Megacommunity Simulation to Re-Imagine Infrastructure

Booz | Allen | Hamilton

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Megacommunity Simulation to Re-Imagine Infrastructure

Executive Summary
Over 2 days in July, 2012, Booz Allen Hamilton, the Northwestern University Transportation Center and the Chesapeake Crescent Initiative came together with stakeholders across 3 megaregions to re-imagine transportation infrastructure in 2040. The results reflected innovative thinking and a realization that, to address complex challenges across regions in the US, a new collaborative approach is needed.

Infrastructure innovation in the United States was once the envy of the rest of the world. A wide array of transportation, energy, and water projects propelled the growth of the US economy and drove the emergence of a vast middle class. But now America’s infrastructure is in decline and the will to develop novel projects that would give the country a new competitive edge is lacking.

Part of the problem is essentially a leadership challenge. Big fixes are needed and bold leaders are required to corral all of the constituencies—local and national—into a cohesive team that works together across state and federal lines to move a project through design and completion. Another constraint is financial. Innovative public and private partnerships will be necessary to fund massive projects in the future.

To identify actionable solutions to America’s infrastructure woes, Booz Allen Hamilton, a leading strategy and technology firm, in conjunction with the Chesapeake Crescent Initiative and the Northwestern University Transportation Center, conducted 2 days of wargames in July, 2012 that brought together diverse teams of infrastructure professionals, including government, civic, and industry leaders. The aim of the sessions was to draw up specific regional initiatives for the movement of people and goods in the US in 2040 built around “megacommunities”—public, private, and civic interests linked together to develop projects that integrate new business models, innovative technology, and alternative financing in scalable, sustainable ways.

The result of the wargame is a remarkable list of possible infrastructure innovation in three critical regions around the country and unique solutions for financing and managing them.

A Waning Legacy of Infrastructure Innovation
Examine a country’s infrastructure and you can readily determine its vitality, potential for economic growth, quality of life, and overall health. The United States is an apt example: its long history, dating back in some cases to the founding, of aggressive and novel transportation, energy, and water projects has been the backbone of a 200-plus-year success story.

In the early 1800s, the Erie Canal opened up the Midwest to trade and growth. More than a century later, rural electrification made farming in America’s heartland more productive. And in the mid-1950s, President Eisenhower daringly earmarked federal funds for the construction of a national interstate system of highways.

Add to this impressive list the Hoover Dam, the building of the railroads, and the laying of telephone, telegraph, and cable lines—and the power of infrastructure to drive the growth of a nation’s economy and improve the quality of life is palpable.

But that uninterrupted period of American infrastructure innovation is now mostly a thing of the past. And the infrastructure that the country was once rightfully proud of is rapidly aging and crumbling. More than a quarter of the nation’s bridges are structurally deficient and highways need paving. Americans now spend 4.2 billion hours a year in traffic delays. Drinking water systems in dozens of major metropolitan areas are contaminated, and broken sewage systems send billions of gallons of untreated wastewater into streams and rivers each year. Of the 85,000 dams in the United States, more than 4,000 are deficient.
The Consequences of Progress and Growth
What’s gone wrong? For one thing, the need for big fixes distinguished by radical technological change has transformed infrastructure projects from relatively standalone efforts into highly integrated ventures. In the past, it would have been possible to add a lane to a 60-mile stretch of an overused highway or repair an aging generator in a power line and generally upgrade the system sufficiently to satisfy the needs of the local population. But as regions have become more densely populated and infrastructure overtaxed, more far-reaching solutions are needed that bind together effectively and efficiently such aspects as traffic management and safety, electricity production and distribution, water and sanitation systems, and public health and the environment.

Or as Mark Gerencser, Booz Allen’s Executive Vice President, Commercial Business, put it: “There’s a significant difference between merely repairing infrastructure and re-imagining it.”

The Need for a Transportation Megacommunity
To envision and oversee such ambitious projects, transformational leadership is required—people that can bring together and elevate the best ideas from engineers, designers, researchers, the private sector, local representatives, and state, municipal, and federal agencies to reimagine infrastructure through a more holistic lens, from its business model to its stakeholder roles, relationships, and purpose. Political consensus necessary for dynamic leadership is precisely what we have lacked in recent years.

Part of the challenge lies in the emergence of megaregions across the US. The infrastructure needs of these areas cross over local and state jurisdictional boundaries and require planning and decision on a regional basis. In essence, our infrastructure problems have outgrown the boundaries of the government organizations responsible for solving them. Re-imagining infrastructure therefore requires new thinking about our governance and oversight models.

