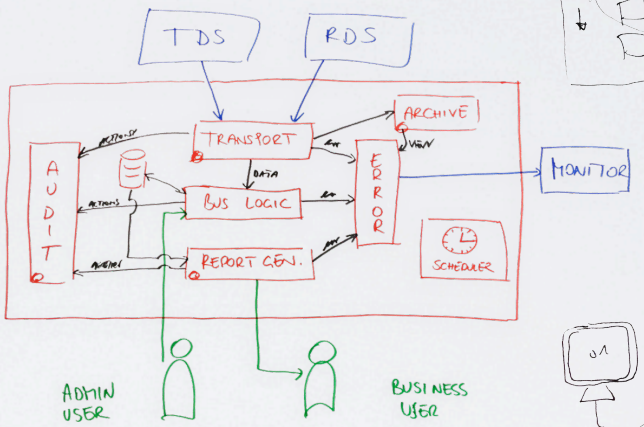
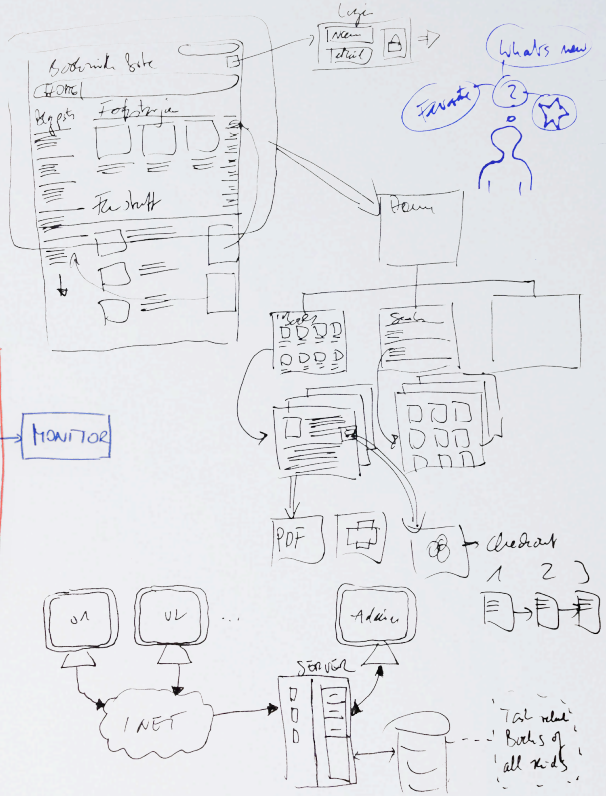
# COMMUNICATION OF SOURCE CODE DESIGNS THROUGH SKETCHING

