Innovation Management

Frank Wagner
Fraunhofer IAO

DTED Meeting
17th May 2005, Adelaide

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Overview

1. Fraunhofer, the IAO and Innovation in Germany
2. Innovation and Innovation Management –
   A Study and some Lessons
3. Partners for Innovation –
   An Initiative of Federal Government of Germany
4. The IAO Innovation Audit
5. Some Ideas for the Future

Fraunhofer Profile in 2004

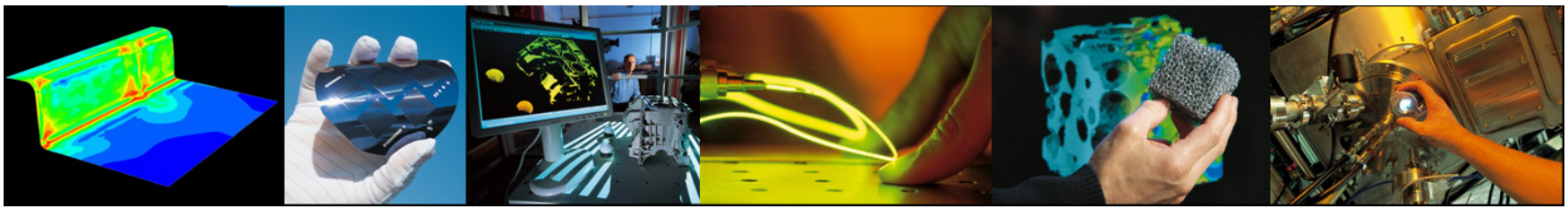
58 Institutes (as independent Profit Centres)

12 700 employees

€ 1 billion research budget

7 Alliances

- Microelectronics
- Production
- Information and Communication Technology
- Materials and Components
- Life Sciences
- Surface Technology and Photonics
- Defence and Security Research



ZV-A2/ Dez 03

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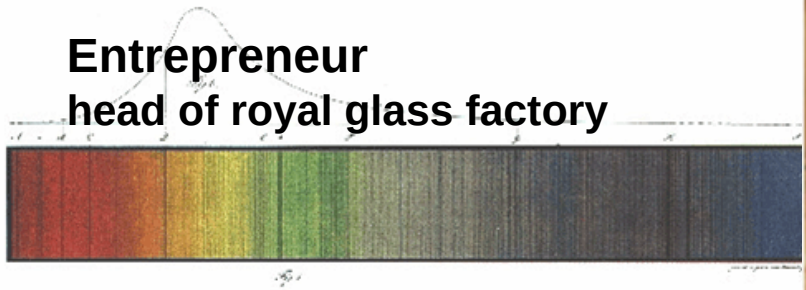
Joseph von Fraunhofer (1787 - 1826)

Researcher
discovery of “Fraunhofer Lines“ in the solar spectrum

Inventor
new methods of lens processing

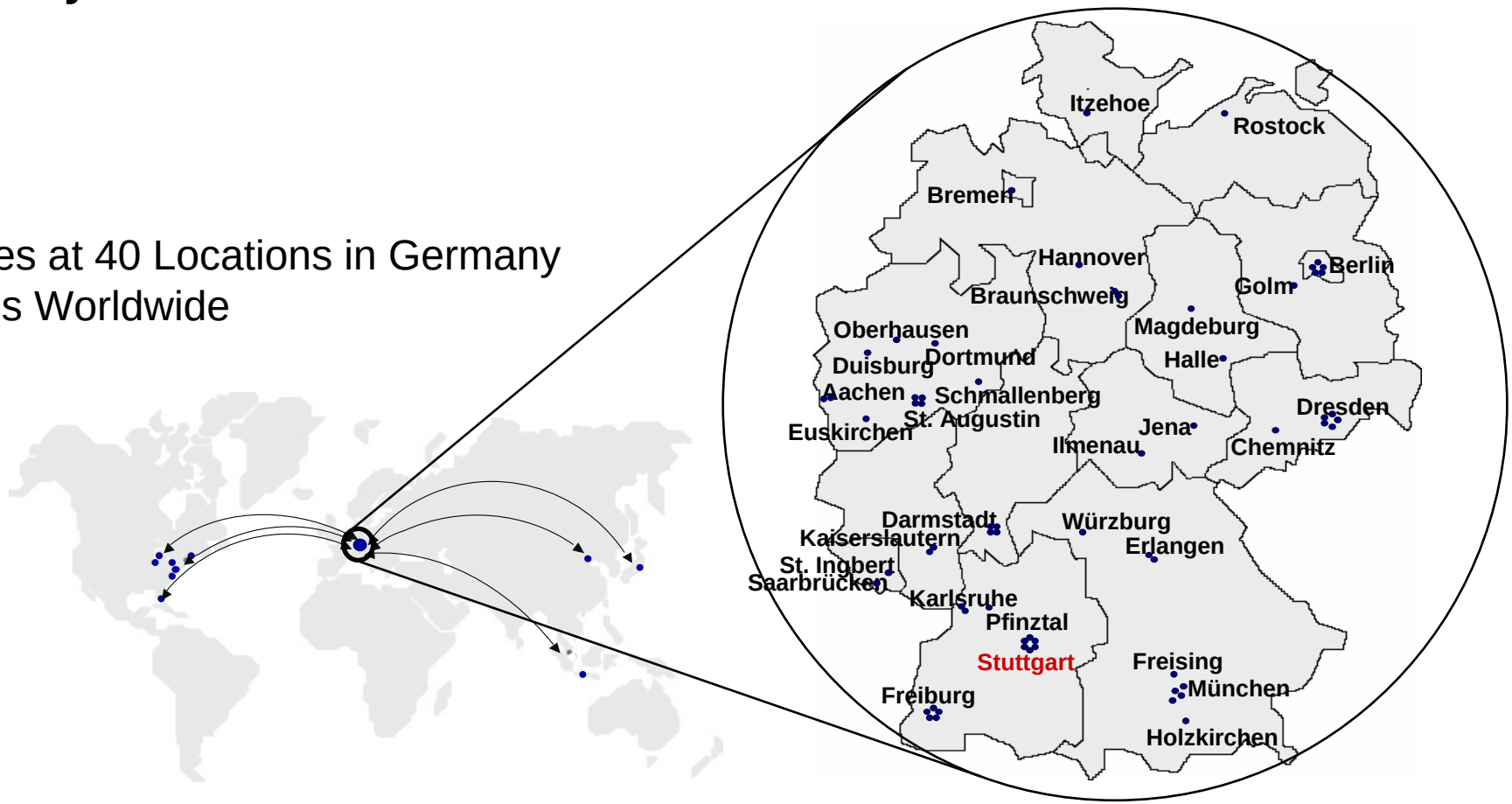
Entrepreneur
head of royal glass factory



ZV-A2/ Juni 03

The Fraunhofer-Institutes in Germany and Worldwide:

8 Institutes at 40 Locations in Germany
18 Offices Worldwide



ZV-A2/ März 04

12 Fraunhofer Leading Edge Innovations

1. Ambient Intelligence - Electronic assistance
2. Polytronics – Displays made of plastic
3. Digital medicine
4. Rapid development of medication
5. Intuitive man-machine cooperation
6. Integrated production – Rapid product development
7. Logistics – A key to success
8. Adaptive structures
9. Simulated reality – Modelling processes and products
10. Custom optics – The universal tool of photonics
11. Extreme ultraviolet for the nano-world
12. Power plants made to order

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A close Link between Fraunhofer and local Universities

Fraunhofer-Institut für Arbeitswirtschaft und Organisation, Stuttgart

Fraunhofer Institute for Industrial Engineering, Stuttgart

Founded: 1981
Employees: 140
Budget: 22.2 million EUR

Institut für Arbeitswissenschaft und Technologiemanagement der Universität Stuttgart

