The Fraunhofer Network: R&D for SMEs

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Washington DC

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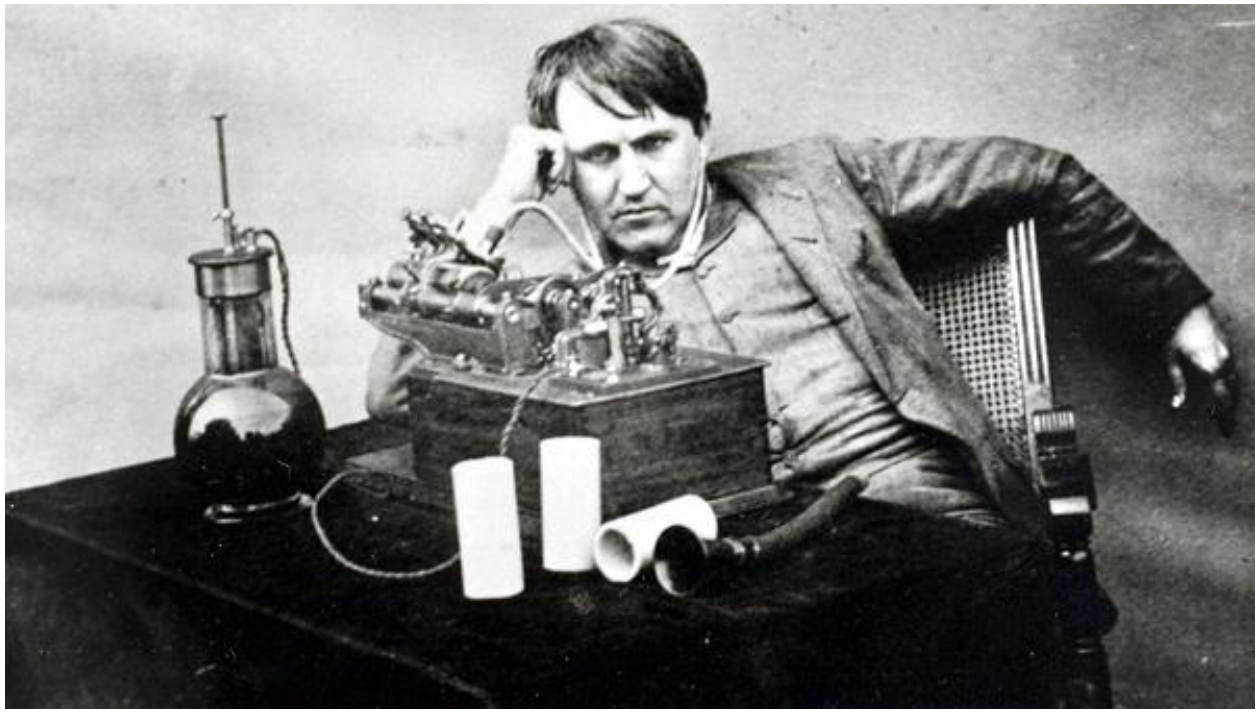
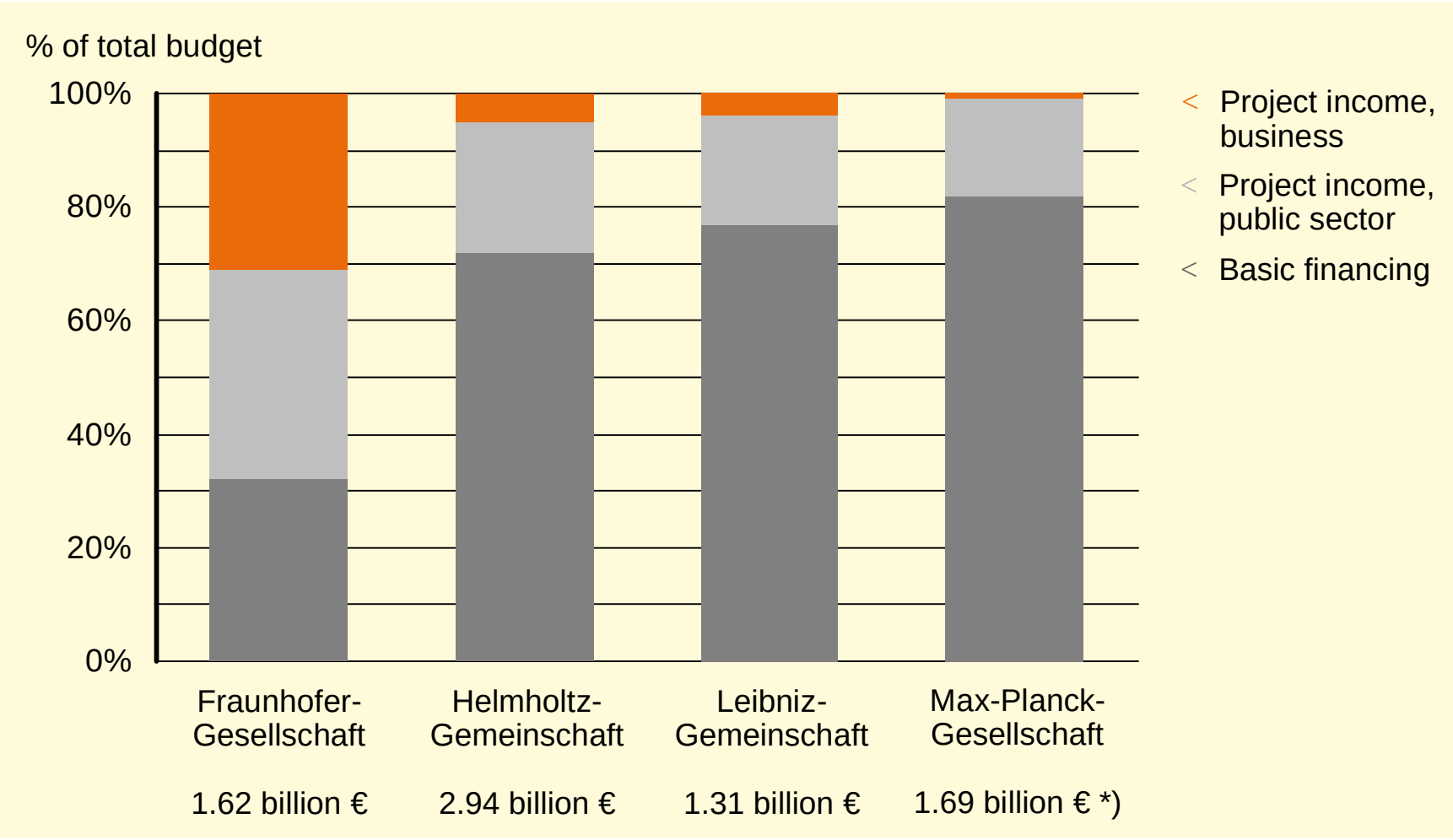
Innovation = Inspiration + Perspiration



