Socio-technical perspective

- Learning objectives
  - Understand a socio-technical perspective
  - Able to apply a socio-technical perspective in the analysis and design of information systems
- Core reading
  - Mumford, Enid (2006) The story of socio-technical design: Reflections on its successes, failures and potential." *Information systems journal* 16, no. 4, 317-342

Sociotechnical perspective

- Social (psychological, cultural, economic, ...) context
  - technical artifacts
  - individuals/collectives who develop/use the artifacts
- Outcomes
  - emerging from the interaction between the two
- Types of outcomes
  - Instrumental outcomes
    - efficiency
    - productivity
  - Humanistic outcomes
    - well-being
    - equality
    - freedom
    - democracy
    - ...

Basis for Science of Information Systems

Enid Mumford
1924-2006

The story of socio-technical design: reflections on its successes, failures and potential

Information Systems Journal, 2006, 16, 317-342

- Background
- **Socio-Technical principles 1-9**
- International Developments
- Future



1. Compatibility

Democratic work structures require democratic change processes



Testing prototypes

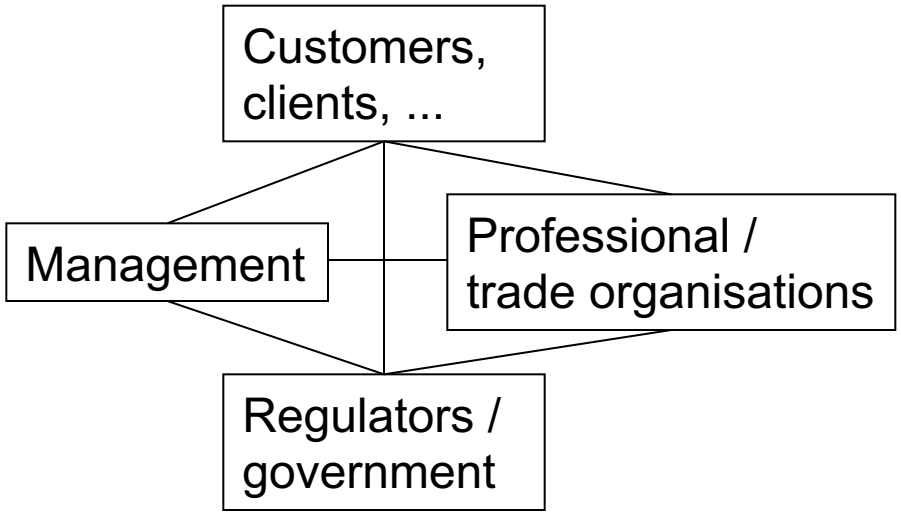
Participation for a democratic process

Front stage development – end user participation

Requirement specification
Prototyping
User training and support



Back stage negotiations – stakeholder participation





Providing support

Most often, when technology is implemented in offices, contacts are given to end-users to call whenever they need support. Today, with the advance in technology, we have chatbot. While providing support to nurses on how to use DHIS, we found that staff are more willing to call someone they are familiar with and when there is a name of someone, instead of just providing telephone numbers.