Lukas Spychalski
Diploma Thesis
advised by Leonhard Lichtschlag

# CONTEXT

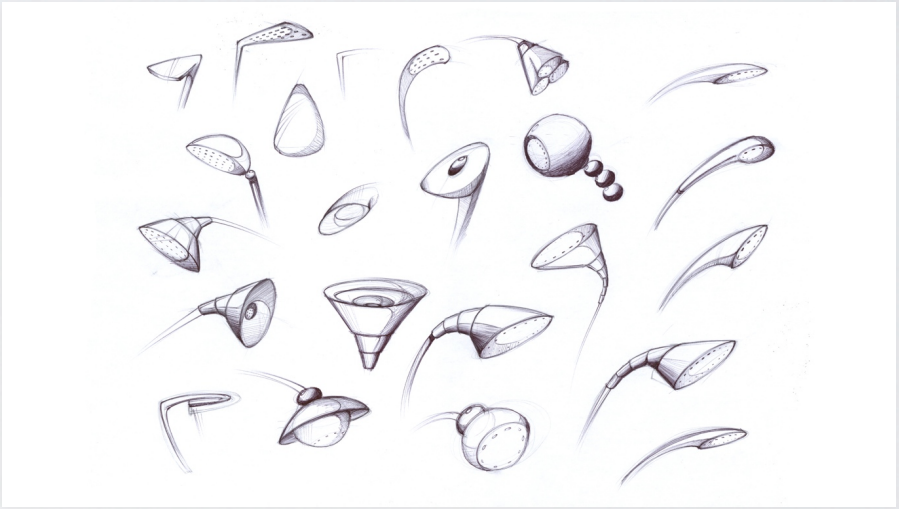

TDS
RDS
TRANSPORT
ARCHIVE
BUS LOGIC
ERROR
MONITOR
AUDIT
REPORT GEN.
SCHEDULER
ADMIN USER
BUSINESS USER


INET
SERVER
PDF

# SKETCHING

- visual representations of imagination
- used for ideation & innovation
- means of communication

Tversky 1999, 2002
Tversky and Suwa 2009
Eppler and Pfister 2011



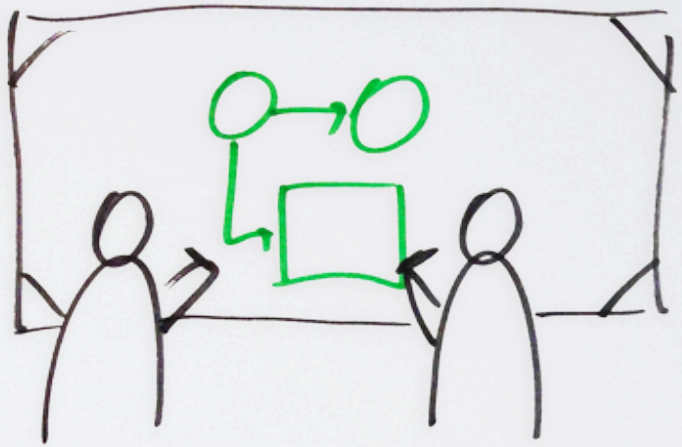
create, share and document knowledge

# SKETCHES & DEVELOPERS

1. understanding existing source code

2. designing & refactoring

Branham et al. 2010
Cherubini et al. 2007
Ko et al. 2006
LaToza et al. 2006
Walny et al. 2006



Sketches get modified, copied, shared and are archived.

