On the UML use in the Brazilian industry: A state of the practice survey

Kleinner Farias[1], Lucian Gonçales[1], Vinicius Bischoff[1], **Bruno C. da Silva[2]**, Everton Guimarães[3], and Jacob Niggle[2].

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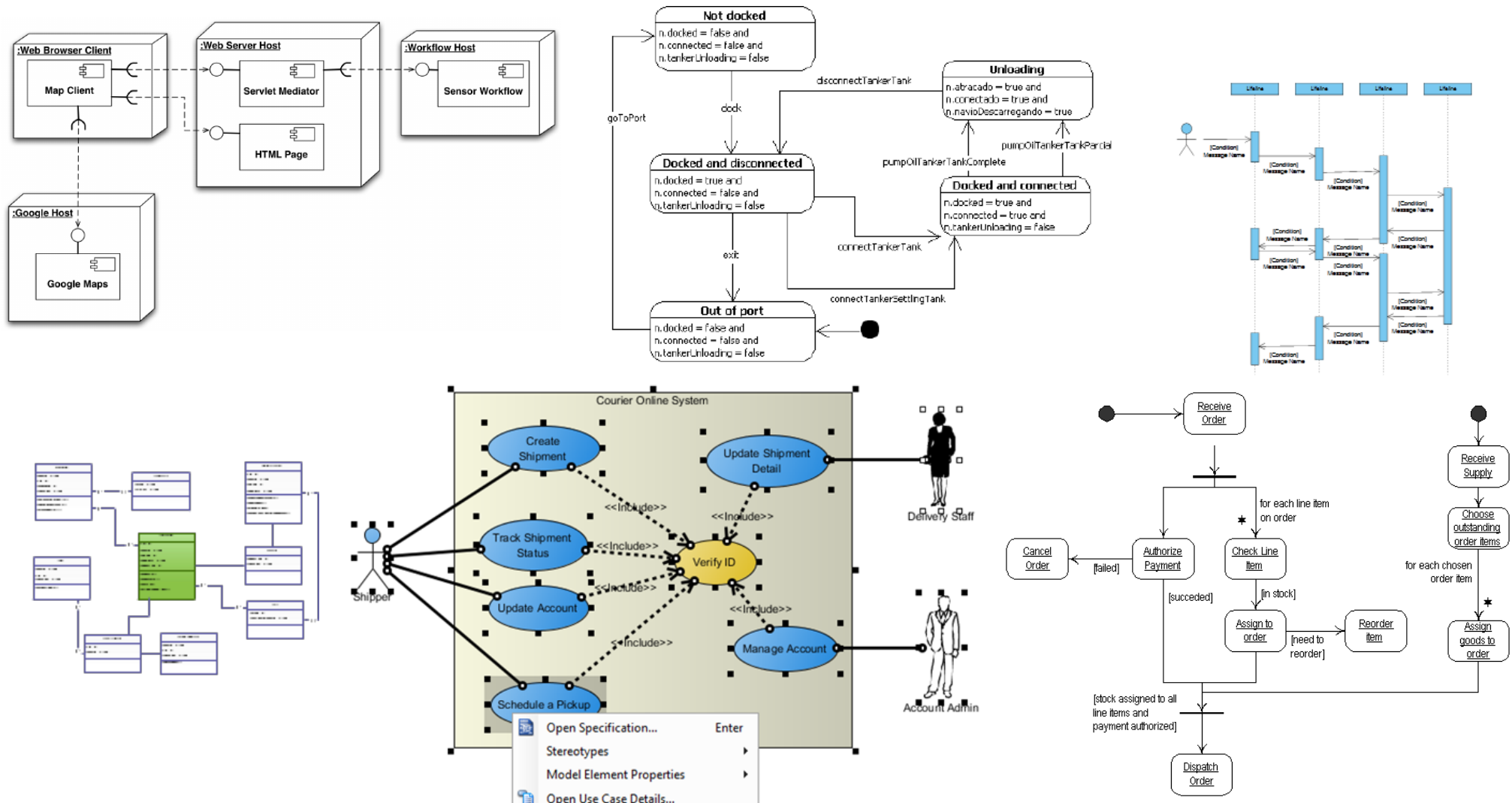[3]Departament of Computer Science, Drexel University

Outline

- Context
- Objective
- Research Questions
- Experimental Process
- Evaluation Scenarios
- Results
- Conclusion
- Future Works
- References