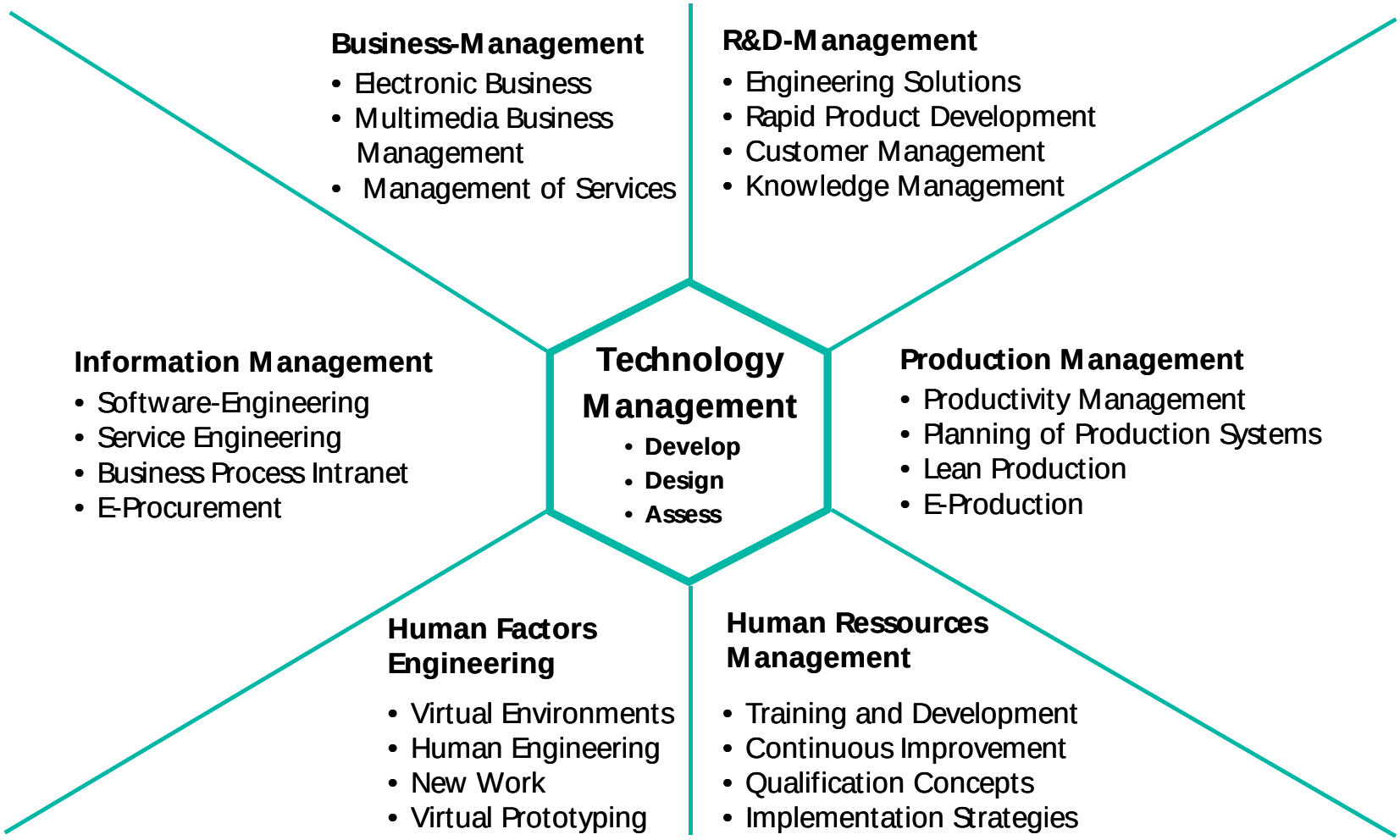
Institute for Human Factors and Technology Management of the University of Stuttgart

Founded: 1991
Employees: 120
Budget: 11.2 million EUR

Head of both Institutes:
Prof. Dr.-Ing. Dieter Spath

Research Areas:
Technology Management, Production and Information Management

Fraunhofer IAO: Fields of Competence



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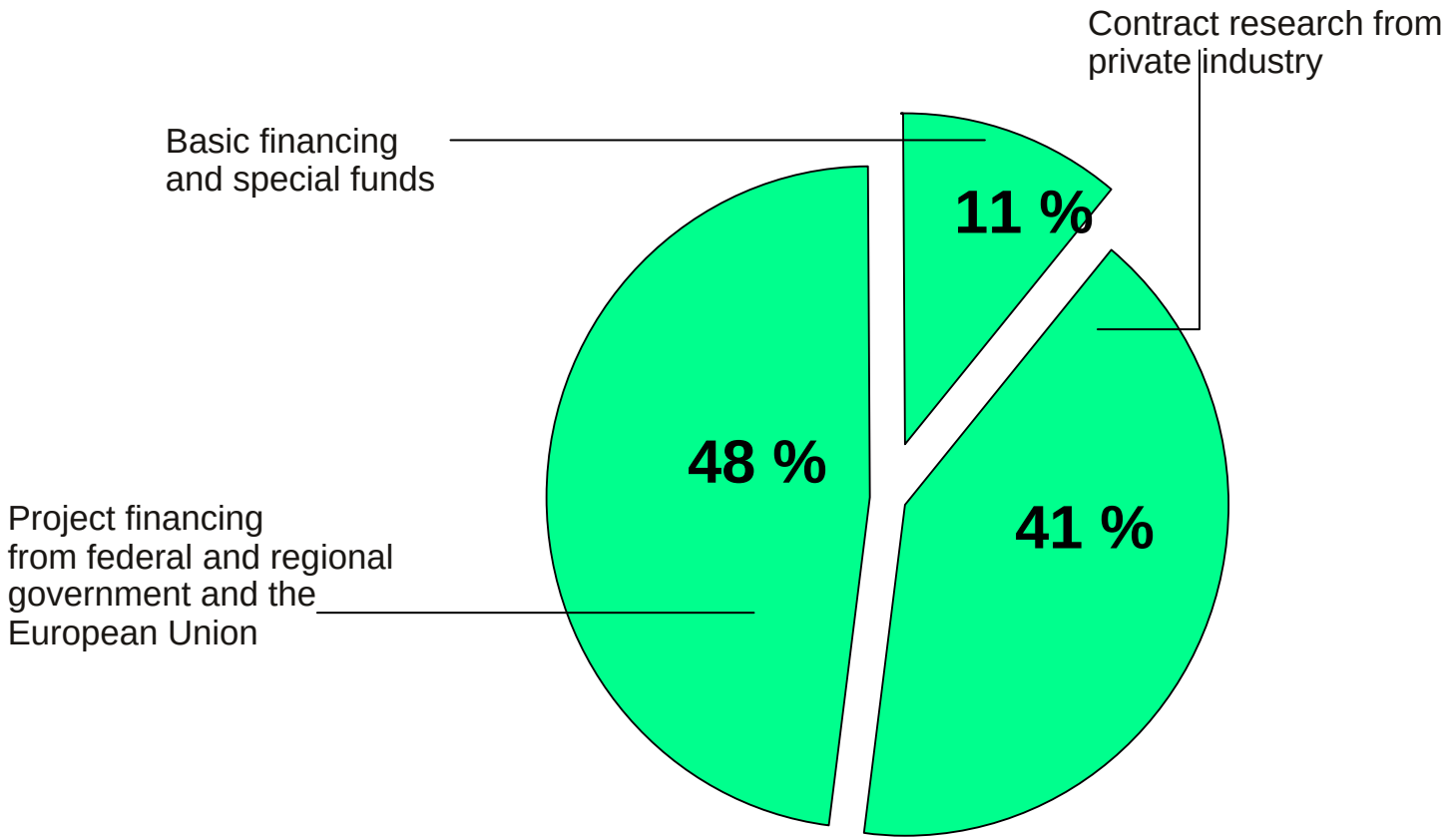
Fraunhofer IAO: Research Volume ~ 33,5 million EUR*



*2001, inclusive IAT

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... some Laboratories @ IAO

Model Factory for
Production Innovation

Office Innovation Centre (OIC) with
Interactive Creativity Landscape (ICL)

Virtual Reality Lab
(6-Wall-CAVE)

Vehicle Interaction Lab

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The Competence Centre R&D Management

Number of Employees: 15 Researchers/Consultants and 20 Research Assistants

Fields of Activity:

