Open Innovation and Intermediaries: Facilitating Knowledge Transfer

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RWTH AACHEN UNIVERSITY

About Us

RWTH Aachen University: Facts and Figures

- **RWTH = Rheinisch-Westfälische Technische Hochschule"** (Institute of Technology of the North-Rhine Westphalia, i.e. a State of Germany)
- **Established in 1870** as a"Technische Hochschule" in Germany. Quickly became leading place for mining technology, electrical and mechanical engineering, and later also medicine.
- Today, RWTH Aachen University is one of Europe's leading institutions for science and research.
- **Annual Budget of €650 million**, of this 50% grants and third-party funding
- **31,400 students** are enrolled in over **100 academic programs**, 20% of them international students from 120 different countries.
- About **2.800 graduates** per year (of which about 800 receive a doctoral degree)
- **One out of every five board members** at German corporations **is an RWTH Aachen alumni**, and about **one out of two engineering managers** in the German automotive industry.
- **Co-Founder of IDEA League** network of the leading universities of technology in Europe

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With about 18 full time research positions plus many graduate student assistants, tutors, and research affiliates, RWTH-TIM is one of the largest groups of its kind in the German-speaking academic landscape.


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RWTH-TIM Group: Facts and Figures

- **Established in 1990** as one of the first dedicated chairs in technology & innovation management in Europe
- **Part of RWTH's School of Business & Economics**, with strong links to the RWTH Engineering Schools, but also Humanties
- **Dedicated to research**, **but excellent in participant-centered learning** on graduate student and executive education level.
- Core student body of **industrial engineering students** ("Wirtschaftsingenieurwesen")
- **Ranked in top3 in school's ranking w/r to research output (publications)**, and #2 w/r to external funding. Awarded "RWTH Price for Teaching Excellence 2009/2010".
- **Interdisciplinary team of about 15 full time positions** for researchers plus about 25 support positions and student researchers (strong growth since 2007)
- 70% of annual research budget funded by **competitive, peer-reviewed research contracts and grants** ("forschungsorient. Drittmittel") from DFG, EU, BMBF, BMWI, AIF
- **Strong industry partnerships, yet focus on scholarly research, not consulting** or contract research for singular companies (but network of affiliated consultancies for this purpose).
- **"RWTH TIM Expertenkreis": Sponsorship circle of 12 companies**, including 3M, Cognis, Ford, Henkel, Lindt, Telekom, Melitta, Johnson Controls, and others

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RWTH-TIM Group: Selections of Recent Research Clusters

- **Open Innovation**: Increasing the productivity of technical problem solving by external search
- **Customer Co-Creation**: Integration of customers and users in the innovation process in form of a firm-initiated strategy. Focus on toolkits for customer innovation, user innovation contests, and innovation communities
- **Technology transfer** : Absorptive capacity, managing ambidexterity, and preventing "NIH" (not invented here)
- **Customer Co-Design in Mass Customization Environments**: Strategies to profit from heterogeneities in the customer domain
- **Modeling the contingencies of the innovation process**: Database of 300 methods for the innovation process and marching tool to corporate challenges of managing innovation
- **Managing the R&D-production interface (ramp-up)**: Connecting the new product development process with scaling up the manufacturing system

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Prof. Frank Piller

- Since 2007: Head of the RWTH Technology & Innovation Management Group, and full (tenured) professor of management at RWTH Aachen University, Germany
- Since 2007: Co-Founder and Co-Director of the MIT Smart Customization Group, MIT, Cambridge, MA, USA
- Research Professorship at the MIT Sloan School of Management (2004-2007), Innovation Management Group, Cambridge, MA, USA
- Assistant / Associate Professor in Management and Habilitation on Customer Co-Creation and User Innovation (1999-2004) at TUM Business School, Munich, Germany
- Ph.D. in Operations Management with focus on Mass Customization (1995-1999), University of Wuerzburg, Germany

- Co-Founder, Investor, or Member of Board of Directors of several companies, including MVM.com (personalization and virtual models), ThinkConsult (consultancy and concept testing in the TelCo industries), Hyve AG (customer co-creation), Dialego AG (innovative online market research and innovation panels), Corpus-e AG (low-cost high-quality body scanning devices)
- More information and recent research: tim.rwth-aachen.de/piller

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Resources

The Smart Customization Group is the leading authority mass customization and provides the most relevant resources for your investigation. Whether you are researching a particular sub-topic for an academic paper, or you are an industry executive searching for strategic applications of mass customization techniques, our resource section will help quickly focus your efforts.

