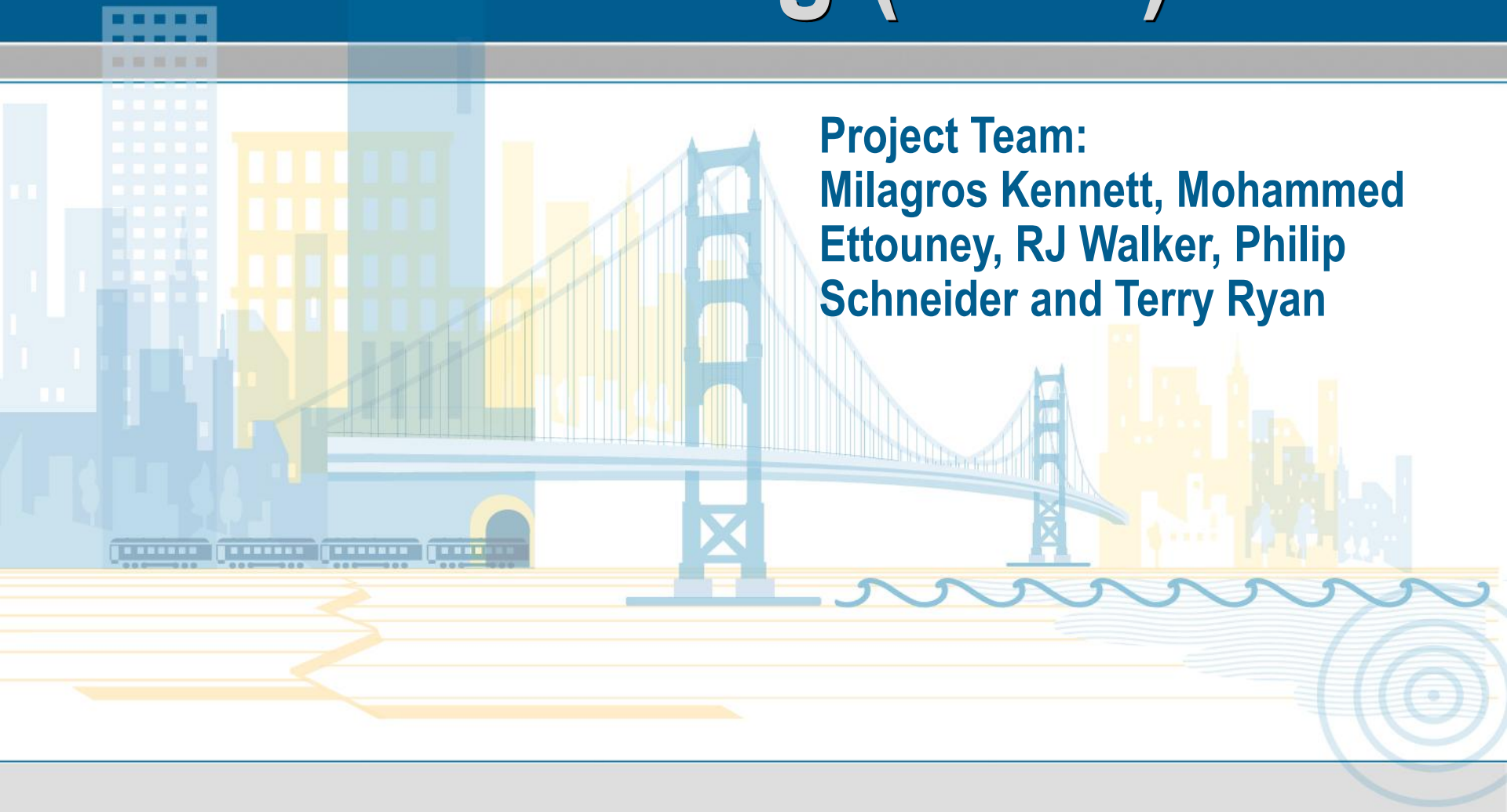


# Integrated Rapid Visual Screening (IRVS)

**Project Team:  
Milagros Kennett, Mohammed  
Ettouney, RJ Walker, Philip  
Schneider and Terry Ryan**



# IRVS Definition and Objectives

- Designed to prepare rapid but comprehensive assessments
- A simple, quick, and reliable tool for obtaining a preliminary risk assessment rating
- Reliability depends on time devoted to collection of information and field inspections
- Can support other more thorough assessments
- Expected to save millions of dollars to federal, state, local government, and private sector
- An all hazard approach
- Computes risk and resilience providing scores and ratings
- Flexible methodology based on dictionaries and scores which are easy to adapt to institutional needs

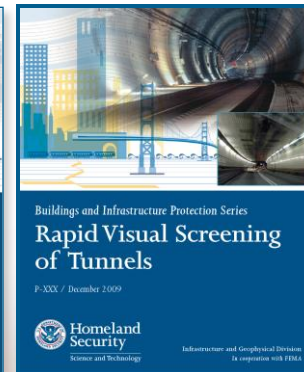
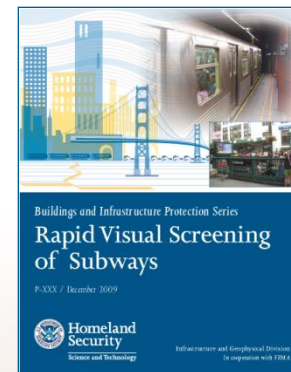
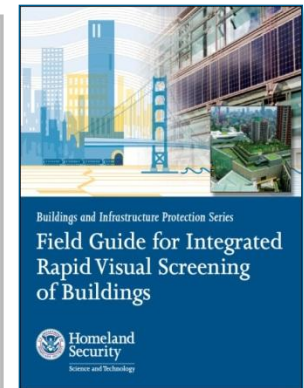
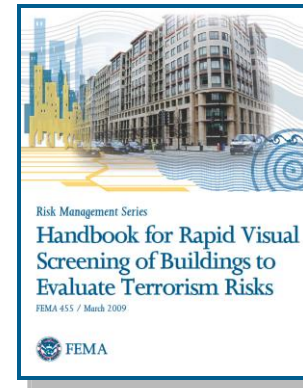


**Homeland  
Security**

Science and Technology

# IRVS Family

- First IRVS generation was deployed in 2008 and has been extensively used
- Second IRVS generation for buildings has been tested in Arlington, Albany, NYC, DC, LA, and Charleston
- Large numbers of federal, state, local governments, law enforcement agencies, and private sector have been involved in the IRVS validation process
