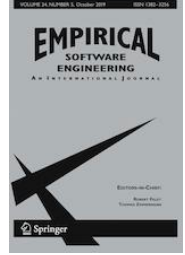




Journal First



# What do class comments tell us?

## An investigation of comment evolution and practices in Pharo Smalltalk

**Pooja Rani**, Sebastiano Panichella, Manuel Leuenberger, Mohammad Ghafari, Oscar Nierstrasz

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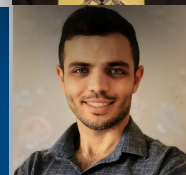
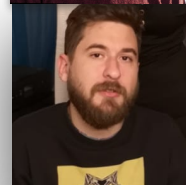
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# Motivation

```
/**
 * A class representing a window on the screen.
 *
 * For example:
 * <pre>
 *     Window win = new Window(parent);
 *     win.show();
 * </pre>
 *
 * @author Sami Shaio
 * @version 1.13, 06/08/06
 * @see java.awt.BaseWindow
 */
class Window extends BaseWindow {
    ...
}
```

Java class comment

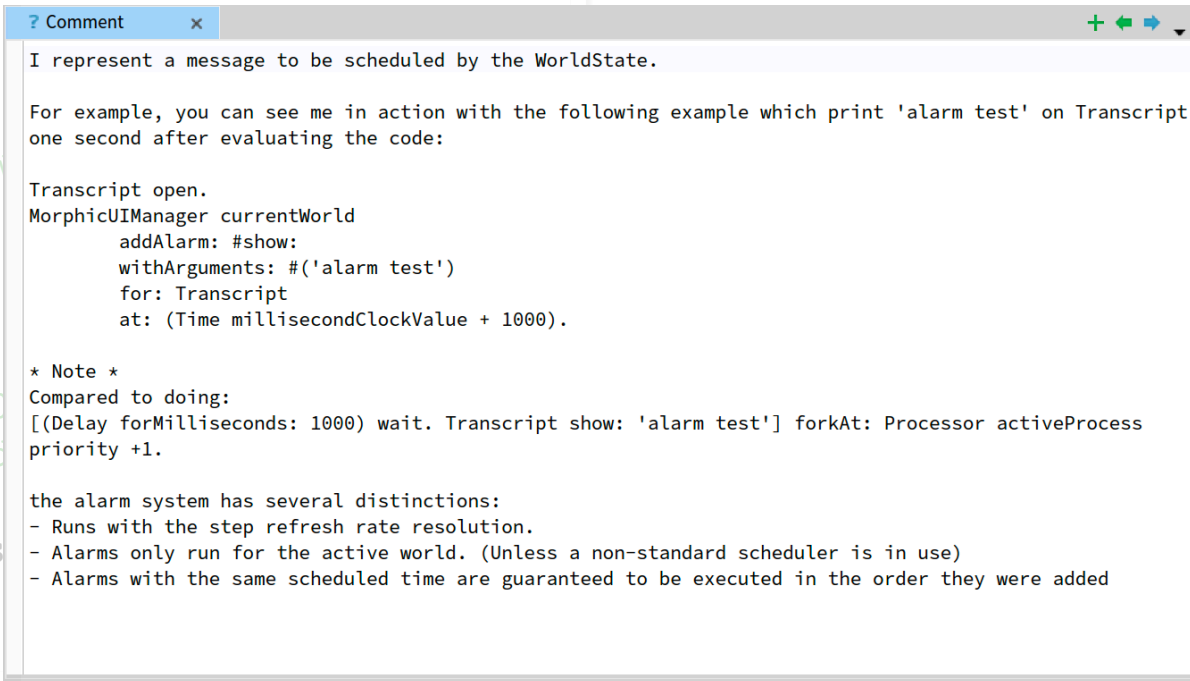
High-quality code comments assist developers

- Dekel et al. 2009

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Java class comment



I represent a message to be scheduled by the WorldState.

For example, you can see me in action with the following example which print 'alarm test' on Transcript one second after evaluating the code:

Transcript open.  
MorphicUIManager currentWorld  
    addAlarm: #show:  
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        at: (Time millisecondClockValue + 1000).

**\* Note \***  
Compared to doing:  
[[Delay forMilliseconds: 1000) wait. Transcript show: 'alarm test']] forkAt: Processor activeProcess priority +1.

the alarm system has several distinctions:

- Runs with the step refresh rate resolution.
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Smalltalk class comment

Different languages use different conventions to write comments

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? Comment



Intent

? Comment x

I represent a message to be scheduled by the WorldState.

## Example

? Comment

x

+ ← →

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## Implementation details

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x



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# Challenges

Class comments are a main source of documentation

No strict comment conventions, such as tags

Lack of quality assessment tools

Lack of empirical studies

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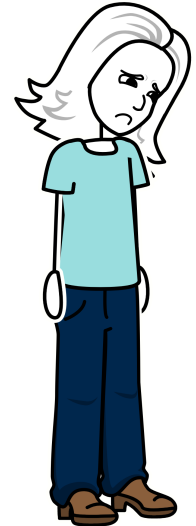
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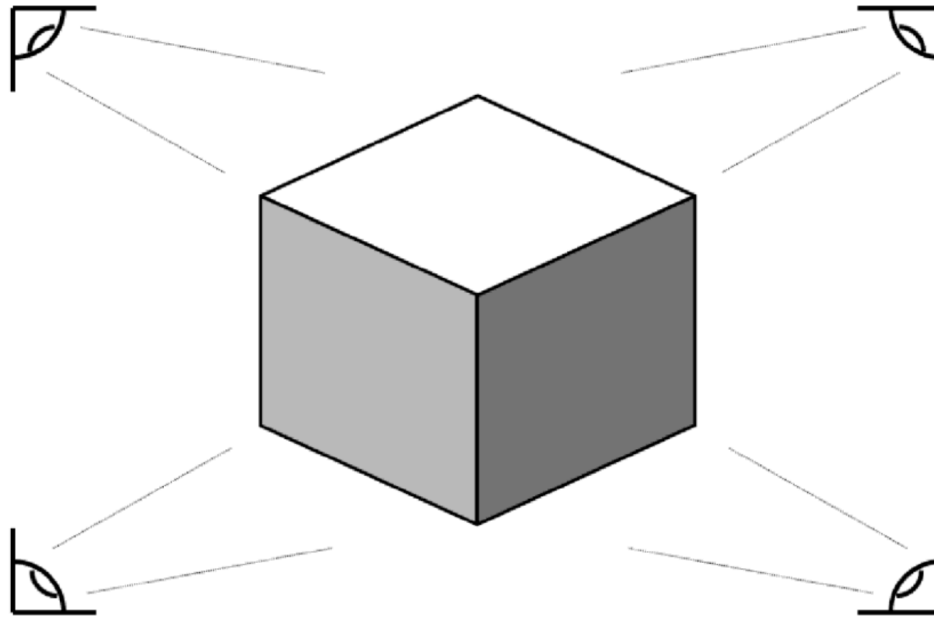
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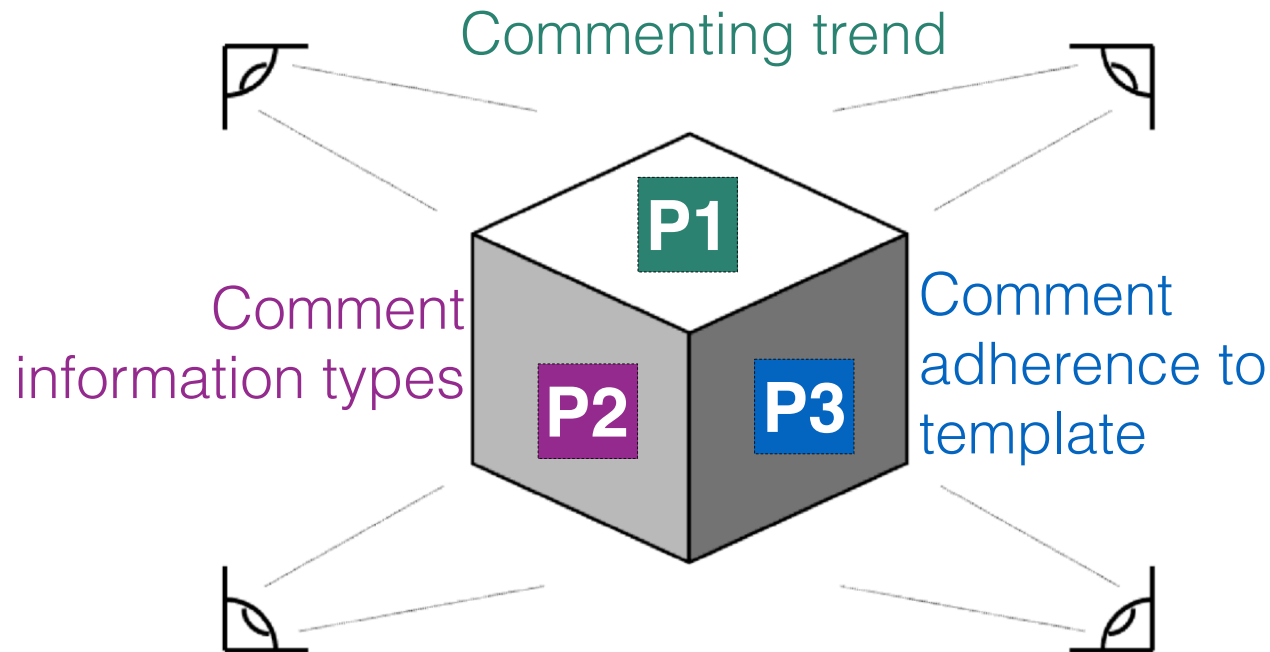
Using previous techniques a non-trivial task

