Video Quality in Public Safety (VQiPS) Workshop Report

July 26-27, 2012
Hilton Garden Inn Denver Tech Center
Denver, Colorado

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If you are interested in participating in VQiPS Workshops or contributing to this work, please contact VQiPS_Working_Group@sra.com

I. Project Background

VQiPS Overview:

Video applications are quickly emerging as essential components for seamless communications among public safety agencies; however, many public safety agencies lack the technical expertise necessary to purchase appropriate video system due to an increasingly complex procurement environment. In 2008, the U.S. Department of Homeland Security (DHS) Office for Interoperability and Compatibility (OIC) partnered with the Public Safety Communications Research (PSCR) program to form the Video Quality in Public Safety (VQiPS) Working Group. The VQiPS Working Group is comprised of volunteers from each public safety discipline, including law enforcement, fire, and emergency medical services from the local, state, and Federal levels, as well as representatives from industry, Federal agencies, academia, and non-profit organizations. Together, these entities work to coordinate disparate video standard development efforts and ultimately arm public safety consumers with the knowledge they need to purchase and deploy the right video systems to fulfill their missions.

VQiPS Vision:

The VQiPS Working Group seeks to empower people with the tools and information needed to purchase and employ the right video technology to support public safety, physical security, and homeland security enterprise operations.

VQiPS Mission:

The VQiPS Working Group will research, develop, and compile information necessary for people purchasing video technology to meet the needs of public safety, physical security, and the homeland security enterprise.

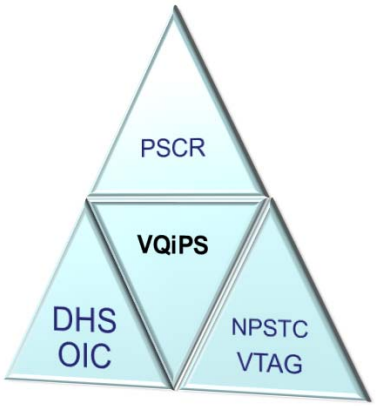
VQiPS Goals:

Goal 1: Educate end users about video system components	**Goal 2:** Provide knowledge tools to help end users define their own use case requirements

Accomplishments -
• Defining Video Quality Requirements: A User Guide for Public Safety (released September 2009)
  o **Link:**http://www.safecomprogram.gov/SiteCollectionDocuments/3aVideoUserRequirementGuidedoc.pdf
• Recorded-Video Quality Tests for Object Recognition Tasks Report (released October 2011)
  o **Link:**http://www.pscr.gov/outreach/safecom/vqips_reports/RecVidObjRecogn.pdf
	Accomplishments -
	• Defining Video Quality Requirements: A Web Tool for Public Safety (version 1.0) (released May 2011, herein referred to as the Web Tool)
	• Defining Video Quality Requirements: A Web Tool for Public Safety (version 2.0) (released July 2012 , herein referred to as the Web Tool)
	  o **Link:**http://www.pscr.gov/outreach/vqips/vqips_guide/define_vid_qual_reqs.php)

Goal 1: Educate end users about video system components	**Goal 2:** Provide Knowledge Tools to help End Users Define their own Use Case requirements
Accomplishments - • Video Quality Tests for Object Recognition Applications *(Live)* Report (released February 2012) o Link:http://www.safecomprogram.gov/library/Lists/Library/Attachments/231/Video_Quality_Tests_for_Object_Recognition_Applications.pdf **Current Initiatives -** • Report on Measuring Required Acuity for Each Discrimination Level (scheduled to be released September 2012) • Video Quality in Public Safety Standards Handbook (scheduled to be released September 2012)	**Current Initiatives -** • Video over Broadband Work Plan (scheduled to be completed November 2012) • Test Plan for Demonstration Network Video over Broadband Experiments (scheduled to be released December 2012)

VQiPS Partner Roles



Role of the DHS OIC as it relates to VQiPS:

DHS OIC serves in an oversight capacity to monitor the direction and focus of VQiPS Working Group initiatives. DHS OIC provides high-level strategic guidance and support for current and future project initiatives. DHS OIC also works with PSCR and the VQiPS Leadership Team to determine appropriate next steps for the VQiPS Working Group.

Role of the PSCR as it relates to VQiPS:

The PSCR program provides additional technical expertise and, along with DHS OIC, shares responsibility for monitoring the direction and focus of the VQiPS Working Group initiatives. PSCR conducts the research, development, applied engineering, and objective experiments that determine all the video quality goals of VQiPS.

