Assessment of Key Requirements and Components of the Emergency Communications Transformation Program (ECTP)

Prepared at the request of the First Deputy Mayor

August 6, 2014

1 Executive Summary

1.1 ECTP Background and Objectives

In 2004, the City of New York (the City) began the Emergency Communication Transformation Program (ECTP), a five-year project to modernize and consolidate the City's 911 emergency communication system, the most complex and expansive system in the nation. City plans included the establishment of two distinct and fully redundant call centers. Eight years later, in December, 2011, as part of the Emergency Communication Transformation Program (ECTP) the NYPD and FDNY 911 operations were co-located into the first Public Safety Answering Center. Since then, the City has been moving towards the development of the second PSAC to ensure fully redundant operations for the first time in its history. By the end of calendar year 2013 the projected opening date for PSAC2 was December 2015. During a May 2014 briefing for the City's First Deputy Mayor, it was communicated that the go-live date for PSAC2 had slipped dramatically and would now be delayed to 2018. In addition to the delay, the cost was expected to increase by at least $100 million. Finding this delay and cost increase unacceptable, and knowing the history of the troubled program, on May 18 2014, First Deputy Mayor Shorris ordered a full assessment of all facets of the program including budget, schedule, and governance to be conducted over the following two months. This assessment, to be lead by the DoITT Commissioner, was to determine the current state of the program and to make recommendations on how to correct any deficiencies in the overall management of the program going forward. First Deputy Mayor Shorris also asked the Department of Investigation and the Office of the Comptroller to conduct independent reviews of ECTP. A separate operational assessment of ECTP, as described at bottom of this section, is also being conducted.

It was apparent that in recent years, there had been a lack of transparency and collaboration among all stakeholders. In response, the City convened a multi-agency assessment team of the program's most senior stakeholders to ensure that the right expertise was readily available and would all be accountable for developing a go-forward strategy for program delivery. The team included representatives from the Fire Department of the City of New York (FDNY), New York City Police Department (NYPD), Department of Design and Construction (DDC), Office of Citywide Emergency Communication (OCEC), Department of Information Technology and Telecommunications (DoITT), Office of the Mayor, and Office of Management and Budget (OMB).

For the past two months, this team spent many hours a day together to conduct the assessment, with the support of both operations as well as technology units. KPMG LLP (KPMG) supported the assessment team, providing analysts who assisted the City in documenting findings, observations, and developing the recommended next steps.

The assessment included a review and validation of the scope, schedule, budget, and governance of the entire program. This report documents the objectives, key findings, and recommendations for each of these areas. Further details and supporting documentation are contained in the appendices.

Based on the findings and the recommendations of this intensive review, the program scope has been revised to be more complete and accurate. While it was necessary to add key requirements that had been previously excluded from scope, the completion date of the program has been pulled in by approximately 18 months from the earlier 2018 estimate. Further, despite increased scope, the outstanding key deliverables of ECTP will be completed within the remaining ECTP capital budget.

This assessment's findings are in agreement with the initial findings of the Department of Investigation's review of ECTP. The program will continue to work with the Department of Investigation to help ensure that recommendations are appropriately implemented. Additionally, the program will consider the findings and recommendations of the ongoing Comptroller's review.

In addition to this assessment of the ECTP, the Mayor's Office of Operations is coordinating a separate operational assessment of 911 call taking operations. Some items raised during the ECTP assessment, deemed to be operations-based in nature, were referred to this separate Operations review.

1.2 Key Findings

The following findings detail the challenges faced by the program in the areas of management, scope, schedule, budget, and vendor management.

1.2.1. Governance Key Findings

Multiple stakeholders cited the overall governance of the program as a serious and significant issue. During the program's lifetime, several governance models have been implemented to address oversight and management; however, none of these models have offered clear accountability or direction for stakeholder decision making and escalation. ECTP is a complex program, made up of several related technology and building projects. While each underlying project has had processes in place to provide oversight of its specific activities, the program did not have clear processes in place to manage its overall scope, schedule, and budget. Other key governance findings include:

- The lack of strong governance also hindered communication and the sharing of critical information among agencies. This subsequently resulted in multiple scope and delivery changes and the development of a budget that did not fully support future operational needs.
- The City has relied on the consultant Systems Integrator to provide staff for roles that could be more effectively filled by City employees.
- In the past, there was inadequate executive-level participation in, and support of, the ECTP program.
- Since August 2010 OCEC has had a clear mandate to aggressively implement the program and had exclusive control of the scope, schedule, and budget. In exercising this authority, they often did not engage the stakeholder agencies at a meaningful enough level for a program of this complexity.

1.2.2. Scope Key Findings

The assessment revealed a lack of clarity and agreement regarding the precise scope of ECTP as well as which items directly impacted and influenced other critical components of the program. It was also apparent that some past scope decisions had been based on whether an item met the program's predetermined budget and time line criteria regardless of its necessity. Key scope findings include the following:

- Components of the program were designed in a way that will not support development of the latest 911 technology standards, (known as NextGen 911), and will require obsolete technology to be replaced in order to integrate NextGen 911 functionality, such as allowing text message communications with 911.
- Over 15 critical items that had previously been excluded from the scope of ECTP were identified as being essential for its successful completion.
- A maintenance and support structure was not put in place as phases of ECTP were implemented. Without that structure, maintenance and equipment refresh needs were rolled into the scope of ECTP. As a result the assessment identified activities that are necessary to maintain current and effective 911 operations but are not within the scope of ECTP.
- A major challenge in managing a program as large as ECTP, being executed over several years, and across multiple agencies, is the difficulty developing a project scope with enough detail to support a firm schedule and budget. In lieu of a well-defined scope, the program has been challenged to define each component and initiative within the program, in real time.

1.2.3. Schedule Key Findings

The primary reason for undertaking this assessment was to understand why the previously published go-live date for First Call at PSAC2 was to be delayed from December of 2015 to May of 2018. Key schedule findings include the following:

- Project plans had not included necessary upgrades to 22 remote radio sites. Adding the site upgrades to the plan was the main reason for the delay in the program's scheduled completion date by nearly three years, until May 2018. The assessment uncovered that the remediation could be managed incrementally and concurrently outside of the program schedule, thereby not impacting the delivery of the program's remaining key components.
- Due to the ambiguity of the ECTP scope, the pre-assessment schedule did not include all relevant ECTP tasks and the schedule was affected by the inconsistent management of scope changes, a lack of stakeholder engagement in the development of the schedule, and a lack of visibility of schedule dependencies.
- ECTP was managed as one extremely large program with many interdependencies and highly complex initiatives scheduled to be executed sequentially. Each was considered critical to the program's success. In reality, not all the initiatives are required to be completed sequentially and several can be decoupled and delivered independently of ECTP, and in doing so can reduce the overall duration of the program.
- With the breadth of previously excluded requirements is better understood, it is clear that December 2015 is not a viable completion date. Most of the major components of the program (i.e., PSAC2 and the Fire Department Computer Aided Dispatches (FDCAD)) will be completed in 2016 with residual items completed in 2017.
- The System Integrator's internal contracting processes take months and have adversely impacted the program schedule.
- The City's own lengthy procurement cycle has also compounded the impact to the program schedule.

