

Combining globalization of R&D and open innovation for better innovation performance

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Agenda

- Some facts and trends about R&D globalization
- Framework of a PhD-project
- Open Innovation
- R&D Globalization
- Limitations of both literature streams
- Linking both theories: 3 research questions
 - ◆ Enriching the OI-framework using insights from the R&D globalization theory
 - ◆ Changing our understanding of MNEs using insights from the OI framework
 - ◆ From R&D globalization towards an OI model for MNEs?

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OI and R&D globalization: Some facts and trends

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Bridging the gap: OI & location of external knowlegde

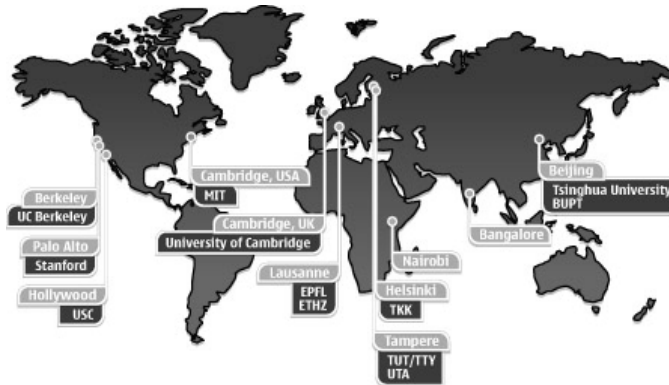
- In most cases about large firms
 - ◆ IBM, Intel, Xerox, P&G
 - ◆ Philips, Nokia, Unilever, BT, ...
- Large firms are without exception MNEs
- MNEs are globalizing their R&D activities
- OI-literature is silent about this geographical dimension
 - ◆ External knowledge is important, but no indication where MNEs should search for external knowledge

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R&D Centers at Nokia

Nokia Research Center Locations

- Bangalore
- Beijing
- Berkeley
- Cambridge, UK
- Cambridge USA
- Helsinki
- Hollywood
- Lausanne
- Nairobi
- Palo Alto
- Tampere



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R&D Centers at Novartis

NIBR- Novartis Institutes for BioMedical Research

Corporate Research comprises four institutes:

- Singapore
- Siena, Italy
- La Jolla, California
- Basel, Switzerland

Novartis **Pharmaceutical Development** employs more than 7 000 associates in several locations globally:

- Basel, Switzerland
- East Hanover, New Jersey, US
- Cambridge, Massachusetts, US
- Horsham, United Kingdom
- Shanghai, China
- Changshu, China
- Tokyo, Japan
- Hyderabad, India



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R&D Centers at Unilever



6 principal R&D centers:

- Colworth and Port Sunlight (UK),
- Vlaardingen (The Netherlands),
- Trumbull (US),
- Shanghai (China)
- Bangalore (India).
- **13 global product development centres** (focusing on new product development for a particular category or technology area)
- **37 regional development centers** (for adapting and implementing innovations and renovations in the regions)
- **small R&D implementation teams** in all factories.

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R&D Centers at Haier (Chinese MNEs)

R&D Centers:

- Qingdao, Beijing
- Seoul
- Tokyo
- Milan
- Los angles

Global Information Centers:

- Hong Kong, Taiwan, Singapore,
- Pakistan, Dubai
- London, Paris, Frankfurt, Milan
- New York, Monterey, Brazil,
- Argentina
- Cap town, Tunis

Global Design Centers:

- Seoul
- Osaka
- Copenhagen
- Amsterdam
- Munich
- ...



e.g.: refrigerator R&D centers, including 10 design centers worldwide, 28 cooperative institutes

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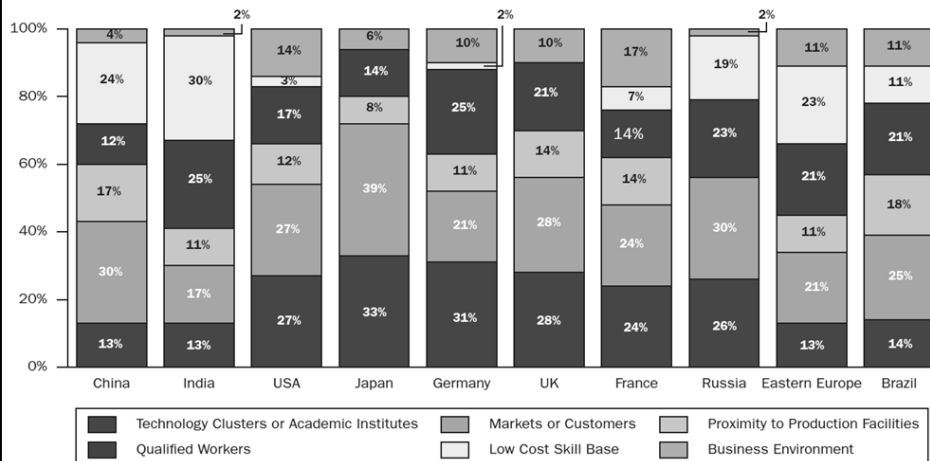
R&D Centers at HP

R&D Centers:

- » Bangalore, India
- » Beijing, China
- » Bristol, UK
- » Haifa, Israel
- » Palo Alto, USA
- » St. Petersburg, Russia
- » Tokyo, Japan
- ...