Below is a quick overview of the history and recent developments of mass customization across different industries. Use the menu to the left to find more in-depth research on mass customization.

Who is Doing Mass Customization?

Today, mass customization can be found in many industries. It originated and developed within business to business models, like large-scale manufacturers, which were typically customized to the specific needs of individual user groups. Starting in the mid 1990s, however, more and more consumer goods manufacturers started to experiment with mass customization offerings.

What is Mass Customization?

Mass Customization aims to provide goods and services that best serve individual customers'

Open Innovation

The formal discipline and practice of leveraging the discoveries of unobvious others as input for the innovation process through formal and informal relationships*.

*Note: It are the informal relationships that constitute the "innovativeness" of open innovation!

Exploring open innovation in the German machinery industry: The value of open innovation intermedaries

VDMA-FVA Project to Pilot Open Innovation in the German Driving Systems Industry

1. Evaluation and modification of OI methods for industry domain

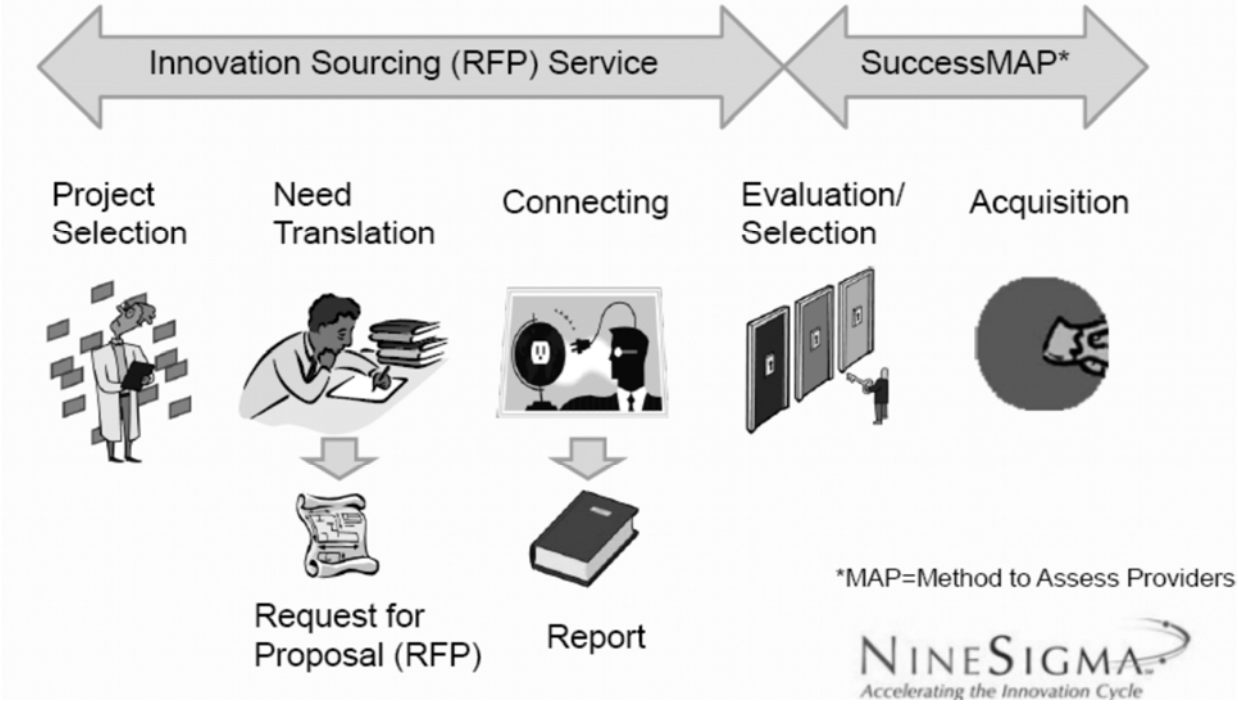
2. Identification of open innovation platform

Forschungsvereinigung Antriebstechnik e.V.

