

# WHEN TO STAMP? A CASE STUDY IN AIRCRAFT GROUND HANDLING SERVICES.



**David Passenier**

VU Amsterdam, Faculty of Social Sciences, Department of Organization Sciences

**Alexei Sharpanskykh**

Delft University of Technology, Faculty of Aerospace Engineering

**Robert J. de Boer**

Amsterdam University of Applied Sciences, Aviation Engineering

# **INTRODUCTION**

# Ground Services executes aircraft turn-around

- Baggage Services
- Pushback and Towing
- Catering and Onboard Supply
- Cleaning
- Aircraft refueling
- Water and toilet services



# Problem of Ground Handling Safety

- 1 ground incident with resulting damage per 5000 flights
- 84% of total incidents is caused when the aircraft is parked (Schiphol Airport: 92%)
- 61% of total incidents is caused when an interface is established between ground equipment and the aircraft (Schiphol Airport: 69%)
- Cargo and passenger doors are most vulnerable to aircraft damage
- In 27%, no incident cause is provided
- Ground handling safety is a shared responsibility of operators and the airport
- Most processes not directly regulated by Government

# Platform threats include mostly organizational issues

- Early taxi-out
- Cargo leaks
- Thunderstorms
- **Non-adherence to procedures**
- **(Macho) behaviour**
- **Performing activities beyond procedures**
- **High personnel turnover (experience)**
- **Short turnaround times**
- **Differences in procedures**
- **Driving**



