Science, Service, and Stewardship: Insights from Joe Klimavicz, Chief Information Officer and Director, High Performance Computing and Communications, National Oceanic and Atmospheric Administration

The National Oceanic and Atmospheric Administration, NOAA, relies on information and technology to carry out its mission—to understand and predict changes in climate, weather, oceans, and coasts. The agency depends on the availability of and access to high-quality, timely, and reliable information and the technology that makes it all possible; both are strategic assets to an agency that understands managing these resources efficiently and effectively is key to its success. What is the information technology strategy for the National Oceanic and Atmospheric Administration? How is NOAA modernizing its technology infrastructure and ensuring that its IT investments align with its overall mission? And how is NOAA providing a balanced stewardship between information and technology? Joe Klimavicz, CIO and Director, High Performance Computing and Communications at NOAA, shares his insights on these topics and more.

Joe, before we delve into specific initiatives, perhaps you could give us an overview of the history and mission of NOAA?

⤚ Joe Klimavicz ⤙

NOAA is fundamentally a science agency. It enriches life through science and was formed in 1970. We like to think about our reach as going from the surface of the sun to the depths of the oceans as we work to keep citizens informed of the changing environment around them. This can be anywhere from daily weather forecasts, severe storm warnings, climate monitoring, fisheries management, to coastal restoration and marine support. Our products and services are vital to economic interests of the U.S. We've estimated that one-third of America's gross domestic product depends on NOAA products.

It's an important mission; we have dedicated scientists that use cutting-edge research, high-tech instrumentation to provide citizens, planners, emergency responders, and other decision-makers with reliable information when they need it. We really think we touch the lives of every American; we're proud of our role in protecting life and property.

We'd like to think of our mission as science, service, and stewardship. Our vision for the future is healthy ecosystems, communities, and economies that are resilient in the face of change.

Joe, with such an interesting mission, I'd like to get a sense of the scale of operations that you support. Would you describe how NOAA is organized, the size of its budget, number of full-time employees, and its geographical footprint?

⤚ Joe Klimavicz ⤙

NOAA is a very diverse organization, made up of six line offices and many different missions. The National Weather Service is probably the one that gets the most attention, but in addition there is the National Ocean Service, National Marine Fishery Service, National Environmental Satellite Data and Information Service, Oceanic and Atmospheric Research Service, and Program Planning and Integration. The budget in our FY 13 request was $5.1 billion. We have about 12,500

federal employees. When you look at onsite contractors and associates, visiting scientists, we're about 25,000 total staff onsite. We have a presence in virtually every state and U.S. territory. I think the last count was we had about 435 buildings across the country with 122 weather forecast offices around the country. We also fly 17 satellites and eight buoy networks. We have 19 ships and 14 aircraft. In addition, we have three weather and climate research supercomputers and two operational supercomputers. We have 284 data centers all over the country. We have 46 IT investments, 71 mission systems according to our inventory, and 47 infrastructure systems. We also are responsible for 13 marine sanctuaries, one national monument, and many other commercial fishery plans and fishery councils.

Now that you've given us a sense of the larger organization, could tell us a little about your specific area? What are your responsibilities as the CIO and as the Director of High Performance Computing and Communications, how is the office organized, and how do you align back to the mission that you described?

❧— Joe Klimavicz —☙

I like to think of our office as sitting right in the middle of the assets I just described. My office is responsible for essentially all the information and information technology resources. NOAA spends about $1.3 billion annually on its IT portfolio, and that's larger than all the four nondefense bureaus. We have the standard CIO responsibilities of planning, reporting, oversight for all investments, cybersecurity, information quality, and privacy. I'm supported by a CIO Council composed of line office CIOs. We provide a host of enterprise-wide, mission-essential IT services, such as e-mail, web hosting, networking, and security response and monitoring. Through our high points computing and communications program, we're striving to ensure that we've got the computing necessary to propel our science and service

National Environmental Satellite Data and Information Service
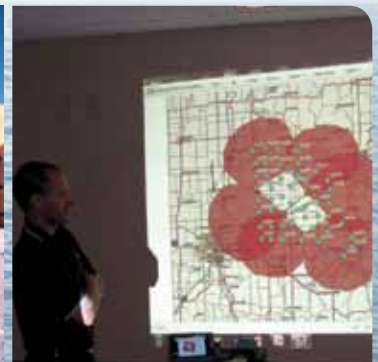
National Marine Fishery Service

National Weather Service

National Ocean Service

Oceanic and Atmospheric Research Service

Program Planning and Integration

missions enterprise-wide, supercomputing, to support both sides of that activity.

