TechTalk

U.S. Antiterrorism Design Standards and Lessons Learned in Europe

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U.S. Army Europe, G-3/4 Protect

PDHs available: 1 (provided to you by SAME)
Purpose

• Educate civil engineers unfamiliar with antiterrorism (AT) design considerations on the Department of Defense’s (DoD’s) methodology
• Learning Objectives

- Identify sources of AT design requirements and determine applicability for DoD buildings

- Establish protection performance thresholds by applying the security engineering methodology and seven steps of UFC 4-020-01

- Develop facility design features that satisfy the 21 AT design standards of UFC 4-010-01

- Design effective AT solutions through utilization of trends and lessons learned across Europe
Agenda

- Reason for AT Design
- AT Requirement Sources
- Threat Analysis
- Minimum AT Standards
- Additional Requirement Sources
- Additional Considerations
- Trends & Application
- Engineer Resources
Reason for AT Design
Reason for AT Design

Since 2013, there have been 179 ISIS-linked incidents in 16 countries.

Most notably, there have been 48 incidents in France, 40 incidents in the U.K., and 30 incidents in Germany.
Reason for AT Design

**THE PERSISTENT TERROR THREAT TO AMERICA**

Homegrown jihadist cases include plots to attack, overseas travel, financial support, lying to authorities, and weapons charges

- 145 homegrown jihadist cases in **29 states** since 2013
- 17 of these cases have been in 2017 alone

U.S. Army Europe (USAREUR) AT Mission

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- 100,000 U.S. personnel
- $10.2 billion in assets
- $245 million construction / year
  - AT Design Considerations

Garrisons in Europe:
- Germany
- Netherlands
- Belgium
- Luxembourg
- Italy
- Vienna
- Brussels
Reason for AT Design

• Increasing interest by private sector

BancFirst

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### Reason for AT Design, History

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Method</th>
<th>Killed</th>
<th>Injured</th>
<th>Lesson</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983</td>
<td>Beirut Barracks</td>
<td>VBEIDs 7k kg/15k lb</td>
<td>307</td>
<td>75</td>
<td>Standoff &amp; barriers</td>
</tr>
<tr>
<td>1993</td>
<td>WTC</td>
<td>VBIED 606 kg/1,336 lb</td>
<td>6</td>
<td>1042</td>
<td>Underground parking</td>
</tr>
<tr>
<td>1995</td>
<td>Murrah Federal Building, OKC</td>
<td>VBIED at 15 ft. 2,000 kg/4,800 lb</td>
<td>168</td>
<td>258</td>
<td>Progressive collapse</td>
</tr>
<tr>
<td>1996</td>
<td>Khobar Towers, Saudi Arabia</td>
<td>VBIED at 72 ft. 11,000 kg/25,000 lb</td>
<td>20</td>
<td>498</td>
<td>AT Design Codes and MWN</td>
</tr>
<tr>
<td>2001</td>
<td>WTC</td>
<td>Aircraft</td>
<td>2,996</td>
<td>6,000+</td>
<td>Emergency management</td>
</tr>
<tr>
<td>2008</td>
<td>Mumbai (12)</td>
<td>Firearms and IEDs</td>
<td>166</td>
<td>308</td>
<td>Coordinated attacks</td>
</tr>
<tr>
<td>2014</td>
<td>Peshawar Army Public School</td>
<td>Firearms</td>
<td>141</td>
<td>114</td>
<td>Children (132)</td>
</tr>
<tr>
<td>2017</td>
<td>OKC, BancFirst</td>
<td>VBIED 453 kg/1000 lb</td>
<td>0</td>
<td>0</td>
<td>Persistent tactics</td>
</tr>
</tbody>
</table>
• Evolution of DoD AT Requirements
  - 1999: Interim after Khobar findings
  - 2002: First version of UFC 4-010-01
  - 2003: Standoff per 25 m & 45 m
  - 2007: Minor changes
  - 2012: Standoff per bldg. materials
  - 2013: Minor changes
Reason for AT Design, Intent

- **Intent**
  - Minimize mass casualties

- **Standardization**
  - Reduce *subjectivity* for reasonable and *justifiable* levels of threat and protection

“While baseline threats are less than some of the terrorist attacks that have been directed against US personnel in the past, they represent more severe threats than a majority of historical attacks. It would be *cost prohibitive* to provide protection against the worst case scenario in every building” - DoDEA
AT Requirement Sources

- **DoD Facilities**
  - Unified Facilities Criteria (UFC)
    - UFC 4-010-01 & 02 DoD Minimum Antiterrorism Standards for Buildings
    - UFC 4-010-03 Security Measures for High-Risk Personnel
    - UFC 4-020-02 DoD Security Engineering Facilities Design Manual
    - UFC 4-021-01 Mass Notification Systems
    - UFC 4-022-01 Access Control Points
    - UFC 4-022-02 Selection of Vehicle Barriers
  - Theater and Agency Supplements
    - U.S. European Command AT Operation Order 16-03
    - U.S. Central Command AT Operations Order 05-02
    - Army Europe Regulation 525-13 Antiterrorism
    - IMCOM-Europe Guidelines for Offices
    - DoDEA, Physical Security & Antiterrorism Guide
    - NATO ACO Directive 80-25 Force Protection
    - Army Standard for Access Control Points, April 2012
Threat and Protection Thresholds
UFC 4-020-01
Threat Analysis

  - Chapter 3 describes steps to perform threat analysis
  - Risk-asset management to establish protection thresholds
  - Chapter 4 describes design strategies
  - Appendixes list cost impacts
Threat Analysis

