



## Appendix D

### Research to Operations: Moving Ideas from Concept to Deployment

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The exponential growth of connectedness and computation has transformed how stakeholders in disaster response translate research into operations.

It is no longer sufficient that we apply traditional methods. We can no longer just design sample surveys to identify problems and initiate a slow sequence of hypothesis testing, field-based pilots, and graduated roll-outs leading, slowly, to deeply-funded and inflexible Programs of Record. While some domains may still yield success through the use of such methodologies, it's rarely optimal anymore. The tempo at which both problems and solutions are advancing is far too fast for investigations measured in years to yield the best answers. By the time the first pilot project nears evaluation phase, the solution set to the original problem may well have altered to irrelevance through technological advance, overtaken by a calculus predicted by Gordon Moore and Ray Kurzweil.

That said this rate of change can be harnessed for good. When ideas are harvested from those closest to the problem, with support from a range of resources that cut across formal boundaries and sectors, the process can show sterling—sometimes astonishing—results. Ideas from fields that would never be explored in traditional acquisition can be applied creatively, taking a solution from one branch of science into another, following non-linear pathways of leaps and tunnels.

We can now ask users for ideas the same way we've historically asked them for descriptions of the problem. We can combine users with domain experts, artists, social scientists, policy makers, and technologists simultaneously, informing each of the other's

strengths and limitations and setting them to work together. Using new tools they can pursue parallel iterations and consider multiple ideas, capitalizing on complexity, creativity, and the synergy that emerges when humans strive toward a common good.

We can also sometimes find the unsuspected genius in the metaphorical haystack, the one rare human that can cut through the fog to find a uniquely valuable solution unapproachable through conventional methods. As we explore these new techniques we're learning how true the saying, "given enough eyeballs, all problems are shallow."

There seem to be only a few havens where such research—leading from crowdsourced ideas to operational deployment—is taking place. These are places where top-down implementation has not gone well or is hopelessly inefficient, and an alternative solution to a persistent and urgent problem is required. This panel session will highlight three examples:

1. **STAR-TIDES:** STAR-TIDES is a project at National Defense University exploring novel methods for providing seven core infrastructures (clean water, renewable energy, efficient lighting, resilient shelter and so on) to vulnerable populations. Instead of following a traditional acquisition model, STAR-TIDES harvests methods and tools from a collaborative social network and evaluates these approaches independently in environments that model real-world conditions. As of August 2012 several ideas have appeared in STAR-TIDES events that have subsequently been deployed to areas of exceptional need. One example is a new portable water purification system based on photoactivated nanofibrils successfully deployed in March 2012 for a cholera outbreak in Accra, Ghana.

2. **Sea Sketch:** Another example is Sea Sketch, a crowdsourcing tool for defining marine preservation areas off the California coast. Online public modeling resulted in ocean areas selected for preservation by the people of California far in excess of the original hope.

Of note, the first legislated preservation model, based on good science but implemented top-down without public input, had resulted in stakeholder pushback severe enough to have that first law annulled. When a public website was established that showed (1) the science, (2) the many overlapping stakeholder concerns, and (3) a writable map, 16,000 potential plans were drawn using what later became SeaSketch and were submitted by citizens. After a public vote for best option the eventual legislation was accepted by stakeholders without protest, despite a preservation area four times larger than anticipated.

3. **RELIEF:** RELIEF is an international humanitarian response field exploration held periodically in the desert scrublands of Southern California and hosted by the Naval Postgraduate School in Monterey. The most recent RELIEF event brought more than 200 participants from a wide range of organizations into the field, including government agencies, industry, academia, NGOs, and a few refugees from garage workbenches, addressing a set of problems that required multiple stakeholders collaborating across multiple sectors toward composite solutions.

Past RELIEF efforts have built several examples of grassroots-to-government bridging, including a process allowing lead federal agencies to release satellite imagery to the disaster response “crowd”. Most recently, RELIEF participants applied crowdsourcing techniques within FEMA and the Civil Air Patrol to improve imagery collection and analysis during disaster response operations.

This workshop looks at several pieces of that. It explores “Grassroots to Governance” with particular attention to the effective use of crowdsourced information in disaster response. The need is great. Humans are facing complex problems that are not yielding to traditional solution methods, and the rate of change is very quick. To ensure that our nation and our species can survive a world that is headed for crises beyond the scale of today’s understanding, we need to harness our collective intelligence to the necessary research.

And we’ll find unexpected pearls. Mark Twain, in his story “Letters from the Earth,” had a Junior Devil writing to God about the beauty of Shakespeare’s poetry. God replied “Yes, Shakespeare is good, but truly, the finest poet I ever made was a mechanic in Philadelphia”. Such invisibility, such waste of human capital, is no longer necessary, nor is it expected by the majority of the public. More than two billion people in the developed world routinely present themselves in a public forum, 800 million of them on Facebook alone. They expect to communicate with each other frequently through several channels, and they certainly expect that professionals and policy makers will be at least as competent at connectedness and community support. Fortunately, exceeding their expectations is neither difficult nor expensive.

And there is another consideration. It now seems mathematically probable that computer processing power will equal the neuronal firings of the human brain within our lifetime. The result of that enormous computational power is difficult to predict. It seems clear, though, that we will have “big data” and “big iron” available to us for exploring solutions to both severe resource shortfalls and technological abundance within the near future. One of the great questions is how to apply this computational power in ways that incorporate those who understand the problem best. We need to augment the human intellect in ways that enable us to tackle problems that even now are risking political stability and might eventually threaten our species.

Seen in this light, participation in the research, development, testing, and deployment of solutions for humanitarian support could be considered a right of the communities we’re hoping to serve. If that’s so, learning how to move ideas from concept to implementation within those communities we serve is a skill worth honing.