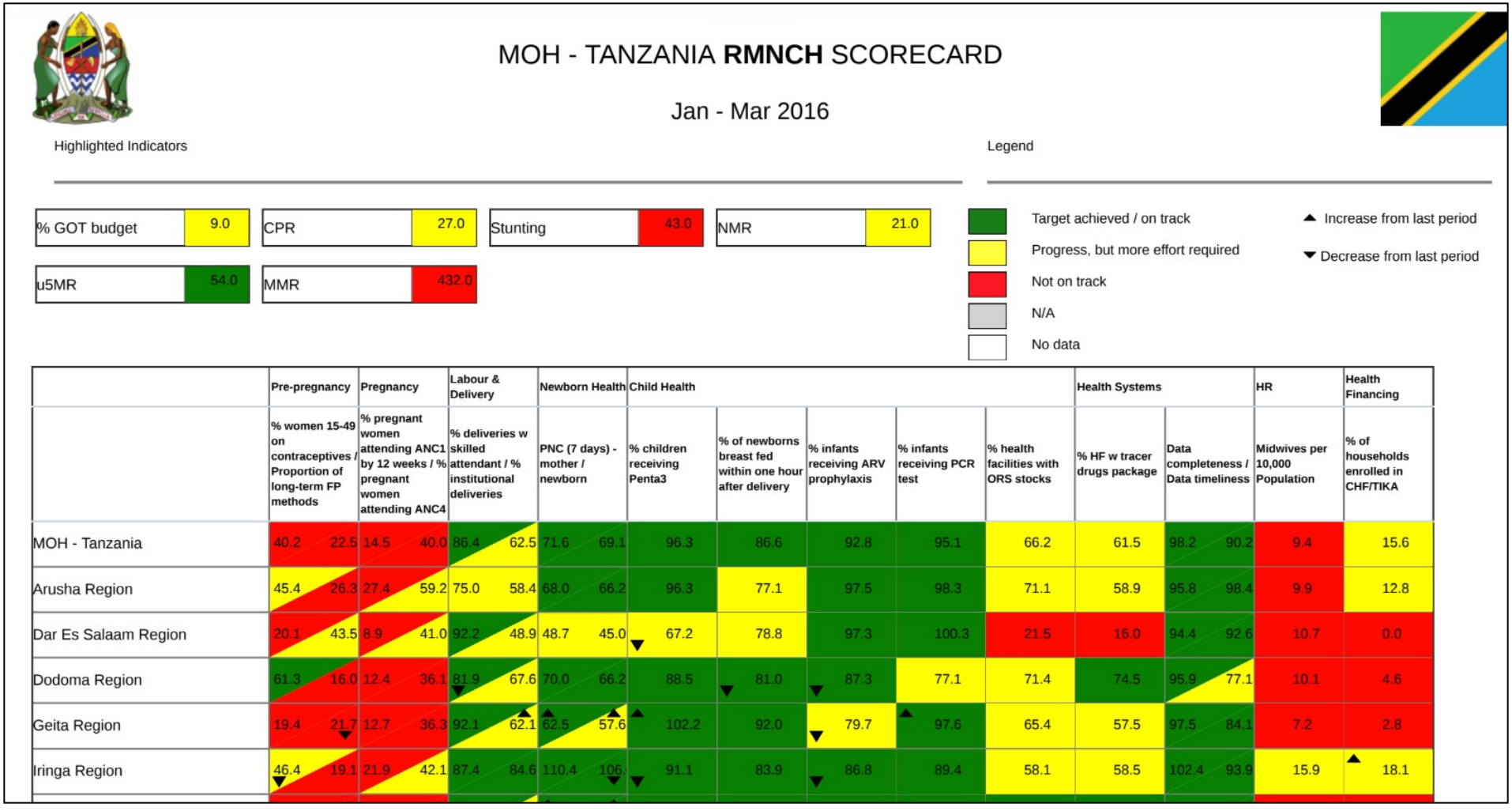
Contact information:

Flora Nah Asah - florana@student.matnat.uio.no

Back and front stage

UNICEF — Health managers

Ministry of Health



MOH - TANZANIA **RMNCH** SCORECARD

Jan - Mar 2016

Highlighted Indicators

% GOT budget	9.0
CPR	27.0
Stunting	43.0
NMR	21.0
u5MR	54.0
MMR	432.0

Legend

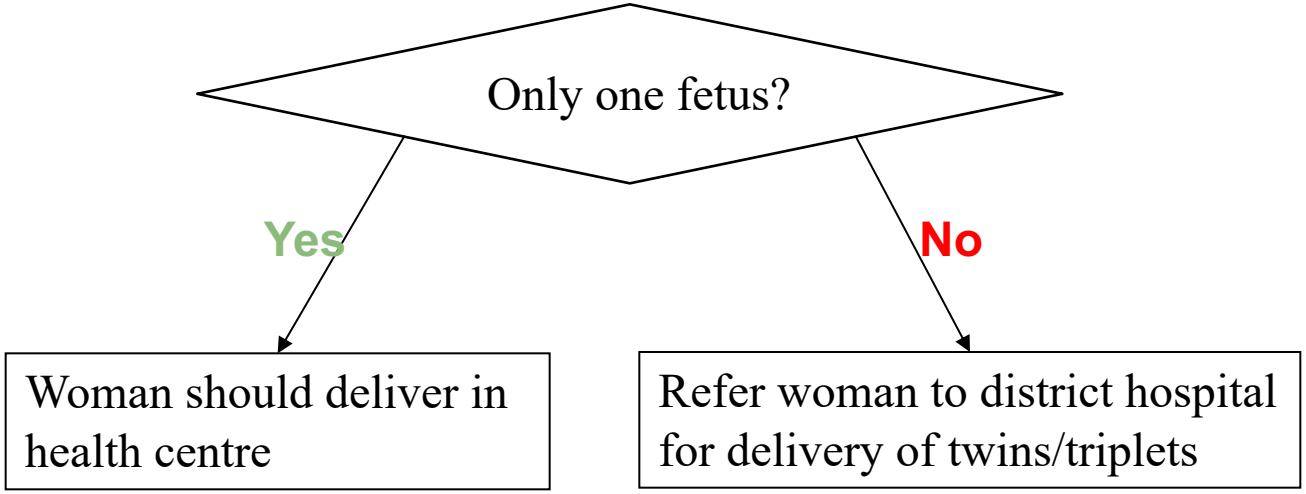
- Target achieved / on track
- Progress, but more effort required
- Not on track
- N/A
- No data
- ▲ Increase from last period
- ▼ Decrease from last period

