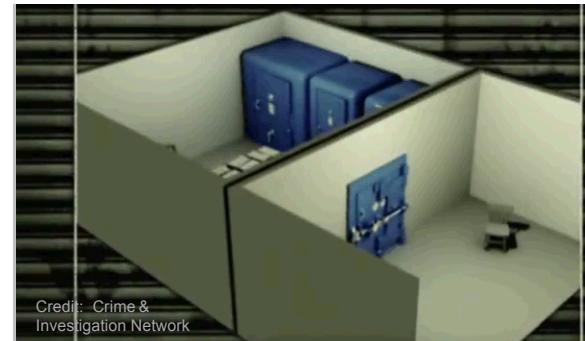


Exceptional service in the national interest



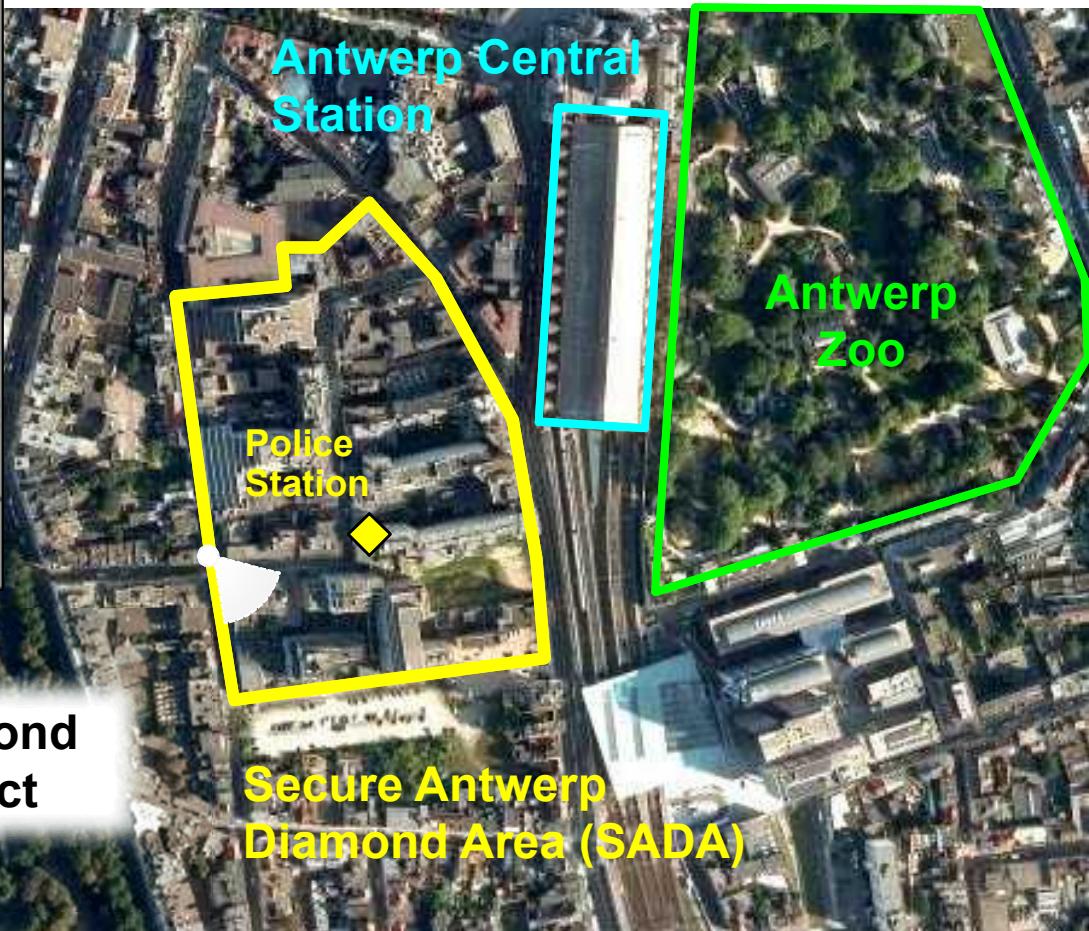
The Perfect Heist

Recipes from Around the World

Jarret Lafleur, Luke Purvis, Alex Roesler, and Paul Westland
Sandia Systems Analysis and Engineering
June 1, 2015



Antwerp: Feb. 2003





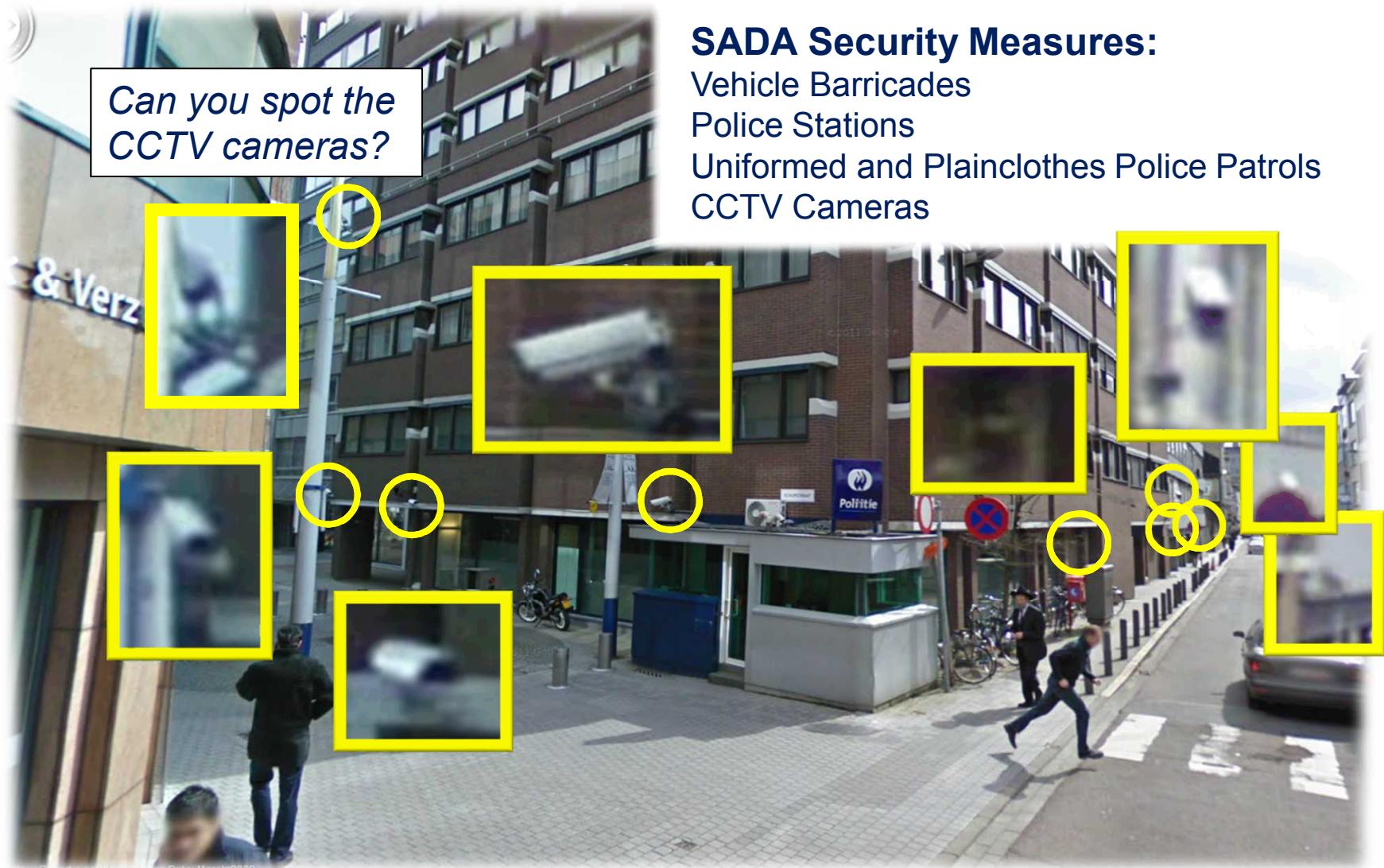
Antwerp: Feb. 2003



Photo credit: Google Street View Date: March 2009

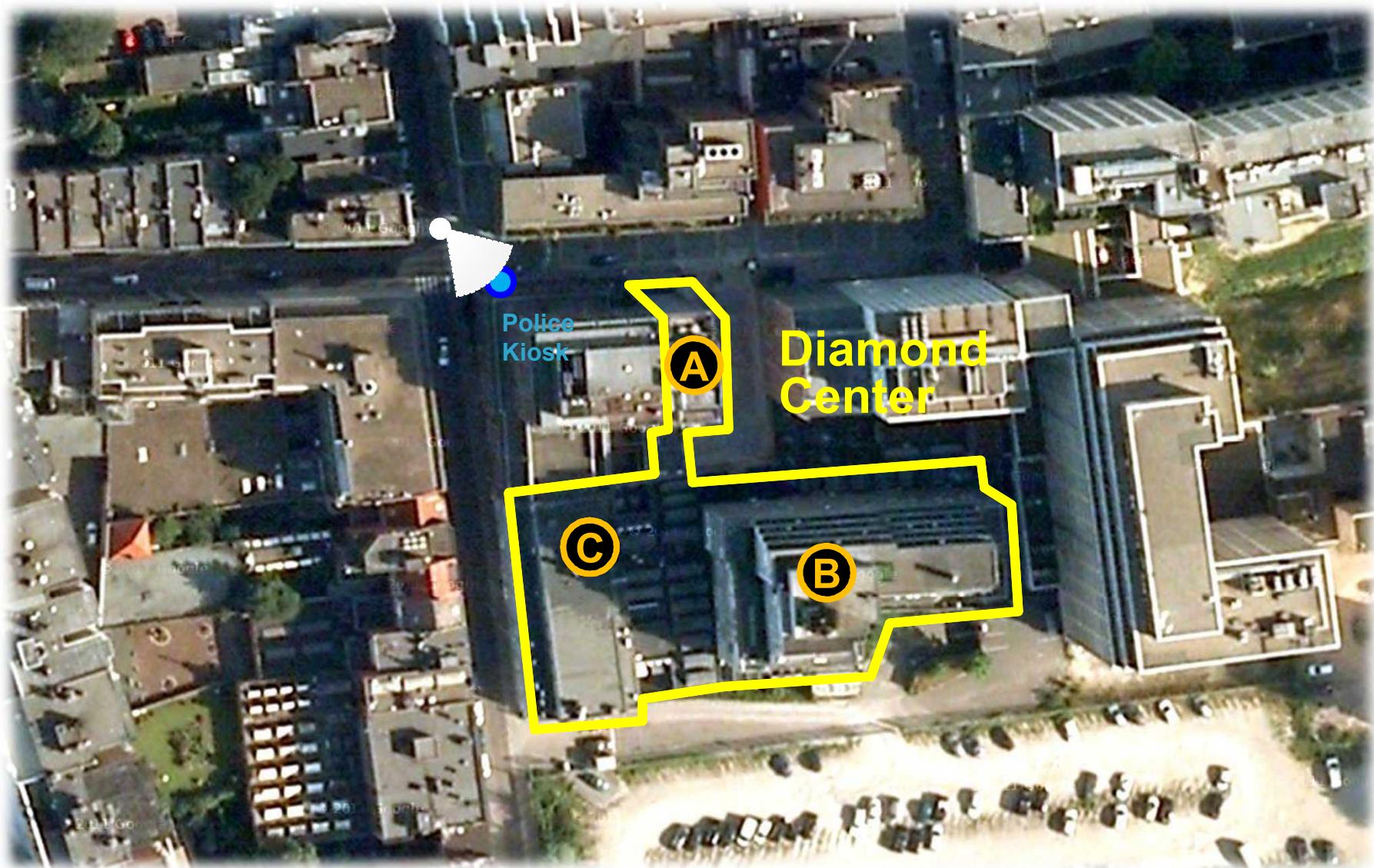


Antwerp: Feb. 2003



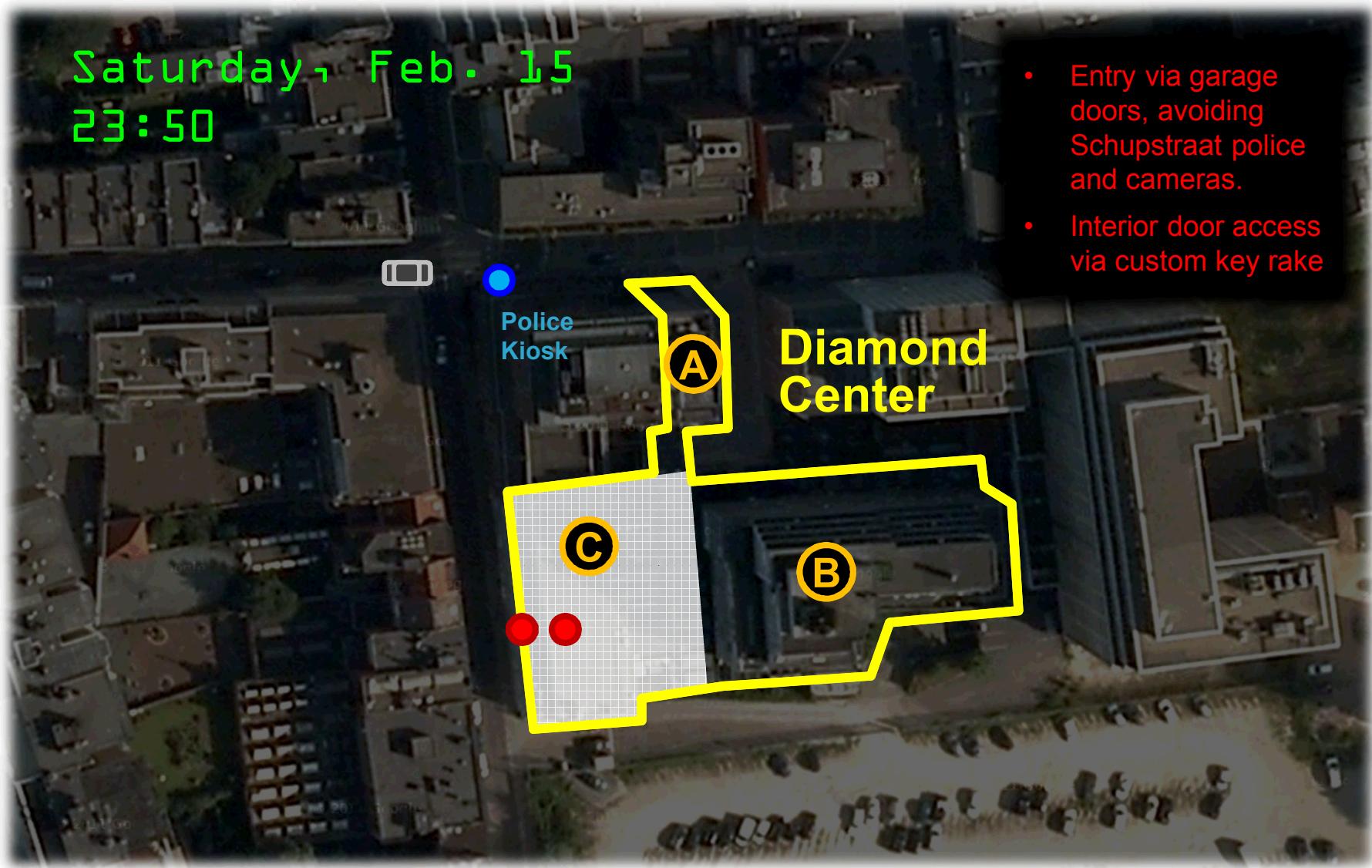


Antwerp: Feb. 2003





Antwerp: Feb. 2003

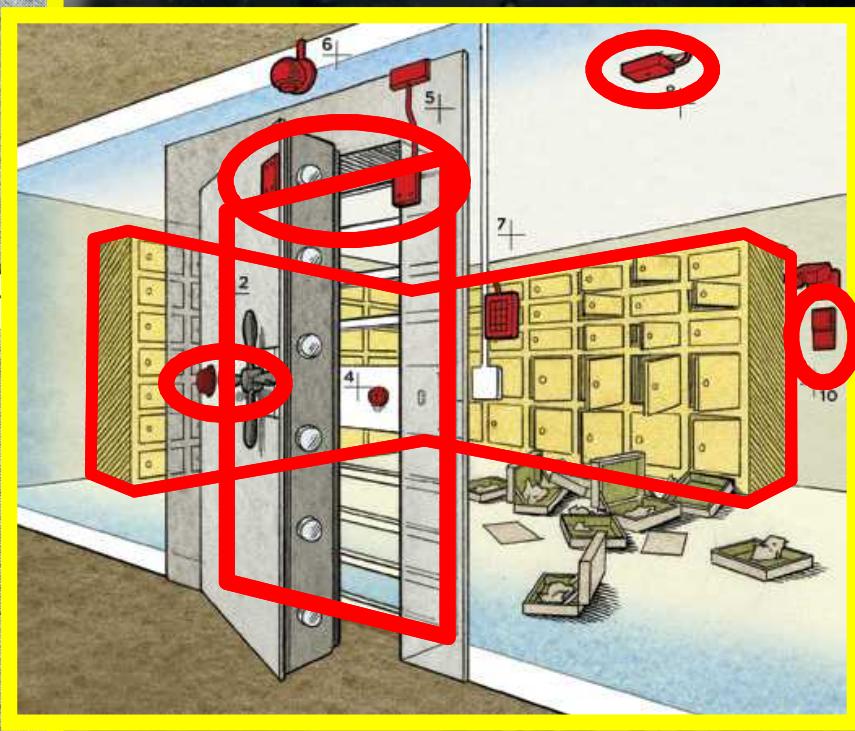
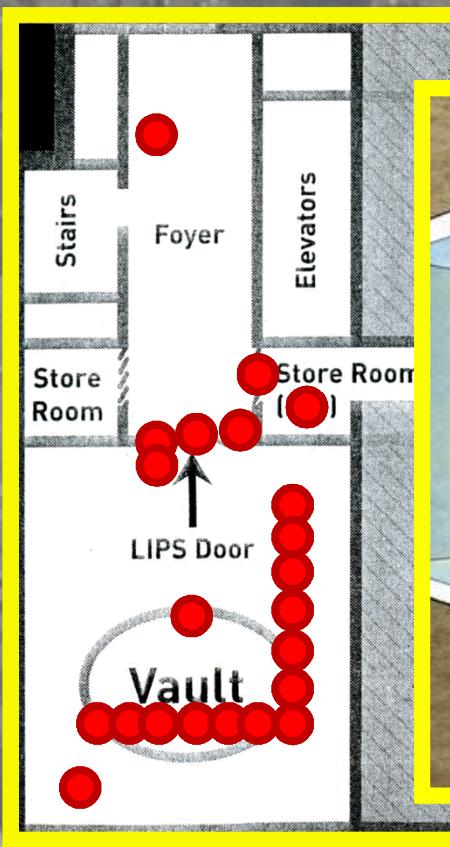




Antwerp: Feb. 2003



Sunday, Feb.
0:00 (approx.)





Antwerp: Feb. 2003

Sunday, Feb. 16
5:00 (approx.)





Antwerp: Feb. 2003

Sunday, Feb. 16
5:00 (approx.)

- Entry into security booth to steal CCTV tapes
- Exit via garage



Why should DOE care?

- DOE and partnering national security agencies are responsible for analysis, design, and implementation of complex physical security systems to protect high-value assets
- **Are we considering the right threats?**
 - Relying on historical attacks can be problematic if there is a low incidence of such attacks
 - **Are there lessons to be learned from major criminal heists** that will help us protect against future adversaries?



Lesson #1:

There's more than one way to steal \$100 million

Nonviolent Classes



Stealth Raid

Thieves actively circumvent security measures without the knowledge of security forces.



Walk Away

Thieves passively circumvent security measures without the knowledge of security forces.

Violent Classes



Smash and Grab

Employing violence toward property rather than people, thieves seize valuables by relying on the delay between theft detection and security force response.



Subdue and Seize

Via violent means, individuals and/or security systems are controlled or incapacitated prior to seizure of valuables.



Deceive, Subdue, and Seize

A Subdue and Seize event is preceded by a deception or diversion, typically permitting the thieves access that they would not normally have.



Tiger Kidnapping

A Subdue and Seize event is preceded by a kidnapping, typically of an individual with access and his family, coercing a person with access the thieves need to act as an insider.



