The Intelligence Community: An Outsider's View

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It is a great pleasure to be addressing this Symposium. A few months ago I mentioned to Robert Steele that I had been very favorably impressed by what I had learned about the American intelligence community, since becoming peripherally involved with it, through my work with TextWise. I had previously had little understanding of what the intelligence community is, or what it does.

I believe this is typical of most Americans. We occasionally hear a vignette on television about an intelligence agency, which is far more likely to be negative than positive. This is, of course, not atypical of the way many things are covered in the media. The many things that Americans have to be proud of about the intelligence community's work, is neither secret, nor commonly known. Instead, it falls in a nether world that we need to correct, by better informing the public of what the intelligence community is and does.

CITIZEN AWARENESS

The citizens of the United States have little appreciation for the tremendous service that the people in the various agencies of the intelligence community have done for America and the cause of freedom. This is a situation that is both unfortunate and unfair. Were the true story known, American citizens and people the world over would stop in appreciation and applaud. The cold war is over. The story of the role intelligence played is only starting to be told.

It is important the story be told of how the combination of intelligence, defense, academia and industry have collaborated for the betterment of American society. America should not lose this legacy, or the tremendous engine of innovation and discovery it provides. We need the eyes and the ears of the intelligence community now, as much as we ever have. Intelligence gathering has been developed into a significant scientific discipline, and is part of the fabric of national innovation. It has benefited the nation in many ways, many not yet known to the general public, including the transfer of intelligence practices and analytics to the commercial world, in part through forums such as OSS.

Surely there has been a need for secrecy in intelligence. And this need often lingers long after the events themselves have occurred. It was thirty years after World War II before the story of the Enigma code breaking machine and the Ultra program came out. So may the true story of how it came to be that the cold war ended not yet be fully understood by those of us outside the intelligence community.

For example, the intelligence community is often faulted for not predicting the break-up of the Soviet Union. But it does not appear to that intelligence community failed us, or was asleep at the switch, when the Soviet empire started falling apart. Far from it. The intelligence community noted the first ruptures in the way official organs of the Soviet state, both print and broadcast, started changing its view towards things like private property. This was first picked up by the Foreign Broadcast Information Service (FBIS).

As things progressed, more and more intelligence flooded the community on the potential for a breakup in the Communist world, our government officials were advised to stay quiet, and we citizens watched President Bush and his cabinet appear to be almost oblivious to the goings on in the Soviet Bloc.

But what appears was really going on when the Wall started crumbling was a concern that too much pontificating by the U.S. might actually hasten the fall, and what our intelligence community and some government officials hoped... was that it might not collapse! Why? Perhaps because management of the nuclear assets pointed at the U.S. and its allies might be better contained within a

friendly Gorbachev regime than a society overtaken by right wingers, or breaking up into chaos. Things the public sees are often not what they appear. The facts need to be clarified, after time passes, to help Americans understand what might be influencing their leaders during a crisis.

Some people know that Stealth technology came about through Lockheed's Skunk Works, backed by CIA and ARPA top secret funding. It was a high risk endeavor, which started back in the 1970's.

We are really fortunate, as a society, that we came through the Cold War as the victors. Imagine what might have happened had the Soviets developed stealth aircraft, and not the United States. One cannot underestimate the value of open source intelligence, of formalized gathering, translation and dissemination, or of programs such as ARPA which came in and backed Stealth development and other critical technologies when they were still an unproven long shot, and very high risk. A small shift in the balance of power and weaponry, such as this, could have made all the difference in the world in the fate of nations. Stealth aircraft showed their incredible effectiveness during the Gulf War. Thank God, and our intelligence, defense and industry's formal and informal organizations, that it was us who had stealth, and not anyone else.

But, where did the original idea for stealth stem from?

According to a fascinating book, Skunk Works, by Ben Rich, the original notion for stealth came about when a thirty-six year old Skunk Works mathematician and radar specialist named Denys Overholser found a technological nugget inside an eight year old Russian technical paper, translated into English by the Air Force's Foreign Technology Division (now the National Air Intelligence Center, or NAIC). Here is an example of open source exploitation at its very best!

This is an important fact for us to reflect upon. The cost of collection, translation, analysis, and dissemination of information, has to be viewed in this context: That open source intelligence may have been one of the most fundamental contributors to the end of the Cold War,

and the spread of freedom throughout the world. And the cost, whatever it was, seems a bargain indeed.

