Effects-Driven Participatory Design and Evaluation
Supporting Local Infrastructuring

- Seminar in Oslo, May 2018: Heavy-weight and Light-weight healthcare technologies
- Magunn Aanestad: “Innovasjon kommer ikke “ovenfra” – Utvikling skjer i reelle brukssituasjoner, design over lang tid” (Aanestad et al., 2017)
- My message to you today:
  - Clinicians are challenged by new large-scale healthcare IT
  - The work to make the healthcare IT work is ignored or heavily under-estimated
  - Strategies to do exist: Participatory Design approaches
  - Much more focus and resources supporting local infrastructuring is needed

Jesper Simonsen
Professor of Participatory Design
Dept. of People and Technology
Roskilde University
jespersimonsen.dk
simonsen@ruc.dk
Technology and the healthcare sector

- Increasing specialization + patients flow across departments => increasing need for coordination

- Require reducing the complexity in articulation work
  (Schmidt and Bannon, 1992: Taking CSCW Seriously: Supporting Articulation Work)

- Information technologies in the healthcare sector:
  - Increasingly interconnected (across space & ‘disciplines’)
    - Information Infrastructures
  - Increasingly embracing core clinical activities
  - Increasingly configurable - though not always treated as such
  - Introduced top-down with embedded clinical process standards
  - Assumed to work “by itself” – ignoring long-term organizational implementation and follow-up: Local Infrastructuring
Local infrastructuring – challenges

- Standard EWS algorithm (workflow & decision support) does not align with local reality (over-sensitive)
- Lack of local knowledge of how to modify EWS; not prioritized when busy; resistance to take responsibility for modification; experience of false safety.
Strategies to local infrastructuring

Participatory design approaches

- Local development, configuration and adaption of technologies through iterative experimentation and learning

Effects-Driven Participatory Design and evaluation

- Developed through action research projects since 2004
- IT development, configuration, pilot implementation, and local infrastructuring
- Effects are specified locally by clinicians — can be related to hierarchies
- Effects are realized through local experiments and interventions
- Effects are assessed from available data (formative vs. summative)

(Hertzum and Simonsen, 2011; Simonsen, Hertzum and Scheuer, 2018)
### Effects specification hierarchies

<table>
<thead>
<tr>
<th>Means/end</th>
<th>Fasting</th>
<th>Interruptions</th>
<th>Warm hands</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>National level</strong>&lt;br&gt;(Environment: Political demands, organizational culture, national standards, legislation, etc.)</td>
<td>Porter’s Trippel aim&lt;br&gt;Value = outcomes / cost per patient</td>
<td>Porter’s Trippel aim&lt;br&gt;Value = outcomes / cost per patient</td>
<td>Centralized healthcare with higher specialization. More ‘warm hands’</td>
</tr>
<tr>
<td><strong>Regional level</strong>&lt;br&gt;(Business strategy: Relation/ function/response to environment)</td>
<td>Patient-experienced value (less thirst)&lt;br&gt;Fewer complications&lt;br&gt;Shorter recovery time</td>
<td>Decreasing costs through more effective interdepartmental work flows</td>
<td>Optimized patient flow and logistics in and between wards</td>
</tr>
<tr>
<td><strong>Clinical process</strong>&lt;br&gt;(Business processes: Recurrent, familiar input-output relationships)</td>
<td>Pre-medication&lt;br&gt;Pre-operative care&lt;br&gt;Operation</td>
<td>Pre-operative care&lt;br&gt;Operation&lt;br&gt;Post-operative care</td>
<td>Improved resource coordination and prioritizing related to patient flow</td>
</tr>
<tr>
<td><strong>Clinical activity</strong>&lt;br&gt;(Work Process: Critical with regard to IT support)</td>
<td>Coordination regarding the patient to be operated</td>
<td>Communication and coordination without interrupting phone calls</td>
<td>Improved overview of incoming and current patients</td>
</tr>
<tr>
<td><strong>Technology support</strong>&lt;br&gt;(IT requirements: Functions, information, categories, computations, GUI, etc.)</td>
<td>Sharing data between emergency-anesthesia- and operation departments</td>
<td>Interdepartmental coordination of operations mainly through e-whiteboards</td>
<td>List of all incoming and current patients, resource allocation, plan, status, etc.</td>
</tr>
</tbody>
</table>

