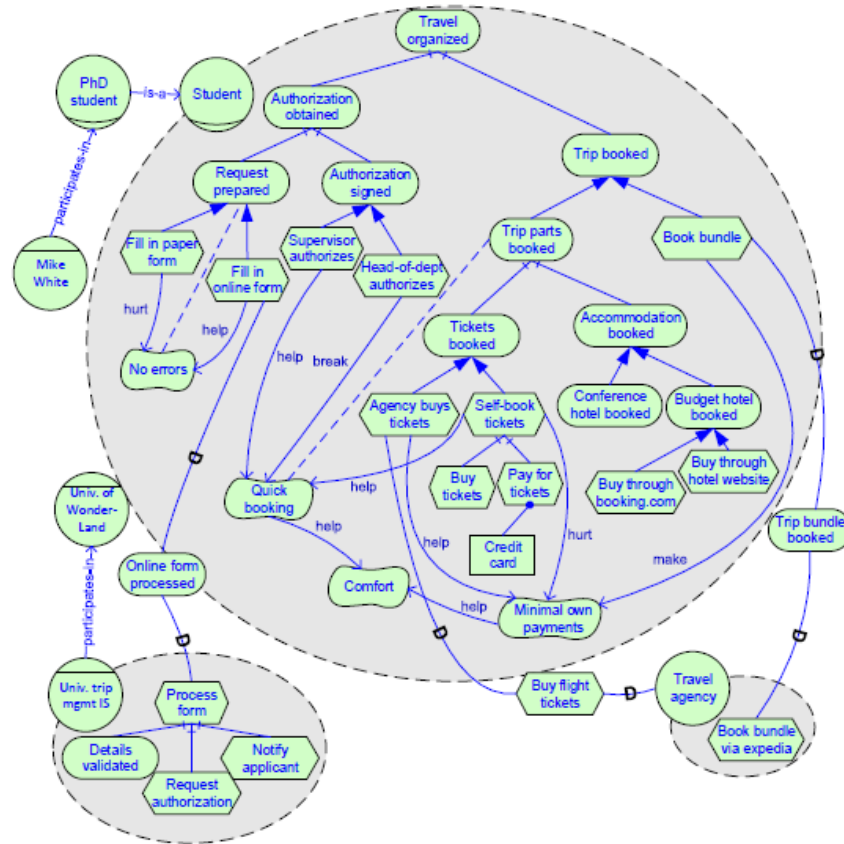




Social modeling of organizations with iStar 2.0

Fabiano Dalpiaz
Game Production 2016

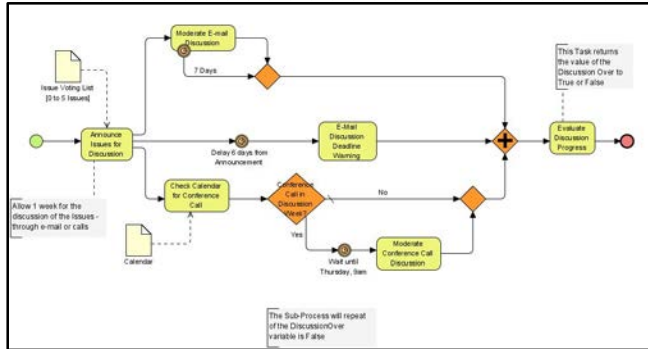
Organizations

- ▶ A (business) organization is a social structure with a purpose, e.g., providing services or producing products
- ▶ Organizations can be understood as composite systems intended to achieve organizational goals and objectives
- ▶ Two basic types of organizations:
 - ▶ **Production organizations:** manufacturing, farming, construction and agriculture, software, games
 - ▶ **Service organizations:** transportation, communication, banking and finance, medicine, education and retailing, distribution

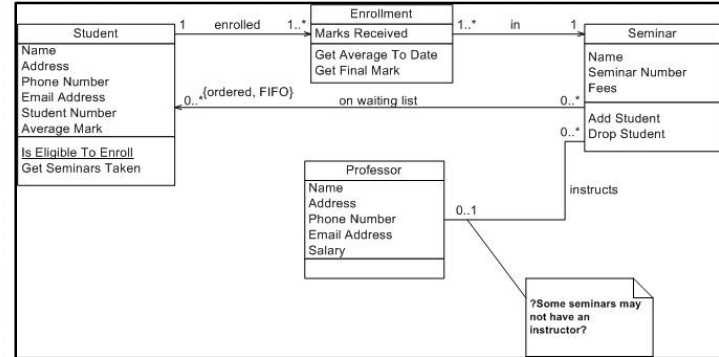
Modeling organizations: why?