- Strategy development and implementation
- Project Management & Controlling
- Business Re-Engineering
- Engineering Life-Cycle Management
- R&D Assessment & Performance Management
- Information and Communication Technology
- Innovation Management
- Knowledge Management
- International Project Management

www.rdm.iao.fhg.de

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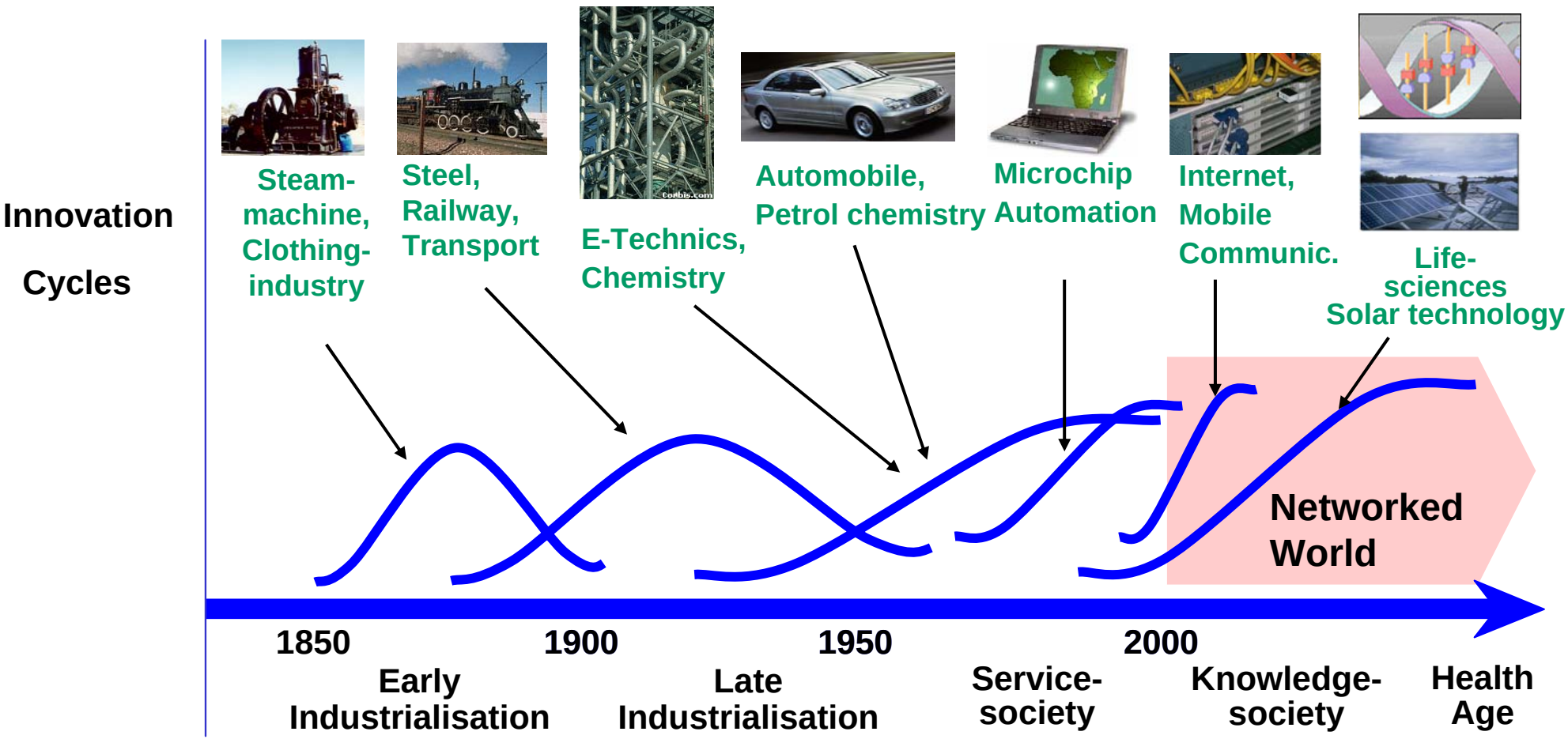
Kondratieff cycles: Key Innovations …

... initiate new industrial and social Stages of Development



Source: similar in Nefiodow in Capital 1/2 2000

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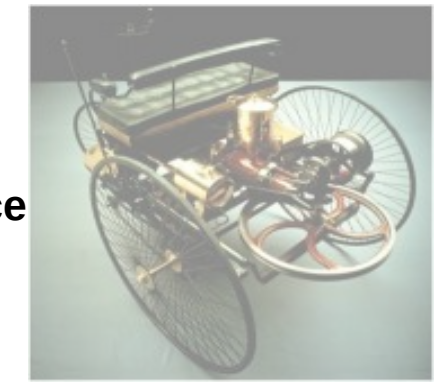
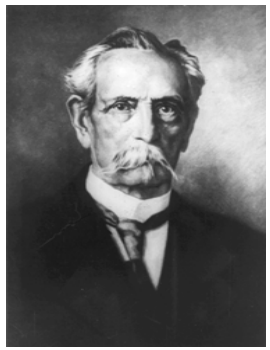
Genesis of Innovations – How were and are Innovations developed?

Old Age

Innovations are
- partial and very slow
- triggered by basic need of people
- based on empirical results and natural laws
- mostly regional limited
- developed by Individuals

Joseph von Fraunhofer





Carl Benz

Middle Age/ 19th & 20th C

- Orientation towards Science after "Renaissance"
- Researcher with Market Orientation

Today

- Wide-networked, multi-layer Interactions of Forces and Actors on the Market
- Innovations are coming due to their Complexity seldom from Individuals but from (international) Teams

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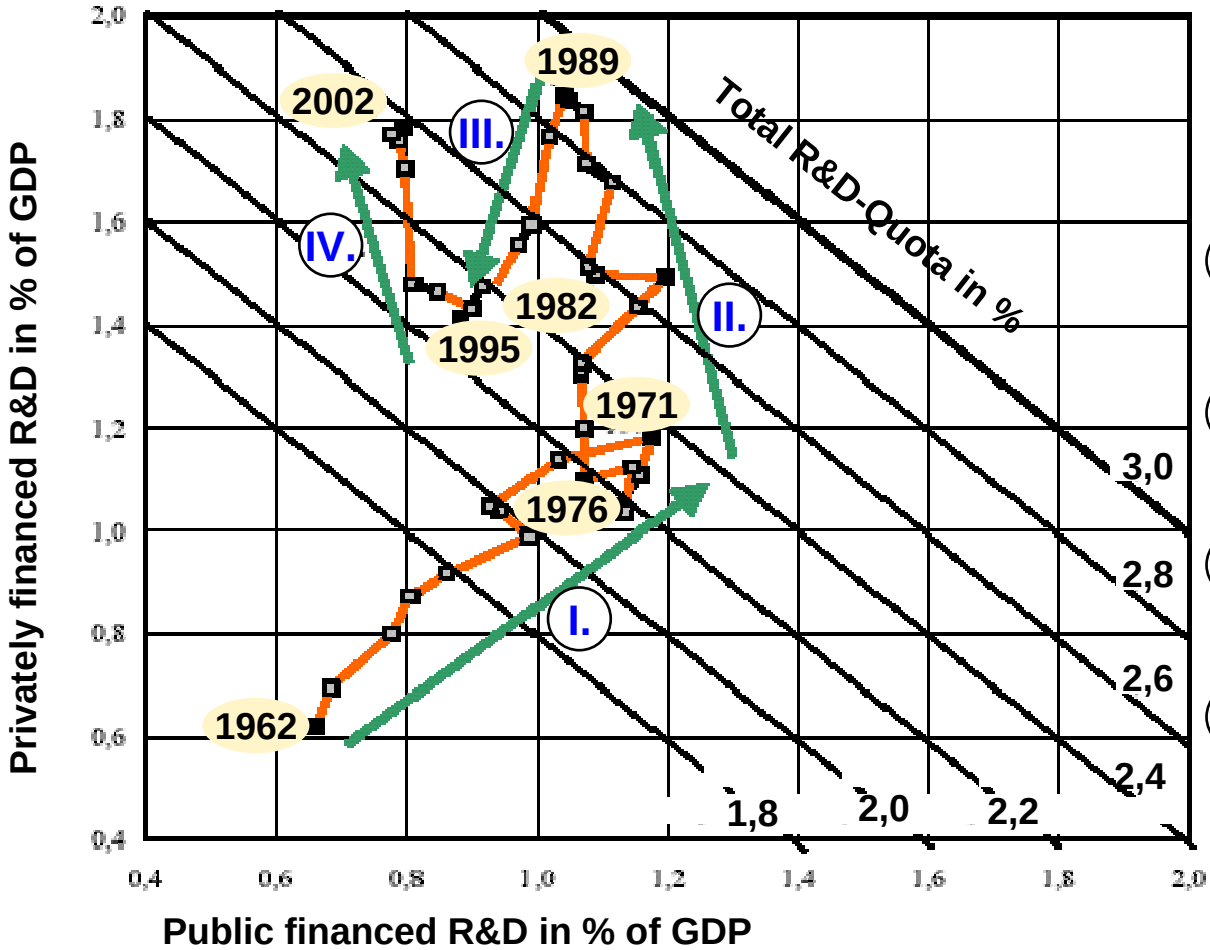
Public and Private Financing of R&D in Germany

