

THE BASIC ORDINANCE OBSERVATIONAL MANAGEMENT SYSTEM

# GEOVISUAL ANALYTICS OF IMPROVISED EXPLOSIVE DEVICE INCIDENTS

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# INTRODUCTION

- **Research Objective**
  - to support *sensemaking & decision making* of **Improvised Explosive Device (IED)** attacks



- **BOOMsys**
  - prototype *geovisual analytics* application designed to facilitate spatiotemporal visual analysis of IED incidents

# PROBLEM CONTEXT

- **Intelligence Analysis**

- *the process by which collected information is evaluated and integrated with existing information (FM 2-0)*



- **Intelligence Preparation of the Battlefield**

- 1) Define the Operational Environment
- 2) Describe the Effects of the Operational Environment
- 3) Evaluate the threat
- 4) Determine threat courses of action

# PROBLEM CONTEXT: IEDs

## ■ The IED

- Terrorist/Insurgent weapon of choice
- Cost effective
- Concealable/ Covert
- 23,000 military & civilian casualties worldwide in 2009



## ■ IED Emplacement

- increase in geographic extent, frequency, and sophistication
- gaps in IED data dissemination, spatial analysis, and threat analysis (GAO 2009)



# PROBLEM CONTEXT: IEDs

**Worldwide Incidents Tracking System** Home | Published Reports | Exports | Methodology | Support

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Search << Reports Event Type Incident Filters Location Victim [+] Perpetrator [+] Facility [+]

within results  
» Advanced Search

**My Search:**

Attack [x] All

Country  
Iraq

Weapon  
IED

Remove All

---

**Date Range:**

Presets: - Select a Preset -

Incident Date

After MM/DD/YYYY

Filter

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**Numeric Range:**

Facility Total Facilities

Filter

---

**My Current Searches**

**My Current Reports**

**GENERATE REPORT**

Begin Date: 01/01/2009 End Date: 12/31/2009

- Select a Report -

Generate Report

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**Attack Victim Perpetrator Facility**

Records Concept Cloud Map Charts Reports

Matching Attack Records: 10,325 [edit]

	ICN	Incident Date	Subject	Country	City	D	W	H	T	View
1.	200566043	27 Jan 2005	3 civilians killed, 7 injured in IED attack in Mahmudiyah, Ninawa, Iraq	<a href="#">Iraq</a>	<a href="#">Mahmudiyah</a>	3	7	0	10	
2.	200907658	17 Aug 2009	Several shops damaged in IED attack in Al Fallujah, Al Anbar, Iraq	<a href="#">Iraq</a>	<a href="#">Al Fallujah</a>	0	0	0	0	
3.	200458891	8 Jun 2004	1 oil pipeline damaged in IED attack in Bayji, Salah ad Din, Iraq	<a href="#">Iraq</a>	<a href="#">Bayji</a>	0	0	0	0	
4.	200565660	19 Jan 2005	1 civilian, 1 child killed, 2 civilians wounded in suicide VBIED attack by AQI in Baghdad, Iraq	<a href="#">Iraq</a>	<a href="#">Baghdad</a>	2	2	0	4	
5.	200809868	23 Sep 2008	1 civilian killed, 8 others wounded in IED attack by suspected ISI in Ba'qubah, Diyala, Iraq	<a href="#">Iraq</a>	<a href="#">Ba'qubah</a>	1	8	0	9	
6.	200691203	29 Jul 2006	3 civilians, 3 police officers wounded in IED attack in Baghdad, Iraq	<a href="#">Iraq</a>	<a href="#">Baghdad</a>	0	6	0	6	
7.	200703104	13 Mar 2007	2 government employees killed, 6 others wounded in IED attack in Baghdad, Iraq	<a href="#">Iraq</a>	<a href="#">Baghdad</a>	2	6	0	8	
8.	200905542	23 Jun 2009	Government building targeted in IED attack in Mosul, Ninawa, Iraq	<a href="#">Iraq</a>	<a href="#">Mosul</a>	0	0	0	0	
9.	200705932	16 May 2007	Civilians targeted in IED attack in Baghdad, Iraq	<a href="#">Iraq</a>	<a href="#">Baghdad</a>	0	0	0	0	
10.	200696083	12 Oct 2006	4 civilians, 1 police officer killed, 22 civilians, 3 police officers wounded in IED and VBIED attacks in Baghdad, Iraq	<a href="#">Iraq</a>	<a href="#">Baghdad</a>	5	25	0	30	
11.	200685787	31 Mar 2006	1 oil pipeline damaged in IED attack in Kirkuk, At Ta'mim, Iraq	<a href="#">Iraq</a>	<a href="#">Kirkuk</a>	0	0	0	0	

