Socio-Informatics

Practice-based understanding of design and use of IT artefacts & infrastructures

2018-06-03

Uni Siegen, CSCW
@RWTH Aaachen

Good Morning!

Info & Background

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B.Sc. CS & Psych, M.Sc. HCI
Transdisciplinarity FTW!

CSCW

Computer **S**upported **C**ooperative **W**ork: Related to HCI, org dev,… “Socio-Informatics” = broader term for CSCW & related work.

FAB101 & Fab Labs

Fab Labs in Academia & Personal Digital Fabrication brought CSCW & MCG together. Cooperation in project www.fab101.de

What should we talk about?

Overview: Socio-Informatics?
Case Study: 3D printing in Palestine?
Personal Fabrication & Fab Labs?
...?

Semester Outline

The history of der Computer science
Our roots

Classic usability (“suitability for use”)
Basics | Usability | User Experience | Methods

Recent approaches towards Socio-Informatics
Work(place) studies & ethnography | Participatory Design & Sociability | Practice & Appropriation | History | Methods

Emergent perspective: Infrastructuring
A holistic look at Human-System-Interaction

Theoretical Basics
Canonical contributions, relevant theories, primary sources

Situating Socio-Informatics

Metaphors and developments in informatics & HCI

Mainframe

Main use: programming

Interaction: purposeful machine function

Using a computer vocationally (“Operator”)

ENGINEERING

Personal Computer

Focus: relationship computer – individual users

Sensory Interaction: Sound, graphics, movement

“Good” Interaction: effective, efficient, satisfactory

PSYCHOLOGY/ COGNITIVE SCIENCE

Networked Computers

Focus: relationship user - computer - user

Cooperative Interaction: “Through the interface”

Effective, efficient, satisfactory for collaborative tasks

COMUNICATION SCIENCE / SOCIAL SCIENCE

Ubicomp (Ubiquitous Computing)

Focus: relationship technology and use ecologies

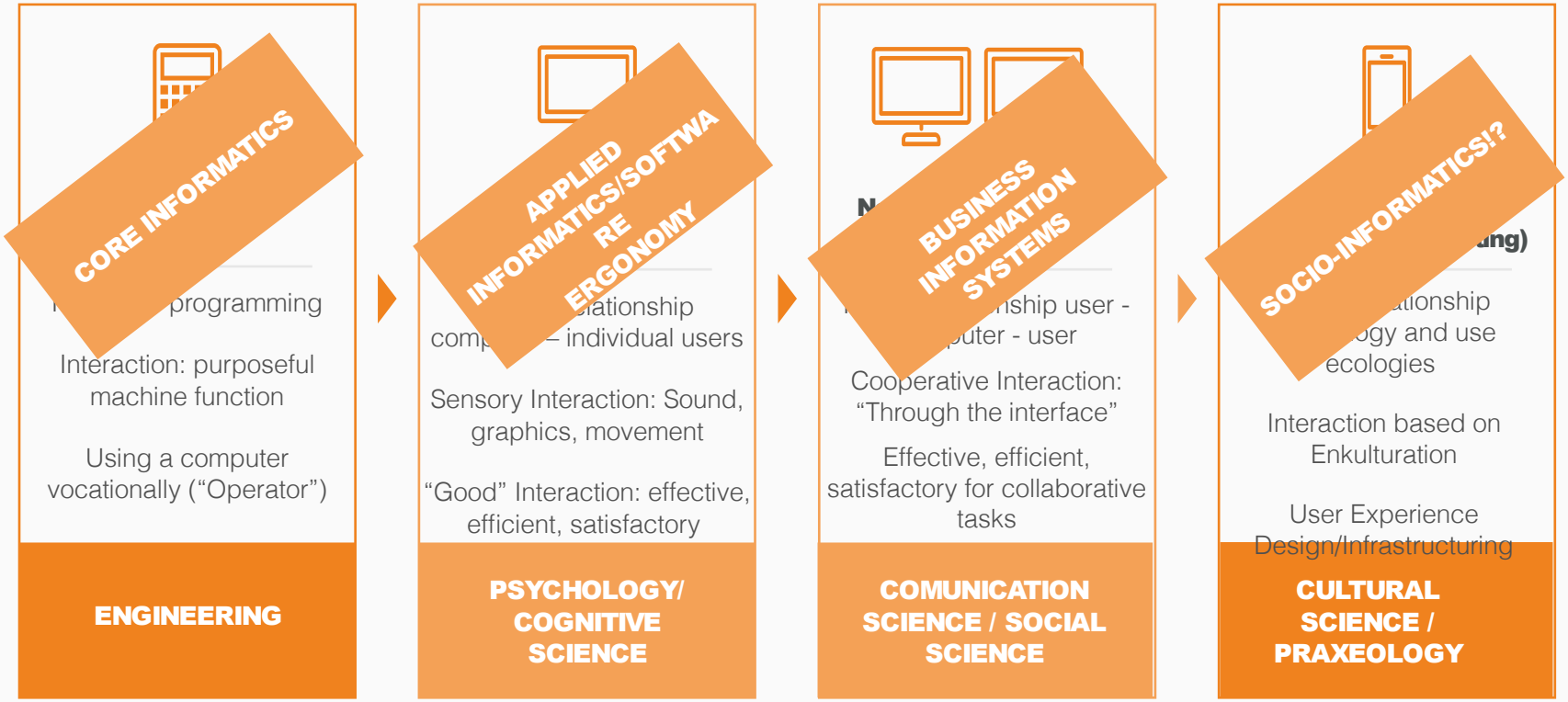
Interaction based on Enculturation

User Experience Design/Infrastructuring

CULTURAL SCIENCE / PRAXEOLOGY

Situating Socio-Informatics

Metaphors and developments in informatics & HCI



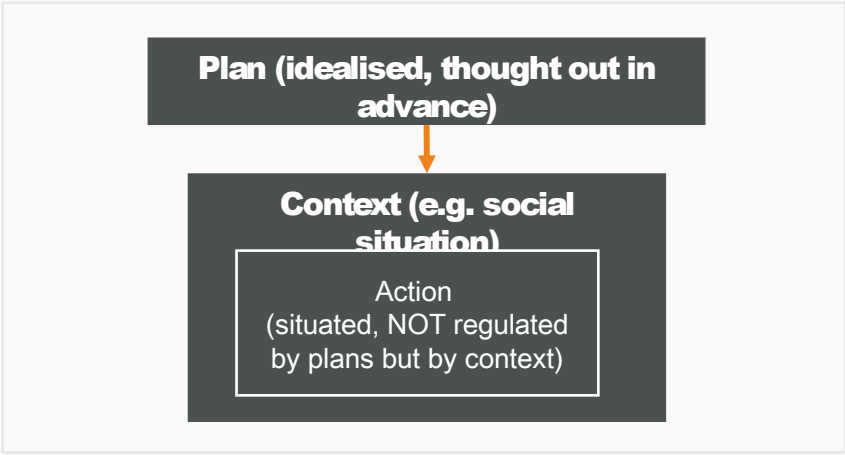
Work(place) studies

Basic idea: HCI takes place (originally: exclusively) against the background of a work situation and is interrelated with practices

- **Background & context**
  Aim: To understand everyday practices which are to be “incorporated” into IT. It is important to understand them so that requirements can be defined and evaluated.
- **Pioneers: Xerox Parc**
  Rooted in anthropology (psychology, sociology). In the past, applied to the design of photocopiers.
- **The workplace as a (real-) lab**
  Ethnography (unlike psychology) provides methods which allow the examination in context without “disturbing” the surroundings. The aim is to describe real practice (as opposed to ideal / official practice).

Plans & Situated Action

Ethnographical foundation for Work(place) studies



Pioneer: Lucy Suchman

Cognitive Models (esp. from psychology)
People's behaviour driven by intellectual models, purpose, aime, motication etc. Explained by theories.

Ethnographical approach
Practical orientation: **"What is happening here?"** vs. "which theories correspond to what is happening?".

Origins lie in the research of indigenous peoples "from the inside" – **participation** in the field is an integral part of this method!
Also: Ethnomethodology - "we cannot recognize one objective, actual practice but rather the actor's intended practice".

Coordination processes: Articulation work

Articulation work = The (meta) work necessary for the coordination of other work elements.

Articulation process

Composition & holding together of work elements, sequences, etc.: Interaction between people!

Articulation work

Example: Post-Its informing colleagues of missed calls, emails containing invitations to meetings, …

The role of IT

Used often for articulation work. Understanding tasks & articulation work is important!

Method: Observation

Basic method of ethnography

Often interesting: the difference between what is said and what is done: Idealistic <> factual behaviour as well as uncovering “tacit knowledge” (knowledge which is embedded in culture and often not (able to be) expressed)

Roles?

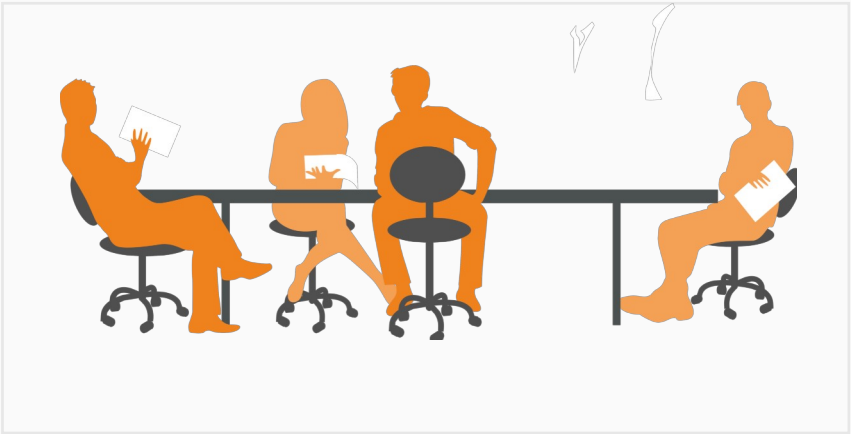
Observing: distanced, results are therefore possibly more authentic vs. participatory: allowing more inquiry.

Observation plan

Focus, duration, location, termination conditions, ethics, (confidentiality, legalities,...)

Data collection

Field notes: (Almost) always important!
Audio / Video complemented.



Method: Interview

Second basic model of ethnography

Questioning in a dialogue. Essential forms are:
open (unstructured) interviews,
narrative interviews (initial question then “story”),
semi-structured interviews (leading questions),
structured interviews (concrete questions).

Roles?

Do not interrupt unnecessarily. No suggestive questions. No pre-formulated answers. No pressure! Rather take a passive role.

Parameters

Chose a suitable location. Justified selection of participants. Take previous interviewees as experts.

Data collection

Recordings (mainly only audio) and field notes.

Analysis of ethnographical data

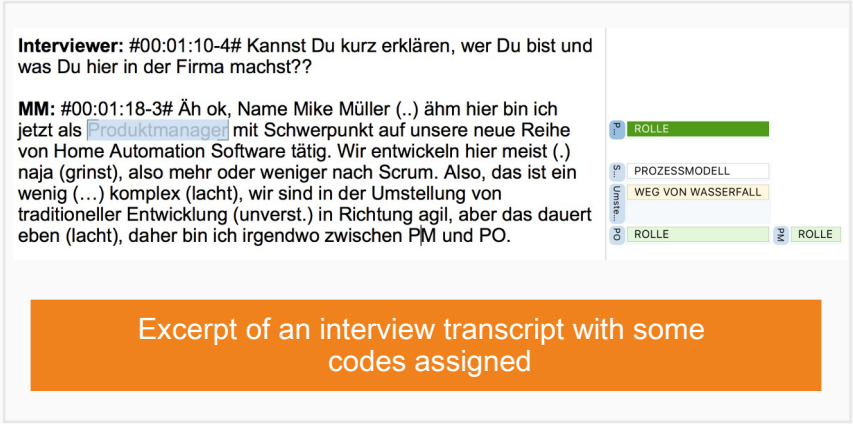
Systematic interpretation: Coding, categorizing, … Generalizing?

