Freie Universität Berlin

Explaining Pair Programming Session Dynamics from Knowledge Gaps

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Practitioner expectations:

Better design and fewer defects in less time

Learning from each other and together

Understanding legacy parts of the software system

Pair Programming

Motivation

- Expectations in industry:
  Why pair-program?

Better design and fewer defects in less time

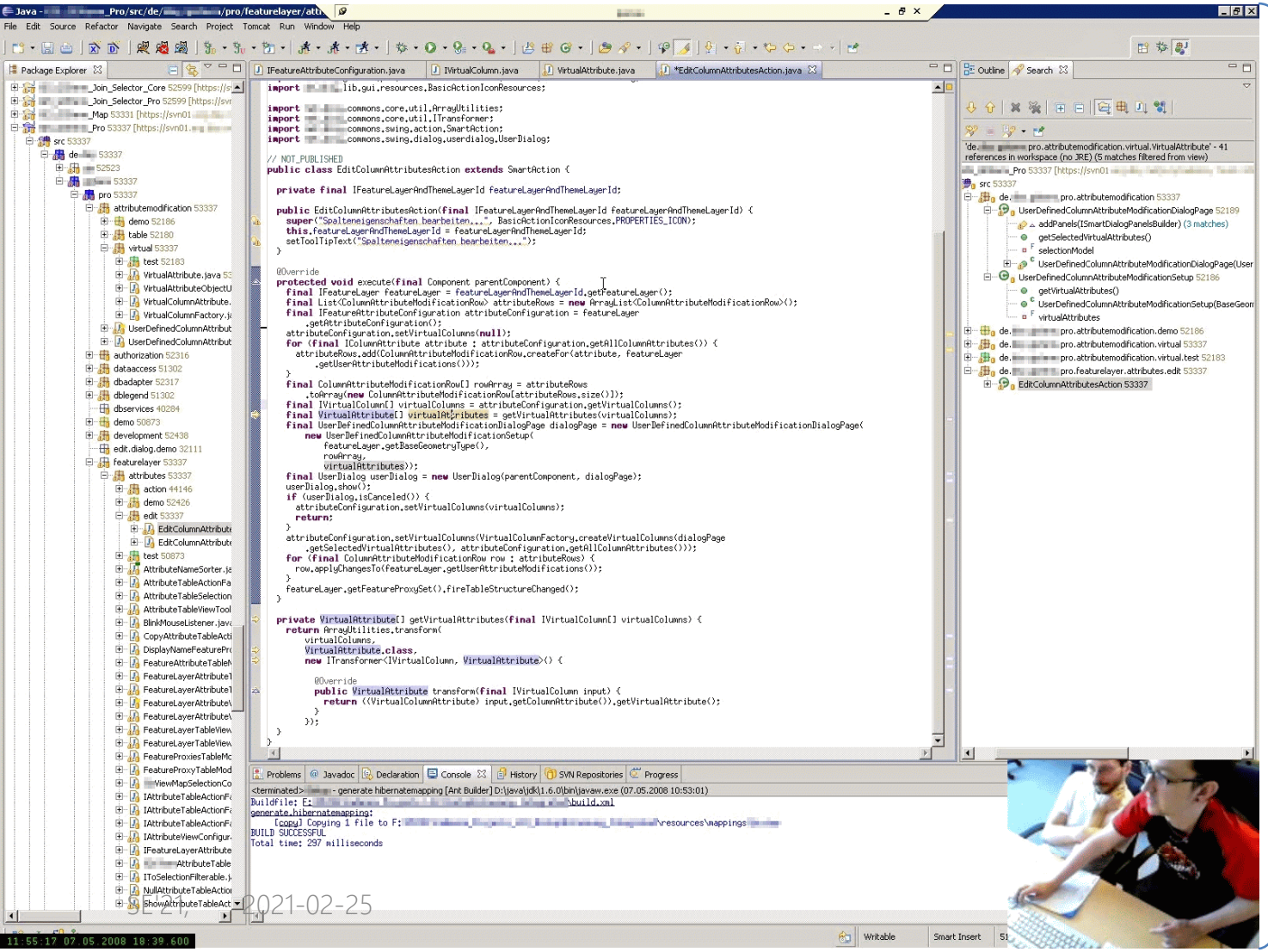
Learning from each other and together

Understanding legacy parts of the software system

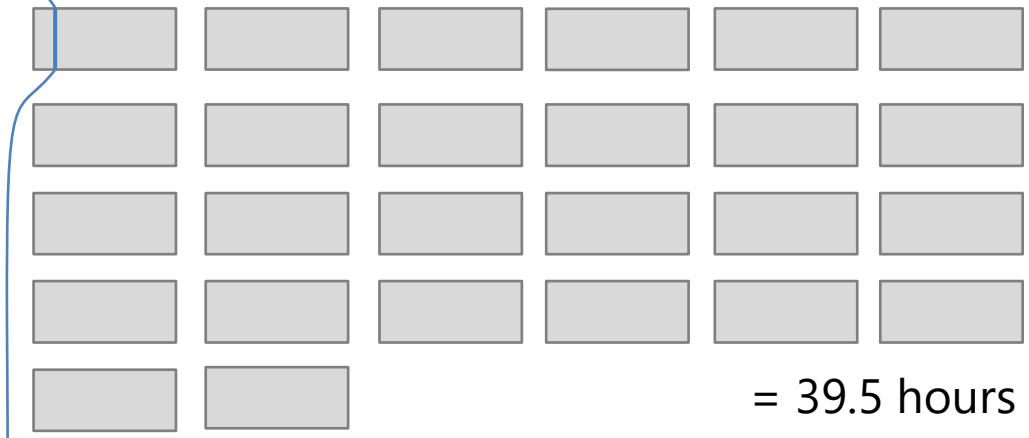
- Our Overall Research Goal
  Understand how industrial pair programming actually works
- Research Question

  What are the underlying mechanisms of **knowledge transfer** in pair programming?
- Intended Outcome
  - Advise practitioners
  - behavioral (anti-)patterns

Qualitative Data Analysis



- **Grounded Theory** approach
- Recorded **industrial** PP sessions (audio, webcam, screen)



