

The TechDebt Game- Enabling Discussions about Technical Debt

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Agenda

- 1 Motivation
- 2 The Game
- 3 Research Questions
- 4 Method
- 5 Results & Discussion
- 6 Limitations & Future Works

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Motivation



Motivation



- “TD accumulation led to increasing cycle times, unnecessary errors in the systems, and developers’ discontent. **The IT management was surprised by these problems because they were not aware of having incurred debts ...”**

Wiese et al., „Preventing technical debt with the TAP framework for Technical Debt Aware Management“, *Information and Software Technology*, 2022.

- “[I]n our theory, **difficulties emerged in communicating the presence of ATD to the stakeholders of a software product.”**

Verdecchia et al., „Building and evaluating a theory of architectural technical debt in software-intensive systems“, *Journal of Systems and Software*, 2021

- “In conclusion, the success of **encouragement across the roles** seems to be **closely related to how the TD is communicated and prioritized”**

Besker et al., „The use of incentives to promote Technical Debt management“, *Information and Software Technology*, 2022.

Motivation



Improve
Communication
in a fun way

IT managers mention **intense business stakeholders** and the **value of TD repayment**

IT managers do not complain about TD and its impact on the effectiveness of the TD item

IT managers discuss solutions alone, do not question TD with business stakeholders

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IT managers' perspective on Technical Debt Management^{a,b}

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Legacy systems

ABSTRACT

Context: Technical Debt (TD) is a term for software solutions that are not fit for their intended purpose and thus impede future change.

Goal: Previous research on TD indicates various management approaches of IT managers on TD since they usually have a major role in identifying TD and setting up a TD management (TDM) process.

Method: To determine the IT managers' perspective, we conducted semi-structured interviews and a three-person focus group discussion.

Results: We found that all IT managers understood the essential topic, though nearly none of them had set up a major process. The IT managers had regarding TD a common understanding of TD as a long-term issue, i.e., old legacy systems, causes and consequences visible to business stakeholders, causes and consequences visible to business stakeholders, causes and consequences visible to business stakeholders, causes and consequences visible to business stakeholders.

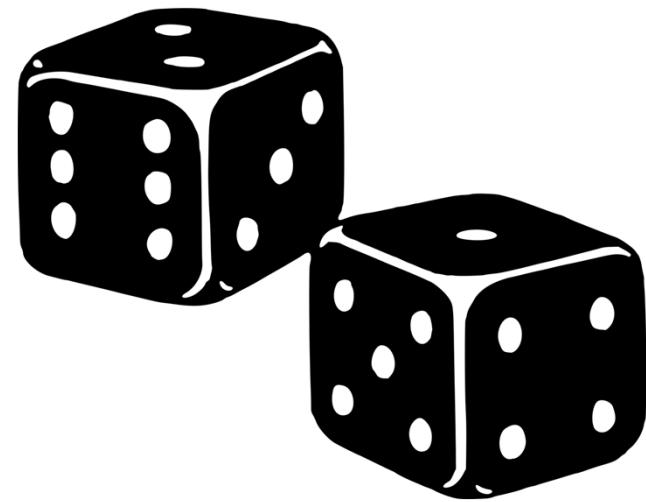
Conclusions: Our research identifies new research gaps and demands for further research. Involving IT managers in a TDM process may be beneficial. It provides the VACTD model for TD management and extends the TD conceptual model and TD management practice.

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The TechDebt Game



Game-based learning



Teaching content is passed on to the learners by playing a game.

J. L. Plass, B. D. Homer, and C. K. Kinzer,
"Foundations of Game-Based Learning,"
Educational Psychologist, Oct. 2015, publisher:
Routledge.

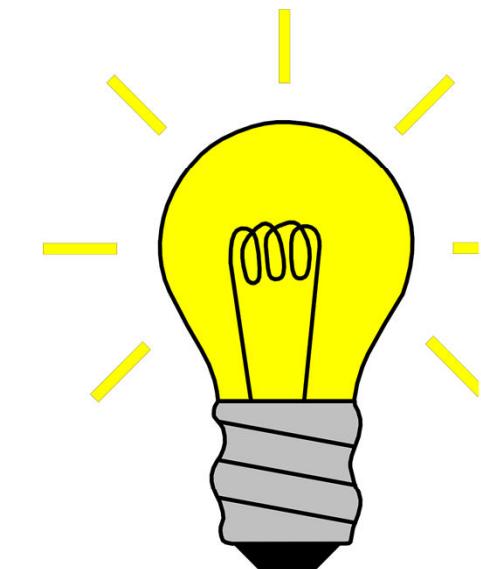
Advantages:

- *Motivation* → better learning outcomes
- *Player engagement* → immersion in the subject
- *Adaptability* → adjustment of the difficulty to the player's abilities
- *Graceful failure* → consequence-free failure

Developing the Game – AHA moments (learning objectives)



TABLE I: *Aha-moments and their explanations (causes and consequences are taken from Wiese et al. [7])*



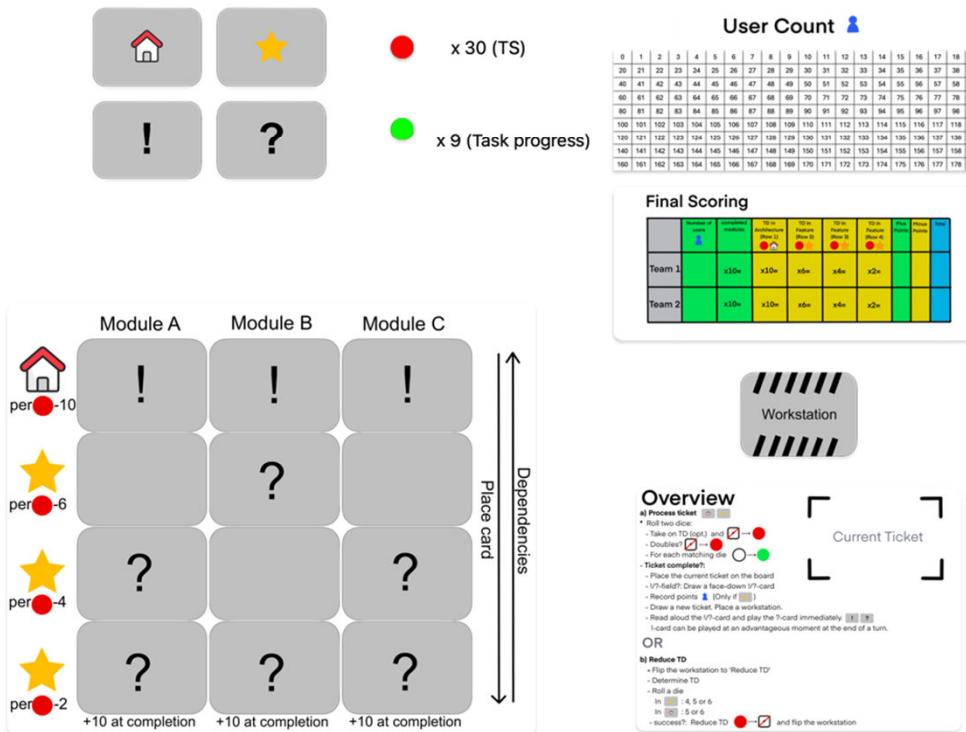
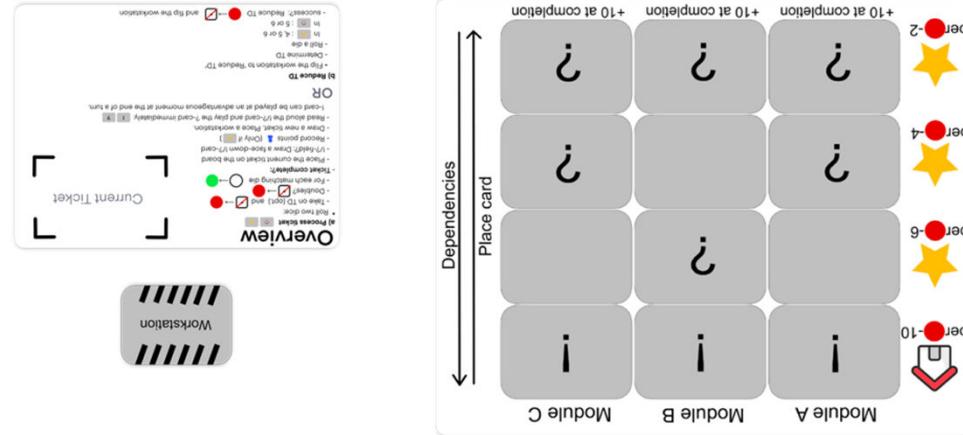
Group	Variable	Description
Causes	Time	Time pressure can be a cause of TD (deadlines).
	Budget	Budget pressure can be a cause for TD (license costs).
	Business	Business decisions can be a cause of TD (change in requirements, change in strategy).
	Management	Management decisions can be a cause of TD (broken communication, poorly planned projects).
Per: Tec: Dec: Aw: Cha:		
Incurrence	Cor Unc	
Consequences	Tim Bud Bus Mai Per: Tec: Cha:	
Vicious Cycle	Inno Out	
Repayment	Diff Tim Ben Sim	
Architecture	Crit Har Prev	
TD management	Idei Prioritizing TD Ignoring TD	To make decisions, TD must be prioritized. It is not always reasonable to fix (all) TD.
Business	Invisible Perspective	TD are invisible in themselves and can only be recognized through symptoms. Causes and consequences of TD can be difficult to discern from a business/management perspective.

