Infrastructure and digital transformations

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About

- What and when are infrastructures?
- In which ways are infrastructures political?
- Digital transformation
  - A very short and biased history of IC infrastructures
  - Some modest and naive proposals for better IC infrastructures
- Conclusions

Conspicuous silence?

- Amazing feats of engineering, complex socio-technical arrangements that provide extraordinary powers to regular people
- When they work they are not talked about much

What/When are infrastructures?

- Susan Leigh Star's and Geoff Bowker's **infrastructural inversions**
- Enabled by infrastructural change in the late 1980/early 1990s and the introduction of computer systems in research institutions
- Ethnographies of infrastructure

Characteristics of infrastructures

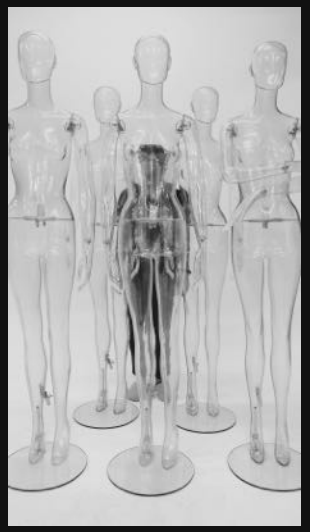
Susan Leigh Star and Karen Ruhleder, Steps Toward an Ecology of Infrastructure: Design and Access for Large Information Spaces, Information Systems Research 7, no. 1 (1996): 111-34.

Embeddedness

- In other infrastructures
- In society

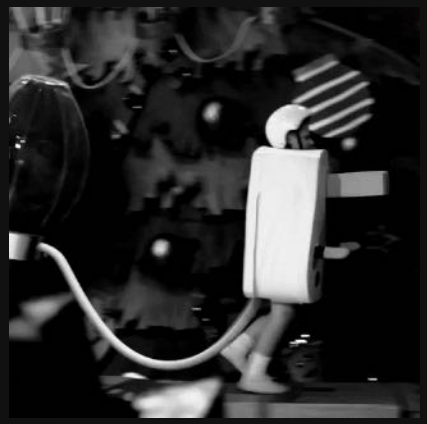
Transparency

No need to assemble it to use it - it is just there....



Reach or scope

- beyond a single practice
- both spatially and temporally



Learned as a part of membership

in a community of practice (cf. Lave and Wenger)

Links with conventions of practice

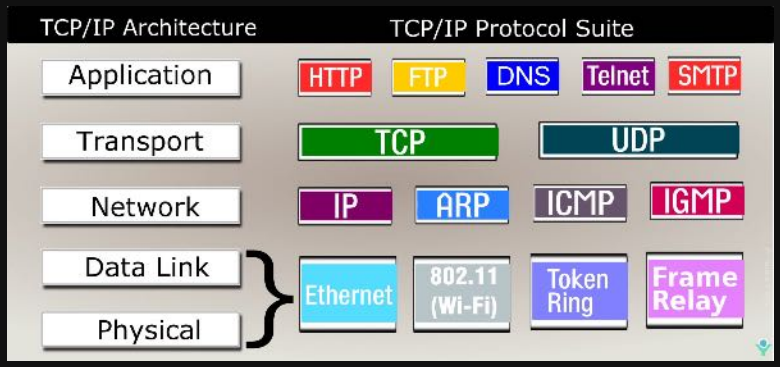
'shapes and is shaped by'

"e.g. the ways that cycles of day-night work are affected by and affect electrical power rates and needs" (Star & Ruhleder 1996: 113)

QWERTY

Embodiment of standards

DIN ISO



Built on an installed based

NEVER de novo!

'wrestles with the inertia of the installed base'

but is also enabled by existing structures

Becomes visible upon breakdown

New York City Blackout, 1959, Joe Scherschel Time & Life Pictures/Shutterstock

A question of degree

- The more these characteristics apply to a socio-technical arrangement, the more it works as an infrastructure
- Relational: One's infrastructure is another person's device

...a bridge too far: Limitations

- Should remain linked to the large socio-technical systems built during the 19th and 20th Century -> involving heavy material structures and huge investments (Hesmondhalgh 2021)
- Should reflect on what exactly is in the 'foreground' enabled by the 'background' of infrastructures (Lee & Schmidt 2018)

Infrastructure politics

Or: why we really should talk more about infrastructures (and not only about how annoying it is when they do not work)

Big infrastructure politics

- Good old geopolitics: large-scale building and destroying
- Infrastructural hopes: roads and grids providing a better life (Reeves 2017)
- Frequent land-use conflicts, e.g., Sami resistance against wind farms at Fosen

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Madeleine Reeves, Infrastructural Hope: Anticipating Independent Roads and Territorial Integrity in Southern Kyrgyzstan,Ethnos 82, no. 4 (August 8, 2017): 711-37

Politics of invisibility

- Broken world thinking: Infrastructures as fragile entities, failure prone, in constant need of care (Steven Jackson)
- Invisible work (corresponds to the invisibility of infrastructure, cf. Star and Strauss 1999)
- Infrastructuring (e.g., Karasti and Blomberg 2018)
  - (incremental) development
  - maintenance and repair
  - articulation

Politics through design

Which communities are served, which are excluded?
Which uses of technology appear as "normal"?