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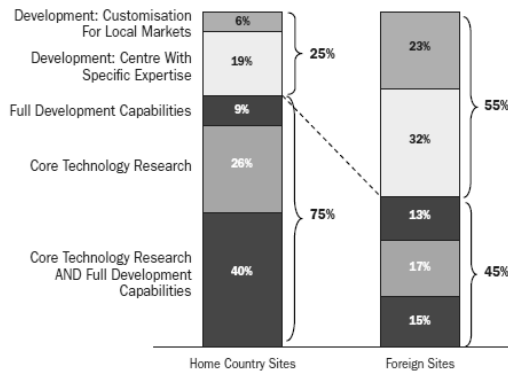
Drivers of future R&D sites



"Innovation: Is Global the Way Forward?"
A joint study by Booz Allen Hamilton and INSEAD - 2006

10

Activities of home-base and foreign R&D Sites

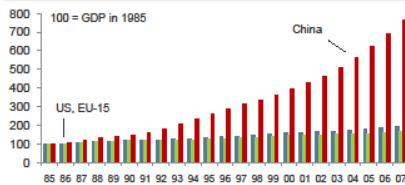


"Innovation: Is Global the Way Forward?"
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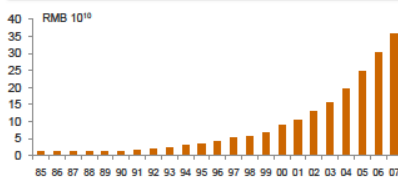
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Where Does Innovation Happen? China's Growing Importance as a Market and as a Source of Technology

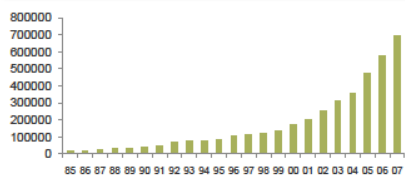
GDP Growth in China (vs US, EU)



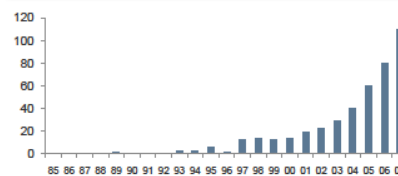
R&D Expenditures in China



Patent Applications in China



New R&D Labs in China per Year



PRTM

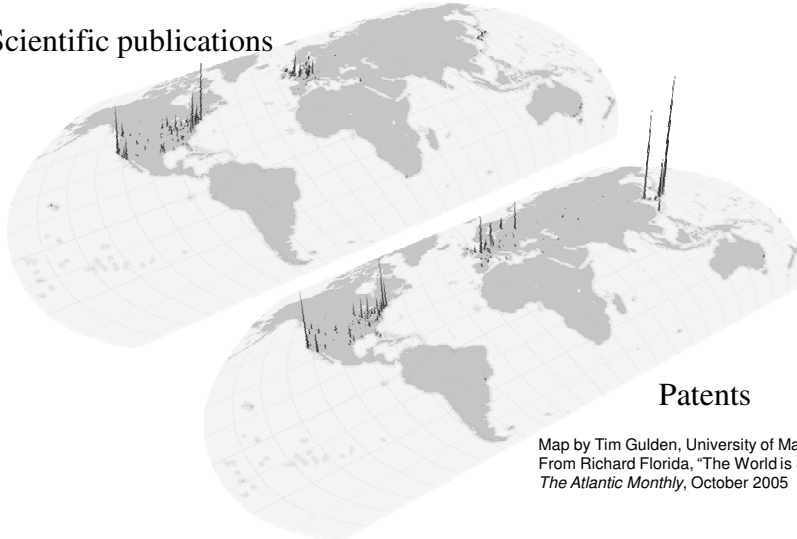
Open Innovation - 28 Oct 2009 © 2009 PRTM Proprietary

PRTM/GLORAD R&D Database, 2008
CN MOST, US BEA, SIPO

CONFIDENTIAL | 512

The World is Flat... The World is Spiky....