Requires empirical knowledge

# We study Smalltalk class comments

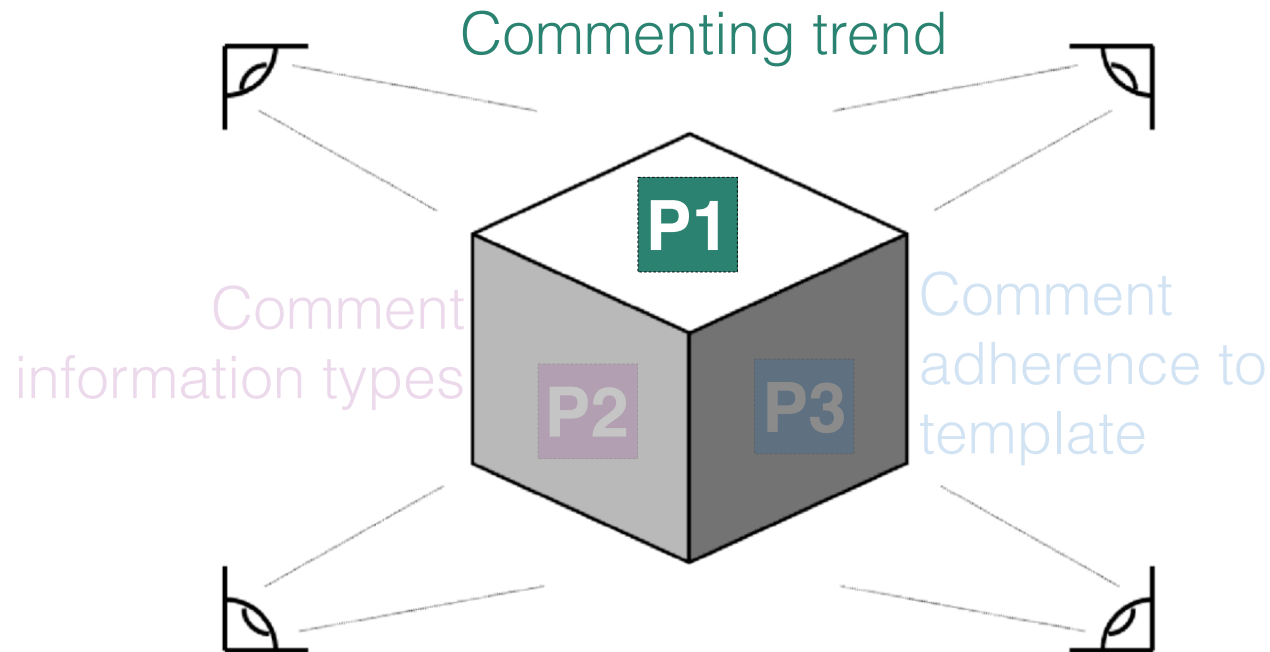


# We analyse from three perspectives



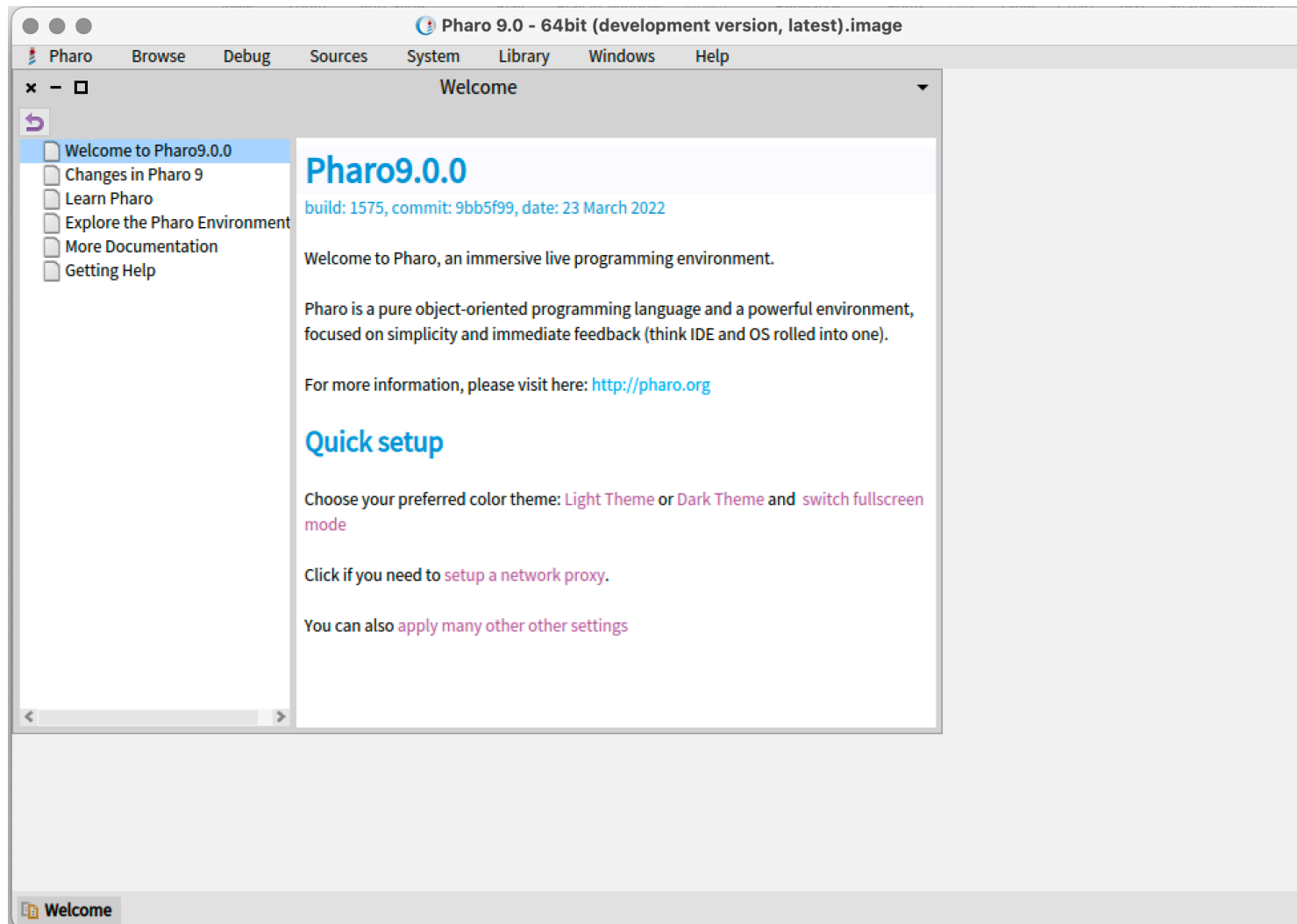
# We analyse from three perspectives

How **often** developers write?



