The i* *conceptual model for requirements analysis*

Background and Motivations
Basic concepts
The Strategic Dependency Model
Example + Exercise

Requirements Engineering (RE)

- RE is crucial to the successful development and subsequent development and ongoing evolution of the system
- Initial requirements statements express customer's wishes about what the system should do. Often they are:
  - Ambiguous
  - Incomplete
  - Inconsistent
  - Usually expressed informally

Requirements Languages

- Many requirements languages and frameworks help to make requirements precise, complete, and consistent
- Modeling techniques, from boxes-and-arrows diagrams to logical formalisms, assist engineers in these tasks
- The objective, in these **late-phase** requirements engineering tasks, is to produce a **requirements document** to pass on ("downstream") to the developers, so that the resulting system would be adequately specified and constrained

Early-phase of RE activities

- Usually, less attention is given to supporting the activities that **precede** the formulation of the initial requirements.
- These **early-phase** RE activities include:
  - how the intended system would meet organizational goals
  - why the system is needed
  - what alternatives might exist
  - what the implications of the alternatives are for various stakeholders, and
  - how the stakeholders' interests and concerns might be addressed.

Early-phase

- The emphasis is on understanding the **whys** that underlie system requirements [Yu94], rather than on the precise and detailed specification of **what** the system should do
- Some of the reasons of an early-phase:
  - poor understanding of the domain (interests, priorities and abilities of various actors and players) is a primary cause of project failure
  - Need of systematic framework to help developers understand what users want and to help users understand what technical systems can do

… Early-phase …

- need to relate systems to business and organizational objectives
- need to deal with change. A representation of organizational issues and rationales in requirements models would allow software changes to be traced all the organizational changes that leads to requirements changes
- need to understand how systems cooperate (with each other and with human agents) to contribute to organizational goals

… Early-phase

- Early-phase RE activities have traditionally been done informally, and without much tool support.
- A considerable body of knowledge would be built up during early-phase RE.
- This knowledge would be used to supporting reasoning about
  - organizational objectives
  - system-and-environment alternatives
  - implications for stakeholders, etc.
- this body of knowledge guides system development, and help to deal with change throughout the system's life time.

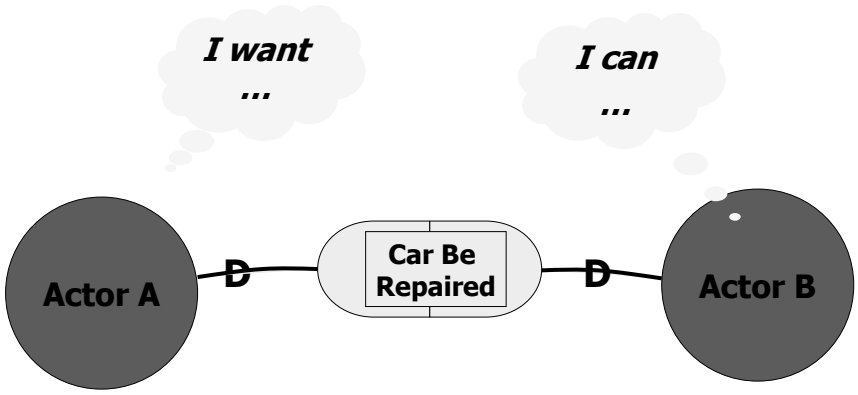
The i* *modelling framework*

- The *i** framework has been developed by Eric Yu in his PhD thesis (1994) at University of Toronto
- Basically, *i** is used for modelling and reasoning about organizational environments and their information systems
- *i** consists of two main modelling components:
  - the **Strategic Dependency** (**SD**) model to describe the dependency relationships among various actors
  - the **Strategic Rationale** (**SR**) model to describe stakeholders interests and concerns, and how they might be addressed by various configurations of systems

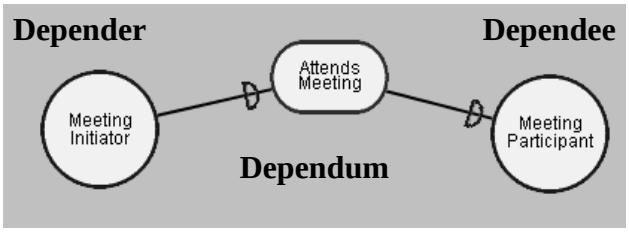
Strategic-intentional Actors

- Actors are viewed as having **intentional** proprerties, such as:
  - goals, beliefs, abilities, and commitments
- Actors depend on each other for:
  - goals to be achieved
  - tasks to be performed
  - resources to be furnished
- Actors are **strategic** in the sense that they are concerned about opportunities and vulnerabilities, and seek rearrangements of their environments that would better serve their interests.