Scientific publications



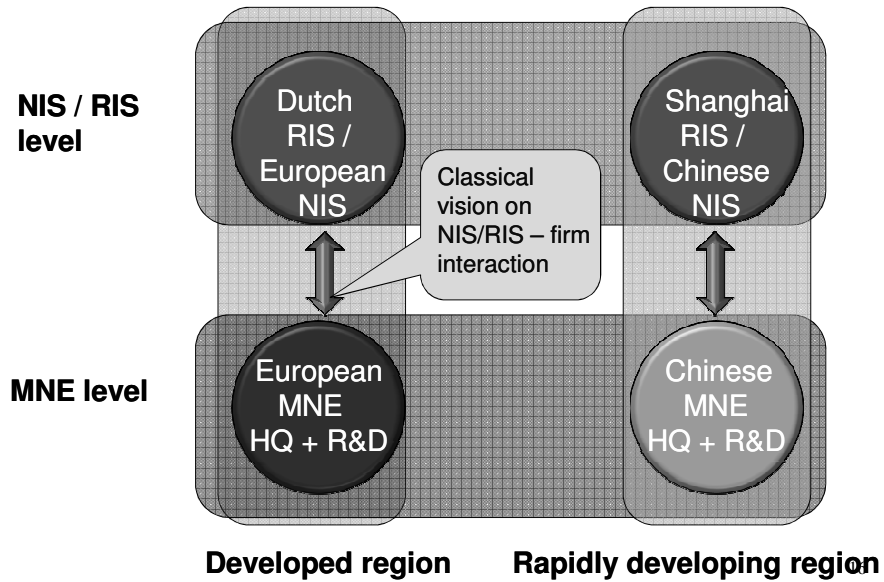
Map by Tim Gulden, University of Maryland.
From Richard Florida, "The World is Spiky,"
The Atlantic Monthly, October 2005

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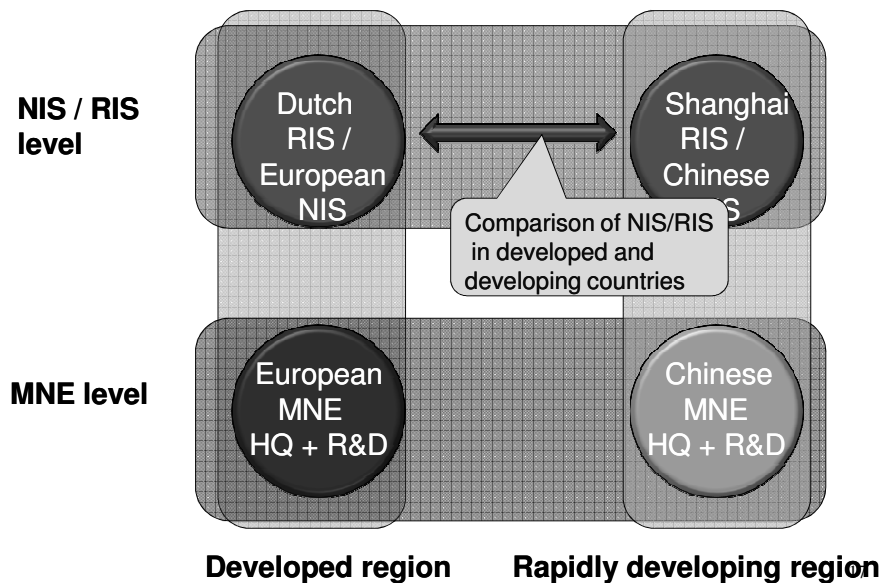
A research framework

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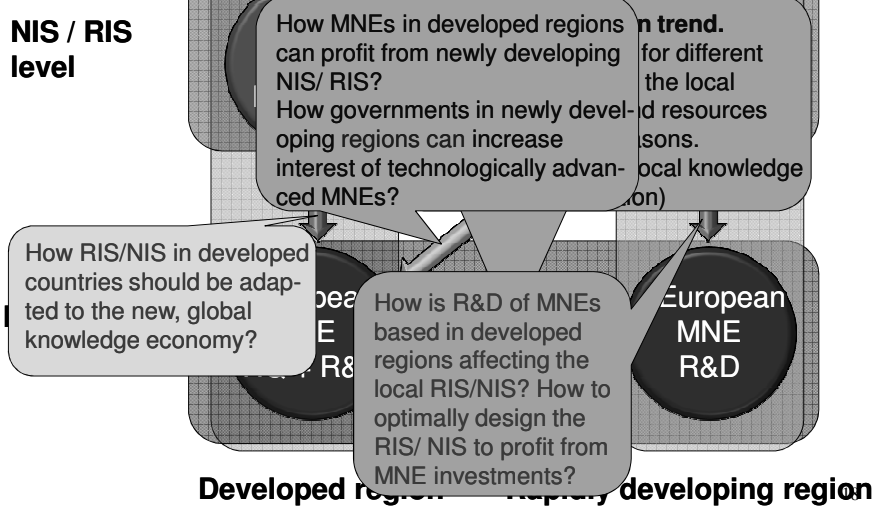
Classical research themes