# INITIAL STUDY

observations at a company in Aachen

- 2 meetings of software architects
- 3 interviews

knowledge is in the head


helpful during onboarding process

# MY APPROACH

## Connection between sketches and source code

# PROTOTYPING

DIA cycle with 6 users

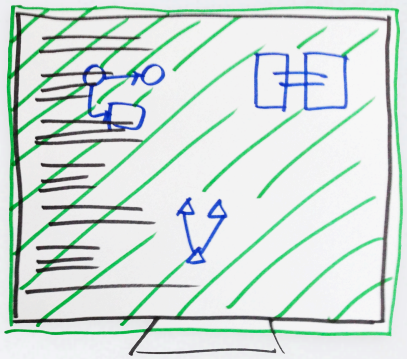
paper prototype

↓

Adobe Brackets extension

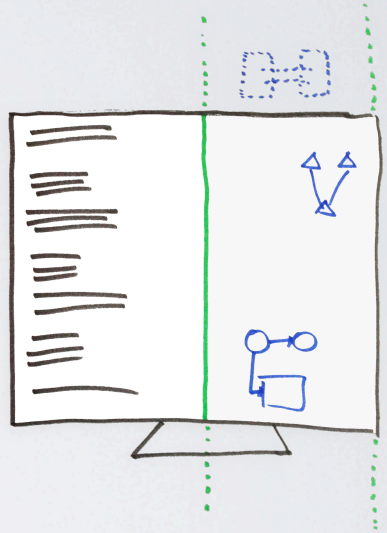
map
view

**overlay layout**



*Mission Control*

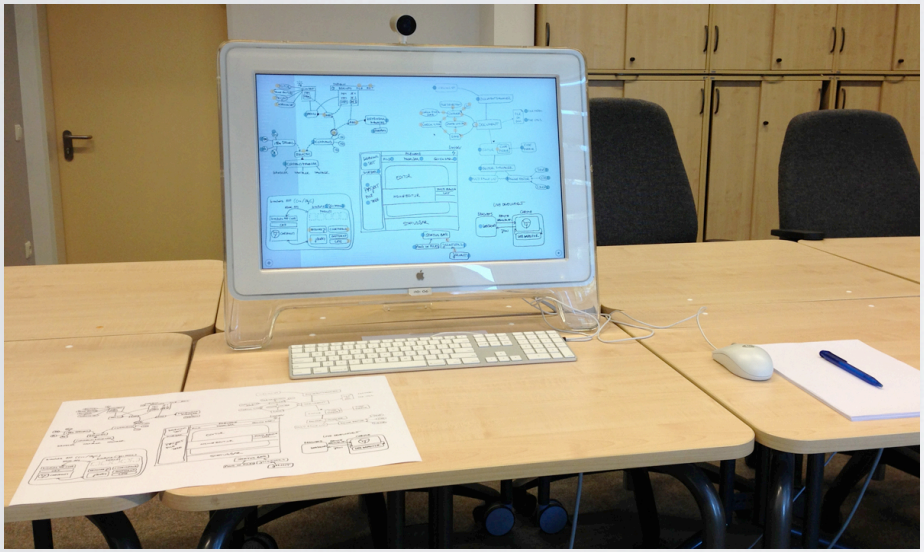
**split layout**



*Sketchbar*

# *demo*

# USER STUDY

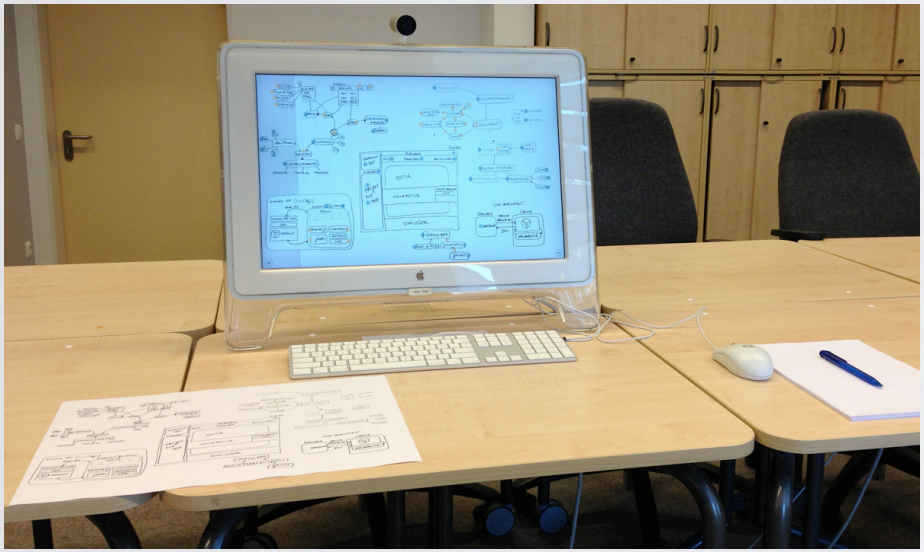


- navigational study
- semi-structured interviews

2 tasks

1. fix a bug
2. add a feature (3 subtasks)