I'm also responsible for NOAA's homeland security program, ensuring preparedness and response and mission continuity in event of a terrorist attack, disaster, or other emergency. I spend time focusing on a program called NOAALink; it's an innovative, strategic sourcing vehicle to provide economies of scale and enterprise-wide acquisition for our IT infrastructure and services. Lastly, I also serve as the Department of Commerce senior agency official for geospatial information as well as the senior executive responsible for the department's use of the radio frequency spectrum.

With such an expansive portfolio, Joe, what are your top challenges that you face in your position and how have you sought to address those challenges?

✎— Joe Klimavicz —✎

I think the number one for most CIOs is cybersecurity. Our ability to execute our mission is at risk every day. Just connecting to the Internet is very dangerous. We had well over a thousand incidences, not all were penetrations, which required response. Every year from 2007 through today, this area has been highlighted by the department and its inspector general as one of the top challenges across the department. It's not unique to NOAA, but it's a big deal and it takes a lot of time and effort.

The next challenge is cost reduction. All CIOs are under incredible pressure to reduce their operating costs. It's quite challenging given the growth of information volume requires us to improve forecasts and services. As requirements are going up, I have to drive down operating costs, which makes the environment quite challenging. Another challenge is getting the right skill sets and deploying the best workforce; it's making sure we have those critical skills in our workforce because that's how you make all this happen. It is also important to enhance portfolio management because if I'm going to really reduce cost I've got to get a better handle on investments. We need to drive convergence on investments while pursuing consolidation and standardization. We spend much time identifying the best ways to consolidate our IT infrastructure and services so we produce and deliver the most efficient services that support NOAA's very important mission.

Our strategic direction maps nicely to meeting these challenges. We seek to protect our IT investments from security threats, ensuring that our information and technology is always available. It's critical that we always put a mission focus on IT investments, looking for innovative uses of IT in

support of evolving and growing mission needs. The third area is high-performance computing. High-performance computing is key to our research and science missions as well as our operations. We want to make sure we expand these capabilities essentially through on-demand computing; we've also been able to expand high-performance computing to non-typical users inside of NOAA to see how we can really advance science. The fourth strategic goal is looking for efficiencies and improving effectiveness through enterprise-wide solutions. The fifth goal is ensuring a skilled IT workforce, because in the end all of this comes down to the people. We are focusing on attracting, developing, and retaining the best IT workforce we can.

Your agency carries multiple and often complex missions and information technology requirements and your portfolio reflects that complexity. How are you fostering an enterprise view of technology, not simply supporting mission, but actually enabling mission?

✎— Joe Klimavicz —✎

Given NOAA's mission, we have information coming in, we have brilliant scientists adding value to that information, and then we provide that information to the public or other agencies. Information and data are key to NOAA's overall mission and none of that can happen without information technology.

What we're trying to do is improve the visibility and decision-making by leveraging IT resources across NOAA. I'm positioning my office's involvement in the budgeting and acquisition planning, evaluating programs upfront rather

than responding to a crisis afterwards. We're really trying to remove barriers to deliver a uniform, modern, agile, and cost-effective set of services. If we can reduce the complexity, then we can improve our security posture. As we build more enterprise-wide services, it'll make it easier for us to secure our IT. Lastly, I seek to position IT as a mission enabler through the right services, common services, and an infrastructure that supports our diverse mission, and really with a strong focus on improving customer service. We want to reduce our operating cost, but we also want to improve our service. We want to empower our employees to more effectively be able to execute their mission-critical activities.

Joe, I'd like to talk about green IT, which aims at reducing the environmental footprint of IT products throughout their lifecycle. What are you doing in the area of sustainable IT practices to act as good environmental stewards?

✍— Joe Klimavicz —✍

We spend time focusing on how we can be better stewards of the environment. I'm committed to reducing our overall IT footprint, and we're trying to do this in a couple different ways. One is lowering our energy consumption and many things go into that effort. It involves how we configure and arrange our servers, how we consolidate our data centers, and pursuing ENERGY STAR® purchasing of equipment. Old chillers that are inefficient are being replaced with newer, higher efficiency systems with a big emphasis on cloud computing. We have moved many programs to the cloud, many services we're buying as services from the cloud. I

think, though, from a strategic perspective you need to look at this in a couple different ways. Regarding business practices, do we have the right policies and strategies in place? Are we looking to identify and seize the easy opportunities? Changing the culture and making sure energy efficiency is a consideration in our acquisitions really drives efficiencies.

