

**Deploying Counter-terrorism
Resources Cost Effectively**
Process Description

**System Approaches for
Countering Terrorist Threats**

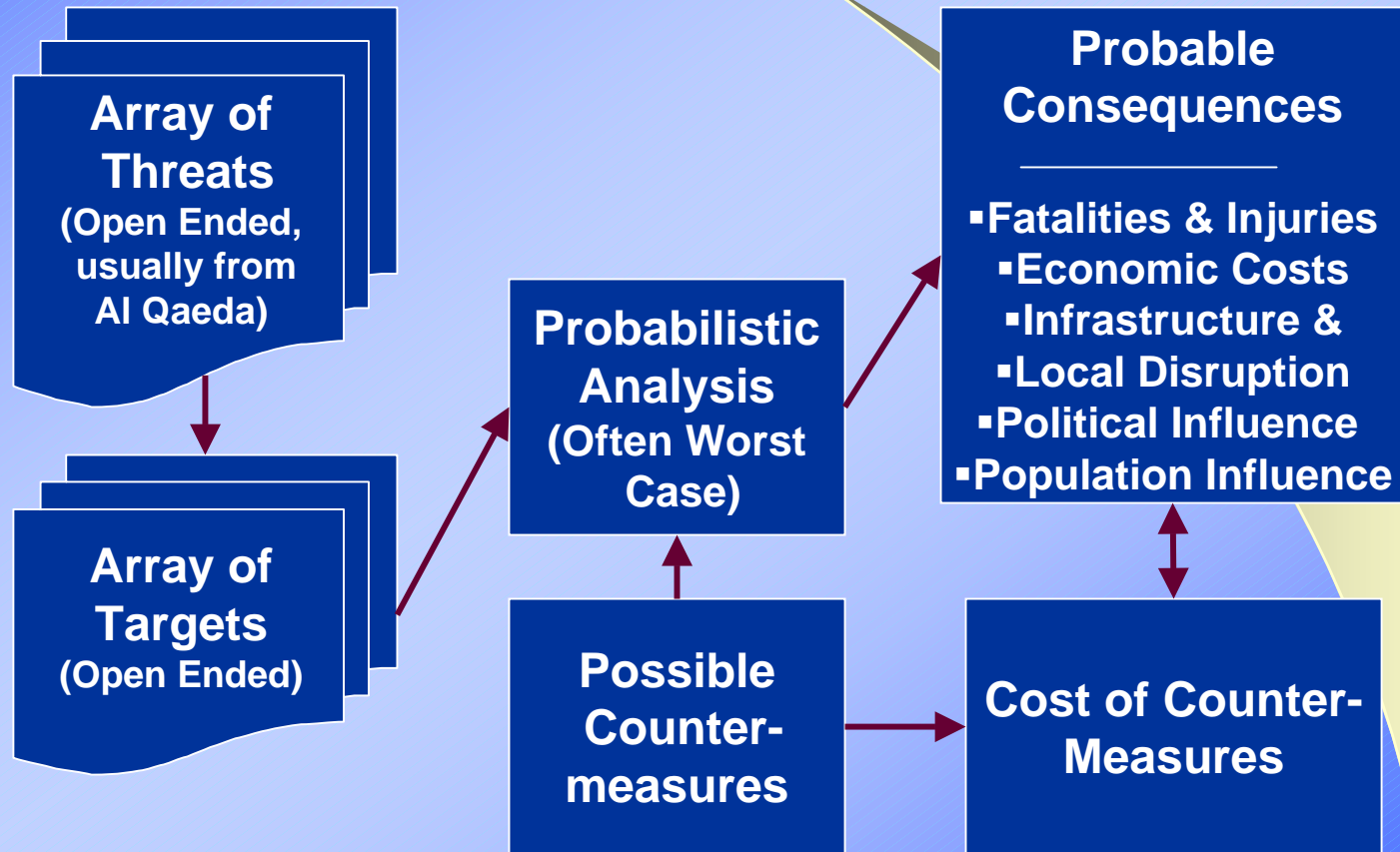
Problem

- Since 9/11 a very large number of vulnerability analyses have been undertaken.
 - For example, Brookhaven vulnerability analysis of the infrastructure of New York State.
 - Many are based upon probabilistic risk analysis.
- They show that nearly everything is vulnerable.
 - Results are highly uncertain and worst case assumptions used to compensate.
 - Resources for countering these vulnerabilities are limited.
- How can we deploy available resources cost-effectively?