Stockholm: September 2009



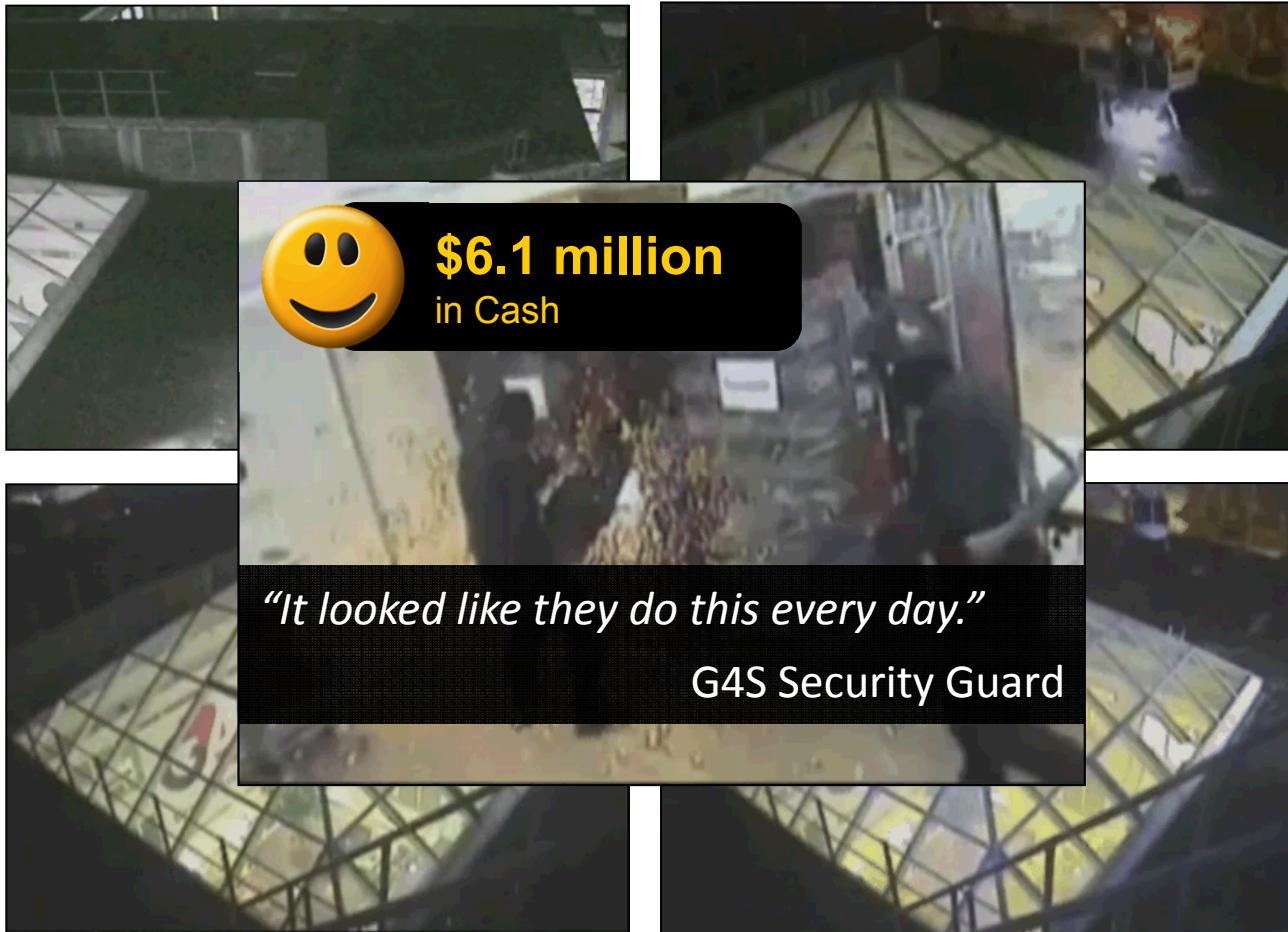


Stockholm: September 2009



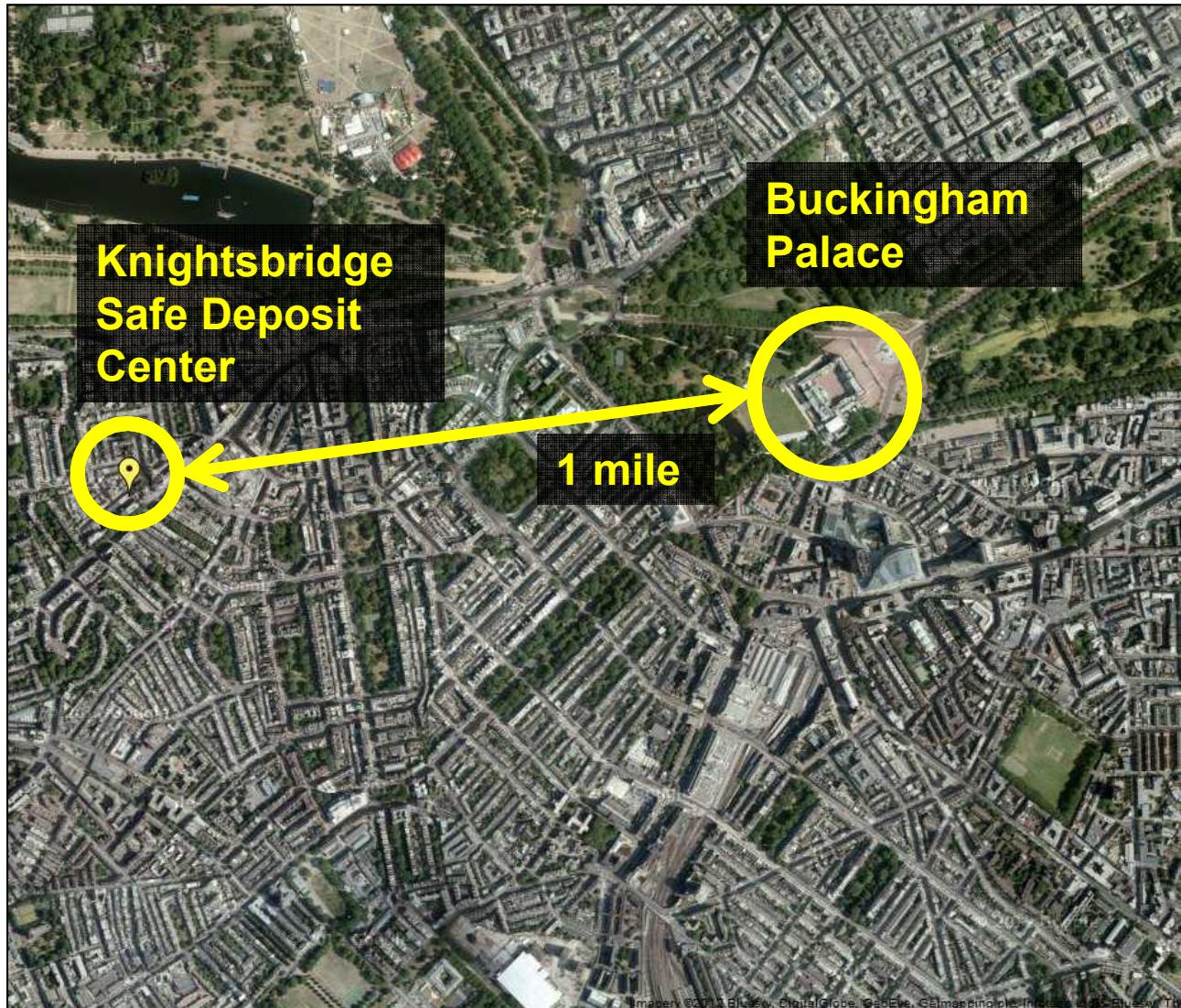


Stockholm: September 2009





London: July 1987





London: July 1987





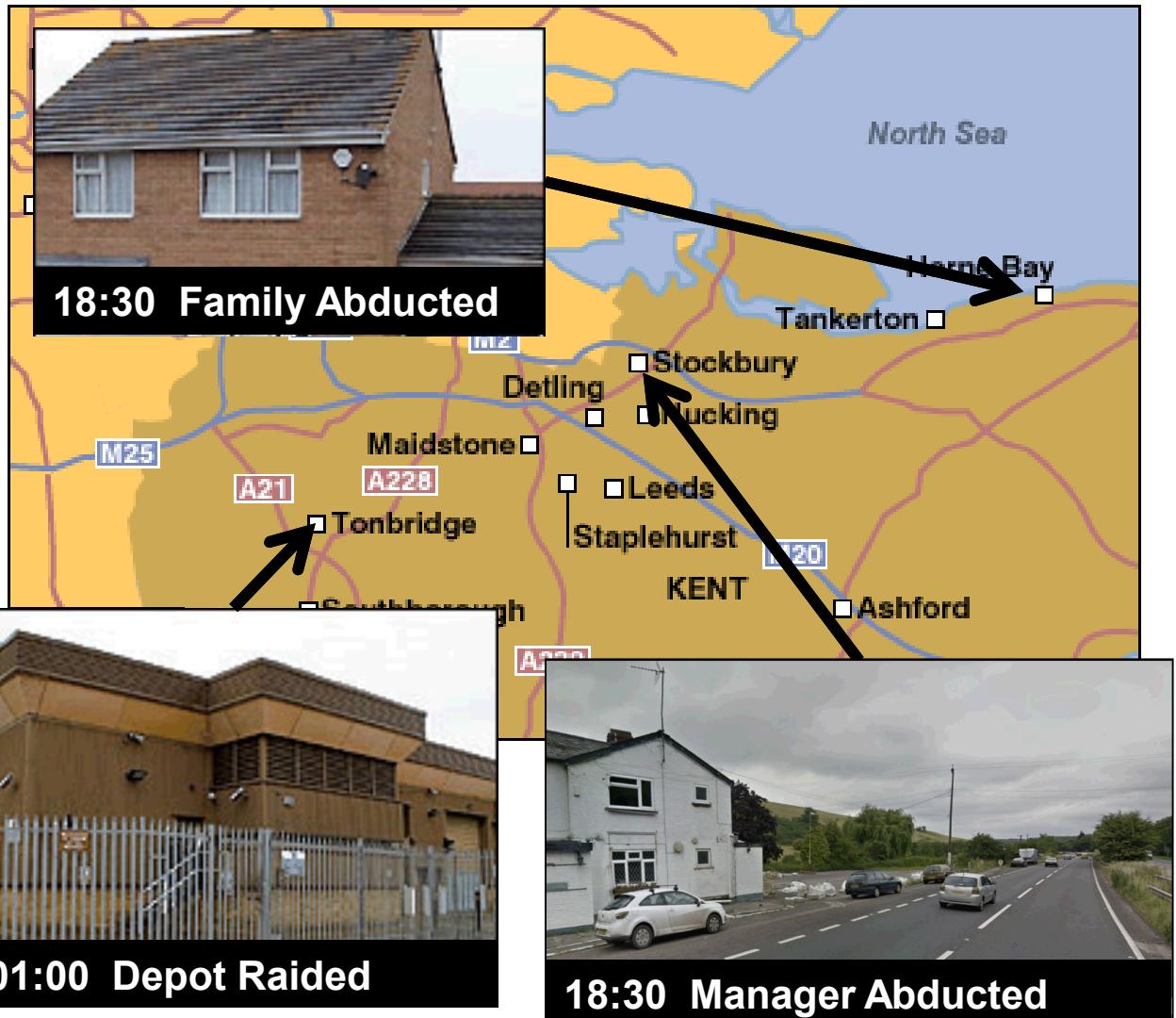
London: July 1987



\$130 million
in Diamonds, Gems, Cash, and other Stored Valuables

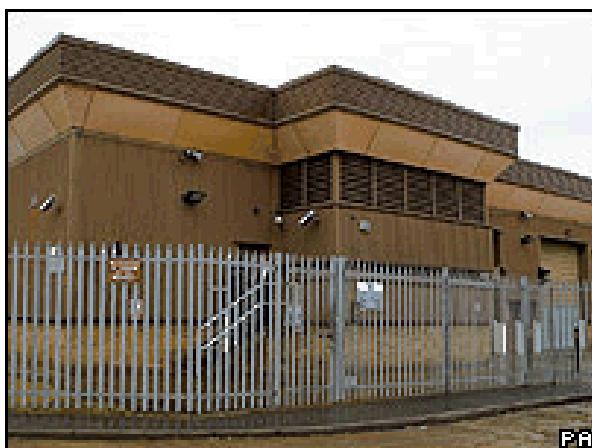


Tonbridge: February 2006





Tonbridge: February 2006





Tonbridge: February 2006





Tonbridge: February 2006



**\$104 million
in Cash**





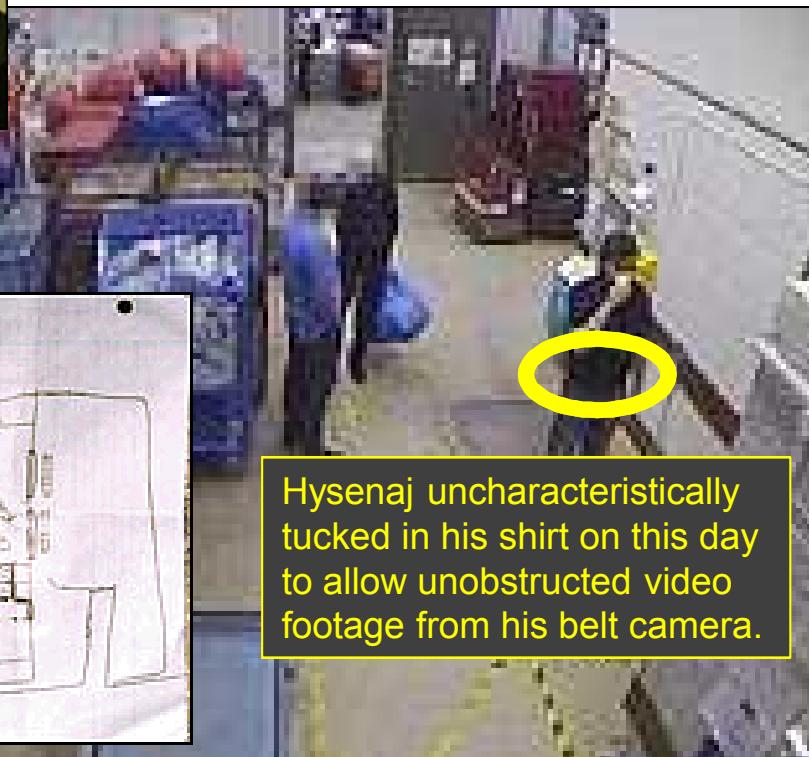
Tonbridge: February 2006



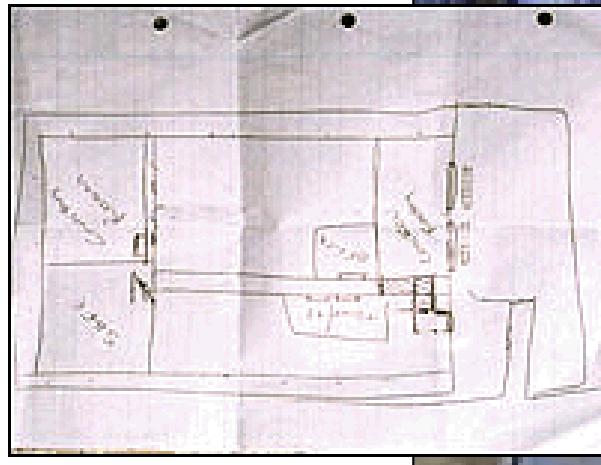
The Inside Man: Ermir Hysenaj



Hysenaj conducting surveillance in plain sight



Hand-drawn plan of
the Securitas Depot



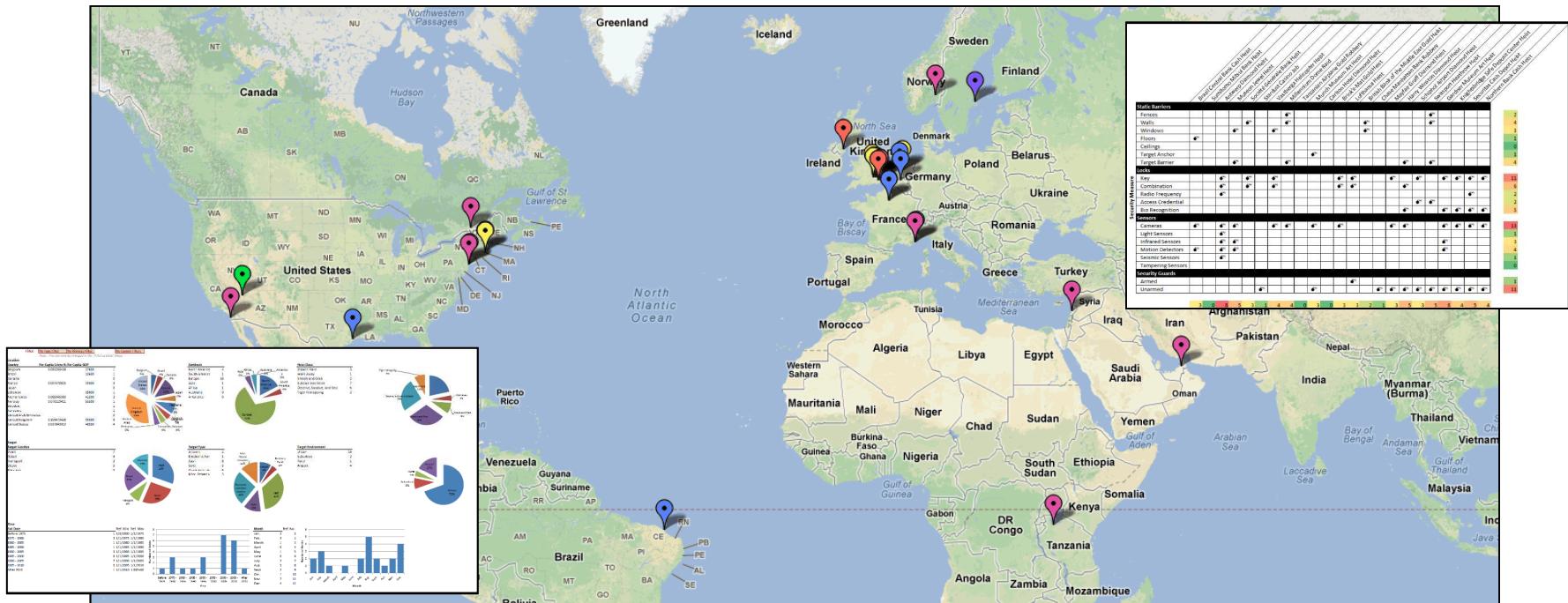
Hysenaj uncharacteristically
tucked in his shirt on this day
to allow unobstructed video
footage from his belt camera.

The Heist Database

ID	Name	Date	Location	Category	Success?	Approx. Value of Items Stolen* (\$FY12M)
1	Brazil Central Bank Cash Heist	Sat., Aug. 6, 2005	Fortaleza, Brazil	Stealth Raid	✓	81.9
2	Sumitomo Mitsui Bank Heist	Sat., Oct. 2, 2004	London, UK	Stealth Raid		478.5
3	Antwerp Diamond Heist	Sat., Feb. 15, 2003	Antwerp, Belgium	Stealth Raid		332.1
4	Museon Jewel Heist	Mon., Dec. 2, 2002	The Hague, Netherlands	Stealth Raid		15.4
5	Société Générale Bank Heist	Sat., July 17, 1976	Nice, France	Stealth Raid		40.4
6	Stardust Casino Job	Tues., Sept. 22, 1992	Las Vegas, USA	Walk Away		0.8
7	Västberga Helicopter Heist	Wed., Sept. 23, 2009	Stockholm, Sweden	Smash and Grab		6.1
8	Millennium Dome Raid	Tues., Nov. 7, 2000	London, UK	Smash and Grab		666.1
9	Tanzanian Airplane Gold Robbery	Thurs., Jan. 5, 2012	Geita, Tanzania	Subdue and Seize		30.5
10	Munch Museum Art Heist	Sun., Aug. 22, 2004	Oslo, Norway	Subdue and Seize		137.9
11	Carlton Hotel Diamond Heist	Thurs., Aug. 11, 1994	Cannes, France	Subdue and Seize		69.3
12	Brink's-Mat Gold Heist	Sat., Nov. 26, 1983	London, UK	Subdue and Seize		85.9
13	Lufthansa Heist	Mon., Dec. 11, 1978	New York, USA	Subdue and Seize		28.2
14	British Bank of the Middle East Gold Heist	Tues., Jan. 20, 1976	Beirut, Lebanon	Subdue and Seize		204.6
15	Chase Manhattan Bank Robbery	Tues., Aug. 22, 1972	New York, USA	Subdue and Seize		1.2
16	Mayfair Graff Diamond Heist	Thurs., Aug. 6, 2009	London, UK	Deceive, Subdue, and Seize		68.9
17	Harry Winston Diamond Heist	Thurs., Dec. 4, 2008	Paris, France	Deceive, Subdue, and Seize		111.3
18	Schiphol Airport Diamond Heist	Fri., Feb. 25, 2005	Amsterdam, Netherlands	Deceive, Subdue, and Seize		115.8
19	Swissport Heathrow Heist	Mon., May 17, 2004	London, UK	Deceive, Subdue, and Seize		71.1
20	Gardner Museum Art Heist	Sun., March 18, 1990	Boston, USA	Deceive, Subdue, and Seize		440.0
21	Knightsbridge Safe Deposit Center Heist	Sun., July 12, 1987	London, UK	Deceive, Subdue, and Seize		130.0
22	Securitas Cash Depot Heist	Tues., Feb. 21, 2006	Tonbridge, UK	Tiger Kidnapping		104.0
23	Northern Bank Cash Heist	Sun., Dec. 19, 2004	Belfast, UK	Tiger Kidnapping		60.5

The Heist Database

- Heist Methods & Characteristics Database (HMCD) consists of:
 - 152 data fields per heist
 - 23 heists completely characterized heists (3,496 entries)
 - 11 additional heists partially characterized (excluded from this analysis)



<https://www.google.com/maps/ms?msid=206565135619449682207.0004be5da3a6089e3d9c5&msa=0>

Study Objectives

- Through qualitative and quantitative analysis, characterize the landscape of high-value criminal heists
 - Describe the **range and diversity of criminal methods** utilized in large heists, both qualitatively and quantitatively
 - Identify **characteristics that are common** (or uncommon) to large heists
- In framing the problem and discussion, focus on:
 - Defeated security measures and devices
 - Deception methods
 - Timing and target selection
 - Weapons employed
 - Resources and risk acceptance
 - Insider information and actions
 - Failures and mistakes

Today's
Presentation

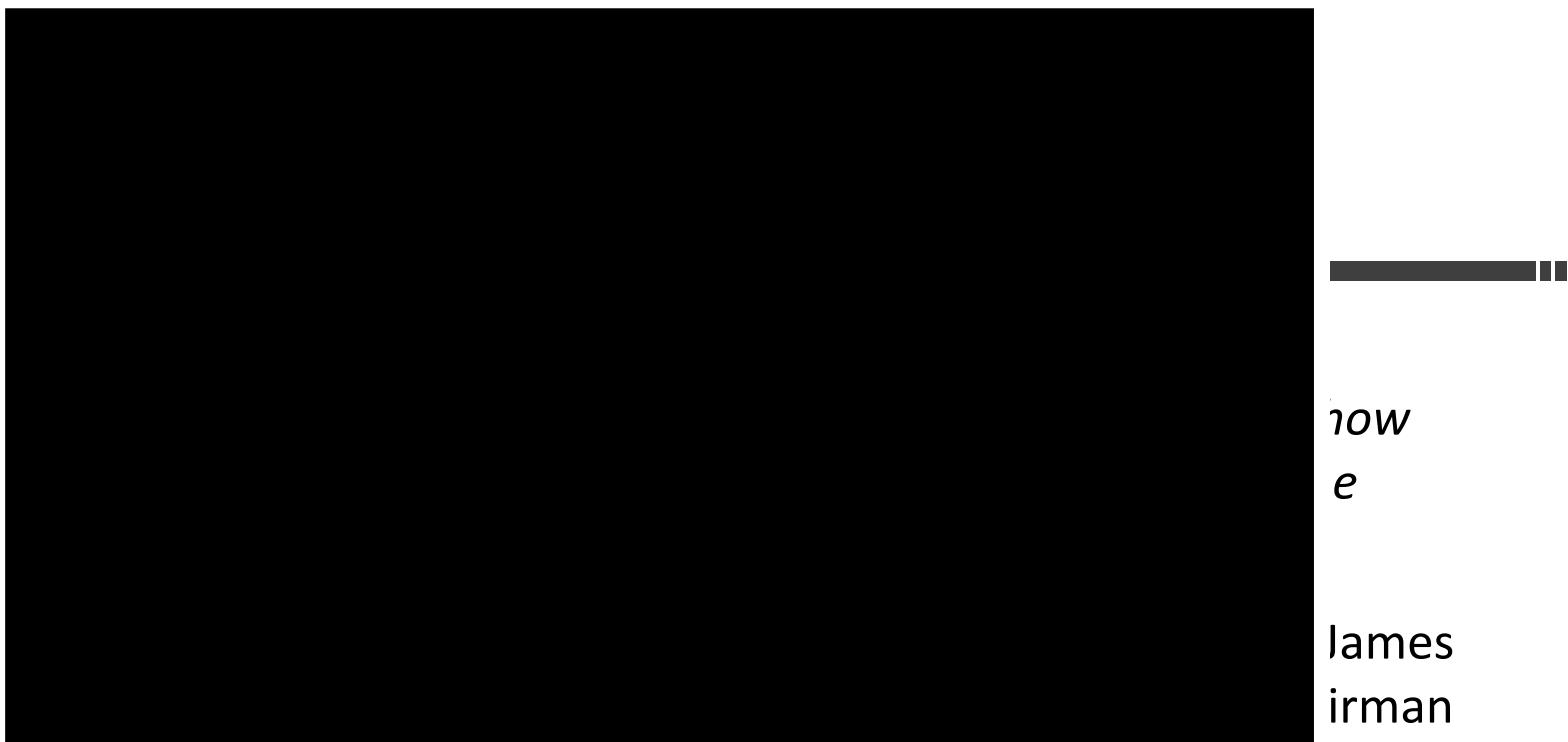
DEFEATED SECURITY MEASURES AND DEVICES



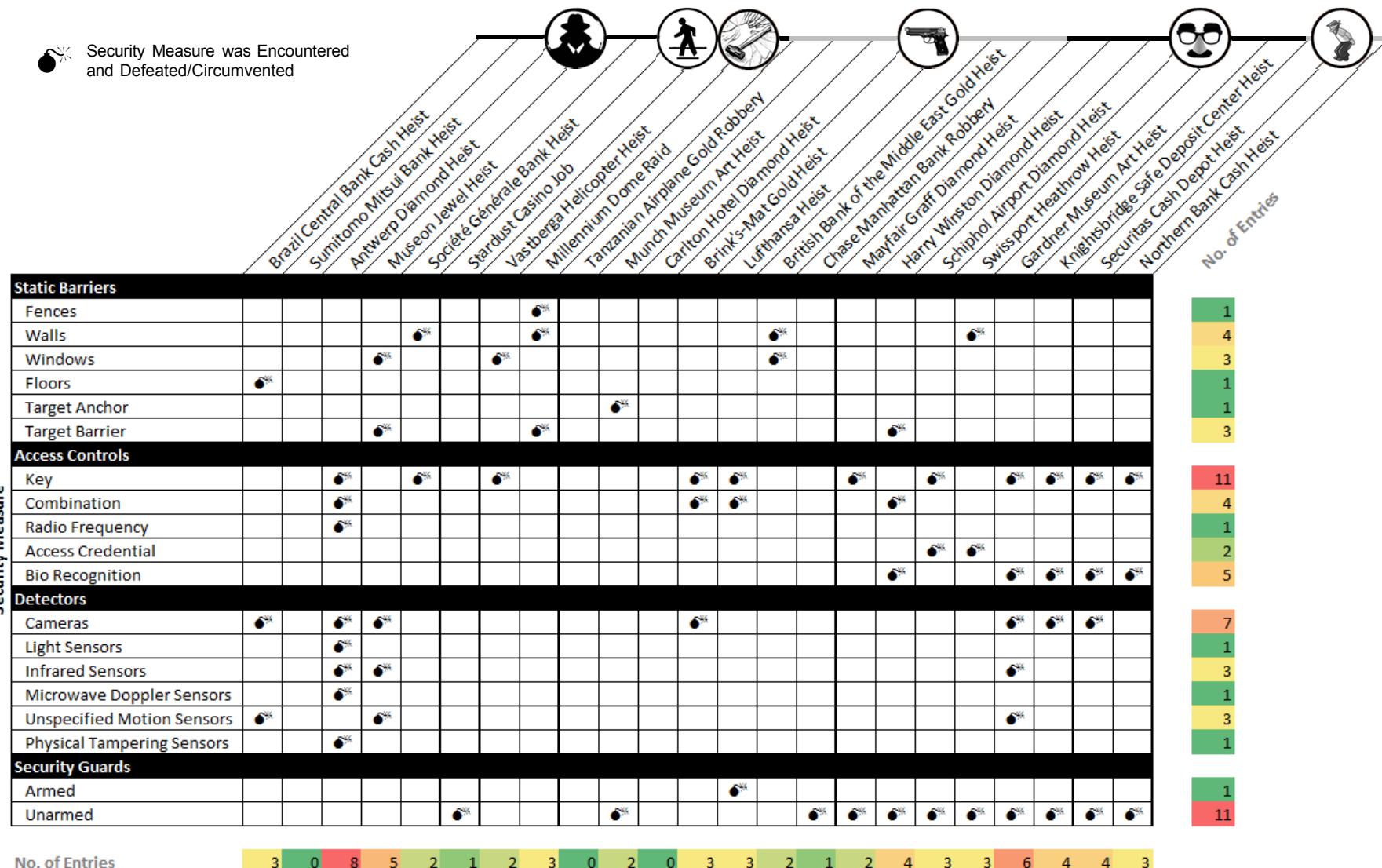
The vault was reputed to be very nearly impregnable, and it was very difficult to see how anybody could just walk up and go and lift the diamonds out of it.