Role of VTAG as it relates to VQiPS:

The Video Technology Advisory Group (VTAG), a group within the [1]National Public Safety Telecommunications Council (NPSTC), provides advice and input on matters raised by the VQiPS Working Group. The VTAG, comprised of senior level practitioners in the technology and public safety fields, will provide the Working Group the benefit of their insight and experience through the review of various work products and processes. They also champion the effective use of video by leveraging communications networks in their respective disciplines and organizations.

II. Introduction

DHS OIC, in partnership with the U.S. Department of Commerce's (DOC) PSCR, hosted the fourth Video Quality in Public Safety (VQiPS) Workshop on July 26-27, 2012, in Denver, Colorado. This Workshop provided VQiPS Working Group members with the opportunity to share key information and best practices about video quality in various operational environments. United by the common goal of improving video quality for public safety, participants represented a diverse range of public safety agencies and practitioners, homeland security operations, and critical infrastructure communities across the Nation. Appendix A contains a list of Workshop participants.

Purpose:

To engage the VQiPS Working Group on recent accomplishments, near-term plans, and the development of long-term goals.

Outcomes:

- Shared understanding of the VQiPS tools available now to the community: Video Quality Standards Handbook and Web Tool
- Increased awareness of tools, technologies, best practices, and lessons learned useful to improving video quality in public safety applications
- Shared awareness of the progress and future direction of the VQiPS project

Summary:

[1] NPSTC is a federation of organizations whose mission is to improve public safety communications and interoperability through collaborative leadership. NPSTC is comprised of different public safety organizations, including the International Association of Fire Chiefs (IAFC), National Sheriffs' Association (NSA), and International Association of Police Chiefs (IACP).

The 2012 VQiPS Workshop offered participants the opportunity to learn about new video technology and interact with a global community of video users, manufacturers, and researchers. Each day of the Workshop began with a plenary session and ended with breakout sessions or a case study. The morning plenary sessions provided participants with an in-depth look at what VQiPS has accomplished over the past year and its plans for the upcoming year and beyond. The afternoon breakout sessions featured presentations by some of the leading industry, government, and academic experts. The case study sessions featured presentations by public safety agencies from cities/counties across the United States on lessons learned from their local implementation of video systems. Both the breakout sessions and case studies provided the audience with best practices for the use of video systems and offered a unique breadth of perspectives that helped to shed light on the wide use of video technologies and applications in various operational systems.

Participants also received an introduction to the Video Quality Standards Handbook and version 2.0 of the VQiPS Web Tool. The Video Quality Standards Handbook will provide the public safety community with guidance for attaining effective video quality when deploying network video surveillance applications. All of the requirements and references in the Handbook are consistent with established best practices. The VQiPS Leadership Team distributed a draft version of the Handbook to participants for feedback. An updated version (Version 2.0) of the VQiPS Web Tool was also demonstrated during the Workshop. The first iteration of the VQiPS Web Tool provided public safety agencies with a self-assessment tool to help them identify their video quality needs and included application-independent usage scenarios and a glossary of common terms. The updated version of the VQiPS Web Tool now can help agencies align their video quality needs with existing technical performance specifications and standards by matching a video user's unique needs to use cases and provide a video system requirement recommendation. The VQiPS Leadership Team requested feedback on the Web Tool from Workshop attendees to continue to make future releases beneficial to the public safety community.

Figure 1: VQiPS Leadership Team members presenting during the morning plenary session (above from left to right: John Contestabile and Cuong Luu)

III. Working Group Team Updates

Leads from the VQiPS Leadership Team presented on the progress their Working Group teams have made over the past year:

- **Leadership Team (Led by Cuong Luu)**
  - This team has coordinated and facilitated team calls and meetings, elicited feedback on Working Group activities, and ensured that all participants have received an equal opportunity to voice comments. This team will continue to monitor each of the teams' progress and provide periodic updates to the Working Group as necessary.

- **VTAG (Led by John Contestabile)**
  - This team coordinated and facilitated quarterly calls, participated in the Standards Team efforts, and attended numerous public safety conferences to speak about VQiPS.

- **Standards Team (Led by Steve Surfaro)**
  - This team has continued to work on researching and compiling information for the Video Quality in Public Safety Standards Handbook. This team will continue to appropriately map standards, specifications, and guidelines to the use cases and compile these into the Handbook. In addition, the Standards Team Lead has attended public safety conferences throughout the year to present on VQiPS.

    Video Quality in Public Safety Standards Handbook Report-Out
    - The purpose of this Handbook is to specify a minimum level of performance for video surveillance system (VSS) required to satisfy a use case.
    - The Handbook recommends a design process which links use cases (i.e., real-life situations of using video in public safety applications) to solutions (i.e., product classes, network infrastructure, and display devices) to illustrate how specific solutions can address requirements.
    - The Handbook represents a "minimum needs" starting point for specifying both physical and logical security systems involving video surveillance and ultimately, the achievement of video quality.