- ▶ Many reasons exist that justify creating conceptual models of an organization
 - ▶ Training of (new) employees
 - ▶ Knowledge management
 - ▶ Certification and accreditation (e.g., ISO, ITIL)
 - ▶ Re-engineering of / improving the organization
 - ▶ Requirements engineering
- ▶ The purpose affects the suitability of modeling languages

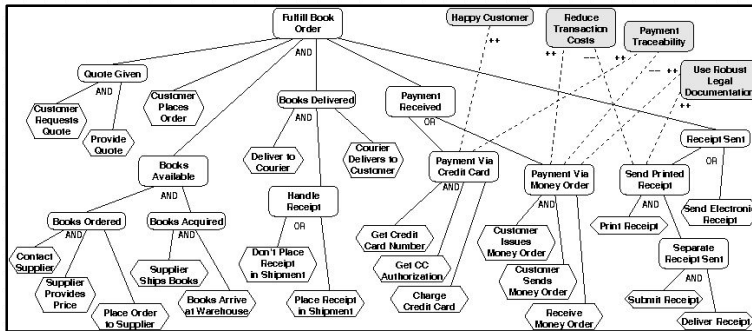
Which modeling language?



How does the org operate?
Business processes



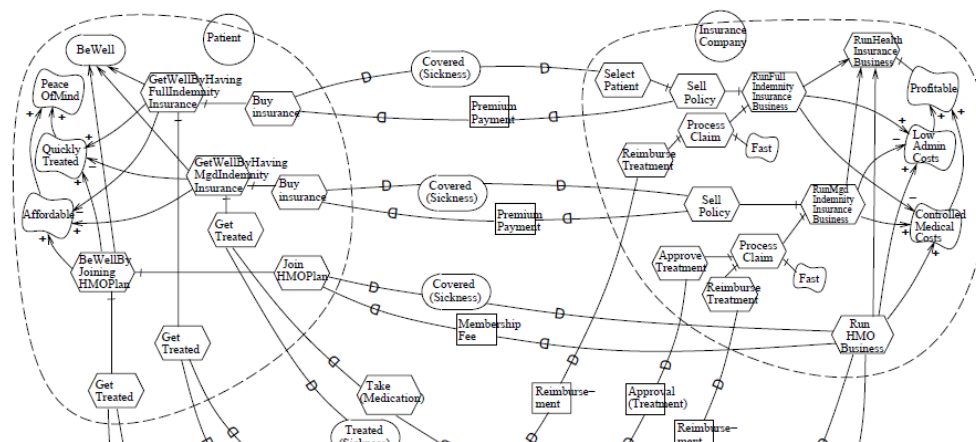
What elements and assets?
Class/ER diagrams



Why do actors act in certain ways?
Goal models

The *i** language

- ▶ Developed in the mid Nineties [Yu 1995]
- ▶ Provides a framework for asking ‘why’ questions
- ▶ Based on the notion of an ‘**intentional actor**’
- ▶ Models are created using two diagrams
 - ▶ Strategic Diagrams: social relationships between actors
 - ▶ Rationale Diagrams: goals and sub-goals of actors



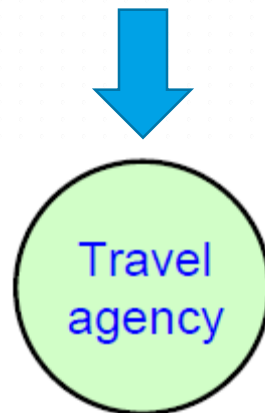
Running example

- ▶ University travel reimbursement
 - ▶ **Students** organize trips to conferences
 - ▶ They rely on **travel agencies** and the university's **trip management information system**
 - ▶ Multiple **alternatives** exist to arrange a trip



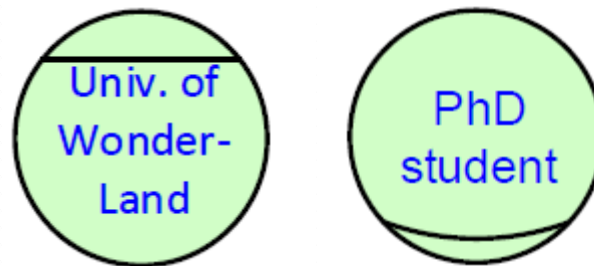
Actors

- ▶ Organizations are social entities
- ▶ Their operation relies on the effective interaction among a number of actors
- ▶ **Actor:** an active, autonomous entity that aims at achieving its goals by exercising its know-how, in collaboration with other actors



Agents and Roles

- ▶ Two types of actors exist in iStar 2.0: agent and role
- ▶ **Agent:** an actor with concrete, physical manifestations, such as a human individual, an organization, or a department
- ▶ **Role:** an abstract characterization of the behavior of a social actor within some specialized context or domain of endeavor



An agent and a role

Which one should I use?