National Counterterrorism Center (NCTC) World Wide Incident Tracking System (WITS)

# METHOD

- **Visual Analytics:**

- the science of analytical reasoning facilitated by interactive visual interfaces
- Thomas et al. (2005) agenda developed in response to pitfalls in information sharing/analysis from 9-11



- **Geovisual Analytics**

- applications to analytical problems with an inherent geographic component

# METHOD

- **Sensemaking:**

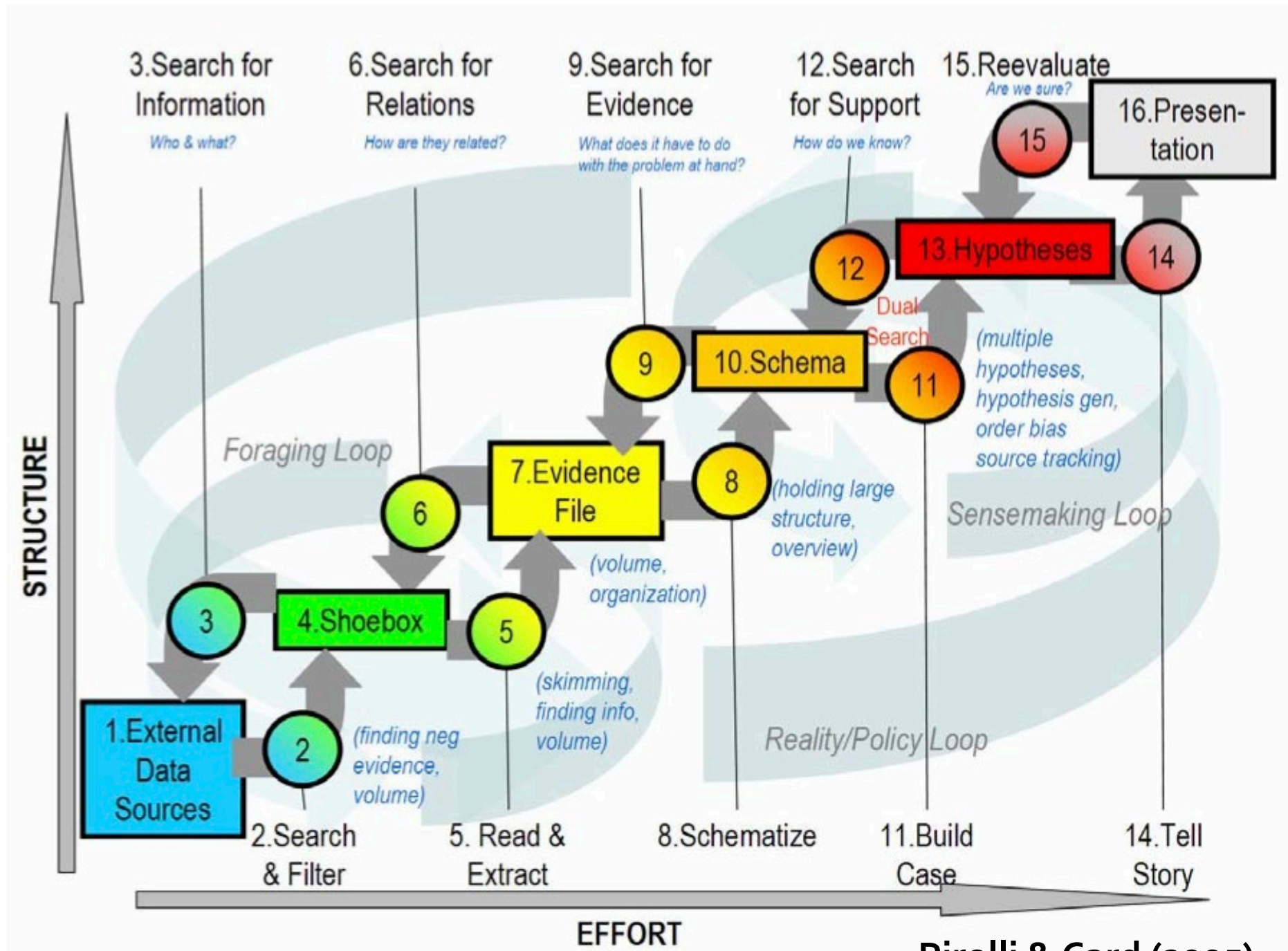
- the process of iteratively acquiring, analyzing, and restructuring relevant bits of information to generate actionable insight