- UFC 4-020-01 Chapter 3, Design Criteria Development
  - Risk is function of criticality, threat, and vulnerability
  - Step 1: Convene the planning team
  - Step 2: Identify assets
  - Step 3: Determine asset value
  - Step 4: Identify aggressor likelihoods
  - Step 5: Identify tactics and threat severity levels
  - Step 6: Consolidate into initial design basis threat (DBT)
  - Step 7: Determine initial level of protection (LOP)
  - Step 8: Determine planning risk levels
  - Step 9: Assess acceptability of risk levels
  - Step 10: Identify user constraints
Threat Analysis

- UFC 4-020-01 Chapter 3, Design Criteria Development
  - Step 1: Convene the planning team
    - Engineer(s)
    - Facility User(s)
    - Intelligence
    - Etc.
**Threat Analysis**

- **UFC 4-020-01 Chapter 3, Design Criteria Development**
  - Step 2: **Identify assets**

### Design Criteria Summary Worksheet

<table>
<thead>
<tr>
<th>Building/Project</th>
<th>Analyst</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tactics</th>
<th>Explosive and Incendiary Devices</th>
<th>Standoff Weapons</th>
<th>Entry Tactics</th>
<th>Surveillance and Eavesdropping</th>
<th>Contamination</th>
<th>Waterfront</th>
</tr>
</thead>
<tbody>
<tr>
<td>DST</td>
<td>LOP</td>
<td>LOP</td>
<td>LOP</td>
<td>LOP</td>
<td>LOP</td>
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<td>LOP</td>
</tr>
<tr>
<td>DST</td>
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<td>LOP</td>
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<td>LOP</td>
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<tr>
<td>DST</td>
<td>LOP</td>
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<td>LOP</td>
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</tr>
<tr>
<td>DST</td>
<td>LOP</td>
<td>LOP</td>
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<td>LOP</td>
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<td>LOP</td>
<td>LOP</td>
<td>LOP</td>
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<tr>
<td>DST</td>
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<td>LOP</td>
<td>LOP</td>
<td>LOP</td>
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<td>LOP</td>
<td>LOP</td>
<td>LOP</td>
</tr>
<tr>
<td>DST</td>
<td>LOP</td>
<td>LOP</td>
<td>LOP</td>
<td>LOP</td>
<td>LOP</td>
<td>LOP</td>
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<tr>
<td>LOP</td>
<td>LOP</td>
<td>LOP</td>
<td>LOP</td>
<td>LOP</td>
<td>LOP</td>
<td>LOP</td>
</tr>
</tbody>
</table>

**General Population**

**Mission Critical PAX**
• UFC 4-020-01 Chapter 3, Design Criteria Development
  - Step 3: Determine **asset value**
  - **Work through a series of tables to compute**
    - Table 3-4. Criticality to User / **Mission Impact** / Population Type
    - Table 3-5. Impact on National Defense
    - Table 3-6. **Asset Replacement**
    - Table 3-7. Perceived Political Sensitivity
    - Table 3-8. **Relative Value to User**
### Table 3-8. Relative Value to User

<table>
<thead>
<tr>
<th>Asset Type</th>
<th>Measure of Relative Value</th>
<th>Relative Value</th>
<th>Value Rating Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Population</td>
<td>Number of people present in facility</td>
<td>Number of people in the facility is less than 11</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of people in the facility is 11 to 49</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of people in the facility is 50 to 100</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of people in the facility is 101 to 500</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of people in the facility is 501 to 1000</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of people in the facility is greater than 1000</td>
<td>5</td>
</tr>
</tbody>
</table>
### Table 3-28. Applicable Levels of Protection

<table>
<thead>
<tr>
<th>Tactic</th>
<th>Threat Severity Level</th>
<th>≤ 0.5 - 0.74</th>
<th>0.51 - 0.74</th>
<th>0.75 - 0.85</th>
<th>0.86 - 0.95</th>
<th>0.96 - 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moving Vehicle Bomb</td>
<td>All</td>
<td>Very Low(^1)</td>
<td>Low(^2)</td>
<td>Medium</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Stationary Vehicle Bomb</td>
<td>All</td>
<td>Very Low(^1)</td>
<td>Low(^2)</td>
<td>Medium</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Hand Delivered Devices</td>
<td>All</td>
<td>Very Low(^1)</td>
<td>Low(^2)</td>
<td>Medium(^3)</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Indirect Fire weapons</td>
<td>All</td>
<td>Very Low(^1)</td>
<td>Low(^2)</td>
<td>Medium</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Direct Fire Weapons</td>
<td>VH</td>
<td>Very Low(^1)</td>
<td>Low(^2)</td>
<td>High</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>L, M, H</td>
<td>Very Low(^1)</td>
<td>Low(^2)</td>
<td>High</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forced Entry</td>
<td>All</td>
<td>Very Low(^1)</td>
<td>Low(^2)</td>
<td>Medium</td>
<td>High</td>
<td>Very High</td>
</tr>
<tr>
<td>Covert Entry</td>
<td></td>
<td>Low(^2)</td>
<td>Low(^2)</td>
<td>Medium</td>
<td>High</td>
<td>Very High</td>
</tr>
<tr>
<td>Visual Surveillance</td>
<td></td>
<td>Low(^2)</td>
<td>Low(^2)</td>
<td>Medium(^3)</td>
<td>High</td>
<td>Very High</td>
</tr>
<tr>
<td>Acoustic Eavesdropping</td>
<td></td>
<td>Low(^2)</td>
<td>Low(^2)</td>
<td>Medium</td>
<td>High</td>
<td>Very High</td>
</tr>
<tr>
<td>Electronic Emanations</td>
<td></td>
<td>Low(^2)</td>
<td>Low(^2)</td>
<td>Medium(^3)</td>
<td>High</td>
<td>Very High</td>
</tr>
<tr>
<td>Eavesdropping</td>
<td></td>
<td>Low(^2)</td>
<td>Low(^2)</td>
<td>Medium</td>
<td>High</td>
<td>Very High</td>
</tr>
<tr>
<td>Airborne Contaminants</td>
<td>All</td>
<td>Very Low(^1)</td>
<td>Low(^2)</td>
<td>Medium</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Waterborne Contaminants</td>
<td></td>
<td>Very Low(^1)</td>
<td>Low(^2)</td>
<td>Medium</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Waterfront Attack</td>
<td></td>
<td>Very Low(^1)</td>
<td>Low(^2)</td>
<td>Medium(^3)</td>
<td>High</td>
<td>Very High</td>
</tr>
</tbody>
</table>
**Threat Analysis, Protection Parameters**