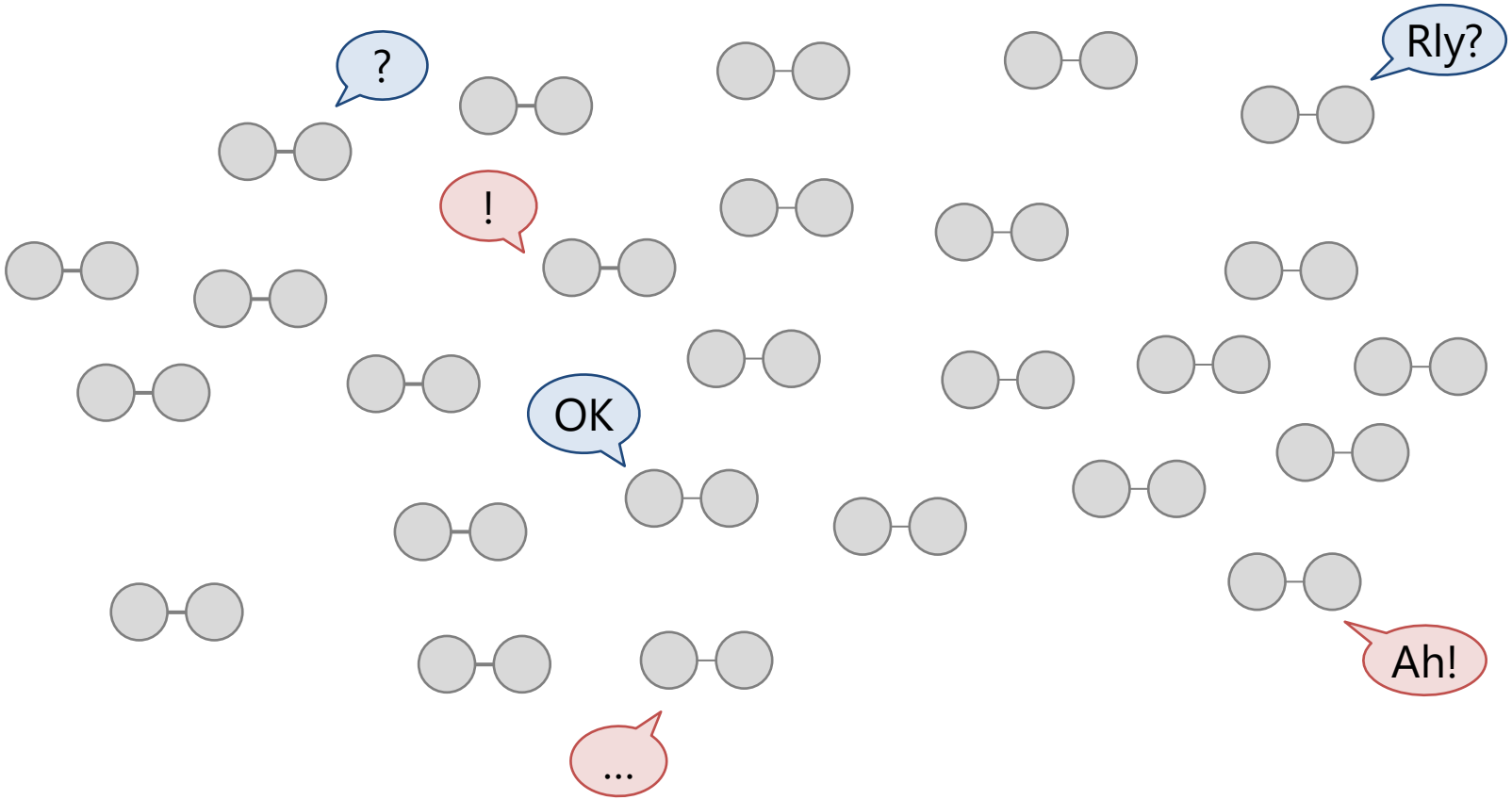
= 39.5 hours

Theoretical sampling: 26 sessions (9 companies, 16 pairs)

- from a total of 67 sessions

Qualitative Data Analysis

26 pairings of professional developers

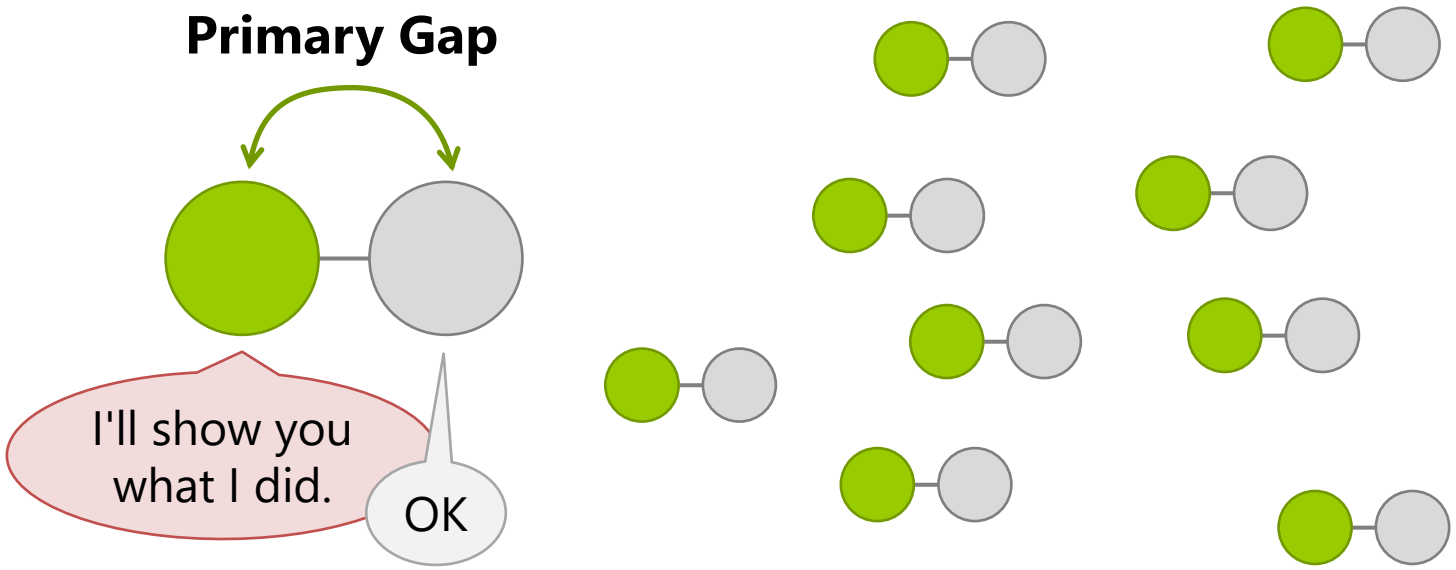


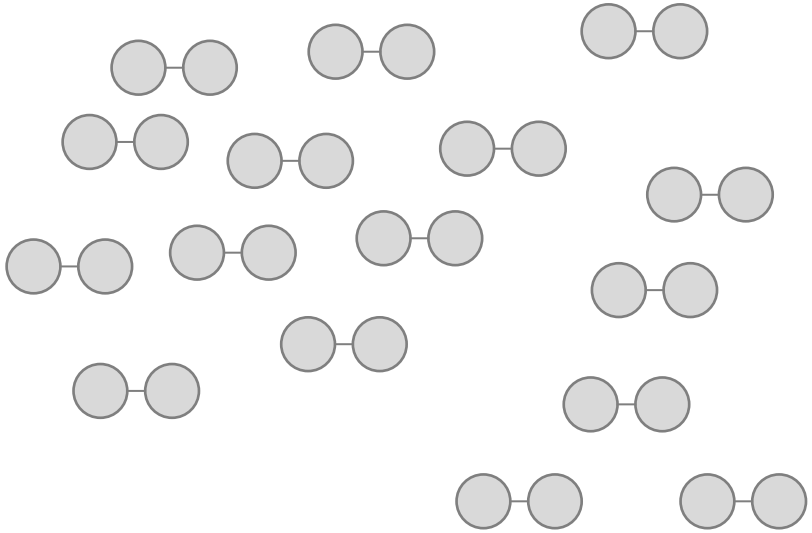
Analysis of pair programmers' dialog:

- What do they ask for? What do they explain?
- What do they (not) know? What do they learn?

