Web Technology Initiatives in the Government
Visions & Strategies

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Did you notice? Did you? … I hope you did.

The name of our DACS publication has changed. Our new publication name is now the DACS “Journal of Software Technology.”

In recent years, this quarterly publication has been called Software Tech News. We have called it informally around the office the ‘DACS Newsletter’. That’s because in its original form, it was officially called the “DACS Newsletter”.

Also in the early DACS days, before the web, this publication was just a newsletter - it included some of the latest DoD news, information about new directories and publications, and calendar of event information.

For many years, we have received much positive reader feedback about the high quality of our technical articles and the high quality of the publication. Many of you have told us (and we agree) that we are underselling this publication by calling it just a ‘Newsletter’. It is much more than a newsletter.

We are also privileged to have an excellent and esteemed Editorial Board that helps us keep the quality high. They help us find excellent and timely articles, write selected articles themselves, and critically review all articles before we publish them.

Many publications like ours have moved away from a hardcopy format to online/web copies only. Feedback from our readers and members of our editorial board suggests that many of you prefer a hardcopy document. You like the feel and portability of a hardcopy journal.

We have an online version of the DACS Journal. Electronic copies of our Journal are always available at https://journal.thedacs.com. Some day we may have to move totally to an electronic format, but not today.

We are very excited about the name change to the “DACS Journal”. We feel it reflects our ideal of what this publication should be.
DACS eNews

The DACS is proud to introduce our new bi-monthly electronic newsletter, the DACS E-News. You should have received in your email inbox your own DACS E-News Vol. 1 No. 1 in early March 2011. If you didn't you probably haven't signed up for it, which you can do by editing your account at the DACS website. Every other month the E-News publication will highlight key updates on the latest information available from the DACS website, new reports available from the DACS, as well as other software technology and software acquisition community updates. Our first E-News contained information on such technical areas as Mobile Technology, Open Source Software, and Agile Development, to name a few.

We know your time is valuable, and we want the DACS E-News to provide the important information you need. Content is constantly being updated and added to our website to keep you on top of our fast changing field. The E-News will keep you on top of the latest of the latest.

New “News” on the DACS Website (iac.dtic.mil/dacs)

In the near future, we will be featuring a new “News” area on the DACS website. Over the 15+ years of being DACS Director, I have found it difficult to stay current with activities and changes, particularly those related to software and IT acquisition policy within the Government. The DACS will monitor selected web resources and post policy updates and other important technology happenings within the News area of the website. It should be available before you receive the next DACS Journal.

By the way, have you noticed that the DACS now has a Calendar of Events on the DACS website?

In it you will find DACS events, such as upcoming DACS webinars, as well as other relevant conferences and workshops from such organizations as NDIA, IEEE, and the SEI. The new “News” area will augment the Calendar of Events information.
Components of Web Technology - An Overview

THE TOOLS AVAILABLE ON THE WEB TODAY DEFINE HOW APPLICATIONS ARE BEING IMPLEMENTED AND HOW THEY ARE ADAPTED FROM CENTRALIZED LOCAL SERVICES TO WEB BASED SERVICES.

By Ivan Lopez

Interest in web-based technologies has been ever growing with an uptick in projects requesting the use of a combination of these technologies. The catalyst to this interest is the explosive growth in the internet itself and the applications that one has available to them by just being online. In some respects, there are parallels to this in the government and various government agencies, especially in the need of providing the tools and technology to help foster information gathering and sharing. In reviewing this we can categorize these technologies and discuss how and where they fit into the overall puzzle. We’ll begin with the web browser as this represents a common entry point. Along with the web browser, we’ll look at how JavaScript plays into the mix. Some advances have been made in how a user visualizes information and so we’ll look into what tools are available from that front. A common problem that people face when using the internet is finding content relative to their need or interest. This problem is similarly faced by government analysts. After an analyst has performed a search for information, they may need to include that information in a work product and as such may need to track this work product from inception to completion along with categorizing it for future retrieval. We’ll take a look into content management systems, workflows, wikis, and blogs as some web technologies that have been used to solve those needs. On the one hand, having tools available is great but the other thing is to actually architect and craft a solution to provide these tools. This is where architecture such as Service Oriented Architecture comes into play.

Web Browser

One of the key tools in web technology is the web browser. The web browser (in one form or another) is available for the desktop operating systems in use today. Building an application that is used by the web browser allows for an ease in application deployment/installation and maintenance, as the core of the maintenance is done on the server in lieu of needing individual installs to occur on the client. Minimizing client installation issues also allows one to craft and architect a solution that can reach a broader base of users regardless of the operating system they are running on. In addition, being able to reach a broader audience helps the customer disseminate the information necessary to those who have a need. For someone making a request, it is much easier to provide them the URL for the resource they need rather than calling the help desk and having the application installed for them. In most cases, pitching a thick-client or desktop tool solution can be a deal breaker for a potential customer as many have become used to accessing what they need through the web browser. There was one occurrence where some key important data had been incorporated into a Microsoft Access database by a subject matter expert and was to be delivered to the customer in that form. The customer joked that the Access database “solution” was the computer equivalent of a paperweight. So, while the data contained within the Access file was important, there was no way to disseminate that information to others that did not have Access installed or that did not have connectivity to the intranet location. Most of the recent projects that I have worked on are the type where a customer has data either in Microsoft Access (more customers do this than you would think), Excel spreadsheets, proprietary database systems, or, in some other, not easily sharable systems – but they have a need to get the data accessible via the web browser.

JavaScript

Building web applications has its fair share of hurdles to overcome, but there have been many advances in this area. Many of the cross-browser idiosyncrasies still exist but these are being reduced as the web browser developers are working toward a common set of standards by which all the web browsers try to implement (the latest of this being HTML5/CSS3). The web browser developers have also focused in on how to make the web browser experience better and they have spent time increasing the performance of JavaScript along with JavaScript frameworks (such as jQuery) to make scripting more straightforward. There used to be a time when the interaction with links on a page caused a full page refresh and, in the end, when the browser rendered the page, only one section of information was updated based on the action. To overcome a problem like this, as well as to allow the web page to be data driven, a development method called AJAX (asynchronous JavaScript and xml) came to be. This development approach allows a web application to be more dynamic, and in some cases, perform more like a desktop application in behavior.
Visualization

A web application is just one aspect of leveraging web technology. The web application is the visual piece, the one part that the end user interacts with. Within this interaction there are times when you need to visualize data in a format other than tabular or inline on a web page. There has been an increasing focus on leveraging geospatial technology and displaying this data within a web browser. At the forefront of this, in recent times, is the use of Google Earth for visualization. Sometimes the visualization is imagery oriented (let someone see down to X meters resolution), but an increasing use of Google Earth is to provide either near real-time visualization of data (plot points and draw lines as a sensor receives them) or to allow a user to view one set of data in relation to another set based on their geospatial characteristics (color code each sampling of data points to allow the user to easily distinguish patterns or inconsistencies in their data). Other uses are to allow the user the ability to “playback” the visualization of real-time data that was captured or sampled. This allows analysis by arriving at possible patterns that occur over time. From a different perspective, Google Earth could be used as the interface by which someone performs an area of interest query by drawing a box around an area. This could then be converted into coordinates by which a geospatial query within a database would return back items qualifying for that region. These items could be documents about an area, points of interest in the area, or anything else that had been catalogued about that region.

Searching for Information

“Search” is another area that has its underpinnings in web technology. With the advent of search engines and the notion of indexing and cataloging content, there has been a focus on leveraging these technologies for use in the government. Sometimes data lives in a database and this data can be queried and the results rendered in a browser. Other times data lives in files or documents that may either be a common file share, or stored in a public folder within a Microsoft Exchange server. One of the challenges is to sift and sort through all of this to make sure there is no duplication of information, or worse – to make sure nothing is lost.

Content Repositories/Workflow

Content Management Systems (CMS) is a technology that has tried to put some structure to it all. CMS setups put a method to the madness so that you can go back and retrieve content without having to guess where it’s located. Along with content retrieval is the need to author content and to make sure it goes through all the proper channels before being released. Workflows allow for content to make its way through the system and come out the other end without being lost in the noise. Each agency/group has their own unique way of deciding how things get done. A customizable workflow engine allows a developer to craft the necessary business rules that need to be implemented in order for the correct tracking of an item from inception to completion.

There has been an evident increase in government agencies trying to get a handle on workflow and work product generation. Some of the agencies have deployed Microsoft SharePoint setups as a way to get a handle on all of their content, the dissemination of information, the tracking of items, and the collaboration on generating the content. One thing to keep in mind is that no one technology is going to magically improve your processes unless you first have a handle on what your process is. Technologies such as SharePoint are merely tools to implement your process -- if you don't have a handle on the process, a tool will not make it happen.

Wikis/Blogs

In addition to content management and the workflows associated with that content, companies and government agencies have also deployed other web technologies such as wikis and blogs. Often times, while there is process and workflows to follow, there may be the need to collaborate or share information. There is also the need to house all of this somewhere for others to contribute or read. The internet has always been a conduit for expression and sharing of information and, as such, the creation of wikis and blogs came to be by the very nature of the internet. Now, government agencies are leveraging these same technologies as a way to allow their analysts to discuss, contribute and collaborate on items of importance. Wikis are used as a way to categorize articles and offer the user the ability to contribute to the information in the article. The government noticed how influential Wikipedia was as being a clearing house of information and has leveraged the same underlying technology as Wikipedia -- the MediaWiki “engine” for their Intellipedia product. In addition to wikis, blogs are also a way for information to be shared. While a wiki is a display of collaborative content, a blog is a way for an individual to discuss a topic or post information that they deem interesting or useful. By leveraging search and the indexing of content, people can find the information within the wikis and blogs.

Service Oriented Technologies

Another aspect of web technologies has to do with the way items are all interconnected together. An architecture that is gaining traction is that of Service Oriented Architecture (SOA). SOA has its underpinnings in web technology. A few pieces of SOA involve extensible markup language (XML), web services
(ways for applications to exchange data), simple object access protocol (SOAP, the programmatic way of exchanging data with web services), representational state transfer (REST), and JavaScript object notation (JSON). These technologies are being leveraged in web applications for many organizations as a way to interconnect and share data between them. Many of the web applications provide context to the underlying data. The analyst will use the web applications as a way to research or gather information about a particular item of interest. In addition to the web application gaining access to the data, other applications may need to access information from the same underlying data store. This is where web services come in and help to provide the conduit by which an exchange of this data can occur and thereby make use of it within the context of their need. I have worked with REST oriented web services as a way to provide content for other applications that is dynamic in nature. Within a REST web service you provide access to the resource by Uniform Resource Identifier (URI). If an analyst is authoring, let's say a wiki page, but wants to hyperlink to content from another application, they could craft the anchor tag with the necessary endpoint that would gain access to that underlying data (as an XML document that could have an Extensible Stylesheet Language Transformation (XSLT) template applied) or redirect the user to the content specified by the URI which could be dynamically rendered. This is just one way that information from different systems could be combined together to then define new content. A term that is sometimes used to describe this is called mashup, where you are taking information from two or more sources and putting that together to form a derived piece of information.

Along with the technologies described above, SOA also brings the ability to create what is called an enterprise bus. This allows for a broader set of applications to interoperate together. The main output of this is the ability to distribute information across the enterprise quickly and easily with platform and programming independence along with the ability to provide for phased rollout of functionality.

In the end the growth of the internet itself has fostered an environment in which it was necessary to tackle key technology challenges. The same challenges the commercial world faced in deploying content via the internet have created solutions that can be leveraged by the government and its agencies. The architectures that have spun out of the need to quickly stage and deliver solutions online can be utilized to solve similar problems of disseminating information among agencies and between agencies.