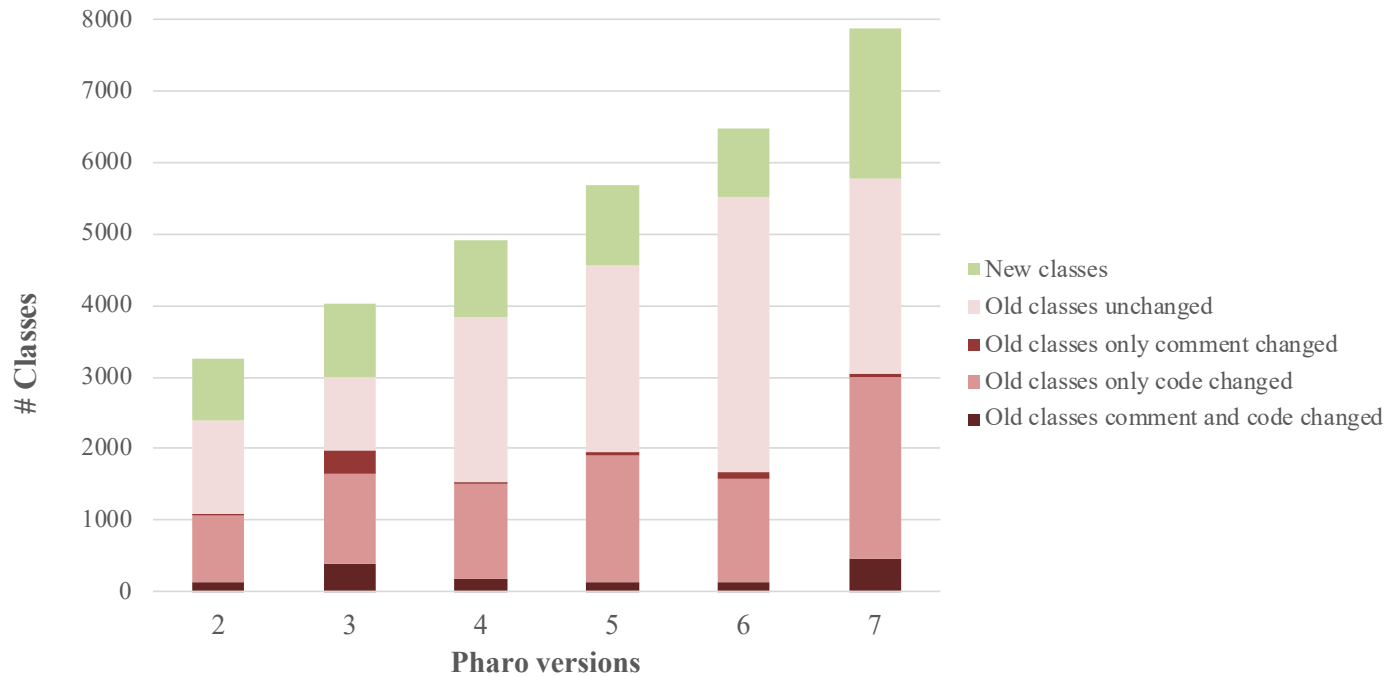


# Commenting trend

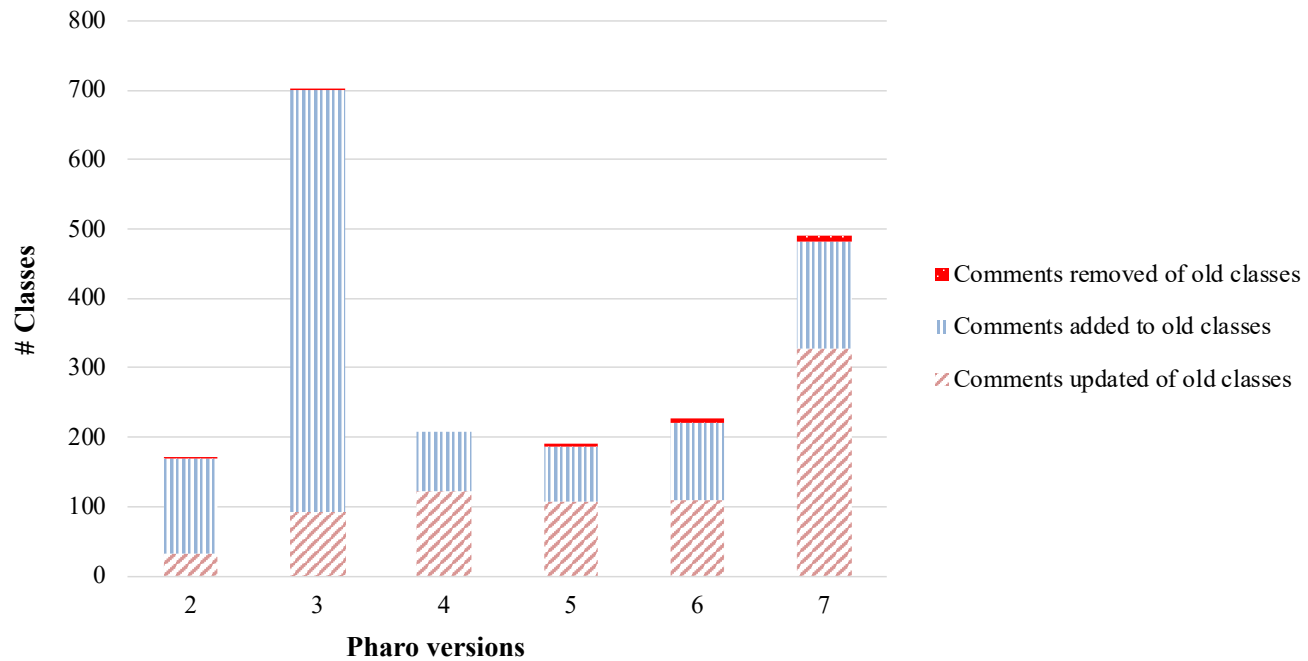


## Commenting trend

- Pharo software system (first appeared in 2008)
- Study its seven versions from 2008-2019 (11 years)

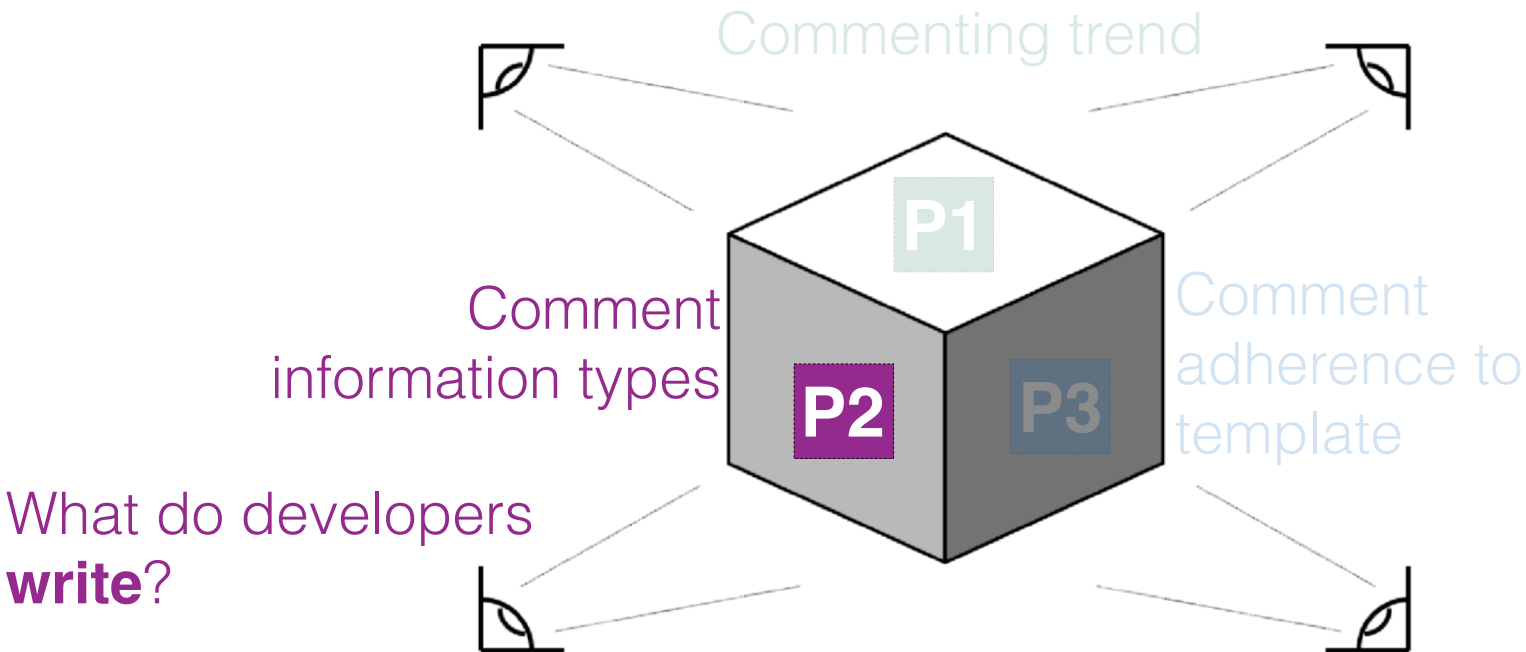


50% of comment changes were related to code changes



developers add or update comment of old classes

# We analyse from three perspectives



# Smalltalk class comments

Intent

I represent a message to be scheduled by the WorldState.