"There is a better way to do it. Find it." – Thomas Edison 1847-1931

Great inventions happen when the insights of basic research are partnered with the applied experimentation necessary to realize them.

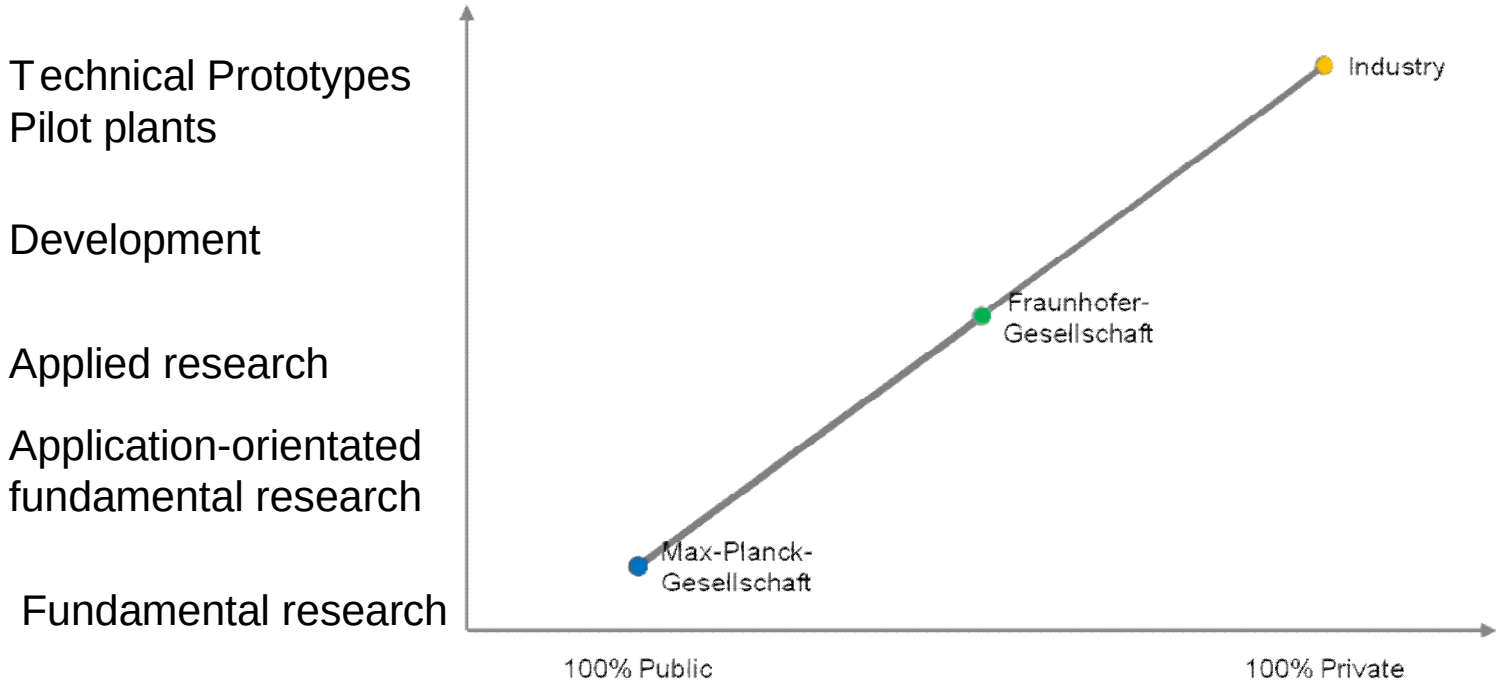
Germany R&D Landscape Coordinates Applied & Basic Research



*) Incl. MPI für Plasmaphysik (Haushalt B)

Fraunhofer-Gesellschaft :dynamic equilibrium between application-oriented fundamental research and innovative development projects

Research orientation



Fraunhofer

Fraunhofer USA

Joseph von Fraunhofer

The Fraunhofer-Gesellschaft

Discovered the “Fraunhofer lines” in the solar spectrum

Developed new methods for processing lenses

Leader and partner in a glassworks

Researcher

Inventor

Entrepreneur

Non-profit Research and development on behalf of industry and state

675 patent apps in 2009 across many different industries

Earns 1.6Bn Euros of research contracts annually

Overview of Fraunhofer-Gesellschaft

Leading Center of Applied R&D

- Application-oriented research for businesses and for the benefit to society
- Application-oriented basic research
- Departmental research for the German Federal Ministry of Defense

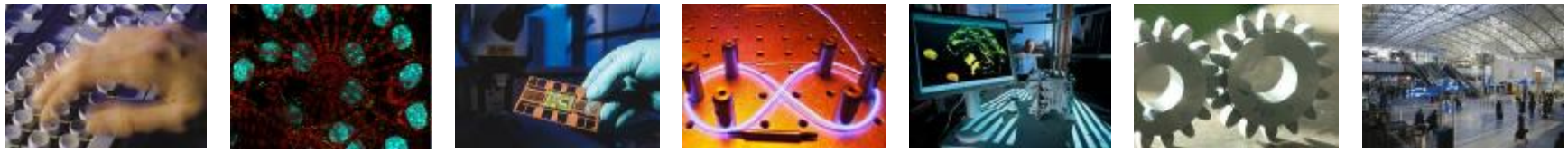
Driven by Needs of Industry

- One-third of the budget consists of income from industrial projects
- Institutes are managed as profit centers
- Spinoffs of research by Fraunhofer researchers is encouraged

Operated as a Public Service

- Support industrial and service companies
- Educate next generation of applied scientists and engineers

