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How to Populate the DoD App Store with Navy Software Products

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\textbf{Captain George Galdorisi} (U.S. Navy – Retired)
\textbf{Ms. Amanda George} - POC
\textbf{Mr. Michael Morris}

Space and Naval Warfare Systems Center Pacific
53560 Hull Street
San Diego, California 92152-5001
(619) 553-2066
Amanda.george@navy.mil
Abstract for
How to Populate the DoD App Store with Navy Software Products

The Navy has been working vigorously to provide widget and application storefronts to disseminate applications that enable agile, composeable, C2 capabilities. Space and Naval Warfare Systems Center Pacific and PEO C4I have been working for the last several years to enable the Navy to implement the DoD Application Store on an Ozone Widget Framework. The government-developed open source Ozone Widget Framework allows developers of web applications to register their app in a single repository where it can be discovered, used, and composed by the warfighter. The DoD Application Store, as an Ozone Marketplace within the Ozone Widget Framework, includes automated delivery of software patches, web applications, widgets and mobile applications. The DoD Application Store will deliver software from a central repository, over the land or air, to the warfighter at the tactical edge thereby increasing C2 agility.

Over the last several years DISA, PEO C4I, and SSC Pacific have moved to implement this framework; it will be introduced in fiscal year 2016 as part of the Consolidated Afloat Networks and Enterprise (CANES) fielding afloat and also at the Naval Operations Centers. Once the storefront is fielded, the use of the rapid IT acquisition process to certify products for the storefront will dramatically reduce fielding and deployment costs by automating the distribution, updating, and installation of software components. Not only will the use of a storefront improve the ability of warfighters to use the software products, the storefront will enable an acquisition, test, and evaluation ecosystem that will promote a streamlined, quick, and agile acquisition process. By adopting this process, the Navy will be able to rapidly deploy software and updates to the warfighter that have passed a rigorous testing process.
How to Populate the DoD App Store with Navy Software Products

In the past year, the United States Department of Defense has faced the twin threats of a rapidly evolving global security situation and a tight fiscal environment. The Quadrennial Defense Review (QDR) released in the spring of 2014 described the evolving security environment, emphasizing the complex and quickly changing nature of the threat environment. The QDR states:

The global trends that will define the future security environment are characterized by a rapid rate of change and a complexity born of the multiple ways in which they intersect and influence one another. As a result, despite the growing availability and flow of information around the world, it is increasingly challenging to predict how global threats and opportunities will evolve.¹

Those who develop military strategies, concepts of operations, and technologies must internalize these two crucial key threads in the future security environment: 1) the future security environment will change rapidly and 2) the future security environment will be increasingly complex. Each of these trends in the security environment has different implications for the future of command and control.

Rapid Rate of Change

The rapid change in the security environment has been examined in a number of leading Department of Defense strategic publications, as well as by a growing group of leading strategic thinkers. The World Economic Forum’s Global Risks 2015 report showcases the rapid change of the security environment by stating, “[a]cross every sector of society, decision-makers are struggling to cope with heightened complexity and uncertainty resulting from the world’s highly interconnected nature and the increasing speed of change.”²

The recently released National Security Strategy succinctly states, “[t]oday’s strategic environment is fluid”³ and the QDR characterizes it as “rapidly changing.”⁴ As the QDR explains, the United States Defense Department is “repositioning to focus on the strategic challenges and opportunities that will define our future: new technologies, new centers of power, and a world that is growing more volatile, more unpredictable, and in some instances more threatening to the United States.”⁵ As such, both documents emphasize that “just as the United States helped shape the course of events in the last century, so must we influence their trajectory today by evolving the way we exercise American leadership.”⁶

Complexity of the Security Environment

The year 2014 presented the world with a variety of unforeseen challenges leading the Honorable James Clapper, Director of National Intelligence, to state, “I’ve often said publicly that we are facing the most diverse set of threats I’ve seen in my 50 years in the intelligence business.”

