

## Service-based organizations: some very preliminary considerations

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## Outline

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- Organizations as designed and structured entities.
- Parallel with artifacts.
- Roles as ideal agents.
- Plans of organizations shape their structure.
- Organizations and service providers.
  
- well. . . no trust,  
but if trust is the 'mental counterpart' of delegation. . .
- no formalization. . . still quite foggy ideas. . .
- an attempt to integrate notions coming from unrelated proposals in a unified model of organizations at both design and concrete levels

## Structured artifacts

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- The **function** of a **part** of an artifact is its **capacity** that causally contributes to the capacity of the whole artifact [Cummins 1975].
- Functions represent the roles the designer intended a system to have in the achievement of goals of the system(s) of which it is part [Lind 1994].

## Designed artifacts

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- To meet certain requirements, the designer builds an artifact that displays a specific **functionality/capability**.
- At the design level, an artifact is specified by its **components** and how these components are connected together.
- The ideal capability of the artifact depends only on the design and on the environmental constraints/laws.
- In the abstract specification, components refer to **kinds** of objects (and relations between them) and not to particular physical objects.
- The *concrete artifact* is constituted by *physical* objects that correspond to components and can be used in reality.
- If the design is correct and the physical objects match the specifications of the components, then the concrete artifact will have the desired capability in the given environmental context.

## Structured organizations

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- An organization is a set of interacting roles (at least at a specific level of refinement) [van den Broek et al., 2005].
- An organization is a structured entity in which agents playing roles interact in a specific way in order to achieve organization-wide goals [DeLoach and Matson, 2004].
- An organization consists of a social structure, i.e. roles and groups of roles, and an interaction structure, which contains the interaction relations between the elements of the social structure [Dignum, 2004].
- An organization is structured through a set of roles, to which are associated deontic notions (...), that apply to the agents that are the actual holder of such roles, when playing those roles [Pacheco and Carmo, 2003].

## Designed organizations

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- To achieve a **goal** under specific **constraints**, the **designer** builds an organization that displays a certain (cap)**ability**.
- At the design level, an organization is specified by its **roles** and how they **interact**.
- The ideal ability of an organization depends only on the design and on the environmental constraints/laws.
- This abstract level of description does not refer to 'real' agents.
- The *concrete organization* is constituted by real agents (e.g. specific persons) that play roles in the organization and act in the reality.
- If the design is correct and the players match the specifications of roles, then the concrete organization can achieve the desired goal in the given environmental context.

## Re-use

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- The artifact designer can decide to **rely** on components that are already available (i.e. already designed and produced by someone).
- The designer has a (general) specification of the needed component, and she chooses an available component that can 'implement' the specification in a particular way.
- The organization designer can decide to rely on an (external) **service** provided by a service provider.
- The designer has a (general) specification of the needed role, and she chooses an available service that can 'implement' that (general) specification in a particular way.

## The artifact metaphor

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- Organizations can be seen as artifacts whose function is to constrain some collective behavior to obtain a specific objective [Tummolini and Castelfranchi, 2006].
  - As in the case of a chair, where each part contributes to the main function of the chair, that is something to sit on.
  - Similarly, competences are assigned to roles of an organization that contribute (via the structure) to its general objective.

- Components of an artifact at the design/specification level can be seen as **ideal physical objects** that cannot malfunction.
- Similarly, roles can be seen as **ideal agents** (Dennettian view) that behave exactly as they are expected to by the designer; they cannot fail to satisfy their specifications.

- A physical object may match or not the designer's specification. In the case of a flawless design, malfunctioning is due to a mismatch.
- In the case of roles things are more complex. Real agents are often **autonomous**, they have their own goals and behaviors. Therefore, in addition to their abilities, the design of roles needs to specify how to **induce** the expected behavior in the players.
- **Norms** (with sanction in case of violation) and **powers** can be used to induce the behavior of real agents to approximate the ideal behavior of the roles they play. They should motivate the players to behave as expected by influencing their beliefs so as to make the consequences of the expected behavior preferable with respect to the consequences of other deviating behaviors.
- The commitment of real agents to play roles is often encoded in a **contract**.

## The dual nature of roles

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- Roles can be seen as the interface between design and concrete levels:
  - they represent the function that the players need to have in the organization (relevant at the design level);
  - they make explicit the strategies to use in order to induce the needed behavior in the players, by norms and powers (relevant at design and concrete levels).

## Structures and plans

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- ▷ **Working hypothesis 1:** the structure of an organization mirrors the plan it has to reach its goals.
- The design assigns sub-plans to roles.
- The assigned sub-plans can be seen as the (intended) **abilities** of roles, as the **functions** roles have in the organization.
- Different sub-plans can be assigned to the same role.
- The global ability of the organization is the result of how the sub-plans assigned to roles **coordinate**, i.e. how the abilities of roles **compose**.
- The structure of the organization can then be reduced to the structure of the global plan that explains how the sub-plans in charge of its roles coordinate.

## Complete vs. partial plans

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- Plans characterize the **collective** complex actions of organizations.
- At the design level the agents involved in the plans are the roles.
- A **complete plan** completely specifies the sequence of actions to achieve the final goal.
- A **partial plan** gives alternative ways to accomplish a goal (indeterminism), it only (partially) constrains the way in which the goal can be achieved.