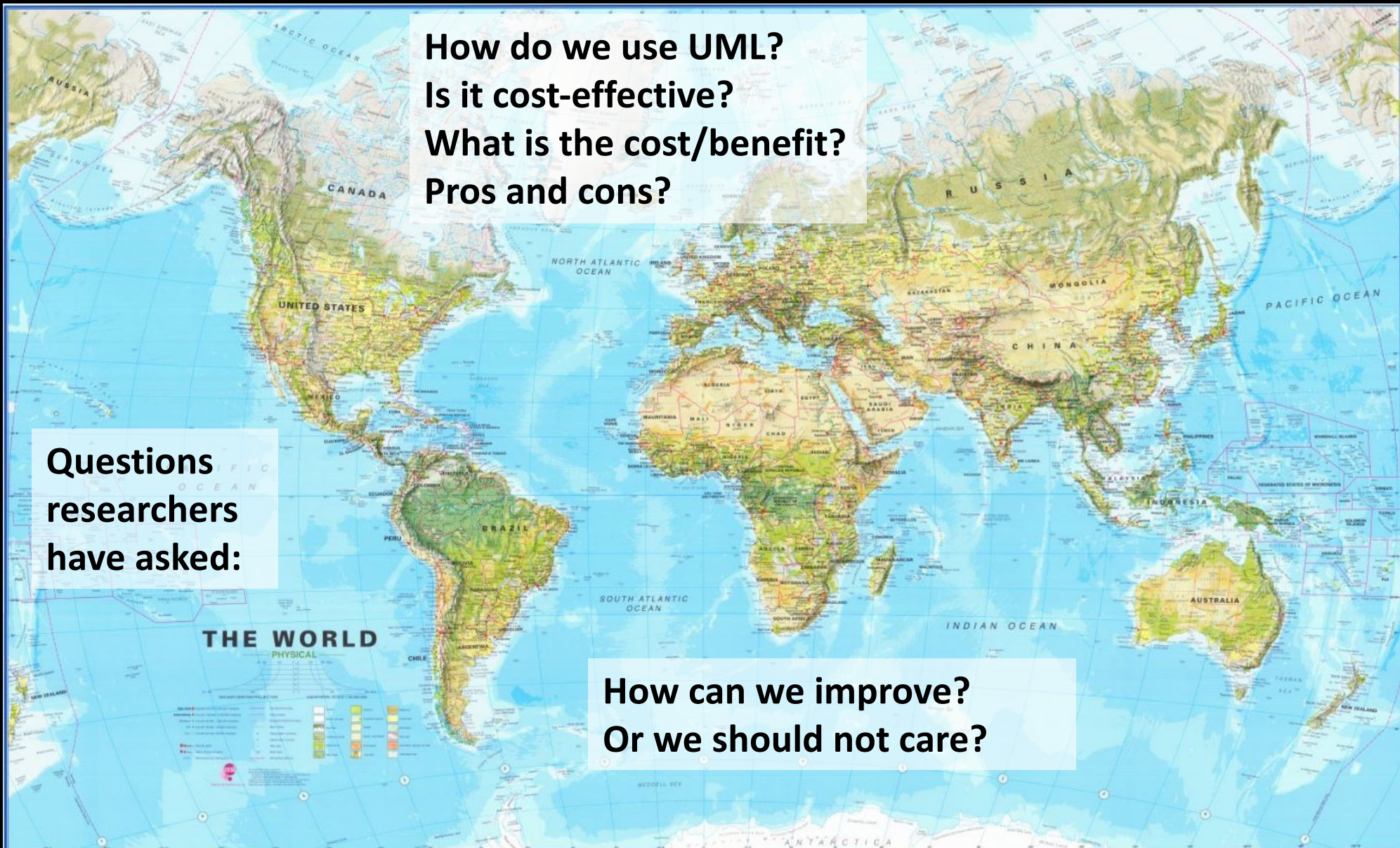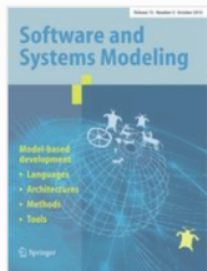UNIFIED MODELING LANGUAGE ™

Context

Context

- Unified Model Language (UML)
  - Graphical representations to denote diverse aspects of software
    - States, activities, components, objects, and classes

- UML is widely adopted on Industry
  - Is considered by many the *de facto* standard for software modeling

- The Use of UML in practice is a topic of interest of researchers on software engineering

- Several studies investigate the practice of UML in industry

How do we use UML?
Is it cost-effective?
What is the cost/benefit?
Pros and cons?

Questions
researchers
have asked:

How can we improve?
Or we should not care?

Recent research findings:

High cost of keeping models synchronized and consistent.

Software & Systems Modeling

October 2014, Volume 13, Issue 4, pp 1225–1235 | Cite as

"No shit" or "Oh, shit!": responses to observations on the use of UML in professional practice
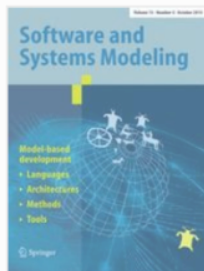
Authors   Authors and affiliations

Marian Petre   1   1.   Centre for Research in Computing, The Open University, Milton Keynes, UK
✉ Email author

Recent research findings:

Great part of developers make a selective use of UML
    i.e. they use UML in a informal and personal way for
    as long it is considered useful;
    Models are usually discarded after their conception

Software and Systems Modeling

Software & Systems Modeling
October 2014, Volume 13, Issue 4, pp 1225–1235 | Cite as

"No shit" or "Oh, shit!": responses to observations on the use of UML in professional practice

Authors   Authors and affiliations

Marian Petre   1
Email author   1.   Centre for Research in Computing, The Open University, Milton Keynes, UK

Recent research findings:

> **Design models are not used very extensively in industry.**
> **UML is used with minimal tool support.**
> **The notation is not necessarily UML.**

Journal of Systems and Software

Volume 95, September 2014, Pages 176-193

On the use of software design models in software development practice: An empirical investigation

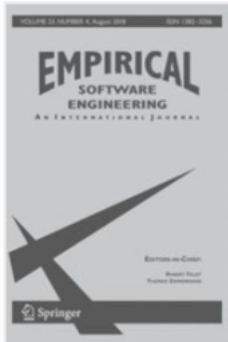Tony Gorschek [a], Ewan Tempero [b], Lefteris Angelis [c]

[a] Blekinge Institute of Technology, Karlskrona, Sweden
[b] University of Auckland, Auckland, New Zealand
[c] Aristotle University of Thessaloniki, Thessaloniki, Greece

Recent research findings:

UML benefits collaboration and communication (especially within teams geographically distributed).

Empirical Software Engineering
pp 1–65 | Cite as

An industrial case study on the use of UML in software maintenance and its perceived benefits and hurdles

Authors   Authors and affiliations

Ana M. Fernández-Sáez ✉ , Michel R. V. Chaudron, Marcela Genero

Recent research findings:

There is a possible association between cultural differences and modeling usage, which was considered worth exploring in the future.

How are Conceptual Models used in Industrial Software Development?: A Descriptive Survey

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Author: Harald Störrle QAware GmbH, Aschauer, München, Germany

Published in:

· Proceeding
EASE'17 Proceedings of the 21st International Conference on Evaluation and Assessment in Software Engineering
Pages 160-169

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ACM New York, NY, USA ©2017
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doi> 10.1145/3084226.3084256

2017 Article
Tutorial
Research
Refereed limited

Bibliometrics

· Citation Count: 0
· Downloads (cumulative): 64
· Downloads (12 Months): 64
· Downloads (6 Weeks): 5

Gaps in Related Work:

- Most of them did not target UML practice specifically on industrial closed source projects.
    - Or they were restricted to participants from a single company.
- They did not focus on:
    - Analyzing whether or not the type of participants' organization affects UML use.
    - A particular geographic region.

Our focus:

Software engineers who work in industrial closed source projects.

Assess the UML practice in a

particular geographic region.

