Values Thinking

***Was:** Values, Ethics, and Other Stories*

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"Values are the facts of the future"

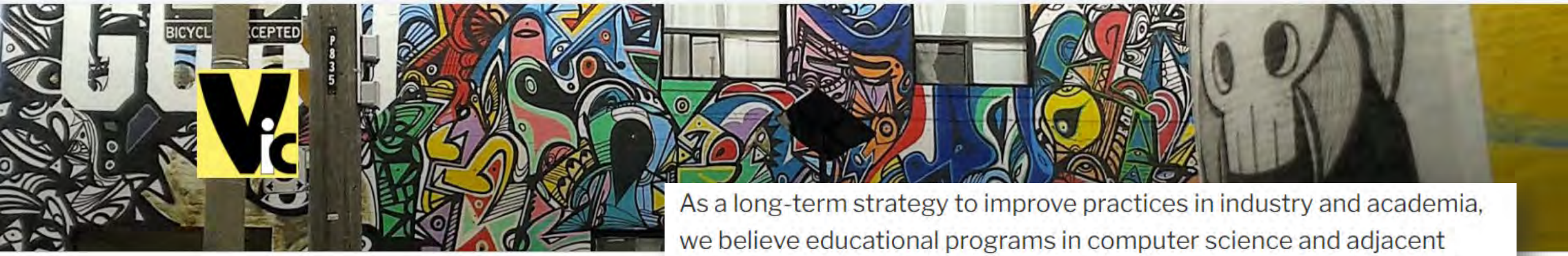
[Feenberg 2010]

Andrew Feenberg. Ten paradoxes of technology. Techné: Research in Philosophy and Technology,14(1):3–15, 2010.

The Binary System's Values

*"I have made things clear by the **numbers 0 and 1**, […] the most beautiful symbols of the continuous creation from **nothing and God**."*

Booch, G., 2013. Deus ex Machina. *IEEE Software*, *30*(6),



Home Tools Reading Room Publications

THE DENVER MANIFESTO

www.valuesincomputing.org/background/chi2017-values-in-computing-workshop/the-denver-manifesto/

Some of the follow-on actions from signees (next Slide)

As a long-term strategy to improve practices in industry and academia, we believe educational programs in computer science and adjacent fields should include focused attention to the values intertwined with the other aspects of career preparation for the field. This training should provide students with the tools necessary for discussing and evaluating relevant values and tensions between them. In addition to providing tools for assessing and communicating about direct impacts, this education should foster an understanding of indirect externalities and risk evaluation, without equating risks with harms.

It should prepare students to think critically, reflectively, and empathetically. It should prepare students to integrate diverse perspectives, and understand the cultural and historical contexts that shape present conditions. It should provide students with an understanding of how responsibility for creating products and systems that instantiate values may be distributed. It is a moral imperative for upstanding individuals in this field not to abdicate responsibility for the values manifest in the products of their work, or those espoused in their work environment.

TUW

https://wot.pubpub.org/

Ways of Thinking in Informatics is a 6 ECTS university course that is **mandatory** for all first-year students of **Informatics bachelor studies** at TU Wien. It was conceptualised by Chris Frauenberger and Peter Purgathofer in 2015, and is part of the degree programs since winter semester 2017. It was inspired by »The first five computer science principles pilots«, re-interpreted through the lens of **European scientific traditions.** This page describes the content and organization of the course as well as our experiences from organizing it.

Monash

https://www.monash.edu/it/ssc/software-engineering/our-research

OVIS
operationalizing values in software

Operationalizing Human Values in Software (OVIS)

Project Lead: Jon Whittle

Software influences almost all aspects of our modern societies. Despite its ubiquity, software often falls short of the desired acceptance. The cause is often not a lack of functionality, rather ignorance of human values such as privacy, equality and social justice. Engineering software with methodologies and practices that are largely values-ignorant leads to systems development that has undesired financial implications and negative societal impact. This project aims to develop software methodologies, tools and guidelines to enable software engineers and innovators to embed human values into technology.

ME: ➪ How do you study values?

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Challenge:

"There is lack of precision in how the construct of values is defined, applied, and investigated" in SE.
[Shilton 2014]

Goal:

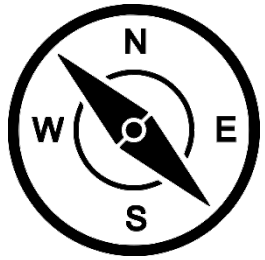
Advance a systematic and SE-relevant approach to the study and application of human values in SE

Shilton, K., Koepfler, J.A. and Fleischmann, K.R., 2014, February. How to see values in social computing: methods for studying values dimensions. In Proceedings of the 17th ACM conference on Computer supported cooperative work & social computing (pp. 426-435).

