FRAUNHOFER AND Global R&D COOPERATION
Overview

- Facts and Figures Fraunhofer International
- Strategies and Models
- Globalisation vs. Regional Aspects
- Lessons Learned
- Conclusions
Facts on Global R&D (1)

Business enterprise R&D financed from abroad

Panel 1: Stable or declining
- Belgium
- Canada
- France
- Japan
- Netherlands
- Russian Federation
- Spain
- United Kingdom

Panel 2: On the rise
- China
- Germany
- Israel
- Italy
- Sweden
- South Africa

Source: OECD, Research and Development Statistics (RDS) Database, March 2014
Facts on Global R&D (2)

National innovation hubs increasingly engage in international co-operation

Source: OECD, Research and Development Statistics (RDS) Database, March 2014
Facts on Global R&D (3)

Multinationals of emerging economies are increasingly offshoring their activities

Source: OECD, Research and Development Statistics (RDS) Database, March 2014
Fraunhofer worldwide

Subsidiary
Center
Project Center / Strategic Cooperation
Representative / Marketing Office
Senior Advisor
International activities and revenues worldwide

- 87.5 Mio €
- >10 Mio €
- 8-10 Mio €
- 6-8 Mio €
- 4-6 Mio €
- 2-4 Mio €
- 1-2 Mio €
- 0.5-1 Mio €

(2012, without subsidiaries, without licensing)
Fraunhofer Subsidiaries and Center worldwide

- **Fraunhofer Austria**
  - Geschäftsbereich Produktions- und Logistikmanagement, Vienna
  - Geschäftsbereich Visual Computing, Graz

- **Fraunhofer Italia**
  - Fraunhofer Innovation Engineering Center IEC, Bolzano

- **Fraunhofer Portugal**
  - Fraunhofer Center for Assistive Information and Communication Solutions AICOS, Porto

- **Fraunhofer Sweden**
  - Fraunhofer-Chalmers Research Center for Industrial Mathematics FCC, Gothenburg

- **Fraunhofer UK**
  - Fraunhofer Centre for Applied Photonics CAP, Glasgow

- **Fraunhofer USA**
  - Fraunhofer Center for Coatings and Laser Applications CCL, East Lansing
  - Fraunhofer Center for Experimental Software Engineering CESE, Maryland
  - Fraunhofer Center for Laser Technology CLT, Plymouth
  - Fraunhofer Center for Manufacturing Innovation CMI, Boston
  - Fraunhofer Center for Molecular Biotechnology CMB, Newark
  - Fraunhofer Center for Sustainable Energy Systems CSE, Cambridge

- **Fraunhofer Chile**
  - Fraunhofer Center for Systems Biotechnology, Santiago de Chile
### International revenues 2014 by countries – Top 20
(without EU-Commission) in € million, preliminary

<table>
<thead>
<tr>
<th>Country</th>
<th>Revenues (€ million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA*</td>
<td>37.4</td>
</tr>
<tr>
<td>Austria*</td>
<td>15.7</td>
</tr>
<tr>
<td>Switzerland</td>
<td>11.5</td>
</tr>
<tr>
<td>Japan</td>
<td>11.5</td>
</tr>
<tr>
<td>France</td>
<td>10.8</td>
</tr>
<tr>
<td>Netherlands</td>
<td>9.5</td>
</tr>
<tr>
<td>Great Britain*</td>
<td>9.1</td>
</tr>
<tr>
<td>China</td>
<td>7.3</td>
</tr>
<tr>
<td>Belgium without EU</td>
<td>6.4</td>
</tr>
<tr>
<td>Italy*</td>
<td>5.3</td>
</tr>
<tr>
<td>Sweden</td>
<td>3.7</td>
</tr>
<tr>
<td>Spain</td>
<td>3.5</td>
</tr>
<tr>
<td>South Korea</td>
<td>3.5</td>
</tr>
<tr>
<td>Brasil</td>
<td>3.2</td>
</tr>
<tr>
<td>Poland</td>
<td>2.4</td>
</tr>
<tr>
<td>Portugal*</td>
<td>2.3</td>
</tr>
<tr>
<td>Norway</td>
<td>2.0</td>
</tr>
<tr>
<td>Finland</td>
<td>2.0</td>
</tr>
<tr>
<td>Denmark</td>
<td>1.7</td>
</tr>
<tr>
<td>Canada</td>
<td>1.7</td>
</tr>
</tbody>
</table>