David James
Former Millennium Dome Chairman

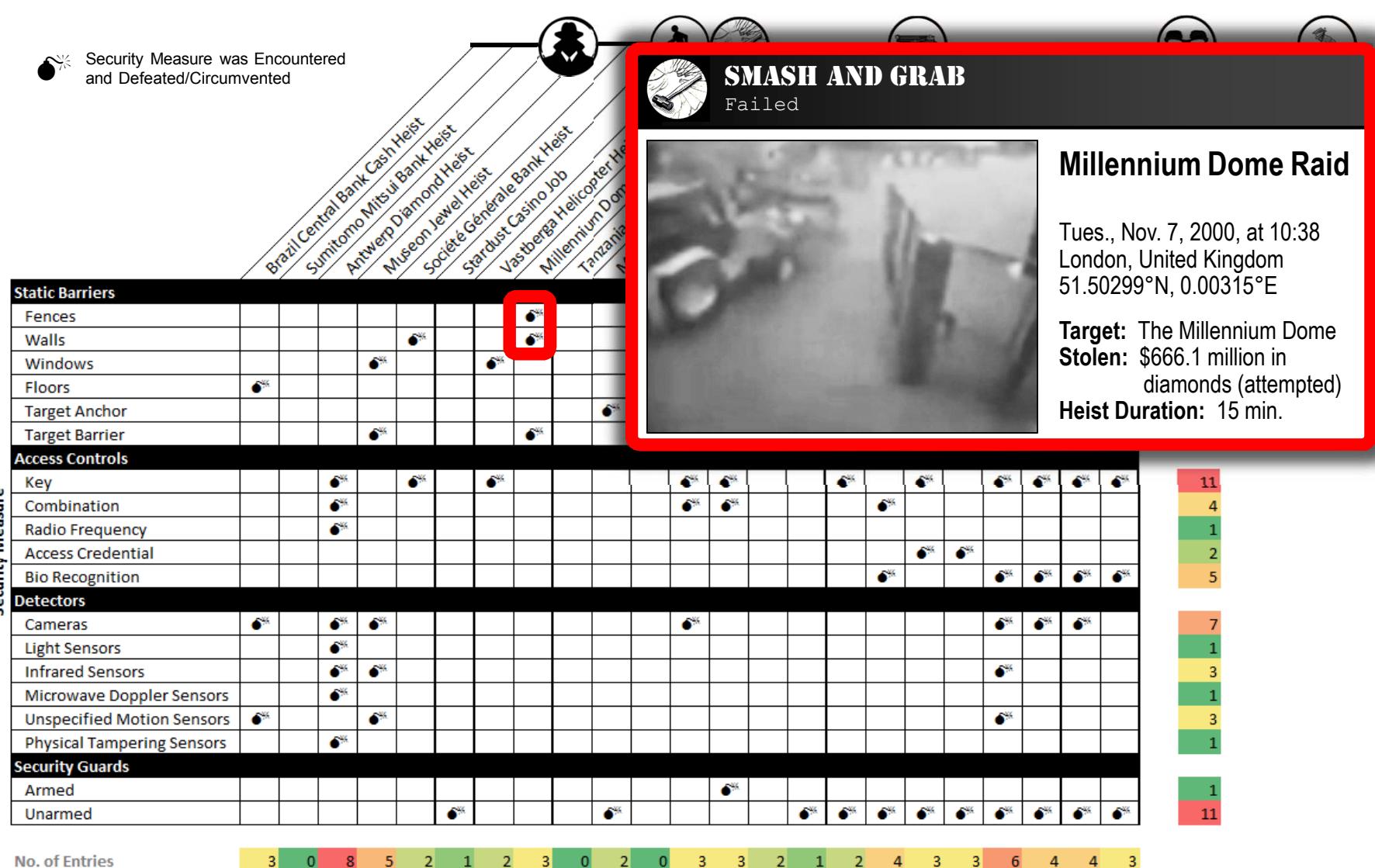
DEFEATED SECURITY MEASURES AND DEVICES



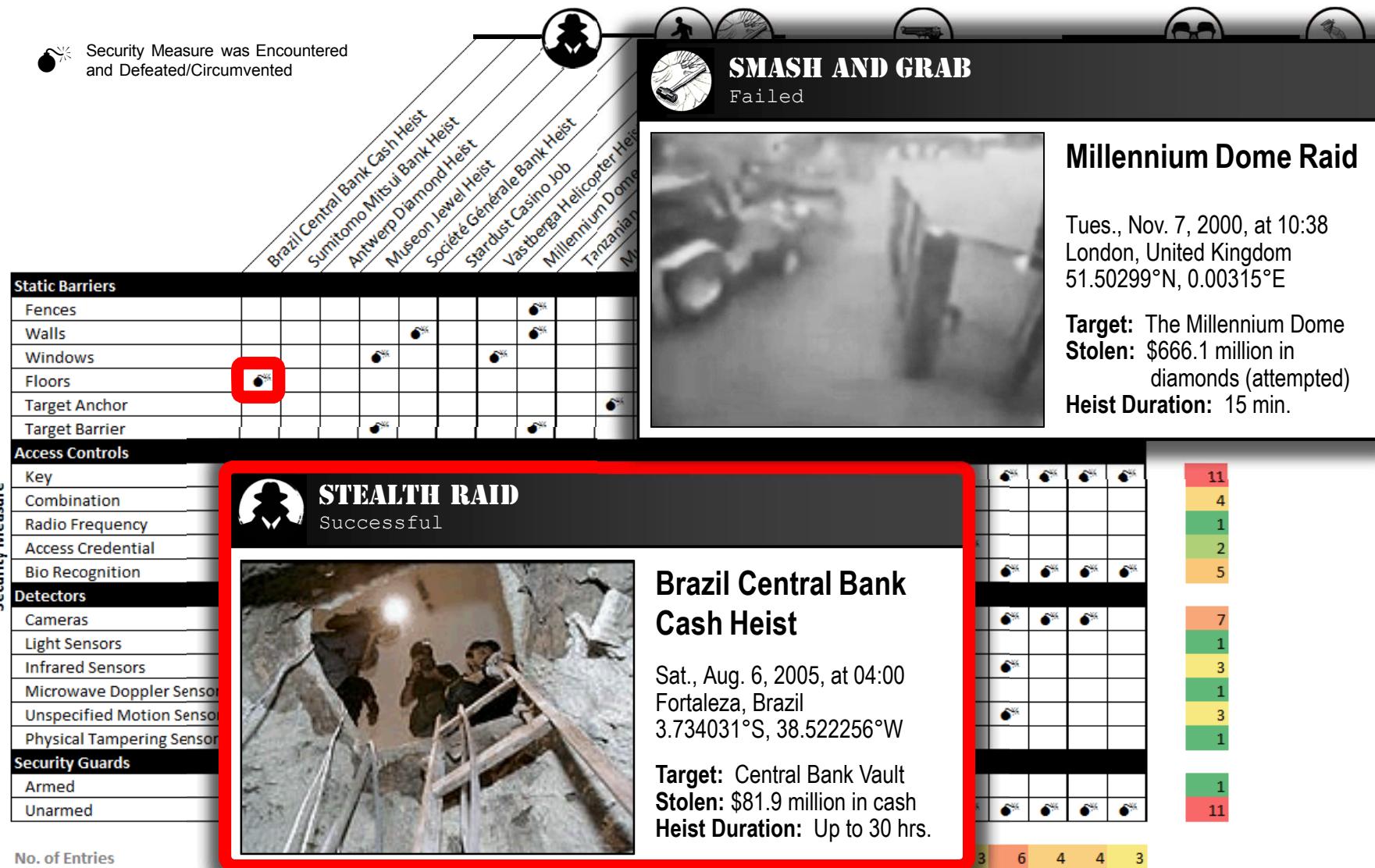
Defeated Security Measures



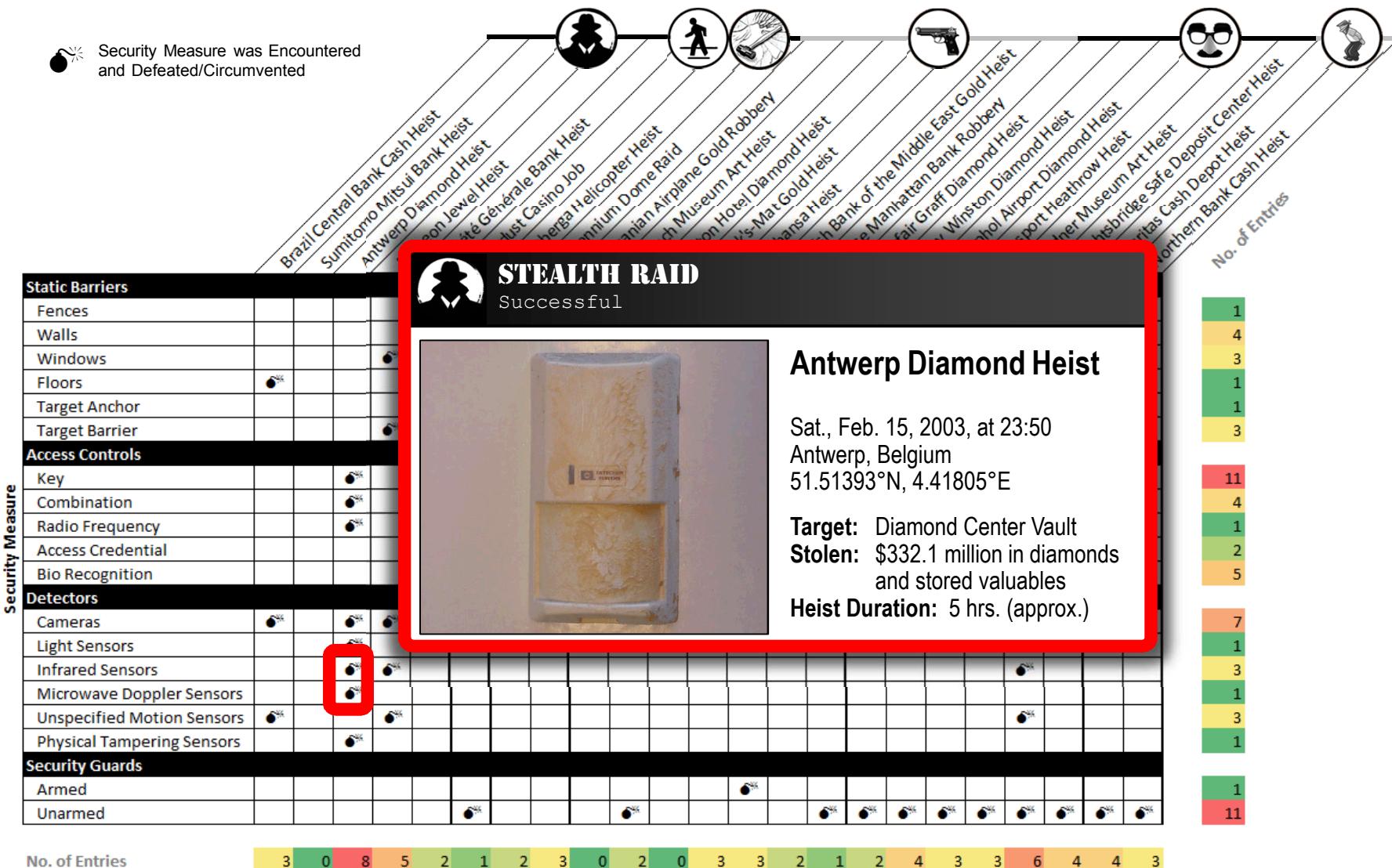
Defeated Security Measures



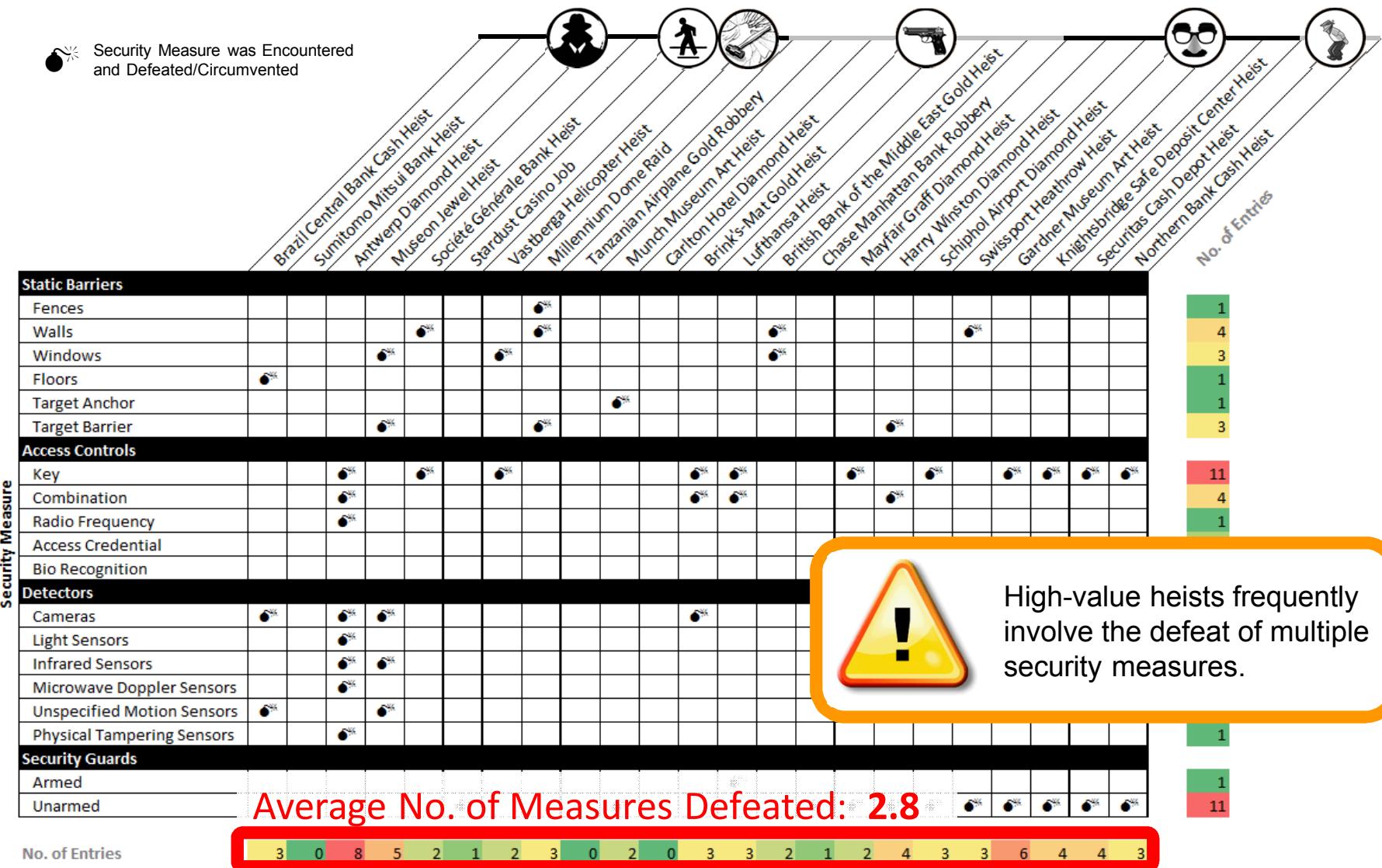
Defeated Security Measures



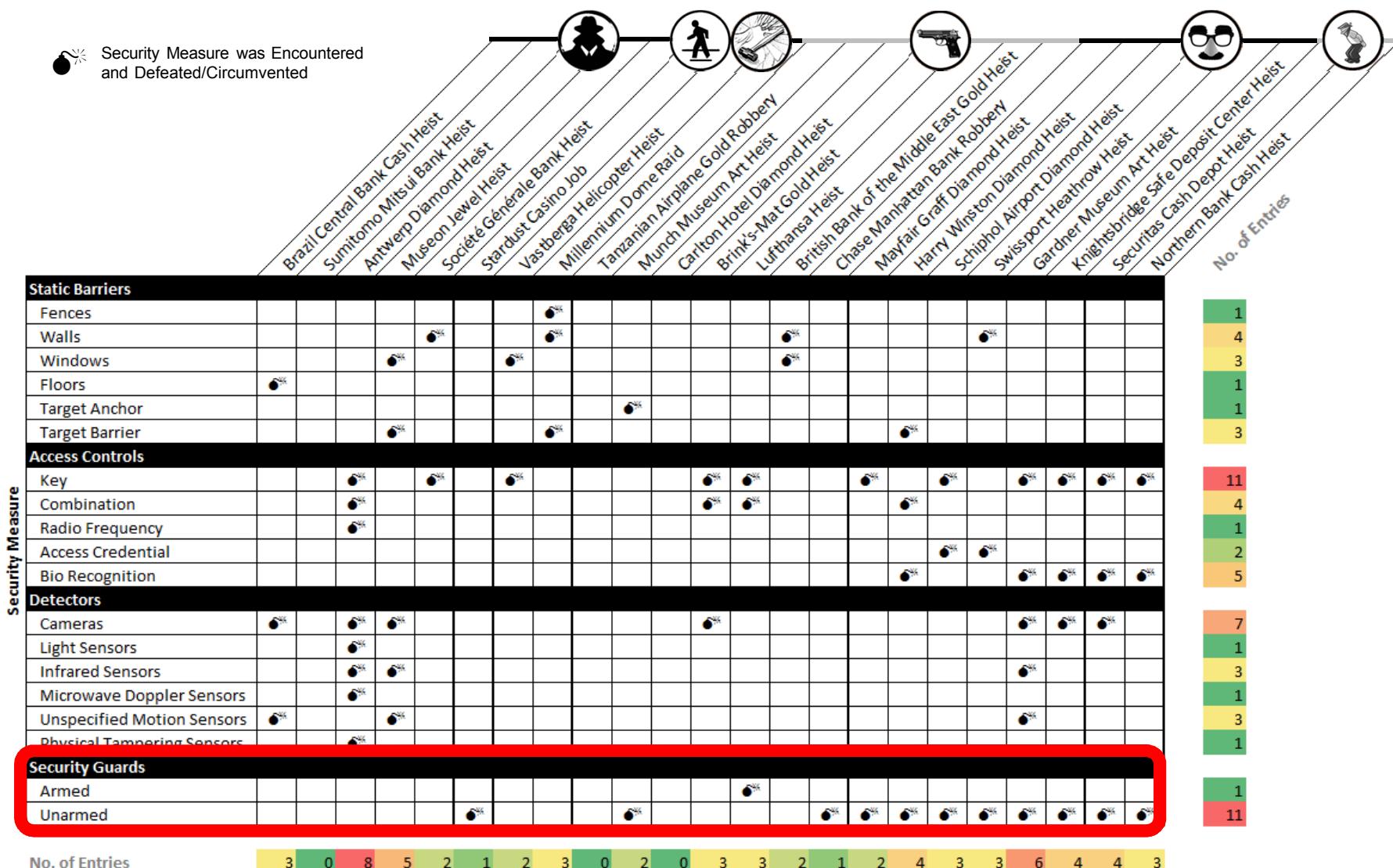
Defeated Security Measures



Defeated Security Measures



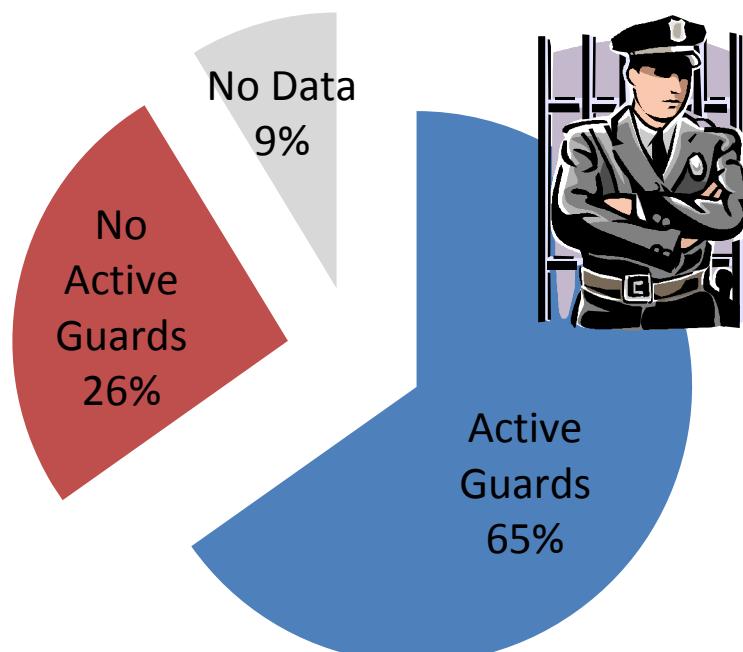
Defeated Security Measures



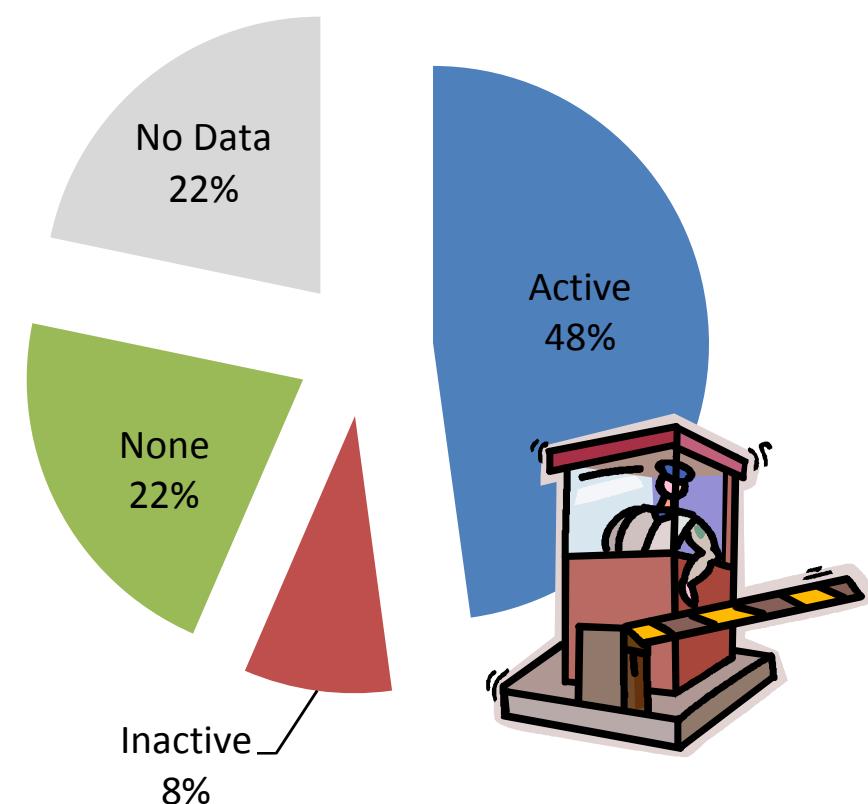
Defeated Security Measures

Security Guards

Existence of Active Guards
at Target Premises During Heists



Status of Guard Stations
at Target Premises During Heists

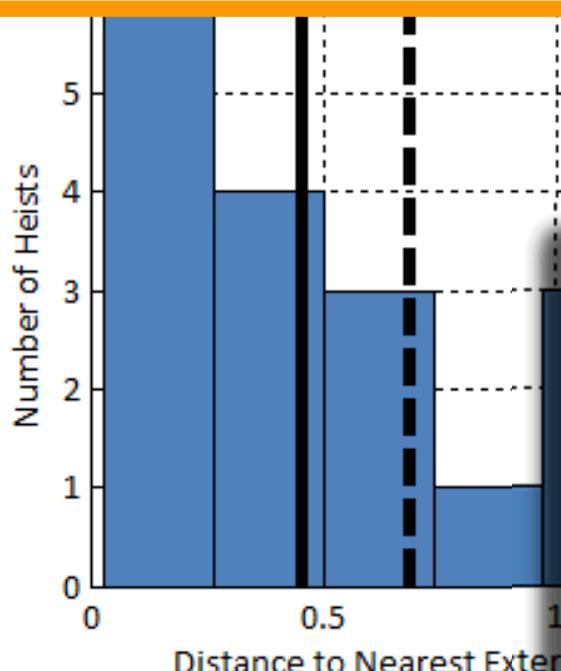


Defeated Security Measures

Security Guards



Close proximity of security forces is not a sufficient condition for protecting high-value assets.



Nearest External Security Force or Police Station

STEALTH RAID
Successful



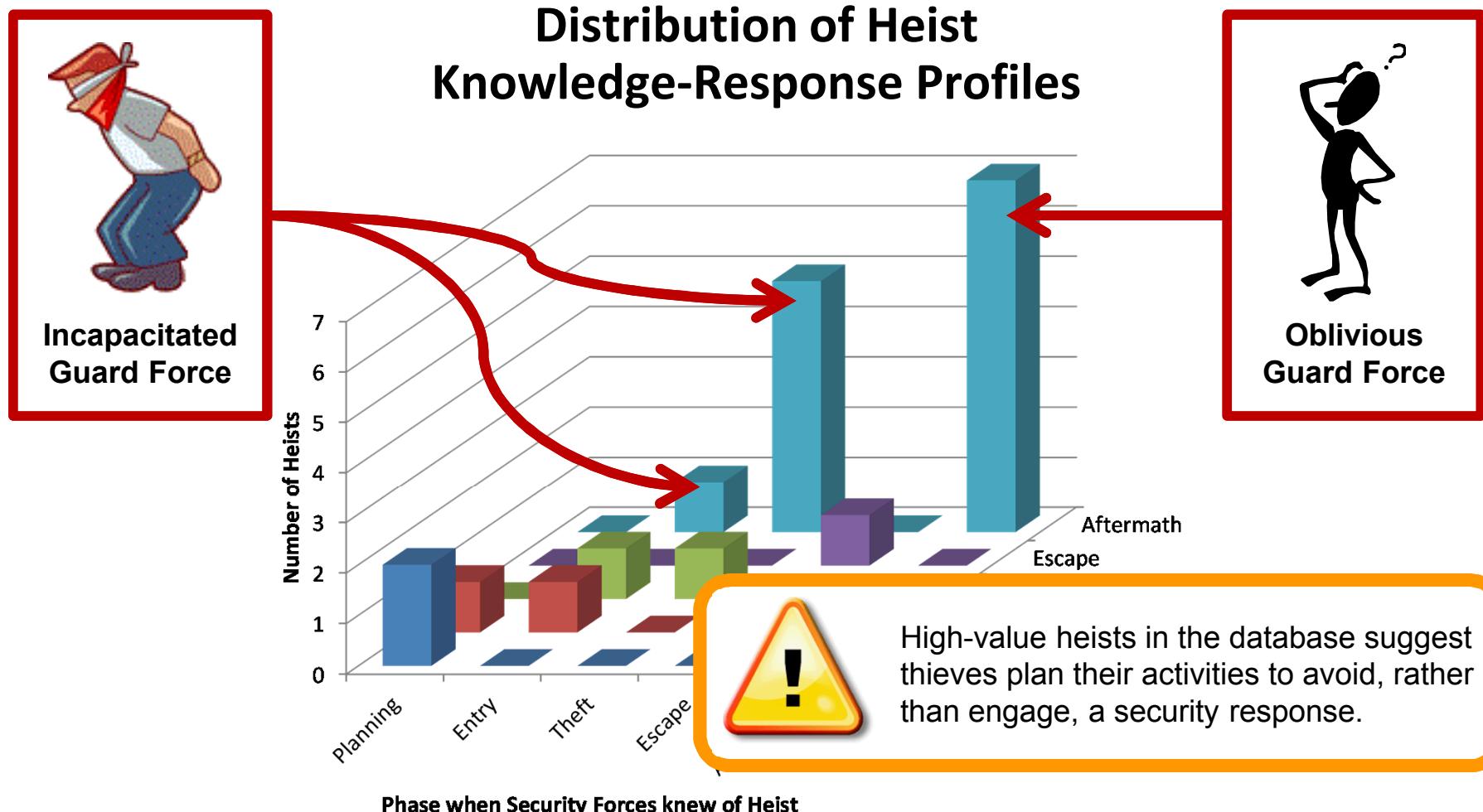
Antwerp Diamond Heist

Sat., Feb. 15, 2003, at 23:50
Antwerp, Belgium
51.51393°N, 4.41805°E

Target: Diamond Center Vault
Stolen: \$332.1 million in diamonds and stored valuables
Heist Duration: 5 hrs. (approx.)

Defeated Security Measures

Security Guards



Defeated Security Measures

Security Guards



Oblivious
Guard Force

ermath

ts in the database suggest
ir activities to avoid, rather
security response.

Defeated Security Measures

Security Guards



Oblivious
Guard Force

rmath

s in the database suggest
r activities to avoid, rather
security response.

DECEPTION METHODS

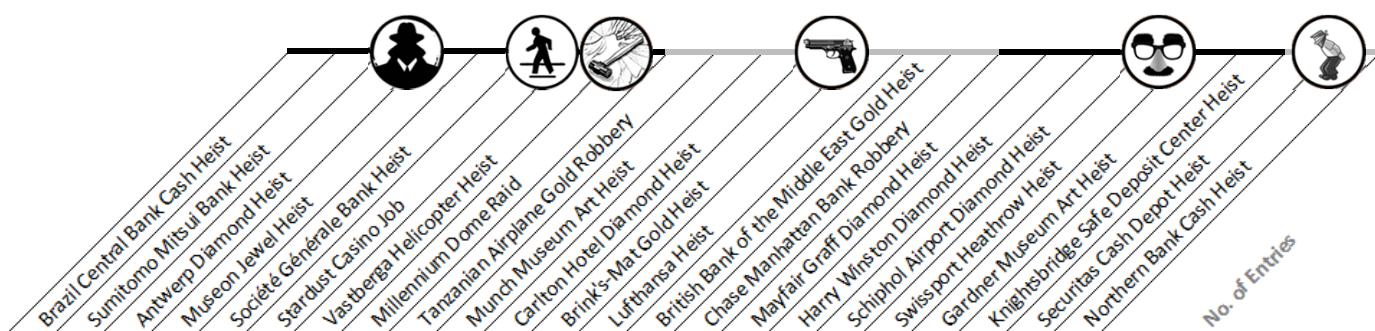
The criminal plan of the thieves, using the two bogus police officers to enter the Gardner Museum, was quite simple and quite easily executed. The Gardner Museum could have been as secure as Fort Knox, but that does no good if the guard is going to let the thief in.

Robert Spiel
Art Theft Investigator

Deception Methods



Deception Method
was Employed

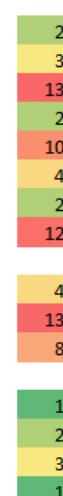


Physical Disguises

Deception Methods	Heists																			
	Brazil Central Bank Cash Heist	Sumitomo Mitsui Bank Heist	Antwerp Diamond Heist	Museon Jewel Heist	Société Générale Bank Heist	Stardust Casino Job	Västberga Helicopter Heist	Millennium Dome Raid	Tanzanian Airplane Gold Robbery	Munich Museum Art Heist	Carlton Hotel Diamond Heist	Lufthansa Heist	British Bank of the Middle East Gold Heist	Chase Manhattan Bank Robbery	Harry Graff Diamond Heist	Schiphol Airport Diamond Heist	Gardner Museum Art Heist	Knightsbridge Safe Deposit Center Heist	Securitas Cash Depot Heist	Northern Bank Cash Heist
Disguise of Thief-Possessed Buildings/Rooms	●		●																	
Disguise of Theft in Progress				●						●										
Vehicles that Blend with Surroundings	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Disguised/Concealed Surveillance Equipment		●																		
Disguised/Concealed Operations Equipment	●	●	●	●				●			●	●	●	●	●	●	●	●	●	●
Physical Disguise or Concealment of Loot	●	●			●															●
Disguised Age or Gender																				
Disguised Other Physical Features	●	●				●	●		●	●	●	●				●	●	●	●	●
Activity Disguises																				
Disarming Personality or Reputation	●		●		●												●			
Blending in by Occupation	●	●	●	●	●	●				●	●	●	●			●	●	●	●	●
Exertion of Perceived Legitimate Authority										●	●	●				●	●	●	●	●
Diversions																				
Personal Distractions																	●			
Relay of Stolen Goods		●														●				
Decoy Vehicle or Device					●					●					●					
Exploitation of Tensions											●				●					

No. of Entries

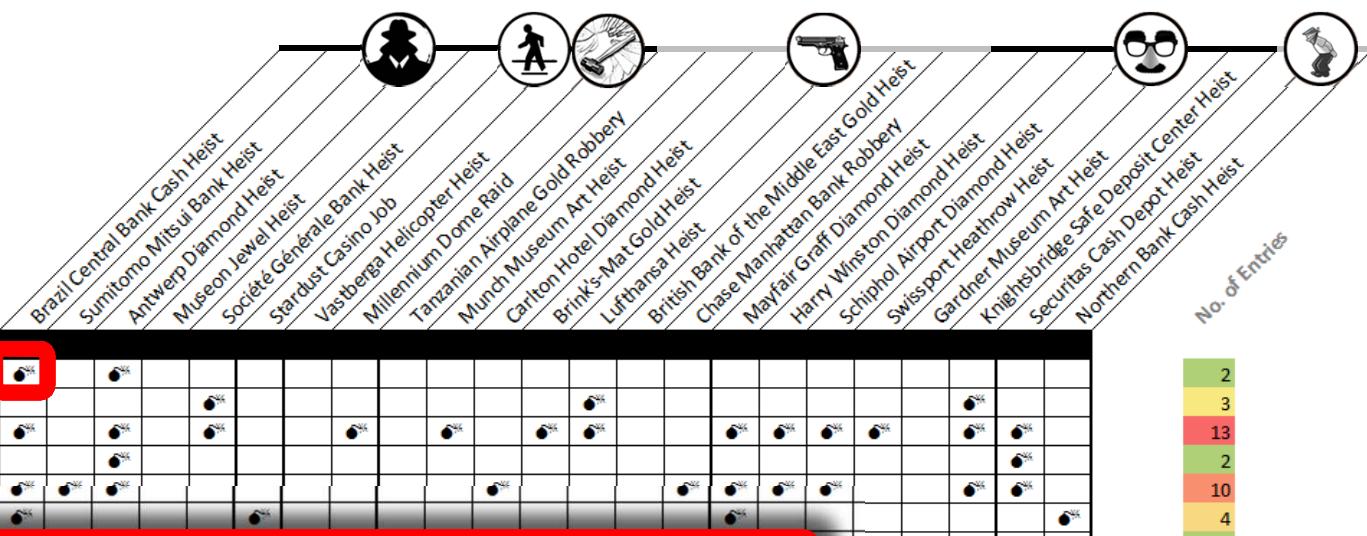
7 3 6 0 4 2 1 2 0 2 2 3 5 1 2 5 3 4 4 2 8 6 4



Deception Methods



Deception Method
was Employed



Deception Methods

Physical Disguises

- Disguise of Thief-Possessed Buildings/Rooms
- Disguise of Theft in Progress
- Vehicles that Blend with Surroundings
- Disguised/Concealed Surveillance Equipment
- Disguised/Concealed Operations Equipment
- Physical Disguise or Concealment of Loot
- Disguised Age or Gender
- Disguised Other Physical Features

Activity Disguises

- Disarming Personality or Reputation
- Blending in by Occupation
- Exertion of Perceived Legitimacy

Diversions

- Personal Distractions
- Relay of Stolen Goods
- Decoy Vehicle or Device
- Exploitation of Tensions

No. of Entries



STEALTH RAID

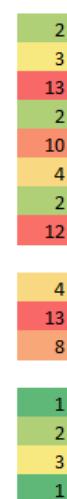
Successful



Brazil Central Bank Cash Heist

Sat., Aug. 6, 2005, at 04:00
Fortaleza, Brazil
3.734031°S, 38.522256°W

Target: Central Bank Vault
Stolen: \$81.9 million in cash
Heist Duration: Up to 30 hrs.



4 4 2 8 6 4

Deception Methods

Deception Methods

 Deception Method was Employed

Physical Disguises	
Disguise of Thief-Possessed Buildings/Rooms	2
Disguise of Theft in Progress	3
Vehicles that Blend with Surroundings	13
Disguised/Concealed Surveillance Equipment	2
Disguised/Concealed Operations Equipment	10
Physical Disguise or Concealment of Loot	4
Disguised Age or Gender	2
Disguised Other Physical Feature	12
Activity Disguises	
Disarming Personality or Reputation	4
Blending in by Occupation	13
Exertion of Perceived Legitimacy	8
Diversions	
Personal Distractions	1
Relay of Stolen Goods	2
Decoy Vehicle or Device	3
Exploitation of Tensions	1

No. of Entries



TIGER KIDNAPPING

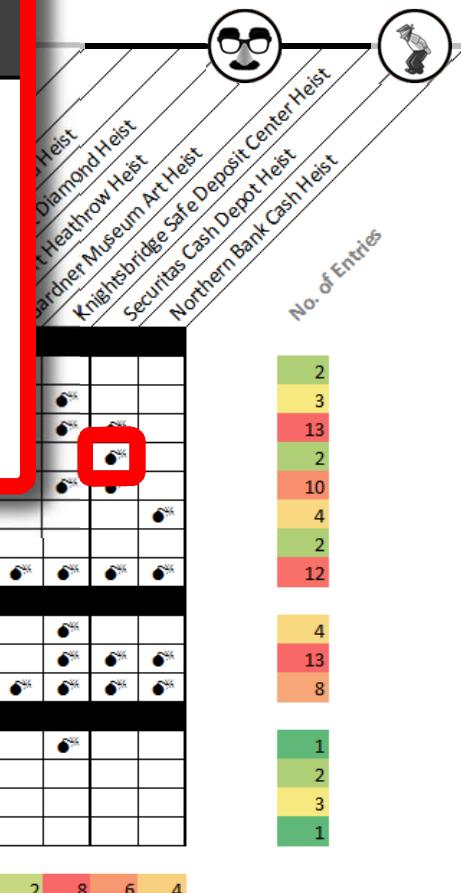
Successful



Securitas Cash Depot Heist

Tues., Feb. 21, 2006, at 18:30
Tonbridge, United Kingdom
51.191098°N, 0.277652°E

Target: Securitas Depot
Stolen: \$104 million in cash
Heist Duration: 7.8 hours



STEALTH RAID

Successful



Brazil Central Bank Cash Heist

Sat., Aug. 6, 2005, at 04:00
Fortaleza, Brazil
3.734031°S, 38.522256°W

Target: Central Bank Vault
Stolen: \$81.9 million in cash
Heist Duration: Up to 30 hrs.

