INF FAKULTÄT FÜR INFORMATIK

A Survey and Comparison of Industrial and Academic Research on the Evolution of Software Product Lines

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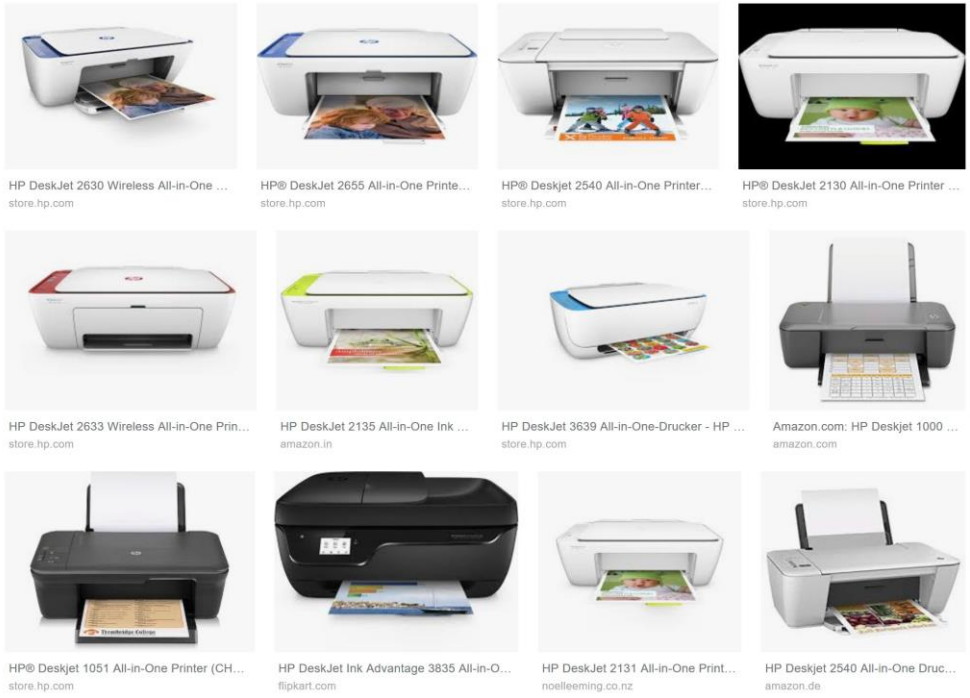
Student Conference 2019