An additional reason for the current infrastructure crisis involves where the funding for multibillion dollar projects will come from. Until recently, government at various levels paid for virtually all infrastructure projects and maintenance. Today, however, government funds are increasingly scarce and there is less political will to spend taxpayer money on innovations such as smart highways, smart grids, high-speed rail, and superports.

“There’s a significant difference between merely repairing infrastructure and re-imagining it.”

As a result, private sector investment will be an essential component of many large-scale infrastructure projects in the future. Yet the planning and operating requirements necessary to attract private financing differ markedly from those typically associated with government funding. For example, private equity demands rigidly drawn rules that clearly proscribe funding and legal responsibilities, anticipated returns on investment (ROI), statutory authority, and transactional costs. By contrast, the culture of public funding tends to be looser about many of these considerations.

Viewing America’s infrastructure landscape broadly, Peter Trick, Booz Allen’s Senior Vice President, Civil Infrastructure, noted, “America’s infrastructure challenge is to leverage new business models, innovative technology, and alternative financing.”

The Simulation
To address these shortcomings in infrastructure development—indeed, to reimagine infrastructure for the future so that it becomes again a hallmark of American innovation—Booz Allen, in conjunction with the Chesapeake Crescent Initiative and the Northwestern University Transportation Center, led a unique transportation “wargame” in three regions on July 23 and 24, 2012. In the Megacommunity Simulation to Re-Imagine Infrastructure sessions, participants explored and designed next generation infrastructure solutions for the movement of people and goods in the US in 2040.
More than 200 participants gathered in Washington, DC; Chicago, IL; and Orlando, FL, to discuss these megaregions, respectively:

- Chesapeake Crescent Region — Greater Washington, DC; Baltimore; Richmond; and Norfolk
- Great Lakes Region — Chicago, Minneapolis, Milwaukee, Grand Rapids, Cleveland, and Detroit;
- Florida Region — All of Florida

In each location, a diverse group of infrastructure professionals including government, civic, and industry thought leaders envisioned specific regional initiatives built around “megacommunities”—public, private, and civic interests linked together to share responsibility for the success of a project. By focusing on the emergence of megacommunities, the participants were able “to take a more holistic view on how infrastructure is built, operated, and financed,” said Ed Crooks, Booz Allen Vice President, Infrastructure Finance. “And it opened up opportunities for resource sharing and network growth.”

There were four teams in each of the megaregions: Freight, People, Publicly Owned-Operated Infrastructure, and Customers (see Exhibit 1). In addition, two national teams represented the financial sector and the federal government.

In each region, these questions were explored:

- What transportation infrastructure is needed to facilitate the flow of commerce, people, and information in 2040?
- How might changes in the transportation network, including the addition of new hubs or corridors, affect operations, management, and technology needs?
- What are the major governance issues that must be resolved to achieve new solutions, and how should

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**Exhibit 1 | Simulation Teams**

Source: Booz Allen Hamilton
decision rights be allocated on the local, state, regional, and federal levels?

- What are the roles of public funding and private financing in resolving resource issues related to infrastructure, and what are the likely consequences of various options for customers?

- At the more general level of the public good, how will changes in transportation infrastructure affect the structure of the US economy, US global competitiveness, the distribution of economic activity, the nature of work, and the prospect of generating stable employment?

Re-Imagining Infrastructure. The simulation consisted of three moves played out over 2 days. (See Exhibit 2 below). In the first move, participants investigated ways to improve infrastructure and the regional economy while minimizing energy use and the impact on the environment.

In the Chesapeake Crescent region, these discussions focused on relieving congestion in the busy Eastern corridor by, among other things, better planning, communication, and cooperation between transportation management in Baltimore, MD, and Washington, DC. They also proposed rewarding smart public development and penalizing ideas that fail to take into account the financial, quality of life, and environmental constraints that envelop transportation projects now. The group began to build consensus around the idea that financing would have to be sought through private investors and full cost pricing mechanisms for construction and maintenance of transportation systems would be needed so that those who benefit from new facilities—commercial and individual users—bear a commensurate share of the cost.

Not surprisingly, in the Great Lakes region, a large part of Move 1 was taken up with exploring ideas to better improve coordination among the five states and the many interest groups—civic, commercial, political, and bureaucratic—that put pressure on them. In this megaregion, the group concluded, there are plenty of underutilized assets, such as airports in Cincinnati, St. Louis, and Milwaukee, that would be more attractive for local travelers if there were interconnection from these sites to other regional destinations.