3. Piloting of platform and evaluation of efficiency and effectiveness of approach as compared to conventional means of organizing R&D

4. Development of business model for future operation of platform on the FVA level

In the project, we selected five problems from both companies and the FVA research consortium, be be "boradcasted" on NineSigma.



RFP Review

REQUEST # 66198
Durable, Non-Lubricated Gear Materials

REQUEST FOR PROPOSAL DESCRIPTION

NineSigma, representing **a Central European Academic/Industrial Development Consortium** invites proposals for **strong, durable gear materials that don't require lubrication.**

The successful material will:

- Be compatible with one or more methods of contemporary gear manufacturing
- Convert into gearboxes that can run without lubrication
- Create gearboxes that meet the following specifications
  - Ambient temperature range from 0 to 40 °C
  - Hertzian stress (at gear contact points) up to 1600 N/mm²
  - Nominal drive torque >100 Nm
  - Typical operating input speed>2000 RPM (up to approx. 8000 RPM); output ratio 1/3 – 1/10
  - Support tooth design permitting Efficiency at full load of >90%
  - Operating life >10000 hour
  - Gear thickness about comparable to same performance metal gears

POSSIBLE APPROACHES

Possible approaches might include, but are not limited to:

- Stronger plastic materials
- Composite Materials
- Durable one-time surface treatments for metal gears
- New Alloys for metal gears
- Ceramic materials
- Porous, oil-soaked gears and pre-lubricated gears
  - oil losses must be safely inhibited
  - bulk oil cannot leave gearbox under any circumstances
  - No additional lubrication for the operating life of the gearbox

Opportunity

Licensing, product acquisition, contract research, proof of concept leading to scale-up to manufacturing, joint development, supplier agreement

Timeline

Phase 1 – Material Feasibility and Proof of Principle
Phase 2 – Manufacturing and Commercial Development

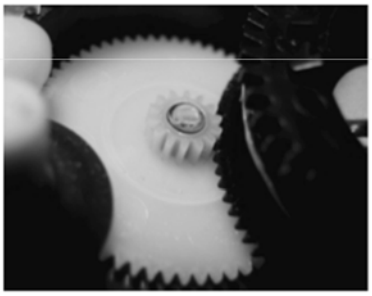
Financials

Phase 1 funding to demonstrate proof of principle is supported by the Academic/Industrial consortium up to the amount needed to contract one year of research in an academic environment. Alternative pathways and options for development will be funded by one or more industrial partners at levels appropriate to the opportunity.

APPROACHES NOT OF INTEREST

The following approaches are not of interest:

- Materials that cannot be fabricated into gears by existing manufacturing methods
- Alternative power trains as substitutes for gears



Request #66198

NINESIGMA
Accelerating the Innovation Cycle

On our call for solutions in five RFPs *("Requests for Proposals")* **we got 95 solutions – from very heterogeneous suppliers.**

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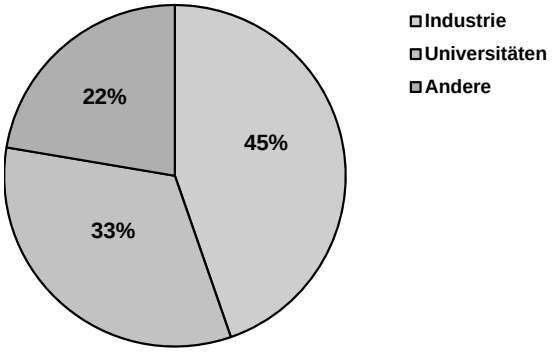
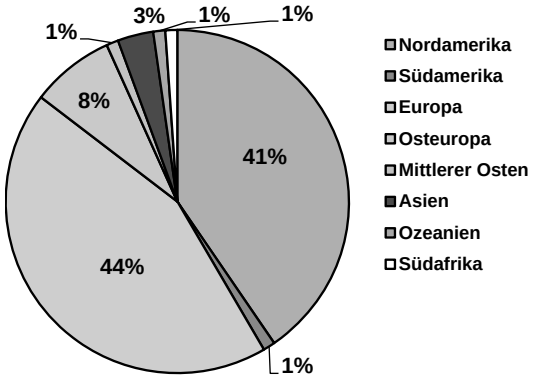
- **42 Industry**
- **32 Universities**
- **21 Others (non profits, research centers)**