Iterative analysis by refining codes, abstracting categories and (long-term!) building theory. Quality criteria & methods to avoid issues with subjectivity are important (e.g. code with people not involved in the study - Inter-Coder-Reliability!)

1. **Transcription**
   Transferring recordings into text. Incorporate spoken and other expressions (“hmm”, noteworthy facial expressions,..). Time stamps!

2. **Coding**
   Read the text several times and assign codes (“tags”) to relevant passages. Codes can be informed up-front or during process

3. **Find topics / categories**
   “Coding of the codes”. Find more general categories for several codes.



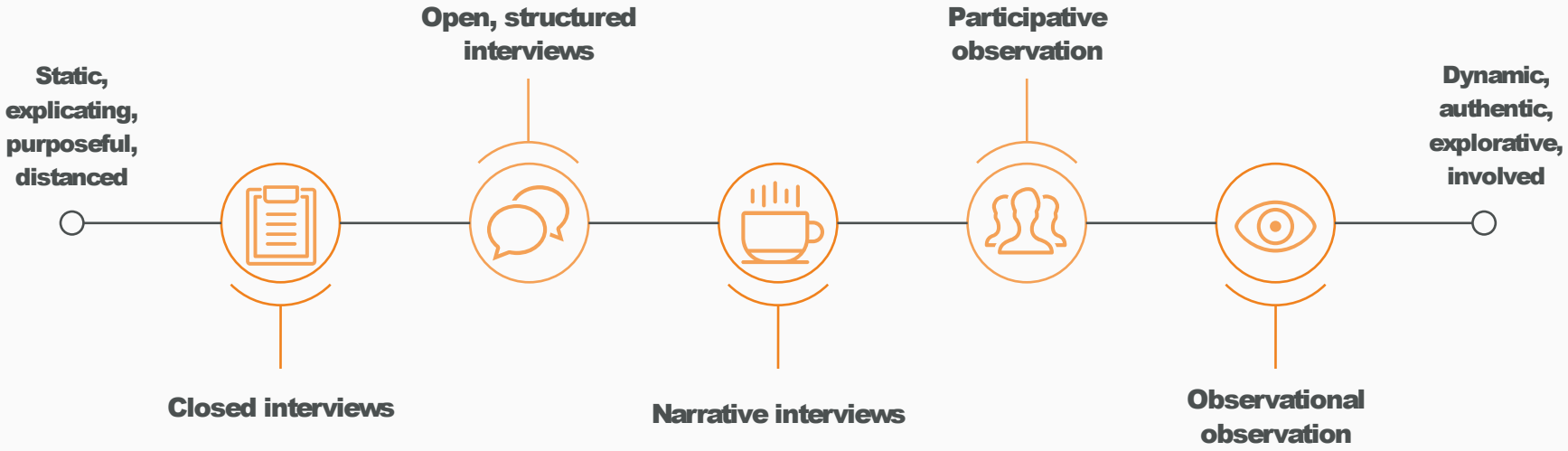
Excerpt of an interview transcript with some codes assigned

In practice: Requires a lot of resources & time. Compromise: partial transcriptions (to verify / consolidate field notes), TA, etc.

Abb. Screenshot Atlas.ti (own work)

Scale of the involvement of ethnographical methods

In an ideal world: Ethnographer always deeply involved in the field (enculturation). Unfortunately not always possible…



Further reading

But don‘t just read! Qualitative research requires **doing** – write, code, make notes, ...

01

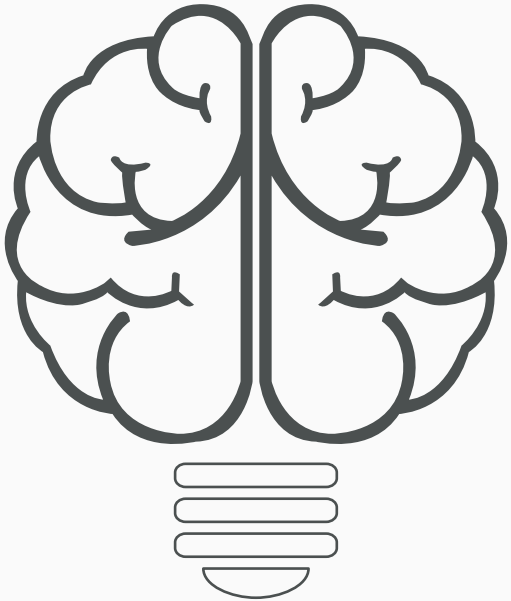
Textbook

Helfferich, C. (2010). *Die Qualität qualitativer Daten: Manual für die Durchführung qualitativer Interviews*. Springer DE.

02

Practical and easy-to-read approach to qualitative analyses:

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*, 77–101.



03

Generalizing things?

Crabtree, A., Tolmie, P., & Rouncefield, M. (2013). “How Many Bloody Examples Do You Want?” Fieldwork and Generalisation. *Proceedings of the 2013 13th European Conference on Computer-Supported Cooperative Work, ECSCW’13*, (Keith 1992), 21–25.

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Recent approaches towards Socio-Informatics
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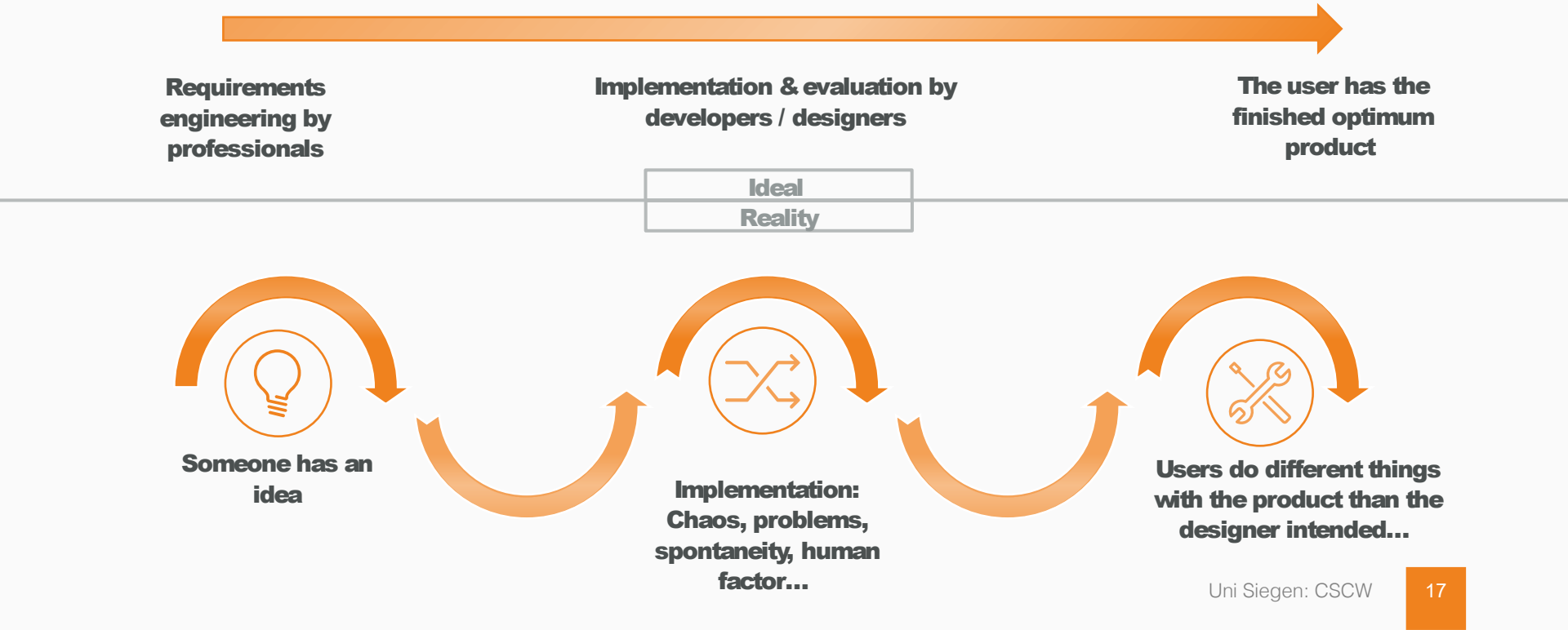
Project plan vs. Reality

The roots of Participatory Design: ideal-typical plans of development processes do not work in reality:



Working with the Chaos: Participatory Design (PD)

Active user integration and the – conscious - intermingling of traditional roles (Designer ← ? → User)

Roles and competences

User vs customer(esp. in B2B). Participation of real users necessaryWho should have decision-making authority?
(“boss who makes IT tool purchase decisions but doesn’t know work practices on the ground”).

Process

Spontaniety, iteration, reaction & participation must be “lived”, … Related concepts: Risk-aware design, user-oriented design, user-centered design, agile,…

Motivation

Do end users want to be involved? Societal norm: Users don‘t have that much to do with design and development (is that a good thing?)

Contexts of & Perspectives on Participatory Design

PD developed (/is developing) in different contexts at the same time

Europe (Scandinavia)

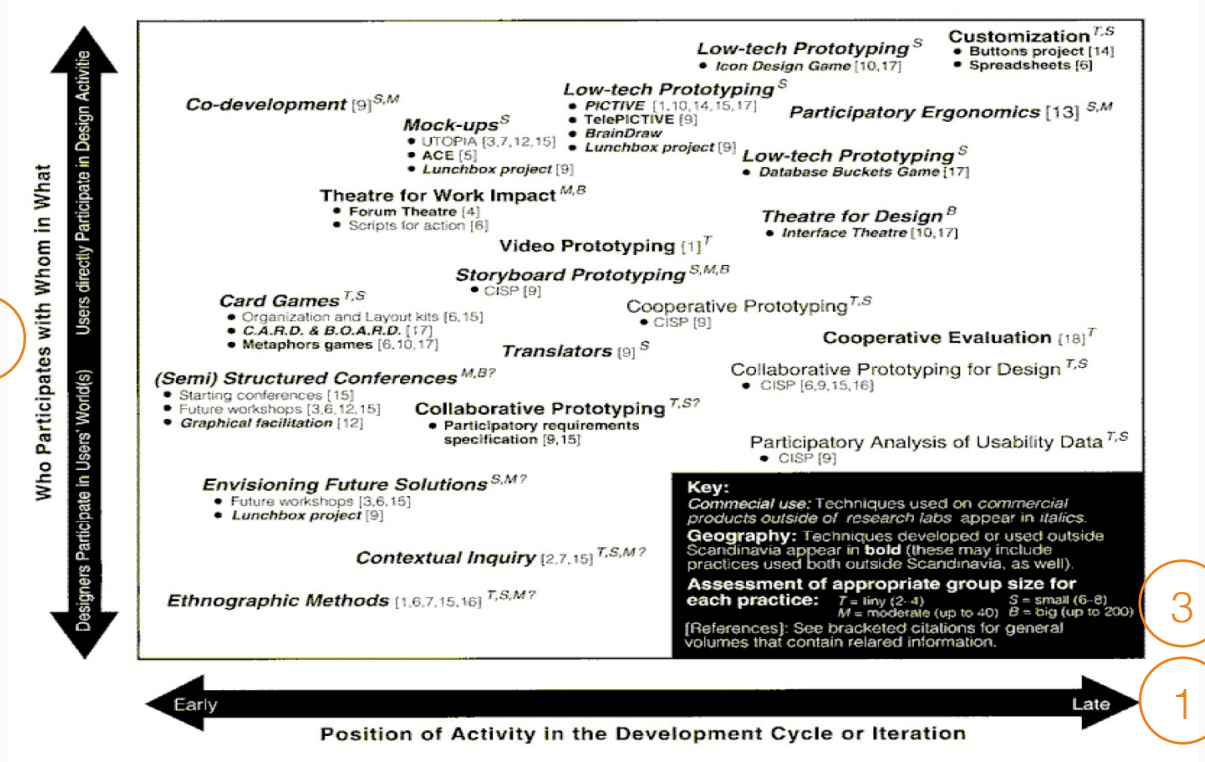
- Union & worker's rights background (co-development of the workplace)
- Fear of rationalization, (elimination) of jobs and maintenance of occupational work and safety standards
- Development from creative techniques

USA

- Pragmatism / Economy: Improved product = profit!!!
- Development from the improvement of process models

User Driven Innovation

- Put users' ideas for the improvement of products into use
- Includes aspects of both Scandinavian and US PD



Classification of PD-methods

PD requires context-specific method combinations. Relevant factors: 1. Point in time in the process,
2. Type of collaboration, 3. Group size

Abb. Aus Kuhn und Müller, 1993

Example: PD of spoons

Illustration of a “PD Frame of Mind”

… Can the spoon possibly be anything other than simply an eating utensil for you or for anyone else? A medium? Can novel new uses be discovered (which were not intended in the design?)