Strategic Dependency Relationship

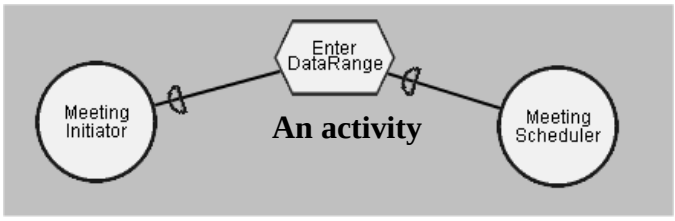


Dependency Types: Goal dependency



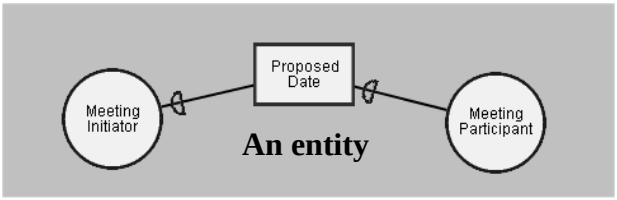
Doesn't care how achieved

Dependency Types: Task dependency



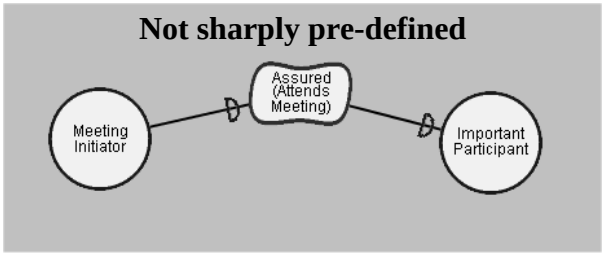
Stipulates what to do

Dependency Types: Resource dependency



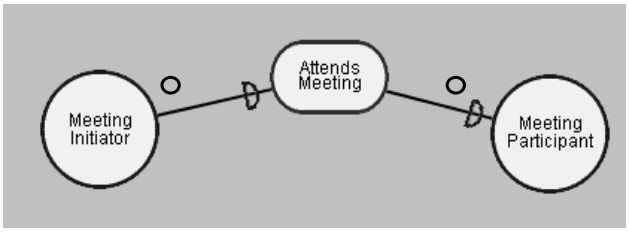
Uses the resource

Dependency Types: SofGoal dependency



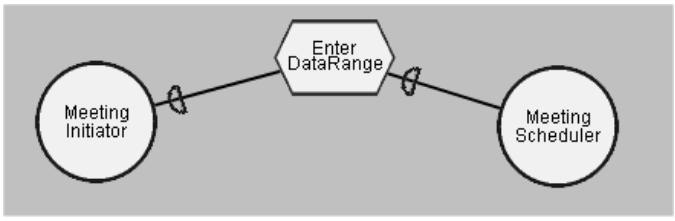
Choose good-enough method

Dependency Strengths: Open Dependency



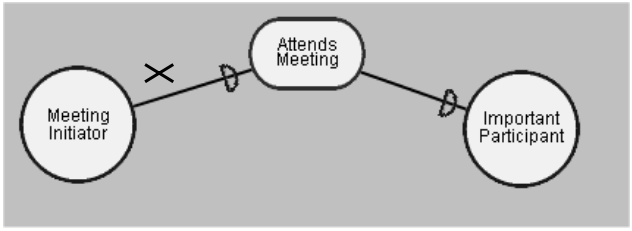
Nice to have

Dependency Strengths: Committed Dependency



Some course of action would fail

Dependency Strengths: Critical Dependency



All known courses of action will fail

An example: the meeting scheduler

- The meeting scheduler should try to determine a meeting date and location so that most of the intended participants will participate effectively.
- The system would find dates and locations that are as convenient as possible.
- The meeting initiator would ask all potential participants for information about their availability to meet during a date range.
- The meeting scheduler comes up with a proposed date.
- Participants would agree to a meeting date once an acceptable date has been found.

