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A Review of the Management and Fiscal Controls Over the City's ECTP Upgrade to its Emergency 911 System

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THE CITY OF NEW YORK OFFICE OF THE COMPTROLLER

A Review of the Management and Fiscal Controls Over the City's ECTP Upgrade to its Emergency 911 System

EXECUTIVE SUMMARY

On May 19, 2014, Mayor Bill de Blasio announced a halt to major work on the Emergency Communications Transformation Program (ECTP) pending reviews of various aspects of the project by the Department of Information Technology & Telecommunications (DoITT), the Department of Investigation (DOI), and New York City Comptroller Scott M. Stringer. The administration asked the Comptroller to conduct a review of the history of the project, including its oversight structure and financial management. The following is the report of the review conducted by Comptroller's Audit and Investigations Bureau in response to the Mayor's request.

The Comptroller's review found that the ECTP's governance was inappropriately structured, overly reliant on consultants, and ineffectively monitored, which resulted in a failure to achieve full agency participation and coordination. Instead of strong City governance, the project outsourced critical responsibilities to consultants who were insufficiently accountable to the City. As a consequence of inadequate governance, the project has taken far longer than anticipated, stretching from the initial estimate of five years to the current estimate of fifteen years, with the end date now projected to be 2018.¹

We found that project delays and cost overruns mounted as technical and other difficulties emerged and the existing governance structure, the project consultants, and assigned personnel proved inadequate to address the project's needs. These problems did not go unnoticed. As the ECTP failed to deliver critical products on time and on budget, various reports and analyses were produced with a myriad of recommendations for improvement. Just three years into what was supposed to be a five-year project, DoITT recommended rebidding the main contract for system integration services, which had been let to Hewlett-Packard (HP). However, DoITT's recommendation and many of those provided in connection with prior audits, investigations and expert studies were not acted upon in a timely manner—if at all—leading to further delays and increased costs.²

¹ "Fiscal Year 2015 Executive Budget for the Department of Information Technology & Telecommunications," page 1.

² These reports and recommendations include four audits undertaken by the Comptroller's Office, multiple reports of investigations by DOI, reports of the ECTP Quality Assurance consultant, and reports of consultants hired by the City, including Winbourne Consulting, LLC., McKinsey & Co. and KPMG.

The Comptroller's review also found a lack of transparency around the City's expenses on the ECTP and its prior related emergency system technology upgrades. As a result, the project's total cost was not clearly disclosed to the public. In 2004, the ECTP's estimated capital cost was projected to \$1.345 billion.³ By last month, as detailed in the City's Fiscal Year 2015 Capital Commitment Plan, the estimated cost had soared by 73%, to \$2.326 billion. Even then, the Comptroller's review found that these capital cost estimates were understated by at least \$39 million, which reflects two contracts that do not appear to have been included as part of prior ECTP cost estimates.

Moreover, none of these projected cost estimates take into account the expenses that were and will continue to be incurred by DoITT and the other City agencies involved with the ECTP development and operations. ECTP maintenance costs alone are projected to cost DoITT \$50 million in Fiscal Year 2015.

Further, our review found that the ECTP cost estimates do not appear to have fully accounted for relevant City's expenditures to upgrade the 911 system incurred by the City prior to the ECTP.⁴ Only by including those expenditures can the complete cost of the ECTP be known.

When all of the above factors are taken into consideration—previously unaccounted for capital contracts, expense budget items, and relevant prior technological enhancements—our preliminary review indicates that the total cost to the City for the ECTP may have been understated by in excess of \$200 million. However, a full audit of the City's ECTP expenses would be required to identify the total program costs, which is beyond the scope of this review.

The absence of effective project governance and complete information about the cost of the ECTP hindered the City's ability to properly evaluate, plan for, and manage an extremely complex multi-billion dollar project. Decisions about project scope, technology, outsourcing, product choices, vendor selection, and change order approvals should have been supported by complete information and should have been promptly acted upon. Further, effective project governance and full transparency were needed to ensure that past operational and management failures informed project planning and vendor selection.

To help address the issues encountered with the ongoing development of the ECTP and other active or future IT projects we offer the following recommendations:

1. A project governance structure should be imposed on the ECTP that ensures that the City proceeds with a single vision, direct control, the ability to make decisions quickly, and the authority to see that all objectives are carried out. Such authority should not be delegated or outsourced to consultants who are not answerable to the public. Neither should authority be vested in so many City stakeholders that they are unable or unwilling to act quickly and efficiently in a coordinated manner.
2. The City should directly employ appropriate technical experts to closely monitor the project in order to advise the contract's governance committee on the project's status and to make timely decisions.

³ Capital expenses are set forth in the City's capital budget which reflects the plan to purchase property, such as computer equipment, for the City; the expense budget contains the fiscal plan to finance the operation of the City <http://council.nyc.gov/html/about/budget.shtml>.

⁴ A list of contracts that the Comptroller's Office has identified as part of the City's 911 system upgrade is included as Exhibit 2 of this report.

3. The City should disclose and consider all costs associated with the project in order to make fully informed decisions about its scope and progress.
4. Where contractors are paid on a time and materials basis, the City should ensure that agency personnel properly review the consultants' timesheets and vendors' invoices before authorizing payments to contractors.
5. The City should implement the controls set forth in Comptroller's Directive 31 on all future contracts for technology services. Moreover, in light of the historic difficulties with the ECTP, where feasible, the City should seek amendments of existing contracts for technology services to conform with the Directive.

CHRONOLOGY

Pre-ECTP Attempts to Upgrade the 911 System

- In 1973, the New York City Police Department (NYPD) installed the 911 system to enable the public to more easily report police, fire, and medical emergencies. The Fire Department of the City of New York (FDNY) developed its own system separate from the NYPD.
- In 1991, the NYPD proposed an upgrade to the 911 system known as the Enhanced 911 System or E-911. The FDNY also embarked on a program to upgrade its emergency response systems.
- E-911 replicated the original 911 system's practice of directing calls to an NYPD calltaker who took down basic information and patched in FDNY or Emergency Medical Service (EMS) in the event of fire or health emergencies. Under this arrangement, critical time was lost before responders were dispatched while the callers repeated information.
- In 1992, the FDNY entered into a two year \$7.9 million contract with Systemhouse, Inc. (Systemhouse) to upgrade its Computer Aided Dispatch (CAD) system. The contract was amended to include an additional two years and the budget for the contract was increased to not exceed \$10 million. Systemhouse was ultimately paid \$5.8 million of the total contract.
- In 1994, the NYPD separately entered into a three-year contract for \$150 million with Systemhouse to act as the system integrator⁵ for the E-911 upgrade, which included the installation of a new CAD system as well as the location of the NYPD's 911 facilities in two Public Safety Answering Center (PSAC) locations, known as PSAC 1 and PSAC 2.
- Work had not been completed when, after three years, the Comptroller's Office audited the NYPD's E-911 project in 1997. By June 1997, only two of five required components were installed in PSAC 1: the telephone system and the logging and recording feature. In addition, the City had yet to identify a location for PSAC 2.
- By 2001, the NYPD's operations at PSAC 1 were functioning. However, the physical site for PSAC 2 was still not available for development as part of the E-911 project.
- In a September 2001 follow-up audit, the Comptroller's Office reported that \$115 million had been paid to Systemhouse for the incomplete E-911 implementation that began in 1994 but was not yet completed.
- City records indicate that an additional \$14 million was paid to Systemhouse in connection with its E-911 contract subsequent to the Comptroller's 2001 follow-up audit report.
- In connection with its efforts to upgrade its emergency response systems, the FDNY purchased new UHF (ultra high frequency) radios in 1999, but was unsuccessful in an attempt to deploy them in 2001.

⁵ A systems integrator is a person or entity that brings together component subsystems into a whole and ensures that those subsystems function together, a practice known as system integration. In the information technology field, system integrators integrate multiple systems for inputting, processing, interpreting, storing, and categorizing data.

- On September 11, 2001, the NYPD and the FDNY experienced major communication difficulties as they responded to the emergency at the World Trade Center. Afterwards, there was a call to improve emergency communications within and between the City's first responders.
- The City commissioned McKinsey & Co. to review its emergency response systems and make recommendations for improvement. The McKinsey report, issued in August 2002, analyzed the FDNY and EMS response to the September 11th attacks and recommended that the NYPD and FDNY coordinate their emergency systems and protocols.
- An August 2003 blackout caused additional difficulties in emergency response, leading the City to conduct a formal review of its emergency response capability. The Mayor's Office of Operations issued a report, *Enhancing New York City's Emergency Preparedness*, which set out high-level goals for improving the coordination of the City's emergency response capabilities, including its 911 system technology and the business operations of the City's first responders.