Example

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Implementation  
details

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Unlike Java and Python, there is **no comment taxonomy**

# Information types in Smalltalk

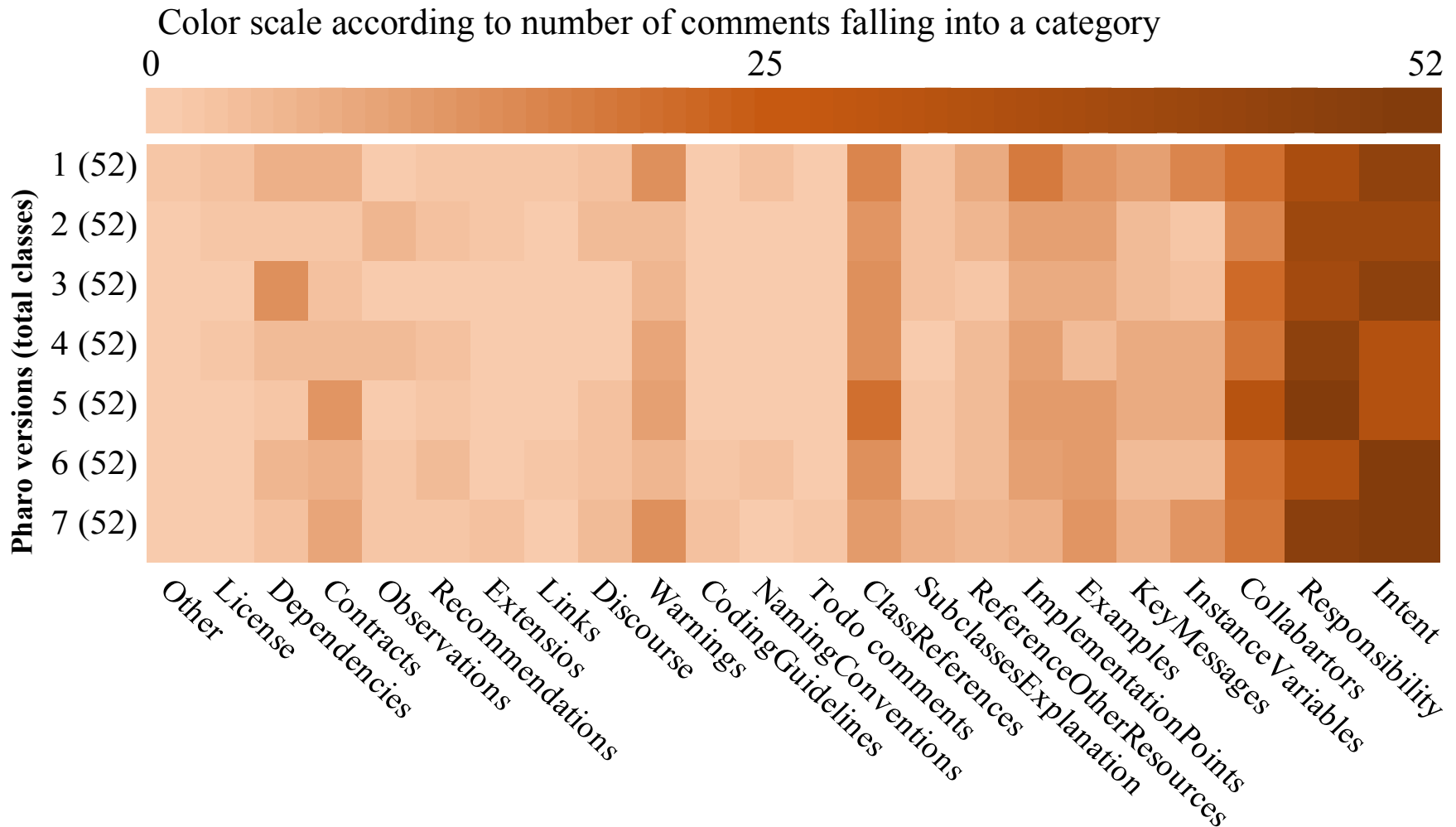
**7** Pharo versions

2008-2019

**364** sample comments

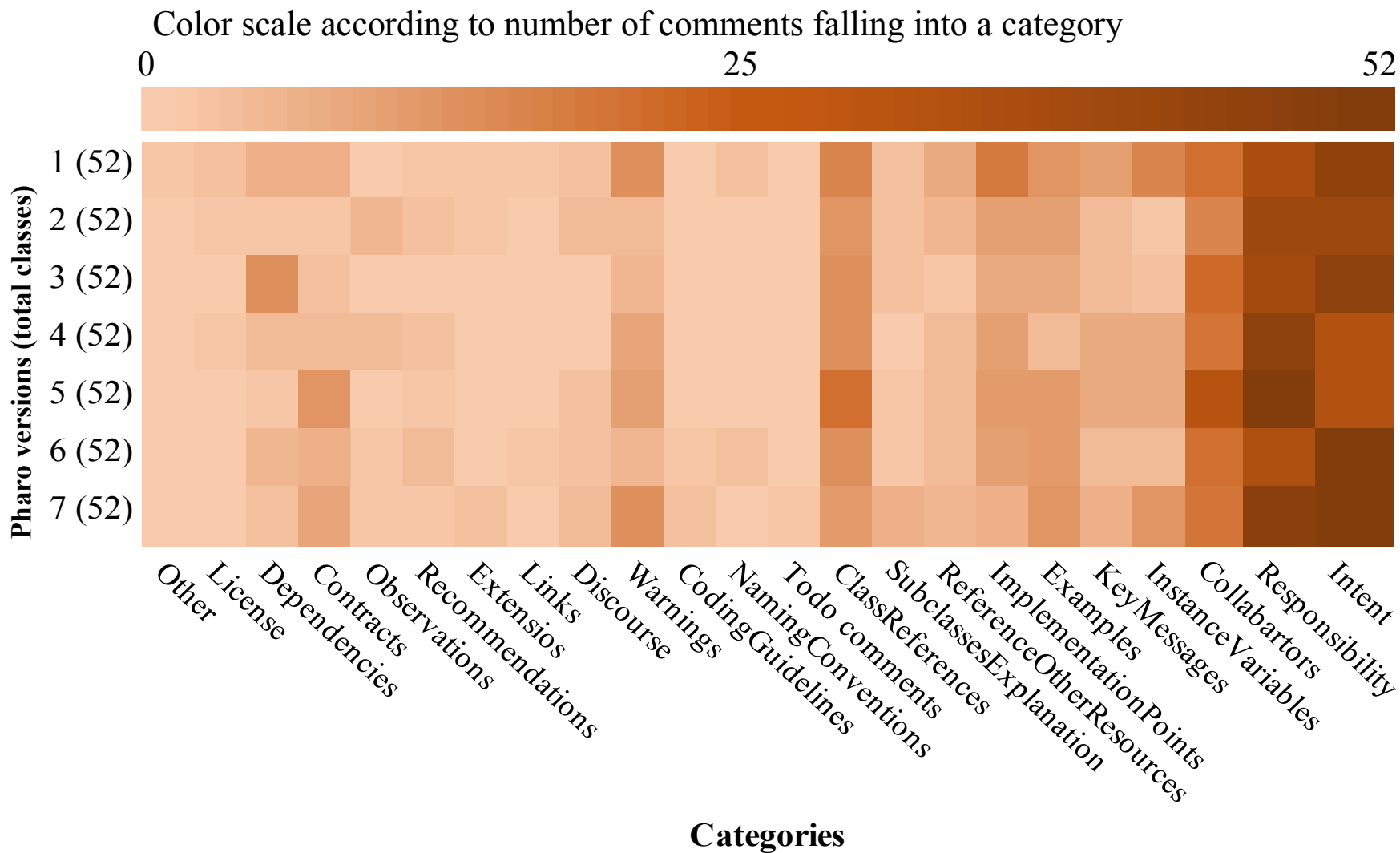
Smalltalk class comments contain 23 types of information