# USER STUDY



32 participants

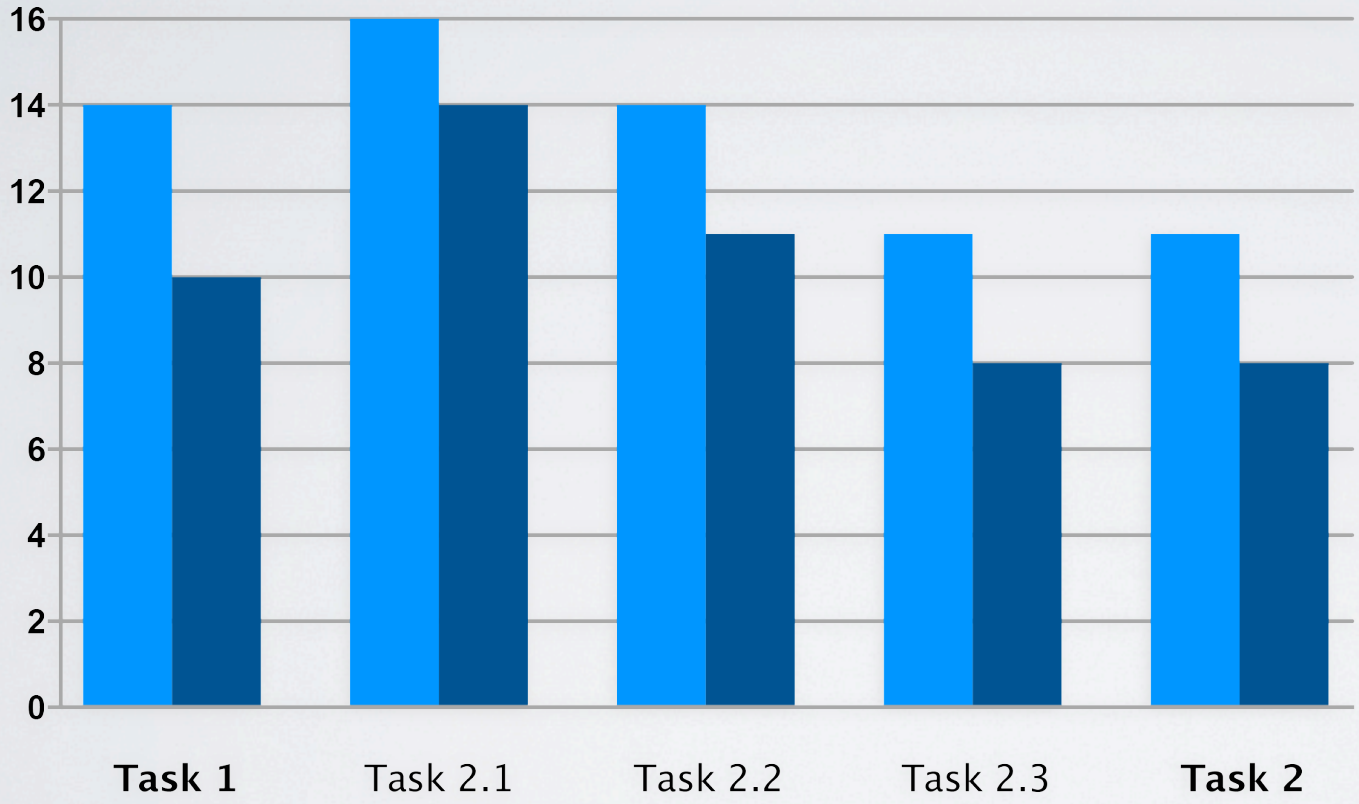
- 27 male and 5 female
- 4 professional software developers