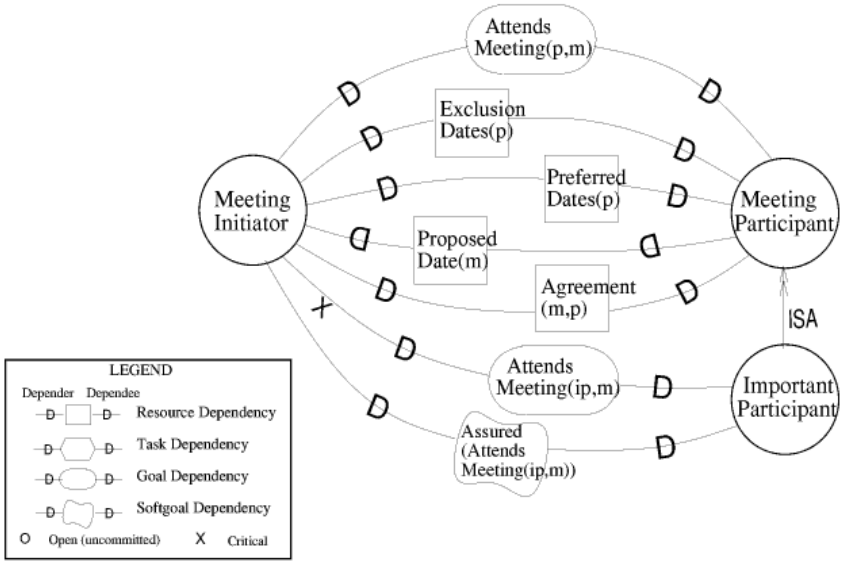
Early-requirements analysis

- Why is it necessary to schedule meetings ahead of time?
- Why does the meeting initiator need to ask participants for exclusion dates and preferred dates?
- Why is a computer-based meeting scheduler desired? And whose interests does it serve?
- Is confirmation via the computer-based scheduler sufficient? If not, why not?
- Are important participants treated differently? If so, why?

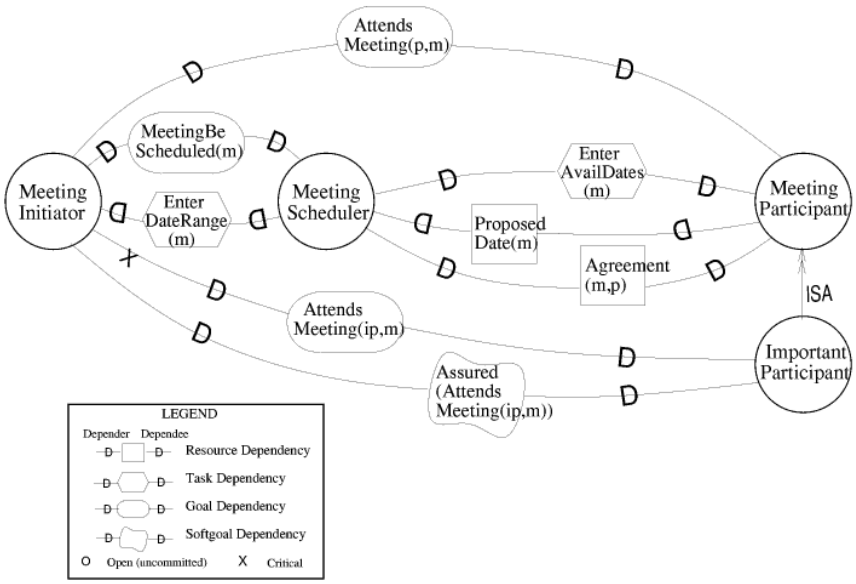
… Early-requirements analysis

- Having answers to these “why” questions are important not only to help develop successful systems in the first instance, but also to facilitate
  - the development of cooperation with other systems (e.g., project management systems and other team coordination “group-ware”for which meeting information may be relevant)
  - the ongoing evolution of these systems.

