



Systems Engineering and Integration

Conceiving, Specifying, and Acquiring Complex Systems

Ready for what's next.

Booz | Allen | Hamilton

Booz Allen Hamilton Offers Systems Engineering and Integration Services Designed to Help Clients with their Acquisition Programs

Large-scale government programs inevitably present their stakeholders with complex challenges that span engineering, acquisition, management, and leadership. Only Booz Allen integrates all four of these areas to get systems built within the constraints of time, funding, changing priorities, and required operational performance.

The rise of system-of-systems programs and network-centric solutions has dramatically increased the inherent risk of large-scale defense, intelligence, and civil system acquisitions. Many systems extend beyond traditional program, command, and even agency boundaries, further complicating the task of integrating subsystems and components while synchronizing activities, budgets, and schedules.

With over 5,000 engineers and technical staff and decades of experience supporting large system acquisitions, Booz Allen provides Systems Engineering and Integration (SE&I) services that combine the “science and art” of SE&I to ensure that complex systems are developed and acquired on time, within budget, and to expected performance while managing risk.

Objective Integration Agents

How difficult is the modern integration challenge? A Government Accountability Office (GAO) report cites that in the US Department of Defense (DoD), nearly half of its major programs were running at least 25 percent over budget and experiencing average delays of nearly 2 years.

The government needs impartial agents with a broad range of leadership, acquisition, program management, and engineering skills to help conceive, design, integrate, and oversee the development of best-value



solutions. Impartial agents are also needed to provide objective advice and to avoid the inherent organizational conflicts of interest when Original Equipment Manufacturers (OEMs) have both systems engineering and development responsibilities.

As an integration agent, we apply our unique SE&I integration methods and techniques to help defense, intelligence and civil agencies build and integrate some of the world's most sophisticated information technology, communications, and mission systems. Booz Allen's SE&I professionals help mitigate risk and improve performance at every phase of the acquisition and

What is Systems Engineering and Integration?

At Booz Allen, we define Systems Engineering and Integration (SE&I) as the science and art of assembling components of a system to assure expected performance within cost and schedule.

The “science” component of SE&I entails classic systems engineering and program management disciplines, while the “art” of SE&I involves mastery of the acquisition processes and leadership environments in which a program resides.

systems development life cycle, from creating preliminary architectural designs to developing a system baseline, and from overseeing integrated master plans and schedules to managing security issues and other risks. Additionally, we work with each program's leadership to help develop tailored acquisition strategies that include win-win contracting incentivization approaches.

Booz Allen offers trained and certified staff following precise organizational standard processes and using proven engineering and management tools to assure system's specifications and acquisition success.

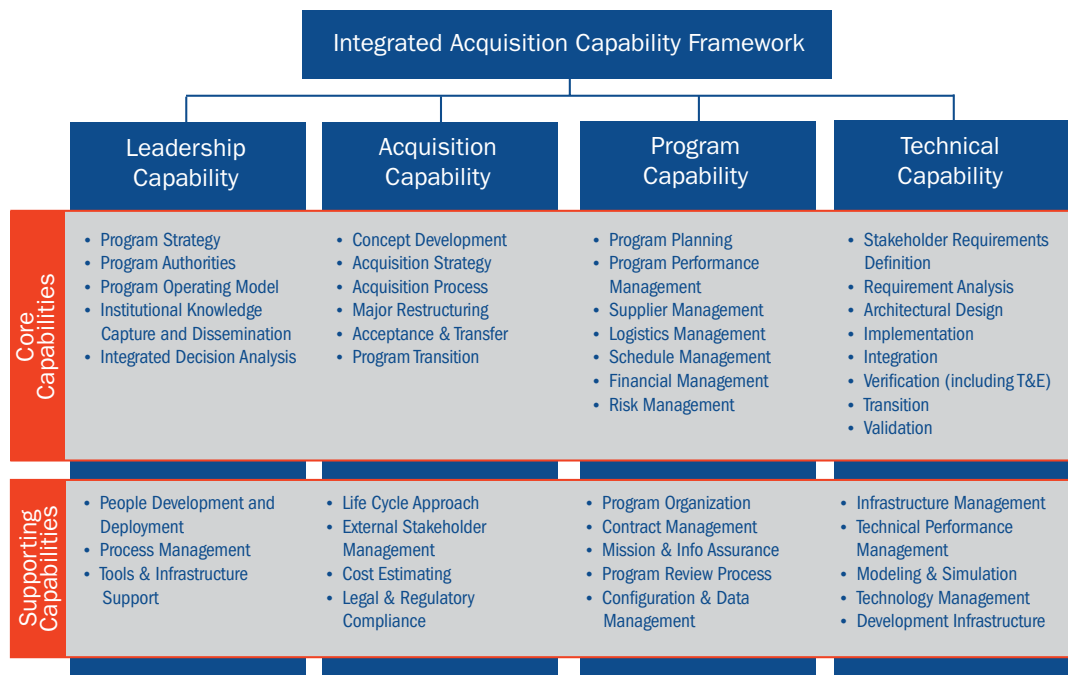
Unique Integration Methods and Techniques