- **Performance Requirements Team (Led by Joel Dumke)**
  - This team has conducted object recognition research and visual acuity research, as well as set performance specifications for various components of a video system. The Lead has attended public safety conferences throughout the year to present on Version 2.0 of the VQiPS Web Tool. This team will continue to engage first responders to gather more feedback on the usability of the Web Tool pertaining to

the use of video quality in daily operations. In addition, the team will also coordinate with other groups that are conducting similar video system research.

Version 2.0 VQiPS Web Tool Presentation

- A storage calculator was added to the Recommendations Tool for Video Requirements section of the Web Tool that provides bit rate estimates based off the information a user provides.
  - This functionality will be helpful to video system procurement officers because it offers bit rate guidance for systems planning.
- A feedback button was added so that users can offer suggestions on future enhancements for the Recommendations Tool.
- Version 3.0 of the Web Tool will allow users to run their results and it will link to the Consumer Digital Video Library (CDVL), found at www.cdvl.org, to provide a more detailed example that shows the users what they need to meet their needs.
- The information provided in the Getting Started section of the Web Tool educates new users on how to use the Recommendations Tool.

Figure 2: Joel Dumke from PSCR previews Version 2.0 of the Web Tool to Workshop participants

IV. Case Study Sessions

The VQiPS Leadership Team hosted a series of case study panel sessions from different cities and counties around the country. Speakers provided best practices and lessons learned related to implementing video surveillance systems to support emergency response, mass transit, and

counterterrorism. The following notes outline some of the key points made by the speakers, but does not constitute the full extent of their presentation.

Case Study Session 1 - Washington, DC; Baltimore, MD; San Diego, CA

- ***Washington, DC***
  - The Homeland Security and Emergency Management Agency is involved in two distinct but parallel projects: one within the District and one within the National Capital Region (NCR).
  - Washington DC began to look into consolidating the distinct video platforms of their different public safety agencies within the District because while each had its own proprietary Video Management System (VMS) that met agency specific needs, the systems were not interoperable.
    - Other challenges included the lack of a set policy or Concept of Operations (CONOPS) for sharing so there were limitations to the agencies accessing each other's feeds due to video ownership and permissions issues.
  - For the NCR initiative, the group realized that in order to achieve communications interoperability, the group looked at each component layer of the video platforms: Data layer, Integration Layer, and Presentation Layer.
    - Interoperability is achieved at the "Integration Layer."
  - *Lesson Learned/Best Practice (District Initiative):* In order to successfully consolidate platforms, it is important to have executive level support early-on as well as regional funding support.
  - *Lesson Learned/Best Practice (NCR Initiative):* The recommended video sharing concept for the regional initiative utilizes the three layered approach of: normalizing the data, distributing it using a Secure Architecture, and allowing the data to be viewed in each Agency's current Presentation layer.

- ***Baltimore, MD***
  - Baltimore's "Citiwatch" program, a municipal surveillance network, partners with multiple law enforcement agencies and the private sector for command and control using a common Physical Security Information Management platform and through the sharing of video/technology assets.
    - This program has become a model for information sharing in the public safety community.
  - During the Baltimore Grand Prix 2011, Baltimore had 779 video assets integrated together through the VidSys platform, which proved it was possible to integrate all video and sensor assets in the City of Baltimore and the State of Maryland to enable cross-agency, real-time situational awareness with command and control.
  - A benefit of the platform is that all agencies operate from a single common operational picture (COP), and can receive unprecedented access to feeds for disaster recovery and storm-related emergency management.
    - The Baltimore Police Department has improved awareness of responder locations and the system has improved their ability to share real-time information.

- *Lesson Learned/Best Practice:* Building partnerships with public and private stakeholders is essential because everyone needs to have a common goal for this platform to be successful.

- ***San Diego, CA***
  - The San Diego region's Automated Regional Justice Information System's (ARJIS) Regional License Plate Readers (LPR) system connects 13 separate LPR efforts and makes data accessible to all 82 ARJIS members, even those without LPR programs.
    - The ARJIS LPR effort is funded primarily by Urban Areas Security Initiative (UASI) funds but has ultimately integrated LPR efforts from multiple sources.
  - The LPR system permits a partial-plate query against information already available in a database containing license information. The photo obtained during the LPR captures, helps officers narrow down potential suspect vehicles and ultimately locate a vehicle of interest.
  - Communities benefit from a regional approach to LPRs that makes a larger amount and source of data available to all law enforcement agencies, even those which are not using LPR hardware. ARJIS members benefit from having a regional database with 24+ million records.
  - *Lesson Learned/Best Practice:* Because LPR operates in the background of the mobile patrol environment, officers are able to conduct routine tasks while the LPR system checks for wanted vehicles and gathers LPR records. The result is an effective force multiplier for law enforcement.
  - *Lesson Learned/Best Practice:* Privacy concerns and questions continue to be complex which means solid policy and training is essential.
  - *Lesson Learned/Best Practice:* LPR is not plug & play. Agencies should engage with IT personnel early and often to ensure project success.
  - *Lesson Learned/Best Practice:* Fixed LPR can be challenging on many fronts due to required infrastructure, environmental/regulatory restrictions, public reaction, and the generation of large volumes of data.