ECTP: Transition to the Multi-Agency 911 Upgrade

- The ECTP was announced in April 2004. The primary objective was to integrate the emergency response functions of the NYPD, the FDNY and its EMS Bureau into a single facility at a new PSAC 1 and to create a second facility, PSAC 2. PSAC 2 was to be developed by HP and built at another location as an identical backup to PSAC 1.⁶
- Under the new plan, as with the prior E-911 project, each facility would be designed to have the same capability.⁷ In addition, the City sought to modernize and strengthen the 911 network, improve data-sharing among agencies, promote better coordination of emergency responses, and improve the deployment of resources to the scenes of emergencies.
- The executive sponsors charged with establishing the strategic direction and implementation of the ECTP were the Mayor's Office, DoITT, NYPD, FDNY, and OMB.
- DoITT was specifically tasked with the development of an integrated dispatch system, upgrading the telecommunications infrastructure, and overseeing the creation of redundant call-taking and dispatch centers.
- The ECTP was supposed to leverage and expand on the existing efforts by the NYPD and the FDNY to upgrade their respective 911 systems.
- Contracts related to the earlier technology upgrades initiated by the NYPD and the FDNY were included as part of the ECTP, including contracts with Systemhouse, by 2004, renamed iXP.
- In the end, the only bidders for the ECTP system integration contract were iXP and HP; two vendors already involved in the substantially delayed 911 upgrade work for the City.

⁶ While construction of the physical plant of PSAC 2 was the responsibility of the City's Department of Design and Construction (DDC), HP remained responsible for the system integration of ECTP into PSAC 2 through its contract with DoITT.

⁷ Each PSAC was meant to provide full citywide service in the event of the unavailability of the other.

- Following an investigation of alleged procurement irregularities, DOI found that legacy 911 contractors Verizon and iXP had engaged in misconduct in connection with the ECTP contract procurement process and iXP withdrew its bid on the ECTP system integration contract.
- As a result, HP was awarded the system integration contract, notwithstanding its failure to receive the minimum technical score as required by DoITT for a viable responder to the Request for Proposal.
- The ECTP introduced Unified Call Taking (UCT), a procedure based on improved technology and personnel training, that would allow an NYPD calltaker to collect both NYPD and FDNY incident information and electronically share it with appropriate emergency response dispatchers, allowing callers to only provide essential incident information one time.
- The ECTP further relied on the development of a unified CAD for NYPD, FDNY and EMS, which would necessitate combining the NYPD and the FDNY's technologies and business processes in ways that had never been done before.
- However, there were failures in the development of a unified CAD. Critical technology that underpinned the entire system was flawed and so the system had to be fundamentally redesigned.
- By 2007, the City abandoned the unified CAD concept.⁸ Among the reasons for this failure was HP's inability to successfully deliver a CAD that was to have been developed by Motorola. HP returned \$33 million to the City in connection with this failure.
- In 2007, DoITT recommended rebidding the main contract for system integration services with HP. That recommendation was not followed.
- The City also encountered difficulty fully implementing the UCT operation. Among other reasons, calltakers from each of the individual emergency responders did not have sufficient training and/or knowledge to handle all types of emergency calls.
- A number of reports analyzing issues with the ECTP pointed to disputes between the NYPD and the FDNY over how to organize and control aspects of the ECTP process, as having hindered the development and implementation of the UCT.

⁸ The role of the Unified CAD and the effect of its failure on operations is illustrated by the work flow charts annexed to this report as Exhibit 1.

REPORT OF FINDINGS

The Project Governance Structure for ECTP was Weak, Relied Heavily on Outsourcing to Consultants, and Failed to Provide Adequate Controls

The multi-layered project governance structure established by the City to implement the ECTP had ineffective City agency participation. Instead of strong City governance, the project outsourced critical responsibilities to consultants who were insufficiently accountable to the City. Consultants were hired to provide oversight of other consultants, with HP overseeing the day to day work of multiple private vendors, and Gartner, Inc. (Gartner) overseeing the work of HP. The result was a project that incurred unnecessary expenditures, was repeatedly delayed, and increased dramatically in cost.

Strong project governance was needed to guide the unique multi-agency, mission-critical, high-expenditure project that required numerous participants to work in live operating environments with state of the art technologies. However, the structure that was created—involving eight separate City agencies with roles in as many as three oversight levels—was unwieldy and ineffective. Prior reports on the ECTP have noted that scheduled meetings were often not held and decision making was diffuse and delayed.

As designed, the project governance consisted of three primary components:

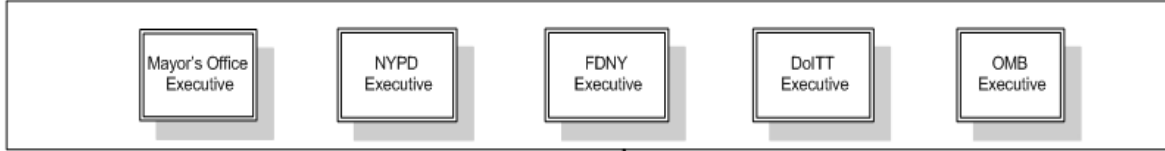
1. The ECTP Task Force composed of executive stakeholders whose responsibilities included: a) initial review of program directions; b) major program investments; and c) critical program issues, direction, and recommendations to the ECTP Working Group.
2. The ECTP Working Group made up of City executives representing all stakeholder agencies with responsibility to: a) oversee execution of program vision and strategic directions; b) commit program/project team resources; c) participate in executive program review sessions; d) approve major program investments; and e) decide on escalated program/project issues.
3. The Program Management Office staffed by the DoITT ECTP Program Manager, the independent external Quality Assurance Manager (Gartner), the NYPD Project Lead, the FDNY Project Lead, the DoITT Program Contract Officer and the DoITT Technical Architect.

The ECTP project governance structure, with its multiple duplicative layers of bureaucracy and diffuse decision making, is graphically illustrated below:

ECTP Program Governance (2004)

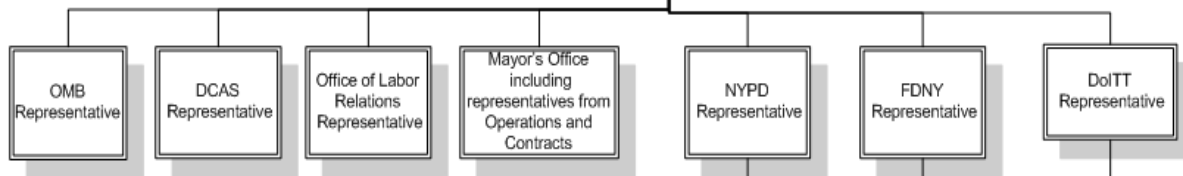
ECTP Task Force (Executive Sponsors)

Establishes program vision and strategic directions. Owns and is accountable for program success. Gets support of other policy makers and executives. Responsible for initial review of program directions, major program investments, and critical program issues. Direction and recommendations to the ECTP Working Group.



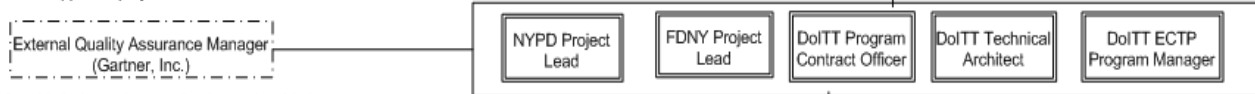
ECTP Working Group (Agency Stakeholders)

Responsible for overseeing execution of program vision and strategic direction; commit program/project team resources; participate in executive program review sessions; approve major program investments; and decide on escalated program/project issues.



