V. Goal Diagrams

Goals and AND/OR Trees
Softgoals
Building Goal Diagrams
How and Why Questions

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Goals

Goals represent business objectives for the new system and its operating environment.

For example,
✓ “Fulfill every book request” (Library organization)
✓ “Produce 1M MacG5s within a year” (Apple), or,
✓ “Serve more passengers” (TTC)
Alternatives for Satisfying Goals

- An AND-goal is satisfied if all of its subgoals are; an OR-goal is satisfied if at least one its subgoals is.
- An alternative (solution) to a root goal G consists of a set of leaf goals which together satisfy G.
- There are 24 alternatives for the goal of the previous slide.
Softgoals

- These are goals that are used as criteria for comparing alternative solutions for other goals.
  
  *E.g.*, Higher profits [ProductionUnit3], Better service, Satisfied customer, User-friendly [Interface2], Portable [Module4]
Goal Relationships

- We will use more than AND- and OR-relationships:
  - + -- one goal contributes positively towards the fulfillment of another goal;
  - - -- one goal contributes negatively towards the fulfillment of another goal;
  - ++ (--) -- one goal subsumes/negates another, i.e., if the first goal is fulfilled, the second is fulfilled/denied;
- With these enhancements, we can build goal models which could be useful for strategic business analysis or requirements analysis.

Alternatives for Satisfying Goals

- An alternative (solution) to the fulfillment of a goal G consists of one or more leaf goals which together fulfill the root goal.
- A goal model defines a space of alternatives for the fulfillment of its root goal.
- An alternative $A_1$ is better than $A_2$ in fulfilling goal $G$ with respect to softgoals $G_1$, $G_2$,... if $A_1$’s net contributions to $G_1$, $G_2$,... (e.g., positive minus negative contributions) is greater than that of $A_2$.
- In general, goals and softgoals can be contradictory. Given a set of root goals and softgoals, there may not be an optimal solution [Simon68]. Hence the search for good-enough solutions.
Building Goal Diagrams

- Start from one or more goals and/or softgoals $G_1, G_2, ..., G_n$ which need to be fulfilled together.
- Analyze each, looking for ways to fulfill it through AND- or OR-decompositions, or through other refinements which contribute positively (How questions).
- Continue this process until there is enough positive support to fulfill all root nodes. At this point you have $n$ disconnected goal trees $T(G_1), T(G_2), ..., T(G_n)$.
- Identify positive and negative inter-tree influences, i.e., positive or negative relationships between goals $g, g'$ which belong to different goal trees.
- Repeat the analysis to see if root goals are fulfilled; if so, done, else continue the analysis.
**Softgoals as Criteria**

- **Minimal effort**
- **Quality of schedule**
- **Degree of participation**
  - Schedule meeting
  - Choose schedule
- **Collection effort**
- **Matching effort**
- **Choose schedule**
- **By all means**
- **By person**
- **By email**
  - Collect timetables
  - Have updated timetables
- **Collect them**
- **Automatically**
- **Manually**

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**Library Goals**

- **Satisfy every book request**
- **Limited loan period**
  - As many copies as needed
- **Enough copies**
- **Regular availability**
  - Availability notified
Public Transit Goals

Serve more passengers
Trains more closely spaced
Minimize costs
Min develop costs
Min operating costs

More tracks
Min time between stations

Why Questions

Min operating costs
Passenger comfort

Why do we need smooth movement?
Min operating costs
Min equipment stress
Min power usage
Smooth movement
Passenger comfort