**Hierarchy inspired by Cognitive Systems Engineering (Rasmussen et al., 1994); Cognitive Work Analysis (Vicente, 1999); and the strategic analysis phase from the participatory design ‘MUST’ method (Bødker et al., 2004; 2008)**

- **Global goals**<br>Given (stable) national-regional quality goals<br>(top-down standardization)
- **Local goals**<br>Local (agile) quality goals obtained by infrastructuring interventions & experiments<br>(bottom-up standardization)
## Global and local goals/standards can co-exist
(Simonsen, Hertzum and Scheuer, 2018)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Accreditation with PDCA phases</th>
<th>Effects-driven Participatory Design and Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aim and concern</strong></td>
<td>• National quality goals achieved through evidence-based or ‘best practice’ process standardisation</td>
<td>• Local quality goals achieved through realising effects aligned with national quality goals</td>
</tr>
<tr>
<td><strong>Strategy</strong></td>
<td>• Behaviour control&lt;br&gt;• Standardisation of processes by indicators of the plan-do-check-act (PDCA) phases&lt;br&gt;• Documenting and complying with standardised processes&lt;br&gt;• Top-down control approach by external auditors</td>
<td>• Outcome control&lt;br&gt;• Standardisation of output by specifying, realising and assessing effects&lt;br&gt;• Local experimentation to realise effects&lt;br&gt;• Bottom-up participatory learning approach by local clinicians</td>
</tr>
<tr>
<td><strong>Gets people to act (Weick 2000)</strong></td>
<td>• By directing attention toward documenting and learning the accreditation standards and by auditor visits every third year</td>
<td>• Through involving people in specifying and prioritising measurable, wished-for effects on an on-going basis</td>
</tr>
<tr>
<td><strong>Gives people a direction (through values or whatever) (Weick 2000)</strong></td>
<td>• People should learn and comply with the standards.</td>
<td>• People should systematically pursue the wished-for effects.</td>
</tr>
<tr>
<td><strong>Supplies legitimate explanations that are energising and enable actions to become ‘routine’ (Weick 2000)</strong></td>
<td>• Legitimate explanations from the ‘outside’&lt;br&gt;• approval/accreditation to enable actions to become routine</td>
<td>• Effects specified from the ‘inside’&lt;br&gt;• legitimate explanations that have the potential to become routine.</td>
</tr>
<tr>
<td><strong>Skill acquisition</strong></td>
<td>• Novices, advanced beginners and competent clinicians</td>
<td>• Novices, advanced beginners, competent, proficient and expert clinicians</td>
</tr>
<tr>
<td><strong>Challenge</strong></td>
<td>• To implement general standards in specific and concrete work contexts&lt;br&gt;• Lack of motivation and engagement from local clinicians</td>
<td>• To generalise and distribute local processes that succeed in obtaining wished-for effects&lt;br&gt;• Lack of top management attention and resource allocation</td>
</tr>
<tr>
<td><strong>Meeting point</strong></td>
<td>• Global aims, goals and standard clinical guidelines that need to be obtained/implemented locally</td>
<td>• Local experimentation to obtain effects as a strategy to align global aims, goals and standard clinical guidelines</td>
</tr>
</tbody>
</table>
Local infrastructuring
A definition for the healthcare sector

The activities taking place, when cross-departmental and heterogeneous groups of clinicians strive to facilitate their collaboration by configuring, reconfiguring, developing, and establishing local guidelines and standards for effectively using the available technologies and information systems as part of their joint collaborative practice

(Simonsen, Hertzum and Karasti, 2015)
Local infrastructuring
The fasting case

- 20 Feb.: Clarifying the concept of fasting-time and when fasting begins
- 06 Mar.: Defining fasting time and when fasting begins
- 17 Mar.: Configuring e-whiteboard fasting-time columns
- 27 Mar.: Defining the standard for documenting fasting-time
Local infrastructuring
Issues traced during the March 27 meeting

27 Mar.: Defining the standard for documenting fasting-time

Asking the patient when he/she started fasting
Recording by secretary or nurse
Practice of patient-responsible nurse
Procedure for elective patients
Recording by nurse or physician for acute patients
Culture/hierarchy of nurses and physicians
Infrastructuring aim
Physicians prioritize patients based on fasting times
Strategic implementation of procedure
Young versus older physicians
Including the emergency department
Procedure for acute patients
Regional D4-guideline