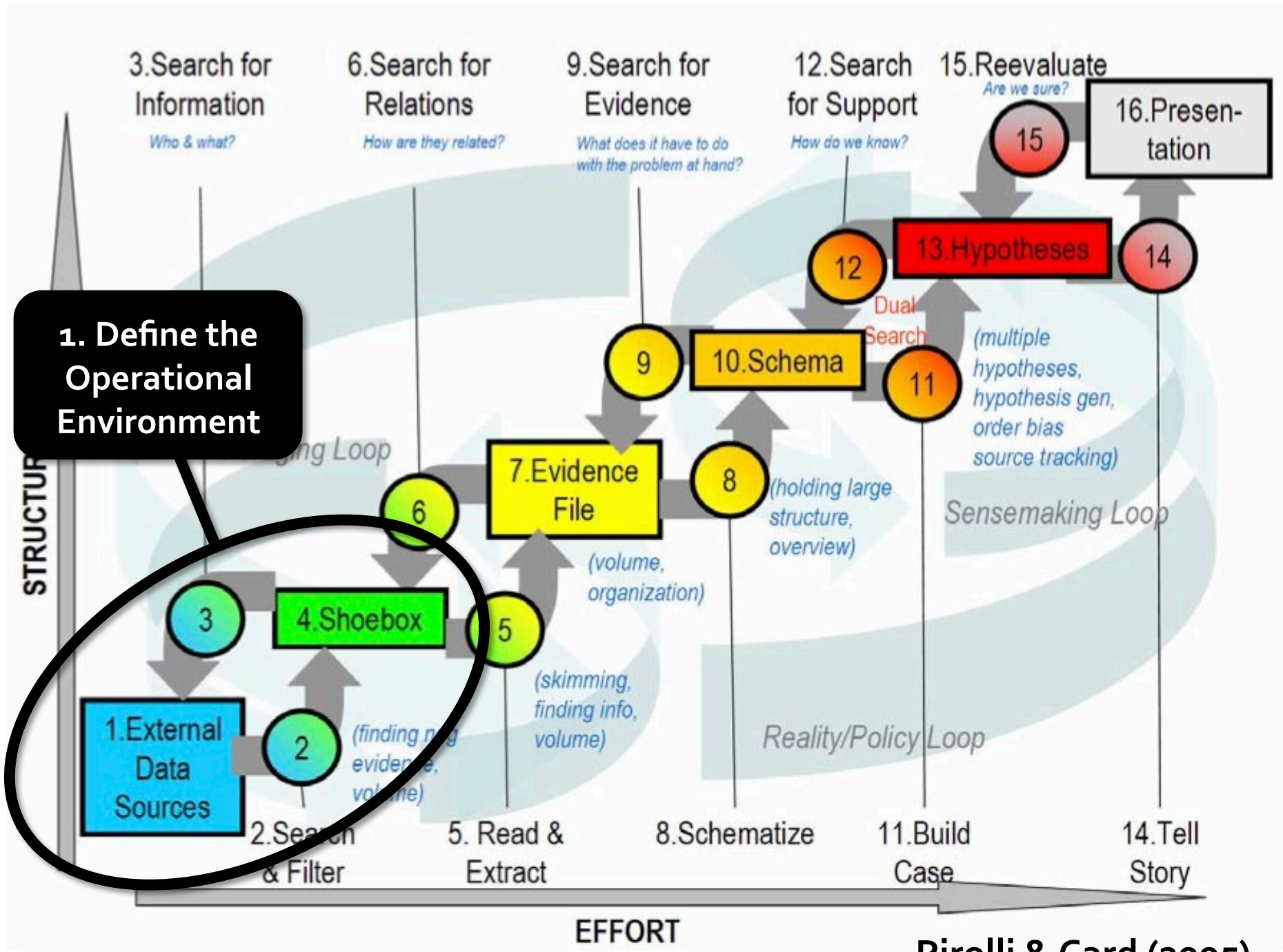
- **Decision Making:**

- operationalizing this insight to inform