

# Relevance, Benefits, and Problems of Software Modelling and Model Driven Techniques

A Survey in the Italian Industry

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A joint research conducted with F.Tomassetti (PoliTo), F.Ricca, A.Tiso, and G.Reggio (UniGe)

## Agenda

- Motivation
- Survey design
- Results
- Conclusions

# Motivation

- Claimed benefits of software Modelling and Model Driven techniques (MD\*) are improvements in:
  - productivity,
  - portability,
  - maintainability, and
  - interoperability.
- Though, few efforts at collecting *evidence*

# Goals

-  **G1** Assess the actual relevance of software modelling and MD\* in the Italian industry,
- G2** Find out the way modelling and MD\* are applied (i.e., which processes, languages and tools are used), and
-  **G3** Understand the motivations either leading to the adoption (expected benefits) or preventing it (experienced or perceived problems).

# Survey design

- Population
  - Italian software professionals
- Probabilistic Sampling
  - Commerce Chamber DB
- Convenience sampling
  - Industrial contact networks
  - Invitations on mailing lists
  - Advertisement in on-line magazine
  - Advertisement on page of large developers' conference

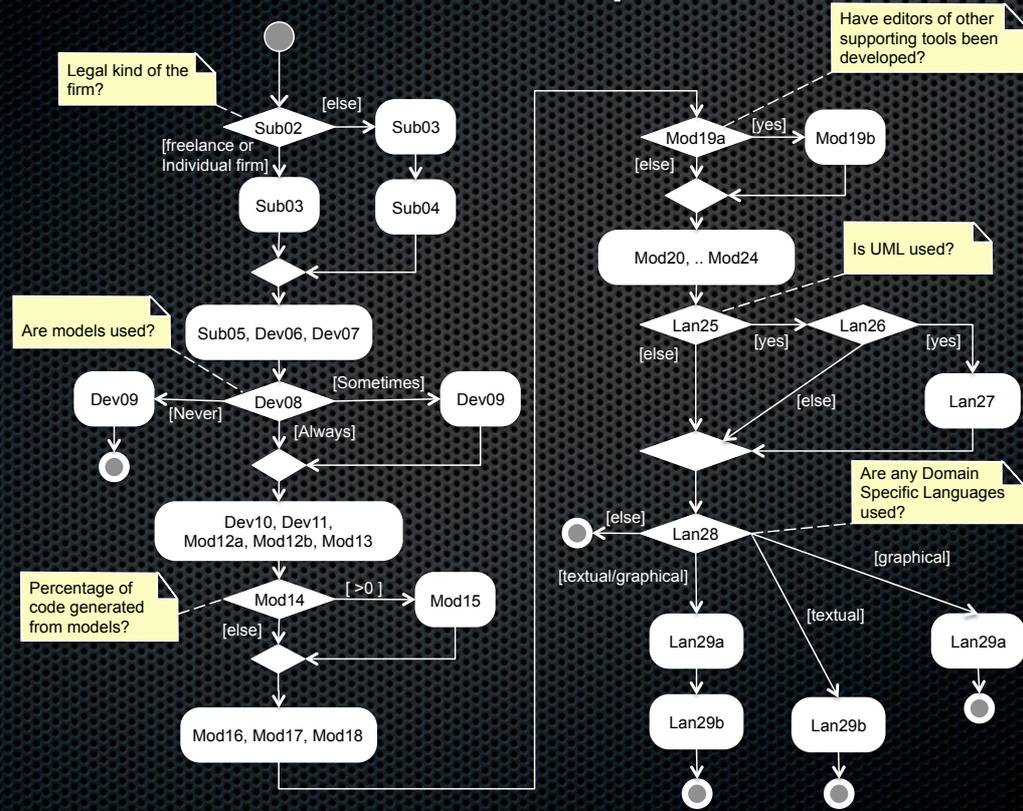


# Questionnaire

- Web-based questionnaire with Lime Survey
  - **Sub**: subject's demographics
  - **Dev**: development process
  - **Mod**: modelling details
  - **Lan**: languages and notations