When you eat soup…

…do you see yourself as a spoon “user”? Would you be interested in designing / evaluating a new spoon? While eating?

… If you (perhaps conjointly with other spoon users) have considered an innovative new spoon, maybe a spoon manufacturer would be interested in it? Of maybe you will become a spoon manufacturer yourself?

… If your spoon broke, would you wait for a new spoon before ever eating soup again? Would you use a fork? A straw? Would you repair your spoon?

…Maybe there are other environments, practices and contexts which are less spoon-centric and in which completely different questions can (need to?) be asked?

Criticism of PD

It‘s all fuzzy Hippie stuff!

Participation?

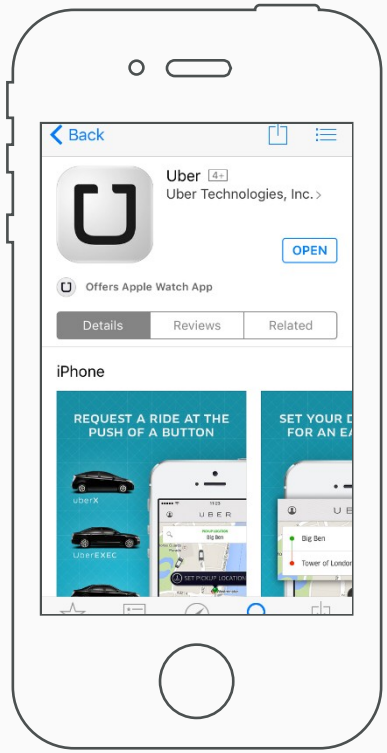
- What does that really mean, anyway?
- Difficult in work situations (Pressure to produce)
- Which qualifications are necessary? What knowledge is relevant?

Developer’s point of view

- PD focuses primarily on the user perspective
- The developer’s perspective is also important for technology…

Design towards technology

- PD is IT-focused. Can / should IT solve all problems?



Design and Values

Design is always political.

Changes in HCI and CSCW (e.g. through new interactions) also bring about changes in stress conditions and power structures. → For whom does (new) IT provide opportunities and for whom does it generate work? Access to information? Privacy? Trust? Transparency? Responsibilities? Possession and ownership? Equal treatment? Sustainability?

Conscious Design

Comparison of old / new interaction and consideration of winners / losers

Participatory Design does not solve all problems

Competences, motivations, process issues, costs for participants & org, workload, uncertainty / *possible* futures, …

Design for social environments

Sociability as design with regards to the social framework

Screenshot Apple App Store (Uber Mobile App)

Sociability: Designing for ubiquitous social media

Sociability as a concept is a direct result of the mobile, ubiquitous internet: interaction everywhere

Facebook is bigger than China?!

1.4 billion active users every month. Dimension and legal basis extremely complex and often unclear.

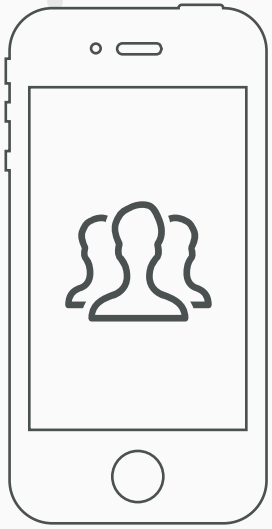
Sociability

From psychology: The ability to blend into a society and to work together effectively with others. But: Influencing others can also be destructive.

For interaction concepts: How can (good?!) sociability be achiebed by design?

Value Sensitive Design (VSD)

Aim: The development of a proactive (!) methodology to allow human values in design processes



Values ≠ Usability

Usability is essential for design that supports values, but it is not sufficient.

Example: a computer virus with good usability for the black hat, “comfortable” GPS surveillance of citizens…

Interactional Variance

Technology varies in its suitabilty to support specific values: technology is not value neutral but is also not necessarily value-specific.

This variance is one of the things VSD focuses on.

Example: Manhattan Project

Design for…

... Egoism

... Self-development

... Collectivism

... Free (software) ideology

And much more (see the work of Batya Friedman)

Hauptakteurin in VSD: Batya Friedman. Projektwebsite: www.vsdesign.org

VSD: Methodology

A conceptual overview

Fundamentally important: Consideration of *direct* and *indirect* Stakeholders (immediately / indirectly interacting with the system which is to be (co-)designed. Iterative and integrative application of the following methods:

Conceptual research

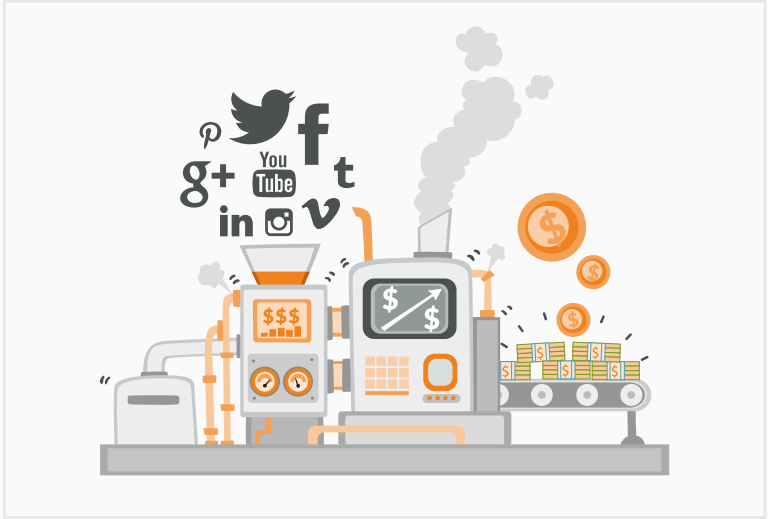
Philosophically informed analyses of the intended / involved / influenced values.

Technical research

Identify or develop technical mechanisms and examine their suitability for the intended values.

Empirical reserach

Application of social-scientific methods to discover who the stakeholders are, what their values are, how these values can or should be prioritised…



IT and values in general

Further examples

Accountability & control

Who is responsible and liable? Who checks to see that these obligations are being observed?

Protection of information

Which rights do individuals / organisations have regarding information about themselves? How can these rights be protected? Which commitments are involved?

System quality

Regarding data / system quality, which standards are required to protect the rights of individuals and the security of society?

Property rights

Infringements are easy, persecution is difficult. How can property be protected? What is property in (collaborative) digital domains?

Quality of life

Which values and institutions should be retained? Which values and behaviours should be promoted?

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Emergent Approach: Infrastructuring
A holistic look at Human-System-Interaction

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Infrastructuring: emergent perspective on HCI & CSCW

Innovation: Criticism of classic development processes (similar to PD)

"Classic" design process

Design → Introduction → Use

Professionals decide when, where and what is to be designed.

However: Users are creative *in situ*, alter IT, use it in a different way than was planned, designer ≠ user,…

Expanding the term "design"

All goal-oriented activities, whether of individuals or groups, which aim to change something (e.g. an IT system).

It is irrelevant **who** those active people are and what their role is.

Infrastructuring: emergent perspective on HCI & CSCW

Focus on Infrastructuring: Located Accountabilities & Concept of (IT-)Infrastructures

Located Accountabilities

Suchman (1994,2002): Criticism of Designer <> user (see previous slide)

Observation: “Design from Nowhere” and “Detached Intimacy”

Advocates the acknowledgement of **all** parties concerned in the (further) development of IT under consideration of their individual perspectives. “Artful integration” of all these activities and “partial translations” instead of standardisation

Infrastructure

Star&Bowker (2002), Star&Ruhleder (1996): Infrastructure should be understood as the relationship between uses, users and IT, not just as a simple compilation of technologies.

Infrastructure runs “beneath” other structures and only becomes visible on “breakdown”. Eight essential characteristics (next slide).

Infrastructure

8 central characteristics

Embedded in other social and technological structures

Transparent in invisibly supporting work

Have a spatial and temporal reach or scope

Comprises taken-for-granted artifacts and organizational arrangements learned as part of membership

Plug in other infrastructures and tools in a standardized way, and are modified by scope and conflicting (local) conventions

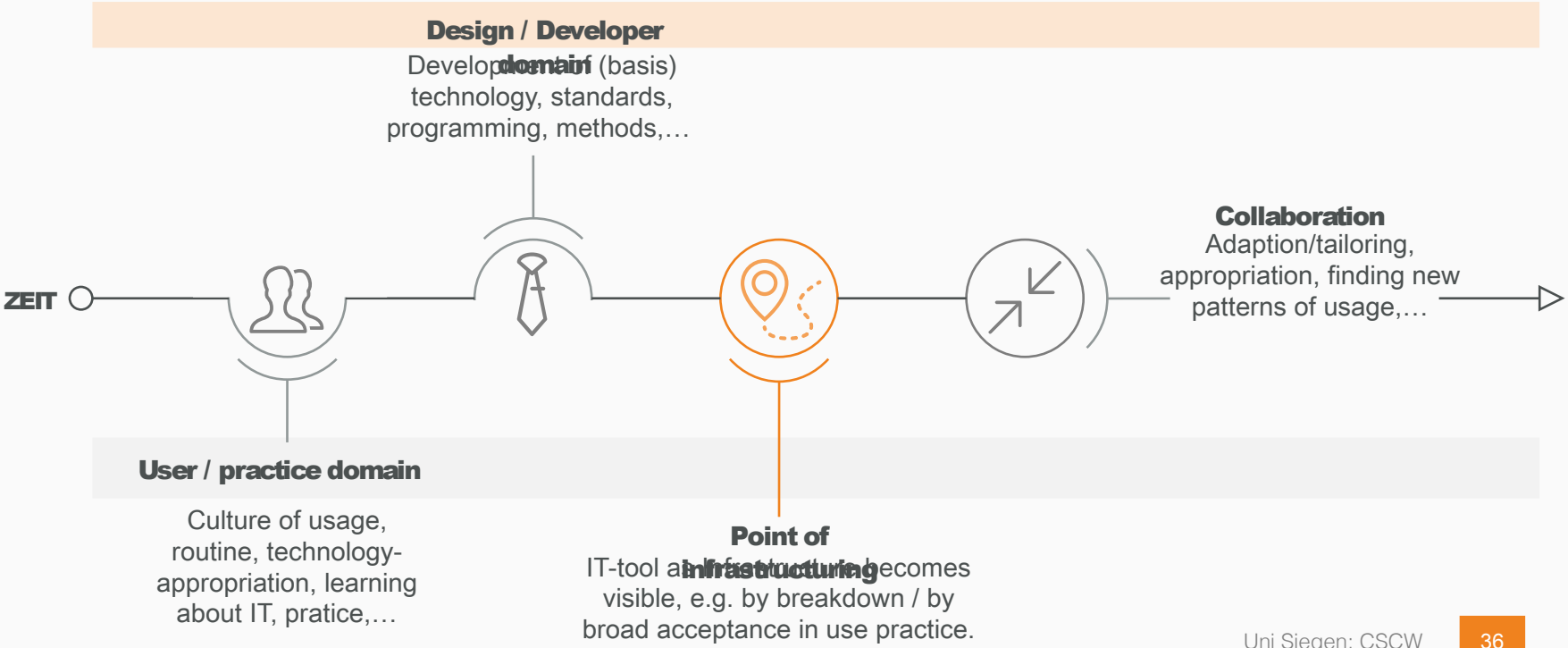
Shape and are shaped by the conventions of practice

