

# How to Reap the Potential of International Industry-Science Collaborations



**Axel Karpenstein**

Program Manager, DWIH Tokyo / Dep. Director DAAD Tokyo

Tokyo, 30 July 2021

# Industry-Science Collaborations (ISC)

1. Potential

2. Obstacles

3. Guidelines

## Types of ISC

### Formal Agreements

Joint / commissioned projects  
Licensing of patents

### Personal Exchanges

Consulting, lectures,  
sabbaticals, internships

### Focused Structures

Innovation / incubation centers,  
science parks, consortia, spin-outs

### Other

Research grants, endowments

# Industry-Science Collaborations (ISC)

1. Potential

2. Obstacles

3. Guidelines

## Types of ISC

### Formal Agreements

Joint / commissioned projects  
Licensing of patents

### Personal Exchanges

Consulting, lectures,  
sabbaticals, internships

### Focused Structures

Innovation / incubation centers,  
science parks, consortia, spin-outs

### Other

Research grants, endowments

# 1. Potential of ISC

Different, but complementary “missions” of Industry / Academia

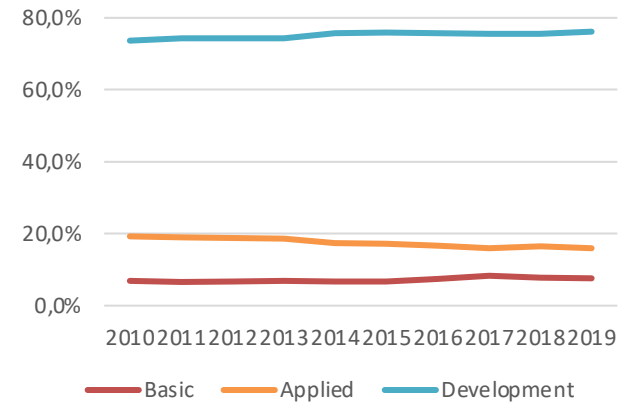
## Industry

- ❖ Tap into universities’ R&D reservoir
- ❖ Reduce risk & save on R&D expenditure

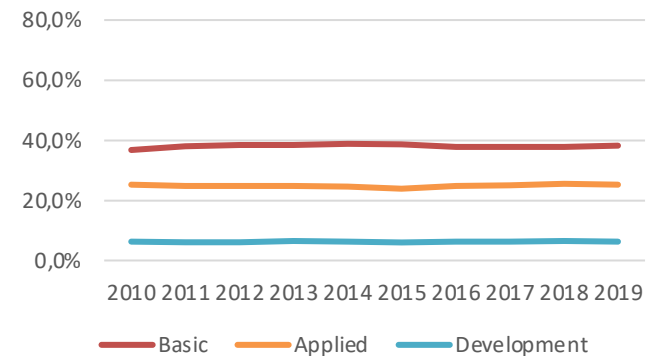
## Academia

- ❖ Research on questions w/ practical application (“Third Mission” – beyond the Ivory Tower ...)
- ❖ Access to funding, equipment, data

R&D Spending Private Sector (Japan)



R&D Spending Higher Education (Japan)