Solution provider institution



Origin of solvers



The solutions in general were both from sources new to the companies and did contain a new technologial solution

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Evaluation of solution proposals by project steering committees

RFP	Institution		Solution Technology		
	new	known	new	known	?
66198	23	3	16	6	4
66204	10	0	3	7	0
66207	7	0	6	0	1
66201	33	2	evaluation ongoing		

Two statements of project managers from our company partners

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*„**During the project, we have learned a lot about new players and the positions of other companies in the technology space**, and this in a very short time. **The real "Aha" however was that we did learn so much about ourselves**. We got a much better understanding where we are and what we know.“*

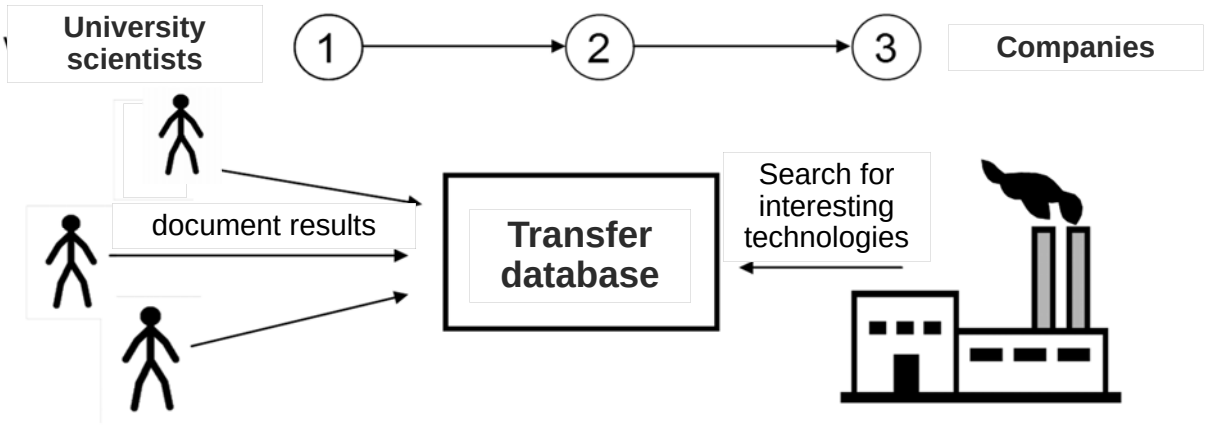
*„**During the project, our culture shifted dramatically**. My colleagues are all bumping at my door, and want to have their own RFP. We are changing from a notion of privacy and being closed (for better) **to become more open**. Participating at this project was clearly the driver of this change.“*

New opportunities for technology transfer

Piloting open innovation via broadcast search as an innovative measure of technology transfer (DFG project in the material sciences and EU FP7 funded project for the nano-technologies)

- **Starting situation: The European Paradox**
  - Europe is leading in basic research in the material sciences (and especially "nano" research) ...
  - ... but is lacking behind North America and Japan in exploitation of research results
  - Same on German level fro DFG: Plenty of initiatives, but no large impact in transferring research results from basic research into practice
- **Idea to pilot open innovation**: Research contract to RWTH-TIM
- **First stage**
  - Background research on state of technology transfer system
  - Empirical research and broad qualitative research *(today)*
  - TAM study on level of researchers
- **Second stage**
  - Piloting of open innovation for technology transfer
  - Idea is to complement traditional transfer channels, not to substitute them
- **Third stage**
  - If evaluation of pilots positive, establishment of OI platform on level of DFG / European Community

