

Conclusions

- Effective adjustable autonomy minimizes the necessity for human interactions but maximizes the capability for humans to interact at whatever level is most appropriate for any situation at any time.
- Adjustable autonomy must be designed in from the beginning -- assume pesky humans will always want to be meddling with the autonomous system!
- Often full autonomy is not possible (for technical, political or economic reasons) and adjustable autonomy is the only solution.
- By asking the right questions at design time (see the following checklist) adjustable autonomy can be safe and practical.

HCA Checklist

- What tasks can be done only by humans? Only by automation? By both?
 - are there certain times or situations when a task should only be done by a human or automation?
- Who can set the level of autonomy for a task?
 - can the level of autonomy change at any time or only under certain circumstances?
 - is the level of autonomy fixed at run-time or is it flexible?
- What are the timing issues with respect to a change in autonomy?

HCA Checklist cont.

- Arranging the hierarchy
 - can autonomy setting at one node apply to all descendants?
- What are possible autonomy level transitions? What transitions are not permitted?
- Is information necessary to control the system available to the user or to other agents?
 - current state, tasks, goals
- Are there multiple ways to accomplish the same task? Are they selectable by the user? By the planner?

HCA Checklist cont.

- What parts of the system are commandable from outside?
 - by humans?
 - by other systems?
 - how are they commanded?
- How is success and failure of other agents recognized?
 - feedback?
 - observation?
 - timeout?

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