Digital transformation?

A short history of IC-infrastructures and some modest and naive proposals for better infrastructures

Digital transformation

- 1970s-1990s
  - Liberalisation of media and telecommunication
  - Technological innovations enabled by the open source model of collaboration
- 2000s:
  - Closed platforms hope to reap the huge rewards that are linked to becoming an infrastructure provider
  - Tech-giants compete for different infrastructures: Meta (social i., ads), Microsoft (office i.), Apple (hardware i.), Amazon (retail i.), Alphabet (search i., ads)
  - Many smaller ones experiment with other infrastructures

Digital transformation (cont.d)

- 2020s
  - OpenAI and NVIDIA, the race to keep up continues
  - Cracks in the platformisation of IC-infrastructures
    - A certain regulatory push back: most recently DSA
    - New federated digital infrastructures break through helped by the ongoing "enshittification" of existing platforms

Alternative ICT infrastructures

Infrastructuring from below, federation, permacomputing, local LLMs

The Internet's open source legacy: Infrastructuring from below

- Collaborative scratching of one's own itch
- Sharing instead of exchange
- Learning, skills and competences as central value

The case of user-driven mobile phone infrastructuring

- De-facto duopoly of iOS and Android
- At the fringes: User-created alternatives, e.g.,
  - LineageOS
  - SailfishOS
  - The PinePhone
- A case of ambitious user-driven infrastructuring: what are the motivations and limitations?

Motivations found among infrastructurers

- Concerns for privacy and control
- Strong anti-corporate stance
- Sustainability - against planned obsolescence
- Eagerness to learn about infrastructures

Modes of user-driven i.

- The non-negotiable need for a "daily driver": a mobile phone which acts as infrastructural node
- Experiments with a second phone - the goal is to make it a "daily driver"
- Collaborative debugging and learning
- Differences in how far the different phones decouple from Android and its infrastructures (e.g., play store) - LineageOS is most entangled, PinePhone least - but the latter is rarely used as 'daily driver'

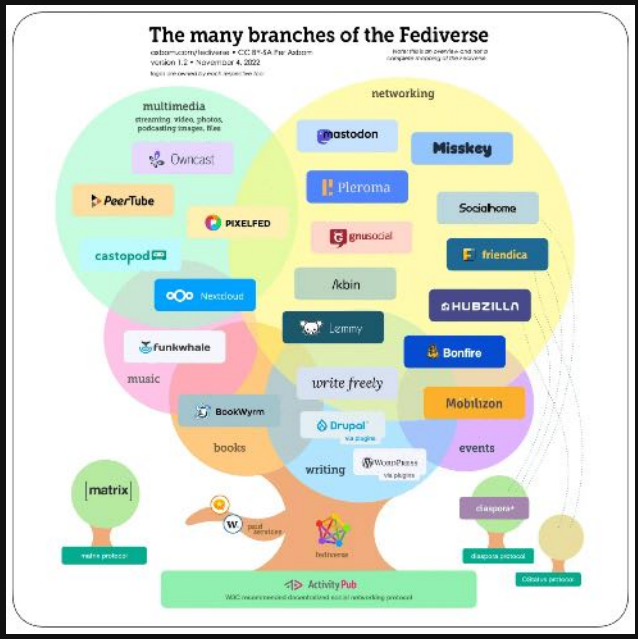
The politics of infrastructuring from below

- **Geopolitics**: Backdoors in your software, security through openness (instead of obscurity) but a stronger focus on corporate power
- (In)**Visibility**: Complete visibility (which can create problems in daily use)
- Politics of **design**: By users for users (in this case presumably a mostly male user group)

Three examples for recent infrastructural innovations "from below"

1. Federation

- Resolves the tension between centralisation (network effects, accountability, simplicity) and decentralisation (democracy, robustness)
- Enabled by the ActivityPub protocol
- E.g., Mastodon (ca 10 mio users), Lemmy, Pixelfed
- Principles: no algorithm, user owns own data and can change "instances", decentralised moderation



2. Permacomputing

- Inspiration: Permaculture (Ville-Matias Heikkilä)
- Principles:
  - aims to have a strengthening effect on ecosystems (social and natural)
  - focus on longevity through maintenance and repair
  - sufficiency instead of efficiency, reuse of existing infrastructures
- How would IC-infrastructures look like when built on these principles instead of profit and rapid growth

3. Local LLMs

- Published among others by META
- Slightly less performant
- But keep data local and provide privacy
- Can be trained with your own data (e.g., pdfs)
- Have within months created a flurry of open source activities using these models for fun and profit

Conclusion 1: Further research

- Uses of AI for fun: research application just sent in (led by Kristine Ask)
- Use of (open source) digital tools for citizen engagement in urban planning (SustainDit, PhD project Leika Aruga)
- Infrastructural literacy: Conspiracy theories vs. infrastructuring from below

Conclusion 2: The performativity of our research

- Race to keep up (to protect) or
- Ignore the hypes and remind that there is nothing new under the sun or
- Connect with socio-technical movements that work for better infrastructures
- Start with: Which digital tools are you using?

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