Background

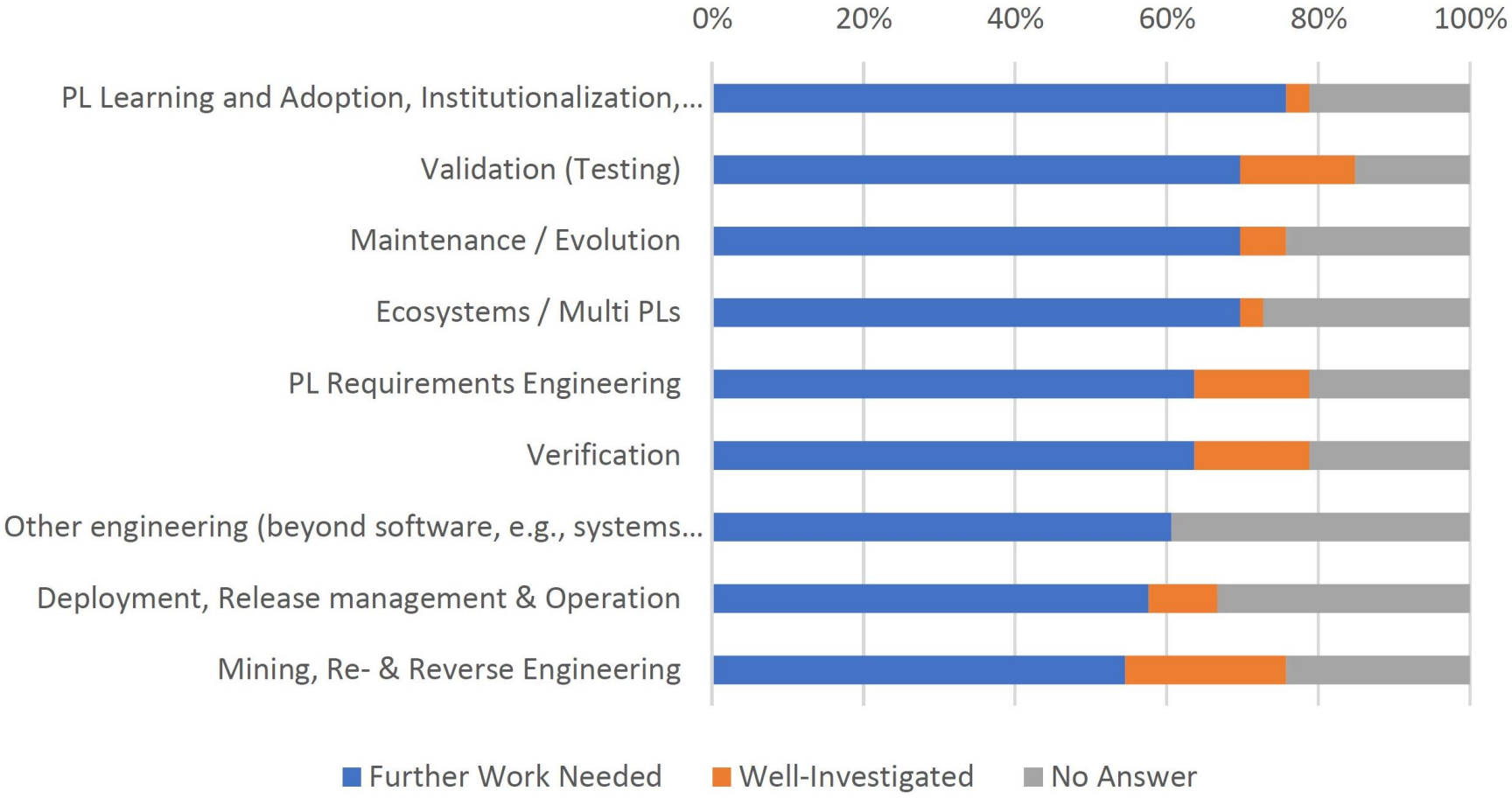
- *Software Product Lines …*
  - allow systematic reuse of software artifacts for customizable and highly-configurable software
    → **mass customization of software**

Background

- *Software Product Lines …*
  - are widely employed in embedded systems
    to satisfy diverse hardware requirements
    → **reduced development costs, faster time-to-market**
  - **BUT:**
    - increased initial investme
    - testability?
    - **maintainability?**



Motivation



Top 10 of 27 research interests among 33 SPL researchers and practitioners as of 2018

Rick Rabiser, Martin Becker, Goetz Botterweck, Matthias Galster, Iris Groher, Klaus Schmid, and Danny Weyns. 2018. Survey for Understanding the Interests of the SPL Community and the Relation of Industry and Academia.

Contribution

- **survey and discussion** of papers on SPL evolution
- comparison of works from **academia and industry**
- **future directions** for research on SPL evolution

} in this presentation

Basic Terms

- **Software maintenance**:
  "modification of a software product **after delivery** to correct faults, to improve performance or other attributes" IEEE Standard 1219
- **Software evolution**:
  closely related to maintenance, but also includes **major changes** (e.g., new functionality)

