Industry and Academia: Why Practioners and Researchers are Disconnected.

by Gerrit Muller University of South-Eastern Norway-NISE

e-mail: gaudisite@gmail.com

www.gaudisite.nl

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

- Industry
- Academics
- Time pressure
- Cost constraints
- Pragmatics
- Products
- Sales
- Lots of people
- Reflection
- Evidence
- Exposure
- Education
- Gap
From Mono-Disciplinary to System

- Mono-disciplinary design
- Multi-disciplinary design
- System evolvability
- Process organization, people
- Robustness
- Cost
- Performance
- Reliability
- Multi-objective design methods
- Performance and resource prediction
- Multi-objective design methods
- Single aspect design method
- Hybrid methods
- HW/SW co-design

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

- \(10^0\)
- \(10^1\)
- \(10^2\)
- \(10^3\)
- \(10^4\)
- \(10^5\)
- \(10^6\)
- \(10^7\)
- \(10^8\)

number of details

- system requirements
- design decisions
- monodisciplinary methods
- scientific foundation

somewhat covered

well covered

gap

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Method Interest is Shared

academic interest:
why
what

argumentation
positioning

is
supported by

tool
representation
reference

industrial interest:
how

recipe

is
supported by

tool
representation
template

support

is
elaborated in

founded upon

principle
drives

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GIAbstractionHierarchy
Industrial Criteria for Articles

- valuable
- useful
- subject
- industrial relevance of subject
- goal, solution oriented
- how to practical
- 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

more context information

broader
integral
practical

more detailed information

alternative

GIAindustrialCriteria
Academic Criteria for Articles

- subject
- scientific relevance of subject
- knowledge oriented
- why, what
- pointers to related scientific work
- clear argumentation
- every statement is supported by reference, verifiable facts
- correct language
- clear positioning, well linked in with existing scientific work
- strong cultural filter in scientific magazines and conferences
- new original
- deep
- including reviewers
- more context information
- used existing science
- competitors
- self citations are not-done
- blocks broadly interested scientists in development
- all contributors are authors including reviewers
- Industry and Academia: Why Practioners and Researchers are Disconnected.

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

tension with Intellectual Property Rights (IPR), confidentiality

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

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