- Currently working with the FPS for training and potential adoption
- In coordination with TSA, IRVS for Mass Transit Stations and Tunnels were tested in Boston, Cleveland, St. Louis. IRVS is extensively used by TSA (official release: June 30, 2011)
- With the support of the NYC Port of Authority NYC subways stations were assessed and tested for validation



**Homeland  
Security**

Science and Technology

# IRVS Analytical Background

- **Methodology:** Knowledge is embedded in the tool. Major tool interactions are automatically calculated. Pre assigned weights, interaction logic, and context-based algorithms based on knowledge and tool validations
- **Risk:** Deals with target attractiveness for manmade hazards. For natural hazards, it uses probability of occurrence. Risk is calculated as follows:  $R = C \times T \times V$
- **Resilience:** Computes robustness (R1), resourcefulness (R2), and recovery (R3) using information such as hardening, training, and redundancies. Resilience is calculated as follows: Resilience =  $R1 \times R2 \times R3$



**Homeland  
Security**

Science and Technology

# IRVS and Undesirable Events

- **Man Made Hazards (ISC)**
- CBR Releases (internal and external)
- Explosive Attacks
- Arson
- Ballistic Attacks
- **Natural Hazards**
- Earthquakes
- Floods
- Winds
- Fire

Crime Statistics  
to be added late  
summer!