# Questionnaire paths



# Research questions

**RQ1:** What is the diffusion and relevance of Modelling and MD\* in the Italian industry?

**RQ2:** What are the benefits of using Modelling and MD\*?

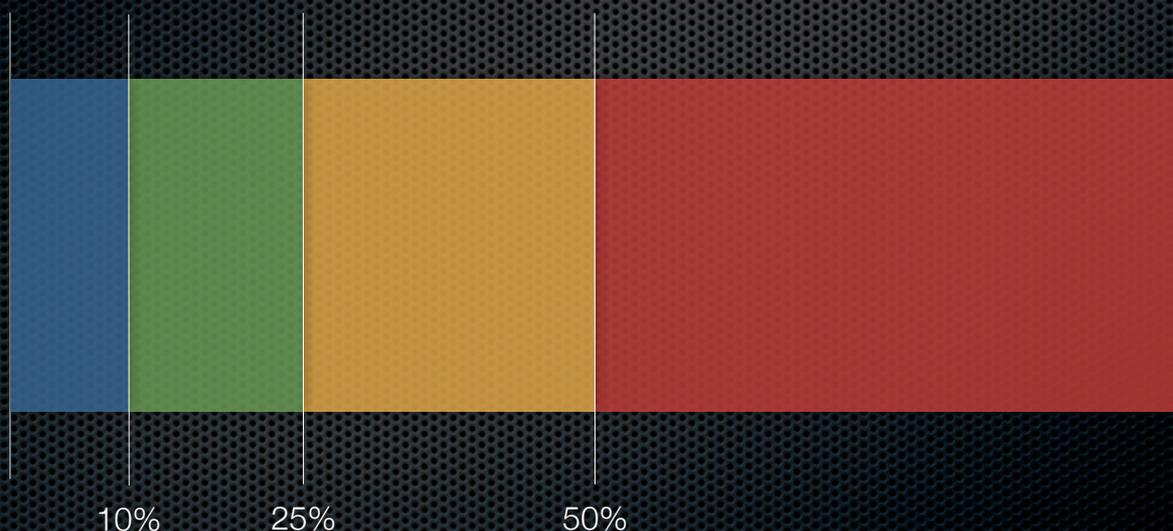
**RQ3:** What issues hinder/prevent the adoption of modelling and MD\*?

# Relevance

- A software development technology is relevant to software engineering if it increases the likelihood of improving software development practices
  - ~~Technical aspects~~
  - Process aspects ~ % of developers adopting it

