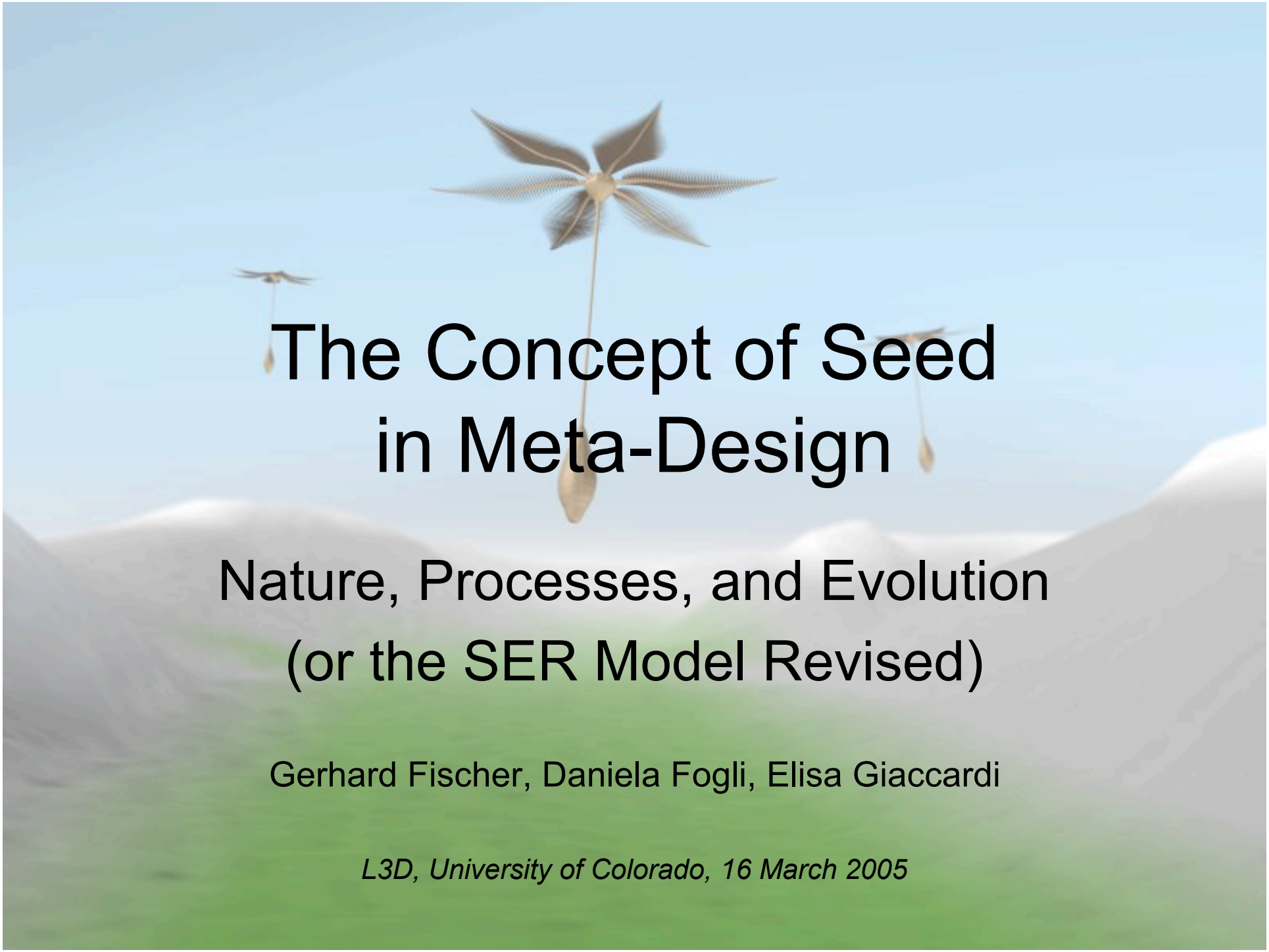

The Concept of Seed in Meta-Design

Nature, Processes, and Evolution (or the SER Model Revised)

Gerhard Fischer, Daniela Fogli, Elisa Giaccardi

L3D, University of Colorado, 16 March 2005

Premises

- Metadesign as a conceptual framework
- Success and failure stories at L3D (interviews)
- The collaboration Elisa - Daniela (self-assessment)
- Integration L3D - Brescia/Milano Group approaches
- Objective: provide indications for the creation of a “good seed” in different domains

Seed definition

- Is a socio-technical system, conceptualized as a participative system, in a state prior to a meaningful set of interactions
- Has a (perceived) value that is defined by both the capability to encourage users' participation in the design process and the possibility of the socio-technical system to evolve and effectively adapt to emergent needs and opportunities
- A seed is not only "what that can be modified", but also "what that inspires"