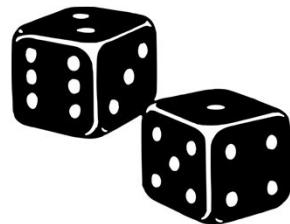
Goal of the Game

PDF

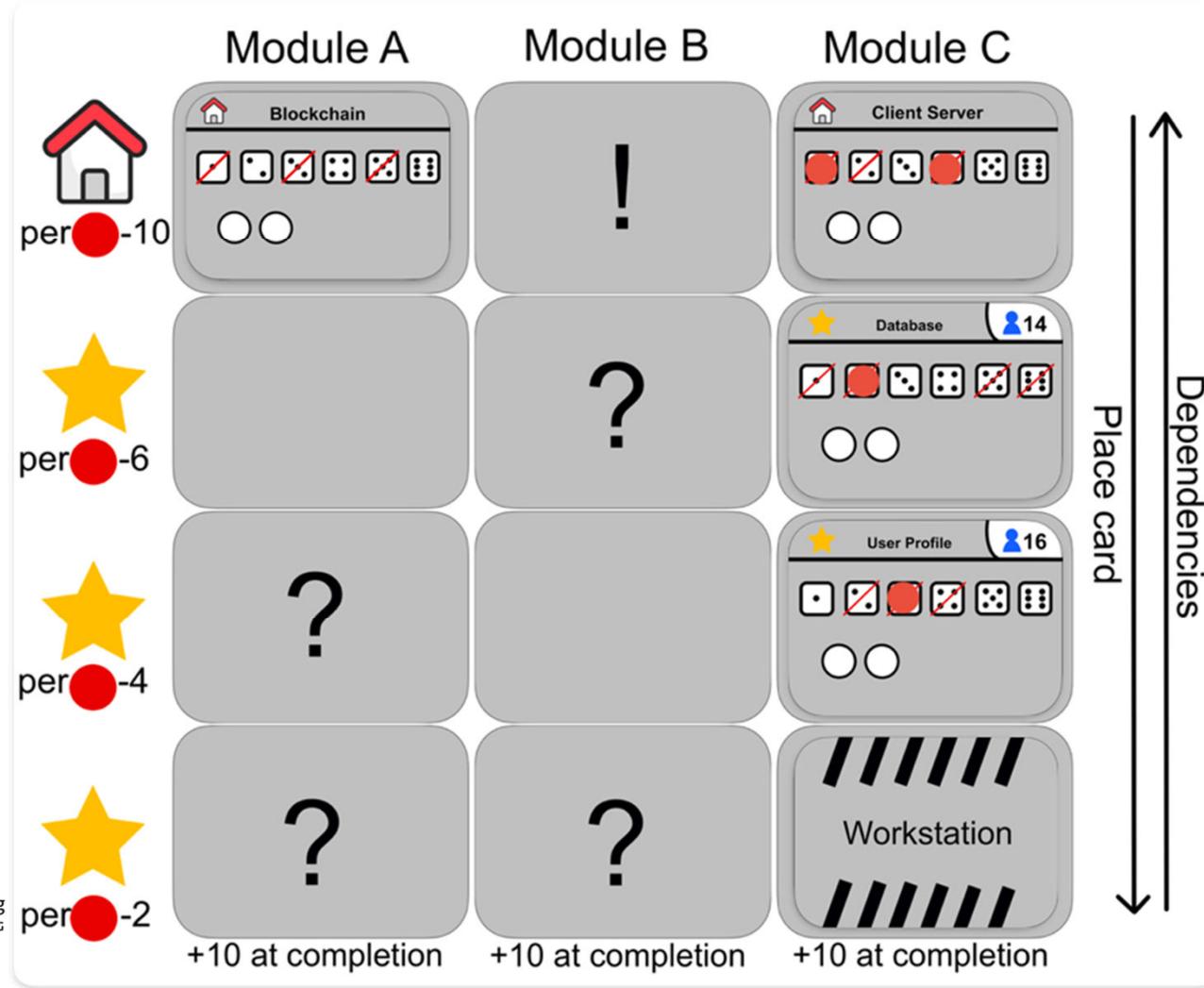
augmented with dice,
game stones

<https://github.com/TechDebtGame>

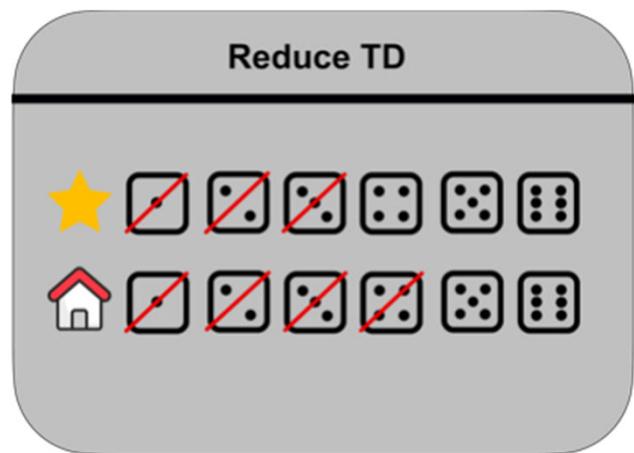




Game Mechanics



Game Mechanics



?

Poor Requirements

C

Poorly documented requirements from the customer led to the wrong architectural choices.

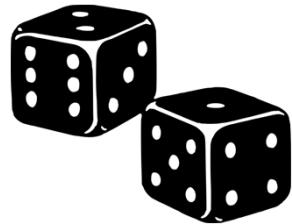
Your opponent can place a TD on any architecture ticket.