Strategic Dependency" Model

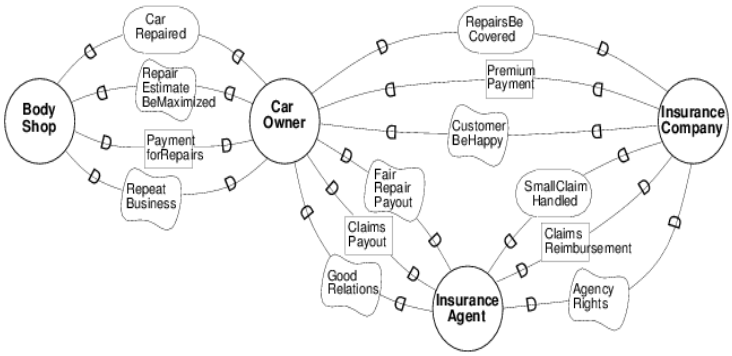


SD with computer-based scheduler



The Strategic Dependency Model

auto insurance – example 2
''Let the Insurance Agent handle it.''



examples taken from: Hammer & Champy 1993 – Reengineering the Corporation, pp. 137–143.

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The Strategic Dependency Model

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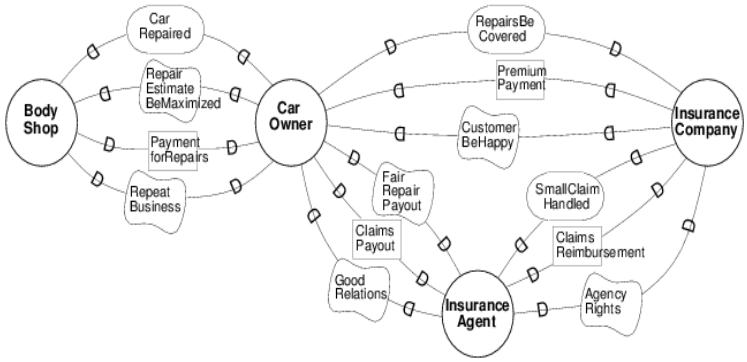

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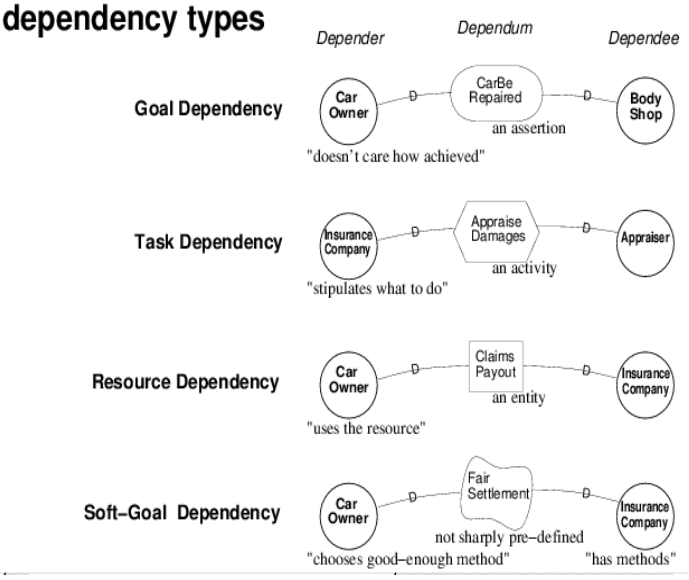
Exercise

- Let's try to model the 3 actors Customer, Bank and House-vendor when the customer want to buy a new house from the House-vendor and has to ask money to the Bank.