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**U.S. Antiterrorism Design Standards**

**and Lessons Learned from Europe**

**Scott Turygan, P.E.**

**U.S. Army Europe**

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**Level of Protection**
- **Below AT standards:** Severe damage, Progressive collapse likely. Space in and around damaged area will be unusable.
- **Very Low:** Heavy damage - Great structural collapse, but progressive collapse is unlikely. Space in and around damaged area will be unusable.
- **Low:** Moderate damage - Building damage will not be economically repairable. Progressive collapse will not occur. Space in and around damaged area will be unusable.
- **Medium:** Minor damage - Building damage will be economically repairable. Space in and around damaged area can be used and will be fully functional after cleanup and repairs.
- **High:** Minimal damage. No permanent deformations. The facility will be immediately operable.

**Potential Building Damage/Performance**
- Windows will fail catastrophically and result in internal hazards. (High hazard rating)
- Doors will be thrown into rooms. (Category V)
- Glazing will fracture, come out of the frame, and is likely to be propelled into the building, with potential to cause serious injuries. (Low hazard rating)
- Doors will become dislodged from the structure but will not create a flying debris hazard. (Category IV)
- Glazing will fracture, remain in the frame and result in minimal hazard consisting of glass dust and slivers. (Minimal hazard and No hazard ratings)

**Potential Door and Glazing Hazards**
- Majority of personnel in damaged area suffer serious injuries with a potential for fatalities. Personnel in areas outside damaged area will experience minor to moderate injuries.
- Majority of personnel in damaged area suffer minor to moderate injuries with the potential for a few serious injuries, but fatalities are unlikely. Personnel in areas outside damaged areas will potentially experience minor to moderate injuries.
- Personnel in damaged area potentially suffer minor to moderate injuries, but fatalities are unlikely. Personnel in areas outside damaged areas will potentially experience superficial injuries.

**Potential Injury**
- **Building:** minor damage, repairable
- **Glazing:** fracture, but remain in frame
- **Human:** injuries but fatalities unlikely

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- **Medium LOP to blast event**
  - **Building:** minor damage, repairable
  - **Glazing:** fracture, but remain in frame
  - **Human:** injuries but fatalities unlikely
• UFC 4-020-01 Chapter 3, Design Criteria Development
  - Step 4: Identify aggressor likelihoods
  - Work through another series of tables to compute
    - Table 3-10. Asset Location
    - Table 3-11. Installation or Facility Publicity Profile
    - Table 3.12 Asset Accessibility
    - Table 3-13. Asset Availability
    - Table 3-14. Asset Dynamics
    - Table 3-15. Recognizability
    - Table 3-16. Relative Value to Aggressors
    - Table 3-17. Law Enforcement Personnel Visibility
    - Table 3-18. Aggressors’ Perception of Success
    - Table 3-19. Threat Level
    - Table 3-20. History of Acts Against Like Assets / Terrorist Intention
    - Table 3-21. Terrorist Operational Capability
    - Table 3-22. Terrorist Operating Environment
    - Table 3-23. Terrorist Activity
### Table 3.12  Asset Accessibility

<table>
<thead>
<tr>
<th>Asset Location and Access Controls</th>
<th>Likelihood Rating Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>The facility in which or at which the asset is located is on a closed military installation or government compound, to which access is controlled, the facility is in a separate access controlled compound interior of the installation, and there are no direct lines of sight to the facility from outside the installation</td>
<td>0</td>
</tr>
<tr>
<td>The facility in which or at which the asset is located is on a closed military installation or government compound to which access is controlled and the facility is in the interior of the installation</td>
<td>2</td>
</tr>
<tr>
<td>The facility in which or at which the asset is located is on a closed military installation or government compound to which access is controlled and the facility is within 100 meters of the installation perimeter</td>
<td>4</td>
</tr>
<tr>
<td>The facility in which or at which the asset is located is on an open military installation or government compound to which access is not controlled and the facility is in the interior of the installation</td>
<td>6</td>
</tr>
<tr>
<td>The facility in which or at which the asset is located is on an open military installation or government compound to which access is not controlled and the facility is within 100 meters of the installation perimeter</td>
<td>8</td>
</tr>
<tr>
<td>The facility in which or at which the asset is located is not on a military installation or government compound</td>
<td>10</td>
</tr>
</tbody>
</table>
## Threat Analysis, Example Worksheet

### Asset Value/Aggressor Likelihood Worksheet

<table>
<thead>
<tr>
<th>Project/Building</th>
<th>Asset Type: Vehicles</th>
<th>Aggressor</th>
<th>Value Rating Factor</th>
<th>Likelihood Rating Factor</th>
<th>Score (Value x Likelihood)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.64</td>
</tr>
</tbody>
</table>