*of which Fh-USA – 19.6 Mio €, Fh-Austria – 2.5 Mio €, Fh-Portugal – 1.6 Mio €, Fh-UK – 1.0 Mio €, Fh-Italia 0.8 Mio €
International revenue of the Fraunhofer-Gesellschaft
2010 – 2014 (in € million)

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other countries</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Asia</td>
<td>17</td>
<td>18</td>
<td>24</td>
<td>29</td>
<td>30</td>
</tr>
<tr>
<td>North and South America</td>
<td>33</td>
<td>35</td>
<td>35</td>
<td>38</td>
<td>44</td>
</tr>
<tr>
<td>European Countries</td>
<td>59</td>
<td>74</td>
<td>84</td>
<td>90</td>
<td>94</td>
</tr>
<tr>
<td>European Commission</td>
<td>65</td>
<td>71</td>
<td>88</td>
<td>92</td>
<td>106</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td>175</td>
<td>200</td>
<td>233</td>
<td>250</td>
<td>276</td>
</tr>
</tbody>
</table>
Regional Distribution of International Proceeds

Europe further in the lead

- Europa
- USA
- Asien
- ROW

1996: 100% = 19 Mio €
2001: 100% = 107 Mio €

German Institutes only, w/o EU-funding and license revenues
International Revenues Grow More Than Proportional Trend Comparable with TNO and VTT

International Share of Industrial Income: +52%
International Share of Projects: +32%
International Share of Turnover incl. Decpreciation: +54%

Basis: Institutes in Germany, excl. Licensing
Overview

- Facts and Figures Fraunhofer International
- Strategies and Models
- Globalisation vs Regional Aspects
- Lessons Learned
- Conclusions
Objectives of Fraunhofer's International Strategy

- Strengthen the role of Fraunhofer as professional R&D provider
- Expand Fraunhofer's scientific competence profile
- Attract the best researchers
- Be pacemaker of the European Research Area
- Contribute to sustainable development
Fraunhofer models of international cooperation

International cooperation is a key element for Fraunhofer to continuously develop and improve its capability in research and development. Fraunhofer thereby seeks to cooperate with excellent research partners over the world to enhance its scientific know how. Moreover it is interested to gain knowledge about international markets as well as specific regional challenges.

Fraunhofer drives international cooperation through a set of instruments such as:

- **Individual project cooperation** - especially in Asia in some cases supported by regional representative offices
- **Strategic Cooperation Programmes** with international Centers of excellence
- Institutionalized, yet temporary, project cooperation located at universities abroad - so-called **Fraunhofer Project Center**
- **Fraunhofer Center** abroad within the framework of Fraunhofer subsidiaries in Austria, Portugal, Italy, USA and recently Chile.
Fraunhofer business models for international cooperation

- **Strategic cooperation programme (prime partnership)** on project basis via sub-contracting and know-how-exchange, focus on scientific cooperation.
  - Example: Strategic cooperation project between University of Cambridge, UK and Fraunhofer ITWM in the field of financial mathematics

- **Fraunhofer Project Center**: cooperation on project basis via joint marketing and acquisition. FPC as "franchise model" of Fraunhofer. Fraunhofer as franchise grantor.
  - Example I with the franchise partner being the partner university: Fraunhofer Project Center for Laser Integrated Manufacturing (PCW-Poland)
  - Example II with the franchise partner being a separate legal entity founded by the partner university: Fraunhofer Project Center for Interactive Digital Media IDM (Singapur)

- **Fraunhofer Center** under legal entity of Fraunhofer subsidiary.
  - Example: Fraunhofer Industrial Engineering Center IEC (Bolzano, Italy) under the roof of Fraunhofer Italy

¹beyond e.g. project cooperation within EU-project
Different ways to reach the goals of international cooperation

Scientific added value – cooperation with excellent research groups abroad

- **ICON** program
  - joint excellence in applied research, following a joint strategic research agenda, exchanging young researchers