1.2.4. Budget Key Findings

Budget status was not effectively communicated across agencies or effectively escalated to senior management when budget needs were in question. Key budget findings are:

- The approved ECTP capital budget is $2.03 billion. Of that, there is a residual balance of $377 million in unspent and un-contracted funds to complete the planned remaining scope. While it was necessary to add key requirements that had been previously excluded from scope, we believe that the outstanding key deliverables of ECTP will be completed within the remaining ECTP capital budget.
- The City can reduce the costs of certain tasks and achieve a more responsible budget by removing select work from the scope of vendor contracts that can be performed by City staff, by changing certain technology decisions, and by de-scoping unnecessary work.
- To date there has been no detailed, comprehensive budgetary planning for ongoing maintenance costs that begin to be incurred upon completion of each component of ECTP. Some of these costs have been covered from within the existing ECTP budget as they have been incurred rather than setting up a sustainable structure for ongoing support.
- A lack of reconciliation with the City's Financial Management System (FMS) resulted in the inaccurate tracking of spent and unspent funds.
- Over-reliance on the System Integrator, a clear mandate to stay on schedule, and a long procurement process have resulted in the City purchasing goods and services through the System Integrator's contract, even when there were more cost-effective procurement vehicles.

- In addition, the City has relied on the System Integrator to provide staff for roles that could be effectively fulfilled by City employees.

1.2.5. Vendor and Contract Management Key Findings

Vendor and procurement management was repeatedly cited as a significant and long-standing issue. The program did not have a strategic or collaborative approach for managing the array of vendors that support the technology and construction efforts of ECTP. Multiple vendors work on a range of projects across various work streams for a host of different stakeholders and agencies. Work has typically progressed in an isolated manner with limited collaboration between agencies and little understanding of each other's interaction with vendors. This has caused an excess of "touch points" between vendors and the program, resulting in conflicting messages to vendors about requirements and priorities and further exacerbating schedule and scope issues. Other key findings include the following:

- The program did not distinguish between vendor management and contract management, at times treating the two as one and the same, thereby reducing its ability to recognize both systematic vendor issues and discrete contract issues.
- Multiple layers of management and oversight, at times with vendors managing other vendors, further complicated vendor and contract management and contributed to the isolated nature of the program.
- Staff positions within the OCEC vendor management unit were left unfilled for many months, thereby impacting the program's ability to monitor vendor performance.
- Contract negotiations often occurred on a contract-by-contract basis without an understanding of the complete list of contracts awarded to, or being negotiated with, the same vendor, thereby precluding opportunities for negotiating favorable financial terms or integration opportunities.

1.3 Recommendations

Following is a summary of the recommendations to address the findings identified during the assessment.

1.3.1 Governance Recommendations

- Implement a governance model that enables and requires sustained participation from all stakeholder agencies for the duration of ECTP.
- The governance model should include executive-level oversight with active and committed participation from agency heads.
- Leverage processes established under the governance model so that issues are escalated, decisions are made quickly, and change is managed effectively.
- Reassess and reallocate resources to integrate OCEC, DOITT, NYPD, and FDNY technology and program management resources into a single, cohesive program team, thereby changing the paradigm of an oversight-agency (OCEC) managing a project for multiple stakeholder agencies.
- Establish an inter-agency Program Management Office (PMO) to realize the new governance model. The PMO will be established in DoITT but will include staff from all stakeholder agencies and will report into an inter-agency steering committee.
- While the governance model is intended to enhance communication and collaboration, the DoITT Commissioner should be charged with managing the ECTP program and must have authority to make decisions that could affect the scope, schedule, and budget. It is important that the Commissioner maintain an open line of communications with the stakeholder agencies and that the agency executives are engaged and supportive of final decisions.

1.3.2 Scope Recommendations

- While the assessment was able to identify gaps in scope and more effective implementation strategies, collaborative efforts must continue to identify and help maximize further opportunities to manage scope, schedule, and budget.
- Continue to aggressively manage the scope of the ECTP program so that the critical deliverables, fully redundant PSACs, and new Computer Aided Dispatch (CAD) systems are delivered.
- Beyond the scope of ECTP work should commence to develop a longer-term strategy for 911 technologies, including but not limited to the implementation of NextGen 911. This longer-term strategy should include a review of opportunities to reduce cost and improve operations through consolidation of systems and system support.

1.3.3 Schedule Recommendations

- Wherever possible, sub-projects and work streams should be decoupled and dependencies eliminated, resulting in multiple, smaller, and more manageable projects. Breaking up very large technology initiatives into smaller, more discrete and attainable parts can allow the City to adapt to advancing technologies as well as expand the pool of potential vendors able to successfully bid on a project.
- Work with the vendors to reduce their lengthy internal contract/work order review and approval processes that have introduced delays to the ECTP schedule.
- Closely manage the City's procurement life cycle to avoid schedule delays.
- Implementation of the FDNY's CAD system is critical to the success of the program; however, the procurement process is behind schedule and should be expedited.

1.3.4 Budget Recommendations

- Develop a strategy for in-sourcing and identify city staff and resources that can replace roles currently performed by consultants.
- Ensure that the City is getting best value by developing a sourcing strategy for the remaining procurements.
- Finalize outstanding major procurements in order to solidify the budget.
- Initiate an immediate and thorough effort to quantify future and ongoing maintenance, support, and upgrade costs and work with OMB to establish a funding stream.

1.3.5 Vendor and Contract Management Recommendations

- Appoint a Vendor and Contract Management lead and provide staffing necessary to effectively oversee the numerous vendor engagements and contracts associated with the program.
- Eliminate layers of vendors wherever possible, so that the vendor directly responsible for delivery is communicating with stakeholders and City program management.
- Define vendor management processes, as well as tools and templates, based on best practices and existing City tools and templates.

1.4 Lessons Learned

The post-assessment phase of ECTP offers many opportunities for improving program and project management practices. These opportunities should also be considered and applied to other large technology projects and programs being undertaken by the City. A list of lessons learned and their Connected Leading Practices is included in the body of this report. For ECTP specifically, the City will re-establish itself (rather than the Systems Integrator) as the program leader, controlling schedule, implementation strategy, and budget. It will seek to right-source work by determining if and where City staff can replace consultants. Operational requirements will drive technology decisions. Most importantly, the City will move to integrate stakeholder agencies into both the management and execution of the ECTP program. Agency ownership in the successful outcome of the program and executive sponsorship is critical if the program is going to be successfully delivered.