Values ≠ Ethics

Map ≠ Compass

Values



Ethics

M. A. Ferrario and E. Winter, "Applying Human Values Theory to Software Engineering Practice: Lessons and Implications," in *IEEE Transactions on Software Engineering*, vol. 49, no. 3, pp. 973-990, 1 March 2023, doi: 10.1109/TSE.2022.3170087

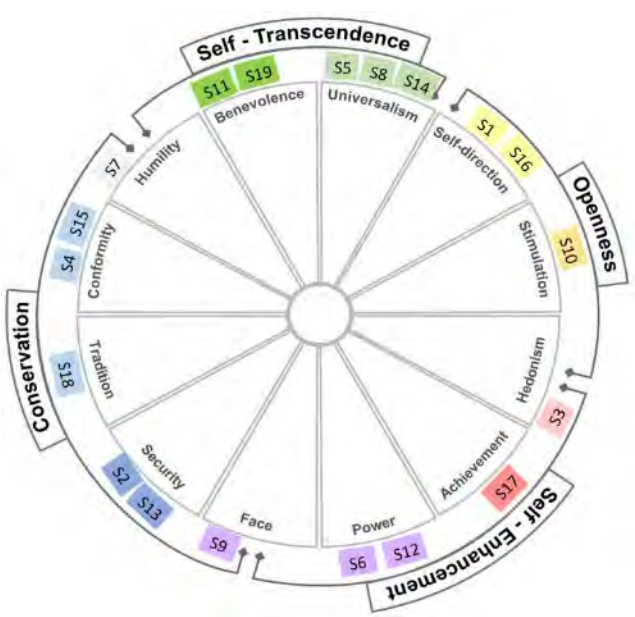
- **#1** Theory
- **#2** Tools
- **#3** Practice

#1 Theory

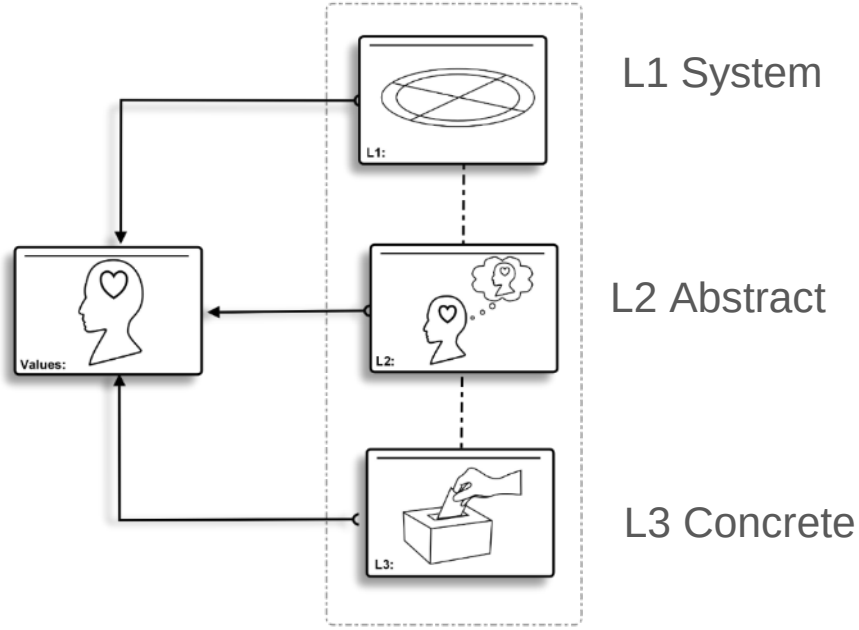
1

RQ1 - How can SE research support a more systematic investigation of values in SE practice? What values theories and models should we draw from?

1. Extend work of social psychologist Schwartz's Universal Values Theory..
2. …with work from cognitive psychologist G. Maio => values as mental constructs to be studied at more than one level: System, Abstract (*Interpretations*), & Concrete (*behaviours*)



