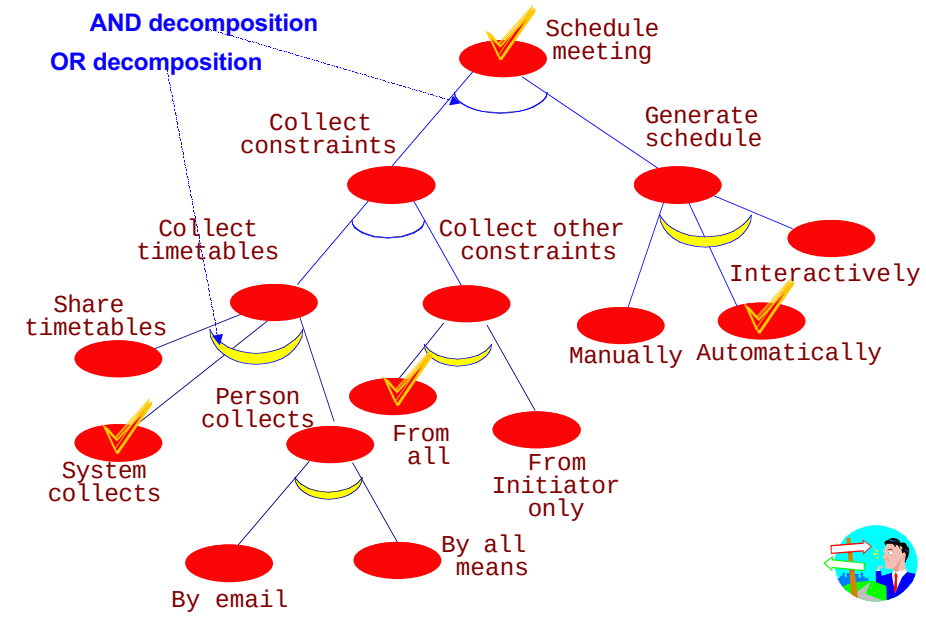
V. Goal Diagrams

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

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)



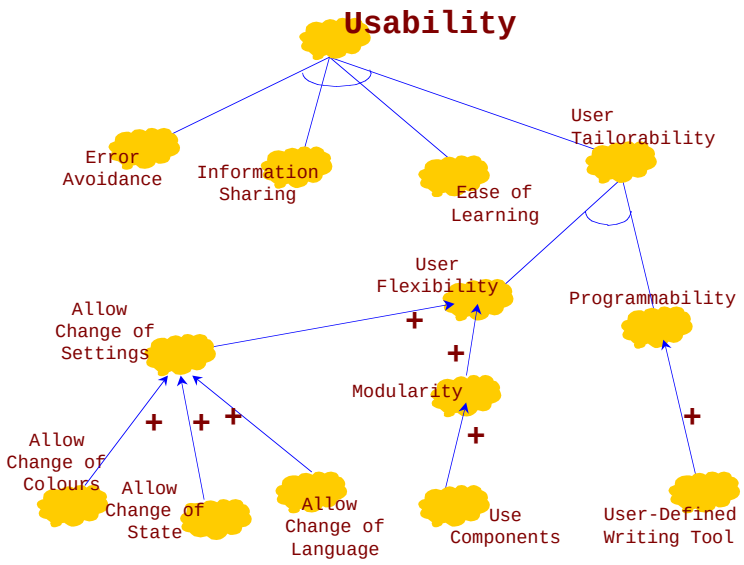
Alternatives for Satisfying Goals

- *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

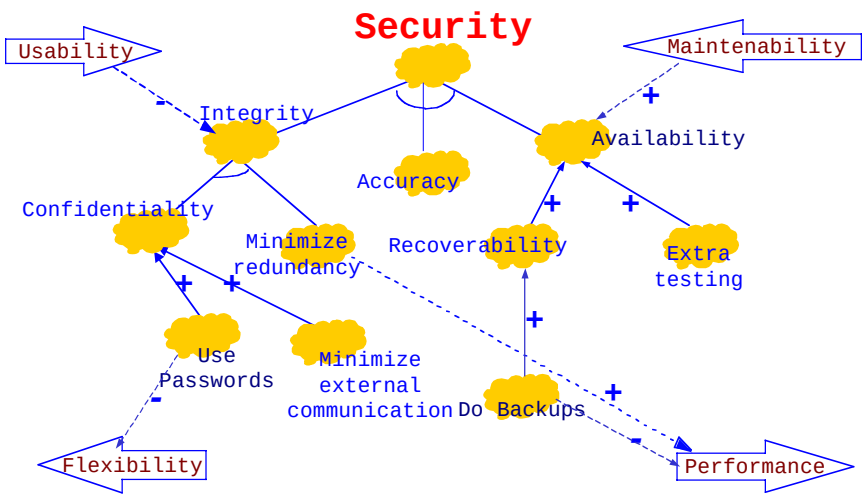
- We will use more than AND- and OR-relationships:
  - ✓ + -- one goal contributes positively towards the fulfillment of another goal;
  - ✓ - -- one goal contributes negatively towards the fulfillment of another goal;
  - ✓ ++ (--) -- one goal subsumes/negates another, I.e., if the first goal is fulfilled, 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