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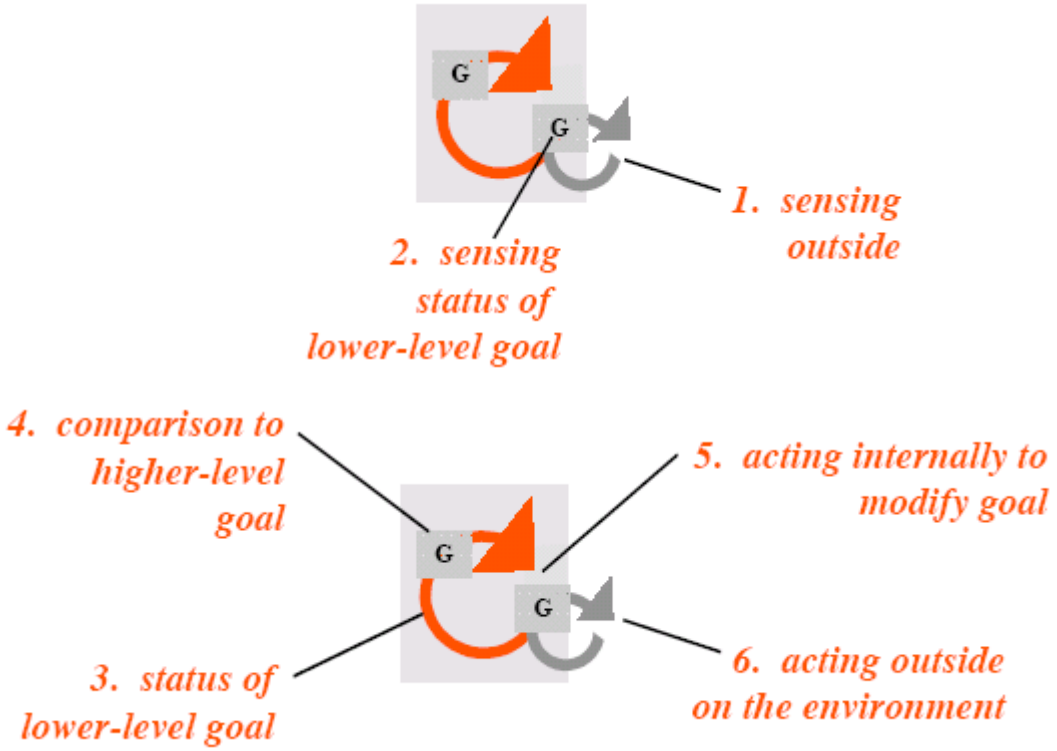
Socio-technical system as participative system

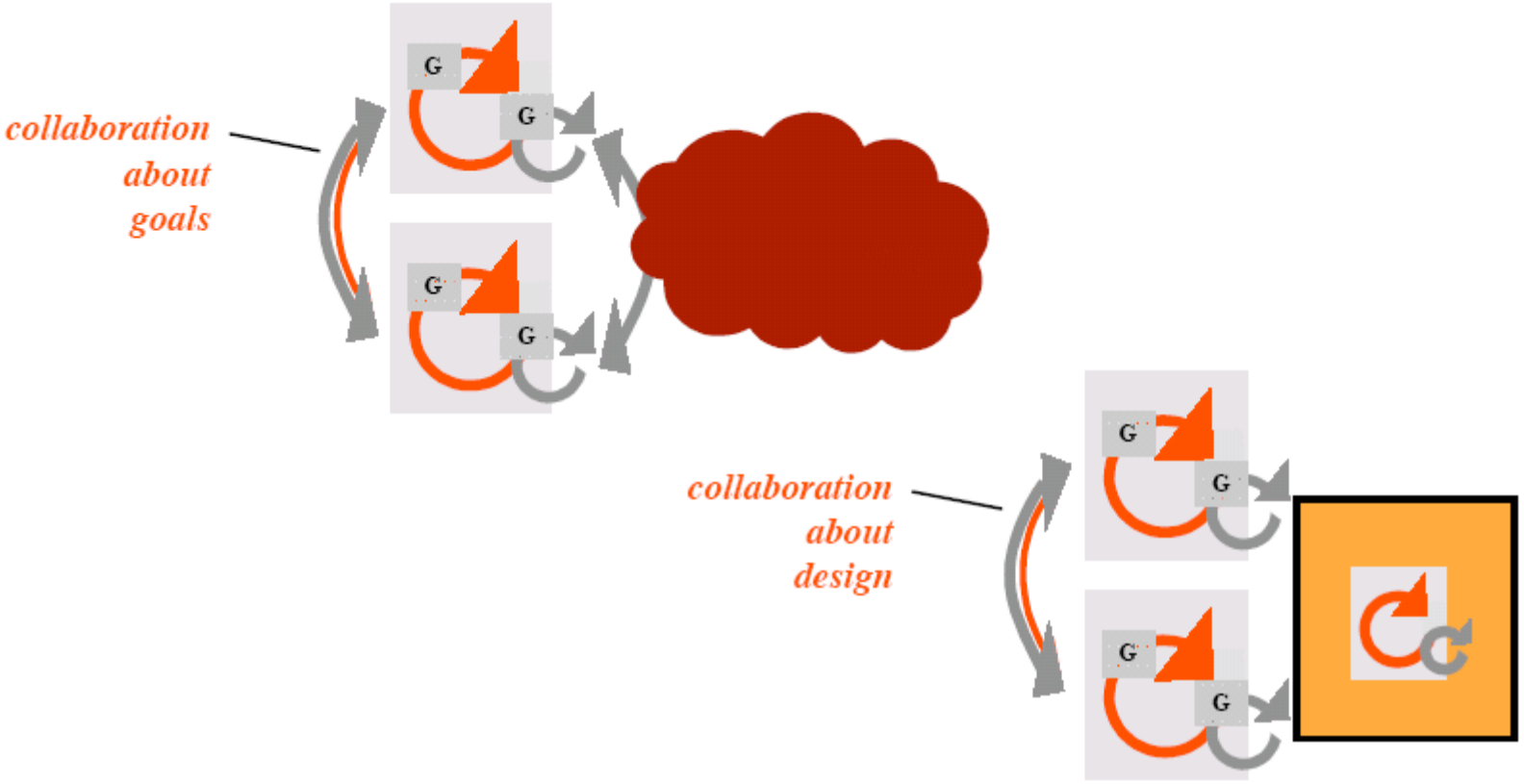
- Composed by double-loop sub-systems of people and artifacts
- Social and technical infrastructures among people and artifacts support collaboration about goals and design
- Characterized by structural openness (modifiability) and interactive openness (communications)