tactical and strategic courses of action



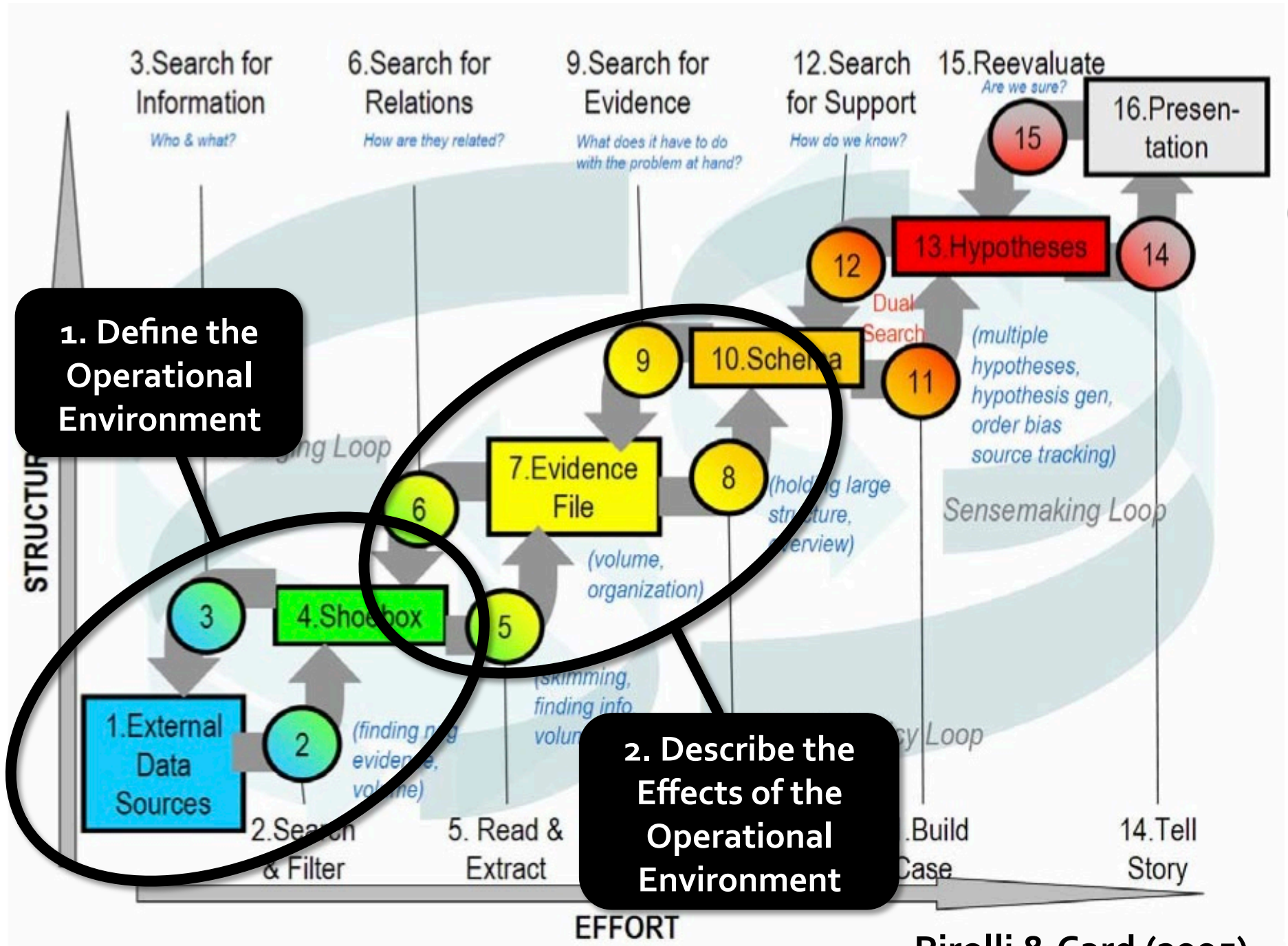


Pirolli & Card (2005)