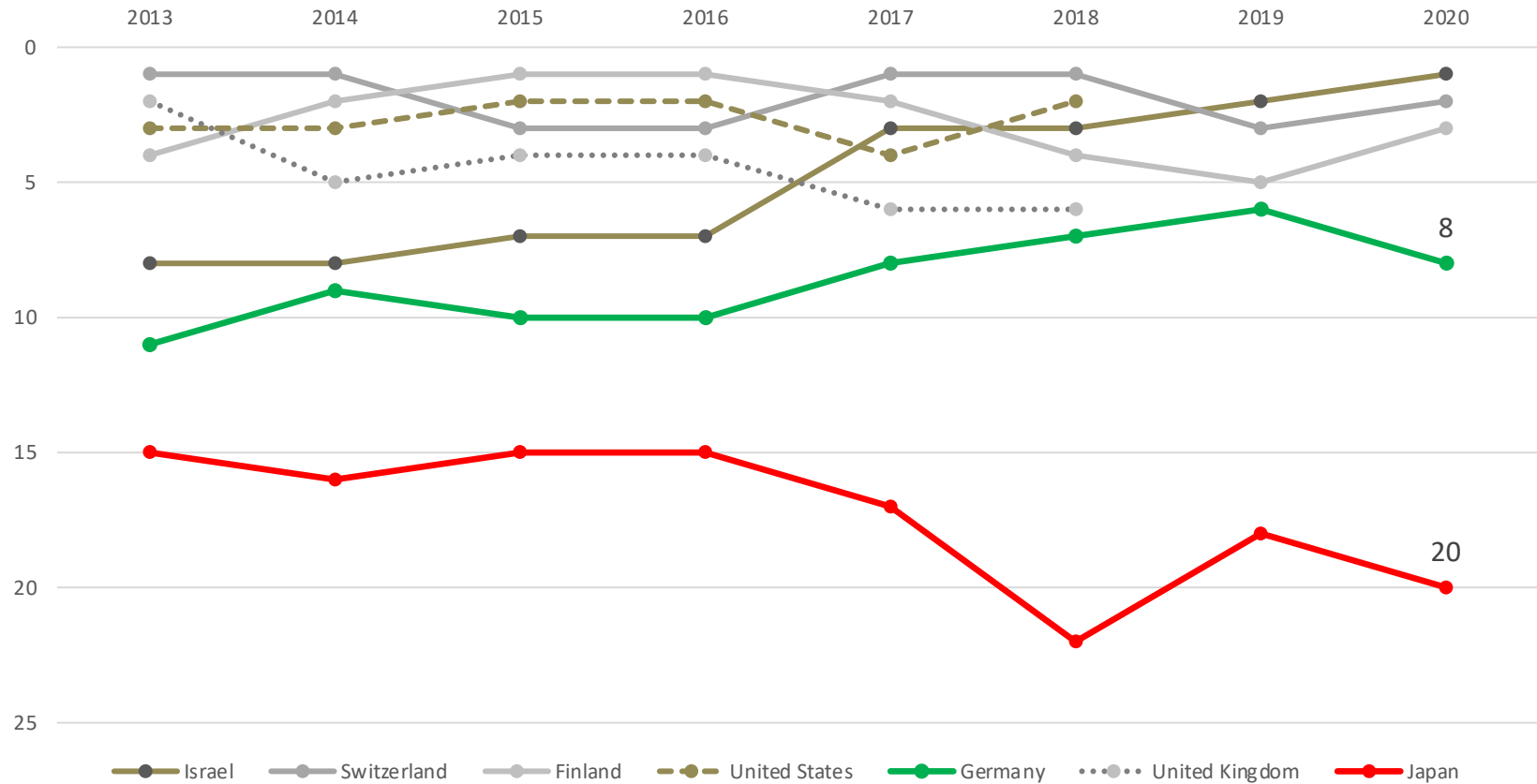
# 1. Potential of *international* ISC

---

- ❖ Tap into research from leading science nations
  - Nature Index 2020: Germany rank 3, Japan rank 5
  
- ❖ Expand access to innovation and technology
  - Germany ranked no. 6 in European Innovation Scoreboard 2021, Japan “innovation leader”
  - Tokyo-Yokohama ranked S&T cluster no. 1 / Osaka-Kobe-Kyoto no. 6 in Global Innovation Index 2020
  - Cologne ranked best German S&T cluster (no. 19) in Global Innovation Index 2020
  
