

**Building Modern Infrastructure:
Effectively Blending Campus Construction,
Physical Security and Information Technology**

INTRODUCTION

While “trusted partner” became almost a maligned term among information technology bloggers a few years ago, we remained confident that the trust we had earned from our government partners to deliver the most effective, lasting IT solutions in the industry was stronger than the latest trend. With taxpayer dollars invested and lives sometimes on the line, we are proud to have earned the trust to help our customers navigate a complex, challenged, and ever-changing IT landscape. Today, federal agency leaders responsible for the modernization of aging infrastructure continue to face a daunting task made more difficult by shrinking IT budgets, rapid changes in emerging technology, more stringent mandates for energy efficiency, and ongoing concerns regarding the security of information. The benefits of modernization certainly outweigh the risks, but the effort can be complex enough that if not done systematically and with the right people and processes in place, both human and technological issues will result, eventually leading to mission failure.

Governance, Project Management, Systems Engineering and Management of Change practices are critical elements of successful enterprise level transformation, but ultimately, success relies on choosing an experienced and collaborative systems integrator as a mission partner, one with a deep grasp of the challenges, a wide view of the landscape of current and future technologies and domains, and a thorough understanding of the government customer. With broad experience and strong working relationships with customers, innovators, vendors and other leaders in the industry alike, General Dynamics IT has made make the difference in delivering a few of the most complex IT transformations in the world, on time, within budget, and of lasting value and greatest mission impact. Below, we offer notional factors to consider when embarking on mission critical transformation involving both IT and construction, which we have gathered from our own experience delivering successfully complex IT modernization efforts to the Nation, despite seemingly insurmountable odds.

CONTRACT CONSIDERATIONS

Before a systems integrator is chosen, it is critical to create contracts with clear lines of responsibility, reporting and performance definitions, resisting the temptation to include IT requirements within contracts for architecture, engineering and construction (AEC). While including IT requirements may appear to simplify the process at contract creation, execution of the contract can quickly become complicated, especially in a multi-vendor environment, rarely resulting in an effective IT solution. More often than not, an agency is left instead with an inadequate IT infrastructure with outdated technology at best, and a broken contracting process with finger-pointing, cost and schedule overruns, and multiple contract cost overrun claims at worst.

To avoid these issues, agencies should consider the following best practices when procuring campus or facility IT solutions as part of a modernization effort:

- Provide at least two (2) separate contracts, one for construction and one for IT services;
- Award the construction and IT services contracts at the same time;
- Engage a systems integrator skilled in IT solution design and services early with implementation processes and incentives to collaborate to lower risk and reduce inefficiencies; and
- Establish Project Leadership Teams comprised of the agency, construction contractor and IT contractor leads that meet regularly throughout the design and implementation phases to coordinate activities and expectations.

When identifying project scope, it is important to distinguish between the passive and active IT infrastructure design categories. Passive infrastructure involves power, planning for data center, closet and IT floor space, as well as cooling and cabling components. Active infrastructure involves end user clients for voice, video, and workstation, the computing, storage and network devices supporting the backend application and systems requirements, and conference rooms, access points and cameras. The scope of the passive infrastructure project includes the data center layout, raised floor and cable management systems, protective distribution systems for classified communications, power and grounding, cooling layout and capacity, and network cabling and terminations. Passive systems planning will allow for the accurate placement of wireless access points, cellular coverage, camera coverage and physical security endpoints (e.g., sensors, doors, access control).

IT SYSTEM ARCHITECTURE

The foundation for any mission critical system is an IT system architecture that supports overall mission requirements. Translating mission requirements into the appropriate IT architecture requires highly specialized experience and technical knowledge. A modern IT infrastructure is a complex mix of passive and active components, virtualization, consolidation, multi-level security and shared services.

The role of the IT systems integrator is to become the agency's trusted advisor, understanding not only what each desired mission capability is, but also why that capability is needed. Leveraging this in-depth understanding at the beginning ensures the right capabilities are built into the IT architecture, the correct tradeoffs are performed at low risk and acquisition costs are balanced against total cost of ownership throughout the lifecycle. Only an IT systems integrator can offer the sort of comprehensive, holistic approach required to deliver a lasting and effective technology solution, one that supports an agency's mission now and into the future.

By executing an acquisition strategy that promotes at least two separate but parallel contracts for both the AEC and IT contractor, the agency will save money by creating an environment where IT and construction efforts are unified and efficient.

The following table outlines common IT challenges that may be experienced when building out or modernizing a campus or facility when the IT systems integrator is not involved early enough in the design and implementation process.

Challenge	Single Contract Approach	Result
Intelligent Building Systems Today's Leadership in Energy and Environmental Design (LEED) guidelines often require the implementation of highly complex IT systems that efficiently control building functions such as lighting, heating/cooling, irrigation, etc.; these systems often require specialized sensors, controllers and wiring paths for automation	Controllers as implemented do not match the final system design, and may, for example, lack adequate pathway, termination and fixture selections	IT systems integrator designs the various systems to meet LEED, operational and mission requirements only to find that new pathways, unanticipated modifications to termination types and fixtures force retroactive accommodation of the design
Physical Security Modern physical security systems have evolved from analog cameras and guarded doors to complex IT systems comprised of thousands of sensors, digital cameras and access control systems	Key attributes like camera angles, turnstiles, access control panels, door hardware, scanners, intrusion detection mechanisms and security posture, required by security policy, are overlooked during design phase	IT systems integrator develops a design that meets agency requirements but results in significant construction modifications to accommodate required camera locations, door hardware, access panels, etc.
Pathways Location, sizing and access to communication cabling pathways throughout a building and across a campus are often inadequately constructed or non-existent, if not specifically requested by the IT contractor	The under sizing of pathways, need for additional pathway capacity and the required access are caused by the use of outdated industry standards	Construction change orders for pathways that need to be increased in size, number and possibly reengineered to meet IT cabling requirements
Technology Advancements Advances in available technology for the systems used for cabling, wireless, end user, audio visual, cameras, access controls, etc., are not fully understood or adopted	Technologies that are widely accepted are not included in the agency's IT vision for future technology adoption roadmaps	Cutting edge technology may not be compatible with an outdated construction design now in place, causing significant rework to offer the agency opportunity to leverage innovation

CONCLUSION

While it may require a little more effort up front, experience has demonstrated that an acquisition approach with separate and distinct, but coordinated, contracts for construction and IT results in greater collaboration, increased transparency, fewer implementation errors and change orders down the road. Following this approach and choosing the right systems integrator are instrumental to the on-time delivery of a total modernized IT and construction solution of greatest mission impact and lasting value to the agency.