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?
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?
Citations

Citations cont.

Citations cont.

Citations cont.

- Muscettola, et al 1998 “Remote Agent: To boldly go where no AI system has gone before,” Artificial Intelligence, 103(1), 5-47.


