Ms Anandi Iyer, Director Fraunhofer India
Fraunhofer is the largest organization for applied research in Europe

- More than 80 research institutions, including 66 Fraunhofer institutes

- Nearly 24,000 employees, the majority educated in the natural sciences or engineering

- An annual research volume of nearly 2 Billion euros, of which 1.7 billion euros is generated through contract research.
  - 2/3 of this research revenue derives from contracts with industry and from publicly financed research projects.
  - 1/3 is contributed by the German federal government and the Länder governments in the form of institutional financing.

- International collaboration through representative offices in Europe, the US, Asia and the Middle East
Some amazing facts!!

- Inventors of MP3, white LEDs, holding world record of maximum solar battery storage and fastest transmission of data etc etc

- Manufacturing Institutes have the capability to go right up to zero batch production.

**Applied Research** - Development- Proof of Concept- Techno-commercial feasibility – Spinoffs- **Commercialization** (closing the loop)

- Institutes in Manufacturing have excellent labs & Equipment at least 2-3 years ahead of Industry.

- More than 7500 Projects implemented every year

- 2 Patents filed for every working day at Fraunhofer

- Prof Hans Joerg Bullinger- Manager of the Year 2010
The Profile of the Fraunhofer-Gesellschaft

- 66 Institutes
- 24,000 employees

7 Groups:
- Information and Communication Technology
- Life Sciences
- Microelectronics
- Light & Surfaces
- Production
- Materials and Components – MATERIALS
- Defense and Security VVS
Position of Fraunhofer within the Innovation System

- Societal challenge as future markets - being ready for global competition
- Universities perform excellent scientific research
- RTOs bridge the innovation gap with technological R&D
- Innovative companies create new products
- Intensive exchange with society

- **fundamental research** challenge of efficient light emitting diodes
- **innovation of luminescence-converter** by Fraunhofer: absorbs blue light and converts it into yellow light → combination of blue and yellow appears white
- **successful commercialization** of white light LED in lighting, car lighting etc by OSRAM
The Fraunhofer-Gesellschaft
Locations in Germany

- 66 institutes and research units
- Nearly 24,000 staff
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
Fraunhofer Subsidiaries and Center and Fraunhofer Project Center in Europe

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

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

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

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

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

- **Fraunhofer Project Center for …**
  - Coatings in Manufacturing, Thessaloniki
  - Laser Integrated Manufacturing, Wrocław
  - Production Management and Informatics, Budapest
# Fraunhofer Groups

| ICT | FIT, FOKUS, IAIS, IAO, IDMT, IESE, IGD, IOSB, ISST, ITWM, IVI, MEVIS, SCAI, SIT, FKIE, AISEC, ESK  
Associated members: HHI, IIS |
<table>
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<tbody>
<tr>
<td>Life Sciences</td>
<td>IBMT, IGB, IME, ITEM, IVV, IZI</td>
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</table>
| Microelektronics | EMFT, ENAS, HHI, IAF, IIS, IISB, IMS, IPMS, ISIT, IZM, FHR  
Associated members: FOKUS, IDMT, IZFP, ESK, IKTS |
| Light & Surfaces | FEP, ILT, IOF, IPM, IST, IWS |
| Production | IFF, IML, IPA, IPK, IPT, IWU, UMSICHT |
| Materials and Components – MATERIALS | EMI, IAP, IBP, ICT, IFAM, IKTS, ISC, ISE, ISI, IWES, IWM, IZFP, LBF, WKI  
Associated members: ITWM, IGB, IIS |
| Defense and Security VVS | EMI, IAF, ICT, INT, FHR, FKIE, IOSB,  
Associated members: IIS, HHI, ISI |

Institutes outside groups: MOEZ, INT, PYCO, IRB, COMEDD
Cell-Free Bioproduction
- Synthesis of customized proteins on an industrial scale

Electromobility II
- Transfer of various research findings into market-relevant products

Rare Earth Metals
- Up to 50% reduction of rare earth metals needed for permanent magnets

E³ Production
- New production technology to gain maximum value with minimum resources
Example: Electric powered mobility

Electric powered mobility needs new products

Human Car Interface:
- e.g. new interface concepts

Car body:
- e.g. lightweight construction, battery packaging, aerodynamics

Infrastructure:
- e.g. Battery-charging station

Power train

Energy storage system:
- e.g. Li-Ion batteries

New climate concepts:
- e.g. motor cooling

Architecture:
- e.g. BUS systems

Auxiliary equipment:
- e.g. turbo charger, electric generator

Power electronics:
- e.g. inverter
Systems research projects: The example of solar energy

Fraunhofer is one of the leading research organisations in the fields of solar energy technology worldwide.

