Booz Allen Hamilton Systems Delivery Group

**Systems Delivery at Booz Allen**

In today's environment, large software projects routinely run significantly over budget and behind schedule. Booz Allen launched the Systems Delivery Group—a dedicated team of systems delivery professionals—in response to the market's need for a solutions provider that understands its clients' missions and business needs, delivers on time and on budget, demonstrates deep functional expertise and commitment to rigorous systems delivery life cycle processes, and appreciates the organizational and cultural challenges of delivering large, complex systems projects.

Systems delivery represents more than 20 percent of Booz Allen's annual revenue. The firm's public and private sector engagements span all markets and range from small prototypes to complex, large-scale, full life cycle engagements with hundreds of staff. Our staff have delivered complex solutions to help public and private sector clients in the following areas: Acquisition and Logistics; Back Office and Financial Systems; Business Intelligence and Data Warehousing; Biometrics; Case Management; Customer Relationship Management; Cyber Intelligence; Document and Content Management; Data Science Solutions; Enterprise Collaboration; Mobility; Grants and Payments; Learning Management Systems; Regulatory Inspection and Fraud Detection; and Systems Delivery Life Cycle (SDLC) Facilitation Tools.

**Firm-Wide Focus on Quality and Process Improvement**

For the past 15 years, Booz Allen has maintained industry recognized certifications for process maturity and product quality. We currently maintain an active Capability Maturity Model Integration® (CMMI®) for Development Maturity Level (ML) 3 rating, as well as an ISO 9001 certified Quality Management System. Our CMMI® ML3 rating was successfully refreshed in October 2014, and we are executing a tactical plan to achieve Maturity Level 4 by December 2015. The firm's CMMI®-compliant processes are institutionalized through more than a dozen certified CMMI® experts, including instructors, lead appraisers, and appraisal team leads.

The firm partners with national and international quality organizations such as the Software Engineering Institute (SEI) and CMMI Institute on industry-leading initiatives. For example, we:

- Collaborated with the CMMI Institute to develop the recently released Data Management Maturity model;
- Served as the first participant in an SEI-sponsored case study on the seamless integration of security processes with other CMMI-compliant processes; and
- Served as one of only five organizations worldwide to participate in the SEI’s original “Jumpstart” program to pilot the initial SCAMPISM B/C appraisal processes.

**Robust Framework for Managing Systems Delivery Risk and Quality**

To help ensure that proper risk and quality management processes are applied across our systems delivery business, the firm developed its Systems Delivery Framework. The framework leverages the firm's experts and leaders to provide the processes, tools, and oversight needed to manage the risks and challenges of systems delivery throughout the engagement life cycle. The framework signals the firm's commitment to quality. In fact, the quality of our software products exceeds industry standards. In 2013, the Average Defect Escape Rate for a Booz Allen systems delivery project was 1.81 percent, compared with an industry average of 15 percent.1

At a high level, the framework is composed of several key elements that support all systems delivery participants, from our business development team to the officers in charge of our engagements, our program managers, and our delivery teams. New officers, systems delivery program managers, and project teams receive training on the framework prior to project kickoff to ensure that proper risk and quality management processes begin on Day One.

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1 Booz Allen Average Defect Escape Rate vs. Industry, Economics of Software Quality (Capers Jones, 2011)
Key elements of the framework include:

- **A Dedicated Corps of Senior Technologists.** These specialists are embedded within each of the firm’s markets and work with delivery teams to execute the framework, institutionalize best practices, leverage firmwide capabilities, and proactively mitigate technical risks from capture through delivery. As Systems Delivery Leads, they cultivate a shared quality and risk ownership mindset among the officers, vice presidents, and program managers who are involved in the firm’s systems delivery business.

- **Standardized Processes to Enhance Quality and Minimize Risk During Project Execution.** These include application of the firm’s:
  - Engagement Risk Matrix, which outlines required activities to manage risk during each phase of the project life cycle and establishes approval gates and consistency checks.
  - Standardized Risk Assessment, Test, and Evaluation tool during the proposal, kickoff, and execution stages of the engagement life cycle to systematically assess key forms of management, operational, and technical risks associated with complex systems development projects. The assessments inform the frequency of project reviews to ensure projects remain on the right track from start to finish.
  - Best practice software estimation methodology and state-of-the-art estimating tools, which provide a fully documentable, repeatable, robust, and quantitative-based estimate.
  - Functional Review process to ensure the quality and suitability of products prior to client delivery. During Functional Reviews, designated Functional Specialists within each of the markets leverage their depth of experience and cross-project perspective to help project teams drive product quality and instill best practices. During project kickoff, the set of project artifacts that will be subject to Functional Reviews are identified; additional artifacts that may benefit from a Functional Review may be identified throughout the project life cycle.