Do not grow de novo but wrestle with the inertia of the installed based and inherit strengths and limits from that base

Normally invisible, become visible upon breakdown

Infrastructuring: Practice & design domains over time

Infrastructuring as a holistic view of IT

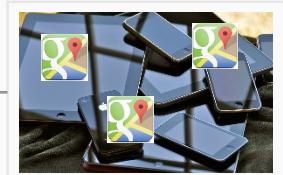


Infrastructuring: Practice & design domains over time

Case example: the discovery of a navigation-app as we know it today

Development of (multi-) touch (since the 70s!),
Microelectronics, the development of a navigation app

Configuration and
integration into practice
(infrastructure gradually
becomes invisible again)



ZEIT

PDAs for professionals, developing a
new consciousness of the limitations of
current systems (Symbian, Stylus etc.)

“The discovery of usage”:
By breakdown: forgotten the map
By innovation: saving routes

Infrastructuring and innovation

Infrastructuring doesn‘t see itself as cyclical/iterative but recognizes chaos, spontaniety and coincidence. “Waves in a pond”

Point of infrastructuring as the central element in the question of when and how design takes place: range of technologies meets usage intention.

Important: Initiative of designers **and** end users. View breakdown and innovation as an opportunity for design!

Consider ripple effects / waves!

Infrastructuring: State of Work

Still in active discussion and not a fully-formed theory yet. However: Useful as a multipurpose framework in HCI & CSCW

Benefit

Understanding of design during use / by users, equality, considerations about the meta-level not just driven by designers

Methodology

Not yet fully formed. Qualitative, ethnographical methods are long established. Historical analyses? Inclusion of technology/standards?

First approach: Activities which change the condition in one of the 8 characteristics of infrastructure.

Theoretical connections

Relations to activity theory and structuration theory as well as other work (more on this later)

Take Away

Socio-Informatics exist
They are a bundle of perspectives & methods for including practices, fuzziness and human mess in ICT development

Infrastructures
IT infrastructures are **way** more than code, specific tools or platforms. Infrastructuring can provide orientation in this space.

Combining Roles, Methods & Perspectives
Less role differentiation ”Designers” vs. “Users”. Socio-Informatics can also integrate aspects of all approaches to HCI research you’ve learned about in DIS 1 *(Test & Look & Make)*

Further Reading
Links throughout slides & http://lead.me/socio-informatics

Socio-Informatics

Practice-based understanding of design and use of IT artefacts & infrastructures

questions?
kthxbye!

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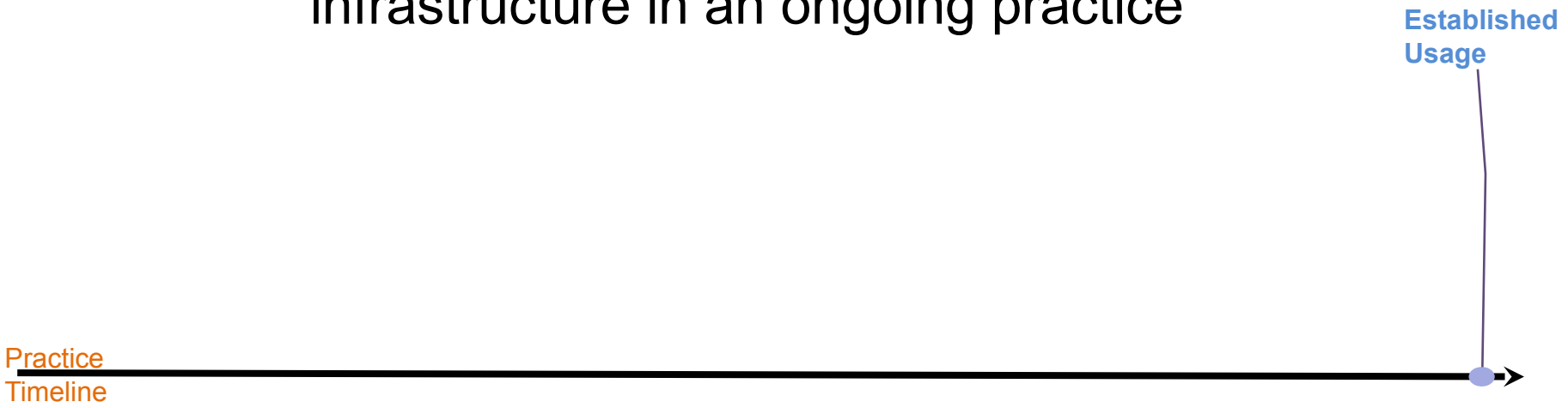
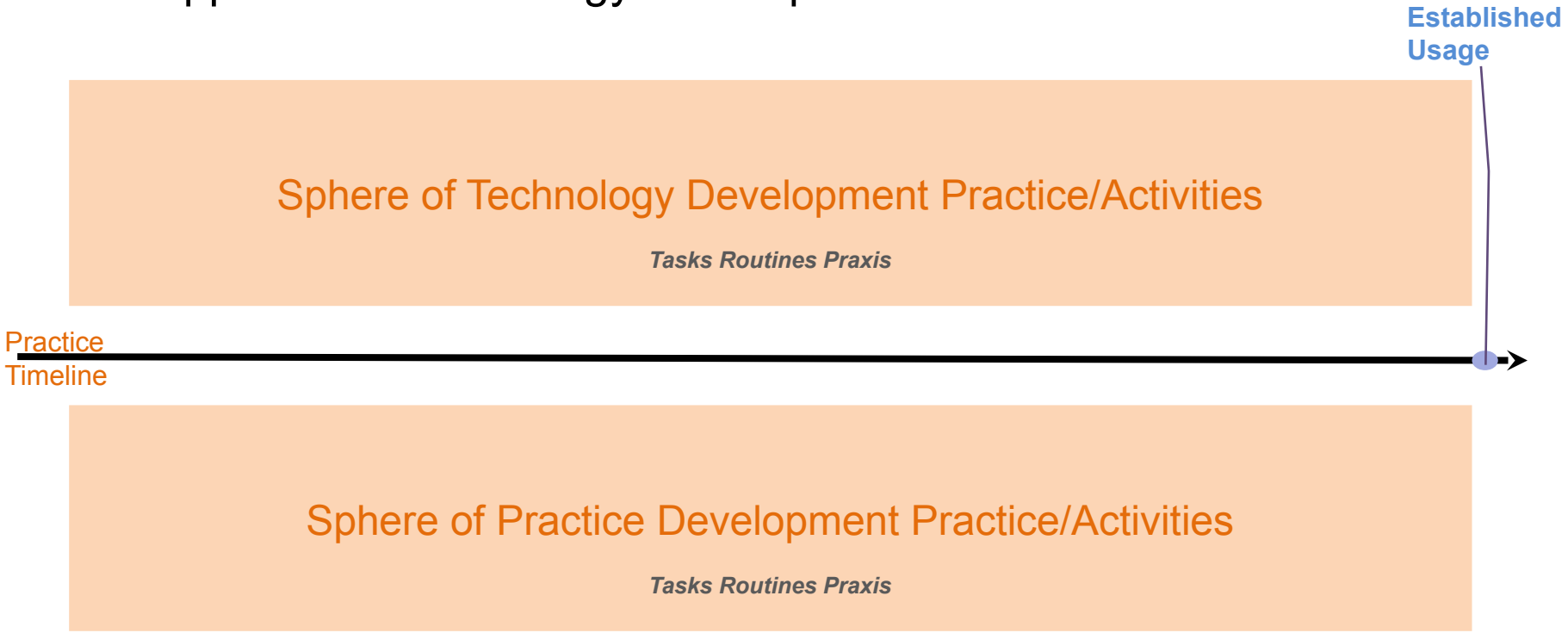
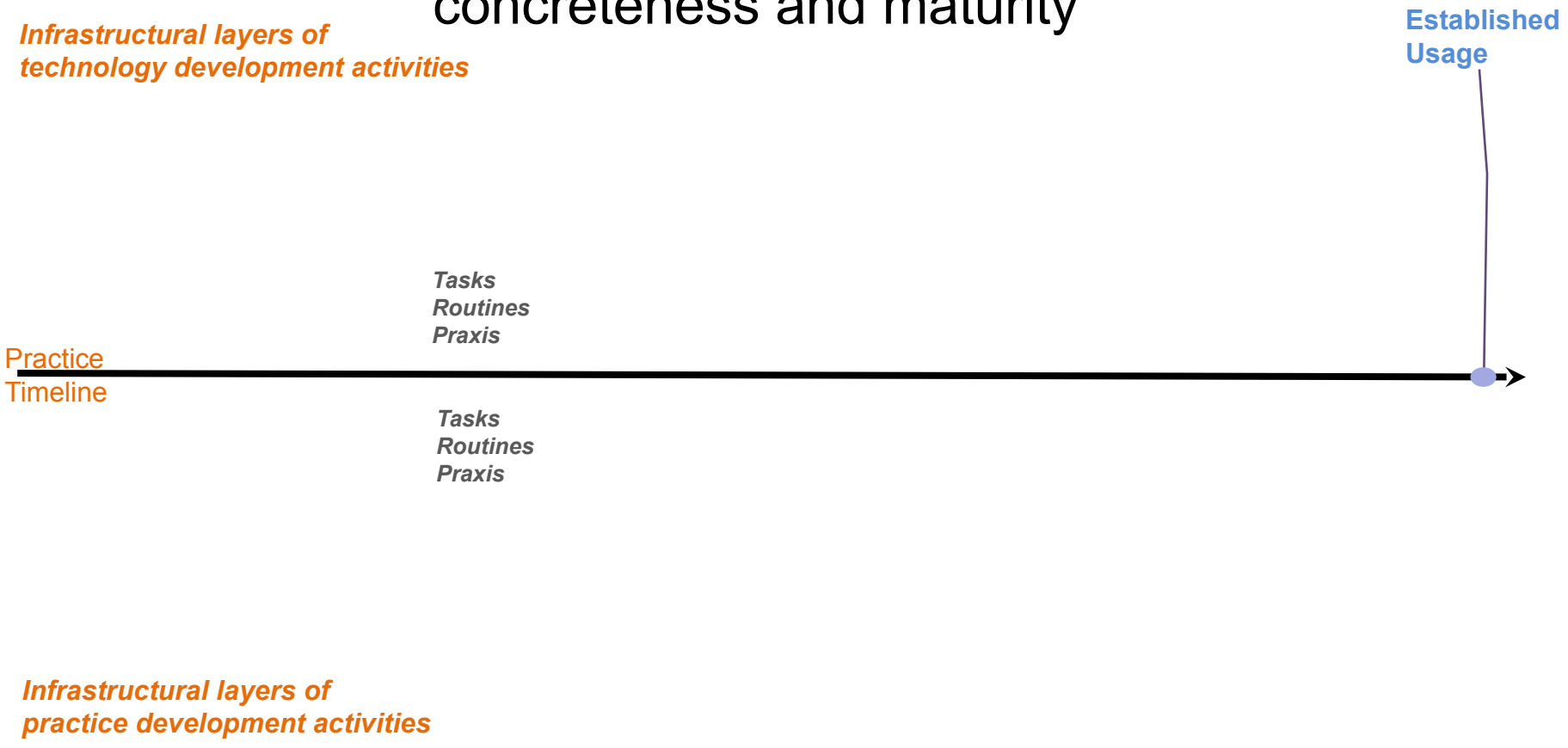
Goal of Infrastructuring: Established Usage of a new/changed infrastructure in an ongoing practice



