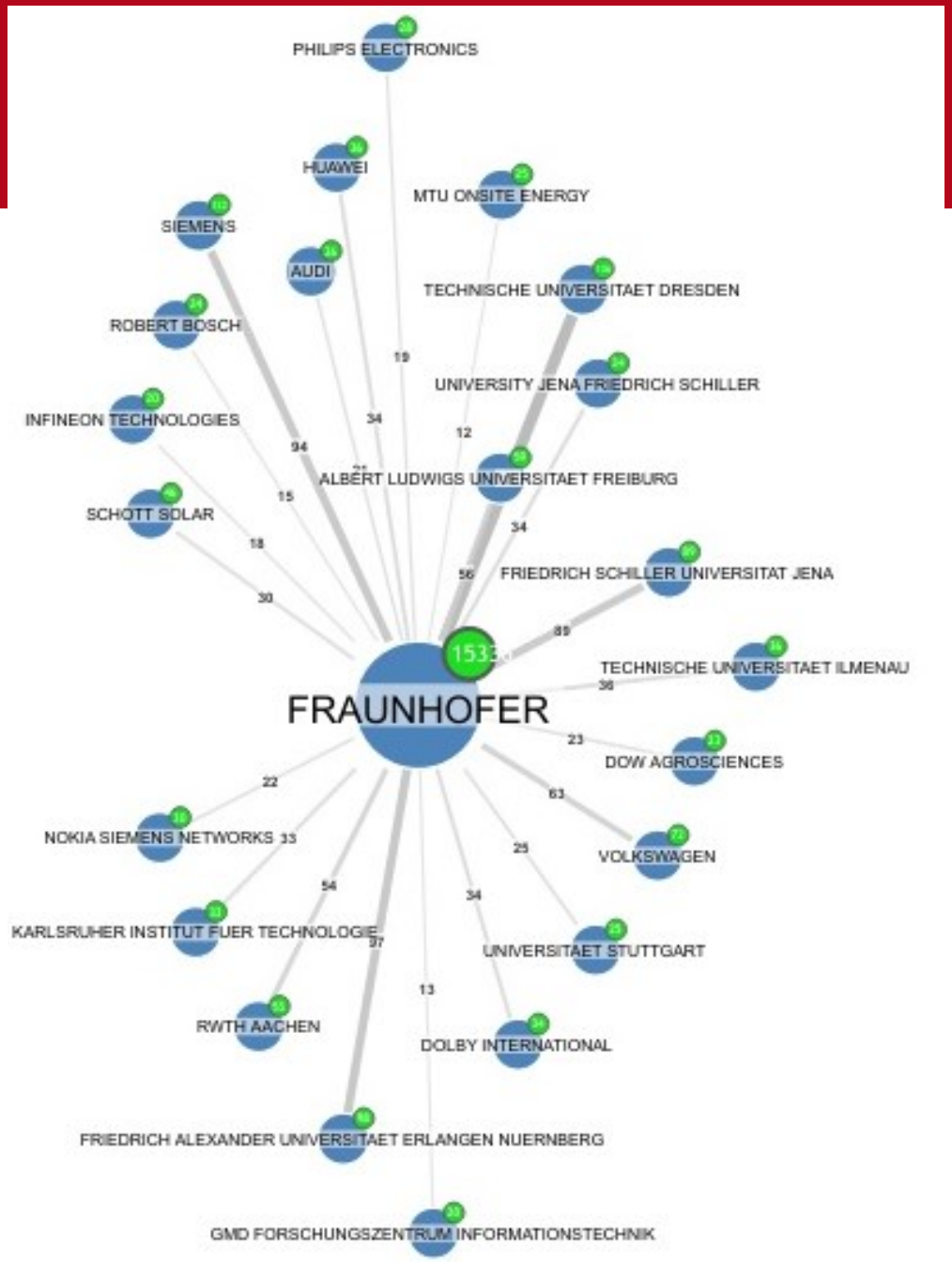
Number of inventions patented per year (last 20 years)