- **Standardized Development Life Cycle Management Methodologies and Tools.** We use these to promote delivery consistency and enhanced quality. Our CMMI® Maturity Level 3 compliant process set—made up of more than 500 reusable templates, job aids, and processes—is tailored for project teams regardless of size, while ensuring that lightweight best practices for systems delivery can be quickly adopted and implemented. To ensure the highest degree of product quality and effectiveness, we invest in a team of SDLC continuous improvement experts who are responsible for culling leading-edge
In 1994, the Centers for Disease Control (CDC) launched the Vaccines for Children program to provide federal funding so that all children could have access to crucial recommended childhood immunizations. By 2004, the program’s outdated technology, inefficient processes and sprawling supply chain were constraining performance. After a critical flu vaccine shortage in 2004, the CDC launched a 10-year initiative to overhaul the program.

The CDC commissioned Booz Allen to conduct the first ever top-to-bottom review of the program, which led to a comprehensive suite of recommendations, including the need to update critical IT systems. As part of the project, Booz Allen supported the CDC with development and deployment of the award-winning Vaccine Tracking System, an innovative nationwide web-based solution for publicly funded vaccine ordering/forecasting and budget/contract management. The solution was completely deployed in May 2013. As a result, the lead time between vaccine orders and shipment to providers was reduced from approximately four weeks in 1994 to four business days or less today.

Agile Development at Booz Allen

Booz Allen has applied Agile systems development practices for more than 10 years. The firm has invested heavily in training, tools, and resources to facilitate adoption and implementation of the Agile mindset and practices, and has developed a formal partnership with the International Consortium for Agile (ICAgile).

The firm has more than 200 certified Scrum Masters and Project Management Institute Certified Agile Professionals; more than 400 developers trained in the Agile mindset and practices; and a cadre of 20 Agile coaches who provide delivery teams with tailored coaching to enhance agility and promote engineering excellence.

Our SmartSuite™ environment is a set of firmwide enterprise tools, processes, and intellectual capital that can be tailored to support Agile delivery in the areas of document management, team collaboration, continuous integration, requirements management, automated code reviews, testing, and defect tracking.

- Extensible development platforms ready for configuration by new project teams on Day One
- CA ERwin Data Modeler and TOAD (for SQL Server and Oracle)—to help database developers build, test, and debug SQL packages, procedures, triggers, and functions
- An automated testing framework and tools—to identify and remove code defects as early as possible in the development life cycle
- SmartSuite™—a comprehensive application life cycle management platform that supports programs that have adopted the Agile mindset to ensure system capabilities are traced through the development life cycle (requirement, design, development, test, deployment), and that real-time progress is communicated to all stakeholders

methodologies and tools for systems delivery; and piloting, testing, and incorporating them into the firm’s set of standard processes.

The firm provides its systems delivery community with centralized application life cycle management tools to ensure that project teams can get started on Day One with integrated tools to support development activities, measure and control project progress, and assess application quality as a part of daily activities. Other tools include:

- CAST and Sonar source code analysis software—used to improve code quality as a part of continuous integration activities
• **The Collection of Performance Metrics and Performance Tracking.** This ensures high quality solutions and client satisfaction. During project kickoff, the core set of measures the project team will collect are identified. The data is stored in the firm’s organizational measurement repository (DataDrill) where it serves as the building blocks to project-level indicators that are regularly reviewed by project leadership.

• **The Capture and Sharing of Innovations, Knowledge, Experience, and Best Practices.** This continuously enhances service and product quality across the board. Staff have access to a vast, centrally managed repository of materials that reflects the firm’s thought leadership and delivery experience. Materials include templates and checklists, processes, how-to videos, sample project deliverable content, standards, guides, and white papers. The templates and checklists support a variety of SDLC approaches including Agile methodologies, commercial off-the-shelf (COTS) solutions, evolutionary prototype, operations and maintenance, spiral, staged delivery, and waterfall.