# Relevance thresholds

■ Irrelevance ■ Limited Relevance ■ Normal Relevance ■ High Relevance

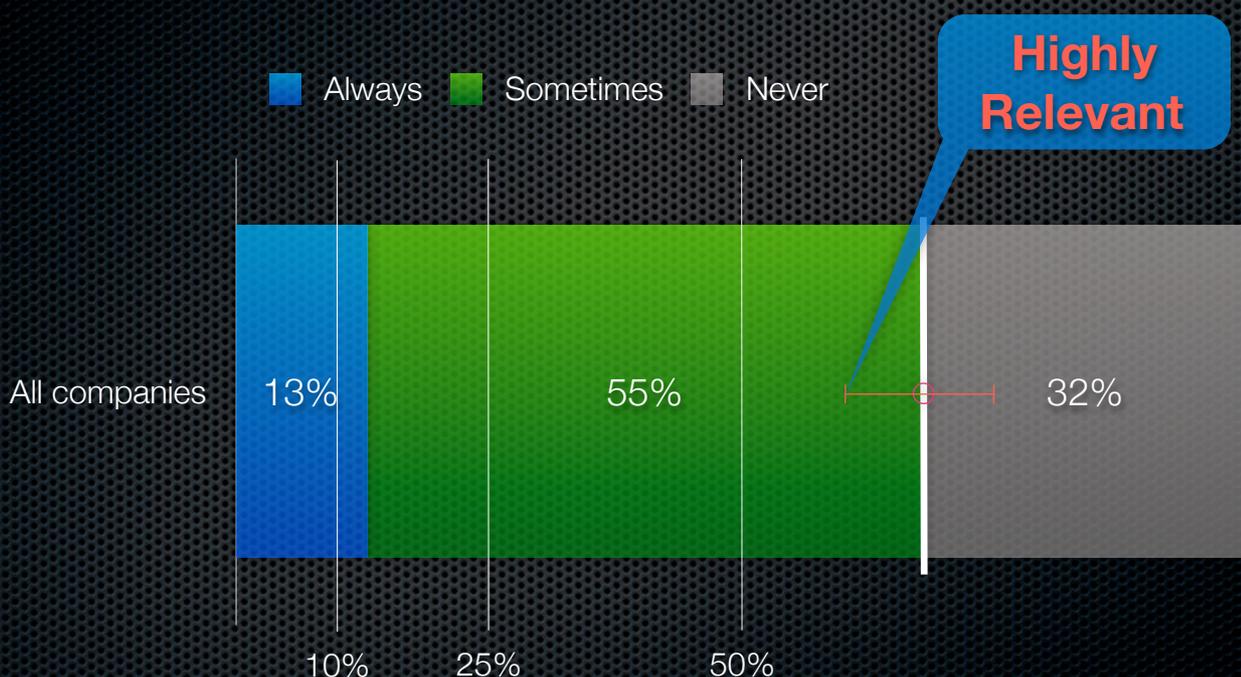


# RQ1: Metrics

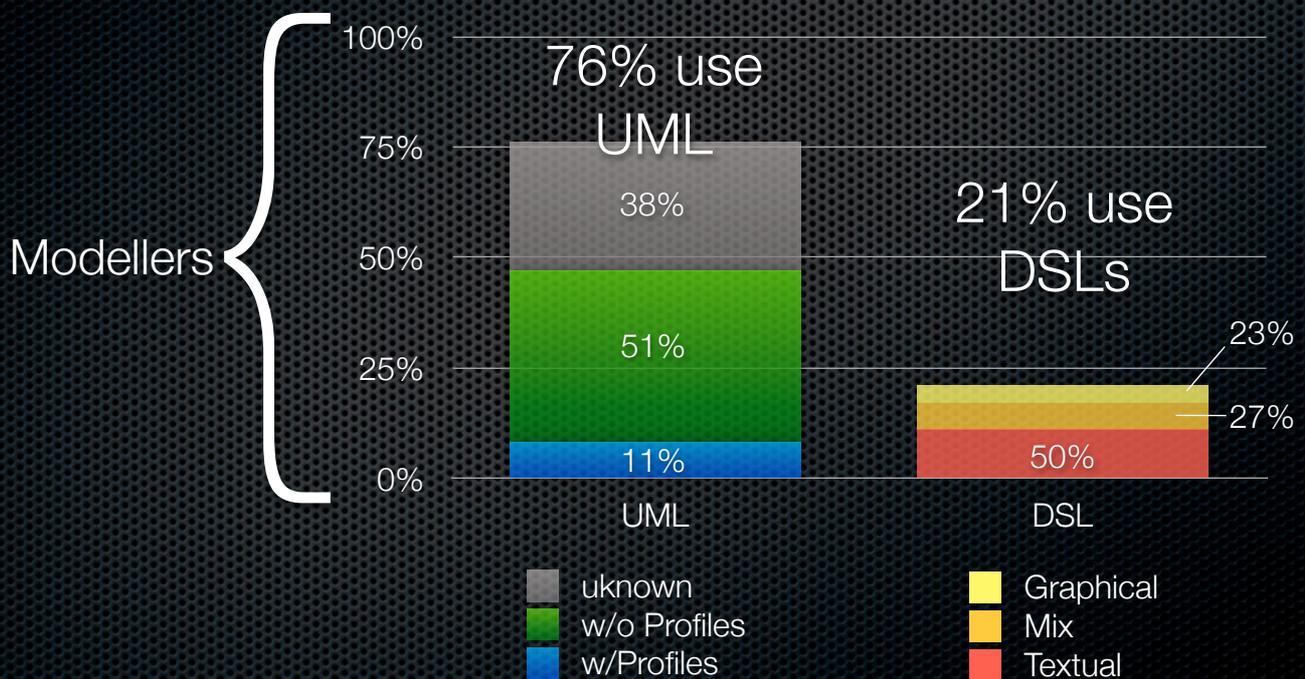
- Are models used for software development in your organization?
  - For model we mean both diagrams, e.g., UML, and text according to any DSL
  - Valid answers: Always; Sometimes; Never
- Percentage of **Modellers** (i.e. Always + Sometimes)