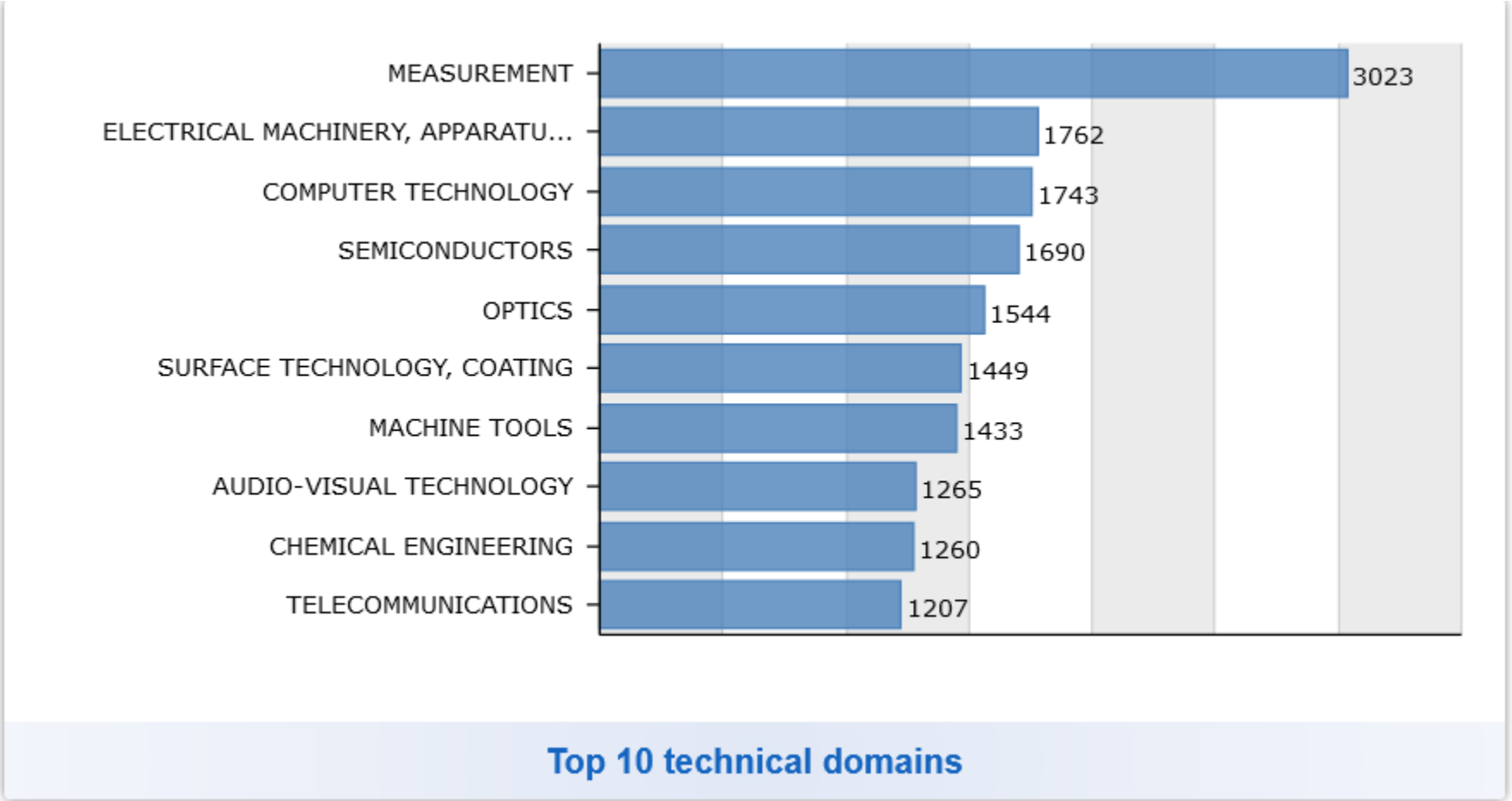
16079 patented inventions by Fraunhofer

Network of collaborations

Siemens
Volkswagen
Audi
Philips
Bosch
Nokia
Huawei
….