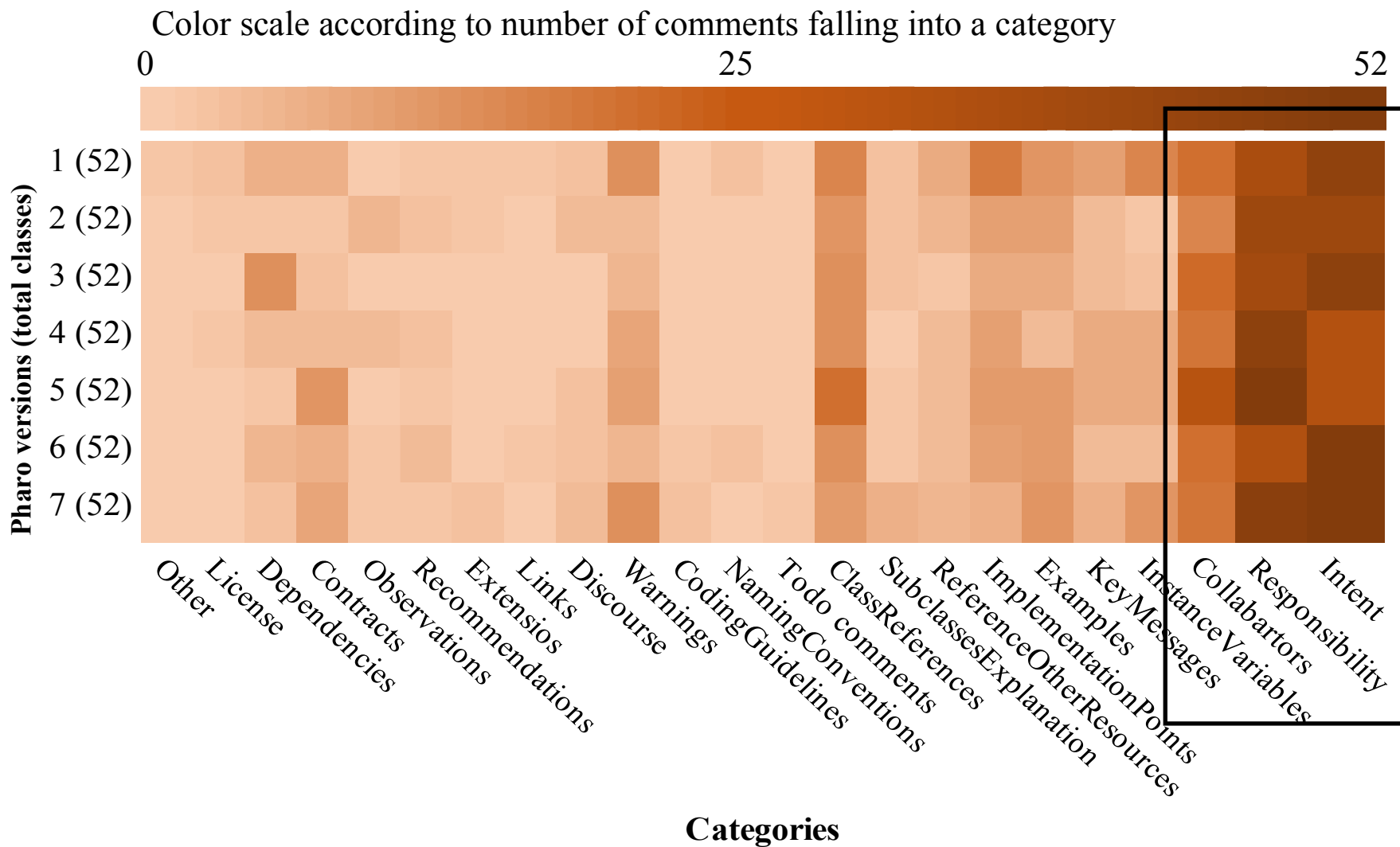
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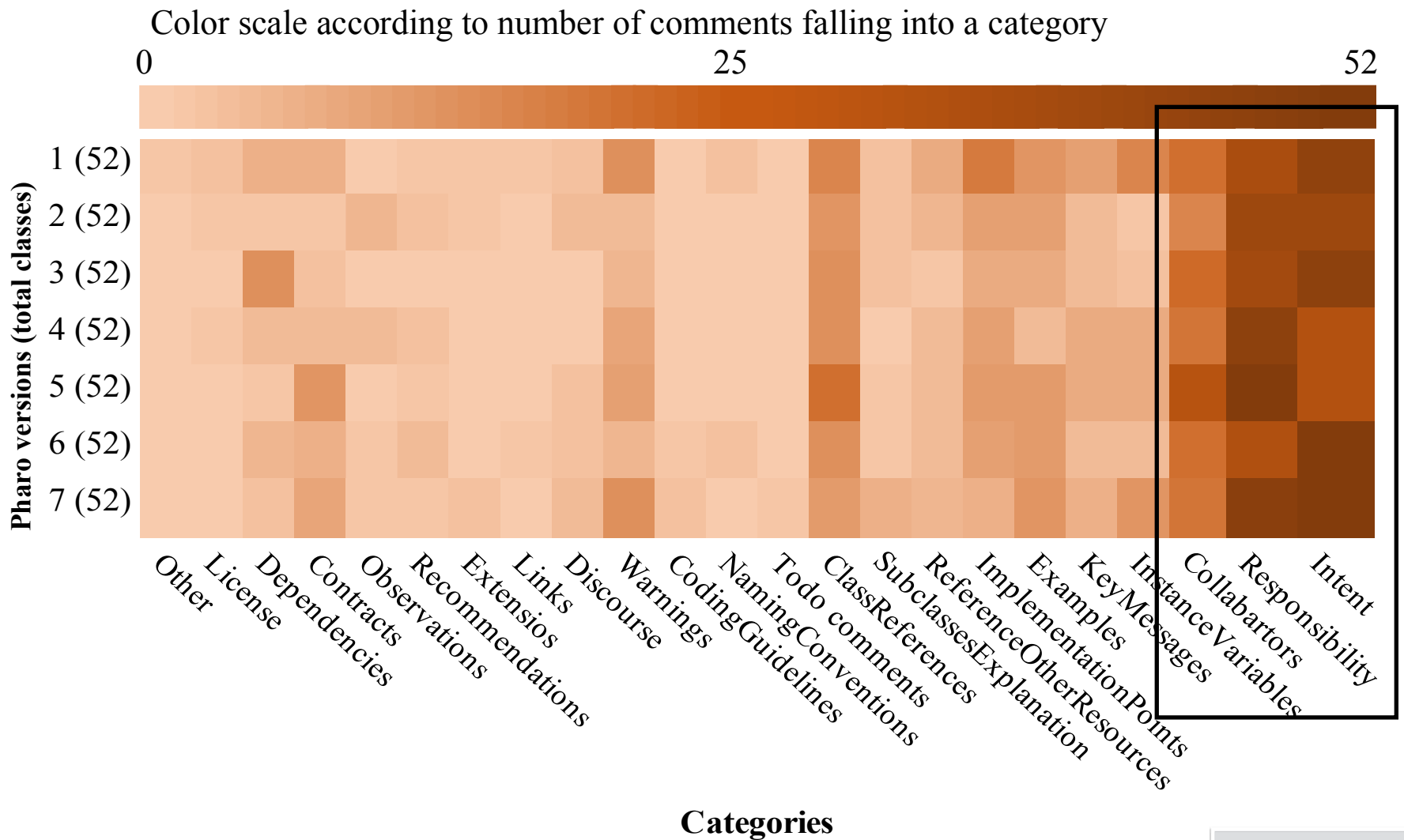


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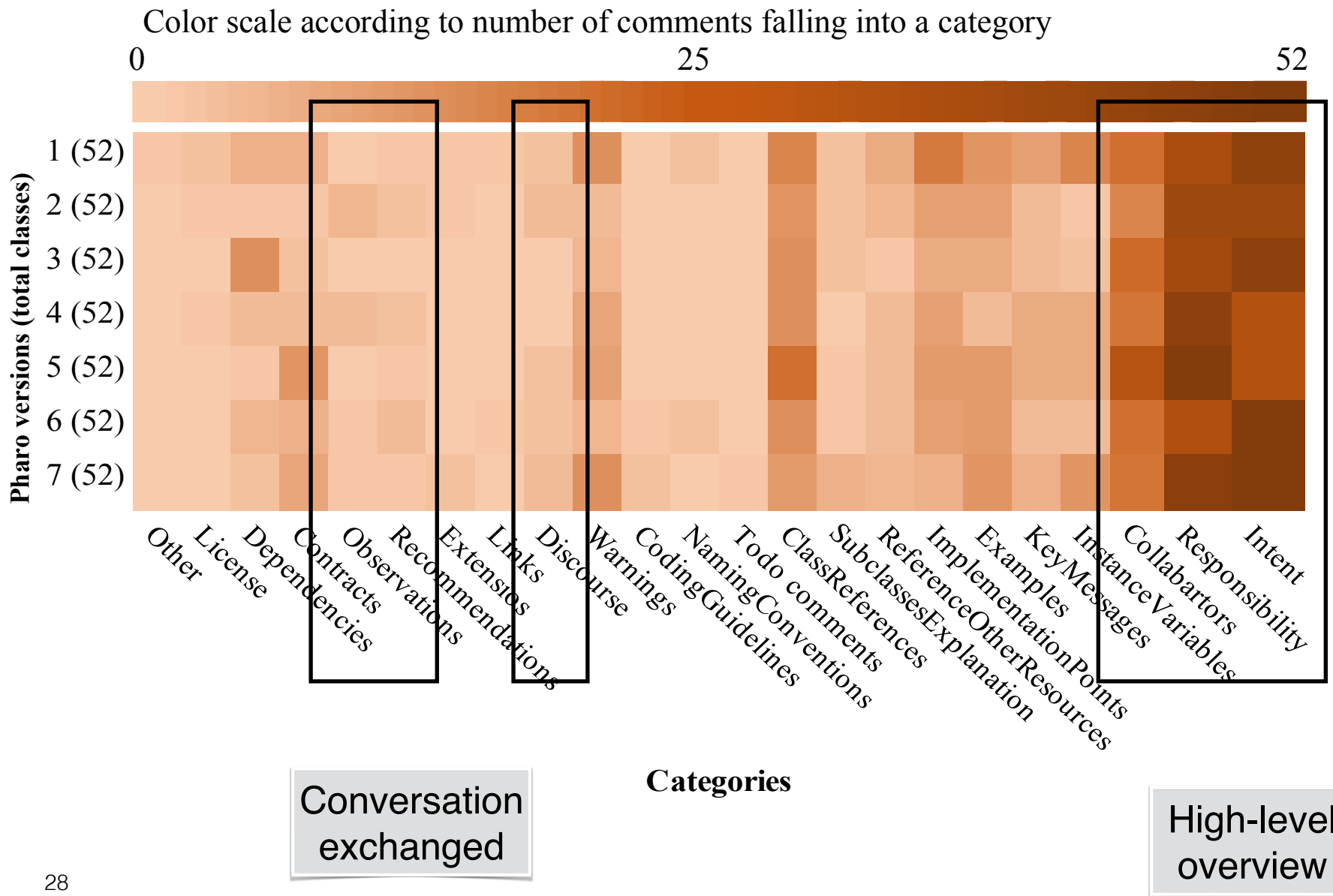