- *Do previous findings hold?*
- *Or do they vary?*

Goals

- **G1:** understand the diffusion and relevance of UML use in the Brazilian companies;
- **G2:** identify improvement points to increase the UML adoption in real-world projects.
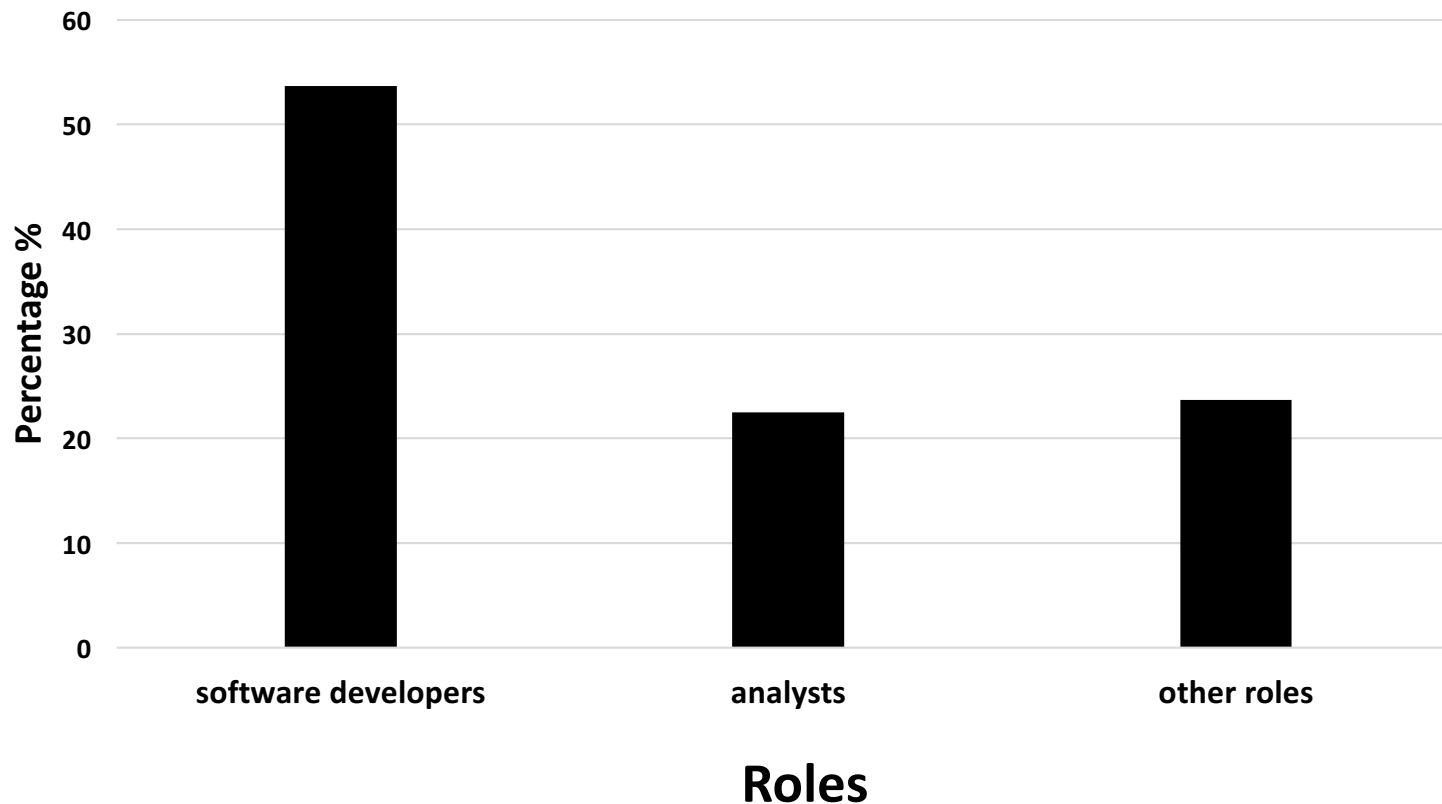
Research Questions

- **RQ1:** How frequent do software engineers use UML in practice?

- **RQ2:** Is UML the "lingua franca" for software modeling?

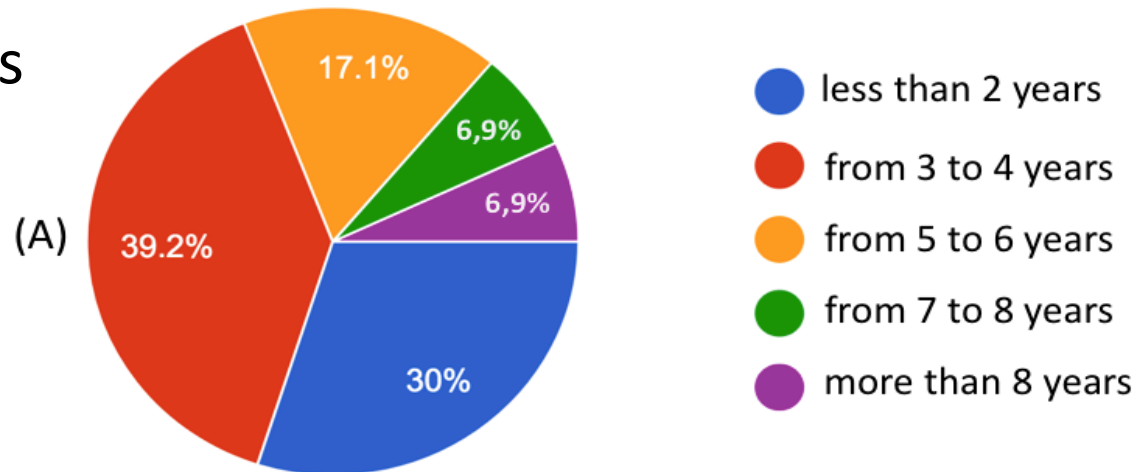- **RQ3:** What improvement points may increase the UML use?