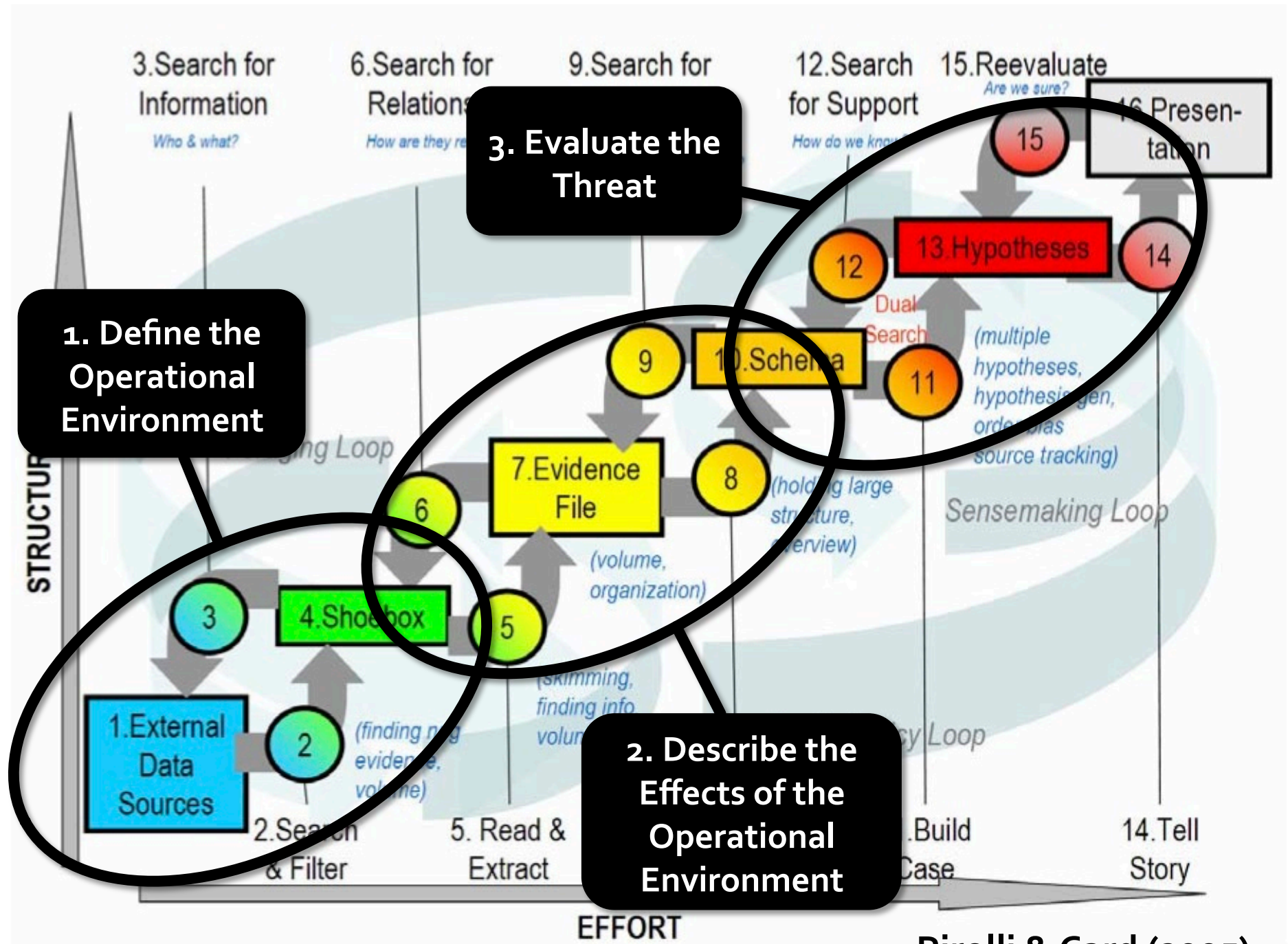


Pirolli & Card (2005)



