



NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY

Office of Corporate Communications

nga.mil | 571-557-5400 | publicaffairs@nga.mil | FB: NatlGEOINTAgency | @NGA_GEOINT

**Remarks as Prepared for
Robert Cardillo
Director, National Geospatial-Intelligence Agency
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Thank you, Keith, for that kind introduction. I want to thank the American Geographical Society and the Earth Institute of Columbia University for the opportunity to join your “Expedition to the Future.” I feel deeply honored to be with you. I am very pleased to join you so early in my tenure as Director of the National Geospatial-Intelligence Agency.

I have only been on the job for about seven weeks, and already I have met with many men and women dedicated to our common cause—navigating our nation to safety through the myriad geospatial challenges we face. I am glad I have a chance today to meet so many more.

We come from many different backgrounds and perspectives. But we share a common appreciation and deep respect for the great value that geography provides our society in a role that is too often underappreciated.

Every modern local, regional and global challenge—climate change, future energy landscape, and more—has geography at its heart. The rapidly spreading geography of the Internet, as more people carry more handheld devices to more places, and the emerging Internet of Things demonstrate what you and I have long known—everything, everyplace, everyone exists in a time and a place. The dependence of those things on their georeference makes what we do – spatio-temporal analysis – the bridge to the future of commerce, cooperation and security.

Why? Because geographers are natural integrators. We look at questions from a broad, spatio-temporal, geographic point of view. We use geospatial data to analyze questions with geospatial scientific methods that give unique perspectives grounded in reality. That is what makes us increasingly valuable in a future in which everything and everyone is interconnected.

Let me take a few moments to discuss with you several key points. First, the value of NGA -- our purpose and where we are going. Next, the impact of the growing volume of data and the increasing velocity of change, in an explosive commercial market. Then, the positive role NGA can play as a transparent intelligence agency. And lastly, the partnership we need to build with you to grow the next generation of geospatial scientists and analysts.

Earlier this month, we commemorated the 25th anniversary of the dismantling of the Berlin Wall. Two years later, the Soviet Union dissolved and the Cold War ended. There was a time during the Cold War when the federal government did have a monopoly on geospatial technology, satellites and the intelligence we collected against a better-understood adversary.

In those days, we lived in a bi-polar world with nation-state actors with certain known military well-known capabilities. Decision making by our adversaries was slow; the disposition of forces was relatively static and easier to detect; strategic warning was measured in days or weeks. We in the intelligence community largely limited our global understanding to the level of these nation states. Of course, those days are gone. And since the events of September 11, there has been a quantum leap in interdependency and complexity.

We all agree that the world of 2050 will be remarkably different than the world of 2014. For example, can you believe that the first tweet was sent on March 21, 2006—only eight years ago! Today, history is made in messages of 140 characters or fewer almost 500 hundred million times a day. Clearly, no one accurately predicted the impact of the instant global obsession with social media. Tweets and images turn local riots into national revolutions and global movements. The global social fabric is changing in ways we do not yet understand.

For us to mount the successful expedition to the future that this Symposium hopes to propel will require far different ways of thinking than we have followed in the past. We are challenged to stretch our global understanding from nation state strategies to “lone wolf” tactics, from static analysis to dynamic anticipation, from periodic observation to persistent coverage.

NGA is taking a leading role in how the national security community views this changing world. Allow me to speak briefly about NGA and our role. We are both a combat support agency and a national intelligence agency. Our customers range from the President for strategic warning to the military for operations planning to the first responder for disaster or medical relief. Traditionally, we were primarily a product provider; today, we are transforming into a dynamic, persistent, pro-active intelligence service that guides our customer for success.

We provide world-class spatial and temporal context—that is, we analyze multiple types of geospatial content and integrate it with other intelligence sources to develop insights for our customers. We convey our content and our context in easy-to-understand ways so our customers achieve the consequence they seek. That is, they reach the goals, accomplish the objectives they intended. That is how we define our success: If they are successful, we succeed. If they are not successful, we fail.