We must expect that the security environment that characterizes the world today will not be the one we encounter tomorrow. The National Intelligence Council describes many of the potential game changers that could shape the security environment but boils down the future to say, “[t]he world of 2030 will be radically transformed from our world today.” The forces that can shape our future environment range from “key nations states [who] continue to pursue agendas that challenge U.S. interests” to “violent extremist groups and transnational criminal networks” to unmet demands for food, water and energy exacerbated by increasing severity of existing weather patterns intensifying “with wet areas getting wetter and dry and arid areas becoming more so.”

As *Global Trends 2030* points out, these trends are exacerbated by the role that technology plays in diffusing power across the globe. By 2030, “individuals and small groups will have greater access to lethal and disruptive technologies (particularly precision-strike capabilities, cyber instruments, and bioterror weaponry), enabling them to perpetrate large-scale violence—a capability formerly the monopoly of states.” These technologies are challenging state and non-state actors alike to “chart the course for the future and reap the many benefits but avoid the risks of emerging technologies.” The complexity of the global security environment ensures that charting a future course “is not a trivial task given the many interdependencies and uncertainties and the fact that many challenges transcend the spheres of decision-makers both across technologies and borders.”

**Department of Defense Fiscal Constraints**

The United States Department of Defense is facing this complex and evolving security situation with the added constraint of decreasing defense budgets. As the QDR points out:

> After more than twelve years of conflict and amid ongoing budget reductions, the Joint Force is currently out of balance. Readiness levels already in decline from this period of conflict were significantly undercut by the implementation of

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sequestration in FY2013, and the force has not kept pace with the need to modernize.\textsuperscript{15}

The QDR emphasizes that even though the defense budget increased steadily from Fiscal Year (FY) 2001 through FY 2010, the DoD was spending all of its funds on the wars in Iraq and Afghanistan, not on modernizing the force. Thus, as the DoD draws down its forces from these two conflicts, the need to modernized, and recapitalize, the force remains high.

Despite the need to modernized, recapitalize, and “reset” its forces, the DoD has faced further constraints in the defense budget caused by a precipitous decline in 2011. The Department of Defense’s Fiscal Year 2016 Budget Request provides the following brief history of the DoD’s defense budget challenges:

Beginning in Fiscal Year (FY) 2013, the Department began a $487 billion, 10-year reduction in spending, compared to the projections in the FY 2012 budget, to adhere to spending limits established by the Budget Control Act (BCA) of 2011. The subsequent failure of the Joint committee on Deficit Reduction resulted in a sequestration mechanism that triggered annual reductions to the discretionary caps established in the BCA. In FY 2013, as a result of sequestration, the DoD base budget was reduced by $30 billion from the original base budget request. The Bipartisan Budget Act of 2013 amended the BCA to provide modest relief from sequestration in FY 2014 and 2015 but, unless Congress acts, annual sequestration cuts are set to begin once more in FY 2016.\textsuperscript{16}

The DoD’s “fiscal environment remains uncertain”\textsuperscript{17} as the President has proposed a defense budget that is “approximately $36 billion above the sequestration level in FY 2016, and about $155 billion above estimated sequestration levels over a 5-year period.”\textsuperscript{18} This sets the Department of Defense up in a situation where Congress must repeal the sequestration caps, cut the defense budget itself, or allow sequestration cuts to go into effect. While the DoD continues to face fiscal uncertainty in the coming years, the imperative for the DoD to remain agile and implement a cost-effective, targeted investments is heightened.

**Department of Defense Implications**

A rapidly changing security environment at the strategic level, leads directly to potential change at the tactical level. As emphasized in the QDR:

Future conflicts could range from hybrid contingencies against proxy groups using asymmetric approaches, to a high-end conflict against a state power armed with WMD or technologically advanced anti-access and area-denial (A2/AD) capabilities. Reflecting this diverse range of challenges, the U.S. military will

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shift focus in terms of what kinds of conflicts it prepares for in the future, moving toward greater emphasis on the full spectrum of possible operations.\textsuperscript{19}

The rapidly changing security environment challenges the United States’ military services to be ready for a full spectrum of possible operations and be able to make the shift between operations types more quickly than ever before. The QDR connects the dots between the need to confront developing challenges agilely, stating “[r]egional and global trends in the security environment, coupled with increasing fiscal austerity, will make it imperative that the United States adapt more quickly than it has in the past and pursue more innovative approaches and partnerships in order to sustain its global leadership role.”\textsuperscript{20}

