

THE STRATEGIC COMPUTING INITIATIVE

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References are to the SCI Strategic plan.

OVERVIEW

The tone and language lead me to confirm rather than reject my interpretation that the SCI objectives are unachievable within 50 years.

EVIDENCE

p. 6 (Expert systems): "Codifying and mechanizing practical knowledge, common sense, and expert knowledge."

p. 8 (ALV): "The resulting vision, scene interpretation, and motor control processes will be, at the very least, analogous to those found in lower animals."

p. 12 (BM): "..certain battle management systems will require immense planning and reasoning processors, vast knowledge and database management systems, perhaps no vision systems, but highly complex distributed, survivable communications systems."

p. 21 (ALV): "...imagine a reconnaissance vehicle that could navigate up to 50km cross-country from one designated position to another. It would be capable of planning an initial route from digital terrain data, updating its plan based on information derived from its sensors, resolving ambiguity between sensed and pre-stored terrain data... identify target objects, and report its findings and interpretations... in real-time or near-real-time while the vehicle is moving at speeds up to 60 km/hr."

p. 24 (PA): "The associate is personal to a specific pilot in that it is trained by that pilot to respond in certain ways and perform particular functions.... It also has a wealth of general knowledge about the aircraft, the environment, and friendly and hostile forces. It will have instruction on advanced tactics from more experienced pilots..."

p. 27 (BM): "It would display a detailed picture of the battle area, including enemy order of battle (surface, air, sub-surface), own force disposition, electronic warfare environment, strike plan, weather forecast, and other factors developed from an analysis of all available data. It would generate hypotheses describing possible enemy intent, prioritize these according to their induced likelihood, and explain the reasons for the prioritization. Drawing upon previous experience, together with knowledge of

own force and enemy capabilities, it would generate potential courses of action, use an ultra-rapid rule-based simulation to project and explain a likely outcome for each course of action, and evaluate and explain the relative attractiveness of each outcome...."

p. 30 (computing technology): "...it will be possible to codify laboratory knowledge in order to produce generic software systems that will be substantially independent of particular applications."

p. 34 (Functional objectives for vision subsystems): FY 90: Recognize and match landmarks and obstacles in complex terrain using rich object descriptions. FY 92: Perform reconnaissance in a dynamically changing environment.

p. 36 (Functional objectives for speech subsystems): FY 89: Recognition of connected speech, independent of speakers from a 200-word vocabulary with strict grammatical constraints under severe noise and high stress conditions. FY 92: Recognition of sentences, independent of speakers, from a 10,000-word vocabulary with natural grammar under moderate noise and low stress conditions.

p. 38 (Functional objectives for natural language subsystems): FY 90: Interactive planning assistant which carries on task-oriented conversation with the user. FY 93: Interactive, multi-user acquisition, analysis, and explanation system which provides planning support and substantive understanding of streams of textual information.

DIAGNOSIS

A severe misunderstanding about the nature of formalization and its relation to material reality.

An attempt to compress exponential development times into a linear framework.

An over commitment to a single limited and immature technology as a panacea.

A severe misassessment of the current state of technology and the state of its application in the field.

A naive scale-up assumption.

A naive understanding of software systems.

A naive model of innovation and technological diffusion.

CONCLUSION

My comments address the technical feasibility of these objectives. It's my job to be knowledgeable about the technological state-of-the-art and potential for breakthrough. My work presses on current advanced techniques and improves them substantially.

So, its my professional responsibility to advise you that:

THERE IS NO INDICATION THAT THESE GOALS ARE ACHIEVABLE WITHIN OUR LIFETIMES.

I have no objection to these goals for political or visionary purposes. Technologically, they are disconnected from the reality of our skills, knowledge, and tools. Worse, they indicate a severe disregard for the mathematical constraints of the problems.

I'd be happy to conduct an in-house forum on the achievability of these goals. If ADS has technical professionals who believe my guesses are wrong, I'd love to negotiate an informed compromise perspective.