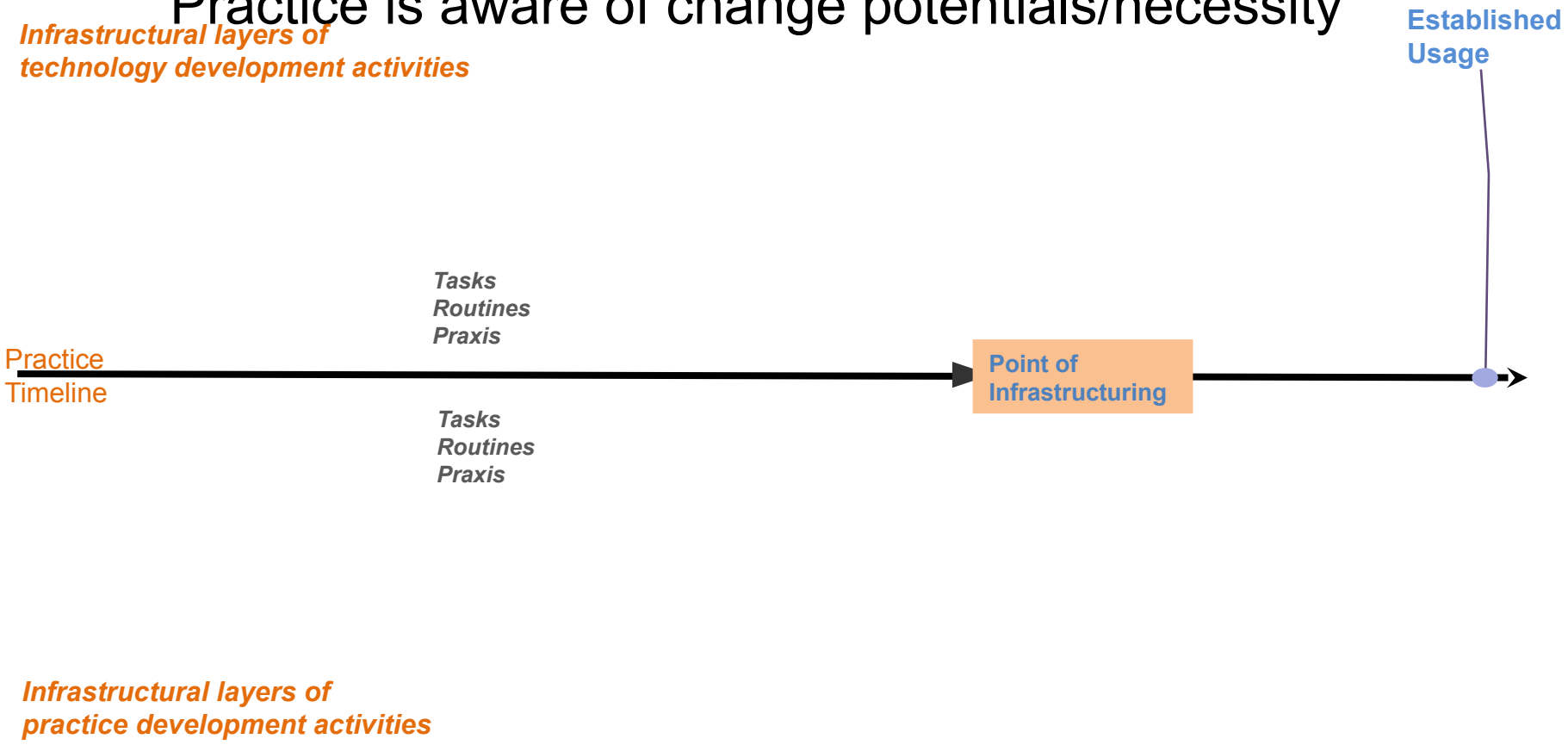
Infrastructuring activities that contribute to the established usage can be found/supported in Technology Development as well as Practice Domains



Infrastructuring activities occur with varying levels of concreteness and maturity



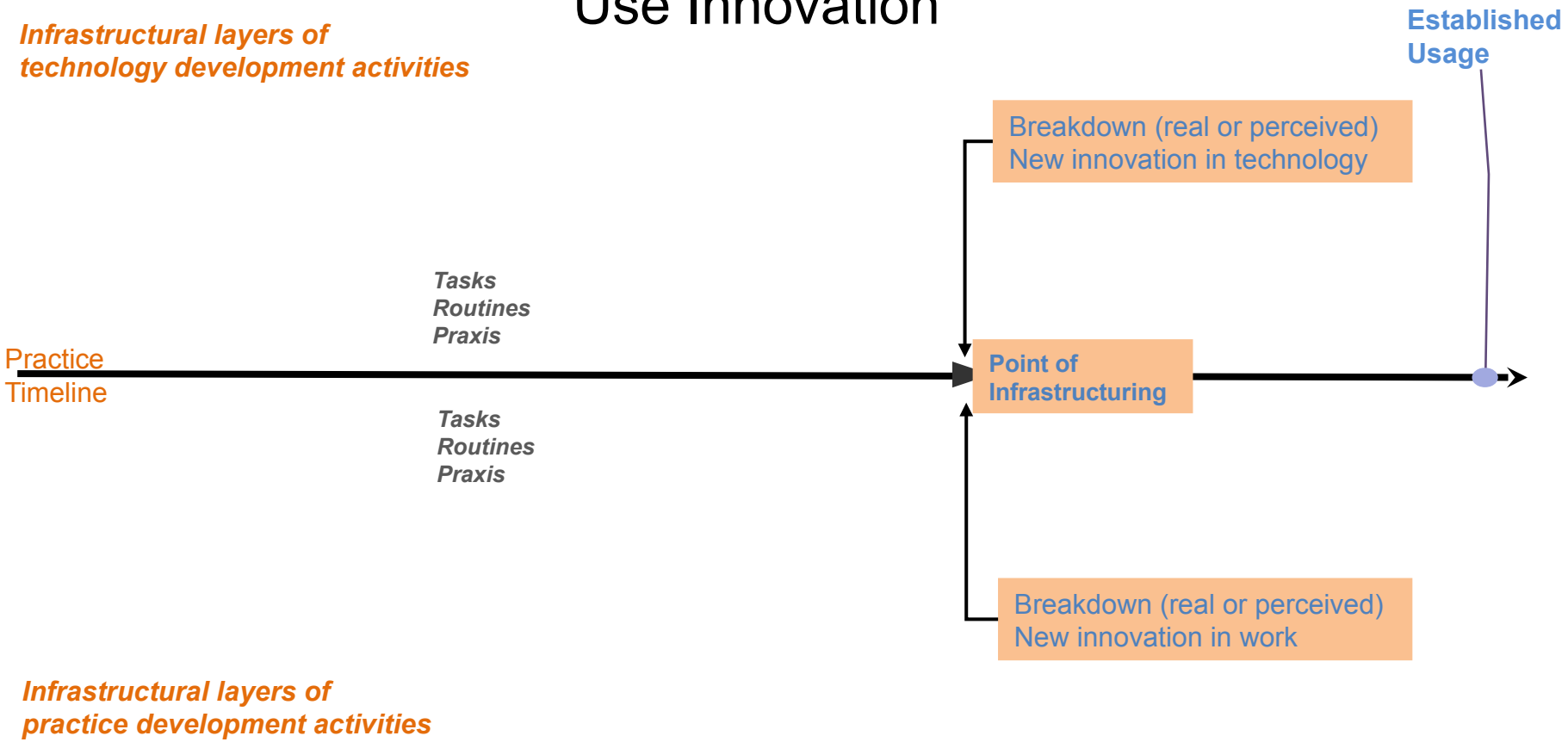
Point of Infrastructuring: Technological option is available, Practice is aware of change potentials/necessity



Point of Infrastructuring (PoI)

- PoI as an analytical figure capturing a moment of awareness of infrastructure problems or opportunities
  - that could happen at the individual, organizational or even societal level,
  - in which the political, social, organizational and technological dimensions of an infrastructure become tangible for the practitioners that depend on it,
  - that initiates a set of activities of a variety of stakeholders targeting the infrastructure problem or opportunity, and
  - that ultimately may result in a modified infrastructure and/or a modified (use) practice.

