

Information systems/infrastructure complexity

Actor Network Theory

Complexity

- **Types of components, types of links, speed of change**
- **Unpredictable (or uncontrollable) interactions, unpredictable (or uncontrollable) outcomes**
- **(propagation of) side-effects**
- **ANT's contribution: "Types"**

Actor Network Theory

- Understanding heterogeneity: interaction between the social, technical, institutional, ... (humans and non-humans/technological and non-technological components)
- Network of actants
- Origin: Social studies of science
- The interaction between social, political, technological, institutional elements in construction of scientific facts and theories (Kuhn)

Actor Network Theory 2

- **Theory/fact and technology:
heterogeneous network**
- **Science and technological development:**
 - Transforming/building networks
 - Actors: (heterogeneous) networks

Actors

- Always heterogeneous network
- No assumptions about differences between human and technology
- There ARE differences: constructed - not given
- Inscriptions of rules and programs-of-action, delegations of roles and competences, ..
- Humans are different - technologies are different
- Ideal for studying interaction between humans, organizations and technology (I.e. the role of the technology. Compare with Orlikowski's technological artefact/technology-in-use distinction)

Concepts

- Actants
 - Associations/networks/collectives (of humans and non-humans)
 - Association, Translation, composition, enrollment
 - Interference
 - Ex.: gun, man, gun+man
 - Inscription, delegation
 - Program-of-action
 - Black-boxing
 - Irreversibility
 - “Immutable mobiles”
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- Fluids (“mutable mobiles”)
 - Order’s dis-order

Assumptions

- Everything – theories, facts, technologies, humans – are networks/collectives
- Network building is a political process
- All actors have interests
- Building alliances (humans and non-humans)
- Power = size of the network
- The process is embedded in the product

Example: Lab reports

- Lab reports - Fürst
- Solution = sequence of translations (of interests and existing solutions and technologies)
- Interests and translations:
 - Increased profits
 - => More customers
 - => Better service
 - => Electronic transmission
 - => Specific design

Lab. reports - continued

- Integration with medical record system
- Giving away modems for free
- Integration with local practices
- For each translation: the network (collective) grows, alignment is maintained

Lab orders

- **Interests**

- lab: increased profits -> cost containment --> cut manual registration work
- doctors: ?
- patients: security, ...
- vendors, authorities, standardization bodies, standards, ... : ????

Order continued...

- **EDIFACT solution: failed to enroll doctors**
- **Failed to align standardized solution and doctors' interests**
- **Fürst: "continuous ordering"**
- **Appears to be impossible to align with established (EDIFACT/e-mail) standards**

Prescriptions

- **Social security: cost containment – more strict control**
- **Pharmacy: Cutting manual registration work, improved logistics**
- **Patients: Less waiting (reiterated prescriptions ?)**
- **Physicians: Quality control**
- **Failed to make a solution that anybody would pay for**
- **Failed in translating the interests into an aligned network**

More on Prescriptions

- **Failed standardization**
Complex socio-technical networks (failed to understand the complex network of relations between the social and the technical)
- **Focused isolated on standardization**
- **Didn't address the need for translating technology into use**
- **Blind for interests**

Design: Making inscriptions

- of programs-of-action
- which one?
- How?
- Who?
- How strong is the inscription?
- Can users change it?

- Flexibility!!

Inscriptions

in standards

Example: Hotel keys (Latour)

- Problem: Customers not returning keys
- Anti-programs
- 1. trial: Sign behind the counter: "Please remember to return the key"
- 2. trial: Ordering the "doorman" to remind customers
- 3. trial: Adding a metal nob to the key
- Inscribing = building network
- Make it strong enough

Inscriptions in standards

- **“Materials”**
 - The standards organizations
 - Systems architecture
 - EDIFACT syntax
 - Messages
 - Data elements
- **The socio-technical network!**
- **The EDIFACT network: Big and strong**

Inscriptions in the EDIFACT actor network

- Emergent property: No user participation
 - Must know the rules and the network
 - The complexity of the network
 - The EDIFACT mafia in control
 - No flexibility
- Emergent inscriptions, aggregation of side-effects

Systems architecture

- Message based, transaction oriented, client/server, event-driven
- EDIFACT: message based (modelling paper forms) => email (X.400)
- Labs:
 - Complete orders and reports
 - Ordering new analysis

EDIFACT Syntax

- No sub typing => no specialization
- General standard that includes everything
- Defining new subsets of this one
- New local needs must
 - Be included in the general standards
 - Defining new subsets

More on EDIFACT syntax

- **Implications**
 - **Low flexibility**
 - **Centralized control**
 - **Complexity**
 - **=> aligned with inscriptions into the standardization organization**

Individual messages

- Data elements determines the use are of a message
- Economic data in lab messages? Support administrative processes
- References internally in a message?
- Including the order in the report?
 - Huge amounts of data
 - Complex definitions
 - Order sometimes required
- Inscriptions in organization too strong

Data elements

- Identifying drugs in prescriptions
- Text?
- Code?
- Selecting identifiers
- Establishing organization?
- Extend GP's systems
- Distribution of new versions to GPs

Extending the network to increase its strength

- How to make GPs use the codes?
 - Integration with EPR
 - Integration with common catalogue?
 - Extend the list with additional information?
 - Quality assurance?

Technology as ally

- Vendors tried to ally themselves with a standard to strengthen own position
- HL-7, Medix, EDIFACT
- ...CEN
- The dept.'s initiative was killed