In a world where everything and everyone is a sensor, we are making these strides by achieving advanced objectives to:

- Leverage emerging trends in high performance and cloud computing. NGA has been the first in the IC to share our content on both the cloud environments set up under the DNI's intelligence integration initiative.
- Create new collaborative tradecraft to do anticipatory analysis across disciplines.
- And, change the way people think, work, and communicate to produce new knowledge when they are faced with complex situations and wicked problems.

We have set this high bar to become the leader in delivering customer consequence because of the next key challenge I want to address with you. Since the end of the Cold War, there has been a quantum leap in the speed of change, the volume of data now measured in terabytes, the immediate impact of global communication, and the increasing difficulty with predicting change with any accuracy.

These uncertainties led the National Intelligence Council to deliberately follow an "Alternate Worlds" approach in the Global Trends 2030 report published two years ago. As I learned from the insights of hundreds of strategists around the world, one fact struck me more than any other: The document was an extraordinary exercise in applying our global understanding of geography to make educated forecasts about the future. And to make these forecasts, we had to apply our deepest understanding of spatio-temporal reasoning as the heart of national strategic decision making. It is critical to understanding the complex interdependencies that create the challenges we face during the coming decades.

Rather than make definite predictions, the Global Trends report embraced the view that at best we could provide a framework for thinking about the future. We wanted to stimulate strategic thinking by distinguishing megatrends—like the nexus of demands for food, water, and energy resources—and game-changers, or critical variables like wide regional instability. We recognized that the world is changing faster than ever before, that the threats are morphing rapidly, that so many unknowns exist at any given time. So we offered what we called four "potential worlds," not to predict the future, but to provoke decision makers and strategic thinkers into thinking about how to achieve positive outcomes.

We believe that the future will be the consequence of the interaction among the megatrends, the game-changers, and most important, human activities. For example, the situation today in Syria and Iraq with the Islamic State of Syria and the Levant – ISIL – shows how a megatrend—resources—and a game-changer—regional instability—can create havoc when a determined human organization intervenes. It also shows while geography may not determine a conflict, it can dominate it.

As you know, ISIL is threatening to permanently destabilize the state structure established by the 1916 Sykes-Picot agreement that divided the Levant into French and British spheres of influence after the fall of the Ottoman Empire. One of ISIL's primary goals is to establish a Sunni caliphate that redresses the boundaries drawn by Sykes-Picot. A critical strategy in ISIL's drive to establish the caliphate is to control the major water and energy resources in what we call northern Syria and northern Iraq and what they see as the heartland of their Islamic State. Those resources are the headwaters

and the major dams on both the Tigris and Euphrates rivers. If ISIL controls those resources and the oil fields in those areas, it will have a stranglehold over all of Iraq and most of Syria.

ISIL's drive to control these resources, especially the water, is a geographic-based strategy that has been pursued for at least 4,000 years old by everyone from the Hittites to the Persians to the British and the French. But ISIL's strategy to re-establish a 7th century caliphate relies on its shrewd exploitation of 21st century technology. It is especially adept at exploiting the explosion in social media to establish its legitimacy, create fear in its enemies, attract more fighters, carry its message across the globe, and spread its network. Peter Kassig was beheaded in Dabiq, Syria. Dabiq was referenced by Mohammed as the location for an end-of-times battle of the crusaders before taking Istanbul.

Of equal concern to the stability of the Middle East, thanks to the Syrian Civil War and the rapid rise of ISIL, are millions of refugees who have fled Syria and Iraq into Jordan, Lebanon, Turkey, and the Kurdish areas of Iraq. They are putting enormous financial, social and resource pressure on two of our key allies—Jordan and Turkey—not to mention Iraq itself.

But as dangerous to the region's stability as ISIL is, the situation does exemplify how we can apply geospatial technologies to imagery and geospatial data with advanced tools to provide customers a better view. Let me briefly tell you a story about how the role NGA recently played in the decision making that helped the military and humanitarian groups save lives in Iraq.