2 Context for the Assessment

In 2004, the City began the Emergency Communication Transformation Program (ECTP), a five-year project to modernize and consolidate the 911 emergency communication system, the most complex and expansive system in the nation. City plans included the establishment of two distinct and fully redundant Public Safety Answering Centers (PSAC1 and PSAC2) or call centers. Eight years later, in December, 2011, as part of the Emergency Communication Transformation Program (ECTP) the NYPD and FDNY 911 operations were co-located into the first Public Safety Answering Center. Since then, the City has been moving towards the development of the second PSAC to ensure redundancy and at the end of calendar year 2013, the projected opening date for PSAC2 was December 2015. During a May, 2014 briefing for the City's First Deputy Mayor, it was communicated that the go-live date for PSAC2 was now delayed to February 2018. In addition to the delay, the cost was expected to increase by at least $100 million. Finding this delay and cost increase unacceptable, and knowing the history of the troubled program, on May 18, 2014 First Deputy Mayor Shorris ordered a full assessment on all facets of the program including budget, schedule, and governance to be conducted over the following two months. First Deputy Mayor Shorris also asked the Department of Investigation and the Office of the Comptroller to conduct independent reviews of ECTP.

It was apparent that in recent years, there had been a great lack of transparency and collaboration among all stakeholders. In response, the City convened a multi-agency assessment team of the project's most senior stakeholders to ensure that the right expertise was readily available and would all be accountable for developing a go-forward strategy for program delivery. The team included representatives from the Fire Department of the City of New York (FDNY), New York City Police Department (NYPD), Department of Design and Construction (DDC), Office of Citywide Emergency Communication (OCEC), Department of Information Technology and Telecommunications (DoITT), Office of the Mayor, and Office of Management and Budget (OMB).

For the past two months, this team spent many hours a day together to conduct the assessment, with the support of both operations as well as technology units. KPMG LLP (KPMG) supported the assessment team, providing analysts who assisted the City in documenting findings, observations, and developing the recommended next steps.

The assessment included a review and validation of the scope, schedule, budget, and governance of the entire program. This report documents the objectives, key findings, and recommendations for each of these areas. Further details and supporting documentation are contained in the appendices.

Based on the efforts undertaken during this intensive review, the project scope has been revised to be more complete and accurate, the remaining costs are being reduced by nearly $19M, and the go-live date has been pulled in by approximately 18 months from the 2018 target.

This assessment's findings are in agreement with the initial findings of the Department of Investigation's review of ECTP. The program will continue to work with the Department of Investigation to help ensure that recommendations are appropriately implemented. Additionally, the program will consider the findings and recommendations of the ongoing review by the New York City Comptroller.

In addition to this assessment of the ECTP, the Mayor's Office of Operations is coordinating a separate operational assessment of 911 call taking operations. Some items raised during the ECTP assessment, deemed to be operations-based in nature, were referred to this separate Operations review. As stewards of

the public's dollars, it was prudent of the City to halt most ECTP-related expenditures while the assessment was underway. Expenditures needed to keep PSAC1 operational, or where the DoITT Commissioner believed that an expenditure was required to avoid further major program delays and financial impacts, were reviewed and approved on a case-by-case basis.

The assessment was divided into five focus areas to allow us to conduct an effective and efficient assessment. Working groups were established for each focus area with input from subject matter experts (SMEs) and included a cross-agency evaluation team.

The five focus areas were:

1. Program Governance
2. Program Scope
3. Program Schedule
4. Program Budget
5. Program Vendor Management

This report documents the objectives, key findings, and recommendations for each of the focus areas above. All key findings have been developed based on extensive consultation with key stakeholders across the FDNY (Fire Department City of New York), NYPD (New York City Police Department), DDC (Department of Design and Construction), OCEC (Office of Citywide Emergency Communication), DoITT (Department of Information Technology and Telecommunications), Office of the Mayor, and OMB (Office of Management and Budget). Agencies' representation on the team included both technical and operations management staff.

At the end of the document is a section on lessons learned that can help ensure the future success of this program and other large IT projects.

3 Program Governance

3.1 Objectives

Develop a strong framework for program governance that establishes clear chains of responsibility, authority, and ongoing open communication.

3.2 Key Findings

- Multiple stakeholders cited the overall governance of the program as a serious and significant issue. During the program's lifetime, several governance models have been implemented to address oversight and management; however, none of these models have offered clear accountability or direction for stakeholder decision making and escalation. ECTP is a complex program, made up of several related technology and building projects. While each underlying project has had processes in place to provide oversight of its specific activities, the program did not have clear processes in place to manage its overall scope, schedule, and budget. The lack of strong governance also hindered communication and the sharing of critical information among agencies. This subsequently resulted in multiple scope and delivery changes and the development of a budget that did not fully support future operational needs.
- The City relinquished too much ownership and control to the System Integrator in the areas of schedule, maintenance, and implementation strategy. The System Integrator communicated, almost exclusively, with OCEC, leaving the stakeholder agencies with the perception that they were not included in many key discussions and decisions.
- In the past, there has been a lack of executive-level participation in, and support of, the ECTP program.
- Since August 2010 OCEC has had a clear mandate to aggressively implement the program and had exclusive control of the scope, schedule, and budget. In exercising this authority, they often did not engage the stakeholder agencies at a meaningful enough level for a program of this complexity.
- The Independent Verification and Validation (IV&V) entity currently does not provide reports to the FDNY or NYPD Executive Sponsors. As a result, the stakeholder agencies, which will ultimately be held accountable for these mission-critical software and systems, are not being provided with independent analyses and assurances that their new public safety technology systems will operate reliably and safely and that systems and software engineering disciplines are being followed.
- There are no key performance indicators (KPIs) currently used for measuring the performance of ECTP. The result is that reports to executives have been lacking in meaningful measurements that would aid them in evaluating the success of the program.

3.3 Recommendations

- Implement a governance model that enables and requires sustained participation from all stakeholder agencies for the duration of ECTP.

  To address deficiencies in the current governance model and an approach to oversight and program management, the assessment team developed a proposed governance model. This model is focused on key governance functions and a number of high-level roles and responsibilities. It provides the framework required to establish a set of responsibilities, processes, and procedures for the

oversight, management, and control of ECTP. Agency ownership in the successful outcome of the program and active and committed participation from agency heads is critical if the program is going to be successfully delivered. A key characteristic of this governance model is the focus on cross-agency integration. This is achieved through integrated teams, wherever possible, and the recognition that key stakeholders are critical to informing and driving ECTP decision making. This model is designed to leverage governance processes so that issues are escalated, decisions are made quickly, and change is managed effectively.

The proposed governance model (see figure below) has four levels of governance – Executive Sponsors, Steering Committee, Program Management Lead/Program Management Office (PMO), and Project teams. It illustrates which functions reside at the individual project level and which belong to the PMO.