External  
threats



Organizational  
issues

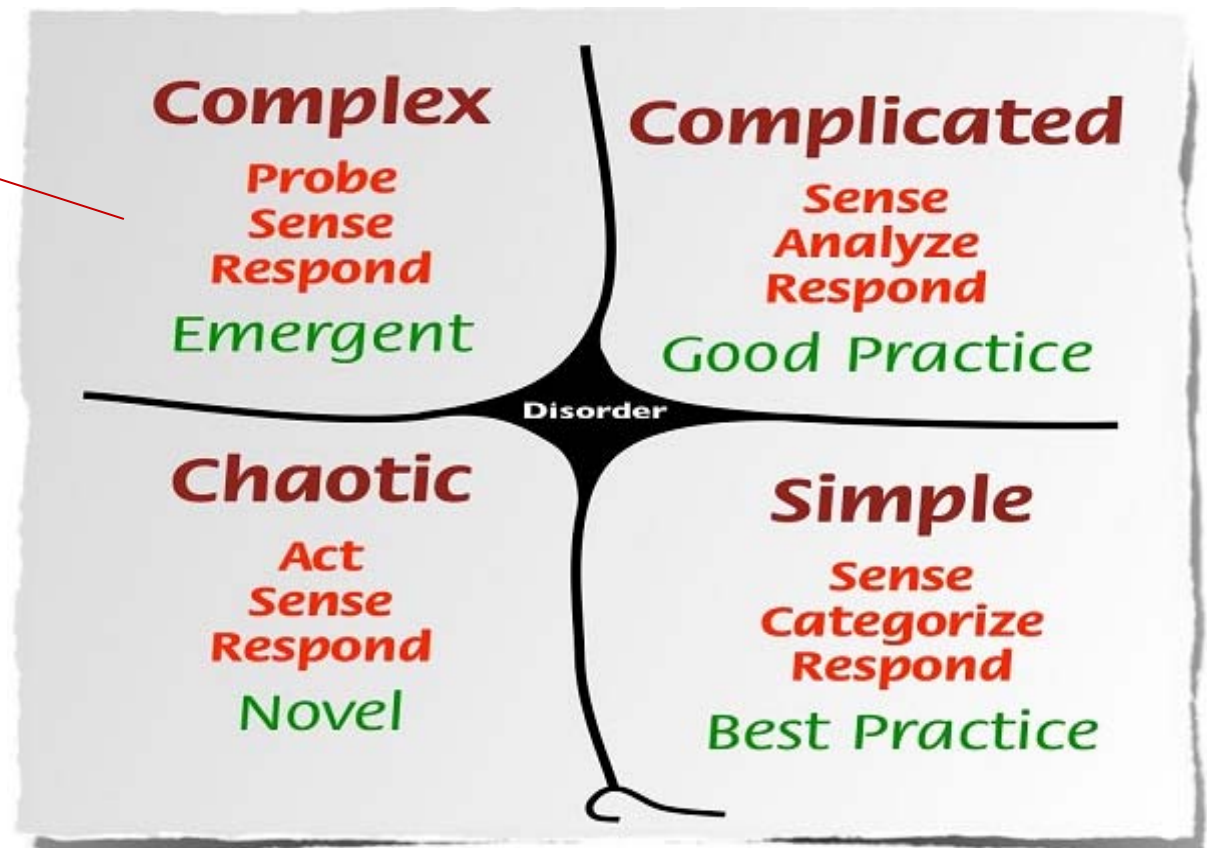
# The case

- Ground handling organization: safety issues
  - Low educated, physically demanding and traditionally dangerous work
  - Safety concern relatively recent phenomenon
  - Resistance against safety rules and procedures
- Complex system:
  - Line Oriented Safety Audits showed where compliance was lacking
  - If managers would enforce compliance, it would relax on other points

