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Customizable Software

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Motivation

- Current *state-of-the-practice* in the software industry is:
  - Bloated software. Lots of features for all potential users – *confusion*.
  - One-size-fits-all. Users usually adapt to software, while we expect the opposite.
- This applies to many different categories of software:
  - Personal Software
    Productivity applications, email clients, etc.
  - Enterprise Software
    Financials, HR, Customer Relationship Management, Supply Chain Management, etc.
- This software *cannot be finely customized*, which may render the software *useless* for certain categories of users.

Most Affected Users

- People with cognitive, sensory, and motor impairments
- Elderly people
- Children
- Novices

For these people fine-grained customization that suits their abilities is *critical*.

Our Approach

Goals (what the users want)

✓Gather user requirements. Represent these requirements as goals. Create a goal model that represents all the alternatives for achieving these goals. Each alternative assigns certain tasks to the user.

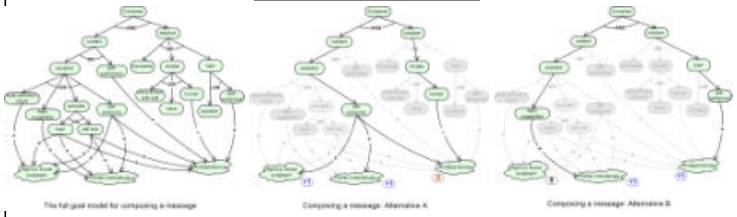
Preferences (how the users want their goals achieved)

✓Represent preferences as softgoals (goals that require solutions that are *"good enough"*). Determine the positive/negative effect of each alternative on these softgoals and use it to prioritize among the alternatives.

Skills (how their abilities constrain the way their goals can be achieved)

✓Identify skills that are required to carry out tasks that are needed to fulfill user goals. Disallow alternatives that assign tasks to users who don't have the necessary skills. E.g. The task *Dictating* requires *Voice Production* & *Spoken Language* skills.

Example



Generating Customized Software

- Associate generic software architecture to the goal model.
- Map the *selected alternative* to the corresponding *customized software architecture*.
- Deliver the customized system.

Case Study

Communication system for people with cognitive impairments
(conducted together with the University of Oregon)

- Goal models with more than 350 goals and 400 tasks.
- Number of alternatives reached 10^{10}!
- We are working on creating a generic architecture for the case study.

Future Work

- Extend the approach beyond personal software
- Runtime Customization
  - Monitor for changes in user skills and preferences and adapt the software accordingly by selecting the *new best alternative*.
  - This can be done by:
    - Humans – Adaptability.
    - The system itself – Adaptivity.