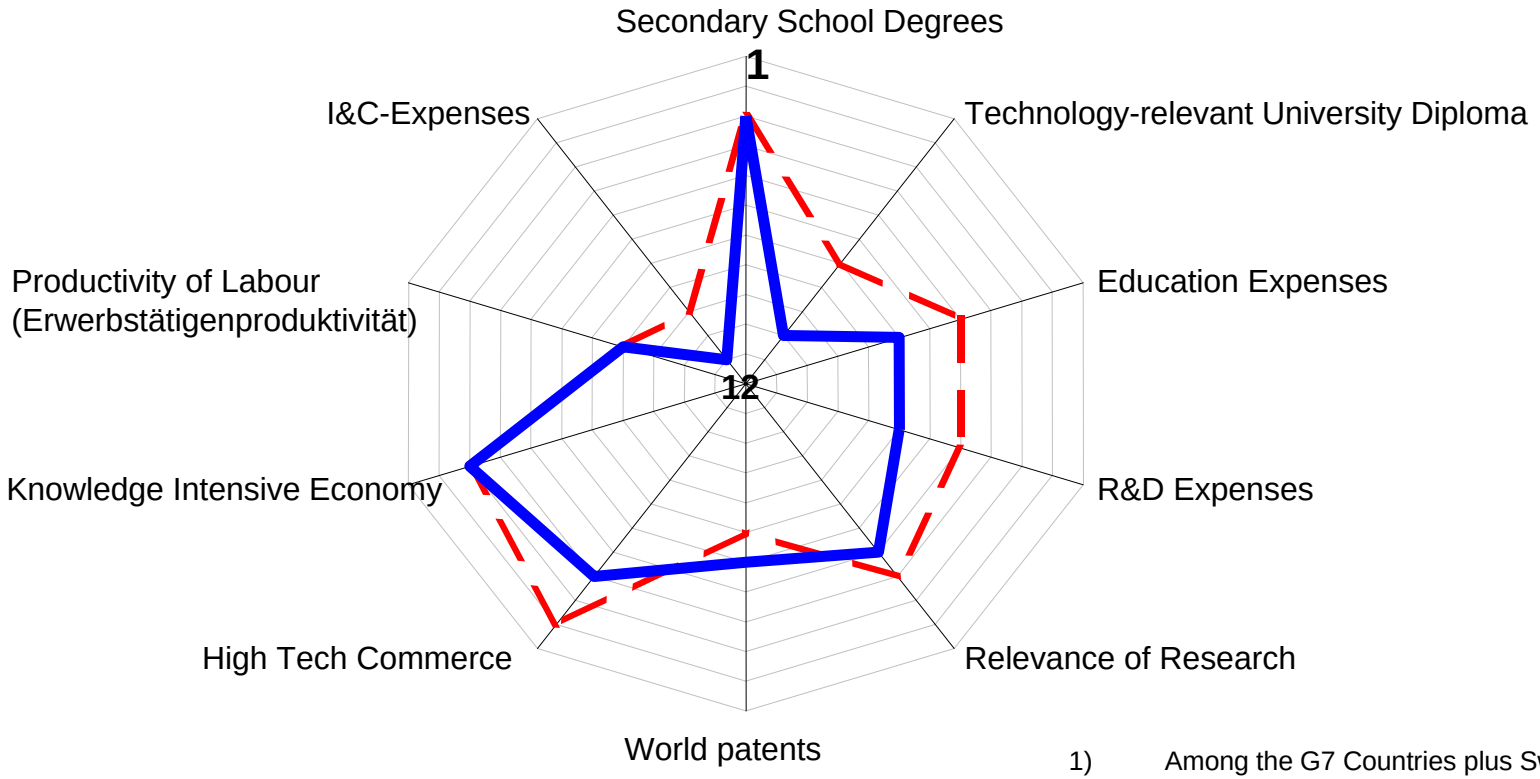


Phases of R&D-Development (1962 – 2002):

- **I.** Increase of R&D-Financing from public and private sources
- **II.** Intensifying of R&D-Financing from private Sources
- **III.** Decrease of R&D-Financing from public and private sources
- **IV.** Intensifying of R&D-Financing from private Sources

Quelle: BMBF, 2002

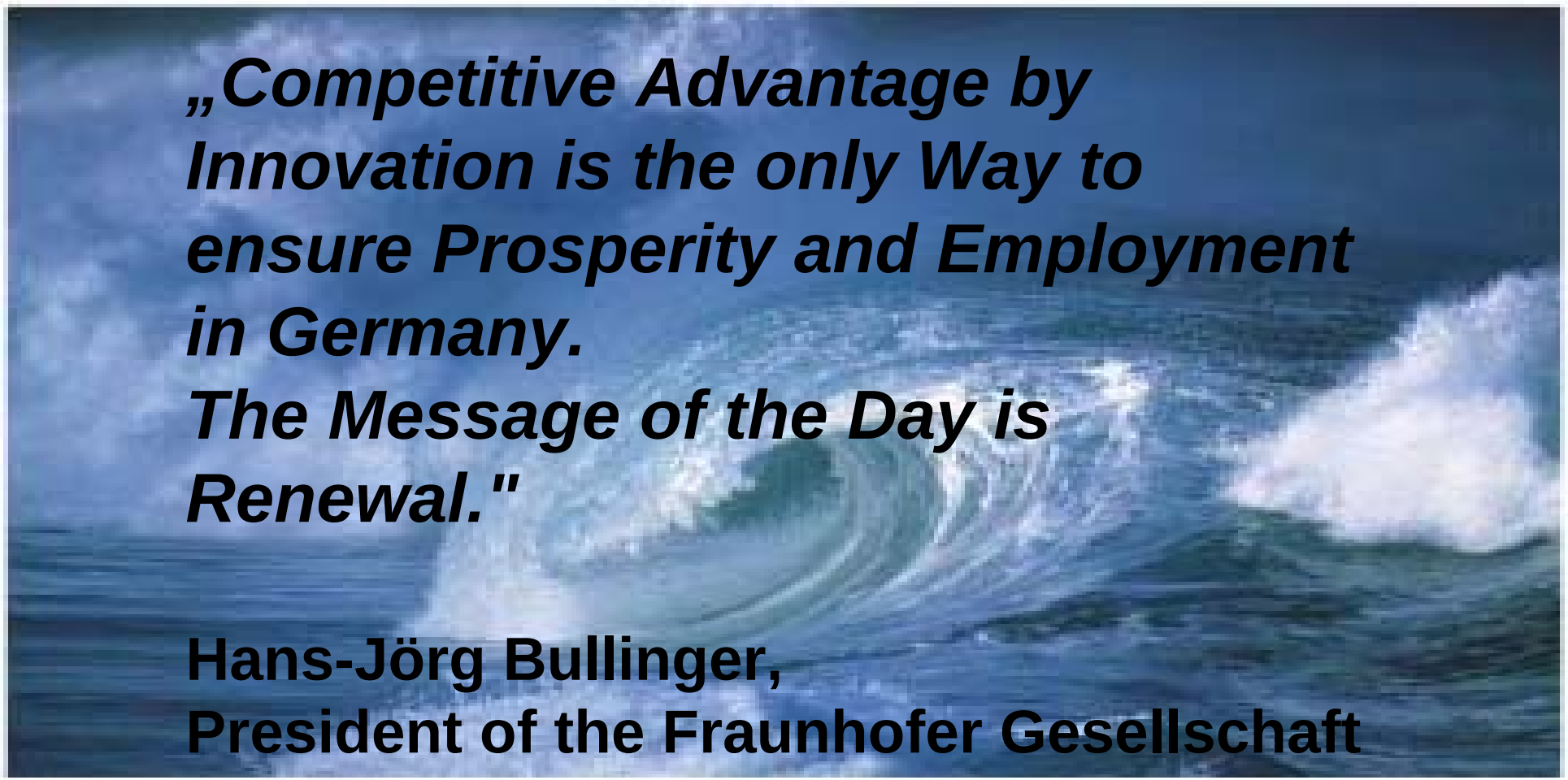
Ranking of Germany [1] following Criteria of Technology Performance Potential