The Profile of the Fraunhofer-Gesellschaft



- 59 Institutes
- 17,000 employees

7 Groups:

- Information and Communication Technology
- Life Sciences
- Microelectronics
- Light & Surfaces
- Production
- Materials and Components – MATERIALS
- Defense and Security

Fraunhofer

Fraunhofer USA

Fraunhofer within the Innovation Ecosystem

Fraunhofer Trains ~4000 PhD and Masters Students Annually

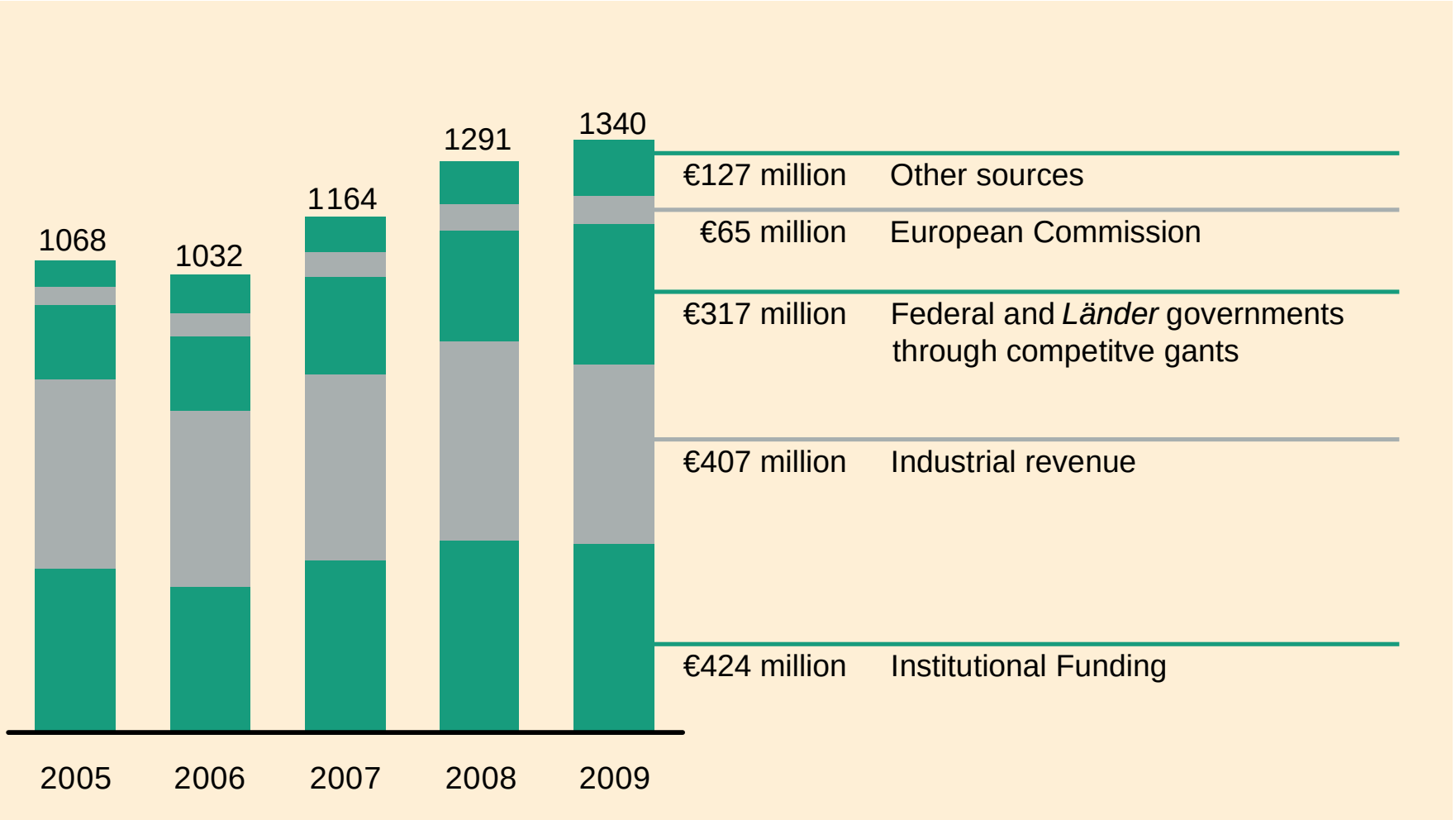
Fraunhofer CSE Module Lab

Tanja & Joachim (CSE students) complete first module lamination tests for industrial client under supervision of Fred and Jeff (professional staff).