Our distinctive SE&I methodologies and techniques include:

- **Integrated Acquisition Capability Framework** characterizes a complete set of leadership, acquisition, program, and technical capabilities found to be critical to system-of-systems development and acquisition

success based on research of over 130 government and industry programs.

- **Integrated Capability Assessment Methodology (ICAM)** objectively measures the maturity of an organization's people, processes, tools, and governance across the 40+ dimensions identified in the Integrated Acquisition Capability Framework.
- **Mission Engineering®** deconstructs and associates mission requirements, business processes, operational capabilities, existing architectures, information, data, and interfaces within a relational framework that feeds and informs milestones and deliverables across the systems engineering life cycle. Data from this approach maps to all government and industry enterprise architecture frameworks (e.g., DoDAF, FEAF).
- **Total Baseline Integration** creates an innovative program-specific cross-reference schema to build and integrate the program's baselines, and enable leadership to evaluate the impacts of changes to any portion of the program's performance, cost, schedule, and risk baselines.



- **Cost/Schedule As an Independent Variable (CAIV/SAIV)** employs our Total Baseline Integration methodology to make better informed cost and schedule trade-off decisions caused by intrinsic or extrinsic changes to one or more of the baselines.
- **Risk Integrated with Cost and Schedule—Intelligently Quantified™ (RISC-IQ™)** quantifies the probable cost and schedule impacts, in terms of dollars and days, of alternatives to accept, mitigate, or transfer risk.
- **Design for Affordability (DfA)** entails the detailed knowledge and decomposition of a system’s design, construction, test, and sustainment cost drivers to optimize the technical baseline in a manner that dramatically reduces the system’s Total Ownership Cost (TOC).
- **Life Cycle Management Process (LCMP)** is a tool-enabled, Web-based process that provides system asset configuration, availability, maintenance, financial, and modernization planning data in a “.mil” (NIPRNET) environment across a fleet of assets to improve an organization’s shared knowledge and decision-making capability.



How does Booz Allen attack the SE&I challenges of complex system acquisitions?

- We bring a fierce objectivity—free from an OEM’s potential conflict of interest—to provide impartial advice and recommendations.
 - We offer deep mission systems insight and domain understanding that come from years of working with clients in nearly every aspect of their operations.
 - We assign staff who are trained and certified in our proprietary methods and techniques, as well as industry-recognized certified processes, for proper application to complex program challenges.
 - We adhere to Booz Allen’s proven Organizational Standard Processes (OSP) to assure disciplined planning of all work activities, the integration of activity dependencies, and ultimately proper assignment execution.
 - We use Booz Allen’s SE&I tools and infrastructure, including our Program Management Environment (PME) for creating, sharing and securing programmatic, technical, and contract data among managers, staff, teammates and clients.
 - We embrace performance-based fees tied to how well our SE&I analyses and artifacts help meet acquisition program performance, cost, and schedule goals.
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- **Dynamic Capability Assessment Model (DCAM)** is a data-driven decision support application that helps manage complex, open-ended portfolio planning and scheduling problems. The DCAM tool tracks costs, schedules, and resource requirements across a portfolio of related programs and generates visualizations for decision makers to evaluate “what if” scenarios rapidly.