# Probing and sensing is essential in the complex domain

The Cynefin framework

**Probe** by safe to fail experiments  
**Sense** emerging patterns  
**Respond** by amplifying or dampening



# Emergent behavior is. .

- A result of interactions of system components
- Therefore not predictable beforehand ...
- But ... comprehensible in retrospect





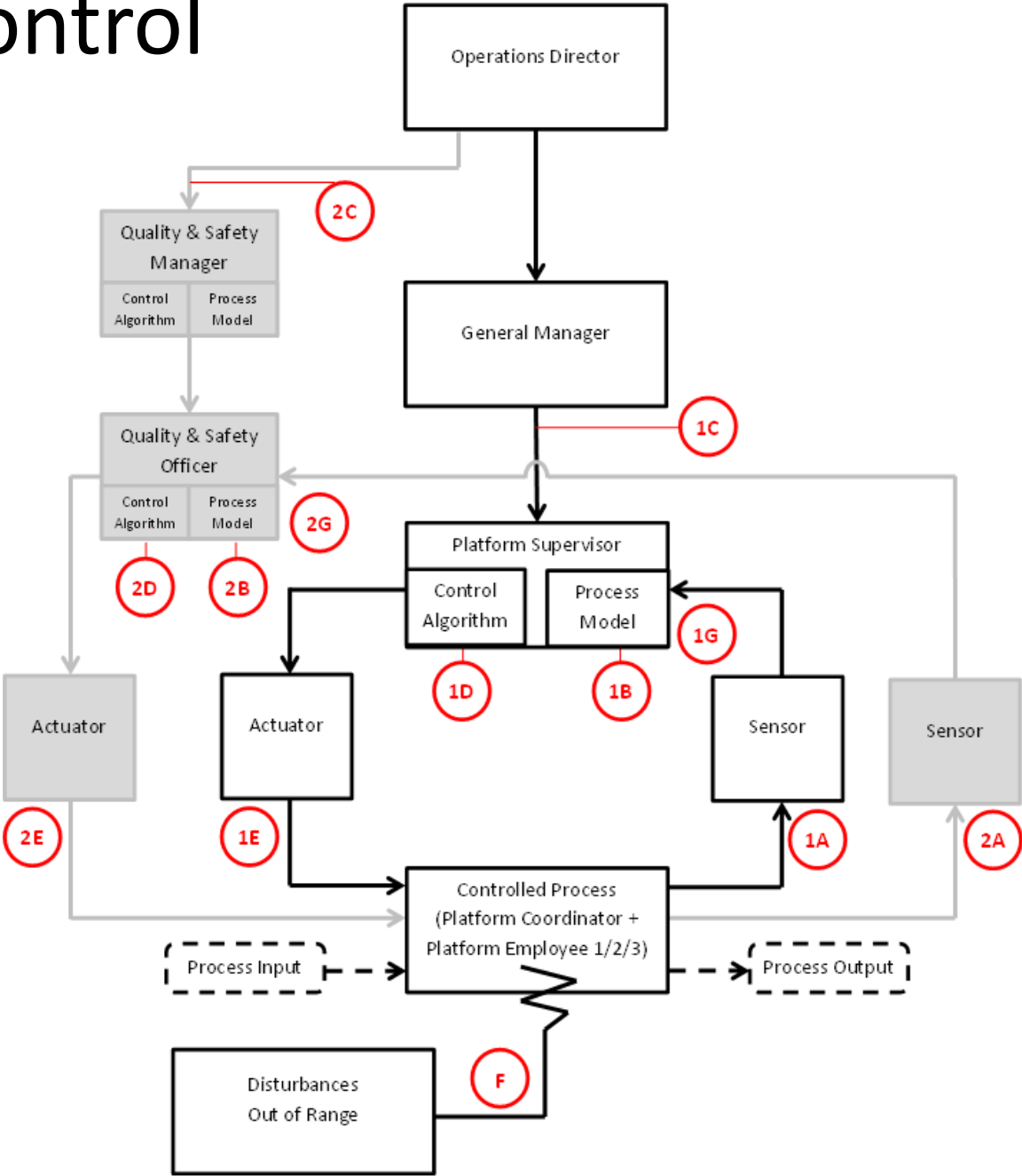
# STAMP: part of a new paradigm – “systems thinking”