## From refinement of plans to layering of organizations

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- Partial plans can be **refined** by adding details (constraints) to the actions composing the plan.
- In particular, plans can be decomposed into **coordinated** sub-plans.
- At the design level this corresponds to a decomposition of the general plan of an organization in coordinated sub-plans assigned to its roles.
- It is possible to iterate this process: the sub-plan assigned to a role (**sub-organization**, in this case) can be further decomposed in sub-plans assigned to other roles.
- The refinement process translates into a process of **layering** organizations into sub-organizations, down to **basic roles**.
- The **hierarchical** structure of an organization is based on the assignment of sub-plans to sub-organizations, that in its turn is based on a mechanism of refinement of plans, from more general and partial to more specific and complete.

## Realization level

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- At the design level, sub-plans can be directly assigned to roles.
- At the realization level one needs to take into account the nature of the relation between players and roles.
- In institutional and public organizations this relation is often regulated by an explicit **contract**.
- Contracts establish the limit between what is 'under the control' of the designer and what is 'outside the control' of the designer.
- The structure of the 'provider' is not necessarily visible to the 'customer'.

## Service level agreement (SLA)

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- The provider (a specific agent) registers a general SLA that specifies the kind of services it offers and at what general conditions. On the basis of this general SLA, potential customers can decide to contact the provider.
- If the provider and the customer agree, they sign a personalized SLA (a specific contract).

## What is a service?

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- No agreement in the literature: an action, a type of action, a capability to perform actions, the result of an action, an organization acting in the interest of somebody.
- I will consider a notion based on **service commitment**: the **provider's** explicit *commitment* to guarantee the **producer's** execution of some type of actions (or the achievement of some goals), on the occurrence of a certain triggering event, in the interest of the **customer** and upon prior agreement, according to a certain specification (the service content) which constraints the way the service actions will be performed (i.e., the service process that will be adopted).
- The provider may coincide or not with the producer.
- **Commitment acts** are often encoded in an institutional document, e.g. contract, official declaration or deliberation, service level agreement (SLA).

## Services and roles

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- **Working hypothesis 2:** service-producers can play roles.
- The provider **commits** to guarantee that the **producer** will execute the plan specified in the SLA in the interest of the **customer**.
- Suppose the customer is a concrete organization. With the SLA, the producer plays a role in the organization, and because there is an explicit agreement between the concrete organization and the provider, we can say that the concrete organization is **delegating** to the producer the sub-plan assigned to the role she is playing.
- When the producer is different from the provider, an SLA can be seen as a 'double' contract: one between the customer and the provider, the other one between the provider and the producer. This also implies a 'double' delegation.

## Service content vs. service process

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- The **service content** is the plan the provider is committed to, i.e. the constraints (on actions, participants, deadlines, etc.) the provider guarantees to satisfy.
- The contract (the SLA) concerns commitment at this level of specification of the service.
- The **service process** is the actual implementation/execution of a service content, consisting of a number of interdependent actions including those necessary to monitor the trigger events, the core actions mentioned in the commitment, and any further actions aimed at supporting or complementing the successful execution of such core actions.

## Distributed-design and adaptable organizations

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- The level of detail of the contract depends on the level of detail of the sub-plan assigned to the role.
- Real agents that play a role could autonomously decide how to refine and/or to delegate/assign a part of the plan to another agent (partial/total transfer).
- Partial sub-plans (and therefore general contracts) give to players more freedom in the 'implementation' phase.
- In this case we have less predictable but more flexible and adaptable organizations.
- In some way, real agents can participate to the design of the organization  $\Rightarrow$  **distributed** design.

## SLA and delegation

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- SLAs create juridical entities: **obligations** for the provider and correspondent **rights** for the customer.
- The specificity of the service content (of the plan established in the SLA) determines the specificity of the obligations and rights and the kind of delegation (*open, close, or intermediate*).
- The delegation to a producer creates an obligation for the producer and a right for the provider. Therefore delegation implies **responsibility transfer**.
- SLAs/contracts are explicit agreement  $\Rightarrow$  **strong delegation**.
- If the obligation (of executing the action) is transferred (delegated), the responsibility of that action is also transferred; nonetheless, the obligation of guaranteeing that the service is executed is not transferable.

## Service transfer

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- One can own a *good* or the right to exploit it while one can only own the right to exploit a *service* .
- **Service transfer:** provider's (partial or total) transmission/delegation of the duty to provide the service content.  
From the point of view of the customer, the responsibility over the service can remain with the provider even in case of service transfer or subcontracting, i.e. service transfers can be opaque to the customer.

## Service-oriented organizations

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- **Working hypothesis 3:** (some) organizations can be seen as a structured clusters of service level agreements.
- SLAs are contracts that explicitly allow the provider to delegate (part) of the service content to the producer. In this sense they generalize the notion of contract between two agents.
- An organization can be seen as a (partially) self-designing (multi-) agent with an hierarchical structure based on how responsibilities established by the SLAs are (partially or totally) transferred.