Case Study Session 2 - *Houston, TX; New York, NY; Los Angeles, CA*

- ***Houston, TX***
  - The City of Houston is deploying a scalable and robust public safety video system that leverages existing public and private cameras and networks to provide enhanced situational awareness for appropriate command and control centers operated by first responders in the region.
    - Funding for this Public Safety Video Initiative was secured through DHS grants.
  - The City of Houston's system is predominantly built on a wireless mesh network.
    - Benefits of the wireless network include the ease of integration with other systems and its scalability.
    - Challenges of the wireless network include a lengthy installation process and difficulty in maintaining a signal.

- *Lesson Learned/Best Practice:* When designing and selecting a system, it is important to know that it is a huge balancing act among video quality, bandwidth, and recording.

- ***New York, NY***
  - The Lower Manhattan Security Coordination Center (LMSCC) is the integration point for video, license plate, and environmental data collected by the Domain Awareness System (DAS) in Lower and Midtown Manhattan.
    - New York Police Department (NYPD) personnel monitor data-generated alerts and incidents at the LMSCC and are able to dispatch field resources for an immediate response.
  - The LMSCC is an active member in the Lower Manhattan Security Initiative (LMSI)/ Midtown Manhattan Security Initiative (MMSI).
    - The main principle of the LMSI and MMSI is to develop a partnership with private sector stakeholders; 30 companies have already signed Memoranda of Understanding (MOUs) to work with NYPD personnel.
    - After the Counterterrorism Cooperation Metropolitan Transportation Authority (MTA) MOU was signed in April 2009, NYPD has integrated into DAS Close Circuit Television feeds from key MTA locations like Grand Central Station, Penn Station, and Times Square Station.
    - The initiative has also set up a license agreement allowing NYPD to install LPRs at Brooklyn Battery Tunnel and Holland Tunnel.
  - *Lesson Learned/Best Practice:* These security initiatives have improved NYPD's ability to respond to ongoing terrorist threats and deter crime.

- ***Los Angeles, CA***
  - The Los Angeles County Sheriff's department uses Physical Security Information Management (PSIM) which is a category of software that provides a platform and applications created by middleware developers.
    - PSIM is designed to integrate multiple unconnected security applications and devices and control them through one comprehensive user interface.
    - It collects and correlates events from existing disparate security devices and information systems (e.g., video, access control, sensors, analytics, networks, building systems, etc.) to empower personnel to identify and proactively resolve situations.
    - A complete PSIM software system has six key capabilities: collection, analysis, verification, resolution, reporting, and audit trail.
  - When implementing CCTVs, look to see if there are existing networks in the area that can be used (e.g., traffic management networks or commuter bus access points to public transportation networks).
  - Training multiple people in monitoring, recording, and pulling video from CCTV feeds is very important to maximize the amount of coverage for an agency.
  - *Lesson Learned/Best Practice:* In order to use video in court, public safety agencies need to have the following policies: a retention policy, recorded video policy, and scope of recording.

Figure 3: Steve Surfaro from Axis Communications presents during the "Cracking the Code to Forensic Video" breakout session

V. Breakout Sessions

The VQiPS Leadership Team hosted a series of nine breakout sessions on a variety of topics ranging from Video Quality to Cloud Computing.

Session #1 - *Is Your Video Smarter than a Fifth Grader (Introduction to User Support Video Management Tools)?*

- **Moderator:** Joel Dumke - PSCR

- **Panelists:**
  1. David King - Milestone
  2. Jeremy Howard - Verint Video Intelligence Solutions

- **Key Takeaways:**
  - High-definition (HD) cameras allow you to maintain a wide field of view (FoV) while preserving high-pixel density to ensure faces are identifiable and recognizable when "digitally" zoomed.
  - Higher resolution from a HD camera gives you two benefits as a practitioner: (1) it preserves resolution and increases FoV and (2) it preserves FoV and also increases the quality of evidence.
  - Before purchasing a HD camera, there are four needs that the user should determine: bandwidth/storage, low-light sensitivity, lens, and use case (i.e., what scenarios the camera will be used to capture).
    - A further critical consideration is matching the lens to the resolution of the imager.