About the Author

Ivan Lopez is a software project manager and technical lead at SRC, Inc., a research and development company with over 50 years of experience in defense, environment and intelligence.

Mr. Lopez has 20 years of engineering and management experience. In his role as lead software engineer for SRC’s Information Science and Engineering Business Area, Mr. Lopez is responsible for designing and developing large-scale multi-tier service oriented architectures involving current Internet related technologies and relational databases.

Currently at SRC, Mr. Lopez is the software project manager and technical lead on the Analyst Portal project, as well as a lead on the Toxic Chemical Threat Database and Chemical Hazards and Industrial Processes projects. These applications consist of a portal and a set of Web sites that target the informational and analytical needs as related to toxic chemical threats and chemical hazards, along with the industrial processes involved.

Mr. Lopez holds a bachelor’s degree in Information Technology/Software Engineering from the University of Phoenix. He may be contacted at lopez@srcinc.com or 315-452-8468.
Do you ever wonder who in the government is working on the development of mobile applications? Are you beginning to use a new software engineering method and want to know how others are using it within the DoD? Are you new to the field and need to build your professional network? The Defense Technical Information Center (DTIC) offers two avenues for the research and engineering (R&E) community to collaborate.

**DoDTechipedia**

DoDTechipedia, launched in October 2008, is the DoD's Science & Technology (S&T) wiki. It has the same basic functionality as popular commercial wikis; however, it provides the extensive, secure collaboration capability needed in the DoD. In addition to creating new pages and editing existing information, DoDTechipedia offers tools for blogging, creating calendars, and posting questions. Through DoDTechipedia you can post a question to the community in “Technology Challenges,” research your topic through the search feature and share your expertise by creating, populating or editing a page. By creating a blog you can update the community on the progress of your research projects and solicit the community’s feedback.

If you are new to working in wikis, DoDTechipedia has 10 tutorials that range from a general overview of the site to more detailed information on creating your personal space or embedding graphics. Each month DTIC hosts a free “DoDTechipedia 101” Webinar via Defense Connect Online. Dates and times for upcoming Webinars are available on the DoDTechipedia Welcome Page. The site also offers a “Sandbox” feature so you can practice adding and editing information without altering the wiki itself.
BUILD YOUR NETWORK WITH COLLABORATION (CONT.)

Does your group need a secure space to collaborate? You can request a community space through the newly released “Defense Communities Wiki” feature. As DoD employees and DoD contractors, you can request a private space on DoDTechipedia and assign your own administrator. By creating a space for your specific work group or project, all key stakeholders can easily access documents and project elements in one location. Your community space administrator determines who can join and sets their collaboration capability.

Use this space to post shared documents, disseminate conference proceedings or collaborate on standard operating procedures. Create a calendar highlighting key milestones or deadlines for your development project. One Defense Communities Wiki group administrator stated: “We load briefings and other documents on the site to facilitate easier access by all…Having the site up, organized and online has reduced the number of requests I’ve received from our team for copies of briefings. They can now get them directly.”

DoDTechipedia provides the flexibility and security you need to collaborate across the S&T community. A classified version of DoDTechipedia is available on the SIPRNET.

Through DoDTechipedia you can access DTIC Online Access Controlled (DOAC) where you can search the DTIC Collection of Technical Reports, Research in Progress, Congressional Budget data and much more. You can also access DTIC’s professional networking tool, Aristotle.

**Aristotle**

Launched in August 2010, Aristotle is DTIC’s newest collaborative tool. Aristotle is a Web-based professional networking tool designed for federal government and DoD employees and contractors in the R&E community. Aristotle connects federal and DoD customers, users, and collaborators. It also provides a constantly evolving snapshot of what is going on across the R&E community. In addition to the security provided by the requirement to sign on with a Common Access Card (CAC) or with a userid and password, you must assign distribution codes and permissions to everything you create in or upload to Aristotle.

Aristotle helps make your search more efficient by searching for people, projects, topics and documents with one query. Results are separated into three tabs: people, those associated with the topic; projects, completed and ongoing projects
in the field; and topics, links to documents (published and working documents) related to the topic. The search engine not only queries for documents uploaded directly to Aristotle, it also searches Technical Reports from DTIC’s collection. For example, if you enter “acquisition software maintenance” into the search box, it will return 1,542 people, 46,654 projects and 16,392 topics associated with your search. If you click on a person from the search results, you will find:

- Documents the individual is working on
- Published documents authored by the individual
- Groups he or she belongs to
- Professional associations
- Areas of expertise

Select “graph view” to see a visual representation of how the selected person, project or topic connects to the greater S&T community. You can subscribe to any person, project or document and receive email notification when it is updated. You can adjust the frequency of notifications to immediately, daily, weekly or monthly.

Aristotle was originally created to meet the collaboration needs of the Air Force Research Lab (AFRL). AFRL personnel, seeking collaboration, often found it difficult to locate people with the right expertise and to identify relevant projects, even from resources within the organization. Existing social networking solutions did not address the unique operations security issues critical to information sharing among military entities. AFRL needed a controlled way to enhance user-driven discovery of information and to foster collaboration, both real-time and asynchronous, across geographical boundaries.

Aristotle’s professional networking capabilities assisted AFRL users in finding people with particular areas of expertise, expanding their array of technical contacts, identifying subject matter experts, collaborating with peers, and building teams for critical or commander’s challenges. It allowed AFRL users to find information about AFRL personnel, projects and specific
topical information on research and published documents. It augmented individual and group decision making and enhanced customer support. Ultimately this lowered AFRL project risk and improved execution saving Air Force time, money and lives.

Mr. Alan Shaffer, Principal Deputy, Assistant Secretary of Defense for Research and Engineering (ASD(R&E)), recognized the potential for Aristotle’s use in the larger S&T community and sponsored the migration of Aristotle from AFRL to DTIC. Now hosted by DTIC, Aristotle is available to both DoD and federal government employees and contractors and utilizes DTIC’s access controls.

**DoDTechipedia and Aristotle Working Together**

Using DoDTechipedia and Aristotle in tandem increases the effectiveness of your work. By searching both tools before beginning your project, you can save time and resources by reviewing the successes and failures of other projects in the software analysis community. Aristotle will connect you to the documents, projects and people related to your work in one search. Pose questions to other R&E experts and work through problems that arise in your research through DoDTechipedia’s real-time collaboration tools. Once your project is complete, post your results on DoDTechipedia for the R&E community to see, and upload completed reports and summaries to Aristotle. Separately DoDTechipedia and Aristotle offer useful data, but when used together they provide a powerful knowledge base presenting situational awareness of the DoD R&E enterprise.

Access to both DoDTechipedia and Aristotle requires a free registration with DTIC. DTIC registration is open to all DoD and federal government employees and contractors. If you have a CAC, visit DoDTechipedia (https://www.dodtechipedia.mil) or DTIC Online Access Controlled (https://www.dtic.mil) to login and be automatically registered for all of DTIC’s products and services, including access to Aristotle and DoDTechipedia. If you do not have a CAC, visit http://www.dtic.mil/dtic/registration for more information on how to register. Potential contractors and some academic institutions may apply for access through the Potential Contractor Program by following the instructions outlined on DTIC’s Web site (http://www.dtic.mil).

DTIC is the premier provider of scientific, technical, research and engineering information for the defense community. DTIC facilitates collaboration among researchers, the exchange of scientific and technical information (STI) and federal research and development (R&D) activities, and supports open access initiatives. Online access is provided to unclassified through classified reports, DoD funded research and development information, and research and analysis services from the Information Analysis Centers (IAC). Collection and dissemination of STI ensures the protection of the warfighter, supports strategic and tactical decisions essential to combating all foreign and domestic enemies, and saves taxpayer dollars. DTIC is a DoD Field Activity aligned with the Assistant Secretary of Defense for Research and Engineering (ASD(R&E)). It has served the information needs of the defense community for over 65 years.

**About the Author**

Cheryl Bratten is a writer-editor in DTIC’s Marketing and Registration Division. She holds both a bachelor’s and master’s degree in English. Prior to joining DTIC, she served as an editor in non-profit organizations for ten years. She may be contacted at CBratten@DTIC.mil.

**Additional Resources**

- **DoDTechipedia, DoD’s science and technology wiki (FREE registration required):**
  https://www.dodtechipedia.mil

- **Aristotle, Professional networking for the DoD (FREE registration required):**
  https://www.dtic.mil/aristotle

- **DTIC Online (public site):**
  http://www.dtic.mil

- **DTIC Online Access Controlled, access to unclassified, unlimited and unclassified, limited information (FREE registration required):**
  https://www.dtic.mil

- **DTIC Registration:**
  http://www.dtic.mil/dtic/registration
Mobile technology is increasingly being utilized as a tool for information dissemination and collection across the Government. The Department of Defense (DoD), Department of Homeland Security (DHS), Intelligence communities, and law enforcement are among those agencies utilizing mobile technology for information management. The primary mobile devices being utilized are the iPad®, iPhone®, Android™, and Windows Mobile™. The open architecture of these devices is advantageous for rapid application development and release. Despite the advanced mobile technology that exists today, factors such as security, usage, and trends must be considered when transitioning to mobile information collection and dissemination architecture.

Information dissemination via mobile devices offers many advantages for both government and non-government organizations over the traditional methods of information dissemination. Mobile technology has a much wider reach than other information reporting technologies today. It is not limited by geographical location and can be accessed anywhere with the appropriate technology. This connectivity is especially important during military missions and exercises. Crucial information such as adversary intelligence, terrain description, maps, and asset information can be accessed by the warfighter instantly, anytime, anywhere. Mobile technology is also more readily available because the devices are always with the user and always on. As a result, when messages or other information needs to be distributed it will reach the maximum number of people when mobile technology is utilized.

The capabilities of mobile technology for information collection also offer various advantages in comparison to traditional forms of information collection. Because mobile devices can be taken anywhere, information can be collected in real-time in the field. Mobile applications help make the collection of information easier and more efficient than traditional collection methods. Utilizing mobile device hardware, information collection applications can take photographs, automatically collect location data, record messages, and transmit information all with the single push of a button.

DoD Mobile Applications

DoD is rapidly adopting mobile technology into its methods of operation. One initiative is Connecting Soldiers to Digital Applications (CSDA), sponsored by the Army Capabilities Integration Center (ARCIC) and the Army CIO/G6, with support from the Army Training and Doctrine Command (TRADOC) deputy commanding general for Initial Military Training, and other Army organizations. The main purpose of this initiative is to determine the value of giving soldiers applications on mobile devices. Specifically, the Army will examine how to integrate mobile technology with radio networks and battle command systems [ARMY]. In the field, mobile applications provide soldiers with the ability to access critical operational information regardless of location. This could include anything from classified intelligence to maps of friendly force locations.

The Defense Advanced Research Projects Agency (DARPA) has launched a similar program known as the Transformative Apps Program to place the correct mobile applications into the hands of warfighters. In this program a military application repository will be created which will have two distinct sections. One section will hold beta applications that need to be evaluated and tested and another section will hold those applications which have been tested and certified for use. DARPA is looking for applications in a wide variety of functions, including command and control, reporting, mission planning, intelligence, geospatial visualization, analysis, language translation, training, and logistics tracking. During initial development, the applications will be focused towards open source mobile platforms.

