

From Blame Game to Knowledge Co-Creation - Swedish Industry-Academia Collaboration in Software Engineering

Robert Feldt

Professor of Software Engineering

Chalmers University, Gothenburg, and

Blekinge Inst of Technology, Karlskrona

robert.feldt@chalmers.se or robert.feldt@gmail.com



@drfeldt





Reqs

Test

Humans

Org, Team, Individual, Processes...

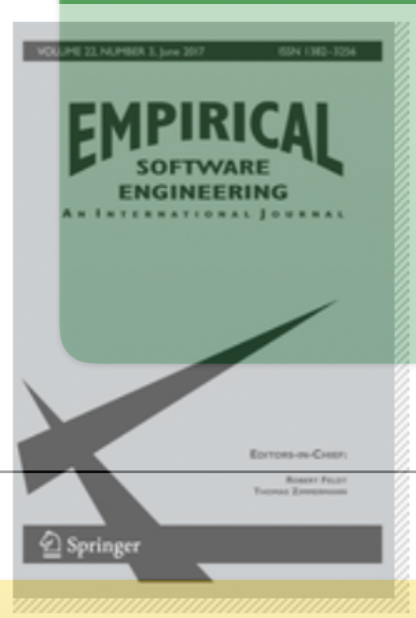
Code

Medicine

Empirical methods &
Statistics

AI, ML, Applied Math/
Stats, Visualisation

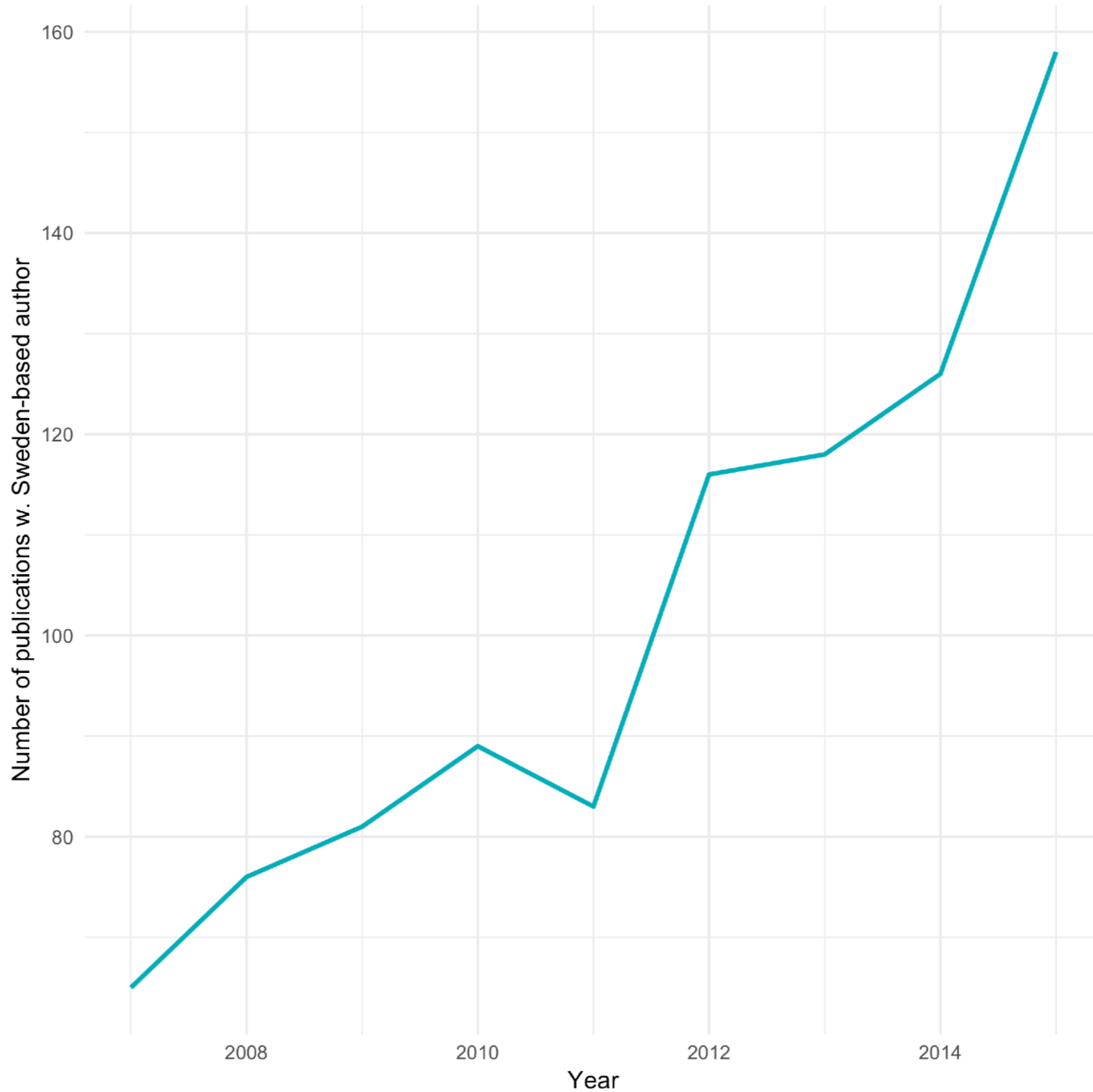
Psychology



Swedish Company Collaborations

- RUAG Aerospace Sweden - Optimizing V&V, Standards, Cost models
- Swedish Space Corporation - Optimizing V&V
- Ericsson (Karlskrona) - SW Customizations
- ABB, Sony Ericsson, Softhouse - Aligning Req & Test Activities
- Volvo Technology - Robustness Req & Testing
- Wireless Car & Ericsson (Gothenburg) - Robustness
- ST Ericsson - Data Mining V&V Metrics Data
- Volvo Car Corp - Interface SW Development <-> Manufacturing
- SAAB Security ATM & Systems - Agile testing, Human factors in SE (BSE)
- IKEA - Data Mining SE & V&V Metrics Data

Swedish Software Engineering is Growing!



Papers on Industry-Academia Collab (IAC):

Gorschek 2006: "A Model for Tech Transfer in Practice"

Ivarsson 2011: "Rigor and Relevance in Tech Evaluations"

Sandberg 2011: "Agile Collab Research: Action principles for IAC"

Runeson 2012: "It takes two to tango - Experience report on IAC"

Eldh 2013: "Researcher Considerations in Empirical SE in Industry"