In the second move of the simulation, the megaregions honed in on their most promising ideas by testing their efficacy and their practicality in the current and anticipated funding and technological landscapes. The most viable project concepts were evaluated by a team of Booz Allen modelers against dynamic impact models developed by the firm to determine their costs, benefits, and feasibility.

For example, the Florida team’s proposal to build an elevated transportation link to carry cargo and passengers from Orlando Airport to Disney World (and eventually to Tampa and the Kennedy Space Center) was found by the modelers to cost $240 million in its first phase; carry 9.4 million passengers annually; and reduce passenger travel on the Tampa to Orlando link by about 5 percent. And for another project—two
offshore ports that each could handle four 35,000-TEU capacity container ships at a time, one in the Gulf and the other on the Atlantic in north Florida—the Booz Allen model determined that about 25,000 additional jobs would be created and the state’s GDP would increase by about $3 billion, a .21 percent gain.

During the 2 days, the teams were connected to each other via sharing tools such as Google Docs, videoconferencing, email, telephone, and blogs so that at any time they could augment their own discussions and concepts with input from the other groups. The Finance and Federal teams proved to be a critical resource because much of what the megaregions were considering ultimately depended on funding from the public and private sectors as well as government support, policy changes, or management.

The Finance and Federal teams wrestled with similar issues, including the efficacy and structure of national infrastructure banks that could be funded by public and private funds; the decision-making process of the federal government in earmarking transportation money—that is, whether more performance- and quality-oriented criteria can be designed for making disbursement choices; and ways to cut out both political and financial red tape to speed up the timetable for the approval and eventual completion of transportation projects.

### Exhibit 3 | Megaregions’ Innovative Ideas

#### Chesapeake Crescent Megaregion:
- A new railroad and road tunnel south of Baltimore to alleviate congestion along the Eastern seaboard
- A high-speed rail project connecting Washington and Philadelphia to make passenger and freight transport more efficient all along the Eastern corridor, and to rejuvenate the Philadelphia regional economy
- Use of a “utility” model to manage transportation infrastructure region wide, so that marginal costs could be more accurately priced and users made more aware of their real costs and choices
- The development of a local food infrastructure system; a freight-only airport in the Washington, DC metropolitan area, possibly at an underutilized military airport, connected to rail and waterway nodes

#### Great Lakes Megaregion:
- Freight-only lanes in and around the Chicago congestion point, and the application of several new efficiency-boosting technologies to these new lanes (platooning and Intelligent Transportation System [ITS] technologies, for example)
- The use of high-speed rail to relieve airport congestion so that, for example, on regional flights passengers could fly into Milwaukee, WI and take high-speed rail into Chicago, thus alleviating congestion at O’Hare International Airport
- A more advanced consortium of states to better manage, and realistically price, transportation infrastructure in the region
- Relieving commuter congestion by allowing and facilitating off-peak truck delivery in the city
- Creating a freight rail line to by-pass Chicago

#### Florida Megaregion:
- At least one and preferably two new floating and movable superports off the coast of the state, one in the Atlantic Ocean and one in the Gulf of Mexico, in anticipation of the need to accommodate new super-large tankers coming through a widened Panama Canal
- The development of a statewide public service commission model for transportation
- The development of high-speed rail, with multimodal spurs, to connect Florida’s airports and create door-to-door corridor efficiency both for residents and for Florida’s large number of tourists
- The development of a superlink or “zipline” to transport people and ultimately goods and services East-West from Orlando Airport to Disney, reducing passenger travel on the Tampa to Orlando link by 200M PMT, approximately a 5% decrease

Source: Booz Allen Hamilton
Each of the megaregions produced practical—and often big—ideas for new transportation infrastructure projects that would benefit their megaregions. (For a compilation of the projects suggested by each megaregion see Exhibit 3 on previous page.)

**Overarching Themes**

Beyond specific projects, numerous broader conclusions were reached, common to all of the groups, pertaining to the overall direction and philosophy of transportation policies needed to reenergize infrastructure development in the coming decades. Among them:

- New operating models are necessary for regional collaboration and these should be facilitated by the federal government.
- Passenger and freight functions on public roads should be separated to relieve congestion.
- New pricing mechanisms for infrastructure projects are essential to drive more private sector investment and determine the amount of public sector funding.
- The federal government should move toward incentivizing best practices in projects and away from formula grants.
- A clearer understanding of project ROI and financing business models is critical.
- Project cycle must be accelerated and more predictable to encourage private sector investment.
- The value of infrastructure projects should be assessed based on more modern and relevant criteria, including safety, security, the environment, sustainability, and health.