Participant Demographics

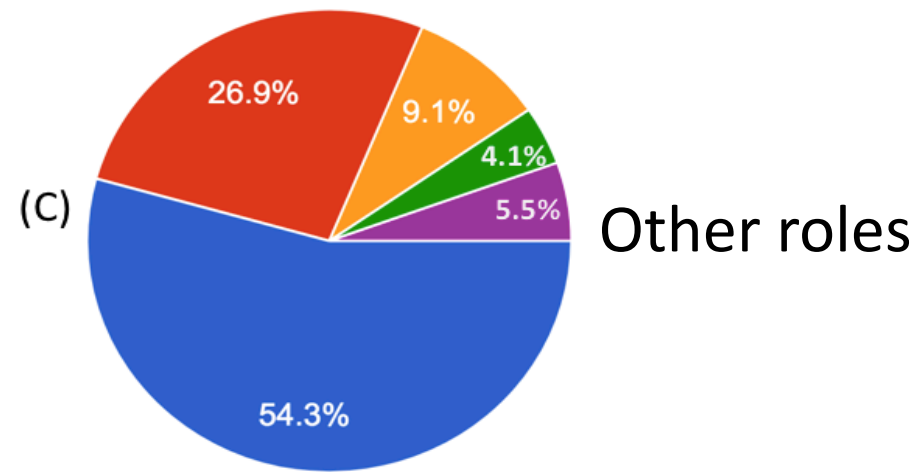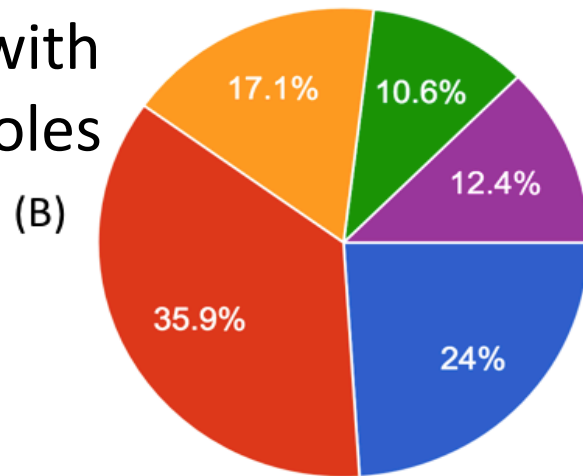- A total of **222 participants** from **140 different companies** in Brazil;

Participant Demographics: Experience

Developers

(A) 39.2% 17.1% 6,9% 6,9% 30%

less than 2 years
from 3 to 4 years
from 5 to 6 years
from 7 to 8 years
more than 8 years

Engineers with modeling roles

(B) 17.1% 10.6% 12.4% 35.9% 24%

(C) 26.9% 9.1% 4.1% 5.5% 54.3%

Other roles

RQ1: How frequent do software engineers use UML in practice?

Survey question:

"Do you use UML in the projects you've been involved with?"

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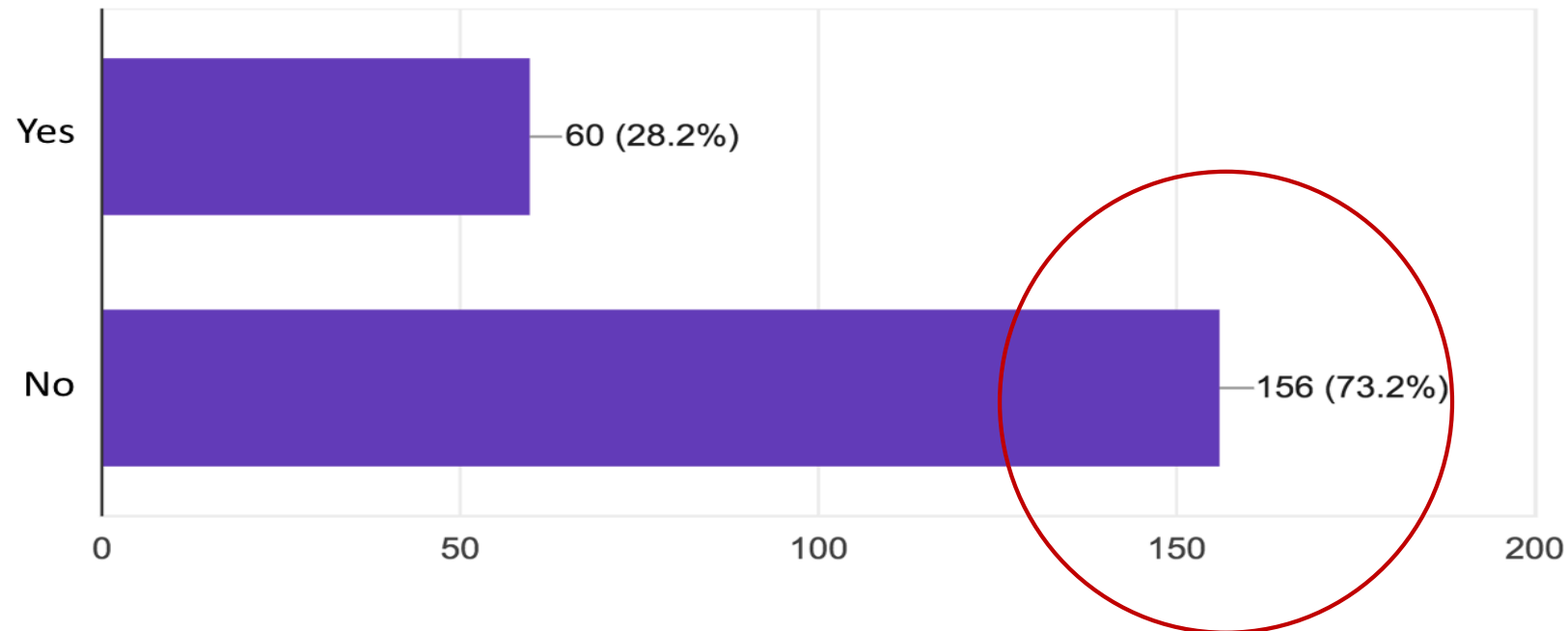
RQ1: How frequent do software engineers use UML in practice?