Clearly defined roles and responsibilities will reduce the current confusion around ownership and also help to ensure successful adoption of the revised governance structure. Each governance group must be accountable for their assigned roles for Program success. Detailed responsibilities have been outlined in the form of a RASCI (Responsible, Accountable, Supportive, Consulted, Informed) model. This includes each level within the Governance structure, as well as the Program Management and Integration Management Leads. Responsibilities have been assigned for each of the core Program Management functions.

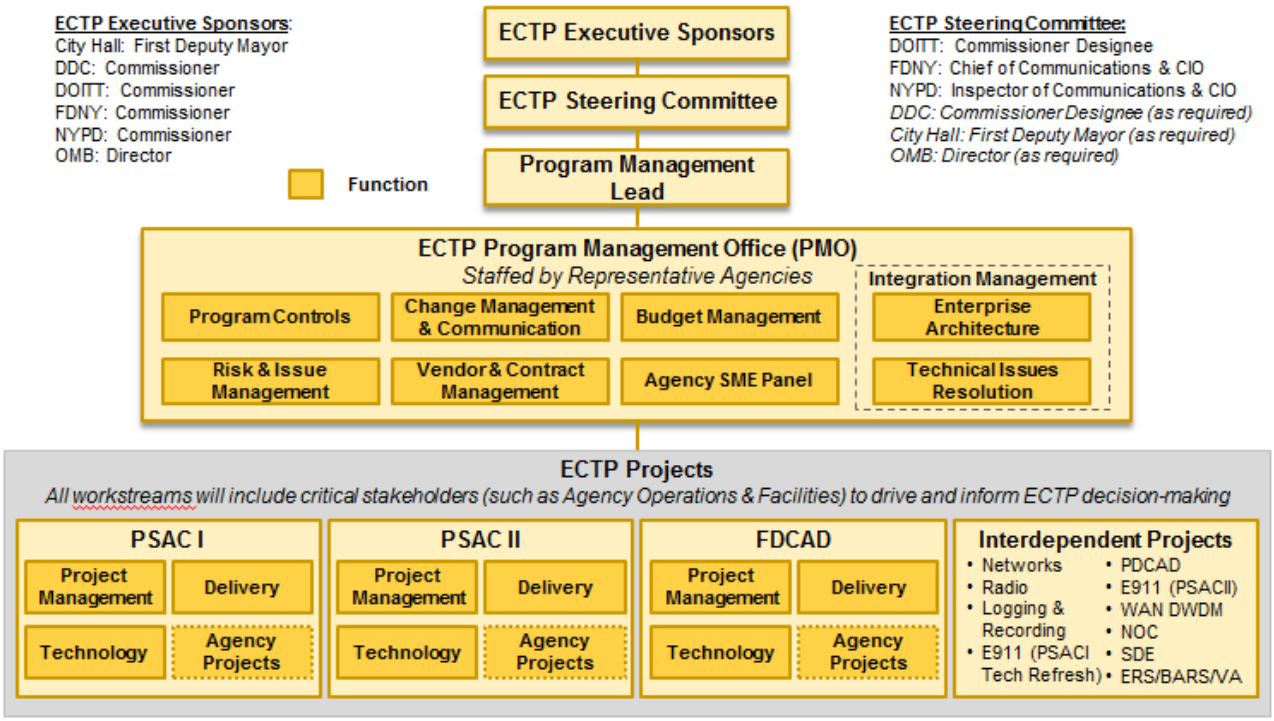

Figure 1 – ECTP Governance Structure

- Establish a cross-agency integrated Program Management Office
  OCEC, DoITT, NYPD, and FDNY technology and program management resources should be integrated into a single, cohesive program team, thereby changing the paradigm of an oversight agency (OCEC) managing a project for multiple stakeholder agencies. The Program Management Office (PMO) should be established to commence realization of the governance model, and the establishment, implementation, and refinement of project and program management processes. The PMO should be established in DoITT but will include staff from all stakeholder agencies and would report into an inter-agency steering committee. It should include critical components, such as standard program reporting, budget oversight, ongoing issues and risk management, and change controls. Project and program management processes, tools and templates should be defined by the PMO based on best practices and existing tools and templates. This can also include the training and education of project managers to ensure alignment and consistent understanding of the overall responsibilities and processes.

- Assign resources to Governance Structure
  Assign resources for the roles outlined in the organization structure. Based on the organization structure developed, the ECTP Steering Committee should form a consensus on the appropriate resource allocation. Resources should be assigned in a collaborative approach that focuses on skill alignment, and agency inclusion.

- IV&V Vendors should report directly to City Hall and stakeholder agencies
  An Independent Verification & Validation (IV&V) program strives to improve software reliability and quality through effective applications of systems and software IV&V methods, practices, and techniques. Software IV&V has been demonstrated to be an effective technique on large, complex software systems (such as those undertaken as part of ECTP) to increase the probability of software being delivered that meets requirements. IV&V deliverables and reporting should be provided to the program executive sponsors that will ultimately be accountable for the software systems.

- KPIs should be established and sent by the PMO to the ECTP Executive Sponsors and ECTP Steering Committee.

- While the governance model is intended to enhance communication and collaboration, the DoITT Commissioner will be charged with managing ECTP and must have authority to make decisions that could affect the scope, schedule, and budget. It is important that the Commissioner maintain an open line of communications with the stakeholder agencies and that the agency executives are engaged and supportive of final determinations.

4 Program Scope

4.1 Objectives

Confirm the current ECTP scope and identify all associated dependencies. Document any gaps in the scope, develop options for remediating these gaps, and determine the related costs. Help ensure that all items included in the scope are necessary to complete the ECTP and that the implementation approach is expedient and cost effective.

4.2 Key Findings

The assessment revealed a lack of clarity and agreement regarding the precise scope of ECTP as well as which technologies or work directly impacted and influenced other critical components of the program. It was also apparent that some past-scope decisions had been based on whether an item met the program's predetermined budget and time line criteria regardless of its necessity. Key scope findings include:

- The ECTP program was designed based on the best technologies available at the time. However, ten years into the program's implementation there are newer technologies available. The latest 911 technology standards, (known as NextGen 911), will require technology to be replaced in order to include functionality, such as allowing text message communications with 911.
- A maintenance and support structure was not put in place as phases of ECTP were implemented. Without that structure, maintenance and equipment refresh needs were rolled into the scope of ECTP. The assessment identified 10 items that are necessary to maintain current and effective 911 operations but are not within the scope of ECTP.
- There have been examples of business processes not changing to accommodate newer technology. One of the program open issues identified related to radio equipment is that the vendor has been unwilling to accommodate an agency request to provide a graphical user interface (GUI) on new radio equipment that more closely resembles agency's legacy display. Program costs could be avoided and effort saved if agencies could adapt their operational processes for the GUI, a modern interface standard.
- A major challenge in managing a program as large as ECTP, being executed over several years and across multiple agencies, is the difficulty developing a project scope with enough detail to support a firm schedule and budget. In lieu of a well-defined scope, the program has been challenged to define each component and initiative within the program, in real time.