If the number of interceptions of terrorists intending to do harm to the United States, and to its allies, were known, Americans would gasp in astonishment, and sigh in appreciation, of the ongoing defense of the nation. And the need for it.

We must better tell this story. Otherwise, the public, who has not been well informed about the value and benefit of intelligence, defense R&D spending, and our silent government champions, might not be informed enough to maintain this capability. This would be unfortunate indeed.

Open source intelligence has fascinating potential for industry, as the realization of the value of open source intelligence and intelligence collection practices becomes better understood. There are some excellent examples of the role it can play.

For example, in the commercialization of xerography. John Dessauer, vice president of R&D for the Haloid Corporation (now Xerox) in 1946, first heard of the invention of xerography and the plight of Chester Carlson to find backing for it, when he read about it in an abstract in a Kodak company newsletter. The idea had been rejected by Kodak, IBM, RCA, Remington Rand, and General Electric. It is doubtful that Chester Carlson and Battelle could have moved xerography along if Haloid had not stepped into the picture. Open source intelligence get them connected, and the rest is history.

Last year, a Dutch journalist working on the story of Carlson's life, discovered that, during World War II, the Nazis were working on xerography! This work preceded Carlson's getting Batelle and Haloid involved by several years! The Nazis had apparently seen Carlson's patents and read his papers, and were hot on the scent of this technology. This is another example of why Open Source intelligence is so important, a competitor may spot an important innovation and gain a significant advantage. We need to maintain the means to know this. The Soviet threat may be diminished, there are other threats of equal or greater proportion now emerging. China, for example.

At last year's meeting of the Society of Competitive Intelligence Professionals (SCIP), Robert Flynn, CEO of Nutrasweet, told the 1,000 member gathering that competitive intelligence was worth at least $50 million per year in revenue either gained, or revenue losses avoided. This incredible savings was gleaned from having a thorough understanding of the capabilities, pricing and supply lines of all competitors and potential competitors.

Competitive intelligence enabled Nutrasweet to maintain its market share lead at a time when their aspartame patents had already been expired for over two years. In fact, Flynn reported, Nutrasweet revenue and profits were at record levels, even though industry wags had predicted they would lose their lead.

Like most Americans, I would occasionally hear and react to things like Senator Proxmire's Golden Fleece Award for the $600 hammer, and the several hundred thousand dollar grant for the study of the sex life of a tse-tse fly. The $600 hammer certainly seems like the public was ripped off, and this needed exposure. But the study of the sex life of the tse-tse fly appears to have been unfair to attack. The press, and the general population, just don't think about the fact that a very common way to retard the spread of an insect species is to cut off their ability to breed. So picking on that grant may have been taking advantage of the public's general naiveté.

We can all respond viscerally when our money is not wisely spent. But what I have learned since is that America has been fortunate indeed to have the formal and informal network that exists between intelligence, defense, academia and industry, and to have dedicated and invisible champions who have sought out bright people with good ideas, and given them the chance to develop great inventions and technological breakthroughs. These efforts unequivocally helped end the cold war.

It is generally known that the Internet is a derivative of the government supported initiative called ARPANET. But most people have no idea how pervasive the influence of ARPA, and organizations such as ORD, ONR, the Air Force and others, has had. When you begin to add it up, it is quite astonishing what government

backed R&D has done for the nation, and the world. The mouse, computers that communicate over phone lines, bit mapped graphics, the graphical user interface, hypertext, and so much of the fabric of the computing industry and the personal computing industry sprang from the early seed support of these agencies.

There are actually many more technologies that have been helped along, and would probably not have gotten off the ground, without the government's collaboration and support. It's not just the cash. There is, in addition to the formal network, an amazing and highly effective, informal network that has existed for over fifty years, of people who when in government service are willing to take risks and back innovation. It is their identification of talent and technology, in its infancy, and their networking and championship, that is at the root of this incredible story of successes.

Today, for example, the folks at ARPA are quite excited about their work on Telepresence, the ability of a surgeon to perform an operation, remotely, on a battlefield or in a hospital in another city, using advanced robotics and telecommunications. This is the type of wondrous stuff that industry, on its own, is unlikely to risk developing. It is the type of invention that can save many lives, in war and in peace. It is great dual use technology.

ARPA recently announced that their work on batteries has produced a battery for an electric car that can be recharged in 18 minutes, with the same capacity that previously took an 8 hour charge!

