Towards public understanding of software through modelling

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Valio PROfeel PROTEIINIVANUKAS PROTEINPUDDING SURLAA CHOKLAD 20g UTAN TILLSATT SOCKER LAKTOSFRI

Valio PROfeel PROTEIN-PUDDING CHOKLAD 20g Protein /portion

GRANDIOSA X-traAllt +Sås STENUGNSBAKAD PIZZA KEBAB KEBABKÖTT, RÖDLÖK & FEFFERONI 400g

En ½ pizza ger:
1697 kJ
406 kcal
20%
225 °C
10-15 min
Per 100 g: 848 kJ/203 kcal

SEDAN 1916 Marabou Helnöt

COCOA LIFE COCOA NON EU SUSTAINABLY SOURCED COCOA

INGREDIENSER

BOTTEN:
Vetemjöl, vatten, rapsolja, jäst, salt.

FYLLNING:
Ost, kebabkött (nötkött, vatten, salt, kryddor, socker), tomatpuré, vatten, grillad rödlök, fefferoni, crème fraiche, smältost (**ost**, vatten, **smör**, **skummjölkspulver**, smältsalt (E339), syra (citronsyra), naturlig arom), kryddor och kryddextrakt (bl.a. chilipeppar, vitlök, basilika, persilja, spiskummin och koriander), salt, socker, jästextrakt och stärkelse.

Till en pizza har använts 18% ost, 12% kebabkött, 6% rödlök, 4% sås samt 3% fefferoni.

Digital society – SW-intensive systems

But..

Resilience against the machine?

- How can we prevent unintended outcomes due to [1]
  - Disuse (under-reliance)?
  - Misuse (over-reliance)?
  - Abuse?

- I assert that this comes from increased knowledge
  - How can we know if software is
    - Maintained? At all? By whom?
    - Tested well? At all?
    - Dealing with my privacy and security concerns? [2]

[1] Parasuraman, R., & Riley, V. (1997). Humans and automation: Use, misuse, disuse, abuse. *Human factors*.
[2] Droste, J., Deters, H., Obaidi, M., & Schneider, K. (2024) Explanations in Everyday Software Systems: Towards a Taxonomy for Explainability Needs. *Requirements Engineering conference*
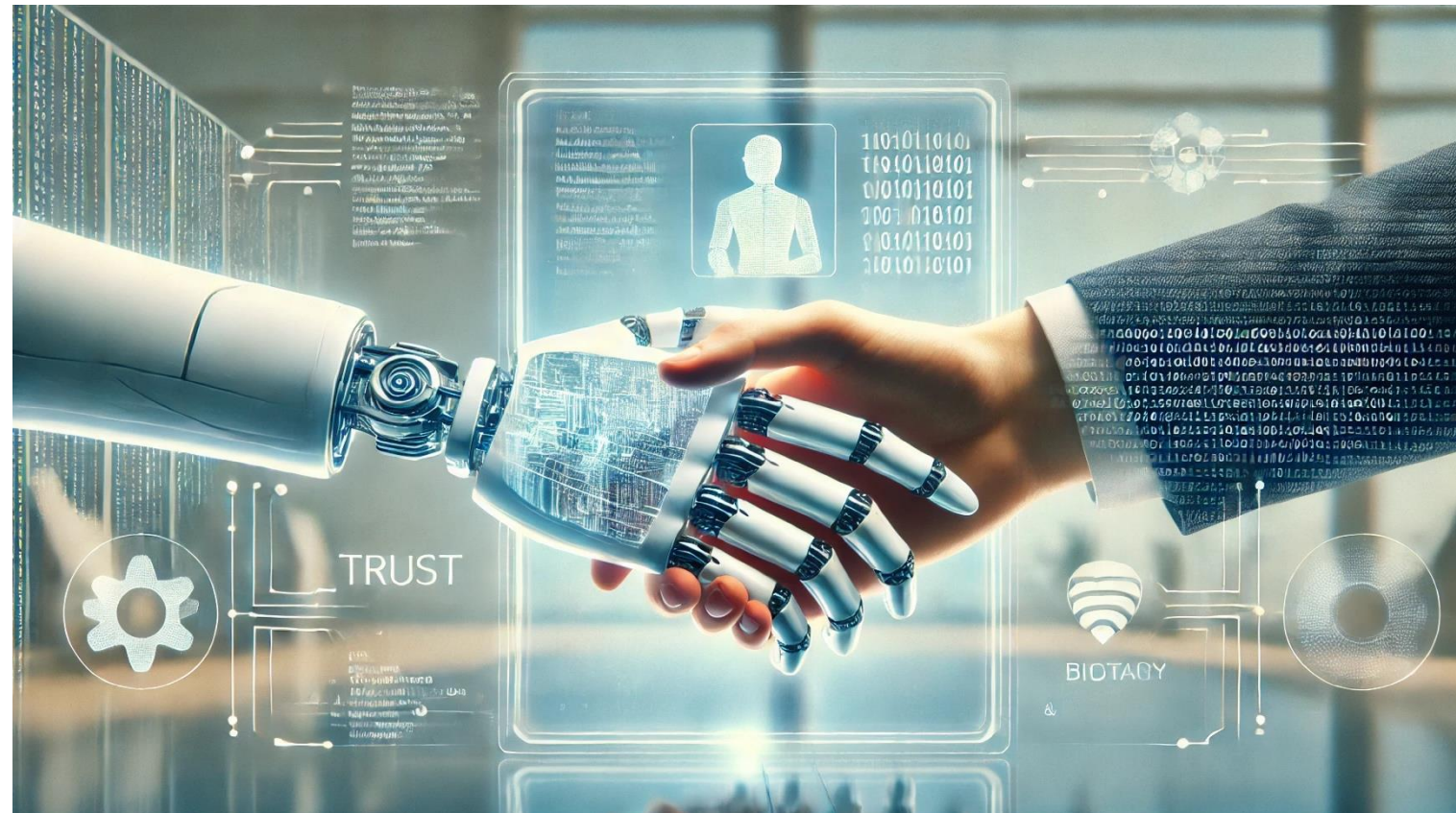
Ethical responsibility