A sample of 113 participants from 222 was extracted to **evaluate statistically if the UML usage** could be **influenced by the type of the company (software factory or not)**

	Software Factory	Not a Software Factory	Total
Use UML	19	17	36
Do not use UML	38	39	77
Total	57	56	113
	50.4%	49.6%	100%

Statistical tests show that there is no relation between using or not using UML and whether the company is a software factory or not.
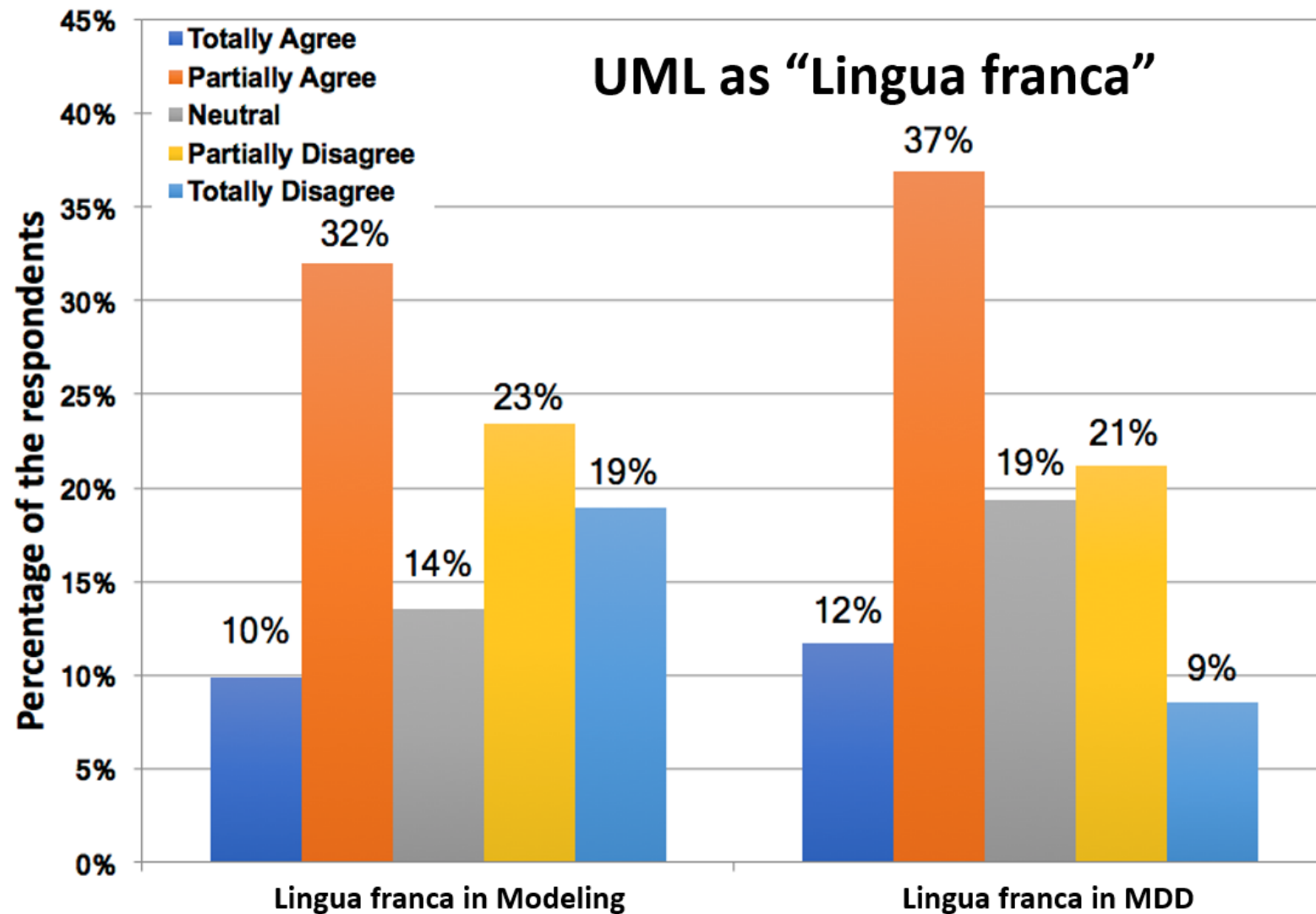
RQ1: How frequent do software engineers use UML in practice?

Conclusion #1:

- *UML is not used very often in the work life of participants.*

- *No relationship was identified between the use of UML and whether or not participants' company is a software factory.*
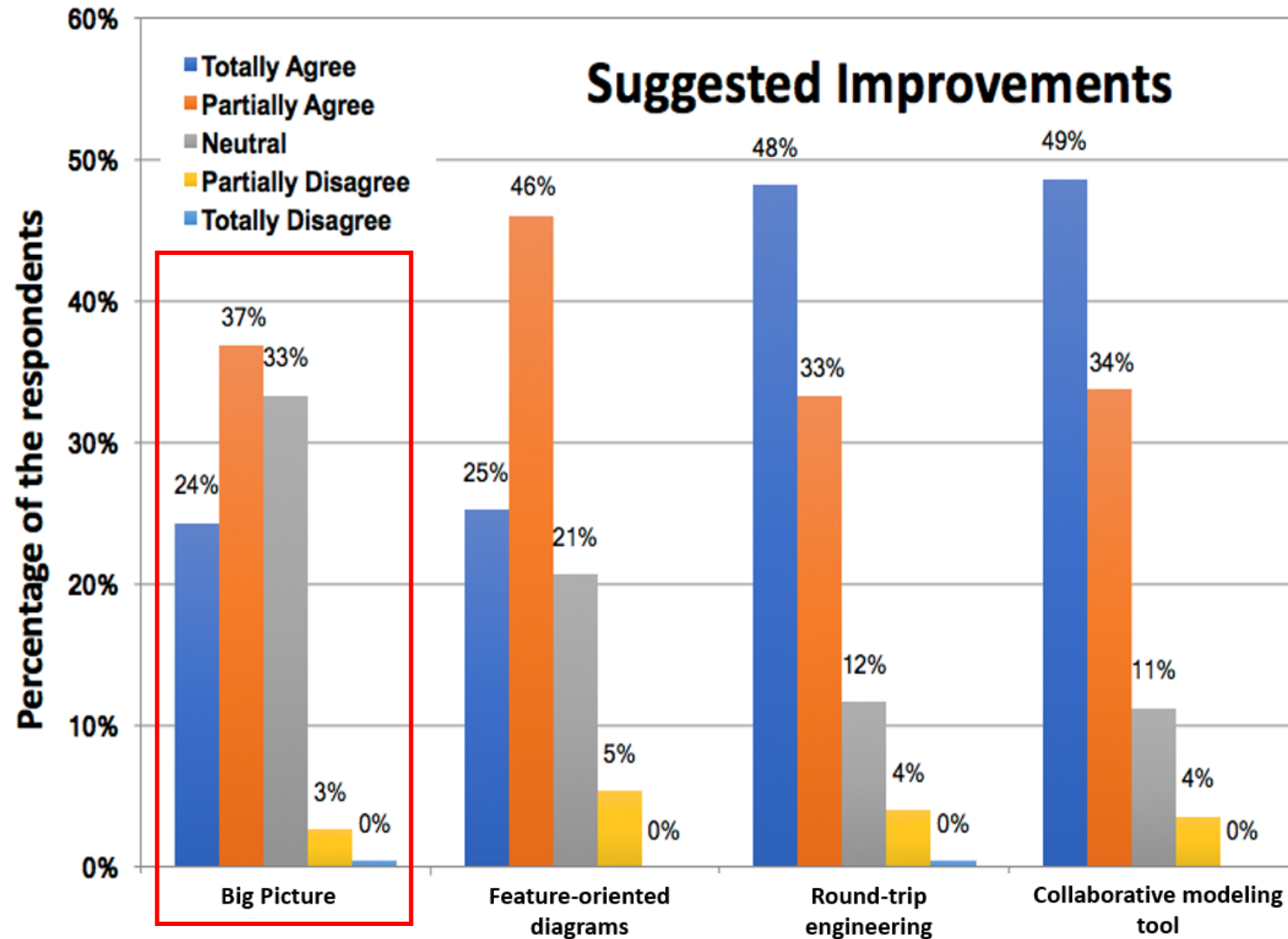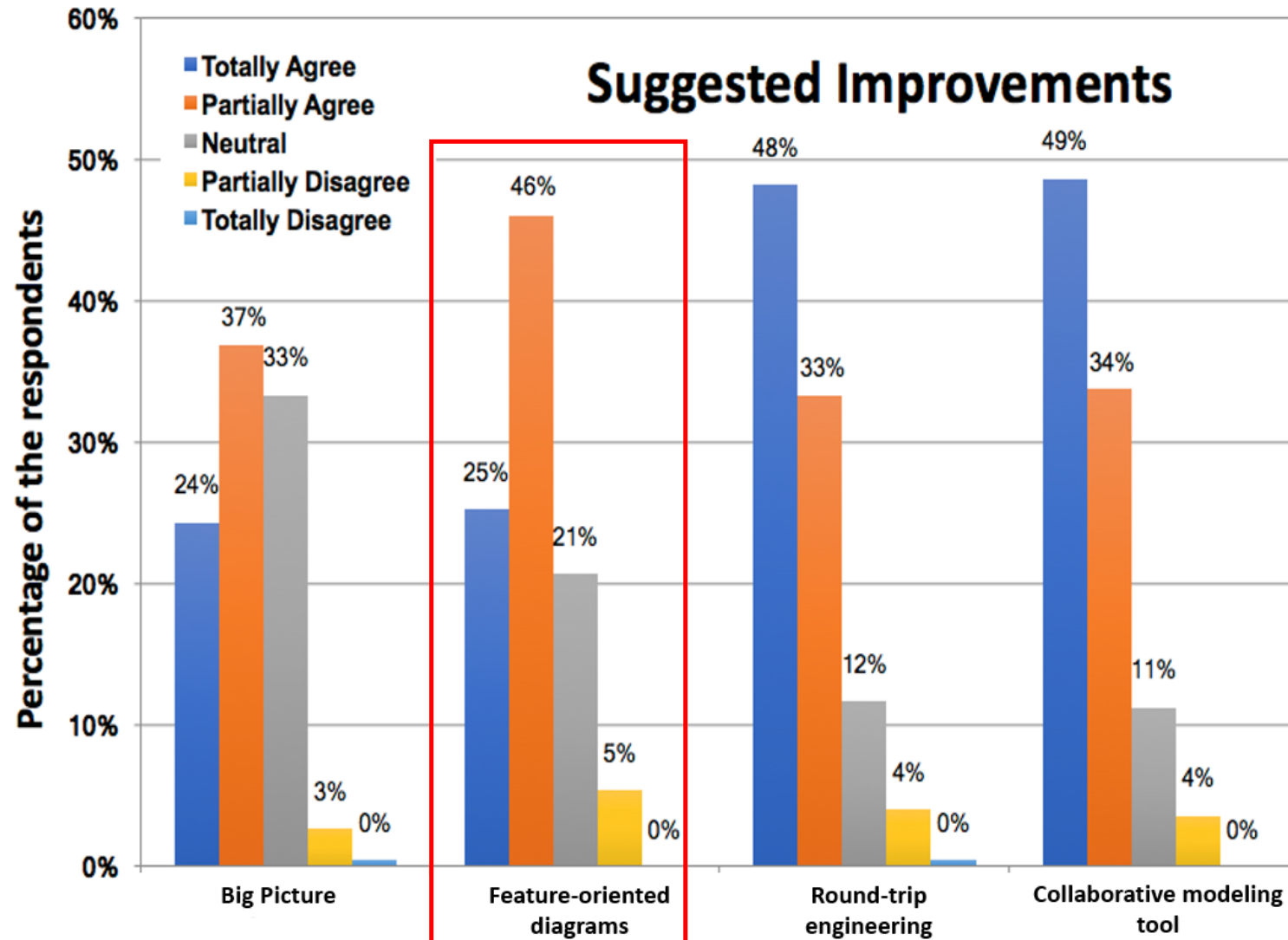
RQ2: UML as "Lingua franca"?

UML as "Lingua franca"

RQ2: UML as "Lingua franca"?