- New view of safety (Dekker)
  - Work reality is complex
  - Systems view helps acknowledging this
  - More analyses, less presumptuous conclusions
- Model 2 (Hale & Borys)
  - Operator/professional discretion taken seriously
  - Bottom-up design processes
  - Trust the operator...?!
- Safety 1 & 2 (Hollnagel)

# STAMP application

- STAMP: organization as giant refrigerator
  - Manager is controller, hierarchy of controllers
  - Check if all the control loops are closed
    - Sensors, process models, control algorithms, actuators
  - Previous successful application on small ground handling organization
  - Complex system behavior
  - LOSA data
- One year of data gathering and analysis

# Typical control structure



# What we found

- Applied STAMP as management tool in ground handling services
- Found that it inspired top-down, behaviorist way of thinking
- Before thinking about control, need to understand emergent behavior first
- Organizational ethnography, multi-agent modeling, theories from social science and psychology
- Better understanding of the social processes that are involved in accomplishing work

# STAMP Findings

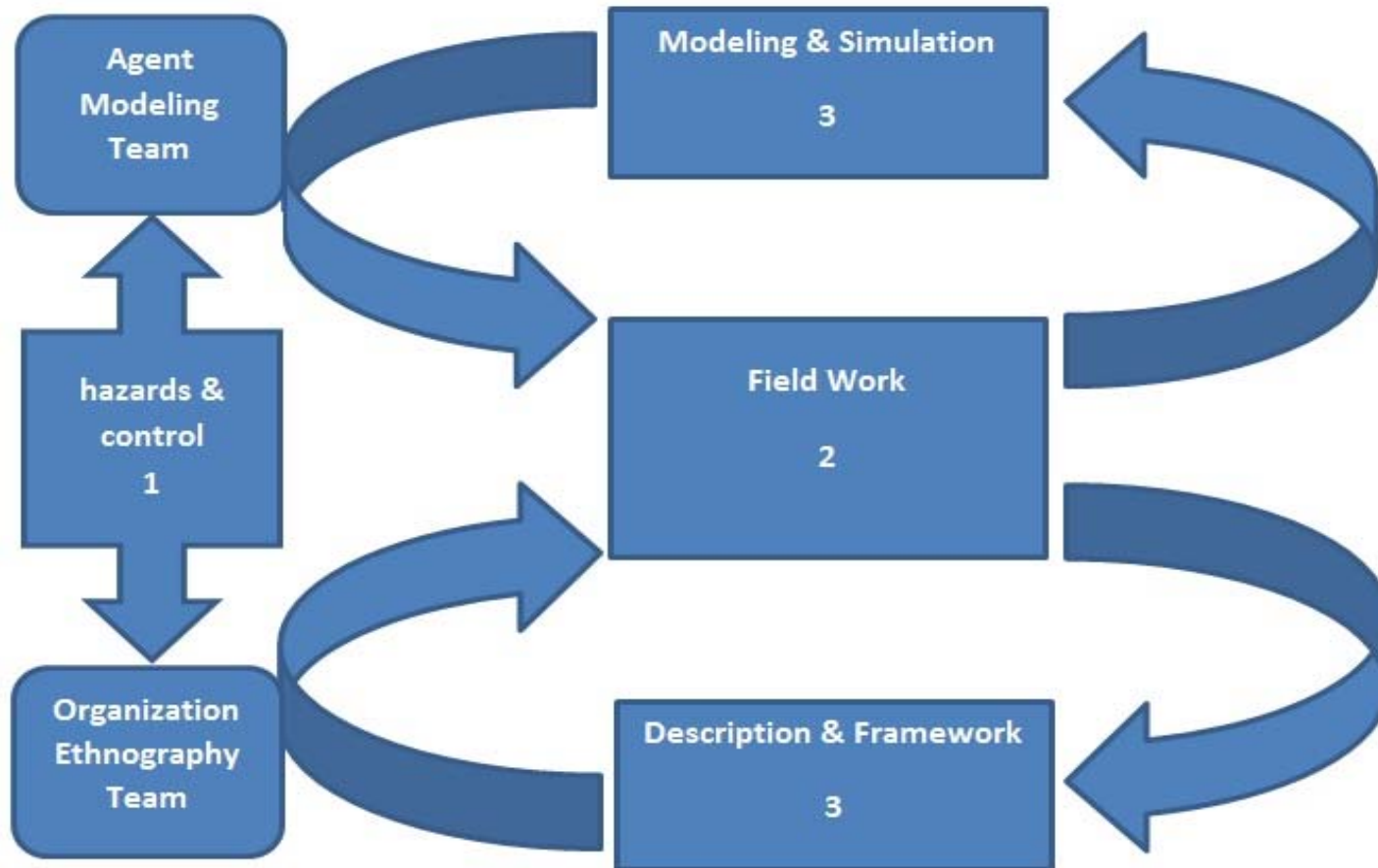
- Many failing control loops
  - Safety reporting low: employees did not seem to appreciate the importance
  - Memos were not read: employees felt that managers did not know what they were talking about
- Suggestion: improve management presence at the work floor
- However: LOSA data showed no difference between 'visible' and less visible managers
- Still lacked insight in the emergent behavior
- Management did not find findings actionable

# **METHOD**

# Organizational ethnography and multi-agent modeling

- One more year with new organizational ethnographer (OE) and agent modeler (AM)
- OE: how people at the ground handling organization make sense of safety in their work
- AM: how social and cultural processes contribute to unsafe deviations from procedures