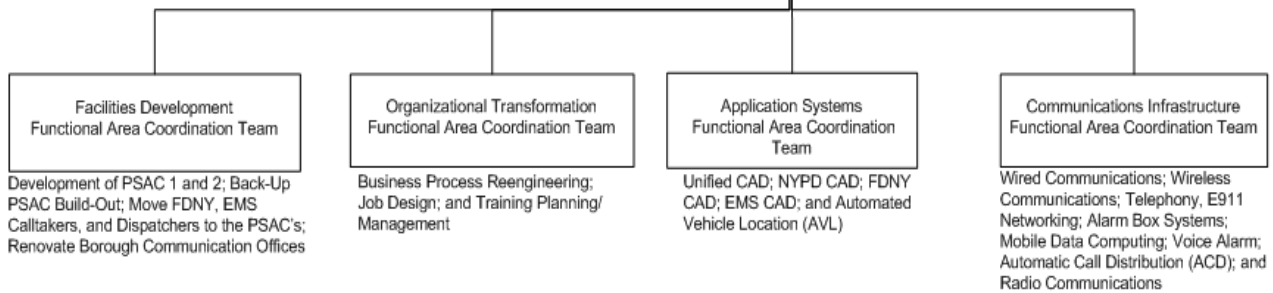
Program Management Office

Manage execution of the program plan, overall budget, scope, and schedule; recommend major initiatives and program investments for approval by the ECTP Task Force; represent business/technology organizations/subject areas and transfer knowledge; provide resources, expertise and issue resolution support to project teams



Provide independent verification and validation of key project deliverables and milestones.

Functional Area Teams



In 2004 and 2006, DoITT contracted with Gartner to provide project management, project monitoring and quality assurance consulting services in support of the ECTP from July 1, 2004 through March 31, 2011. Under the 2004 Gartner contract, Gartner was required to establish a Project Management Office (PMO) and strategy which included organizing the operation of the PMO, project planning, and other activities such as identifying space requirements and possible dispatch facility sites, reviewing 911-related projects at NYPD/FDNY, and defining requirements for a unified CAD and other critical technologies. In addition, Gartner was expected to provide program management oversight and assistance, which included addressing long-term projects such as CAD development, site planning, voice and data networks radio communications, integration of technologies, business process reengineering, training programs, and coordination of vendor and City resources.

Pursuant to the 2006, Gartner was required to further assist in developing the overall strategy for the ECTP; monitoring the implementation of that strategy; managing project risks, costs, and timeline; working with various City agencies to facilitate project completion; and providing weekly reporting. Furthermore, Gartner was to advise the City on overall project best practices and provide subject matter expertise that would allow the City to develop a new 911 organization consistent with best practices in the United States. City records reflect numerous difficulties that Gartner had in fulfilling these responsibilities.

The City contracted with HP to act as the ECTP system integrator in 2005. The Scope of Work associated with the contract set forth HP's responsibilities, including oversight of the completion of PSAC1; providing, maintaining and supporting all program components; designing, managing and supporting the development of PSAC 1's identical backup facility PSAC 2; and developing the unified CAD system for NYPD and FDNY.

Problems with the multi-party and multi-layered governance structure were evident from the beginning of the ECTP. Gartner documented its efforts to screen out inaccurate and unsupported billing. However, its efforts were deficient as was evident from the erroneous billing submitted to the City by HP identified in multiple audit reports and investigations.⁹ The City indicated in Gartner's performance evaluations that it "needs improvement" in numerous areas and was "unsatisfactory" in at least one. Gartner prepared an action plan for improvement in response.

In May 2009, Gartner produced a report entitled *Lessons Learned* in which it summarized the problems in the initial project governance structure for the ECTP including questionable judgment, poor decisions, and slow decision making. Gartner reported that the governance committee failed to meet regularly and failed to effectively exercise its authority over consultants. As both a cause and effect of this inaction, the ECTP Steering Committee failed to make timely decisions, which adversely affected the project's schedules, trajectories, budgets, and accountability.

In addition, reports by Gartner in 2009 and Winbourne Consulting, LLC in 2012 noted that the collaborative approach was not effective in addressing critical cross-agency issues because the governance structure failed to resolve conflicts between agencies involved (NYPD, FDNY, and DoITT) in ECTP.

In 2010, in response to the failures of the existing governance structure, the Mayor's Office created a new project office called the Office of Citywide Emergency Communications (OCEC) to provide dedicated focus on the ECTP project. However, OCEC was staffed by the existing DoITT ECTP team and so there was little substantive change in the City's oversight practices.¹⁰

Various reviews and audits of the ECTP project and City agency records describe program and operational failures of ECTP. A few of the major program failures that resulted in costs overruns and project delays are highlighted below.

- Failure to Deliver the Motorola Printrak CAD System. As part of the ECTP project, the NYPD's contract with HP for the delivery of a CAD to be produced by Motorola was

⁹ Audits by the Comptroller's Office in 2012 and KPMG in 2012 and 2013 identified inaccurate billing and unsupported invoices that made it through the multi-layered review process and were approved for payment. Among other things, HP consultants were found to have been unqualified for their positions, billing rates were incorrect, and work described was not within the scope of what the City had agreed to pay for.

¹⁰ Gartner ECTP ITSC Risk Report dated February 1, 2011.

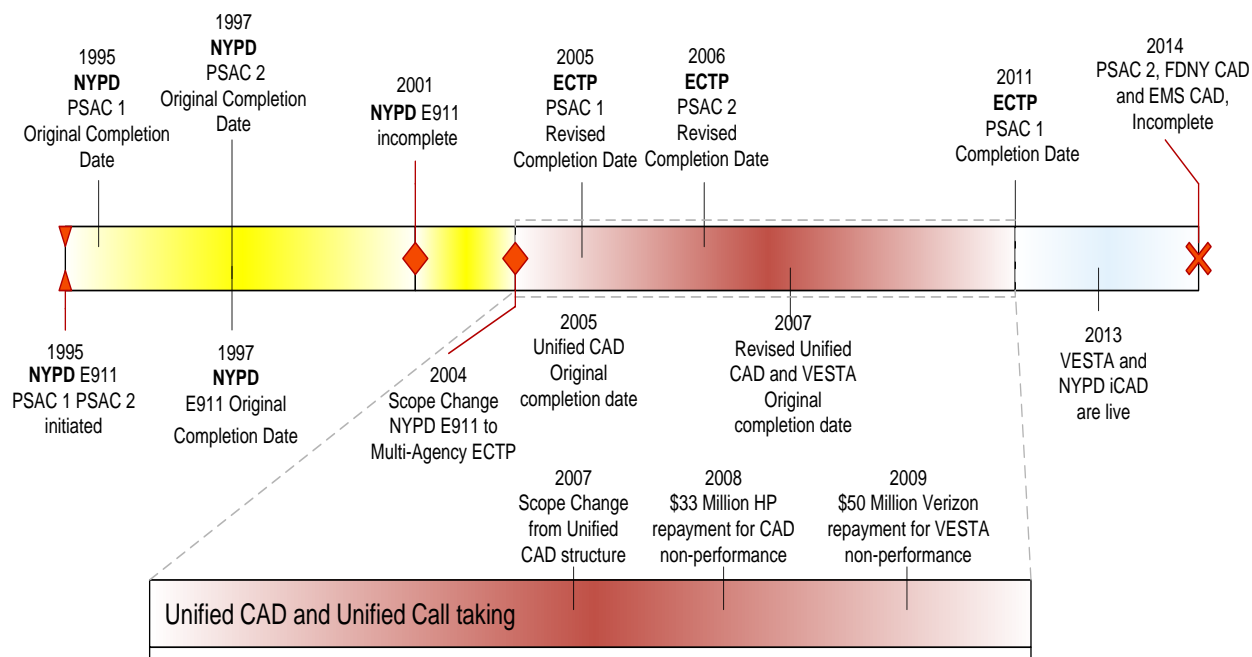
incorporated as part of the new ECTP initiative. However, HP failed to deliver the Printrak system to NYPD and as a result, HP paid \$33 million back to the City.¹¹ Not included in this settlement amount were additional costs to the City for the significantly delayed deployment of this system, particularly those costs incurred during the period after the City had instructed HP to sever ties with Motorola and when that instruction was finally followed.

- Failure to Implement a Unified CAD. By April 2007, the ECTP had abandoned one of its original goals of having a unified CAD due to technical obstacles. As a result, NYPD, FDNY, and EMS have had to independently upgrade their respective CAD systems. The total cost involved appears to have exceeded the \$110 million originally budgeted for a unified CAD and includes the cost of the individual CADs developed by each agency. The NYPD's current contract for its own CAD is valued at \$88 million and the cost of upgrading the individual systems for the FDNY and EMS would be in addition to that along with additional system integration work to design and facilitate the changes to the ECTP.
- Failure to Complete PSAC 2. The installation of PSAC 2 has been a critical piece of the ECTP and the E-911 upgrade that preceded it. Funds for it were included in the 2005 systems integrator contract with HP, as were funds for the unified CAD. When neither went forward, the money was reallocated to other work by HP with limited transparency. In 2012, a new contract for the implementation of PSAC 2 was awarded to Northrup Grumman in an amount that was not to exceed \$241 million.