The U.S. Navy, in particular, is positioned deliberately to “operate forward” in order to “provide offshore options to deter, influence and win in an era of uncertainty.”\textsuperscript{21} Despite the fiscal constraints in 2014, the Navy “maintained a steady pace of over 200 engagements, more than 30 amphibious operations, 150 TSC events, and 130 exercises over the year.”\textsuperscript{22} The Navy has achieved this by using “new technologies and operating concepts to sharpen our warfighting advantage against evolving threats.”\textsuperscript{23} The Navy will continue to embrace new technologies, and focus on adjusting business practices to increase its ability to maintain its operational tempo, and agilely address the variety of engagements required to perform its mission.

**DoD Application Store Enables Rapid, Cost Effective, Command and Control**

In the face of uncertain operations, agile command and control systems and technologies are a crucial component for success. The command and control community in the United States has documented the difficulties that the current and future strategic environment will pose to military command and control. As described in “A Concept for Command and Control,” “the future operational environment will be complex, diverse, and always in flux ... therefore, future C2 must be flexible enough for decision makers to conduct operations under all conditions.” As the U.S. military forces face the uncertain, rapidly changing security environment described in its strategic documents, “[a]gility is increasingly becoming recognized as the most critical characteristic of a transformed force, with network-centricity being understood as the key to achieving agility.”\textsuperscript{24} Today, agility is no longer “merely an attribute of the C2 system,”\textsuperscript{25} instead “military establishments have recognized that ability considerations must permeate the mission capability package, operational concept, or force.”\textsuperscript{26}

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\textsuperscript{22} Honorable Sean Stackley, *Statement on Department of the Navy Seapower and Projection Forces* (Washington, D.C.: Department of Navy, 2015), pg. 2.
The U.S. Navy’s Space and Naval Warfare Systems Center Pacific (SSC Pacific), in partnership with PEO C4I, has been working to instantiate an agile method of acquiring C2 capabilities with low cost and in a quick time frame. The Navy’s cloud-based application store populated with rapid acquired and tested C2 applications and widgets offers the Navy a way to adapt the current acquisition system to accommodate the short time frame necessary for C2 software capabilities to be fielded. Additionally, this trio of capabilities—agile software development, integrated T&E environment, and fielding in the cloud-based DoD Storefront—will substantially decrease the cost to field multiple C2 programs of record on Navy platforms. As this paper will show, SSC Pacific has proven this approach to be technically feasible, and has been making great strides towards making this approach a reality.

DoD Storefront Vision

The vision of the DoD Storefront is to increase the speed in which we can develop and make available software for deployment, by providing the software in a cloud-based application store, similar to commercial software stores like Apple’s App store or Playgoogle. The DoD Storefront will enable the warfighter to consume small lightweight applications to maximize their number of capabilities rather than having a large complex package that encompasses all capabilities in one offering. The use of widgets and apps increases the agility of a military unit, be it a commander in a command center or a sailor deployed on a cruiser. Through widgets and specialized apps the warfighter can easily access data to increase situational awareness as well as connect rapidly with a command center. Widgets and application packages provide the command center and the warfighter the ability to rapidly adapt their information sources to their information needs. The widgets, each providing tailored information and services, can be composed in a variety of ways for the warfighter to tailor the specific information that is needed, while culling out the information that is unnecessary for the task at hand.

Currently, the C2 systems for warfighters are hard-coded to perform a single mission. Each ship or unit is outfitted with the C2 information and tools that are applicable to the mission it is deployed to do. If there is enough room, then alternate tools may be loaded, but given the information storage constraints in any deployment, be it naval or expeditionary, there is finite space for additional C2 tools not tailored to the current mission. Basically, the current process puts as many capabilities in one bag as can fit and sends the units out to perform within that bag of capabilities requiring different units to have different fixed sets of capabilities and to be constrained to those actions only. Thus warfighters face the challenge that their C2 abilities are limited by the tools that they deploy with. This limitation constrains the warfighters’ ability to quickly change missions without returning to base. Widgets and application packages offered in a storefront, combined with an afloat or expeditionary cloud environment, will enable a warfighting unit to tailor its C2 capabilities to respond to changing mission requirements, without necessitating a return to its base.