**Focused Leadership Oversight**
The Systems Delivery Group conducts monthly Systems Review Boards with the firm’s leadership in each market to provide the necessary insight and oversight into systems delivery engagements. Program assessments include in-depth analyses of all major risk elements, including program management, technical delivery, financial management, scope management, resource management, security, and customer satisfaction.

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**Exhibit 1 | Scalable Standard Processes for Systems Delivery**

![Scalable Standard Processes for Systems Delivery Diagram](image)

Booz Allen’s standardized processes for systems delivery can be scaled by delivery teams according to project constraints and resources. They evolve over time based on best practices and lessons learned.

Source: Booz Allen Hamilton
Exhibit 2 | Sample Systems Delivery Performance Dashboard

Project Sprint Burndown

Defect Resolution by Sprint

Defect Backlog by Severity

Test Defect Closure Rate

System Code Violations

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<th>Name</th>
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<th>Number per File</th>
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<tr>
<td>Critical Violations</td>
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<td>1.42</td>
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Delivery teams use performance data to track progress against tasks and objectives. Data is also used to inform risk ratings as part of market-based Systems Review Board sessions.

Source: Booz Allen Hamilton
BAHx Fosters Software Reuse

Booz Allen recently launched its BAHx platform to serve as a single point of reference for sharing, obtaining, evaluating, and refining internally developed applications and libraries. Users are able to search for software based upon configurable fields such as tags, text, and average rating; and are provided with comprehensive information and supporting documents about each search result. A direct feedback system to an application’s point of contact allows users to ask questions, make recommendations, and leave reviews on the product. By providing a cohesive environment that includes supporting information and metadata, the BAHx platform allows project teams to easily identify software to satisfy clients’ requirements.

Scorecards are used to measure the degree to which markets are adopting the firm’s technical risk and quality management standards.

Thousands of Talented Professionals

Booz Allen’s systems delivery community consists of more than 2,700 talented professionals, including:

- 1,600+ software engineers and architects
- 400+ systems delivery program managers
- 300+ software requirements and test engineers
- 250+ data architects and engineers

Our staff are certified in industry-leading technologies, including:

- 1,400+ Microsoft Certified Professionals, Architects, Application Developers, Database Administrators, and System Administrators
- 100+ Oracle Certified Database Administrators and Engineers
- 125+ Certified Java/Javascript Developers
- 80+ Certified Cloud Architects and Amazon Web Services Certified Staff
- 80+ Certified SOA Architects

The firm invests heavily in the maintenance of 16 Functional Communities, championed by officers of the firm who are experts in their disciplines. More than 5,000 staff participate in the Software Development and Architecture Functional Community, where they connect with like-minded professionals, further their functional expertise, discover ideas to apply to their own client work, and develop new intellectual capital that they can contribute to the firm.

The firm provides its systems delivery professionals with a variety of opportunities for strengthening their technical skills and furthering their careers at Booz Allen, including:

- Traditional classroom training and self-paced, online courses on leading-edge technologies and programming languages, as well as the firm’s quality management and process improvement frameworks
- Tuition assistance for academic and technical certification courses and paid professional society membership
- External learning opportunities via university partnerships and technical learning providers. For example, the firm partners with:
  - George Mason University to offer a two-course sequence in front-end web development and Ruby on Rails
  - Indiana University Kelly School of Business to offer a graduate certificate program in Enterprise Resource Planning
  - George Washington University to offer both a Graduate Certificate and a Master’s degree in Computer Science
  - University of Maryland University College to provide three graduate certificate programs in cybersecurity
Strategic Alliances Help Deliver Business Value to Clients

Booz Allen maintains strategic alliances with technology vendors, enabling the firm to shape innovative solutions that combine the best of the firm’s capabilities with our partners’ leading products and services. In concert with our strategic partners, we possess the relevant technology and domain expertise to invent transformational new capabilities and new industries that don’t yet exist. Our partnerships position Booz Allen as our clients’ essential partner, and diversify our portfolio of networked businesses and business models.