” Members of the IEEE commit to improve the understanding by individuals and society of the capabilities and societal implications of conventional and emerging technologies, including intelligent systems”

IEEE Code of Ethics https://www.ieee.org/about/corporate/governance/p7-8.html

- How can we support engineers to make this promise a reality?

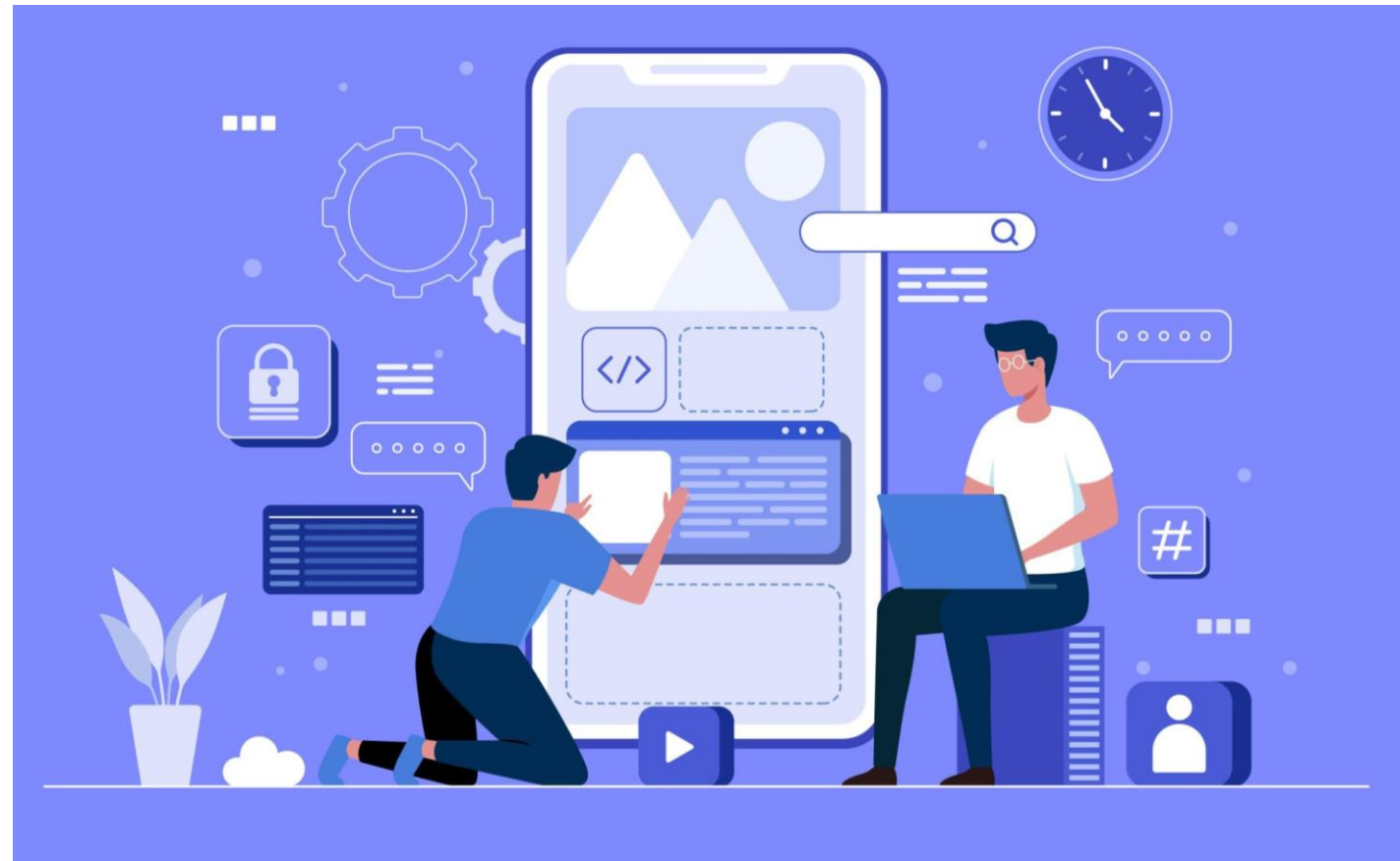# Trust from transparency?