Diversified technological portfolio



Top 10 technical domains

Germany industrial characteristics in the immediate postwar period (WWII)

- Labour representation → ensured rules for work safety, wage scale negotiation, presence in the management board of many firms
- Vocational training →technical education of high school students and traineeships within firms
- Dynamic SME sector and interaction with institution (High schools, labor representations and banks)
- Central role of bank → strong links with the local community and strong influence on firm's decisions

The creation of the Fraunhofer Institute

Fraunhofer Institute was created in 1949 by 210 scientists, businesspeople and politicians gathered in the Bavarian Ministry of Economic Affairs' conference hall.

It received grants from the Bavarian government, and starting in 1951, funds from the USA's European Recovery Program, the Marshall Plan.

Born as a counterpart of Max-Planck Institute (mainly devoted to basic research), gained a solid reputation over year

Two principles

- ✓ Collaboration among societal spheres, avoiding duplication of effort
- ✓ Bring scientific relevant results to societal concrete problems

Joseph Von Fraunhofer legacy

Born in 1787 -

At 22 head of the glass work –Manufacturing of optical elements

- Founder of scientific methodology in the field of optical and precision mechanics
- Application of invention and discovery to real world problems
- From the specific case to the introduction of new practices to foster the industrial and scientific systems

Fraunhofer's goals

1 The objectives of the Fraunhofer-Gesellschaft ("Organization") shall be to promote applied research. In this context, the Organization shall conduct independent research projects, carry out projects assigned to it by the German federal and state governments, and undertake contract research.

2 The objectives under the Statute are to be achieved by the following activities in particular:

1. the setting up and maintaining of research institutes and similar establishments;
2. working towards the translation of scientific findings into practical applications and bringing together the forces of applied research and industrial practice;
3. the provision of facilities for work on scientific work and their utilization in applied research;
4. collaboration with other research organizations to fulfill the activities set down under the Statute;
5. promoting training and development in technical and scientific fields through the establishment and operation of training and development facilities and the implementation of projects (e.g. teaching courses, seminars, new media) to spread awareness of innovative professional methods.

