Industry and Academia: Why Practioners and Researchers are Disconnected.

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Abstract

The industrial world and the academic world have grown far apart. The distance between the worlds primarily originates from different goals and different means of support. This is a problem in the areas of systems engineering and multi-disciplinary design. These areas are relatively young, providing lots of opportunity for research. Education in this area is scarce. Publications are tangible examples of the gap between the two worlds.

In this paper we discuss the needs of both communities with respect to publications, education, and research. The mutual understanding of each other’s needs may help to bridge the gap between academics and industry.
Practitioners and Researchers are Disconnected

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- time pressure
- pragmatics
- cost constraints
- lots of people
- products
- sales

reflection
evidence
exposure
education
From Mono-Disciplinary to System Design

- Evolvability
- Robustness
- Cost
- Performance
- Reliability

Multi-objective design methods

- Performance and resource prediction
- Single aspect design method

Hybrid methods

HW/SW codesign

Legend:
- Well defined
- Rather soft
- Well defined but soft

Mechanical Engineering
Electrical Engineering
Software Engineering

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The Gap-Size is Multiple Orders of Magnitude

- somewhat covered
- well covered
- gap
- system
- multi-disciplinary
- mono-disciplinary
- scientific foundation
- monodisciplinary methods
- design decisions
- system requirements
- number of details

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Industrial Criteria for Articles

- Valuable
- Useful
- Subject
- Industrial relevance of subject
- Goal, solution oriented
- How to
- Practical
- Broad
- Integral
- Other contributors are reviewers
- Single author
- Clear responsibility
- Pointers to related relevant information
- Clear description
- Juicy description
- Understandable
- Lots of signal, very low noise level

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Academic Criteria for Articles

- New original
- Deep
- Including reviewers
- More context information
- Competitors
- Self citations are not-done
- Blocks broadly interested scientists in development
- Strong cultural filter in scientific magazines and conferences

**subject**
- Scientific relevance of subject
- Knowledge oriented
- Why, what
- Pointers to related scientific work

**new original**
- All contributors are authors
- Pointers to related scientific work

**deep**
- Clear argumentation
- Every statement is supported by reference, verifiable facts
- Correct language
- Clear positioning, well linked in with existing scientific work

**blocks broadly interested scientists in development**
Economic Viewpoint on Publications

Industry:
+ writing and reading publications is a cost
+ publications are useful for PR

Academics:
+ number of publications and citations determines standing and funding

limits change of research area, because you have to rebuild a reputation and to bootstrap background know how
### Comparing the Industrial and Academical Viewpoints

<table>
<thead>
<tr>
<th></th>
<th>industrial</th>
<th>academical</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>relevance</strong></td>
<td>useful, valuable</td>
<td>new, original</td>
</tr>
<tr>
<td><strong>orientation</strong></td>
<td>goal, solution</td>
<td>knowledge</td>
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<tr>
<td><strong>content</strong></td>
<td>practical, how to</td>
<td>theoretical, why, what</td>
</tr>
<tr>
<td><strong>style</strong></td>
<td>clear, understandable</td>
<td>clear argumentation, juicy, low noise no loose statements</td>
</tr>
<tr>
<td><strong>references</strong></td>
<td>service to the reader</td>
<td>positioning in existing science</td>
</tr>
<tr>
<td><strong>author</strong></td>
<td>single author</td>
<td>all contributors as author</td>
</tr>
<tr>
<td><strong>economic driver</strong></td>
<td>writing and reading = cost public relation vs IPR and confidentiality</td>
<td>funding based on number of publications and citations</td>
</tr>
</tbody>
</table>
Value of publications shared by both worlds

writing facilitates overview and understanding
writing milestones help to focus on results
stops endless wandering
Consequences

Different publications needed for industry and academics

some re-use via copy/paste

But how to share information between the worlds?

And how to cross fertilize, how to get inspiration from the other world?

Industry: how to outsource education to academic community?

Academics: how to enter the unknown area?
The Embedded Systems Institute (ESI) solution:
collaborative research;
seeding for long term (10-15 years) renewed respect