- ▶ Can I identify a concrete individual or (sub)organization?

➡ **Agent**



- ▶ Do I want to characterize an abstract class?

➡ **Role**



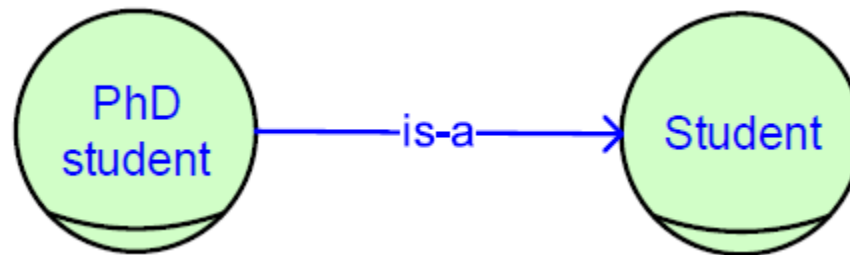
- ▶ I don't know at this time, or I do not care

➡ **Actor**



Actor association links

- ▶ Often one wants to relate multiple actors (incl. agents & roles)
- ▶ iStar 2.0 offers binary, directed actor links
- ▶ **is-a**: represents the concept of generalization / specialization, and can be applied to (role to role) or (actor to actor)
 - ▶ Does not apply to agents. Why?



Actor association links

- ▶ **participates-in**: represents any kind of association, other than is-a, between two actors
- ▶ Depending on the linked elements, takes different meanings
 - ▶ (agent to role) represents the **plays** relationship



- ▶ (linking elements of the same type) represents the **part-of** relationships



Actor association links

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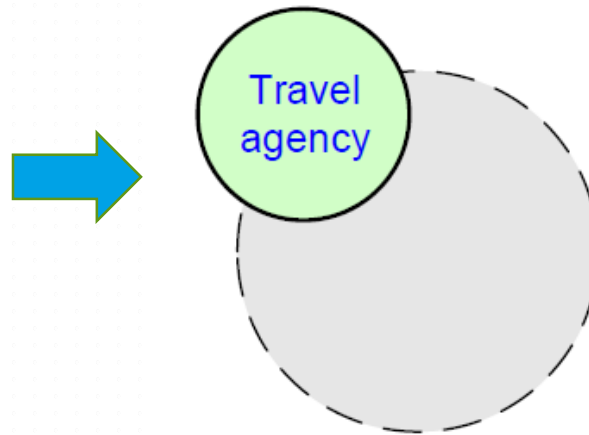
- ▶ (linking elements of the same type) represents the **part-of** relationships



Examples for
role-role?

Intentional elements

- ▶ iStar 2.0 focuses on **intentions: things that actors want**
- ▶ Intentional elements appear inside a so-called actor boundary, representing that actor's perspective in the model
- ▶ Four types of intentional elements
 - ▶ Goal
 - ▶ Quality
 - ▶ Task
 - ▶ Resource
- ▶ An actor with an empty actor boundary



Goals

- ▶ A **goal** is a state of a affairs that the actor wants to achieve and that has clear-cut criteria of achievement

- ▶ “Travel from Amsterdam to Osaka”
- ▶ “Paper published”
- ▶ “Tickets booked”



There is a clear criterion to determine if these are achieved. E.g., did I reach Osaka?

- ▶ Goals are represented as ovals



Qualities

- ▶ A **quality** is an attribute for which an actor desires some level of achievement
- ▶ Being attributes, they always relate to an entity
 - ▶ “Performance (of a system)”
 - ▶ “Yearly profit (of an organization)”
 - ▶ “Quick booking (of a trip)”
- ▶ Qualities guide the search for ways of achieving goals
- ▶ Represented as curved, cloud-like shapes



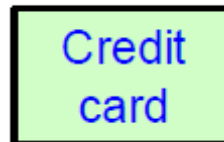
Tasks

- ▶ A **task** represents actions that an actor wants to be executed
 - ▶ Usually within the purpose of achieving a goal
- ▶ Examples
 - ▶ “Pay for tickets”
 - ▶ “Take the train”
 - ▶ “Scan the receipt”
- ▶ Represented as diamonds