Double-loop system [Pangaro 2000]

Has goals that are dynamic and changeable

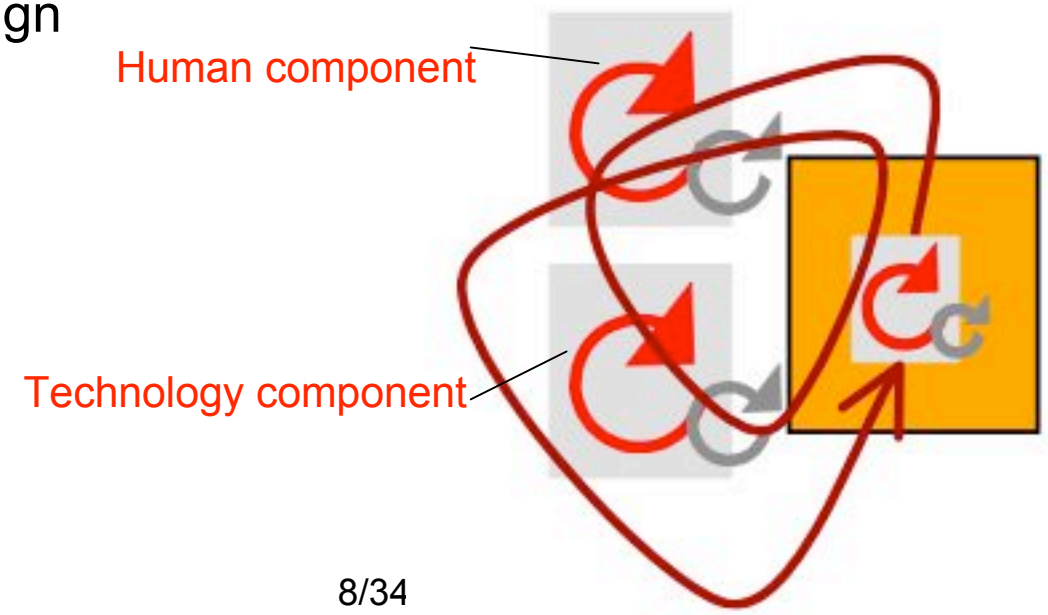


Collaboration about goals and collaboration about design



Participative systems (after P. Pangaro 2000)

- Composed of double-loop systems
- Sensitive and reactive to external environment
- Can determine and change their own goals
- Collaborate (same goal)
- Engage in design



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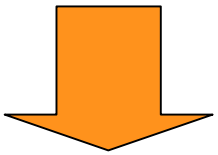
Seed value

- Complex (several factors), dynamic (time, people) and situated
- Value as value-feeling (Donaldson, 1991) not as utility

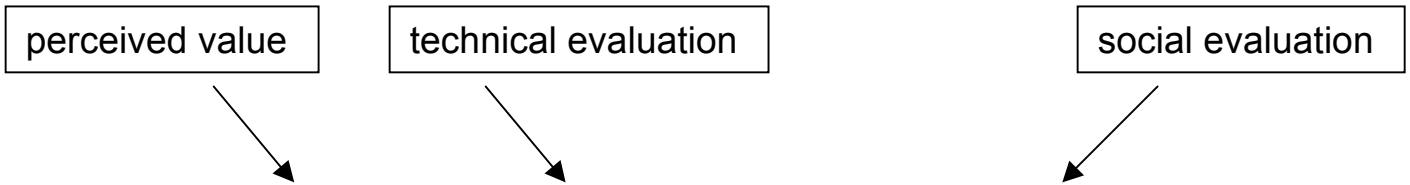
utility=value/effort

people will decide on the worthiness of doing something (utility) by relating the (perceived) value of an activity to the (perceived) effort of doing it



becomes

Seed value



value=usability*(usefulness+meaningfulness)