Some of the current mobile applications being utilized by the DoD for collecting and disseminating information are listed in Table 1.
<table>
<thead>
<tr>
<th>Platform</th>
<th>Application Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>iPhone®</td>
<td>Find Your Embassy</td>
<td>Used to locate and contact the nearest U.S. Embassy anywhere in the world. Also gives international users maps and contact information for U.S. Embassies and consulates along with access to travel alerts and warnings.</td>
</tr>
<tr>
<td>iPhone®</td>
<td>Physical Training Program</td>
<td>Allows soldiers to create their own training program from the application’s plans and videos based on the Army’s new Physical Readiness Training program.</td>
</tr>
<tr>
<td>iPhone®/Android™</td>
<td>Telehealth Mood Tracker</td>
<td>This app monitors soldiers using a visual rating scale to keep records of their psychological health and address behavioral issues that can stem from deployment or trauma.</td>
</tr>
<tr>
<td>Android™</td>
<td>Disaster Relief</td>
<td>Helps military personnel working in humanitarian relief and civilian affairs campaigns. The dissemination and analysis tool searches, edits and creates maps which are viewable on Google Earth and Google Maps.</td>
</tr>
<tr>
<td>Android™</td>
<td>New Recruit</td>
<td>Provides information for soldiers considering joining the army, including military rank and insignia, Army news feeds, an Army physical fitness test calculator and a Body Mass Index calculator.</td>
</tr>
<tr>
<td>Android™</td>
<td>Raytheon Android™ Tactical System (RATS)</td>
<td>RATS is a battlefield networking system that utilizes mobile terminals powered by the Android™ OS to connect soldiers in the field with other soldiers and military assets. With RATS system, soldiers will have access to recon data, friendly unit locations, and biometric/photo analysis.</td>
</tr>
<tr>
<td>Android™</td>
<td>Android™ Portable</td>
<td>Allows potential Army soldiers to learn important information about the Army such as rank and soldier’s creed before beginning basic training. The application can also be used as a reference for existing soldiers after they complete their training.</td>
</tr>
<tr>
<td>Android™</td>
<td>Grid Nav</td>
<td>This will allow users the ability to get accurate location data displayed in both angular and MGRS coordinate format. The user also has the ability to convert between decimal degrees and DMS to MGRS format.</td>
</tr>
<tr>
<td>Android™</td>
<td>Movement Projection</td>
<td>A map app for the navigation of roads. It allows soldiers to input obstacles and threats, stops, start and end points, and calculates the best route to a destination.</td>
</tr>
<tr>
<td>Android™</td>
<td>Fort Gordon Post Locator</td>
<td>Allows users to find important locations on the post. It uses Google Maps to show exact locations of popular locations on base.</td>
</tr>
<tr>
<td>Android™</td>
<td>go2MWR</td>
<td>Allows users to locate Morale, Welfare and Recreation locations, display different types of information, and schedule the use of services.</td>
</tr>
</tbody>
</table>

Table 1: Table of Example Apps
Many DoD applications are designed to work in conjunction with mobile devices to automatically collect location data, known as GeoTagging. This location data can be collected for DoD assets such as equipment, military bases, terrain, and even soldiers themselves. Once collected, the location based information is transmitted to centralized DoD communications networks, processed and correlated, and then made available to other mobile devices. Utilizing this collected and processed location data, soldiers are able to transmit crucial location-based information back to their mobile devices. This relays information about the upcoming terrain, enemy location, fellow soldier location, and asset location. All of this data is plotted on a generalized map of the soldier's surroundings for quick and easy access. The DoD applications are excellent at taking in information, correlating it, and then disseminating it again to mobile users at a time when the information is most useful and relevant.

Many other DoD mobile applications take advantage of the storage and video playback capabilities of the iPhone® and Android™ based mobile devices to serve as a training tool. Training subjects currently used in mobile applications range from exercise regimens to information about military language, ranks, and insignia. Mobile technology is especially useful when utilized as this type of training aid as the information can be viewed virtually anywhere at any time.

The DoD is now starting to integrate chemical and biological sensors into mobile technology. Researchers from University of California, San Diego have developed a miniature chemical sensor which can detect harmful gas in the air and then automatically send out the information about the type and transmitting range of the gas. The chemical sensor is made up of a silicon chip with hundreds of independent miniature sensors. These sensors can identify the molecule of specific toxic gas and then report on it [SENSOR].

The Army has recognized the need to provide applications to the field in a much faster manner than currently taking place. As a result, a program called Apps for the Army was introduced. The goal of the program is to have applications in the field ninety days after requesting it. During the first thirty days, a request for an application to do a specific function will be made and the developer will create and demonstrate a prototype of the desired application. The software will then be voted upon and suggestions offered. The developer will then have another sixty days to bring the application to completion. At this point, the application will be deployed in the field. This concept of rapid development was successfully tested in The Apps for the Army challenge [ARMY APPS].

**Tactical Networks**

Because many of the tactical networks in the field are unreliable, unsecure, or often times not available at all, DoD mobile applications will not be able to connect to large centralized servers. Rather, these applications will rely on distributed compute and storage nodes in vehicles or outposts. Most of the applications for DoD’s use in the field are developed so they do not need a constant active network connection to fully function.

One company that has begun to address the unreliability of field based network connections is Lockheed Martin who has created a new communications system called **MONAX**. This is a 3G wireless system, designed specifically for warfighters, consisting of a portable sleeve that is able to connect smartphones to base stations on the ground or in the air. All data being transferred over the network is protected by exportable encryption (encryption that is able to be employed outside of the U.S.). The MONAX communications system also has its own app store with applications which leverage the new network.

Textron is another company addressing the networking issues and has released a communications system, **Forward Airborne Secure Transmissions and Communications (FASTCOM)**. This cellular network has been approved to handle Secret level and below communication. FASTCOM can be powered by an unmanned aircraft, aerostat (moored balloon), or ground vehicle equipped with 3G cellular pods. From these pods, FASTCOM creates a secure cellular network providing its users with full access to the 3G features of their smartphones, and access to any available network-based resources.

**Department of Homeland Security**

The Department of Homeland Security (DHS) is working to expand its mobile application capabilities. Researchers from DHS’ Science and Technology Directorate recently introduced prototypes of mobile phones which could detect chemical and biological threats in the air. When this technology is combined with a phone’s global positioning system, emergency responders will be able to have a better understanding of the scope of the biological or chemical attack [DHS].
Another DHS agency, the Transportation Security Administration (TSA), has created a mobile application called MyTSA which provides the public access to relevant TSA travel information. This includes the types of items that may be carried through TSA security checkpoints, checkpoint policies, estimated wait times at checkpoints, and current travel conditions [PIA]. The application will also have the ability to connect to a data feed through the Federal Aviation Administration (FAA) to bring up information about airport delays.

**Intelligence Agencies**

One of the many challenges facing individuals in the intelligence community is how to collect, organize, and archive the vast amounts of data that are received every day. Mobile applications are vital in assisting with this task as information can be collected and organized directly in the field. An application called **Counter-Insurgency Intelligence Collection (COIN)** has been developed by MITRE for both the iPhone® and Android™ operating systems to assist with this task. This application allows warfighters to collect, organize, and share user-defined intelligence data such as people, places, and events directly from the battlefield. Prior to this technology, soldiers carried personal cameras, GPS devices, and other commercial technology to gather the same data. [COIN]

**Mobile Information Collection and Dissemination**

The data collection client is the interface in which the mobile user interacts to facilitate data collection and transmission. There are six popular types of data collection client applications [DATA].

- **Fixed Format Short Messaging Server** (SMS) is utilizing the mobile device's existing SMS capabilities to collect information. Using this type of data collection, the user provides answers to successive questions in a predefined format utilizing SMS.
- **Java Micro Edition Platform** is an application which is written in the Java programming language. It is loaded onto the mobile device where the user navigates through questions in the application which collects the answers and submits the completed form to a server.
- **Web-based Forms** are forms that are published in an optimized format for mobile browsers. An online form is filled out utilizing a mobile web browser and then saved directly to the mobile device.
- **Voice-Data Collection** is when a user dials a number and then chooses options from a menu. An example of this would be when a user dials 7 for technical support.
- **Wireless Internet Gateway Menus** use a programming language known as Wireless Markup Language to create data collection menus.
- **Unstructured Supplementary Service Data** is where the mobile user starts a session and is then able to interact with the remote server by selecting number based menu options.

**Data Transfer Method**

The data transfer method controls how collected information on a mobile device is transmitted to a central server for both storage and retrieval. Most mobile devices utilize the Global System for Mobile Communications (GSM) network for collected data transfer specifically utilizing SMS or General Packet Radio Service (GPRS). There are some important differences between SMS and GPRS technology. SMS is more widespread and is available on almost all mobile devices. GPRS is a higher-end technology that is not yet available on many mobile devices. However, GPRS does offer advantages in cost and size. SMS is limited to 160 characters of data for each message. GPRS has virtually no character limit. Also, for the cost of one 160-character SMS message, many times that amount of data can be sent for the same cost using GPRS [DATA].

**Dynamic Information Dissemination**

During military missions the ability to dynamically react and adapt to new operating conditions is vital. Dynamic information dissemination would allow mobile devices to do just that. Lockheed Martin and DARPA have integrated this principle into a prototype mobile application to rapidly push information gathered by soldiers to other squad members as quickly as possible. To help achieve the dynamic nature of the information disseminated, a series of intelligent agents were built into the application. An analysis agent was used to determine when a particular member of the squad needed the information sent to their mobile device. This was primarily based upon location. As a soldier approached a location in which data or intelligence was available or critical, the data would be automatically delivered. This enabled relevant information about threats, terrain, and field equipment to be rapidly and automatically disseminated to the correct soldiers at the correct time. This dynamic push of only relevant data to the soldiers minimized bandwidth loads over the mobile network. A separate delivery agent handled receiving the information for the soldier. If there was a connection failure, the agent would retry to deliver the data at regular intervals without user interaction. [AGENTS].
Security Considerations

These data transmitted to and from mobile devices can be sensitive or classified and must be kept secure. Security considerations must also be taken into account for the devices themselves.

One of the most widely used mobile features is the Global Positioning System (GPS). While this feature is beneficial and valuable in a mobile device, it can also be exploited. Cellular phone carriers have long had the ability to track the location of mobile devices using either the GPS or cellular communication towers, and other companies are now beginning to develop products and provide services to track mobile devices. Many of these tracking services run covertly to the mobile device’s user, sending no messages or indications that the device is being tracked [NIST]. Also, photographs taken with mobile devices can be geotagged by the unit’s GPS without the user’s knowledge. This data can then be extracted from the photograph by a potential adversary to determine the location where the photograph was taken from [GEO]. Another danger of mobile device tracking services is an attacker can secretly register a mobile device for tracking without having actual possession of the mobile device [NIST]. This can ultimately help an attacker track a mobile device and its owner. This becomes especially problematic in a military setting where confidentiality of location is crucial to mission success.

Another security issue is mobile device cloning. Each device has unique identifiers programmed into it to help identify it. For example, the signal produced by a mobile device contains both a unique Electronic Serial Number (ESN) and Mobile Identification Number (MIN). If an adversary was able to intercept the signal and extract these two pieces of data, he or she could create a cloned mobile device that was able to both send and receive data posing as the original device. This type of attack presents both confidentiality and integrity concerns. First, with a cloned mobile device an attacker could intercept sensitive and confidential information. Secondly, the attacker could also send out false information which would appear to be valid [NIST]. For warfighters this could be catastrophic as an adversary could both intercept mission plans and send out new falsified mission plans to units. Many of today’s mobile devices have begun encrypting signals to ensure that neither the ESN nor the MIN can be captured. However, a how-to-guide was recently released detailing how to crack the a5/1 stream cipher used to encrypt GSM networks [INFOWAR].