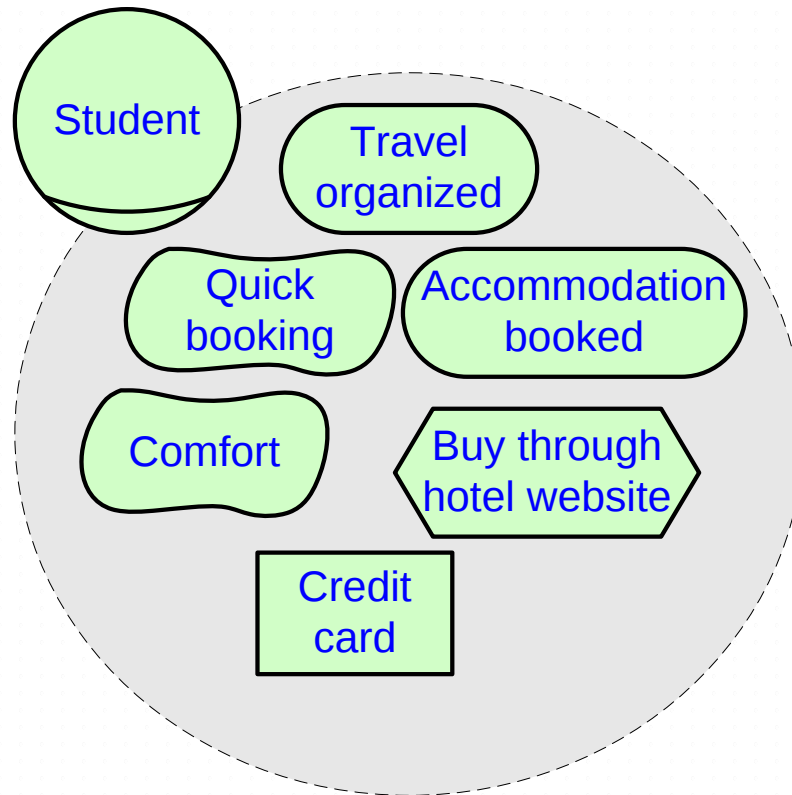


Resources

- ▶ A **resource** is a physical or informational entity that an actor requires in order to perform a task
- ▶ Examples
 - ▶ Credit card
 - ▶ Server
 - ▶ Personal details
- ▶ Represented as rectangles