Observation 1: The Primary Gap

One partner already worked on the task



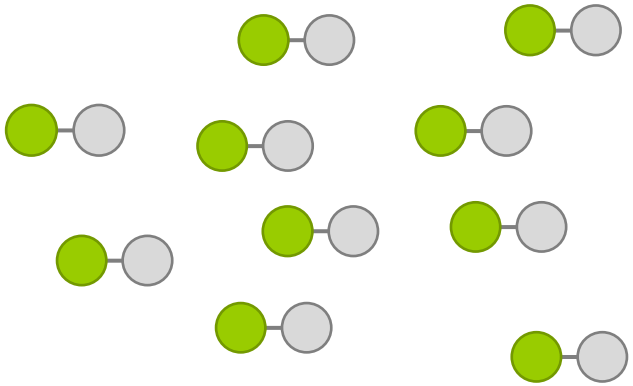


= task-relevant system knowledge

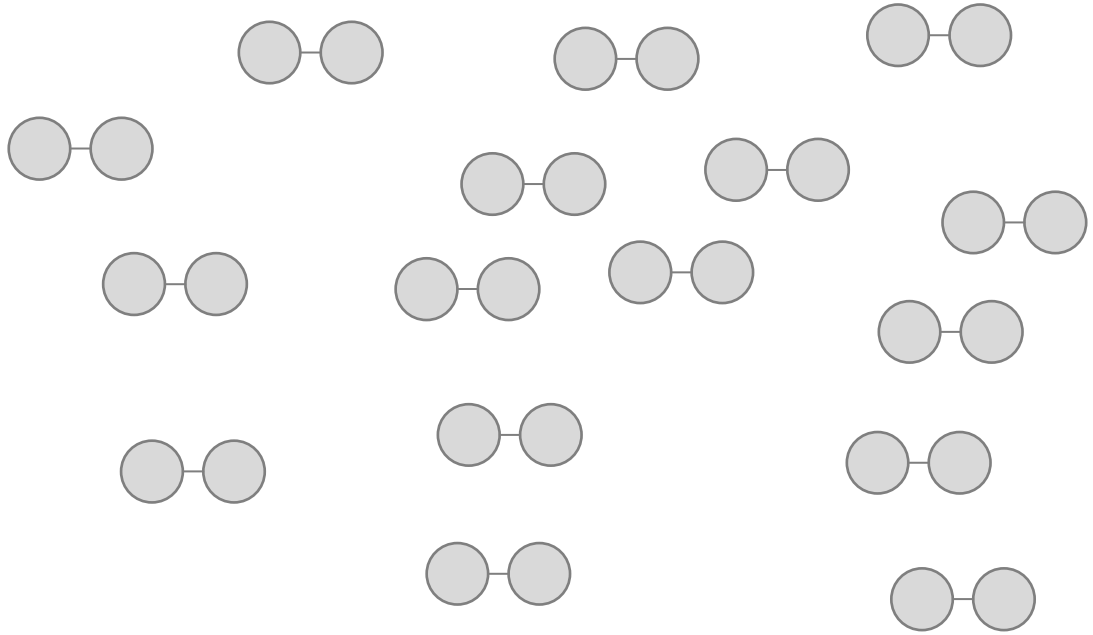
current state of implementation, classes, call hierarchies, defects, test/build setup, configuration state, ...

What about more homogenous pairs?

One partner already worked on the task



Both partners with similar prior involvement



= task-relevant system knowledge

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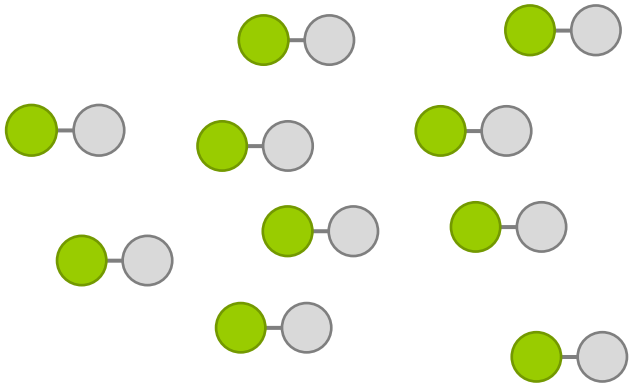