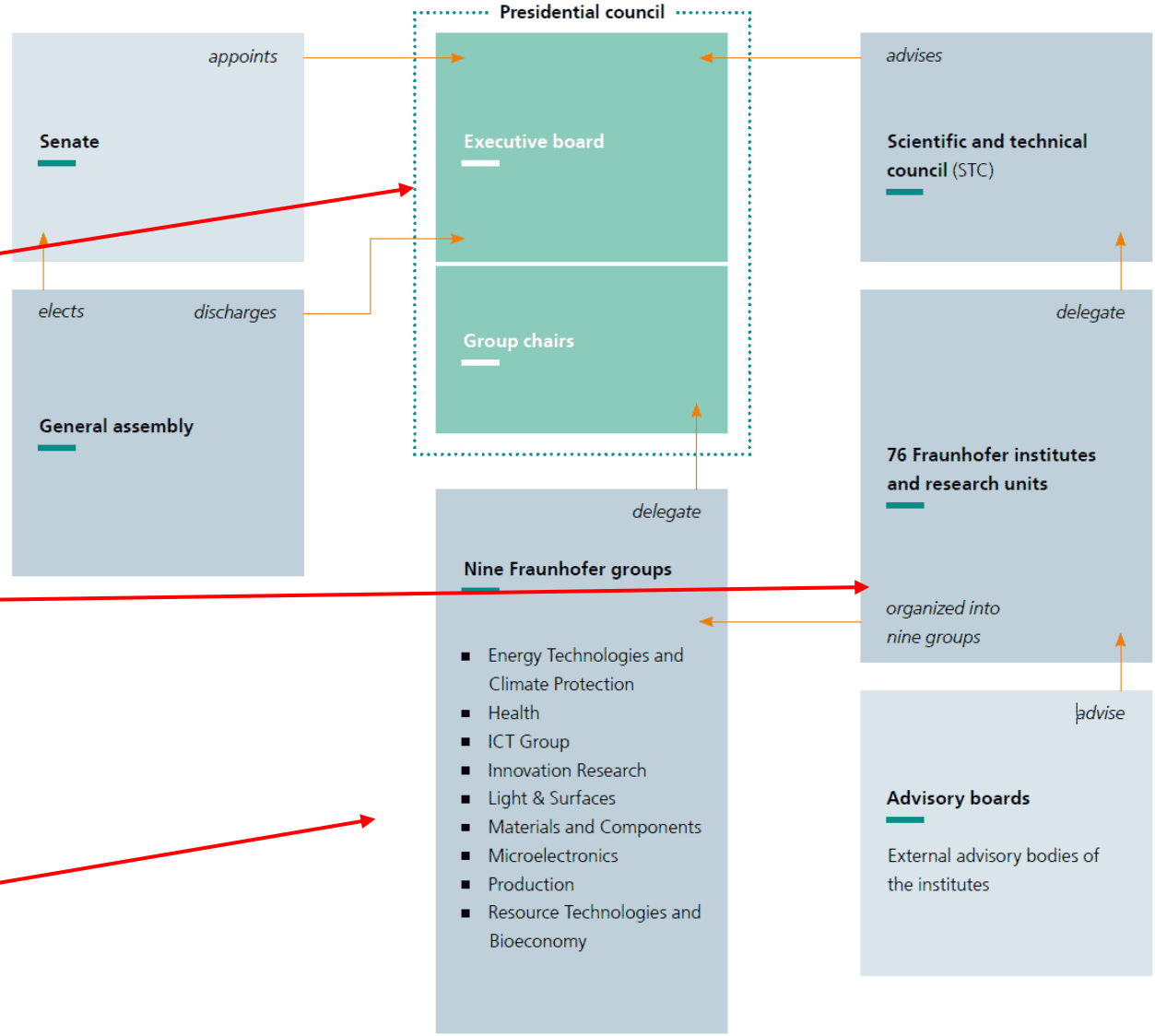
Source: https://www.fraunhofer.de/content/dam/zv/en/documents/Statute-of-the-Fraunhofer-Gesellschaft.pdf

Fraunhofer Governance

Corporate

Local branch

Group level



Fraunhofer institutes: Geographical distribution

Fraunhofer Governance – three layers

Corporate

Identify broad and strategic areas of research. Evaluation of three main criteria:

- Is the field genuinely R&D-intensive?
- Are the results likely to lead to innovations (in terms of market success)?
- Does Fraunhofer possess the appropriate resources to take the lead in that field?