Session #2 - *Cloud Computing Applications in Public Safety*

- **Moderator:** Steve Surfaro - Axis Communications

- **Panelists:**
  1. Don Zoulfal - System Development Integration, Inc.
  2. Cort Thompkins - ipConfigure, Inc.

- **Key Takeaways:**
  - A cloud provider is a person, organization, or entity responsible for making a data storage service available to cloud consumers.
    - Cloud providers are located where the greatest spectrum is available (e.g., Miami).
  - A significant aspect of the cloud is that you can access it from multiple areas (e.g., mobility) and it can lower storage costs.
  - Video mobility is a benefit of "virtualization" and cloud computing.
  - The public safety community can use the cloud to store data and run analytics to help crack down on crime.
  - Security, risk allocation, data retention, third-party contractual limitations, privacy, regulatory compliance, data location, and jurisdiction are all legal concerns that agencies should consider before using the cloud.
    - On a public cloud, legal issues are controlled by the Service Level Agreement (SLA) between the customer and the cloud provider.

Session #3 - *Introduction to User Support Analytics Tools*

- **Moderator:** Don Zoulfal - System Development Integration, Inc.

- **Panelists:**
  1. Melchior Baltazar - EMSS3
  2. Amit Gavish - BriefCam
  3. Cort Thompkins - ipConfigure, Inc.

- **Key Takeaways:**
  - Video analytics software turns video into actionable data.
    - By turning video into data, devices can respond and alert on a variety of human and non-human events, such as: detection of people and vehicles, recognition of a person or vehicle breaking a perimeter, identification of a person who is leaving a bag unattended, etc.
  - Video analytics for public safety enables municipal video systems to automatically capture, analyze, and store video data according to agency-defined rules.
  - Always determine the use case upfront so you can get the proper video analytics set up (e.g., scalability, protocols, response).
  - Aging, pose, illumination, and expression are all factors affecting accuracy and performance of facial recognition software and tools.

- Using the latest video analytics technology available, vendors have developed solutions that allow agencies to review hours of video footage in minutes.

Session #4 - *Build Your Best Project Team: The Art of Critical Decision Making in Security*

- **Speaker:** Steve Surfaro - Axis Communications

- **Key Takeaways:**
  - When physical security (e.g., buildings) and logical security (e.g., password access, authentication, access rights, authority levels, etc.) are defined and managed independently of each other, the potential increases for security holes that outsiders and insiders can exploit.
  - With any security project, it is important to enlist not only subject matter experts, but also non-technical stakeholders.
  - The ten steps to build your best project team are the following:
    1. Put someone in charge
    2. Develop your business case
    3. Get your documentation current
    4. Put your collaboration team in place
    5. Inform and educate your systems integrator and key vendors
    6. Identify your organization's current applicable standards and requirements (PACS/LACS)
    7. Learn from the way your organization approaches PACS/LACS projects
    8. Be willing to accept advice from the project team
    9. Get up to speed with planning and execution
    10. Document and share your success

Session #5 - *Visual Acuity and Video Quality Specification*

- **Moderator:** Joel Dumke - PSCR

- **Panelists:**
  1. Andrew Watson - National Aeronautics and Space Administration (NASA)
  2. Mikołaj Leszczuk - AGH University of Science and Technology
  3. Yohanna Schulze - Service des Technologies et des Systèmes d'Information de la Sécurité Intérieure (ST(SI))

- **Key Takeaways:**
  - During testing, PSCR has seen very few significant differences between recognition rates for live and recorded video.
    - PSCR measured video acuity according to the smallest reliably-recognizable characters on a reduced logarithm of the Minimum Angle of Resolution (LogMAR) chart (e.g., eye chart) that was synthetically inserted in the videos.

- The NTIA/ITS Video Quality Experts Group (VQEG) is an independent group with members drawn primarily from the International Telecommunication Union ITU, but it is not exclusive.
  - VQEG has an ongoing project, Quality Assessment for Recognition Task (QART), to perform series of tests to study effects and interactions of compression and scene characteristics.
- A recommended minimum requirement for use of video in court for identification purpose of a face must be at least 90x60 pixels.
- Video Acuity is a useful general real-world metric of video system performance
- The NASA Visual Identification Model can predict human performance using a video system.

Session #6 - *Cracking the Code to Forensic Video*

- **Moderator:** Steve Surfaro - Axis Communications

- **Panelists:**
  1. Cort Thompkins - ipConfigure, Inc.
  2. Lloyd Uliana - Bosch Security Systems, Inc.
  3. Tom Callaghan - Vancouver Police Department

- **Key Takeaways:**
  - Effective crime prevention starts with a camera that has a good light source.
    - For example, be able to actually track offenders to a vehicle provides better information to law enforcement.
  - Verify that the video can play and be displayed by those investigating and litigating.
  - Use the original Digital Multimedia Content (DMC) file for any litigation.
  - Document and maintain a chain of custody on the video evidence.