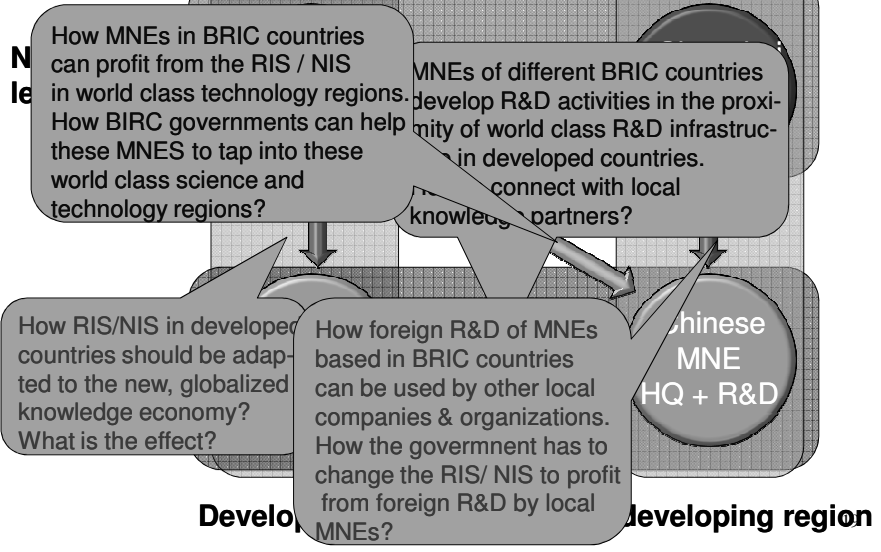
Classical research themes



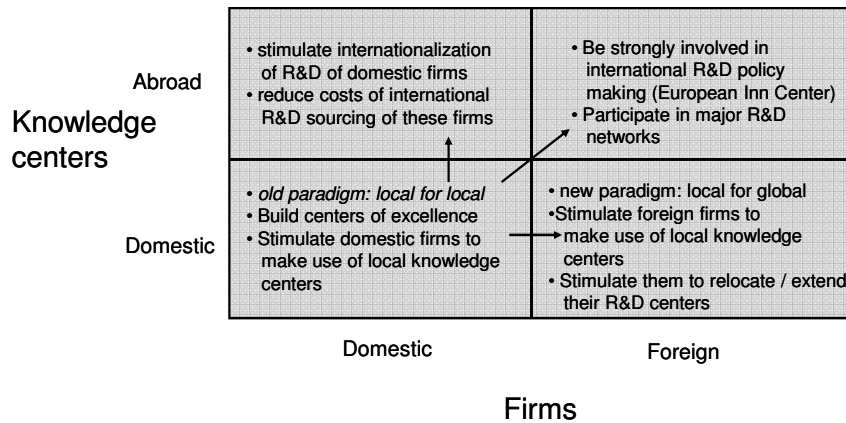
Structure of the project



Structure of the project



R&D globalization and changing policy making?



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Open innovation

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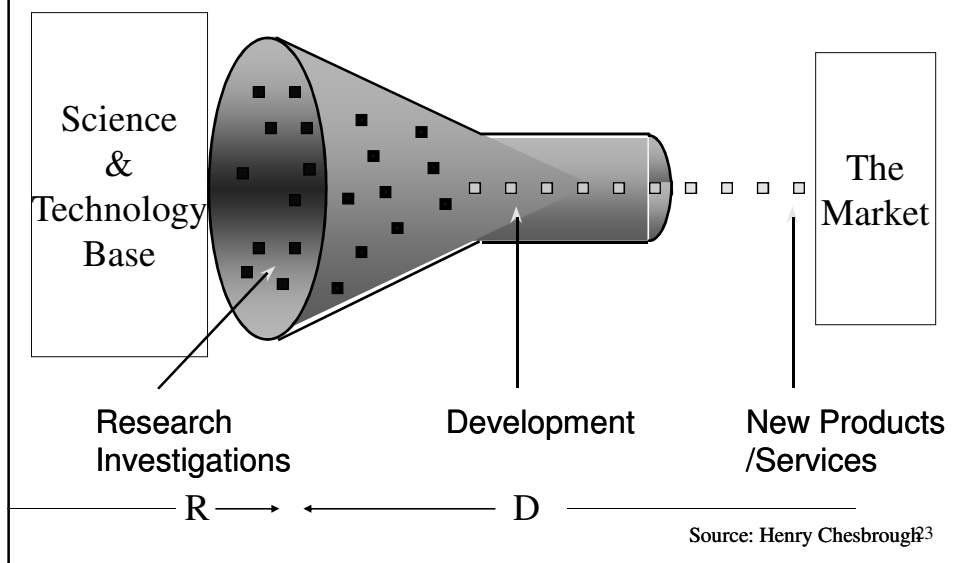
What is Open Innovation?

“Open innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively.”

Chesbrough, Vanhaverbeke, West
Open Innovation: Researching a New Paradigm
(OUP, 2006)

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A Closed Innovation System



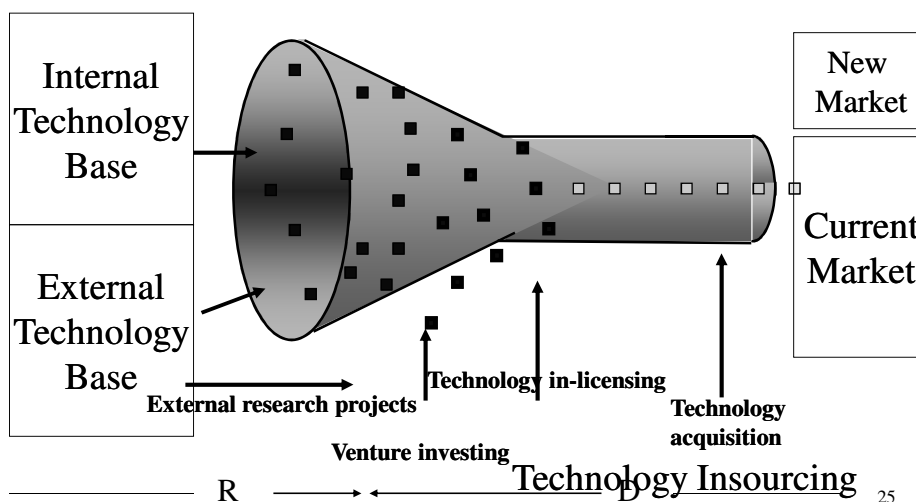
What changed?

