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Genoa II

Genoa II is part of IAO's Total Information Awareness program. Genoa II is the area with the light blue background.

We are planning to support a collaboration between two collaborations. One of those two collaborations is composed of intelligence analysts, themselves collaborating across organizational boundaries. Their goal might be described as "sensemaking" developing a deep understanding of the terrorist threat through the construction of structured arguments, models, and simulations.

These become the basis for a collaboration with the second collaboration: this one among policymakers and operators. Our focus is supporting policymakers and operators at the most senior levels of government, incidentally. Together, the two groups use the understanding captured in the first group's arguments, models, and simulations to hypothesize about the future, creating a set of scenarios that effectively cover and bound the space of the plausible possible. With these at hand, the second group then turns to the task of generating and evaluating options to respond to these scenarios. Genoa II is all about creating the technology to make these collaborations possible, efficient, and effective.

The unfortunate fact is that these collaborations today...if you can even call them that...are done much as they were done twenty years ago. Means of communication are telephone and fax. Maybe a Video Telecopy (VTC) now and then...but VTC is more about alleviating the impact of traffic gridlock in the Washington, DC, metropolitan region than improving the quality of the collaboration. Absent are any tools to help people think together, or any tools to support the collaboration itself as an enterprise.

I call this the bathtub, with most of the efforts placed on data gathering and presentation, and analysis is de-emphasized. The government has indeed been slow on this score. And we have paid for this with a history punctuated with failures of intelligence and policymaking...last September being the most extreme to date (and we all hope for all time).

To be fair, this stuff is hard, in part because of some of these challenges:

- Need faster systems of humans and machines—invert the "bathtub"
- Break down the information stovepipes.
- Overcome wetware limitations
- Deal with data biases, especially deliberate deception
- Rapidly and deeply understand complex and uncertain situations

Of course we need to be faster so that we can react more quickly: providing warning sooner to aid preemption, increasing the range of options and the probability of success. But we also have to be faster so that our national security team can deal with more issues simultaneously. "The U.S. government can only manage at the highest level a certain number of issues at one time—two or three," said Michael Sheehan, the State Department's former coordinator for counterterrorism. "You can't get to the principals on any other issue. That's in any administration." Before September 11, terrorism did not make that cut. As reported in the Washington Post.

That we continue to pay the price for stovepiped information systems seems to be beyond doubt at this point. We must find ways to bring all relevant information together while still enforcing appropriate use, releasability, and privacy policies.

The "wetware" whose limitations I mentioned is the human cognitive system. Its limitations and biases are well documented, and they pervade the entire system, from perception through cognition, learning, memory, and decision. Moreover, these systems are the product of evolution, optimized by evolution for a world which no longer exists; it is not surprising then that, however capable our cognitive apparatus is, it too often fails when challenged by tasks completely alien to its biological roots.

Intelligence analysts are taught that every source, including human assets, technical collectors, and open sources, impresses biases upon the information provided. Knowing this and adequately compensating for this bias are different matters, however. And, increasingly, our opponents are manipulating our information sources to provide a false reality. There is nothing new about this, of course; it has long been called "deception and denial" in intelligence circles. What is new, however, are the powerful capabilities of technology to manipulate almost any information channel and produce intricately orchestrated deception campaigns.

And, of course, reality itself provides a huge challenge: complexity and uncertainty. These characterize almost every issue that today's intelligence analysts and policymakers engage with. Yet they must rapidly and deeply understand these issues and often must do so in an environment marked by urgency and turbulence.

By the way, it's not individual lone rangers that must do the work, but teams of specialists drawn from a plethora of organizations—law enforcement and intelligence, federal, state, and local—who must collaborate in an enterprise that crosses existing organizational and hierarchical boundaries. Doing so while maintaining necessary control and accountability is a huge challenge.

Finally, it is not enough to deeply understand and construct effective preemptive options...this all must be explained in a persuasive way to other stakeholders and overseers—a reality that is too often overlooked.

Genoa II's predecessor program, Genoa, was about getting "smarter" results by harnessing the diversity of lone rangers, bringing them together as a team and supporting them with technology to discover relevant information, reason systematically about it, and capture and reuse knowledge created by this and other teams. We believe that Genoa I did produce better, deeper understandings of complex situations, but it did so at a price: speed. Lone rangers are, after all, much more nimble that most teams.

With Genoa II, we want to improve on both dimensions, and do so with teams that function at the edges of existing organizations while having access to the information and other resources of the participating organizations. I will talk about the three themes of the Genoa II program. These themes are: becoming faster through automation; becoming smarter through what we are calling cognitive amplification; and working more jointly through center-edge collaborative technology.