A crucial component to any mobile device is the availability of data and communication networks. One of the main objectives of information warfare is to deny adversaries access to information systems, cutting off the ability to effectively send and receive anything. There are a number of methods to disrupt communication services. The simplest is a jamming device. Devices available on the market today can jam mobile devices in localized areas, leaving the user unable to receive a signal. The downfall to this type of attack is only a limited number of users are affected; only those in range of the jamming device will lose service. Software based approaches to denial of service can have much wider reaching effects. An example of a denial of service attack would be Short Message Service (SMS) texting. If a mobile network was spammed with
enough SMS messages, all services, from voice calls to data, would be rendered unusable in that network. A more advanced denial of service attack may attack the mobile device itself, using SMS injection to crash connectivity [INFOWAR]. With respect to jamming, friendly forces use that tactic as well. In 2006, the Pentagon spent around $1.4 billion on jamming devices. Allied units need to determine what effect jamming equipment will have on their own mobile based information communication assets and adjust accordingly.

With the increasing popularity of mobile devices new forms of malware, which specifically target mobile devices, are emerging. Malware can be delivered to a mobile device through Multimedia Messaging Services (MMS), email, Bluetooth connections, or internet downloads. Just as on a traditional computer system, users can download malware from the internet disguised as a game, patch, application, or any other benign piece of software. Using Bluetooth, the malware engages the connectivity services that Bluetooth offers to connect to a mobile device and deliver the malware. Once the mobile device is infected it is susceptible to attacks including data theft, spoofing, backdoor access, data interception, service abuse, and device availability [NIST].

Based upon the above security considerations, one major area of research in mobile devices today is securely sending and receiving messages. An application called SecureSMS Pro was recently released for the iPhone® that addresses this. It allows the user to encrypt SMS messages before sending. This can be done by utilizing either a user defined PIN, which is less secure but quicker, or a dynamically generated key, which is more secure. The application can also encrypt the contents of email messages as well.

**Trusted Applications**

When using a mobile device to deal with sensitive, high-assurance information, it is critical to utilize only trusted applications. As stated above, there are multiple methods to deliver malware to a mobile device. One method of combating this is to only use trusted applications. DoD has developed a trusted application store known as “DoD Storefront.” Designed to be used only by military personnel, this store contains trusted applications designed for smartphones. Because the DoD Storefront utilizes preapproved software development toolkits and automates submission, testing, and certification, applications are able to get to the field more quickly and efficiently. Access to the store is only available through the use of a DoD Common Access Card (CAC). Also available to users of the DoD Storefront will be collaboration tools. Through a comment and rating systems, developers and end-users will be able to work together to deliver the types of applications that are really needed out in the field. An online testing environment will also be available for end users to test out beta versions and offer feedback. As development continues on the DoD Storefront, individual sub-stores will be developed for different branches. An example of this is the U.S. Army Marketplace which is already in preliminary stages of use. This will allow for increased specialization in the types of apps developed for each branch of the military, increasing both the effectiveness and the efficiency of applications developed for use in DoD [ARCH].

Another approach to ensuring only trusted applications are used on a mobile device is whitelisting. Whitelisting is a process by which only known and trusted applications are allowed to be installed on a system. The iPhone® currently operates on this principle. When a user wants a program to run on the iPhone®, he or she must get it approved by Apple and put in the iPhone® store (unless the phone is tampered with or what is commonly referred to as iOS jailbreaking). The whitelisting process used by Apple is not perfect, but whitelisting in general is gaining momentum as a way to gain trust in the applications we depend upon. [WHITE].

**Secure Information Removal**

A major concern with mobile devices is how to securely delete sensitive information if a device is lost or stolen. To help accomplish this, many DoD agencies are adopting a suite of tools known as Good for Government. Good for Government is defined as “productivity and mobile device management tools for agencies requiring the highest level of end-to end security.” Some of the features of this tool suite include: locking down device functionality such as the camera, infrared port, Wi-Fi, and Bluetooth features; controlling which applications are allowed to exist on the device; dictating which apps must be running before allowing a secure connection; and remotely wiping a lost or stolen unit. The remote wiping feature allows mission commanders to initiate a secure and unrecoverable data wipe sequence if a mobile device is compromised. [GFG].

**Mobile Device Usage Considerations**

Hardware limitations and environmental variables can have a major impact on how mobile devices perform in the field. Many of today’s advanced mobile devices have touch screens. In a harsh environment, however, a purely touch screen based mobile device can create problems. Most mobile device touch screens react to user input through the natural bioelectricity in the skin. Small amounts of moisture, salts, and oils on the skin create the necessary conductivity
allowing electrons to flow between the user and the mobile device. Soldiers in the field are usually wearing protective gloves which prevent the necessary conductivity and they must remove their gloves whenever they input data. This can be time consuming and impractical. To resolve this problem companies have started producing gloves made from highly conductive elements such as silver, allowing the user to gain the conductivity he or she needs to supply user input on a touch screen while wearing the gloves [GLOVE]. Apple is also looking into a solution for this problem on its next generation of iPhone®. They have been working with Japan’s Hitachi Displays, developing a projection-type touch panel capable of detecting insulators such as plastic and cloth. With this display, mobile users can select icons with the tip of a gloved finger, input handwriting with a plastic pen, and enable multi-touch operation with both insulators and fingers. [TOUCH].

Another consideration in the deployment of mobile devices is how the display screen reacts to direct sunlight. Most displays currently in use are Active-Matrix Organic Light-Emitting Diode (AMOLED). These often become extremely washed out and difficult to read in direct sunlight. Anti-glare screen protectors have been introduced over the years to help combat this problem with little or no success. One technology, Super AMOLED, is showing promise. Traditional touch screens consist of two layers, a separate display and touch layer. These two layers can create a reflective glare when exposed to sun. Super AMOLED screens have only one layer, eliminating the air gap that causes this glare. The result is a much easier to read display in direct sunlight. Super AMOLED screens also offer a 180 degree viewing angle and a 20% brighter and are noticeably clearer than a typical AMOLED screen. Color reproduction is also 30% better than LCD screen technology. This technology is already available on some smart phones such as the Galaxy S from Samsung [SAMOLED].

Best Practices for Mobile Web Software Development

For mobile web application developers, the World Wide Web Consortium (W3C) has developed a proposed recommendation of Mobile Web Application Best Practices (see http://www.w3.org/TR/mwabp/). It was developed by the Mobile Web Best Practices Working Group of the W3C. The document states its goal “is to aid the development of rich and dynamic mobile Web applications. It collects the most relevant engineering practices, promoting those that enable a better user experience and warning against those that are considered harmful.” The recommendations made by the W3C are directly applicable to development organizations developing “information collection and dissemination mobile web applications.”
Conclusions

Mobile devices offer tremendous promise if applications are well thought out and utilize the technology these devices have to offer to the fullest. Future applications should be developed that are heterogeneous, operating on a variety of mobile platforms. This will improve security and offer more widely used applications that are capable of taking advantage of many different types of hardware. The open architectures and sophisticated hardware on these devices create the perfect conditions for rapid application development and advancement. The advancements in mobile technology have attracted many government agencies such as DoD to integrate mobile technology into their standard operating procedures. As a result, the move to modern mobile devices in the battlefield is accelerating.

With adoption of mobile technology for information management certain considerations must be accounted for, including using mobile devices in harsh environments, security of the information collected and disseminated, and the availability of the networks necessary for many mobile devices to function. These factors must be evaluated before heavily relying on mobile technology for the collection and dissemination of high assurance information.

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Both Chet Hosmer and Matthew Davis are key authors of our full report available online.

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Additional Resources

- Army Mobile
  http://www.army.mil/mobile/

- Consumer Guide to Wireless Device Security
  http://spotlight.getnetwise.org/wireless/wirelessguide.pdf

- Delivery Context Overview for Device Independence
  http://www.w3.org/TR/di-dco/

- DoD Mobile
  http://www.defense.gov/mobile/

- Gartner
  http://www.gartner.com/technology/home.jsp

- Government Mobile Apps
  http://apps.usa.gov/

- Information Dissemination in Mobile Ad-Hoc Geosensor Networks
  http://www.geosensor.net/papers/giscience04.pdf

- iOS Dev Center

- Navy Mobile Apps
  http://www.public.navy.mil/ia/Pages/mobile.aspx

- Mobile GIS for Homeland Security

- The Open Web Application Security Project (OWASP)
  http://www.owasp.org/index.php/Main_Page

- Mobile Web Application Best Practices
  http://www.w3.org/TR/mwabp/

- DACS Mobile Technology Topic Area
  http://www.thedacs.com/databases/url/key/5692
Use of Mobile Technology for Information Collection & Dissemination
A Critical Review/Technology Assessment Report

Mobile technology is increasingly being utilized as a tool for information dissemination and collection. Numerous agencies including the Department of Defense (DoD), Department of Homeland Security (DHS), Intelligence community, and law enforcement are utilizing mobile technology for information management. The three primary mobile devices being utilized today for the purposes of information collection and dissemination are the iPad®, iPhone®, Android™, and Windows Mobile™. The open architecture of these devices is conducive for rapid application development and release. Despite the advanced mobile technology that exists today, factors such as security, usage, and trends must be considered when transitioning to mobile information collection and dissemination architecture.

Now Available at:
Introduction to the Federal Web Managers Council

REACHING ACROSS A MULTITUDE OF GOVERNMENT AGENCIES, THE FEDERAL WEB MANAGERS COUNCIL IS HELPING TO IMPROVE THE DELIVERY OF GOVERNMENT SERVICES TO PEOPLE EVERYWHERE.

By Rachel Flagg

What is the Federal Web Managers Council?

The Federal Web Managers Council (Web Council) is an interagency group of senior federal government Web Managers who collaborate to improve the online delivery of U.S. government information and services.

The Web Council is sponsored by the General Services Administration’s (GSA) Office of Citizen Services and Innovative Technologies. Membership is comprised of: Web and New Media Directors from federal Cabinet agencies; designated Congressional support agencies; major independent and sub-agencies that deliver top citizen tasks; and Sub-Council Co-Chairs. Members work in various branches of their respective agencies, including Policy, Communications, Public Affairs, and CIO staffs.

The Sub-Councils of the Federal Web Managers Council cover a variety of content management areas, including:

- Accessibility/Section 508 Compliance
- Analytics/Metrics
- Governance and Operations
- Mobile
- Multilingual Websites
- Search/SEO
- Social Media and Citizen Engagement
- Technology and Innovation
- Training and Development
- User Experience/Usability

Originally called the Web Content Management Working Group, the Web Council was established in January 2004 at the request of the Office of Management and Budget (OMB) by the Interagency Committee on Government Information (ICGI). The original mission was to recommend policies and guidelines for all federal public websites, to comply with such requirements as Sections 207(f)(1) and (2) of the E-Government Act of 2002. The Working Group issued its recommendations to the ICGI in June 2004, and these recommendations and best practices became the foundation for the website WebContent.gov (now called HowTo.gov).

Today, the Web Council has grown into a dynamic and influential community of practice, guiding not only the work of their various Sub-Councils, but also the Web Content Managers Forum. The Forum is a vibrant community of over 2,000 web content professionals from federal, state, local and tribal U.S. government agencies. Forum members communicate and collaborate via a listserv and networking website, forum.webcontent.gov.