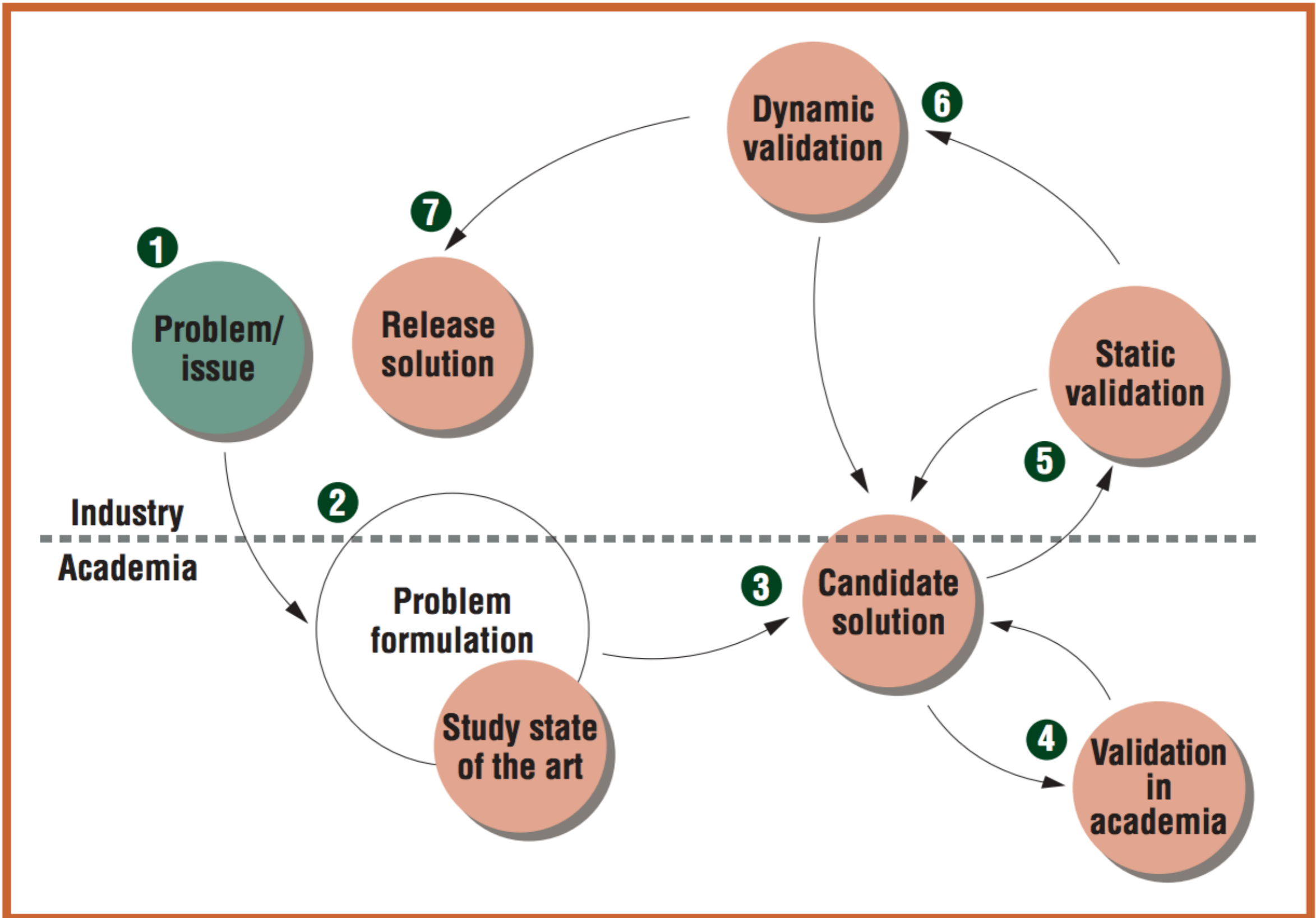
Wohlin 2013: "Empirical SE Research w Industry: Top 10 Challenges"

Runeson 2014: "The 4+1 model of IAC"