- *People will perceive the value of the seed as a result of the relation between usability, usefulness, and meaningfulness of the system*
- *This value is inversely proportional to the perceived effort to engage in the design activity*
- *Usability, usefulness and meaningfulness are variables that assume a different importance according to the domain*

- ***Usability=f(efficiency, learnability, reliability + modifiability)***
- ***Usefulness=g(goal)***
- ***Meaningfulness=h(motivation)***

- *Motivation as internal and external motivations (feelings, personal attitudes, personal interest, competency, participants' number/critical mass, participants' reputation/social capital)*

When a seed is a seed (or the matter of perception)

- A seed “is” a seed when it is perceived as such: when its value is recognized by users
- Retrospective perception on the basis of the resulting interaction

Goal-directedness

- A seed must:
  (a) fit an existing practice
  (b) create a new practice

- A matter of:
  - social interaction (internal to the socio-technical system and computationally mediated, e.g. artifact interface, collaborative capabilities, interaction rules)
  - social support (external to the computational system, but internal to the socio-technical system, e.g. outreaching)
  - organizational policies (“external” to the socio-technical system)

Seed requirements

A seed (to be perceived as a seed) must:

- encourage participation and modification
- have the possibility to evolve at the hands of the users (co-evolution of artifacts, people, and socio-technical infrastructures)
- identify a shared trajectory

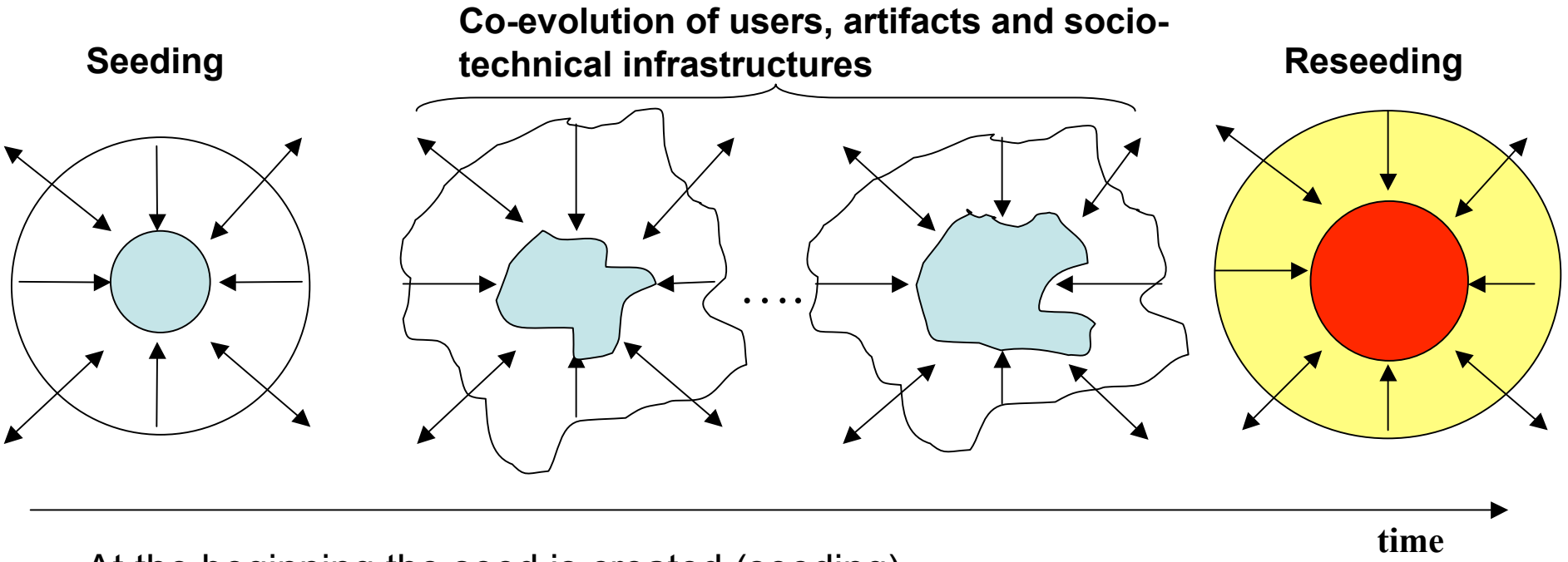
Seed elements

- **Initial content (subjects-objects)**
  - Initial functionalities and data
  - Initial people
- **Technical possibilities (enablers)**
  - End-user modifiability components permitting the modification of functionalities and data (tailoring and customization techniques, end-user programming, programming by examples)
  - Infrastructures for social communication (communication channels, social connection paths)
- **Interaction strategies (activators)**
  - Creativity support mechanisms sustaining users' cognitive process in the modification and/or creation of functionalities and data (constraints, critics, annotations, tools for back talk)
  - Social strategies encouraging users' participation and embodiment in the interactive environment (policies, facilitation, critical mass, social capital, fun)