1) Among the G7 Countries plus Switzerland, Sweden, Finland, Netherlands and South Korea

(Source : Bericht zur Technologischen Leistungsfähigkeit Deutschlands 2002)

Economic Growth through Innovation



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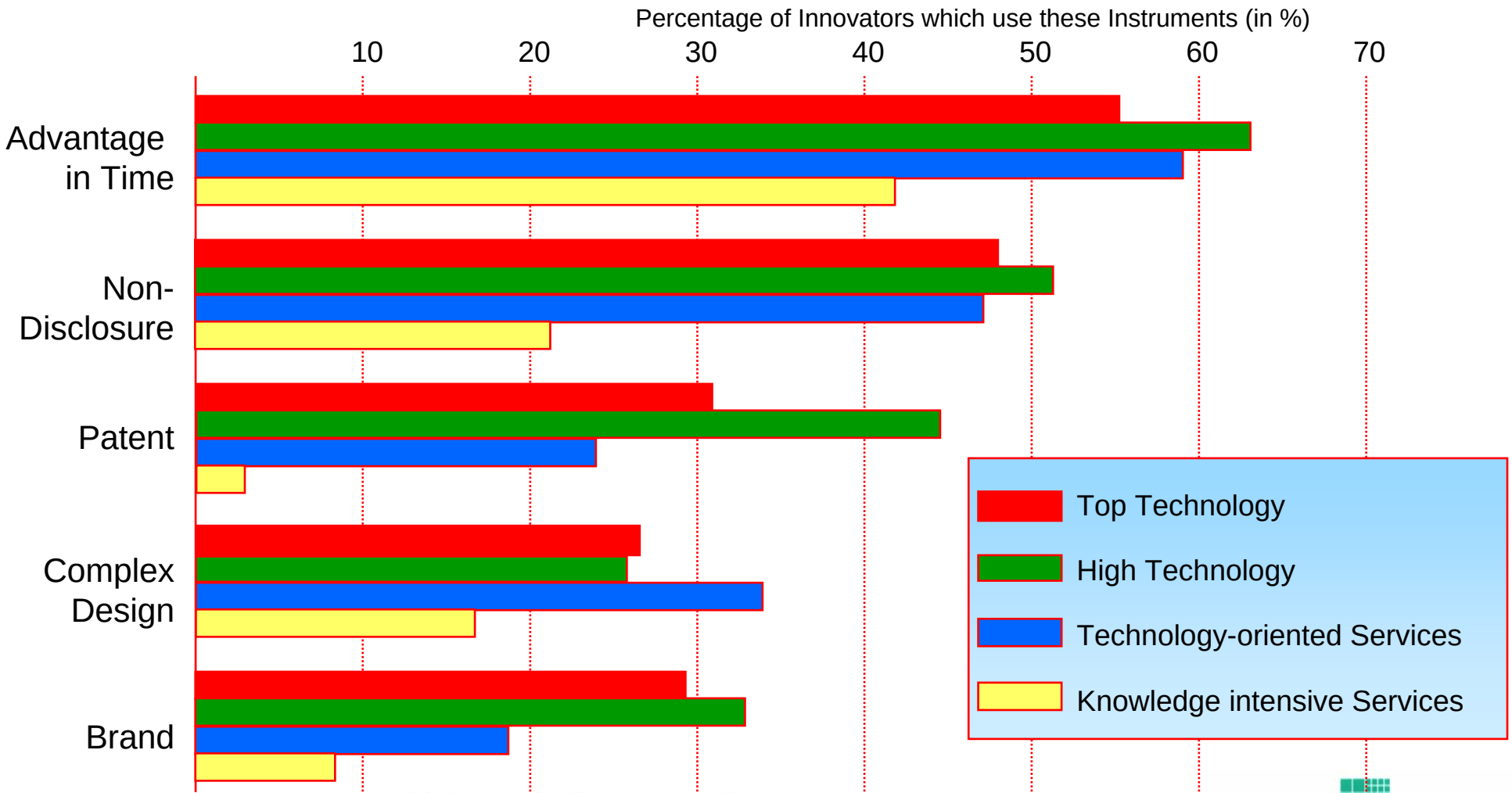
Accelerated Innovation Processes as an “Protective Mechanism”

Source: BMBF, Zur technologischen Leistungsfähigkeit Deutschlands 2002



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Strategic Growth Options by Innovation

Product / Tech-nology

Programme Extension
- New
  Product Functions

Diversification
- vertical
- horizontal
- lateral

New

Old

Market Penetration
- Product Improvements
- Product Variations

Market Extensions
- New Target Customers
- Internationalisation

Market / Customers

Old

New

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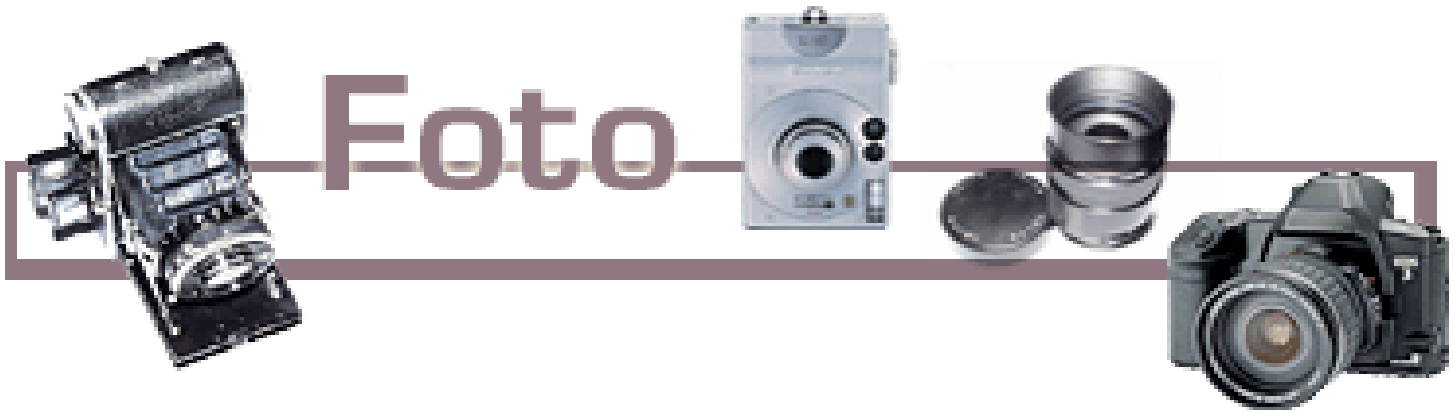
“Disruptive Technologies”

- Digital Photography has eroded the profits and viability of companies like Polaroid and Kodak.