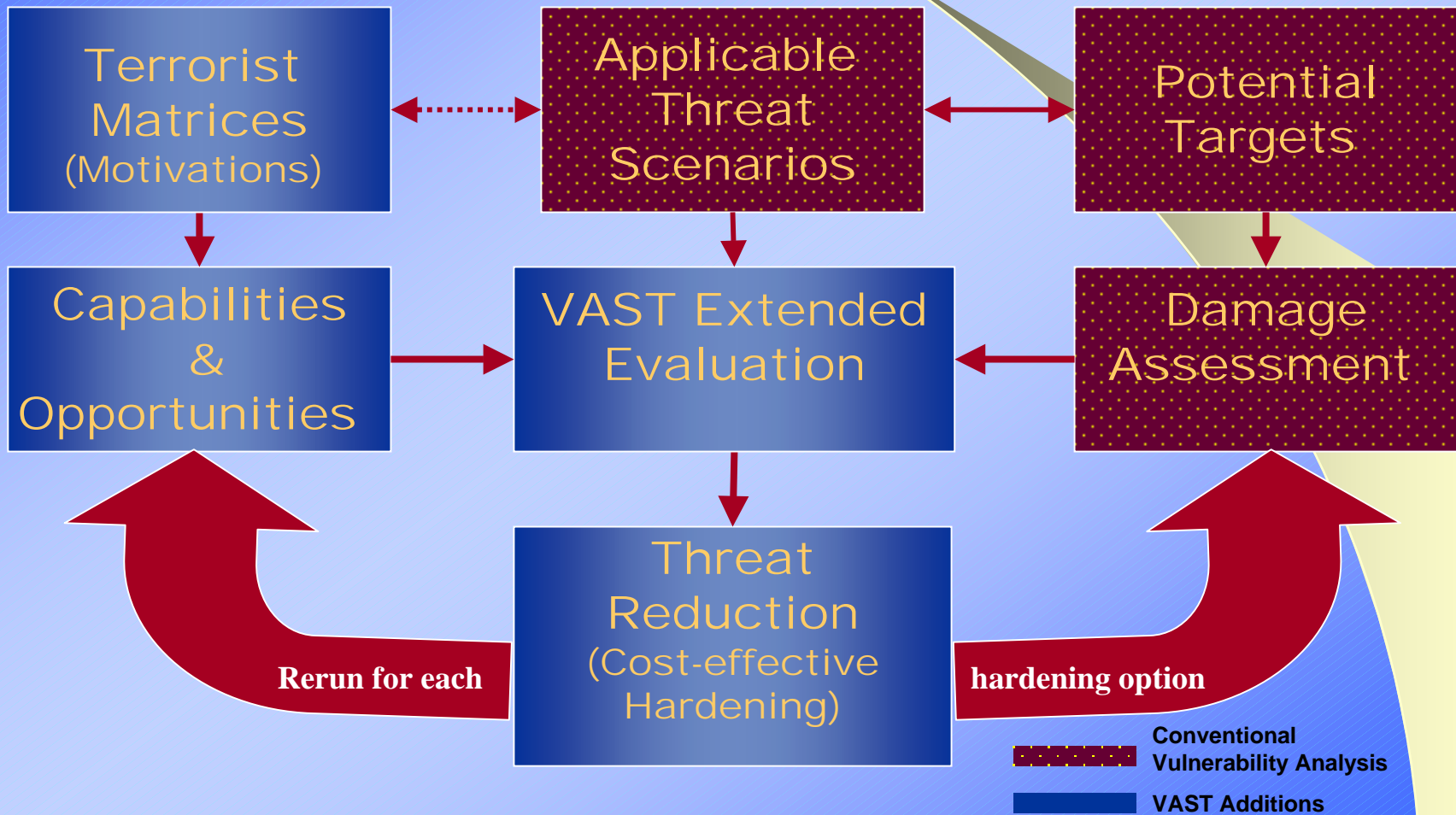
What Is Vast?

- VAST is a new paradigm and data management system for enhancing the usefulness of conventional vulnerability analyses to:
 - Set priorities for critical target/threat vulnerabilities,
 - Establish priorities for cost-effective counter-measure deployment,
 - Determine success/failure outcomes of specified threats to targets from a variety of terrorist groups,
 - Measure the attractiveness of targets to these groups.
- VAST enables strategic evaluation of assets.