The scope and milestone changes encountered by the ECTP were the result of multiple factors of which the failure of project governance was at the core. A summary of the major changes in scope, and of milestones, is depicted in the timeline below.

¹¹ The \$33 million settlement paid by HP was rolled over to the contract with Intergraph Corporation for the ICAD system. In 2013, NYPD finally replaced its legacy SPRINT CAD system with ICAD.

Scope Changes and Milestones

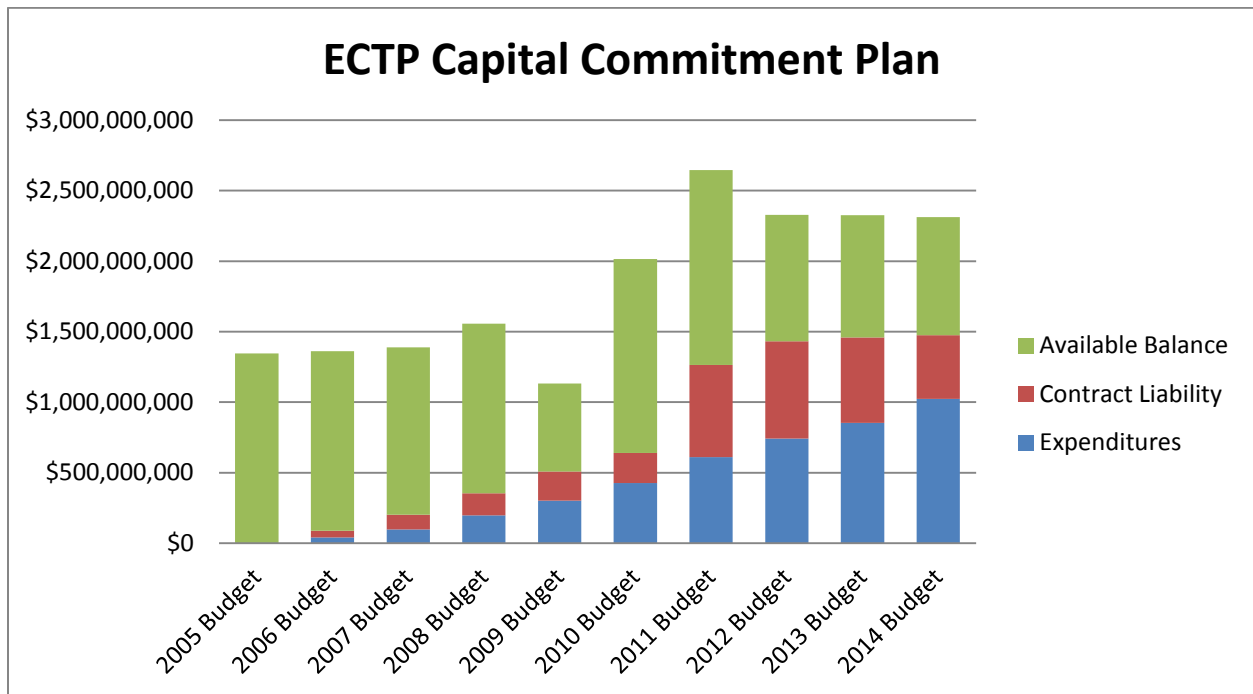


- 2004
- Critical System VESTA behind Schedule.
 - Unified Call Taking operational model not implemented.
 - Unified CAD system not developed or delivered, deemed infeasible.
HP contract estimated at \$110 million for UCAD development.
 - Failed Project Governance caused loss of direction and opportunity for timely corrections.
 - Project structure returns to E911 framework with NYPD, FDNY and EMS developing their own CADs with electronic interface links from NYPD to FDNY and EMS CADs.
- 2011

The Total Costs to the City for its 911 System Upgrade Are Greater Than Previously Announced Cost Projections for ECTP

The actual capital and operational costs of the ECTP are difficult to estimate due to the City's lack of transparency in identifying and disclosing all the associated costs. Previously, City officials have provided ECTP cost estimates in the City's capital commitment plans. The plans identify total amounts set aside in the budget for capital expenditures, but do not identify the individual contracts with which they are associated. Based on our review of City records, we have been able to identify components of the ECTP that do not appear to have been included in the City's formal ECTP cost projections.¹²

In 2004, City officials announced that capital costs for the ECTP would be \$1.345 billion. Ten years later, at a City Council hearing in May 2014, City officials stated that the capital cost of the ECTP would be \$2.03 billion. Most recently, in July 2014, a preliminary capital commitment plan estimated the capital cost of ECTP to be \$2.326 billion.



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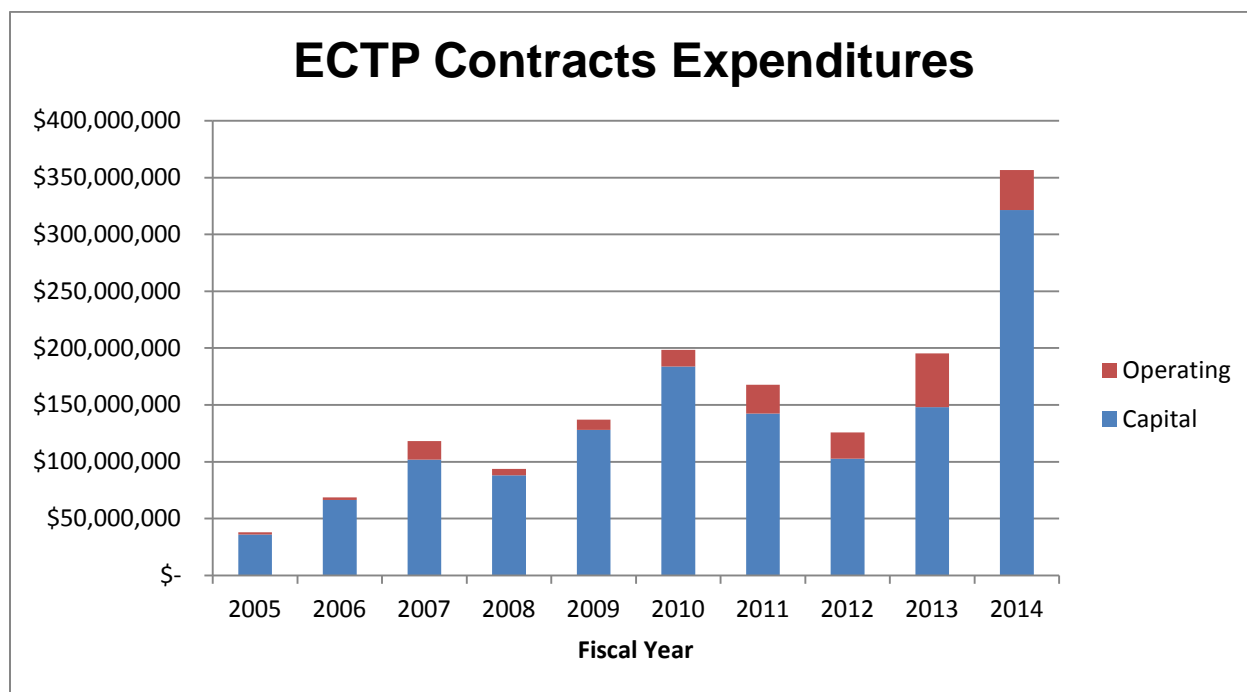
The Comptroller's review has identified two FDNY capital contracts totaling \$39 million that do not appear to have been included in prior ECTP cost estimates. Both contracts are with Purvis for two ECTP components: an emergency reporting system and a voice alarm system. As a result, the cost estimates would have been understated by at least the \$39 million associated with these contracts. Further review would be required to determine if there are additional capital contracts associated with the ECTP that were not included as part of the ECTP cost estimates produced by the City.

¹² Prior to this review, DoITT provided the Comptroller's Office with a list of contracts it said were components of the ECTP in connection with a 2012 audit. As part of this review, we identified additional contracts in City records beyond those provided by DoITT that contain a project code identifying them as being related to the ECTP.