**Budget:**
- 65 million Euro for solar energy

**Employees:**
- more than 700 scientists

**Network:**
- Fraunhofer Alliance Energy with 15 FhI
## Fraunhofer initiative »Morgenstadt«
### Challenges and fields of research

<table>
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<th>Decentralized and centralized energy</th>
<th>Mobility Transportation</th>
<th>Planing Building</th>
<th>Production Logistics</th>
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<tr>
<td>Generating and saving emission-free energy</td>
<td>Multimodal mobility systems</td>
<td>Buildings as climate-neutral power plants</td>
<td>Urban production and supply</td>
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<th>Information Communication</th>
<th>Urban processes Organisation</th>
<th>Security Protection</th>
<th>Convergence of city systems</th>
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<tr>
<td>ICT platforms for Smart Cities</td>
<td>Collaborative decision-making processes</td>
<td>Resilient buildings and infrastructures</td>
<td>municipal integration and technology management</td>
</tr>
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New Research Strategy in USA

»Obama Will Unveil $1-Billion National Manufacturing Innovation Network Initiative Based On Germany's Fraunhofer Institute«

By Richard A. McCormack
cfmr@manufacturingnews.com

Tucked deep—very deep—within the Obama administration's Fiscal Year 2013 budget submission to Congress is a proposal to create a new $1 billion private-public partnership program aimed at commercializing and manufacturing U.S. developed technologies. The National Network for Manufacturing Innovation (NNMI), modeled after the German Fraunhofer Institutes, would be a joint effort between the Departments of Defense and Energy, the National Science Foundation, the Commerce Department's National Institute of Standards and Technology. Its goal would be to "revitalize U.S. manufacturing...through a network of institutes where researchers, companies and entrepreneurs can come together to develop new manufacturing technologies with broad applications," according to the budget submission.

Each of the institutes "would have a unique technology focus." They would support the ecosystem of local manufacturers, develop skilled workers and focus on technology commercialization "by helping to bridge the gap from the laboratory to the market and address core gaps in scaling manufacturing process technologies," according to page 236 of the NIST budget request.

The proposal springs from this past summer's President's Council of Advisors on Science and Technology's (PCAST) recommendation that the United States launch an advanced manufacturing initiative that would be a "whole-of-government effort." The program would
Why Fraunhofer in India??

Innovative Fraunhofer

• Covers applied research topics across industry sectors
• Proven capability to close loop from research to commercialization
• Experience in other markets including Asia
• Needs to penetrate Asian markets

Incredible India

• Seeks support to leapfrog technologies
• Weak academia-industry link, needs Fraunhofer
• Many Fraunhofer clients already in India
• Excellent market for Fraunhofer
Fraunhofer in India – Highlights

- Project cooperation with Core Group of Automotive Research (CAR) to the tune of nearly Euro1 Million.

- MoU with ACMA, SIAM and NATRiP for the Automotive sector

- MoU with BML Munjal University for setting up advanced qualification courses.


- Contract with Ministry of Small Medium and Micro Enterprises for evaluation and upgradation of Tool Rooms.

- Research contracts worth more than Euros 8 Million in the last 4 years (largely Indian companies!).

- More than 100 Projects at various levels of discussion and implementation and Top 30 Indian companies are already clients of Fraunhofer in India.

- Fraunhofer registered Office with an Experience Theater showcasing Fraunhofer capabilities, Fraunhofer Innovation and Technology Academy to conduct workshops for Fraunhofer clients.
Strategic Entry Strategy for Fraunhofer in India

**Strategise**
- Strategy paper, and analysis
- Identification of clients and partners
- Intiate Dialogue with Multipliers
- Projects under discussion: 2008-2009

**Penetrate**
- Technology Day to reduce time from query to contract: 2009
- Indian CEO Delegations to Germany: 2008-2009
- Expert Delegations from FHIs to India: 2009-2011
- Projects under discussion: 2009-2011