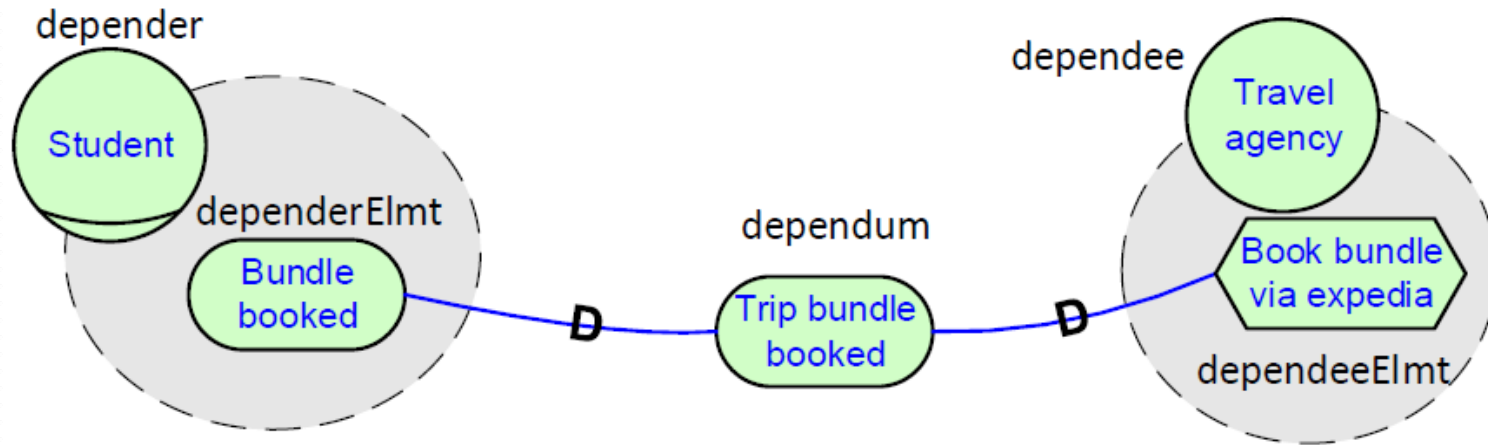
Example of intentional elements



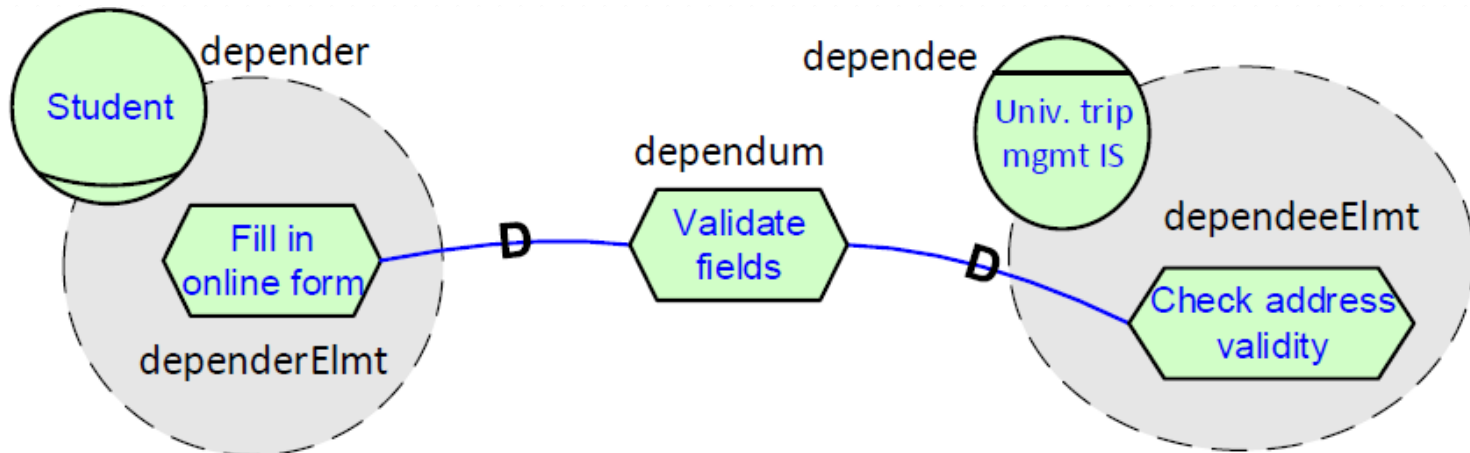
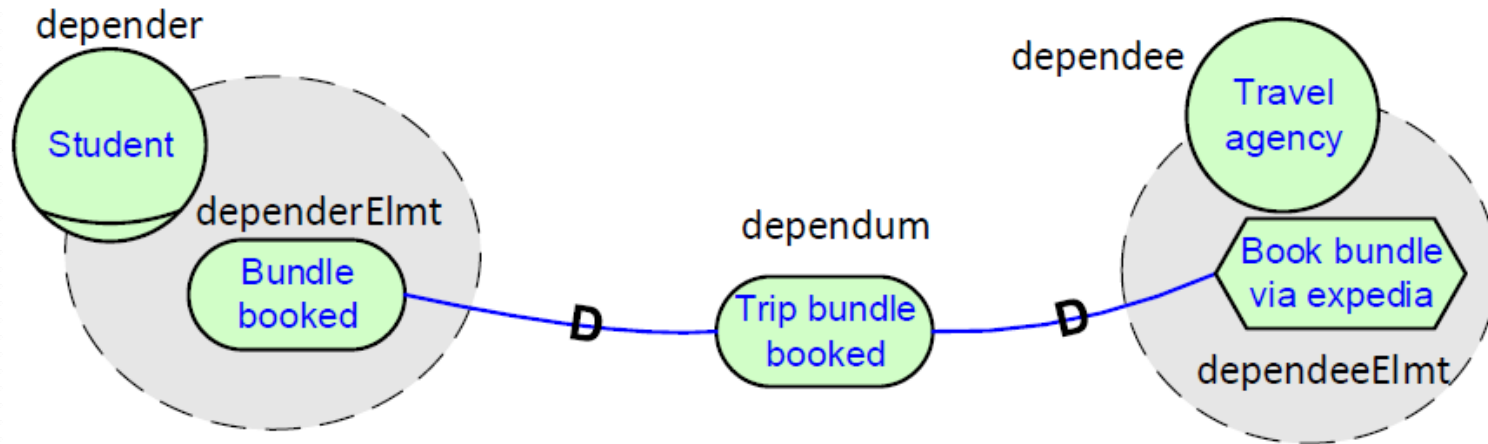
Dependencies

- ▶ Social relationships are represented as **dependencies**
- ▶ A dependency is a relationship with five arguments:
 - ▶ *Depender*: an actor that depends for something (the dependum) to be provided
 - ▶ *DependerElmt*: an intentional element within the depender's actor boundary where the dependency starts from, which explains **why** the dependency exists
 - ▶ *Dependum*: an intentional element that is the object of the dependency
 - ▶ *Dependee*: the actor that should provide the dependum
 - ▶ *DependeeElmt*: the intentional element that explains how the dependee intends to provide the dependum.