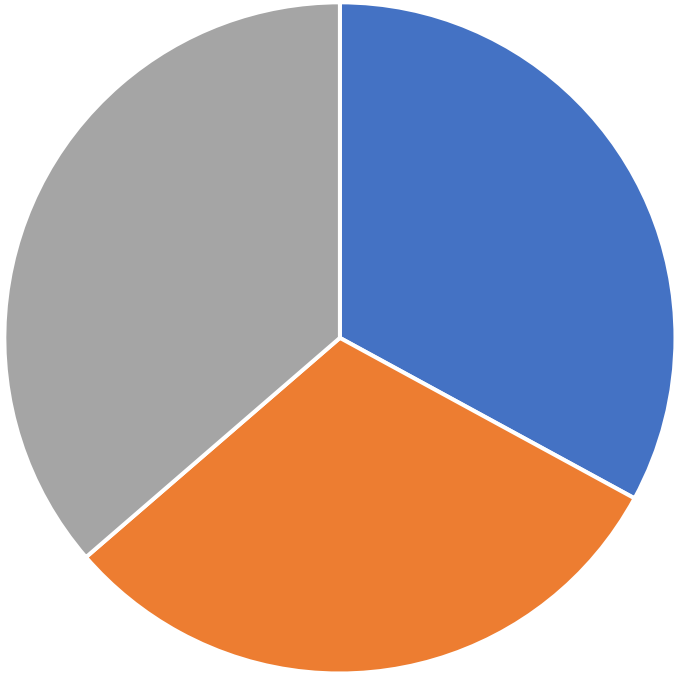
Local branch

Local institutes decide their own growth strategies (according to competencies and specificities of the territory)

Group level

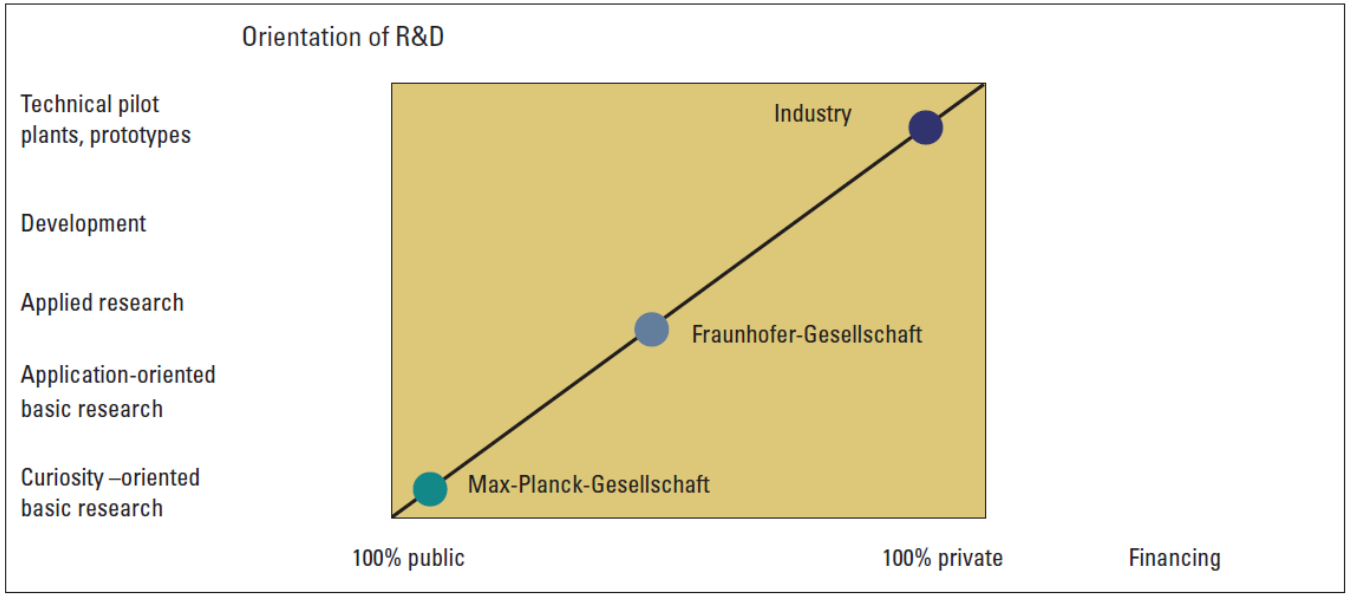
Individual institute strategies are compared and discussed with a view to harmonization at the Group Level of the Fraunhofer (from a university point of view being comparable with faculties and usually consisting of 5-12 institutes with competencies in related fields). Fraunhofer Groups Levels are separate from the actual corporate management structure and have no official control functions. They function as informal platform for communication and cooperation

How to address the R&D funding gap: a balanced model



- Non competitive public funds (national and regional)
- Public funds from European and German procurements
- Research contracts with private firms

FIGURE 2. Correlation of Funding and Research Activities



Private financing

- Low markup on the single project (15%) → high quality with a reasonable price for firms
- Much attention dedicated to intellectual property rights (IPR) as it is essential for Fraunhofer to generate knowledge without compromising the interest of the “original” client
- Important focus on having a diversified portfolio of clients (reduce financial risks)

- Two options: request from the firm or collaborative research

What are the different ways of working with Fraunhofer?