Helping US Government Leaders Acquire Complex Systems

With domain experience that stretches across government to include nearly every civil, defense, and intelligence agency, we bring both operational and engineering experience to every engagement.

Our recent SE&I engagements include:

- **International Space Station (ISS).** Booz Allen is in its 23rd year of helping NASA address its most complex SE&I and program management challenges. Currently providing SE&I, IT infrastructure, and program controls support to the International Space Station, Booz Allen developed sophisticated models and simulations that contributed significantly to the design and assembly of the ISS, which now supports a permanent presence for six crew members in low Earth orbit conducting microgravity and life sciences experiments.



- **Air Force Military Satellite Communications Systems.** The US Air Force Space and Missile Systems Center (SMC) selected Booz Allen Hamilton to be the SE&I contractor to develop the next generation high-bandwidth global satellite communications network to transform military operations. Booz Allen's CAIV methodology closed a \$3 billion affordability gap while still satisfying mission requirements.

- **Constellation.** The National Aeronautics and Space Administration (NASA) awarded Booz Allen a prime contract to provide SE&I and Test & Evaluation Services to replace the Space Shuttle for human space flight and to achieve space travel beyond low Earth orbit, to the moon, and ultimately Mars. The implementation of Booz Allen's Total Baseline Integration (TBI) methodology is helping assure rigorous integration of the program's technical, cost, schedule and risk baselines.





- **Operational Support Aircraft (OSA), Very Important Person (VIP), Special Air Mission (SAM) Aircraft Acquisition and Modernization.** Booz Allen provides acquisition and system/subsystem modernization services to the Air Force in support of the OSA/ VIP/SAM aircraft fleet. Our systems engineering services include defining the technology needs, mission capabilities, and enterprise architectures supporting multi-year, multi-platform modernization efforts. These efforts ensure that our nation's most senior leadership have affordable and reliable command and control capabilities while on board these aircraft.

- **Security Systems Engineering (SSE) for the Department of Defense and Intelligence Community.** Booz Allen provides Information Systems Security Engineering (ISSE) to the DoD and IC by: developing and implementing security architectures (such as Computer Network Defense Architecture development for the Global Information Grid (GIG)); generating standards and system-level designs for high assurance products and systems (including policy development and risk identification for the DoD Public Key Infrastructure (PKI)); and supporting operational enterprise networks (including Threat/Risk Modeling for the Cryptographic Modernization Program).



- **KC-135 Stratotanker Systems Engineering and Integration Support.** Booz Allen provides strategic planning, SE&I services and execution support for the acquisition, modernization and sustainment of this aging fleet of aircraft. This includes performing systems engineering analyses to evaluate historical aircraft performance data, and using Booz Allen's Life Cycle Management Process (LCMP) to identify and understand interdependencies among the KC-135 fleet. These collective analyses are used to optimize technology readiness, schedules, and budgets to meet current and future Air Force aircraft availability and operational requirements.

- **Global Broadcast Service.** Booz Allen leads the systems engineering, architecture design, test & integration, and operational transition of this worldwide networked satellite broadcast and information management system for the US Air Force Electronic Systems Center (ESC). We have supported this client for over 10 years providing a full range of SE&I services for the GBS system to deliver intelligence, warfighter mission data and situational awareness to tactical units around the globe.



- **US Army Tank Automotive Research, Development, and Engineering Center (TARDEC).** TARDEC employed Booz Allen's Integrated Capability Assessment Methodology (ICAM) to provide an objective evaluation of the SE&I capabilities through an assessment of several programs across the enterprise. The assessment established a baseline that identified areas for improvement, made the business case for change based on risks and opportunities, and provided a prioritized work plan to help enhance future capabilities and performance.