Deception Methods

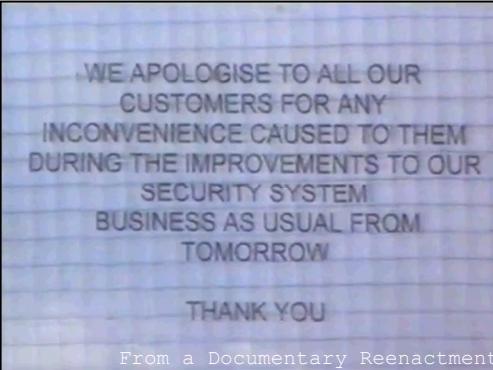
Deception Method was Employed

Physical Disguises	
Disguise of Thief-Possessed Building	●
Disguise of Theft in Progress	●
Vehicles that Blend with Surroundings	●
Disguised/Concealed Surveillance	●
Disguised/Concealed Operations Equipment	●
Physical Disguise or Concealment of Loot	●
Disguised Age or Gender	●
Disguised Other Physical Features	●
Activity Disguises	
Disarming Personality or Reputation	●
Blending in by Occupation	●
Exertion of Perceived Legitimate Authority	●
Diversions	
Personal Distractions	●
Relay of Stolen Goods	●
Decoy Vehicle or Device	●
Exploitation of Tensions	●

No. of Entries

7 3 6 0 4 2 1 2 0 2 2 3 5 1 2 5 3 4 4 2 8 6 4

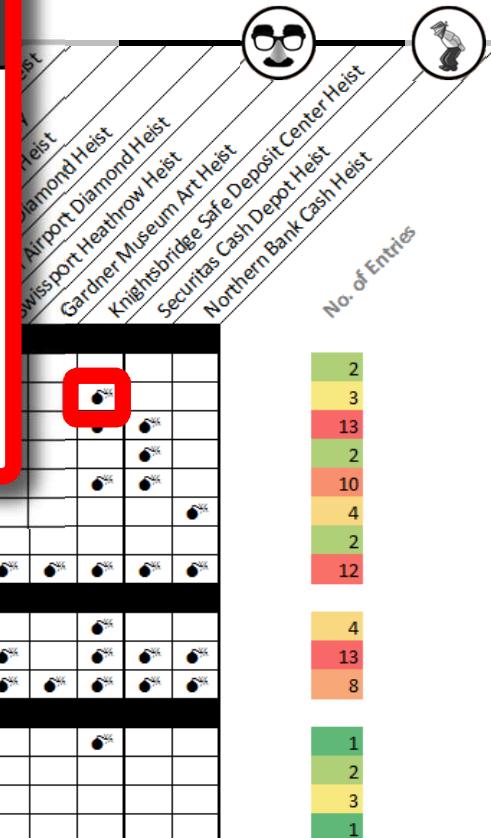
DECEIVE, SUBDUE, AND SEIZE
Successful



From a Documentary Reenactment

Knightsbridge Safe Deposit Center Heist
Sun., July 12, 1987, at 15:00
London, United Kingdom
51.498765°N, 0.166361°W

Target: Safe Deposit Center
Stolen: \$130 million in cash, gems, and stored valuables
Heist Duration: 2 hours



Deception Methods

Deception Method was Employed

Deception Methods	Physical Disguises
	Disguise of Thief-Possessed Building
	Disguise of Theft in Progress
	Vehicles that Blend with Surroundings
	Disguised/Concealed Surveillance Equipment
	Disguised/Concealed Operations Equipment
	Physical Disguise or Concealment of Loot
	Disguised Age or Gender
	Disguised Other Physical Features
Activity Disguises	
	Disarming Personality or Reputation
	Blending in by Occupation
	Exertion of Perceived Legitimate Authority
Diversions	
	Personal Distractions
	Relay of Stolen Goods
	Decoy Vehicle or Device
	Exploitation of Tensions



DECEIVE, SUBDUE, AND SEIZE

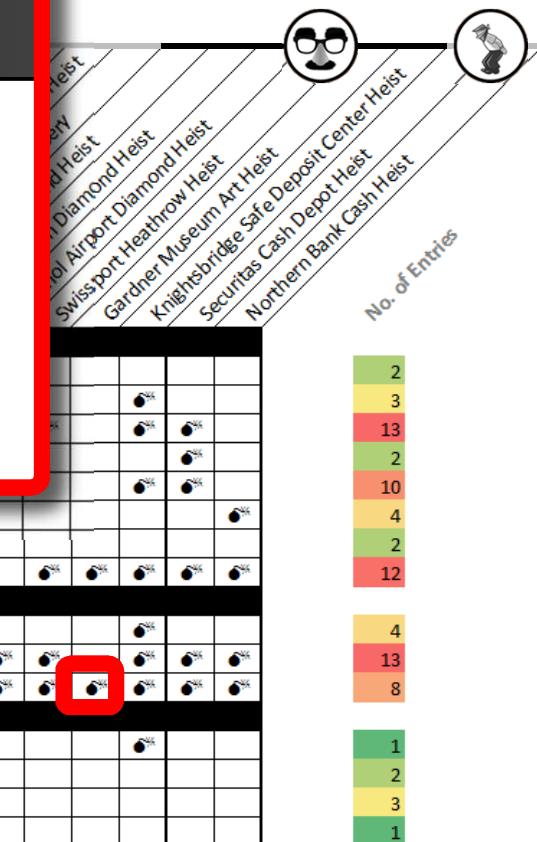
Successful



Gardner Museum Art Heist

Sun., March 18, 1990, at 01:24
Boston, United States of America
42.338768°N, 71.098859°W

Target: Gardner Museum
Stolen: \$440 million in artwork
Heist Duration: 1.4 hours

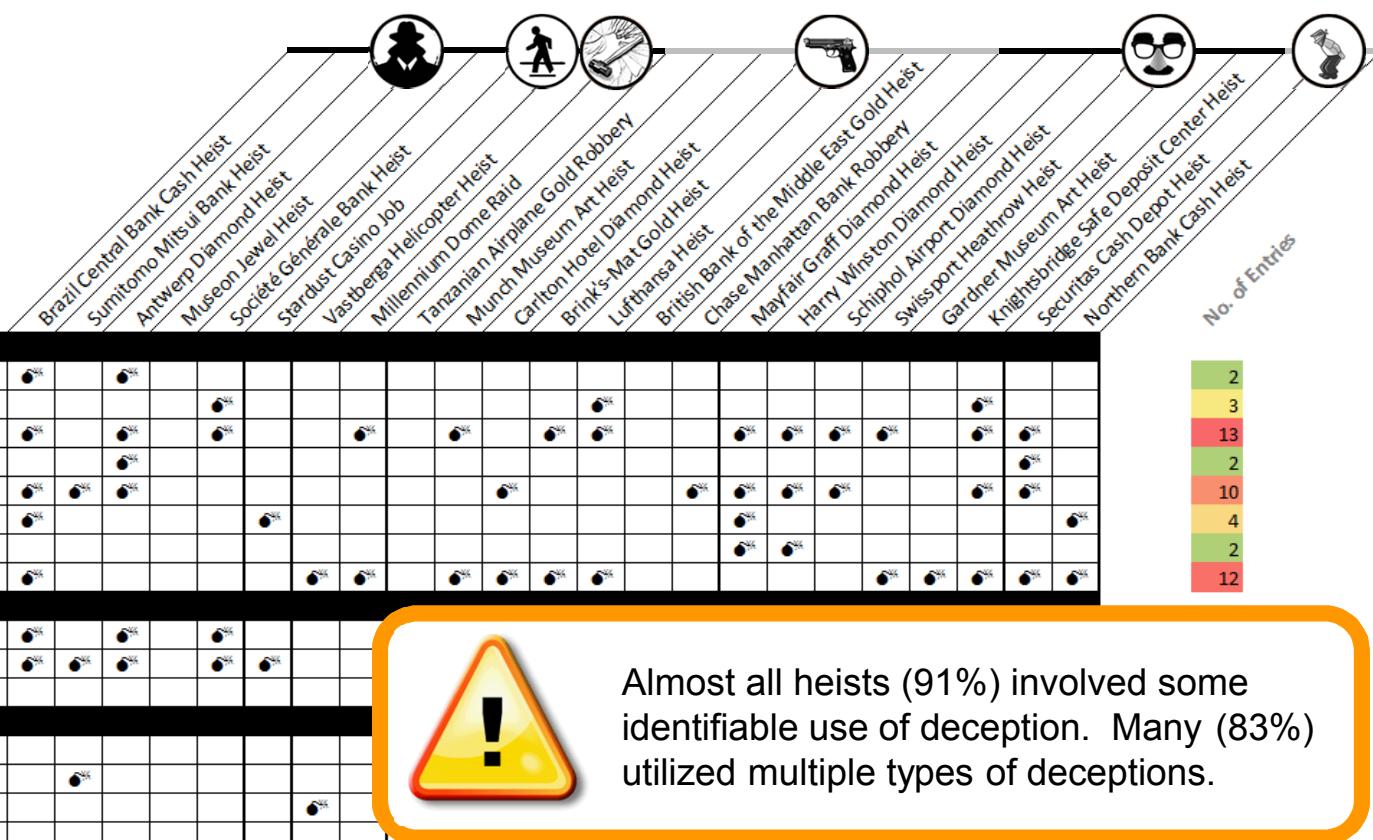


No. of Entries

Deception Methods



Deception Method
was Employed



No. of Entries

7 3 6 0 4 2 1 2 0 2 2 3 5 1 2 5 3 4 4 2 8 6 4

RESOURCES AND RISK ACCEPTANCE



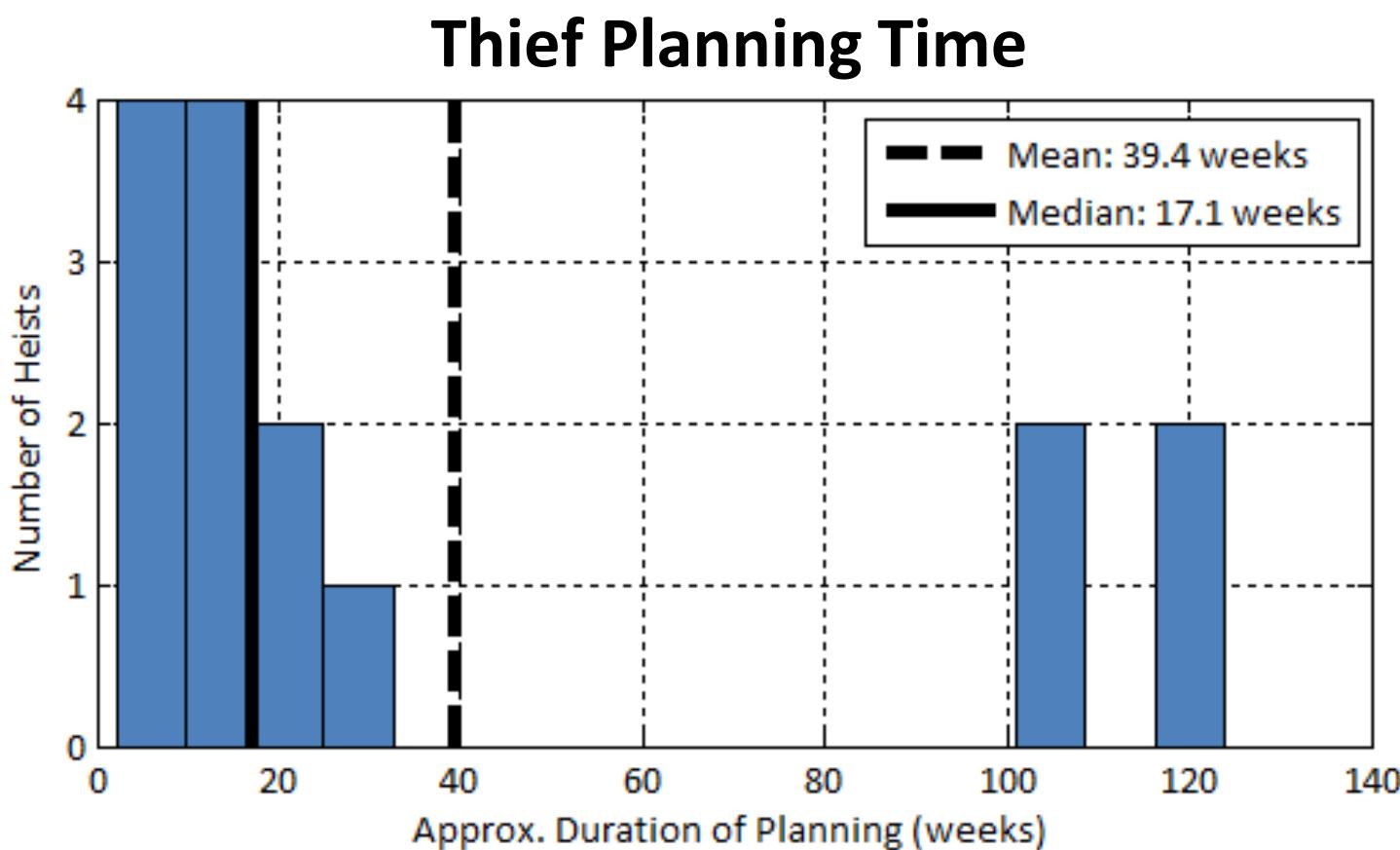
Thieves of high-value items are often a lot like us: Ambitious, disciplined, and good systems engineers and project managers.

It's like a big challenge, like Olympic games. You train for most part of your life, and go that day hoping to have an opportunity.

Valerio Viccei, Criminal
Knightsbridge Safe Deposit Center Heist

Resources and Risk Acceptance

Schedule



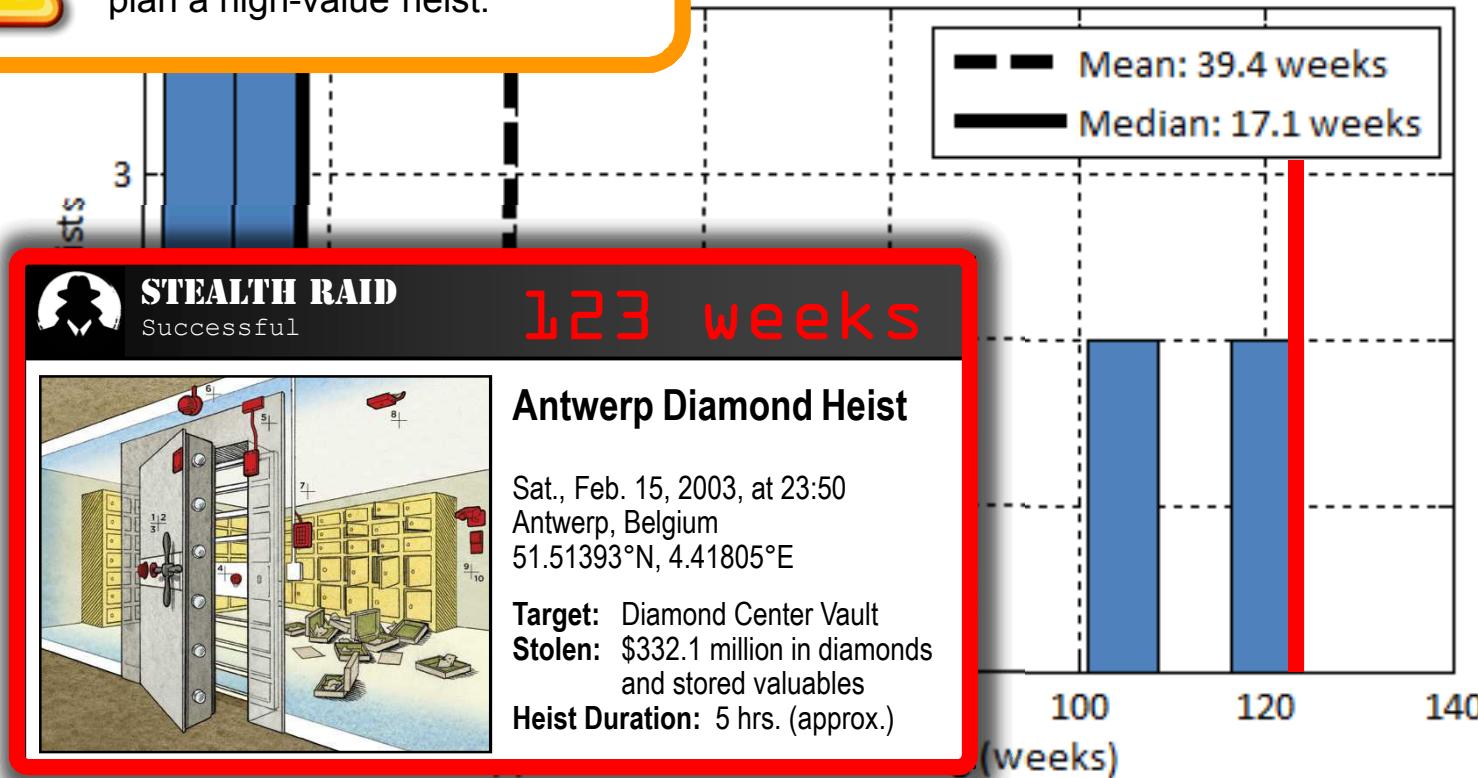
Resources and Risk Acceptance

Schedule



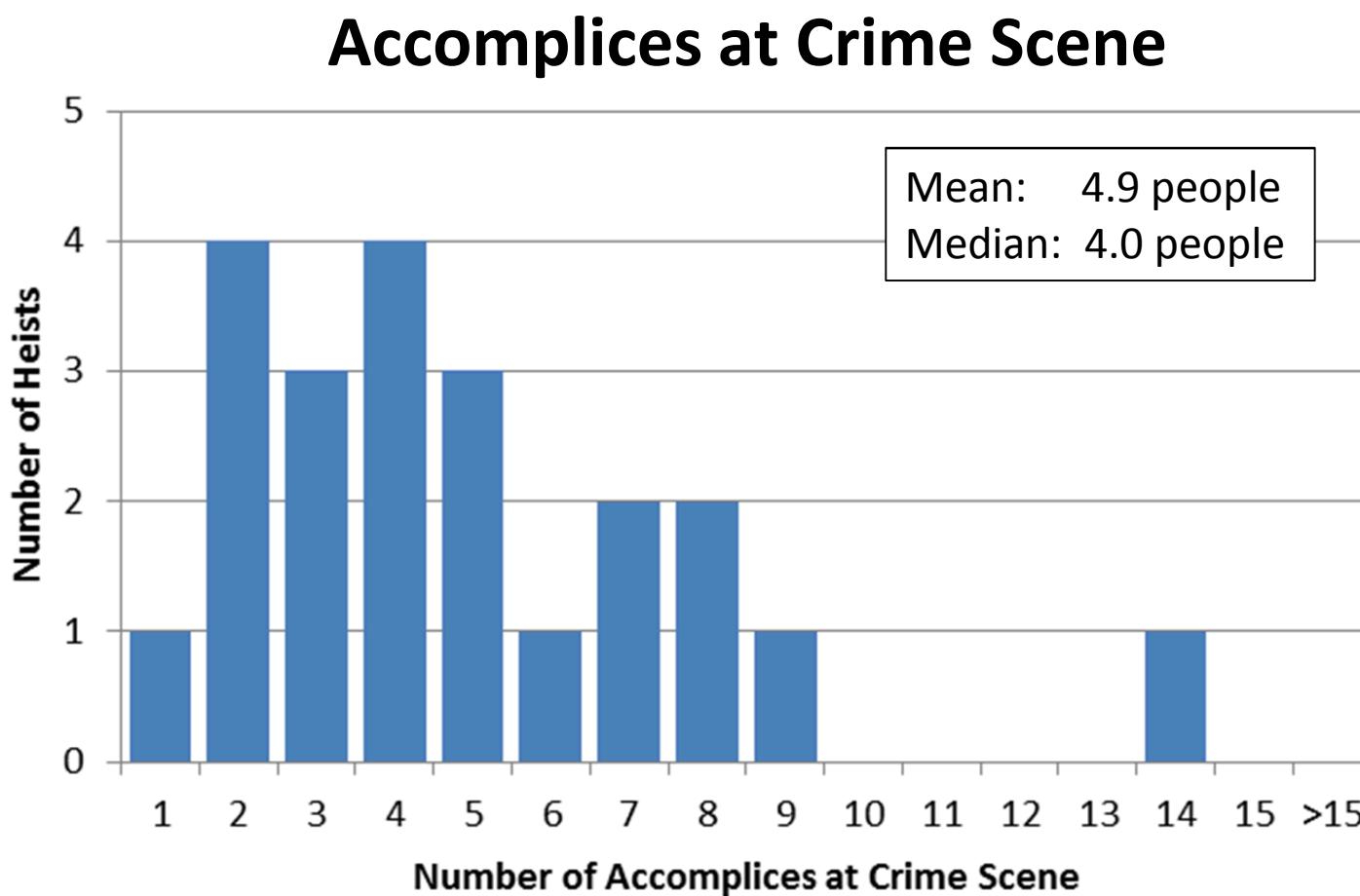
Thieves do their homework and typically take months or years to plan a high-value heist.

Planning Time



Resources and Risk Acceptance

Human Resources



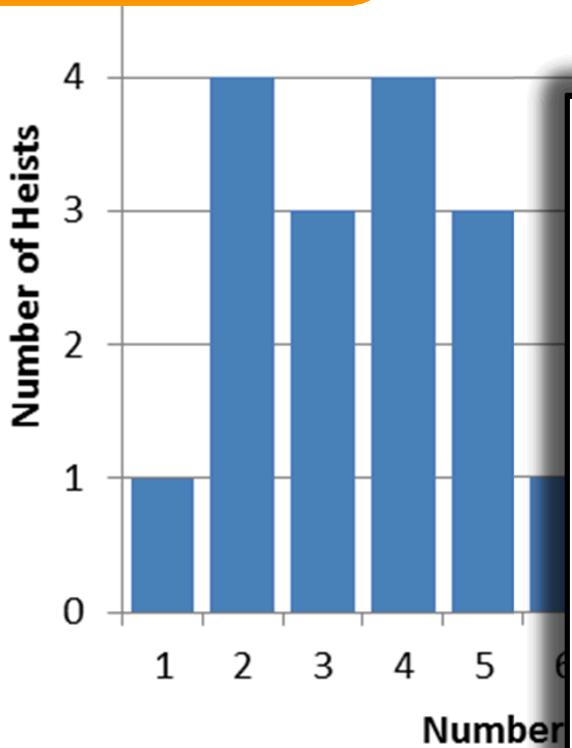
Resources and Risk Acceptance

Human Resources

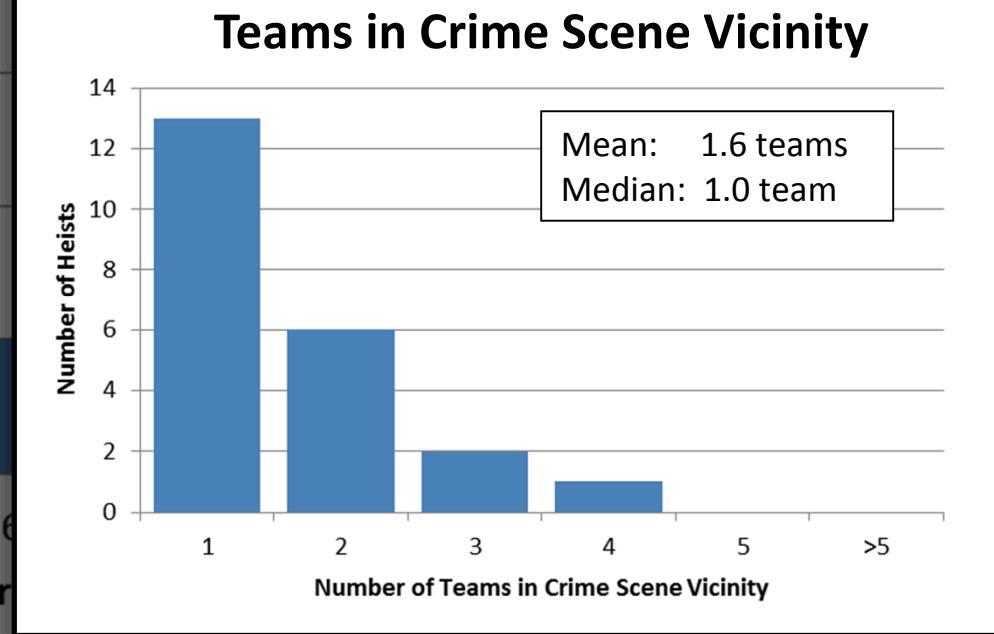


Thieves need the ability to work well in small teams.

Accomplices at Crime Scene



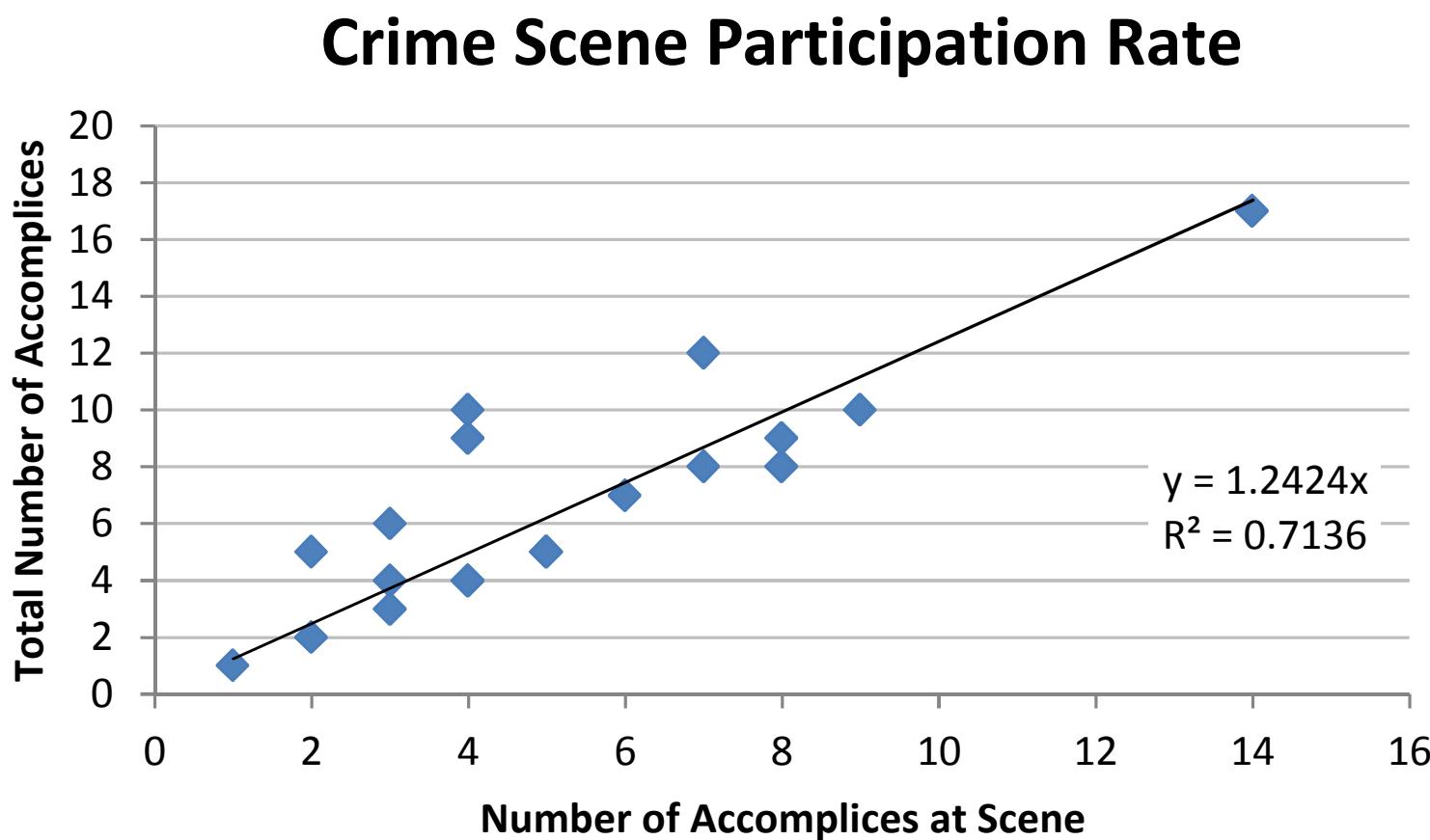
Mean: 4.9 people
Median: 4.0 people



Mean: 1.6 teams
Median: 1.0 team

Resources and Risk Acceptance

Human Resources



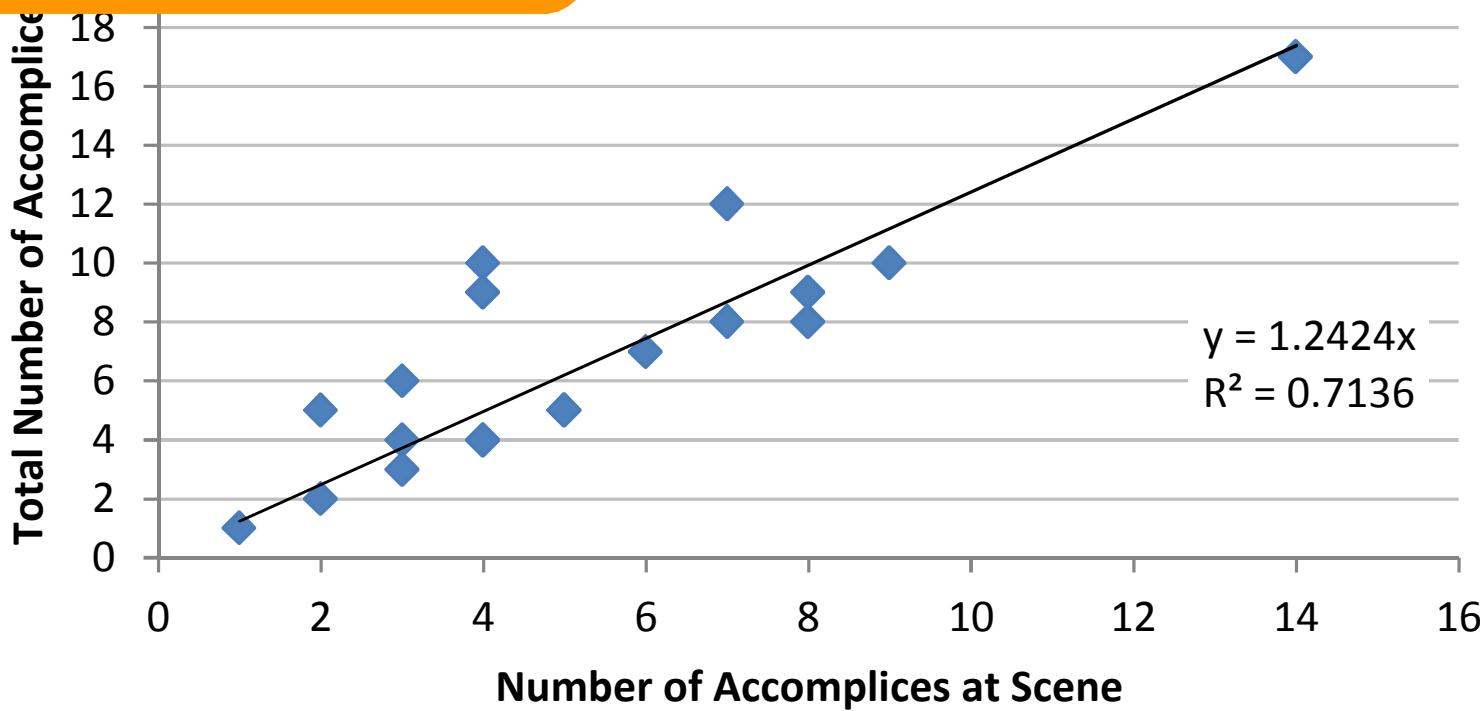
Resources and Risk Acceptance

Human Resources



Thief operations are almost always supported by a larger team effort.