Conclusion #2: *Participants are relatively divided in this regard. There is no agreement or consensus.*

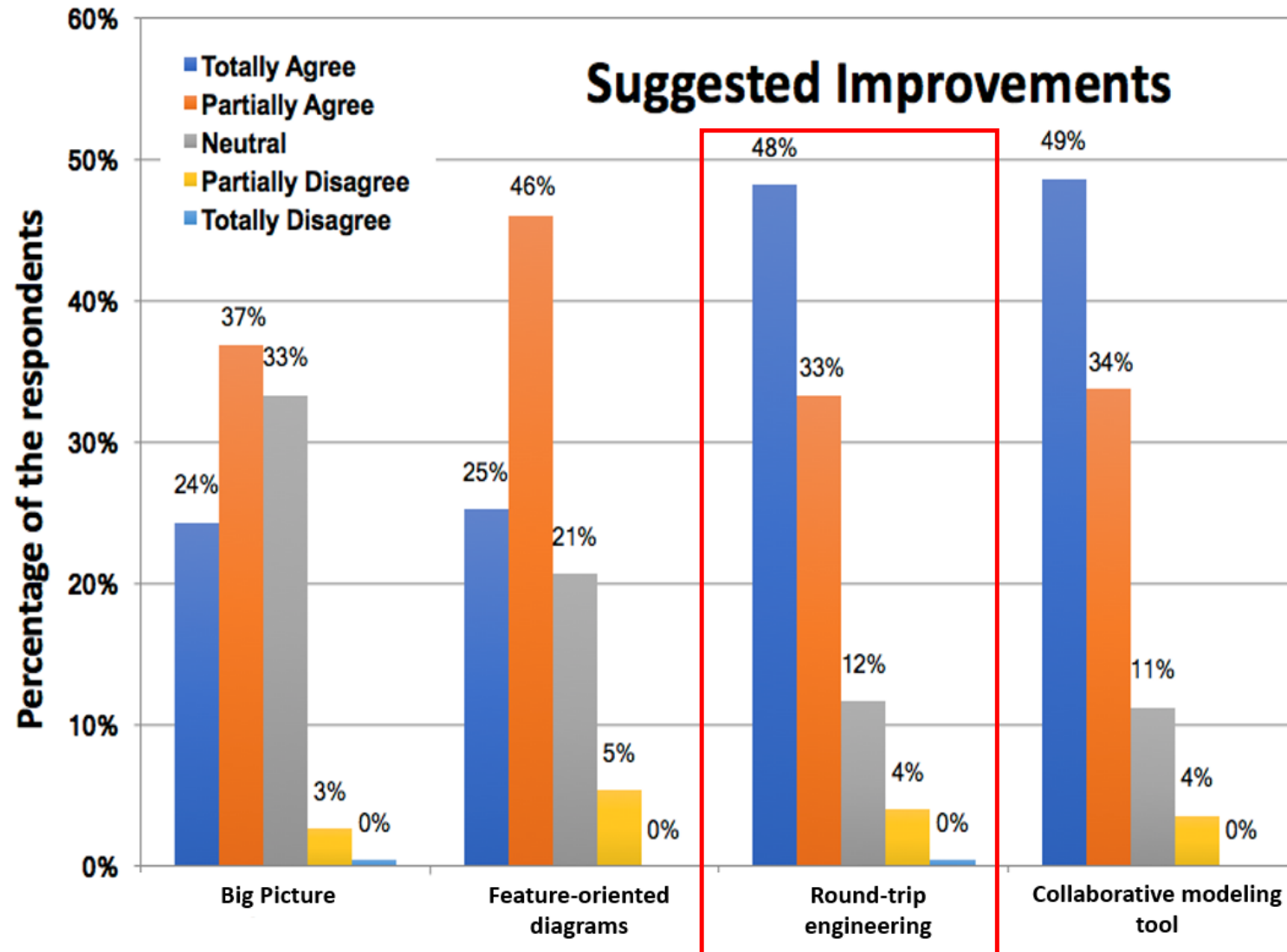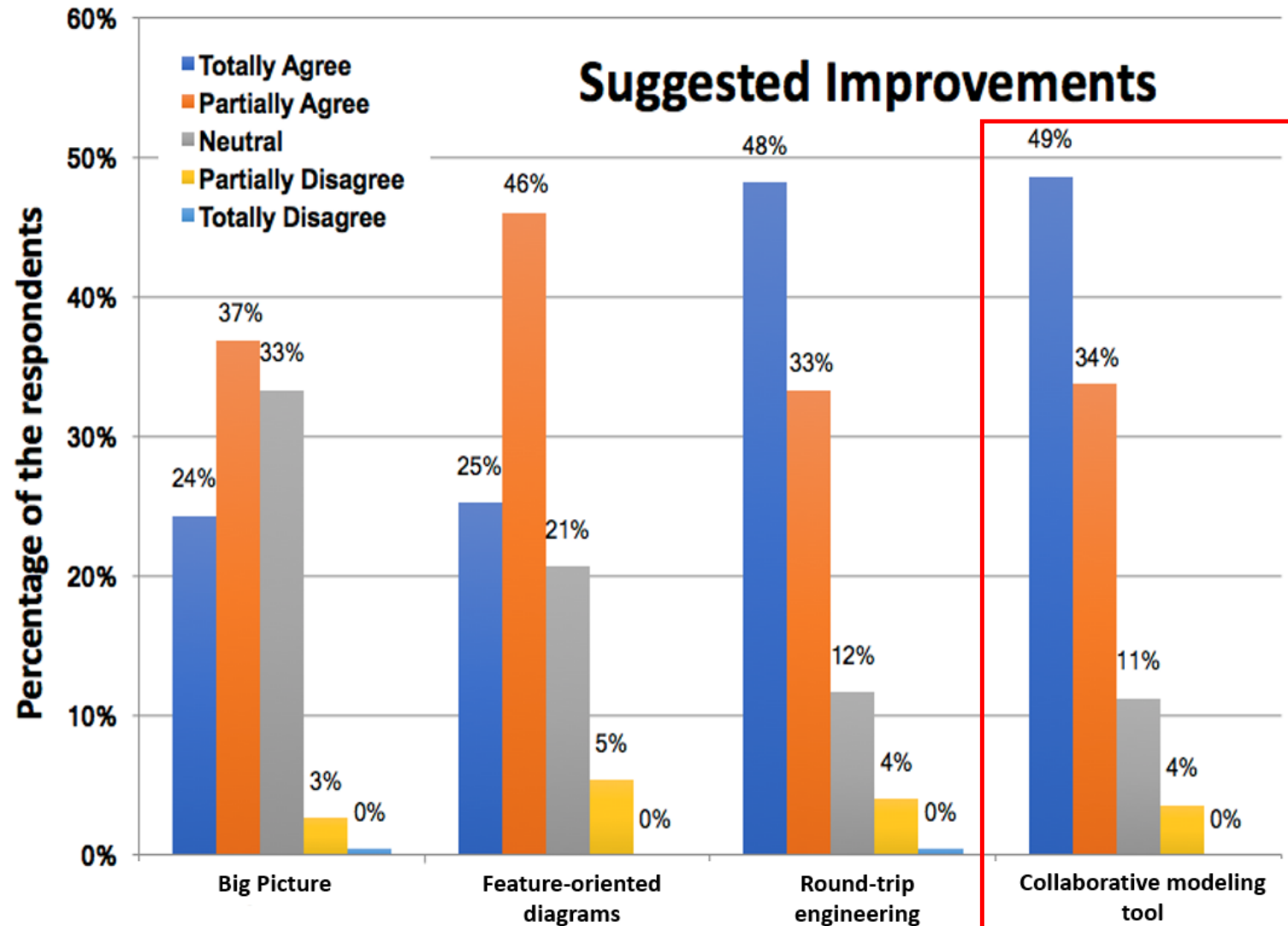# RQ3: Improvement points to support UML use