The City's capital cost estimates do not purport to include expense budget items that were incurred by the multiple City agencies involved with the development of the ECTP. Thus, by definition, these budget estimates understate the total ECTP project costs to the City. For example, DoITT's maintenance costs for ECTP are identified as approximately \$50 million for FY 15 alone in material prepared for a March 6, 2014 City Council hearing on that year's Preliminary Budget. Further, this material prepared by the Council's Finance Division notes that additional expense funding for ECTP calltakers is included in the budgets of the NYPD and the FDNY.

Using project codes maintained in City records, the Comptroller's Office has been able to identify specific expense items, such as licenses and maintenance contracts that have been included in Exhibits 2, 3 and 4 to this report. However insufficient detail is provided in the available records and, therefore, the Comptroller's office has been unable to identify how these relate to the expense budget items referred to in the City Council Finance Division material. Thus, we have no assurance that all such costs have been completely identified.

Annual capital fund expenditures reported for the ECTP have ranged from \$36 million to \$322 million. When the operating expenditures of these contracts are also included, the yearly expenditures could increase by \$2 million to \$47 million. The chart below illustrates the additional operating expenses and the capital expenditures.



In addition to the ECTP items above, cost estimates for the ECTP do not appear to include funds the NYPD and the FDNY had previously spent to upgrade the pre-ECTP 911 emergency response system. Accordingly, it is not clear that prior costs of technology upgrades to the City's 911 system that became a part of the ECTP have been accounted for in any of the City's

ECTP cost estimates. A full accounting of the cost of the ECTP should include these City expenses.¹³

As part of this review, the Comptroller's Office has identified over 100 contracts and purchase orders that were associated with ECTP through the following sources:

- 1) Contract information obtained from DoITT in January 2011 during the course of the Comptroller's Office audit of the HP system integration contract;
- 2) Capital project identification numbers;
- 3) DoITT's budget codes that are associated with ECTP; and
- 4) Contracts identified in other prior audits related to the upgrade of the emergency communications system.

The contracts that we have identified as related to the ECTP are listed in Exhibit 2 to this report with their contract numbers, contract amounts, and amounts actually paid to date on the contracts. They are further identified as one of the following: ECTP Capital Commitment Plan Contracts, ECTP Maintenance and Support Contracts, Other Contracts Related to the Emergency System Upgrade, and pre-ECTP E-911 Contracts. Exhibits 3 and 4 contain information about the same contracts in a graphic form that identifies the project sponsors for each contract, the aspect of the ECTP/E-911 project they relate to, whether they are for capital or for maintenance and support, and whether they were the subject of prior audits.

We cannot confirm that this list of ECTP-related contracts is complete because the information from DoITT that we relied on was current as of January 2011. In addition, we do not know if the capital project identification numbers and budget codes were always accurately applied. Further, the contract data obtained in earlier audits is neither current nor comprehensive. An audit of the ECTP would be required to obtain assurance of the identification of all ECTP-related contracts. Nonetheless, even with partial information, the total value of the contracts identified in the attached exhibits, which include some of the prior E-911 costs, total in excess of \$2.6 billion, which is more than any of the cost estimates previously provided by the City for the ECTP.

¹³ City-wide technology developments that are not part of the ECTP, such as the \$536 million NYCWIN project (wireless technology that allows for real time live video to first responders), are also relied on by the ECTP. While these projects appear to have been developed independently of the ECTP, a complete accounting of the cost to the City of the ECTP would identify and allocate a portion of the costs of all such peripheral City-wide projects to the extent they are integral to the ECTP.

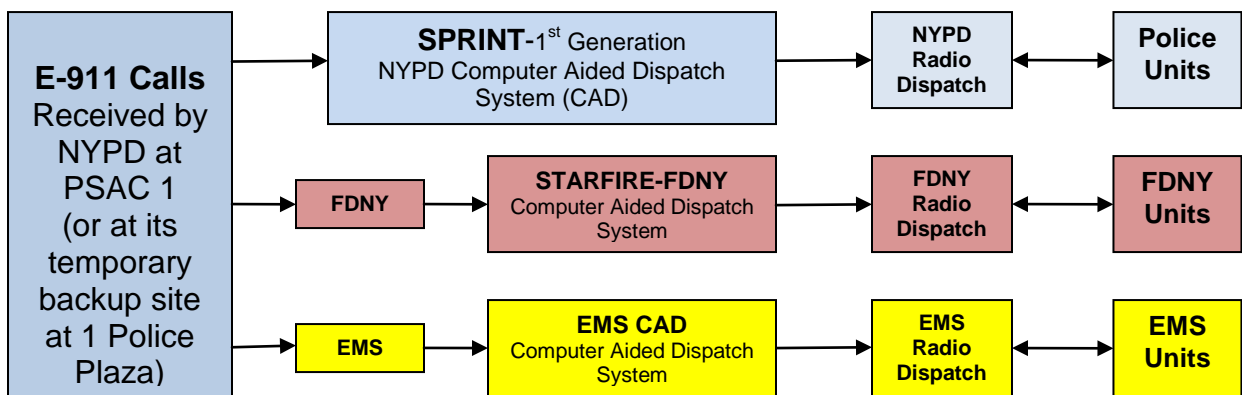
CONCLUSION

This review provides an overview of the ECTP's history and identifies problems with its governance structure and with its financial management. Prior reviews, audits and investigations have also documented multiple failures, delays and system design changes that plagued the development of the ECTP and resulted in substantial cost overruns. The specific causes are complex. The findings in this review provide guidance on how the City should conduct further efforts to upgrade its 911 systems and how it should conduct future large scale technology upgrades.

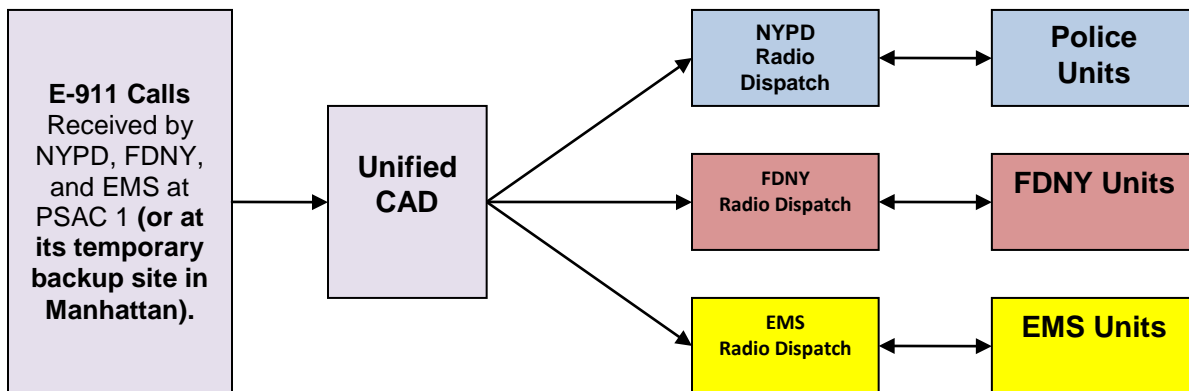
Based on this review, we offer the following recommendations.

1. A project governance structure should be imposed on the ECTP that ensures that the City proceeds with a single vision, direct control, the ability to make decisions quickly, and the authority to see that all objectives are carried out. Such authority should not be delegated or outsourced to consultants who are not answerable to the public. Neither should authority be vested in so many City stakeholders that they are unable or unwilling to act quickly and efficiently in a coordinated manner.
2. The City should directly employ appropriate technical experts to closely monitor the project in order to advise the contract's governance committee on the project's status and to make timely decisions.
3. The City should disclose and consider all costs associated with the project in order to make fully informed decisions about its scope and progress.
4. Where contractors are paid on a time and materials basis, the City should ensure that agency personnel properly review the consultants' timesheets and vendors' invoices before authorizing payments to contractors.
5. The City should implement the controls set forth in Comptroller's Directive 31 on all future contracts for technology services. Moreover, in light of the historic difficulties with the ECTP, where feasible, the City should seek amendments of existing contracts for technology services to conform with the Directive.