Following is a summary of pre-assessment scope and the Previously Excluded Requirements that have been added to the scope during this assessment. These are categorized within the program's three major work streams: 1) PSAC2, 2) Fire Department Computer Aided Dispatches (FDCAD), and 3) PSAC1. Current scope items represent the planned initiatives where funding has been allocated or is in the process of being spent. Requests indicate requirement gaps that are either unplanned, are not deemed critical, or have not been formally approved as being within the scope of ECTP prior to the assessment.

PSAC2

The main objective for the Public Safety Answering Center 2 (PSAC2) located in the Bronx is to design and build a redundant, load-balancing Public Safety Answering Center (PSAC) facility to support NYPD, Fire, and EMD call taking and dispatch operations. The following is PSAC2's scope:

Current:

- Design, procure, install and test local area networks at PSAC2 for NYPD and FDNY 911 Telephony, CAD & Logging and Recording, Administrative Applications & Distributed Enterprise Services. DoITT build out of supporting services such as administrative PCs, VOIP Administrative Telephony, Wireless Access Points, and Enterprise Printing Services.
- Configure, Procure, Install and test an IP based radio console sub-system that interfaces with the existing citywide analog infrastructures
- Augment the existing NYPD and FDNY microwave systems to accommodate radio audio and radio data communications into and out of PSAC2.
- Remediate 22 Remote Radio sites that will provide transport of radio audio and data communications into and out of PSAC2. Six sites need extensive remediation work prior to augmenting the microwave and radio audio routing sites.
- Design, procure, install, and test a 911 Telephony System at PSAC2 (VESTA 4.x).
- Project management for the integration of E911 Telephony and all other sub-systems into the ECTP2 System.
- Verizon plant work for trenching, conduit installation, fiber and copper cabling into PSAC2.
- Develop a production-like Solution Development Environment (SDE) and third-party interfaces (TPI) to support testing for the complete SDLC, integration testing of the hardware and software components implemented at PSAC2, dual data center operations, and high availability/failover testing.
- Implement ERS/BARS/VA System at PSAC2 that duplicates the system at PSAC1.
- Project management for the integration of ERS/BARS/VA and all other subsystems.
- Implement Logging and Recording Analog Solution at PSAC2 that will index data related to telephony, radio traffic, events within the CAD systems, ERS, and shall synchronize/replicate storage arrays between PSAC1 and PSAC2.

Previously Excluded Requirements Now in Scope:

- Creating a maintenance network for each agency using Virtual Local Area Networks (LANs) on ECTP following the existing PSAC1 network monitoring services model.
- Creating a Centralized Network Operations Center (NOC) with 24x7x365 monitoring capability of PSAC2 systems.
- Outfit FDNY administrative PCs (non-911) with dual Network Interface Cards wired to diverse LAN closets to achieve network redundancy at the end point (PCs).
- Installing NYPD radio equipment in a separate specially built PSAC2 Radio Room.
- Providing connectivity between the Bronx Central Office and Queens Central Office to the two DoITT/FDNY Ultra High Frequency (UHF) simulcast radio system prime sites.

- Creating an ECTP2 microwave radio overlay to accommodate NYPD future growth capacity needs. An overlay allows for two microwave signals to be sent between single microwave dishes.
- Purchasing administrative workstations for NYPD (~200) and FDNY (~160)
- Remove NICE Inform Matrix super-user feature from the Logging & Recording implementation due to changes in network design.
- Testing of third-party applications on PSAC2 Tape and Records workstations running Logging & Recording (e.g., E-Subpoena, McAfee EPO, MS Office®, etc.).
- Incorporating power, space, and cooling gaps into updated PSAC2 data center design
- Incorporating cabling gaps into updated PSAC2 infrastructure cabling design

FDCAD

Currently, FDNY is working with two separate Computer Aided Dispatch (CAD) systems that are both close to 40 years old; one system is supporting the Fire Department and the other is supporting Emergency Medical Services (EMS). These legacy CAD systems will not be migrated to PSAC2. FDNY is required to build a new CAD system, which will integrate with FD and EMS CAD, as well as interface with the newly built NYPD CAD. FDNY has selected the technology solution (Intergraph); however, the procurement to implement this technology has not yet taken place.

Following are the scope findings for FDCAD.

Current:

- Build a system configuration (PSAC1 and PSAC2) that features multi-path redundancy both within the PSACs (segmented into server zones) and between the two PSACs.
- Purchase and install workstations at PSAC1, PSAC2, Bronx & Queens COs, 1MTC, EMS Stations, etc. that will support Intergraph, Starfire, and EMSCAD. Workstations (aside from those at PSAC2) must be installed in advance of FDCAD go-live in PSAC1. Starfire and EMSCAD systems will be retired at FDCAD cut-over.
- Build an interface between the FDCAD and NYPD CAD to replace the current I/CAD incident event information interface with Starfire and EMSCAD.
- Purchase a Commercial Off-The-Shelf (COTS) product that contains hospital diversion codes for both the Dispatch Center and mobile computers in ambulances.
- Implement a geographic mapping solution that uses the most comprehensive and dependable map base to support the CAD's map centric system.

Previously Excluded Requirements Now in Scope:

- Providing a mobile data wireless solution (Radio Data Link Access Procedure, NYCWiN, Verizon, other) with considerable bandwidth using RD-LAP (19.2 kbit/sec).
- Purchasing and installing Mobile Data Computers (MDCs) for FDNY and EMS vehicles (~1183 units) to run the Intergraph mobile application.
- Creating interfaces to FDNY proprietary applications (22 interface control documents) to interoperate with FDCAD.
- Creating user authentication on Mobile Data Centers and voluntary hospital personnel control.

PSAC1

PSAC1 is the City's current, functionally operational, primary 911 call center. However, the longer PSAC1 continues to serve as the primary site without PSAC2 being available and operational for 911 call taking and dispatch, the greater the risk to 911 call center operations. There are also long-standing quality of life considerations that are important for morale that should be resolved in both the short and long term. When PSAC2 is operational, it will have a direct impact on the operations and required upgrade and maintenance of PSAC1.

Following are the scope findings for PSAC1.

Current:

- Construct System Development Environment (SDE) lab at 11 Metro Tech Center for testing integrated code.
- Establish a consolidated Network Operation Center (NOC) utilizing internal resources and tools
- Engineer, procure and install equipment for an integrated test facility at PSAC1 with the capability to support testing for the complete Software Development Life Cycle (SDLC), perform integration testing of the hardware and software components implemented at PSAC2, and support dual data center operations testing and high-availability/failover testing.
    - This Includes procuring and installing:
        - Base Infrastructure/Network
        - Logging and Recording and Storage
        - E911 Telephony (VESTA)
        - FDCAD and PD I/CAD

Previously Excluded Requirements Now in Scope:

- None

4.3 Recommendations

Ongoing Scope Management

- While the assessment was able to identify gaps in scope and more effective implementation strategies, ongoing collaborative efforts must continue to identify and maximize further opportunities to manage scope, schedule and budget.
- Continue to aggressively manage the scope of the ECTP program, so that the critical deliverables, fully redundant PSACs and new CAD systems are delivered.
- Evaluate and develop the proposed solutions for NOC operations at PSAC1 and PSAC2 with the involved agencies. This should include a cost/benefit analysis.
- Confirm agreement with all stakeholders on the requirements for building the network and infrastructure at PSAC2.