PoI may be caused by a real/perceived breakdown, or by a Use Innovation



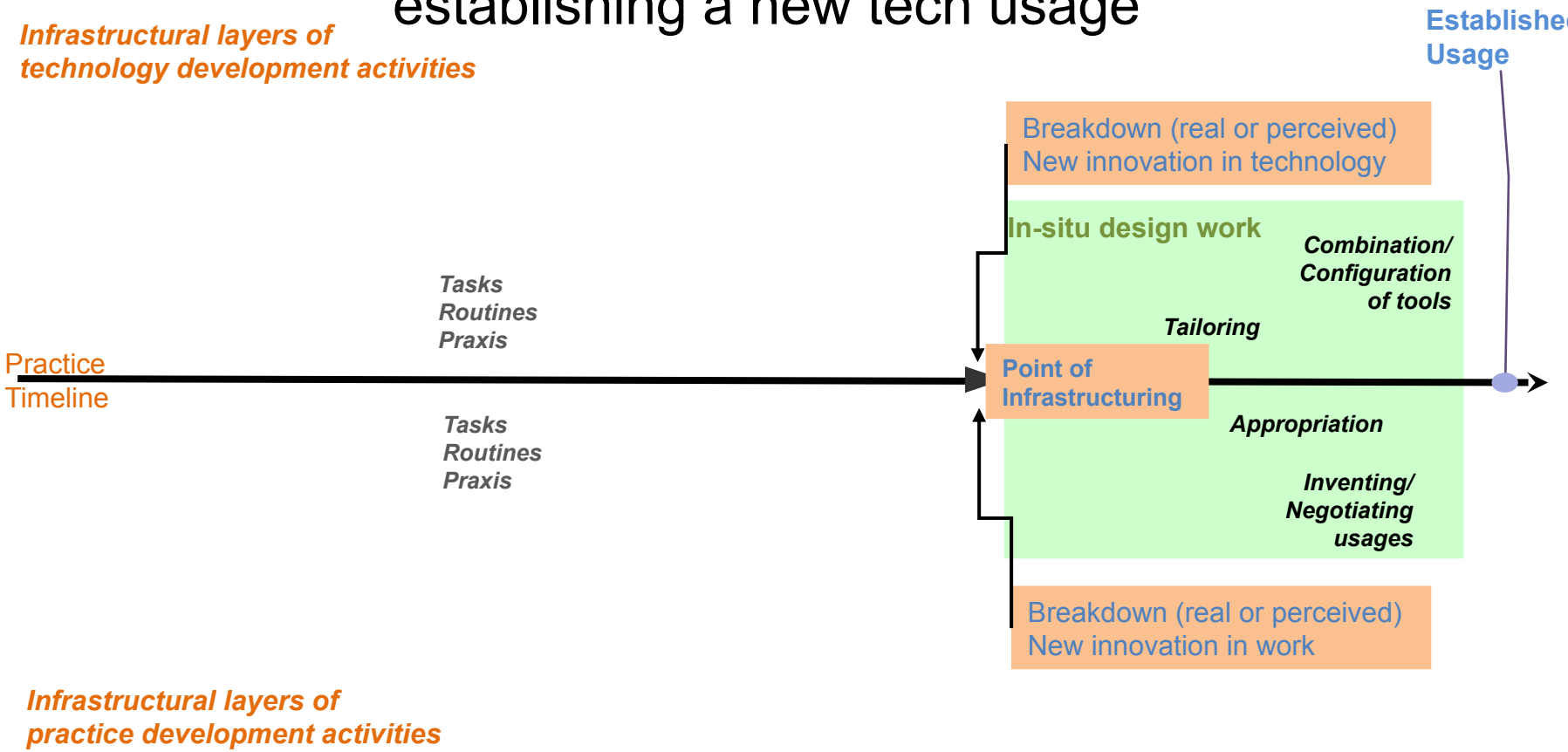
Point of Infrastructuring (PoI)

- Four motivational forces (Pipek & Wulf, 2009)
  - Actual infrastructure breakdown: The infrastructure is not able to deliver the service it is expected to provide
  - Perceived infrastructure breakdown: The infrastructure does provide its service technologically, but not to the level of expectations of its user
  - Extrinsically motivated practice innovation: The framing conditions or the task and goals associated with a practice have changed in a way that it is impossible to maintain the old practice
  - Intrinsically motivated practice innovation: The framing conditions, tasks and goals associated with a practice remain unchanged, but practitioners discovered the potential for performing the practice in a new way, possibly because it is more cost efficient, simpler, quicker, or simply more fun
- Intrinsically motivated practice innovations are often connected to reverse salients

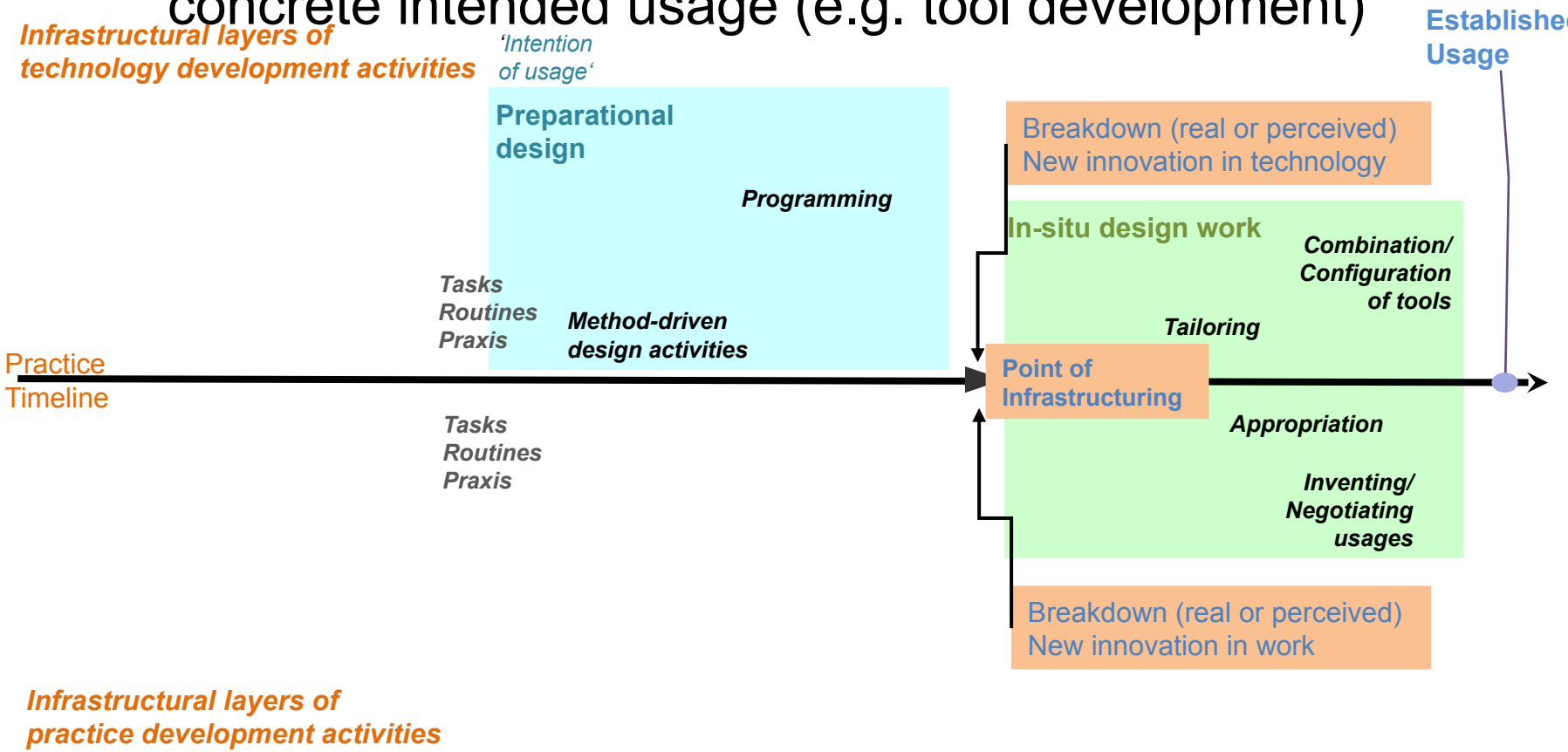
Point of Infrastructuring (PoI)

- Motivations trigger different reactions/strategies
  - If an infrastructure actually breaks down, one may aim to repair it.
  - If an infrastructure is perceived as breaking down, one may find complementary technology to overcome the problem.
  - If the framing conditions of a practice change, one may want to change use conventions, but also look for complementary technology.
  - If there is an intrinsic motive, there is a potential alternative or complementary technology already at hand that needs to be explored and integrated into a practice

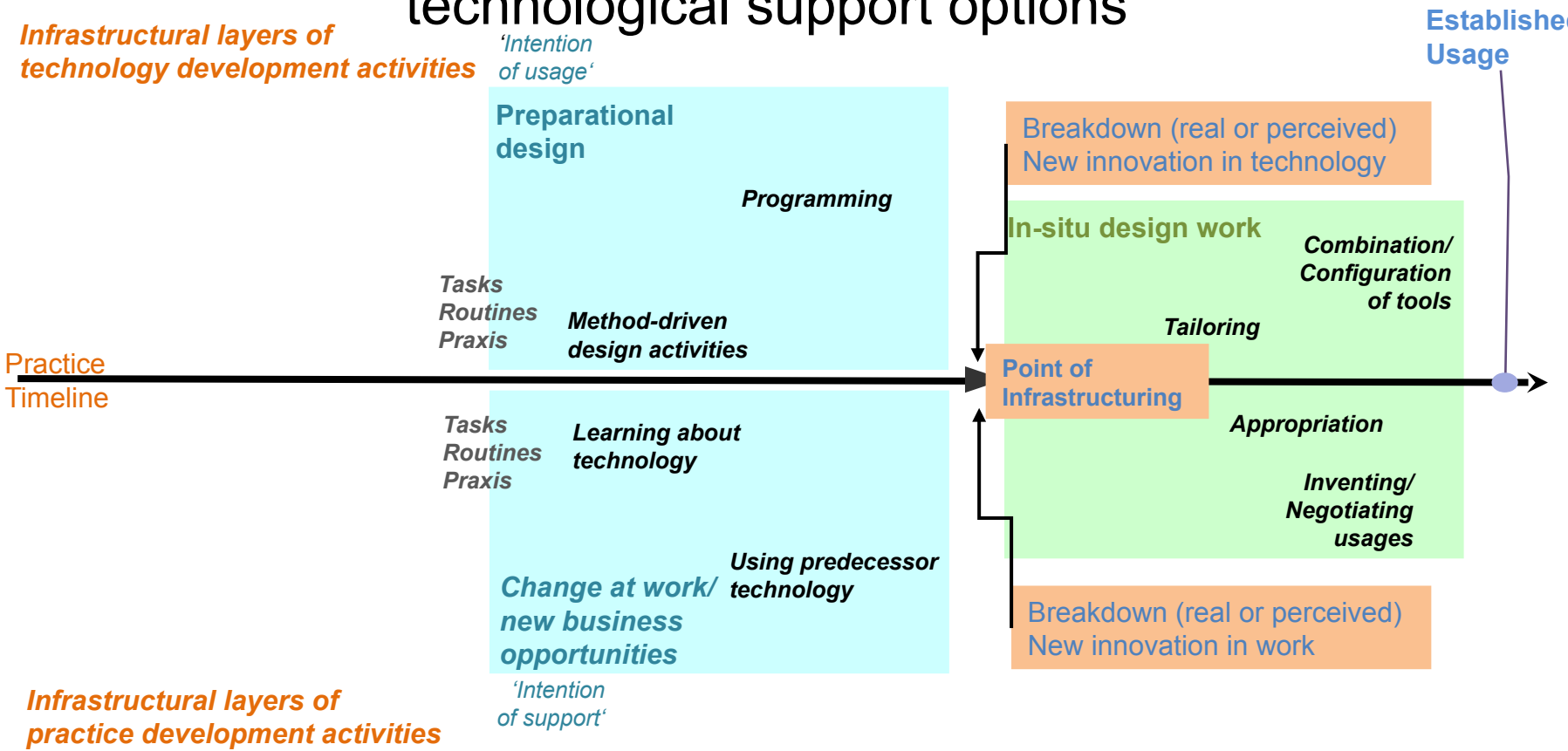
In-Situ design activities of developer and/or practitioner help establishing a new tech usage



