Intention with regard to objectives, properties, or use of the system
Lecture Objectives

• Remind what stakeholders and their interests are
• Discuss principles of goal modelling
• Present different goal modelling approaches
  – *i*
  – KAOS
Lecture 4:

Stakeholders and Goals

• Stakeholders
  – Identifying the problem owners

• Goals
  – Identifying the success criteria
Stakeholders

• Stakeholder analysis:
  – Identify all the people who must be consulted during information acquisition

• Example stakeholders
  – Users
    • concerned with the features and functionality of the new system
  – Designers
    • want to build a perfect system, or reuse existing code
  – Systems analysts
    • want to “get the requirements right”
  – Training and user support staff
    • want to make sure the new system is usable and manageable
  – Business analysts
    • want to make sure “we are doing better than the competition”
  – Technical authors
    • will prepare user manuals and other documentation for the new system
  – The project manager
    • wants to complete the project on time, within budget, with all objectives met.
  – “The customer”
    • Wants to get best value for money invested!
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• Financial interest
• Development interest
• Usage interest
Finding stakeholders: The Org Chart

• Organization charts show
  – Areas of responsibility (flows upwards)
  – Lines of authority (delegated downwards)

• A useful tool for figuring out where the stakeholders are
  – …but remember that most activities involve connections that cross the org chart
Levels of authority

• **Top management**
  – establishes goals
  – does long-range planning
  – determines new market & product developments
  – decides on mergers & acquisitions.

• **Middle management**
  – sets objectives
  – allocates & controls resources
  – does planning
  – measures performance

• **Lower management**
  – supervises day-to-day operations
  – takes corrective action when necessary.

• **Operational level**
  – performs day-to-day operations
Lecture 4:

Stakeholders and Goals

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Goals

• **Approach**
  - Focus on *why* a system is required
  - Use goal refinement to arrive at specific requirements
  - Goal analysis
    • document, organize and classify goals
  - Goal hierarchies show *refinements* and *alternatives*

• **Advantages**
  - Reasonably intuitive
  - Explicit declaration of goals provides sound basis for conflict resolution

• **Disadvantages**
  - Captures a static picture - what if goals change over time?
  - Can regress forever up (or down) the goal hierarchy

• **Goals:**
  - Describe functions that must be carried out

• **Actors:**
  - Owners of goals

• **Tips:**
  - Multiple sources - better goals
  - Associate stakeholders with each goal
  - Use scenarios to explore how goals can be met
Goal Modeling

• **(Hard) Goals:**
  - Describe functions that must be carried out. E.g.
    • Satisfaction goals
    • Information goals

• **Softgoals:**
  - Cannot really be fully satisfied. E.g.
    • Accuracy
    • Performance
    • Security
    • ...

• **Also classified temporally:**
  - Achieve/CEase goals
    • Reach some desired state eventually
  - Maintain/Avoid goals
    • Keep some property invariant
  - Optimize
    • A criterion for selecting behaviours

• **Agents:**
  - Owners of goals
  - Choice of when to ascribe goals to agents:
    • Identify agents first, and then their goals
    • Identify goals first, and then allocate them to agents during operationalization

• **Modelling Tips:**
  - Multiple sources yield better goals
  - Associate stakeholders with each goal
    • reveals viewpoints and conflict
  - Use scenarios to explore how goals can be met
  - Explicit consideration of obstacles helps to elicit exceptions
Goal analysis

• Relationships between goals:
  – One goal helps achieve another (+)
  – One goal hurts achievement of another (-)
  – One goal makes another (++)
    • Achievement of goal A guarantees achievement of goal B
  – One goal breaks another (--) 
    • Achievement of goal A prevents achievement of goal B

• Goal Elaboration:
  – “Why” questions explore higher goals (context)
  – “How” questions explore lower goals (operations)
  – “How else” questions explore alternatives
Softgoals

• Some goals can never be fully satisfied
  – Treat these as softgoals
    • E.g. “system be easy to use”; “access be secure”
    • Also known as ‘non-functional requirements’; ‘quality requirements’
  – Will look for things that contribute to satisficing the softgoals
  – E.g. for a train system:
Softgoals as selection criteria

- minimize costs
- serve more passengers
- minimize operation costs
- maintain safe distance
- reduce staffing
- improve safety
- clearer signalling
- maintain passenger comfort
- automate collision avoidance
- add new tracks
- increase train speed
- automate braking
- more frequent trains
- hire more operators
- buy new rolling stock
i*
http://istar.rwth-aachen.de/

Tropos

Secure Tropos

...
• Strategic dependency model
  – used to express the network of intentional, strategic relationships among actors

• Strategic rationale model
  – used to express the rationales behind dependencies
Strategic dependency model (1)

- **Actor**
  - carries out actions to achieve goals

- **Role**
  - characterization of the behavior of a social actor within some context
  - a set of roles typically played by one agent

- **Agent**
  - actor with concrete, physical manifestations, such as a human individual
  - an agent occupies a position

- **Position**
  - used between a role and an agent
  - a position is said to cover a role
Strategic dependency model (2)

• **Dependee**
  – Actor who is depended upon on a dependency relationship.

• **Depender**
  – The depending actor on a dependency relationship.