New Division of Innovation Labor

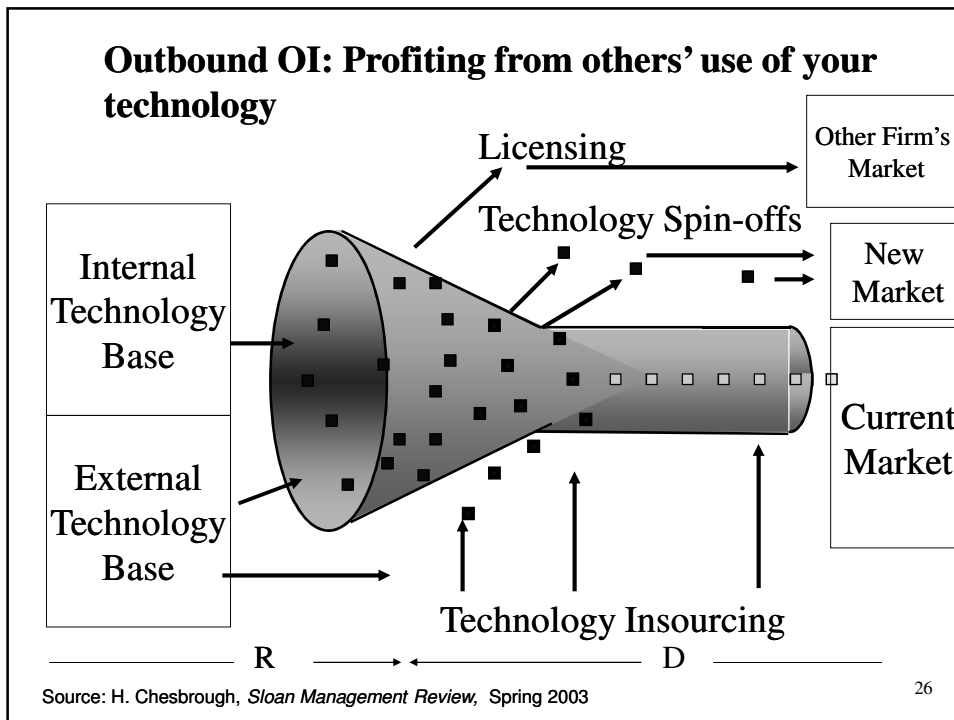
- Increasingly mobile trained workers
- More capable universities
- Knowledge distributed more widely throughout the world
- Diminished US hegemony in many leading technology fields
- Erosion of oligopoly market positions
- Deregulation (EU-liberalization)
- Enormous increase in Venture Capital

Source: Henry Chesbrough²⁴

Inbound OI: Filling the gaps with external technology



Source: H. Chesbrough, *Sloan Management Review*, Spring 2003



Globalization of R&D

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Globalization of R&D – A brief review

- From the late 1980s – A trend towards R&D globalization starts
- Adaptation to local conditions rather than basic/fundamental research as the main mandate of overseas R&D units
 - Home-base exploiting – MNEs as vehicles for technology unilateral transfer and dissemination
- Since the 1990s - The growing importance of affiliate activities in generating new knowledge and competencies for MNEs has increased
 - Home-base augmenting / competence creating MNE subsidiaries as generators of new technology

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Globalization of R&D – A brief review

- From Transnational ...
- Growing pressures for achieving global integration and local responsiveness at the same time
- Bilateral technology flows: several subsidiaries get an important role in MNEs' innovation
- To metanational ...
- Geographically dispersed, locally embedded, and globally leveraged
- Sensing network of research departments across the globe

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**Metanational:
Knowledge is increasingly dispersed:**

- National economic development efforts
- Strategic knowledge industries in several countries
- Ease of communication and access
- Multinational companies as teachers
- Overseas outsourcing, contract manufacturing
- Global customers
- Industry convergence

**Metanational:
The Global Knowledge Economy**

1. Knowledge is now key everywhere, in all industries.
2. Leading firms are accustomed to project home-grown knowledge...
3. But sources of knowledge are now increasingly dispersed.
4. Competitively valuable knowledge is complex and hard to move (tacit and contextual knowledge)...
5. And success depends on innovation using complex knowledge.
6. Firms are thus moving from projecting home-grown knowledge to “learning from the world”.