Traditional pattern of university-firm technology transfer



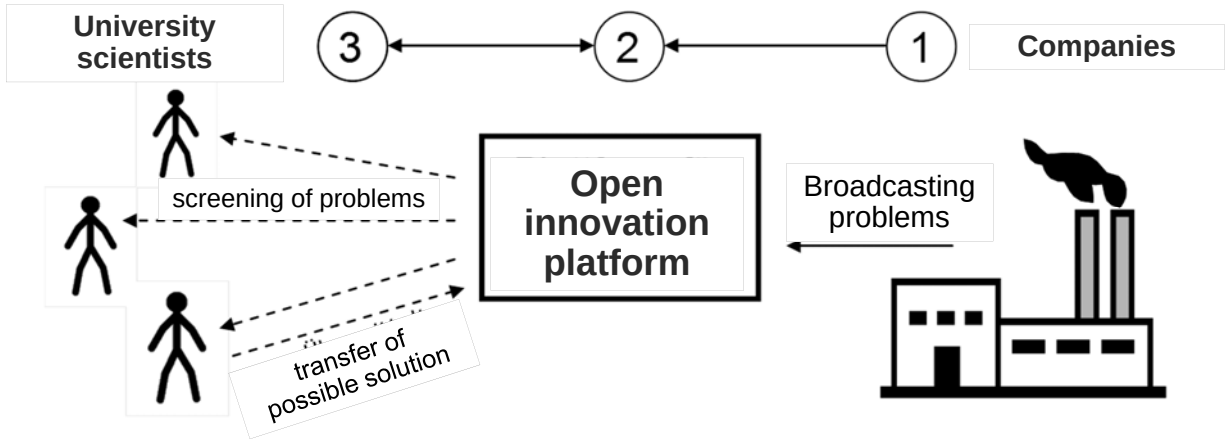
Incentives for transfer

- Part of grant contract
- Expected value of potential demand of knowledge by a firm
- Increasing reputation

Search for research in universities etc.

- Screening of usual suspects
- Using existing networks
- Local search bias
- Transfer often stopped by "Not-invented-here"

Using Open Innovation for Technology Transfer: A project for the German National Academy of Science (DFG)



Activities on research site:

- Screening of problems
- Reaction only when problems seems to be known and cost to answer affordable
- Transfer of solution idea
- Transfer of suggestion for contract research

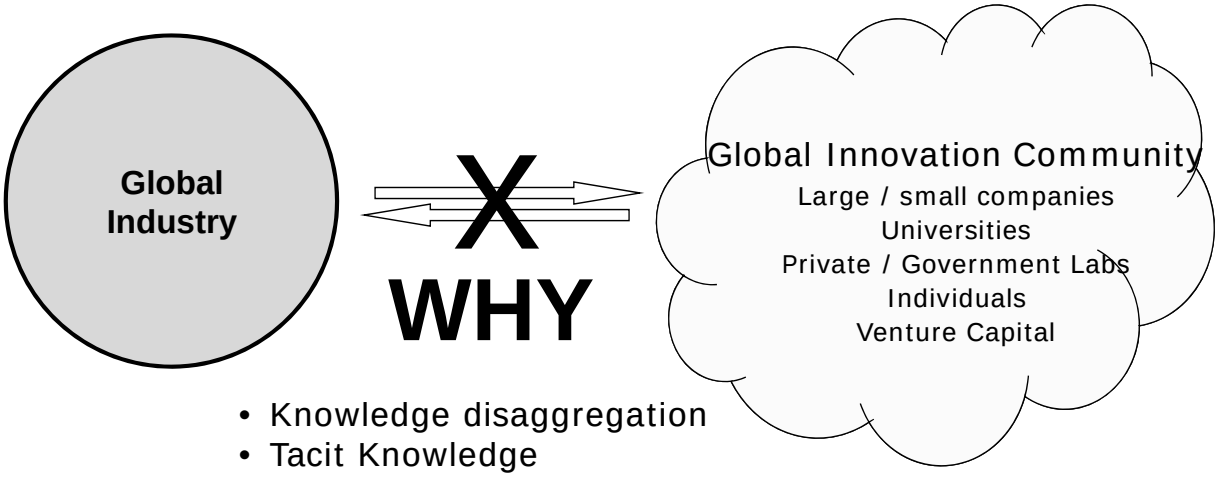
Activities on company site:

- Transfer of problems
- Screening and evaluation of problems
- Transfer of "best" solution
- Contracting of further directed research

Open Innovation Accelerators (OIA): A new class of service providers facilitating open innovation*

***joint work with Kathleen Diener**

The Challenge [of doing open innovation alone]: Or why firms often face difficulties in going outside for innovation



- Knowledge disaggregation
- Tacit Knowledge
- IP Considerations (protection/pollution)
- Leading Edge Knowledge Not in Public Domain
- Need for translation and Disguise
- Leakage of Competitive Information
- Culture/Policies/Authority
- Processes Efficiency

Source: Zynga 2009

Open Innovation Accelerators (OIAs) defined

- ***Innovation Intermediaries*** are actors specialized in the *articulation and selection of new technology options;* in *scanning* and *locating of sources of knowledge;* in *building linkages* between external knowledge providers; and in *developing and implementing* business and innovation strategies (Bessant & Rush 1995; Howells 2006; Lopez-Vega 2009).
- **Open Innovation Accelerators (OIA)** are innovation intermediaries that operate on the behalf of organizations seeking to innovate in cooperation with external actors from their periphery. **Their mission is to bridge structural disconnected knowledge pools caused by the lack of diversity** within a firm.
- OIAs offer one or several methods of open innovation (e.g. idea contests, broadcast search, co-creation toolkits etc.) and complementary services for the innovation process.

Or, in short, OIAs engage in …

- **Scanning and gathering information,**
- **Facilitating communication and knowledge exchange.**

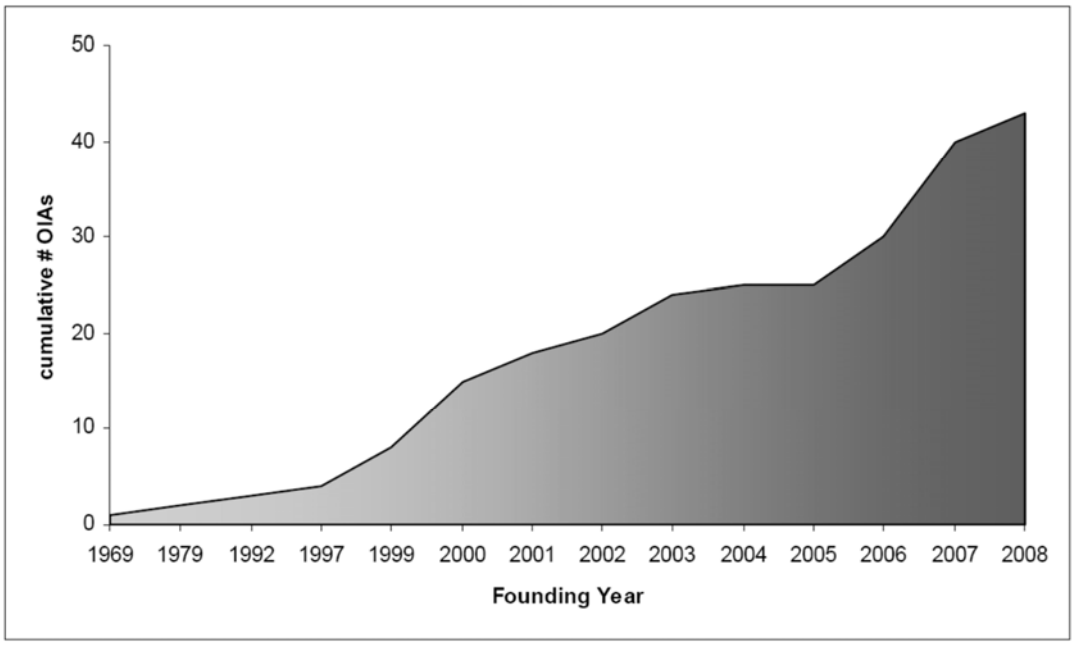
RWTH-TIM Study comparing open innovation intermediaries (Diener / Piller 2010)