A 1991 report to Congress stated:

> This emphasis on fundamental change is vital to all DARPA programs... DARPA's business is developing and demonstrating technology that leads to fundamental change... Because fundamental change is risky, DARPA's programs always involve a good deal of technical risk, and because risk involves a chance of failure, DARPA programs will occasionally fail.

Our strong and growing computer and information industries owe their success, in part, to this army of unsung heroes at ARPA,

intelligence and defense, who work together behind the scenes on many ARPA programs. Sun Microsystems, for example, would not exist without the championship that ARPA extended in funding Bill Joy's work on Berkeley Unix in the four years before Sun actually got started. IBM mainframe computers, the first Cray Supercomputers, the first massively parallel processors at Thinking Machines and Maspar, Dialog's on-line service, all were helped along or turbocharged by ARPA and the intelligence agencies.

Xerox, my corporate alma mater, was helped along during its difficult formative years, in the 1950's, by defense and intelligence programs. Film in ordinary film cameras clouds up around nuclear detonations. Plain paper xerography doesn't. Xerox had an R&D contract to develop a little known xerographic camera, in the 1950's.

In the 1960's and 1970's, many of the infamous innovations at the Xerox' Palo Alto Research Center (PARC), and at SRI, were directly and indirectly aided and abetted by this same community of government sponsors and champions, at ARPA, ORD and elsewhere. Charles Symonyi developed Bravo X at Xerox PARC in 1976, the first powerful bit mapped graphics editor driving a laser printer. He then left PARC and went to Microsoft, bringing with him the technology and concepts for Windows, Microsoft Word (amazingly similar to PARC's Bravo X program of 1976), and other Microsoft staples from silicon valley to Seattle. The impact on the computer industry is historical and unarguable. It traces directly back.

Behind each of these innovations was not just funding, but agency championship, by people such as J. C. Licklider, Craig Fields, Bob Taylor, Bill Schultheis, and many others. Each of us has the potential for championship. Let's take advantage of it. You may find that an intriguing idea you help fuel and build can turn out to be a great success. The money granted is alone not enough. It often takes networking and sponsorship, risk taking and discrimination, for the money for technology innovation to be well spent.

INFORMATION HARVESTING

The harvesting of information in more efficient and intelligent ways is a very important area of ongoing development. We are in the midst of a revolution as significant as the agricultural revolution, when technology and automation enabled our country to become the breadbasket of the world, and to teach the rest of the world how to take advantage of our innovations.

So it will be with information harvesting, and due very much in part by the vision of what can be, and the support, championship, funding and risk taking of organizations gathered here today, who are forging this new and powerful capability.

The work my colleagues are doing at TextWise is dedicated to taking the vision and dream of the intelligence community vision of information harvesting, and bringing it to fruition, and commercialization. Back in the 1970's you could go to Xerox PARC and see a crystal clear vision of the future of computing and where it was heading. Today, the future of advanced information processing technologies is very much a vision created and spurred on by the intelligence community.

At TextWise, our DR-LINK (Document Retrieval through Linguistic Knowledge) technology, is pushing the envelope of intelligence defined information retrieval capabilities. It was originally developed under the ARPA funded, intelligence community backed, Tipster program.

Tipster is another superb example of government championship and support of bright people in pursuit of high risk breakthrough. Tipster funded a number of organizations to work on algorithms and processes for enhanced searching through very large scale collections of information, so as to enable computers to understand information requests at a level never before possible.

The government, through its agencies such as ORD, DTIC, NGIC, NAIC, etc., has spurred development and collaboration between disparate groups in academia and industry, to improve the state of

the art. In a field as subjective as information retrieval, the government, through NIST and ARPA, has provided a 1 million document corpus of documents to be retrieved, queries to be processed, and a formalized method of reviewing the results, to create a common baseline which has helped bring significant development to this scientific field.

Liz Liddy and I founded TextWise to commercialize DR-LINK, a retrieval system that is designed to realize the wishes of the many intelligence analysts. DR-LINK automatically identifies whether events reported in text are said to have actually occurred, or might occur in the future. The system knows that British Prime Minister John Major is a government official, of the United Kingdom, which is a member of the EEC, and NATO. These links are invaluable in doing good retrieval and intelligence gathering and analysis.

One of our modules accurately organizes proper nouns into forty categories in a two level hierarchy. This allows us to know the difference between a city and a port, a person and an organization, a product and a place. This type of knowledge is very useful in business and government intelligence.