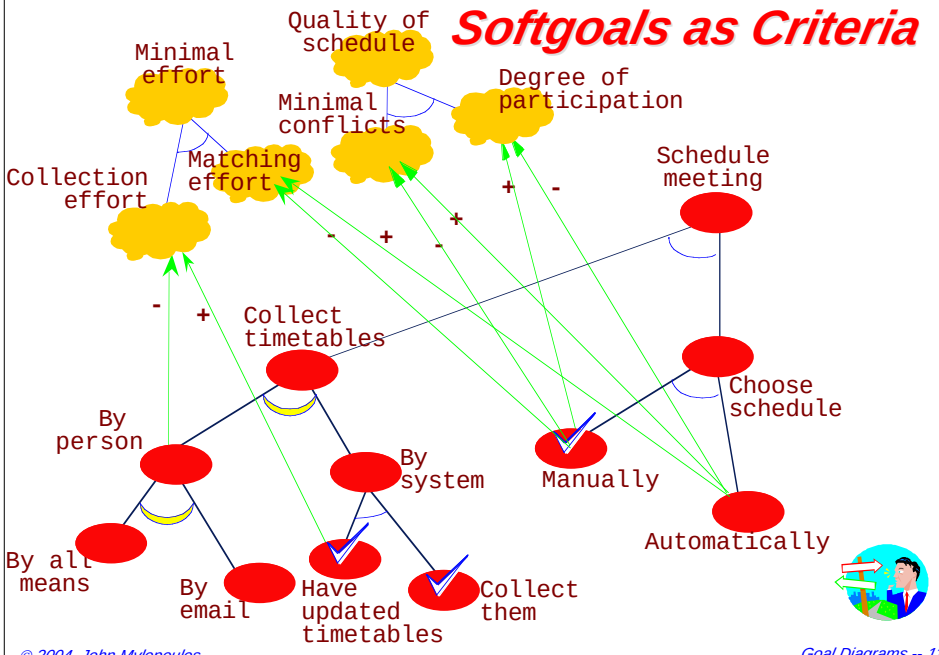
- An ***alternative*** (solution) to the fulfillment of a goal G consists of one or more leaf goals which together fulfill the root goal.
- A ***goal model*** defines a space of alternatives for the fulfillment of its root goal.
- An alternative ***A_1 is better than A_2 in fulfilling goal G*** with 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

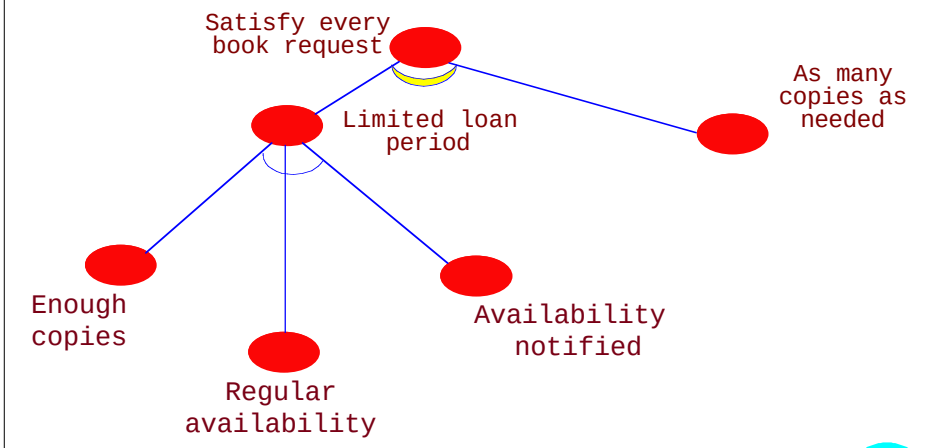
- *Start from one or more goals and/or softgoals* $G_1, G_2, \ldots, G_n$ *which need to be fulfilled together.*
- *Analyze each, looking for ways to fulfill it through AND- or OR-decompositions, or through other refinements which contribute positively (**How** questions).*
- *Continue this process until there is enough positive support to fulfill all root nodes. At this point you have n disconnected goal trees* $T(G_1), T(G_2), \ldots, T(G_n)$.
- *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.*



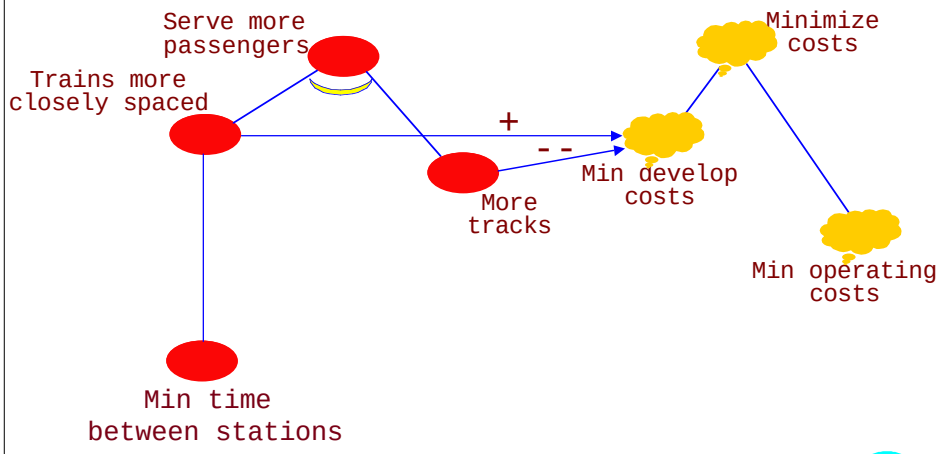
Softgoals as Criteria



Library Goals



Public Transit Goals



Why Questions

Min operating costs

Passenger comfort

Why do we need smooth movement?

Smooth movement