



Presentation to

**Transportation Security Technology Conference:  
Facilitation of International Cooperation on Technological  
Developments and Disseminations**

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Let me introduce myself - My name is Gianni Arcaini, and I'm the CEO of Duos Technologies, Inc., in Jacksonville, Florida.

On a very personal level, I'm pleased and honored to address you today.

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On September 11, 2001, America joined the large family of nations that have been exposed to homeland terrorism. We learned that unless we act preventively, a new wave of terrorism, potentially involving the world's most destructive weapons, looms in America's future. But this is not just an American problem.

As you know all too well, our enemies are vicious, hidden, and discrete. Today's terrorists can strike at any place, at any time, and with virtually any weapon.

However, September 11 has also energized our nation's brightest minds and has triggered an unprecedented flurry of developments of innovative security technologies.

That, ladies and gentlemen, is why we are here today – to talk about the status and direction of global security in general, and more specifically, transportation security - as it was, as it is now, and as it will be in the not too distant future.

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How important is our work? Let's think about the United States alone. Stretching from coast to coast are more than

- 4 million miles of highways
- 600,000 bridges
- 300,000 miles of freight rail lines and about
- 10,000 miles of commuter and light rail systems.
- Hundreds of tunnels
- Port facilities
- Waterways and
- Other transportation-related systems, all designed to expedite movement.

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The nation's products, once residing in warehouses, now are found in trucks, rail cars, and sea cargo containers.

The value of goods shipped each year totals nearly 8 trillion Dollars, with another 1.5 trillion Dollars added to the global economy from U.S. international cargo movement. Additionally, transportation accounts for 11% of the gross domestic product and 19% of family budgets, second only to spending on housing. Travel per capita, whether for business or pleasure, has increased by 50% over the past 18 years.

And, as goes America, so goes the rest of the world. Therefore, the significance of transportation to the world standard of living cannot be underestimated.

As we all know, acts of violence are already familiar territory for bus and rail transit authorities. Highly accessible, with large numbers of people concentrated in small spaces, these systems are tempting targets. And yet, world wide, only a fraction of the already limited funding allocated to security is set aside to secure critical rail infrastructure.

Duos Technologies' mission is to help secure our homeland and that of our friends across the globe. Our model is to provide sophisticated turn-key security systems for the protection of critical infrastructure.

More about Duos later – now, let's talk more about security.

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Once the security infrastructure came under scrutiny in recent years, it quickly became obvious that traditional security measures were inadequate and obsolete. Why?

- Traditional CCTV security requires significant personnel resources.
- Only one resource at a time has access to visuals. ([You certainly know the picture of one command and control operator trying to monitor a bank of monitors](#)).
- Information recording, processing, and subsequent decision making are typically performed unshared.
- Retrieval of video footage from traditional CCTV systems, showing relevant events is typically cumbersome and time consuming, and in most cases is only used for forensic purposes.

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Although most governments have recognized such inadequacies and technology developments have taken a quantum leap forward in the post 9/11 environment, our security infrastructure is still in its infancy, and the deployment of significant improvements have been widely limited by budget constraints and environmental permitting procedures.

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Allow me to speak about the significant technology improvements that have been introduced to market in recent years.

One of the most significant improvements within the security landscape is certainly the convergence of digitized sensing technologies, digitized voice and video using the Transmission Control Protocol and Internet Protocol, known as TCP/IP to distribute instantly real time information over local and wide-area networks, known in the industry as LAN and WAN. Use of all these technologies within security systems allows directing sensing, voice and video data to and from any place in the world over the internet. Most importantly, recent technology developments have made the use of sophisticated systems including the secure transmission of real-time information commercially affordable and by in large technically robust and reliable.

Today's homeland security technologies are usually bundled into Vision Alert Suites, combining

- High quality fixed and remotely controllable pan tilt zoom (PTZ) day/night cameras, as well as Infrared, and thermal video cameras,
- Programmable Logic Controllers (PLC),
- Intelligent Video software to process the live streaming video,
- Any combination of sensors and detectors for motion, impact, chemicals, biological agents, radiation, and explosives,
- Enhanced detection suite capabilities using Global Positioning Systems (GPS), Radio Frequency Identification (RFID), biometric, hydrophonic, radar, OCR, meteorological, and other such devices.