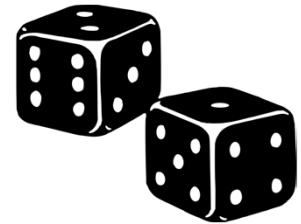
!

Refactoring

A developer is assigned to appropriately divide overly long classes and methods. This reduces the complexity of the project.

You can remove any TD.

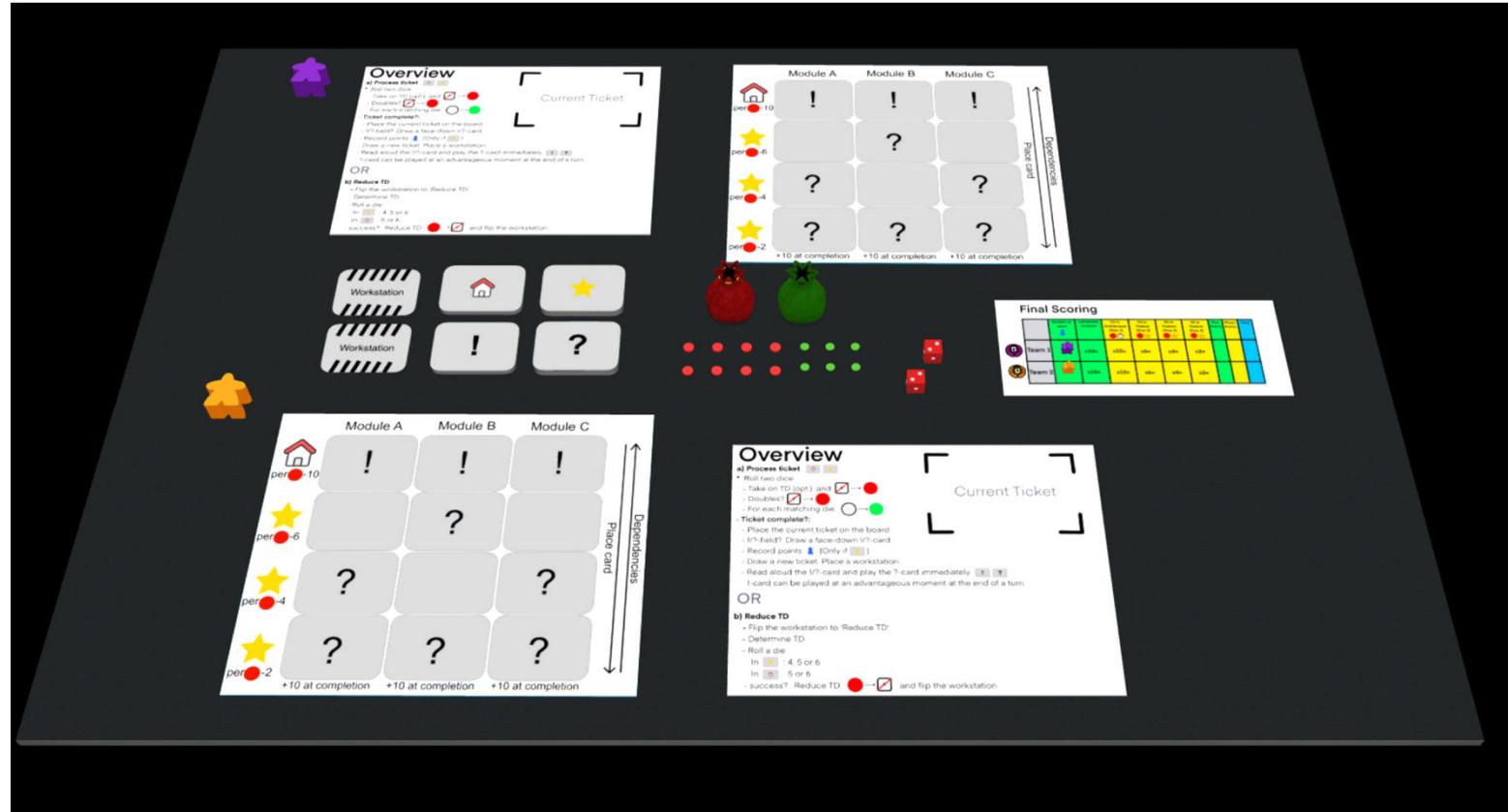




Playing Online

Online at Tabletopia

<https://tabletopia.com/workshop/games/techdebts/1-7players/test>



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Research Questions



Picture: [Clker-Free-Vector-Images \(Pixabay\)](#)

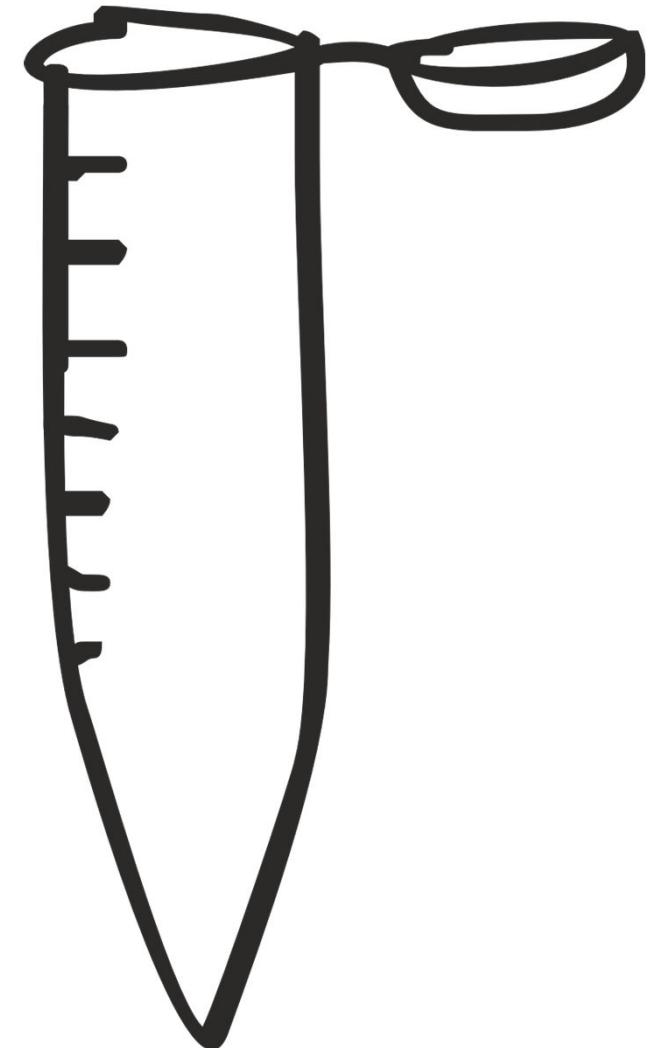
Research Questions

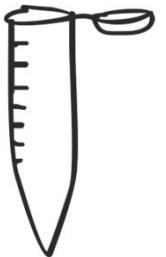


- RQ 1: To what extent does the game **emulate the real-life experiences that technical stakeholders encounter?**
- RQ 2: Do the players encounter **new insights** and learn about **additional facets** of TD management?
- RQ 3: How does the game change players' **attitudes and possibly behaviors** regarding TD?