Much of what Liz Liddy built into the DR-LINK system came about from our interaction with the intelligence community, and understanding its vision for improving machine retrieval and analysis.

We were only able to take the time and the effort to figure out how to break the code on determining these very difficult things as a result of the several years of R&D funding that government championship enabled.

Here is an example of what DR-LINK technology can do:

QUERY AND ARTICLE RETRIEVED FROM TIPSTER PROGRAM

When the following query was retrieved on one year of Wall Street Journal articles (100+ megabytes), the resulting query was found by DR-LINK:

"Document will report on the proposed building of a new or the expansion of an existing theme park overseas by a U.S. corporation."

The resulting find was:

"Wall Street Journal, 10/1/87 - Six Flags Corp. announced plans to manage and operate an amusement park on Spain's Costa del Sol. Scheduled to open in 1990, the park is intended to form part of a 107,000 acre tourism complex costing about $575 million. The company, a unit of closely held Wesray Capital Corp. of Morristown, NJ, said Spain is anticipating an increase in tourism because of the 1992 Barcelona Olympics and Seville World's Fair."

The system also performed well on the query: "A relevant document will discuss automation, but only where it has clearly failed, or conversely, has clearly paid off." Only documents dealing with the past consequences of automation were deemed highly relevant.

People do NOT expect computers to be able to do this. The many processes, dictionaries, knowledge bases, expert systems, and the very computational horsepower needed to attempt such feats, with measured high accuracy and coverage, is substantial enough to be in the league of needing a technological breakthrough. The technology will one day soon enable a search to be conducted against vast document collections, without having to predict, in advance, where the relevant material might be found.

When our vision at TextWise is realized, computers will also search books and reports for the precious data they contain, and find the relevant passages and chapters that today are often impossible to find. We are talking here of a truly scalable system. This is no small undertaking. Fortunately, we are working closely with Geoffrey Fox at InfoMall, the technology development program at the Northeast Parallel Architecture Center (NPAC). We are currently porting DR-LINK from our current Sun SPARC environment to several MPP machines, including an IBM SP-2 and an nCube machine, and

working on using text retrieval as a means for real time image retrieval. InfoMall is exhibiting here at OSS, and I invite you to stop by and visit the booth and understand the significant undertaking that is underway at Syracuse University's School of Information Studies.

InfoMall is supported by sponsors such as NYNEX and Reuters, and their mission is the commercialization of advanced information technologies, using parallel processing. TextWise currently has 90 gigabytes of on-line RAID storage, and by this time next year the combined NPAC and TextWise on-line storage capability will be well over a terabyte.

InfoMall and TextWise are two of the organizations supported at CASE Center, a technology incubator funded by New York State. This is part of the fabric of our society which allows good ideas not only to be developed in the lab, but to migrate into the private sector through entrepreneurship.

It is the nature of organizations such as ARPA and NSF to so influence the direction of development and thinking of the country's technical talent pool. The innovation and output that new initiatives will generate in technology, capability and industry, is far greater than the nominal cost of the several institutions that actually receive funding.

Such a breakthrough in text retrieval as DR-LINK was not going to be funded by industry on its own. It just would not happen, not for a very long time, if at all. The Tipster program has enabled this breakthrough. One more in a very long litany. I told the story of ARPA's funding of Tipster, and how it enabled several companies such as ours to start-up and pursue this exciting breakthrough in text understanding and retrieval, to a friend in the publishing community. He got tears in his eyes, realizing what ARPA and the intelligence community was doing to improve the state of the art in machine understanding of language, and allowing technology to transfer to the private sector. He could immediately see what the commercial and societal benefits might be. Like most Americans, he previously had no idea.

We need this intelligence gathering capability, and the ability to act on innovation, as a nation. We cannot allow those things which can affect defense, security, or competitiveness, to be left merely to random chance. The legacy by which the free world outlasted the totalitarian world, is very much integrated into the capabilities and culture I've tried to illuminate today.

While the intelligence agencies have to careful not to become their own domestic propaganda machines, it is important that their story and value added contributions be noted. And it is important that misunderstandings be corrected.

It is a great personal pleasure to be here, and to able to stop for a moment and reflect on what the people in this room, and your colleagues, and predecessors, have done. I want to thank you, and to encourage you to break silence on the non-classified, positive contributions the intelligence community has made. Let us tell your friends, neighbors and fellow Americans what a great job has been done, and is being done today, by the people represented in this room.

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