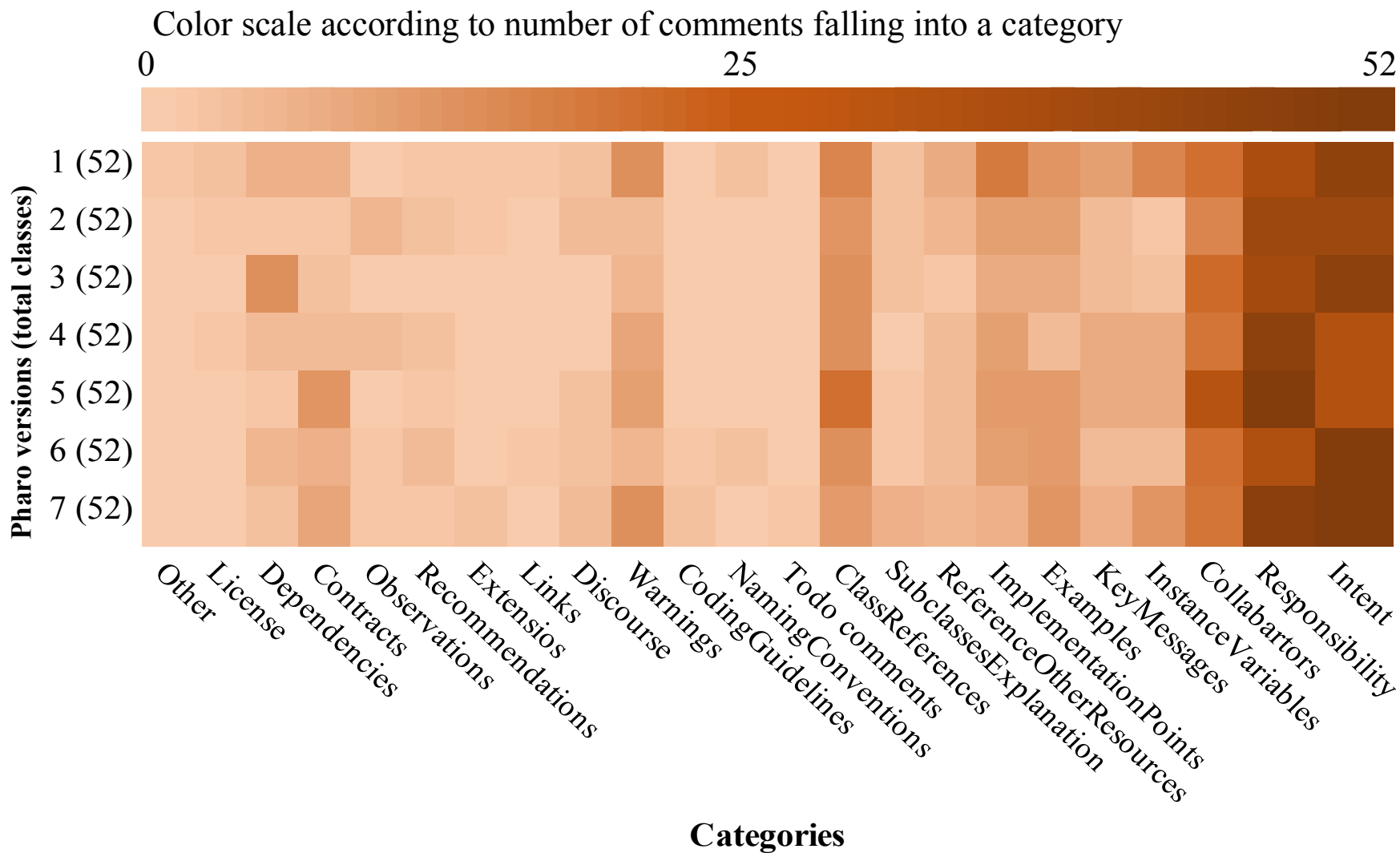


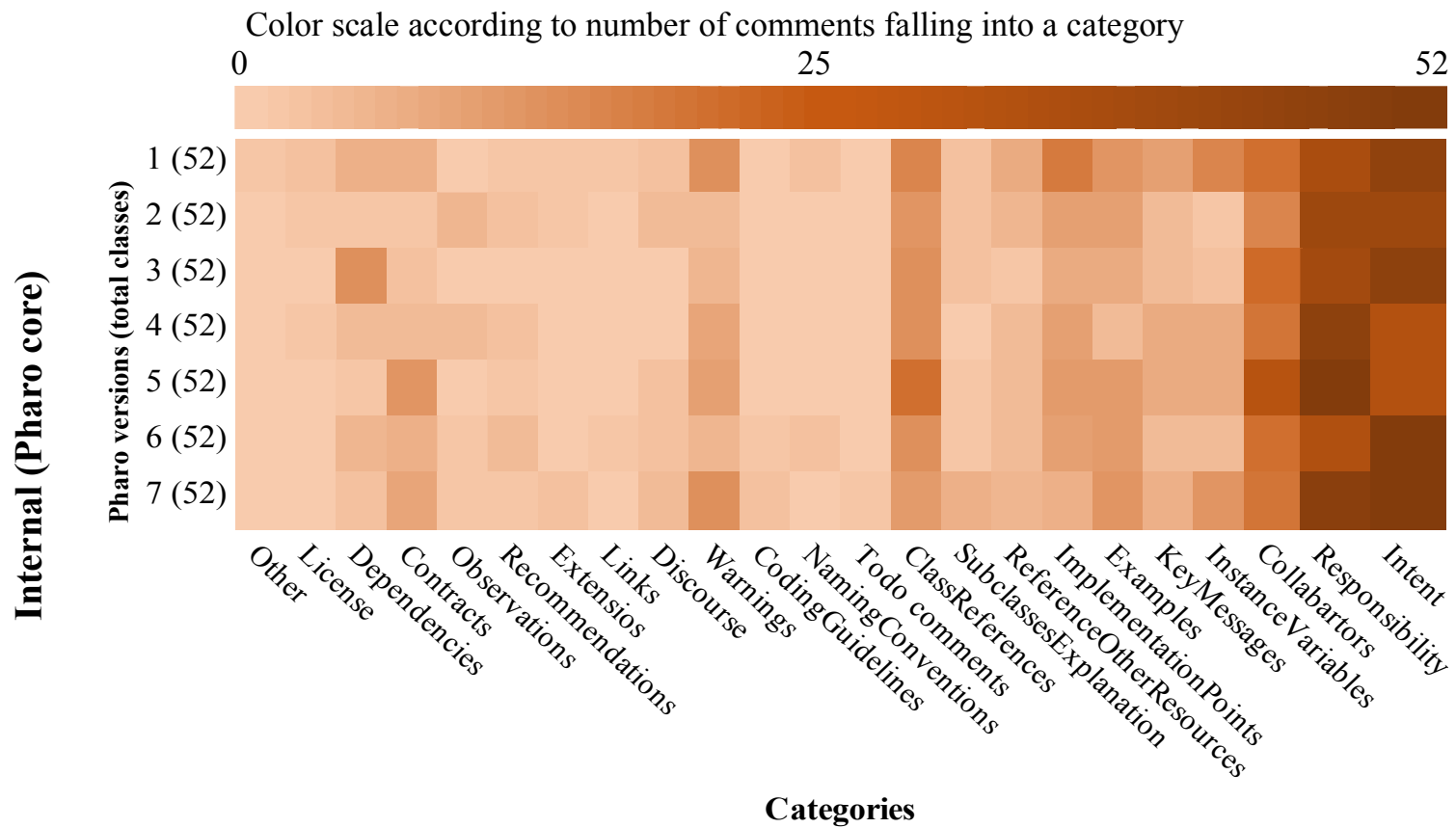




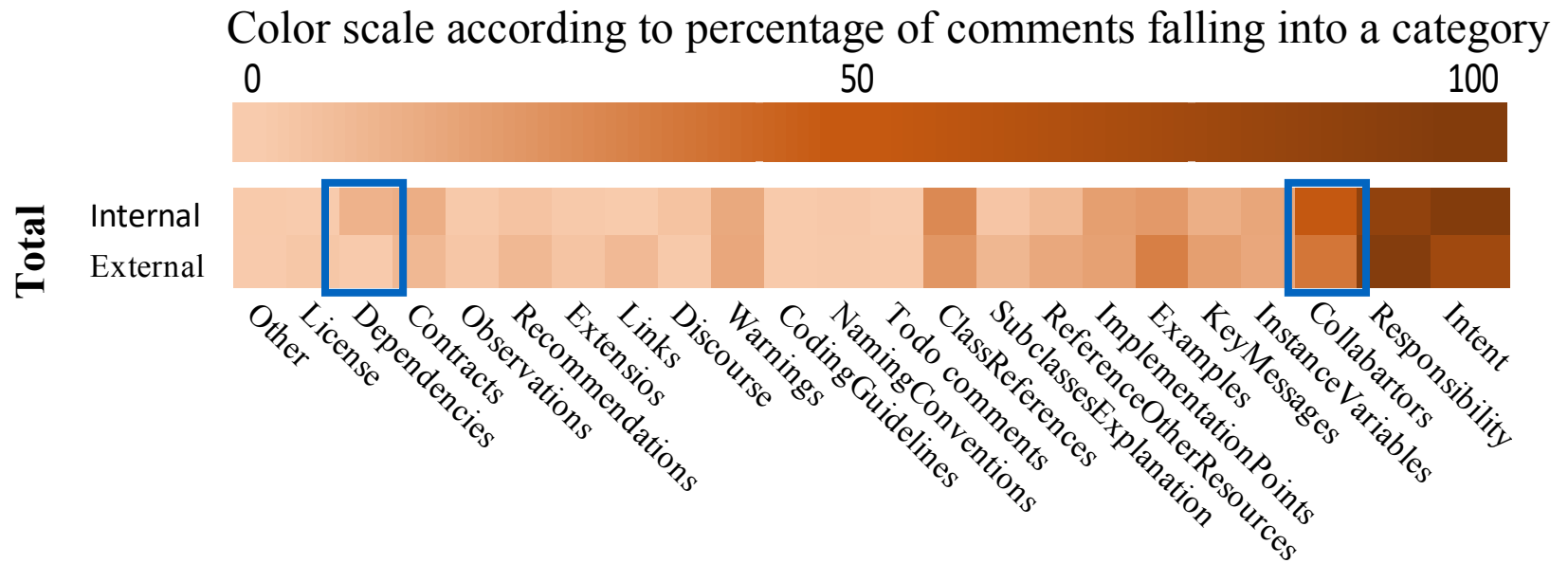
High-level  
overview







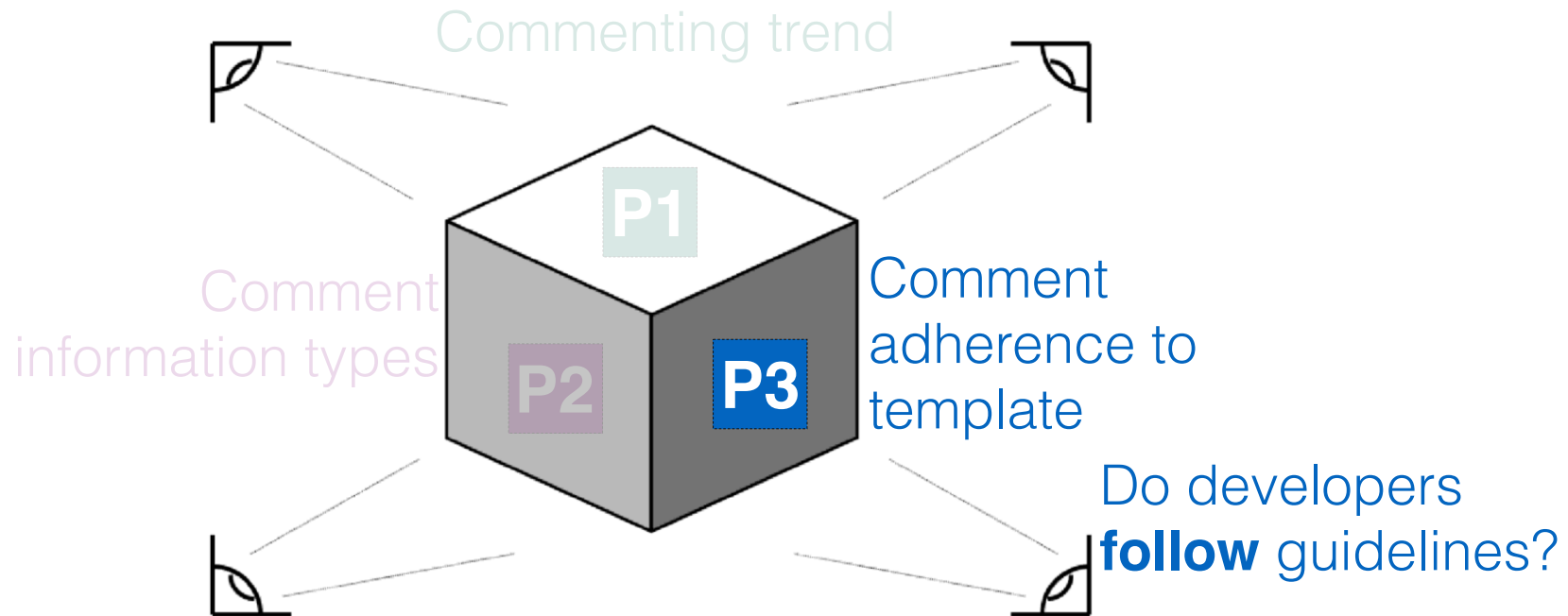




Core developers and external developers vary