Session #7 - *Airport Lessons Learned while Using Video*

- **Moderator:** Paul Koebbe - Faith Group LLC

- **Panelists:**
  1. Mark Nagel - Denver International Airport (DEN)
  2. David Cardenas - Los Angeles International Airport (LAX)

- **Key Takeaways:**
  - In July 2008, when DEN signed the agreement with the Transportation Security Administration (TSA) they installed 254 digital cameras and added 42 TB's of storage.
    - The increase in cameras reduced criminal activity (i.e., baggage theft) and improved reaction to security incidents and breaches.

        - The Denver airport has the ability to take a photo of a person of interest and send it out to all security personnel communication devices in a timely manner.
        - Some challenges the airport faces are caused by the camera and workstation placement as well as staff not receiving the proper training for accessing and pulling video.
        - The City of Denver, which operates DEN, will release video footage depending on the request but they also have an internal process of retaining video for 30 days.
    - At LAX, if there is a breach in security, they have the authority to shut down the terminal and re-screen every passenger which can have impact on all flights.
        - Due to the Freedom of Information Act, LAX will provide footage if requested but they only hold their recorded video footage for 2-3 days.
    - Before setting up a camera in a location, both DEN and LAX suggest conducting a site survey to identify potential obstructions and help determine what type of lens to use.

Session #8 - *Update on Ongoing Broadband Related Projects*

- **Moderator:** Cuong Luu - OIC

- **Panelists:**
    1. Andy Thiessen - ITS
    2. Emil Olbrich - NIST

- **Key Takeaways:**
    - The 700 MHz Demonstration Network provides a place for public safety to see how the different manufacturers will function, specific to their unique needs; and where early builders can ensure that the systems they might procure will in fact work in the eventual nationwide network.
        - PSCR and NIST are interested in ensuring that the Demonstration Network allows for various stakeholders across industry and the public safety community to work together to meet the long-term requirements of public safety agencies.
    - The Broadband Working Group under NPSTC is currently working on updating the Statement of Requirements (SoR) for FirstNet which will be stood up in September 2012.
    - Over 50 Cooperative Research and Development Agreements (CRADAs) have been signed with industry to date.

Session #9 - *Mobile Devices*

- **Moderator:** John Contestabile - Johns Hopkins University Applied Physics Lab (APL)

- **Panelists:**
    1. Tyrone Bekiares - Motorola Solutions

2. Doug Jones - Smith Micro Software, Inc.

- **Key Takeaways:**
  - Mobile device users experience challenges trying to stream video to their devices because bandwidth is not guaranteed; transcoding with dynamic bit rate adaption will be required.
  - Transcoder, streamer, and security components are necessary in the system and software to successfully transmit a video to a mobile device.
  - Customer mission quality requirements and wireless constraints are two opposing forces that drive the encoded video bit rate for a wireless video application.
  - Resolution, frame rate, and compression components make up the encoded video bit rate.
    - For a given video bit rate, improving one component of video quality requires a tradeoff in one or more other components of video quality.
    - "Blurry" video is typically a function of too few pixels comprising an object of interest.
  - Increased motion requires a higher encoded video bit rate to maintain the same level of decoded spatial video quality.
  - To accommodate the coverage and capacity challenges associated with broadband, customers should consider the following when shopping for wireless broadband networks and video solutions: quality of service (QoS), delay, priority, and dynamic bit rate adaptation.

VI. Additional Presentations

Over the course of the two-day Workshop, participants had an opportunity to listen to two presentations on Video User Training and the Top Ten Transformative Technologies in Physical and Cyber Security.

Video User Training Presentation

- **Presenter:** Paul Smith, Lawrenson Smith LLC

- **Key Takeaways:**
  - There are approximately 2.85 million CCTV cameras in the United Kingdom (UK).
  - There is a lack of reactive training available for CCTV monitors on how to use, record, or analyze video.
  - Planning:
    - It is important to always conduct a vulnerability assessment on critical assets before putting up CCTVs in a particular area so you can determine the best location to place your cameras to capture the intended point of interest.

    - The shift changes of CCTV monitors should be planned in such a way that monitors receive adequate breaks, but does not occur at hours the area being monitored is at its greatest risk.
- Monitoring:
    - One best practice for operators is to have their monitors consistently log and report what they see on their screens (e.g., information like age, build, and distinguishing features).
    - It is important to change the mentality and culture of monitors from being passive to being more proactive.
- Trends:
    - Some agencies are looking into hiring private companies to help with monitoring, but then they will need access to the data which may raise security concerns.