The idea of a composeable package of capabilities to assist the warfighter is not new, however, it is possible today. The ability to provide widgets, applications, application bundles, and services on demand to the warfighter to reconfigure mission capabilities, will enable commanders to change the mission parameters of any unit, while deployed. The unit in turn would be able to turn off and turn on capability packages as necessary to meet mission requirements. The major enabler of this is the ability to expose and discover C2 capabilities by the warfighter. Storefronts on enterprise and deployed networks provide the ability to instantiate software and platforms as a service is a key element to providing the composeable mission
capability. These devices are innovative in that they also enable the warfighter to provide pertinent data to the central command center thereby increasing total situational awareness. The DoD and the military Services are currently working to provide widget and app storefronts to disseminate applications. The storefronts will enable the developers of the widgets and apps to be more responsive to user needs by allowing them to field innovative products tailored to current needs.

DoD has started to make inroads within this environment with several Programs of Record (PoR) embracing widgets and other mobile technologies, hoping to enhance warfighter situational awareness and access to information. Figure 1 provides an overview of how widgets created within a PoR would flow through the rapid IT acquisition testing and integration (T&I) environment, to an ashore-afloat Storefront framework.

**Figure 1: DoD Storefront Vision**

As Figure 1 shows, widgets and light weight applications can be developed for use with and within a variety of programs of record (PoR). The PoR pictured here represent a few of the Navy’s crucial command and control capabilities: Naval Integrated Tactical Environmental System – Next Generation (NITES-NEXT), Maritime Tactical Command and Control (MTC2), and Distributed Common Ground Station – Navy (DCGS-N). In a nutshell, the Storefront T&I environment provides: automated submission of new warfighter capabilities; manual and automated integration, functional, and IA testing of widgets and applications; and a rapid approval process to push new warfighter capabilities to the operational environment. The ashore storefront (the PEO C4I Storefront) then provides all PEO C4I capabilities to ashore users and distribution of PEO C4I capabilities from ashore to the tactical environment. The final piece, the Navy Tactical Cloud Marketplace, provides afloat users the ability to discover,
access, and use PEO C4I capabilities. In addition, the Navy Tactical Cloud Marketplace enables the warfighter to provide feedback on capabilities received, updated, and installed back to the PEO. The Storefront framework enables rapid testing and fielding, as well as two-way communication between the user and the developer of the C2 capability by utilizing an open-source Ozone Widget Framework (OWF).

**Ozone Widget Framework (OWF)**

**What is a widget?**

Widgets are lightweight, single-purpose, web-enabled applications users can configure to their specific needs. Widgets can provide summary information or a limited view into a larger application and can be used alongside related widgets to provide an integrated view as required by the user.

**OWF**

The Ozone Widget Framework (OWF) is a platform that offers infrastructure services to simplify the development of workflows and presentation-tier application integration. It is also a layout manager for the operation of widgets on a single web page. Widgets, which are web applications that can be installed and executed in a web browser, display information or provide dynamic content from a backend or local service. Just like any other widget framework, OWF supplies the structure and templates for creating widgets providing users with the capability to develop, share, and operate widgets. Unlike a standard browser window, OWF allows users to load and operate multiple widgets within a single webpage rather than requiring multiple browser windows or tabs to display more than one widget. This allows users to view a great amount of information on a single browser interface. From an intelligence analyst’s standpoint, the OWF provides a means to conveniently search, access, and display intelligence data on a single display. Furthermore, the OWF allows the user to adapt their information flows by adding, deleting or modifying the loaded widgets, in the shortest amount of time. In under a minute, an OWF operator can change the information they have access to, allowing the user to agilely adjust to changing circumstances.

OWF allows users to load widgets, select a layout type called a dashboard layout, and customize the arrangement of the widgets within the dashboard. OWF supports multiple dashboard layouts including desktop, tabbed, portal, and accordion. The desktop layout allows users to arrange and drag widgets anywhere within the browser window much like a desktop application on a standard operating system desktop. The tabbed, portal, and accordion layouts fix the widget positions in the browser, but users are able to select which widgets are assigned to the fixed locations creating a customized display. The dashboard layout and arrangement of widgets is saved when a user logs out of the OWF, so the next time the account is accessed the entire layout is maintained. Thus, a user could have a dashboard specifically targeted to address multiple scenarios; this moves the operator away from the stove piped information system.