# We analyse from three perspectives



# Coding style guidelines


Each community has its own guidelines



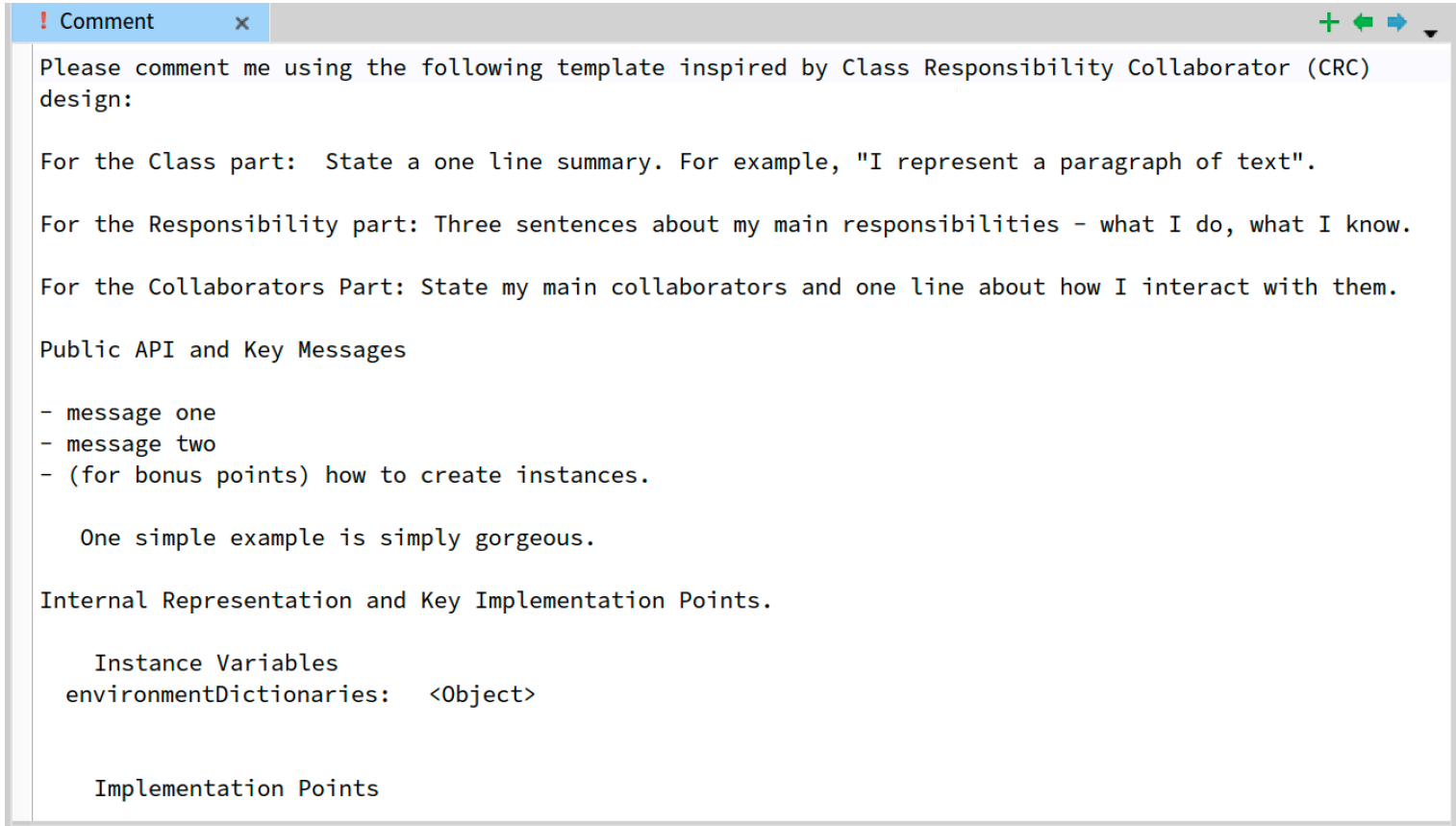
# Coding style guidelines

Each community has its **own** guidelines



- 
- State a one line of summary
  - Summary should be written in first person style