Upon graduating from a Fraunhofer lab a student has a developed understanding of the industry, the applied R&D challenges it faces and the tools and skill sets needed to make and immediate impact in an applied R&D group.

Contract research revenue

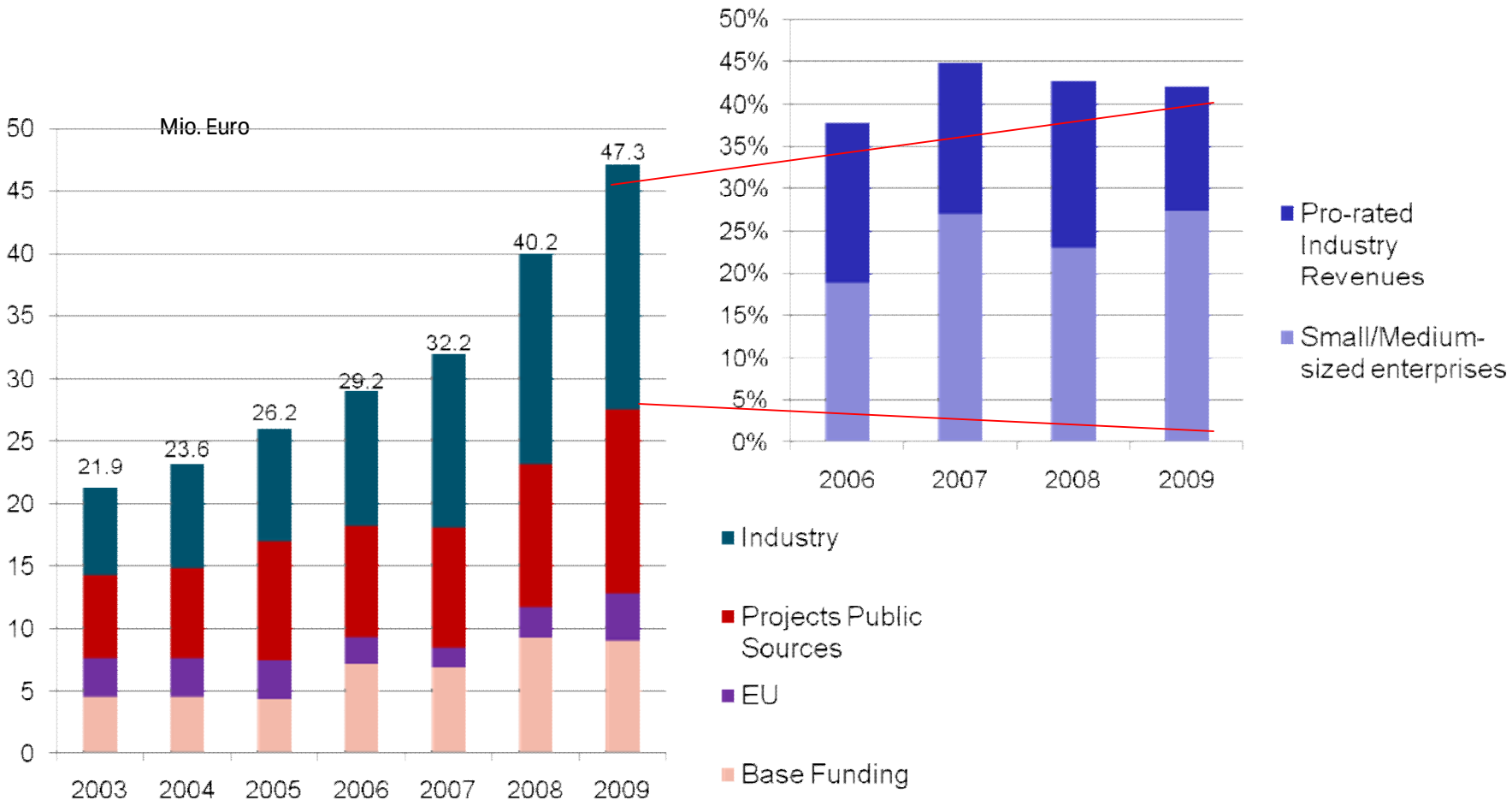
(million euros)