- ❖ Expand customer base for university research

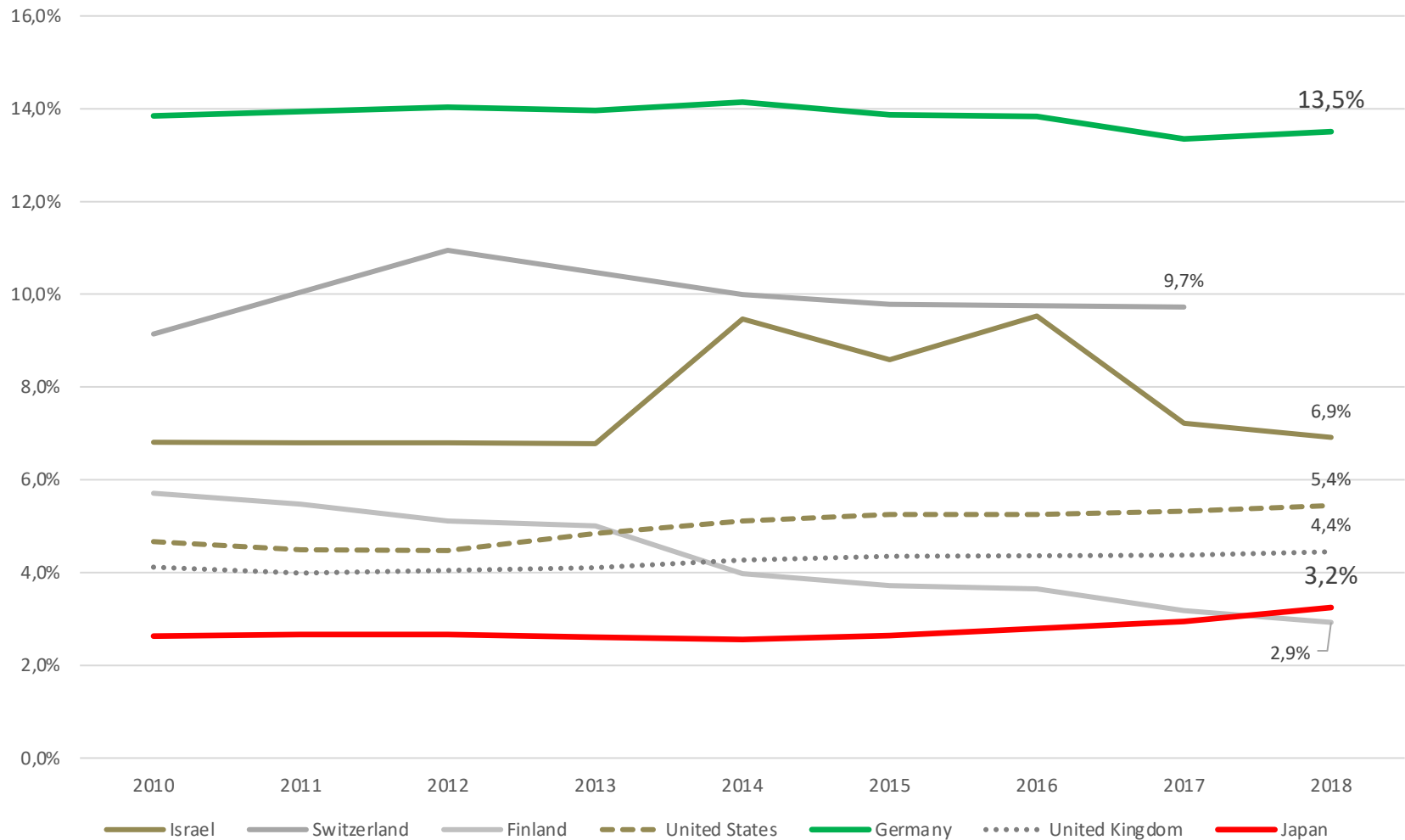
# 1. Current State: International UIC Ranking