	Pre-pregnancy	Pregnancy	Labour & Delivery	Newborn Health	Child Health					Health Systems		HR	Health Financing
	% women 15-49 on contraceptives / Proportion of long-term FP methods	% pregnant women attending ANC1 by 12 weeks / % pregnant women attending ANC4	% deliveries w skilled attendant / % institutional deliveries	PNC (7 days) - mother / newborn	% children receiving Penta3	% of newborns breast fed within one hour after delivery	% infants receiving ARV prophylaxis	% infants receiving PCR test	% health facilities with ORS stocks	% HF w tracer drugs package	Data completeness / Data timeliness	Midwives per 10,000 Population	% of households enrolled in CHF/TIKA
MOH - Tanzania	40.2 22.5	14.5 40.0	86.4 62.5	71.6 69.1	96.3	86.6	92.8	95.1	66.2	61.5	98.2 90.2	9.4	15.6
Arusha Region	45.4 26.3	27.4 59.2	75.0 58.4	68.0 66.2	96.3	77.1	97.5	98.3	71.1	58.9	95.8 98.4	9.9	12.8
Dar Es Salaam Region	20.1 43.5	8.9 41.0	92.2 48.9	48.7 45.0	67.2 ▼	78.8	97.3	100.3	21.5	16.0	94.4 92.6	10.7	0.0
Dodoma Region	61.3 16.0	12.4 36.1	81.9 ▼ 67.6	70.0 66.2	88.5	81.0 ▼	87.3 ▼	77.1	71.4	74.5	95.9 77.1	10.1	4.6
Geita Region	19.4 21.7 ▼	12.7 36.3	92.1 62.1 ▲	62.5 ▲ 57.6	▲ 102.2	92.0	79.7 ▼	97.6 ▲	65.4	57.5	97.5 84.1	7.2	2.8
Iringa Region	46.4 ▼ 19.1	21.9 42.1	87.4 84.6	110.4 106. ▼	91.1	83.9	86.8 ▼	89.4	58.1	58.5	102.4 93.9	15.9	▲ 18.1

2. Minimal Critical Specification

- Clear objectives
- Leave it to the workers how to reach the objectives

How to implement a medical protocol?



Implementing medical protocols - relaxing the rules

Information systems for patient data can have built-in rules which trigger lab tests, diagnosis, treatments, etc. If the outcome of applying the rules implied the patient being referred to more advanced care, the computer system could automatically invoke the Referral operation and alert the referring unit.

Example:
The nurse-midwives at the health centres did not follow the protocol strictly in terms of how they chose clients to be referred for delivery at a hospital. In particular, due to consideration of high congestion rates at the referral hospitals, the nurse/midwives somehow prioritized the risk cases, leaving some of the identified cases to be handled at the health centre. For example, during observation of a client consultation, the nurse identified that the client was pregnant with twins. According to the protocol, she should deliver at a secondary health facility. However the client was not 'referred' because of high congestion at the referral facility and the fact that she (the nurse) had previously been able to deliver twins. Thus prioritisation of referral cases was done with consideration to resources in the referral hospitals, as well as to the level of expertise of the nurse-midwife herself.