3

Method





Method: Playing the Game

13 game sessions

- 7 in Germany, 5 in Brazil, 1 in Poland
- 4 on-site, 9 online

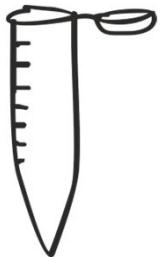
46 practitioners

1 customer, 1 user, 9 project or product managers, 6 IT managers, 4 software architects, 25 developers

➤ Categories:

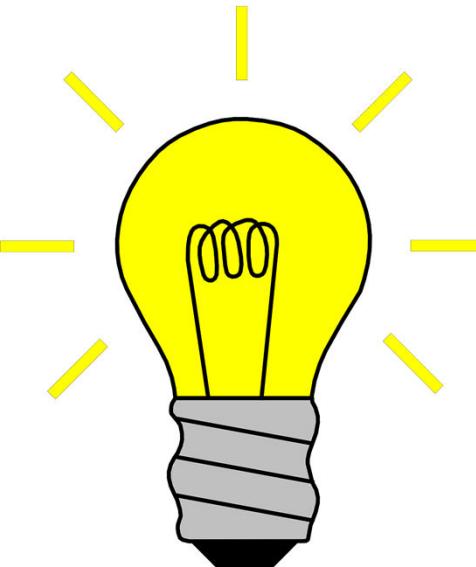
- 17 senior technical stakeholders (> 5 yrs experience)
- 18 junior technical stakeholders (<= 5 yrs experience)
- 11 business stakeholders

Method: Evaluating the Success



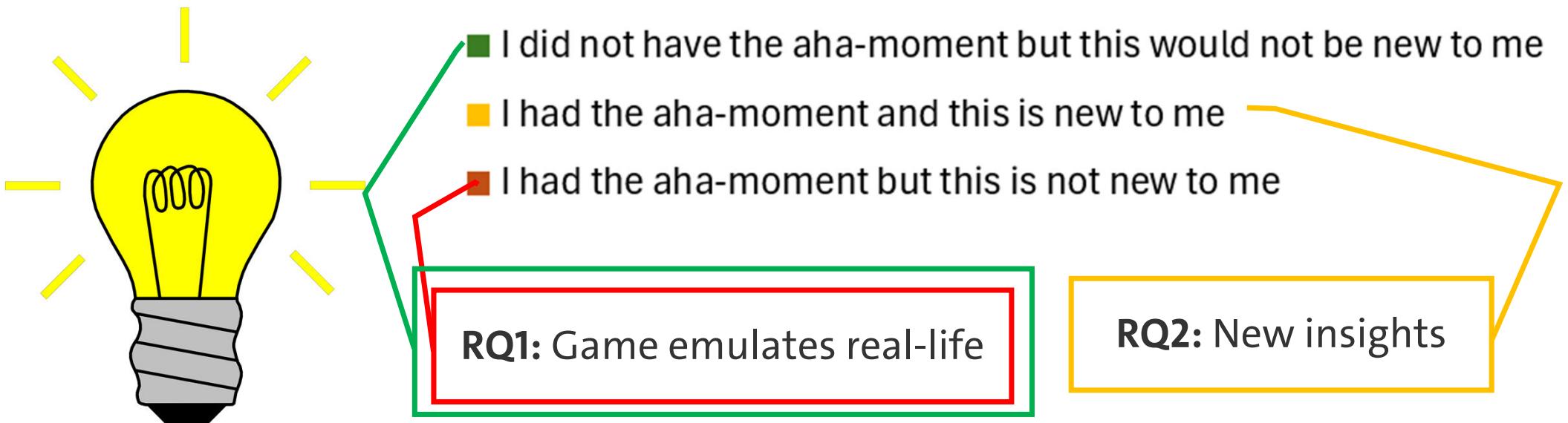
Which of the following AHA moments did you have regarding the causes of technical debt (TD)?
*

Please choose the appropriate response for each item:

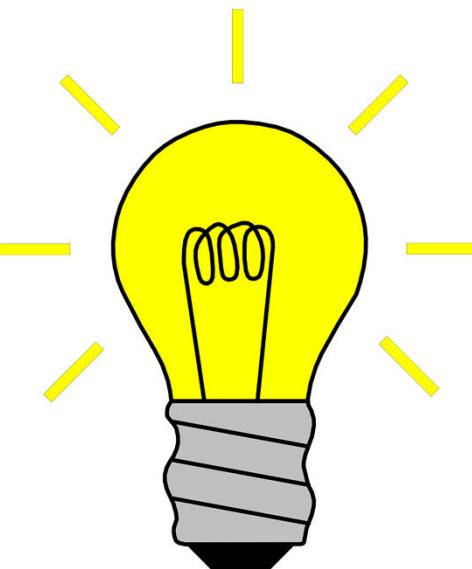


	I had the AHA moment, but the realization is NOT NEW to me.	I had the AHA moment and the realization is NEW for me.	I didn't have the AHA moment, but the realization is NOT NEW for me.	I didn't have the AHA moment and the realization would be NEW for me.
Time pressure can be a cause of TD (deadlines).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cost pressure (budget) can be a cause of TD.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Business decisions can be a cause of TD (change in	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Method: Evaluating the Success



Method: Evaluating the Success



RQ3:

Has the game changed your attitude towards the topic of "technical debt"?

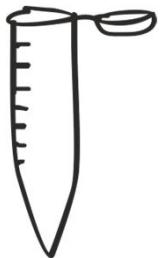
If yes, in what way? If not, why not?

*

Please write your answer here:

Do you plan to change your behavior regarding "technical debt" (e.g. management of technical debt)? If yes, in what way? If not, why not?

Please write your answer here:

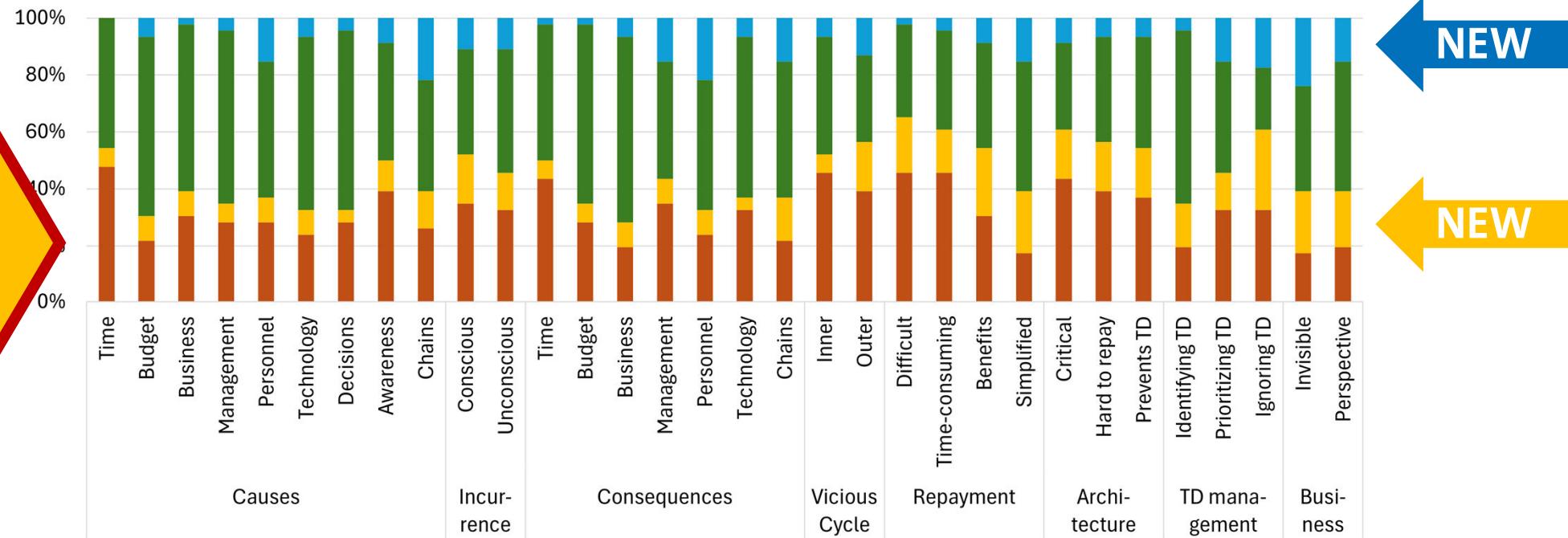


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Results & Discussion



Results – Overview

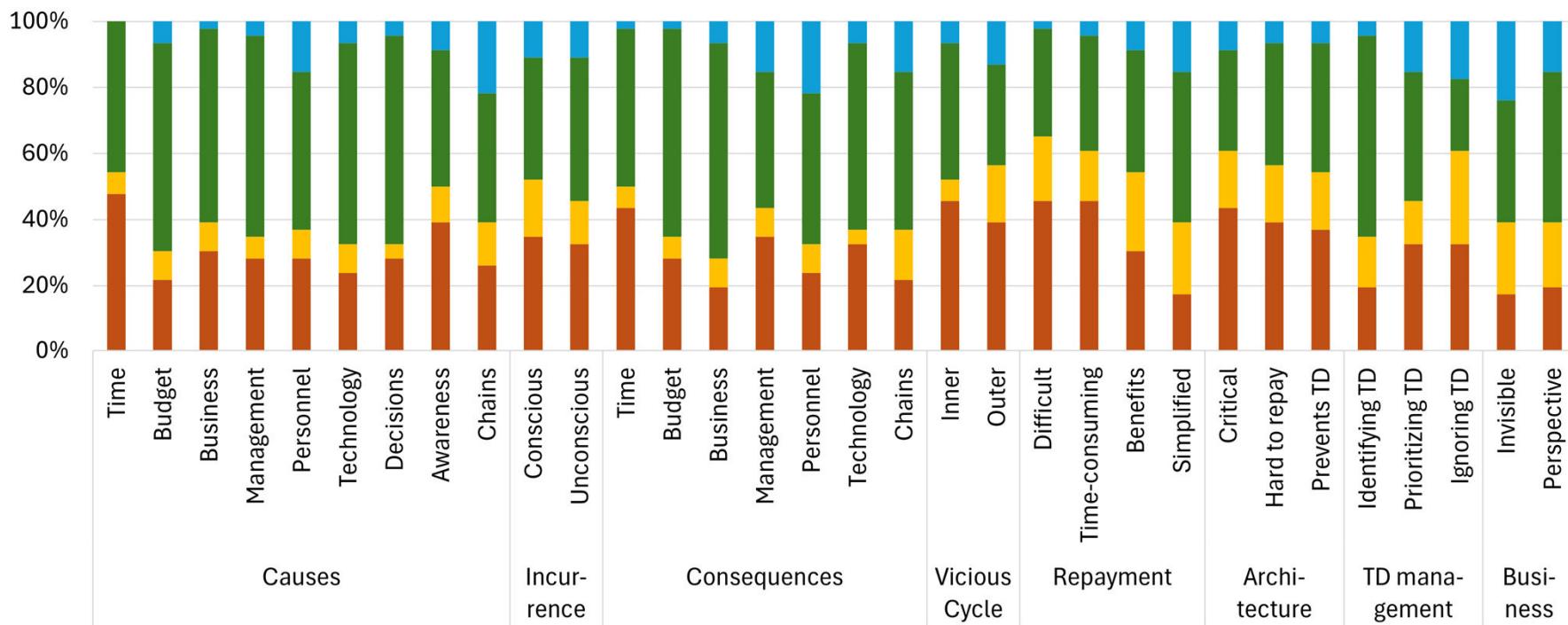


AHA MOMENTS

■ I did not have the aha-moment but this would be new to me
 ■ I had the aha-moment and this is new to me

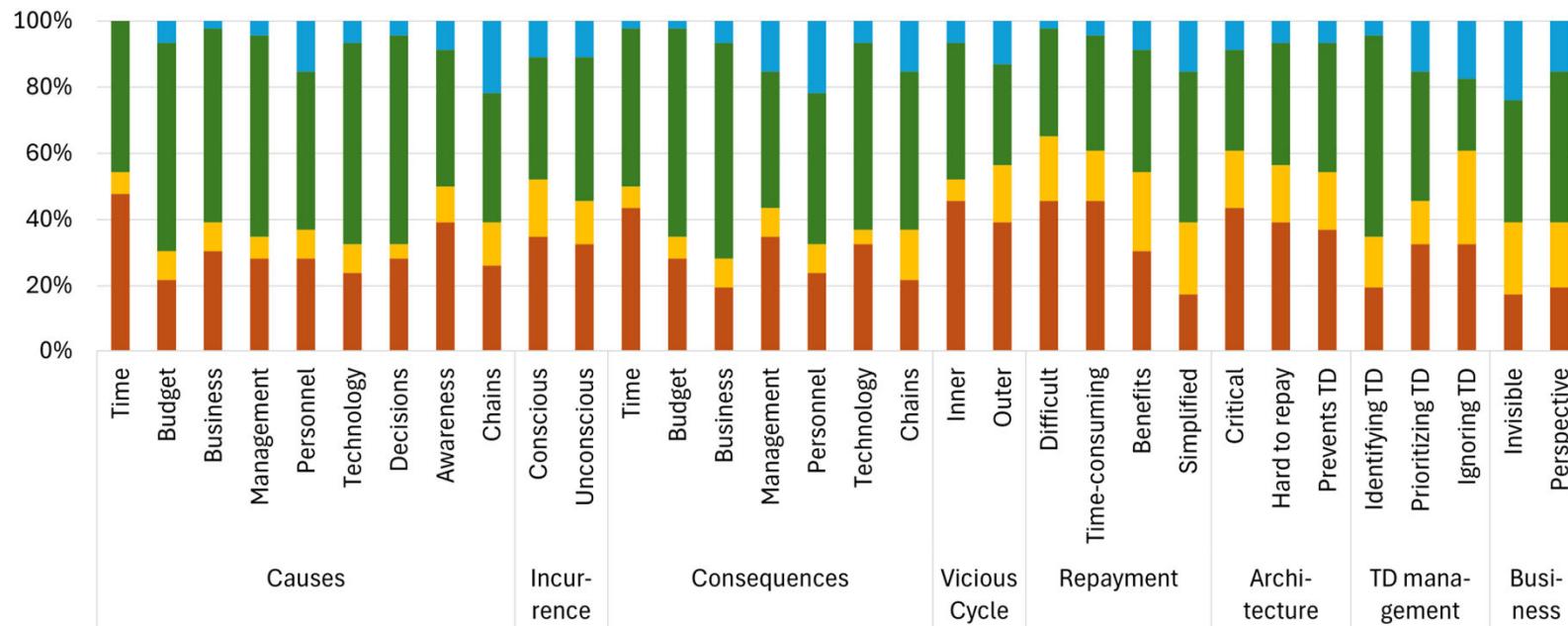
■ I did not have the aha-moment but this would not be new to me
 ■ I had the aha-moment but this is not new to me

Results – RQ1: Does the game emulate real-life?