Scene Participation Rate



Resources and Risk Acceptance

Human Resources

Thief Level of Effort

A Back of the Envelope Calculation

$$\begin{aligned} & 39.4 \text{ weeks planning time (average)} \\ \times & 7.0 \text{ days/week} \\ \times & 4.9 \text{ accomplices at scene (average)} \\ \times & 1.2 \text{ total accomplices / accomplice at scene (average)} \\ \div & 365 \text{ days/year} \end{aligned}$$

4.4 person-years of effort



Thieves put substantial effort into planning high-value heists.

Resources and Risk Acceptance

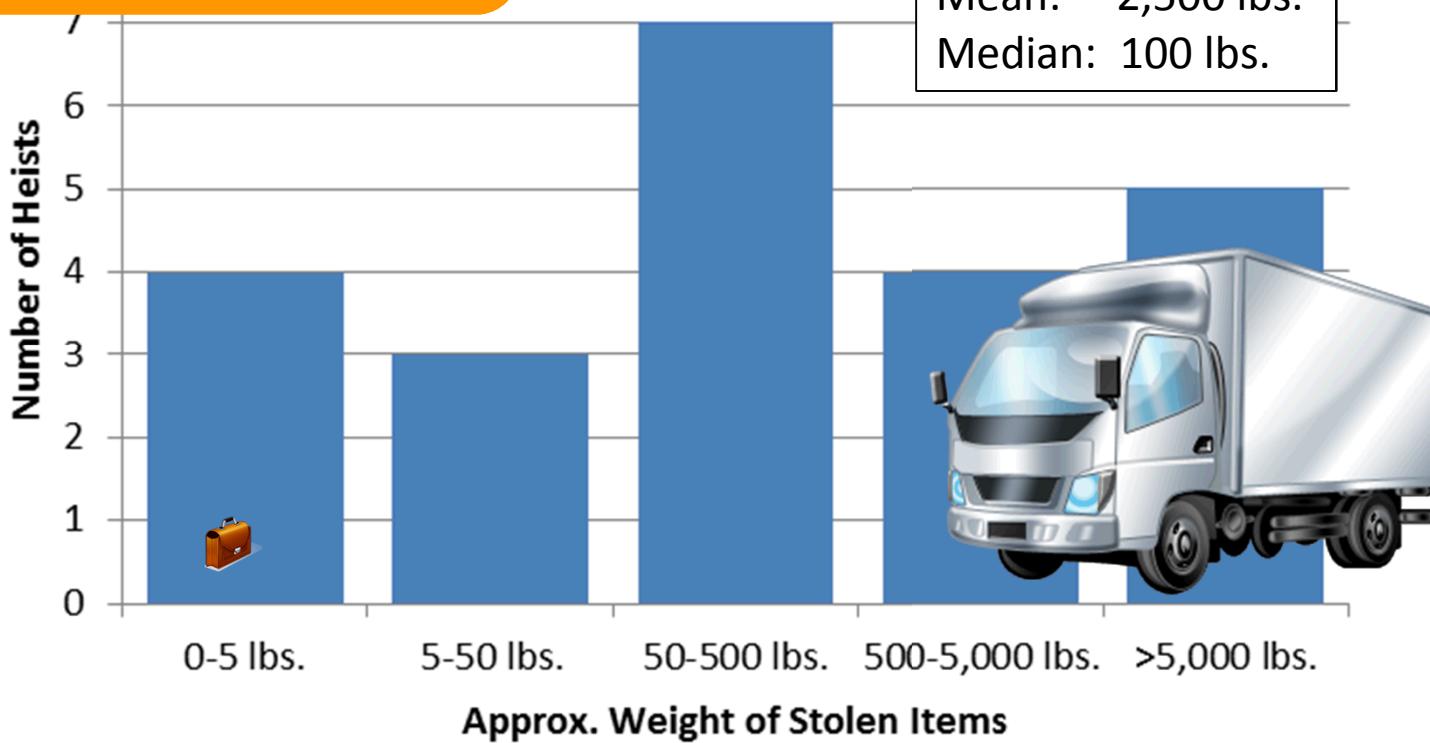
Mass Properties



Thieves have demonstrated capabilities to steal anything from briefcases to trucks full of high-value items.

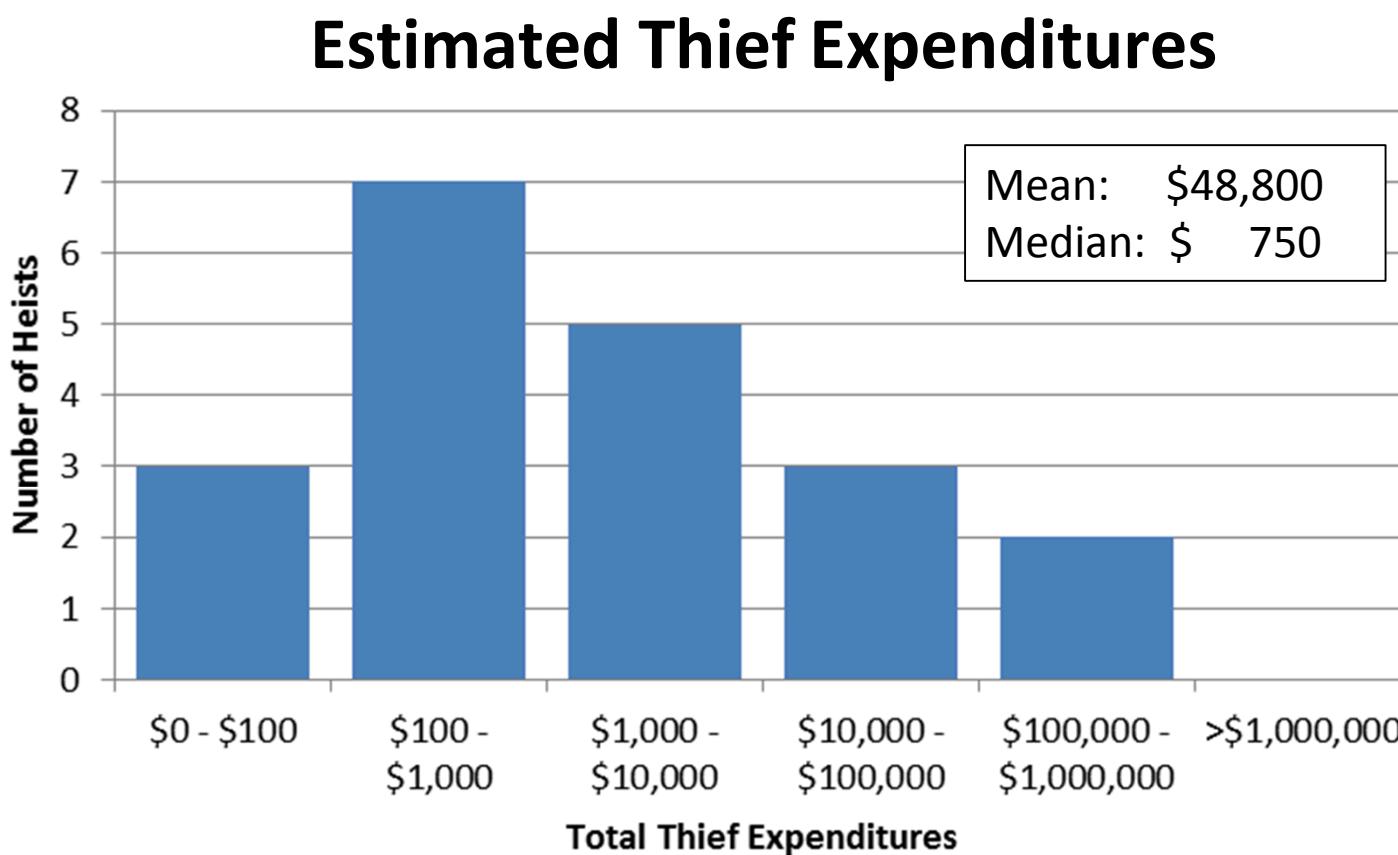
Weight of Stolen Items

Mean: 2,500 lbs.
Median: 100 lbs.



Resources and Risk Acceptance

Budget



Resources and Risk Acceptance

Budget



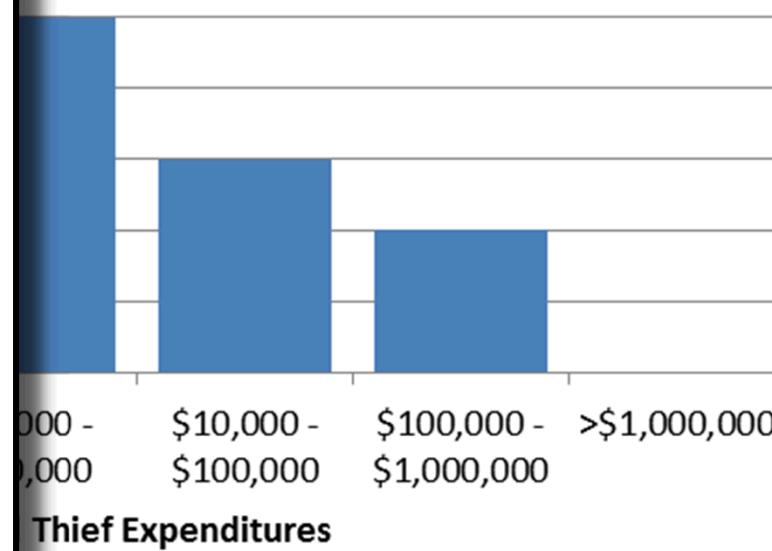
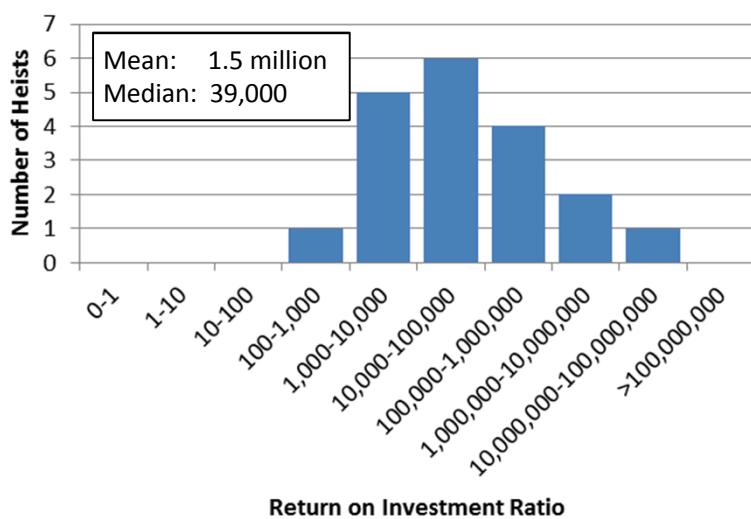
Thieves are willing to invest large amounts of money in planning and preparation, justified in part by the probable financial returns.



Thief Expenditures

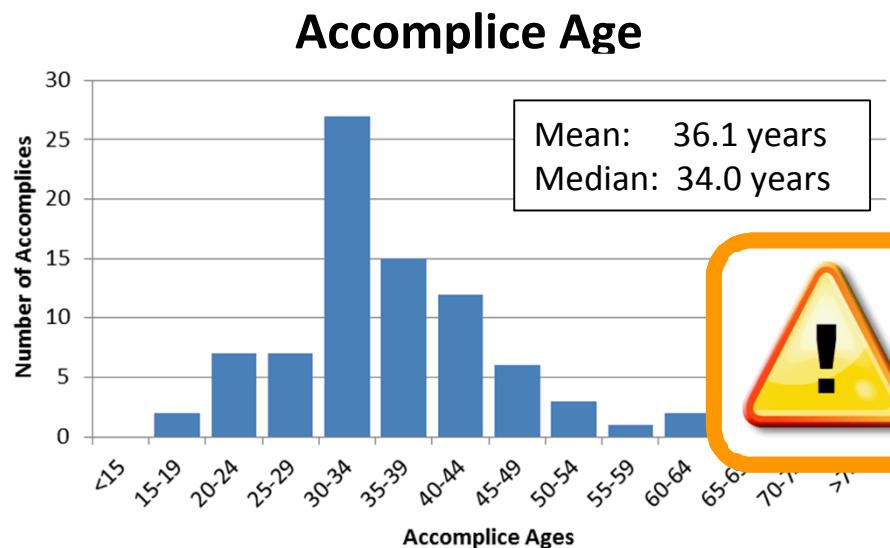
Mean: \$48,800
Median: \$ 750

Return on Investment



Resources and Risk Acceptance

Recruiting



Accomplice Gender

n = 133

Female
0%



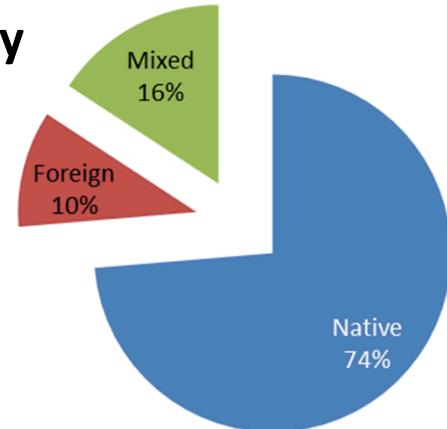
The typical high-value item thief is a 36-year-old man who is native to the country that is home to the asset he intends to steal.

Comparing to the general population:

U.S. Arrestee Average Ages, 2001:

Motor Vehicle Theft:	24.4
Robbery:	25.3
Burglary:	25.3
Stolen Property:	26.9
Weapons Violations:	27.0
Violent Crime:	29.6
Forgery/Counterfeiting:	30.6
Fraud:	32.3

Accomplice Nationality



Average high-value heist criminal is closer in age to that of the average fraud or forgery, rather than robbery or burglary, criminal.

Resources and Risk Acceptance

Risk Assessment

- Risks of capture and death to a thief can be quite high for an attack executed with minimal planning, but can be bought down with:
 - Reconnaissance, often with insiders
 - Detailed planning (for months or years prior to heist)
- For an unarmed attack:
 - Risk of death generally low (unarmed intruders unlikely to be fired upon)
 - If captured, consequences are relatively minor (e.g., 5-10 years for Antwerp)
- For an armed attack:
 - Risk of death higher but not unfathomable (2 deaths out of 80 violent heist on-scene accomplices in database), and much lower risk if security forces are unarmed
 - Consequences of capture higher, but mitigated if nobody was harmed (i.e., if thieves plan only to *threaten* violence)
- Less intuitive risks:
 - Risk of attack plan obsolescence (as soon as attack plan is executed, targeted security force will quickly adapt)
 - Risk of post-heist death (examples: Brazil Central Bank Heist, Lufthansa Heist)

INSIDER INFORMATION AND ACTIONS



They knew so much. To be honest I could have written down the combination numbers, given them the keys, and sat upstairs and had a cup of tea. They told me how to get into my own vault.

Mike Scouse
Brink's-Mat Security Supervisor

Insider Information and Actions

Working Definition for **Insider**:

A person recognized or accepted as a member of a group or organization who has authorized access to restricted areas, equipment, or information.

The Insider Spectrum

“Partial” Insider

Spaggiari (Société Générale)



Hearing a rumor that the Société Générale vault was not alarmed, Spaggiari rented a safe deposit box and investigated.

Viccei (Knightsbridge)



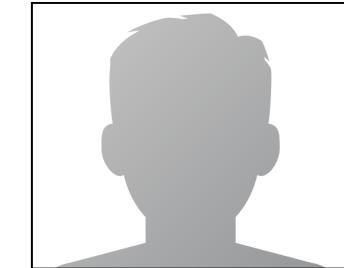
Rented a safe deposit box in the Knightsbridge center, built up a rapport, and learned through the owner's girlfriend that the owner was in financial trouble (and recruitable).

Notarbartolo (Antwerp)



Became a tenant of the Antwerp Diamond Center two years before the heist to gain access to the vault and identify security procedures and weaknesses.

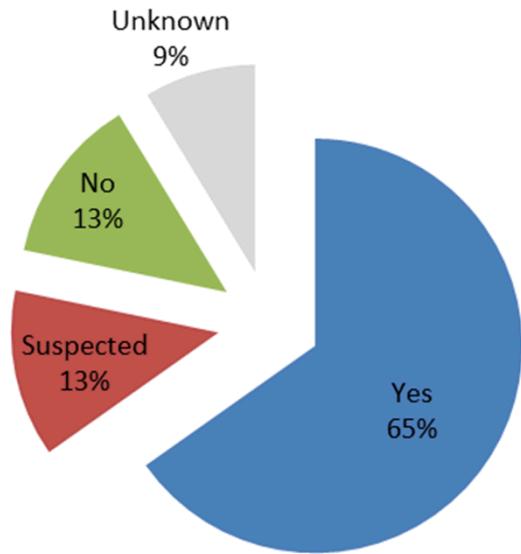
Latif (Knightsbridge)



In financial trouble, this owner of the Knightsbridge Safe Deposit Center had the good fortune to be recruited by Viccei to help rob his own facility.

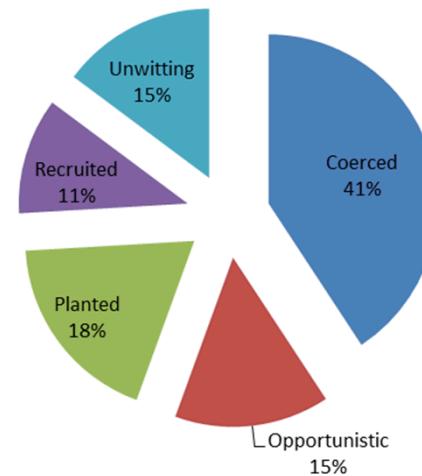
Insider Information and Actions

Was an insider used? *among heists in the database*

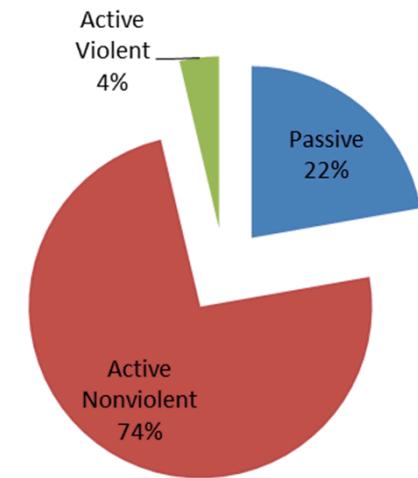


What types of insiders were used? *among heists in the database*

Insider Origin



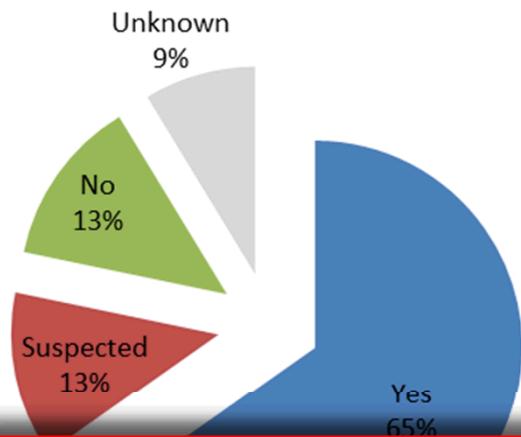
Insider Role



Insider involvement is exceedingly common in the planning and execution of high-value heists.

Insider Information and Actions

Was an insider used? among heists in the database

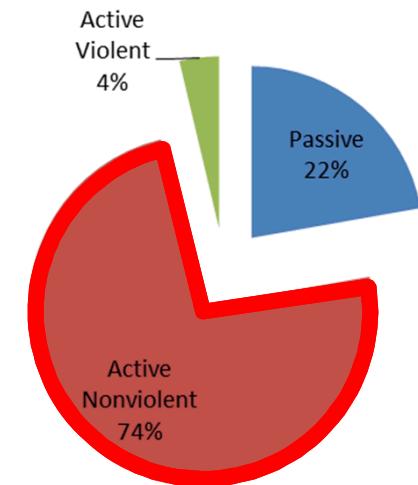


What types of insiders were used? among heists in the database

Insider Origin



Insider Role



STEALTH RAID

Successful

Planted, Active
Nonviolent Insider



Antwerp Diamond Heist

Sat., Feb. 15, 2003, at 23:50

Antwerp, Belgium

51.51393°N, 4.41805°E

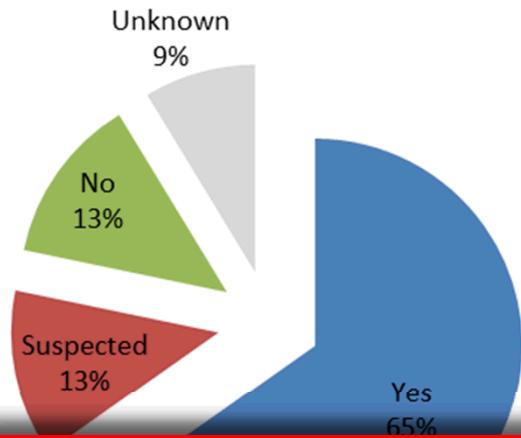
Target: Diamond Center Vault

Stolen: \$332.1 million in diamonds
and stored valuables

Heist Duration: 5 hrs. (approx.)

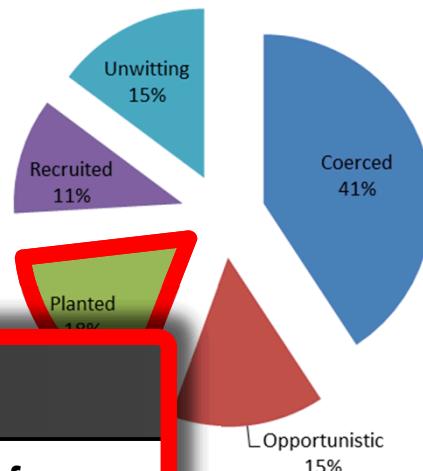
Insider Information and Actions

Was an insider used? among heists in the database

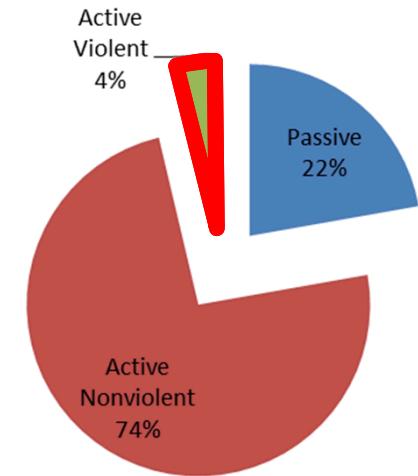


What types of insiders were used? among heists in the database

Insider Origin



Insider Role



DECEIVE, SUBDUE, AND SEIZE

Successful



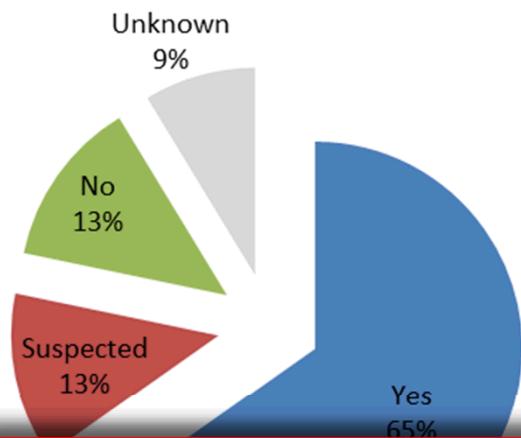
Knightsbridge Safe Deposit Center Heist

Sun., July 12, 1987, at 15:00
London, United Kingdom
51.498765°N, 0.166361°W

Target: Safe Deposit Center
Stolen: \$130 million in cash, gems, and stored valuables
Heist Duration: 2 hours

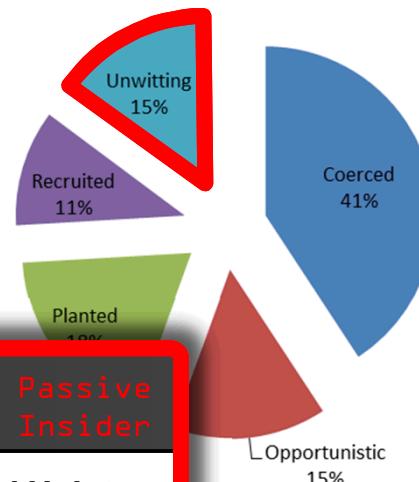
Insider Information and Actions

Was an insider used? among heists in the database

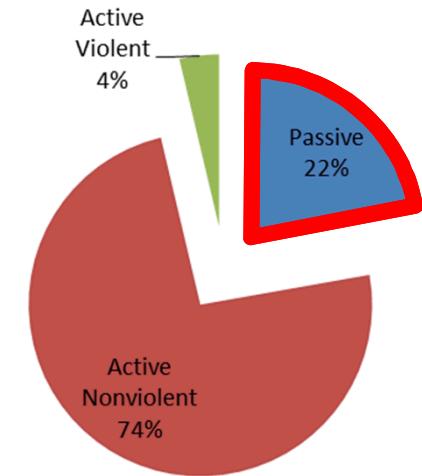


What types of insiders were used? among heists in the database

Insider Origin



Insider Role



STEALTH RAID Successful



Julie Boost CPP, CFM
Inspector / Expert Nuclear Security at FANC -
Federale Agentschap voor Nucleaire Controle
Antwerp Area, Belgium - Security and Investigations

[Join LinkedIn and access Julie Boost CPP, CFM's full profile](#)

As a LinkedIn member, you'll join 175 million other professionals who are sharing connections, ideas, and opportunities. And it's free! You'll also be able to:

- See who you and Julie Boost CPP, CFM know in common
- Get introduced to Julie Boost CPP, CFM
- Contact Julie Boost CPP, CFM directly

Julie Boost CPP, CFM's Overview

Current Inspector / Expert Nuclear Security at FANC - Federale Agentschap voor Nucleaire Controle

Unwitting, Passive
Insider

Antwerp Diamond Heist

Sat., Feb. 15, 2003, at 23:50

Antwerp, Belgium

51.51393°N, 4.41805°E

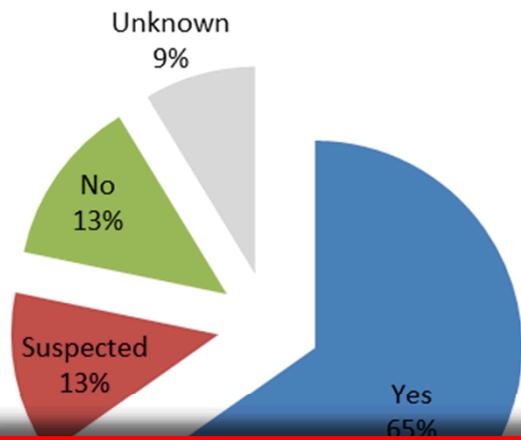
Target: Diamond Center Vault

Stolen: \$332.1 million in diamonds
and stored valuables

Heist Duration: 5 hrs. (approx.)

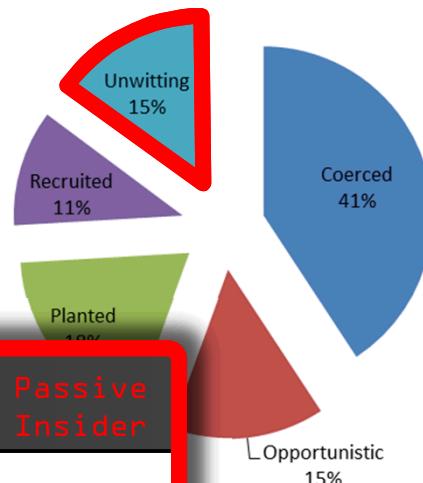
Insider Information and Actions

Was an insider used? *among heists in the database*

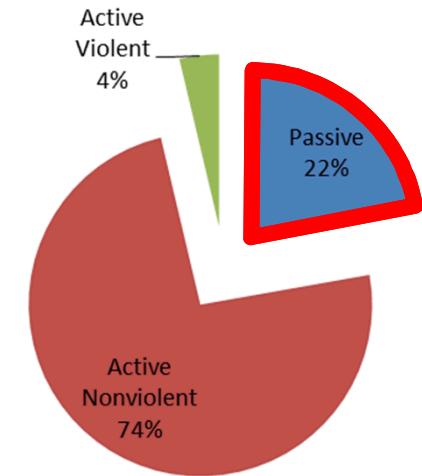


What types of insiders were used? *among heists in the database*

Insider Origin



Insider Role



STEALTH RAID

Successful

Unwitting, Passive
Insider



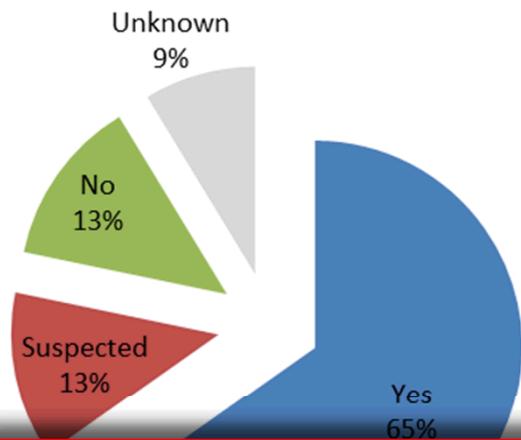
Société Générale Bank Heist

Sat., July 17, 1976, at 16:00
Nice, France
43.69900°N, 7.26933°E

Target: Société Générale Vault
Stolen: \$40.4 million in cash, gold, and stored valuables
Heist Duration: 36 hrs. (approx.)