**Homeland  
Security**

Science and Technology





# IRVS Key Elements

- Designed to reflect DHS 18 Sectors
- Assessments only take a few hours to complete
- Designed to be conducted by 1 or 2 screeners
- Assessors require limited expertise
- Experts can be reserved for more detailed assessments



**Homeland  
Security**

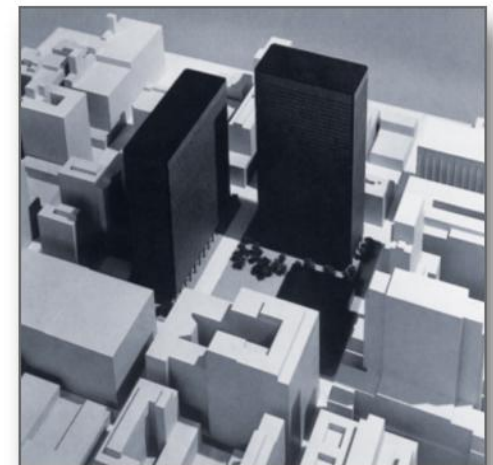
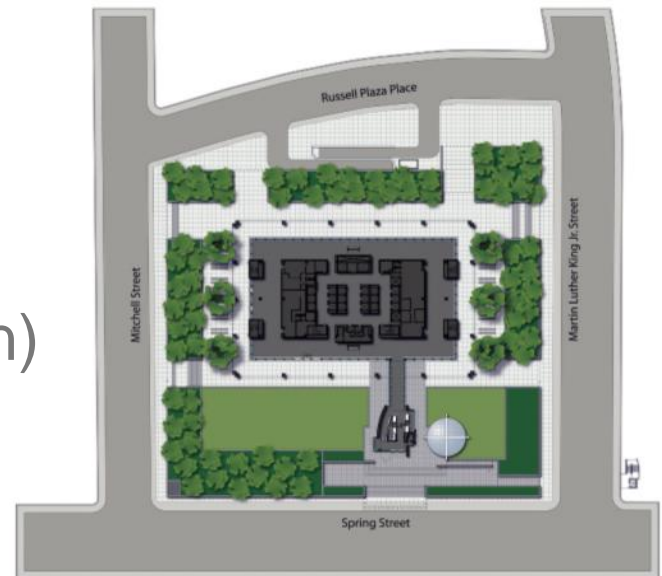
Science and Technology

## Assessments are applicable to:

- A particular building
- A group or cluster of buildings
- Buildings situated in different geographic locales (city, region, nation)

## Assessments are based on building features that can be observed during a visual inspection including:

- Building perimeter
- Building enclosure
- Selected interior areas



**Homeland  
Security**

Science and Technology

# IRVS Audience and Users

- City, County, and State Officials
- Emergency Managers
- Law Enforcement Agencies
- Lenders
- Insurers
- Building Owners/Operators
- Facility Managers
- Security Consultants
- Engineers, Architects and other design professionals



**Homeland  
Security**

Science and Technology

# Overall Benefits of the Tool

- Flexible and adaptable to the needs and requirements of government agencies
- Allows individual facility assessments to be customized to specific protection strategies
- Allows the prioritization of inventories of facilities based on resilience and resource allocation
- Dramatic reductions in facility assessment costs, time, and expertise constraints
- Provides a systematic and standard assessment methodology that can provide a new delivery process among agencies