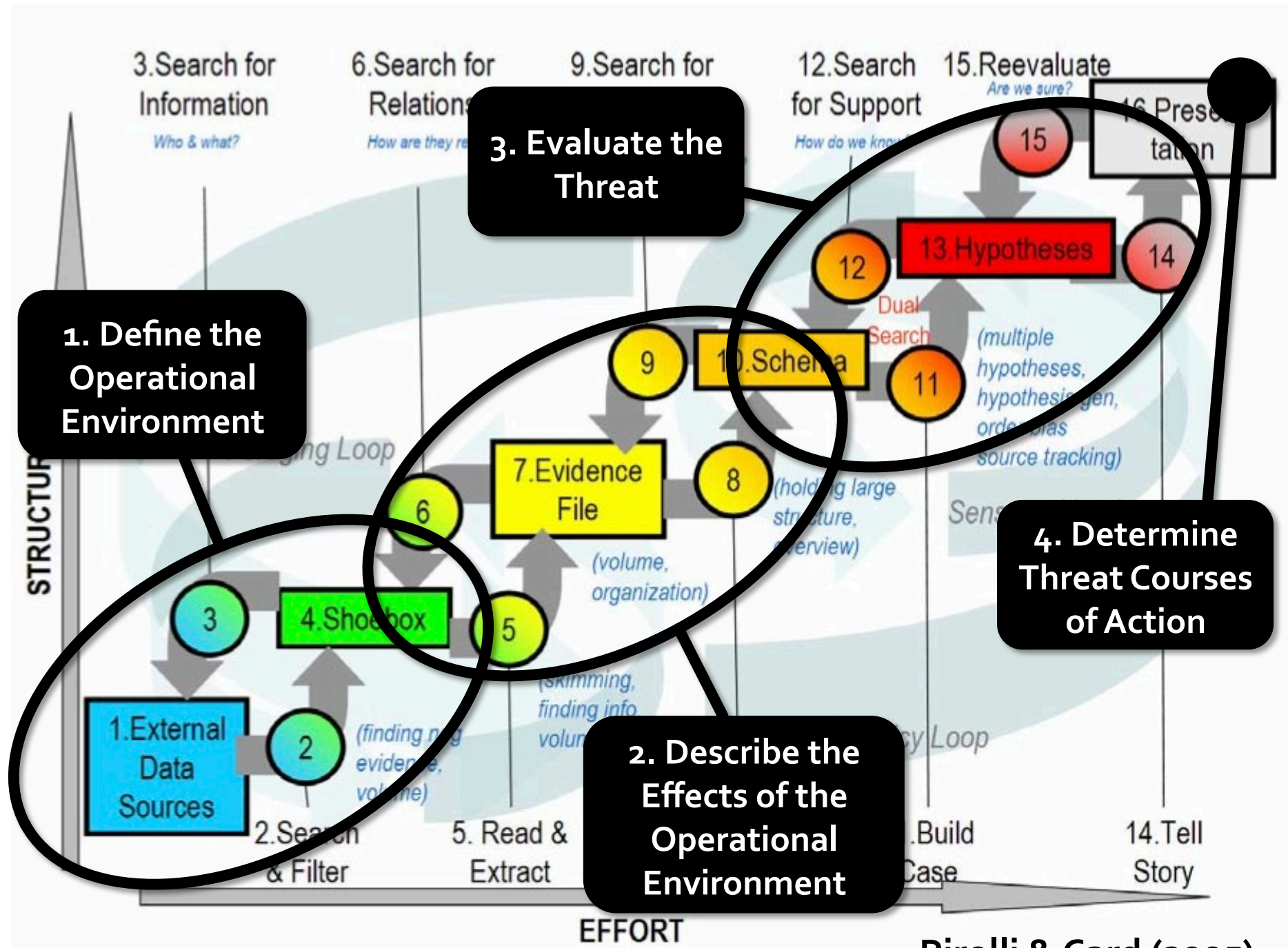


Pirolli & Card (2005)