- **Army Strategic Services Sourcing (S3) Contract.** Booz Allen supports the US Army and Joint Service organizations in developing, fielding, and providing life cycle support for tactical C4ISR sensor systems by providing tailored rapid acquisition support and SE&I services to facilitate Quick Reaction Capability (QRC) development and major programs of record. This support includes QRC prototyping, system-of-systems architecture design and acquisition support to programs and initiatives.



Ready to Help You

Sophisticated technologies, complex interfaces, demanding schedules, rigid milestones, and changing requirements represent daunting management challenges. In some instances, programs also grapple with hardware vendors whose solutions are clouded by vested product line interests.

Our SE&I services address these problems with expertise, tools, and processes that can help government program executives direct development contractors and shepherd programs through all phases of design and acquisition. We understand both the science and art of SE&I. We ask our clients to measure us by our value added impact on system cost, schedule and performance.

We offer deep systems expertise and broad domain knowledge that comes from working in nearly every government office and agency.



A Broad Spectrum of SE&I Services

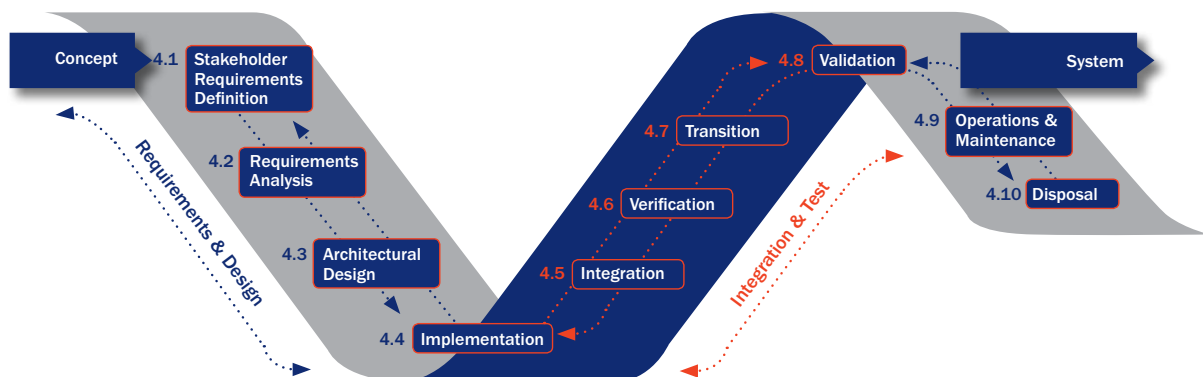
Booz Allen's SE&I services are fully informed by our consulting heritage, extending beyond traditional systems engineering functions to address the multi-dimensional challenges facing today's acquisition programs.

- **Design Through Testing Services.** We advise, train, supplement, and serve as the government's SE&I agent by offering trained engineers and systems experts, backed by a robust supporting infrastructure that includes in-house Organizational Standard Processes, a Program Management Environment, proprietary methods and techniques, models & simulations, prototypes, and laboratories.
- **Integrated Acquisition Management Services.** We define, generate and maintain the programmatic and technical plans, analyses, reports and baseline documentation needed to support concept development, demonstrate technological feasibility, and initiate systems development activities—in accordance with milestone requirements, decision authority criteria, and contracting options and procedures.
- **Program and Technical Integration.** We employ our Total Baseline Integration methodology to develop and integrate the program's performance, cost, schedule, and risk baselines and their component artifacts to enable better trade-off decisions.
- **Program Leadership Services.** We leverage objective counsel, best-in-class practices, organizational design and scenario-based simulations to test strategies that help leadership define decision rights and authorities, provide knowledge capture and dissemination, direct personnel deployment, and coordinate process management.
- **Program Assessment and (Re-)Structuring.** We apply Booz Allen's Integrated Acquisition Capability Framework—our complete articulation of requisite SE&I cross-functional competencies—to measure objectively an organization's or program office's strengths and weaknesses and to help ensure systems acquisition and development success.



To learn more about Booz Allen's SE&I services, visit www.boozallen.com/sei.