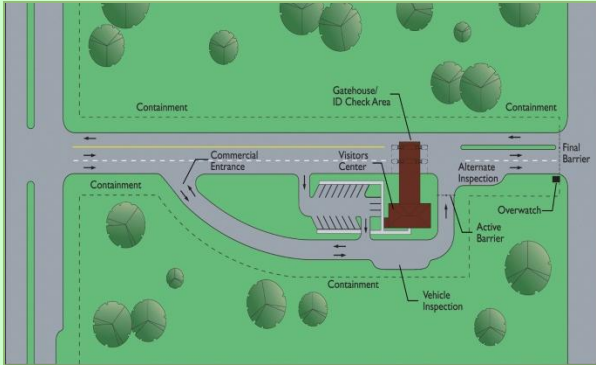
**Homeland  
Security**

Science and Technology


# IRVS Methodology

Risk and Resiliency Summary																				
RVS Building/Facility: <input type="text" value="Demo of Bldg 1"/>					Scales															
Facility ID#: <input type="text" value="0001"/>					Scores and Color Mapping															
Assessment Date: <input type="text" value="2/2/2002"/>					<table border="1"> <tr> <td>Risk Color Scale</td> <td>0-30</td> <td>30-50</td> <td>50-70</td> <td>70-100</td> </tr> <tr> <td>Resiliency Color Scale</td> <td>100-70</td> <td>70-50</td> <td>50-30</td> <td>30-0</td> </tr> </table>						Risk Color Scale	0-30	30-50	50-70	70-100	Resiliency Color Scale	100-70	70-50	50-30	30-0
Risk Color Scale	0-30	30-50	50-70	70-100																
Resiliency Color Scale	100-70	70-50	50-30	30-0																
Site Type: <input type="text" value="Building"/>																				
Summary Categories	Internal Intrusion	Internal Explosive	Internal CBR	Explosive Zone 1	Explosive Zone 2	Explosive Zone 3	CBR Zone 1	CBR Zone 2	CBR Zone 3											
Total Consequences (%)	66.83%	59.61%	57.91%	61.97%	59.33%	69.13%	57.41%	61.75%	65.10%											
Total Threat (%)	27.18%	66.34%	62.83%	85.34%	58.67%	49.69%	84.00%	71.16%	53.30%											
Total Vulnerabilities (%)	8.92%	61.04%	61.62%	56.01%	57.28%	57.10%	57.42%	56.99%	60.93%											
Total Risk Percent (%)	25.30%	62.26%	60.75%	66.66%	58.42%	58.10%	65.18%	63.03%	59.57%											
Summary Categories	Earthquake General Shaking	Earthquake Ground Failure	Flood Stillwater	Flood Velocity Surge	Wind Hurricane	Wind Tornado	Wind Other	Landslide Rainfall	Fire From Earthquake	Fire From Blast	Fire From Arson									
Total Consequences (%)	61.31%	59.45%	61.04%	59.50%	61.30%	61.97%	61.33%	61.47%	61.15%	63.67%	62.90%									
Total Threat (%)	0.00%	0.00%	77.76%	78.22%	54.31%	48.44%	52.10%	62.05%	0.00%	67.89%	29.80%									
Total Vulnerabilities (%)	30.30%	35.30%	35.34%	41.30%	42.99%	38.99%	39.50%	33.16%	2.04%	3.19%	3.12%									
Total Risk Percent (%)	0.00%	0.00%	55.15%	57.71%	52.31%	48.92%	50.16%	50.19%	0.00%	23.97%	18.02%									
Resiliency Scales (%)					Multihazards Interaction Matrix															
Performance Measure	Time Measure	Robustness Measure	Resourcefulness Measure	Recovery Measure	... will result in this change for other hazards:															
48.6%	47.3%	43.4%	48.6%	49.3%	a change in:	Blast	CBR	Seismic	Flood	Wind	Fire									
					a change in Blast	100.0%	9.3%	33.0%	9.7%	47.5%	22.6%									
					a change in CBR	12.7%	100.0%	0.0%	16.8%	1.2%	5.2%									
					a change in Seismic	55.5%	0.0%	100.0%	35.9%	50.7%	16.3%									
					a change in Flood	7.5%	9.6%	16.7%	100.0%	8.8%	10.2%									
					a change in Wind	68.2%	1.3%	43.3%	16.3%	100.0%	16.1%									
					a change in Fire	83.2%	14.1%	35.7%	48.4%	41.5%	100.0%									
Total Risk All Scenarios (%)					Record: 1 of 6															
60.88%					No Filter Search															
Resiliency (%)					Print															
23%					Close															