ONE-OFF CONTRACTS	LARGE-SCALE PROJECTS WITH MULTIPLE PARTNERS	INTERNATIONAL COOPERATION
→ Solve the problem → Launch the innovation in the business or the marketplace	→ Cooperation between multiple Fraunhofer institutes, external partners and companies	→ Fraunhofer offices abroad
STRATEGIC PARTNERSHIPS	**INNOVATION CLUSTERS**	**SPIN-OFFS**
→ Long-term partnerships that evolve from non-contract, pre-competitive research	→ Regional partners from research, industry and universities	→ Fraunhofer researchers branch out on their own, often with the customer taking a stake

How does Fraunhofer help its customers?

- Improving products (performance and cost efficiency)
- Manufacturing methods and/or prototyping
- Market analysis and innovation consultancy service
- Incorporating new technologies (e.g enabled technologies related to Industry 4.0)

Fraunhofer financial sources – distribution of funds across institutes

All institutes can rely on a given volume of medium-term funds

Transparant approach (use of criteria to allocate funds), but not necessarily equal shares:

65% of public funds are distributed according to some criteria (operating budget, revenues from industry, revenues from the European Commission)

15% internal programs financed by competitive project proposal

10% strategic investments for machinery and technical equuipments

10% miscellaneous spending (e.g. assets for starting projects for new institute directors)

Fraunhofer challenges

- ✓ Maintain agility having such a big structure
- ✓ Answer to company need using different approaches
- ✓ Attract talent
- ✓ Be societal and scientifically relevant

Fraunhofer challenge companies-related

- Applied research that can be directly translated into innovative products (**market pull**)
- Complete system solutions versus short-term solutions
- Competitive prices
- Exclusive exploitation of intellectual property rights
- Wide dissemination of research findings
- Technological initiatives (**technology push**)

Fraunhofer challenge society-related

- Significant improvement to the global competitive status of Germany (in terms of research excellence,
- Training opportunities for young scientists, and business executives)
- Creation of jobs in industry through the introduction of innovative products/processes
- Research that contributes to sustainable development