1.1. Universal Values System



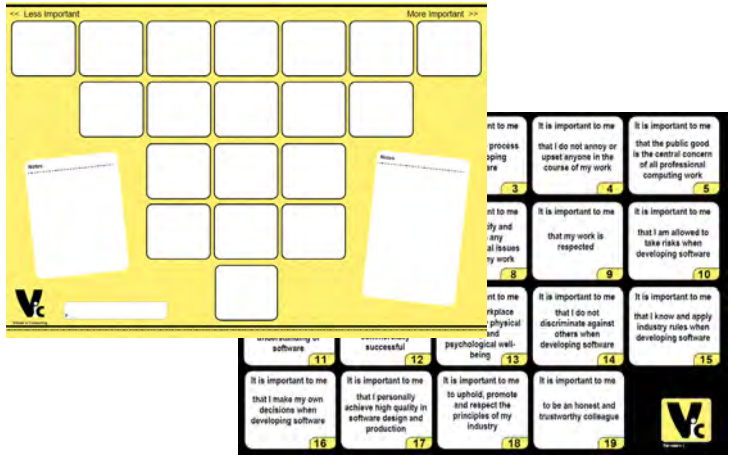
1.2 Levels at which we study values

#2 Tools

2

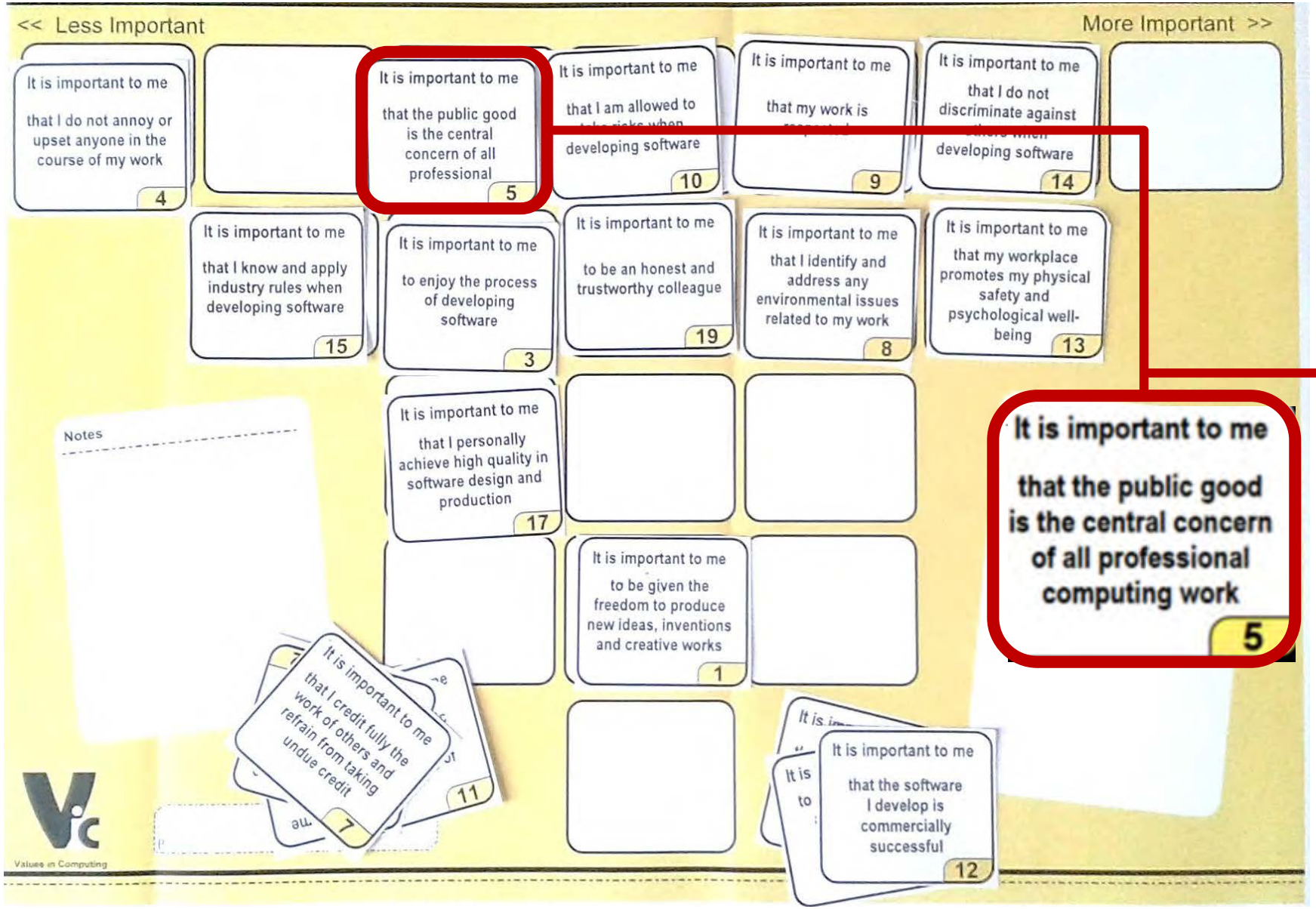
RQ2 - What new tools can be developed and what existing SE techniques can be adapted (and how) to help elicit, articulate, and measure values in SE practice?

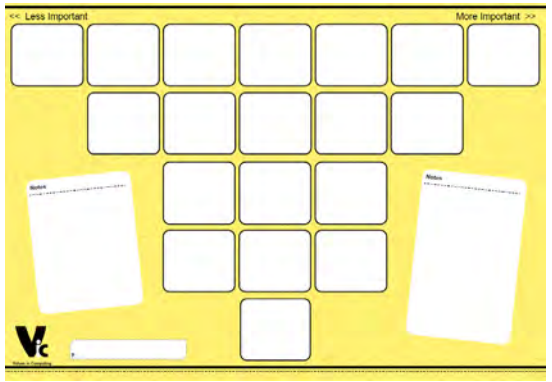
1. Design new tools: the Values Q Sort (V-QS), a values elicitation & measuring tool that adapts values-study instruments (e.g., Schwartz's values survey) to the SE context; mapped on ACM Code of Ethics.
2. Adapt existing tools: the Values-Retro an example of how emotional response to values - 'affect' - can be included in agile retrospectives.