In assessing the constraints that stand in the way of addressing these policy issues sufficiently so that infrastructure projects could be viewed as a competitive advantage for the country again, one participant said, “The US is decidedly behind the curve in developing integrated transportation approaches to create more holistic solutions, since we still are using a silo-based approach for planning purposes.”

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**Affording Our Re-Imagined Infrastructure**

To tackle critical funding issues, the Finance team, in consultation with the megaregions, proposed greater reliance on user-based fees to cover ongoing costs as well as adjusting the tax code to facilitate investment from private equity. This group also supported the creation of state, regional, and federal infrastructure development banks, funded with both private and public dollars.

The Federal team recognized that the government’s approach to infrastructure management is often burdened by legacy arrangements that no longer serve any useful purpose and may act as a drag on efficiency. The group conceded that the high transactional costs of federal government inefficiency deter both good ideas and private financing. As a result, the Federal team recommended changes in the way that the federal government interacts with states: instead of using traditional formulas to allocate money to states, federal agencies would use a performance-based model to stimulate a race to the top in state-of-the-art infrastructure. Moreover it was clear that megaregions saw a role for the Federal government in facilitating the interstate collaboration necessary for innovation.
On a more concrete scale, to encourage better infrastructure projects the Federal team proposed that the states and agencies consider making use of unused capacity on passenger rail lines by moving freight on these systems; retaining rights of way so that these corridors can be used for innovative transportation ideas in the future; and facilitating multistate procurement of transportation infrastructure to drive more efficiency into transportation management, expansion, and maintenance.

**Conclusion**

The simulation was unique because for many of the participants this was the first time that they were in the same room with their counterparts involved with different aspects of transportation infrastructure planning, development, and financing. It’s unusual for the public and private sectors, users and designers, and agency bureaucrats and sustainability activists to discuss face-to-face issues that, in the past, often brought each side to loggerheads—and slowed down or completely scuttled efforts to modernize infrastructure and drive real innovation into transportation programs.

In these meetings, the different constituencies came to realize that they had been wasting enormous amounts of time and energy competing with or looking past each other. They came to understand, too, that in the absence of carefully designed initiatives for infrastructure development in which all interests can be negotiated in pursuit of positive-sum outcomes, futile and wasteful habits will persist.

One participant in the simulation summed this up best by saying, “We need to require representatives of government, industry, and finance as well as representatives of the communities that are served by infrastructure, to get together, educate each other, and discuss issues in a constructive way, to generate and agree on innovative solutions and practical priorities in a rapidly changing and resource-constrained world.”
About Booz Allen

Booz Allen Hamilton has been at the forefront of strategy and technology consulting for nearly a century. Today, Booz Allen Hamilton is a leading provider of management and technology consulting services to the US and international governments in defense, intelligence, and civil sectors, and to major corporations, institutions, and not-for-profit organizations. In the commercial sector, the firm focuses on leveraging its existing expertise for clients in the financial services, healthcare, and energy markets, and to international clients in the Middle East. Booz Allen Hamilton offers clients deep functional knowledge spanning strategy and organization, engineering and operations, technology, and analytics—which it combines with specialized expertise in clients’ mission and domain areas to help solve their toughest problems.

The firm’s management consulting heritage is the basis for its unique collaborative culture and operating model, enabling Booz Allen Hamilton to anticipate needs and opportunities, rapidly deploy talent and resources, and deliver enduring results. By combining a consultant’s problem-solving orientation with deep technical knowledge and strong execution, Booz Allen Hamilton helps clients achieve success in their most critical missions—as evidenced by the firm’s many client relationships that span decades. Booz Allen Hamilton helps shape thinking and prepare for future developments in areas of national importance, including cybersecurity, homeland security, healthcare, and information technology.

Booz Allen Hamilton is headquartered in McLean, Virginia, employs approximately 25,000 people, and had revenue of $5.86 billion for 12 months ended March 31, 2012. Fortune has named Booz Allen Hamilton one of its “100 Best Companies to Work For” for eight consecutive years. Working Mother has ranked the firm among its “100 Best Companies for Working Mothers” annually since 1999. More information is available at www.boozallen.com. (NYSE: BAH)

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