Suggested Improvements

RQ3: Improvement points to support UML use

RQ3: Improvement points to support UML use

RQ3: Improvement points to support UML use

RQ3: Improvement points to support UML use

Conclusion #3:

- *The ability to automatically create a "Big Picture" view of the system under development;*

- *Provide diagrams/views filtered by system features;*

- *Support more effectively:*
  - *round-trip engineering; and*
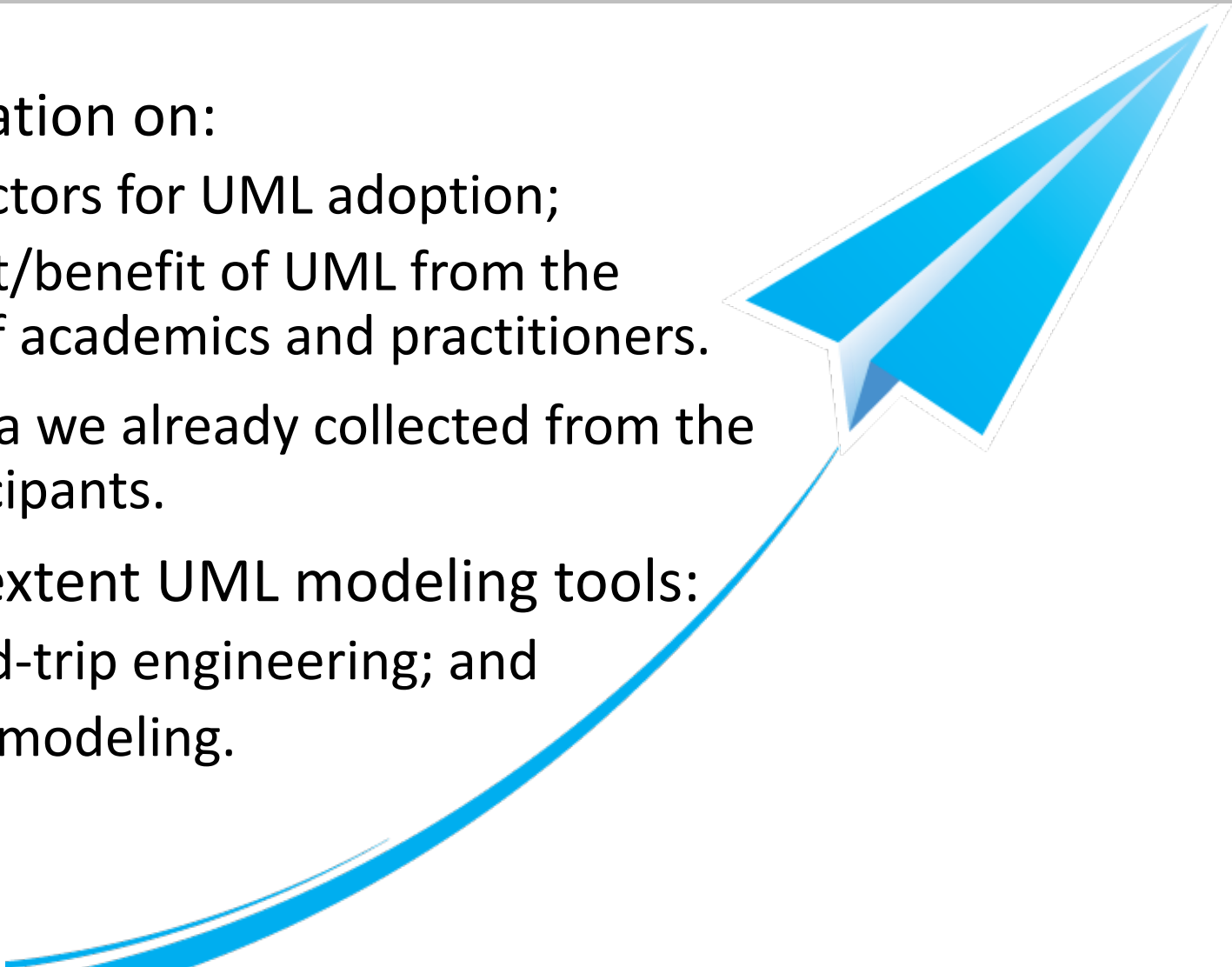 - *modeling collaboration.*

Final Remarks

- This work sought to find evidence of how UML is used in practice focused on:
  - Particular geographic region (Brazil);
  - Practitioners who work on closed source projects.

- In total, 222 participants from 140 IT companies.

Final Remarks

- Overall, our results show that UML use has not varied much by region.

- In our context:
    - The majority have not used UML in their work life.
    - Everyone knows UML but they don't necessarily agree it is a "Lingua Franca" for software modeling.
    - The majority pointed out tool related improvements to boost UML use. Perhaps this requires changes in the language.

Future Work

- Further investigation on:
  - Motivating factors for UML adoption;
  - Perceived cost/benefit of UML from the perspective of academics and practitioners.
- Analyze more data we already collected from the same set of participants.
- Assess to what extent UML modeling tools:
  - Support round-trip engineering; and
  - Collaborative modeling.

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Redwood City - CA, USA, July 2nd 2018

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