2.1 Values-q-sort: grid and statements

2.2 Values Retro





Q-GRID

Q-SET

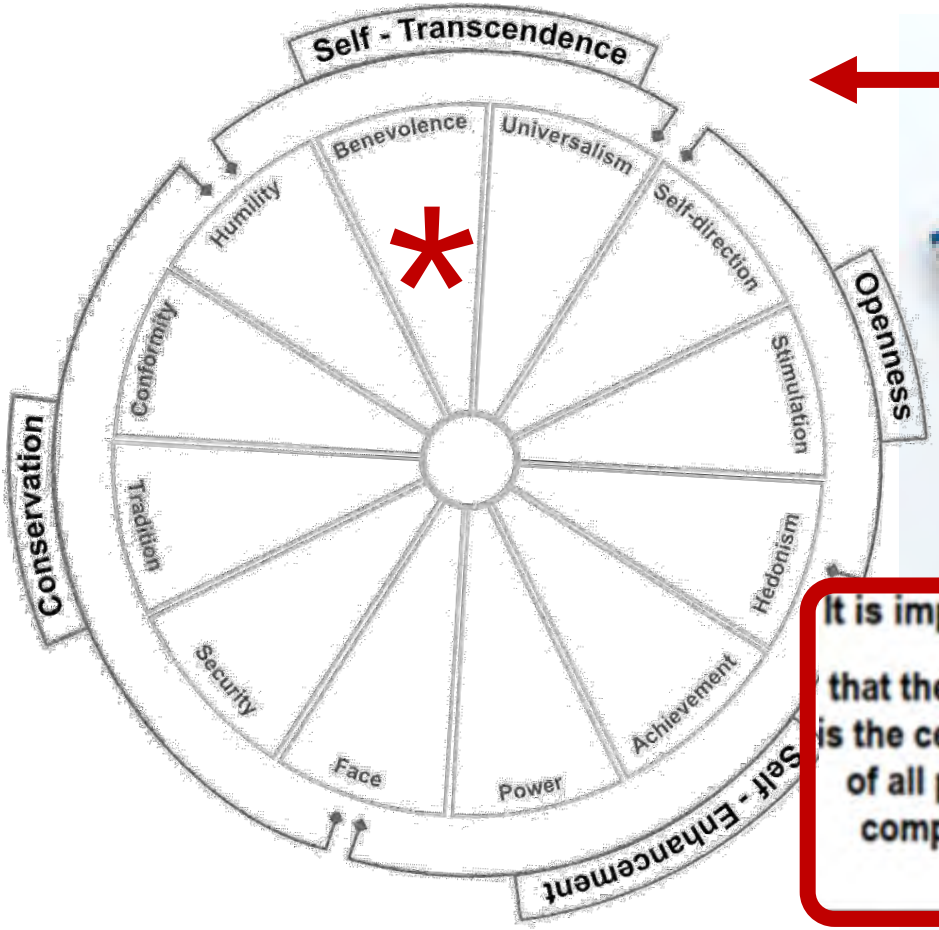
https://tinyurl.com/VQS-CAM

Q-Set: map the Code onto the Values Model

Schwartz PV-19 (Refined) Values Model (Schwartz et al. 2012)

ACM Code of Ethics (2018)

https://www.acm.org/code-of-ethics



It is important to me

that the public good is the central concern of all professional computing work

5

#3 Practice

3

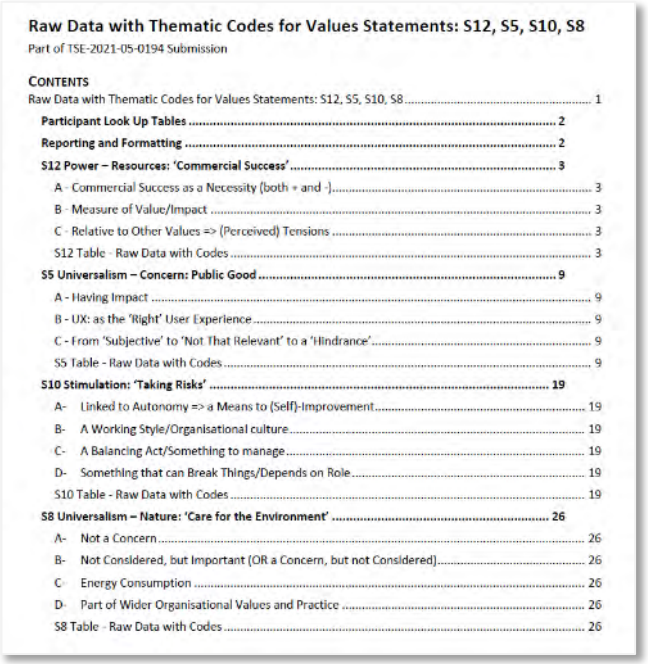
RQ3 - […] What can we learn about software practitioners' understanding and articulation of values, and their relation to SE practice?

two V-QS data outcomes:

1. quantitative measurements of SE practitioners' values orientations,
2. qualitative narratives explaining SE practitioners' interpretations & instantiations of values in SE practice.

CF1	Socially-Concerned & Considerate
CF2	Ambitious & Non-Conformist
NF1	Dependable & Considerate
NF2	Market Conscious & Autonomous

3.1 - Four 'Types' of Software Practitioners*



Raw Data with Thematic Codes for Values Statements: S12, S5, S10, S8

Part of TSE-2021-05-0194 Submission

CONTENTS

3.2 Coded Qualitative Data

*M. A. Ferrario and E. Winter, "Applying Human Values Theory to Software Engineering Practice: Lessons and Implications," in *IEEE Transactions on Software Engineering*, vol. 49, no. 3, pp. 973-990, 1 March 2023, doi: 10.1109/TSE.2022.3170087

#3 Practice

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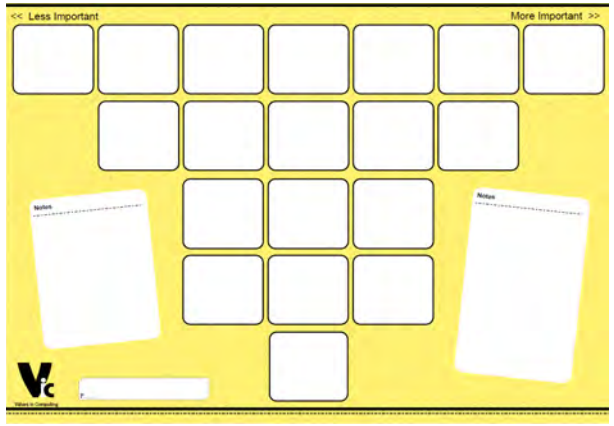
RESEARCH/INDUSTRY

- N = 1+ 5 prototype stage
- N = 12 Pilot Case Study (Opportunistic Sample from different organisations)
- N = 24 Industry Case Study

UG TEACHING/EDUCATION, started from

- N = 19 Software Studio Context (2UG, teams)
- N = 25 RE Class (1UG, teams)
- N = 15 Law & Computing Class (3UG, teams)
- N = 400+ seminars, 'evil twins' sessions (by Lucy Hunt)…

The AI V-QS



ASILOMAR PRINCIPLES 2017

These principles were developed in conjunction with the 2017 Asilomar conference (videos here), through the process described here.