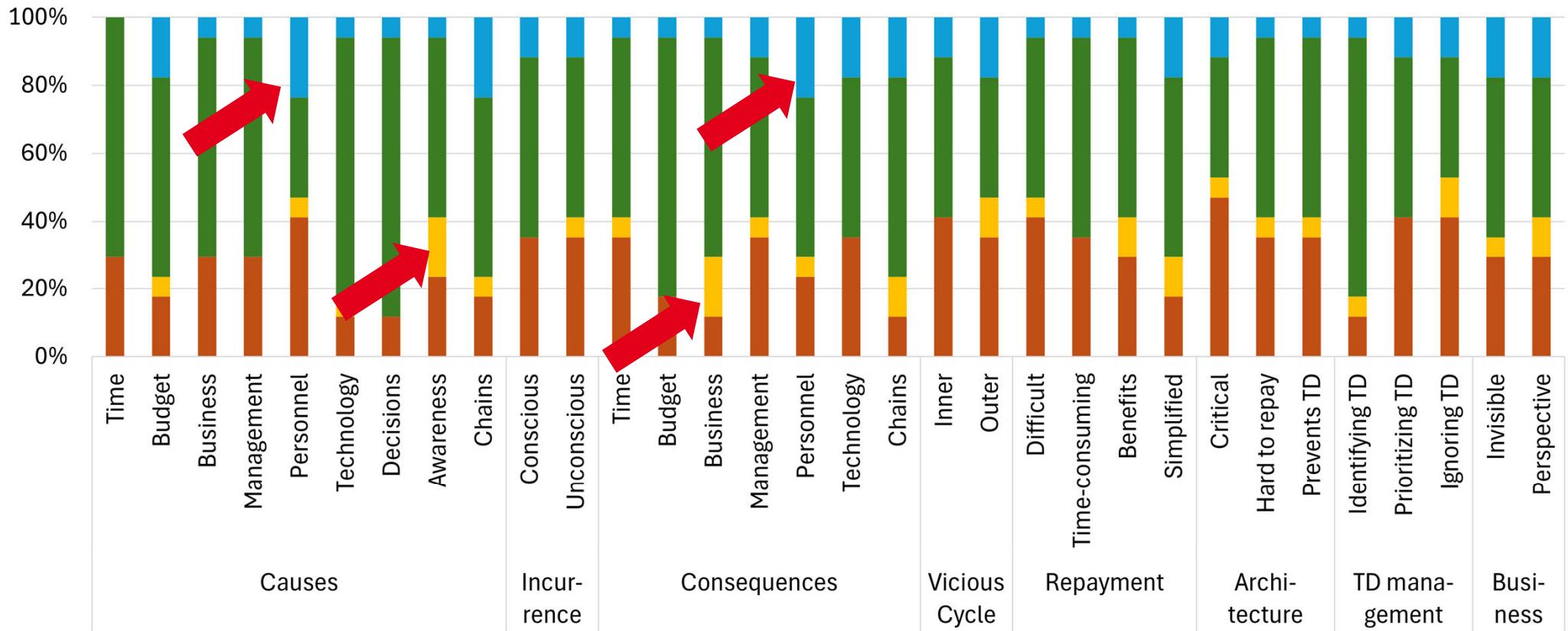
Each Aha moment was had by at least 15% of the participants (red+yellow)
 Each Aha moment is not new to at least 50% of the participants (red+green)

Results – RQ2: Do players encounter new insights?