- Embrace a greater openness to adopting, and adapting to, changes in business processes when making technology decisions.
- Leverage existing infrastructure to facilitate upgrades and avoid developing unnecessarily redundant systems.

NextGen 911 Strategy

- Outside of the ECTP scope, work should commence to develop a longer-term strategy for 911 technologies, including, but not limited to the implementation of NextGen 911. This longer-term strategy should include a review of opportunities to reduce cost and improve operations through consolidation of systems and system support.

5 Program Schedule

5.1 Objectives

Determine why the original published go-live date for First Call at PSAC2 was delayed from December 2015 to February 2018 and the status of the existing ECTP schedule; identify all omissions, interdependencies, and critical path tasks and develop strategies for bringing this date back in.

5.2 Key Findings

- To date, ECTP has been managed as one extremely large project with many interdependencies and highly complex initiatives scheduled to be executed sequentially and with all the items considered critical to the program's success. In reality, not all the initiatives are required to be completed sequentially and several can be decoupled and delivered independently of ECTP and, in doing so, reduce the overall duration of the program.
- Project plans had not included necessary upgrades to 22 remote radio sites. Adding the site upgrades to the plan was the main reason for the delay in the program's scheduled completion date until February 2018. The assessment uncovered that the remediation could be managed incrementally and concurrently outside of the program schedule, thereby not impacting the delivery of the program's remaining components.
- There was considerable ambiguity regarding the scope of ECTP. The pre-assessment schedule did not include all relevant ECTP tasks and was affected by the inconsistent management of scope changes, a lack of stakeholder engagement in the development of an Integrated Master Schedule (IMS), and a lack of visibility of schedule dependencies. Now that the breadth of previously excluded requirements is better understood, a high-level IMS has been created, and it is clear that the previously planned December 2015 estimate is not a viable completion date. Most of the major components of the program (i.e., PSAC2 and the FDCAD will be completed in 2016 with the final phase of the program (completion of PSAC2) completed in 2017.
- The pre-assessment ECTP schedule was not an IMS or aligned with any other agencies' interdependent project schedules, thereby increasing the potential for unidentified critical path dependencies and for entire projects and their associated tasks to be overlooked. Training of operators and dispatchers on FDCAD is one such example of a task that was not included. Training activities should be included in the IMS, as they have potential to impact the overall schedule going forward. In addition, the durations of certain tasks, such as the agency operations transition tasks, are estimates based on assumptions that have not been reviewed, vetted, and accepted by key stakeholders.
- The System Integrator's lengthy internal contracting processes have adversely impacted the program schedule and been compounded by the City's own procurement cycle.

5.3 Recommendations

- Sub-projects and work streams should be decoupled and dependencies eliminated, resulting in multiple, smaller, and more manageable projects.
- Assess the current ECTP work streams against the agency-related projects/efforts to determine if additional work streams need to be added to the integrated program-wide schedule.

- Aggressively manage the critical path items such as approving the high-level network design, providing vendors with notices to proceed, and negotiating outstanding contracts to help ensure that they occur on schedule.
- Continue the ongoing exercise of assessing options for reducing scope, task durations, and dependencies within the IMS.
- Work with the vendors to reduce their lengthy internal contract/work order review and approval processes that have introduced delays to the ECTP schedule.
- Closely manage the City's procurement life cycle to avoid schedule delays.
- Implementation of the FDNY's CAD system is critical to the success of the program; however, the procurement process is behind schedule and should be expedited.

6 Program Budget

6.1 Objectives

Review the $2.03 billion ECTP capital budget to gain a clear understanding of the funds spent to date, identify any additional costs associated with material gaps identified during the assessment, and find savings opportunities or alternative funding sources as needed.

6.2 Key Findings

- The City can reduce the costs of certain tasks and achieve a more responsible budget by removing select work from the scope of vendor contracts that can be performed by City staff, by changing certain technology decisions, and by de-scoping unnecessary work.

  In order to maximize efficiency and determine areas where funding could be put to better use, analysis was focused on the Northrop Grumman contract, as the current value, including pending Change Orders (CO), was captured as $285.2 million.

  Seven distinct, high-value areas of the Northrop Grumman contract were analyzed by representatives from FDNY, NYPD, OCEC, DoITT, and OMB in order to identify potential areas for cost savings. Analysis focused on areas for potential insourcing, activities not required for go-live, and opportunities for contract renegotiation. Further, the participants confirmed that cost estimates were reasonable based on the information available and that the scope of work was required and relevant. The seven areas analyzed included:

  1. Networks and PSAC2
  2. Logging and Recording
  3. Performance Monitoring
  4. NYPD and FDNY Radio
  5. Systems Development Environment (SDE)
  6. Program Management Office (PMO) / Systems Engineering Organization (SEO)/Tools
  7. Facilities

  Of these seven areas, three were identified as having potential cost avoidance. A brief description of these areas is provided below:

  - **Logging and Recording:** Forecast Item 14 (FI14) is for the replacement of deep archive equipment. It was noted that the costs for one year of warranty, maintenance for years two through five, and on-site support for years one through five were rolled into the product at a cost of $7.3 million. Initial analysis suggested that $2.6 million of the ECTP capital budget should not and cannot be applied towards these maintenance expenses and should be reallocated appropriately, to capital-eligible costs. Also, the assessment team determined that support can and should be in-sourced.

    Additional analysis suggested changing the implementation approach of the core logging and recording infrastructure which will result in an additional savings of $25 million.

- **Performance Management:** $6.1 million was allocated for the performance management work stream. Representatives from FDNY, NYPD, and OCEC agreed that because the work has already been done by the City to capture and report operating metrics for the 911 call centers, additional performance monitoring is not immediately required. This therefore represents cost avoidance of $6.1 million to the ECTP capital budget. If a later determination is made that additional reporting is required, some funding will need to be restored to the ECTP budget.

- **PMO/System Engineering Organization (SEO)/Tools:** Change Order 38 (CO38) requests additional funding to realign and increase the Northrop Grumman staff supporting the PMO and SEO for $7.9 million. If the City opts to convert the additional positions to government jobs replacing the proposed contractor positions, there is a potential cost avoidance of up to $5.2 million.

- Requirements that were previously not included in the scope that are critical to go-live and are not funded.

  Representatives from FDNY, NYPD, OCEC, DoITT, and OMB reviewed the current scope of the ECTP and identified gaps required for go-live. Additional details on the gap analysis conducted can be found in Section 4 – Assessment of the Project Scope.

