

IN2150 Concepts

• Installed Base

It's not a thing, but it's a concept. It is also relational.

It is what already exists (e.g. existing IT-systems, organizational routines, practices and tools).

- Information Infrastructures are *shaped* by the installed base.
- The **installed base** is **sociotechnical**:
 - Technology
 - Social practices
 - Organizational structures
 - Regulation
- What is the installed base then?

It depends on the case you are studying.

It depends on the **change process** you want to focus on.

• Information systems

*“An information system (IS) is a group of **components** that interact to produce information ”*

- Humans
- Notebooks
- Letters
- Telephone
- Computer (hardware and software)

Big information system

- Internet
- Google

- Facebook
- Snapchat
- Journal systems at hospitals
- Internet of things

How does this concept differ from HCI (Human Computer Interaction) ?

Information systems - sociotechnical

- Focus on improvement of the totality of the workplace/system.
- Democratization of the workplace
- Balanced focus on the social and technical aspect, considering design and interdependencies.

HCI

- Focus on individual interactions
- Build user-friendly applications for humans
- Many different disciplines within HCI (Participatory, UX, Service)

• **Complex**

- Linear behaviour
- The sum is equal to its parts

• **Complexity**

- Non-linear behaviour
- Behaviour can't be understood solely on looking at the parts alone.

Inherent

How the system we're looking at behaves and is directly dependent and affected by the environment it works in. Also known as the system's characteristics.

Epistemic

The system we're looking at is put together by so many components that it isn't possible to recognize all the elements. The problem that arises is a lack of knowledge.

For this case, we are interested in so called sociotechnical complexity.

How technologic aspects are intertwined with the social, organizational, administrative and legal aspects.

The core challenge with information infrastructures is complexity.

• Information infrastructure

Information infrastructure is a concept/theory/framework that helps us analyse and describe big and complex information systems.

It highlights complexity as its main challenge.

It consists of an ... installed base:

- Open
- Shared
- Heterogenous
- Evolving

It is:

- Socio-technical
- Recursive
- Standards are core elements in information infrastructures

Information infrastructures as installed base

“All that is there, including the existing work practices with their tools and established division of labour, the legal and professional regulations in place, and so on ”

In other words:

Everything that is already there and affects the information system. Both how it has been, how it is, and how it will further develop.

It is described as:

The installed base in an information infrastructure is **open** for potentially many users, technology, organizations and other components. It is therefore **divided** between these. These participants or components can be very different, or **heterogeneous**. This installed base of components/actors change and **evolve** over time.

Open, divided, heterogenous, evolving

Open

- Open means that it can be expanded, more people can use it, connect to it and etc.

Divided

- Shared between different user groups, not a specific system for only one user group.

Heterogenous

- Comprised of different elements, different types of technology, different uses and different user groups, not uniform/homogenous.

Evolving

- Evolving in increments, not “all at once” or over night.

Installed base

- What already exists (e.g. existing IT-systems, organizational routines, practices and tools)

Sociotechnical

- Not just a technical infrastructure, but also a heterogenous collection of elements, social, organizational, technological, legal, etc. which is so intertwined that it doesn't give (analytically) sense to try to separate them.

• **Task Chain**

A task which includes and consists of a sequence of subtasks.

1. Have a user to the computer
2. Log in
3. Open web browser
4. Open Google Drive and presentation
5. Start Crestron
6. Start projector
7. Pick a source image

• **Production Lattice**

A lattice consisting of task chains

Individual or organizational matrices

- A person has many roles and tasks
- Personnel with coinciding task-lattice.

There are three types of work in a *production lattice*

- Primary work
- Articulation work
- Computing work

Work situation

Everything of “work” is used by a work situation.

- Unforeseen events /slips

Unforeseen events or slips -> adjusting

Strategies for adjusting:

- Fitting
- Augmenting
- Working around

- Fitting

“Fitting work is the activity of changing computing or changing the structure of work to accommodate for computing misfit ”

A strategy for handling a **misfit** between work routines and computer system.

1. Adjust data system
2. Adjust work routines
3. Adjust both

- Augmenting

“Augmenting work is undertaking additional work to make up for misfit”

Doing extra work to make up for “*misfits*” .

1. Verify and double check data
2. Search for source of the problem
3. Collect information from multiple sources
4. Extended/additional training
5. Archiving data to make up for lack of storage.

- Working around

“Working around means intentionally using computing in ways for which it was not designed or avoiding its use and relying on alternative means of accomplishing work”

Using computer systems deliberately in ways it was not designed for, to avoid “misfits”.

1. Adjust data input
2. Change work routines
3. Take use of alternative systems

• Redistribution of work

Redistribution helps change established organizational routines and can in many cases complicate the conditions in the workplace.

Change has a tendency of leading to redistribution.

There is redistribution in three areas:

- Redistribution of work: who needs to work more, or who needs to work less?
- Redistribution of focus: What gets increased focus, and what is more overlooked?
- Redistribution of risk: For whom is risk lowered and for whom is risk increased?

• Standards

Which role does standards have in information systems?

Standards are universal solutions that sets guidelines for how we work across boundaries, practices, working conditions, etc.

It increases control .

There are different types of standards

Global standards vs local variations.

Heterogeneity in the information infrastructure.

Balancing the standardization and customization.

It often creates a “tension”.

- Standard as tension

Global standards

- Rigid
- Structured
- Accurate
- Quality in form of equal data across different branches

Local variations

- Flexibility
- Uncontrolled
- More detailed

- Costs

Costs is a result of standardization, where different actors in local contexts has to do more to achieve a functioning solution.