Top Ten Transformative Technologies in Physical and Cyber Security

- **Presenter:** Steve Surfaro, Axis Communications

- **Key Takeaways:**

1. **Mobile Devices**
    a. A benefit of mobile devices is that they have multi-core processing and access to cloud support.
2. **Wireless Networks**
    a. A wireless network will allow public safety agencies to roam on private Land Mobile Radio (LMR) networks where they will have access to the Wireless Priority Service (WPS).
3. **HD Imaging**
    a. Standardized HD video surveillance brings affordable image quality to law enforcement, physical security, public safety, telehealth, and retail markets.
4. **Low-Light Imaging**
    a. Vendors have products available that will provide a lower-cost thermal imaging with no motion blur.
5. **Efficient Video Compression**
    a. Efficient video compression is 80 percent more efficient than Motion JPEG (MJPEG) and is suitable for recording on moving law enforcement vehicles.
6. **Cloud Computing**
    a. Video mobility is a benefit of "virtualization" and cloud computing.
    b. Cloud computing allows for enhanced emergency response because pre-event video is instantly accessible.
    c. Elasticity and scalability are important aspects to consider when thinking about whether to use a cloud computing environment.
7. **Video Verification**

   a. This technology reduces false alarms by helping to verify that all alarm transmissions are valid before the alarm is set off.

8. **Device Authentication**
   a. Device authentication minimizes the possibility of exploits of cameras on public networks.
9. **Video Content Analysis**
   a. Video content analysis can reduce incident review time by at least 50 percent and allow agencies to set specific object criteria.
   b. Technology also allows agencies to look at 24 hours of footage in as little as 15 minutes.
10. **Edge Devices**
   a. Edge devices provide users with the ability to transact with other people in a self-contained area which increases their protection zone.

VII. Next Steps

In 2009, when VQiPS was started by OIC and PSCR, the VQiPS Leadership set out to accomplish two Phase 1 goals: educate the end users about video systems and help end users define their own requirements. Now in 2012, the VQiPS Leadership Team reports that they have accomplished those goals with the development of the Video Quality User Guide and the Recommendations Tool for Video Requirements. The Leadership Team recommends that VQiPS Phase 2 focus on video over broadband efforts given the passing of recent legislation and the impending creation of a nationwide public safety broadband network. The Working Group will start to work on video projects that will inform public safety agencies about their video over broadband needs, such as bandwidth capacity and standards.

The VQiPS Working Group left the Workshop having made the commitment to work on the following activities:

- Connect with VQiPS Team Leads
- Engage with broadband initiatives
- Provide feedback on Video Quality in Public Safety Standards Handbook draft
- Test Web Tool and provide feedback via the new Feedback button; provide success stories on using the Web Tool to VQiPS_Working_Group@sra.com

The VQiPS Leadership Team also shared its Deliverable Roadmap for the coming year:

Q4 FY12	Q1 FY13
• Video Quality in Public Safety Standards Handbook Version 1.0 • 2012 VQiPS Workshop Report • Sign CRADA with video industry leader • DHS Technical Report on Phase 2 and 3	• 2013 Communications & Marketing Plan • Working drafts of: o Policy Issues Concept Paper; o PSCR 2013 Work Plan; and o Plan to leverage Axis Communications CRADA. • VQiPS Leadership /VTAG Meeting (November 5-6, 2012)
Q2 FY13	**Q3 FY13**
• Final drafts of: o Policy Issues Concept Paper; o PSCR 2013 Work Plan; and, o Plan to leverage Axis CRADA. • 2013 VQiPS Workshop (Date TBD) • Present at IWCE Conference (March 11-15, 2013)	• 2013 VQiPS Workshop Report

To ensure project progress and to explore future work surrounding video quality for public safety, additional in-person Workshops will be scheduled. These Workshops will continue to allow Working Group members to help inform the direction of the VQiPS project to ensure stakeholder alignment with project actions.

Additional information about VQiPS can be found at:

- **SAFECOM Web site:** http://www.safecomprogram.gov/currentprojects/videoquality/Default.aspx
- **Public Safety Video Quality Web site:** http://www.pscr.gov/projects/video_quality/vqips/vqips.php

Appendix A - Workshop Participant List

2012 VQiPS Workshop Participant List			
First Name	**Last Name**	**Agency, Company, or Organization**	**E-mail Address**
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Appendix B – Agenda

Thursday July 26th – DAY 1

7:30 – 8:30AM *Registration*

8:30 – 9:40AM *Welcome and Opening Remarks*

- VQiPS Background and Progress Report
- Federal Update

9:40 – 10:40AM *Video Standards Roundup Report-Out*

10:40 – 11:00AM ***~Break~***

10:40 – 11:00AM *Educational Panel Breakouts*

Session #1: Is Your Video Smarter than Fifth Grader (Introduction to User Support Video Management Tools)	**Moderator:** Joel Dumke - Public Safety Communications Research (PSCR) Program **Panelist:** David King - Milestone **Panelist:** Jeremy Howard - Verint Video Intelligence Solutions
Session #2: Cloud Computing Applications in Public Safety	**Moderator:** Steve Surfaro - Axis Communications **Panelist:** Don Zoulfal - System Development Integration, Inc. **Panelist:** Cort Thompkins - ipConfigure, Inc.