What We Do

The Web Council provides a venue for U.S. government Web Managers to collaborate and share common challenges, ideas, and best practices. Our goal is to create the most citizen-focused and visitor-friendly government websites in the world. To that end, we:

- Manage HowTo.gov, a repository of federal customer service-related requirements and best practices;
- Help agencies identify and improve completion rates of customer top tasks, and leverage USA.gov to make those tasks easier to find online;
- Sponsor and organize an annual training conference each spring for government Web Managers, the largest event of its kind in the country, with over 500 attendees;
- Organize training and workshops through Web Manager University;
- Coordinate the work of various Sub-Councils to advise the government web community on high-level web policy issues;
- Provide oversight and guidance to the large community of federal, state and local government web content professionals (the Forum);
- Manage listservs and a networking website for community members to connect and collaborate;
- Coordinate regular conference calls to discuss common challenges, exchange ideas, share best practices from other
agencies, and hear from web experts;
- Host New Media Talks with industry thought leaders, to keep our community informed of the latest tools and technologies;
- Monitor innovative policies and practices used by other governments, looking for opportunities for replication and coordination; and
- Sponsor and partner with similar communities of interest such as Plain Language, K-12 Web Managers, National Association of Government Webmasters, or regional groups.

HowTo.gov

In December 2010, GSA launched HowTo.gov, an online resource managed by the Web Council and GSA, dedicated to helping agencies improve the customer experience. HowTo.gov organizes information by contact channels, to help agencies quickly find guidance to improve their websites; use social media to engage with the public; set up a call center; or learn how to use technologies such as cloud computing or mobile to deliver information and services more effectively. HowTo.gov also supports cross-agency communities of practice for Web Managers, Technologists, Contact Center Managers, and Open Government, to share solutions across government.

HowTo.gov is a model for agile development and iterative design. Developed in Drupal, the site was launched in a very short timeframe, with the bulk of the content coming from two older GSA websites: WebContent.gov and CitizenServices.gov. GSA is working to migrate all the content from those older sites, so they can be decommissioned. We are also rewriting our most popular content into a “how to”, step-by-step, start to finish format. This “how to” format will help agencies see, at a glance, all that is involved in a particular process. As an example, the HowTo Blog page walks visitors step-by-step through planning, implementing and improving a government blog.

Since HowTo.gov is a resource for agencies, we are currently recruiting writers and subject-matter experts from across the government to help us develop and improve content on the site.

Improving Online Service Delivery

In November 2008, the Federal Web Managers Council published a White Paper called “Putting Citizens First: Transforming Online Government”, in which we laid out six customer service goals for government websites.
When people need government information and services, they should be able to:

- Easily find relevant, accurate, and up-to-date information;
- Understand information the first time they read it;
- Complete common tasks efficiently;
- Deliver the same answer from every service channel (web, phone, email, print, in-person, etc.);
- Provide feedback and ideas and hear what the government will do with them;
- Access critical information if they have a disability or aren’t proficient in English.

Over the past two and a half years, the Web Council, either on our own or in collaboration with partners across the federal government, has made significant progress toward meeting these goals. Here are some of the highlights:

- The Office of Management and Budget (OMB) has modernized several outdated policies which made it difficult for agencies to compete online with best-in-class private sector websites. These policies were originally written before the “Internet Age”, and covered issues such as privacy, the use of third-party websites, web measurement and customization, and information collection. Federal agencies can now take advantage of tools commonly used in the private sector to measure website performance; engage with citizens using social media; survey the public to collect feedback; and improve the findability and usability of government information.
- As an example, agencies had been hampered by antiquated policies such as the Paperwork Reduction Act, which required agency surveys to go through a six-month OMB review before they could be issued... and these surveys had often lost their relevance by the time the public could respond. However, OMB is implementing a new fast-track review process which takes just days, instead of months, so agencies can gather feedback in a timely manner, and take quick action to respond to findings and improve service.
- In October 2010, the President signed the Plain Writing Act of 2010. This Act requires agencies to apply the principles of Plain Writing to government documents and online information. We are developing an online tutorial to train government employees to write documents and web content using plain language. Clear writing will have a tremendous impact on the usefulness of government information.
- Many agencies now feature top tasks prominently on their home pages, and have oriented their websites around those topics most important to the public. Agencies are also improving the design of those tasks through user testing, helped in part by a new GSA program called “First Fridays”. In this program, our User Experience Experts work with agencies to conduct user testing, and apply their findings to make concrete improvements to the organization and delivery of information on government websites.
- Delivering excellent service requires extensive coordination, not just within agencies, but across government – and training is a key component to improving service. Web Manager University has trained over 10,000 students in web, new media and customer service best practices. We also sponsor and organize the Government Web and New Media Conference each spring – the largest such training event in the country.
- Since federal agencies could not legally comply with the standard terms of use for most social media tools, GSA negotiated model Federal-Friendly Terms of Service (TOS) agreements with social media providers. These TOS agreements help federal agencies legally use social media tools such as Facebook, Twitter, and YouTube, which enables agencies to reach people where they already congregate on the web, instead of relying on the public to come to government websites to find our information.
- The Web Council collaborates on critical government-wide disaster response efforts, to ensure agencies aren’t duplicating efforts or working at cross-purposes. We work together to provide the most current and accurate information to the public during events such as the H1N1 outbreak, by developing standardized URLs and/or web pages, or creating widgets to deliver the latest information.
- Web Managers champion Open Government by publishing Open Government plans and managing agency OpenGov web pages. Many Web and New Media Directors lead their agency’s online dialogue efforts. Web teams provide critical support to flagship initiatives such as the Department of Justice’s FOIA Dashboard, Social Security’s Spanish-language Retirement Estimator, and the General Services Administration’s citizen engagement platform.

Forward Focus

We followed up our 2008 White Paper with a Progress Report in April, 2010, and are currently working on our 2011 Progress Report. These follow-up reports detail the progress the federal government has made toward achieving our goals of better customer service for the American people. In the coming year, we plan to focus our energies in these three main areas:
• Plain Language and Writing for the Web, to enable compliance with the Plain Writing Act of 2010, and to help the public find, understand and use government information;
• Improve Search Engine Optimization (SEO), to make government content easier to find; and
• Developing guidance for creating universally accessible content – creating content once, and delivering it through many different channels, including websites, mobile devices, text/SMS, social media – anywhere people might need government information or services.

Plain language writing, better SEO, and universal content will increase the transparency, accountability, and participation between government and the public, contributing to our ultimate goal of a great customer experience for the American public, when they interact with their government.

The Web Content Managers Forum is open to government employees and contractors with a government email address. If you would like to join, visit forum.webcontent.gov to register.

About the Author

Rachel Flagg is Deputy Director of the U.S. General Services Administration’s (GSA) Center for Customer Service Excellence. For many years, she worked as an IT Trainer and Network Administrator, and has managed government websites since the late 1990s. She has a passion for Plain Language writing, and currently oversees HowTo.gov, a website to help government agencies improve customer service. Since 2007, Rachel has co-chaired the Federal Web Managers Council, working with leading Web Directors and New Media Directors in the Federal government to develop best practices for managing government websites. She also leads a large community of more than 2,000 federal, state, and local U.S. Government Web Content Managers, who collaborate to improve the delivery of online government services to the American public. Rachel lives in Washington (the State).

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Cloud computing has exploded in popularity as a way for businesses and organizations to save on Information Technology (IT) costs. To the customer, cloud computing can be either a strict computational or storage service, or a combination of the two. As a general definition, the cloud is an environment of both the virtualized applications and infrastructure provided to clients, as well as the physical hardware and software in the service provider’s data centers [Arm]. More accurately, cloud computing is a type of distributed computing utilizing on-demand services over the internet, charging the customer only for the quantity they use. The elasticity of the cloud is a significant characteristic of the cloud computing model, referring to the ability for up-scaling services due to performance spikes and quickly downsizing when usage dissipates, in effect, giving the customer a real-time supply of resources [Ster].

Another important aspect of cloud computing is the economy of scale in that the service provider only charges the customer for the amount of time or quantity of space they use. Furthermore, the pricing policy is such that the cost of using more cloud resources over a short period of time is equal to using fewer resources over a longer period of time, given the same task. “A job that might take 40 hours on a 10-node cluster could instead be run on a 400-node cloud cluster in 60 minutes for the same cost” [World]. This gives customers the ability to solve very large and complex problems by harnessing the computing power they need, without the cost associated with over provisioning. Cloud computing makes financial sense to service providers because it gives them a better return on their hardware investments through increased hardware utilization.

On the customer’s side, cloud computing reduces the barriers to entry for start-up companies by eliminating the need to invest in costly infrastructure up front. Also, using the cloud enables the customer to have access to the latest technologies at a reduced cost, rather than paying a premium and purchasing them outright [Ster].

Clouds can be owned and operated principally in two ways: private clouds and public clouds. Private clouds are owned by a corporation, university, or agency for their own use, primarily for security reasons, and to ensure they are always in control of their data. Some organizations who own and operate private clouds will also use a public cloud during peak usage times [Mur]. In contrast, a public cloud is open for general use, so long as any and all subscription and usage fees for the service are paid. Public cloud providers include IBM, Amazon, Google, and Microsoft, to name a few.

Federal Agencies Move to Consolidate

Due to their expensive and large scale operations the federal government has declared that federal IT must start a migration to the cloud. In a memorandum sent to all Chief Information Officers (CIO) within the government, CIO of the White House Vivek Kundra noted that the total number of government owned data centers grew from 432 in 1998 to more than 1,100 in 2009. Kundra also reported that in 2006, federal data centers consumed 6 billion kWh of electricity with the expectation of energy consumption doubling by 2011. In addition to these figures, Kundra also stated that federal data centers are running at relatively low utilization rates. Due to these reasons, Kundra created the Federal Data Center Consolidation Initiative (FDCCI) which aims to reduce energy, hardware and software costs, while also decreasing the real estate owned by the government for their data centers [Data]. One of the first steps of the FDCCI being implemented is a five year, $40 million dollar General Dynamics contract with the Defense Intelligence Agency (DIA), where the contractor will consolidate DIA’s seven regional help desks into two enterprise help desks in Washington D.C. and in Colorado [SITE].

Kundra’s FDCCI is a stepping stone, or an initial phase for the government to migrate to cloud computing. Kundra’s “Cloud First” or Federal Cloud Computing Initiative (FCCI) is part of his strategy to bring the cloud into the government using the savings gained by shutting down 800 data centers from the FDCCI. The government is ready to allocate up to an additional $20 billion on cloud spending.

The cloud adoption timeline is rather aggressive. Kundra requires every government agency to have a single cloud solution up and running by December 2011 and three by June 2012. Savings from adopting the cloud are already being
realized by some agencies. The GSA has saved $15 million dollars and the USDA $20 million dollars by transitioning to the cloud. These are savings from a single cloud solution in each agency [Walker].

While cloud computing is maturing at a fast pace, the security policies and standards for government cloud adoption are not. Due to the lack of standardization, many government agencies are taking a cautious step into the cloud before they fully commit. Through pilot programs such as migrating e-mail first, agencies can test these policies and standards to gain a better understanding of cloud computing. This will delay the initial adoption of many cloud endeavors within the government [Yas1]. In addition to this, because of a lack of confidence, many government agencies are looking into building private clouds for themselves, rather than going out to the public offerings to keep a closer watch on their sensitive data [Zys].

To assist agencies with migrating to the cloud, the government has appointed the National Institute for Standards and Technology (NIST) to develop interim standards for cloud computing that relate to high priority security, interoperability, and portability requirements [Tech].

The federal CIO Council created the Cloud Computing Executive Steering Committee (CCESC) to provide overall management of the FCCI. The committee is led by GSA CIO Casey Coleman and includes IT executives from more than 15 federal agencies [Exec]. They are representatives of best practices, consensus building, and they also are the primary educators for their respective agency or department for cloud computing [IApps].