The OWF, originally developed and sponsored by the National Security Agency (NSA) as a Government Off-The-Shelf (GOTS) solution, is now Government Open-Source Software (GOSS) with a collaborative software development model. The OWF GOSS Program is responsible for the maintenance of OWF and Ozone Marketplace (OMP) software releases. The OWF GOSS board, comprised of members from NSA, ODNI, DoD, CIA, DISA, SPAWAR,
NRO, and INSCOM,\textsuperscript{27} can distribute development priorities to any government agency or program requesting the source code for either its own use or for updating. These agencies are encouraged to submit software patches and feature enhancements to improve the baseline code and benefit the community of projects utilizing the OWF and OMP. The OWF also provides a suite of application programming interfaces (APIs) that give widget developers the ability to further their web applications using inter-widget communication, user preferences, and internationalization. Each API is written in JavaScript so that widgets can be built in a large variety of web technologies. Therefore, widgets can be written in the JavaScript capable technology of the developer’s choice. The ability of each agency to customize their APIs further allows for quick responsiveness.

\section*{PEO C4I Storefront Overview}

Before new capabilities are made available to the warfighter, they must undergo developmental tests, operational tests, and a strict certification and accreditation (C&A) process. This process can take as long as nine months, enough time for the “new” technology to become out of date and unresponsive to immediate user needs. Widgets provide a technological capability now to foster this rapid fielding ability and provide the potential to rapidly implement C4ISR and operational capabilities for the war fighter. Widgets are being deployed in the Navy operational environment as part of formal software builds and releases for Programs of Record (PoRs). The PEO C4I Storefront and a governance process specific to widgets submitted by an accredited PoR will reduce lead times and ensure that widgets are efficiently and securely introduced for the warfighter in a production environment.

Using the widget framework, the operator is not only able to be successful but is able to maintain “success in light of changed or changing circumstances”\textsuperscript{28} a key component of agile C2. The PEO C4I Storefront provides an example of how quickly widgets can be created and fielded when they are associated with an already accredited PoR. The DoD would be well-served to examine its acquisition paths and to adopt widgets and associated storefronts at an accelerated pace in order to enable agile C2. As \textit{Global Trends 2030} notes “the future world order will be shaped by human agency as much as unfolding trends and unanticipated events.”\textsuperscript{29} The DoD should enable its commands to be able to respond to these events with innovative approaches as exemplified by the use of widget and application storefronts described in this paper.

The PEO C4I Storefront seeks to increase the speed at which new capabilities are provided to the warfighter by creating an efficient test, verification and validation process to govern widgets. Figure 2 depicts the operational concept of the PEO C4I Storefront. A widget developer produces a widget which he or she submits to the Test and Integration (T&I) Storefront Environment for testing. The Widget Test and Integration Team provides feedback to the widget developer on improvements needed to make the widget compliant with the Operational Storefront standards. Upon completion of all testing, the widget is promoted to the

\begin{itemize}
\item[27] The OWF GOSS board includes members from: the Office of the Director of National Intelligence (ODNI), the Central Intelligence Agency (CIA), the Defense Information Systems Agency (DISA), Space and Naval Warfare Systems Center (SPAWAR), the National Reconnaissance Office (NRO), and United States Army Intelligence and Security Command (INSCOM).
\item[28] Alberts, \textit{The Agility Advantage}, 66.
\end{itemize}
Operational Storefront Environment. From there, the Operational User can discover the widget from a Marketplace (applications store) and consume the capability in an operational environment. Ultimately, the operational user can provide feedback about the widget to build on the existing capability or to evolve new capabilities.

Figure 2: PEO C4I Storefront Operational Concept

Widget Governance Tool

Widget governance describes how an organization establishes and controls its processes and policies regarding widgets. It includes a system to track and record where a widget is within a widget process and checks for its compliance with existing policies. By establishing an efficient test and evaluation process to govern widgets and approve their acceptance into a marketplace, the lead time for a developmental concept to reach the warfighter can be greatly reduced.