Dependencies, an example



Dependencies, an example



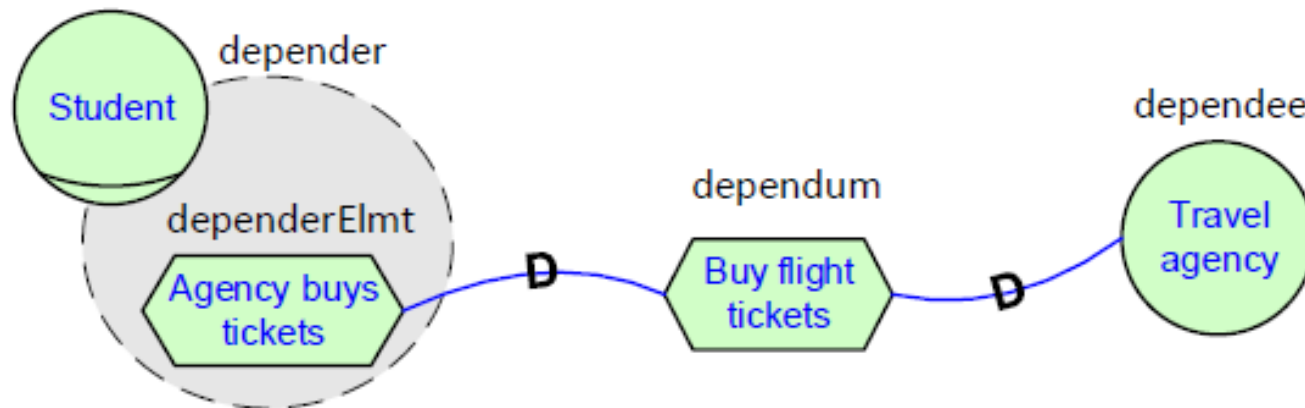
Any differences?

Dependum types

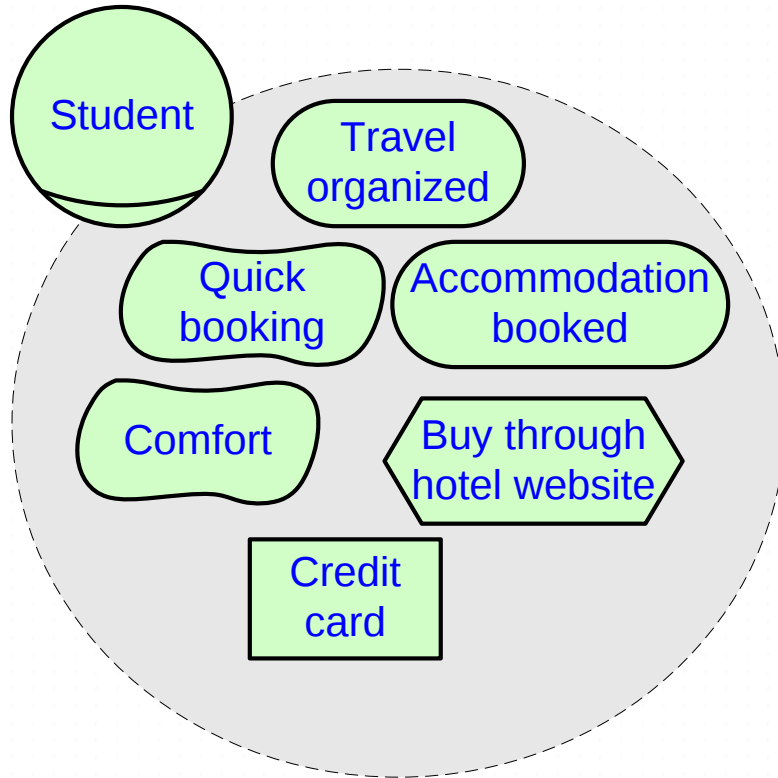
- ▶ The type of the dependum specializes the semantics of the dependency relationship
 - ▶ **Goal**: the dependee is free to choose how to achieve the goal
 - ▶ **Quality**: the dependee is free to choose how to sufficiently satisfy the quality
 - ▶ **Task**: the dependee is expected to execute the task in a prescribed way
 - ▶ **Resource**: the dependee is expected to make the resource available to the depender
- ▶ Different dependum types give the dependee different degrees of freedom

Omitting dependency parts

- ▶ **Omitting the `dependerElmt`** implies not specifying why the dependency exists
- ▶ **Omitting the `dependeeElmt`** implies not specifying how the dependency will be fulfilled



Intentional element links



The elements within an actor boundary are interrelated.

