Drivers of Innovation for Business Excellence
Innovation and Intellectual Capital Management to support a sustainable corporate development

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Head of Dept. Business Excellence Methods

Fraunhofer Institute
Production Systems and Design Technology
Your task is not to foresee the future, but to enable it.

Antoine de Saint-Exupéry
(1900 - 1944)
Development of Economy - Innovation System

National Wealth

Innovation

World standard products

Competitive production processes

Benchmarking

Intellectual Capital

Human Capital
Use technology

Structural Capital
Manage technology

Relational Capital
Communicate technology

Intellectual Capital Statements
## Agenda

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<td><strong>The Fraunhofer-Gesellschaft</strong></td>
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<td>Innovation and its Drivers</td>
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<td><strong>3</strong></td>
<td>Rules for Successful Innovation</td>
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<td><strong>4</strong></td>
<td>Intellectual Capital Management</td>
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The Fraunhofer-Gesellschaft

The Fraunhofer-Gesellschaft is the leading organization for applied science in Europe.

It strives for application-oriented research regarding the direct benefit for enterprises as well as for the advantage of society

- more than 80 research facilities, including 60 Fraunhofer-Institutes
- The majority of more than 20,000 staff are qualified scientists and engineers
- Euro 2,0 billion annual research budget, including Euro 1,5 billion contract research.
  - 70% are contributed by industrial contracts and publicly financed projects.
  - 30% basic funding of the Federal and Länder Government.
- Research centers and representative offices in Europe, USA, Asia and in the Middle East
Joseph von Fraunhofer

- Discovery of "Fraunhofer Lines" in the sun spectrum
- New methods of lens processing
- Head of Royal Glass Factory
- Researcher
- Inventor
- Entrepreneur

- e.g.: Innovation Awards of the German Federal President for Electric Biochip Technology
- e.g.: 2 patent applications each working day
- e.g.: ~ €800 million revenues from industry (about 4000 contracts) p. a.
Fraunhofer IPK, Berlin

Corporate Management
- Management of Intellectual Capital
- Management of Innovation Systems
- Benchmarking
- Balanced Scorecard
- Corporate Planning and Logistics
- Knowledge Management
- Process Management
Agenda

1. The Fraunhofer-Gesellschaft
2. Innovation and its Drivers
3. Rules for Successful Innovation
4. Intellectual Capital Management
Then and now – Genesis of Innovation Activities

- Partial and gradual Innovations
- Regionally restricted
- Based on laws of nature
- Innovations by **Individuals**

- Conversion to science towards civil enlightenment
- **Market-oriented** Innovations

- **Interconnected** multi-layer interplay of market participants
- **Complexity** of innovations induces international collaborations

Antiquity | Middle Ages | Present
Making a Difference for a better Life in a fairer World

Technological Innovations
Investing in research and development for the creation of new products and services

Structural and Process-Innovations
Development and implementation of adaptive and creatively profitable working, learning and living environments

Innovations in Society and Politics
Creating sustainable location factors for the mobilization of individual and collective creativeness
<table>
<thead>
<tr>
<th>Characteristics of successful Innovators</th>
</tr>
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<tbody>
<tr>
<td>A Clear Strategy</td>
</tr>
<tr>
<td>The Best Team and Work Environment</td>
</tr>
<tr>
<td>The Unrelenting Will to Succeed</td>
</tr>
<tr>
<td>Ongoing Quality Control and Result Monitoring</td>
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</table>
Agenda

1. The Fraunhofer-Gesellschaft
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3. Rules for Successful Innovation
4. Intellectual Capital Management
Rules of the Game

...for successful innovations

**Growth**  Sustainable growth through innovation

**Strategy**  Differentiation potential through innovation strategy

**Customer**  Focus on the solution of customers’ problems

**Competency**  Integration of internal and external competencies

**Technology**  Successfully exploit the potentials of applied research
Innovation for Competitiveness

Which are the most significant factors for growth and profitability increase?

<table>
<thead>
<tr>
<th>Factor</th>
<th>Entrepreneurial Relevance</th>
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<tbody>
<tr>
<td>Increase of Innovation Capability</td>
<td>4.43</td>
</tr>
<tr>
<td>Cost Reduction</td>
<td>4.21</td>
</tr>
<tr>
<td>New Markets via Globalization</td>
<td>4.01</td>
</tr>
<tr>
<td>Fokus on Core Competences</td>
<td>3.93</td>
</tr>
<tr>
<td>Active Price-Management</td>
<td>3.81</td>
</tr>
<tr>
<td>Increase of Capital-Efficiency</td>
<td>3.67</td>
</tr>
<tr>
<td>New Business Areas through organic growth</td>
<td>3.66</td>
</tr>
<tr>
<td>New Business Areas through Acquisition</td>
<td>3.51</td>
</tr>
</tbody>
</table>

Source: Arthur D. Little; Innovation Excellence Study, 2004
Shareholder Return of Innovative Enterprises
Outperforming Industry peers