### World Bank UIC Ranking, 2013-2020



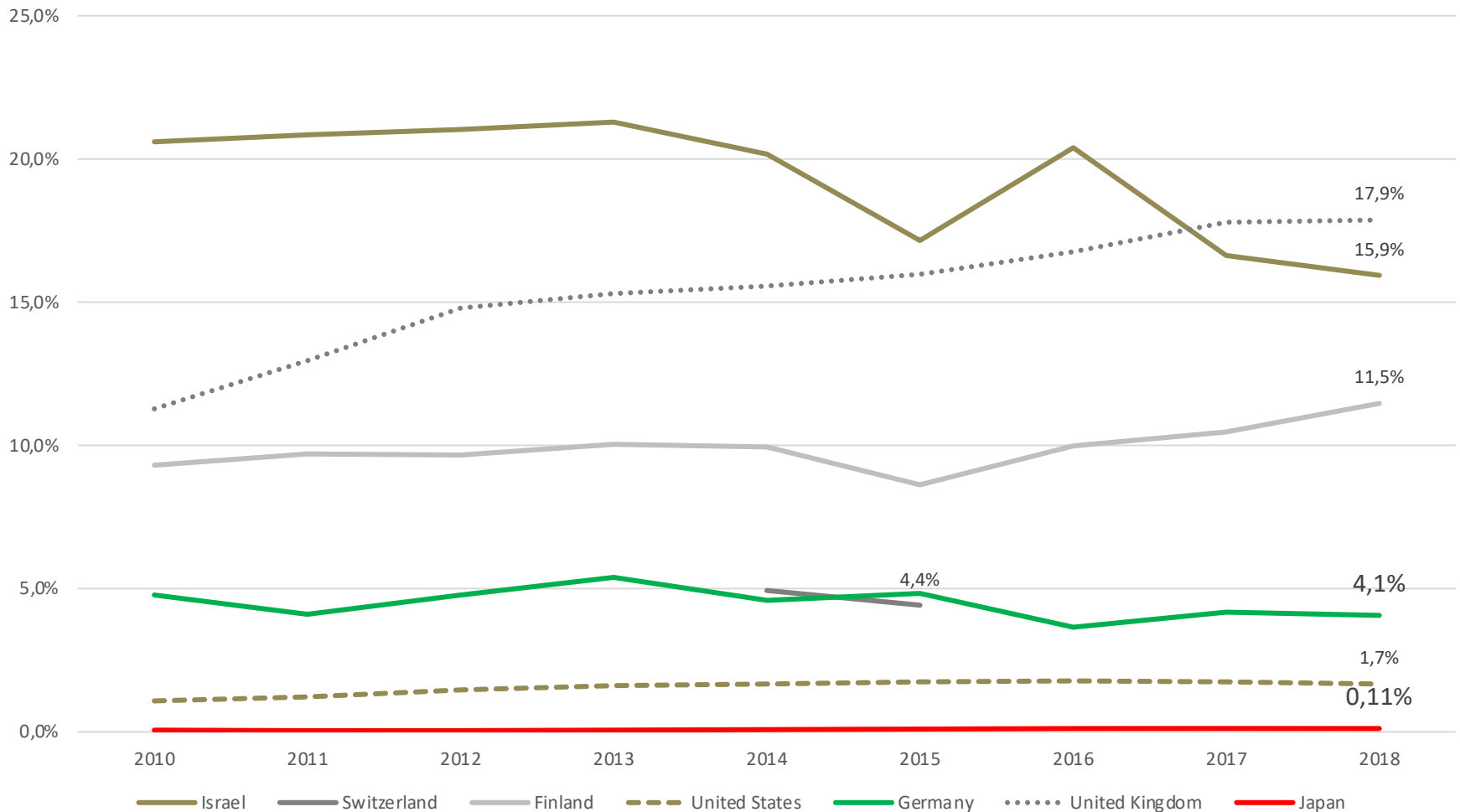
# 1. Current State of ISC: Domestic Cooperation

## Higher Education R&D Expenditure from industry



# 1. Current State of ISC: International Cooperation

## Higher Education R&D Expenditure from abroad





# 1. Current State: Top Industry Collaborators

## Industry Collaborators for Select German Universities

(based on all publications & patents for 2011-2020 – Rank in brackets)