**DISA**

The Department of Defense (DoD) is already very active with cloud computing. The DoD has declared a Department of Defense Tools Initiative which aims to maximize the efficiency and quality of software development, as well as reduce duplicate and conflicting software and systems. To meet these goals, the Defense Information Systems Agency (DISA) is developing a suite of tools that can be accessed via their private cloud for software development projects. These products can be found on DISA’s Forge.mil website.

Currently, **SoftwareForge** and **ProjectForge** are available. These tools are hosted by DISA on their Rapid Access Computing Environment (RACE) private cloud. RACE provides virtual machine environments for development, test and production [Yas2]. SoftwareForge enables collaborative software development and includes software version control, bug tracking, requirements management, and release packaging. SoftwareForge also has wikis, discussion forums, and document repositories.

ProjectForge is similar to SoftwareForge in that it provides the same development and collaborative tools. The difference is that ProjectForge is designed for more restrictive access. Another difference between the two is that SoftwareForge is free for all valid users. ProjectForge is a service fee-based product with two types of offerings, **On-Demand** and **Private**. **On-Demand** is hosted as a multi-tenant application, meaning that the infrastructure is shared by multiple projects and users who can access their projects concurrently. Restrictions set and managed by the project owner prevent unauthorized access to projects. **Private** offers single tenancy, providing the customer with exclusive resources.

Another cloud technology that DISA owns is the GIG Content Delivery Service (GCDS), a reliable and secure distribution service for applications and other content. This system enforces information assurance and secure transmission of data to remote users. The success of GCDS proves the ability to retrieve and send applications and data in adverse network conditions. [DISA]

**Army**

In response to the FCCI, the Army is calling upon DISA to assist them in migrating their e-mail services into the cloud. The Army’s current e-mail solution is rather expensive, spending $100 dollars per user annually for their email account, with over 1.5 million users [Ken]. DISA will host their new enterprise e-mail service within one of the Defense Enterprise Computing Centers. Migration is scheduled to be completed by September 30, 2011 and is expected to save the Army $100 million dollars annually. The new service will initially allow 4GB worth of data storage per user, as opposed to the 100MB in the old system. Another benefit of this migration is allowing users to access their accounts from any DoD facility and to collaborate with other users worldwide [DISA].

The Army Experience Center wanted to upgrade their 10 year old Customer Relationship Management (CRM) Army Recruiting Information Support System (ARISS). Rather than upgrade, they chose a cloud solution. While bids to upgrade ranged from $500,000 to $1,000,000 dollars, the cloud solution only cost $54,000 to implement. Not only did they save a considerable amount of money, their cloud solution can
handle five times the amount of work that a single traditional recruitment center can handle [Kun].

To help handle the deluge of sensor data collected in the battlefield, the Army is engineering a cloud-based solution. The Distributed Common Ground System-Army (DCGS-A) collects and shares data and intelligence. This system will be installed at edge nodes with a data cache for times when bandwidth is limited or non-existent. The cache would automatically update when reconnected to the network. In the future, the system will implement 3G and 4G network capability to increase its bandwidth resources. The system has been installed and tested at Bagram Air Field in Afghanistan [Cor].

Department of Homeland Security

Responding to the FDCCI plan, the Department of Homeland Security (DHS) has reduced their 24 datacenters down by six. They have future plans to move applications from Citizen and Immigration Services, Customs and Border Protection, Immigration and Customs Enforcement and U.S. VISIT into a Justice Department-run facility by the end of the year. Due to security, DHS primarily uses a private cloud. There are public-facing agencies within DHS that are able to use the public cloud, such as FEMA and CIS [Yas2]. By using cloud computing, DHS estimates that it could save $2.4 Billion dollars annually [Feds].

Department of State

The State Department is currently decreasing its number of data centers from eleven down to two. At the moment, the State Department has a private cloud called the International Information Programs Content Management System (IIPCMS), managed by Computer Technologies Consultants. It hosts over 400 “.gov” websites [CTC]. The State Department does not utilize the public cloud due to security and governance issues [Yas2].

Department of Treasury

In response to the FCCI, The Department of Treasury has retooled their website and migrated it to Amazon's EC2 cloud. Awarded the contract in June 2010, Smartronix created a new version of the Treasury's main website and migrated it to Amazon's cloud. They also migrated the Treasury's SIGTARP.gov, MyMoney.gov, TIGTA.gov, and IRSOversightBoard.treasury.gov sites to the cloud as well. The Department of Treasury is the first cabinet-level federal agency to use Amazon to host a Web site [Mon1]. As with DHS, the Department of Treasury estimates that it can save $2.4 billion dollars a year by utilizing cloud services [Feds].

Department of Agriculture

The Department of Agriculture has already saved $20 million dollars by migrating services to the cloud and expects to increase their savings as more services are migrated [Walker]. One cloud solution implemented consolidated their fragmented 21 system large e-mail service. To upgrade their old system would have taken years, as opposed to implementing the cloud solution within a matter of months. Their cloud solution immediately removed duplication within the system. They also experienced an immediate savings of $6 million dollars per year [Kun].

Department of Energy

The Department of Energy (DoE) has been consolidating their data centers for a few years. Currently, they have two primary datacenters in Germantown, MD and Albuquerque NM. They have been able to cut the amount of servers down by half, from 200 to 100 [Yas2].

Funded by the American Recovery and Reinvestment Act through the Department of Energy, Project Magellan is to test cloud computing for scientific study. The project is underway at the Argonne Leadership Computing Facility and the National Energy Research Scientific Computing Center. Mid-range computing hardware will be installed at these locations to create a cloud testbed to examine the effectiveness of cloud computing in a research environment as a cost and energy efficient computing alternative [Arg].

Department of the Interior

The Department of the Interior's National Business Center currently has four cloud projects underway. NBCFiles is their cloud storage service. NBC Hybrid cloud allows users to seamlessly link NBCFiles to NBCGrid, which is their cloud infrastructure service. NBCApps is their cloud application marketplace, and NBCAuth is their security and authentication service that allows users to move seamlessly between different NBC cloud apps without being prompted for their user account information [NBC].

Department of Health

The Department of Health (DoH) has begun implementing the Electronic Health Records (EHR) system. To help coordinate and manage this task, the DoH has called upon Salesforce.com to provide customer relationship and project management services. The primary use of the Salesforce.com cloud services is to support DoH’s Regional Extension Centers in guiding doctors and rural hospitals help understand and use and implement EHR systems [Kun].
National Aeronautics and Space Administration

National Aeronautics and Space Administration’s (NASA) cloud Nebula is under development at the Ames Research Center. Nebula promotes rapid software development, secure web applications, and code reuse [NAS]. For security, NASA is implementing virtual LAN and data encryption techniques into their Nebula cloud system. NASA is also implementing a near real-time security audit within their system. The slightest change within the system, such as an IP request, will trigger a new security audit [Joch].

National Science Foundation

The National Science Foundation (NSF) has its hands in many diverse research projects relating to cloud computing. The project “Comparative Study of Approaches to Cluster-Based Large Scale Data Analysis” is a partnership between MIT, Yale and the University of Wisconsin, which compares and contrasts parallel database systems for scalable data processing. This project is being hosted on the Cloud Computing Testbed (CCT) operated by researchers at the University of Illinois, Urbana-Champaign.

Other projects funded by the NSF include the “Unified Reinforcement Learning Approach for Autonomic Cloud Management” project which automates the configuration processes of virtualized machines and applications; the “Commodity Computing in Genomic Research” project to develop parallel algorithms to analyze the next generation of sequencing data; the “Data-Intensive Text Processing” project uses network analysis and cross-language information retrieval techniques to create a richer, contextual model for the machine to translate text more accurately; and the “Feedback-Controlled Management of Virtualized Resources for Predictable eScience” project aims to accurately report the status of virtualized resources within a cloud framework through feedback control theory.

In addition, the “Hierarchically-Redundant, Decoupled Storage Project (HaRD)” is developing next generation storage software. The overall objective is to improve the performance of storage, especially in new use case scenarios such as online photo albums and large-scale data processing.

The “One Thousand Points of Light” project proposes a cloud proxy network that allows optimized and reliable data-centric operations to be performed at strategic network locations. In this model, proxies may take on several data-centric roles: interacting with cloud services, routing data to each other, caching data for later use, and invoking compute-intensive data operators for intermediate processing. The proposed solution will enable an efficient coupling of cloud services to yield improved end-to-end performance and reliability for newly emerging data-intensive applications.”

The “Scaling the Sky with MapReduce/Hadoop” project focuses on developing new algorithms necessary for indexing, accessing and analyzing the petabytes of data associated with astronomical imagery.

The “Trustworthy Virtual Cloud Computing” project investigates fundamental research issues leading to new security architectures. This research includes development for new “…security services that enhance the trustworthiness of virtual cloud computing, protection of management infrastructure against malicious workloads, and protection of hosted workloads from potentially malicious management infrastructure.”

The last three cloud based projects currently being funded by the NSF are the “Image Super-Resolution Using Trillions of Examples” project with the goal to be able to “infinitely zoom” into a picture using on-line image repositories for reference as to what the picture would look like at the higher resolution. The “Learning Word Relationship Using TupleFlow” project attempts to improve the efficiency of web retrieval results by studying word relationships. Finally, the “Where the Ocean Meets the Cloud” project proposes to build a new infrastructure designed to allow massive oceanic simulations and queries on these simulations at interactive speeds [NSF].

National Oceanic and Atmospheric Association

To meet the demands of the FDCCI and the FCCI, the National Oceanic and Atmospheric Association (NOAA) currently has two “500-day plans” they are enacting to overhaul their IT infrastructure and to make scientific data easily available to the public. The first 500-day plan is to consolidate all IT. The second is to mature their IT infrastructure to become an effective and efficient IT service. The goals are to secure NOAA’s information and IT investments from threats, build robust high performance computing (HPC) capabilities, operate NOAA IT as a customer-focused service provider, increase efficiency and effectiveness through Enterprise-wide IT Solutions, and attract, develop, and retain a skilled IT workforce.

IT security is an important aspect to NOAA as they are the official voice of the U.S. for severe weather warnings. "Damage to, or loss of, complex, high-cost technology assets such as
satellites, ground control systems, and space weather systems, due to cyber attacks could take years to repair or replace, at the potential cost of millions of dollars”.

High Performance Computing will allow NOAA to better forecast the weather by allowing them to shove more data into their weather models, increasing its accuracy. Cloud computing will give NOAA the computing resources they need [NOA].

**Recovery Accountability and Transparency Board**

In a statement made by Chairman Earl E. Devaney of the Recovery Accountability and Transparency Board (RATB), announced their migration to the cloud. On April 26th 2010 Recovery.gov moved into Amazon’s cloud. They estimate that within the first year and a half they will save $750,000 in their effort [Dev]. The $750,000 dollars in savings is planned to be redirected into its oversight operations to identify fraud, waste and abuse [Rec].

**State Governments**

State and local governments are realizing they can benefit from cloud computing just as much as the federal government. In fact, state and local governments have been quicker to adopt cloud computing, in part because state and local governments are more “agile” over their federal counterparts making it easier for them to utilize the cloud more quickly. Microsoft has announced 14 new initiatives at the state and local level which include Chicago, Illinois, Andover, Minnesota, Virginia Beach, Virginia, and Carlsbad, California [Mon2].