# Research process



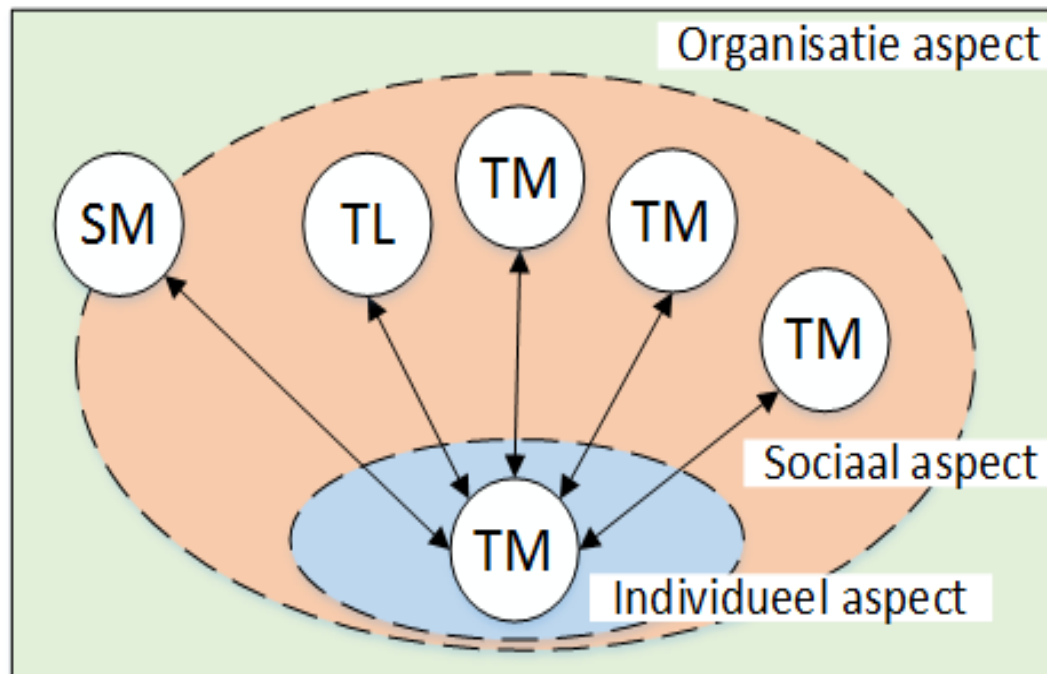


# Ethnographic approach

- Anthropological method applied to organizations
  - viewing as a group that develops a culture
- Culture is highly complex and that prediction is almost impossible
  - Agency: the ability to reflect on what is happening, form goals, and make decisions
  - Management models are not neutral devices
- Management systems are political
  - Power and privilege
  - people learn how the system works to own advantage
- Human repertoire: humor & ridicule, distance, endorse management control
  - This may render managerial control ambiguous
- Organizational ethnographers immerse in the organization
  - with as little preconception as possible / make explicit
  - thoroughly observe what is really going on
  - Remain sensitive to the interests of various groups in being represented in certain ways.
  - Use all social skills to both establish rapport and engage with people
  - Keep intellectual distance

# Multi Agent Model

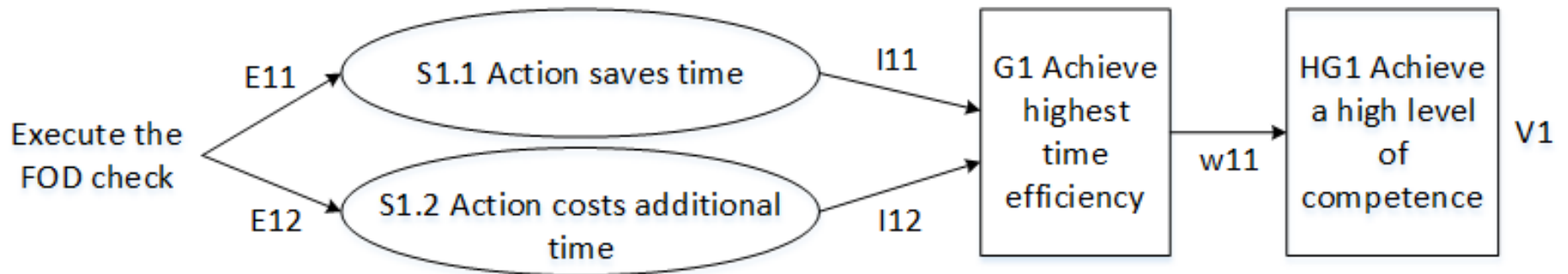
- Foreign Object Debris Check
- New procedure with more explicit task coordination (briefing, role assignment)
- Agent model using motivational theories, learning model, social contagion



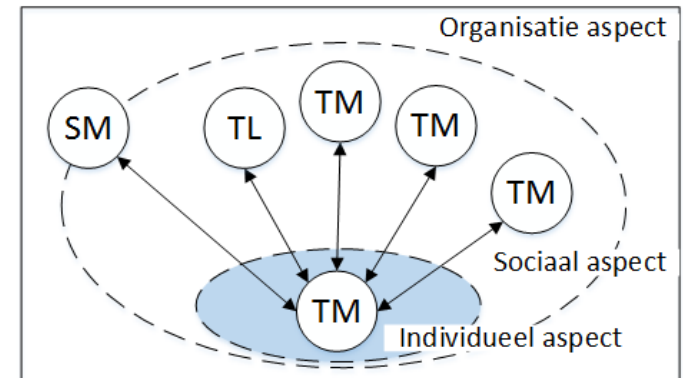
TM = team member  
TL = team leader  
SM = sector manager