(Simonsen, Karasti and Hertzum, forthcoming)
Local infrastructuring
Characteristics and learning points

- Socio-technical dialogue
- Foregrounds a web of relations that varies in reach or scope (Star and Ruhleder, 1996; Bowker and Star, 1999; Karasti, 2014)
- Presuppose local knowledge
- Alternate between analysis (of current as-is) and design (of future to-be)
- Develops local procedures and guidelines that might evolve to global standards
- Requires specific competencies

Reach/scope

Analysis

Design

Asking the patient when he/she started fasting
- Recording by secretary or nurse
- Practice of patient-responsible nurse
- Procedure for elective patients
- Recording by nurse or physician for acute patients
- Culture/hierarchy of nurses and physicians
- Infrastructuring aim
- Physicians prioritize patients based on fasting times
- Strategic implementation of procedure
- Young versus older physicians
- Including the emergency department
- Procedure for acute patients

Regional D4 guideline

(Simonsen, Karasti and Hertzum, forthcoming)
Local infrastructuring
Characteristics and learning points

▶ Socio-technical dialogue

▶ Foregrounds a web of relations that varies in reach or scope (Star and Ruhleder, 1996; Bowker and Star, 1999; Karastī 2014)

▶ Presuppose local knowledge

▶ Alternate between analysis (of current as-is) and design (of future to-be)

▶ Develops local procedures and guidelines that might evolve to global standards

▶ Requires specific competencies

Competence types identified through a GT analysis based on 433 codes derived from 17 infrastructuring meetings, in total 36 hours (Hertzum and Simonsen, forthcoming)

1. **Managing the project**: the shaping, maneuvering, and steering of the individual project activities and of the project at large.
2. **Understanding practice**: the analysis and grappling with the particulars of local practices to connect them to project activities and goals.
3. **Understanding technology**: knowledge about how others have configured the technology and knowhow about how to configure it.
4. **Preparing change**: the envisioning, modeling, and detailing of the pursued change and of the means necessary to make it happen.
5. **Making change**: the implementation of the change by informing local actors and motivating them to adjust their practices.
6. **Assessing change**: the appraisal of the new situation and reflections on what has, and has not, been accomplished.
7. **Personal traits**: the personal impact that follows from being able to talk knowledgeably and convincingly about how the change will improve local matters.
Participatory evaluation and learning

Fasting and interruptions cases

(Brandrup et al. 2017; Brandrup 2018)
Participatory evaluation and learning

Warm hands case (Hertzum and Simonsen, 2013; 2016)

- Centralized healthcare with higher specialization. More ‘warm hands’
- Optimized patient flow and logistics in and between wards
- Improved resource coordination and prioritizing related to patient flow
- Improved overview of incoming and current patients
- List of all incoming and current patients, resource allocation, plan, status, etc.

More ‘Warm Hands’: 44 min/nurse/shift

<table>
<thead>
<tr>
<th></th>
<th>Physicians</th>
<th></th>
<th>Nurses</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before</td>
<td>After</td>
<td>Before</td>
<td>After</td>
</tr>
<tr>
<td>Patient room</td>
<td>19</td>
<td>20</td>
<td>***</td>
<td>17</td>
</tr>
<tr>
<td>Coord. Center</td>
<td>**</td>
<td>59</td>
<td>**</td>
<td>55</td>
</tr>
<tr>
<td>Other</td>
<td>***</td>
<td>20</td>
<td>27</td>
<td>28</td>
</tr>
</tbody>
</table>

N = 663 shifts
Concluding remarks

“Innovasjon kommer ikke “ovenfra” – Utvikling skjer i reelle brukssituasjoner, design over lang tid” (Margunn Aanestad)

- Clinicians are challenged by new large-scale healthcare IT
- The work to make the healthcare IT work is ignored or heavily under-estimated
- Strategies to do exist: Participatory Design approaches
- Much more focus and resources supporting local infrastructuring is needed

Innovation from ‘below’ - through Effects-Driven Participatory Design and Evaluation

- Takes time & local knowledge
- Requires specific competencies
- Can be aligned and co-exist with global goals and standards
References