Seed elements: examples

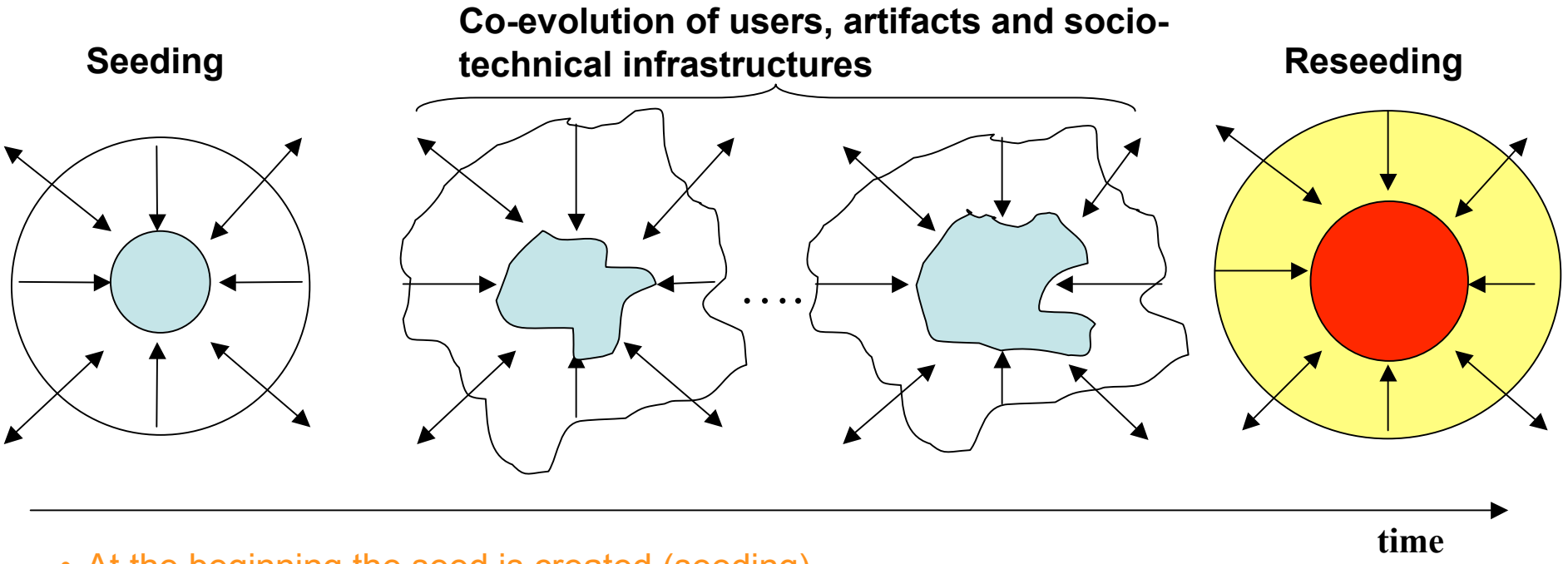
Elements	Dimension	General instances	Examples
Initial functionalities and data	Technical	System functionalities, information resources, users' externalizations, audio/video files	Script templates in MAPS, evolvable information repositories in LivingOM and CodeBroker, pool of pixema in Face Poiesis
Initial people	Social	Community, shared knowledge space	CoPs, CoIs, dynamic communities
End-user modifiability components	Technical	Tailoring and customization techniques, EUP, programming by examples	Script editor in MAPS, system workshops in SSW
Infrastructures for social communications	Technical	Communication channels, social connection paths	Emails in Step-In, web-based communication tools in SSW and SITO
Creativity support mechanisms	Socio-technical	Constraints, critics, annotations, tools for back talk	Annotation in SSW, logs in LifeLine, critics in EDC, mediators in Open Studio
Social strategies	Social	Critical mass, social capital, fun	Social capital and people reputation in OSS, fun in interactive arts

Socio-technical system life cycle



- At the beginning the seed is created (seeding)
- Then, the interaction of the users with the artifact and the other users makes the socio-technical system evolve, implying both the evolution of the artifact and the social context
- At some point in time, the socio-technical system may be evaluated: as a consequence, the artifact may be re-factored and the socio-technical infrastructures redefined in order to create a new seed (reseeding)