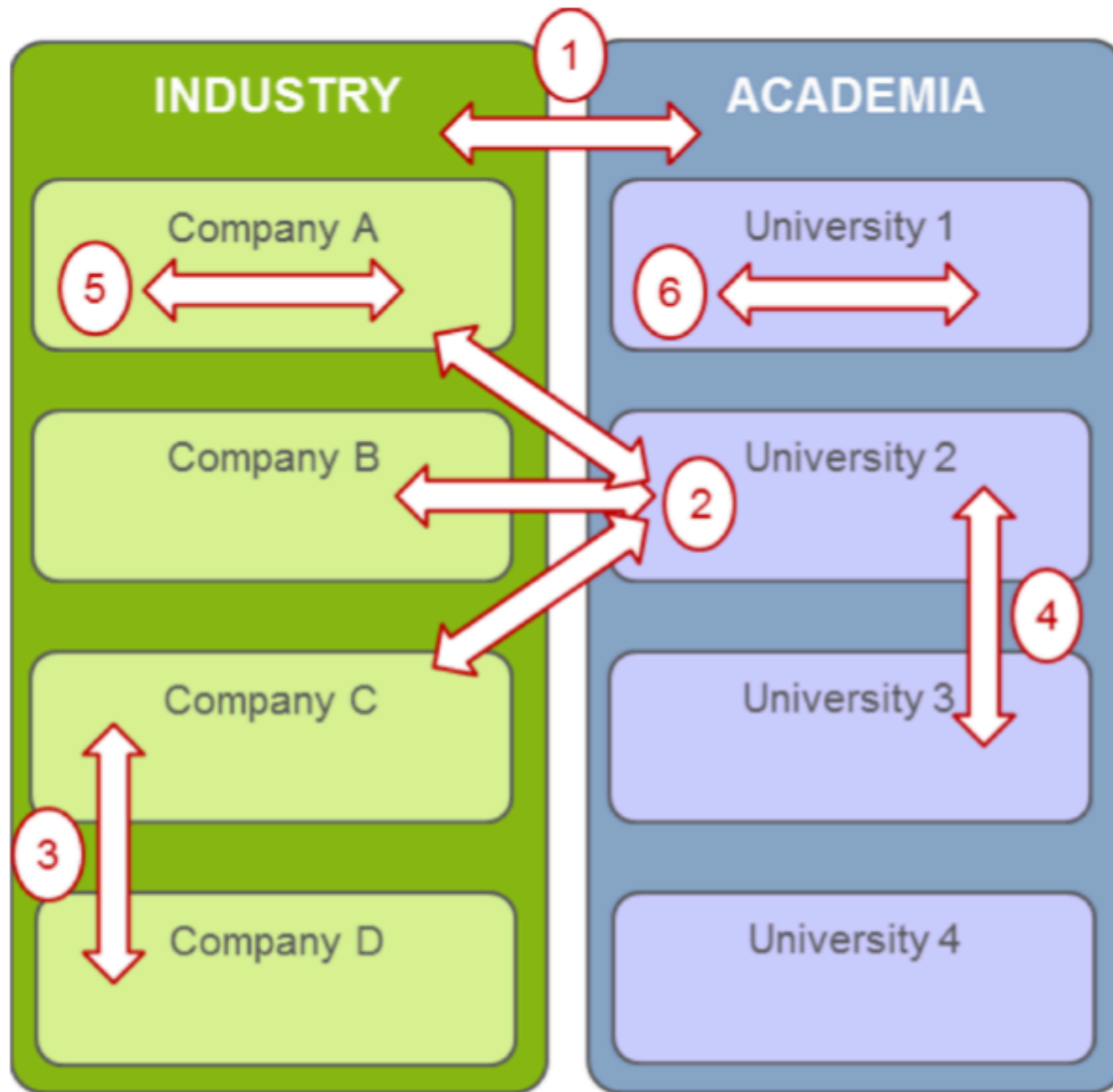
Runeson 2014: "Get Cogs in Synch - Time Horizon Aspect of IAC"

Sandberg 2017: "Meeting IAC Challenges with Agile Methodologies"

From 2016 and on there is more non-Swedish meta-papers on IAC...