In other state and local governments, New Mexico has deployed a private cloud at the end of 2010 to save on operational and infrastructure costs. Los Angeles has partnered with Google to supply its employees with Google’s cloud-based Gmail service. New York City gave Microsoft exclusive rights to provide the entire city with their cloud products. This partnership is estimated to save New York City $50 million dollars over five years [Yas3]. In an unrelated project, a $7.7 million dollar contract with IBM is consolidating 14 of 50 NYC agency datacenters into one by the end of the year. These agencies include Finance and Sanitation departments and the City’s Chief Medical Examiner. Applications that will be migrated into the new datacenter are help desk, hosting, storage, e-mail, virtualization and network services. The eventual long term goal is to move these applications into a cloud environment [Yas4]. Utah has consolidated its 35 datacenters down to two, a primary and backup storage pair. Utah was also able to virtualize 75% of their servers. Michigan and Colorado are providing their state, cities and counties with cloud based services such as email [Yas3]. Also, in October of 2010 the state of Wyoming moved its 10,000 employees into Google’s cloud saving the state $1 million dollars annually [Zys].

**Security**

Not every program, system and service can be thrown into the cloud. With trade secrets, sensitive documents, identifiable information, and other restricted information that companies internally, and by law need to protect, security in the cloud is absolutely paramount. These concerns are very real. In one instance in 2007, criminals were able to breach Salesforce.com’s systems to steal personal information [Krebs].

Government programs have Federal Information Security Management Act (FISMA) regulations imposed to make certain a system performs at or above a certain level of standard to ensure data is kept safe. There are other regulatory laws that protect data such as HIPAA regulations within the healthcare system. Any agency wishing to migrate to the cloud must ensure that they conform to any and all regulations when considering a cloud solution [Kun]. The government is addressing the issues of security on several fronts.

The Obama administration is requesting to allot NIST a budget of $100 billion dollars for developing needed policies and standards for cybersecurity and how they relate to cloud computing [Yas5]. The Federal Risk and Authorization Management Program (FedRAMP) is an assessment process that will be implemented by the CIO Council to analyze security compliance in cloud implementations, standardize the assessment of cloud solutions, and to authorize them as safe to use within the government. FedRAMP will free agencies from performing their own compliance audits. After a FedRAMP approval, agencies will still need to determine any additional security measures that are appropriate and necessary for their projects.

The Cloud Security Alliance (CSA) is a non-profit group that consists of many industry-leading companies and their employees to create a standardized security framework for the cloud. They also strive to educate people through awareness campaigns to promote proper use of security in the cloud. They have a web based certification program using the Security Guidance for Critical Areas of Focus in cloud computing catalog that they released in 2009. The certification is cloud specific with topics and content not covered in other certification programs [Jac]. Companies that are a part of the CSA include Microsoft, Verizon Wireless, Cisco, Dell, HP, Oracle, IronMountain and Lockheed Martin [CSA].
About the Author

EJ Puig graduated from SUNY Institute of Technology with an M.S. in Computer Science in December of 2010. He is currently living in East Fishkill, New York and is working as an independent contractor for Quanterion Solutions, Inc. to extend his thesis on cloud computing. EJ has many professional interests which include cloud computing and web application development.

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The I MEF Web Initiative

SUPPORT TO MARINE CORP PERSONNEL USING THE WEB FOR UNIT TASK ORGANIZATION, PERSONNEL ASSIGNMENTS, EQUIPMENT ASSIGNMENTS, MESSAGING AND COLLABORATION ARE BEING UNDERTAKEN THROUGH THE I MEF INITIATIVE.

By Major James D. Neushul, USMC

In 2008 the I Marine Expeditionary Force (I MEF) Information Management Office initiated an effort to pursue web technologies in order to automate access controls, information delivery, and web site generation for the over 200 units and 40,000 Marines. This ambitious effort required authorization from Headquarters Marine Corps Command and Control Computers and Communication (HQMC C4) and direct support from several I MEF Commanding Generals. The project was not successful from a user perspective but made significant progress in the development of a Net-Centric Warfare (NCW) web service architecture at the operational level.

Net-Centric Warfare

NCW doctrine pervades US Department of Defense (DoD) acquisitions requirements and is referenced in all topics that concern information technologies. Unfortunately, the concepts are generally diluted to apply to anything that is connected, and seldom apply to the success models of web technologies in the mainstream. Effective implementation of NCW doctrine requires technical knowledge and implementation of world wide web consensus standards on military networks in support of military use cases. The I MEF Web Initiative sought to achieve this by employing enterprise level Authoritative Data Sources (ADS), unit level ADS, and web services to interact with them.

Web sites and web collaboration are not often considered in the same category as tactical warfighting systems. In fact, web services represent the only achievable way in which tactical software can be effectively provided to every operator. Web services can be used to distribute basic unit and personnel data across the force, can be designed to accommodate intermittent and latent connectivity, and will permit disconnected functionality. Simply put, until personnel can be accurately and reliably represented on a web page, we cannot be expected to reliably and effectively track and communicate with them on the battlefield.

Communication

Military networks have unique characteristics which complicate development and distribution of software. Unclassified networks are fenced off from broad access to web resources due to special authentication requirements, and classified networks can only provide those services which are hosted within their respective enclaves. Military networks must also accommodate throughput and latency issues caused by extension to remote and tactical nodes. A great deal of effort is applied to ensuring functionality when networks are disconnected, and this is often seen as an obstacle to web technologies.

All of these difficulties are addressed specifically by mature web technologies, which are represented by prominent examples in the mainstream that prove the success models which NCW is intended to support. Unfortunately, awareness and proper implementation of these technologies is largely absent in the DoD. The I MEF effort was based on the concept that effective employment of web services would improve situational awareness and warfighting effectiveness from the highest level staff to the tactical operator.

Because public web services are so advanced and ubiquitous, the robust nature of the public network architecture is often underestimated. A valuable lesson learned in efforts to deliver web services “inside the wire” is that server, transmission, and network architectures are not configured or optimized to efficiently accommodate web traffic. Many assumptions which apply in the mainstream are not valid. Edge servers, data centers, and other basic elements of the content delivery networks which power the public Internet are conspicuously absent. This represented significant challenges for the I MEF team. Content delivery networks must be provided at the enterprise level if effective web technologies are ever to be successfully employed in the DoD.

Site Generation

Military units are required to maintain accurate and relevant public facing web sites for purposes of public support and
family readiness. At I MEF this challenge remains significant given the high operational tempo and there is a strong need to represent the efforts of Marines deployed in combat zones in a manner commensurate with their service. A primary goal for the I MEF Web project was to support the Public Affairs Office in this task by auto-generating internal and external web pages. These intranet pages were intended to allow non-technical Marines to upload photos and articles that would be subject to approval before being made visible on the external pages.

The rationale for site generation is clear when considering the cost to manually produce and maintain individual unit sites, and the amateur efforts that result from ad-hoc “homegrown” unit sites. An embarrassing number of military unit web sites in the Marine Corps and other services are inaccurate, out of date, and unprofessional. In attacking this problem, the I MEF web team was required to address a deeper data and information management problem in that accurate data level representations of units and organization structure are non-existent for any practical purposes. In order to represent the Marine Corps in cyberspace, this basic representation of the operational architecture had to be created.

The ADS for Marine Corps organizational structure is the Total Force Structure Management System (TFSMS). This system is used to maintain tables of organization and equipment primarily for resourcing purposes. While the web team was able to re-purpose this data to create a hierarchical command structure representation for every unit and billet in the Marine Corps, an important lesson learned was that this could only be a starting point.

While ADS are critical to enterprise data and information management, they cannot be expected to directly support functions for which they are not designed. TFSMS is not meant to accurately reflect the actual task organized and command allocated structure of the active Marine Corps. It can only provide the units, billets and equipment which are the basis of a ground truth. Useful implementation will require active unit participation to achieve and maintain. This level of participation required mission relevance which goes beyond web development and proved difficult to establish.

**Human Effort**

Marine Corps Doctrinal Publication (MCDP) 1, entitled “Warfighting” describes war as an inherently “human activity.” Software that supports warfighting must accordingly support the things that people need to do. Often this principle is subverted to technical, intellectual and financial concerns which place perpetuation of programmatic or acquisitions goals before functional relevance. The I MEF project deliberately avoided this tendency, which made it uniquely non-competitive.

One goal for the project was to leverage a ubiquitous and pervasive human activity in order to achieve an accurate and useful cyberspace representation of the institution. The targeted process is known as the “morning report” in the Marines and Army, and as “muster” in the Navy. It is a report of personnel status that propagates up the chain of command from the lowest levels on a daily basis. This is an example of
a human activity that can both be improved and leveraged to achieve accurate automated organizational representation in cyberspace. The ADS for this process is called the “Marine Corps Total Force System” (MCTFS), and contains personnel and assignment data.

In the Marines the “morning report” process is already supported by a web based service called Marine On-Line (MOL). It was impractical and inappropriate for the I MEF project to replace this function or to become a duplicate effort, so the goal was to create a prototype in which unit level reporting would occur locally in the context of adjusted TFSMS data, and be propagated to the MOL system. This way the personnel data could be used both for accountability as well as for authentication and access control. Daily verification and maintenance through a leadership driven process would then ensure appropriate supervision. Currently authentication and access control are accomplished using data sources that are separately and manually maintained by network administrators in Microsoft Outlook. Commitment to this system represented inertia that was difficult to address.

The effort to integrate unit and personnel ADS was meant to leverage and improve human activities that are currently supported by services, systems and procedures that, however inefficient and arcane, are what people know and what they prefer to do. The only way to achieve change in the operational environment is to either provide alternatives that are so clearly superior that they are demanded, or to transparently integrate the improved functionality into existing tasks. The I MEF project encountered difficulties on both counts, but succeeded in creating a capability that others may employ in the future.

The Web Initiative succeeded in establishing an architecture that could leverage unit structure data and personnel data to create a virtual command structure for the entire Marine Corps in

Example: Screen Shot 2

Outlook. Commitment to this system represented inertia that was difficult to address.

The effort to integrate unit and personnel ADS was meant to leverage and improve human activities that are currently supported by services, systems and procedures that, however inefficient and arcane, are what people know and what they prefer to do. The only way to achieve change in the operational environment is to either provide alternatives that are so clearly superior that they are demanded, or to transparently integrate the improved functionality into existing tasks. The I MEF project encountered difficulties on both counts, but succeeded in creating a capability that others may employ in the future.

The Web Initiative succeeded in establishing an architecture that could leverage unit structure data and personnel data to create a virtual command structure for the entire Marine Corps in
<p>which every Marine can be automatically assigned access to information based on unit membership and billet assignments. As devices are distributed to the lowest levels in the operational hierarchy in order to enable position location information, voice and text communication, and other functions, the importance of unit level ADS will become more apparent and the importance of these efforts will be realized.</p>

### The Way Forward

The I MEF project was intended to instigate action at the institutional level while producing basic web services that would be useful at the operational level. Using the TFSMS and MCTFS ADS the project created services to access and manage data for units, billets, personnel, equipment, files, command displays and messaging. All of these efforts were published as GPL open source to the DoD software forge, and will be employed to support Marine Corps MAGTF C2 functionality by Marine Corps Systems Command (MCSC). The functionality can also be re-used in support of any other service or government function in keeping with the intent and strategy of GPL OSS. In this respect, it was a successful and productive endeavor.

The fundamental principles developed by the web project were used to develop operational concepts of Marine Air Ground Task Force Shared Awareness (MAGTF SA), Combat Relevant Position Location Information (CR-PLI), and Tactical Data Network Extension (TDNE). These concepts each require practical, persistent and accurate representation of unit, billet and personnel data in cyberspace so that corresponding collaboration can occur across real space. Use of institutional ADS to support creation and maintenance of unit level ADS is an important concept that should be applied by all DoD developers seeking to provide useful capabilities at the operational and tactical levels.