between groups study design

- connection group (Mission Control only)
- control group

# USER STUDY - RESULTS

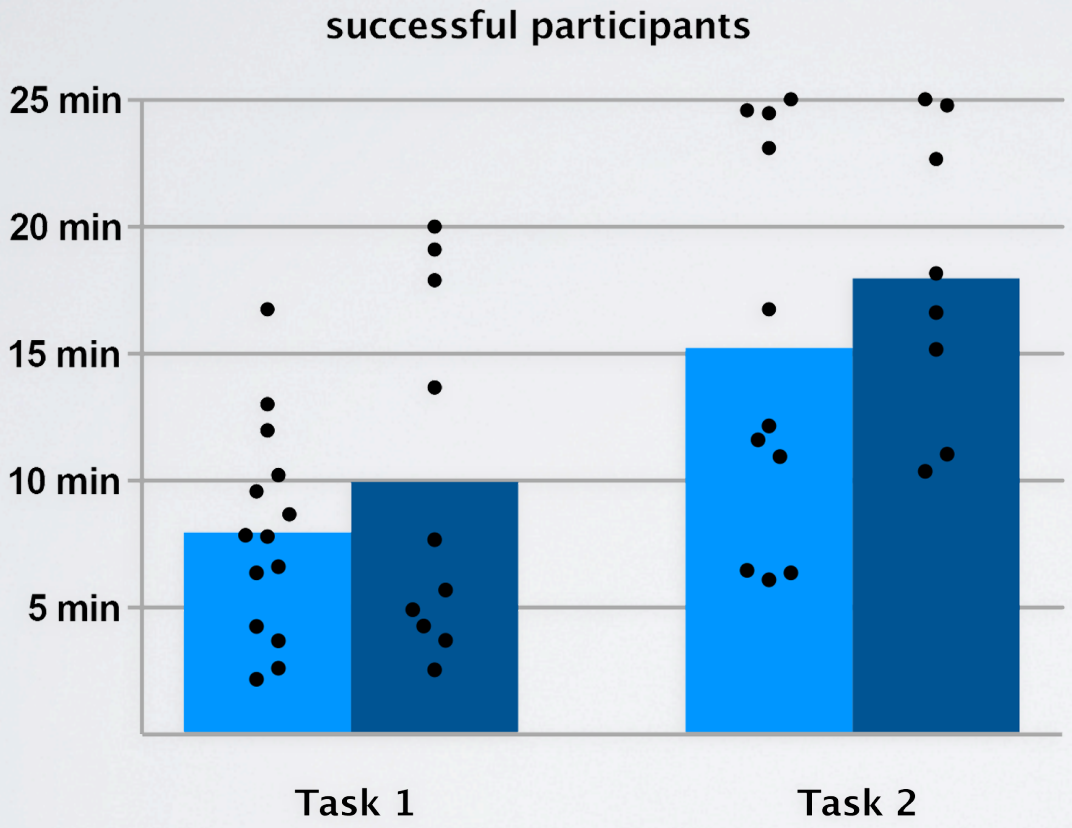
## task success




**no significant difference**

# USER STUDY - RESULTS

## task completion time

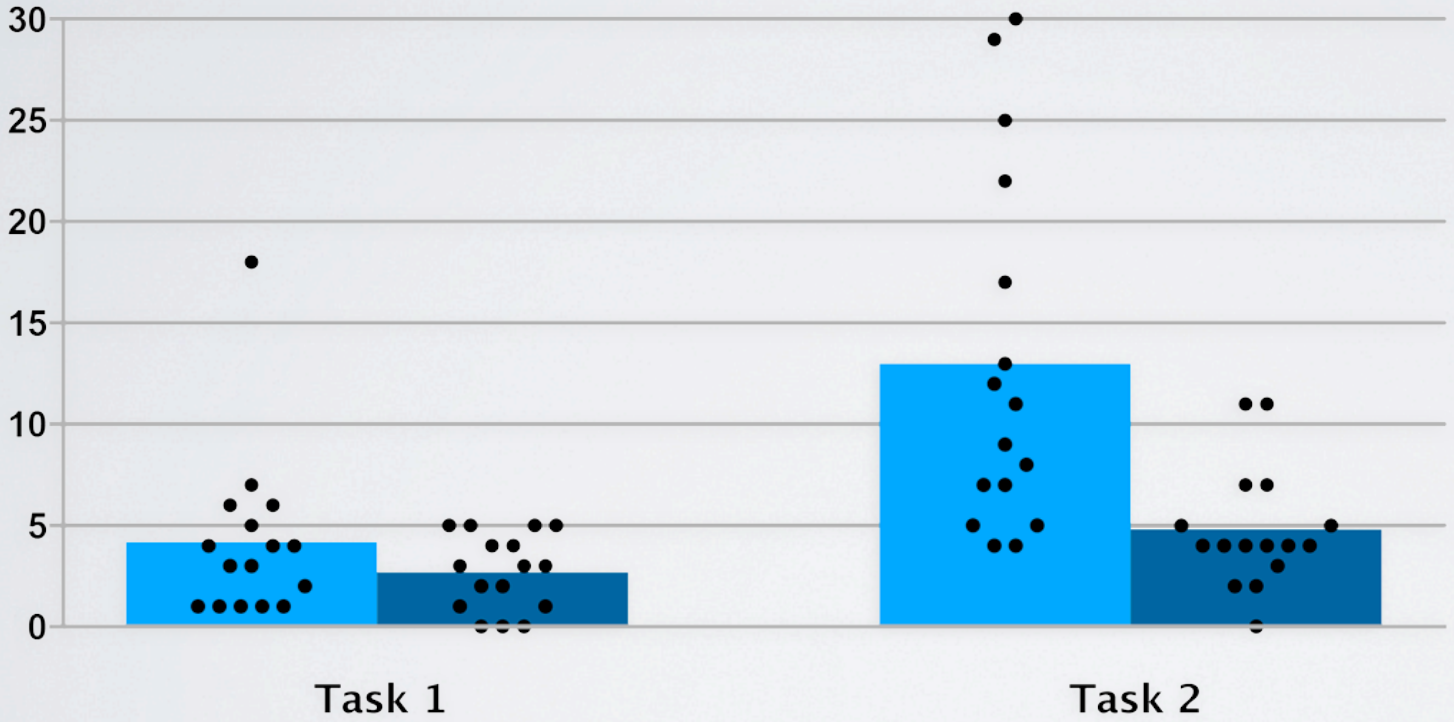



connection group
control group

**no significant difference**

# USER STUDY - RESULTS

## amount of glances at sketches



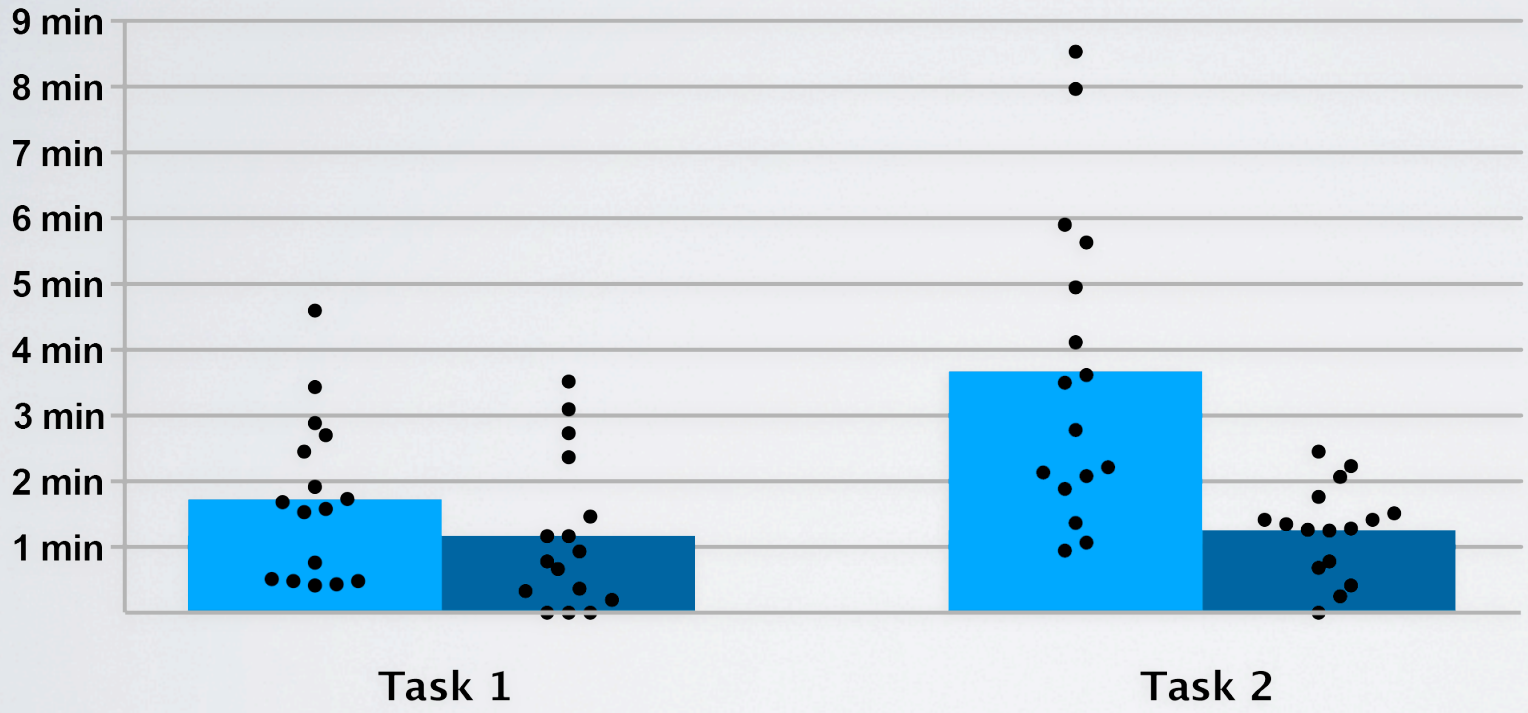

connection group

control group

**significant difference for task 2**

# USER STUDY - RESULTS

## time spent looking at sketches




connection group

control group