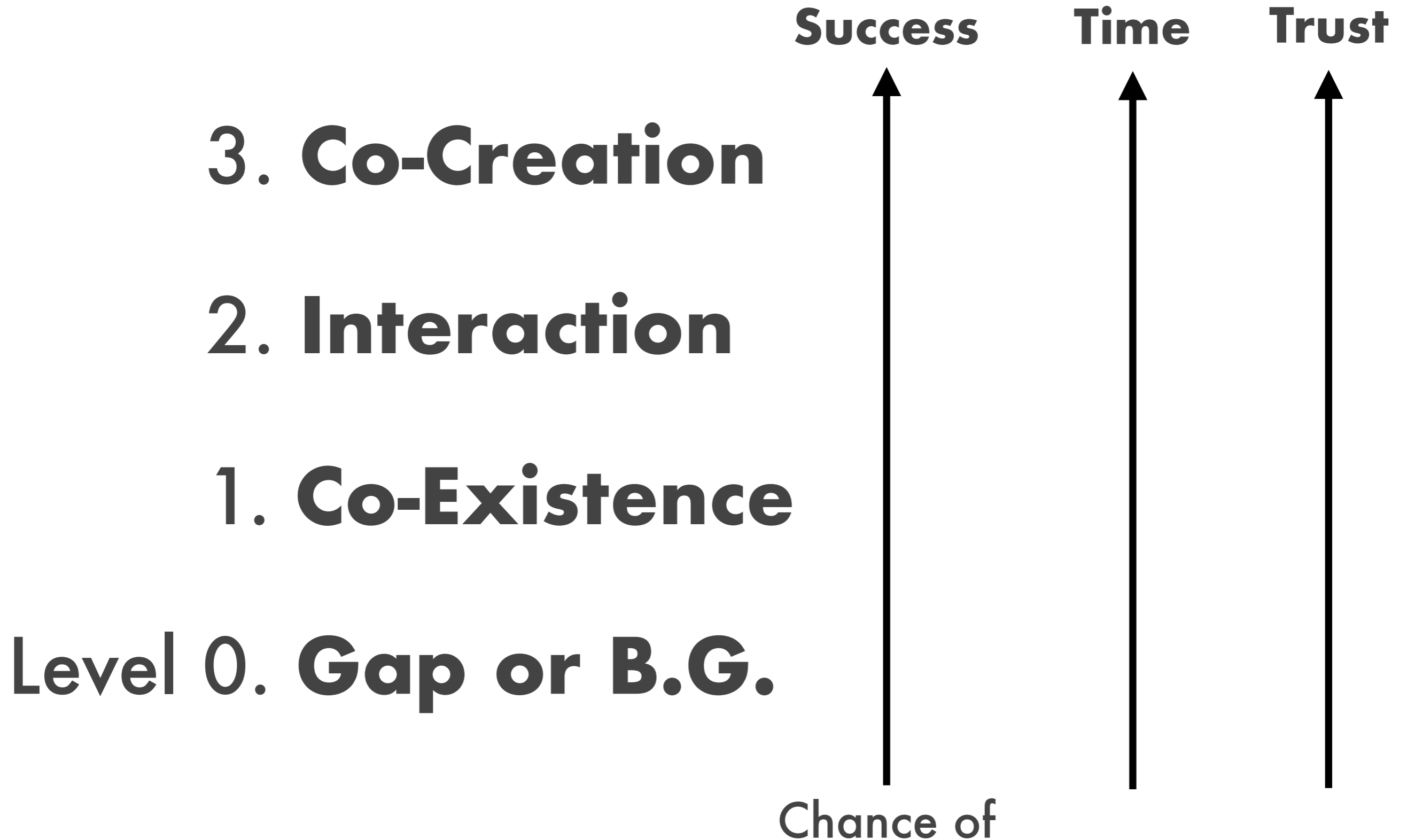


[Gorschek2006]



| Collaboration Opportunity | Main Collaboration Value |
|-----------------------------|--|
| 1: Industry to Academia | Leaders to Leaders |
| 2: University to Companies | Practitioners to Researchers |
| 3: Company to Company | Practitioners to Practitioners |
| 4: University to University | Researchers to Researchers |
| 5: Company internal | Leaders/Practitioners to Leaders/Practitioners |
| 6: University Internal | Researchers to Researchers |

Industry-Academia Collaboration Stages (IACMM)



Level 0. The Gap or Blame Game



“They want to build their ivory tower theories and don’t care about solving real problems now”



“They only want to quickly find solutions to problems we have already solved many times over; I basically have to be a consultant.”



Academia says:

“Industrial problems lack scientific novelty”

“Industry is short sighted”

“Industry don't dare taking risks”

Industry says:

“Academic solutions impractical & hard to apply”

“Academic solutions don't scale”

“Academics study problems we don't care about”

Level 1. Co-Existence



Level 1. Co-Existence

Both sides decided they **wanted to do the research but lack** real interest, commitment, time, or collab skills.

Company or their project members have moved on

Researchers just wanted the funding

Company might put more junior staff in project

Hard to find relevant data, people, or resources

In a sense, both parties are **“sitting off time”** and **“want to be somewhere else”**

Level 2. Interaction

Bridging the Gap



Level 2. Interaction

Both sides **are really trying** and **want something useful** out of collaboration

Often the normal “operations” of their, respective, organisations **get in the way**.