Institution	Co-Publications	Publication sponsors	Co-Patents
LMU	(no co-publications with industry)	(no publication sponsors from industry)	<b>10 from Germany:</b> Medigene (15), BMW (21), Bayer (23), etc., <b>6 from abroad:</b> Roche (3), Philips (22), <b>Takeda</b> <b>Yakuhin (41)</b>
RWTH	<b>3 from Germany:</b> in FEV Europe (434), (470), Aixtron (483)	<b>7 from Germany:</b> Bayer (75), BASF (106), Siemens (118) etc., <b>31 from abroad:</b> Xerox (159), Philips (183), Shell (215) etc.	<b>12 from Germany:</b> Henkel (4), ThyssenKrupp (5), BMW (16), etc. <b>7 from abroad:</b> IBM (6), ASML (15), Ericsson (17), etc.

# 1. Current State: Top Industry Collaborators

## Industry Collaborators for Select Japanese Universities

(based on all publications & patents for 2011-2020 – Rank in brackets)

Institution	Co-Publications	Publication sponsors	Co-Patents
Tokyo U	Hitachi (458)	<b>33 from Japan:</b> Asahi Glas (50) etc., Xerox (171), Pfizer (225), AstraZeneca (399), Microsoft (403), Google (475)	<b>181 from Japan:</b> NTT (2), Fujifilm (3), Hitachi (3) etc., <b>13 from abroad (3 from Germany):</b> Schlumberger (94), BASF (141), AstraZeneca (212)
Tokyo Tech	NTT (339), Hitachi (444), Sony (457), Toshiba (497)	<b>24 from Japan:</b> Murata Manuf. (51), Asahi Glass (57), Hitachi (78), <b>14 from abroad (1 from Germany):</b> Xerox (101), BASF (207), Samsung (208) etc.	<b>102 from Japan:</b> NTT (3), Toyota (5), Daikin (6) etc., <b>6 from abroad (1 from Germany):</b> BASF (4), LG (44), Samsung (110) etc.

# 1. Current State: Top Industry Collaborators

## ISC Ranking of Japanese Universities

Joint Research Projects (total)		Joint Research Projects with int'l partner	
<b>1</b>	<b>Tokyo U</b> <ul style="list-style-type: none"> <li>• 1,797 projects</li> <li>• Revenue 7.5 bn JPY (ca. 60 mio EUR)</li> </ul>	<b>Tokyo U</b>	<ul style="list-style-type: none"> <li>• 28 projects</li> <li>• Revenue 328 mio JPY (ca. 2.5 mio EUR)</li> </ul>
<b>2</b>	<b>Osaka U</b> <ul style="list-style-type: none"> <li>• 1,243 projects</li> <li>• Revenue 9,6 bn JPY (ca. 72 mio EUR)</li> </ul>	<b>Osaka U</b>	<ul style="list-style-type: none"> <li>• 21 projects</li> <li>• Revenue 76 mio JPY (ca. 580,000 EUR)</li> </ul>
<b>3</b>	<b>Tohoku U</b> <ul style="list-style-type: none"> <li>• 1,201 projects</li> <li>• Revenue 4,9 bn JPY (ca. 38 mio EUR)</li> </ul>	<b>Tokyo Tech</b>	<ul style="list-style-type: none"> <li>• 17 projects</li> <li>• 21 projects</li> <li>• Revenue 101 mio JPY (ca. 777,000 EUR)</li> </ul>

## 2. Problems

---

1. How to navigate the national innovation system?
2. How to locate suitable partners?
3. How to connect with potential partners – and how to maintain the connection?
4. Differences in regulatory environment / Intellectual Property Rights regime

## 3. Guidelines: (1) National Innovation System

---

### ❖ Japan

- Top-tier research universities vs. regional universities
- Strong concentration in areas around Tokyo and Osaka (but not just)

### ❖ Germany

- Technical Universities / Universities of Applied Sciences with strong links to industry
- Role of non-university research organizations (Fraunhofer Society / Helmholtz Association / Leibniz Association / Max Planck Society)

### ❖ Brush up on the National Research Systems!

- Germany: DWIH Tokyo ([Link](#)), Research in Germany ([Link](#))
- Japan: some basic information on MEXT ([Link](#)) / contact DWIH Tokyo