Several months ago, as you may recall, tens of thousands of Yazedis and Christians in Northern Iraq were fleeing from ISIL attacks and atrocities. They were trapped on Sinjar Mountain. At the time, our planners were unsure on how best to deliver humanitarian aid and help the Yazedis and Christians escape. NGA foundation data helped the customers understand the complex and severe terrain. Our analysis identified the airdrop locations and evacuation corridors. We layered multiple types of data—roads, elevation, populated areas, weather conditions, the ISIL threat, and the like—with multi-source reporting.

The integrated intelligence gave leaders and military commanders the context they needed to anticipate what might happen when combat operations and humanitarian activity interacted. Day in and day out throughout this crisis, our analysis made our key customers aware of the status of refugees and the airdrops in near-real-time. Spatio-temporal analysis was critical to understanding the complex situation.

We first learned this lesson at the regional level in the 1990s when Yugoslavia disintegrated into the ethnic conflicts among Serbs, Croats, Bosniaks, and Kosovars. Today, we must extend this lesson to far more and more scattered conflicts than ever before—in the Sudan, in Libya, in Mali, in Nigeria, in Afghanistan, and more. However, thanks to the internet and social media, we suddenly have available vast troves of geospatial information to help us better understand these complexities in our rapidly

changing world.

We are rapidly developing tools and methodologies called activity based intelligence – or ABI – that allow us to manage the volume and velocity of Big Data so we can discover the networks and patterns of activities through which we can better understand these difficult situations. But the analytic tools and technologies we are developing—such as the automated algorithms on sensors that are searching for patterns—mean little if analysts do not know how to evaluate all of the data they receive in their multi-dimensional immersive environments. The analysts must understand and practice deep spatio-temporal thinking and how to apply it identify the factors that influence future trends.

What do I mean by ‘spatio-temporal thinking’? Let me use a simple analogy. Spatial thinking is the ability to put together the myriad pieces of a static jigsaw puzzle. The puzzle may be the religious and ethnic groups in Syria and Iraq, their locations, and their relationships. But everything in human activity is always changing through time and place, so the human jigsaw puzzle is constantly changing—pieces moving in and out, shapes of pieces themselves changing, the puzzle spinning or changing dimensions. Analysts must evaluate these changes over time to have any hope of anticipating an accurate picture as it changes. And they must examine an increasing number of and increasingly complex geographic variables that at any moment can turn into a crisis.

In short, in a world where everything and everyone is a geospatial sensor—with a spatio-temporal reference—geospatial methods will lead the way to understanding the world by revealing the uncertainties and enigmas of rapidly changing, complex systems. Let me tell you a story about how, right now – today - NGA is playing a vital behind-the-scenes role in the Ebola crisis in West Africa and enabling customer consequence by marshalling traditional and advanced geospatial methods. How this crisis has unfolded shows how a seemingly local, but terrible problem can quickly become a global crisis and demand a global response.

The President has called the Ebola crisis a national security issue because it affects international trade and air travel, international politics, the economies and stability of developing countries, and potentially, the American people. This crisis also has brought about unexpected, yet gratifying examples of partnership and collaboration. Throughout this crisis, NGA analysts have taken our commanding knowledge of the earth and its features in Liberia, Guinea, and Sierra Leone, and we have analyzed complex variables, such as access to government services and health care, food and water supplies, and the transportation infrastructure.

NGA has produced easy-to-understand, unclassified graphics that have guided decisions by the national security community, the UN World Health Organization, the U.S. Agency for International Development, many international partners, and many non-governmental organizations – NGOs. Our work has helped them better understand the human geography and social-cultural issues affecting the spread of Ebola through the region. And when the 101st Airborne Division deployed to build hospitals in Liberia, NGA analysts immediately stepped up to analyze the terrain and infrastructure to

identify the best, safest locations for the hospitals while keeping US service members out of harm's way.