- Strong growth of special intermediaries for open innovation
- We coined them "**open innovation accelerators**"
- First study comparing these intermediaries
- 65 companies identified, 43 met our definition
- Extensive analysis and profiling of these 43 OIAs
- Self reports, interviews, survey, secondary sources, client interviews

study.open-innovation.com

The number of OIAs is increasing strongly since 2000

Figure 7: Cumulative increase of OIAs in the past decades

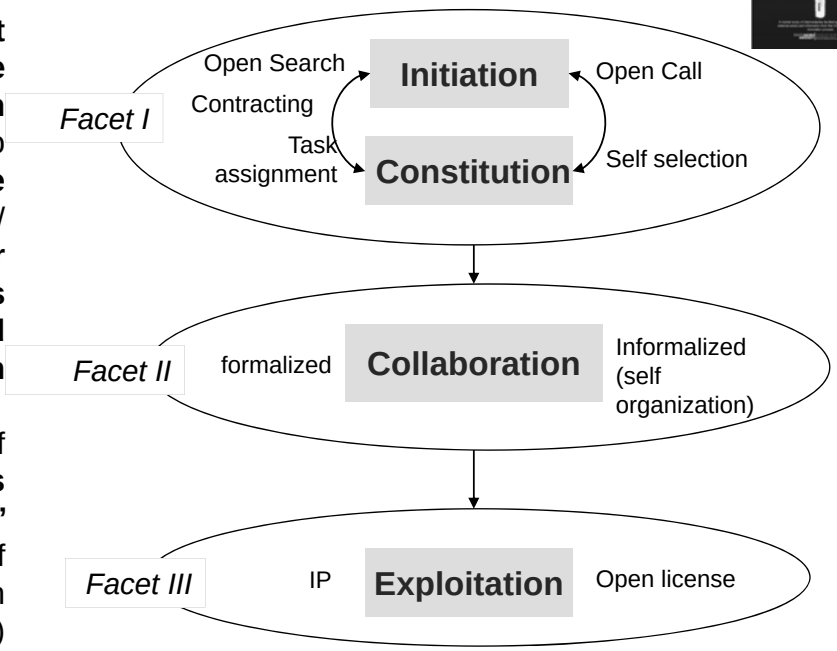


Source: Diener & Piller 2010

How do the intermediaries differ? We find three core elements which "define openness"

The **most distinguishable difference of open innovation** seems to be to **avoiding the active search** for information / solutions **with a clear presumption about its location and composition**

Along the dimension of openness, **companies give away the 'control'** over parameters of knowledge acquisition processes, and, (partly) about the exploitation of the generated results.



Source: Diener & Piller 2010

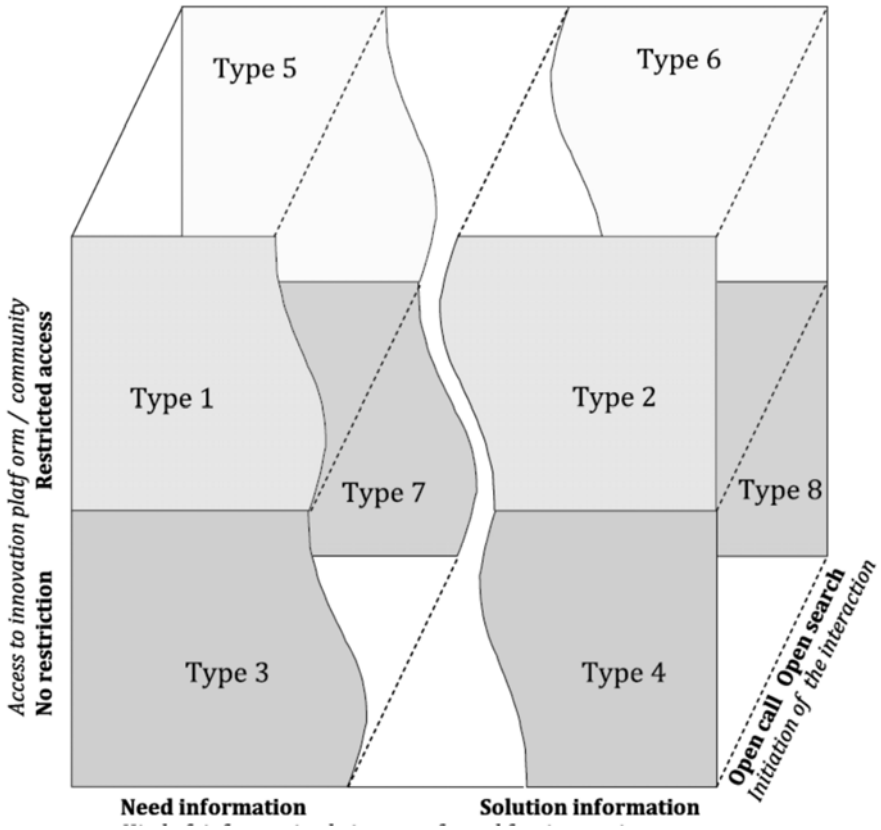
Conceptual Framework of Openness in the Innovation Process