Cultural & subtle differences can also get in the way

Too little understanding of context and adaptations

IP problems can get in the way

As well as deployment and politics

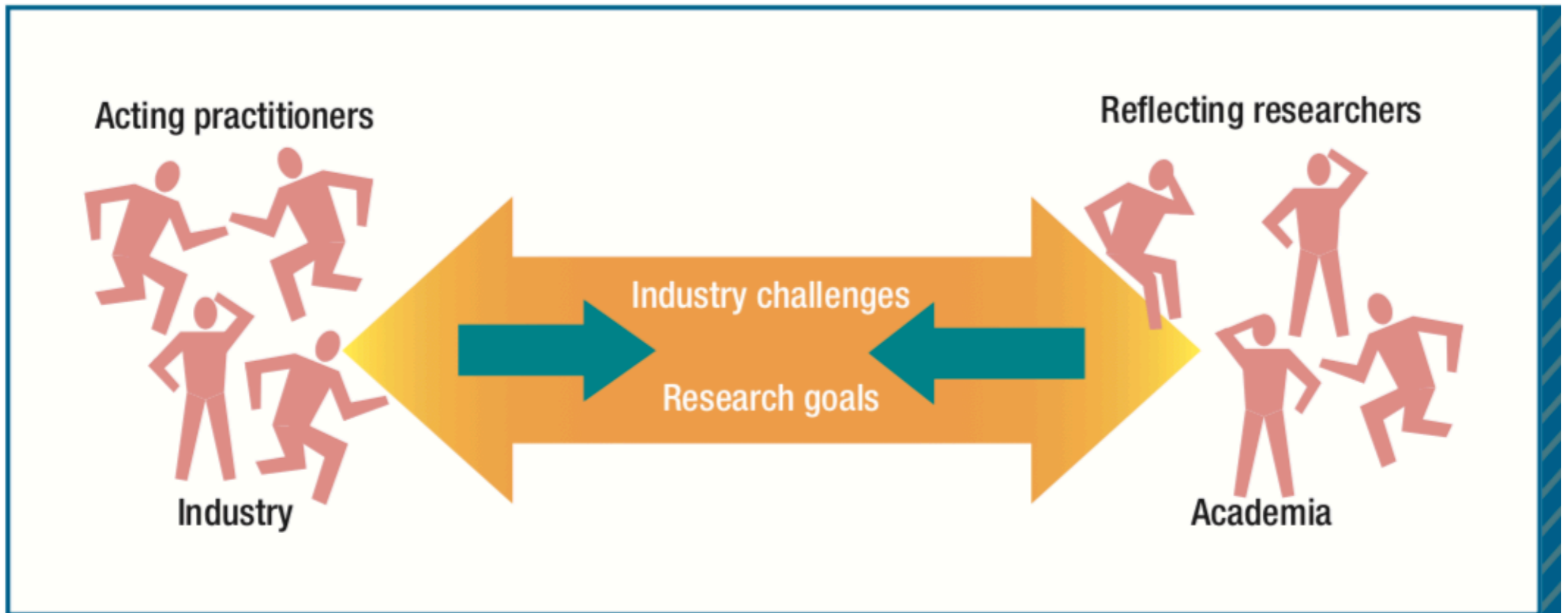


FIGURE 1. Collaborative practice research (CPR). Skilled professionals from industry and academia bring the strengths of each community to solving industry research needs.

[Sandberg2011]