But I have been most impressed by a simple story about the impact one person can make in this terrible situation. An NGA analyst, embedded with the 101st Airborne, is working on the ground in Liberia with the Joint Forces Command—Operation United Assistance to help upgrade the country's essential, but out-of-date maps. Using current unclassified commercial imagery, the NGA analyst sits directly with Liberian analysts who work for the Liberian Institute of Statistics-Geo-Information Services or LISGIS.

You can imagine how important it is right now for the Liberian government to have accurate maps of the areas hardest hit by the Ebola epidemic as well as the medical and transportation infrastructure to combat the disease. The NGA analyst downloaded more than a terabyte of up-to-date commercial imagery. The Liberians added their local knowledge. Our analyst and his Joint Force colleagues trained the Liberians in new techniques that have saved hours and days of effort. Right now, working together, they are identifying safe helicopter landing zones for supply drops, supporting the US military in locating hospital sites, and creating accurate maps of vital areas.

That is just the beginning of the consequences of these small acts. In the future, the Liberians will be able to use their new content and techniques well beyond the current crisis to build a modern geospatial database about their country for a future census and future elections. While we've posted our context on the worldwide web, we have much to learn, because this will be more and more common, and more and more necessary.

And just to give you an idea, the last report I saw that came out Friday (with the ESRI Dashboard Interpretation of our Public-Facing Ebola Content) said we'd made available: 29 maps, 157 data layers (like transportation, hydrography, cities, and health care facilities), and 64 files. As far as traffic – which we're glad we're getting – there have been more than 400,000 views on the publicly accessible worldwide website since it was launched on October 23rd. It shows there's a high demand for this type of information among non-traditional customers – including volunteers, health workers, and NGOs. In fact, the traffic on our site on the WWW far exceeds that of our unclassified but password-protected Ebola site, which has only had 900 visits to R3 Ebola associated content. It's a frank reminder we need to do all we can to provide our data, knowledge and services at the lowest classification possible, in order to provide context for our customers.

As far as content, if you think of all of NGA's holdings on Liberia 30% is out there for everyone to see, on our WWW site, 7% is on our NIPR (user/password) site, 60% is currently on our secret network (where most military reside), but they're awaiting legal review, and hopefully a very large number of them will be able to be pushed down to the web or at least to NIPRNET.

It's been an unprecedented experience for NGA, with important lessons that will inform our efforts to provide public-facing geospatial content in the future. It's also not only downloads – we've recently had some British products uploaded that we hope will be

available very soon. Plus, one of the main contributions we got from the outside world (even before the public-facing website was established) was due to a terrific response from a data cell in the World Wide Human Geography Data Working Group.

The ISIL crisis and Ebola epidemic are just two of dozens of international crises to which NGA analysts must apply our best geospatial techniques and spatio-temporal reasoning to every day. Our analysts are deeply involved in every crisis you hear about and many you don't—the Ukraine and Russian's intentions there and around its periphery, Iranian nuclear negotiations, North Korean proliferation and provocation, the South China Sea, and of course, we still have thousands of troops in harm's way in Afghanistan and Iraq.

Our disaster relief efforts like those in the Ebola crisis allow us to be transparent in ways our sister agencies cannot. These efforts allow NGA to play a vital role to build the public's confidence in the intelligence community. Director of National Intelligence James Clapper has said that geospatial intelligence "has a great advantage in our current environment because it is the most transparent of the collection disciplines." The world of geospatial intelligence is becoming increasingly transparent because of the huge number and diversity of commercial and open sources of information.

NGA is uniquely positioned to lead the Intelligence Community and demonstrate the value of intelligence to the American people. Our successful, open disaster response partnerships with FEMA and state and local first responders have led to a groundbreaking initiative in transparency and open sourcing. NGA encourages collaboration and integration among the first responders by being transparent with our data and applications. We work closely with first responders to provide pre- and post-disaster data so they can quickly understand the damage to critical energy infrastructure.