- Transparency [3]
  - Accessibility
  - Usability
  - Informativeness
  - Understandability
  - Auditability

[3] Leite, J. C. S. D. P., & Cappelli, C. (2010). Software transparency. *Business & Information Systems Engineering*.

Citizen developers?

- We demand more from users
  - Low-code
  - → No-code
  - ➔ SE 2.0 [4]

[4] Lo, D. (2023, May). Trustworthy and synergistic artificial intelligence for software engineering: Vision and roadmaps. In *2023 ICSE-FoSE*

Collaborative and participatory

- Crowd as collaborator and participant?

- Models as cross-boundary communication means

- Participation requires some initial knowledge, the ability to engage

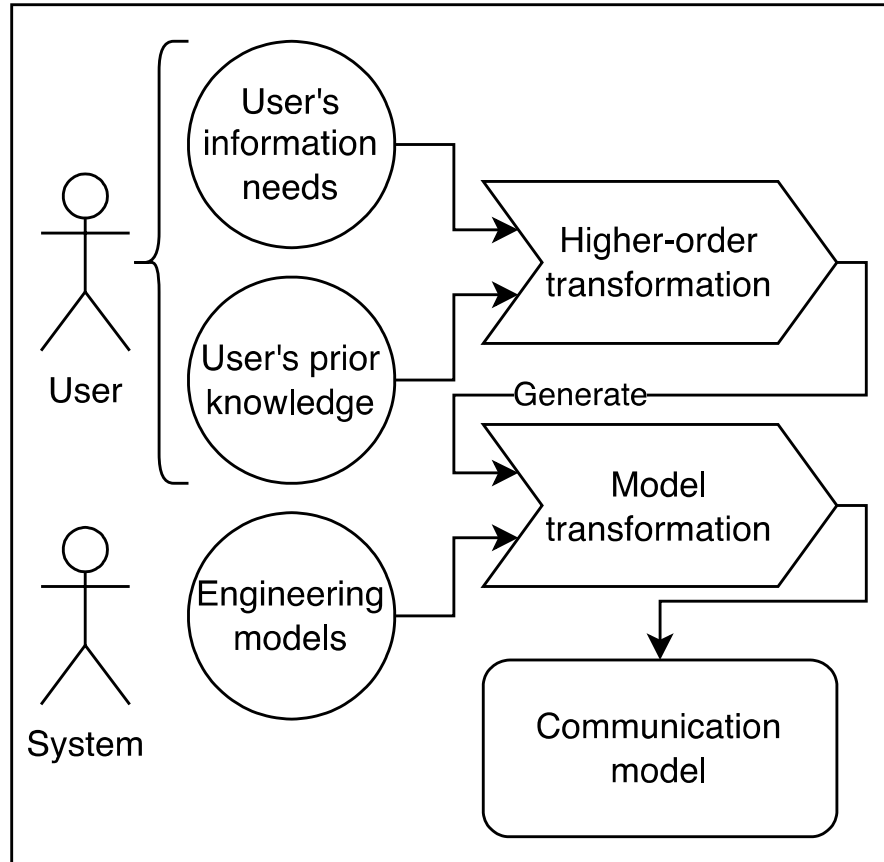- What knowledge do we need?

What else would we require?

- Standardized and Fixed vs. Personalized and Dynamic explanations
  - I don't need explained what I already know
  - Should I search the information I want or should it provide me with only what I want?

- How can people interact with these software systems?

Transparency using models?

- **Information needs of user, e.g.**
  - Is my data secure?
  - Was this thing tested?
  - How do I know what the update does?
  - Was I concidered in the requirements?

- **We need to take into account prior knowledge too**
  - Customized explanations?

- **Can we use existing models?**

What do you think… (1/3)

- … about the public understanding of software?
  - Is this relevant for collaboration and participation?
  - What should users know about systems?
    - Requirements, tests, dependencies, safety, security, …?

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What do you think… (2/3)

- … about the public understanding of software *engineering*
  - What should be understood about the limitations of software engineering?
  - How do we enable people to ask the right questions?

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What do you think… (3/3)

- … about the public understanding of modelling?
  - Abstraction? Decomposition? Encapsulation? Notations? Other?

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Summary

1. We assert that: **collaboration and participation** of a broad audience **demands** first **transparency** of software-intensive systems

2. One key aspect of this transparency is **understandability**

3. I propose to study how to **re-use existing engineering models** for (from the outside) understandability of software-intensive systems

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