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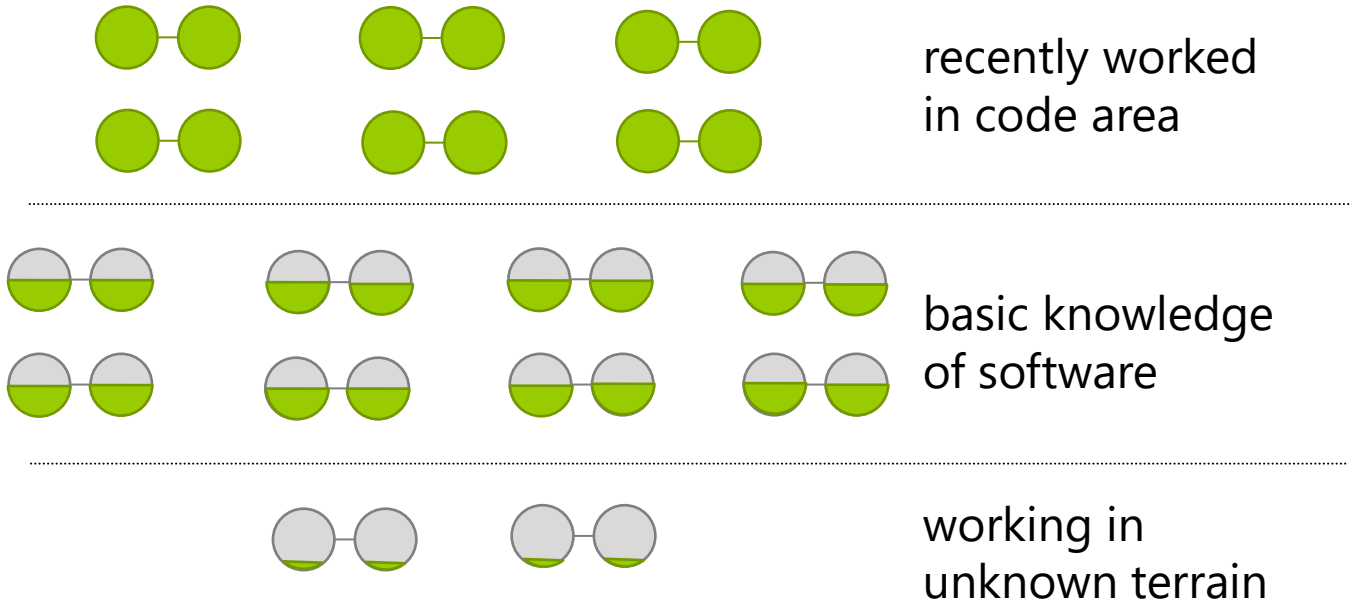
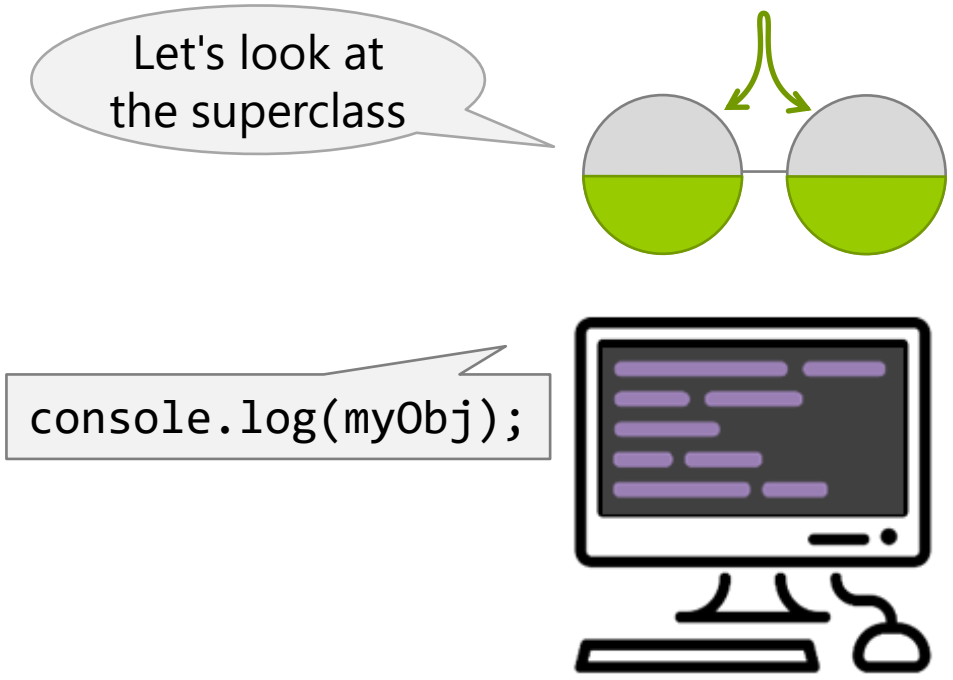
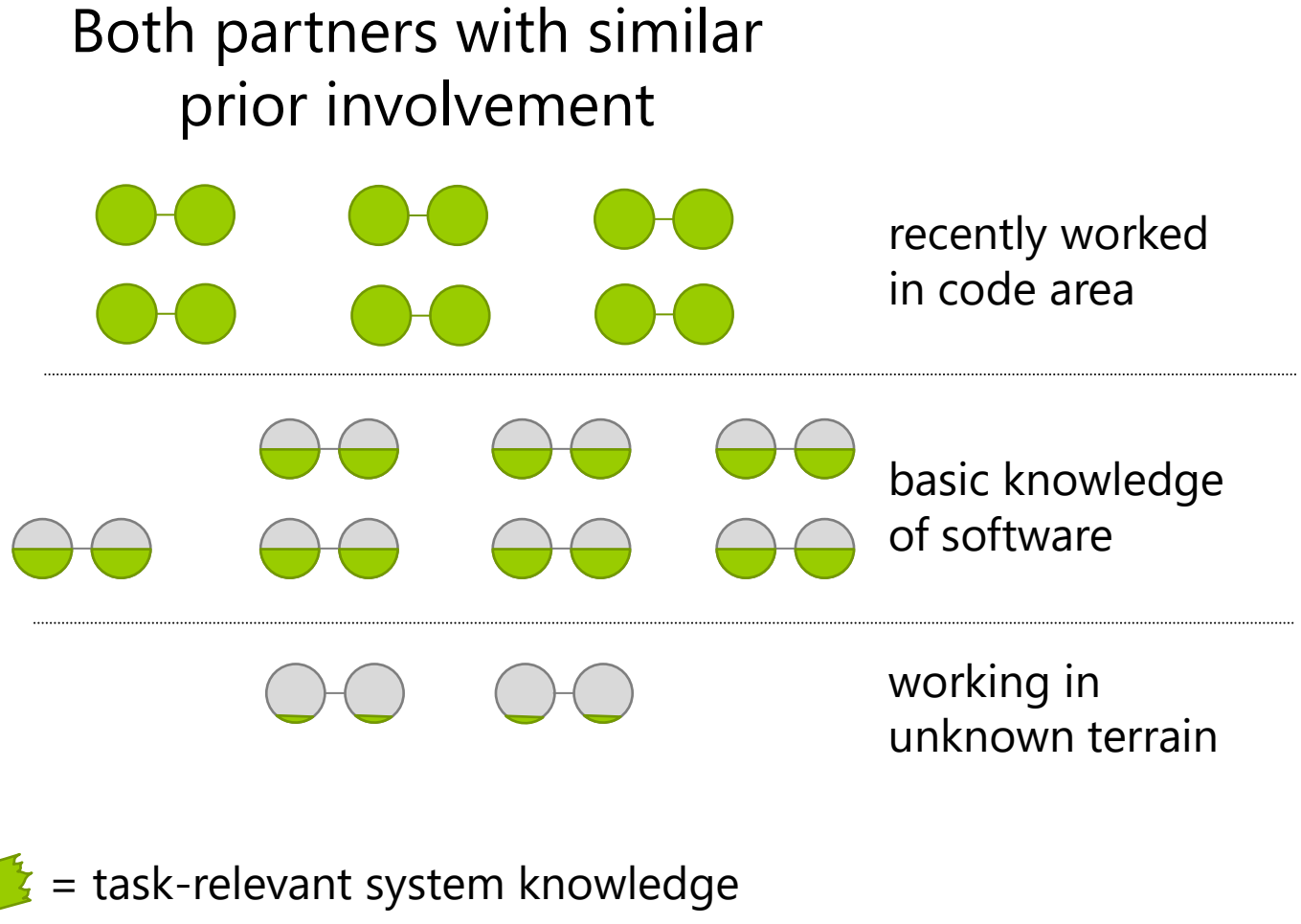