Conventional Vulnerability Analyses



VAST Enhances Existing Analyses

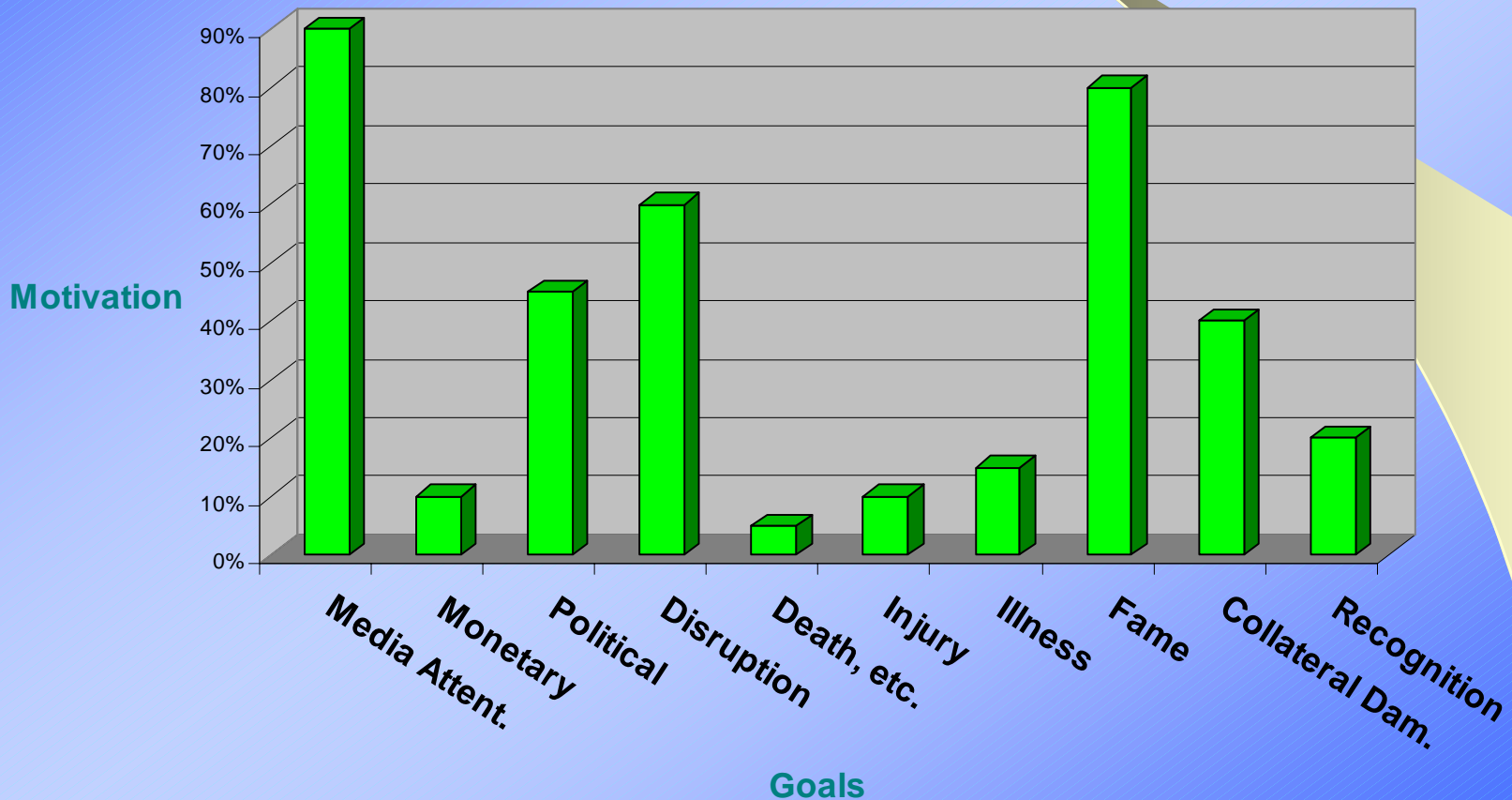


Threat Analysis Data Base Structure*



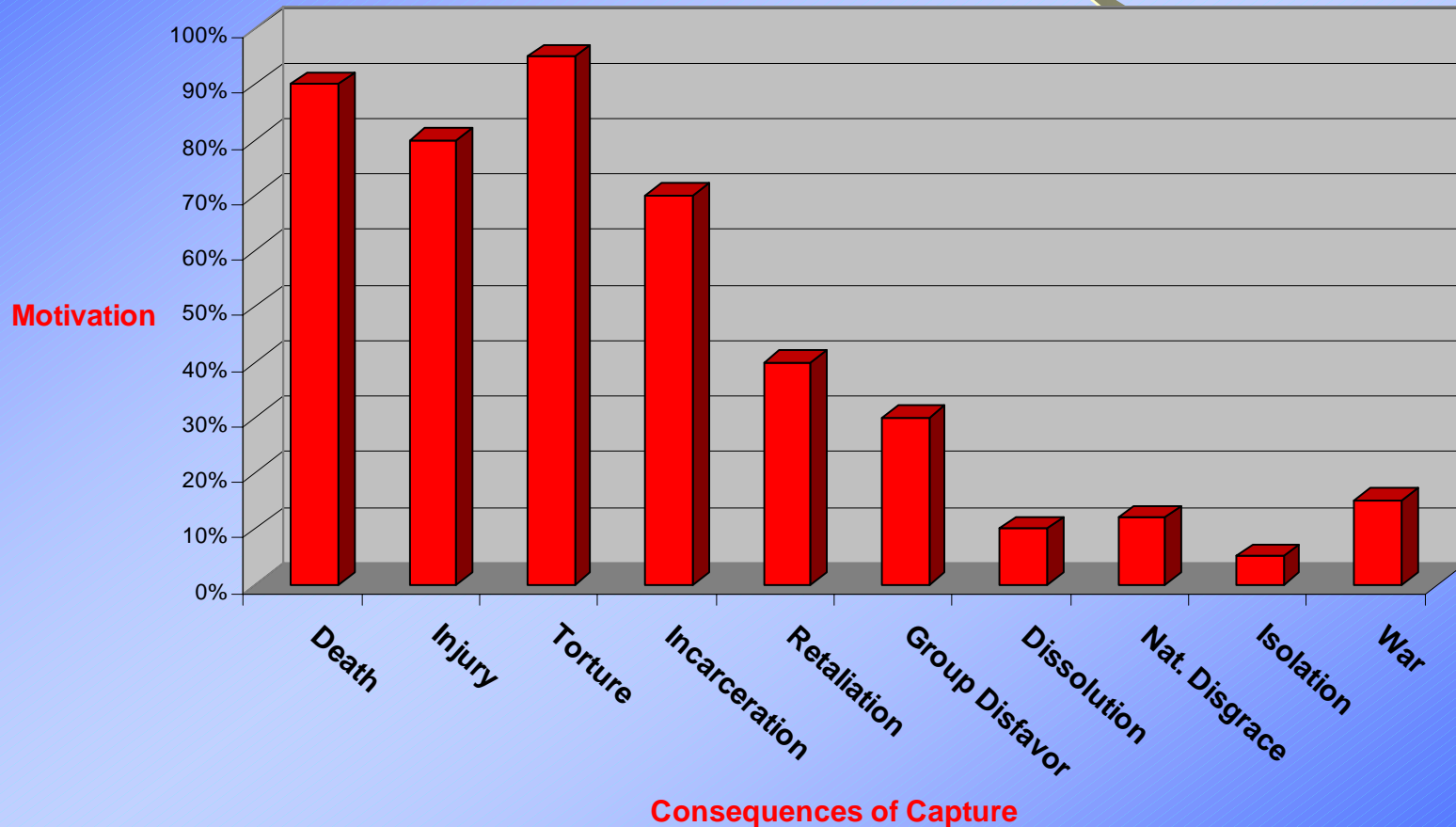
First Level Motivational Profile

Positive Motivational Profile

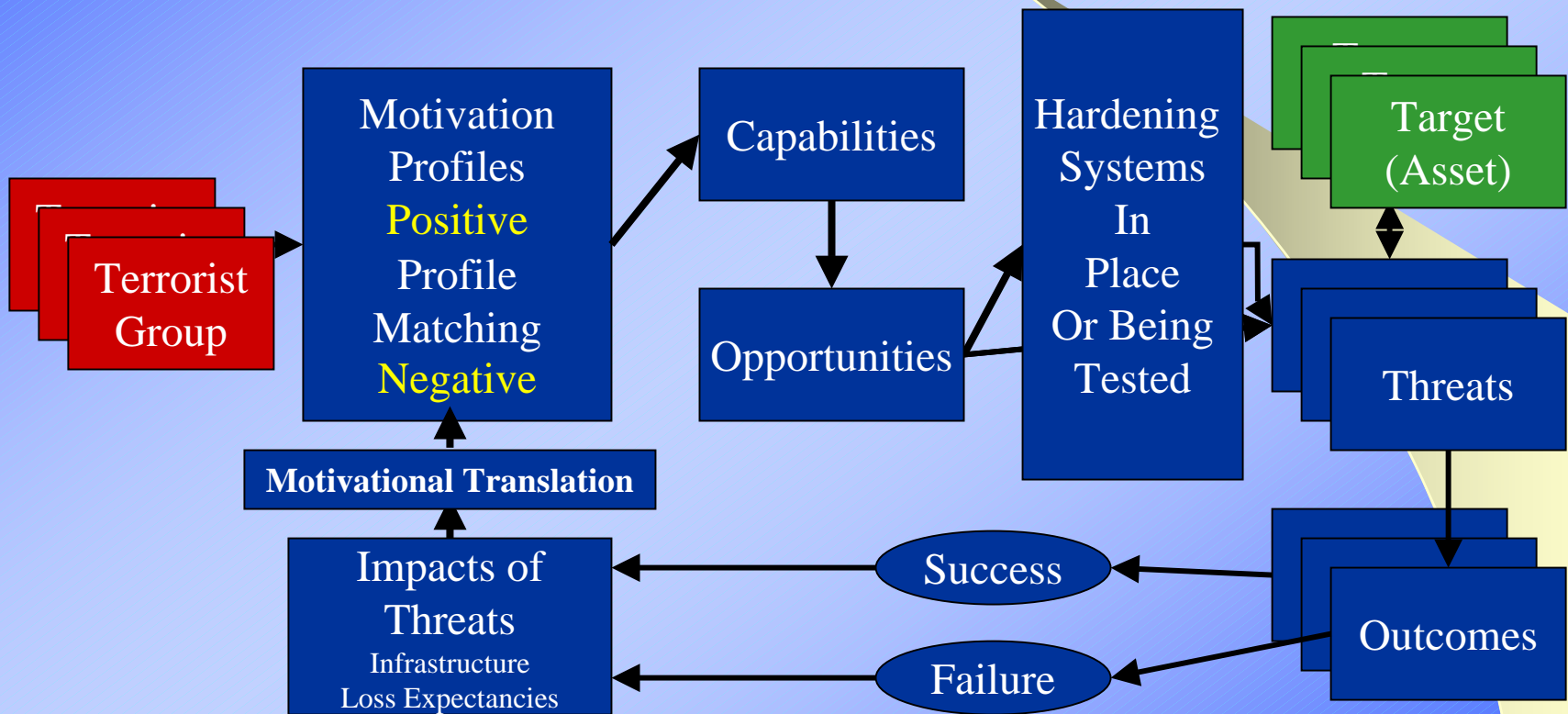


Negative Motivational Factors

Negative Motivational Factors



VAST System Process Flow



Intelligence Credibility

- **VAST is:**
 - **An anticipatory rather than an imminent threat warning system,**