Fraunhofer

Fraunhofer USA

Fraunhofer ISE; 80% Earned Revenue, much from SME's



Fraunhofer in Action: 4 Case Studies

Case 1: Schott Solar Case – Developing Specific Technologies for Industry

Case 2: Smart Vapor Barrier Case – Commercializing Internal Research

Case 3: MP3 Case – Enabling and Supporting Strategic Industries

Case 4: Bioenergy Cluster – Developing Industry Clusters

Case Study 1: Developing Specific Technologies for Industry

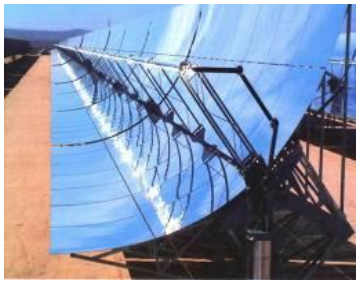
Schott Solar wanted to expand its solar offerings and was particularly interested in concentrated solar collection for parabolic trough operations.

Problem: As a glass manufacaturer with limited solar thermal expertise and the need for very sophisticated sputtering capabilities, Schott needed to find a quick and cost effective solution to develop their envisioned reciever.

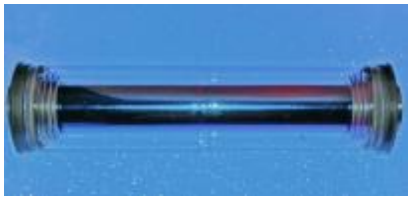
Solution: Fraunhofer was hired to develop the vacuum reciever for Schott. Fraunhofer not only built the first prototypes but also developed the specilized process equipment necessary to fabricate the recievers in-line.

Results: Schott Solar has an 80%+ market share in concentrated trough solar due to superior quality and lower relative cost of production. Schott with its new factory in Albuqueque, NM is expected to dominate the $600M parabolic trough maket in the medium term.

SCHOTT solar



Parabolic trough



Reciever

Case Study 2: Commercializing Internal Research

Developed internally by Fraunhofer IBP in response to specific building industry problems

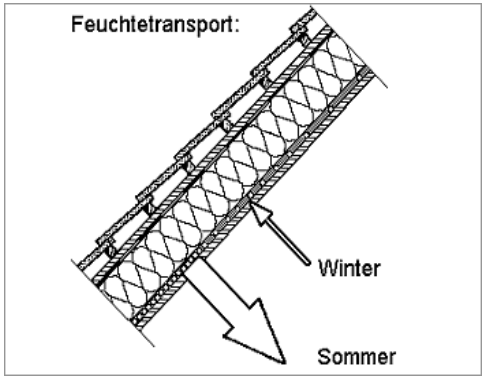
Problem: Pronounced thermal gradients caused by improved building insulation products can cause moisture related building problems over time.

Solution: Fraunhofer developed materials, application scenarios and test methodologies for a smart vapor barrier that can change permeability depending on humidity

- Enables high level of vapor transport to dry building components during summer
- Prevents vapor transport in winter to avoid condensation

Results: Commercialized by G+H Isover in Europe and by CertainTeed in the US (as MemBrain™ and remains one of their top products)

CertainTeed
ISOVER



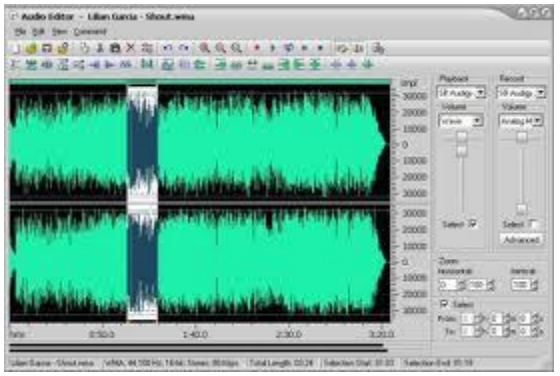
Case Study 3: Enabling & Supporting Strategic Industries

Fraunhofer IIS developed the MP3, a strategic technology that enabled the rise of an entire industry

Problem: Reducing size of audio files without compromising quality

Solution: A OCF-Algorithm (Optimum Coding in the Frequency Domain) for compressed audio encoding in cooperation with AT&T Bell Labs and Thomson

Results: MP3 is the most famous compressed audio format in the world, and has created an entire industry: companies producing MP3-players and/or software; music tracks sold in MP3-format on platforms like Amazon, iTunes or eMusic.



