



Next Steps for the NSCI: Looking to Ensure a Long and Lively Life Span

January 26, 2016

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IDC's Quick Take

As the National Strategic Computing Initiative (NSCI) hits its six-month mark, most of the progress to date has been behind the scenes as participating federal agencies work with the president's science office to develop an operational plan for realizing the ambitious goals outlined in the order. To ensure that this initiative has the best chance of moving forward from both a technology and budget perspective, NSCI policy makers should soon be looking for ways to justify funding NSCI work. This can be accomplished initially by gathering success stories to impress upon a new administration, a relatively uncommitted Congress, and an indifferent electorate that this program can have real value for the future of U.S. technology, economic prowess, and national defense capability, while at the same time laying the policy and regulatory foundation for effective long-term public/private collaboration with an eye toward critical technology development and increased U.S. global competitiveness.

Event Highlights

On Friday, January 29, it will be exactly six months since the White House released the executive order establishing the [National Strategic Computing Initiative](#) (NSCI), the broad interagency research effort seeking to maximize the benefits of high-performance computing (HPC) research, development, and deployment across the U.S. public and private sectors. Since then, each of the participating U.S. agencies has prepared and submitted to the president's [Office of Science and Technology Policy](#) (OSTP) their specific plan for the future. Currently, those plans are being assembled into one overarching document for internal U.S. government planning purposes while a more compact and less detailed version is being drafted for eventual release to the general public.

IDC's Point of View

Right now, there is little information coming out of OSTP, the participating agencies, or the overall U.S. budget process — including the Office of Budget and Management and Congress — that provides any additional details or insights as to where the program stands and, perhaps more important, its true future prospects. To date, the bulk of interest in the press — and the HPC community — has centered on the aggressive technical aspects of the project: exascale computing architectures, post-CMOS semiconductor technologies, and HPC application development. To be sure, the technical goals for the NSCI are daunting, visionary, and decidedly designed to advance the state of the art in HPC capabilities well into the next decade.

However, these goals — aside from their specific performance requirements — are essentially treading familiar ground for the U.S. government when it comes to high-tech promotion programs that establish specific technology goals, fund the right agencies, get the smartest people on the job, and wait for the results to roll in. Indeed, despite the aggressive nature of the technical goals outlined in the original

order, the government policies and practices needed to address these technology challenges are the stock-in-trade for the U.S. government research community and the initiative's chances for success there are accordingly optimistic.

In contrast, there has been less attention paid to some of the nontechnical, but perhaps more complicated and challenging, elements of the NSCI that include:

- Fostering a robust commercial HPC sector that can supply systems to critical U.S. government missions
- Keeping the United States as the leading supplier nation in an increasingly competitive global HPC sector
- Broadly deploying HPC capability in the U.S. private sector (both the industrial and service sector) to help ensure that key U.S. businesses can compete more efficiently in the global market
- Building up an HPC workforce that ensures an adequate number of qualified job applicants and workers for the HPC research, development, and deployment disciplines
- Training a wide range of non-HPC scientists and engineers across a broad range of technical areas to introduce or improve their use of HPC in their overall business processes

Perhaps most important, from a U.S. government perspective, is that these ambitious missions can only succeed through a whole-of-government effort, where the collective skills of individual government agencies can be brought to bear with a single focus on these critical problems. In other words, the executive order calls for close collaboration among agencies that in some cases have not worked together before.

Although it is a given that the various NSCI agencies will pursue their individual goals with their best efforts, it is critical to remember that the NSCI was brought forth by executive order and it can be easily killed off by another as soon as a new administration takes office. In addition, any administration that wants to sufficiently fund the NSCI will face the challenge of securing a series of annual budget commitments from Congress for at least the next decade. Building a congressional consensus to ensure the steady flow of funds will not be easy. Scientific and economic considerations aside, there is little within the NSCI plan today that links it explicitly to either end of the political spectrum, so the NSCI has the ability to either appeal to — or be ignored by — either party with equal chance.

This places a substantial burden on NSCI policy planners who, no doubt, will soon be looking for ways to justify funding NSCI work or risk driving agencies to simply relabel existing research efforts under the NSCI label. In the near term, the NSCI should begin gathering success stories to impress upon a new administration, a relatively uncommitted Congress, and an indifferent electorate that this program can have real value for the future of U.S. technology, economic prowess, and national defense capability. These stories can be either existing exemplars of HPC-driven academic or government scientific developments; outlines of compelling emerging application areas in the HPC world, such as precision medicine; or success stories from the commercial sector on new HPC-based products or processes that drive economic competitiveness, particularly those in a global context. An important element of these success stories will be framing them for a number of diverse, but equally important, consumers that encompass and extend well beyond the HPC R&D community: government officials, HPC vendors, current and potential HPC users, journalists, and the nontechnical public. Building an overall positive and

broad-based consensus on the scientific and economic potential of this program will significantly help its long-term funding prospects.

Moving beyond some of the more pressing needs for the NSCI to hit the ground running, there are a number of deeper considerations that program planners will be grappling with in the coming months that bear watching, as progress in these areas will ultimately determine if the program can achieve some of its more ambitious goals. As mentioned previously, these considerations carry with them a high degree of complexity, as they will be pushing many government agencies into practices that require a whole new way of addressing technological development.

First and foremost, NSCI planners will need to ensure that a wide range of potential HPC technology options are explored by the participating agencies and that risky or innovative technology developments are encouraged — and indeed legitimized — by a continual stream of smart and forward-leaning USG R&D funding as well as hardware/software procurements.

Such efforts will require close coordination across both development and procuring agencies to ensure that the promising technologies are not overlooked, nor that there is an overcommitment to any single technology option. This will require a careful balance between meeting critical mission requirements and inculcating an entrepreneurial spirit into the government's procurement process. This issue becomes critical now, more than ever, as the HPC sector writ large is undergoing a significant sea change with the merging of traditional HPC, big data analytics, and HPC in the cloud.

NSCI planners must also make a concerted effort to better understand the best — and worst — mechanisms, policies, and practices available for government/industry collaboration. Indeed, setting up new public/private collaborations may require a close examination of — and perhaps even changes to — existing laws, regulations, and policies that cover such partnerships to best enable effective, nimble, and market-relevant activities. In addition, NSCI participants need to make coordinated commercial procurements that meet both specific USG mission requirements and overall NSCI objectives but that also integrate well into the overall product offerings of the commercial firms that supply those systems. For their part, industrial partners must be prepared to take a more long-term perspective on R&D projects and their demonstrable results, financial or otherwise.

Finally, the NSCI should be on the lookout for ways to generate sufficient interest in HPC technology — and related new computing applications like data science or deep learning — within the academic community. IDC studies confirm that the HPC community is having trouble attracting new talent, and many say that an "Apollo-like program" could generate new and needed enthusiasm within the academic sector, ultimately creating a new cadre of HPC experts coming out of leading universities. As such, the NSCI must consider what steps to take to ensure that the academic sector not only engages with the USG to drive HPC technology forward but also to help build a new generation of U.S. HPC designers, builders and, perhaps most important, users across a wide range of academic disciplines and commercial market sectors to help ensure that HPC is used in an ever-increasing base of U.S. public and private high- and low-tech sectors.

Near-term NSCI actions, combined with details of specific agency plans and related budget commitments for the next few years, should be available soon. NSCI watchers everywhere will be on the lookout for clues as to how far reaching the NSCI can be in helping drive the overall vitality of the U.S. HPC community and the American economy or if this program is doomed to become nothing more than a nice try that failed to make it over the bar.

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