AI systems should not negatively impact upon human freedom of thought 1	AI systems should not unreasonably curtail people's real or perceived liberty 2	AI systems should make human life more enjoyable 3	AI systems should obey human commands 4	AI systems should benefit and empower as many people as possible 5
AI systems should be controlled by human beings to accomplish human-chosen objectives 6	AI systems should know their place 7	AI systems should be used to protect the natural environment 8	AI systems should not be in a position to embarrass humans 9	AI systems should increase people's opportunities in life 10
AI systems should help humans in their everyday lives 11	AI systems should be used to grow economic prosperity 12	AI systems should be safe and secure throughout their operational lifetime 13	AI systems should be compatible with ideals of human dignity, rights, freedoms, and cultural diversity 14	AI systems should adhere to the standards of the industry 15
AI systems should not limit humans' ability to act in the world 16	AI systems should enhance human capabilities 17	AI systems should respect & improve the social & civic processes on which the health of society depends 18	AI systems should be developed in a culture of cooperation, trust and dependency 19	

For cutter v 1

Values-thinking: How Might We Think About Values in SE education and practice?

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Try / play: https://tinyurl.com/VQS-CAM

Download replication pack/ adapt: M. A. Ferrario and E. Winter, "Applying Human Values Theory to Software Engineering Practice: Lessons and Implications," in *IEEE Transactions on Software Engineering*, vol. 49, no. 3, pp. 973-990, 1 March 2023, doi: 10.1109/TSE.2022.3170087

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Additional slides

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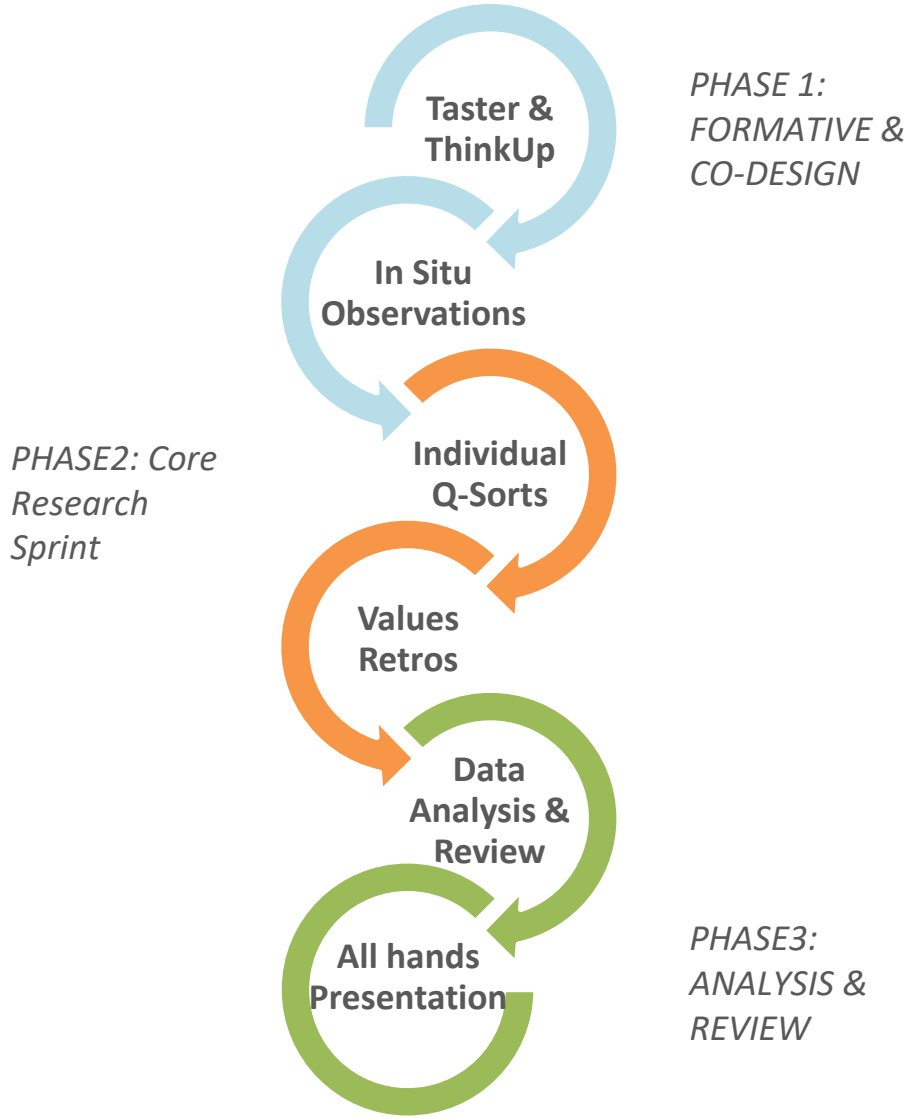
The Digital Share Case Study