On the technology side, we are focusing on PC power management. We've also reduced our printing quite a bit through workflow management tools and better utilization of technology to reduce our printing demand. We've reduced the number of desktop printers by over half to reduce our paper consumption. We've also started deploying to leadership with iPads. As an environmental agency, the NOAA leadership stresses the importance of conserving paper. We're also improving our efforts with virtualization and looking at using microchips. We're reducing our IT load while reducing our power consumption.

Joe, through its advanced modeling capabilities, climate research, and real-time weather products, NOAA is a recognized leader in understanding and predicting the earth's environment. To do this it requires high-performing computing systems. Would you tell us more about NOAA's high-performance computing and communications program and its goals?

✍— Joe Klimavicz —✍

These supercomputer assets are going to help us improve our weather forecast, our ability to forecast hurricanes and track their intensity. We had these plans in place and we received $170 million of the ARRA funding to replace our research and development supercomputers. In March of 2012, we completed a modernization and recapitalization of all of our research and development supercomputers. What we ended up with is seven times the computing that we had originally. In essentially two years, we ended up with a seven-times improvement in our research and development computing. We did this in cooperation and collaboration with the Department of Energy, so the biggest one for our research sits down in Oakridge, Tennessee, in the Department of Energy's lab, enabling very large data files to move from the computing to our data stores to the scientists. It's a major accomplishment; we're ready to continue to expand on how we collaborate and share these computing assets across the federal government. They are key assets at the federal level to spur innovation. We have test beds in place to work with the next generation of supercomputing chips, things called graphic processing units and integrated core technologies. The future computer processors are going to be very different than what we're using today. We need to be prepared from a

software perspective because we have millions upon millions of lines of code that need to be able to run on the next generation of hardware. We're also in the process of replacing all of our operation supercomputers. It should go live with the next generation of operation computers in October 2013. That'll be about a four-times improvement in our operational computing. Again, we'll make sure that we're capable of running high resolution and complex models. This is what drives our ability to forecast changes in the environment.

Today rapidly evolving technology increases an organization's vulnerabilities. Would you elaborate on the efforts to secure the IT infrastructure and to combat cybersecurity threats? What are you doing to implement safeguards to reduce these attacks and sustain the heightened user security awareness?

⇜— Joe Klimavicz —⇝

I look at this in terms of three sources of attacks. There are the criminals out there trying to steal things for profit, but there's also an area that's growing pretty quickly, and that's the co-hacktivism. Folks looking for publicity seek to deface a website or bring down a capability. They may not be trying to get rich or steal your intellectual property, but they're trying to make a point. We're trying to improve our ability to monitor and respond to threats. In 2010, we established a security operation center that's constantly monitoring all of our devices, our networks, and trying to correlate very subtle events and assess threat levels. Trusted Internet connections are critical and the Department of Homeland Security has approved us for four trusted Internet connections. We have a fairly robust FISMA compliance program. Continuous monitoring is a huge operation right now, and being able to track reports and assess endpoint security is something we've put a lot of time and effort into. From a critical infrastructure perspective, we're trying to understand and document the risk exposure of our systems and respond accordingly.

Given the importance that information technology plays in mission and program delivery, how has the role of the CIO evolved to that of a trusted advisor? What are the characteristics of a successful CIO in the future?

⇜— Joe Klimavicz —⇝

I made the point to NOAA and department leadership that I really want to be a buyer of IT and IT services in the future. It's evolved from the early days when you had to build the IT in-house, you had to operate it, it was all a fairly closed system, and it was more about the IT. Today, it's less about the IT and more about meeting the mission, which brings the CIO closer to being that trusted advisor.

If I could reduce my job to taking our customers' requirements, funding, and provisioning the right services at the right time at the right price, I'd be okay with that approach. I think the future is buying from the cloud, buying from other agencies that have already implemented these services, and only then if you can't find what you need at the right price you implemented yourself. But that, to me, is a last resort.

Moreover, I believe that CIOs need to be connected to other CIOs. We need to share, talk, and learn from each other because we all face many of the same challenges. I also think it's important to connect to and stay connected with industry. I participate in many venues that bring together industry and government; you have to constantly be learning. This is a very dynamic area. Sometimes I learn more about what's going on in other departments and agencies from industry. It pays to be well connected and to maintain an understanding of what's going on in other places. Typically, I don't have enough money to be a first [adopter], but I don't want to be the last either. Whenever you're looking to move to another service, another technology, it's important to understand who has gone before you. I would reach out and talk to those individuals. In the end, it is important to spend time talking to other CIOs about what works and what doesn't work. ◻

To learn more about NOAA's Office of the Chief Information Officer & High Performance Computing and Communications go to www.cio.noaa.gov

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