Source: BCG 2010 Senior Executive Innovation Survey

Global Innovators
- Three-year Premium: 12.4
- Ten-year Premium: 2

Americas Innovators
- Three-year Premium: 12
- Ten-year Premium: 2

European Innovators
- Three-year Premium: 7.2
- Ten-year Premium: -1.9

Asia-Pacific Innovators
- Three-year Premium: 16.5
- Ten-year Premium: 6
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…for successful innovations

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Consistent Strategy-Planning ensures a joint understanding

Minimum Requirement for a consistent Strategy

1. Definition of Core Competencies & Business Areas
2. Documentation of Strategy and planned Measures
3. Implementation of Technology-Audits (5-year cycle)

Goals:
- Consistent and quality-assured Process
- Strategic Cooperation across Industries
- Comprehensive cross-cutting Strategy Planning
Development of types of Innovation Activities

Source: BCG 2009 / 2010 Senior Executive Innovation Survey
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Structured Processes to identify new Markets

Perspectives for future Markets
- Foresight analysis and trend studies
  - 50 Technology Trends
  - Workshop >50 Experts
  - Market Perspectives 12

Fraunhofer Frontline Themes
- Global Megatrends
  - Survey of 170 Topics among Executives
  - Ranking of Topics 25 Focus-Topics
  - Frontline Themes 12

Markets of the future
- Grand societal challenges
  - Technological solutions
    - Mapping with Fh-Competence
    - Fraunhofer internal call
    - Future Markets 5
Structured Processes to identify new Markets

1. Internet of Things
2. Intelligent Products and Environments
3. Micro-Energy Technologies
4. Adaptronic
5. Simulated Reality for Products and Processes
6. Human-Machine-Interaction
7. Grid-Computing for Enterprises
8. Integrated Lightweight Construction
9. Industrial white Biotechnology
10. Tailored Light
11. Polytronics
12. Safety Technologies for Risk Prevention
Global Megatrends until 2050

Fraunhofer Frontline Themes

Global Megatrends

Survey of 170 Topics among Executives

Ranking of Topics

25 Focus-Topics

Frontline Themes

12

- Water Demand
- Demographic change
- Economic change
- Global exchange of goods
- Digital Networking
- Living-standards in emerging economies
- Electromobility
- Urban decision-making
- Global Migration
- Higher Population Densities
- Energy Demand

Fraunhofer Frontline Themes Survey of 170 Topics among Executives Ranking of Topics 25 Focus-Topics Frontline Themes 12

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## 5 Future Markets

<table>
<thead>
<tr>
<th>Category</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate / Energy</td>
<td>Sustainable Cities</td>
</tr>
<tr>
<td></td>
<td>Intelligent transformation of energy supply</td>
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<tr>
<td>Health</td>
<td>Individualized Healthcare</td>
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<td>Self-determined life in seniority</td>
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<td>Prevention of avoidable common diseases</td>
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<tr>
<td>Mobility</td>
<td>Electromobility</td>
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<td>Affordable CO₂-optimized mobility</td>
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<td></td>
<td>Smart-mobility - connection transportation</td>
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<tr>
<td>Safety</td>
<td>Safe Cloud made in Germany</td>
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<td></td>
<td>Secure Identities</td>
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<td></td>
<td>Embedded Security in Embedded Systems</td>
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<tr>
<td>Communication</td>
<td>Internet of the Future, Green IT &amp; IT for Green</td>
</tr>
<tr>
<td></td>
<td>Digital Knowledge Society based on acceptance and participation</td>
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The German R&D Innovation Chain

1. Basic research
   creates basic innovations.

2. Application-oriented research
   transfers basic innovations to the application stage and creates prototypical solutions.

3. Industrial application
   implements application-ready solutions in the economy.
From Idea to Practice: Who stands where?

1. Basic research
- Universities
- Helmholtz Centers
- Max-Planck-Institutes

2. Application-oriented research
- Industrial research centers
- Fraunhofer Institutes

3. Industrial application
- Companies

creates basic innovations.

transfers basic innovations to the application stage and creates prototypical solutions.

implements application-ready solutions in the economy.

creates

© Fraunhofer

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Kondratjew-Cycles: Key-Innovations (Theory of long waves)
>>Valley of Death<< of Innovation as a challenge for innovation systems
>>Valley of Death<< of Innovation as a challenge for innovation systems

Core Activities

- Basic Research and Invention
- Prototypes, Demonstration and Market Analysis
- Early Commercialization
- Market Entry and Growth

Availability of Capital

- Government
- Fraunhofer, Enterprises and founding investors
- Venture Capitalists
- Creditors and investors

Typical Investors

Fraunhofer 4D
Overcoming the >>Valley of Death<< of Innovation

High-Level Expert Group on Key Enabling Technologies recommends Advancement and Stimulation of:
1. Technological Research (RTOs)
2. Lab-Fabs (small production lines - prototype cells)
3. Globally Competitive Fabs
4. Planned Buy-Out

Characteristics of the Fraunhofer 4D Advancement Process:
- Applied, technological Research and product-oriented development
- Demonstrators and Production Processes from Pilot-Plants under real-life conditions (Lab-Fabs)
- Competitive Pilot-Production high-volume production (Global-Fabs)
- Pre- Planned Buy-Out
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Why Measuring Intellectual Capital (IC)?