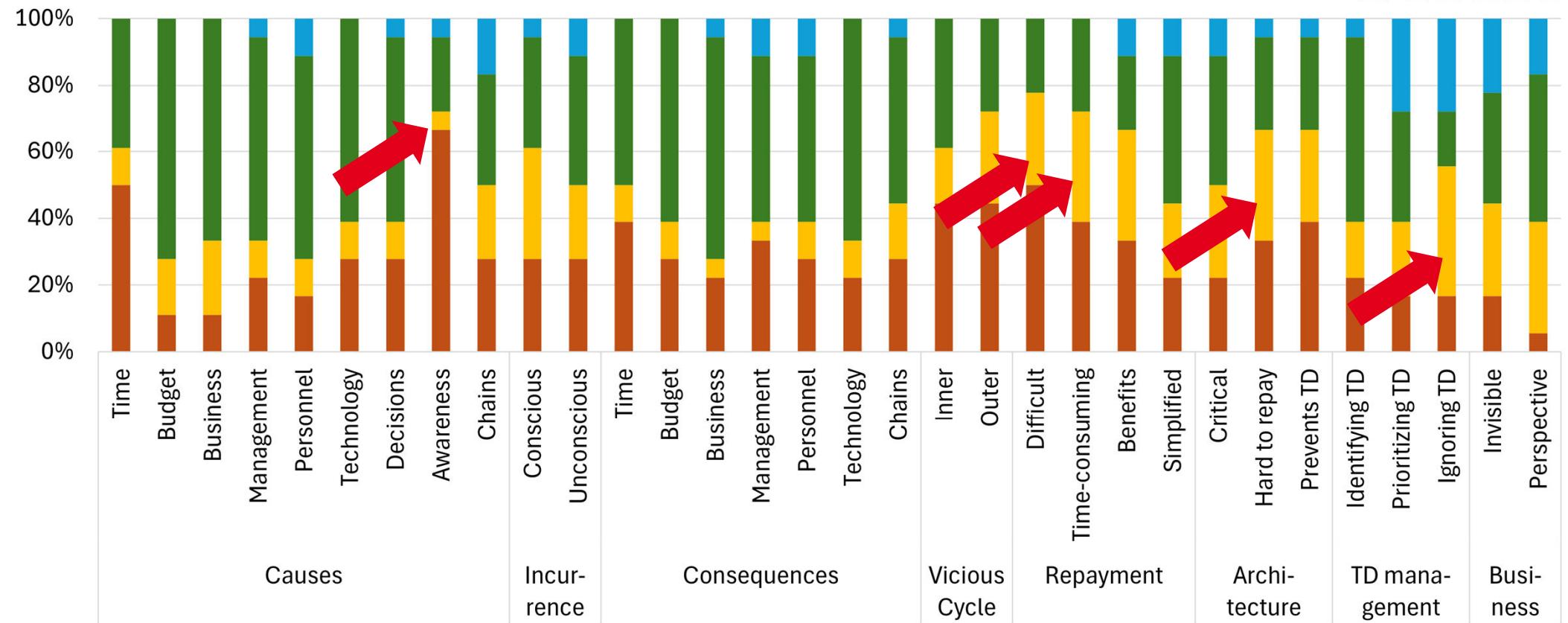


Each Aha moment was new to at least some participants

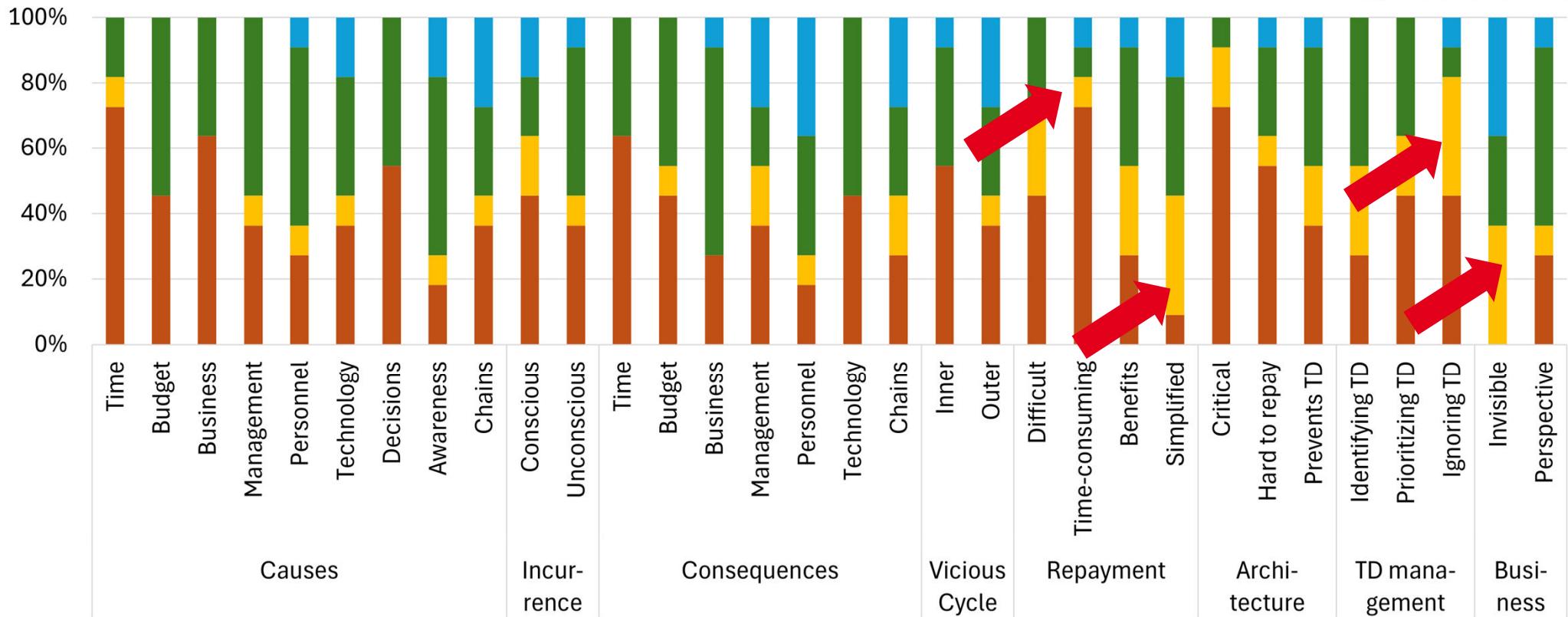
Results – Senior Technical Stakeholders



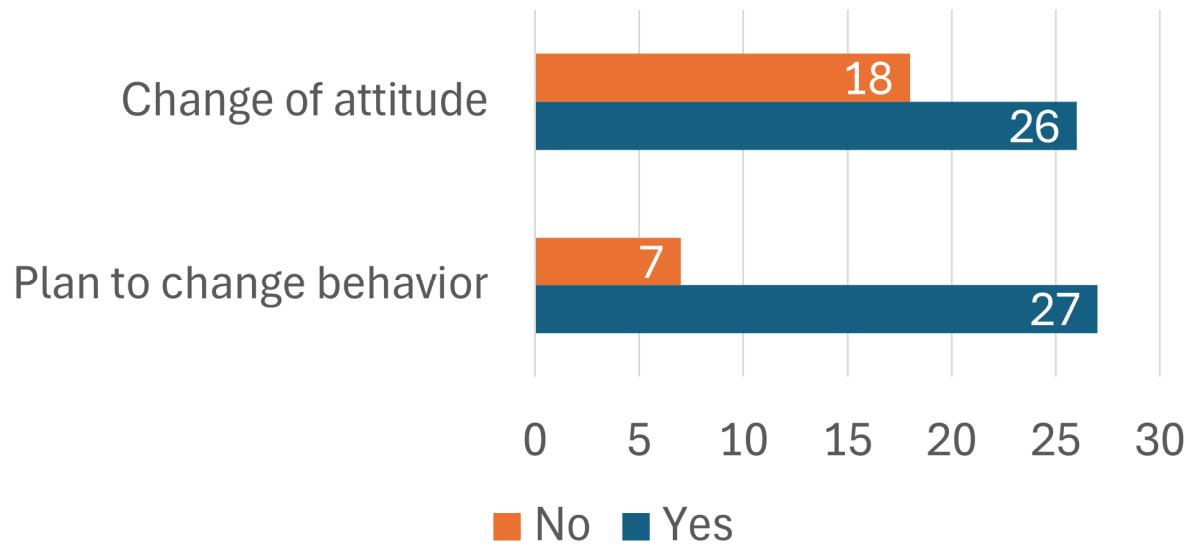
Results – Junior Technical Stakeholder



Results – Business Stakeholders



Results – RQ3: Change of Attitude & Behavior



No change of attitude

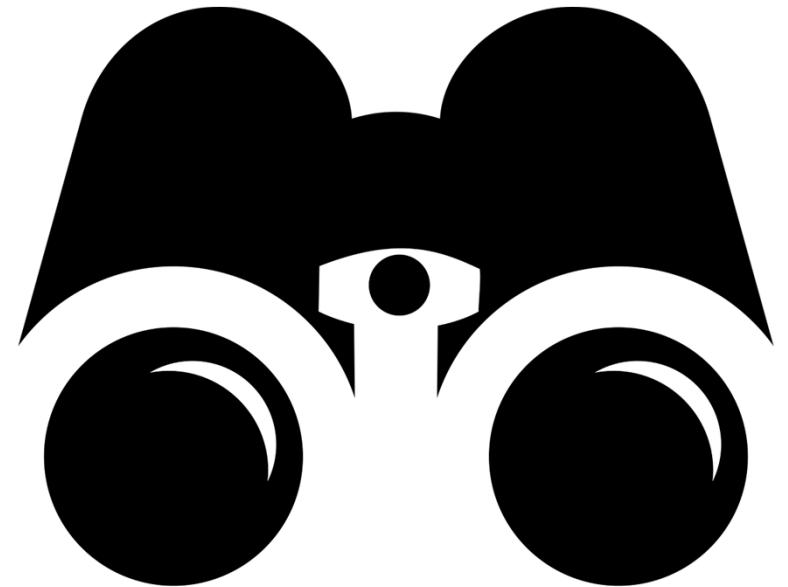
- 17: Already familiar with the TD
→ no need to change attitude

No plan to change

- 2: Other stakeholders responsible
- 5: Already aware of TD
→ always try to avoid TD

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Limitations & Future Work

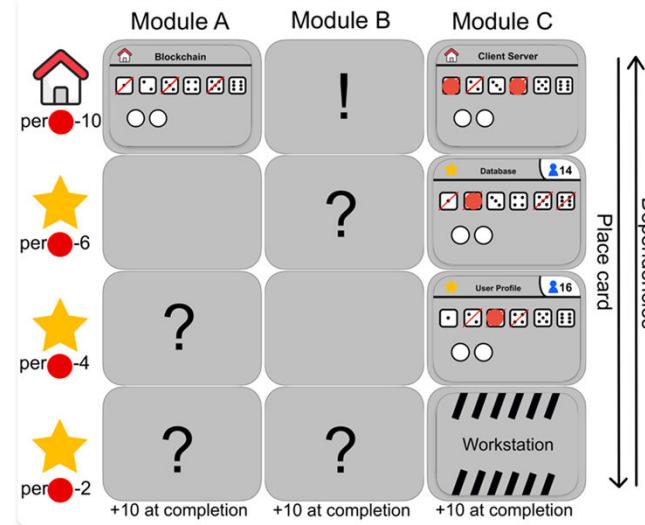


Limitations & Future Work

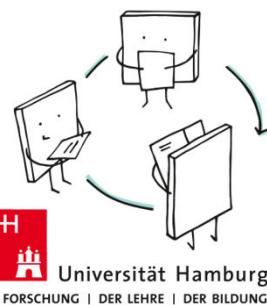
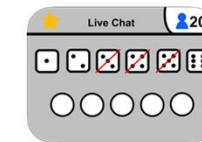
- Improve the game
 - Add more Aha-moments as action or event cards
- Analyze communication during the Game
 - Transcribe and code communication
- Selection bias
 - Use the game in a company, including less willing players
- Long-term evaluation of the results
 - Do participants really change?