Business partners include Amazon Web Services, Microsoft, Red Hat, Intel, Oracle, Salesforce, Apple, IBM, EMC, and 1776. The firm is investing approximately $1.5 million to train and certify staff in our business partners’ technologies. To date, more than 1,000 staff have benefited from this program. Other highlights of these relationships:

Amazon Web Services
• Partnership capabilities include: cloud services consultation, design, implementation, operation, and management; cloud hosting environments; cloud service brokering; application, platform, and infrastructure migration; data analytics; program testing; and proof-of-concept development
• AWS Premier Consulting Partner

Microsoft
• Partnership capabilities include: enterprise solutions; enterprise collaboration; cloud platforms (IaaS, PaaS, and SaaS); platform transformation; big data, advanced analytics and machine learning; secure data management; digital solutions; and enterprise mobility
• Member of Microsoft’s National Systems Integrators Program
• Federal Solution Integrator of the Year (2013)
• Windows 8 Partner of the Year—Volume (2013)

Red Hat
• Partnership capabilities include: cloud enablement (e.g., cloud infrastructure, management, and brokering); and cloud service hosting and reselling
• Awarded Red Hat Innovation Award for our work on the Army AcqBiz Private Cloud (2012)
• Awarded Systems Integrator of the Year Award—Public Sector (2013)
• Joined Red Hat’s Online Partner Enablement Network (OPEN) Program (2013)
• Joined Red Hat’s ManageIQ Open Source Community as a Founding Partner (2014)

• Gold Competency: Content and Collaboration
• Silver Competencies: Application Development and Mobility
In 2014, the Internal Revenue Service issued refund checks to more than 85 million Americans, money they want quickly, money they count on. The IRS has worked hard to speed up the refund process. At the same time, criminals tried to scam the system by submitting bogus returns. In fact, the nation’s tax refund system is under continuous attack. The challenge: how to catch and stop fraudulent tax refunds—without slowing down the overall refund process?

The IRS turned to Booz Allen to enhance the agency’s Fraud Detection Program and, in particular, manage the Electronic Fraud Detection System (EFDS). The EFDS, the agency’s first line of defense, scans all 145 million+ tax returns within hours of receipt and assigns a risk score. The risk score determines if a return will be processed (and, where appropriate, a refund issued), or requires further review.

For Booz Allen, the challenge was two-fold: improve the system’s performance; and enable ongoing modifications to an incredibly complex system, with minimal disruption. In particular, the Booz Allen team:

- Dramatically strengthened the agency’s ability to detect fraud in areas like the Earned Income Tax Credit program (the federal program with the second largest amount of improper payments next to Medicare) through new processes, systemic filters, and advanced analytics
- Drove business process improvements that reduced fraud and lightened internal workloads by improving the quality of returns coming in from paid return preparers
- Created a streamlined process to implement 40+ major software changes each year required by changes to the tax code; the process focused on both software upgrades and the “human side” (organization and training for the IRS staff)
- Designed and implemented new data models on a “fast track” basis, in time for each tax filing season to stay ahead of changes in the tax code that could create opportunities for fraud

The results are impressive. In 2012, the enhanced EFDS flagged more than 2.7 million potentially fraudulent returns and protected $16 billion in potential revenue loss—a 200 percent increase from the previous year and a 2,185 percent increase from when Booz Allen took over management of the system. During the same period, the IRS has maintained its commitment to getting legitimate refund checks in the hands of taxpayers quickly. In recognition of these outstanding results, the Booz Allen-developed fraud detection system won the IRS “Commissioner’s Award” in 2012.
About Booz Allen

Booz Allen Hamilton has been at the forefront of strategy and technology consulting for 100 years. Today, Booz Allen is a leading provider of management consulting, technology, and engineering services to the US government in defense, intelligence, and civil markets, and to major corporations and not-for-profit organizations. In the commercial sector, the firm serves US clients primarily in financial services, healthcare, and energy markets, and international clients primarily in the Middle East.

Booz Allen helps clients achieve success today and address future needs by applying functional expertise spanning consulting, analytics, mission operations, technology, systems development, cybersecurity, engineering, and innovation to design, develop, and implement solutions. The firm’s management consulting heritage is the basis for its unique collaborative culture and operating model, enabling Booz Allen to anticipate needs and opportunities, rapidly deploy talent and resources, and deliver enduring results. Booz Allen helps shape thinking and prepare for future developments in areas of national importance, including cybersecurity, homeland security, healthcare, and information technology.

Booz Allen is headquartered in McLean, Virginia, employs more than 22,000 people, and had revenue of $5.48 billion for the 12 months ended March 31, 2014. Over the past decade, Booz Allen's high standing as a business and an employer has been recognized by dozens of organizations and publications, including Fortune, Working Mother, Forbes, and G.I. Jobs. In 2014, Booz Allen celebrates its 100th anniversary year. More information is available at www.boozallen.com. (NYSE: BAH)

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