- The organizational value consists of tangible and intangible assets, which are mostly undocumented in traditional accounting systems.

- Investors (Rating according to Basel II) demand plausible evidence of corporate values. Companies in knowledge-intensive fields have difficulties in proving their value to investors.

- Legal regulations commit organisations to legitimate their intangible assets. (Austrian UOG, IAS 38, DRS 12 and 5)

Would you have invested?

Microsoft Corporation 1978
National IC Report: Average Impact of Intellectual Capital on Business Success

Source: Survey Results „Knowledge Economy Germany“, Fraunhofer IPK 2010 (N=1,000)
What is an Intellectual Capital Statement?

Definition Intellectual Capital Statement (ICS): An Intellectual Capital Statement is an instrument for the focused description and development of the Intellectual Capital in an organisation. It shows the interdependencies between the organisational aims, the business processes, the Intellectual Capital (IC) and the business success and describes these elements by means of indicators.

Intellectual capital (IC) is defined as “existing knowledge of an organisation that contributes to future success” and is subdivided into three categories:

- **Human Capital** (HC), e.g. qualification, leadership, motivation
- **Structural Capital** (SC), e.g. innovation, knowledge transfer
- **Relational Capital** (RC), e.g. relations to customers, partners
The ICS Framework: ICS Structural Model

Business environment
(Possibilities & risks)

Organization

Initial situation
Vision

Business- Strategy knowledge

Measures

Intellectual capital
- Human capital
- Structural capital
- Relational capital
- Other resources

Business processes

Knowledge processes

External impact

Measures

Business success
Standard IC Factors

**Human Capital**
- Professional Competence
- Social Competence
- Employee Motivation
- Leadership Ability

**Structural Capital**
- Internal Co-operation and Knowledge Transfer
- Management Instruments
- IT and Explicit Knowledge
- Product Innovation
- Process Optimisation and Innovation
- Corporate Culture

**Relational Capital**
- Customer Relationships
- Supplier Relationships
- Public Relationships
- Investor Relationships
- Relationships to Co-operation Partners
Main Results of the German ICS Pilot Project

- **Efficient method** to start IC Management in SMEs.
- **Guideline for ICS implementation** in German and English language published, more than **50,000 copies** distributed.
- **Software “Wissensbilanz-Toolbox”** available since July 2006, more than **30,000 copies** distributed.
- **Financial Times and Commerzbank Award 2005** for one of the first 14 Pilot-SME
- **30 Roadshows** for entrepreneurs with more than 1,000 participants.
- More than **200 users and trainers** trained

www.akwissensbilanz.org
Background of Intellectual Capital Statements (ICS) in Europe

- Development of an economical method of Intellectual Capital Management on the basis of international experiences
- Establishment of ICS method and software as a national and international accepted standard
- Implementation of more than 1,000 Intellectual Capital Statements in German & European organizations
- Distribution of 100,000 copies of the ICS Guideline and 40,000 copies of the ICS-Toolbox
- 50 regional events with 2,500 participants from companies to inform on the topic
- Training of 300 ICS-Moderators
Intellectual Capital Statements (ICS) - Toolbox

Step 8: Interpret Analysis Outcomes

IC Management Portfolio

Legend:
- No Legend
- Short Form
- Long Form

Interpretation:
Structured Assessment of Innovation Capabilities

„Do we have enough product innovations according to the strategic requirements?“

„Are the product innovations good enough according to the strategic requirements?“

„How systematically do we manage our product innovations?“

0% = not sufficient  
30% = partly sufficient  
60% = mostly sufficient  
90% = always sufficient
Summary of ICS Results and Prioritization of Fields of Action

QQS Assessment

Impact Analysis

Diagnosis

Development Potentials
Impact Map for Strategic Development of the Company
Continuous IC Monitoring: Example of German Energy Supplier

EnBW

<table>
<thead>
<tr>
<th>Human Capital</th>
<th>Structural Capital</th>
<th>Relational Capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional Competence</td>
<td>Corporate Culture</td>
<td>Customer Relations</td>
</tr>
<tr>
<td>Management- and Social Competence</td>
<td>Communication and Organisation</td>
<td>Relations to Co-operation Partners</td>
</tr>
<tr>
<td>Motivation</td>
<td>Innovation</td>
<td>Stakeholder Relations</td>
</tr>
</tbody>
</table>

2006 2007 2008

80 % —
70 % —
60 % —
50 % —

„Very good“
„good“
„satisfactory“
Impact of ICS on Financial Analysts’ Assessment of Future Earning Potential

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