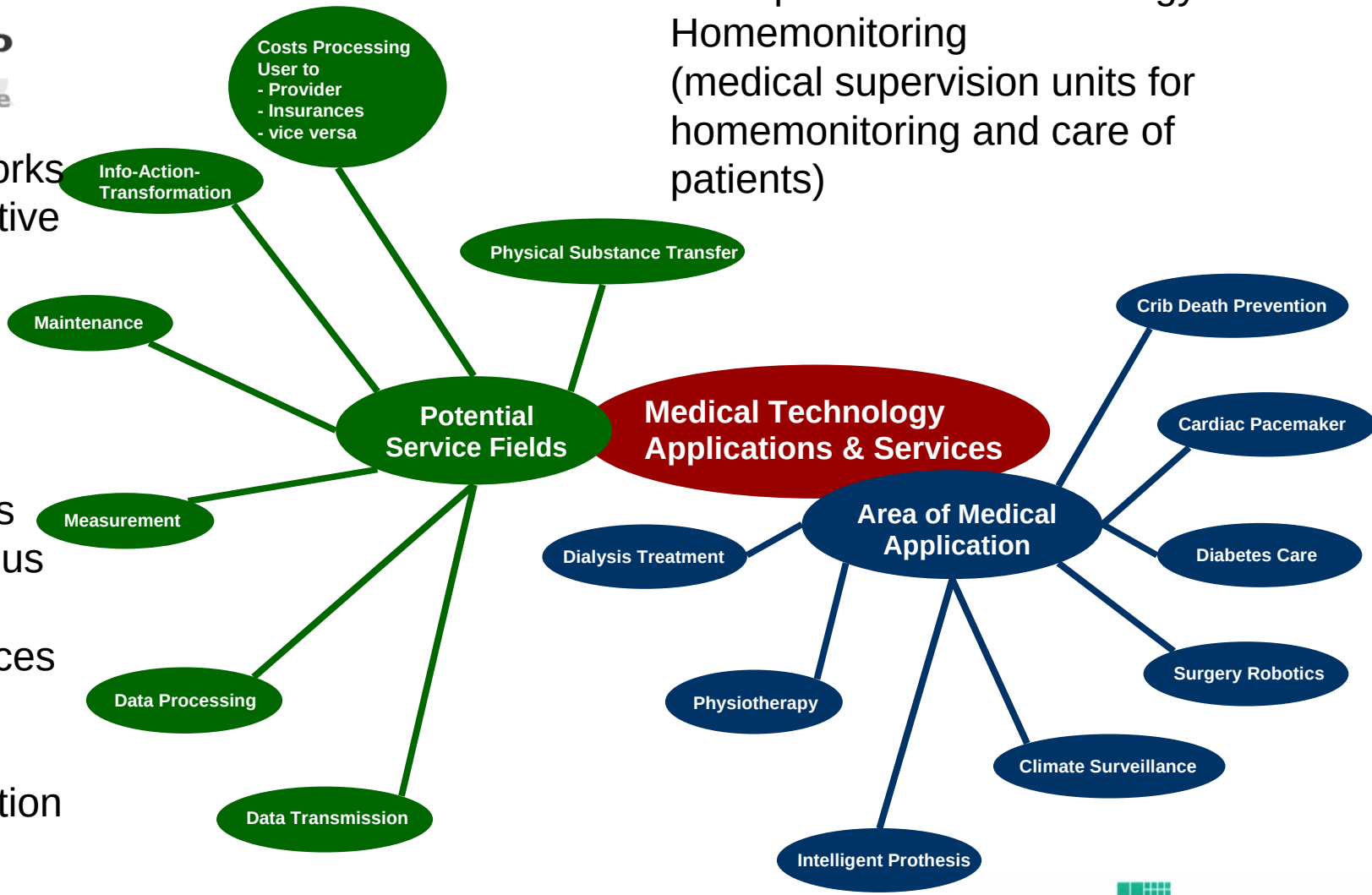
- Digital Video Recorders (DVRs) — which require no tape medium, allow advertisement to be skipped, and allow TV shows to be transmitted via the Internet — threaten the business models of commercial TV channels.

“Hybrid Products” – „Product Service Co-Design“

Competence networks proposing cooperative combinations of products and services

Integrated solutions make a simultaneous development of products and services necessary for coordination and economic optimisation

Example: Medical technology - Homemonitoring
(medical supervision units for homemonitoring and care of patients)



Product Innovations

- increase of customer benefit
- intensification of customer loyalty
- increase of market share or enable entry in new markets
- building and consolidation of admission barriers
- sustaining the independence
- improving the opportunities for profit

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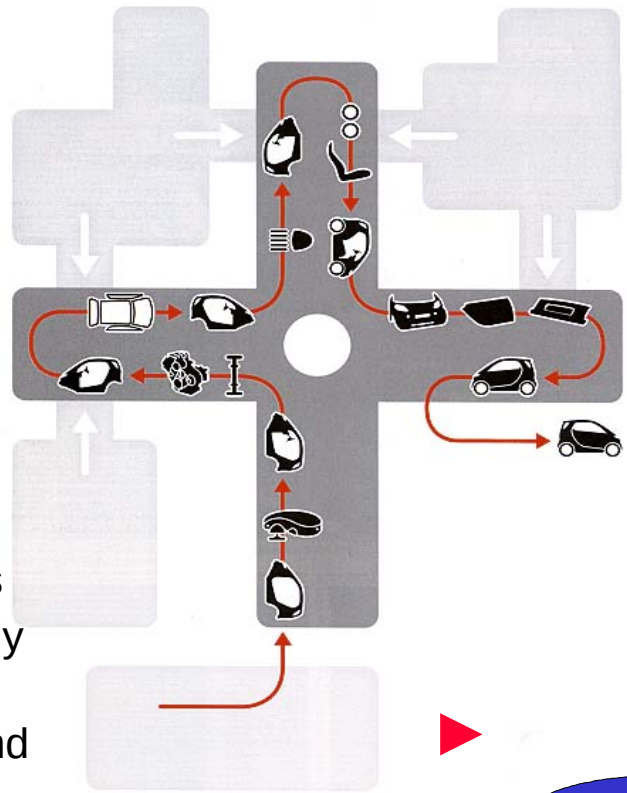
Process Innovation

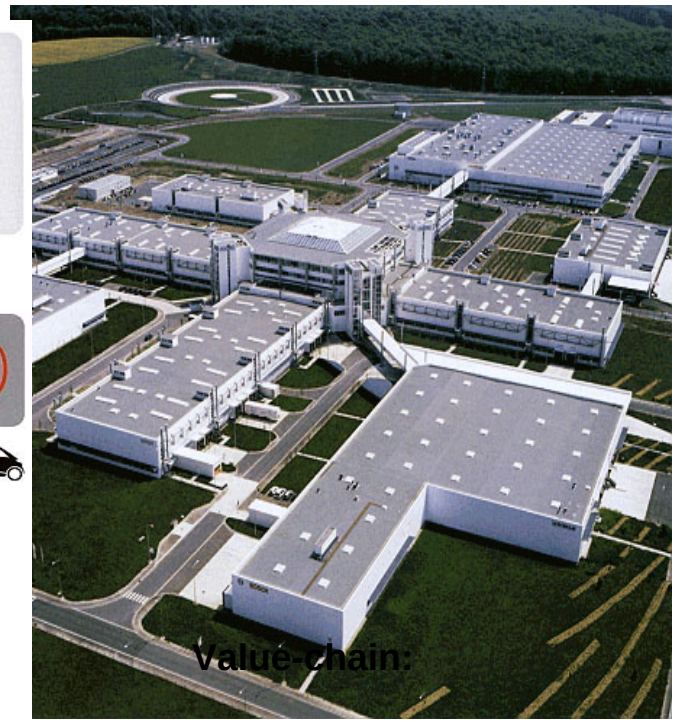
"SmartVille" being an Assembly Plant

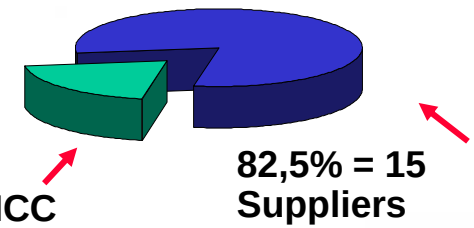
System partners:
- Powder lacquering
- Assembly front module
- Convex pressure synthetic parts
- Body panels and external parts
- Rear axle-power unit module
- Door - and flap module
- Safety car body
- Cockpit-module

Service partners:
- Delivery of vehicles
- Steering of transportation means
- Logistic centre for small assembly parts
- Logistic centre for spare parts and accessories

IT partner:
- Information management







Source: Smart

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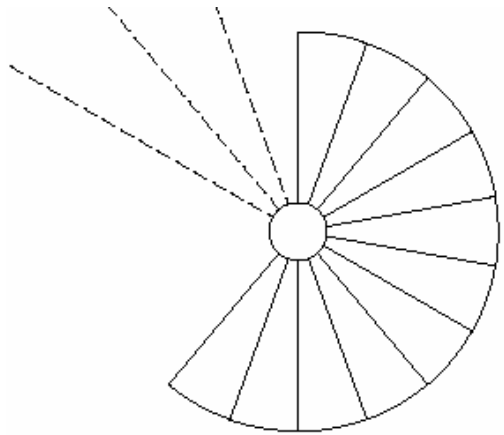
Central Questions of the Study

1) How is the Innovation Management harmonised with the Business and the Technology Strategy?

2) How is the Innovation Process structured for integrating incremental and radical Innovations?

3) Which Methods are useful for an “Integrated Innovation Management”?

4) How Innovation Management organised inside the Company



Case Study: Hilti Corporation

Founding of 'Maschinenbau Hilti OHG' in Schaan, Principality of Liechtenstein, as a five-man company by the brothers Martin and Eugen Hilti.