# RVS Dictionaries - Buildings

Consequences	Threat Rating	Vulnerability
<ul style="list-style-type: none"> <li>• Locality Type</li> <li>• Number of Occupants</li> <li>• Replacement Value</li> <li>• On Historic Registry</li> <li>• Business Continuity</li> <li>• Physical Loss Impact</li> </ul> 	<ul style="list-style-type: none"> <li>• Occupancy Use</li> <li>• Number of Occupants</li> <li>• Site Population Density</li> <li>• Visibility/Symbolic Value</li> <li>• Target Density</li> <li>• Overall Site Accessibility</li> <li>• Target Potential</li> </ul>	<ul style="list-style-type: none"> <li>• Site</li> <li>• Architecture</li> <li>• Building Envelope</li> <li>• Structural Components and Systems</li> <li>• Mechanical/Electrical/Plumbing (MEP) Systems</li> <li>• Security</li> </ul> 

# RVS Dictionaries – Mass Transit

Consequences	Threat Rating	Vulnerability
<ul style="list-style-type: none"> <li>• Number of Tracks/Subway Lines</li> <li>• Number of Station Levels</li> <li>• Impact of Physical Loss</li> <li>• Number of Riders per day</li> <li>• Commercial, and Industrial Facilities</li> <li>• Adjacent Stations</li> <li>• Adjacent Critical Infrastructure</li> <li>• Social Effect of Loss</li> <li>• Replacement Value</li> <li>• Operational Redundancy</li> <li>• Function Criticality</li> </ul>	<ul style="list-style-type: none"> <li>• Visibility</li> <li>• Historic Nature/Landmark Status</li> <li>• Number of Riders per day</li> <li>• Previous Threats</li> <li>• Accessibility</li> <li>• Elevation</li> <li>• Site Locality</li> <li>• Adjacent Critical Infrastructure</li> <li>• Function Criticality</li> <li>• Storage Use</li> </ul>	<ul style="list-style-type: none"> <li>• Site</li> <li>• Architectural</li> <li>• Structural</li> <li>• Ventilation (including HVAC)</li> <li>• Fire Systems</li> <li>• Operations (including power supply, lighting, etc.)</li> <li>• Non-Structural</li> <li>• Physical Security</li> </ul> 

# RVS Dictionaries - Tunnels

Consequences	Threat Rating	Vulnerability
<ul style="list-style-type: none"> <li>• Impact of Physical Loss</li> <li>• Number of Vehicles/Trains per Day</li> <li>• Nearby Commercial Facilities</li> <li>• Adjacent Critical Infrastructure</li> <li>• Social Effect of Loss</li> <li>• Replacement Value</li> <li>• Operational Redundancy</li> <li>• Function Criticality</li> </ul>	<ul style="list-style-type: none"> <li>• Visibility</li> <li>• Historic Nature</li> <li>• Number of Vehicles/Trains per day</li> <li>• Previous Threats</li> <li>• Accessibility</li> <li>• Elevation</li> <li>• Site Locality</li> <li>• Adjacent Critical Infrastructure</li> <li>• Function Criticality</li> </ul>	<ul style="list-style-type: none"> <li>• Site</li> <li>• Architectural</li> <li>• Structural</li> <li>• Ventilation (including HVAC)</li> <li>• Fire Systems</li> <li>• Operations (including power supply, lighting, etc.)</li> <li>• Non-Structural</li> <li>• Physical Security</li> </ul> 

# Questions?



**Homeland  
Security**

Science and Technology