### 3. Guidelines: (2) How to locate suitable partners

- ❖ Find relevant research & excellent researchers / institutions through bibliometric databases:
  - Dimensions.ai ([Link](#))
  - for Japan also: CiNii ([Link](#)), Kaken Database ([Link](#)), researchmap ([Link](#))
  - for Germany also: DFG GERiT ([Link](#))



Dimensions search interface showing filters for Publication Year (2021 OR 2020 OR 2019 OR 2018 OR 2017 OR 2016), Country/Territory (Germany), and Abstract ("printed electronics").

Organization Country	↓ Publications	Citations
Karlsruhe Institute of Technology (KIT) Germany	77	631
Offenburg University of Applied Sciences Germany	35	216
Technical University of Munich (TUM) Germany	32	263
University of Erlangen-Nuremberg (FAU) Germany	30	123
TU Darmstadt Germany	29	231
TU Dresden (TUD) Germany	25	69
Chemnitz University of Technology Germany	25	311
Fraunhofer Institute for Electronic Nano Systems (EN...) Germany	21	239

Publications | Citations | Citations (Mean)  
Indicator

Mean | Change

Show only researchers from Germany

Name Organization, Country	↓ Publications	Citations
Jasmin Aghassi-Hagmann Offenburg University of Applied Sciences, Germany	32	213
Mehdi Baradaran Tahoori Karlsruhe Institute of Technology, Germany	29	219
Reinhard R Baumann Chemnitz University of Technology, Germany	18	301
Gabriel Cadilha Marques Karlsruhe Institute of Technology, Germany	17	143
H Thomas Hahn Karlsruhe Institute of Technology, Germany	14	216
Gerardo Hernandez-Sosa Karlsruhe Institute of Technology, Germany	14	180
Kalyan Yoti Mitra Fraunhofer Institute for Electronic Nano Systems, Germany	13	165
Karlheinz Bock TU Dresden, Germany	11	20

### 3. Guidelines: (3) How to connect?

---

- ❖ ISC especially difficult on international level:
  - geographical distance
  - language barrier
  - general “culture” (customs, attitudes, values)
  
- ❖ Importance of creating & maintain personal contacts
  - Ask the experts!  
Make use of organizations dedicated to international networking
    - German Research Foundation (DFG), Fraunhofer Society
    - DWIH Tokyo & network of supporters
  - Attend relevant events to meet and connect in person
  - Maintain relations

### 3. Guidelines: (3) How to connect?

---

- ❖ Differences in Organization Culture of Industry vs Science
  - = objectives, expectations, operating speed, project management
  - Evidence from Surveys in Japan:  
Biggest problem for ISC are „incompatibilities“ between firm vs. academic cultures
  - Problems identified in surveys with esp. with Japanese universities
    - Slow moving, bureaucratic
    - Attitudes of researchers: independent mind frame,
    - Problems with administration: Rotation system / frequent change of contact persons
    - Evidence that Japanese firms do like working with universities overseas
  - Important to seek guidance and advice:  
can be provided by TLOs in Japan / Departments for Technology Transfer in Germany



### 3. Guidelines: (4) Regulation & Intellectual Property

---

- ❖ Climate has become more favorable
  - National versions of US-American “Bayh–Dole Act” in 1999 (Japan) / 2002 (Germany)
  - Establishment of dedicated support structures (TLO Law in Japan, 1998)
  - Changes to create incentives for commercialization of research (e.g. Incorporate of National Universities in Japan, 2004)
  - Changes to patent filing system
  
- ❖ Again: seek guidance from TLOs in Japan / university Departments for Technology Transfer in Germany

# Thank you!



## **DWIH Tokyo**

German Culture Centre (OAG-Haus) 4F  
7-5-56 Akasaka, Minato-ku, Tokyo 107-0052  
Japan

Email: [info@dwh-tokyo.org](mailto:info@dwh-tokyo.org)

Website: <https://www.dwh-tokyo.org/>