The Hilti-Portfolio:

- Drilling
- Diamond Coring and Cutting
- Direct Fastening
- Anchoring Systems
- Screw Fastening Systems
- Installation Systems
- Positioning Systems
- Firestop and Foam Systems

Short Company Profile	
Name:	Hilti Corporation
Branch	Professional Electric Tools
Employees:	14.390
Turnover:	3,1 Mrd. CHF
Innovation Rate:	28%

Source: http://www.hilti.de

Hilti AG - Procedure Chart of Assembling Cable Trays

Source: Studie des Fraunhofer IAO „Integriertes Innovationsmanagement“, 2003

Technologically simple, little competitive pressure

Room for improvement: 20%

Measuring and marking 28%

Drilling 17%

Doweling 10%

Assembly of Linings 10%

Assembly of brackets 14%

Cable Tray Assembling *21%*

Technologically sophisticating, high competitive pressure

Room for improvement: 4 %

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Hilti AG – Setting up the Business Segment Positioning

Source Studie des Fraunhofer IAO „Integriertes Innovationsmanagement“, 2003

The Results:

- Laser measurement has been identified as attractive solution for the building industry regarding surveying and mapping.
- The decision to set up this business and to establish the business segment Positioning was made.
- The concept was implemented shortly through developing competences by cooperation and technology purchase.
- Today Hilti provides a wide range of laser measurement tools for construction building site applications.

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Sucess Factors of an *Integrated Innovation Management*

- **Long-term Target-oriented Focus of Efforts**
- **Early Customer Integration and active Design of Trends**
- **Transparency und Speed**
- **Adaptive Organisation of Innovation**
- **Passion und Courage for Innovation**

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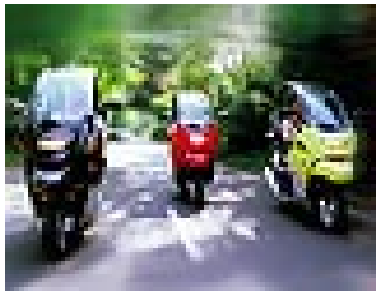
Not all Innovations are successful…

Both Products will disappear from the market.



Das Konzept, das
die Stadt in Fahrt bringt.

An Innovation does not guaranty a successful Business.
Well-Known Companies can have Problems.

The Estimation of the Market Potential can be tricky.

»Germany Innovative«

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The »Partners for Innovation«

Ideen erfolgreich machen
Partner für Innovation

With the Innovation Initiative the **»Partners for Innovation«** want to show that it is time to take responsibility for the **Topic of the Future: Innovation.**

The »Partners for Innovation« bundle their Expert Knowledge and their Innovation Forces in a common Structure. They use their Know-How, Manpower and Experience to develop and start **convincing Pioneer Activities as "Lighthouses" for the Innovation Power in Germany**.

The »Partners for Innovation« create Examples of **courageous Objectives and the consistent Implementation of new, creative Solutions.** They contribute to produce a new Tendency and to create the social Climate encouraging to engaged with Energy for the future Capabilities of Germany.

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The Impulse Topics

Ideen erfolgreich machen
Partner für Innovation

Cross Section topics

State as an Innovation Factor

Innovation Power in Small and Medium-sized Enterprises

Exploitation of the Potential in the Research System

Exchange Processes of Economics/Science/Politics

Human-centred Knowledge

Markets and Application Fields

Networked World

Mobility and Logistics

Health

Energy

Services

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Ideen erfolgreich machen
Partner für Innovation

Frame Conditions for the Work in the Network

»Horizon 2010«

is the conclusive and generally understandably Description of a desired Status developed in each *Impulse Initiative* in the Period up to the Year 2010.

»Pioneer Activities«

are realistic, concrete Actions for the Implementation of Innovations. Pioneer Activities contribute to achieve the Horizon described in the Impulse Initiatives and are characterized by courageous Objectives, singular Solution and productive Implementation.

»Recommendations for Action«

are concrete Recommendations to other Participants in the Innovation System, who support the Conversion of Ideas to new Solutions.

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Impulse Initiative »Innovation Power SME«

[Make Ideas successful]
[Partners for Innovation]

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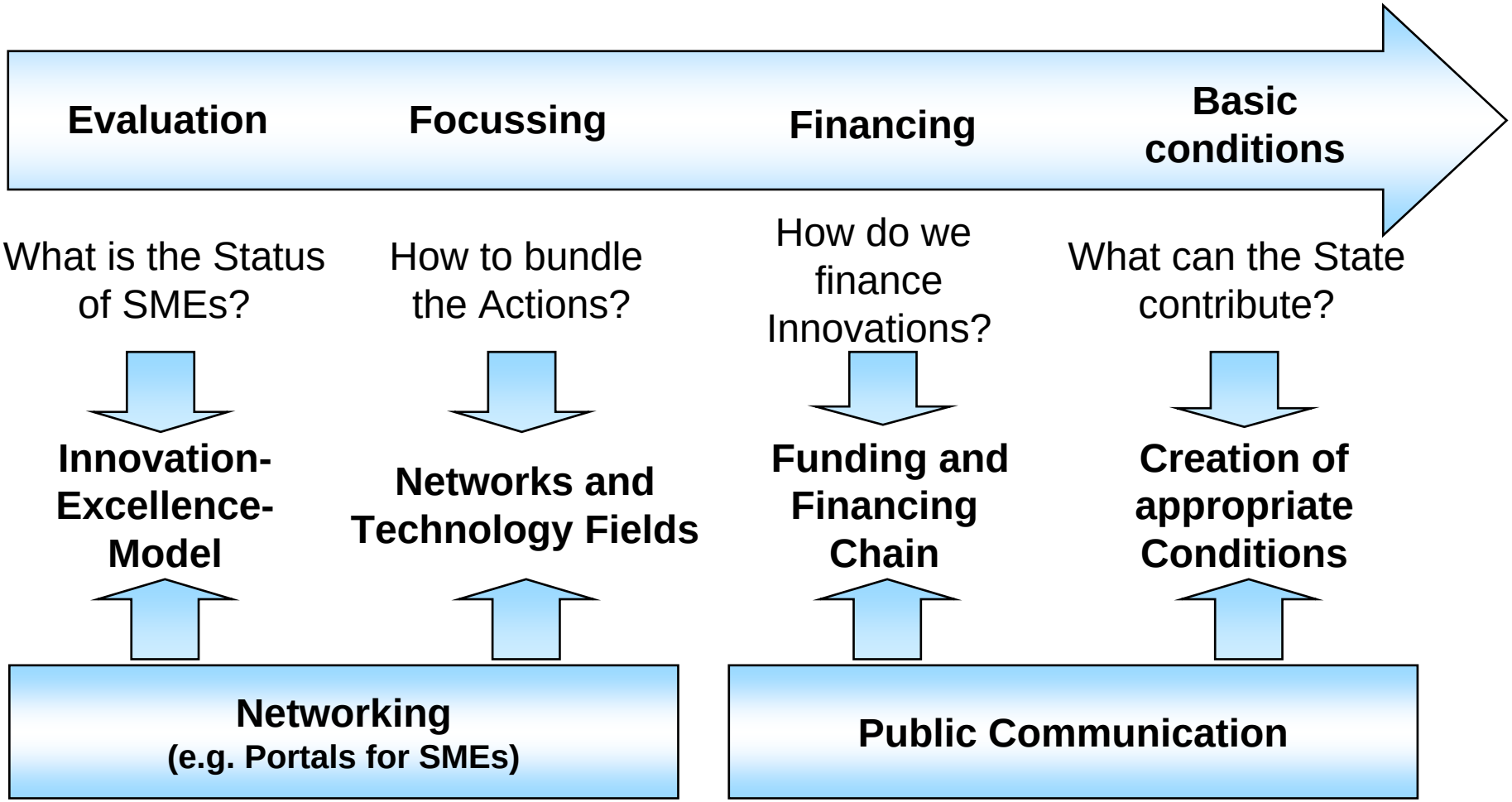
Proceeding and Action Fields



Ideen erfolgreich machen
Partner für Innovation

Pioneer Activity - Innovation Excellence

Increase the Ability of Innovation of an SME by an easy-handling and SME-oriented Evaluation and Audit Instrument

Current situation:

- Decrease of continuous investment in innovation of SME
- Weaknesses of SME in evaluating of the own innovation competence and thus afterwards with the selection of suitable innovation management instruments
- Neglecting the topic innovation due to resources bottlenecks

Objective:

- Simple, non-beaurocratic innovation benchmarking for SME („*Find out the innovation profile Sundays between breakfast and lunch*“)
- Increase of initiative power of SME within the range of innovation
- Uncovering of hidden innovation potentials in different innovation fields (New products or processes, new services or organizational approaches as well as „intelligent production“)
- Comprehensive Promotion of Hidden Champions (Best Practice)