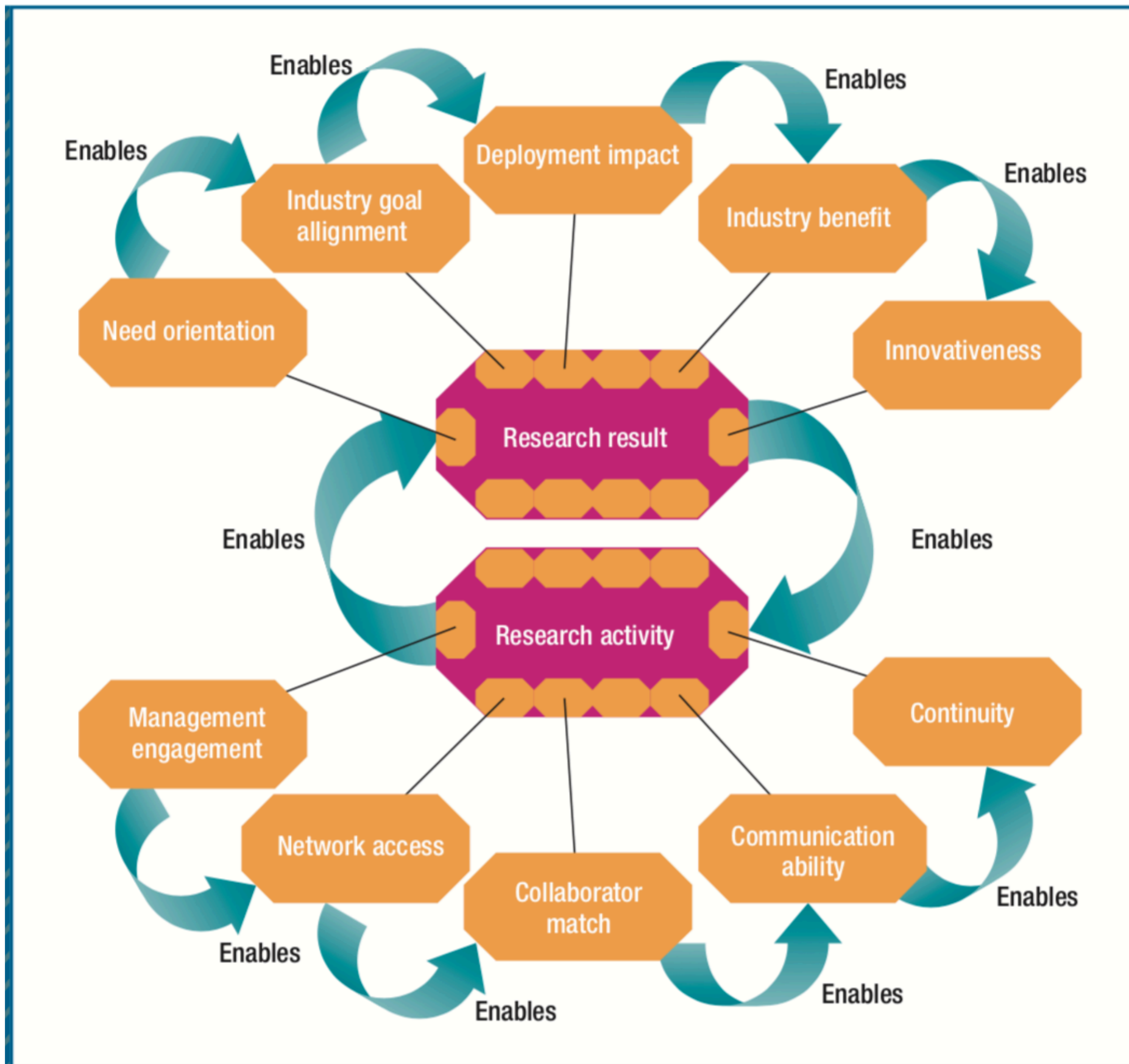


FIGURE 2. A collaboration model for collaborative practice research. Successful research projects must attend to both industry needs and management involvement.

[Sandberg2011]

*Academics comes with their beloved “hammer”
and sees all problems as essentially “nails”*



Industrial politics & power games get in the way of rational discussion, decisions, & deployment



IP rights can get in the way by delaying or making publication impossible.



SWELL Scale for Industry Involvement

| # | Type | Description |
|---|---------------|---------------------------|
| 7 | Collaboration | Employed by company |
| 6 | | Office at company |
| 5 | | Recurrent visits |
| 4 | | Several visits |
| 3 | Exchange | Data collection |
| 2 | Visit | (One) Visit & discussions |
| 1 | | Presentation |
| 0 | Contact | Initial |