**Relevance**

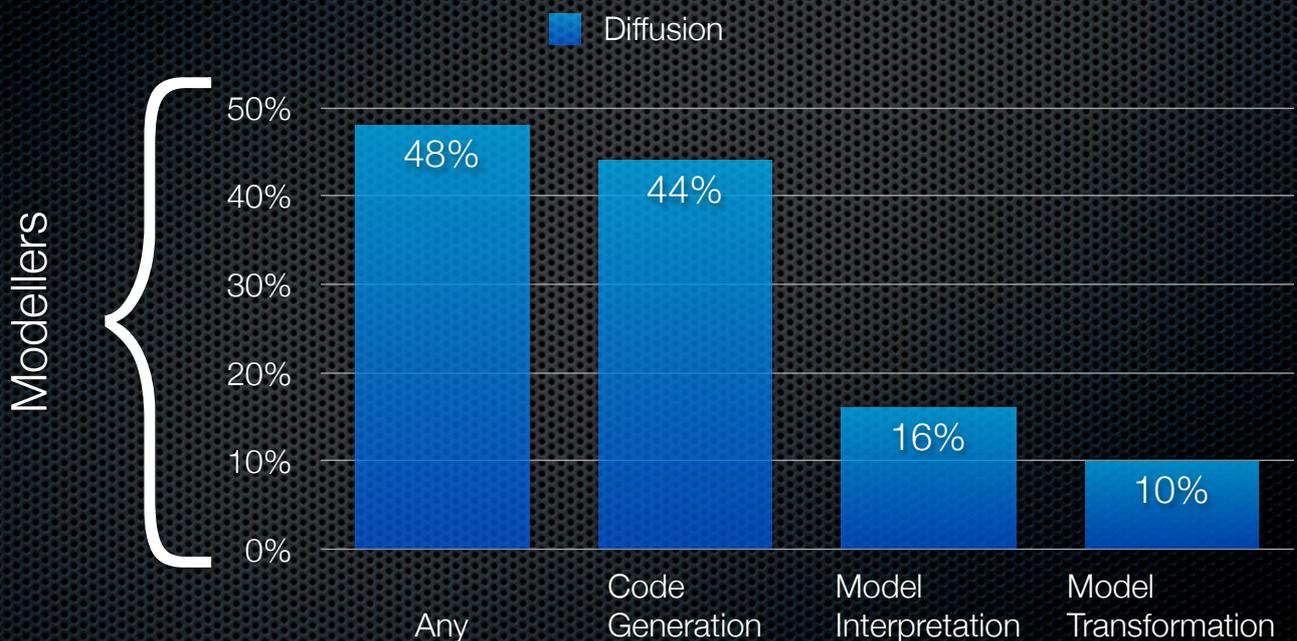
# RQ1: Results



# RQ1: Languages & notations



# R1: MD\* key techniques

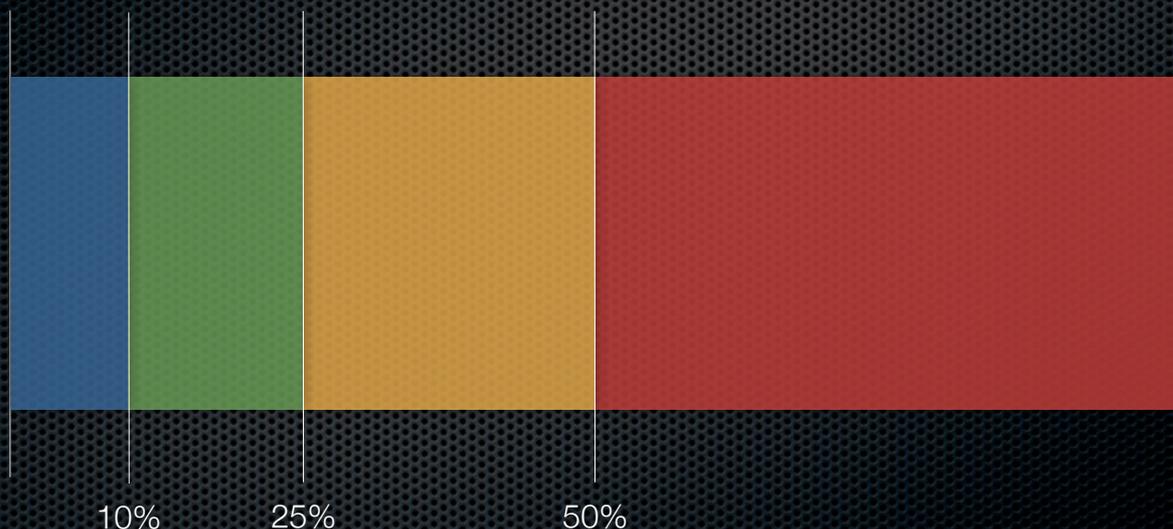


# RQ2: Metrics

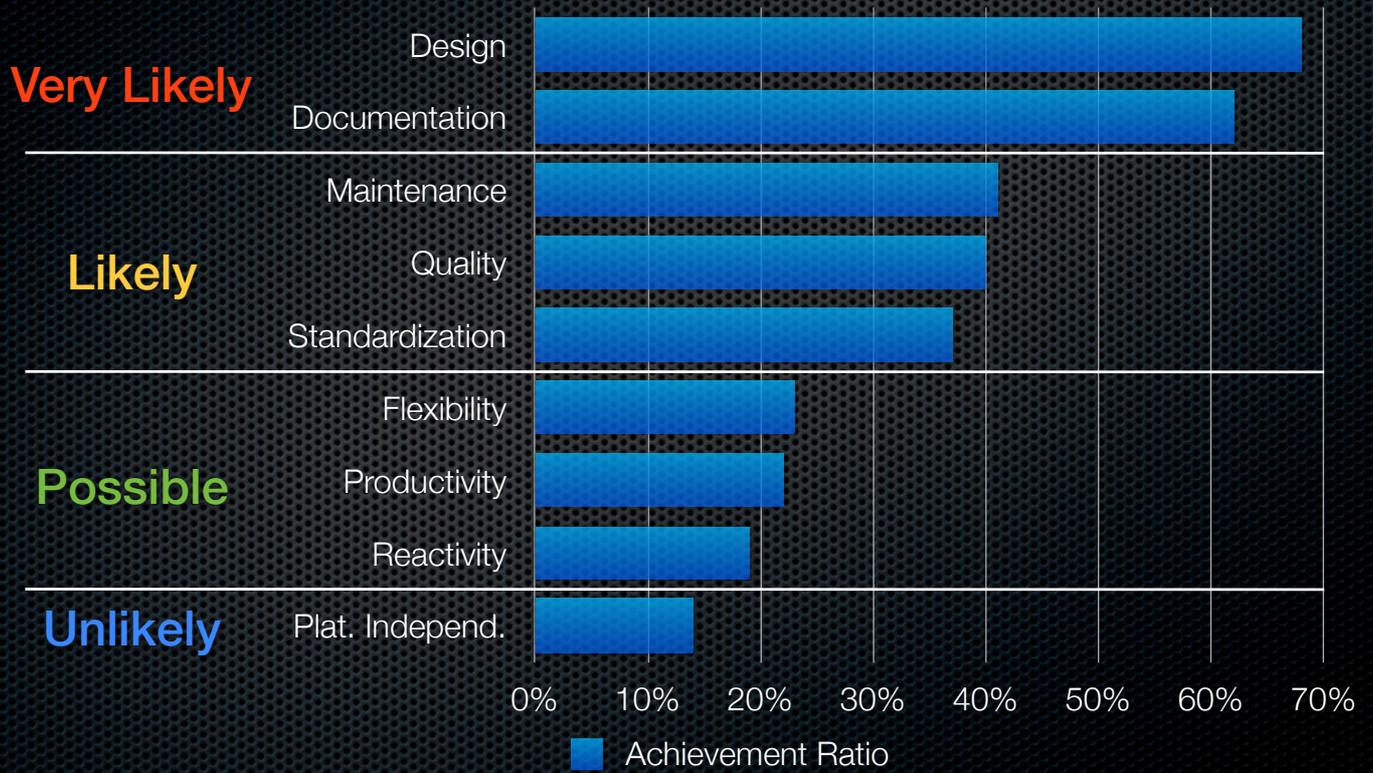
- What are the benefits verified as consequences of using modelling?
    - Design support
    - Improved documentation
    - Improved development flexibility
    - Improved productivity
    - Quality of the software
    - Maintenance support
    - Platform independence
    - Standardization
    - Shortened reaction time to changes
- } Benefit achievement ratio