1. Population Type: Applies to General Population only
2. Risk of Value/Likelihood: 10% for Real Estate
3. For General Population, 10% for National Infrastructure and Operations, 20% for all other sectors
4. For mission-related assets, if the mission-related asset is not mission-related, apply
5. This is based on the data for all aggressors in the region
6. Applies to all aggressors
7. Applies to terrorism only
8. Sum of Likelihood Ratings = 80
### Threat Analysis, Example Worksheet

#### TACTICS, THREAT SEVERITY, AND LEVEL OF PROTECTION WORKSHEET

<table>
<thead>
<tr>
<th>Project: Building</th>
<th>Asset: Tactical Vehicles</th>
<th>Asset: Main Post</th>
<th>Analyst: Jamie G. Planner</th>
<th>Date: 4 August 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Declared Value 6.76</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Tactics**: Vandalism, Overhead, Infiltration, Direct Attack

**Threats**
- Unattended Weapons: .92
- Infiltration: .81
- Organized Criminal Groups: .84
- Vandalism: .84
- Extremist/Extremists: .67
- Economic Terrorism: .67
- International Terrorism: .66
- State Sponsored Terrorism: .72
- Saboteurs: .51
- Foreign Intelligence Services: .51

**Level of Protection**
- Initial Design: High Severity Level for Office
- Initial Level of Protection for Applicable Tactic: M

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**Applicable Tactics**
- Vandalism: ✔
- Overhead: ✔
- Infiltration: ✔
- Direct Attack: ✔
- Declared Value: ✔

---

**Level of Protection**
- Initial Design: High Severity Level for Office
- Initial Level of Protection for Applicable Tactic: M
Threat Analysis, Threat Parameters

Table 3-27  Threat Parameters

<table>
<thead>
<tr>
<th>Aggressor Tactic</th>
<th>Design Basis Threat</th>
<th>Weapons</th>
<th>Tools Or Delivery Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moving and Stationary Vehicle Devices</td>
<td>Special Case</td>
<td>9000 kg (19,800 lbs) TNT</td>
<td>18,000 kg / ~40,000 lbs truck</td>
</tr>
<tr>
<td>Very High</td>
<td>2000 kg (4400 lbs) TNT, Fuel</td>
<td>7000 kg / ~15,000 lbs truck</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>500 kg (1100 lbs) TNT, Fuel</td>
<td>2500 kg / ~5500 lbs truck</td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>750 kg (1550 lbs) TNT, Fuel</td>
<td>1500 kg / ~4000 lbs truck</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>100 kg (220 lbs) TNT</td>
<td>1800 kg / ~4000 lbs truck</td>
<td></td>
</tr>
<tr>
<td>Very Low</td>
<td>25 kg (55 lbs) TNT</td>
<td>1800 kg / ~4000 lbs truck</td>
<td></td>
</tr>
<tr>
<td>Hand Delivered Devices</td>
<td>High</td>
<td>IID, IED (up to 25 kg/55 lbs TNT) &amp; hand grenades (Mail bomb limited to 1 kg/2.2 lbs TNT)</td>
<td>None</td>
</tr>
<tr>
<td>Medium</td>
<td>IID, IED (up to 1 kg/2.2 lbs TNT) &amp; hand grenades</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>IID</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Indirect Fire Weapons Attack</td>
<td>Very High</td>
<td>Improvised mortar (up to 20 kg/44 lbs TNT)</td>
<td>None</td>
</tr>
<tr>
<td>High</td>
<td>122 mm rocket</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>82 mm mortar</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>Incendiary devices</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Direct Fire Weapons Attack</td>
<td>Very High</td>
<td>Light antitank weapons, and UL 752 Level 10 (12.7 mm (0.50 caliber), 1 shot)</td>
<td>None</td>
</tr>
<tr>
<td>High</td>
<td>UL 752 Level 9 (7.62mm NATO AP, 1 shot)</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>UL 752 Level 3 (7.62mm NATO ball)</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>UL 752 Level 3 (.44 magnum)</td>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>
Threat Analysis, Protection Parameters

• **UFC 4-020-01 Chapter 4, Design Strategies**
  - Vehicle bomb tactics (stationary & moving)
  - Hand delivered devices
  - Indirect fire weapons
  - **Direct fire weapons**
    - Low LOP: block sightlines
    - High LOP: harden building elements (e.g. 4” RC for 7.62mm)
  - Airborne contamination tactic
  - Waterborne contamination tactic
  - Waterfront attack tactic
  - **Forced entry tactic**
    - Low LOP: 1 min. delay
    - High LOP: 15 min. delay
  - Covert entry tactic
  - Visual surveillance tactic
### Threat Analysis, Example Worksheets