This means that actors might have to use strategies like 'work arounds' to make it function to their specific needs.

Standards change local practice but gives better data central. Where is the line?

- Need for customization

"For any given information system to work, the argument goes, it has to be tailored according to the requirements of the local context of use"

With such an introduction, the system is gradually adapted to the local needs.

• Socio-technical complexity

Socio-technical complexity is the result of the combination between social and technical aspects.

• Systems

- IT-capabilities (a specific feature for use)
- Applications (collection of capabilities)
- Platforms (Bigger collections of applications and capabilities)
- Information infrastructures

• **Bootstrapping problem**

- *“To promote or develop by initiative and effort with little to no assistance”*
- *“The process of making a tool by means of the tool itself”*

Simply explained: Strategy for starting a process. E.g. introduction of a new system.

- Both a technical and social phenomenon.

For a new information infrastructure to have **value**, it first needs **users**.

- Users have important value
- More users increase the **credibility** so more users will come.

Design principles for the bootstrap problem:

1. Design initially for usefulness
2. Draw upon the existing installed base
3. Expand installed base by persuasive tactics

• **Adaptability problem**

The system is growing and is constantly receiving new users and organizations in new contexts.

The problem is supporting further implementation, further development and use of the system.

As an information infrastructure is evolving, earlier choices will affect possible choices later. That's why we call it path dependent.

Some choices can lead to “lock-ins”, where further choices for changes are limited.

Technology traps

The information infrastructure is growing/developing, supporting new users, new contexts and its following demands.

How can this be handled?

- **Modularization**

“modularity creates a balance between variety and order by localizing the change and permitting fast and deep change in parts of the system. Engineered as well as living system must thus be modular to remain robust and at the same time to generate variety”

- **Gateways**

Software/component that takes care of communication between different modules in the information infrastructure.

Design principles for the adaptability problem:

1. Make each IT capability simple
2. Modularize the II by building separately its principal functions and sub-infrastructures using layering and gateways.

Concepts to describe heterogeneity

Syntactic -> Data format

Semantic -> Different meaning of data

Structural -> Structure of data and systems

Heterogeneity in systems -> Different hardware, operating systems and etc.

• Legacy / silo systems

Why are they still in use?

- They contain huge amount of important data
- Costs with change
- Risk with change

What is the problem with old systems?

- Lack of documentation
- Not flexible and adapted for change
- Cost at maintenance
- Designed as silos of information

• Standard systems

“Shelfware” that cover many needs

Related problem:

Change the system or work practice?

How does organizations tackle heterogeneity in the systems?

• Integration

Integration is about having different systems function as a whole, even when the systems weren't designed to work together.

Interoperability: The system's capability to share data between different systems.

It revolves around what types of links that exists between solutions.

• System architecture

Three different types:

- Monolithic - Single unit
- SOA - Coarse-grained
- Microservices - Fine-grained

• IT management

"The leadership and organizational structures and processes that ensure that the organization's IT sustains and extends the organization's strategies and objectives"

Centralised vs decentralised

Responsibility at different levels

Who takes the strategic decisions?

How are the processes around IT organized?

How is the information flow around the IT in the organization?

- Architecture-based approach to management

Proactive vs reactive strategies

Architecture as a process

- One can define a target architecture, but one must also define a migration strategy.

Challenge: Make long term perspectives relevant to a situation with short sight priorities and “here-and-now” needs.

- **Reflexivity**

Where examination or action “bends back on”, refers to and affects the entity instigating the action or examination” - Wikipedia

Strategies

- **Cultivation**

To observe how the “system” responds to an intervention.

“To foster the growth of vegetables”

- **Wrapping**

Integration of old and new systems.

- **Rip and replace**

Remove the old and replace with the new.

- **Cultivation strategy**

- Changes processes one by one
- Motivate users to start using the technology and apply it in their manner.
- Validation of whether the completed changes are good or not.

- **Top-down**

- Standards, requirements, specifications put in advance (without reiteration)
- Stakeholders, actors and managers/leaders are responsible
- Small degree of user involvement
- Both evolutionary and drastic

- **Bottom-up**

- Standards aren't specified in advance, they develop along the way and can be changed
- The requirements iterate over based on input
- Input comes from the users of the system
- Mainly evolutionary

| **Logics of information use**

• **Patient-centred logic**

Follow the events through a chronological perspective of patient events. Information to follow the patient through treatment.

• **Treatment-centred logic**

Information to improve treatment. Communicate the state and results. Science and other data here is relevant, and for other use cases.

• **Activities-centred logic**

Information used to coordinate all the different events a patient must go through.

• **Event-centred logic**

Information to coordinate the transplantation between donor and receiver.

Much uncertainty and many factors. Information is used to reduce uncertainty. The process goes as fast as possible.

Change / Evolution

- **Drift**

Control over technology <-> Technology drifts away from plan

Discrepancy between initial goals, visions, plans and models and the actual outcomes.

Drifting can be looked at as the outcome of two intertwined processes. One is given by the *openness* of the *technology*, its plasticity in response to the re-inventions carried out by users and specialists, who gradually learn to discover and exploit features, affordances, and potentials of the systems. On the other hand, there is the sheer unfolding of the actor's being in the work flow and the continuous stream of *interventions*, *tinkering*, and *improvisations* that colour the the perceptions of the entire system life cycle (Ciborra, 2002, p. 87).