

DARPA IPTO Grand Challenge Proposal

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e-Response: Pervasive assistance and emergency response on all levels: personal, family, organizational, local, regional, national and international.

Brief explanation:

Imagine a situation in 2030, an environment where pervasive computing, status reporting, sensor capabilities and autonomous or semi-autonomous diagnosis, protection and repair systems will be built into clothing, devices, vehicles, transportation systems, buildings and the environment. These would form the basis for a distributed and highly adaptable resilient safety net for every individual and organization from personal, through family, business, regional, national and international levels. In risk or natural disaster prone areas, building codes and insurance requirements would ensure that appropriate systems, robots or sensor/actuator systems were included in all future personal help devices, vehicles and buildings to assist their uses. Systems would adapt and respond to the need for emergency response whether communication was possible or not. Local help would be used where feasible, but appropriate calls on shared services would be facilitated wherever possible when required. Services would be provided to individuals or communities through this network to add value for all sorts of assistance beyond the emergency response aspects. In emergency situations, the local built infrastructure would be augmented by the facilities of the responder teams at any level from local police and fire response, right up to international response. An emergency zone's own infrastructure could be augmented on need by laying down temporary low cost sensor grids, and placing specialized robots and responders into the disaster area. Technology challenges and the excitement of the individual milestone demonstrations as the technology improved would ensure public support for the work and provide realistic and socially valuable platforms for new generations of researchers. Response using a mixture of military and non-military interventions would be encourage leading to new doctrine and operating methods. The opportunities, benefits and new markets for products and services that would be created would be vast.

DARPA IPTO research technology checklist

Which of the following technologies are addressed by the Grand Challenge proposal?

learning

knowledge representation

reasoning

perception

multi-modal interaction/human-computer interaction

natural language processing

other (please list): sensor grids, robotics, new ways of operating as a society, planning, collaboration, mixed-modal communication, etc.

Other remarks:

Technology progress would be able to be shown in an incremental way through simulated emergency response competitions – such as the initial RoboCup Rescue simulated Kobe Earthquake response competition... where metrics are very clear in terms of lives and property saved over the real life situation. But graded and showcase challenge scenarios and demonstrations would be possible that would excite the public and researchers alike. New and popular ways for military and non-military interventions and assistance to work effectively together could be explored.

This document is available at <http://i-rescue.org/gc/>

Updated: 15-Dec-2004

Criteria checklist

How does the proposal rate against IPTO criteria? Use '+,' '-,' or '?'

1. Clear & compelling demonstration of cognition	
+	a. The test should be a proxy for problems requiring cognitive capabilities.
+	b. The test should not be “game-able” or solvable by “cheap tricks”
+	c. It should not be solvable by brute force computation, alone, and it should not lend itself to idiot savant solutions
+	d. The test should require integration of multiple cognitive capabilities. It is desirable that the portfolio of tests includes sensing and acting (i.e., situated cognition).
2. Clear & simple measurement	
+	a. The test should have a clear & simple measure for measuring success.
+	b. The test should specify what must be done, not how to do it.
+	c. It is desirable to have a graduated sequence of increasingly more difficult problems.
+	d. It is desirable to have tests that are automatically score-able.
+	e. It is desirable that the tests be easy to create and run and that test results be reproducible.
3. Decomposable & diagnostic	
+	a. The test should be decomposable into sub-tests or sub-measurements for different aspects of cognition.
+	b. The test should be diagnostic (failure to pass the test should point the way to future improvements).
+	c. It would be desirable to have partial, intermediate results (scores are not just “Pass/Fail”).
4. Ambitious & visionary, not unrealistic	
+	a. It should not be a toy problem
+	b. It should represent technical/scientific goals achievable within a 10-20 year window.
+	c. It should not be something that a computer can already do.
+	d. It is desirable to have military relevance (eventual).
5. Compelling to public	
+	a. It should be simple to explain and convey to the general public.
6. Motivating for researchers	
+	a. It should generate enthusiasm in the research community.
+	b. It is desirable to have a low cost of entry so that work on the problem can begin right away.
+	c. It is desirable to enable continuous testing, perhaps over the web.