**significant difference for task 2**

# USER STUDY - RESULTS

## observations during sessions

control group

### common set of operations

- navigation via project tree and tabs
- scrolling through files
- searching
- reading comments and code

Ko et al. 2006
Starke et al. 2009

connection group

### change of behavior

- navigation via Connection Dots
- review of context
- orientation within context

⇨ mental walkthroughs

# USER STUDY - DISCUSSION

## identified problems

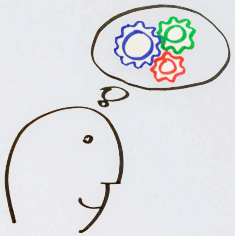
- certain amount of sketches and connections needed
- creation of sketches / visualizations
- standardized sketching
- currentness of sketches

## task appropriateness

- task 1 as a prelude for task 2
- tasks were appropriate in combination

# CONCLUSION

integration of sketches and connection to source code



- supports forming mental model

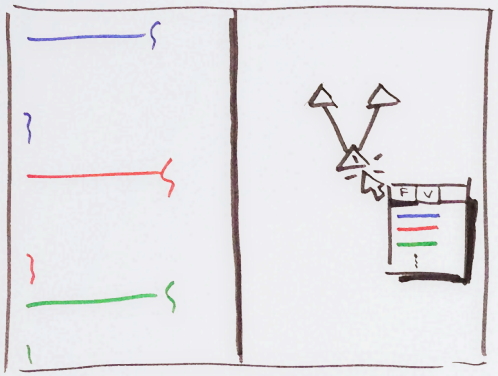
- not significantly faster, but different way
- helpful during onboarding process

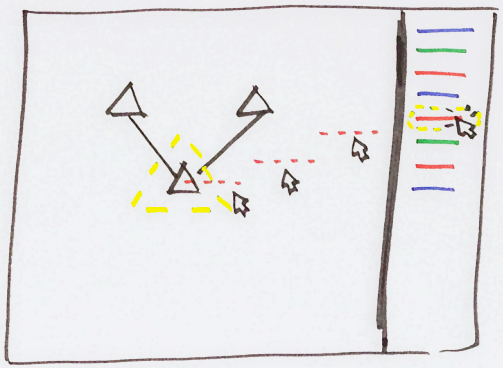

- additional time and effort needed

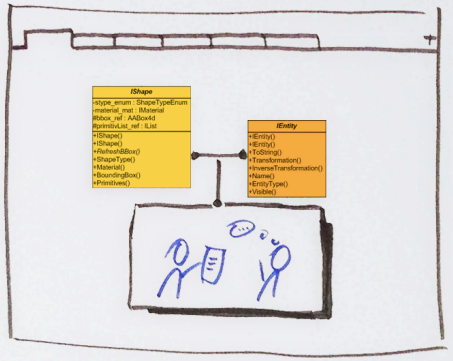
# FUTURE WORK

integrate multiple sources of information

provide more automatization and assistance







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# USER STUDY - RESULTS

## amount of participants looking at sketches during task 2