 - **A defensive threat evaluation system that prioritizes defensive countermeasures,**
 - **Dynamic only in so far as terrorist motivations and capabilities change and imminence information in the form of a single activity index from outside sources.**
- **Imminent threat data from terrorist groups or for types of assets is:**
 - **Directly available from government and police sources,**
 - **Discerned from defensive measures uncovering salient activity,**
 - **Used by VAST to validate high priority attractiveness ratings.**
- **Expert judgments for motivational and capability profiles can come from many sources:**
 - **In-house experts familiar with domestic and international terrorist groups**
 - **Client experts,**
 - **Government intelligence experts.**
- **VAST provides means to merge estimates while providing value diversity when appropriate.**

Threat Consequence Structure

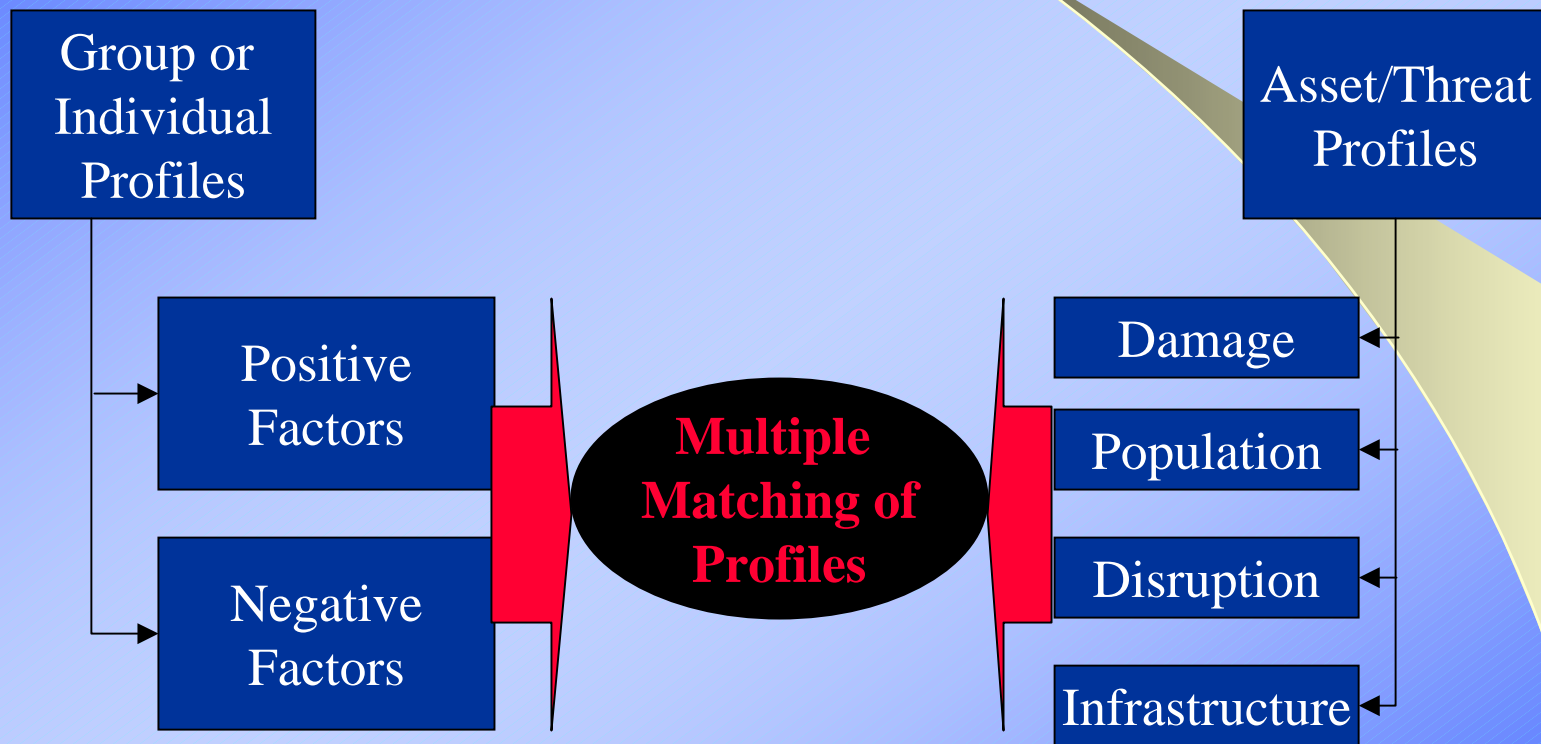


Structured Threat Lists

Generic Threats

- Single Action Threats
- Compound Action Threats
- Asset Particular Threats
 - Single Action Threats
 - Compound Action Threats

