

Problem & Motivation

Software projects regularly fail. They are running over budget and time and prove to be unmanageable; the product is often inefficient, of low quality, difficult to maintain, does not meet the requirements or is not delivered at all (e.g., "Elwis" by Lidl/SAP which cost 500 million without ever being deployed). This **software crisis** – a term coined as early as 1968 – has considerable economic and societal consequences, since **software systems are our society's digital nervous system**. Innumerable attempts to mitigate this situation through exclusively technological means have fallen short.

Software systems are socio-technical systems. Hence, software systems must be analysed from more than just a technical viewpoint to ensure the reliability and long-term maintainability of our software-based (information) infrastructures. This clearly requires an interdisciplinary approach through which insights from various research domains can be aggregated and contextualised to generate much-needed new knowledge and innovative approaches.

Computer Science

- ▶ How can we measure software systems with regards to sustainability?
- ▶ How can we identify "tipping points" for the complexity of software systems which might trigger cascading failures?
- ▶ Which knowledge can we extract from existing software environments and their runtime behavior?
- ▶ How can we maintain an understanding of a software system's functionality and the interaction of a myriad of (technical and social) components?

Social Sciences

- ▶ How do human and organisational factors – like team structures, communication patterns and biases – shape software development?
- ▶ What are the sociotechnical imaginaries of actors involved in (sustainable) software development?
- ▶ What can we learn from other domains (e.g., nature/biology) in terms of system sustainability and -resilience?
- ▶ What do we need to holistically approach software sustainability?

An Interdisciplinary Approach towards Sustainable Software Systems

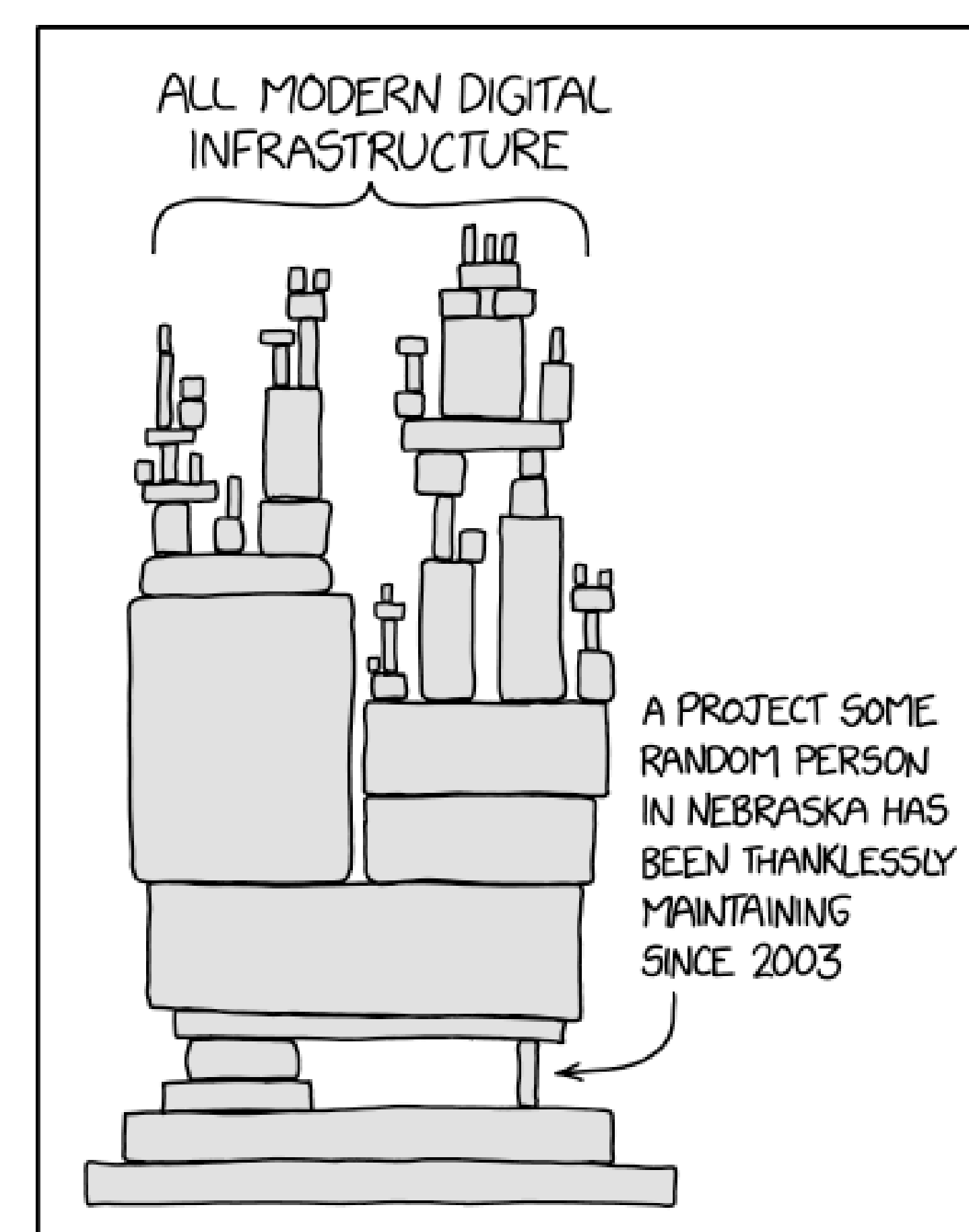
Since 2018, SBA Research is striving to gain a deeper, multi-angled perspective on complex software systems. Therefore, we are forging connections with i.a. the Stockholm Resilience Centre and the University of Vienna, namely the Faculties of Psychology resp. Social Sciences, and the Department of Science and Technology Studies.

Our long-term goals are:

- ▶ strengthen the trust in digital systems
- ▶ maintain control over IT systems
- ▶ further a more resilient digital society

Related projects contribute to:

- ▶ assessing software longevity and the interplay between innovation and infrastructure (which work on different time scales)
- ▶ analysing and understanding contextual software behaviour
- ▶ investigating human and organisational factors
- ▶ assessing systemic risks of software complexity



SBA Research

SBA Research – located in Vienna, Austria – is a non-academic research center for information security. Four main research areas cover security topics from IoT and Industry 4.0 to the Internet and software. Privacy protection and the long-term effects of digitalisation on our society are a central concern. SBA's network encompasses national and international institutions from academia and industry alike.

Example projects:

Webshop-Studie – Simulationsstudie zu sicherheitsbewusstem Verhalten beim Online-Einkauf (Arbeiterkammer Niederösterreich, Universität Wien)
Security and Resilience for P2P Energy Trading (FWF Joint Seminar AT-JP, September 2022)

The Karlskrona Manifesto for Sustainability Design. <https://www.sustainabilitydesign.org/karlskrona-manifesto>.

List of failed and overbudget custom software projects. https://en.wikipedia.org/wiki/List_of_failed_and_overbudget_custom_software_projects.

Robert M McClure. NATO Software Engineering Conference 1968. <http://homepages.cs.ncl.ac.uk/brian.randell/NATO/nato1968.PDF>.

N.N. Comic ("all modern digital infrastructure"). <https://xkcd.com/2347>.

heise online. "Elwis" ist tot: Lidl stoppt millionenschweres Projekt mit SAP. <https://www.heise.de/newsticker/meldung/Elwis-ist-tot-Lidl-stoppt-millionenschweres-Projekt-mit-SAP-4111245.html>.