#### SAME RHEIN-MAIN POST

<table>
<thead>
<tr>
<th>6 SHIFT VALUE AGGRESSOR LIKELIHOOD WORKSHEET</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Asset Category</th>
<th>Value Rating Factors</th>
<th>Value Rating Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mission Critical Operation</td>
<td>Critical Infrastructure and Operations and Activities</td>
<td>Information Security</td>
</tr>
<tr>
<td>Asset</td>
<td>General Population</td>
<td>Critical Criminals</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Organized Criminal Groups</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vendales</td>
</tr>
<tr>
<td></td>
<td></td>
<td>External Terrorist Groups</td>
</tr>
<tr>
<td></td>
<td>All Other Assets</td>
<td>Domestic Terrorists</td>
</tr>
<tr>
<td></td>
<td></td>
<td>International Terrorists</td>
</tr>
<tr>
<td></td>
<td></td>
<td>State Sponsored Terrorists</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Substate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Foreign Intelligence Services</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Aggressor Type</th>
<th>Value Rating Factors</th>
<th>Likelihood Rating Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unspecified Criminals</td>
<td>6 3 4 3 4 15 15</td>
<td>6 15 6 2 2 5 2 80 0.46</td>
</tr>
<tr>
<td>Organized Criminal Groups</td>
<td>3 4 3 4 15 15</td>
<td>6 15 6 2 2 5 2 80 0.46</td>
</tr>
<tr>
<td>Vendales</td>
<td>3 4 3 4 15 15</td>
<td>6 15 6 2 2 5 2 80 0.51</td>
</tr>
<tr>
<td>External Terrorist Groups</td>
<td>3 4 3 4 15 15</td>
<td>6 15 6 2 2 5 2 80 0.51</td>
</tr>
<tr>
<td>Domestic Terrorists</td>
<td>3 4 3 4 15 15</td>
<td>6 15 6 2 2 5 2 80 0.51</td>
</tr>
<tr>
<td>International Terrorists</td>
<td>3 4 3 4 15 15</td>
<td>6 15 6 2 2 5 2 80 0.51</td>
</tr>
<tr>
<td>State Sponsored Terrorists</td>
<td>3 4 3 4 15 15</td>
<td>6 15 6 2 2 5 2 80 0.51</td>
</tr>
<tr>
<td>Substate</td>
<td>3 4 3 4 15 15</td>
<td>6 15 6 2 2 5 2 80 0.51</td>
</tr>
<tr>
<td>Foreign Intelligence Services</td>
<td>3 4 3 4 15 15</td>
<td>6 15 6 2 2 5 2 80 0.51</td>
</tr>
</tbody>
</table>
Minimum AT Standards for Buildings
UFC 4-010-01
Minimum AT Standards, Introduction

**Applicability:**
- New Construction
- Existing Buildings
- Leased Buildings
- Others…

**Exemptions:**
- “Low Occupancy” Buildings
- “Temporary” and Relocatable Buildings
- Others…
Minimum AT Standards, Introduction

• Assumptions:
  - Only asset is people
  - U.S. threat environment
    • Aggressor types and tactics
    • Stationary vehicle bomb only
Minimum AT Standards, Terminology

- Low occupancy building
- Inhabited building
- Primary gathering building
- Routinely occupied
- Conventional construction
Minimum AT Standards

- **UFC 4-010-01 Standards**
  - **Site Planning**
    - 1: Standoff Distances
    - 2: Unobstructed Space
    - 3: Drive-Up/Drop-Off Areas
    - 4: Access Roads
    - 5: Parking Beneath Buildings or on Rooftops
  - **Structural Design**
    - 6: Progressive Collapse Resistance
    - 7: Structural Isolation
    - 8: Building Overhangs and Breezeways
    - 9: Exterior Masonry Walls
  - **Architectural Design**
    - 10: Windows and Skylights
    - 11: Building Entrance Layout
    - 12: Exterior Doors
    - 13: Mail Rooms and Loading Docks
    - 14: Roof Access
    - 15: Overhead Mounted Architectural Features
  - **Electrical & Mechanical Design**
    - 16: Air Intakes
    - 17: Mail Room and Loading Dock Ventilation
    - 18: Emergency Air Distribution Shutoff
    - 19: Equipment Bracing
    - 20: Under Building Access
    - 21: Mass Notification
Minimum AT Standards, Stds. 1-4

- Std. 1: Standoff Distances
- Std. 2: Unobstructed Space
- Std. 3: Drive-Up/Drop-Off Areas
- Std. 4: Access Roads
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Minimum AT Standards, Std. 1 Standoff
### Minimum AT Standards, Std. 1 Standoff

**Table B-1 Standoff Distances for New and Existing Buildings**

<table>
<thead>
<tr>
<th>Distance to</th>
<th>Building Category</th>
<th>Applicable Level of Protection</th>
<th>Minimum Standoff Distance</th>
<th>Applicable Explosive Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controlled Parking and Roadways without a Controlled Perimeter</td>
<td>Billing and High Occupancy Family Housing</td>
<td>Low</td>
<td>A</td>
<td>20 ft (6 m)</td>
</tr>
<tr>
<td></td>
<td>Primary Gathering Building</td>
<td>Low</td>
<td>A</td>
<td>20 ft (6 m)</td>
</tr>
<tr>
<td></td>
<td>Inhabited Building</td>
<td>Very Low</td>
<td>B</td>
<td>20 ft (6 m)</td>
</tr>
<tr>
<td></td>
<td>Billing and High Occupancy Family Housing</td>
<td>Low</td>
<td>E</td>
<td>13 ft (4 m)</td>
</tr>
<tr>
<td></td>
<td>Primary Gathering Building</td>
<td>Low</td>
<td>E</td>
<td>13 ft (4 m)</td>
</tr>
<tr>
<td></td>
<td>Inhabited Building</td>
<td>Very Low</td>
<td>F</td>
<td>13 ft (4 m)</td>
</tr>
<tr>
<td>Trash Containers</td>
<td>Billing and High Occupancy Family Housing</td>
<td>Low</td>
<td>E</td>
<td>13 ft (4 m)</td>
</tr>
<tr>
<td></td>
<td>Primary Gathering Building</td>
<td>Low</td>
<td>E</td>
<td>13 ft (4 m)</td>
</tr>
<tr>
<td></td>
<td>Inhabited Building</td>
<td>Very Low</td>
<td>F</td>
<td>13 ft (4 m)</td>
</tr>
</tbody>
</table>