Contact information:

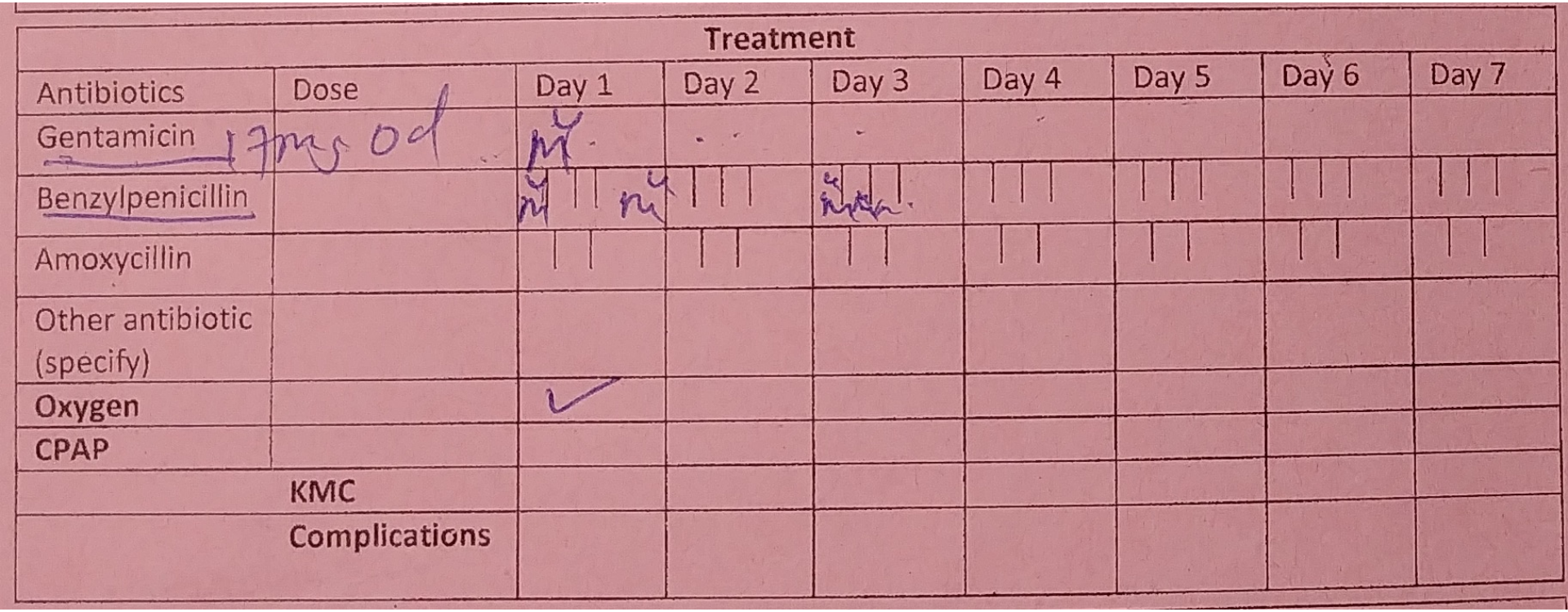


Marlen Chawani,
Health Systems and Policy Research Fellow at Malawi-Liverpool-Wellcome Trust Clinical Research Programme

LinkedIn

3. The Socio-technical Criterion

- **Variances** to be controlled as close to their origin as possible
- To be solved by the group that experiences them

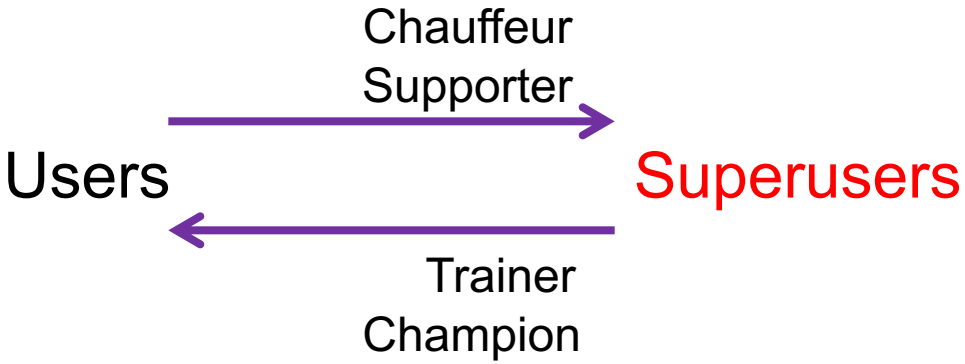


Treatment								
Antibiotics	Dose	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Gentamicin	17mg od	M						
Benzylpenicillin		M M M		M				
Amoxycillin								
Other antibiotic (specify)								
Oxygen		✓						
CPAP								
	KMC							
	Complications							

4. Multifunctionality

- Groups need multiple skills
- They need more than their day-to-day activities requires

Superuser: Person skilled in one area + in IT



Superuser as supporter

This worked last time, why did the computer do something else now?