The following, described in Figure 3, is an overview of the widget governance tool that governs widgets beginning with its initial submission to the widget governance process to its acceptance into the operational environment where it is becomes available for use by the warfighter.
Developers provide widgets to Programs of Record (PoR) which expose capabilities in a widget framework (1). The widgets must meet Entrance Criteria for introduction to the Test and Integration (T&I) environment (2), which includes the source code, descriptive metadata, configuration documentation, and developer testing results for the target production environment. Applying Navy approved processes, the widget passes through a number of manual and automated tests to ensure suitability for the production Storefront environment (3). Upon review of the test results which verify that the widget meets the exit criteria (4), the widget is approved to be introduced into the Storefront operational environment (5) and is made readily available to the warfighter. The following, detailed in Figure 4, is a process flow for the widget governance tool.
A Widget Submission Package (WSP) is submitted (1) which contains source code and documentation of the widget and application programming interface (API), as well as metadata describing the function, user guidance, characteristics, boundaries and deployment locations, preferred browser and system configuration, installation instructions and dependencies. Developer, Functional, Information Assurance and Integration Test Reports are also included, as well as a Mobile Code Risk Mitigation Strategy and a statement that the widget has been developed in accordance with mobile code developer’s guidance and a Security Technical Implementation Guide (STIG) report. All required components of the WSP are indexed for ready reference. If the package does not pass the Acceptance test (1), a report of deficiencies is provided and the submitter is provided the opportunity to edit and correct the submission (2). If the WSP passes the Acceptance sub process, the package is provided for Functional, IA, and Integration Testing sub processes in the T&I environment (3).

The Functional, IA, and Integration testing is conducted in parallel to the greatest extent possible in order to optimize testing resources and make the procession of the WSP through the process efficient (4). Functional testing will focus on the proper operation of the widget in generating the desired output in a widget as described by the PoR. Integration testing will concentrate on how well the widget performs in the Storefront environment (e.g. with the widget framework, identity management solution, etc.) and also amidst other widgets. IA testing will ensure that the widget meets OWF standards, that backend services and data inherit configuration attributes from their accredited parent environments, that information is exchanged over a secure channel, and that the widget operates in a manner which ensures an acceptable level of security. Some tests will be conducted manually by the T&I Testing Team, but automation is desired to the greatest extent possible to decrease the amount of time and manual effort required to designate a widget suitable for the operational Storefront environment.

Upon completion of the preceding tests, the results will be aggregated and compiled for the Approval Board sub-process. The Board may determine that a WSP needs to be returned to the
T&I Test Team if the results did not demonstrate acceptable functional, information assurance or integration testing results (5). A widget may also be ordered to be reworked by the developers if major deficiencies exist which must be corrected prior to deployment to the operational Storefront environment (6). Additionally, a WSP may be rejected if the content rendered or output of the widget is deemed to be inappropriate or of no added value in the Storefront environment (7). The end goal, however, is to have the widget approved, making it available to the warfighter in from the production Storefront environment (8).

**Rapid IT Process and Agile Widget Process**

The current process for developing software capabilities and testing and fielding them can take up to 44 months. This process, originally designed for hardware insertions, is not only lengthy but seeks to deliver the exquisite solution to the warfighter, without warfighter input along the way. In the current process, capability development takes on average twelve to eighteen months per release; in this manner all the capabilities for a new or updated software artifact are created at once. The new capability must pass operational testing and evaluation (OT&E) testing as well as information assurance (IA) testing that take, on average, an additional six to eight months. Once the new capability is approved, it must be installed manually onboard ships. A manual install takes on average two weeks and it must align with ship schedules; therefore, due to difficulties in getting aligned with the ship schedules, the approved capability could take up to 18 months just to field. Agile widget development, working smoothly with the rapid IT release process, can increase the speed at which capabilities are released to the Fleet by providing multiple updates in six month fleet releases, getting incremental solutions to the warfighter, through the OMP, in a matter of days.