# Individueel aspect

## Individual decision making - example

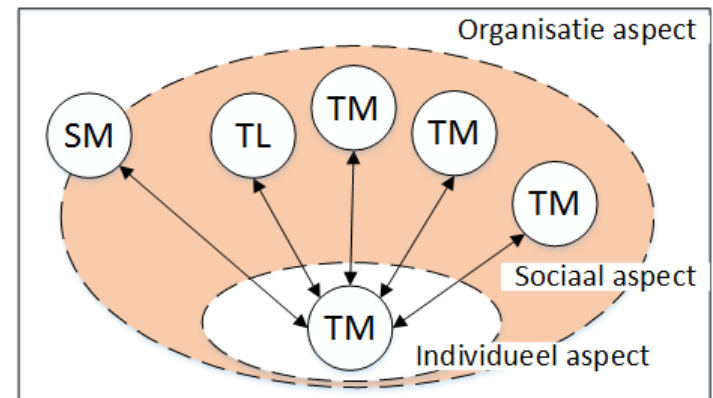


*N.B. part model*



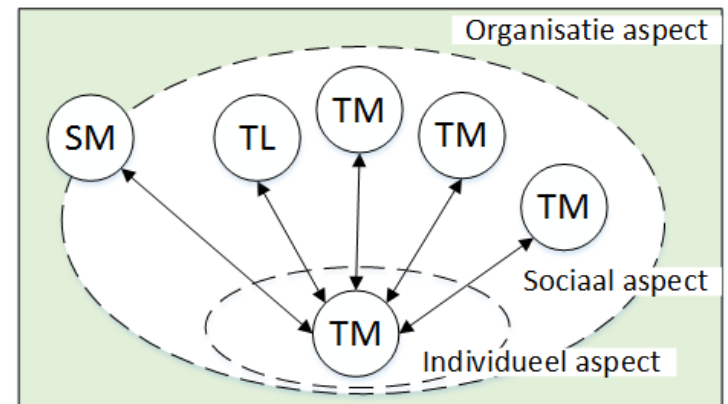
# Sociaal aspect

- Communication
- Observation
- Norms and peer pressure



# Organisation aspect

- Rules and procedures, interpreted as organisational values
- Influence of management intervention
  - Control
  - Information



# **FINDINGS**

# Joint Findings

- Managers stuck to their office
  - Little awareness of facts on the ground
- Different units were given much leeway in carrying out safety policies
  - Made safety policies appear inconsistent
- Employees only received feedback of high-importance safety issues
  - Made them think all other reports were not used

# Findings: ethnography

- Managers thought that employees did not care about safety, and vice versa
  - If employees complied with procedures they could be reprimanded for being slow, and if they worked around them to be on time they could be reprimanded for violating the procedure
  - Some procedures were less safe than the 'workaround' (high loader example)
- Polarization akin to Social Identity Theory
  - Out-group reified and less trusted than in-group



# Findings: Agent model

- Management control turned out to be relatively ineffective to establish compliance
- Addressing employees' needs to understand why they were asked to do something
- Responding to team member norms
- Shift to more conscious, rational way of reasoning helped norms to become ingrained and compliance to remain high, also when managers relax control

**CONCLUSION**

# Actionability

- Manager humbled by AM conclusions
  - Might have over-estimated management influence
- Enthused by OE recommendations
  - Form safety teams from every rank, not just the “usual suspects”
- Generated ideas on the spot:
  - Bottom-up elements in design process of new safety procedures
  - Present teams with new regulatory requirements and work with them on the best way to capture those into a procedure

# When to STAMP?

- Can be used as an element of safety management, but:
  - Careful with the paradigm-claim: we found combinations with other theoretical perspectives and models to be more productive
  - Not to introduce control as a main focus too soon in the analysis cycle
  - Understand how emergent behavior comes about first
- Learn how to work in interdisciplinary teams
  - speaking a different language
  - complementary skills and knowledge