No worries. Start over again. Go slowly and observe precisely what you are typing.



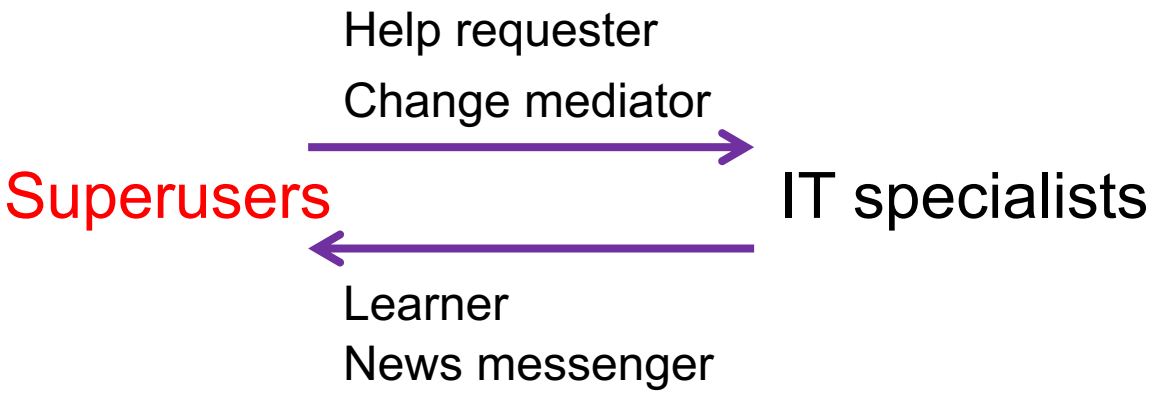
You know, I often mistype myself. That is normally the reason why surprising things happen on the screen.

Trainer refering to own mistakes

→ Learner understands that he is not stupid

5. Boundary Location

- Boundaries occur where work passes to another group with a different skill set
- Boundaries should facilitate sharing of knowledge



User documentation at the boundary between IT specialists and (super)users

Minimal Manual = Task + Stepwise instructions

Output from DHIS2 – Data set report

Data set reports enable print and export to Excel of Data sets. Both facility data and data aggregated at district and higher levels are available.

1. Click on the **Apps** button.
2. Click the **Reports** button.
3. …

Time trends with Visualizer

A line chart displays how health and health services change over time.

1. Click on the **Apps** button.
2. Click on the **Data Visualizer** button.
3. …

6. Information

- Information must go where needed for action
- Often the next work group in the chain
- Not only to management



Community Health Workers - CHW

CommCare





CHW

Client data

Health manager



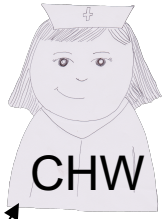
Health data
from the CHWs

User Android App
Client data
API calls, sync

PDF-files

Software Platform Instance
CommCare database at dimagi

dhis2



CHW

Client data

Health data from
all health services

User Android App
Client data
API calls, sync

User Android App
Aggregate data
API calls, sync

Software Platform Instance
Malawi MoH database
Patient data → Aggregate data

7. Support congruence

- To breed cooperation, incentives should be in place
- Management should cooperate with subordinates and support them when needed



Commanding subordinates for obediance



Guiding subordinates for improving performance

8. Human values for job satisfaction

- Reasonably demanding
- Opportunity to learn
- An area of decision-making
- Social support and recognition
- Relate work to social life
- Leads to a desirable future

Einar Thorsrud

1923-1985



Act relating to work environment – 1977

Section 12.2 Arrangement of work.

The individual employee's opportunity for self-determination and professional responsibility shall be taken into consideration when planning and arranging the work.