Modifiers: **P** Co-published **A** Co-applicant **?** Planned collab

Level 3. Co-Creation



Level 3. Co-Creation

Long-term collaboration based on mutualism and trust

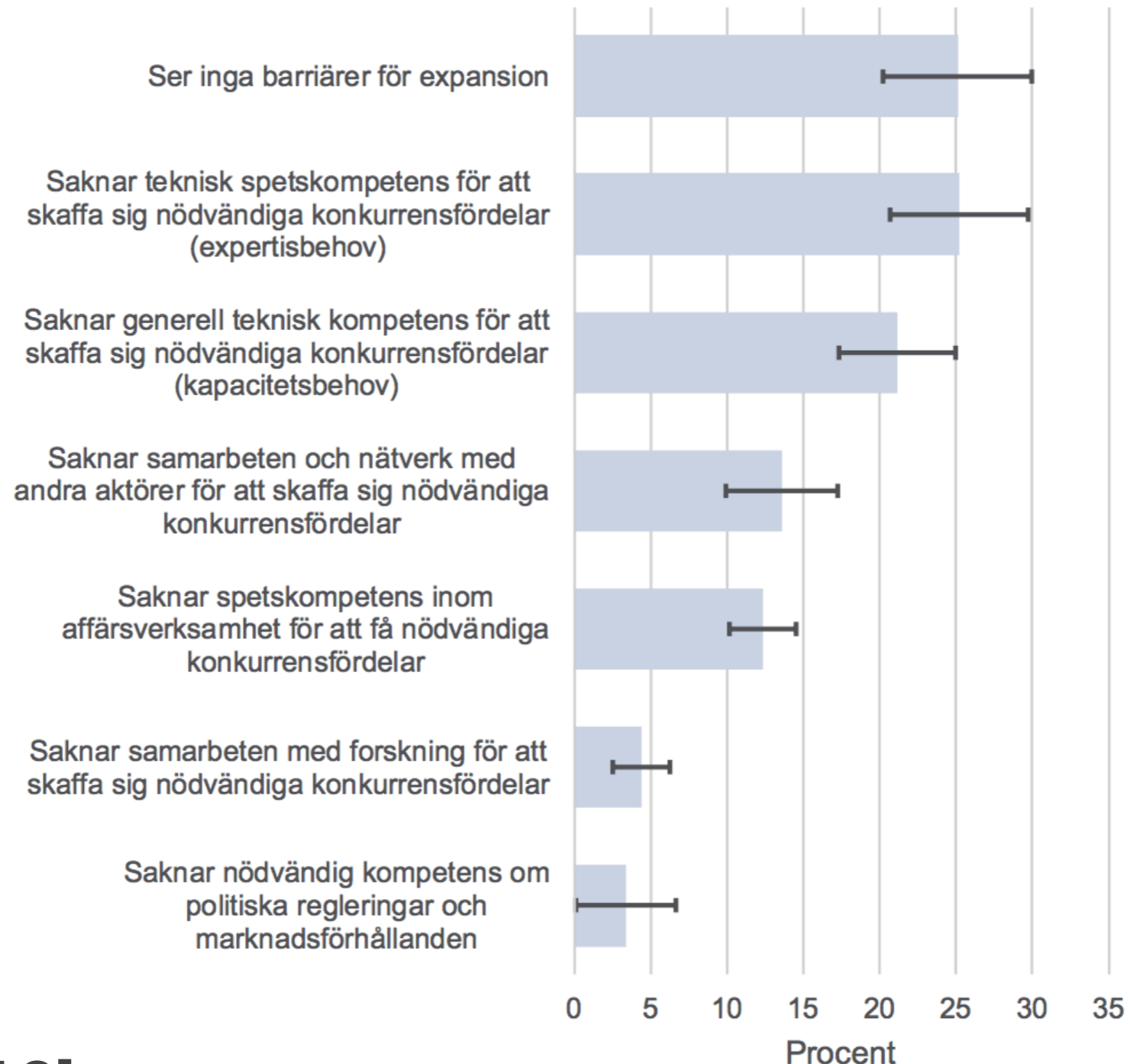
Focus as much on relation and humans aspects as on technical, practical or process aspects.

Critical to achieve understanding of each other's realities; yes, different incentives but can handle/align.

Is IAC prioritised by companies?

12

Upplevda hinder för expansion



Conclusions

It is great and very important to get good Industry-Academia Collaboration going

Large literature on how to make it work in SE; much of it based on Swedish experiences

Literature focuses on processes and practices not on the “soft” aspects, i.e. values, motivation, expectations

To develop long-term, mutually beneficial collaborations “soft” factors must be considered

Pic credits



[<http://www.lighting.philips.com/main/inspiration/co-creation>]

[<https://www.clomedia.com/2016/05/06/mentor-mentee-relationships-guide/>]