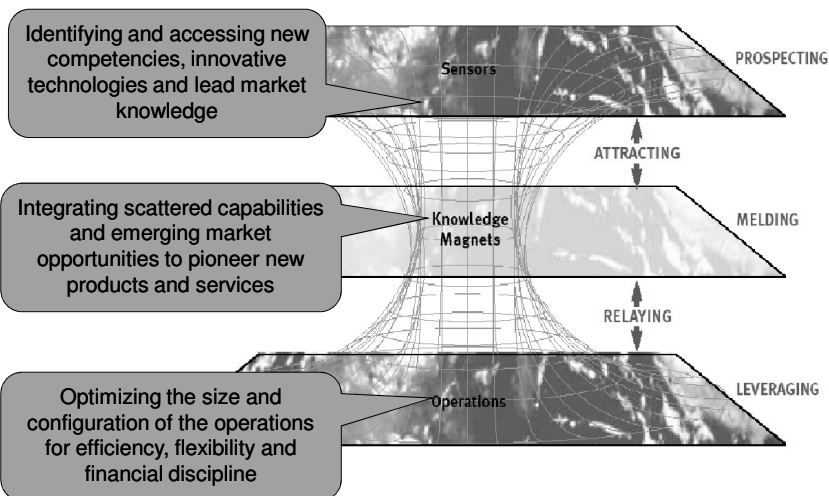
The metanational company

(Doz et al., 2001)

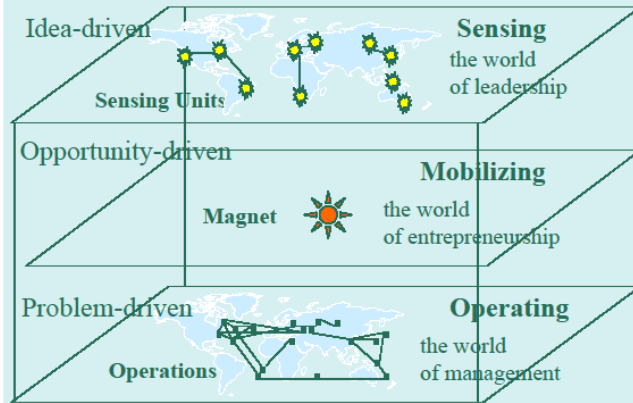
- Pockets of under-exploited technology and market knowledge scattered around the world that are locally imprisoned
 - Embedded in local context
 - Tacit, not codified
- If we could tap and connect these pockets of imprisoned knowledge this would fuel a powerful new source of innovation
- You have to be where the knowledge is!!!
- Conclusion: R&D globalization forces firms to start OI activities in an international & multi-cultural setting

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The Metanational process Learning from the world



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© Yves Doz, Peter Williamson, Jose Santos, INSEAD, 2006

- ✓ Prospect the world for new capabilities and lead market knowledge
- ✓ 'Plug-in' to learn locally embedded knowledge
- ✓ Set up 'magnets' to bring together knowledge pieces dispersed around the World
- ✓ Innovate by melding dispersed capabilities and market knowledge
- ✓ Relay innovations into the operations network
- ✓ Use global operations to leverage metanational innovations rather than to project home orthodoxies

(Source: Doz, Santos, Williamson - "From Global to Metanational" - HBS Press, 2001)

© Yves Doz, Peter Williamson, Jose Santos, INSEAD, 2006

Linking open innovation and globalization of R&D: 3 research questions

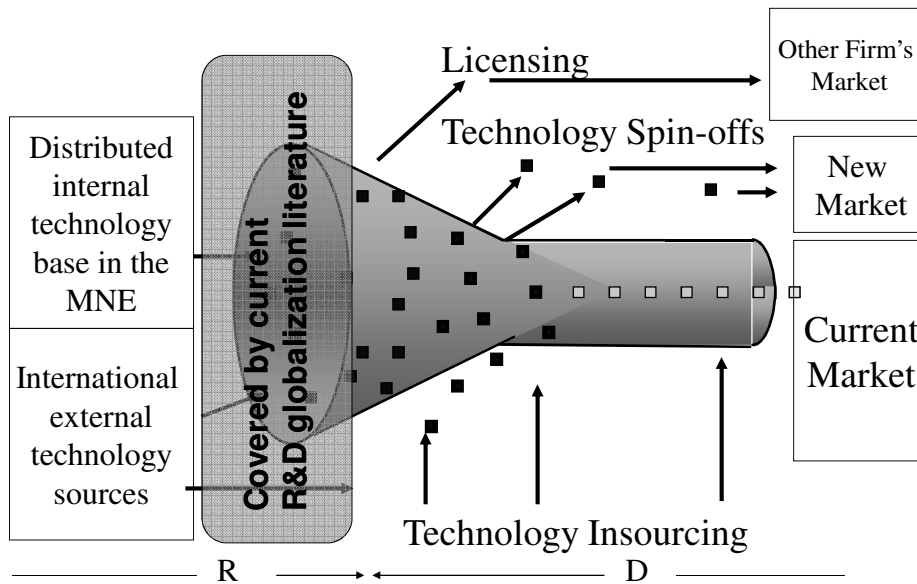
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Weaknesses in OI and globalization of R&D

- **Open innovation literature:**
 - ◆ OI shows why and how to source outside knowledge
 - ◆ *It does not tell us anything where outside partners are located and how to get access to and absorb geographically dispersed, locally embedded knowledge*
- **Internationalization of R&D literature:**
 - ◆ Considers a company as a MNE and international strategy plays a crucial role (global vs. multi-local company, transnational company etc...)
 - ◆ Shows why companies locate their R&D centers in particular places around the globe
 - ◆ *Does not have an advanced view on how to tap into external sources of technology*
 - ◆ *Does only consider OI at the fuzzy front end, not along the innovation funnel*

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How are OI and R&D globalization connected?