But we have seen no ways to relate them so far.

Any idea?

Intentional element links: overview

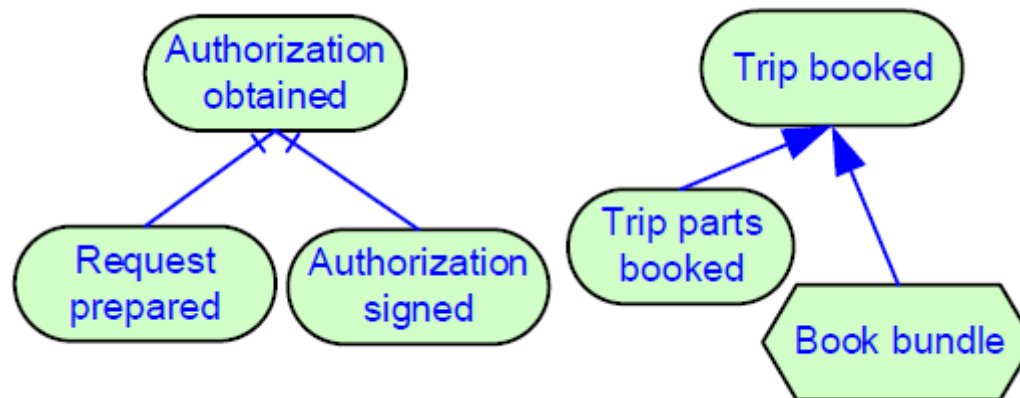
- ▶ Four link types:
 - ▶ Refinement
 - ▶ NeededBy
 - ▶ Contribution
 - ▶ Qualification

		Arrowhead pointing to			
		<i>Goal</i>	<i>Quality</i>	<i>Task</i>	<i>Resource</i>
Link starts from	<i>Goal</i>	Refinement	Contribution	Refinement	n/a
	<i>Quality</i>	Qualification	Contribution	Qualification	Qualification
	<i>Task</i>	Refinement	Contribution	Refinement	n/a
	<i>Resource</i>	n/a	Contribution	NeededBy	n/a

Refinement

- ▶ **Refinement** is a generic relationship that links goals and tasks hierarchically
 - ▶ n-ary relationship linking one parent to one or more children
 - ▶ An intentional element can be the parent in at most one refinement link
- ▶ Two types of refinement
 - ▶ **AND**: the fulfillment of all n children ($n \geq 2$) makes the parent fulfilled
 - ▶ **Inclusive OR**: the fulfillment of at least one child makes the parent fulfilled

AND & OR
refinements



Different meanings of a refinement

- ▶ Refinement takes different meanings depending on the type of connected elements

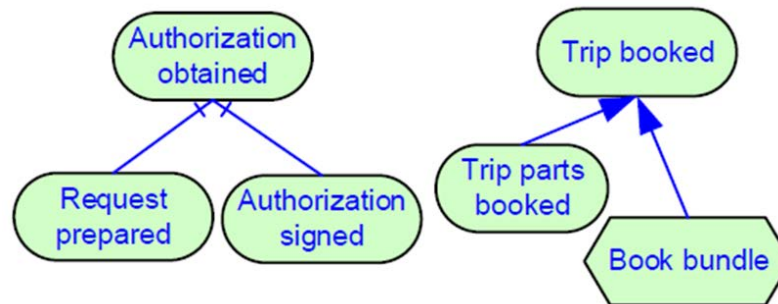
I. If the parent is a **goal**

▶ **AND-refinement**

- ▶ A **child goal** is a sub-state of affairs that is part of the parent goal
- ▶ A **child task** is a sub-task that must be fulfilled

▶ **OR-refinement**

- ▶ A **child goal** is a sub-goal that can be achieved for fulfilling the parent goal
- ▶ A **child task** is a particular way for fulfilling the parent goal



Different meanings of a refinement

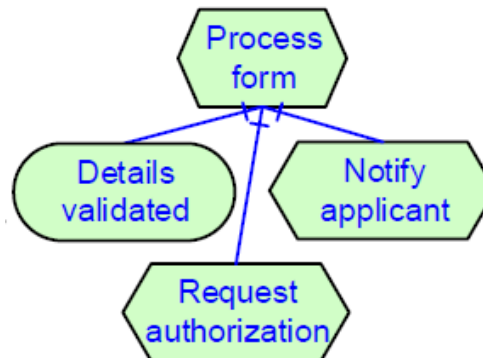
2. If the parent is a **task**

▶ **AND-refinement**

- ▶ A **child goal** is a goal that is uncovered by analyzing the parent task
- ▶ A **child task** is a sub-task that is identified as part of the parent task