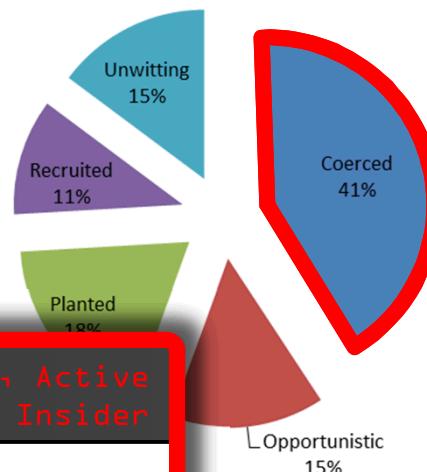
Insider Information and Actions

Was an insider used? among heists in the database

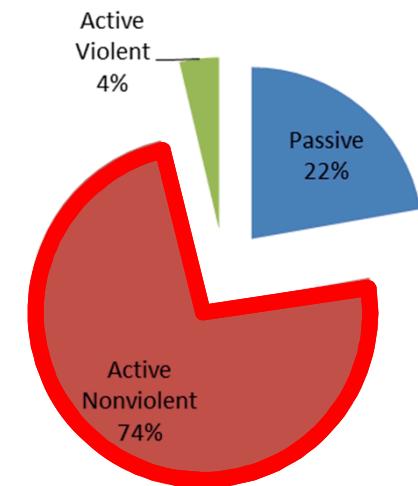


What types of insiders were used? among heists in the database

Insider Origin



Insider Role



TIGER KIDNAPPING Successful

Coerced, Active
Nonviolent Insider



Northern Bank Cash Heist

Sun., Dec. 19, 2004, at 22:00
Belfast, United Kingdom
54.596244°N, 5.932016°W

Target: Northern Bank
Stolen: \$60.5 million in cash
Heist Duration: 22 hours



Insider involvement can
take a variety of forms,
spanning various origins
and various roles.

Who is the adversary?

- Experienced, 30-40 year old native citizens and career criminals (male)
- Typical teams
 - Total Size: 2-8 people
 - Breaking up into 1-4 teams during heist
- Resources
 - Planning time: 2 weeks to 2 years
 - Willing to spend tens of thousands of dollars or more, given the return on investment
 - Able to transport thousands of pounds of loot
- Innovative, esp. in terms of:
 - Security circumvention Measures
 - Deceptions
 - Getaway methods
- Use (or become) insiders to assist in planning and execution

Rodley (Sumitomo Mitsui)



Notarbartolo (Antwerp)



Spaggiari (Société Générale)



Viccei (Knightsbridge)



Allen (Securitas)



Sergio (Central Bank)

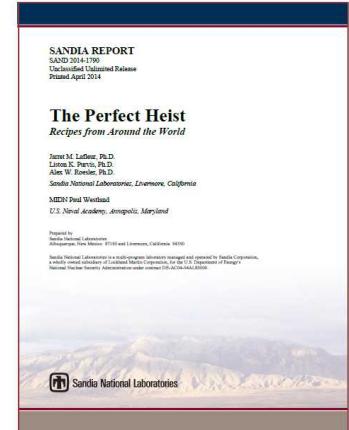


Some Lessons Learned

- Security circumvention techniques are often **innovative and novel** (e.g., helicopters, tunnels, and backhoes) but often **not high-tech**
- Thieves of high-value items typically plan to **avoid, rather than engage**, a security response
- Almost all large heists involve some use of **deception**
- Thieves have **great timing** (i.e., attack at times of low activity and high target value)
- An **unarmed adversary is not an unimportant adversary**
- Thieves demonstrate great **project management** skills
- **Insider involvement** is exceedingly common in heist planning and execution
- Insiders can have a **variety of origins and roles**.

Follow-on Work

- Documentation
 - SAND Report of Overall Study
 - Conference Paper and/or Journal Article on Overall Study
 - Numerous Presentations in California, New Mexico, and the Washington, DC area
- Summer Military Academic Collaboration Projects
 - Trading Centralization vs. Distribution of Security Access Privileges
 - The Perfect Heist: Recipes from the Silver Screen
 - The Double-Edged Sword of Redundancy in Security System Design
- Future Research Areas
 - Analysis of Clandestine Tunneling Operations
 - Comparison of Heist Lessons Learned to Defined Threats
 - Outreach to other Security-Focused Government Agencies



Follow-on Work: Cyber Heists

Cyber Heists

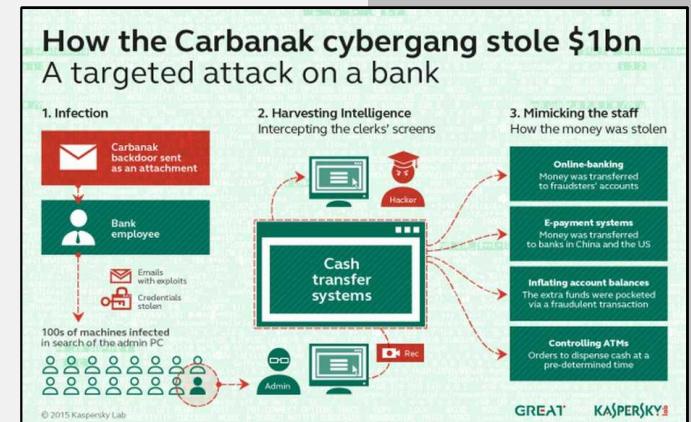
Defeat of security measures and theft itself occurs in cyberspace



Target Credit Card Breach, Nov. 2013



JPMorgan Breach, Aug. 2014



Carbanak Cybergang Heist, Feb. 2015

Physical-Enabled Cyber Heists

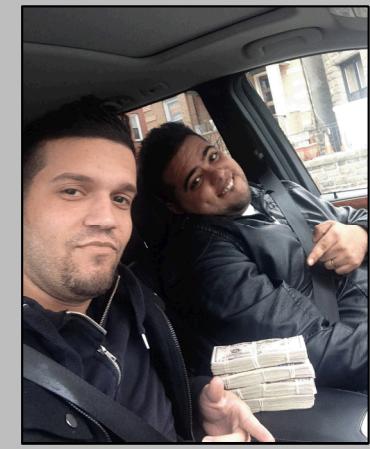
Defeat of security measures occurs or is assisted in physical space, while theft itself occurs in cyberspace



Sumitomo Mitsui Bank Heist, 2004

Cyber-Enabled Physical Heists

Defeat of security measures occurs or is assisted in cyberspace, while theft itself occurs in physical space



Global ATM Heist, Feb. 2013

Follow-on Work: Cyber Heists

Research and Discussion Questions

- What diversity of criminal methods is employed among large cyber heists? What criminal methods are common?
- What characteristics of large cyber heists are common between cyber and physical-only heists?
- If we apply the original heist study's database-driven methodology:
 - What specific cyber heist examples should we track?
 - What characteristics should we track?
 - Defeated security measures and devices
 - Deception methods
 - Timing and target selection
 - Weapons employed
 - Resources and risk acceptance
 - Insider information and actions
 - Failures and mistakes
- Are there other methodologies we should consider?

Questions?

Primary Point of Contact:

Jarret M. Lafleur, Ph.D.

Homeland Security and Defense Systems Center

Sandia National Laboratories

P.O. Box 969, MS 9407

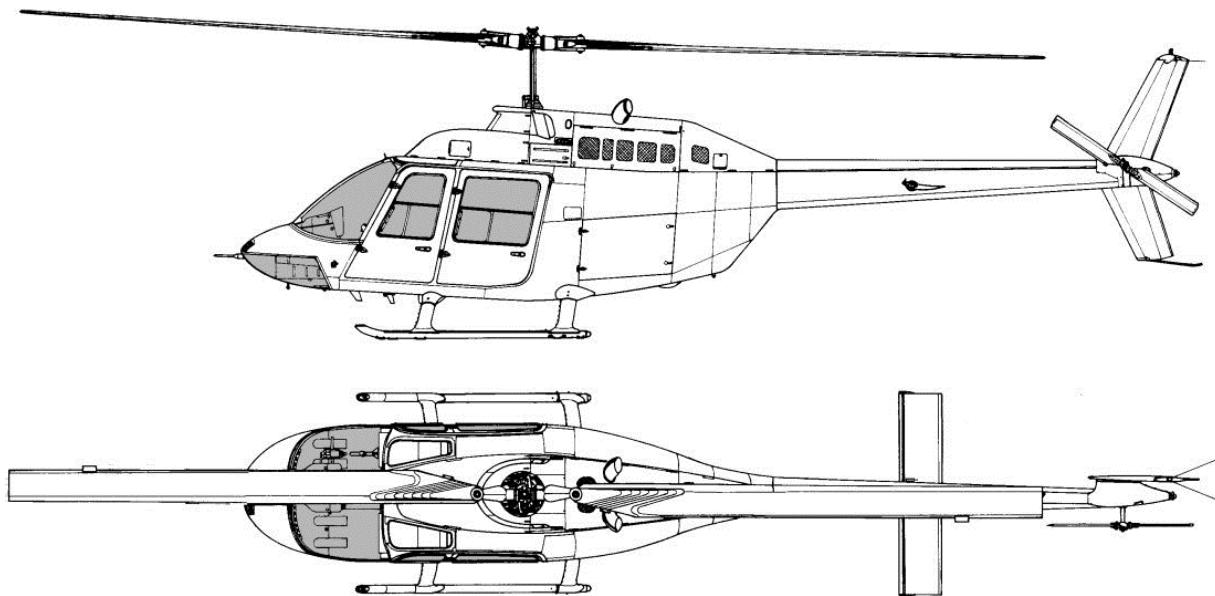
Livermore, CA 94550

E-mail: jarret.lafleur@sandia.gov

Phone: (925) 294-3449



Stockholm: September 2009



Bell 206 JetRanger

Role: Multipurpose Utility Helicopter
Capacity: 1 pilot, 4 passengers
Max Speed: 139 mph
Range: 430 miles
Ceiling: 13,500 ft.



New York: December 1978



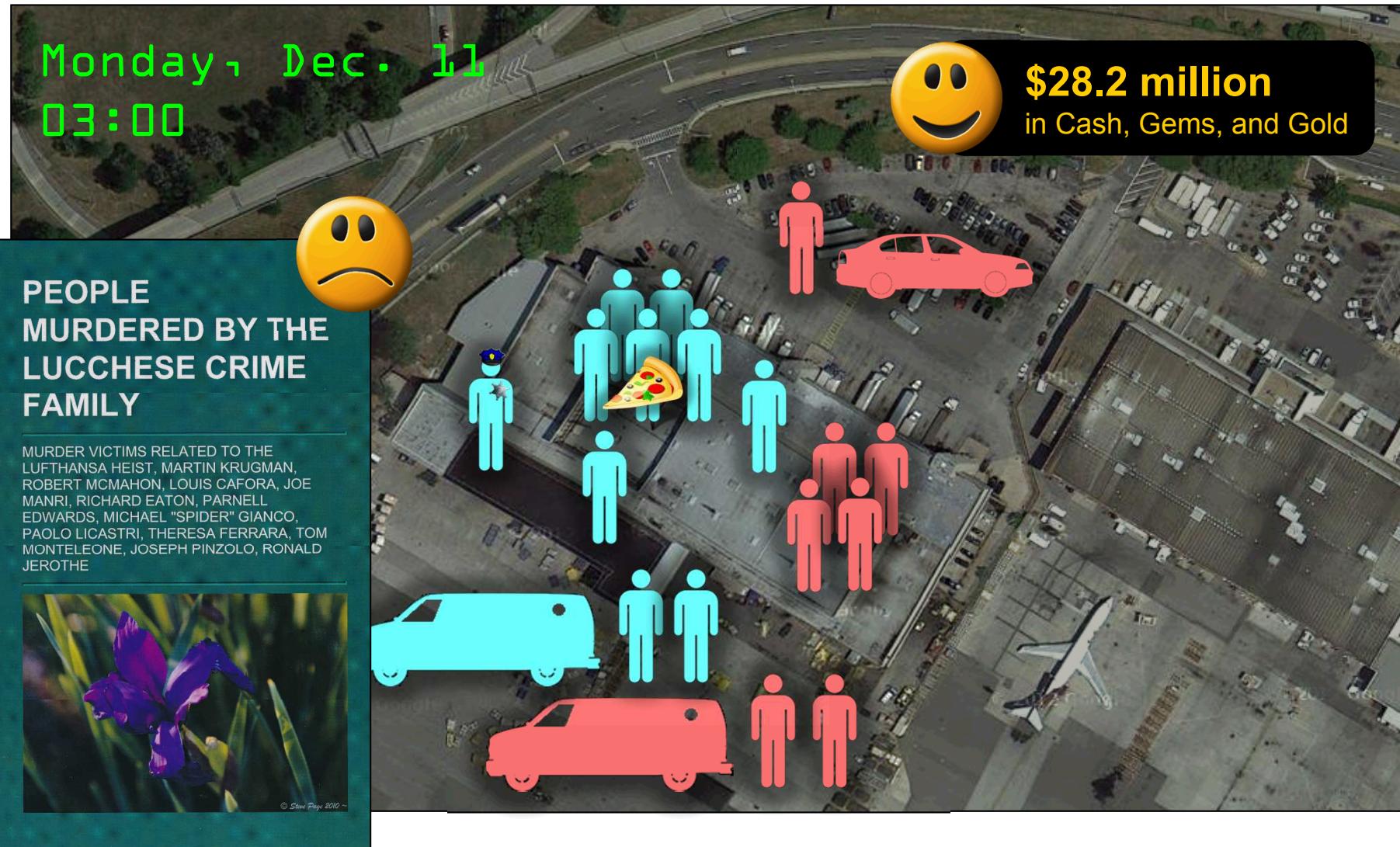


New York: December 1978





New York: December 1978





Tonbridge: February 2006

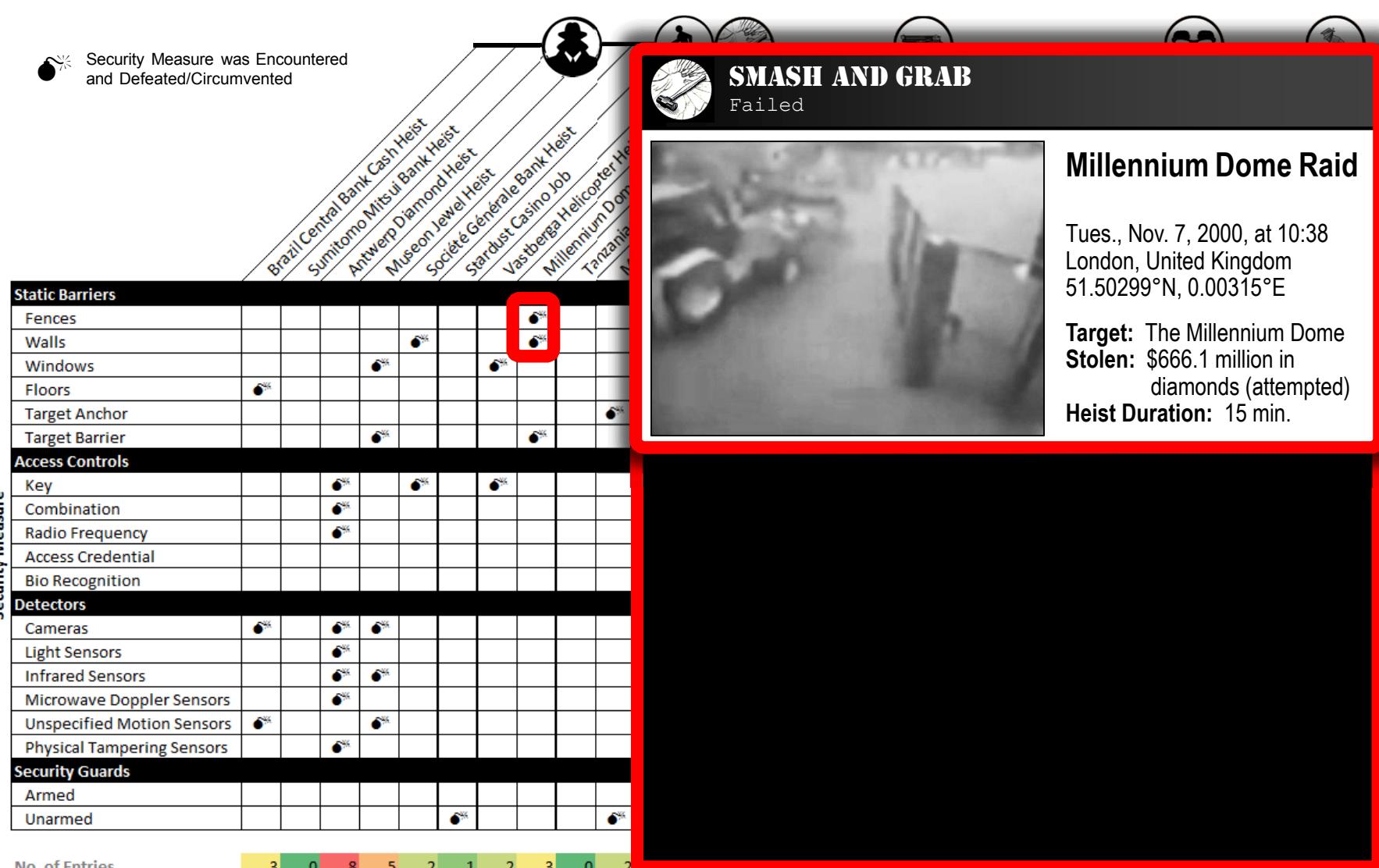


Real police officer with recovered Ford Transit van from kidnappings

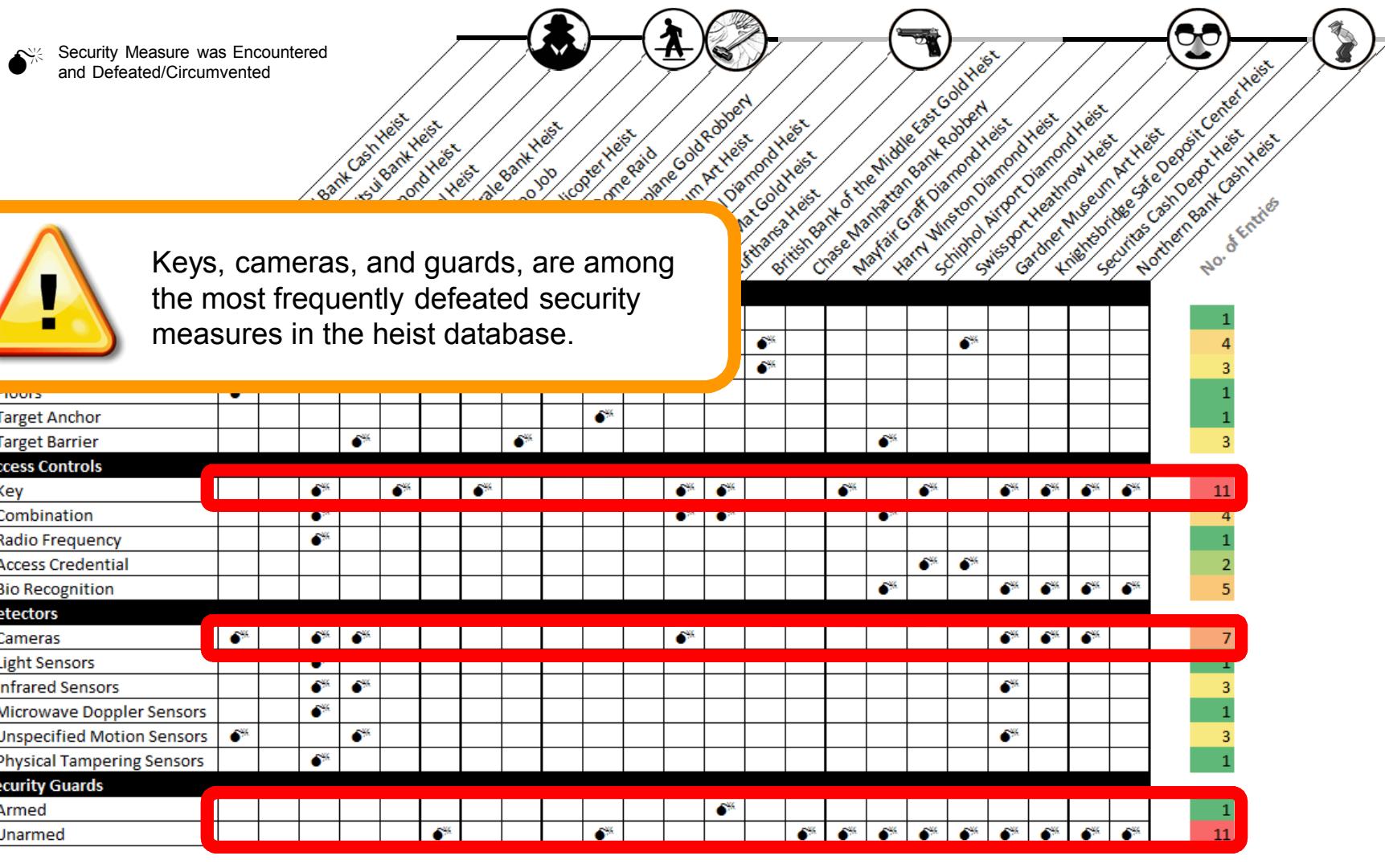


Phony police officer ushering criminals into Securitas Cash Depot

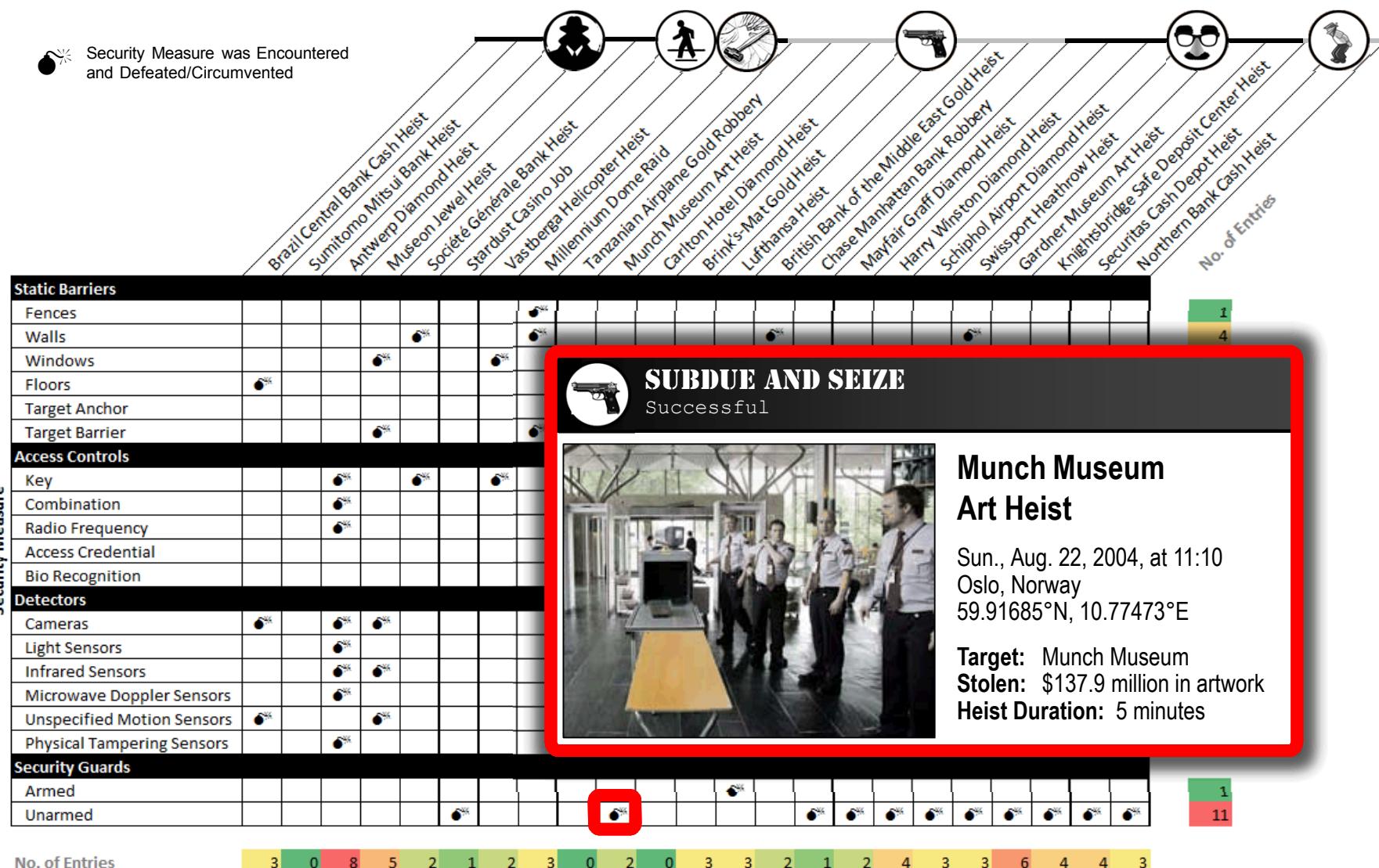
Defeated Security Measures



Defeated Security Measures



Defeated Security Measures



SUBDUE AND SEIZE

Successful



Munch Museum Art Heist

Sun., Aug. 22, 2004, at 11:10

Oslo, Norway

59.91685°N, 10.77473°E

Target: Munch Museum

Stolen: \$137.9 million in artwork

Heist Duration: 5 minutes

Defeated Security Measures

Lessons Learned

- High-value heists typically involve the defeat of **multiple security measures**
- Keyed locks, cameras, and unarmed guards are very commonly defeated
- Even among the creative and innovative security measure defeat methods, **none make significant use of high technology**
- Lack of response force proximity is rarely the reason for a lack of security response
- Security systems relying on a small on-duty guard force to detect incursions are **highly susceptible to well-planned adversary attacks** designed to prevent the guards from acting as effective sensors or responders
- Thieves of high-value items **typically plan to avoid, rather than engage, a security response**

Deception Methods

Lessons Learned

- **Almost all large heists involve some use of deception**
- Frequently, deceptions are physically **simple and inexpensive** (e.g., sign indicating security upgrades are occurring, police jacket and cap, promotional baseball hats)
- However, effective deceptions are highly dependent on context and **may require time and inside information to develop** (e.g., creating false paperwork for authorized access, learning the occupational jargon of the targeted industry)
- Most frequently, thieves (1) use getaway vehicles that do not draw attention, (2) conceal equipment, (3) disguise or mask their physical features, and **(4) avoid attention by blending in to normal occupational activities.**
 - Thieves or coerced accomplices that blend in by occupation exist more frequently inside than outside the targeted organization
 - There is no clear limitation to what level (e.g., manager, employee, customer) of occupational role thieves or their coerced accomplices will take

TIMING AND TARGET SELECTION

Armed with Werner and Gruenwald's plan, Burke and the Robert's Lounge gang hammered out the details: They'd go in late, when only a skeleton crew of ten was on, striking while the graveyard shift was at lunch.

Charlie Glaze, Narrator
Daring Capers: Kennedy Airport Caper

Timing and Target Selection

Absolute Timing

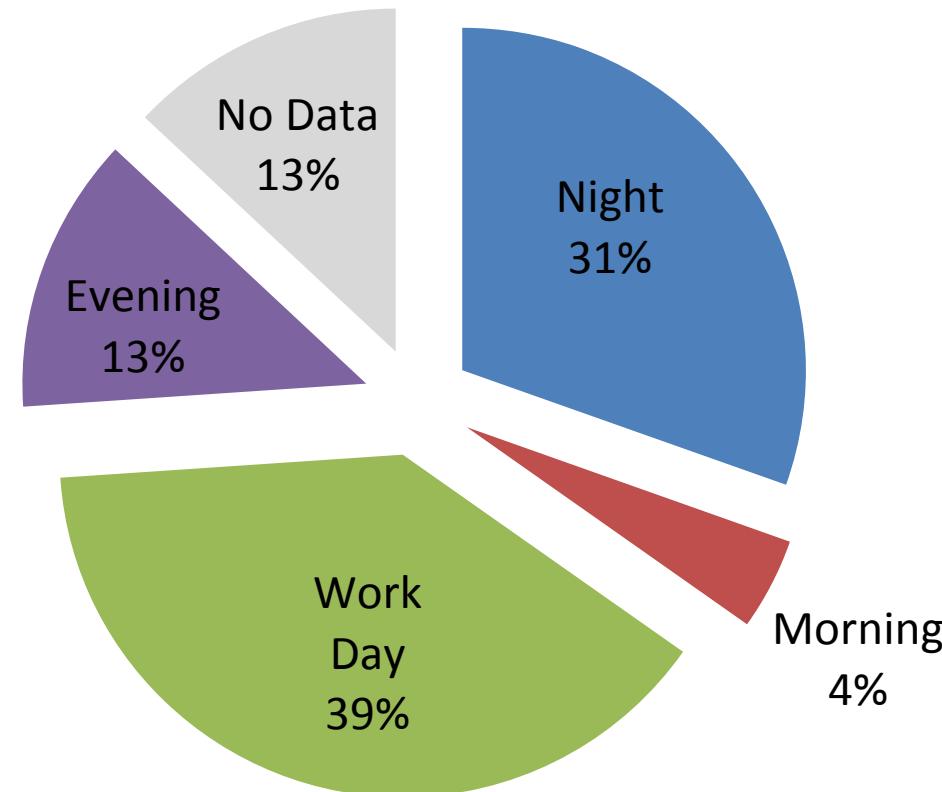
Term Definitions

Term	Time Range
Morning	6:00 AM – 9:00 AM
Work Day	9:00 AM – 5:00 PM
Evening	5:00 PM – 8:00 PM
Night	8:00 PM – 6:00 AM



Thieves of high-value items have no clear preference for a particular time of day at which to strike.