- Digital Share is the digital arm of a large membership-based organisation (>4.5M members) - *Share*
- A 9-month process (from first engagement point to closure)
- 3 Phases, starting with the co-design of a 5-week research sprint
  - Partner seeking to design a values-based SE decision making process
- Methodology
  - in situ observations,
  - 24 x individual V-QS,
  - 2 x Values Retros
  - 2 Teams (Net and Comm)
  - A total of 27 participants



Digital Share Case study Research Process

Findings: Quantitative analysis

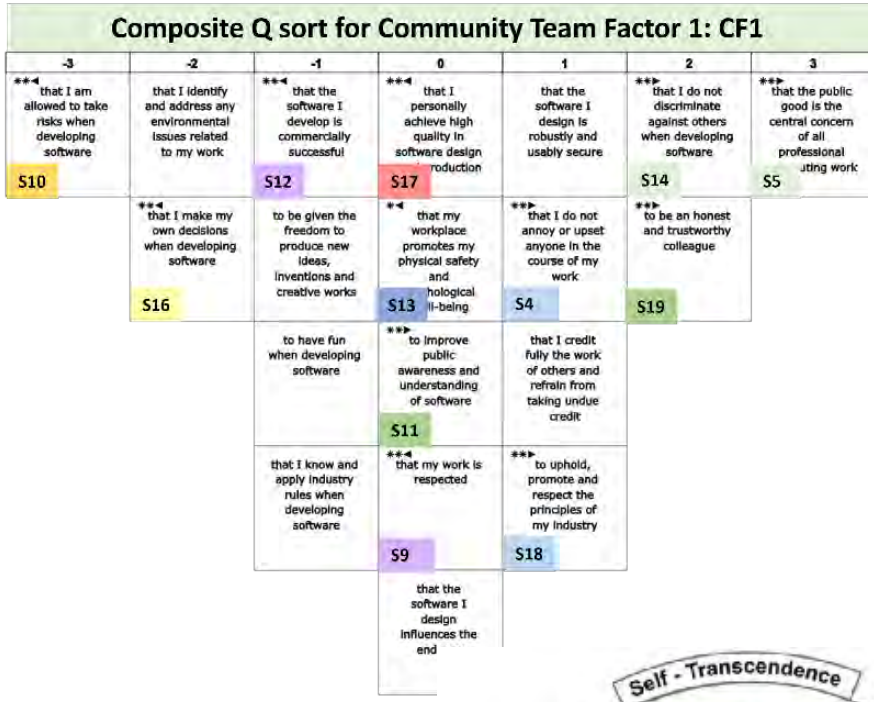
Values orientations 'types' extracted via V-QS factor analysis

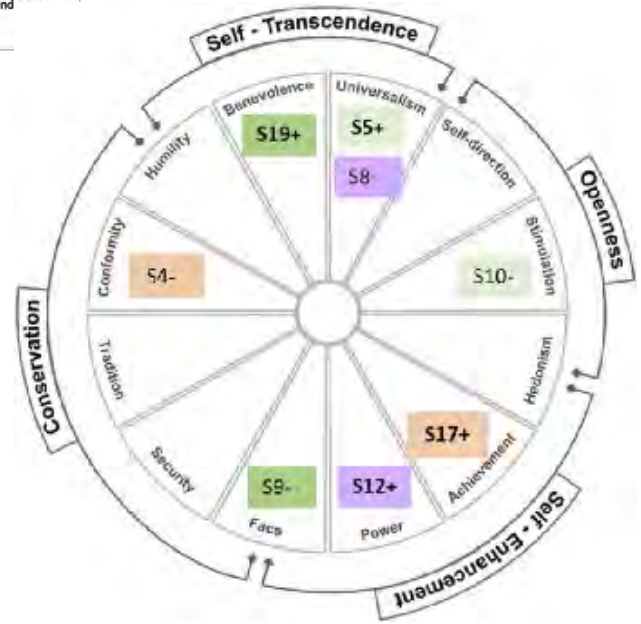
TEAM Com (N=9)

- **CF1:** Socially-Concerned and Considerate
  (S5- Public Good)*
- **CF2:** Ambitious and non-Conformist
  (S17 - High Quality Code)*

TEAM Net (N=12)

- **NF1:** Dependable and Considerate
  (S19 -Trustworthy Colleague)*
- **NF2:** Market Conscious and Autonomous
  (S12 -Commercial Success)*