Summary Game



Q&A



Results & Discussion

- **Senior Technical:** Missing TD awareness, TD's business impact
- **Junior Technical:** Ignoring + Repaying TD
- **Business:** Invisible TD, Simplifying TD Repayment, Ignoring TD
- Game as incentive to change

CONTACT

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J. L. Plass, B. D. Homer, and C. K. Kinzer, "Foundations of Game-Based Learning," *Educational Psychologist*, Oct. 2015, Routledge.

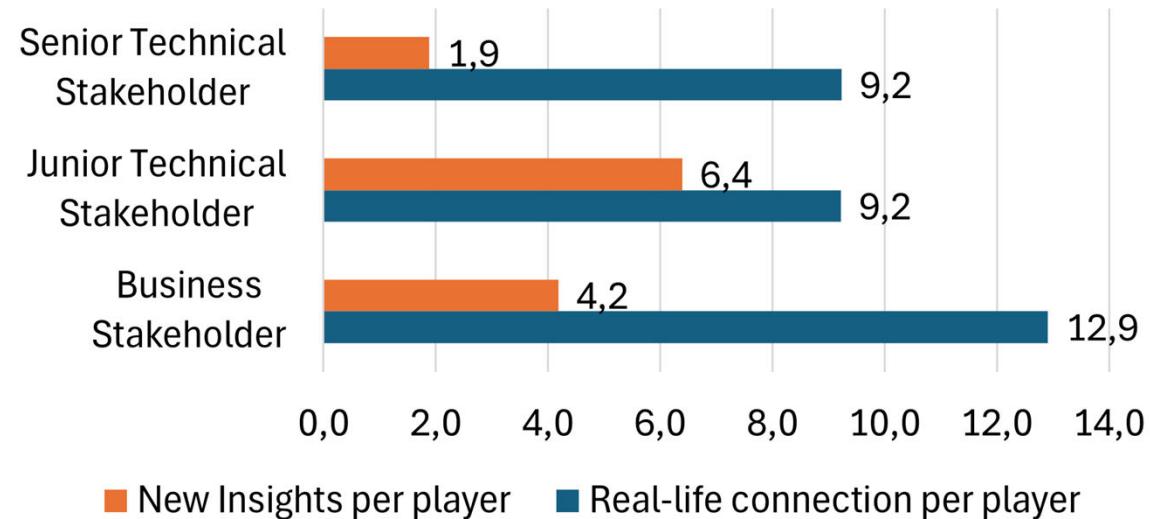
Method: Developing the Game

Game Design elements:

- Game Mechanics
- Aesthetic Design
- Narrative design
- Incentives
- Music
- Content/Skills

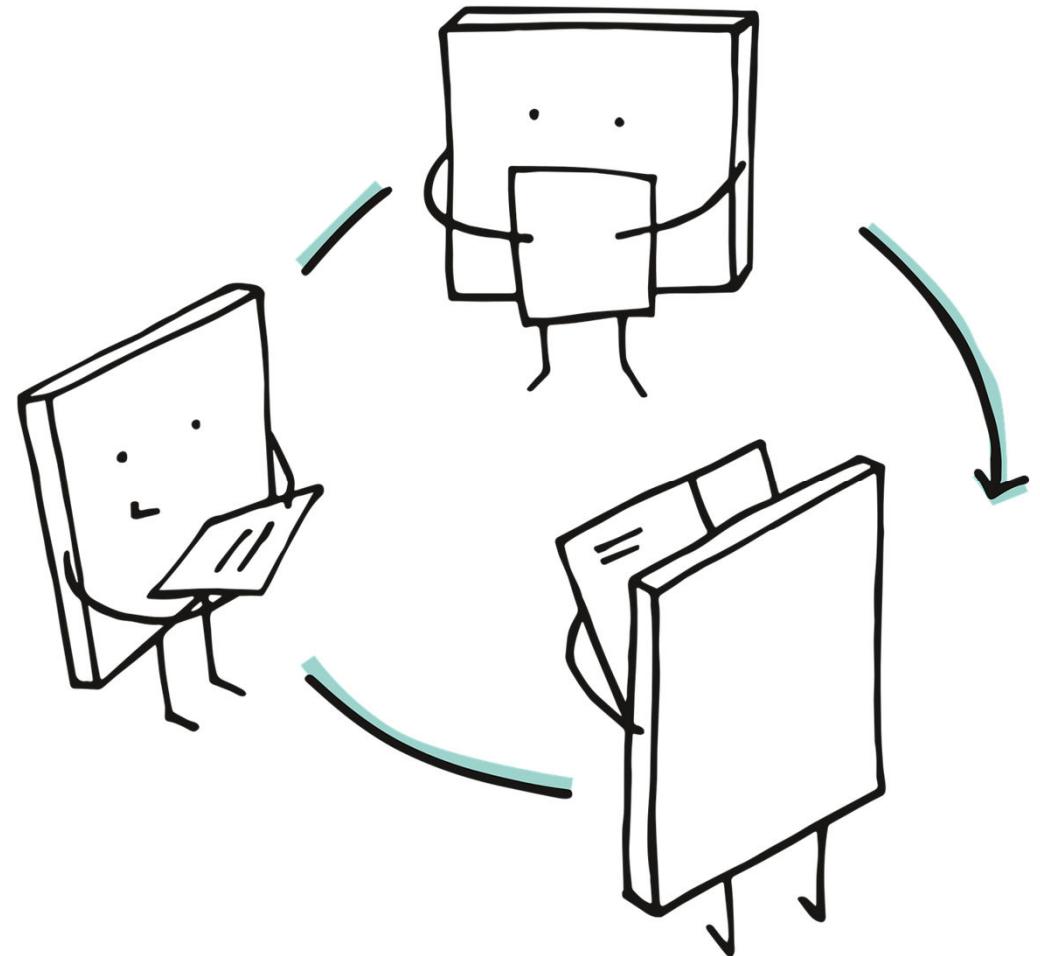


Results – Communication – Influencing factors



5

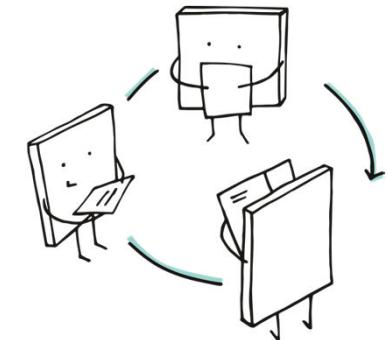
Discussion & Call to Action



Discussion

Effects on Senior Technical Stakeholders

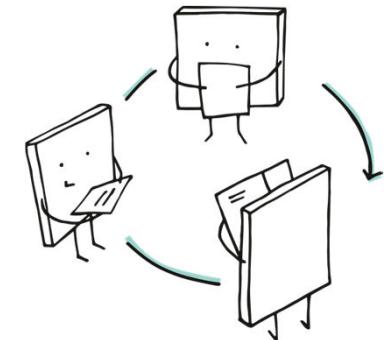
- Not many new insights but
 - TD Awareness is not a given for each Stakeholder
 - TD can have Business impact
- Seniors are “knowledge givers”
- Often no attitude change, but willing to make behavior changes



Discussion

Effects on Junior Technical Stakeholders

- Most new insights, e.g.
 - Ignoring TD is an option → Game encourages pragmatic approaches
 - Repaying TD might be hard → more understanding in discussions with seniors
- Junior developers often incur TD inadvertently → Game might support being more careful



Discussion

Effects on Business Stakeholders

- Lot of new insights, e.g.
 - TD might be invisible to them → they might put more trust into developers
 - There are measurements to simplify repayments
 - TD can be ignored → Confirmation bias at work? ;-)
- Game might improve future discussions with technical stakeholders