Sun Tzu wrote that “If you know the enemy and know yourself, you need not fear the result of a hundred battles.” The I MEF Web Initiative made significant progress on the “know yourself” challenges of modern warfighting, by leveraging existing ADS in the creation of unit level ADS to support the mission critical information operations and situational awareness objectives.

Operational development efforts represent invaluable sources of requirements and lessons learned for the DoD developer community, as well as a course of re-usable concepts and code. For this reason, all code for the I MEF Web Initiative was explicitly licensed as GPL and published to the DoD software forge in the project “MAGTF WEB” (https://software.forge.mil/sf/projects/magtf_web). The Marine Corps Expeditionary Software Development System (ESDS) is leveraging this concept to bridge the gap between operators and acquisitions through the MAGTF C2 project on software forge. (https://software.forge.mil/sf/projects/magtf_c2). EFDS is supported by the Command Operation Center (COC) program of record (POR) at Marine Corps Systems Command (MCSC). Efforts are underway to transition all work to the EFDS to allow reuse and integration into related efforts. The work is available to any DoD developers for this purpose, with the intent that all future development will be posted to the project per GPL license requirements.

Demo site: https://neutron.moesol.com/portal

### About the Author

Major James D. Neushul is currently serving as the Commander THIRD Fleet Amphibious Communication Officer. He has over 18 years experience in the Marine Corps. In 2003 Major Neushul earned a Master's of Science in Computer Science from the Naval Postgraduate School where he authored a thesis on “Interoperability, Data Control and Battlespace Visualization Using XML, XSLT, and X3D,” which represents a point of departure for his efforts with Net-Centric Warfare (NCW) data concepts and principles.

Major Neushul has subject matter expertise on DoD tactical data formats: Variable Message Format (VMF) and Tactical Data Link (TDL and wrote the implementation and directive for Appendix F of the VMF MIL-STD 6017, which addresses the application of XML Schema technologies to binary message handling. He has contributed to the development and fielding of systems which are used to disseminate video from Unmanned Aerial Systems, and has operational experience with the use of tactical data radio systems to distribute position location information, chat and streaming video from Unmanned Aerial Systems (UAS) operations in direct support of combat operations.

Major Neushul is a leading advocate for the application of collaborative open source software development practices in the DoD and welcomes any and all inquiries from those who are interested in improving capabilities. He can be reached at james.neushul@usmc.mil, or james.neushul@gmail.com.
Enterprise 2.0 Collaboration Comes To The Army
BRINGING ENTERPRISE 2.0 COLLABORATIVE WORKSPACES AND SOCIAL NETWORKING STYLE FUNCTIONALITY TO THE ARMY’S SENIOR LEADERS AND THEIR STAFF IS THE KEY OBJECTIVE OF THE ORION PROGRAM.

By Kane McLean

The transition of a new Chief of Staff of the Army is no small task; while transitioning Gen. Dempsey into his new role as the senior-most officer in the United States Army, the transition team utilized a new social workspace—ORION. ORION is a collaborative, online environment that enables teams to work together regardless of time and geographical limitations. It is being developed within milSuite, a web-based social collaboration tool available to the Department of Defense (DoD). The Army’s transition team put ORION through its paces, and found it particularly useful.

The ORION platform brings Enterprise 2.0 collaboration to the senior leaders of the Army’s Generating Force in the Pentagon. A shift from Enterprise 1.0 concepts that simply connect staff with information, Enterprise 2.0 allows staff to generate and collaborate around information in an online social workspace environment.

Introducing ORION, a Virtual Workspace for the Army
ORION is an ecosystem of private, protected web-enabled professional forums that support the senior leadership’s collaboration and decision making processes for the Army’s Generating Force, the part of the Army who supports the warfighter. The initiative effectively leverages the benefits of collaborative web-technologies that support the Army’s senior leaders. ORION provides a common, virtual workspace for leaders to interact on decisions through asynchronous discussions and share documents. Private and open sub-communities can be created as needed to support a wide variety of purposes from ongoing missions to short-term tiger teams. Developed on milSuite, ORION is a common, virtual workspace for leaders to interact on decisions, and create and share documents or ideas around core activities and emerging initiatives.

By spanning time and geo-location ORION enables better feedback, information-sharing and discussion in a private virtual workspace. Enterprise 2.0 tools allow the wisdom within an organization to be harnessed. ORION allows the conversation to happen with the right people while the information is still timely enough to have the greatest impact.

Supporting Sense Making and Decision Making
“In a constantly changing environment, decision making processes are learning processes. As a result, decision making becomes more about making sense of the situation than actually comparing various courses of action. Once we’ve made sense of the situation it’s often very clear what needs to happen” said Col. Nate Allen of the Army Office of Business Transformation (OBT) who is heading up the ORION project. “No leader ever has all the information they want before making a critical decision. Usually, there is at least one more thing they wish you knew. In some cases leaders don’t have the right information. ORION can provide the vital link from leaders to the people who can help provide context needed to make sense of situations.”

The unfortunate reality is that many conversations are lost or shortened due to time constraints and geographic limitations. What many consider worse than missed conversations are conversations that happen too late to be useful to the decision-making process. “I wish I had known that yesterday” is a sentiment too often experienced by decision-makers.

ORION enables teams to have the vital conversations without the limits of physical presence, or geo-location—allowing key conversation not only to happen, but happen quickly enough to have an impact on the decision.

Collaborating and Connecting Effectively
It is no secret that face-to-face meetings are the most common way collaboration happens in the Department of Defense (DoD); however, meetings can tend to be one of the least productive collaboration methods used by teams. Collaborating effectively means connecting effectively; the more effective the connection, the more effective the collaboration. By using ORION to communicate between official meetings, organizations can reduce not only the length of their meetings but also the number of meetings needed. When meeting attendees arrive more prepared to deal with specific issues, less time is used bringing everyone up-to-speed and more time is spent on the actual purpose of the meeting.
ORION also incorporates an online documents feature that allows multiple people to collaborate on the creation and editing of a document within the ORION space. ORION automatically and seamlessly handles document version control. Online document creation, editing, and sharing dramatically reduces the volume of email traffic between teams working on documents together. Additionally, it also eliminates the time spent incorporating changes from team members into the newest version of the document. Teams can spend their time writing—rather than compiling—when they use the online document capability.

Effective collaboration tools need practical access, ORION allows users to interact via email. Users can simply respond to email notifications they receive and their response is entered into ORION as though they were logged in. This particular aspect of ORION lets team members be agilely engaged with their team.

Connecting Across Time and Geo-Location

The biggest challenge to senior leaders collaborating effectively is the coordination of over-committed calendars across multiple time zones. The primary methods currently employed are face-to-face meetings and email distribution—both which have limitations for Army leaders that can negatively impact the speed of making decisions.

The use of online technologies removes the most common barriers to effective collaboration—time and geo-location. Conversations within ORION are asynchronous, meaning that they don’t have to happen at one time. For example, a team member in the Pentagon can start a discussion in ORION and other members of the team can respond from wherever they are, whenever they have the time, all the while maintaining awareness of everyone else’s responses. ORION spans time and geo-location thus enabling better feedback, information-sharing and discussion in a private virtual workspace. While this form of conversation can be somewhat slower than an in-person meeting, it is much faster than putting off the conversation altogether until the next meeting. Threaded discussions allow teams to continue discussion between key meetings and at any time of day that works best for them. ORION allows the conversation to happen with the right people while the information and issues are still timely and relevant.

Team Situational Awareness

A vital aspect of effective collaboration is situational awareness of the team members. ORION makes sharing information easy through threaded conversations and alerts. Each workspace has an overview page that consolidates the most recent activity—new conversations, documents, alerts, external news, etc.—into an straight-forward summary.

Teams can easily stay abreast of the activity of other teams within their organization. This cross-channel awareness helps keep everyone focused on the mission and up-to-speed on changes that impact everyone. Teams no longer have to wait for periodic meetings to learn about information that affects them; they can adapt and re-orient more quickly because they know about changes sooner.

Progression of Social Platforms in the Army

The Army has a varied history of adopting new technologies—useful ones usually find a permanent place while less useful technologies are discarded. ORION has proven its usefulness and will be around a while. It is the natural outgrowth of the experience and lessons learned from earlier attempts by the Army at bringing social capabilities to the workplace.

In 2000, CompanyCommand.com (now CompanyCommand.army.mil) was launched by a group of young officers passionate about company-level leadership; it was followed by PlatoonLeader.org (now PlatoonLeader.army.mil), which was launched by the same team. Both of these forums provide an exceptional place for sharing knowledge as well as exchanging information and ideas; and both of these tools were absorbed into the institutional Army's official resources and continue to thrive.

More recently, the MilTech Solutions team at PEO-C3T has taken the forum concept to the next level by introducing milSuite, a collection of open source Web 2.0 solutions for the Defense Community. The milSuite mission is to provide “cutting edge collaboration behind the firewall,” and they have done just that. Geared toward the military’s next generation, milSuite brings technologies and paradigms that are familiar and natural to today’s recruits.

The Collaboration Around Building a Collaborative Tool

Most successful endeavors are collaborations—ORION is no exception. Allen, one of the founding members of both the CompanyCommand and PlatoonLeader forums, is working through the OBT to bringing those collaborative technologies to the Army’s senior leaders. The foundation of the ORION team is a strong partnership between MilTech Solutions and the OBT with support from Symbolic Systems, PKMM, DSA, and BRTRC. The experience, expertise and thought leadership of the MilTech Solutions and OBT teams are uniquely suited to bring this collaborative workspace to the Army.
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Developed within milSuite, a collection of secure online tools that promote workforce collaboration among communities of interest across the DoD, ORION brings the milBook tool into the day-to-day team work environment. MilBook is the Facebook-style collaboration tool, Jive SBS, which has been heavily modified to meet the demands of the military environment and community. Jive is the same platform that A-Space, a Defense Intelligence Agency project that enables collaboration within the Intelligence Community, is built on. A-Space, was named one the Best Inventions of 2008 by Time Magazine. The teams at ORION and MilTech Solutions continue to work closely together as the two technologies grow and evolve to support the Defense community. Without the milSuite platform or the tight partnership between the two teams, ORION could not be possible.

Beyond technology collaboration, the ORION project is bringing together the OBT, Department of the Army Staff (DAS) and Army Chief Information Officer (CIO-G6) in a combined effort lead by the OBT to educate ORION users on Knowledge Management (KM) concepts and how they are applied.

Looking Forward

The Army’s next generation of leaders are already comfortable processing information digitally and interacting socially in online environments. The natural progression is to incorporate the benefits of these technologies in a digital work environment. Enterprise 2.0 social workplace technologies are going to become more common not only for industry, but also in the DoD due to the forward thinking and work on systems like ORION and milSuite.

Resources
https://orion.army.mil
http://armyobt.army.mil/orion.html
orion.team@us.army.mil

About the Author

Kane McLean is part of the Strategy & Communications Group at BRTRC Technology Research Corporation and currently works supporting the Under Secretary of the Army at the United States Army Office of Business Transformation.

An Open Source advocate, evangelist and strategist, Kane works to find the right solutions to clients’ challenges—more often than not Open Source solutions provide the best-fit and prove to be the most flexible long-term solutions. In addition to creating the strong solution strategies, Kane is works to tout the business case for Open Source adoption.

Prior to joining BRTRC, Kane led a company that helped corporations and organizations develop their online presence, enhance their strategic communication and improve their collaboration capabilities by adopting open source web-based technologies. Kane is a former entrepreneur having founded two companies, the last of which he sold in 2008 before becoming a defense contractor.

Kane also serves on the Steering Committee of Mil-OSS, a Department of Defense Open Source community.
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