The proposed rapid IT process and agile widget process described below in Figure 4 has the ability to provide incremental capability releases to the software user. Instead of getting a complete package in 44 months, the user can get parts of the package over time, and provide input during the development, which will lead to a more agile and useful capability in a much shorter time period. During this six month time period, OT&E and IA testing will be done within the process in the space of a few weeks. Once tested and approved the new capability will be ready to be disseminated to the Fleet via the OMP, thereby making a manual install unnecessary. The end user will simply download the new capability from the Application Store. Bypassing the need for a manual install significantly cuts the time and cost incurred in fielding new software capabilities to the Fleet because there would no longer be a need to coordinate with the ships’ availabilities and there would no longer be a need to send installers to the ships.
Figure 5 provides a detailed view of the rapid IT process and agile widget process working together. As top of the chart shows, the contractor for the program of record (PoR) develops capabilities – applications and widgets – using the rapid IT process. For a specific release, the POR has five monthly sprints where the results of each sprint are delivered to the government tester (the green boxes). The government, potentially including the Commander Operational Test and Evaluation Force (COTF) performs the OT&E and IA testing on the results of each sprint. In this manner, the results of the testing, including bug fixes, are included in the next spiral. After the five sprints, the COTF would have a collection of testing artifacts that can be combined over the course of the release to support a formal test report. Essentially, at the end of the five 1-month sprints, there would be the capability that has been incrementally tested (from an IA and OT perspective) and only minor regression testing would be required to generate a formal test report and make a fielding decision for the release. At this point, the release would include both widgets and their backend applications. Thus, the incremental capability would be fielded within six months.

Even though the Fleet releases would be scheduled every six months, there are some widgets that will need to be fielded more quickly. The red dotted lines show that at the end of a sprint, the widget could enter the AWA governance process with the letter from the PoR’s Project Manager stating this widget needs to be fielded before the Fleet Release and that it doesn't change the IA baseline. Depending on the complexity of the widget, it may require some level of IA or OT testing as shown in the testing process outlined at the bottom of the diagram. Following a similar process for the six month releases, the T&I Team will continue to provide the test artifacts back to the collection of DT/OT/OA. The Agile Widget Approval Integrated Product Team (AWA IPT) would review the results of the T&I team and then recommend approval to add the widget to the PEO C4I Storefront for distribution to the afloat users.
Despite being fielded earlier, the widgets would still be part of the larger, Operational Test Report as well. This process allows for a needed capability to be agilely created and deployed in a time sensitive manner.

**Time and Cost Savings**

The use of the Application Store framework will both decrease the time to fielding as well as the cost to fielding for crucial C2 software components. While all PoRs have costs associated with distributing, updating, and installing components, the Storefront reduces these costs by providing these capabilities as common services across PEO C4I. The cost savings are achieved in part by providing a common presentation service for all PoRs to use (the OWF), which enables a single fielding cost, single maintenance cost as each PoR isn’t developing, integrating, and fielding and maintaining their own OWF. The storefront framework also provides a common distribution service to automate distribution of components from PoR to ashore and afloat platforms enabling automation, with common installation, of the delivery of widgets, applications, services from PoR. With automated distribution, often lengthy and expensive physical fielding costs can be avoided. In addition, provides common update service to provide status on fielding and installation of PoR components (and their versions). Finally, it provides the PoR with status of fielding and installation of their capabilities (down to specific version) to provide enhanced awareness of fleet implementation.

The time savings of the storefront framework has the potential to reduce total time from development to final installation from a former maximum of 2 years 4 months to 6 months. Figure 6 illustrates the timeframes needed for each section: capability development, testing, and fielding.

**Figure 6: Agile Widget Time Savings**
Widgets in Action

The power of widgets and apps to provide agile C2 is being recognized across the DoD. The recognition of the power of these apps is driving a push to change the acquisition structure of these products to allow them to be fielded in a responsive manner. The Navy’s Program Executive Office for Command, Control, Computers, Communications and Intelligence (PEO C4I) is actively working to implement a storefront and a widget acceptance process through which widgets can be fielded through an already existing program of record and thereby reach the user in a timely fashion. Command and Control and Intelligence widgets as well as the Ozone Market Place (OMP) provide examples of this adoption of widgets. These C2 widgets, when fielded, provide agile C2 capabilities in response to emergent warfighter requirements.