= task-relevant system knowledge

Observation 2: The Secondary Gap

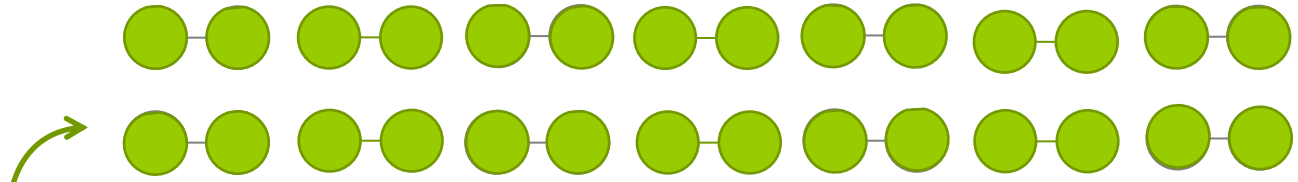




Observation 2: The Secondary Gap

Both partners with similar prior involvement

Acquiring System Knowledge together works for most pairs



Good system understanding

Medium system understanding

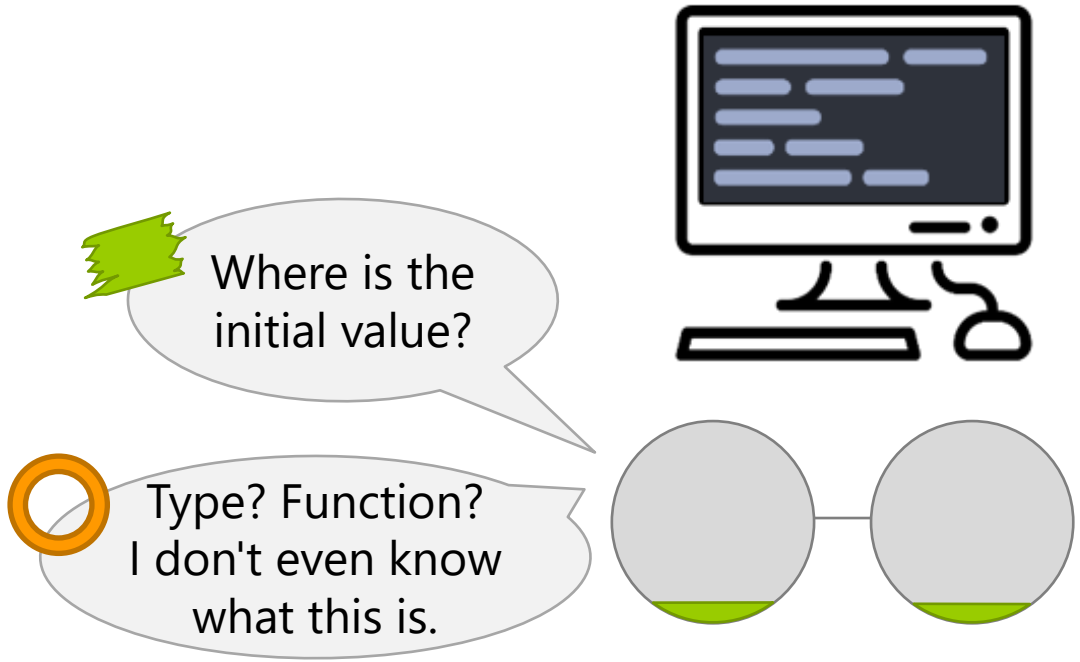
… but not for all

Litte system understanding

 = task-relevant system knowledge

A Different Kind of Knowledge

Task: implement test case



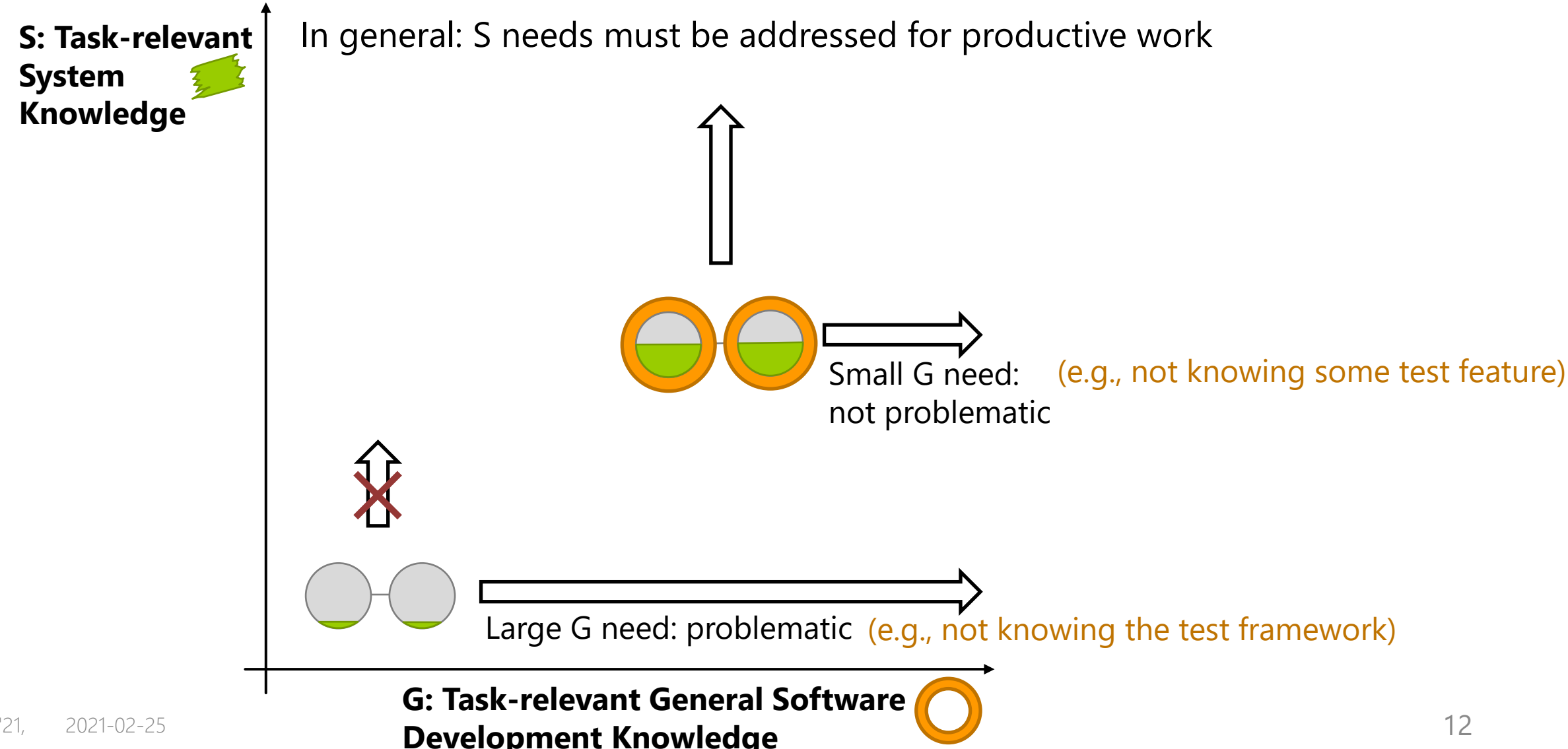
S knowledge (task-relevant system understanding)

Data structure holding the application state?
How to modify and read the state?
…