1994 E-911 Conceptual Workflow

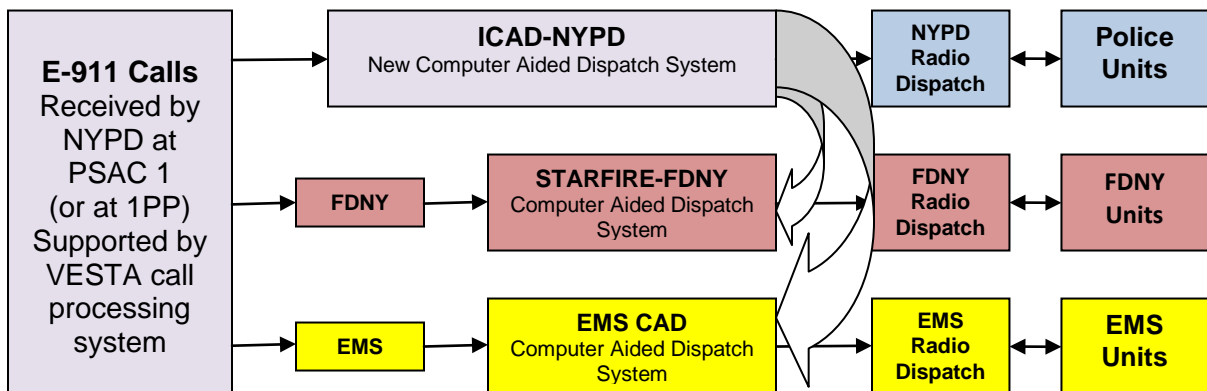


2004 ECTP Project Conceptual Workflow



Note: ICAD is a NYPD implemented project. It replaced unified CAD, a former ECTP project component.

2013 ECTP Project



ECTP Capital Commitment Plan Contracts

VENDOR NAME	CONTRACT DESCRIPTION	CONTRACT NUMBER	REVISED CONTRACT AMOUNT \$	EXPENDED AS OF JUNE 2014
AQUIFER DRILLING AND TESTING, INC	TAKING LAND BORINGS WITHIN THE BOROUGH	20060004355	\$1,620,000.00	\$147,742.30
BLUEWATER COMMUNICATIONS GROUP LLC	NEXUS 7000 NETWORKING SWITCH UPGRADE	20145402146	\$319,533.20	\$319,533.20
BOVINE MANAGEMENT SYSTEMS, INC	IMPLEMENT INTEGRATED SYSTEM FOR MAINTENANCE OF CSCL DATABASE	20080035759	\$3,700,000.00	\$3,672,514.90
CHASE OFFICE SUPPLIES LTD	FURNITURE FOR OUTFITTING OF RECONDITIONED 911 CALL CENTER	20080850326	\$24,000.00	\$24,000.00
CHASE OFFICE SUPPLIES LTD	FURNITURE FOR OUTFITTING OF RECONDITIONED 911 CALL CENTER	20080850124	\$180,844.00	\$182,128.27
COMPAQ COMPUTER CORP	COMPUTER AIDED DISPATCH SYSTEM	20020016408	\$63,922,982.00	\$26,578,029.34
COMPLINK TECHNOLOGIES INC	CISCO ASA PARTS	20141413220	\$87,411.08	\$87,411.08
COMSYS INFORMATION TECHNOLOGY SERVICES, LLC	ITCS-3 ECTP IBM RUP SPECIALIST	20127201056	\$281,057.00	\$162,101.00
COMSYS INFORMATION TECHNOLOGY SERVICES, LLC	ITCS-3 ECTP SHAREPOINT SPECIALIST	20127202923	\$339,559.50	\$334,905.75
COMSYS INFORMATION TECHNOLOGY SERVICES, LLC	ITCS NEGOTIATED ACQUISITION ECTP SENIOR NETWORK ARCHITECT	20137201488	\$710,000.00	\$539,884.00
COMSYS INFORMATION TECHNOLOGY SERVICES, LLC	ITCS NEGOTIATED ACQUISITION ECTP DATA INTEGRATION ARCHITECT	20137202104	\$694,400.00	\$504,980.00
COMSYS INFORMATION TECHNOLOGY SERVICES, LLC	ITCS NEGOTIATED ACQUISITION - ECTP SYSTEM INTEGR. TEST LEAD	20137202941	\$340,326.00	\$328,330.28
COMSYS INFORMATION TECHNOLOGY SERVICES, LLC	ITCS NEGOTIATED ACQUISITION - ECTP SR. TELEPHONY SME/ANALYST	20137204548	\$619,020.00	\$0.00
COMSYS INFORMATION TECHNOLOGY SERVICES, LLC	ITCS NEGOTIATED ACQUISITION OCEC SHAREPOINT ARCHITECT	20137208146	\$72,000.00	\$61,440.00
COMSYS INFORMATION TECHNOLOGY SERVICES, LLC	ITCS NEGOTIATED ACQUISITION OCEC FONYEMS PSAP	20137208206	\$453,840.00	\$291,834.00
COMSYS INFORMATION TECHNOLOGY SERVICES, LLC	ITCS NEGOTIATED ACQUISITION OCEC NYPD FONY EMS PSAP	20137208207	\$453,840.00	\$282,813.00
COMSYS INFORMATION TECHNOLOGY SERVICES, LLC	ITCS NEGOTIATED ACQUISITION OCEC RADIO SME	20137208210	\$476,160.00	\$327,871.50
CURRIER MCCABE & ASSOCIATES INC	ITCS NEGOTIATED ACQUISITION - ECTP SYSTEM	20137203721	\$143,520.00	\$102,258.00
DELL MARKETING	VIA OFFICE PRO PLUS 2010	20111420641	\$33,403.00	\$33,402.60
DIMENSION DATA NORTH AMERICA	NOT AVAILABLE	PO#1650233	\$270,698.00	\$270,697.60
DIMENSION DATA NORTH AMERICA, INC.	SYSTEMS INTEGRATION CONSULTING SERV FOR TECHNOLOGY PROJECTS	20060026003	\$17,479,382.58	\$881,017.40
DOME-TECH	GENERAL CONSTRUCTION - ARCHITECTURAL	20107202446	\$1,186,743.00	\$0.00
DYNTEK	IT OPERATIONS AND TELECOM CONSULTING SVCS	20090031589	\$27,000,000.00	\$2,283,445.00
EVANS CONSOLES	DESIGN, BUILD, INSTALL PUBLIC SAFETY CONSOLE EQUIPMENT	20060029110	\$5,490,000.00	\$5,088,525.25
FOREST CITY MYRTLE ASSOC. LLC	CONSTRUCTION OS LEASED SPACE	20050003827	\$7,980,000.00	\$3,768,292.46
FOREST CITY RATNER COS	CONSTRUCTION OS LEASED SPACE	20000029426	\$107,484,343.00	\$104,727,153.80
FOREST CITY TECH PLACE FOREST CITY RATNER COS.	LEASE	20060027269	\$38,890,000.00	\$5,391,521.07
FORTRES GRAND CORPORATION	TO INCLUDE 10 FULL SETS OF MEDIA AND MANUALS	20100019290	\$55,480.00	\$55,480.00
GARDINER & THEOBALD, INC.	PS&C 2 BX: ACQUISITION & CONSTRUCTION OF NEW CLASS A FACILITY FOR ECTP/911 PROJECT	20090006922	\$7,722,739.16	\$3,107,800.82
GARTNER, INC.	CONSOLIDATED PUBLIC SAFETY DISPATCH (911) PM/QA	20040016091	\$10,080,000.00	\$10,076,585.75
GARTNER, INC.	PROJECT MANAGEMENT, MONITORING AND QUALITY ASSURANCE CONSULTING SERVICES FOR 911 ECTP	20060043040	\$51,400,000.00	\$47,735,592.82
GATEWAY INDUSTRIES, INC	11 METROTECH SECURITY UPGRADE	20090013914	\$7,213,000.00	\$2,539,424.23
GCOM SOFTWARE INC	ITCS NEGOTIATED ACQUISITION - ECTP PUBLIC SAFETY BUS ANALYST	20137208316	\$196,272.00	\$83,607.00