Case Study 4: Developing Industry Clusters

Innovation Clusters are regional industry consortiums built around Fraunhofer Institutes and Funded To Jump Start Areas Leadership in New Strategic Markets

Problem: Scattered resources make it more difficult to advance and commercialize new technologies.

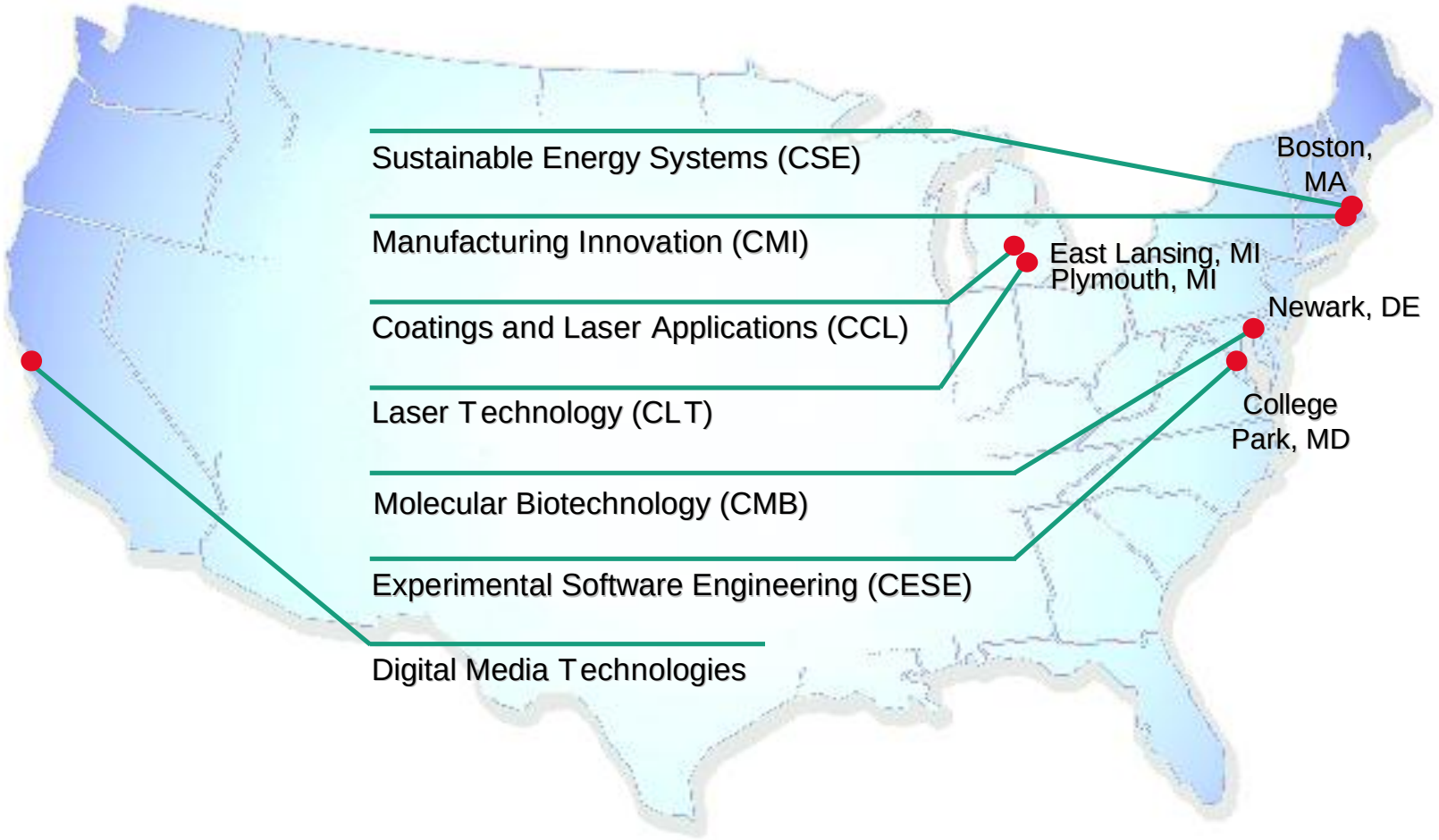
Solution: Create Innovation clusters around Fraunhofer Institutes