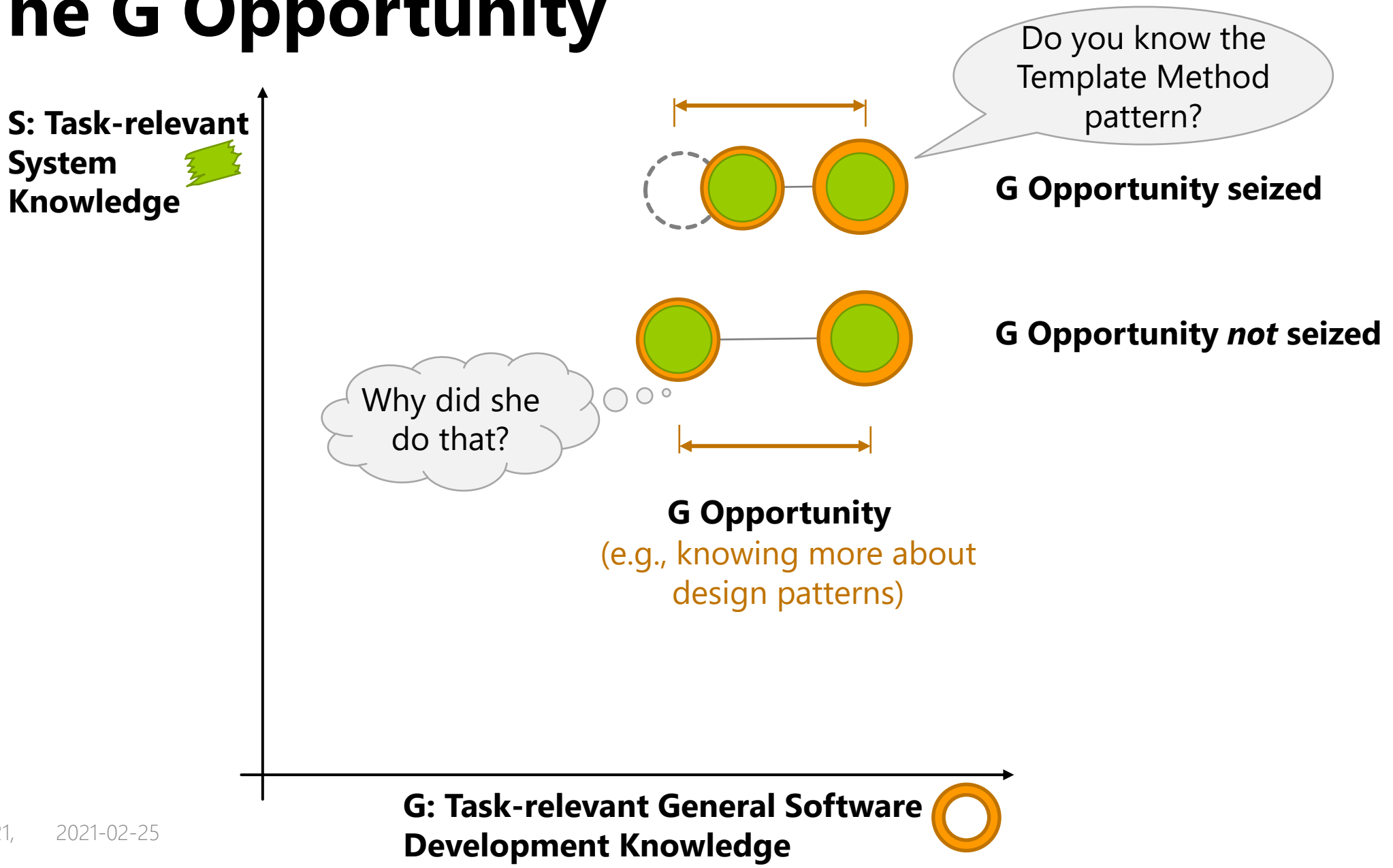
G knowledge (task-relevant general software development knowledge)

Syntax of programming language?
Higher-order functions?
Application framework?
Test framework?
…