Socio-technical system life cycle



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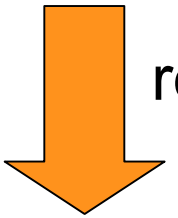
- This cycle can have different time scales

Seed creation

- Construction (initial content and socio-technical infrastructures)
- Activation/support (communication and interaction)



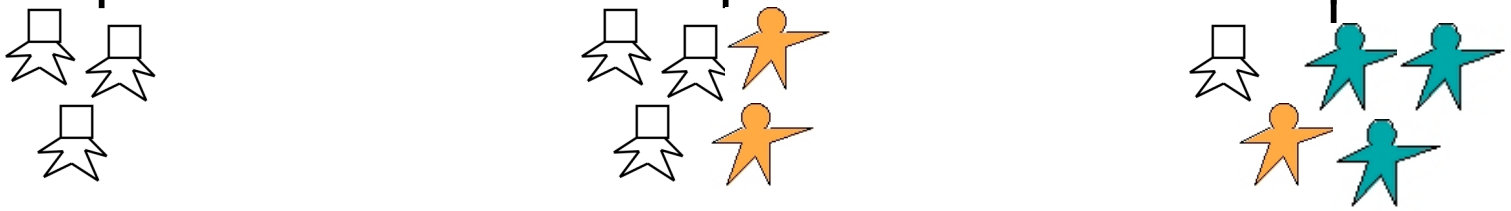
resulting into…

seeding

The spectrum of seed creation

Clearly coupled domains
(e.g. corporate workplace)

Loosely coupled domains
(e.g. creative practices)



The seed is created **by anticipation**

(EDC, LivingOM)

The seed is created **by participation**

(MAPS, LifeLine)

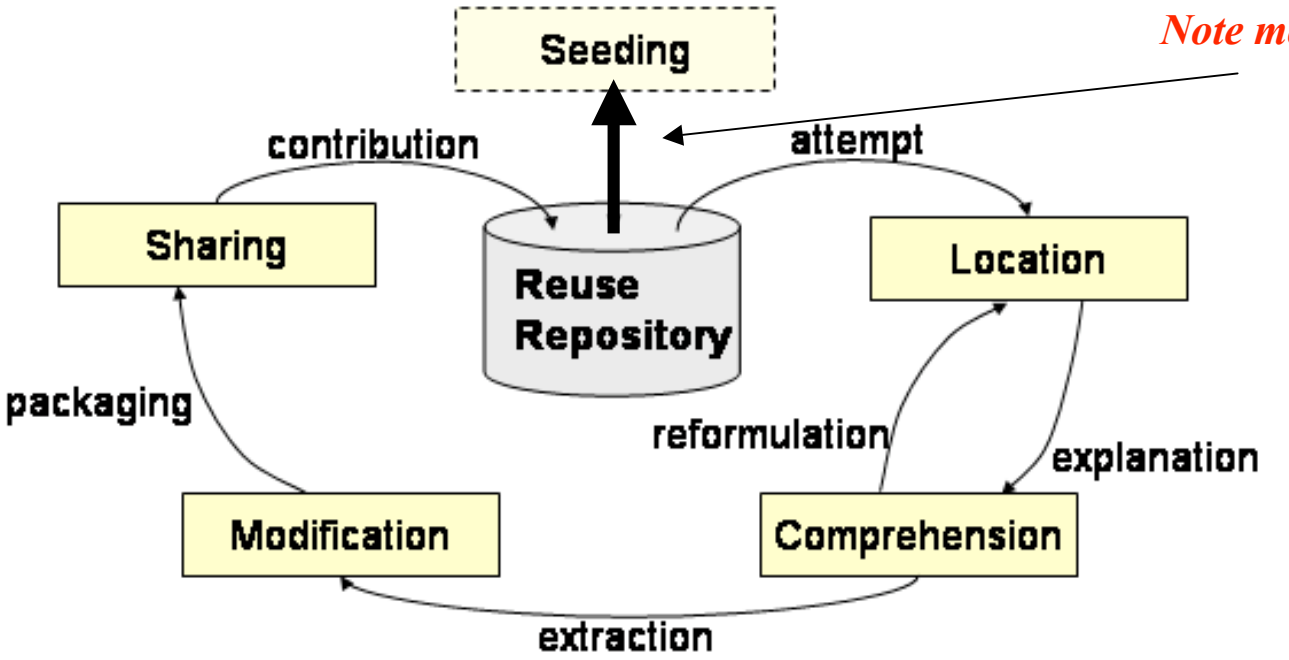
The seed is **co-created by emergence**

(OSS, interactive arts, SSWs)

•In the right part of the spectrum communication and interaction within the user community come first to *support* the arise of the seed: these strategies encourage seed construction and *activation* (support-activation)