**Table B-2 Conventional Construction Standoff Distances**

<table>
<thead>
<tr>
<th>Column Letter</th>
<th>Wall Type</th>
<th>Without Controlled Perimeter Applicable Explosive Weight</th>
<th>Within Controlled Perimeter Applicable Explosive Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Wood Studs – Block Veneer</td>
<td>105 ft (32 m)</td>
<td>105 ft (32 m)</td>
</tr>
<tr>
<td>B</td>
<td>Wood Studs – ESP</td>
<td>207 ft (63 m)</td>
<td>207 ft (63 m)</td>
</tr>
<tr>
<td>C</td>
<td>Metal Studs – Block Veneer</td>
<td>107 ft (32 m)</td>
<td>107 ft (32 m)</td>
</tr>
<tr>
<td>D</td>
<td>Metal Studs – ESP</td>
<td>151 ft (46 m)</td>
<td>151 ft (46 m)</td>
</tr>
<tr>
<td>E</td>
<td>Metal Panels</td>
<td>25 ft (7.6 m)</td>
<td>25 ft (7.6 m)</td>
</tr>
<tr>
<td>F</td>
<td>Cuts</td>
<td>6 ft (1.8 m)</td>
<td>6 ft (1.8 m)</td>
</tr>
<tr>
<td>G</td>
<td>Reinforced Concrete</td>
<td>6 ft (1.8 m)</td>
<td>6 ft (1.8 m)</td>
</tr>
<tr>
<td>H</td>
<td>Unreinforced Masonry</td>
<td>6 ft (1.8 m)</td>
<td>6 ft (1.8 m)</td>
</tr>
<tr>
<td>I</td>
<td>Reinforced Masonry</td>
<td>6 ft (1.8 m)</td>
<td>6 ft (1.8 m)</td>
</tr>
<tr>
<td>J</td>
<td>European Block</td>
<td>154 ft (47 m)</td>
<td>154 ft (47 m)</td>
</tr>
</tbody>
</table>
Table B-2 Conventional Construction Standoff Distances

<table>
<thead>
<tr>
<th>Wall Type</th>
<th>Without Controlled Perimeter Applicable Explosive Weight</th>
<th>Within Controlled Perimeter Applicable Explosive Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Load Bearing Walls</td>
<td>Non-Load Bearing Walls</td>
</tr>
<tr>
<td>Reinforced Masonry</td>
<td>86 ft (26 m)</td>
<td>86 ft (26 m)</td>
</tr>
</tbody>
</table>
• Std. 6: Progressive Collapse

- Localized failure => overloading and failure of adjoining members
- Disproportionate damage
- Required for buildings ≥ 3 stories
• Progressive Collapse
  - UFC 4-023-03, Design of Buildings to Resist Progressive Collapse
  - ASCE 7-16, Minimum Design Loads and Associated Criteria for Buildings and Other Structures
  - ACI 318-14, Building Code Requirements for Structural Concrete and Commentary
  - International Building Code 2015
Minimum AT Standards, Std. 10 Windows

- Std. 10: Windows and Skylights
- 80% occupant injures are from glazing hazards in blast events
Minimum AT Standards, Std. 10 Windows

Building Inspection Area

Legend
- A. P. Murrah Federal Building
- Collapsed Structure
- Structural Damage
- Broken Glass/Doors

Approximate Scale: 1" = 1,300'
Note: Undamaged structures are not shown on this map
Minimum AT Standards, Std. 10 Windows

- Standoff distance may differ and control
Minimum AT Standards, Stds. 15 & 19

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- Std. 15: Overhead Mounted Architectural Features
- Std. 19: Equipment Bracing
- Brussels Airport Bombing 2016
Minimum AT Standards

• UFC 4-010-01 Standards
  - Site Planning
    • 1: Standoff Distances
    • 2: Unobstructed Space
    • 3: Drive-Up/Drop-Off Areas
    • 4: Access Roads
    • 5: Parking Beneath Buildings or on Rooftops
  - Structural Design
    • 6: Progressive Collapse Resistance
    • 7: Structural Isolation
    • 8: Building Overhangs and Breezeways
    • 9: Exterior Masonry Walls
  - Architectural Design
    • 10: Windows and Skylights
    • 11: Building Entrance Layout
  - Electrical & Mechanical Design
    • 12: Exterior Doors
    • 13: Mail Rooms and Loading Docks
    • 14: Roof Access
    • 15: Overhead Mounted Architectural Features
  - Mass Notification
Minimum AT Standards

• UFC 4-010-01 Required **Submittals**
  - Design **narratives** of each standard
  - Design **explosive weights**
  - Design **levels of protection**
  - Provided standoff
  - Window systems **calculations/results**
  - Building element analysis/calculations, **as required**
  - Progressive collapse calculations, as applicable
Additional Requirement Sources
Theater Specific Requirements

- U.S. European Command (EUCOM) AT Operation Order 16-03
- **Annex D**, Antiterrorism Construction Standards
  - Use of UFC 4-020-01 Threat Analysis (DBT-LOP)
  - Unique aggressors & additional tactics
  - Document submission requirements through lifecycle
  - Fragment retention film (FRF) retrofits
  - Ballistic rating of guard booths
Theater Specific Requirements

• Army Europe Regulation 525-13 Antiterrorism
• Appendix E, Antiterrorism Construction Standards
  - Perimeter countermobility
  - Active barrier consultation
  - **Centralized parking** & cantonment areas
  - Active shooter (UFC 4-023-10 Safe Havens)
  - **Windows**
  - Access Control Point (ACP) search procedures
  - Facility operation and response plans
• **Interagency Security Committee (ISC) Standard**
  - All nonmilitary Federal facilities in the U.S.
  - Applicability:
    - U.S. General Services Administration
    - DoD leased buildings in U.S. and abroad
  - Methodology:
    - Determine **Facility Security Level (FSL)**
    - **86 Security Criterion**
    - Customization of countermeasures
    - Risk management based
ISC Standard