Time of Day Distribution for Heists in the Database



Timing and Target Selection

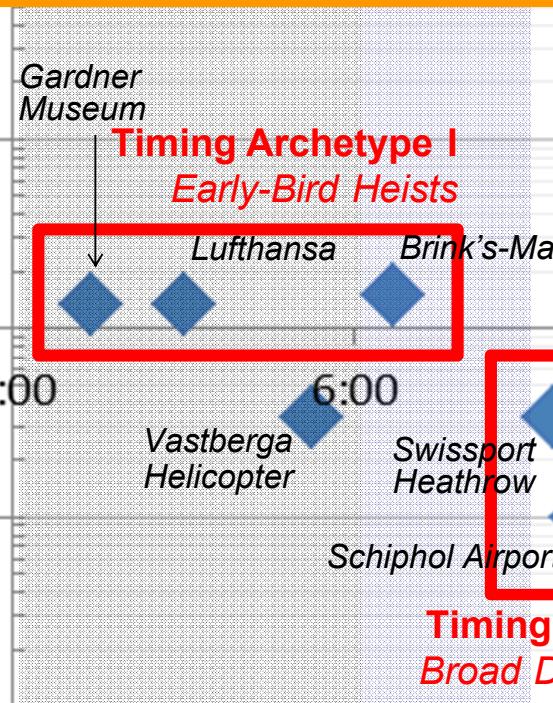
Absolute Timing



With lower surrounding activity and risk of discovery, nighttime heists tend to have substantially longer durations than daytime heists.

Heist Duration (hrs.)

10
1
0.1
0.01



Timing Archetype I
Early-Bird Heists

Vastberga
Helicopter

Lufthansa

Brink's-Mat

Schiphol Airport

Swissport
Heathrow

Timing Archetype II
Broad Daylight Heists

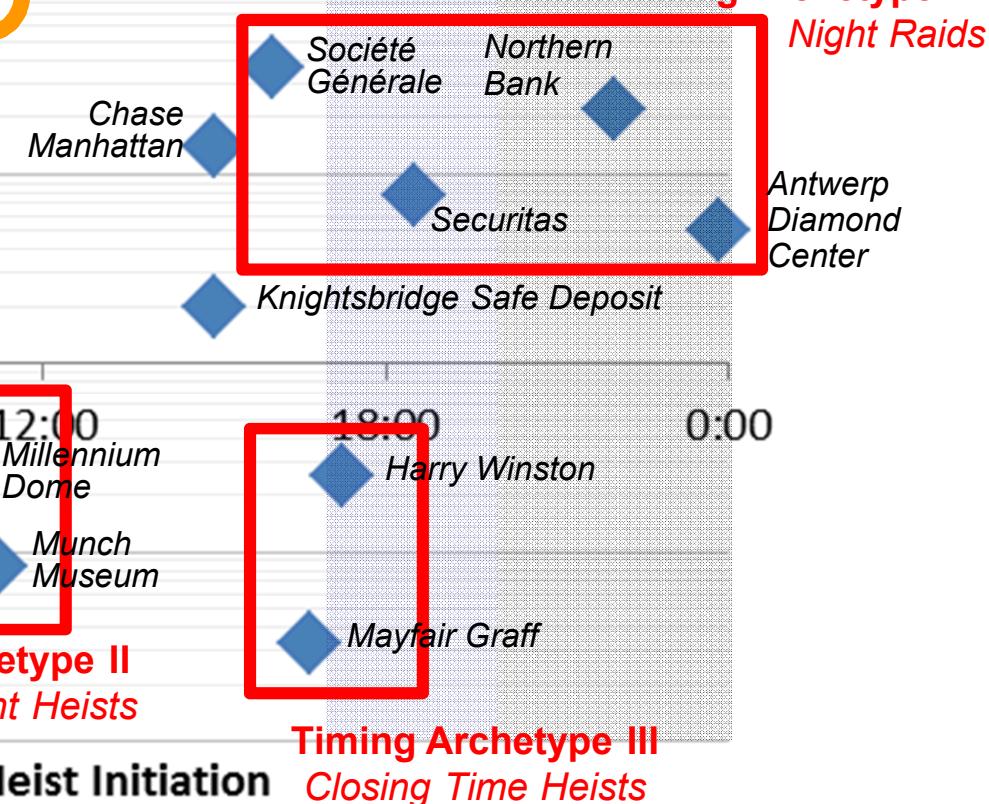
Time of Heist Initiation

Post. Time of Initiation

Work Day

Evening

Night



Timing Archetype IV
Night Raids

Night Raids

Antwerp
Diamond
Center

Société
Générale

Northern
Bank

Knightsbridge Safe Deposit

Securitas

Harry Winston

Mayfair Graff

Timing Archetype III
Closing Time Heists

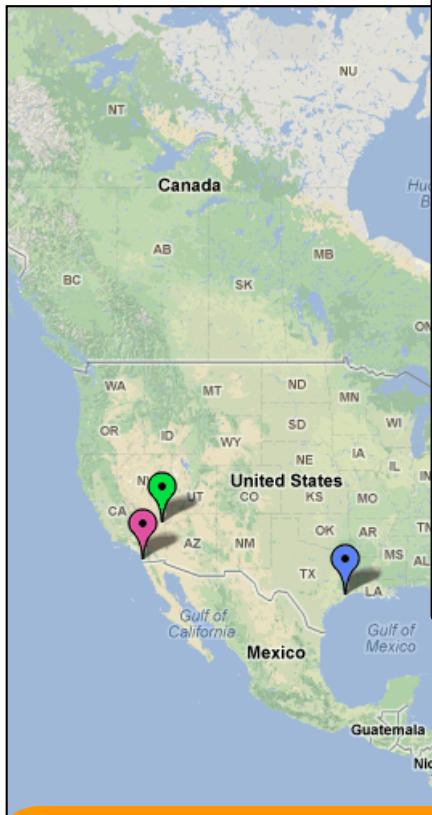
Timing and Target Selection

Relative Timing

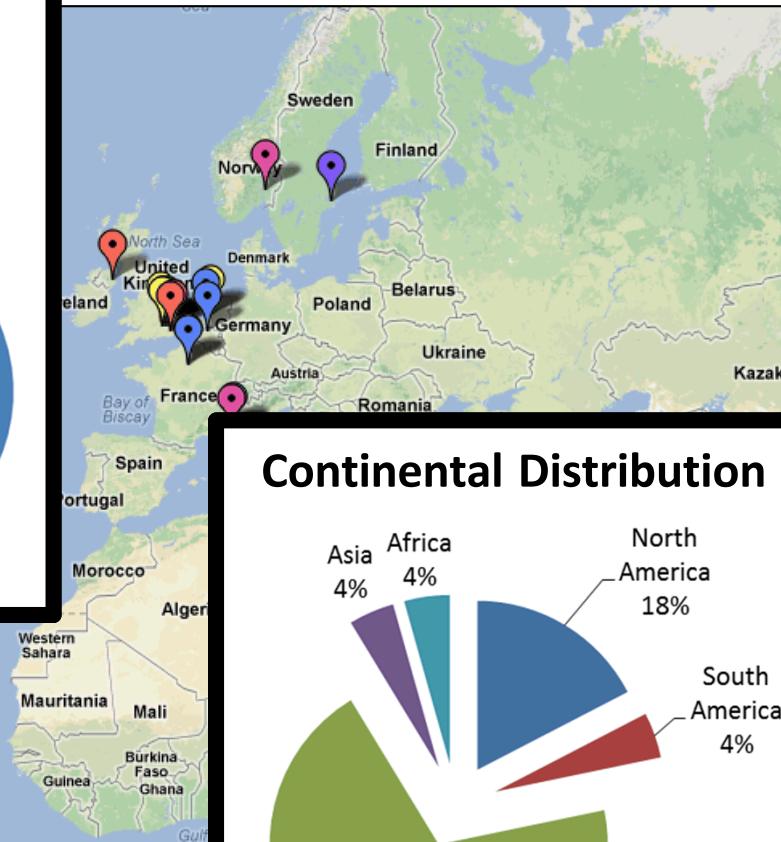
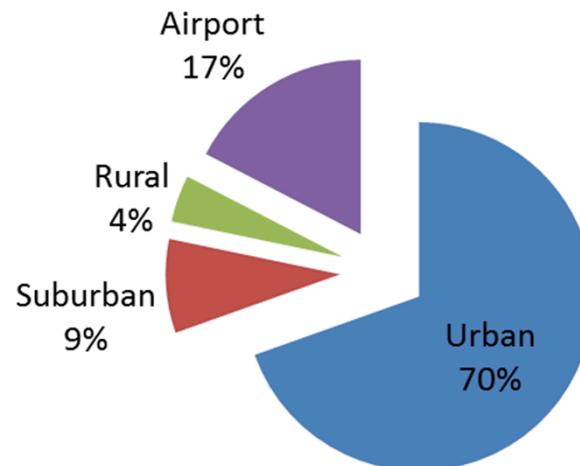
- Common Factors
 - Low bystander activity, typically resulting in:
 - **Low likelihood of unexpected detection**
 - Timing outside of core business hours (nights, weekends, holidays)
 - Low employee or security activity, typically resulting in:
 - **Ease of defeating expected detection**
 - Timing outside of core business hours (nights, weekends, holidays)
 - High target value, with regular or irregular timing known through:
 - Inside information
 - Outside observation or inference
- Uncommon Factors
 - Direct knowledge of personnel location vs. time
 - Physics-related timing (e.g., tides enabling escape)

Timing and Target Selection

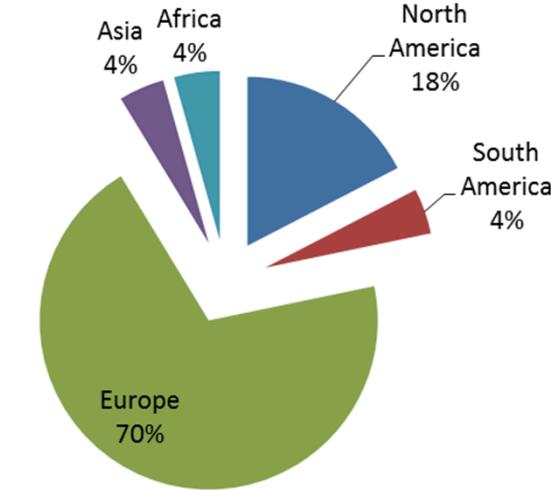
Target Environments



Target Environment



Continental Distribution



Historically, high-value heists in the West have predominantly taken place in areas with high amounts of daily activity (e.g., airports and urban areas).

Timing and Target Selection

Lessons Learned

- Timing
 - Absolute Timing
 - **Thieves can – and do – strike at any time of day**
 - **Night heists typically do not demand rapid operations** and tend to have substantially longer durations than daytime heists
 - Relative Timing
 - **Times of low bystander, employee, and security activity** (nights, weekends, holidays) offer thieves a low likelihood of unexpected detection and ease of defeating any expected detection
 - **High available target value**, often known through inside information
- Target Selection
 - Aggregate data suggests **thieves rationally trade between ability to penetrate and ability to fence**
 - High-value heists have predominantly taken place in areas with high amounts of daily activity (urban areas and airports)

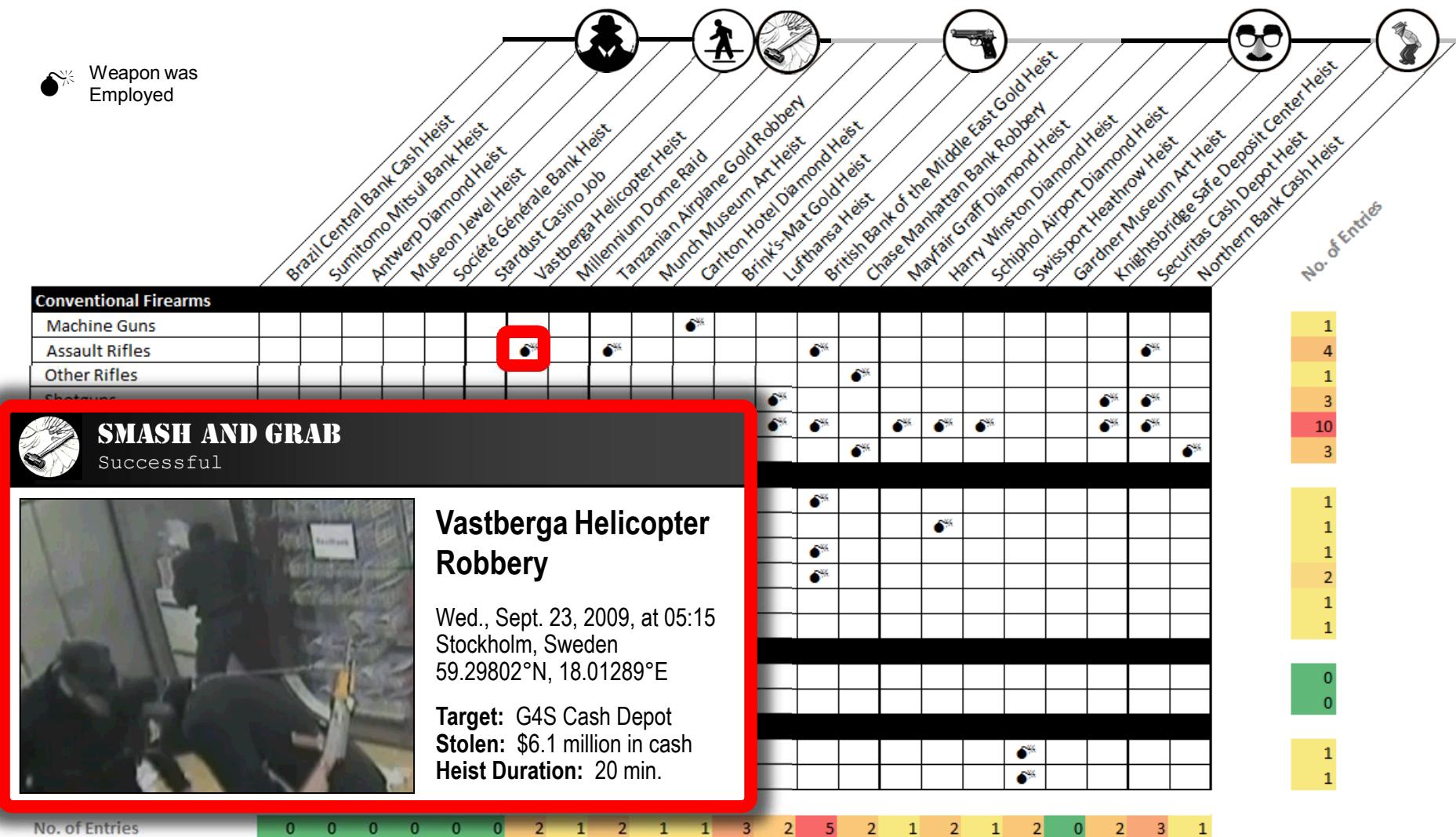
WEAPONS EMPLOYED



When they threaten the guards with a gun there is not much to be done.

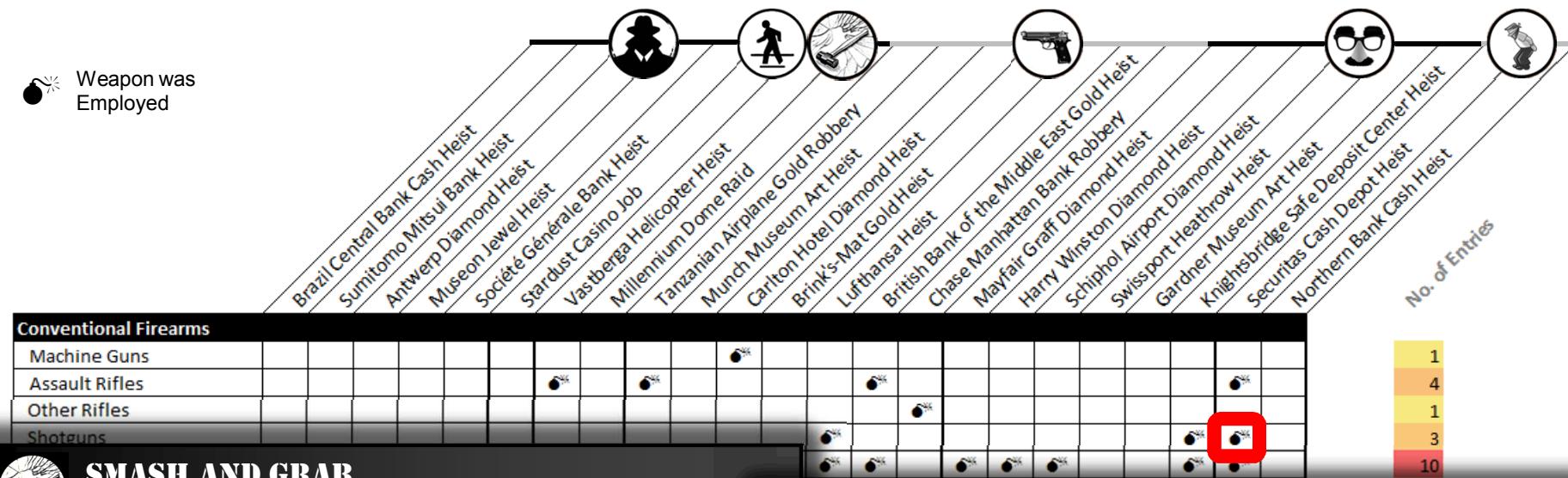
Jorunn Christofferson
Munch Museum Press Officer

Weapons Employed


 Weapon was Employed


Weapons Employed

 Weapon was Employed



SMASH AND GRAB

Successful



Vastberga Helicopter Robbery

Wed., Sept. 23, 2009, at 05:11
Stockholm, Sweden
59.29802°N, 18.01289°E

Target: G4S Cash Depot
Stolen: \$6.1 million in cash
Heist Duration: 20 min.

No. of Entries

0 0 0 0 0 2 1 2 1



TIGER KIDNAPPING

Successful

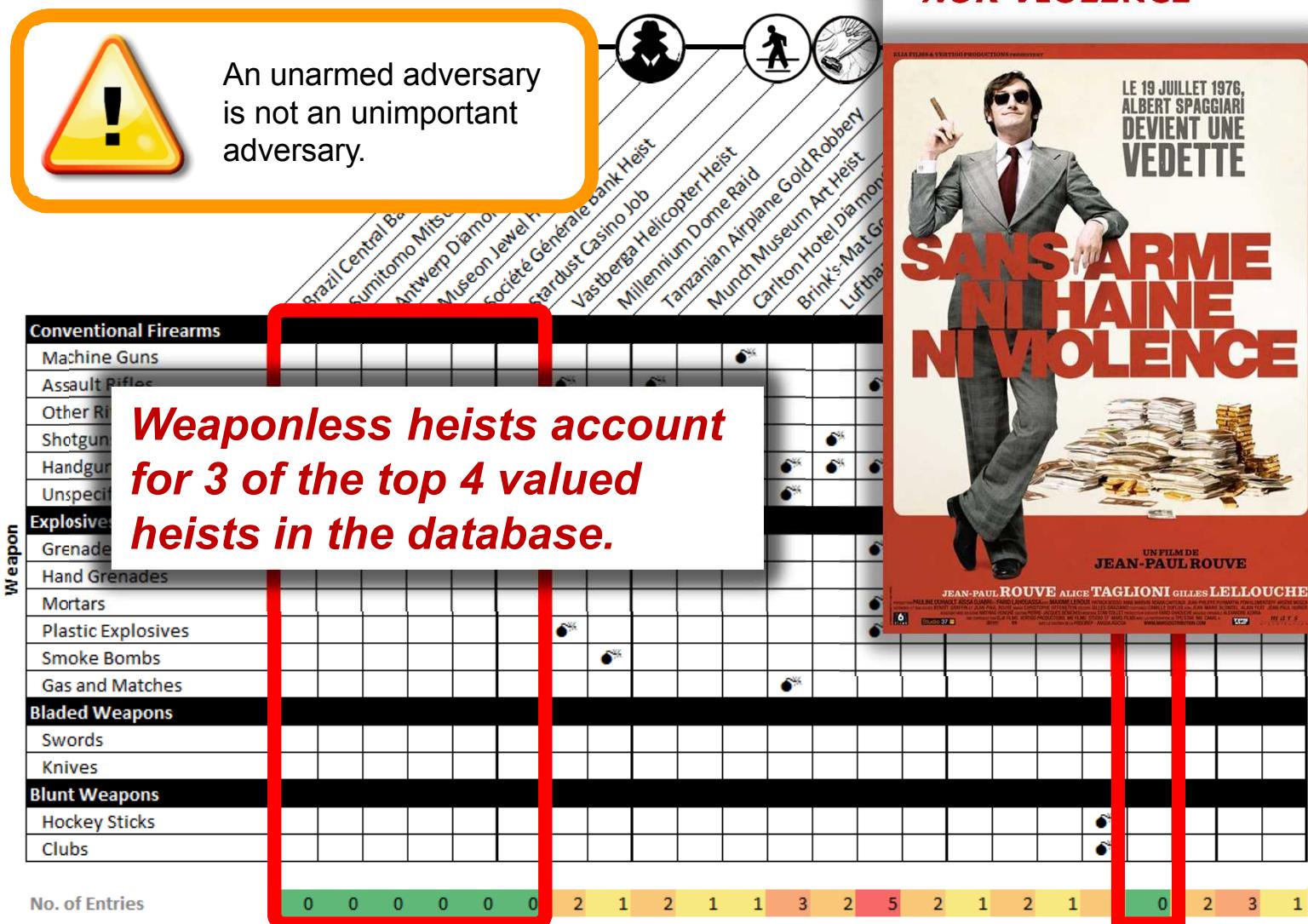


Securitas Cash Depot Heist

Tues., Feb. 21, 2006, at 18:30
Tonbridge, United Kingdom
51.191098°N, 0.277652°E

Target: Securitas Depot
Stolen: \$104 million in cash
Heist Duration: 7.8 hours

Weapons Employed



Weapons Employed

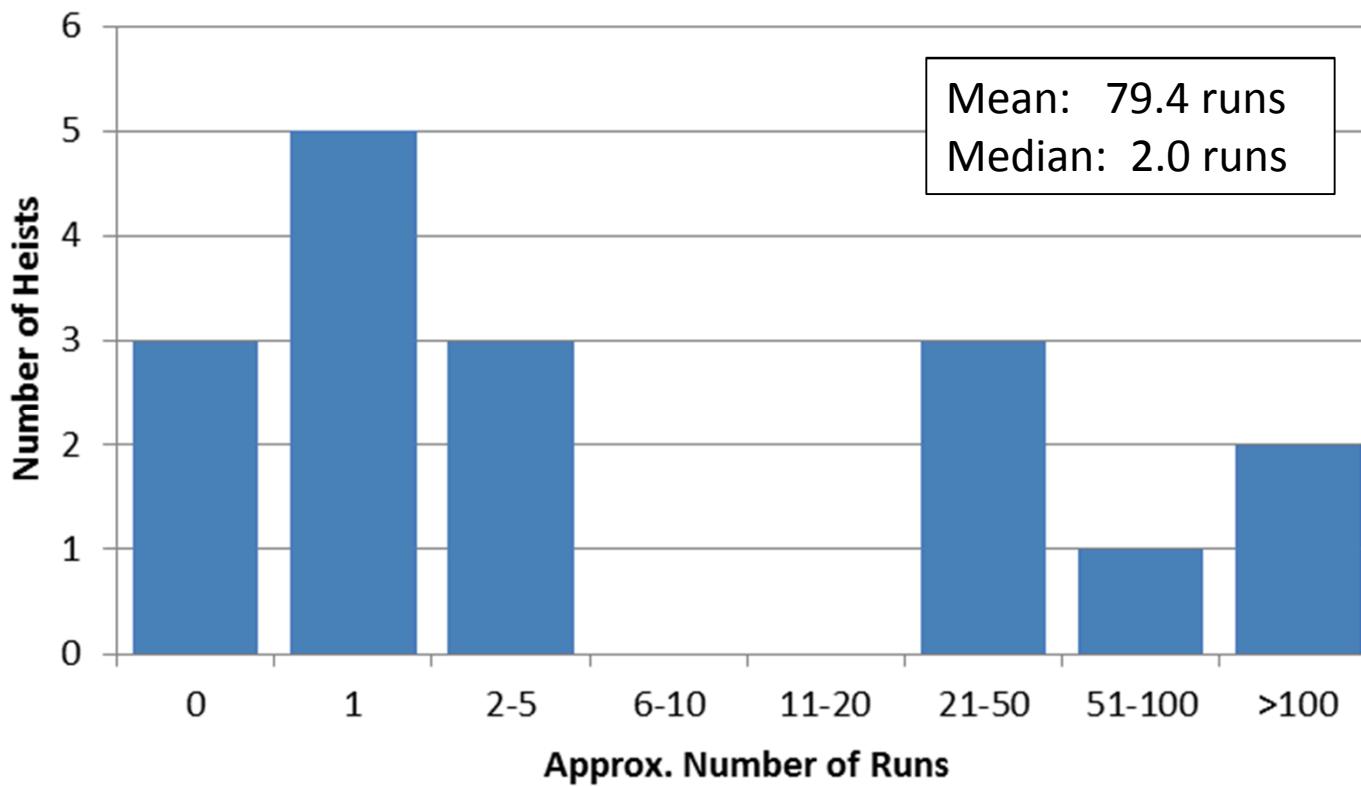
Lessons Learned

- Conventional firearms, rather than explosive, bladed, or blunt weapons, are typical weapons of choice
- **Many high-value heists involve no use of weapons at all**
- **An unarmed adversary is not an unimportant adversary**

Resources and Risk Acceptance

Testing and Qualification

Practice and Reconnaissance Runs



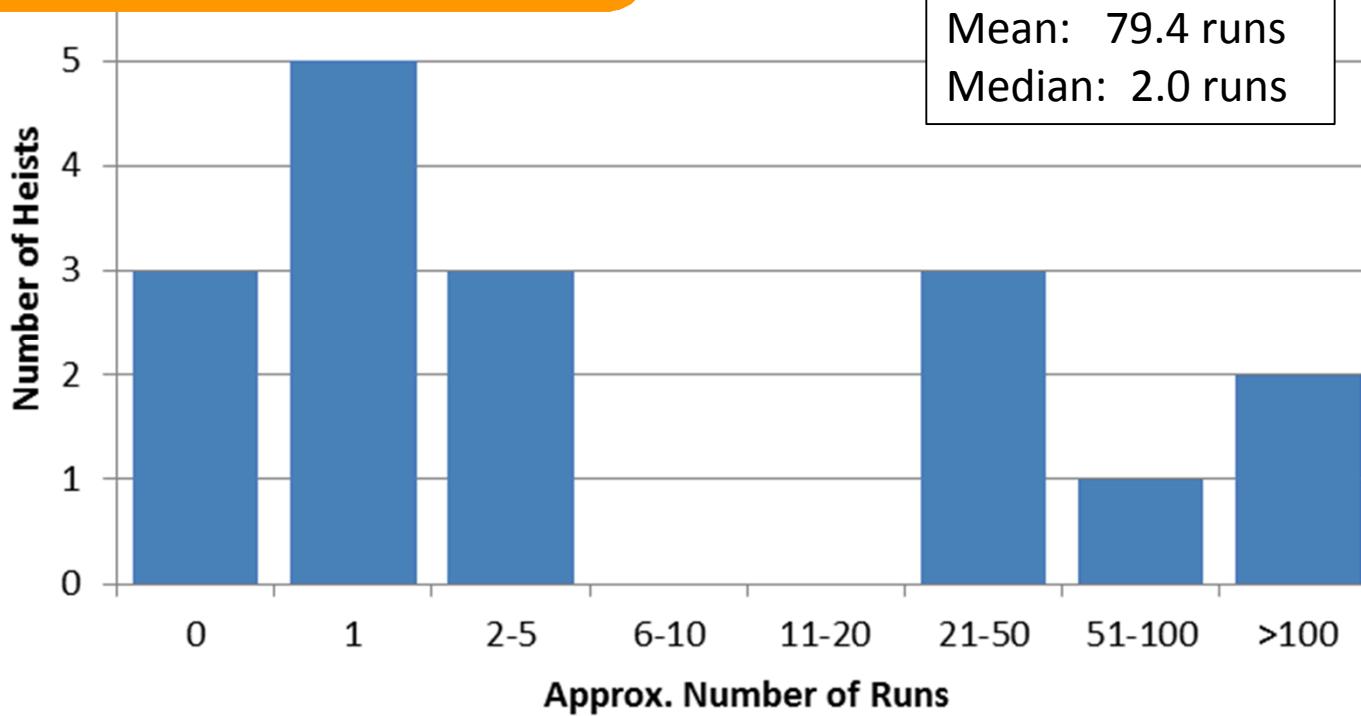
Resources and Risk Acceptance

Testing and Qualification



Test, test, test: Rarely do thieves engage in a heist without a reconnaissance or practice run.

Reconnaissance Runs



Resources and Risk Acceptance

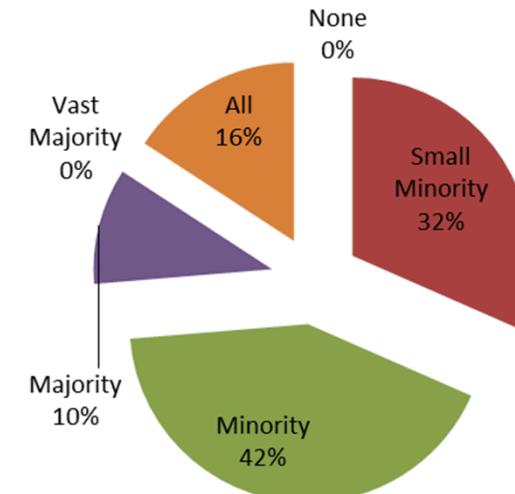
Mass Properties



Thieves have demonstrated capabilities to steal anything from briefcases to trucks full of high-value items.