Exhibit 2

VENDOR NAME	CONTRACT DESCRIPTION	CONTRACT NUMBER	REVISED CONTRACT AMOUNT \$	EXPENDED AS OF JUNE 2014
GCOM SOFTWARE INC	ITCS NEGOTIATED ACQUISITION NYCB TLC LARS OLA SR JAVA DEV	20137208433	\$482,640.00	\$312,733.50
HERMAN MILLER INC.	FURNITURE FOR OUTFITTING OF RECONDITIONED 911 CALL CENTER	20080850433	\$87,854.00	\$80,911.98
HEWLETT-PACKARD COMPANY	EMERGENCY COMMUNICATION TRANSFORMATION SYSTEM	200500043752	\$380,000,000.00	\$327,220,408.79
HP	NOT AVAILABLE	20090007449	\$23,324.00	\$0.00
HP	PHASE I OF AUTOMATIC VEHICLE LOCATION PROJECT INCL HARDWARE AND SOFTWARE UPGRADES	20090026388	\$3,697.00	\$3,696.92
HP - IBM	NOT AVAILABLE	PO#1950127	\$415,353.00	\$0.00
HUDSON BAY ENVIRONMENT GRP LLC	FURNITURE FOR OUTFITTING OF RECONDITIONED 911 CALL CENTER	20080850459	\$118,244.00	\$118,244.16
HUTCH REALTY PARTNERS	PSAC 2 LOT	PCAS2P2	\$12,890,900.00	\$12,890,900.00
HUTCH REALTY PARTNERS	PSAC 2 LOT	PSAC211	\$70,326.00	\$70,326.30
HUTCH REALTY PARTNERS	PSAC 2 LOT	PSAC2P1	\$32,909,100.00	\$32,909,100.00
I X P CORPORATION	COMPUTER AIDED DISPATCH SYSTEM INTEGRATION, TESTING, INSTALL	20040021538	\$19,800,000.00	\$18,062,242.83
IBM	SPRINT - INTERIM UNIFIED CALL TAKING SYSTEM	20080041842	\$10,243,879.00	\$4,810,920.00
IBM	NOT AVAILABLE	PO#1950103	\$438,242.00	\$438,242.00
INTERGRAPH CORPORATION	COMPUTER AIDED DISPATCH SYSTEM - AUTOMATION OF E-911 SYSTEM	20090013879	\$88,409,388.00	\$44,043,261.00
LOUIS BERGER & ASSOC PC	CONSULTANT CONTRACT	20080015924	\$2,787,949.54	\$279,487.25
MOTOROLA INC	HARDWARE PURCHASES	20070750389	\$3,123,601.85	\$3,123,601.85
MOTOROLA INC	TESTING & IMPLEMENTING 7 PAIR CABLE CONNECTORS	20080023547	\$509,610.00	\$509,612.00
MOTOROLA INC	EMD CHANNEL 16 INTEGRATION	20080026737	\$6,387,000.00	\$6,391,045.78
MOTOROLA INC	FDNY CONSOLIDATE DISPATCH - REMOVAL, REPAIR AND INSTALLATION OF CABLES	20080028411	\$3,150,000.00	\$3,150,847.00
MOTOROLA INC	TESTING & IMPLEMENTING 7 PAIR CABLE CONNECTORS	20080030074	\$131,980.00	\$131,976.00
MOTOROLA INC	911 ECTP CONSOLIDATED DISPATCH	20090016763	\$686,467.57	\$295,140.00
MOTOROLA INC	ECTP EMD PPT & EM TRAINING	20100018941	\$286,597.00	\$264,833.00
MOTOROLA INC	HARDWARE PURCHASES	PO#550646	\$980,925.00	\$980,924.71
MOTOROLA INC	HARDWARE PURCHASES	PO#550034	\$573,640.00	\$573,640.40
MOTOROLA INC	HARDWARE PURCHASES	PO#550045	\$546,739.00	\$546,739.26
MOTOROLA INC	HARDWARE PURCHASES	PO#550046	\$99,468.00	\$99,468.00
MOTOROLA INC	HARDWARE PURCHASES	PO#550047	\$301,577.00	\$301,577.20
MOTOROLA INC	HARDWARE PURCHASES	PO#550210	\$18,671,729.00	\$18,671,729.34
MOTOROLA INC	HARDWARE PURCHASES	PO#550343	\$14,629,190.87	\$14,526,147.87
MOTOROLA INC	HARDWARE PURCHASES	PO#550063	\$11,116,373.00	\$11,116,372.91
MYTHICS	SUPPLY PURCHASES	PO#1850496	\$131,762.00	\$131,762.40
NASA	PROVISION FOR NASA TO PROVIDE IV&V SERVICES FOR ECTP	20121437341	\$13,282,855.00	\$9,898,590.00
NEW YORK CITY TRANSIT AUTHORITY - PARATRANSIT	11 METROTECH SECURITY UPGRADE	20090030518	\$61,000.00	\$0.00
NEXUS CONSORTIUM, INC.	EMC EQUIPMENT TO SUPPORT SDE FOR FDCAD	20145402012	\$499,250.00	\$499,250.00
NORTHROP GRUMMAN INFORMATION TECHNOLOGY, INC	ECTP 2	20111422403	\$244,480,311.64	\$99,750,608.30

Exhibit 2

VENDOR NAME	CONTRACT DESCRIPTION	CONTRACT NUMBER	REVISED CONTRACT AMOUNT \$	EXPENDED AS OF JUNE 2014
OAC SERVICES INC.	VALUE ENGINEERING SERVICES ON A TASK ORDER BASIS	20090022973	\$4,000,000.00	\$460,419.93
PSI INTERNATIONAL INC	ITCS NEGOTIATED ACQUISITION ECTP PUBLIC SAFETY CAD / UCT SME	20137201489	\$925,860.00	\$717,795.00
PSI INTERNATIONAL INC	ITCS NEGOTIATED ACQUISITION ECTP QA ANALYST	20137208105	\$79,600.00	\$78,605.01
RANGAM CONSULTANTS INC	ITCS-3 ECTP PMO SME PROJECT MANAGER	20127203364	\$327,757.96	\$274,252.13
SKIDMORE OWINGS & MERRILL	ENGINEERING DESIGN SERVICES FOR CONSTRUCTION FOR PSAC 2	20080024234	\$56,460,000.00	\$37,441,477.79
SWANKE HAYDEN CONNELL LTD	ARCHITECTURAL, ENGINEERING DESIGN SERVICES AND CONSTRUCTION IN CONNECTION WITH RENOVATION AND REHABILITATION PROJECTS	97C3857	\$10,750,000.00	\$749,240.28
TECTONIC ENGINEERING & SURVEYING CONSULTANTS PC	GEOTECHNICAL INSPECTION SERVICES	20090025170	\$2,519,860.49	\$120,043.51
TELESECTOR RESOURCES GROUP INC A VERIZON SERVICES GROUP	NETWORK EQUIPMENT AND OTHER SERVICES FOR ENHANCED 9-1-1 SYSTEM	20070020036	\$200,800,000.00	\$145,212,774.88
TELESECTOR RESOURCES GROUP INC A VERIZON SERVICES GROUP	PROVISION OF SERV AND EQPT FOR NETWORK OPE FOR 9-1-1 SYSTEM	20141407188	\$90,855,715.34	\$15,542,495.92
TISHMAN TECHNOLOGIES	CM/BUILD SERVICES FOR CONSTRUCTION OF PSAC II	20090037282	\$645,038,440.00	\$451,143,929.39
TRIGYN TECHNOLOGIES INC	ITCS NEGOTIATED ACQUISITION ECTP PUBLIC SAFETY BUS ANALYST	20147201743	\$135,360.00	\$83,780.00
URBAHN ASSOCIATES, INC	CONTRACT FOR POLICE & CORRECTION, CITYWIDE	20060023419	\$4,541,922.73	\$470,657.41
URS CORPORATION - NEW YORK	NOT AVAILABLE	20060007162	\$5,704,946.75	\$0.00
WARREN GEORGE, INC.	TAKING OF MARINE BORINGS WITHIN THE CITY OF NEW YORK	20080009378	\$2,790,000.00	\$107,305.84
	TOTAL		\$2,244,952,488.41	\$1,484,515,420.25

ECTP Maintenance and Support Contracts

VENDOR NAME	CONTRACT DESCRIPTION	CONTRACT NUMBER	REVISED CONTRACT AMOUNT \$	EXPENDED AS OF JUNE 2014
NORTHROP GRUMMAN INFORMATION TECHNOLOGY INC.	MAINTENANCE & SUPPORT OF EMS COMPUTER AIDED DISPATCH	20070038163	\$2,220,000.00	\$912,921.92
NORTHROP GRUMMAN SYSTEMS CORPORATION	MAINTENANCE & SUPPORT OF EMS CAD SYSTEM	20121423371	\$6,482,988.79	\$6,391,912.19
NORTHROP GRUMMAN SYSTEMS CORPORATION	ECTP 1 MAINTENANCE AND MODIFICATION SERVICES	20131411313	\$56,236,831.16	\$13,048,696.14
PURVIS	MAINTAIN AND REPAIR STARFIRE CAD SYSTEM	20050027685	\$22,060,000.00	\$18,219,032.57
PURVIS	MAINTAIN AND REPAIR STARFIRE CAD SYSTEM	20060016487	\$17,200,000.00	\$17,166,558.85
	TOTAL		\$104,199,819.95	\$55,740,121.67