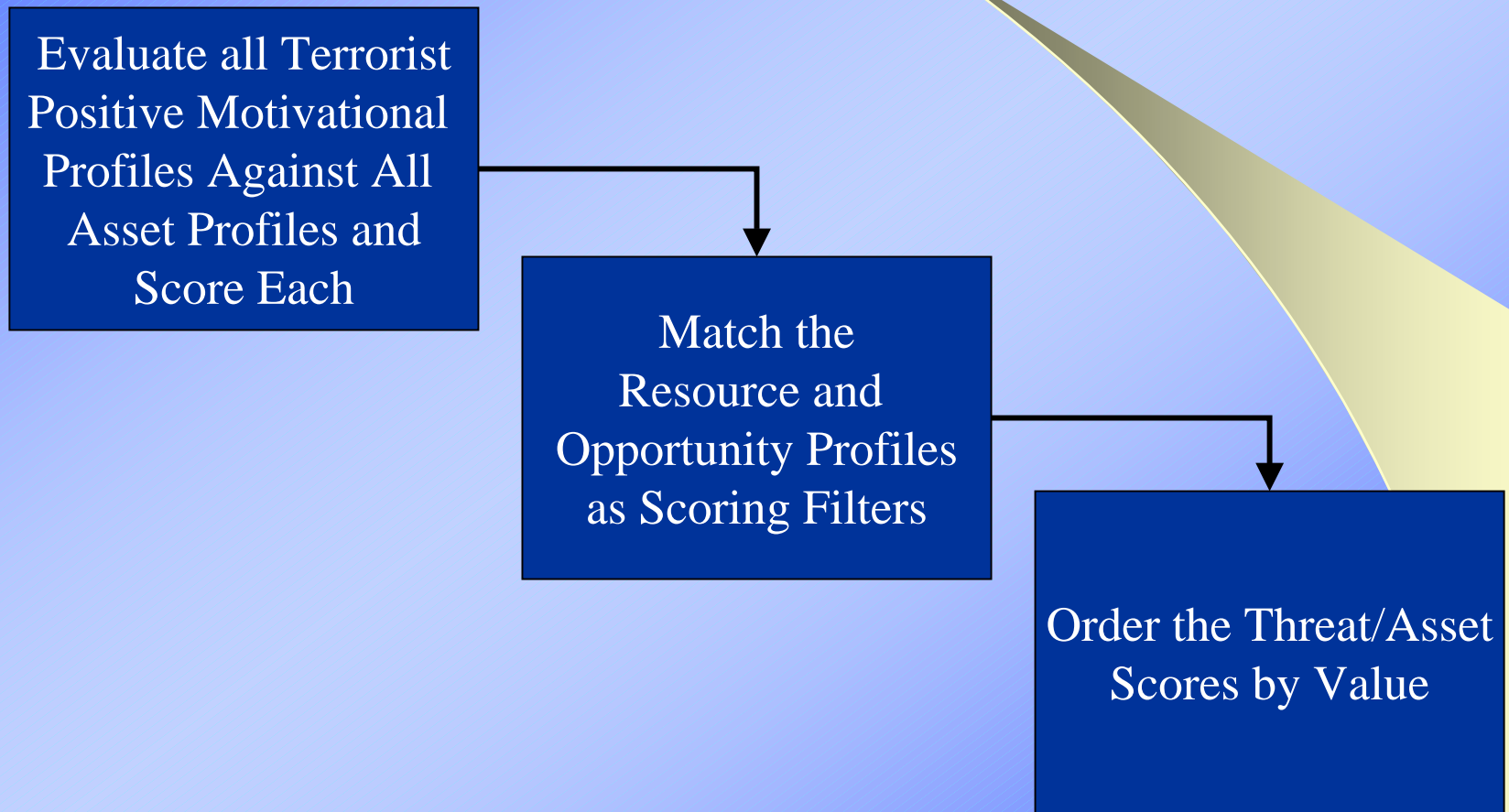
Profile Pattern Matching



Further Profile Matching



Vulnerability Analysis



Resultant Indices

- **Attractiveness Index**

- Measures how well the positive motivations of a terrorist group matches the likely outcome of a threat to a target.
- Low value = High Match Open ended at high end



- **Negative Motivation Index**

- Measures the fear factor involved in attacking a target for a given threat
- Low Value = Low Fear Open ended at high end