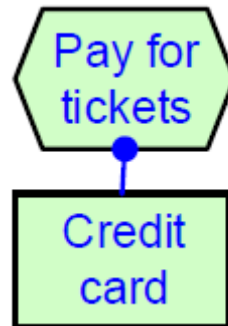
▶ **OR-refinement**

- ▶ A **child goal** is a goal that is uncovered by analyzing the parent task which may substitute for the original task
- ▶ A **child task** is a particular way for executing the parent task



NeededBy

- ▶ The **NeededBy** relationship links a task with a resource and it indicates that the actor needs the resource in order to execute the task
 - ▶ No details on the reason for this need: consumption, reading, ...

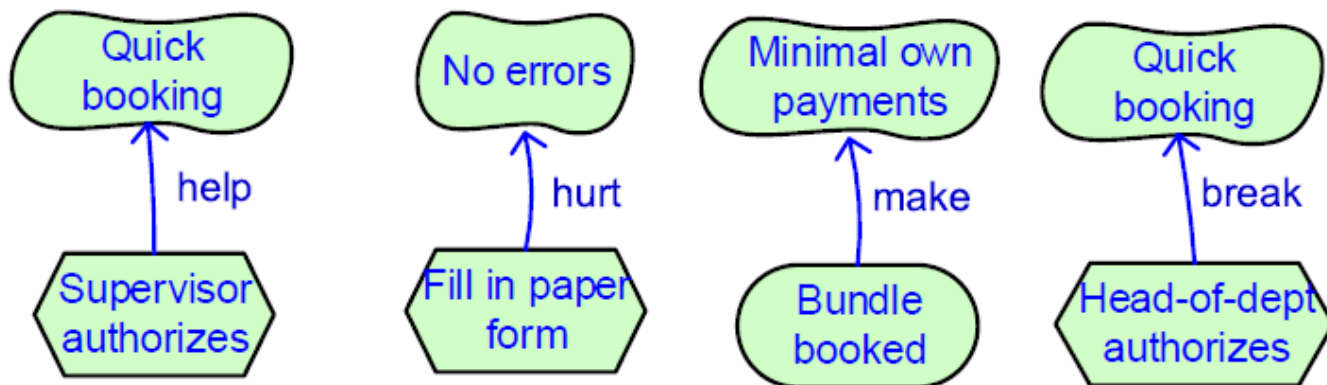


Contribution

- ▶ **Contribution links** represent the effects of intentional elements on qualities
 - ▶ These are qualitative links
 - ▶ Assist analysts in the decision-making process among alternative goals / tasks
- ▶ Qualities can be
 - ▶ **Fulfilled** (or satisfied), having sufficient positive evidence
 - ▶ **Denied**, having strong negative evidence
- ▶ No details here on how fulfillment / denial are calculated

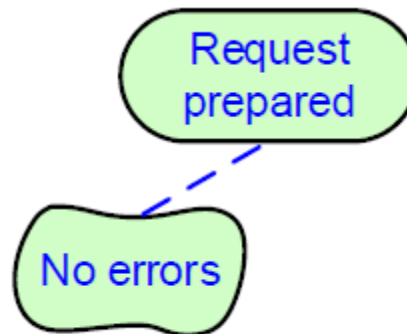
Contribution types

- ▶ Four types, expressing that “the source provides...”
 - ▶ **Make**: sufficient positive evidence for the satisfaction of the target
 - ▶ **Help**: weak positive evidence for the satisfaction of the target
 - ▶ **Hurt**: weak evidence against the satisfaction (or for the denial) of the target
 - ▶ **Break**: sufficient evidence against the satisfaction (or for the denial) of the target



Qualification

- ▶ The **qualification** relationship relates a quality to its subject: a task, goal, or resource
- ▶ Examples:
 - ▶ the quality “Quick booking” refers to the goal “Trip parts booked”, elaborating on how this goal might be achieved
 - ▶ the quality “No errors” refers to errors possibly created while fulfilling the goal “Request prepared”



Mandatory literature

- ▶ Fabiano Dalpiaz, Xavier Franch, Jennifer Horkoff. *iStar 2.0 Language Guide*. arXiv:1605.07767, 2016