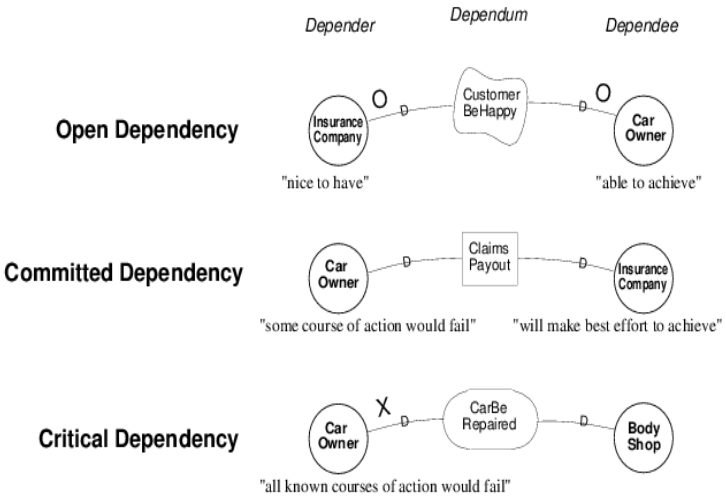
Strategic Dependency Model

dependency types



Strategic Dependency Model

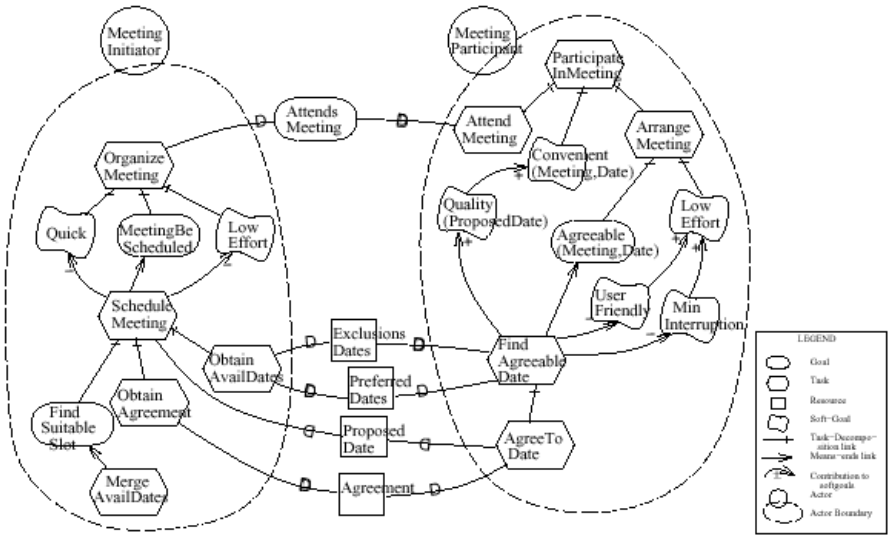
dependency strengths



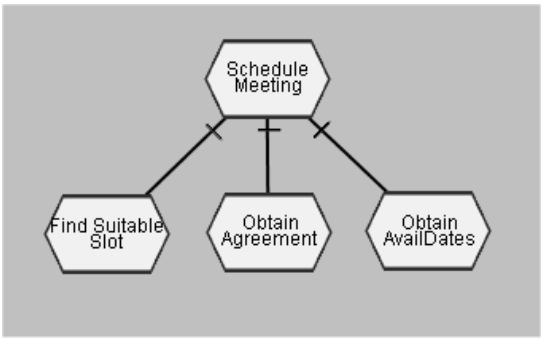
The Strategic Rationale (SR) model

- SD shows external relationships among actors, while hides the intentional constructs within each actor
- SR models internal intentional relationships inside each actor
- Intentional elements (goals, tasks, resources, and softgoals) appear in the SR model not only as external dependencies, but also as internal elements linked by **means-ends relationships** and **task-decompositions**

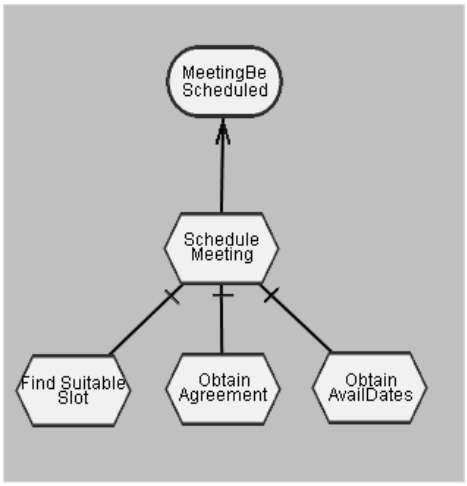
SR without the Meet. Sched.



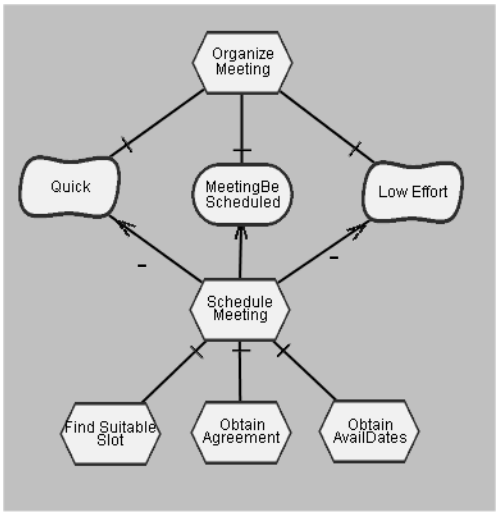
Task-decomposition



Means-end links



Contribution to GostGoals



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SR with the Meet. Sched.