Positions of Factors' significant values on Schwartz's Model

Findings: Quantitative analysis

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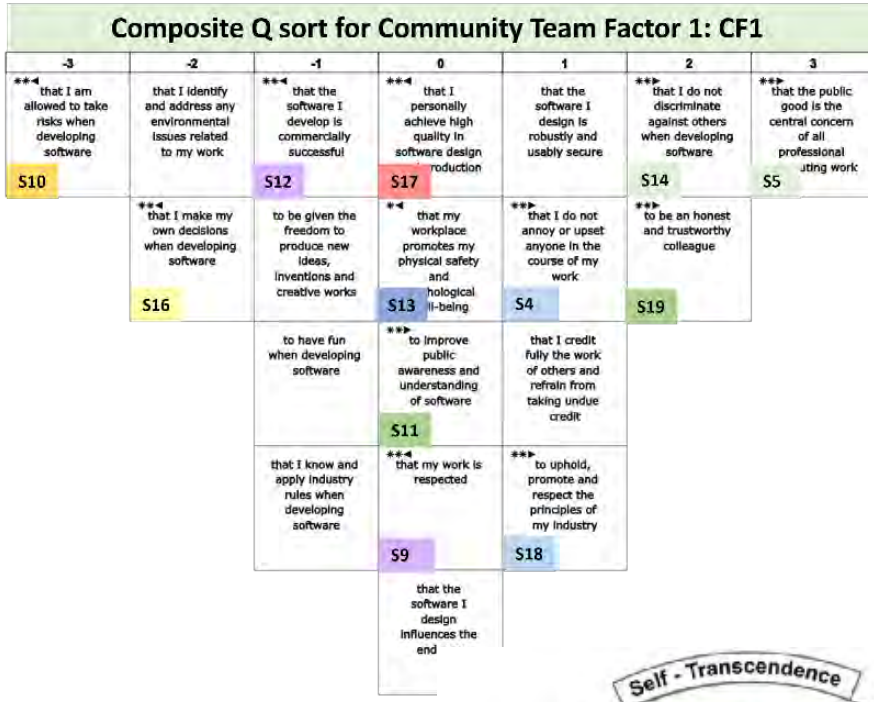
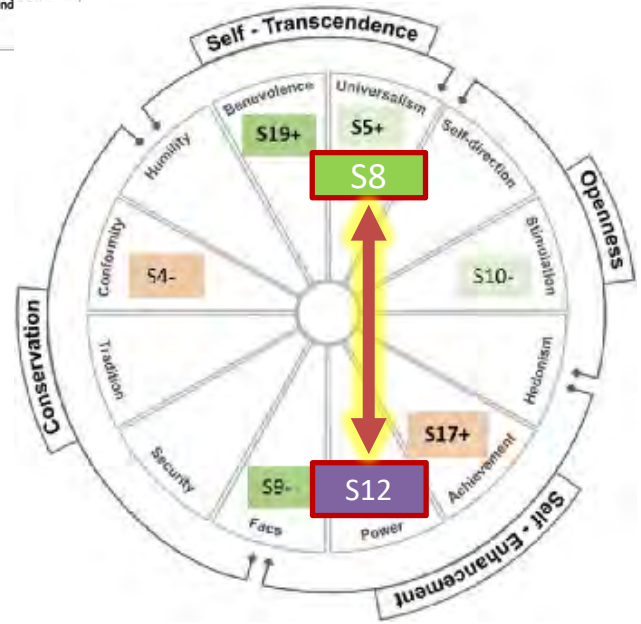




Opposition NF2

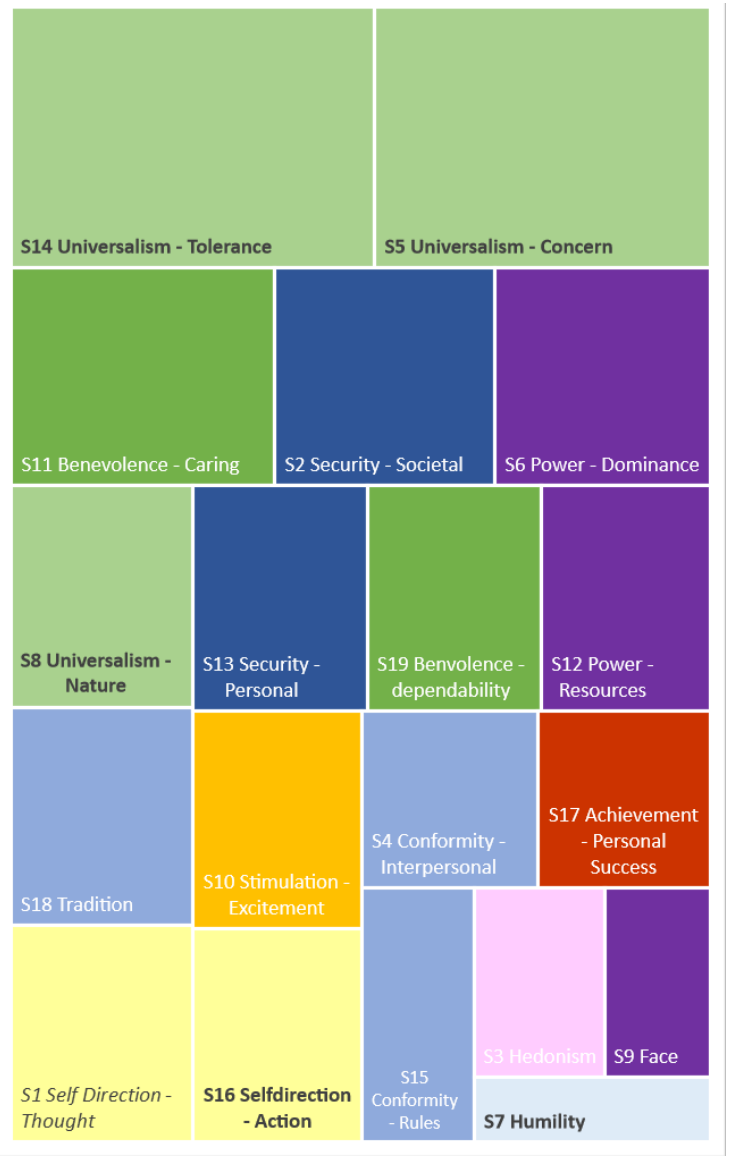
Positions of Factors' significant values on Schwartz's Model