  The tables below illustrate the ECTP capital budget breakdown including the estimated costs for Previously Excluded Requirements as well as potential reductions in the spending plan. The current ECTP capital budget was $2.03 billion. FMS indicates that $1.7 billion has been committed (contracted), with $1.3 billion liquidated (spent) of that contracted amount. Three hundred and sixty two million dollars remains under contract but unspent, and $143 million remains uncommitted. There is an additional amount of $234million available in the budget for new funding requests.

ECTP Capital Allocation Summary - based on FMS		
Contracted		***$1,655,000,000***
	Contract, Liquidated	*$1,293,000,000*
	Contract, Unliquidated	$362,000,000
Not Contracted		***$143,000,000***
Pre-assessment Forecasted	**$**	**234,000,000**
Subtotal *(Pre-assessment)*		**$2,032,000,000**

The assessment identified requirements that are required and must be added to the scope for ECTP go-live that represent an additional $34 million. But with identified savings of $53 million, the new estimate to complete the remaining work in the program, including requests, is $358 million, which is an overall reduction of $19 million. It is important to note that both the cost of additional requirements and the savings are best estimates as of the date of this report. The City is confident that ECTP will be completed within, or below, the remaining ECTP capital budget.

ECTP Balance of Remaining Funds based on FMS		
Remaining funds available to ECTP	**$**	**377,000,000**
Previously excluded requirements *(Added to scope)*	**$**	**34,000,000**
Assessment-identified savings	**$**	**53,000,000**
Funding needed to complete ECTP	**$**	**358,000,000**
Net savings	**$**	**19,000,000**

- Not all significant annual operations and maintenance costs had been identified before the assessment, and those that had been identified, have been merged with program needs and capital costs, unnecessarily increasing the ECTP-budget. Nor have agencies' ECTP related operating costs been accounted for.
- A lack of reconciliation with the City's Financial Management System (FMS) resulted in the inaccurate tracking of spent and committed-but-unspent funds.

This assessment initially identified the ECTP capital budget to be **$2.03 billion.** The assessment has sought to gain a deeper understanding of the funding required to complete ECTP's pre-assessment (current) scope. The analysis conducted included reviewing individual projects that comprise ECTP and identifying the committed (contracted) but unliquidated funds as well as forecasted funds. OCEC, DoITT, and OMB were able to provide multiple, detailed documents illustrating liquidated, unliquidated, and forecasted funds. Reconciliation to FMS, however, was not possible within the time frame of the assessment. Budget analysis for the assessment recognizes FMS as the primary source for accurate financials.

- Overreliance on the System Integrator, a clear mandate to stay on schedule, and a long procurement process have resulted in the City purchasing goods and services through the System Integrator's contract, even when there were more cost-effective procurement vehicles.

6.3 Recommendations

- The City should closely evaluate the vendor contracted tasks identified above to develop a transition plan for bringing these functions in-house, especially where City employees exist with the skill sets necessary to perform needed work, such as network monitoring, project management, and performance analytics.
- Ensure that the City is getting best value by developing a sourcing strategy for the remaining procurements.
- Further refine and validate the cost estimates of previously excluded requirements to confirm that the associated costs are correct to accurately capture budget and forecasts. For any new initiatives or needs that arise and are reviewed for ECTP eligibility, the City Should obtain the accurate, associated costs and confirm the program remains within the capital budget.
- There must be an immediate effort to quantify future and ongoing maintenance, warranty, production support, training, and upgrade costs to support 911 operations. To date, the assessment has identified which of these existing costs have been covered from within the existing ECTP budget, but the City must develop a budget plan for such expenses when both PSAC1 and PSAC2 are operational. Additionally, the City should create a separate budget tracking and funding stream for ongoing operating costs.
- Confirm that budget and spend is reconciled with FMS as part of ongoing program budgetary functions and responsibilities. To support this goal, budget analysis and spend reporting should be conducted and reconciled with FMS on a quarterly basis, at a minimum.

7 Vendor and Contract Management

7.1 Objectives

Review the existing vendor oversight arrangements and identify opportunities to help maximize benefits and efficiencies.

7.2 Key Findings

Vendor and procurement management were repeatedly cited during this review as significant and long-standing issues. The program did not have a strategic or collaborative approach for managing the array of vendors that support the technology and construction efforts of ECTP. Multiple vendors work on a range of projects across various work streams for a host of different stakeholders and agencies. Work has typically progressed in an isolated manner with limited collaboration between agencies and little understanding of each other's interaction with vendors. This has caused an excess of touch points between vendors and the program, resulting at times in conflicting messages to vendors about requirements and priorities and further exacerbating schedule and scope issues. Other key findings include:

- The program did not distinguish between vendor management and contract management, at times treating the two as one and the same, thereby reducing its ability to recognize both systematic vendor issues and discrete contract issues.
- Multiple layers of management and oversight and vendors managing other vendors further complicated vendor and contract management.
- Staff positions within the OCEC vendor management unit were left unfilled for many months, thereby impacting the program's ability to effectively monitor vendor performance.
- Critical vendor management roles, such as a vendor and contract management lead, are missing from the current governance model. These separate roles would have allowed for a greater focus on vendor oversight, in addition to individual contracts.
- Contract negotiations often occurred on a contract-by-contract basis without an understanding of the complete list of contracts awarded to, or being negotiated with, the same vendor. In some cases, this may have precluded the City from opportunities to use negotiation leverage for more favorable financial, schedule, or other contract terms.
- Contract deliverables and progress payments have been reviewed in isolation rather than across an entire vendor's portfolio of contracts or with consideration of the vendor's performance as a whole. This reduces the ability to identify performance issues that may not span contracts but rather exist one area or one particular contract.

7.3 Recommendations

- Assign the role of Vendor and Contract Management to the PMO to allow for implementation of a more robust vendor management approach.

  To address Vendor Management and Contract Management issues, the program assessment team developed a governance model that addresses specific oversight problems by having the PMO assume responsibility for these functions.

The distinction between the vendor management and contract management functions is outlined below:

- **Vendor Management:** Ownership of the overall ECTP/vendor relationship and oversight across all vendor contracts. This would include communication with other City vendor managers for all shared vendors.
- **Contract Management:** Overall management of contracts including contract changes and the acceptance of contract deliverables.

- The Steering Committee, in conjunction with the Program Management Lead, should be responsible for appointing a vendor and contract management lead as soon as possible and have that person begin the implementation and refinement of vendor and contract management processes.
- Eliminate layers of vendors wherever possible, so that the vendor directly responsible for delivery is communicating with stakeholders and City program management.
- Project Managers should be educated and trained on both the vendor and contract management processes to ensure alignment and a consistent understanding of the overall responsibilities and processes.