- **Degree of Success**

- Measures how successful the terrorist may be in carrying out an attack
- + 1 = High Success
- 0 = Success/Failure Even
- - 1 = High Failure



- **Aggregate (Composite) Index**

- Measures the combination of attractiveness, negative motivation and degree of success
- Low = High Potential Target Value Open ended at high end



More Detailed Reports Page

Target Attractiveness (Only Top 10 Shown)

in Order by Aggregate Index (Low number is more susceptible to attack)

Target and Conf. Level	Group and Conf. Level	Threat and Conf. Level	Pos Motivation Index	Neg Motivition Index	Degree of Success	Aggregate Index	Confi- dence
Courthouse 99.0% W	Deranged Small Grps 99.0% W	Bomb: Truck or Box Van, Outside 60.0% B	0.09	0.19	0.06	0.28	98.2%
Courthouse 81.0% C	Al Qaeda 99.0% W	Gasoline Tanker Truck 99.5% W	0.18	0.17	0.02	0.35	99.8%
Courthouse 98.0% W	Al Fatah 83.0% C	Bomb: Truck or Box Van, Outside 81.0% C	0.35	0.01	0.01	0.36	99.1%
Courthouse 99.5% W	Al Qaeda 99.0% W	Bomb: Truck or Box Van, Outside 60.0% B	0.43	0.17	0.02	0.60	98.4%
Courthouse 98.0% W	Deranged Individuals 99.5% W	Bomb: Truck or Box Van, Outside 60.0% B	0.52	0.15	0.42	0.67	98.3%
Courthouse 60.0% B	Militia 99.0% W	Bomb: Truck or Box Van, Inside 83.0% C	0.29	0.52	0.14	0.81	96.5%
Courthouse 99.5% W	Al Qeada 83.0% C	LP Tanker Truck 99.0% W	0.02	0.89	0.01	0.91	99.9%
Courthouse 83.0% C	Al Qaeda 81.0% C	Bomb: Truck or Box Van, Inside 98.0% W	0.42	0.51	0.32	0.93	99.1%
Courthouse 98.0% W	Al Fatah 81.0% C	Bomb: Small Box Van, Inside 99.0% W	0.50	0.63	-0.01	1.13	99.8%
Courthouse 99.5% W	Hamas 81.0% C	Bomb: Truck or Box Van, Outside 98.0% W	0.25	0.91	0.01	1.16	99.8%

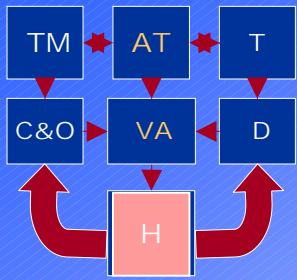
100s of more entries with higher index values not shown

Using The Indices

- If a target is high on the aggregate index (closer to zero), it means that it is likely target to the specified terrorist groups.
- A detailed review (built in) provides insight on the critical parameters for protection.
- Based on the critical parameters, alternative hardening solutions are defined, and new resulting indices are obtained and compared with the originals.
- The lowering of the target on the indices along with costs of the hardening alternatives provides a cost-effective evaluation of target protection.