I just had an up-close-and-personal view of this in Huntsville, as we partner in their Geo-Huntsville project. We create online Event pages open to all first responders on the World Wide Web. They can upload their data from their mobile devices and share that data with everyone who needs access to it. We provide thorough analyses into the impact of a disaster on roads and bridges, power grids, shorelines, flooded areas, and the like. With all of the up-to-date data, FEMA managers then can allocate their scarce resources to where they are most needed, saving time and lives.

Lastly, let me discuss our common bonds and our interest in facing the challenges for using spatio-temporal reasoning and geographic science build to a safe, secure future. Given these bonds, we – this Society and NGA – have an enormous opportunity—and a solemn responsibility—to grow and sustain the new generation of geographers and geospatial scientists that we need now more than ever.

NGA has many roles and venues for collaboration as the Geographer for the Department of Defense and the intelligence community's functional manager for geospatial intelligence. We openly share common interests across a wide range of public interests through which we can partner with the AGS. In fact, in a fine example of our partnerships, I am pleased to announce that last week, NGA and the U.S. Geological Survey established the Centers for Academic Excellence in Geospatial

Sciences Program. Together, we are going to encourage two- and four-year institutions, including research universities, to participate in this program. In the programs, NGA and USGS will work with the institutions to design curricula and develop capabilities that will improve their education and training for a geospatial workforce. This program is one way to build, strengthen and cultivate the current and future geospatial sciences workforce that the U.S. government so desperately needs.

It is just one way NGA is acting to closing the huge geographic education gap that concerns you as much as it concerns us. We already support elementary, high school, college programs; recruit actively at historically black colleges; and support STEM education programs. We are concerned about the decline in geographic education in schools and the abysmal geographic knowledge of the workforce when we all have a growing demand for geospatial information analysts and we are creating new careers related to geography and geospatial information science. I urge this Society to join with NGA to explore advanced joint efforts to address this growing need.

I also urge NGA and this Society to consider other areas where our interests and our challenges overlap, especially those new, emerging challenges. First, the risks and opportunities inherent in climate change, particularly in the Arctic with its issues of resource management, national sovereignty issues, energy/mineral exploration, and the like. Humanitarian Assistance/Disaster Relief (HADR) – The Ebola crisis is only one example of our global efforts. We have combated natural and man-made disasters resulting from climate change around the globe—from Fukushima to the Caribbean. Climate change not only influences the scope and scale of natural disasters, it also can affect resource competition for water and energy and as the Ebola crisis shows, drive pandemics.

Lastly, we can work together to promote what right now looks like a very bright energy future for the United States. The Global Trends 2030 states that during the next 15 to 20 years, although global energy demand will rise about 50 percent steadily rising global production will meet or exceed that demand. And much of that increase in production will take place in the U.S. because of dramatic growth in the production of shale oil and natural gas. This tectonic shift means that for the first time in generations, the U.S. will become energy independent thanks to the oil and natural gas revolution and the growth of alternative energy sources. Even greater resources are available from our neighbors in Canada and Mexico.

In all these areas from climate change to the next generation of geospatial scientists, NGA wants to partner with you. In remote sensing industries, NGA wants to cooperate with commercial imagery and foreign partners to identify and use best technologies and methodologies. NGA's long history of support for commercial imagery industry and agreements with other commercial data sources mean that we can participate in legal and policy discussions about the need for transparency and how we can use geospatial technology to meet societal goals. We especially need to work with you to understand the implications of the Internet of Things and the impact of every person and everything is a sophisticated sensor.

In closing, the future of our national security depends on our ability to maneuver wisely through complex, interdependent, yet widely contrasting, fast evolving circumstances. No one can predict the realities that the megatrends and game-changers will create in coming decades. Yet, together, NGA and partners like the forward-looking geographers here tonight can shape the trends that will shape our future.

As the science fiction writer Frederick Pohl said, "You can't really predict the future. All you can do is invent it." So, let us venture boldly forward on our Expedition to the Future not to predict, but to prepare the best future we can for future generations.

Thank you. I would be happy to open the floor for discussion.

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