Efforts shall be made to avoid monotonous, repetitive work and work that is governed by machine or conveyor belt in such a manner that the employees themselves are prevented from varying the speed of the work.

Otherwise efforts shall be made to arrange the work so as to provide possibilities for variation and for contact with others, for connection between individual job assignments, and for employees to keep informed about production requirements and results.

The work must be arranged so as not to offend the dignity of the employee.

Trade unions need knowledge about technology

- Socio-technique
  - all partners equal
- Trade union approach
  - Employers strong
  - Workers and unions weaker

Kristen Nygaard
1926-2002



Action research aims at

1. Generating new scientific knowledge
   published as academic papers or master theses

   AND

2. Improving life for the clients
   also after the research has finished

Develop and evaluate a novel IT solution for clients, publish results and make the clients continue using the solution.

Develop and evaluate a test installation of a novel IT solution for clients, publish results and remove the test installation.

Train clients on a novel topic which improves their life and publish results.

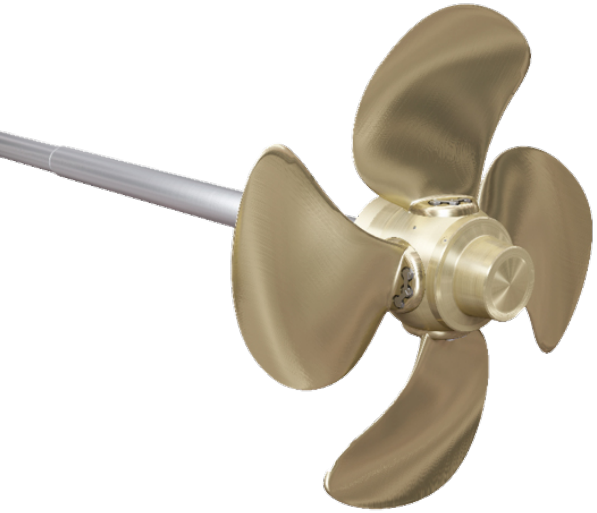
Action research

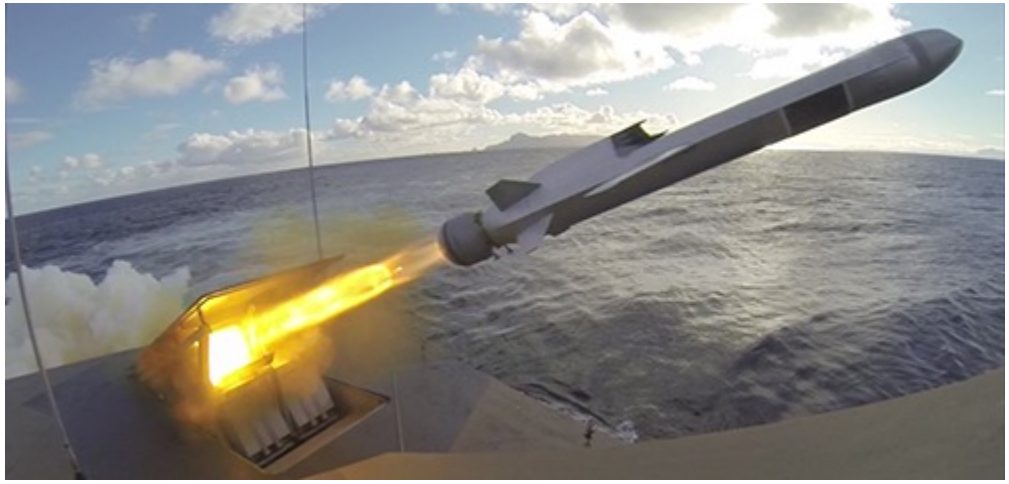
Research

Field experiment

Action research

Kongsberg Weapon factory





High-tech with highly skilled workers



Recent changes

- Longer queues of tasks for the workstations
  → Stress
- More overtime work during weekends
  → Less family/leisure time

Why?

Act relating to work environment – 1977

Section 12.3 Control and planning systems.

The employees and their elected representatives shall be kept informed about the systems employed for planning and carrying out the work, and about planned changes to such systems. They shall be given the training necessary to enable them to learn these systems, and they shall take part in designing them.

9. Incompletion

- Design never stops
- New demands and conditions require rethinking of systems

Implementation of sustainable eHealth