Other Contracts Related to Emergency System Upgrade

VENDOR NAME	CONTRACT DESCRIPTION	CONTRACT NUMBER	REVISED CONTRACT AMOUNT \$	EXPENDED AS OF JUNE 2014
COMSYS INFORMATION TECHNOLOGY SERVICES, LLC	ITCS NEGOTIATED ACQUISITION - ECTP SYSTEM	20137203766	\$365,376.00	\$345,312.00
DATAMAXX APPLIED TECHNOLOGIES, INC	CAD DIGITAL DISPATCH & MESSAGE SWITCH INTERFACE	20101403416	\$3,238,292.00	\$3,237,401.00
E & M SALES INC	TONERS FOR ECTP	20101420358	\$99,988.50	\$99,988.50
INSIGHT PUBLIC SECTOR INC	HP WORKSTATIONS WITH MONITORS, AND ACCESSORIES	20141423763	\$25,442.06	\$0.00
PSI INTERNATIONAL INC	ITCS NEGOTIATED ACQUISITION - ECTP SYSTEM FOR CITISERV IT SVC	20137203091	\$425,862.00	\$390,019.50
PSI INTERNATIONAL INC	ITCS NEGOTIATED ACQUISITION ECTP SYSTEM	20137203108	\$9,025.00	\$8,930.00
PURVIS	MODERNIZE EMERGENCY REPORTING SYSTEM	20050026936	\$28,430,000.00	\$27,160,623.18

Exhibit 2

VENDOR NAME	CONTRACT DESCRIPTION	CONTRACT NUMBER	REVISED CONTRACT AMOUNT \$	EXPENDED AS OF JUNE 2014
PURVIS	DESIGN AND INSTALL VOICE ALARM SYSTEM	20050028253	\$12,240,000.00	\$12,029,553.57
RANGAM CONSULTANTS INC	ITCS NEGOTIATED ACQUISITION - ECTP SYSTEM	20137203767	\$88,200.00	\$81,427.50
TRIGYN TECHNOLOGIES INC	ITCS NEGOTIATED ACQUISITION - ECTP GIS PUBLIC SAFETY CAD SME	20147000198	\$72,960.00	\$67,965.00
WEBHOUSE INC	NETAPP HARDWARE AND SUPPORT FOR OCEC PROJECT	20145402596	\$2,000,000	\$0.00
	TOTAL		\$46,995,155.56	\$43,421,230.25

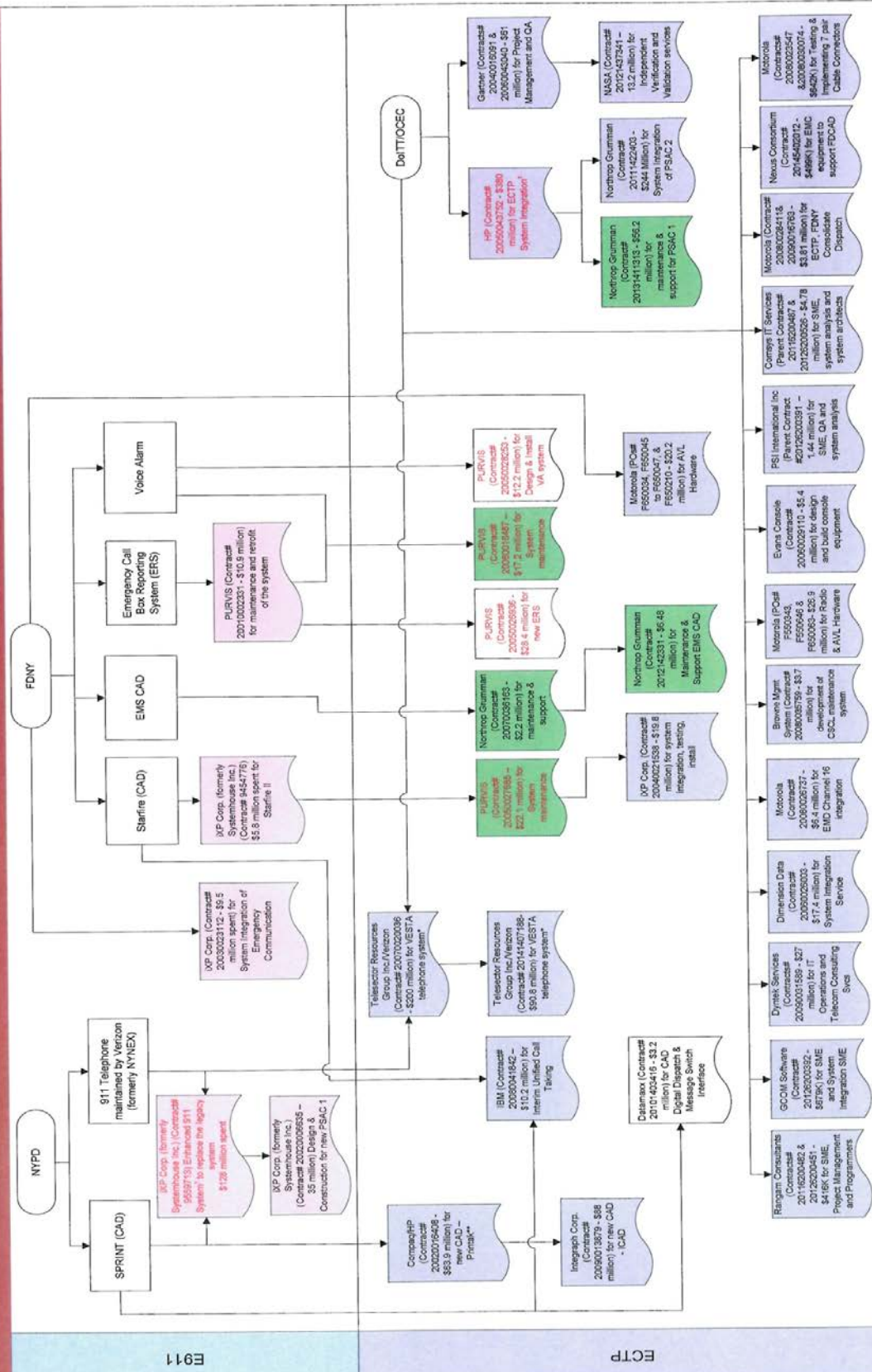
E911 Contracts

VENDOR NAME	CONTRACT DESCRIPTION	CONTRACT NUMBER	REVISED CONTRACT AMOUNT \$	EXPENDED AS OF JUNE 2014
IXP Corp	DESIGN & CONSTRUCTION OF NEW ENHANCED 9-1-1 PSAC	20020006635	\$35,036,428	\$16,686,083.04
I X P CORPORATION	SYSTEM INTEGRATION SERVICES - EMERGENCY COMMUNICATIONS	20030023112	\$10,433,980.00	\$3,692,548.36
SYSTEM HOUSE INC.	STARFIRE II COMPUTER AIDED DISPATCH SYSTEM	9454776	\$10,228,728.28	\$5,803,366.22
SYSTEMHOUSE INCORPORATED	DESIGN & CONSTRUCTION OF NEW ENHANCED 911 PUBLIC SAFETY ANSWERING	9559713	\$160,654,717.04	\$128,787,667.87
	TOTAL		\$216,353,853.32	\$154,969,665.49
	GRAND TOTAL		\$2,612,501,317.24	\$1,604,055,403.57

* Contract amount revised to expended amount as of June 2014

† Total Contract amount not exclusive for ECTP Project

Major Consultant Contracts Involved in Emergency Communication System Maintenance and Upgrade



Notes

- * The new CAD was not implemented and the Mobile Data Terminal interfaces were not complete.
- ** HP paid \$33 million to the City for the delay of delivering VESTA.
- † Verizon paid \$50 million to the City for the delay of delivering VESTA.
- ‡ System integration for PSAC 2 was not done and Unified CAD was not delivered.

Contracts were audited by the NYC Comptroller.

Contracts are part of the ECTP Capital Commitment Plan.
 Contracts are for maintenance and support.
 Contracts are part of NYPD EHI1.

Land Acquisition and Major Construction Contracts Associated

with PSAC 1 and PSAC 2