Source: H. Chesbrough, *Sloan Management Review*, Spring 2003

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Research questions

- A. How the recent literature about R&D globalization can enrich our understanding of open innovation?**
- B. How insights from the OI framework can enrich our understanding of current innovation management in MNEs**
- C. From R&D globalization towards a broader OI model for MNEs?*

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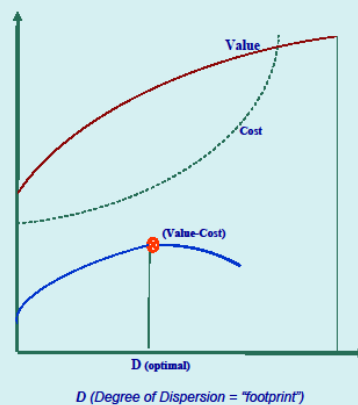
A. How Globalization of R&D can enrich the OI-framework (1)

- Large firms are MNEs tapping into the globally distributed sources of knowledge (science, technology, design, fashion, market insight, etc..)
- What are interesting R&D locations for a firm?
- How to tap effectively into local R&D-communities around the globe?
- What is an effective number of R&D locations?
- How to transfer and integrate effectively knowledge from different parts of the world in a MNE?
- How to decide about task specialization in R&D among the different locations?
- How to link R&D with operational units (subsidiaries) in MNEs?
-

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INSEAD

Value and cost of an innovation,
as a function of dispersion



© Yves Doz, Peter Williamson, Jose Santos, INSEAD, 2008

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A. How Globalization of R&D can enrich the OI-framework (1)

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-

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A. How Globalization of R&D can enrich the OI-framework (2)

- ...
- R&D management across different cultures and time zones
- Role of ICT-based knowledge management
- How does this change OI-theory?
 - ◆ *New, interesting questions* emerge:
 - ◆ Where to set up research centers?
 - ◆ How many locations?
 - ◆ How to manage cultural differences?
 - ◆ How to manage knowledge flows and integration among R&D units?
 - ◆ How to manage transition from research centers to development centers and the operational network of the MNE?
 - ◆ Control, communication, resource balance between HQ₄₃ and R&D sites

What can Metanational contribute to OI theory?

- Suggests a way how to implement OI for the front end innovation activities, gives guidelines for the practical use
- International sensing network broadens the innovation search & explains why search technologies in hot spots
- ✓ Building “Sensing network” by company itself is expensive and time-/effort- consuming
- ✓ Cross-border cooperation may be difficult and expensive
- ✓ No “outlet” for non-commercialized innovation
- ✓ Exclusive focus on science based OI with universities and research labs: user knowledge? Local market knowledge?
 - ✓ e.g.: Shishedo: is about market knowledge. The company collaborates with local, French perfume companies

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B. How OI can enrich our understanding of current innovation management in MNEs

- Strong focus on how to tap into external research and technology facilities
- Not only internationalization of fuzzy front research, but also of all phases in the innovation funnel:
 - ◆ Focus on *value creation from innovation* rather than research and technology development
 - ◆ Not only outside-in but also inside-out
- What is the role of HQ or RHQ in the different phases? Likely to be different for each phase!
 - ◆ E.g.: licensing-in & -out (corporate IP)
 - ◆ E.g.: corporate venturing
- ...

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B. How OI can enrich our understanding of current innovation management in MNEs

- Not only R&D department but different internal players are crucial for decision making in different phases.
 - ◆ E.g.: licensing (IP), CVC (CV-department), incubators (corporate and divisional level), alliance department, experience labs, ...
- Different external players:
 - ◆ Universities, research labs, customers, intermediaries (innomediaries), VCFs, hi-tech start ups
- Different organizational modes to source from (not only R&D collaboration)
 - ◆ Contract R&D, licensing, equity + non-equity alliances, crowd-sourcing, spin-ins & -outs, ...

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C. How to structure a MNEs' R&D in the era of Open Innovation?

From R&D globalization towards an OI model for MNEs?

Some orientating questions as a start

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C. An OI model for innovation in MNEs (1)

- Start the analysis from an overall innovation strategy:
 - ◆ What is the main target of a firm's innovation?
 - ◆ What should be internally developed and what should be externally sourced?
- What is the role of using the intermediaries (technology market) and specialized service providers in external knowledge sensing/ technology sourcing?
 - ◆ not only universities & research labs
- What is the role of the HQ in the several phases of the innovation funnel:
 - ◆ How to internationalize R&D is only part of the picture?