Table 1: Interagency Security Committee Facility Security Level Determination Matrix

<table>
<thead>
<tr>
<th>Factor</th>
<th>Points</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Mission Criticality</td>
<td>LOW</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Symbolism</td>
<td>LOW</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Facility Population</td>
<td>&lt; 100</td>
<td>101–250</td>
</tr>
<tr>
<td>Facility Size</td>
<td>&lt; 10,000 sq. ft.</td>
<td>10,001–100,000 sq. ft.</td>
</tr>
<tr>
<td>Threat to Tenant Agencies</td>
<td>LOW</td>
<td>MEDIUM</td>
</tr>
</tbody>
</table>

- Appendix of specific countermeasures for each FSL and tactic
Other Requirement Sources

- **Agency Supplements** (e.g. DoDEA, IMCOM-E)
- **NATO** ACO Directive 80-25 Force Protection
  - Annex E: Threat-Capability Matrix
  - Annex H: Force Protection Measures
  - Annex I: Design Guidelines for Expeditionary Operations
- **U.S. Department of State**, Foreign Affairs Manuals (FAM) and Handbooks
  - 12 FAM Diplomatic Security
  - 12 FAM 300 Physical Security Programs
  - 12 FAM 350 Construction Security Standards
Additional Considerations
Additional Considerations, Costs

- Cost Modifiers
  - UFC 4-020-01, Appendices A through D, tabulated cost modifiers
    - L LOP to VL DBT VBIED for Admin Facility with 10 m standoff +16.8%, 25 m = 9.5%
    - L LOP to VL DBT VBIED for Barracks with 10 m standoff +3.2 %, 25 m = 1.7%

- Unit costs
  - UFC 4-020-01, Table D-1, Unit costs of expedient passive defense measures
    - Fence Obscuration at $8/lf
  - UFC 4-022-02, Tables B-2 & B-3, Unit costs for active and passive barriers
    - Anchored concrete Jersey barrier $65/ft.

- Actual Costs at USAREUR
  - AT windows typically +20-50%($1.1K vs. $1.5K)
  - Rated active barriers (installed) ~$37K
  - Rated passive bollards ~$3K each
Additional Considerations

- Effects on LEED accreditation
  - Green space and storm water management
  - Window surface area

- Intelligence support
  - Installation Antiterrorism Officers
  - Local law enforcement, criminal activity
  - Open source and classified reports
    - Global Terrorism Database
Further Analysis

- U.S. Army Corps of Engineers, Protective Design Center, **standoff tables**

- **Blast Analysis**
  - Manual calculations (e.g. PDC TR-06-01, UFC 3-340-01)
  - Computer software (e.g. VAPO, SBEDS, SBEDS-W, WINGARD, LS-DYNA)
  - Analyze individual **components**, **entire building**, **building cluster**
Further Analysis, Blast Effects

• Blast Analysis
  - TNT equivalency
  - Overpressure & impulse
  - Incident & reflected
  - Effect of Standoff
Further Analysis, Blast Effects

1. Blast wave breaks windows. Exterior walls blown in. Columns may be damaged.

2. Blast wave forces floors upward.

3. Blast wave surrounds structure. Downward pressure on roof. Inward pressure on all sides.
Further Analysis, Blast Effects
Blast Analysis, Peak Shock Pressure
Blast Analysis, Structural Damage Level
Blast Analysis, Level of Protection

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Trends & Application
Recent Trends, Introduction

- 2014 ISIL call to attack home countries
  - Instructive propaganda
Recent Trends, Data from 2014-10.2017

- 67 jihadist terrorism attacks in 11 Western countries
  - 426 deaths and 1,800+ injured
  - 386 of the deaths are from 11 attacks
    - 130 @ Paris NOV2015
    - 86 @ Nice JUL2016
    - 49 @ Orlando JUN2016
    - 32 @ Brussels Airport & Metro MAR2016
    - 23 @ Manchester MAY2017

- More killed in Europe 2015 & 2016 than in all previous years combined
Recent Trends, Summary

• Inspired lone actors without knowledge/experience
  - <1 in 10 ISIL directed
  - Demographic

• Less sophisticated tactics
  - Edged weapons
  - Firearms
  - Kinetic vehicle (12 since 2016)
  - Home made explosives
  - Hoax suicide belts
  - Multi-prong

• Emulating successful attacks

• Difficult to detect/prevent
Recent Trends, Summary

• “Soft target” locations and victims
  - Public venues
  - Transportation nodes
  - General public citizens
  - Exposed military, law-enforcement

• High-profile events
  - Celebratory gatherings
  - Sporting competitions
  - Concerts
Recent Trends, Outlook

• “The Future of Jihadism in Europe: A Pessimistic View” – Thomas Hegghammer

• Further **increase** due to expected:
  - Growth in number of economically **underperforming Muslim youth**
  - Growth in number of available **jihadi entrepreneurs**
  - Persistent conflict in the Muslim world
  - Continued operation **freedom** for clandestine actors on the **internet**
Tactic Evolution

- **Tactic migration**
  - Kinetic vehicles, and combination with secondary weapons (knife, firearm, bomb)
  - Complex and coordinated attacks
  - Weaponized recreational drones

- **Propaganda to implementation**
  - Kinetic vehicles, edged weapons, children
  - Arson, kidnapping, train derailment, critical infrastructure, chemical weapons
Tactic Evolution

• DoD Engineering Mitigations
  - Active shooter
    • UFC 4-023-10 Safe Havens
  - Suicide aggressors
    • EUCOM AT OPORD for kinetic vehicle bomb
  - Kinetic vehicles
    • Most lethal weapon of 2016
    • 200 killed and 1000 injured since 2014
    • UFC 4-022-02 Selection and Application of Vehicle Barriers
UFC 4-022-02, Vehicle Barriers