Design Through Testing Services



Booz Allen's SE&I Leadership Team

Each federal agency requires solutions that address its distinctive history, culture, and mission. Led by officers with extensive SE&I experience in government and commercial sectors, Booz Allen's SE&I professionals bring in-depth domain knowledge that enables us to understand our clients' unique challenges, and to build systems and solutions that address their unique mission needs.

Meet our leadership team:



Ken Wiegand currently leads Booz Allen's SE&I business across the firm. He has over 35 years of experience in systems engineering and integration, and intelligence systems planning for national security and defense clients.



Bill Bastedo leads the firm's work with NASA, including the Constellation, International Space Station, and Space Shuttle related programs. He has 25 years of experience in government and industry as a systems engineer and project manager supporting NASA's most critical spaceflight programs.



Trish Goforth is a leader of Booz Allen's Defense IT Infrastructure business. She has over 25 years of experience in SE&I of IT communications systems and MILSATCOM systems, delivering secure, reliable information for the Defense Information Systems Agency (DISA) and other Defense clients.



Ron Kadish leads Booz Allen's aerospace business. With over 35 years of experience, his insights as the Program Director of the F-15, F-16 and C-17 programs, the Commander of the USAF Electronics Systems Center, and the Director of the Missile Defense Agency (MDA) informed Booz Allen's Integrated Acquisition Capabilities (IAC) Framework.



James Manchisi has over 30 years of experience designing and developing space, communications and navigation systems and leading aerospace businesses. He currently focuses on providing SE&I services to the Federal Aviation Administration and aviation markets.



Angie Messer has over 25 years of experience leading Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) and Information Technology efforts for DoD and US Army clients.



Sam Porgess has over 25 years of experience in systems engineering and integration of complex space systems and ground infrastructure. He leads a team that executes SE&I programs for the USAF's Space and Missiles Systems Center (SMC) and other clients responsible for developing complex space systems.



Carol Staubach has over 30 years of acquisition, operations and management experience, primarily with the National Reconnaissance Office (NRO), in satellite and ground systems, ground station operations, and R&D programs. She received the 2006 Women in Aerospace Lifetime Achievement Award.



John Thomas is Booz Allen's Senior Systems Engineer. He supports SE&I activities across our defense, intelligence and civil markets. He has over 30 years of experience delivering large, complex mission systems and is the current President-elect of the International Council of Systems Engineering (INCOSE).



Jack Welsh leads Booz Allen's SE&I and technical analysis business with the National Geospatial-Intelligence Agency (NGA). He has over 25 years of experience in SE&I, IT strategy, Scientific Engineering & Technical Assistance services, and mission integration.



Lee Wilbur currently leads Booz Allen's SE&I activities in the Army and Missile Defense Agency (MDA) markets. He has over 25 years of experience in systems engineering and integration for large, complex, distributed systems in the areas of space, missile defense, advanced aircraft, and ground combat.

About Booz Allen Hamilton

Booz Allen Hamilton has been at the forefront of strategy and technology consulting for 95 years. Every day, government agencies, institutions, corporations, and not-for-profit organizations rely on the firm's expertise and objectivity, and on the combined capabilities and dedication of our exceptional people to find solutions and seize opportunities. We combine a consultant's unique problem-solving orientation with deep technical knowledge and strong execution to help clients achieve success in their most critical missions. Providing a broad range of services in strategy, operations, information technology, systems engineering, program management, and organization and change, Booz Allen is committed to delivering results that endure.

With more than 22,000 people and over \$4.5 billion in annual revenue, Booz Allen is continually recognized for its quality work and corporate culture. In 2009, for the fifth consecutive year, *Fortune* magazine named Booz Allen one of "The 100 Best Companies to Work For," and *Defense News* magazine has ranked the firm among its "Top 100 Defense Companies" in 2009.

To learn more about the firm, visit www.boozallen.com.

Booz Allen brings an independent perspective and collaborative approach to every engagement, helping federal clients by making their mission our mission and delivering results that endure.

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delivering results that endure