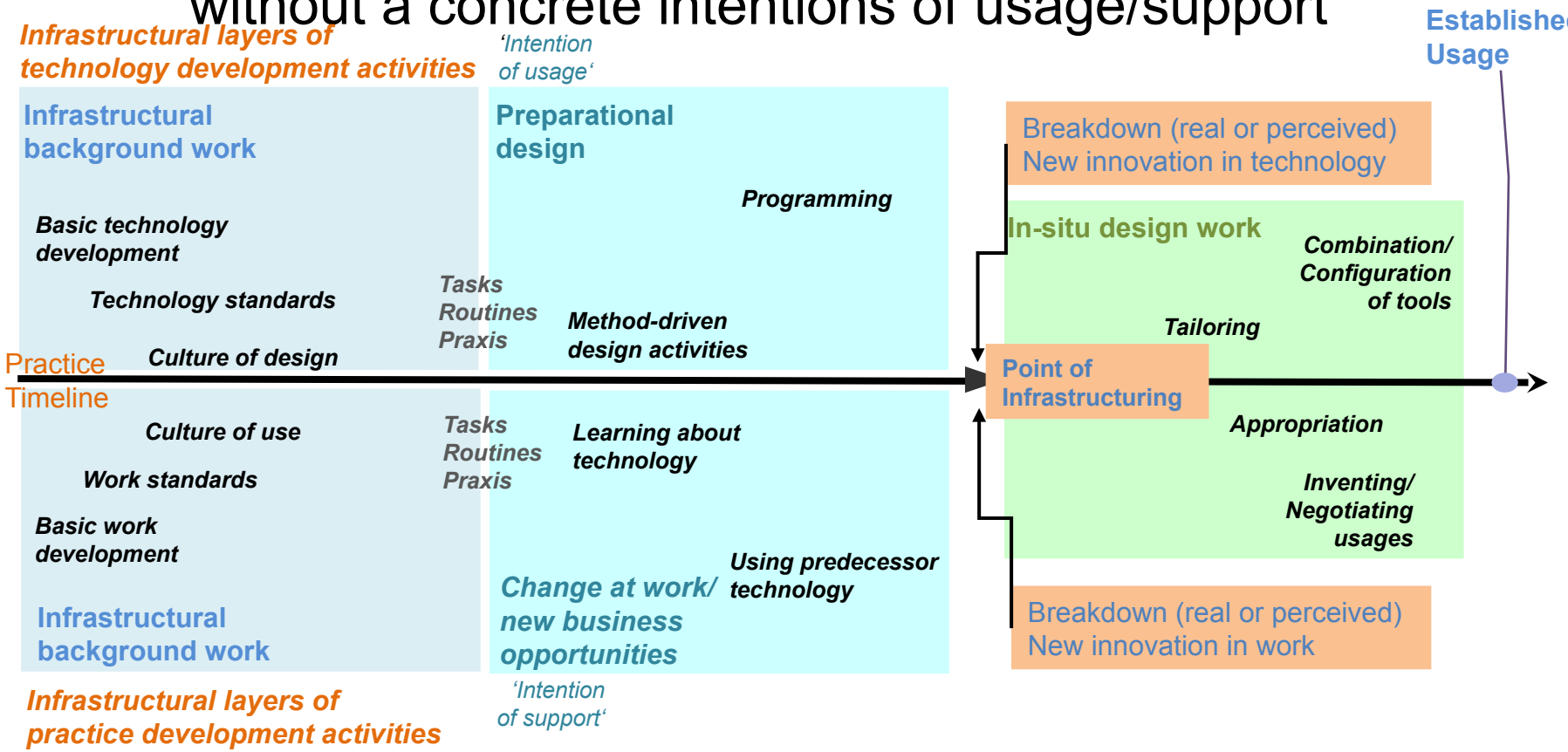
Previously technological options were developed with a concrete intended usage (e.g. tool development)



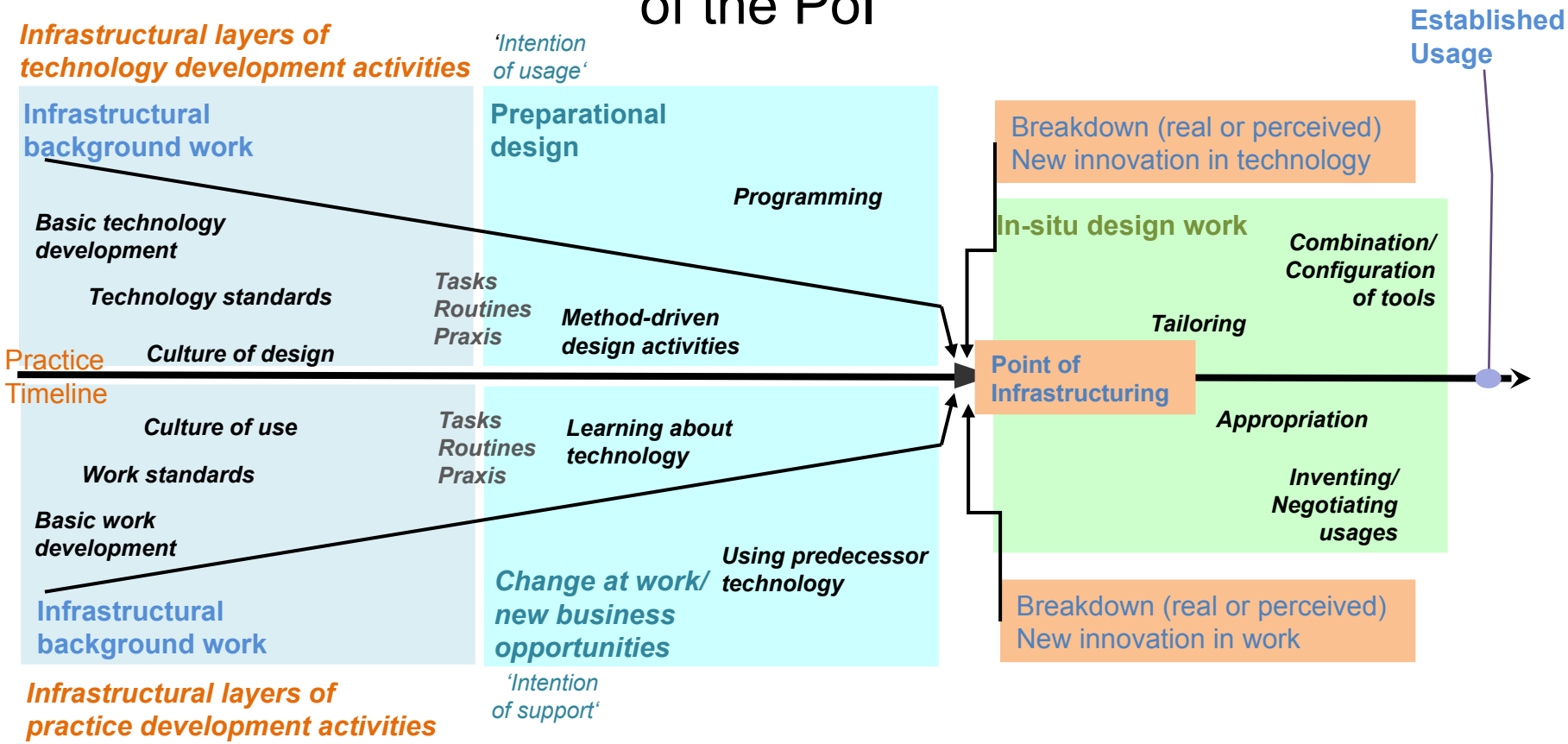
Changes in the practice sphere suggested an idea of technological support options



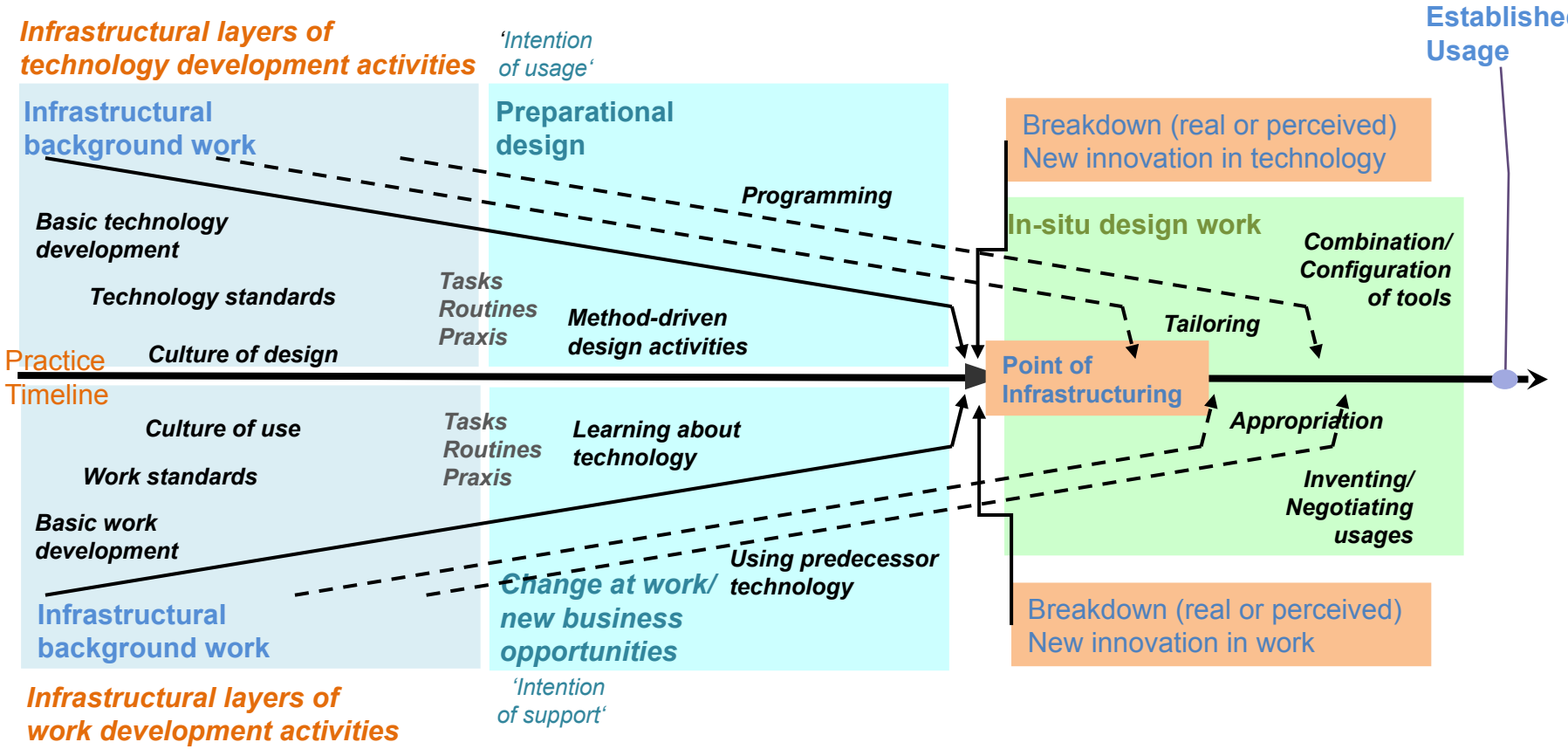
Previous activities reflected improving the capacities to act without a concrete intentions of usage/support