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C. An OI model for innovation in MNEs (2)

- Differentiate “R” and “D” – not necessarily to be co-located – D is frequently co-located with subsidiaries
- How to leverage and use others' innovation efforts beyond the fuzzy front end– CV, licensing-in, spin-ins, acquisitions?
- Not all R&D is equally important. Distinguish three capabilities and develop them accordingly:
 - ◆ Core capability – mainly rely on itself; Critical capability – develop with partners (contractual R&D, licensing ...) ; Contextual capability – technology transaction: buy-in; sell-out...
 - ◆ How does this distinction affect the globalization decisions?

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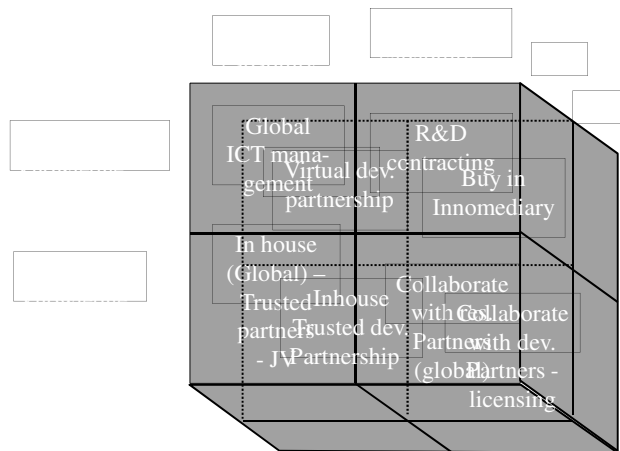
Chesbrough & Schwartz (2007): Innovating business models with cpo-development partnerships, *RTM*.

Table 2.—Co-Dev Partnerships in Relation to Required R&D Capabilities

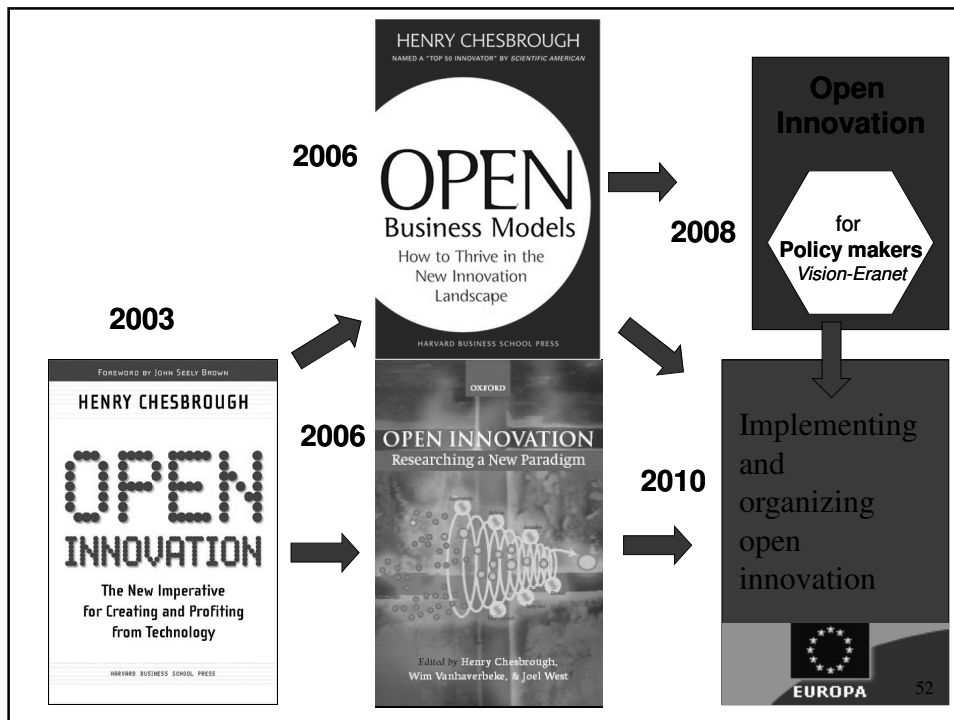
| Partnership Attributes | Type of R&D Capability | | |
|--|---|--|--|
| | Core | Critical | Contextual |
| Partner role | Vital; utilize in-house R&D or very select strategic partners | Important, but not core to overall business (may be core to partner) | Necessary but not value adding; develop multiple sources of capability |
| Number of partners | None or very few | Small number | Safety in numbers |
| Depth of co-dev relationship | Deep | Medium | Low |
| Contingency plan (if things don't go as planned) | Best to develop yourself; recruit strategic R&D suppliers if needed | Partner on a win-win basis; align business models; go in-house only as last resort | Switch to another partner if one partner is not performing |

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Categorization of technology insourcing



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Exnovate as a network of excellence for OI-practitioners and scholars?

- www.exnovate.org (see also: <http://innovationmanagement.se>)
- An international network of excellence on Open and Collaborative Innovation
- Projects
 - ◆ CE and OI Masterclass (6 times already)
- <http://masterclassfall2009.cisevents.hightechcampus.nl/>
 - ◆ European Innovation Forum
 - ◆ 30 top scholars networked
- Cases and syllabi about open innovation
- Updated bibliography