# Smalltalk comment template



```
! Comment x + ← → ▾
Please comment me using the following template inspired by Class Responsibility Collaborator (CRC)
design:

For the Class part: State a one line summary. For example, "I represent a paragraph of text".

For the Responsibility part: Three sentences about my main responsibilities - what I do, what I know.

For the Collaborators Part: State my main collaborators and one line about how I interact with them.

Public API and Key Messages

- message one
- message two
- (for bonus points) how to create instances.

    One simple example is simply gorgeous.

Internal Representation and Key Implementation Points.

    Instance Variables
environmentDictionaries:  <Object>

    Implementation Points
```

# Measure adherence to template

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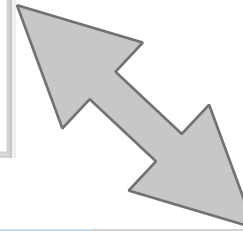
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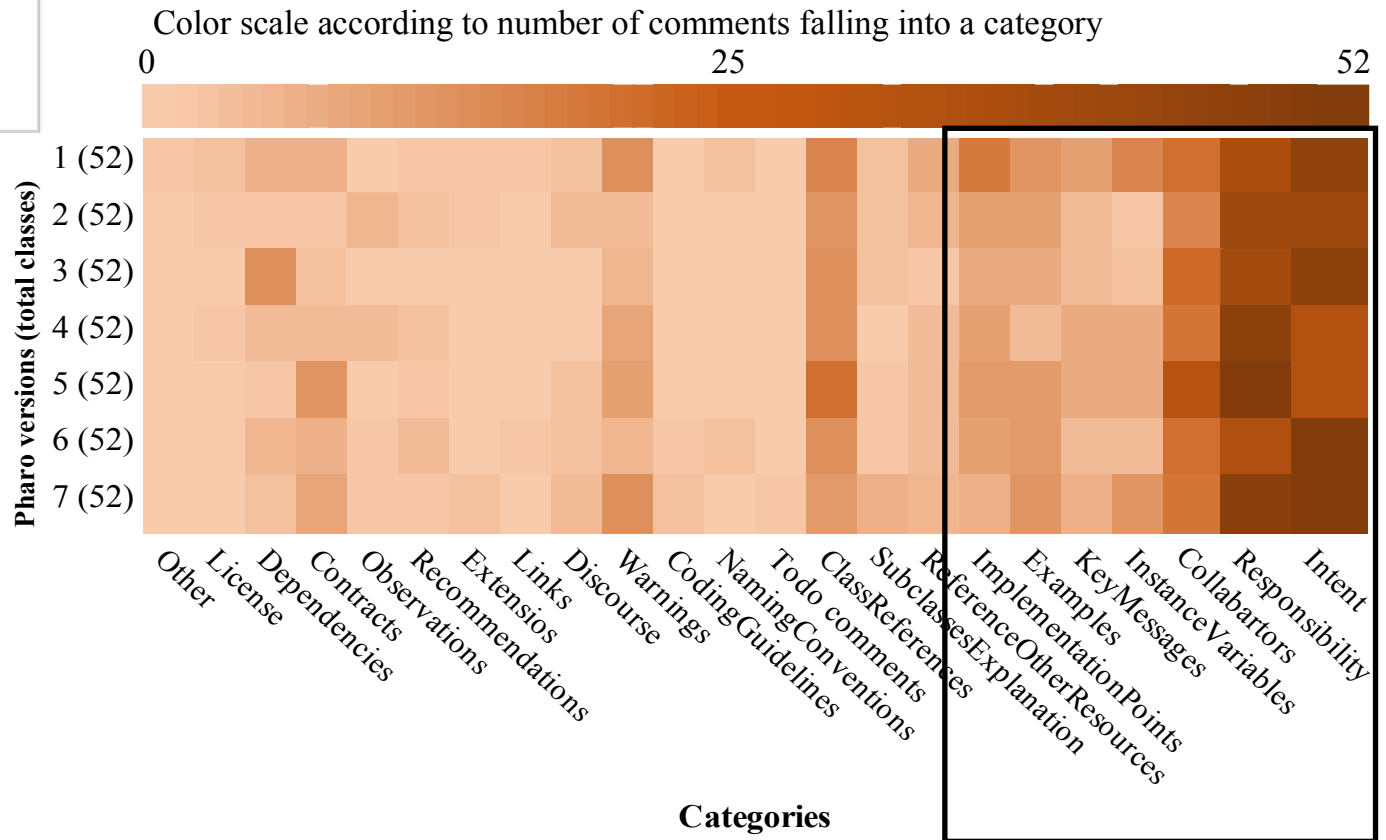
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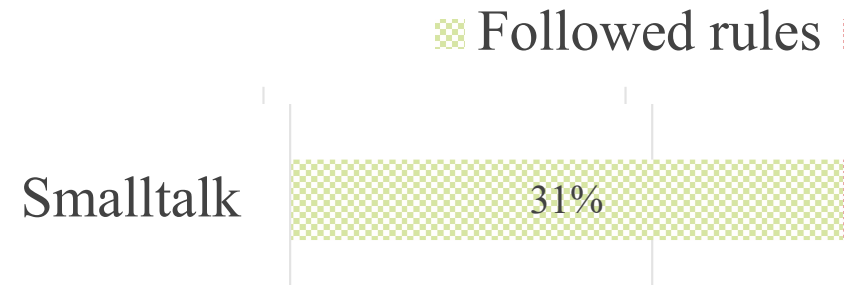
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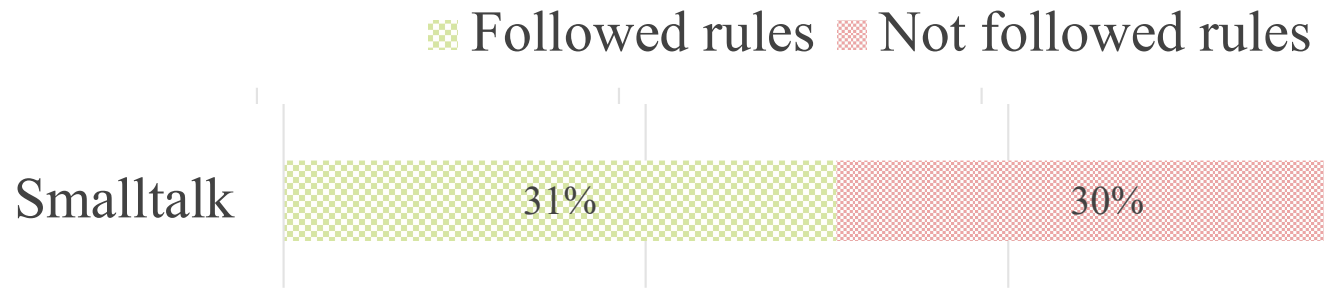
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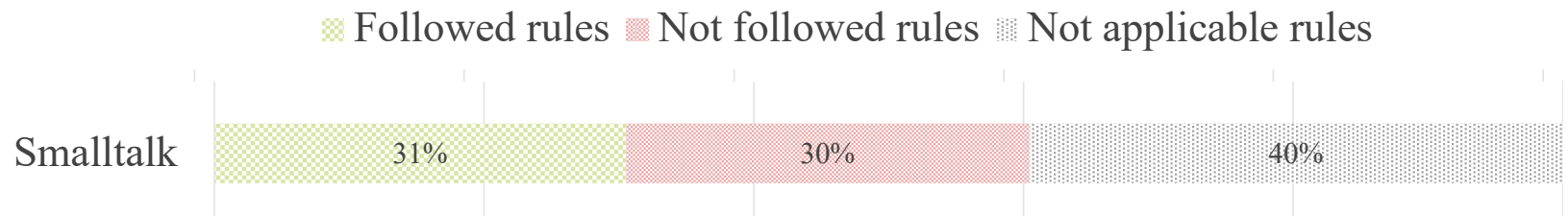


# Measure adherence to template





# Measure adherence to template



Developers do not always adopt conventions (not applicable rules)

# Takeaway

Developers embed 23 types of information in class comments

Developers follow template inspired information types more often than others



The ultimate goal of automatically assessing comments is still far away...

# Future work

Which information types do developers find important?

How do various information types support developers?

How to extract them automatically?

# What do class comments tell us?

## An investigation of comment evolution and practices in Pharo Smalltalk

### Paper

<https://link.springer.com/content/pdf/10.1007/s10664-021-09981-5.pdf>

### Replication Package on GitHub

<https://github.com/poojaruhal/CommentAnalysisInPharo>

### Contact us



<https://twitter.com/poojaruhal>

*u<sup>b</sup>*

<http://scg.unibe.ch/staff/Pooja-Rani>