8 Lessons Learned

The post-assessment phase of ECTP offers many opportunities for improving program and project management practices. These opportunities should also be considered and applied to other large technology projects and programs being undertaken by the City. Below are key examples of lessons learned and their connected leading practices within ECTP:

- The program did not break down large projects into smaller, more manageable projects. Projects that are too large are difficult to execute successfully because priorities and goals are less clear to those working on the fringes of the project. Planning is also more difficult in large projects. Finally, as new technologies are made available, the scope of a large project could expand beyond its initial parameters.

  Connected Leading Practice:
  - Breaking a large program up allows the work to be managed more effectively and ultimately provides a better chance for success. The work is broken down into more manageable chunks, managed as its own project, with its own project definition and work plan.

  - A Change Management committee assessing a change request should guard against the tendency to accept scope changes simply because requests are related to 911 operations.

- The City relinquished a large degree of ownership and control of the program to the contracted Systems Integrator. Evidence of this surfaced in the areas of technical decision making, project scheduling, task duration estimating, cost estimating, and procurement of hardware and software.

  Connected Leading Practice:
  - The City will re-establish itself (rather than the Systems Integrator) as the program leader, controlling schedule, implementation strategy, and budget. Substantial reliance on a System Integrator contractor that wields too much control over schedule and budget estimates can pose oversight challenges and may lead to an erosion of, or conceal a lack of, in-house expertise.

- There is not an IV&V vendor monitoring the program's overall scope, schedule, and budget and reporting to executive stakeholders. While there is a vendor providing Quality Assurance services, they are doing so at a lower level.

  Connected Leading Practice:
  - The IV&V vendor should provide reports directly to City Hall and stakeholder agencies. The IV&V role strives to improve the likelihood of project success. This function has been demonstrated to be effective in large, complex software systems, increasing the likelihood that the project is delivered within budget and schedule. The IV&V vendor (or equivalent) should provide reports to all levels of the adopted governance program as well as agency stakeholders.

- A program that stubbornly commits to a schedule, even after it becomes apparent that it is unachievable, flouts responsible decision making around scope, budget, and schedule and disregards the overriding goal of realizing program success.

  Connected Leading Practice:
  - A well-documented Change Management process that is consistently followed and has a firm executive stakeholder approval process, acts as an important and effective check to ensure that change orders for requirements falling outside of the original scope of the program receive adequate and proper assessment.

- The lack of clearly defined roles and responsibilities, agreed upon by all of the stakeholder agencies, significantly jeopardized the success of the program. It permitted stakeholders to call into question many of the decisions made by those responsible for day-to-day management of the program, without having to accept any personal accountability for, or knowledge of, those decisions.

  Connected Leading Practice:
  - Agency ownership in the successful outcome of the project and executive sponsorship is critical if the program is going to be successfully delivered. IT governance entails establishing chains of responsibility, authority, and communication–decision rights, which are most often stated in a Responsible Accountable Supported Consulted Informed (RASCI) matrix. It is recommended that the City implement governance structures that make use of RASCI matrices and hold project team members responsible for their decisions according to their defined and stated role.

- The governance model had a limited role for communication and collaboration between and amongst FDNY, NYPD, and OCEC.

  Connected Leading Practice:
  - The City should move to integrate stakeholder agencies into both the management and execution of the ECTP program. Clear IT program communication not only reduces the cost and risk of IT failures, but engenders greater trust, teamwork, and confidence in the program executive sponsors and other interested stakeholders. Leading practices in IT governance emphasize the importance of making sure stakeholders understand and feel responsible for safeguarding against risks.

- With respect to the technology supporting 911 operations, the City must improve its processes around planning for and performing routine upgrades to the technology infrastructure (e.g., workstations, operating systems).

  Connected Leading Practice:
  - The Information Technology Infrastructure Library (ITIL) is a set of practices for IT Service Management (ITSM) aimed at aligning IT services around a process with the needs of an organization. The City can leverage ITIL practices to develop, implement, and continually enhance the DoITT IT Services Management organization.

- There are no key performance indicators (KPIs) currently used for measuring the performance of ECTP. The result is that reports to executives lack meaningful measurements that would aid executives in evaluating the success of the program.

  Connected Leading Practice:
  - KPIs help a program define and measure progress towards the program's goals. Once a program has analyzed its mission, identified all its stakeholders, and defined its goals, it needs a way to measure progress toward those goals--KPIs. It is recommended that the City establish KPIs during the initiation phase of large, complex programs and progress is measured and reported on using those KPIs.

- The procurement cycle is so long that it has often left the program with already out-of-date, or otherwise inappropriate, technology by time the procurement is completed. It also motivated Program Managers to procure goods and services through an executed SI contract, which may not be the best value for the City.

  Connected Leading Practice:
  - The procurement cycle needs to be flexible enough to allow for the appropriate technologies to be selected after the final design of the system, rather than being dictated as part of the Request for Proposals (RFP). Program Managers should be encouraged to procure through non-SI vendors. Breaking up very large technology initiatives into smaller, more discrete and attainable parts can allow the City to adapt to advancing technologies as well as expand the pool of potential vendors able to successfully bid on a project.

- Embrace a greater openness to adopting, and adapting to, changes in business processes when making technology decisions.

  Connected Leading Practice:
  - Operational requirements will drive technology decisions.
  - To achieve the benefits of a business transformation or large system implementation, operational changes are often necessary. Using a change management process--a sequence of steps that a change management team follows to apply change management to operations--can reduce hesitancy around adopting changes.
  - A Change Management committee assessing a change request should guard against the tendency to accept scope changes simply because the requests support or are closely related to other aspects of the program's scope.

- Physical facility renovations at PSAC1, after it was already an operational call taking and dispatch facility, should not have been adopted into the scope of ECTP.

  Connected Leading Practice:
  - Some expansion of scope is justifiable in order to update requirements during a multiyear IT transformation program, but often these changes come from needs that are incorrectly assessed against the original scope of a program. A Change Management committee assessing a change request should guard against the tendency to accept scope changes due to the fact that the requests support or are closely related to other aspects of the program's scope.

- The many layers of vendors within the program, a byproduct of using an SI that brings in specialized subcontractors for discrete services, caused communications problems, poor requirements management, and inefficiencies.

  Connected Leading Practice:
  - Establishing direct contract relationships with the vendors performing and providing discrete services provides for the optimal communication structure, system of controls, level of monitoring, and cost reduction.

- Several program components were going to be outsourced or built anew despite existing City technology and services that could be leveraged (or where there existed feasible opportunities for the City to provide them in-house). The result is that the City fails to efficiently leverage City investments and unify services across the enterprise. These capabilities should be reviewed by the forthcoming ECTP Steering Committee.

  Connected Leading Practice:
  - The City should seek to right-source work by determining if and where City staff can replace consultants. Conveying abundant authority to SI contractors risks that the SI has no incentive to leverage City resources (technology, people, etc.) and will not take an enterprise view of the City's IT landscape, but rather a narrowly focused view on the program deliverables.