Such systems allow the establishment of virtual fence lines or security buffer zones within the field of view of any camera. The cameras function as intrusion detectors as well as providing live streaming video. Systems use Artificial Intelligence and proprietary algorithms to interpret scenes from multiple cameras and process the information into a user-friendly Graphic User Interface (GUI). As soon as a breach at any point of the virtual fence is detected, an audio alarm

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sounds at the command and control center, and the GUI screen graphic flashes to show the pickup camera and intrusion zone. PTZ cameras allow authorized personnel at any location connected to the LAN/WAN to view the surrounding area, zoom in on the breach, assess the situation, and if necessary mobilize law enforcement.

Rule based data management software provides multi-level management tools ranging from simply observing the scenes from the video cameras in real time, to operative interaction with system security features such as intrusion alarms and real time and archived video forensics, to complete system administration including setting rules, adding and removing users and user credentials.

Events are automatically digitally recorded, time stamped, and stored for later retrieval. A powerful video search engine (searchable by time, date, camera number, and location) allows easy retrieval of stored video files.

A software interface can be installed at a select number of locations (Federal Agencies and local Law Enforcement) to provide access to and display the live video and event data. The interface can include a variety of interactive features including direct communication with the system owner. The thought is to allow federal authorities to interact directly through this interface in the event of a threat.

A recent and highly significant addition to the security and monitoring arsenal is that of a real-time immersive visualization system which integrates information in a common coordinate system. Using this technology, the user can move in time and space, and as every live video and sensor meta-data is co-registered in the same environment, it is possible to move backward, forward, or jump to any recorded moment in time. Seamless transition from 3D virtual environment to live video and the ability to freely fly through a scene renders this application supremely intuitive and provides the impression of remote immersive tele-presence. Using PTZ cameras and automatic camera handover, the user can maintain continuous view of a target as long as it is in the coverage area.

Global features help manage data flow in a geospatial context, and permit users to navigate through and process mission critical real-time information from the globe level all the way down to street and camera/sensor feeds. Especially in situations where data overload is a pressing issue and there is a need to work in terrestrial zones, this technology helps the user by dividing information into priority sorted, custom configured, manageable portions.

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Creating exactly this genre of cutting edge security and monitoring solutions is Duos Technologies' mission. Duos Technologies is a privately owned corporation headquartered in Jacksonville, Florida. Since its inception in the early 90s, our company provides a broad variety of sophisticated, technology-based applications, advanced automated control systems, and intelligent security. With the need for a general hardening of security world-wide, Duos re-focused to develop and deploy intelligent security technologies including artificial intelligence integrated with actionable video surveillance solutions - very applicable to Homeland Security initiatives. Since then, the Company has specialized in the hardening of critical infrastructures with a main focus on the rail and transportation industries.

Recently, Duos was awarded a contract for the turn-key development of the first virtual rail corridor security system, known as the Washington D.C. Security Corridor with the official name "National Capital Region Rail Pilot Project" (NCRRPP).

I'd like to mention some of our unique, security technology solutions:

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### ***Praesidium™***

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The PRAESIDIUM™ sensor detection suite analyzes and processes incoming video and sensor feeds utilizing algorithms to detect specific activities and events for security and surveillance applications. The system is designed to simultaneously detect multiple events and to process each event in accordance with user-defined parameter settings, and creates cognitive information enabling decision makers to evaluate threats in real-time and collaborate using the same data. PRAESIDIUM™ allows both real-time local and remote monitoring using a customized browser-based interface. From simple installations to highly complex, richly sensed urban site setups, the PRAESIDIUM™ sensor detection suite provides the most advanced, accurate, and flexible video analysis available in the marketplace today.

Supported features include object detection, virtual tripwire, theft detection, abandoned object detection, congestion detection, automatic object tracking, multi-camera handover, object classification, and programmable multi-sensor behavioral logic. PRAESIDIUM™ comes with a sophisticated user interface that

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enables users to set zones, create custom logic, and manipulate system parameters.

PRAESIDIUM™ on a system level features automatic failure recovery, strong encryption, custom policy management, diverse alarm notification methodology, multi-type sensor support, low bandwidth requirements for remote video and sensor access, and months of archive capability.

Duos' proprietary video server, known as rvspro, uses mostly Dual processors. In addition, our latest version of software uses a video compression that reduces outbound bandwidth utilization to only 40 to 50Kps at a frame rate of 30fps.