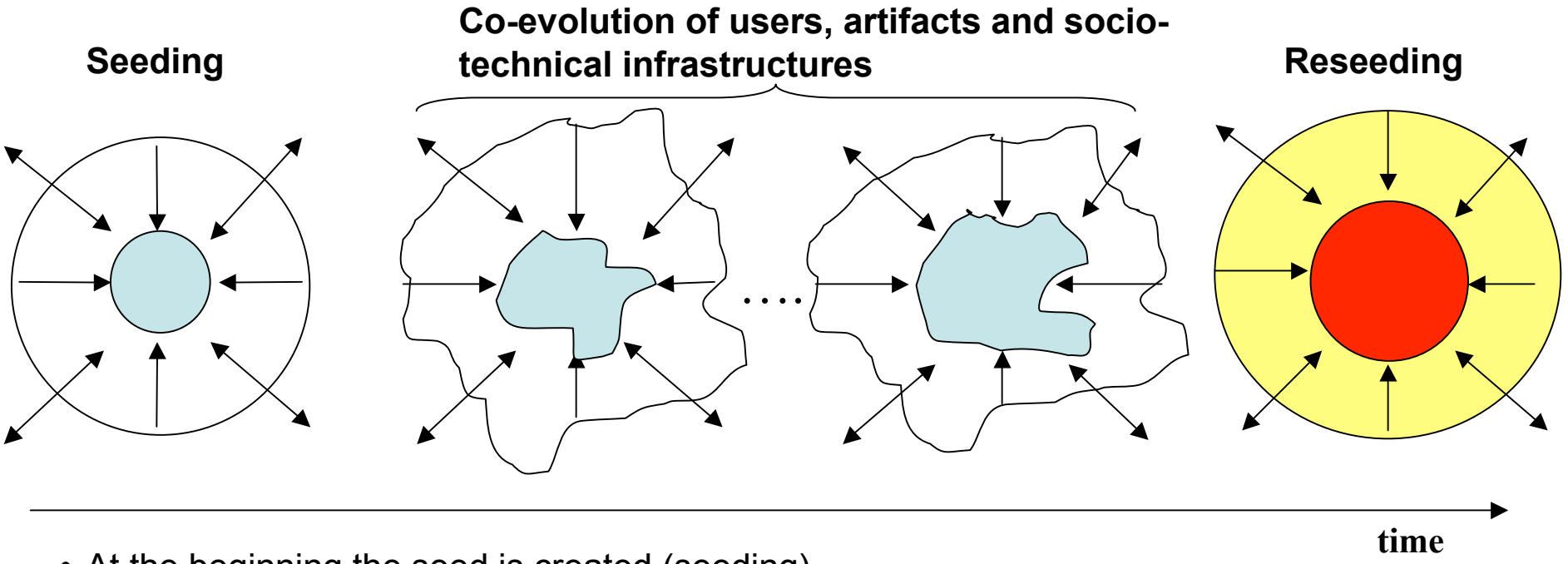
•In the left part of the spectrum, construction and *activation* come first and then communication and interaction are encouraged to *support* seed evolution (activation-support)

The LCMS model



One of the possibile models for co-creation of the seed by emergence (right hand of the spectrum)

Socio-technical system life cycle



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- This cycle can have different time scales

Seed evolution

- A seed evolves as a consequence of the users' participation and design activities
- Means co-evolution of users, artifacts, and socio-technical infrastructures

Seed evolution (cont'd)

A seed may evolve by:

- addition (functionalities, data, people number, socio-technical infrastructures)
- composition (functionalities, data, people organization and identity, socio-technical infrastructures)
- modification (functionalities, data, people knowledge/skills, socio-technical infrastructures)

Mechanisms and strategies for seed evolution

- Comprise different dimensions (from the individual cognitive level to social interaction)
- Sustained both by:

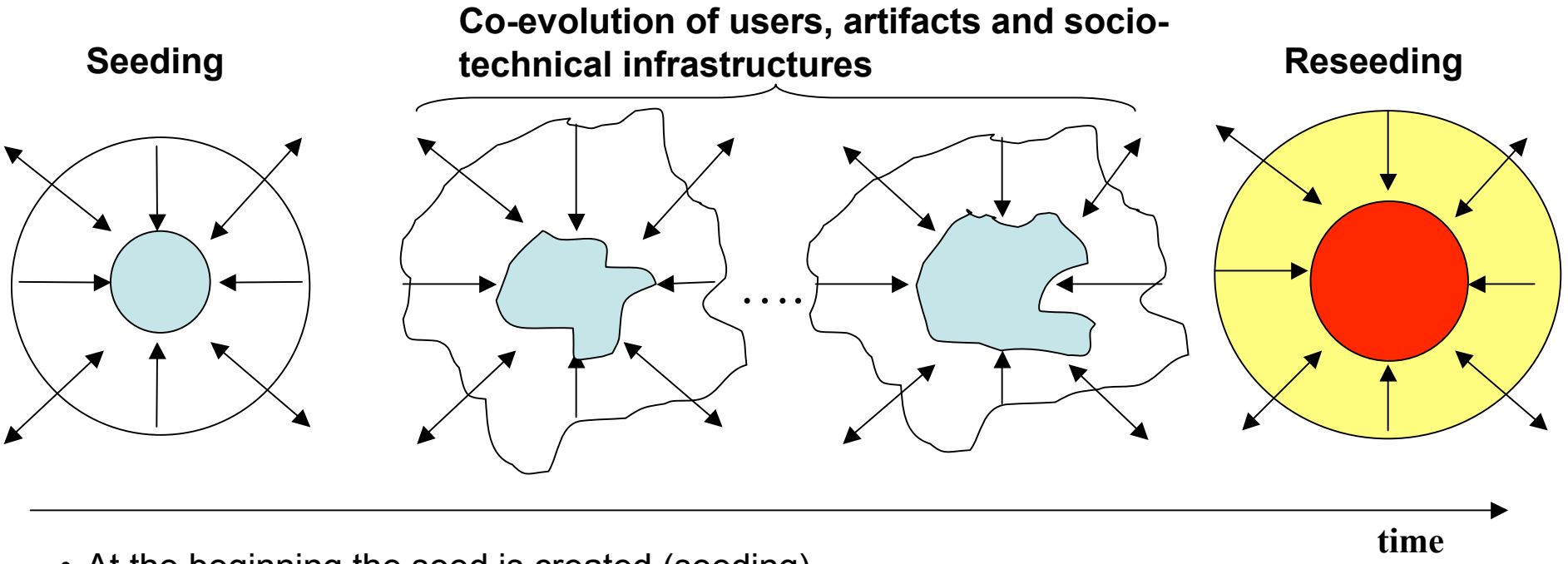
  (a) *enabling* the modifiability of content and socio-technical infrastructures ⇒ structural openness

  (b) *supporting* users' cognitive and creative relationship with materials (reflective practice) and people (social interaction) ⇒ interactive openness

More on evolution and design (or about meta-design)

- Evolution is not only difference but *change of process*
- Meta-design (as design of the design process) enables the possibility of changing evolution (empowers evolution trajectories)
- Change is always based on a subjective evaluation: is “meaningful change” (assessment methodologies for our systems must consider this)

Socio-technical system life cycle



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Reseeding

- Activity of creating a new seed
- Takes place when the evolved seed ages or dies
- Seed aging or death happens when the seed value is under a minimum threshold
- Aging or death are based on evaluative thinking according to several dimensions (see next slide)
- The evaluative thinking may be performed by internal agents (from inside the socio-technical system) or by external agents (from “outside” the socio-technical system)
- Reseeding may be performed by the meta-designer or programmed in the artifact through automatic mechanisms observing the evolution and extracting patterns
- It is not always necessary (not necessarily the seed ages or dies)

Dimensions of evaluation

INTERNAL

- The evolved seed is not *useful and meaningful* anymore
  - Social and technical infrastructures are not adequate anymore to support the evolved goal (pursued practices and interactions)

  ⇒ people do not participate
- The evolved seed is not *usable*
  - The system is not effective, efficient, reliable or evolvable anymore

  ⇒ people cannot participate

EXTERNAL

- New rules or policies have to be satisfied (external agent requirements)

Techniques of reseeding

- From the technical side
  - Individual artifact evolved into different versions at the hands of different users → the modifications may be generalized and integrated in the new seed
  - Collaborative artifact evolved in a “weak” artifact → refactoring and throwing away redundancies
- From the social side
  - Cognitive and social strategies need to be redefined, new infrastructures need to be created to support them

Success and failure stories: LivingOM

- Initial value [usability*(usefulness+meaningfulness)]

  low usability, low usefulness, low meaningfulness
- Evolution possibilities: repository (data) is evolvable at the hands of the users, but functionalities are not evolvable
- Goal-directedness: the artifact did not integrate with the existing practices, the goal was not shared by all the users
- Motivation: missing social strategies encouraging users' participation
- Retrospectively: it was not a seed because users did not attribute a value to the system

Success and failure stories: EDC

- Initial value [usability*(usefulness+meaningfulness)]

  high usability, low usefulness, low meaningfulness
- Evolution possibilities: data and functionalities are evolvable at the hands of the users
- Goal-directedness: the artifact created neither a new work practice nor integrated with an existing one
- Motivation: missing identification of user communities potentially more adequate to participation
- Retrospectively: it is not a seed because an element was missing (people)

Success and failure stories: Courses-as-seeds

- Initial value [usability*(usefulness+meaningfulness)]
  high usability, high usefulness, low meaningfulness
- Evolution possibilities: data and functionalities are evolvable at the hands of the users
- Goal-directedness: students had to participate in order to succeed in the course (organizational mandate)
- Motivation: students participate in the timeframe of the course but tend not to participate after the course
- Retrospectively: it is a seed for the students of the course – it is not a seed anymore for the students after the course (because motivation was based on an organizational mandate)

This is our seed!

Thank you