• **Dependum**
  – Element around which a dependency relationship centers.
Strategic dependency model (3)

- **Goal dependency**
  - the depender depends on the dependee to bring about a certain state of affairs in the world

- **Task dependency**
  - the depender depends on the dependee to carry out an activity

- **Resource dependency**
  - the depender depends on the dependee for the availability of an entity

- **Softgoal dependency**
  - a depender depends on the dependee to perform some task that meets a softgoal
Strategic dependency model (4)
Strategic rationale model (1)

- **Actor boundaries**
  - all of the elements within a boundary for an actor are explicitly desired by that actor
  - to achieve these elements, an actor must depend on the intentions of other actors

- **Goal (hardgoal)**
  - intentional desire of an actor

- **Softgoal**
  - criteria for the goal's satisfaction are not clear-cut
  - judged to be sufficiently satisfied from the point of view of the actor

- **Task**
  - actor wants to accomplish some specific task, performed in a particular way

- **Resource**
  - actor desires the provision of some entity, physical or informational
Strategic rationale model (2)

• **Means-ends**
  - a relationship between an end, and a means for attaining it
  - "means" is expressed in the form of a task
  - "end" is expressed as a goal

• **Decomposition**
  - task can be decomposed into four types of elements: a subgoal, a subtask, a resource, and/or a softgoal
Strategic rationale model (3)

- **Contribution**
  - **Make**: strong enough to satisfice a softgoal
  - **Some+**: positive with unknown strength
  - **Help**: not sufficient by itself to satisfice the softgoal
  - **Unknown**: polarity is unknown
  - **Break**: sufficient enough to deny a softgoal
  - **Some-**: negative with unknown strength
  - **Hurt**: not sufficient by itself to deny the softgoal
  - **Or**: satisficed if any of the offspring are satisficed
  - **And**: satisficed if all of the offspring are satisficed
Strategic rationale model (4)
KAOS
KAOS

Constructs of Goal and Agent models

- **Goal**
  - Prescriptive assertion that captures an objective which the system-to-be should meet
    - **Achieve/Cease goals**
      - Reach some desired state eventually
    - **Maintain/Avoid goals**
      - Keep some property invariant

- **Softgoals**
  - Cannot really be fully satisfied
    - Accuracy, Performance, Security

- **G-refinement**
  - Relates a set of subgoals whose conjunctions possibly together with *domain properties* contribute to the satisfaction of the goal

- **Domain property**
  - Descriptive assertion about object in the environment which holds independently of the system-to-be
**Konkrete Agenten- und Zielmodelle**

- **Agent**
  - Aktiver Objekt, das eine spezifische Rolle im Erfüllen des Ziels spielt, indem es bestimmte Objektverhalten überwacht oder beeinflusst.

- **Assignment**
  - Eine mögliche Zuweisung eines Ziels an einen Agenten
  - **Verantwortung** – eine tatsächliche Zuweisung eines Ziels an einen Agenten.

- **Zielordnung**
  - Ein Agent, der eine Aufgabe tatsächlich übernimmt, wird als **Anforderung** bezeichnet.
  - Ein Umgebungs-Agent wird als **Erwartung** bezeichnet.
KAOS

Goal and Agent (responsibility) model

- Date found using scheduler
  - Available dates obtained
    - Agreeable slot found
      - Agreement obtained and stored
        - Agreement stored
          - Scheduler
            - Agreement obtained
              - Date agreed
                - Participant
                  - Agreement confirmed
                    - Participant
                      - Proposed date sent
                        - Scheduler
                          - Participant
                            - Available dates obtained
                              - Available dates stored
                                - Participant
                                  - Available dates entered
                                    - Scheduler
                                        - Participants are inquired
                                          - Participant
                                            - Date range entered
                                              - Initiator
Explore Context

• “Why” questions explore higher goals
  – Rationale for the initial goals
  – Companion subgoals that were overlooked in the first place
Explore Context

• “Why” questions explore higher goals
  – Rationale for the initial goals
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Why?

Crucial planning decision be made

Decision be made face-to-face

Meeting be scheduled
Look for Alternatives

• “How else” questions explore alternatives
  – Better solutions to the higher level goals
  – Different design of the system-to-be
Elicit Operations

• “How” questions explore lower goals
  – Refine goals until reaching subgoals that can be assigned to individual agents
Elicit Operations

- Decision be made by email discussion
  - Crucial planning decision be made
    - Decision be made face-to-face
      - Agenda be defined
        - Meeting be scheduled
          - Meeting be held
            - Minutes be circulated
              - Meeting be requested
                - Date and location set
                  - Attendees know details
                    - Changes be handled
                      - Attendee list obtained
                        - AV & other needs defined
                          - Participant availability known
                            - Facilities booked
                              - Attendance confirmed
                                - Participants notified
                                  - Change requests accepted
                                    - Room availability determined
                                      - Meeting announced
When the refinement should stop?
Responsibility assignment

- Refine goals into subgoals
  - Latter require the cooperation of fewer agents
- Stop refining a goal
  - Goal is assigned as the responsibility of a single agent
- Alternative goal responsibility assignments
  - Different design of system-to-be
KAOS

Constructs of Operation model

• **Operation**
  – An *input/output* relation over *objects*
  – Define state transition

• **Operationalisation**
  – Relationship between goal and operation

• **Performs**
  – Agent performs operations
KAOS
Operation model

Check time of last agenda entry

Maintain [Participant agenda up to date]

Scheduler

Update agenda with new information

Agenda
meetingDates: Date
Lecture Objectives

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Take Home!

• Stakeholders
  – Identifying the problem owners

• Goals
  – Identifying the success criteria

• Social Modelling
  – Early requirements
  – Late requirements
  – Architecture design
  – Detailed design