# Likelihood thresholds

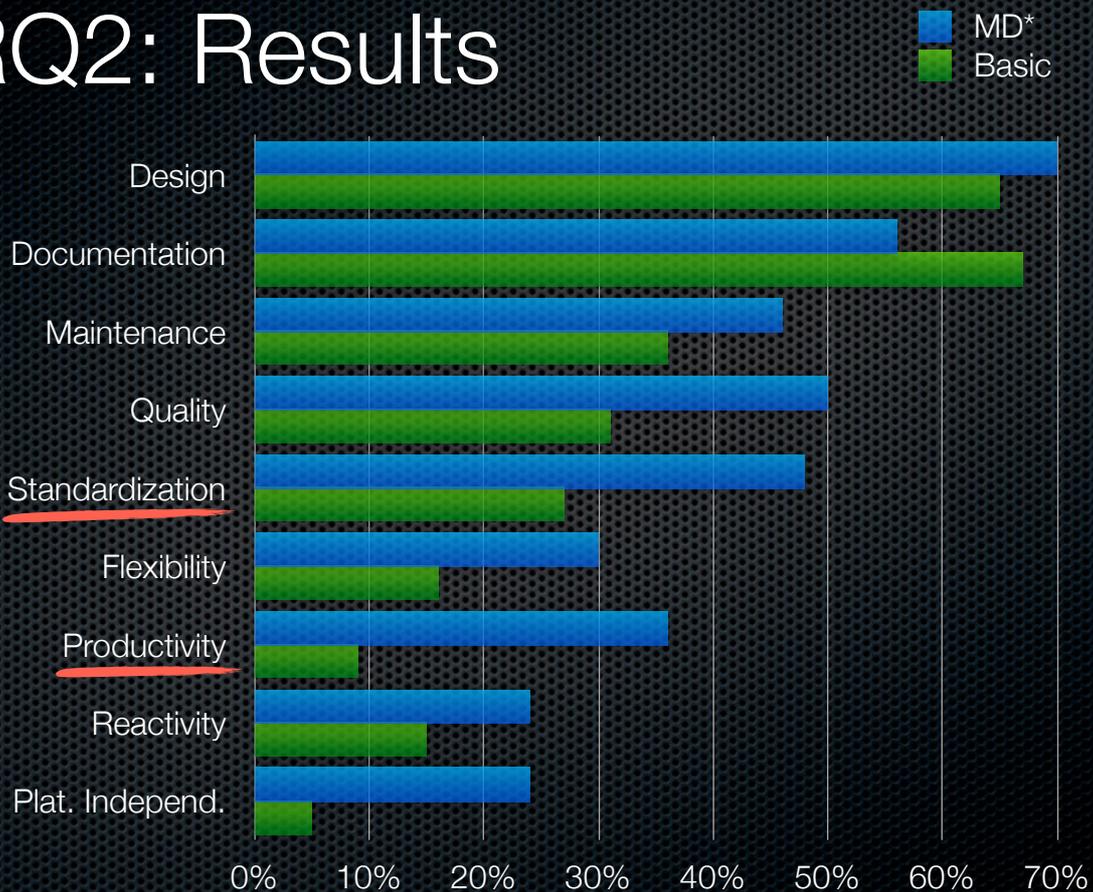
■ Unlikely   ■ Probable   ■ Likely   ■ Very Likely



# RQ2: Results



# RQ2: Results



# Benefits Achievement

	Code Gener.	Model Interpr.	Model Transform	Toolsmith	UML	UML Profiles	DSL
Design					2.4		
Documentation					2.6		
Maintenance							
Quality							
Standardization	2.2			3.9		4.7	
Flexibility		3.9		3.9			3.1
Productivity	3.9	4.2	8.3	4.2			3.4
Reactivity		4.0		5.5			
Independence	3.0	4.7	4.2	9.9			4.3