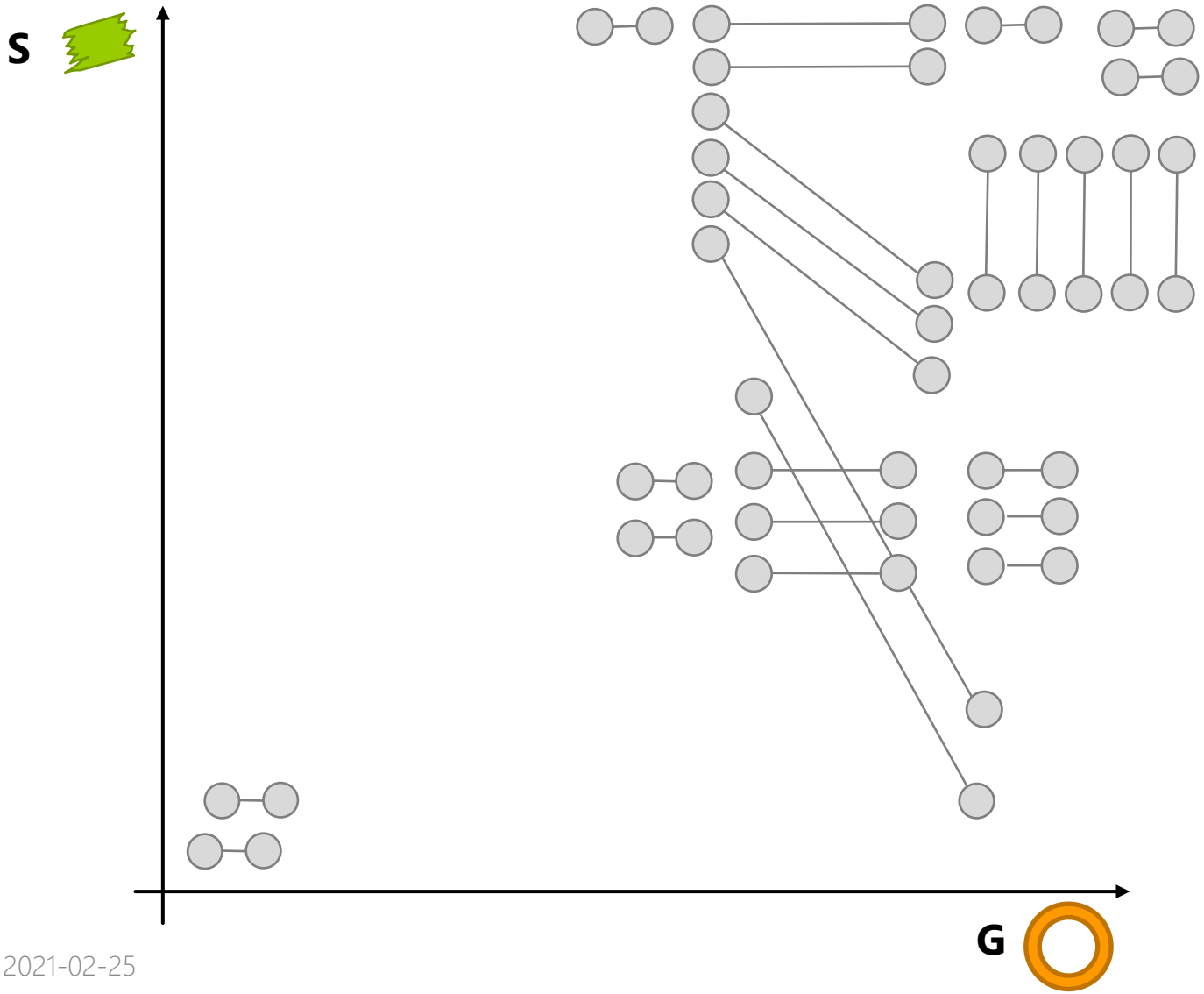
Roles of S and G knowledge



The G Opportunity



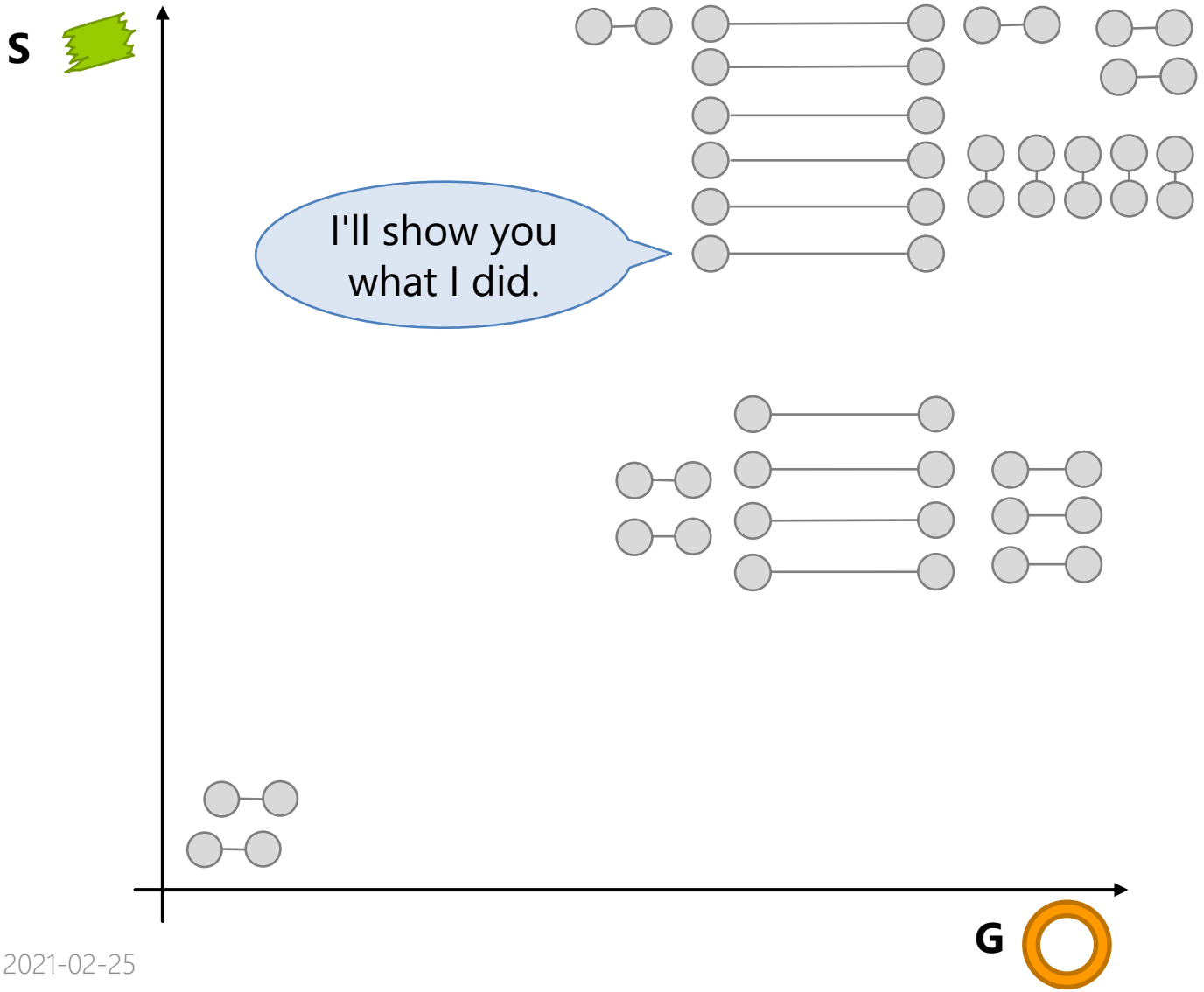
Overall Session Dynamic



Overall Dynamic

1. Close **Primary Gap**
2. Close **Secondary Gap**
3. Seize **G Opportunity**

Overall Session Dynamic



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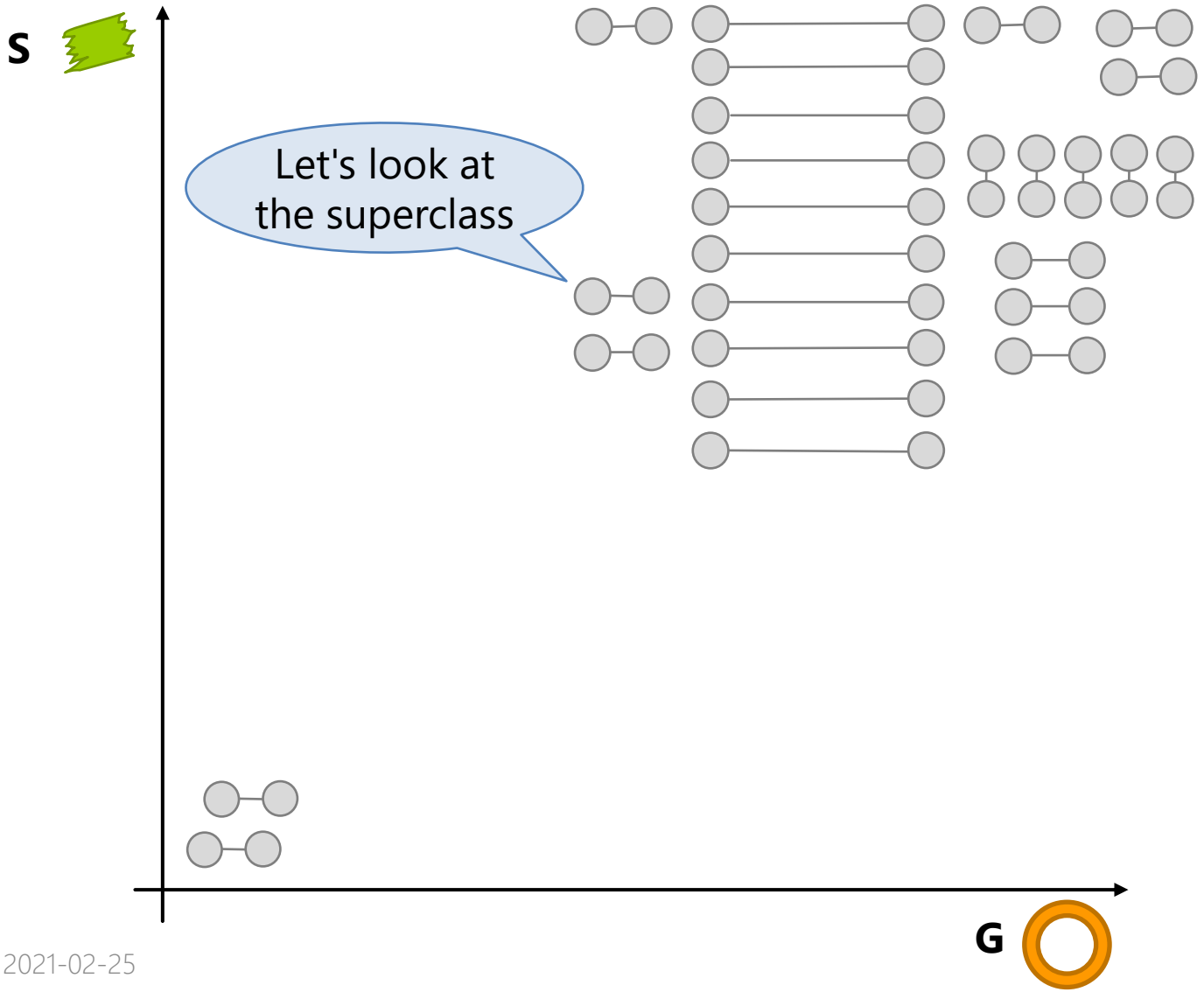