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• Passive and Active
  - Kinetic energy calculations
  - K4, K8, K12 performance standards
    - 400K ft-lb = 4000 lb car at 50 mph, 15,000 lb truck at 30 mph

• Construction features
  - 75% DBT wheel height (20”+) at 3-4’ spacing
  - Permanent and temporary installs across cities
  - Las Vegas Strip, 700 bollards at $5M
• Across 51 countries
  - Variation of aggressor types and tactics

• Design facilities to deter / “Hard Targets”
  - Access controlled installations
  - Standoff and obstructed lines of sight
  - Deterring facility features
  - Random antiterrorism measures

• Design facilities to protect
  - Threat severity per aggressor likelihood
  - Protective performance per asset value
  - Layers of physical features and operational procedures
USAREUR Mitigation Efforts, Operations

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- Reduce DoD/U.S. signature off-post
- Risk management of off-post activities
- Educate & alert community
  - Threat awareness, real-time mass notifications
  - Best practices awareness
- Regularly scheduled working groups, exercises, and assessments
Europe’s Mitigation Efforts

- **Vehicle barriers**
  - Temporary & permanent

- **Police & military presence**
  - Deterrence
  - Reaction

- **Secure zones**
  - Screen & prescreens
  - Limit entry chokepoints

- **Material control & reporting**
  - Explosive precursors
  - Vehicle rentals

- **Intelligence monitoring**
  - Foreign fighters (5K from ‘11-‘16)
  - Social media channels
Europe’s Mitigation Efforts, Engineering

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- “Terrorsichere Architektur”
  - Govt. & high profile business

- **European Central Bank**
  - Standoff (180 m)
  - Unobstructed space
  - Rated passive barriers
  - Rated active barriers
  - Controlled access roads
  - Aesthetics
  - Visitor parking
  - Visitor processing center
  - Laminate glass
  - Others…
Lessons Learned

• **Project lifecycle**
  - Inadequate planning documents
  - Use of minimum standards without threat analysis justification

• **Planning**
• **Design**
• **Construction**
• **Facility occupancy**
Lessons Learned

- Local DBT vs. Asset DBT
- DBT bomb size per installation search procedures
- Operational dependencies
  - E.g. HVAC, MWNS, unobstructed space, barriers
- Standoff, walls vs. windows
- Fragment retention film retrofits
  - Anchorage & rating, design life limitations
Holistic Approach

- Defense in depth
  - Deter
  - Detect
  - Deny
  - Delay
  - Defend
- Sitework, building, equipment, manpower
- Multiple disciplines
- Regular assessments
References and AT Engineer Resources

• Engineering
  - Whole Building Design Guide, Unified Facilities Criteria Library
  - U.S. Army Corps of Engineers, Protective Design Center
    • Software (threat analysis, blast analysis, structural member and windows analysis), Engineering Technical Letters & Reports, UFCs, Std. Drawings, DoD Anti-Ram Vehicle Barrier List
  - FEMA 426, Ref. Manual to Mitigate Potential Terrorist Attacks Against Buildings
  - USEUCOM Antiterrorism Operations Order 16-03
  - US Army Europe Regulation 525-13 Antiterrorism
  - Joint Forward Operations Base, Protection Handbook (GTA 90-01-011)
  - Department of Homeland Security, Interagency Security Committee Standards
  - U.S. Department of State, Foreign Affairs Manuals and Handbooks

• Threat
  - West Point, Combatting Terrorism Center
  - University of Maryland, Global Terrorism Database
  - Terrorism Research Initiative, Perspectives on Terrorism
  - Department of Homeland Security, National Terrorism Advisory System
  - Homeland Security Committee and Terror Threat Map (interactive)
References

- L. Vidino, “Fear Thy Neighbor, Radicalization and Jihadist Attacks in the West”, 2017
- “Assassination Operations”, Inspire, no. 14, SEP 2015
- “Garrison in Europe”, U.S. Army Europe Homepage, SEP 2017
- “Man charged with car-bomb plot on Oklahoma City Bank”, BBC News, 14 AUG 2017
- “Overview: Terrorism in 2016”, START - National Consortium for the Study of Terrorism and Responses to Terrorism, AUG 2017
- “Terror Threat Snapshot”, Homeland Security Committee, SEP 2017
- “Truck Attacks”, Rumiyah, no. 9, MAY 2017, p. 56
Agenda

• Reason for AT Design
• AT Requirement Sources
• Threat Analysis
• Minimum AT Standards

• Additional Requirement Sources
• Additional Considerations
• Trends & Application
• Engineer Resources
"Without deep engagement in the world, America would face more conflict, not less - and on the terms of our adversaries, not on our own terms. That is why America's commitment to its allies - in Europe and around the world - is not a burden... it's not a luxury, but it is a necessity. And it must be unwavering."

-Secretary of Defense Chuck Hagel

May 2, 2015
(Backup) Recent Trends, Data from 2014-10.2017

- **Demographics**
  - Avg. age 27.5, only 2 of the 85 attackers were female
  - 50% had a criminal background
  - 63% were citizens (6 were asylum seekers, 7 were in country illegally/awaiting deportation, 1 was a tourist)
  - 17% recent converts to Islam

- **Affiliations**
  - 2 of the 4 most lethal attacks (Paris NOV2015 & Brussels) are believed to be ISIL directed & used returned foreign fighters
  - Overall, fewer than 1 in 10 was ISIL directed
  - 42% clear operational connection to an established jihadist group
  - 18% had travelled to jihadist-controlled territories
  - 63% pledged allegiance to a jihadist group before or after attack
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