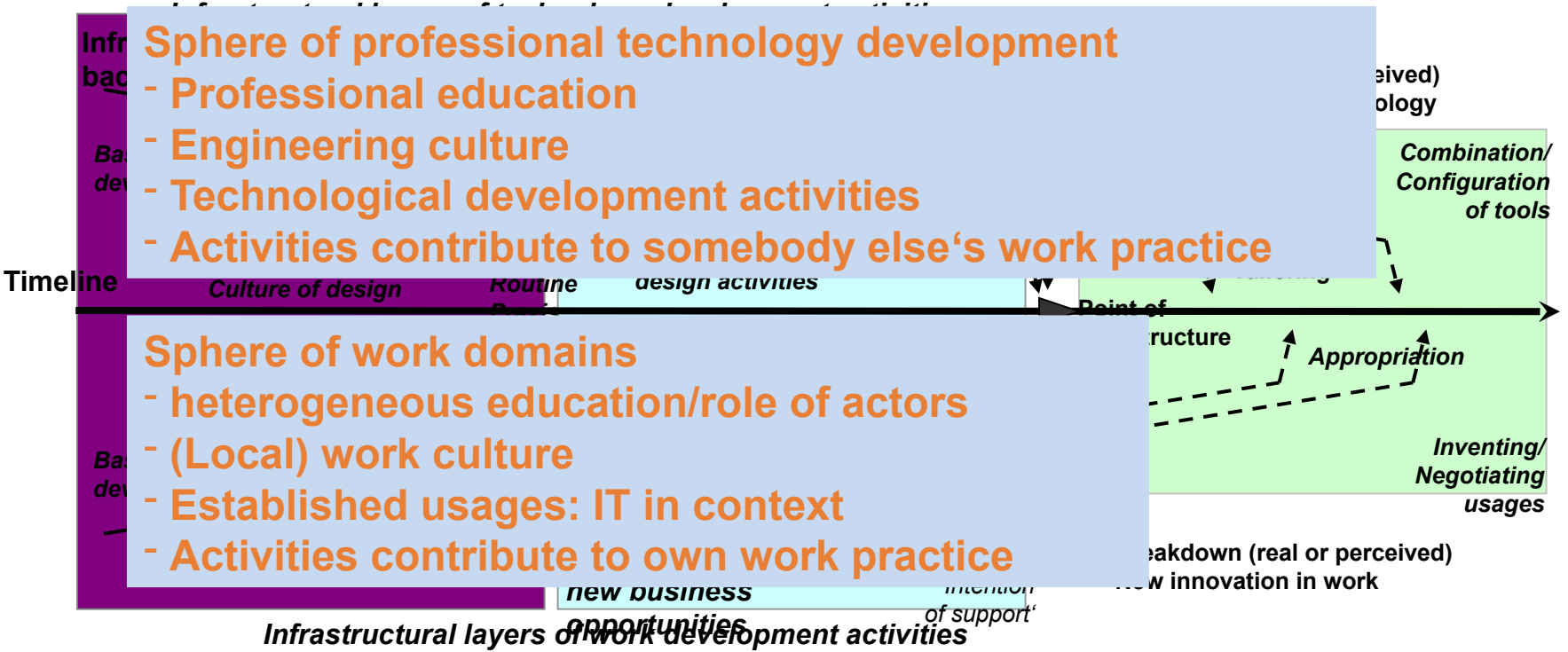
Activities contributed to occurrence and opportunities of the PoI



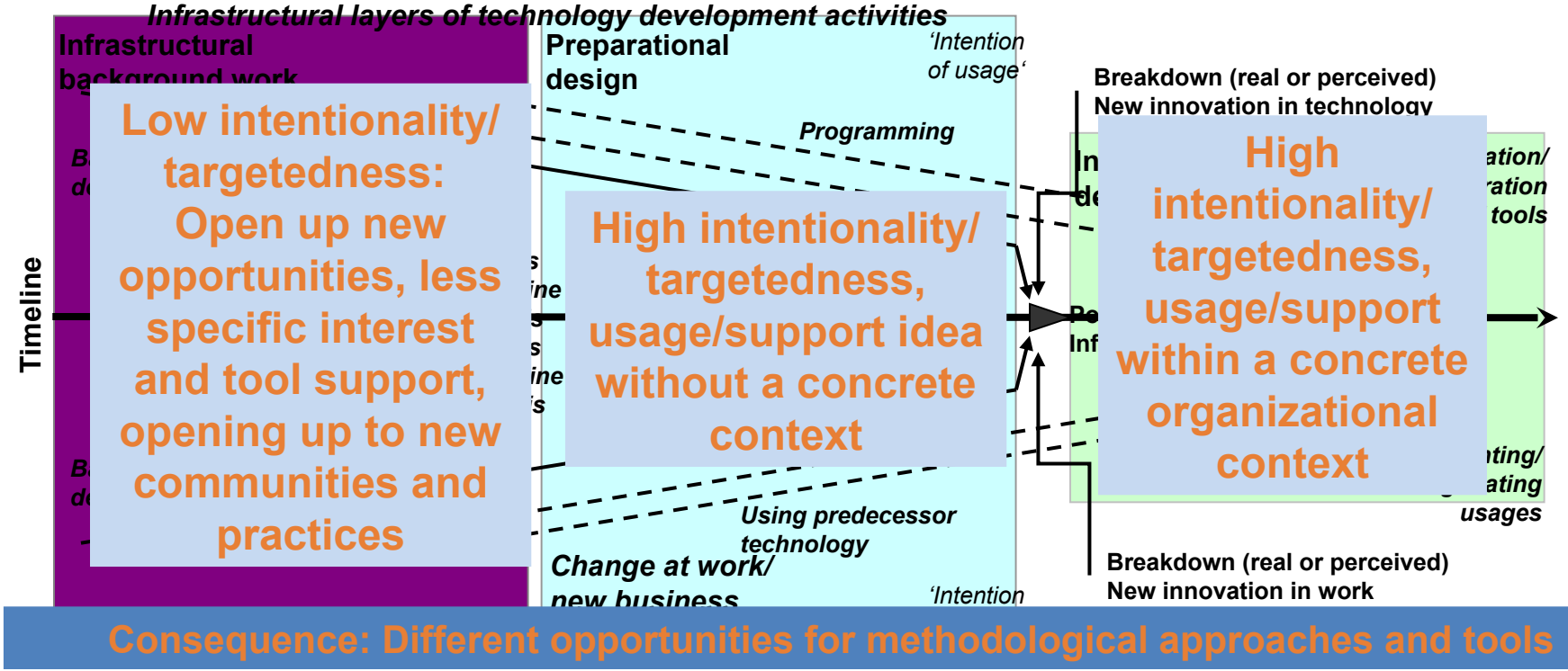
Activities built the capacity to act in In-Situ Design



‘Infrastructuring’: Design activities around the ‘Point of Infrastructure’



‘Infrastructuring’: Design activities around the ‘Point of Infrastructure’



Innovations and use of the ‚Infrastructuring' framework

- Point of Infrastructure: Re-defining the ‚when' of design
  - Defining moment: Technological offer meets use intention
  - Initiative also from end user, not only from designers
  - *Design focuses on the established usage, not the product*
  - *Design becomes opportunity-driven - Breakdowns and Innovations*
- Point of Infrastructure: Resonance activities
  - Breakdowns/Innovations may be communicated to/observed by actors who are not directly involved
  - Observations/communications may suggest further innvations → different ‚points of infrastructure'

Resonance Activities

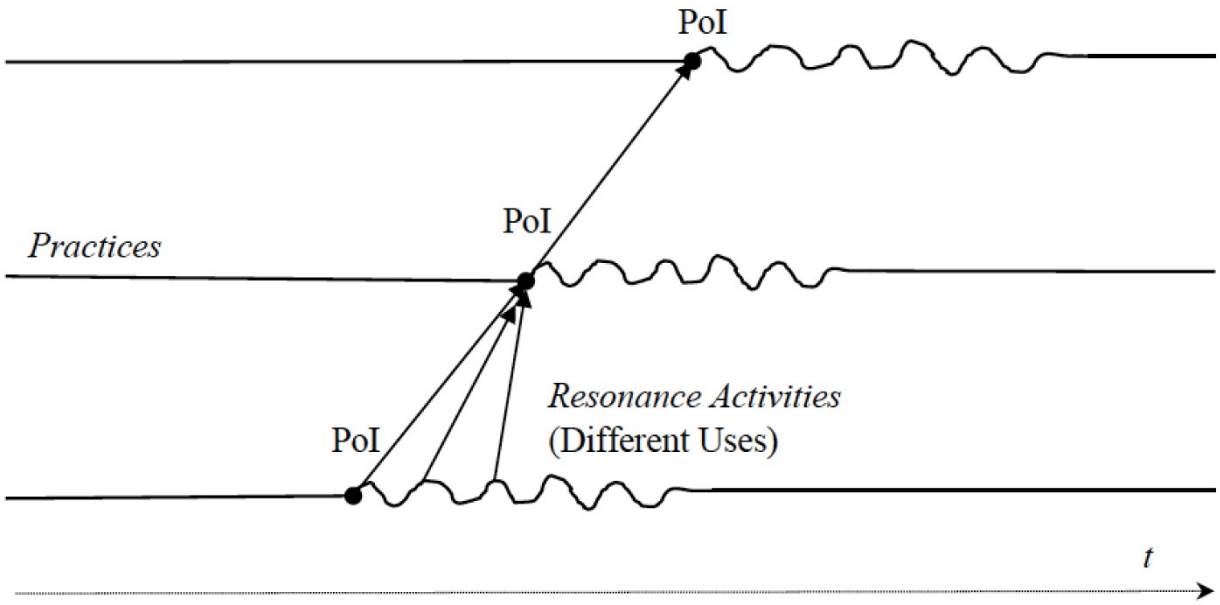


Figure 2: Resonance Activities in Infrastructuring

Resonance Activities Support

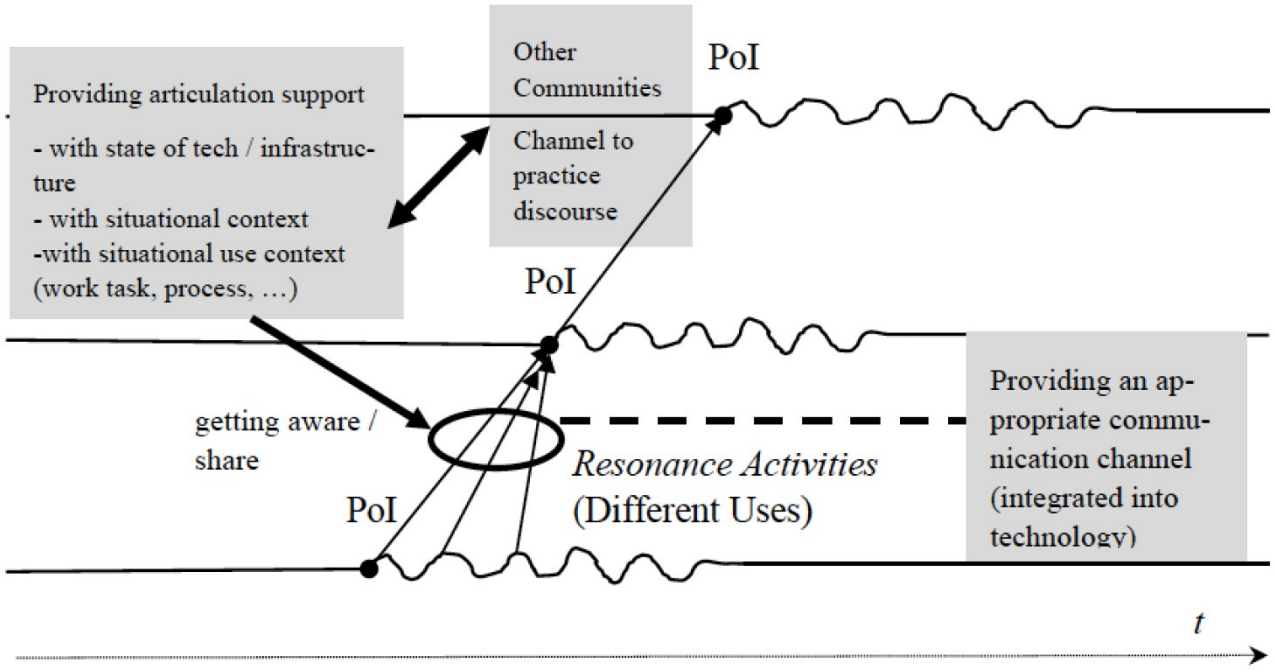


Figure 4: Sociable Technologies to Support Resonance Activities in Infrastructuring