Results: Fraunhofer has 16 active Innovation Clusters where it is developing industrial / academic and government cooperation to develop strategic industries

Example: Fraunhofer UMSICHT **North Rhein Westphalia - "Bioenergy Cluster"**

- 17 regional partners (industry and academic)
- funding period: 4 years

Fraunhofer USA Centers - Headquarters: Plymouth, Michigan



The TechBridge Program Develops Start-up Companies By…

Fraunhofer TECHBRIDGE™

… connecting early stage startups with Fraunhofer R&D services to help translate great technologies from the lab to the market

How Fraunhofer TechBridge Works With Startups

Validation & Benchmarking

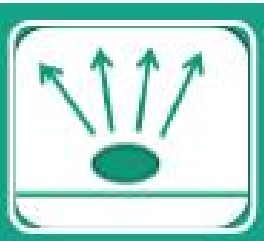
- Building energy systems and energy savings technologies
- Technology demonstrations for competitive evaluation
- Failure mode assessment and mitigation

Prototype Development & System Integration

- Next step development partnership
- Integrating a component into a larger systems
- Modeling support, material testing and selection

Parallel Track Advanced Development

- Advanced design study for next generation product offering
- Prepare new materials, form factors or other evaluation



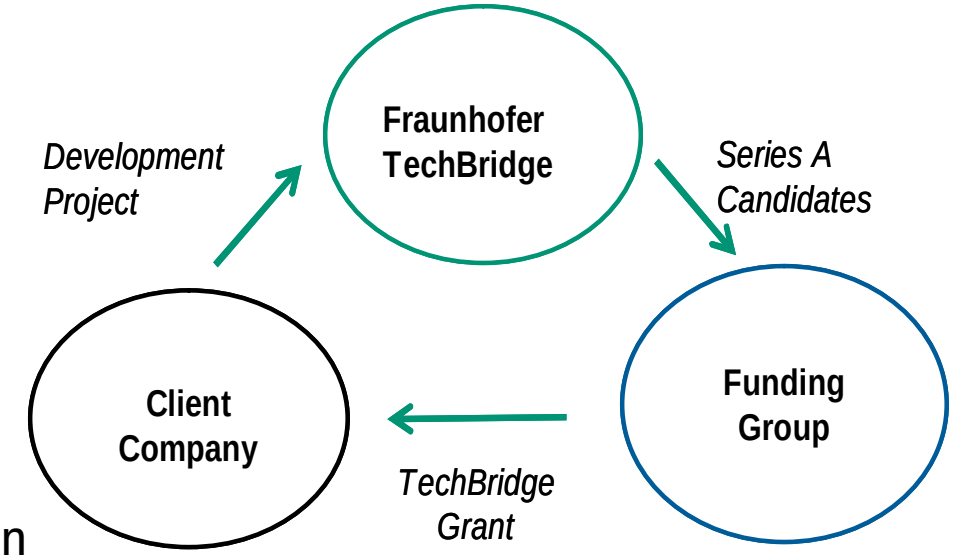
Application development for platform technologies

- Material innovations may have many industry applications
- Test and prioritize markets and identify integration strategies

The TechBridge Start-up Acceleration Pathway

Accelerating the funding cycle:

- Develop TechBridge Grants to fund first prototype and proof of concept work
- Enable investors to make more seed investments
- Accelerates path to commercialization
- Reduce risk for Series A investments.



September 2010: DoE award of $1.05 million to expand the Fraunhofer TechBridge program and establish the Energy Innovation Acceleration Program (IAP) for clean technology innovation.

MASSACHUSETTS CLEAN ENERGY CENTER