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
@drafeldt
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!

Graph showing the number of publications with Sweden-based authors from 2008 to 2014.
Papers on Industry-Academia Collab (IAC):

Gorschek 2006: “A Model for Tech Transfer in Practice”
Ivarsson 2011: “Rigor and Relevance in Tech Evaluations”
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]
Industry-Academia Collaboration Stages (IACM)

Level 0. Gap or B.G.

1. Co-Existence
2. Interaction
3. Co-Creation

Success
Time
Trust

Chance of
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.
<table>
<thead>
<tr>
<th>#</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Collaboration</td>
<td>Employed by company</td>
</tr>
<tr>
<td>6</td>
<td>Collaboration</td>
<td>Office at company</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Recurrent visits</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Several visits</td>
</tr>
<tr>
<td>3</td>
<td>Exchange</td>
<td>Data collection</td>
</tr>
<tr>
<td>2</td>
<td>Visit</td>
<td>(One) Visit &amp; discussions</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Presentation</td>
</tr>
<tr>
<td>0</td>
<td>Contact</td>
<td>Initial</td>
</tr>
</tbody>
</table>

Modifiers:  
P Co-published  
A Co-applicant  
? Planned collab
## Collaboration with Industry

<table>
<thead>
<tr>
<th>#</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><img src="image" alt="ERI1.png" /></td>
<td><img src="image" alt="VOL1.png" /></td>
<td><img src="image" alt="LOGOยิง1.png" /></td>
<td><img src="image" alt="LOGO1111.png" /></td>
<td><img src="image" alt="LOGO1111.png" /></td>
<td><img src="image" alt="LOGO1111.png" /></td>
<td><img src="image" alt="LOGO1111.png" /></td>
<td><img src="image" alt="LOGO1111.png" /></td>
<td><img src="image" alt="LOGO1111.png" /></td>
<td><img src="image" alt="LOGO1111.png" /></td>
<td><img src="image" alt="ABB1.png" /></td>
</tr>
</tbody>
</table>

1. **ERI**
2. **VOL**
3. **WirelessCar**
4. **ABB**
5. **RUAG**
6. **DEKK**
7. **TEMA**
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?

Survey on perceived hindrances for expansion:

- 

- 

- 

- 

- 

- 

- 

- 

- 

[Swedsoft2018]
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/]