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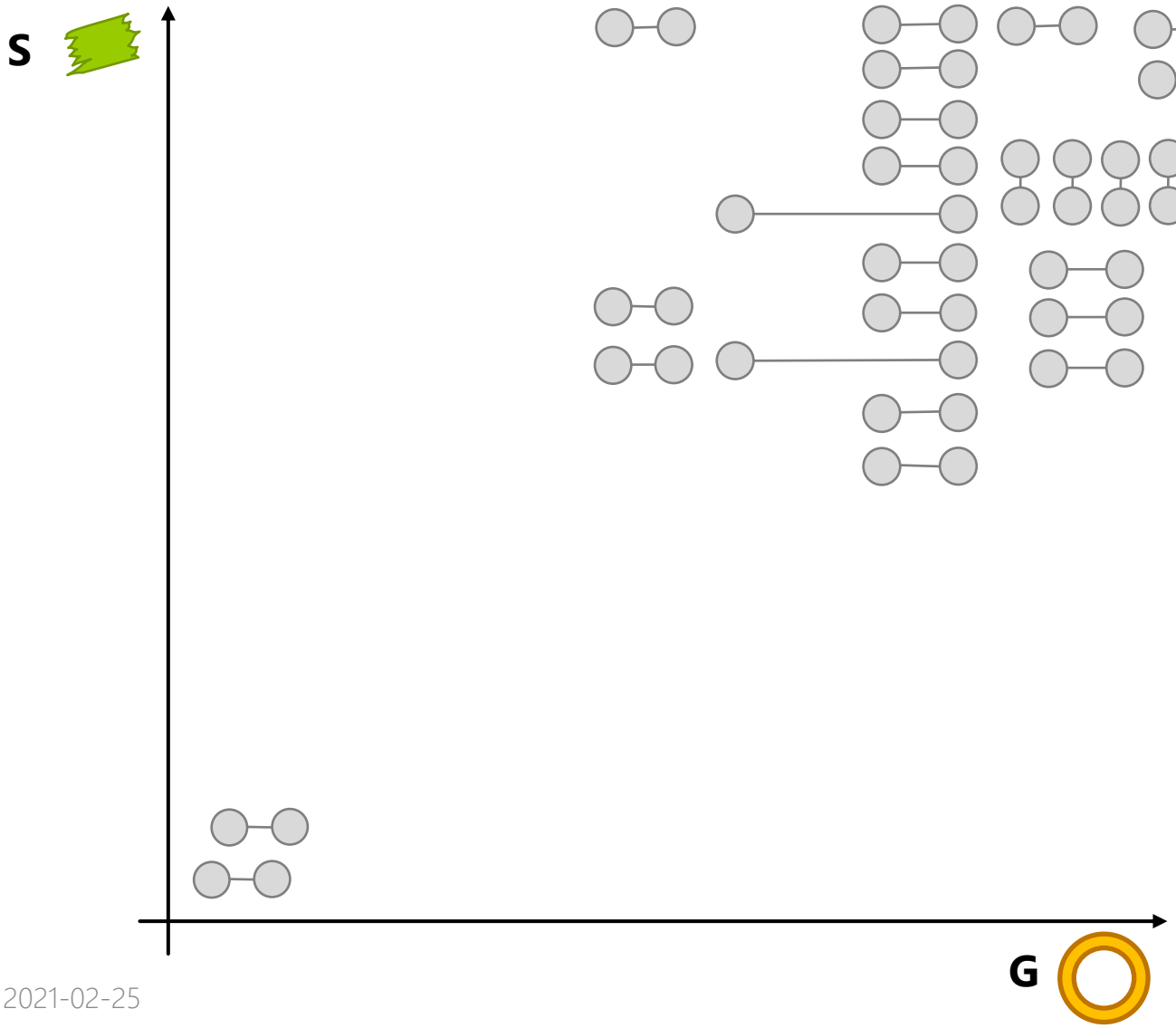

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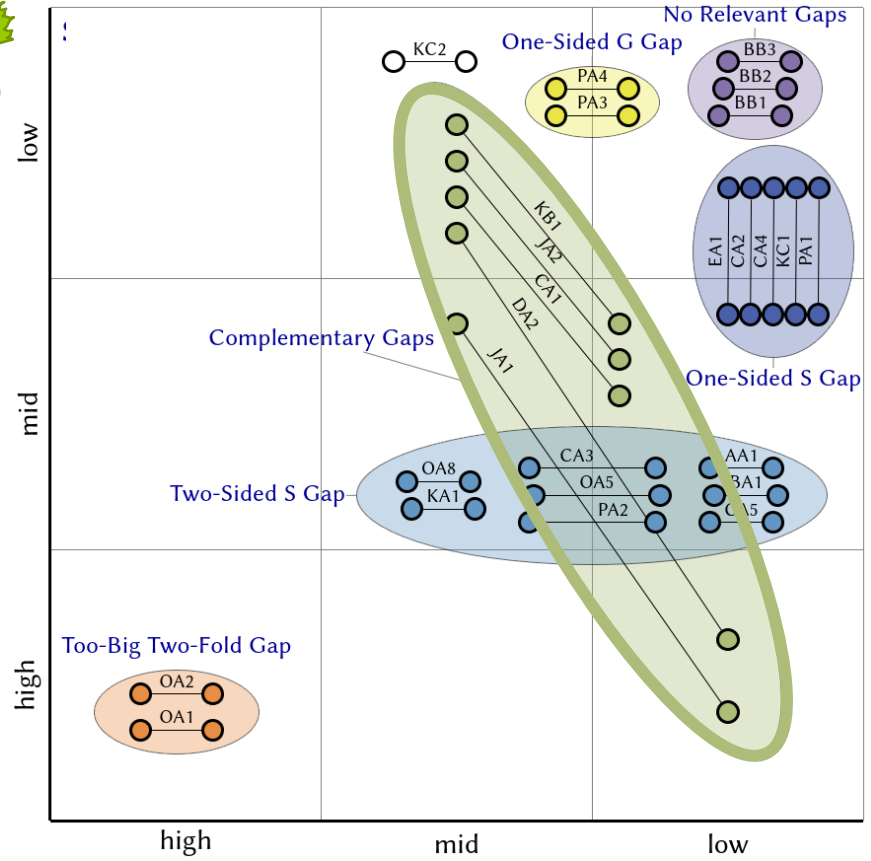
Summary

S: Task-relevant System Knowledge



G: Task-relevant General Software Development Knowledge

- Differences in S knowledge affect pairs more than in G knowledge
- What matters is **task-relevant** knowledge
  - ➔ different knowledge needs, different session dynamic
- Practical idea: consider team members' task-specific knowledge needs to *form pairs* and *tailor tasks*
  - Mutually satisfactory constellation: **Complementary Gaps**

Thank you!

Images

 https://web.archive.org/web/20080509191418/http://www.cenqua.com/pairon/

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