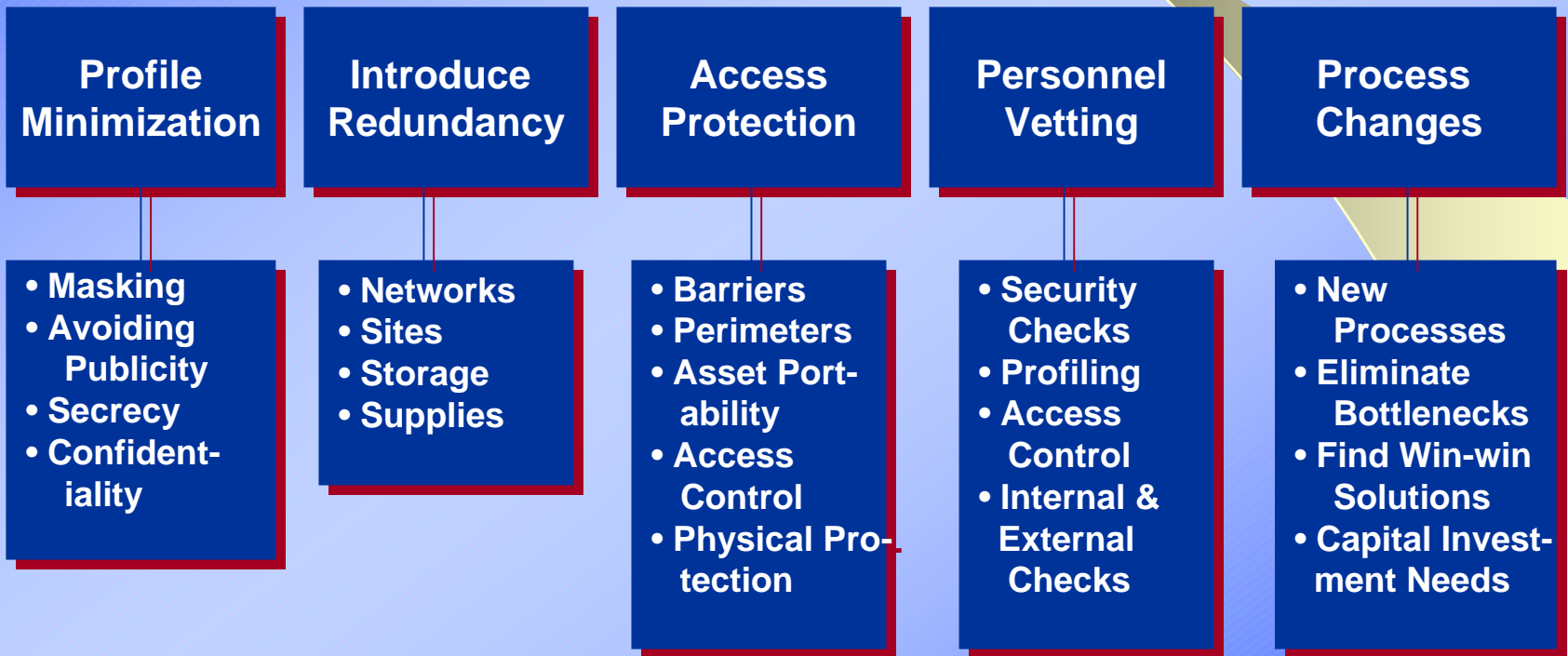
Index Values

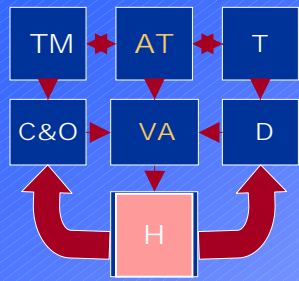
- Cardinality
- Relative Valuation
 - Discrimination among threats and hardening options
 - Relative Distance
- Absolute Valuation
 - Establish by trials on past events
 - Establish by repeated use and pegging



Structure for Methods of Hardening

Hardening - Reducing the Vulnerability of Assets and Sites to Terrorist Attacks





Hardening

- **Intervention with hardening systems and technology reduces the ability to achieve the threat:**
 - impacts the *opportunity and resource profiles* of the terrorists
 - impacts the *negative motivational profiles*,
 - Reduces the extent of damage to the target
- **Analysis is run for variety of hardening conditions:**
 - current level of hardening,
 - maximal hardening,
 - good judgment levels,
 - Several cost-effective levels,
 - Less hardening (removal of cost-ineffective operations)

Sample Hardening Report

(99% Confidence)

(95% Confidence)

<i>(90% Confidence) Hardening Option</i>	<i>Change in Aggregate Index</i>	<i>Capital Cost</i>	<i>Operating and Maintenance Costs/year</i>
Jersey Barriers	+ 0.48	\$6,000	\$500
Portal Controls	+ 0.13	\$15,000	\$30,000
Gate Controls	+ 0.09	\$20,000	\$30,000
Street Access Limit	+ 1.50	\$5,000 + Loss of Use	\$10,000

Results with Jersey Barriers

Target Attractiveness in Order by Aggregate Index

(Low number is more susceptible to attack)

<i>Rank</i>	<i>Target</i>	<i>Terrorist Group</i>	<i>Threat</i>	<i>Aggregate Index</i>
1.	Courthouse	Deranged Small Grps	Bomb: Truck or Box Van, Outside	0.76
6.	Courthouse	Militia	Bomb: Truck or Box Van, Inside	0.81
2.	Courthouse	Al Qaeda	Gasoline Tanker Truck	0.83
3.	Courthouse	Al Fatah	Bomb: Truck or Box Van, Outside	0.84
8.	Courthouse	Al Qaeda	Bomb: Truck or Box Van, Inside	0.93
4.	Courthouse	Al Qaeda	Bomb: Truck or Box Van, Outside	1.08
5.	Courthouse	Deranged Individuals	Bomb: Truck or Box Van, Outside	1.15
9.	Courthouse	Al Fatah	Bomb: Small Box Van, Inside	1.13
7.	Courthouse	Al Qaeda	LP Tanker Truck	1.38
10.	Courthouse	Hamas	Bomb: Truck or Box Van, Outside	1.64

100s of more entries with higher index values not shown

Applying Results

- **Use the compiled list of likely threats to specific facilities in ordered manner to identify the critical vulnerabilities.**
- **Develop cost-effective programs to reduce the threat potential to various levels.**
- **Apply to different applications**
 - One to One – Threat by a specific terrorist group to specific assets.
 - One to Many – Likely targets for a terrorist group.
 - Many to One – Vulnerability of specific assets to all threats
 - Many to Many – Identification of global target vulnerability
- **Provide the basis for cost-effective deployment of resources for:**
 - Hardening,
 - Coping,
 - Emergency response, and
 - Crisis management preparation.