### ***3D-IS (3D Immersive Surveillance)***

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3D-IS is a real-time immersive visualization system that integrates information in a common coordinate system. With 3D-IS, the user can move in time and space, and as every live video and sensor meta-data is co-registered in the same environment, it is possible to move backward, forward, or jump to any recorded moment in time. Seamless transition from 3D virtual environment to live video and the ability to freely fly through a scene renders this application supremely intuitive and provides the impression of remote immersive tele-presence. Using PTZ cameras and automatic camera handover, the user can maintain continuous view of a target as long as it is in the coverage area.

PRAESIDIUM™ and other vision algorithms can be plugged to 3D-IS to alert users of specific events, and 3D-IS is instrumental in obtaining visual verification of the event by a simple fly-through.

3D-IS Global Edition extends 3D-IS by adding features that help manage data flow in a geospatial context, and permits users to navigate through and process mission critical real-time information from the globe level all the way down to street and camera/sensor feeds. Especially in situations where data overload is a pressing issue and there is a need to work in terrestrial zones, 3D-IS GE helps the user by dividing information to priority sorted, custom configured, manageable portions.

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### **ICES™**

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The Intermodal Container Exit System (ICES)™ is a completely automated application for tracking and recording intermodal containers entering and exiting a yard. The core technology of the system is the Video Optical Character Recognition (VOCR) engine. ICES™ takes video imagery from moving containers, extracts relevant data (user defined), and populates a database with the extracted data.

Each transaction record contains imagery, audio, and data from multiple sources such as video/audio recording of the interaction between driver and security guard, video of front and rear license plates, video of container side and back panels depicting the container serial number, and a scanned image of the driver's license and ticket. The serial numbers of the containers, license plates and driver's license (image and data) are extracted via a sophisticated TCR/VOCR (text character reader/video optical character reader) licensed for each location/yard. Imagery, video clips, voice recording, and extracted data are recorded into a database (SQL), and a powerful search engine allows retrieval of data by any criteria available in the database. Data can also be retrieved from a remote location.

Supported features include proximity sensors, side capture camera activation, video optical character recognition (VOCR) software, license plate / bill of lading / manifest scanning, security guard / driver recording, biometric finger print scanning, and electronic messaging board support.

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Ok, so what about the future?

- Increasingly complex algorithms require enormous processing power not readily available in traditional processors. The consequence is that most products on the market limit the number of cameras that can be used per server to one or two depending on the number of features turned on simultaneously.
- PCs with Quad processors should come to market very shortly.
- Better compression codec will decrease bandwidth utilization even further allowing for improved video quality using even cheaper data services including palm pilots and cell phones.

Many technology improvements will be geared towards increasing the amount of intuitive information presented to operators and first responders. For example,

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Duos' object identification modules now include an estimate of real-life object size which is calibrated to the actual field of view. An operator no longer has to guess the size of an object or person and can use the dimensional data to further narrow down the threat analyses.

As thermal imaging devices become more affordable, you will increasingly see a combination of different types of cameras bundled into one analysis software, further improving the resolution of data points and consequently the quality of threat analyses presented instantaneously to operators and first responders.

Going out a little further, I believe the solution dear to the hearts of all who serve and protect is the developing technology of Face Recognition. Presently, Face Recognition is limited to access points and entirely dependent upon optimum viewing lens angle, best possible resolution and many more factors. Of course, it is easy for a person to defeat this technology at its present level using simple disguise techniques, making the scanning of faces in a crowd even less reliable. Still, this technology continues to develop and improve, and has potential of becoming a new powerful tool in the near future.

Next on the wish list is Retinal Scanning and Tracking. The same comments apply to this technology as to Face Recognition, only Retinal Scanning and Tracking is not as far along in terms of development.

I personally would favor the implant of microchips in all humans at birth. It would save humanity trillions of Dollars and would be extremely useful in many aspects of life. I know that this raises the specter of vanishing personal freedoms that Americans are, at least at this time, unwilling to consider.

I think that the real future of security and monitoring lies in development of our ability to capture and recognize a person's unique aura, or body "footprint", if you will. Through this medium (no pun intended) a snapshot of anyone, anywhere, could be retrieved and compared. Granted, today this is a parlor trick, but in the future it will be as reliable as DNA.

As the technology of the future rapidly unfolds, Duos is committed to design, refine, and implement comprehensive turn-key technology-based solutions that represent a high return on investment to our customers.

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We have reached the end of my message. I would like to personally thank Mr. Kazuhiko Kanazashi and the Japan International Transport Institute for allowing me this opportunity to speak. If you have any questions, or if

you would like Duos Technologies to recommend specific solution for your company, please stop and chat after the program has completed.

Thank you all for listening.