The first theme—becoming faster through automation—involves applying automation to the front and back ends of the analytic process so more time is available for the actual analysis, which is, of course, the whole point. The "front end" of the system refers to the beginning of the analytic process where the tasks involve finding relevant data and then preparing it to support the analytic task. "Back end" refers to the presentation of the results of analysis, capturing strategic knowledge for reuse, and maintaining the knowledge repository. In addition, by creating a better environment to work in, we can achieve speed gains end-to-end.

So here are three bumper sticker phrases that capture Genoa II's automation goals: read everything without reading everything; maintain a consistent and accessible world view; and begin the trip to computers as servants to partners to mentors. The first is perhaps a bit idiosyncratic if not downright contradictory. What's the opposite of a tautology? But I think you know what I mean. Today's analysts and policymakers acquire information chiefly by reading documents or electronic facsimiles of them. Even today, analysts spend much of their time pressing a button that issues the command "NEXT DOC," to request the next document. We've got to get past the NEXT DOC world. There is too much that must be read to actually read.

I summarize the focus of the back end activities as being about creating a world view—the results of the knowledge work of teams of analysts—that is internally consistent and maintained consistent even as the

understanding of various aspects of it evolve independently. And that is accessible to team members and policymaker collaborators in an efficient but persuasive way.

The final goal is to create a computing environment aware of its users' contexts and goals in a deep and even thoughtful way, and can tailor that environment intelligently and proactively and offer relevant resources: information, tools, techniques, and other people for instance.

The second theme again is becoming smarter through cognitive amplification. Consider this citation, from Daniel Dennett's book, "Kinds of Minds:" quoting Bo Dahlbom and Lars-Erik Janlert: "Just as you cannot do very much carpentry with your bare hands, there is not much thinking you can do with your bare brain." I stumbled across this quote while reading Dennett's book and was struck by how relevant it is to this second Genoa theme—and how odd it was in the book context—but that's another story.

Tools for amplifying our intellect are nothing new, nor necessarily employ high tech. Consider, for instance, paper and pencil. Even this simple Cognitive Amplification System (CAS) exhibits what I consider to be the two essential elements of tools for thinking: they permit people to structure their thinking in some way, and to externalize it. Not only does this improve the quality of the intellectual work, but it makes it possible for people to think together, which, as I've said, is an important theme for Genoa II, both because people have to think together as they participate in teams, and because you get better thinking when people think together because you've harnessed diversity in knowledge, expertise, experience, outlook, and so forth. And, again, we need cognitive amplifiers to help us deal with complexity and uncertainty, and to overcome the limitations and biases of our biological cogno-ware.

So we plan to build cognitive amplification tools for the four purposes listed on the slide: modeling current state, estimating plausible futures, performing formal risk analysis, and developing options. These tasks occur more or less in sequence as the teams engage a new problem.

While Genoa I focused on tools for people to use as they collaborate with other people, in Genoa II, we also are interested in collaboration between people and machines. We imagine software agents working along with humans in creating models using our tools...and having different sorts of software agents also collaborating among themselves. Thus we imagine the three modes of collaboration shown on the slide: people with people, machines with machines, and people with machines.

Finally, the third theme—a collaborative environment that supports work at the edges of existing organizations, and supports the sort of bottom-up, self-organizing, and self-directing team work that we imagine will be essential to combating networked threats.

Sure, we have teamwork today, but the necessary process and policy support is provided by existing hierarchical organizations. The rub comes when people come together from very different organizations with very different policies and processes. Such teams will need to create and negotiate these things themselves, quickly and effectively, and on the fly. So we intend to provide support for the full life cycle of "edge" teams...applications and data bases to support the work itself—resource discovery, role negotiation, policy development and enforcement, planning, executing monitoring, strategic knowledge capture, after action review—the lot.

Equally challenging will be supporting the coexistence of such teams operating on the edge with the centers of their multiple home institutions. We must find ways to provide the control and accountability that such organizations demand of their members, as well as ways to tap into center-based resources and make them available to the team while complying with the use policies of the providing organizations. Needless to say, we haven't begun to do this effectively, and getting traction on the problem will require the inspired application of technology as well as innovation in policy and process design. And, I might add, it will require paying serious attention to creating what I'll call an "intentional culture" that is supportive of this way of working. Indeed, we see the challenge here as being creating coordinated revolutions in the domains of technology, process and policy, and culture.

So this is Genoa II. Faster, smarter, and jointer—three major themes, with a number of initiatives under each. Five years to create three coordinated revolutions. Thank you for your attention.