**Consolidate**
- Closing contracts
- Participation in Trade Shows and Conferences
- Fraunhofer Innovation and Technology IT Platform
- Opening of Representative Office
- Projects under discussion: 2010-2012

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Fraunhofer strategy for India


- Establish long-term strategic partnerships related to focus industries: automotive (ACMA, CAR, IMTMA, CII), Aerospace (NAL, Airbus, Diehl, ISRO), energy (TERI, BHEL) materials (Tata, NAL)

- Bring Fraunhofer researchers to India (lectures, technical workshops, exhibitions, company visits) and receive Indian firms and researchers at Fraunhofer (institute visits, workshops, training)

- Lighthouse Events for high visibility and focus on broad topics such as green manufacturing, sustainable cities, green buildings, water, energy (FIT Platform)

- Increased applied research engagement with industry moving from one off projects to strategic technology projects

- Cluster development and augmentation of research ecosystem to bring in SMEs into the R&D environment.
Some successful examples

<table>
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<tr>
<th>Precompetitive</th>
<th>Industry</th>
<th>Public sector</th>
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<tr>
<td>• Multijoin project Ashok Leyland, IIT Madras, ARCI, Hyderabad,</td>
<td>• Strategic cooperation with a large Indian OEM for Light weighting</td>
<td>• TEFR for BHEL on Solar Energy Plant.</td>
</tr>
<tr>
<td>• 4 Fraunhofer Institutes</td>
<td>• 3 Fraunhofer Institutes.</td>
<td>• Fraunhofer ISE Freiburg</td>
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Project Revenues in India 2004-2014
FUTURE DIRECTION

- Strategy and Market Entry
- Penetration through multipliers
- Visibility and consolidation
- Strategic and large projects

Timeline:
- 2009-10
- 2010-11
- 2011-12
- 2012-13
SCENARIO IN INDIA

- Contract research is a very nascent field and Industry not fully aware of the potential.
- Industry prefers licensing of existing technology breakthroughs rather than investing in long term strategy of using R&D and Innovation to drive Growth.
- Product development is not an area or priority for most firms.
- Medium sized firms more hungry for technology and have the mindset to “invest” in long term engagement.
- Indian context extremely important for implementing the right technologies and strategies.
- Government grants geared to research organisations, not yet to innovative companies. Exception: Biorad programme of DBT.
- Increased relevance of R&D and Indigenous Technology in India.
- Huge potential and market for Fraunhofer, learning curve extremely stile!
Recommendation for fast-tracking Innovation

Accelerating innovation by creating regional focuses:

- Reinforcing strengths
- Creating beacons of research
Fraunhofer-Innovationscluster:

- Successful and visible engagement in research areas by Fraunhofer
- Fraunhofer is the first research organisation with its own Model for the development of Clusters.
- Long term partnership within a Region between Industry, Universities R&D organisations with regard to a specific thematic focus.
- Fraunhofer-Innovationsclusters are Projectclusters – not a mere networking cluster.
- A forum for effectively showcasing technologies that have made the transition from research to industry
- The inclusion of Germany’s Länder in the appraisal process reinforces the bond Fraunhofer has with each State
- 19 approved Fraunhofer innovation clusters to date
Fraunhofer Innovation clusters – examples of success

• **Fraunhofer innovation cluster Digital Commercial Vehicle Technology**: establishment of the John Deere research center in the region.

• **Fraunhofer innovation cluster Secure Identity Berlin-Brandenburg**: Collaborative “Electronic ID Card” system (Bundesdruckerei).

• **Fraunhofer innovation cluster Nano for Production (Dresden)**: Two plants featuring Fraunhofer IWS technology for industrial manufacture of EUV mirrors in operation at user’s site, third plant under construction.

• **Fraunhofer innovation cluster Optical Technologies, Jena Optical Innovations JOIN**: Hand-held 3D scanners for applications in medicine, archeology and criminalistics

• **Fraunhofer innovation cluster Future Security BW**: Safe construction of high-rise buildings with a service core

• **Fraunhofer innovation cluster Multifunctional Materials and Technologies MultiMaT (Bremen)**: Joining of fiber-reinforced composite structures in collaboration with Optoprecision and Airbus

• **Digital Production (Stuttgart region)**: Energy-efficiency: model-based optimization for the company Kärcher.
Thank you for your attention

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