Findings: Qualitative analysis

Thematic Analysis of V-QS qualitative data elicited by each of the 19 V-QS statement

We coded the narrative elicited by the V-QS exercise, and we found A variety of interpretations and enactments of the same value, including different enactments of the same interpretation – for instance:

- Public Good (S5) – *variety of interpretations & enactments – even within same team & identified theme (e.g. doing the 'right thing' for the end-user)*
- Care for Environment (S8) – *varies from 'not a concern' to 'a concern' but not knowing what to do / or having tried unsuccessfully and feeling 'guilty' about it.*



Elicitation power (# of word) each V-QS value statement)

3.3 Five Values Features

Empirical research has found that values exhibit certain common characteristics or features [14], [33], namely: they are linked to affect (emotions); they transcend specific situations; they guide selection and evaluation of behaviour; they are ordered by relative importance; and the relevant importance of multiple values guides people's actions. Our research finds that such features are recurrent and can be observed in the SE context. Below, we report a summary of the key values' features and exemplify with quotes from our case study. We show in brackets the number and label of the V-QS value statement (S#) that elicited a participant's response (fig. 3 reports the full list of values statements).

#1 Values are linked to affect- When values are activated, particularly if an individual's values are challenged, they often lead to the expression of emotion. For instance, in our study, we found that participants feel 'angry' when their work is not respected (S9 Face - Public Image) or 'frustrated' when they can't be as creative as they would like at work (S10 Self Direction- Thought).

#2 Values transcend specific actions and situations- Values can be relevant in several contexts - the workplace or at home, with friends or team workers. For example, in our study we found participants who considered honesty *'very important from a personal perspective so... professional(ly) it's the same'* (S19 Benevolence - Dependability).

#3 Values serve as standards or evaluation criteria- Values guide the selection or evaluation of actions, people, and events. People may not act on the values that they hold important due to external circumstances (e.g. budget constraints), but they do still evaluate their actions against them, leading to emotional reactions. For instance, some participants felt 'sad' for not doing more for the environment (S8 Universalism - Nature).

#4 Values are ordered by relative importance- People's values form an ordered system of priorities. For instance, a number of participants stated that, although it was important for a software product to be commercially successful (S12 Power - Resources), they valued positive social impact more (S5 Universalism - Concern).

#5 Multiple values importance guides action- Similarly, any attitude or behavior has implications for more than one value. For example, high quality and secure software (S2 Security - Societal) may come at the expense of exploring something new, more fun, and riskier (S10 Stimulation).

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A model for Human Values

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Figure 1: Value structure across 68 countries – Image by Public Interest Research Centre (2011) based on Schwartz, S.H., 1992. Universals in the content and structure of

Other Tools Used

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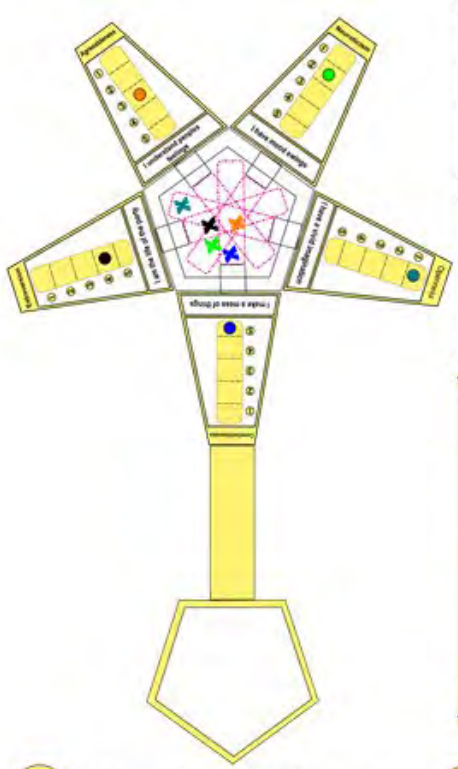
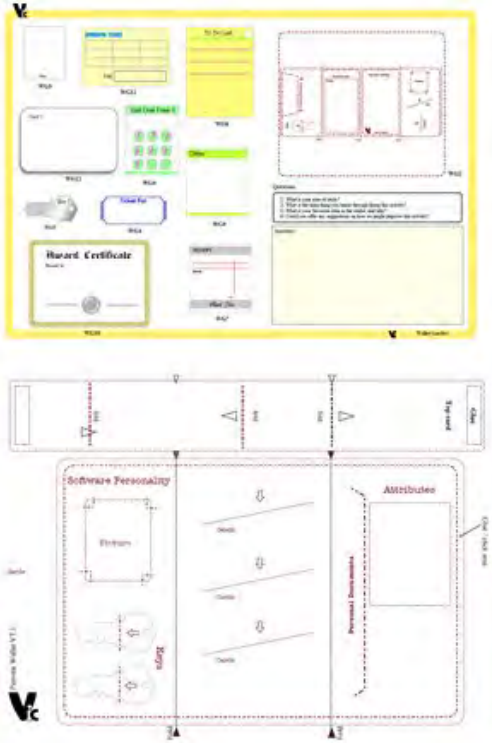


1 Software Personality Starmap

2 Values- Q-Sort, cards and grid.



3a Values Wallet Design

3b Values Wallet Analysis Grid

4 3DP AI Values probes