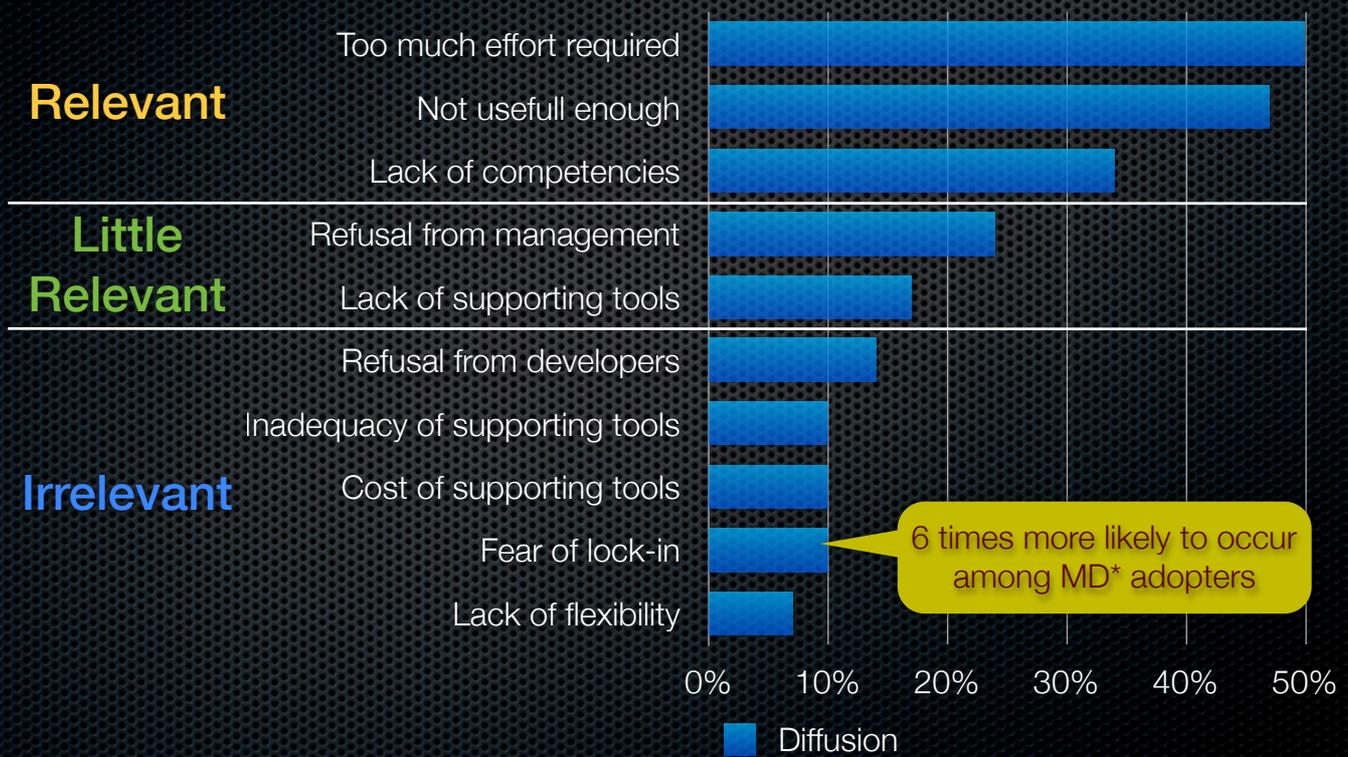
Odds ratios

## RQ3: Metrics

- What are the problems preventing the adoption of modelling and MD\*?
  - Too much effort required
  - Not useful enough
  - Lack of competencies
  - Lack of supporting tools
  - Refusal from management
  - Cost of supporting tools
  - Refusal from developers
  - Fear of lock-in
  - Not flexible enough
  - Inadequacy of supporting tools

} Problem Relevance

# RQ3 - Results



## Threats to validity

- Construct
  - Did we capture the essential aspects of MD\*?
- Internal
  - Sampling (selection bias)
- External
  - How representative of the Italian (EU) IT industry?

# Conclusions

- MD\* is a **relevant** technology, modeling is **highly relevant**
- A few (very) likely benefits of modeling
  - MD\* techniques make the chances of achieving the less likely benefits four+ times higher
  - Toolsmithing provides several benefits
  - UML apparently plays no significant role

# Conclusions

- Main problems
  - Too much effort estimated
  - Not useful enough
  - Lack of competencies
- Among MD\* fear of lock-in

# Thank you

- For further details:
  - Marco Torchiano, Federico Tomassetti, Filippo Ricca, Alessandro Tiso, Gianna Reggio,  
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Journal of Systems and Software, Available online 1 April 2013, ISSN 0164-1212, 10.1016/j.jss.2013.03.084.  
(<http://www.sciencedirect.com/science/article/pii/S0164121213000824>)