Basic Terms

- **SPL maintenance**:
  "modification of a software product **after delivery** to correct faults, to improve performance or other attributes" IEEE Standard 1219
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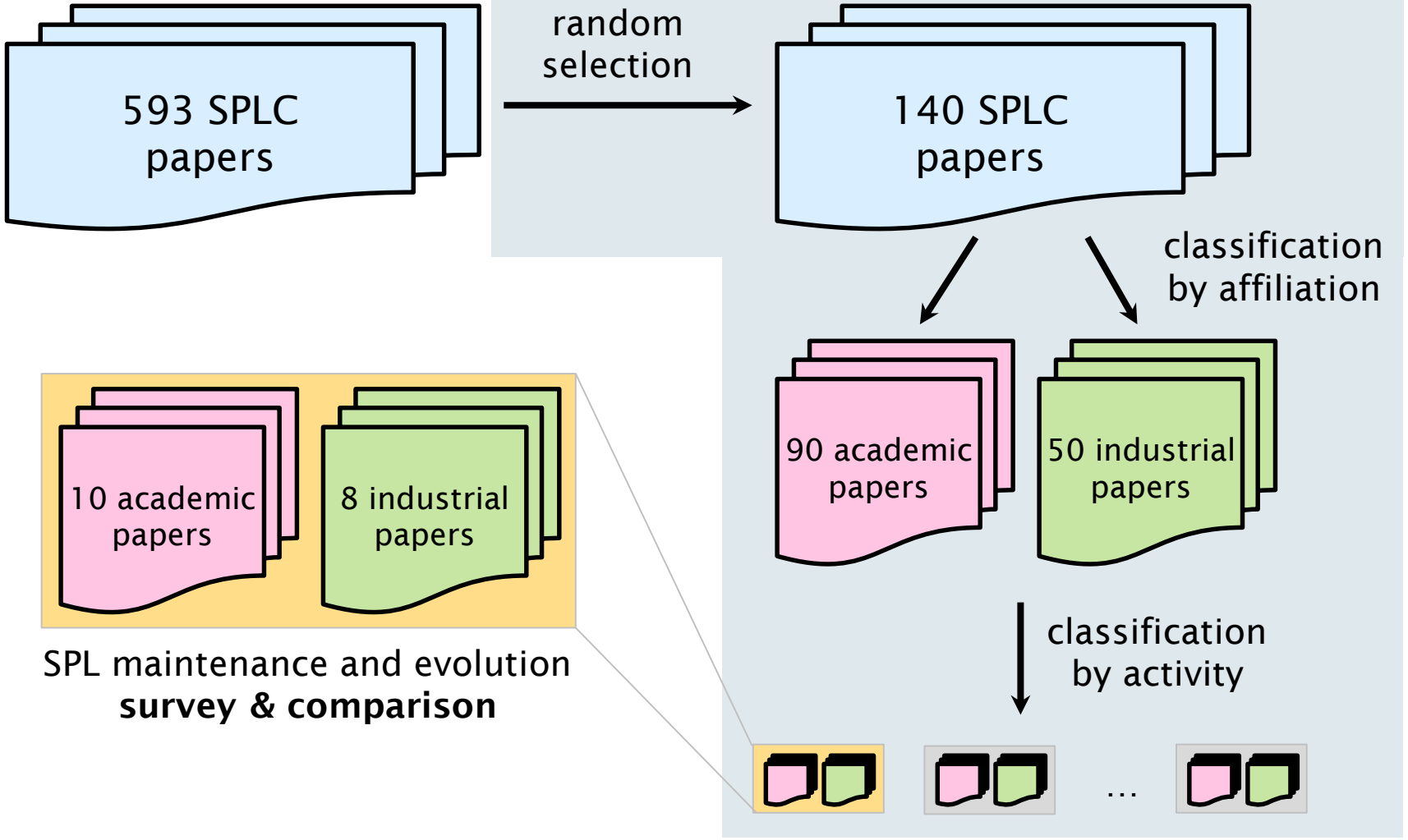
  closely related to maintenance, but also includes **major changes** (e.g., new functionality)

Methodology

Rick Rabiser, Klaus Schmid, Martin Becker, Goetz Botterweck, Matthias Galster, Iris Groher, and Danny Weyns. 2018. A Study and Comparison of Industrial vs. Academic Software Product Line Research Published at SPLC. 14–24.



Results

Academia

Year	Authors
1998	Weiderman et al.
2001	Svahnberg and Mattson
2008	Dhungana et al.
2012	Seidl and Heidenreich
2012	de Oliveira et al.
2012	Rubin et al.
2013	Linsbauer et al.
2014	Quinton et al.
2015	Teixeira et al.
2016	Sampaio et al.

focus on **concepts**, methods, and technical advancements, e.g.

- evolution operators
- change impact analyses

vs. Industry

Year	Authors
2000	Dager
2001	van Ommering
2002	van der Linden
2003	Karhinen et al.
2009	Pech et al.
2011	Vierhauser et al.
2012	Martini et al.
2013	Zhang et al.

focus on **economic/organizational** constraints and human factors, e.g.

- communication
- knowledge management

Academia

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purely academic collaboration

vs. Industry

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purely industrial collaboration

the binary classification into *academia/industry* is not accurate

→ collaboration is happening!

Key Insights

successful SPL evolution requires **organizational changes**
→ in particular w.r.t. communication and knowledge management

the industry demands **stability** and **support guarantees**
→ change impact analyses / safe evolution are not adopted yet

researchers call for more publicly available **industrial case studies**
→ few long-term, empirical studies on SPL evolution

SPL erosion is a known, but rarely investigated problem
→ research dismisses removal of variability, which leads to erosion

advanced tooling leads to acceleration of code size and variability
→ may promote erosion, consider carefully

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