Fraunhofer challenge employees-related

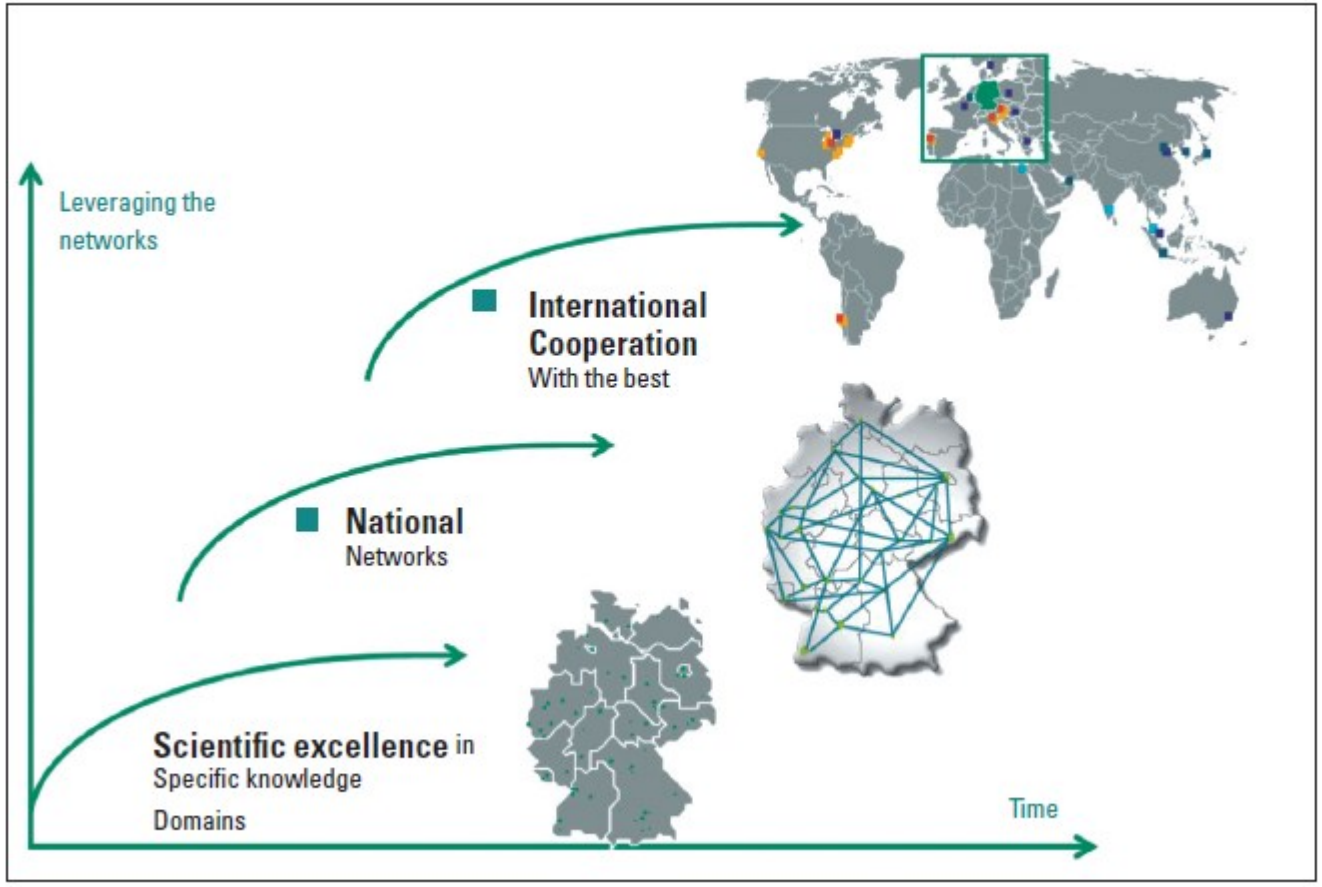
- Top-class equipment and motivating working conditions
- Work-life balance
- Secure jobs
- Possibilities for career advancement
- Fraunhofer covers the cost of patenting for workers, splitting the royalities 70/30 between institution and the inventor

Fraunhofer challenge science-related

- Research excellence, each of the institute partnered with at least one of the 70 German universities
- Director of institutes often were senior professor at partner universities to allow the creation of bridge between institutions, favouring knowledge circulation
- Training opportunities for young scientists → often people move between industry and science.
- Intense scientific cooperation at national and international level

Fraunhofer levels of cooperation

FIGURE 5. Smart Specialization: Internationalization Along Fraunhofer-Internal Networks and Capabilities



Summing up

- Scientific competencies
- Entrepreneurial attitude
- Wide partnerships
- Balanced and mixed financial sources

What are the barriers to implement such a model in the Italian context?

How to bring Fraunhofer best practices in other contexts?

- Transparent financial mechanisms
- Vibrant industrial environment
- Scientific Excellence
- Multi level cooperation

Italian Context

- Fragmented Technology transfer environment, many institutes with overlapping mission
- Absence of (a shared) long-term vision on the evolution of the strategic industrial sector of
- Cognitive barriers between firms and research

Wrap-up with the topics of the course

Arguments touched during this case presentation:

- Absportive capacity
- Networking
- Public-private collaboration
- Industrial dynamics and techno-economic environement
- Mutidisciplinary teams