Benefit for the industry of both countries

- **Bilateral contract research**
  - driven by Fraunhofer Institutes, facilitated by Fraunhofer Headquarters as well as through Representative Offices in specific countries and markets outside Europe

- **Fraunhofer Project Center**
  - joint applied research and joint project acquisition at the location of the international partner university

- **Fraunhofer Center**
  - institutionalized Fraunhofer research presence abroad
<table>
<thead>
<tr>
<th>Cooperation Program</th>
<th>Mobility Program</th>
<th>Institutional Cooperation</th>
<th>Acquisition Marketing</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICON – Cooperation with the best</td>
<td>Fraunhofer – Chinese Academy of Sciences (CAS) PhD Program</td>
<td>Fraunhofer Subsidiary with Centern</td>
<td>Representative Offices and Senior Advisors</td>
</tr>
<tr>
<td>AERToS – Networked RTOs in Europe</td>
<td>Fraunhofer Mobility Program</td>
<td>Fh USA</td>
<td>Ros: Beijing, Tokyo, Jakarta, Seoul, Bangalore</td>
</tr>
<tr>
<td>Fraunhofer - Carnot Program PICF</td>
<td>Brazilian Relocation Program (CNPq) to Fraunhofer</td>
<td>Fh Austria</td>
<td>SAs: Ampang, Dubai, Cairo</td>
</tr>
<tr>
<td>…</td>
<td>…</td>
<td>Fh Portugal</td>
<td>Market Development</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fh Italia</td>
<td>Projects with a new country, theme or approach</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fh Chile</td>
<td>Technology Days Abroad</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fh UK</td>
<td>Delegation Visits, Policy Advise, EU-Commission</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fh Schweden</td>
<td>International Research Marketing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Temporary Fraunhofer Project Center</td>
<td></td>
</tr>
</tbody>
</table>

Institutional Cooperation
- Temporary Fraunhofer Project Center

Acquisition Marketing
- Representative Offices and Senior Advisors
  - Ros: Beijing, Tokyo, Jakarta, Seoul, Bangalore
  - SAs: Ampang, Dubai, Cairo
- Market Development
  - Projects with a new country, theme or approach
- Technology Days Abroad
- Delegation Visits, Policy Advise, EU-Commission
- International Research Marketing
Overview

- Facts and Figures Fraunhofer International
- Strategies and Models
- Globalisation vs. Regional Aspects
- Lessons Learned
- Conclusions
Globalisation and Regionality
The Example of Regional Clustering in Germany

Thoughts on Regionality:

Accumulated Industrial Turnover FhG Institutes

Accumulated Industrial Income

Distance to Institutes
Globalisation and Regionality
The Example of Regional Clustering in Germany

Thoughts on Regionality: Project Share of 50 Km radius
Globalisation and Regionality
The Example of Regional Clustering in Germany

2009-2011: Regional Innovation Cluster

Accelerating innovation by creating regional focuses:
Reinforcing strengths
Sharpening the existing profile
Creating beacons of research
Activating private industry research activities

University
Basic Research

Teamwork

Industry
R&D for Products and Services

Fraunhofer
Applied Research

Research Area – Region – Fraunhofer
Overview

- Facts and Figures Fraunhofer International
- Strategies and Models
- Globalization vs Regional Aspects
- Lessons Learned
- Conclusions
Lessons Learned

Good ones:

- Good integration within Fraunhofer speeds up joint initiatives (EU, etc.)
- If the partner has a good link to industry, projects to Fraunhofer in Germany are likely

Bad ones:

- Institutional cooperation ends quickly if the partner organisation can’t provide long term funding
- Cooperation suffers, if exchange (also physically) is not driven by the partners
- Weak links from partner abroad to industry can’t be strengthened quickly
Overview

- Facts and Figures Fraunhofer International
- Strategies and Models
- Globalisation vs. Regional Aspects
- Lessons Learned
- Conclusions
Conclusions

- Don’t forget, where the investment is coming from.
- “tax payers’” money can’t be simply invested
- Analysis of local industry and research market is fundamental.
- International partner must be able for long term partnership (also financially)
- Good integration in “Fraunhofer World”
- Don’t go for every occasion, even if funding is offered.