Table 30: Defining the right open innovation approach: Matching information requirement and type of initiating the collaboration

	Open search	Open call
Need information	▪ Searching for trends ▪ Integrating the gathered information in own innovation process	▪ Posting a question to a broad community and perform an idea contest ▪ Integrate selected ideas and concepts
Solution information	▪ Searching for certain knowledge and expertise ▪ Integrating the expert holding the needed knowledge	▪ Posting very specific problems to broad or special expert communities ▪ Integrate the solution to the problem

Source: Diener & Piller 2010

We found three core characteristics to structure the market of open innovation providers



Source: Diener & Piller 2010

Services offered by OIAs can be structured into three different clusters

- (1) **Community Managers:** Managing a (online) community that is used as a source for problem solving and idea generation, but also to generate open problems at a first place.
- (2) **Software Providers:** Providing dedicated software for open innovation, often in form of a web-service.
- (3) **Consultants:** Acting as an open innovation consultant to provide a customized and integrated service for the client's innovation process.

The client perspective: Success factors of selecting an OIA (and working with them)

- Determine the **objective** of your open innovation venture!
- Decide about the **control** you want to keep on the open knowledge transfer process (and the exploitation opportunities of the results)
- Decide about your **resource allocation**: Do you want to outsource or to co-create the innovation process with the OIA? Hint: Much "open innovation" today is inside the firm
- **Consider what's next in the short term**: Shall the OIA provide support before and after the open task? (e.g., generating thousands of ideas is one thing, evaluating them another)
- **Consider what's next in the long term**: Think of, e.g., community management
- Look on your **budget** (especially if you are piloting)

Observations from the market study

- **Very young tech service market far before consolidation**
- Dominated by new players / outsiders / start-ups
- A few established players like *InnoCentive, NineSigma, Yet2, CommuniSpace, Hyve ...*
- ... but the majority is still in the early stages

- **Lack of coherent business models** (take "problem broadcasting" providers as an indication: How to profit from value generated for clients?)
- **How to scale service business without increasing cost proportionally?** Is this a service platform or a high-tech knowledge consultancy?

- **Strong education and training element required**, client field characterized by "piloting" rather then "contracting practice"

- Low price level, strong competition in a few market segments

- **What is the role of public bodies / TLOs ?? Is there a need for an European OIA?**

What are sustainable business models for open innovation service providers?

Will there be competition from public infrastructure (at least in Europe and Asia)?

What are core strategic capabilities and competences of these companies? (e.g., value of their network vs. search capabilities?)

How to scale up these services?
(Or is this just another form of high-end knowledge consulting?)

More information ...

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Diener / Piller: **The Market for Open Innovation:** The first market study comparing the brokers, platforms, and intermediaries for open innovation, Feb. 2010, Lulu Inc. €795.00*
study.open-innovation.com
** Please contact me for a free version for students and members of research organization*

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RWTH AACHEN UNIVERSITY Technology & Innovation Management Group
THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY Advanced Manufacturing Institute

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Bridging Mass Customization & Open Innovation

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Innovation & Research Conference, November 17-19, 2011

Conference Venue: **San Francisco Airport Marriot Hotel & Conference Center**
Conference Host: **Center for Open Innovation, University of California, Berkeley**

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