Fraction of Valuables Stolen



Thieves have demonstrated the ability to execute highly targeted heists.

Resources and Risk Acceptance

Lessons Learned

- **Thieves of high-value items are often a lot like us:**
 - Ambitious and disciplined
 - Good systems engineers and project managers
- **Schedule:** Thieves often take **months or years to plan** a high-value heist
- **Testing and Qualification:** **Rarely do thieves execute a heist without a recon or practice run**
- **Human Resources:**
 - Thieves need the ability to work well in small teams
 - Thief operations are **almost always supported by a larger team effort**
- **Mass Properties:**
 - Thieves have demonstrated capabilities to **steal anything from briefcases to trucks full of high-value items**
 - Thieves have demonstrated the ability to execute **highly targeted** heists
- **Budget:** Thieves are **willing to invest large amounts of money** in planning and preparation, justified in part by the probable financial returns.
- **Recruiting:** The typical high-value item thief is:
 - A 36-year-old man
 - Career criminal
 - Native to the country that is home to the asset he plans to steal

Insider Information and Actions

Lessons Learned

- **Insider involvement is exceedingly common** in the planning and execution of high-value heists.
- Insiders come in a variety of flavors:
 - Origin: Unwitting, Recruited, Planted, Opportunistic, or **Coerced**
 - Role: Passive, **Active Nonviolent**, Active Violent
- **Coerced, active nonviolent insiders** tend to be the most frequently observed type in high-value heists.

FAILURES AND MISTAKES



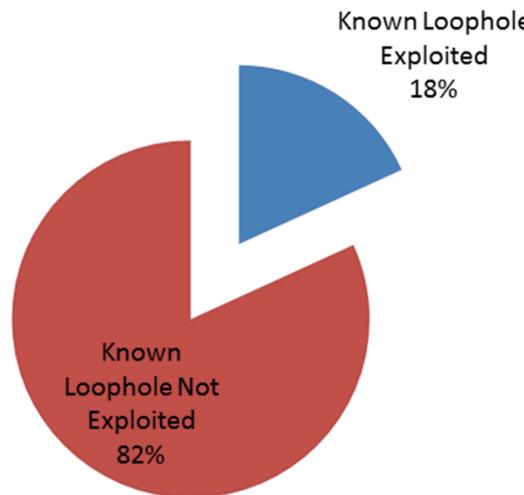
I mean, there is no security system that can't be bypassed, because there always is a human mind and a human hand activating them.

Valerio Viccei, Criminal
Knightsbridge Safe Deposit Center Heist

Failures and Mistakes

Blue Force Issues

Exploitation of Known Security Vulnerabilities

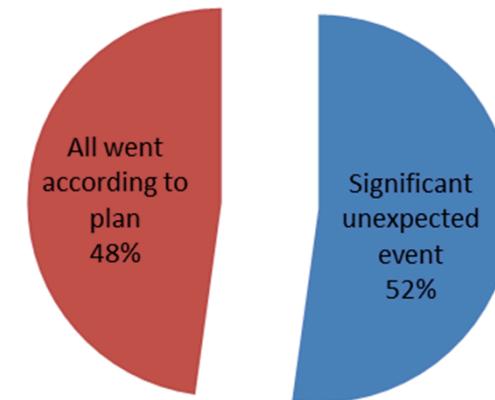


Examples:

- Antwerp Diamond Center would not consent to insurance investigator evaluation
- Gardner Museum underfunded security and did not implement recommendations from security consultant two years prior to heist

Red Force Issues

Occurrence of Unexpected or Plan-Altering Events during Heist



Examples:

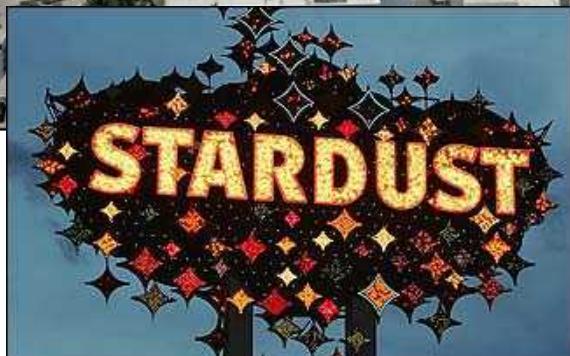
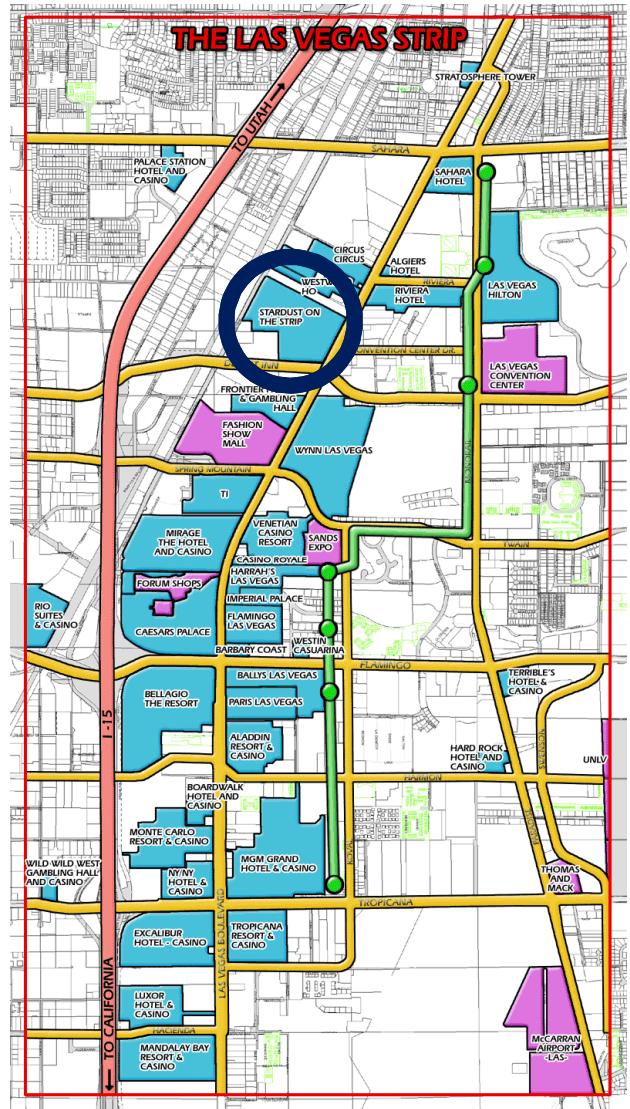
- Stressed Brink's-Mat employee inability to remember vault combination
- Chase Manhattan bank manager's disguised communications
- Knightsbridge thieves on wrong radio channel
- Société Générale late-night cash drop and storm

Failures and Mistakes

Lessons Learned

- In a small but significant number of cases, decisions to not invest in appropriate security led to substantial losses
- **Thieves' plans are not always perfect**, and it is common for unplanned events to require them to alter their plans

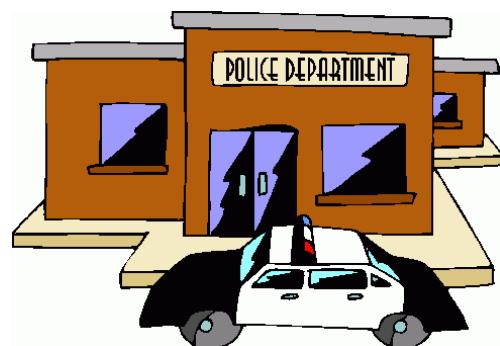
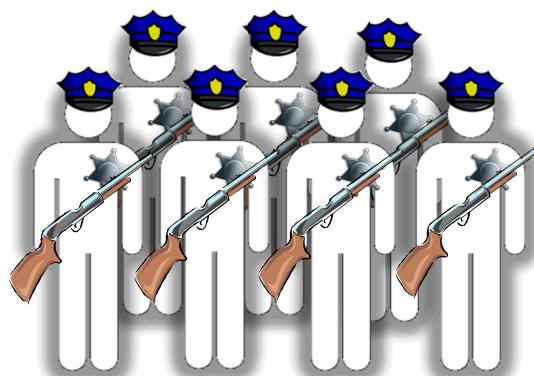
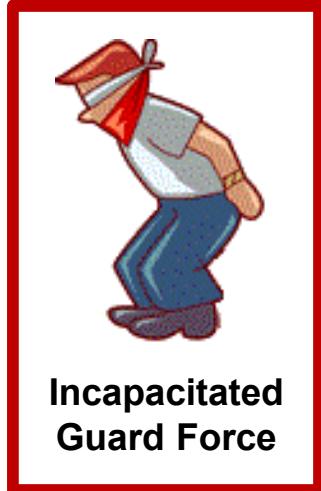
Las Vegas: September 1992



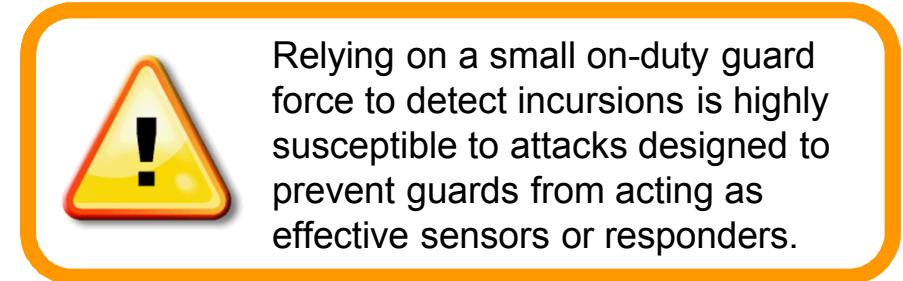
\$800,000
in Cash and Chips

Defeated Security Measures

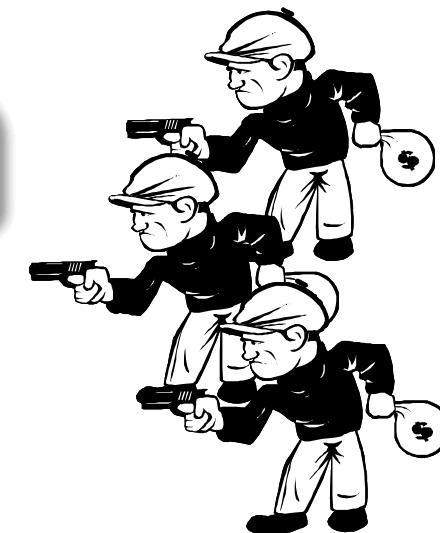
Security Guards



Large Generatable Guard Force



Sensor / First
Responder
Guard Force



Deception Methods

 Deception Method was Employed

Physical Disguises

- Disguise of Thief-Possessed Building
- Disguise of Theft in Progress
- Vehicles that Blend with Surroundings
- Disguised/Concealed Surveillance Equipment
- Disguised/Concealed Operations Equipment
- Physical Disguise or Concealment of Loot
- Disguised
- Disguised

Deception Methods

No. of Entries



DECEIVE, SUBDUE, AND SEIZE

Successful



Gardner Museum Art Heist

Sun., March 18, 1990, at 01:24
Boston, United States of America
42.338768°N, 71.098859°W

Target: Gardner Museum
Stolen: \$440 million in artwork
Heist Duration: 1.4 hours



DECEIVE, SUBDUE, AND SEIZE

Successful

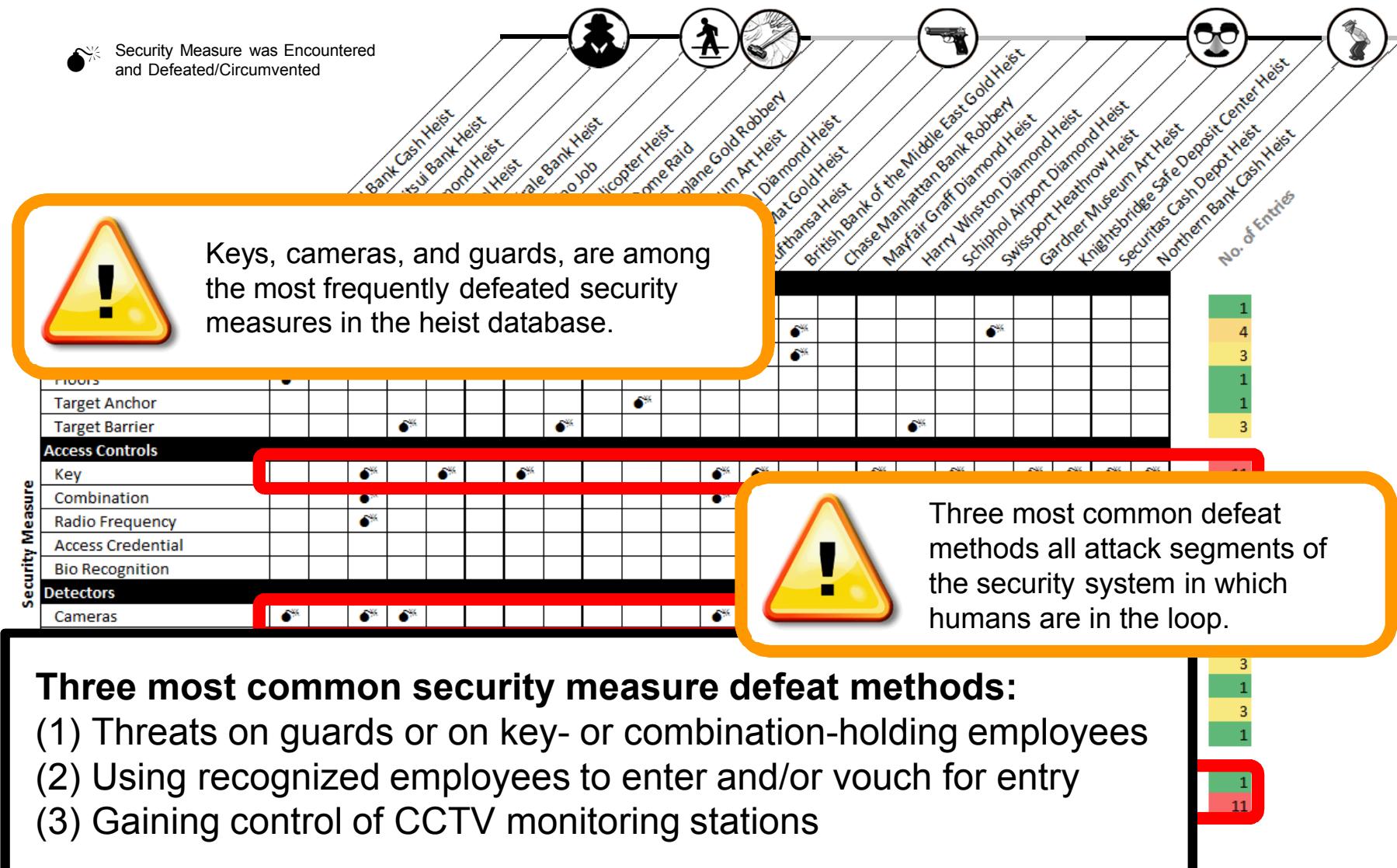


Mayfair Graff Diamond Heist

Sun., Aug. 6, 2009, at 16:40
London, United Kingdom
51.509821°N, 0.141851°W

Target: Graff Diamonds Store
Stolen: \$68.9 million in jewelry
Heist Duration: 2 minutes

Defeated Security Measures



Resources and Risk Acceptance

Recruiting



The typical high-value item thief is a 36-year-old man who is a career criminal and native to the country that is home to the asset he intends to steal.

List of Occupations for High-Value Heist Accomplices

Employees	Managers	Business Owners	Illicit	Other
Appraiser	Airline Cargo Supervisor	Adult Store Owner	Career Criminal	Cage Fighter
Cashier	Security Chief	Bar Owner	Drug Dealer	Soldier
Construction Worker	TV Producer	Camera Store Owner	Gang Leader	Unemployed
Delivery Driver	Youth Club Leader	Coffee Shop Owner	Hacker	
Doorman		Garage Owner	Petty Thief	
Electrician		Jewelry Designer		
Electronics & Alarms Expert		Minicab Agency Owner		
Engineer		Safe Deposit Center Owner		
Gardener				
Journalist				
Musician				
Pizzeria Worker				
Postal Worker				
Roofer				
Security Guard				
Used Car Salesman				

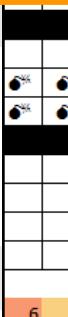
Deception Methods



Thieves or coerced accomplices that **blend in by occupation** exist more frequently inside than outside the targeted organization.

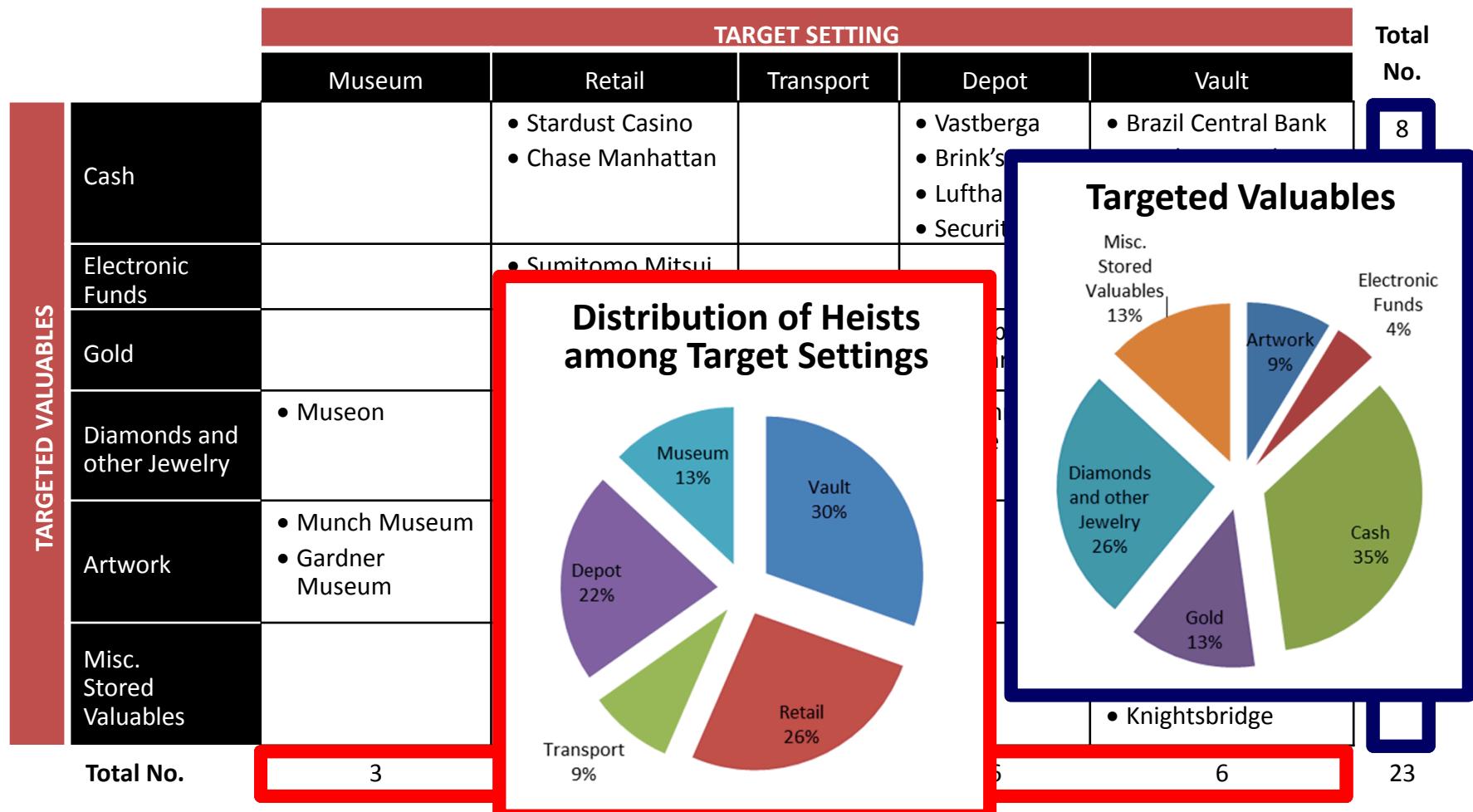
		RELATION TO TARGET ORGANIZATION									
Deception Methods	ROLE	Inside									
		Outside									
		<ul style="list-style-type: none"> • Knightsbridge • Sumitomo Mitsui • Lufthansa • Securitas • Northern Bank • Stardust Casino • Brink's-Mat • Securitas • Schiphol Airport* • Antwerp 									
		<ul style="list-style-type: none"> • Société Générale* • Swissport Heathrow* • British Bank of the Middle East • Brazil Central Bank 									
		<ul style="list-style-type: none"> • Sumitomo Mitsui* • Société Générale • Knightsbridge 									

* Heist in which a thief posed in a role he did not legitimately hold.



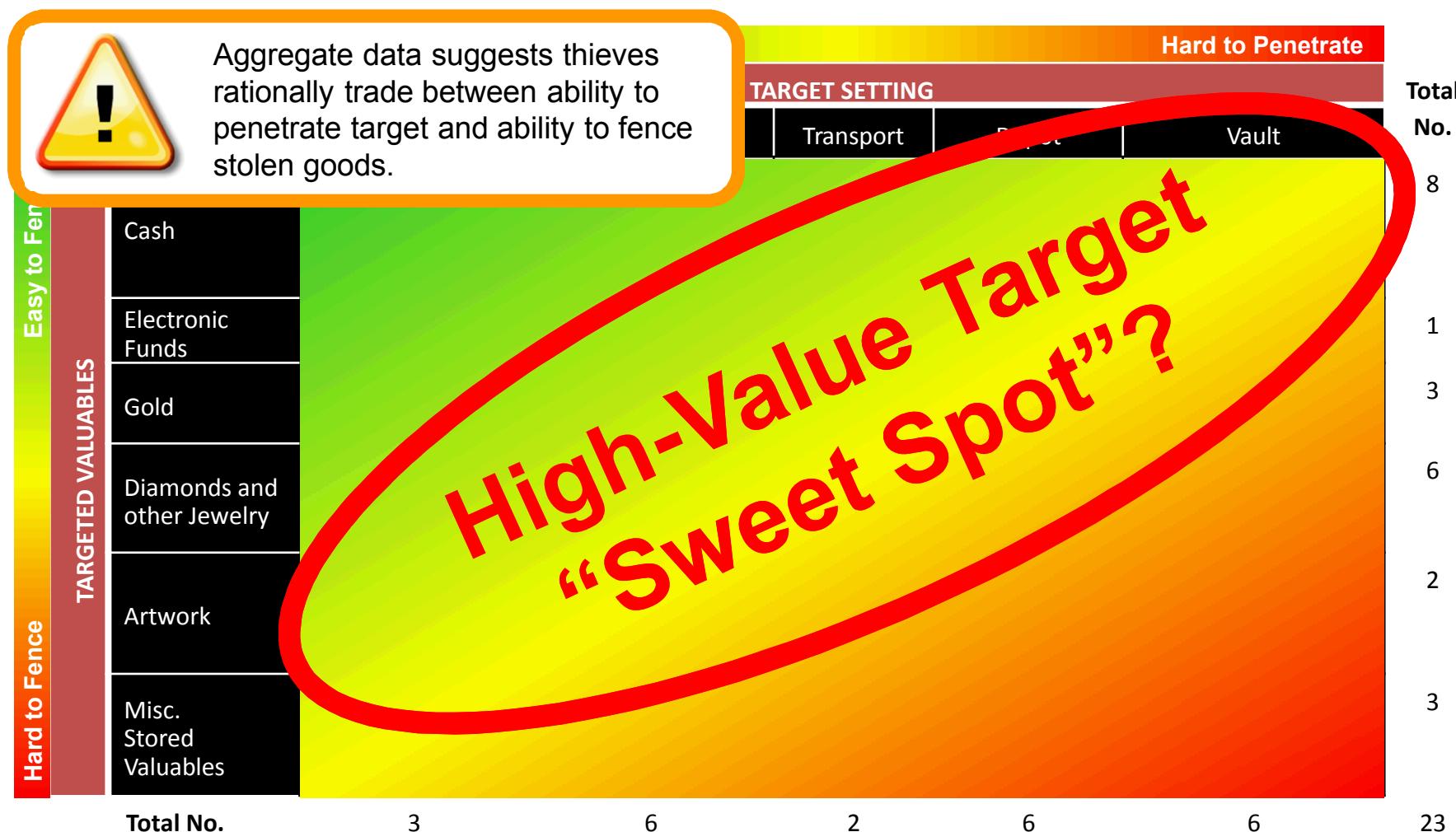
Timing and Target Selection

Targeted Valuables and Settings



Timing and Target Selection

Targeted Valuables and Settings



A Few More Examples

Schiphol Airport: Netherlands, 2005

Two men dressed in KLM uniforms drive a stolen KLM vehicle into the secure freight area at Schiphol Airport. They then intercept a truck carrying **\$115 million** (FY12 equiv.) worth of diamonds bound for a flight to Antwerp.



Securitas Depot: United Kingdom, 2005

Depot manager and his family is kidnapped by thieves posing as policemen. On threat of death to his family, manager is driven to the depot to tell the control room operator to let in seven thieves with a van. The thieves make off with about **\$104 million** (FY12 equiv.) in cash.



A Few More Examples

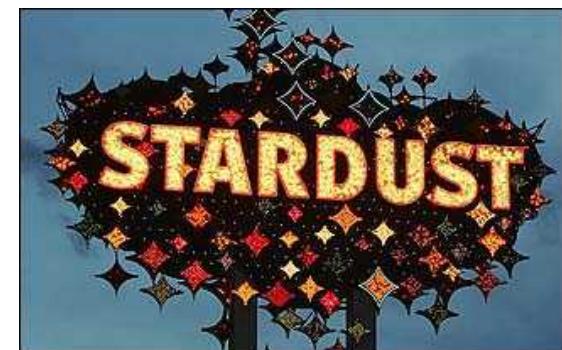
Brink's-Mat Depot: United Kingdom, 1983

Seven armed, masked men enter the depot 10 minutes after its opening. The six employees present are subdued and bound, and the two employees with the vault keys and combinations are called by name and coerced at gunpoint to open the vault. Seventy-six boxes of gold bullion worth **\$86 million** (FY12 equiv.) are loaded into a van and disappear.



Stardust Casino: United States, 1992

Casino worker on his lunch break walks past security guards, carrying a backpack of cash and chips worth **\$800,000** (FY12 equiv.). Worker is never seen again.



Idea: Heist Baseball Cards



SUBDUE AND SEIZE

Successful



Västberga Helicopter Robbery

Wed., Sept. 23, 2009, at 05:15
Stockholm, Sweden
59.29802°N, 18.01289°E

Target: G4S Cash Depot
Stolen: \$6.1 million in cash
Heist Duration: 20 min.



STEALTH RAID

Successful



Brazil Central Bank Cash Heist

Sat., Aug. 6, 2005, at 04:00
Fortaleza, Brazil
3.734031°S, 38.522256°W

Target: Central Bank Vault
Stolen: \$81.9 million in cash
Heist Duration: Up to 30 hrs.



Security Force Profile

Active Guard Station
Planning Stage Knowledge
Planning Stage Response

Notable Security Measures:
Video surveillance
Bullet/Smash-proof glass
Reinforced steel doors
Padlocked cages

No Known Insiders

Thief Profile

Native Citizenship
4 Accomplices on Scene
1 Team in Vicinity

Notable Circumvention:
Roof entry via helicopter
Cut-to-fit custom explosives
Cut-to-fit ladders
Circulating saw for padlocks

Armament: AK-47
Explosives

Est. Expenditures: \$2,000
Benefit/Cost Ratio: 3,050
Est. Planning Time: 30 days

Risk of Capture: Medium
Risk of Death: Medium

Security Force Profile

Inactive Guard Station
Aftermath Stage Knowledge
Aftermath Stage Response

Notable Security Measures:
Video cameras
Motion detectors
Locked vault door
Thick iron and cement floor

Recruited, Passive Insider
– Bribed Security Guard

Thief Profile

Mixed Citizenship
14 Accomplices on Scene
1 Team in Vicinity

Notable Circumvention:
Dug tunnel under 1.5 city blocks
Created CCTV blind spot
Used existing CCTV and motion detector blind spot

Armament: None Known

Est. Expenditures: \$700,000
Benefit/Cost Ratio: 117
Est. Planning Time: 3 months

Risk of Capture: Low
Risk of Death: Medium

Heist Traceability

ID Heist Name

ID	Heist Name	Internet Sources			Book Sources			
		Time	BBC	Discovery	History	Flawless	True Crime	Heists
1	Brazil Central Bank Cash Heist	✓	✓			✓	✓	
2	Sumitomo Mitsui Bank Heist							
3	Antwerp Diamond Heist	✓		✓	✓	✓	✓	
4	Museon Jewel Heist			✓				
5	Société Générale Bank Heist					✓	✓	
6	Stardust Casino Job			✓				
7	Vastberga Helicopter Heist		✓					
8	Millennium Dome Raid							
9	Tanzanian Airplane Gold Robbery							
10	Munch Museum Art Heist			✓			✓	
11	Carlton Hotel Diamond Heist				✓	✓		
12	Brink's-Mat Gold Heist		✓			✓	✓	✓
13	Lufthansa Heist	✓			✓		✓	
14	British Bank of the Middle East Gold Heist	✓	✓		✓	✓		
15	Chase Manhattan Bank Robbery							
16	Mayfair Graff Diamond Heist		✓			✓		
17	Harry Winston Diamond Heist			✓		✓		
18	Schiphol Airport Diamond Heist				✓			
19	Swissport Heathrow Heist							
20	Gardner Museum Art Heist	✓		✓	✓			
21	Knightsbridge Safe Deposit Center Heist	✓			✓	✓		
22	Securitas Cash Depot Heist	✓			✓		✓	
23	Northern Bank Cash Heist	✓			✓			