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Pioneer activity innovation excellence (2)

Conversion:

Analysis of the innovation behaviour of SME

- Factors of influence on innovation activity
- Barriers, chances
- Innovation indices (Benchmark)
- Empirical investigation

Step 1

Instrument for evaluation

- Development of criteria and indices
- Maturity degree model
- Internet platform
- Networking of current SME portals

Step 2

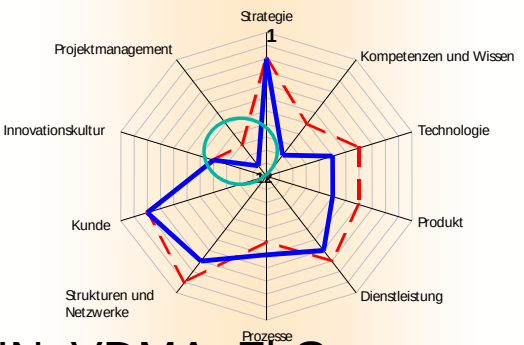
Increasing steadiness

- Effective operator model
- Case studies, success stories
- Certified method „*Innovation Excellence* “
- Promotion by associations

Step 3

Challenge and participants:

- Systematic change of innovation behaviour of SME
- Basis for innovation financing in combination with BASEL II (e.g. by certificate)
- Increase of innovation activity of SME
- Participants: e.g. Harting, Kuhnke, Wittenstein, ISA, ZVEI, DIN, VDMA, FhG



The Fraunhofer IAO Innovation Audit is a comprehensive, systematic analysis of the firm's innovative capabilities, with the prior goal, to improve them.

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What are the benefits of the Innovation Audit ? (I)

Direct benefits:

- Assessment and documentation of the firm's current innovative capabilities

  ⇒ How am I ?

- Identification of firm- specific potentials for improvement

  ⇒ Where can I do better ?

- Indication of, and starting points for, recommendable actions

  ⇒ How can I do better ?

Innovation Audit – Approach

The innovation audit approach is divided into in 4 phases:

Phase 1:
- Presentation of the innovation audit concept (goals, philosophy)
- Determination of representative business units
- Selection of interview partners in different areas and hierarchy levels

Phase 2:
- Execution of the interviews by the Fraunhofer IAO.
- Gathering and processing of data (interviews, observations, operation figures ,etc.)

Phase 3:
- Analysis of the interviews and data based on an Audit-Scorecard
- Indication of action fields in each dimension
- Preparation of the audit report

Phase 4:
- Committal of the audit report
- Presentation of the key results
- Proposal on the implementation of the recommendable actions

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Innovation Audit - Documentation and Certificate

- Report: Documentation of the firm's innovative capabilities and starting points for improvement actions
- Audit Certificate as documentation for the rating process and as instrument for capital provider


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„Innovationsaudit Musterfirma GmbH"

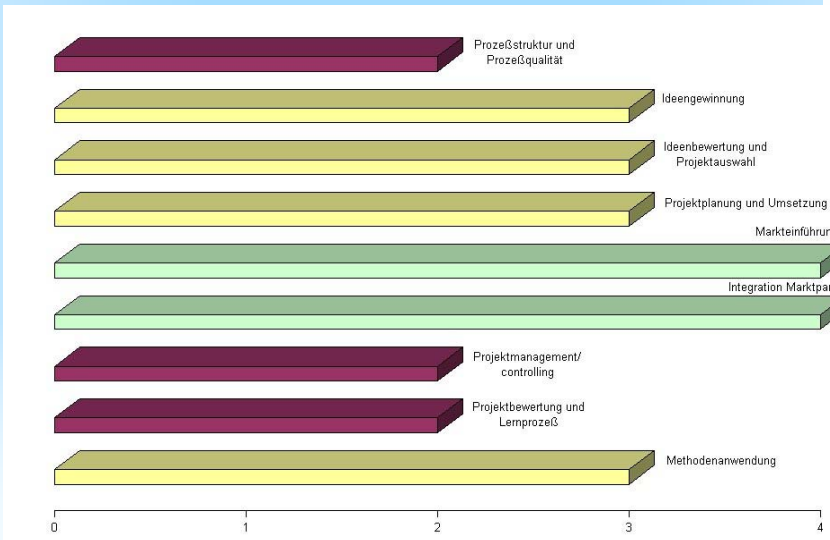
Auswertung des Innovationsaudits
durchgeführt durch das
Fraunhofer Instituts für Arbeitswirtschaft und Organisation

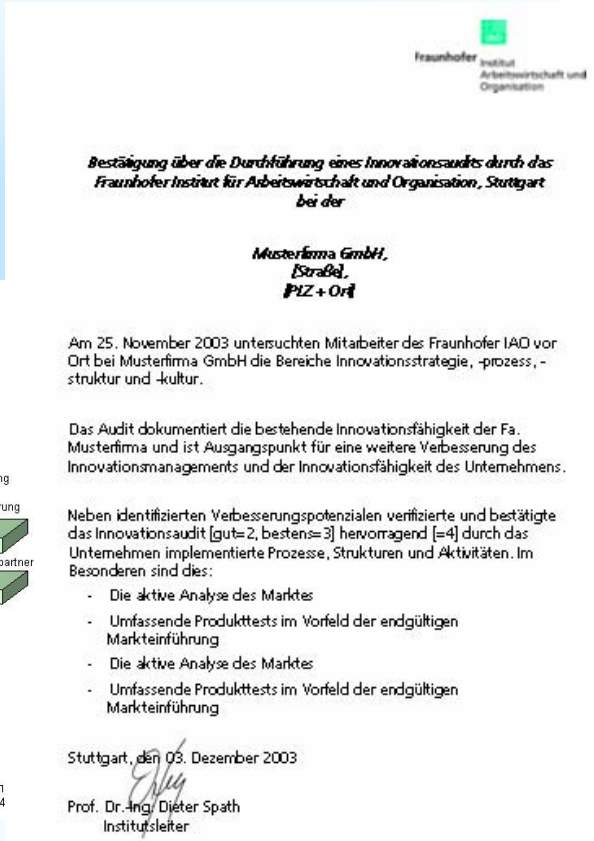
im Auftrag der
Musterfirma GmbH,
[Straße],
[PLZ + Ort]
http://www.Musterfirma.de

Stuttgart,
29. Oktober 2003

Dipl.-Kfm. Karin Auernhammer
Dipl.-Kfm. Mark Neumann

Fraunhofer Institut für Arbeitswirtschaft und Organisation
Nobelstrasse 12
70569 Stuttgart

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Bestätigung über die Durchführung eines Innovationsaudits durch das Fraunhofer Institut für Arbeitswirtschaft und Organisation, Stuttgart bei der

Musterfirma GmbH,
[Straße],
[PLZ + Ort]

Am 25. November 2003 untersuchten Mitarbeiter des Fraunhofer IAO vor Ort bei Musterfirma GmbH die Bereiche Innovationsstrategie, -prozess, -struktur und -kultur.

Das Audit dokumentiert die bestehende Innovationsfähigkeit der Fa. Musterfirma und ist Ausgangspunkt für eine weitere Verbesserung des Innovationsmanagements und der Innovationsfähigkeit des Unternehmens.

Neben identifizierten Verbesserungspotenzialen verifizierte und bestätigte das Innovationsaudit [gut=2, bestens=3] hervorragend [=4] durch das Unternehmen implementierte Prozesse, Strukturen und Aktivitäten. Im Besonderen sind dies:

- Die aktive Analyse des Marktes
- Umfassende Produkttests im Vorfeld der endgültigen Markteinführung
- Die aktive Analyse des Marktes
- Umfassende Produkttests im Vorfeld der endgültigen Markteinführung

Stuttgart, den 03. Dezember 2003

Prof. Dr.-Ing. Dieter Spath
Institutsleiter

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Some Ideas for the Future...

Policy Activites: 2005-2020

ManuFuture: The Future of Manufacturing in Europe
www.manufuture.org

JETIs Joint European Technology Initiatives
e.g. European Construction Technology Platform

-> ***"Technology Intelligence" Toolset***

Innovation for Industry SMEs, Automotive, Advanced Manufacturing, Food, Construction, Electronics,…

-> ***"Innovation Audit": Effectiveness and Efficiency of the Industry***