12:00PM – 1:30PM ***~Lunch~ *Not Provided****

1:30 – 2:00PM *VQiPS Web Tool Presentation*

2:00 – 2:20PM ***~ Break~***

2:20 – 3:20PM *Educational Panel Breakouts*

Session #3: Introduction to User Support Analytics Tools	**Moderator:** Don Zoulfal - System Development Integration, Inc. **Panelist:** Melchior Baltazar - EMSS3 **Panelist:** Amit Gavish - BriefCam **Panelist:** Cort Thompkins - ipConfigure, Inc.

Session #4: Build Your Best Project Team: The Art of Critical Decision Making in Security	**Speaker:** Steve Surfaro - Axis Communications

3:20 – 3:35PM ***~ Break~***

3:35 – 4:35PM *Issues in Video User Training Session*

- *(Paul Smith, Lawrenson Smith LLC)*

4:35 – 5:35PM *Case Studies Presentation*

Case Study: • Washington, DC • Baltimore, MD • San Diego, CA	**Moderator:** Mike Fergus - International Association of Chief of Police (IACP) **Panelist:** Joshua Jack - Washington, DC Emergency Management Agency **Panelist:** Sam Hood - Baltimore Police Department **Panelist:** Dale Stockton - Automated Regional Justice Information System (ARJIS)

5:35 – 5:40PM *Next Steps and Adjourn*

6:00 – 8:00PM *Networking Reception (For All Workshop Participants)*

Friday July 27th – DAY 2

8:30 - 8:50AM *Review and Reflections from Day 1*

8:50 - 9:20AM *Next Steps in VQiPS Program*

9:20 - 10:25AM *Case Studies Presentation*

Case Study: • Houston, TX • New York, NY • Los Angeles, CA	**Moderator:** Mike Fergus - International Association of Chief of Police (IACP) • **Panelist:** Jack Hanagriff - City of Houston • **Panelist:** Amin Kosseim - New York Police Department (NYPD) • **Panelist:** Sgt. John Gaw - Los Angeles County Sheriff's Department

10:25 - 10:40AM ***~ Break~***

10:40AM - 11:40PM *Educational Panel Breakouts*

Session #5: Visual Acuity and Video Quality Specification	**Moderator:** Joel Dumke - Public Safety Communications Research (PSCR) Program **Panelist:** Andrew Watson - National Aeronautics and Space Administration (NASA) **Panelist:** Mikołaj Leszczuk - AGH University of Science and Technology **Panelist:** Yohanna Schulze - ST(SI)²
Session #6: Cracking the Code to Forensic Video	**Moderator:** Steve Surfaro - Axis Communications **Panelist:** Cort Thompkins - ipConfigure, Inc. **Panelist:** Lloyd Uliana - Bosch Security Systems, Inc. **Panelist:** Tom Callaghan - Vancouver Police Department
Session #7: Airports Lessons Learned while Using Video	**Moderator:** Paul Koebbe - Faith Group LLC **Panelist:** Mark Nagel - Denver International Airport (DEN) **Panelist:** David Cardenas - Los Angeles International Airport

11:40 - 1:10PM ***~Lunch~ *Not Provided****

1:10 - 2:35PM *Top 10 Technologies Available for Physical Security*

2:35 - 2:50PM ***~ Break~***

2:50 - 3:50PM *Educational Panel Breakouts*

Session #8: Update on Ongoing Broadband Related Projects	**Moderator:** Cuong Luu - Office for Interoperability and Compatibility (OIC) **Panelist:** Andy Thiessen - Institute for Telecommunication Sciences (ITS) **Panelist:** Emil Olbrich - National Institute of Standards and Technology (NIST)
Session #9: Mobile Devices	**Moderator:** John Contestabile - Johns Hopkins University Applied Physics Laboratory (APL) **Panelist:** Tyrone Bekiares - Motorola Solutions **Panelist:** Doug Jones - Smith Micro Software, Inc.

3:50 - 4:05PM ***~ Break~***

4:05 - 4:20PM *Next Steps and Adjourn*