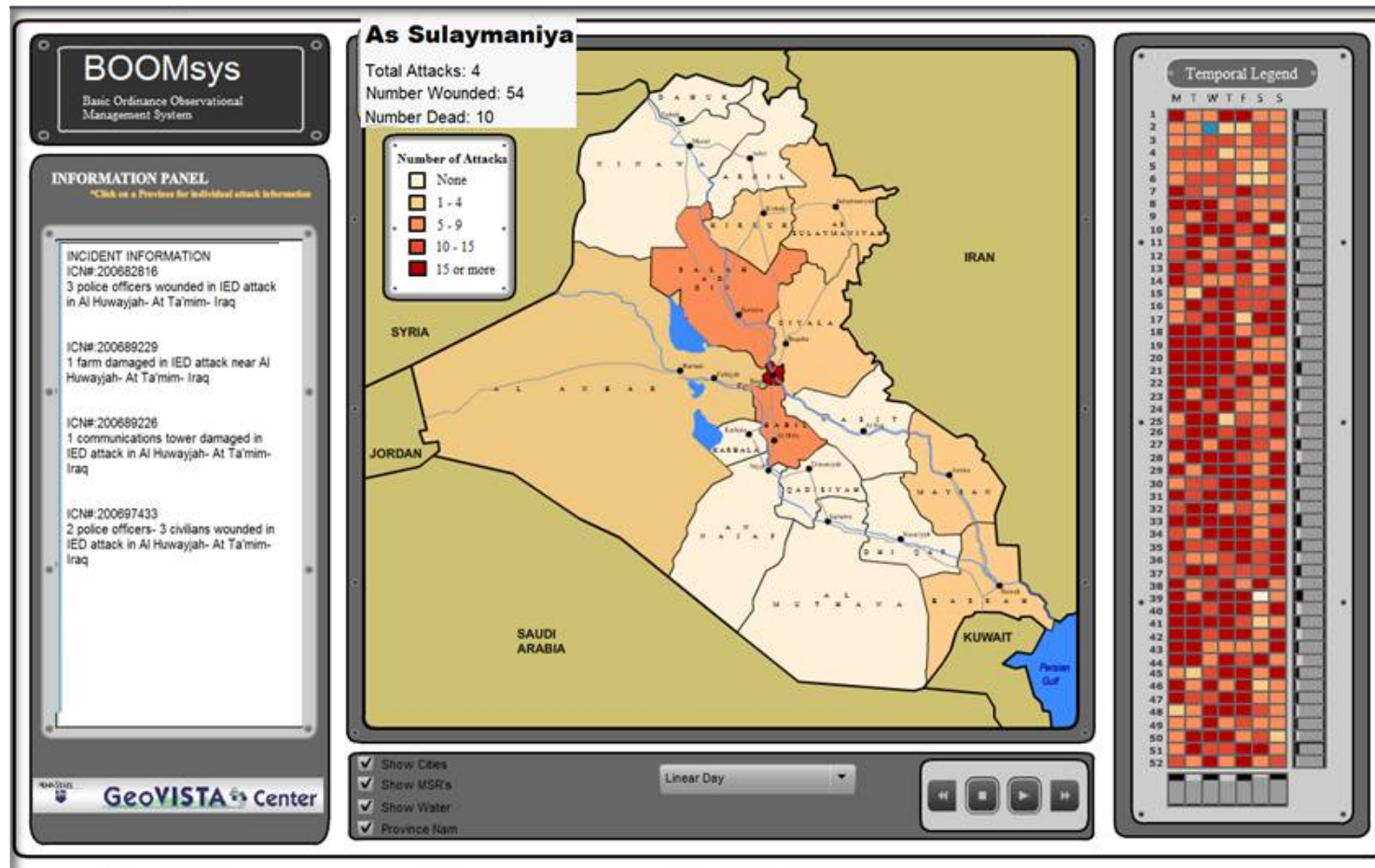
Pirolli & Card (2005)





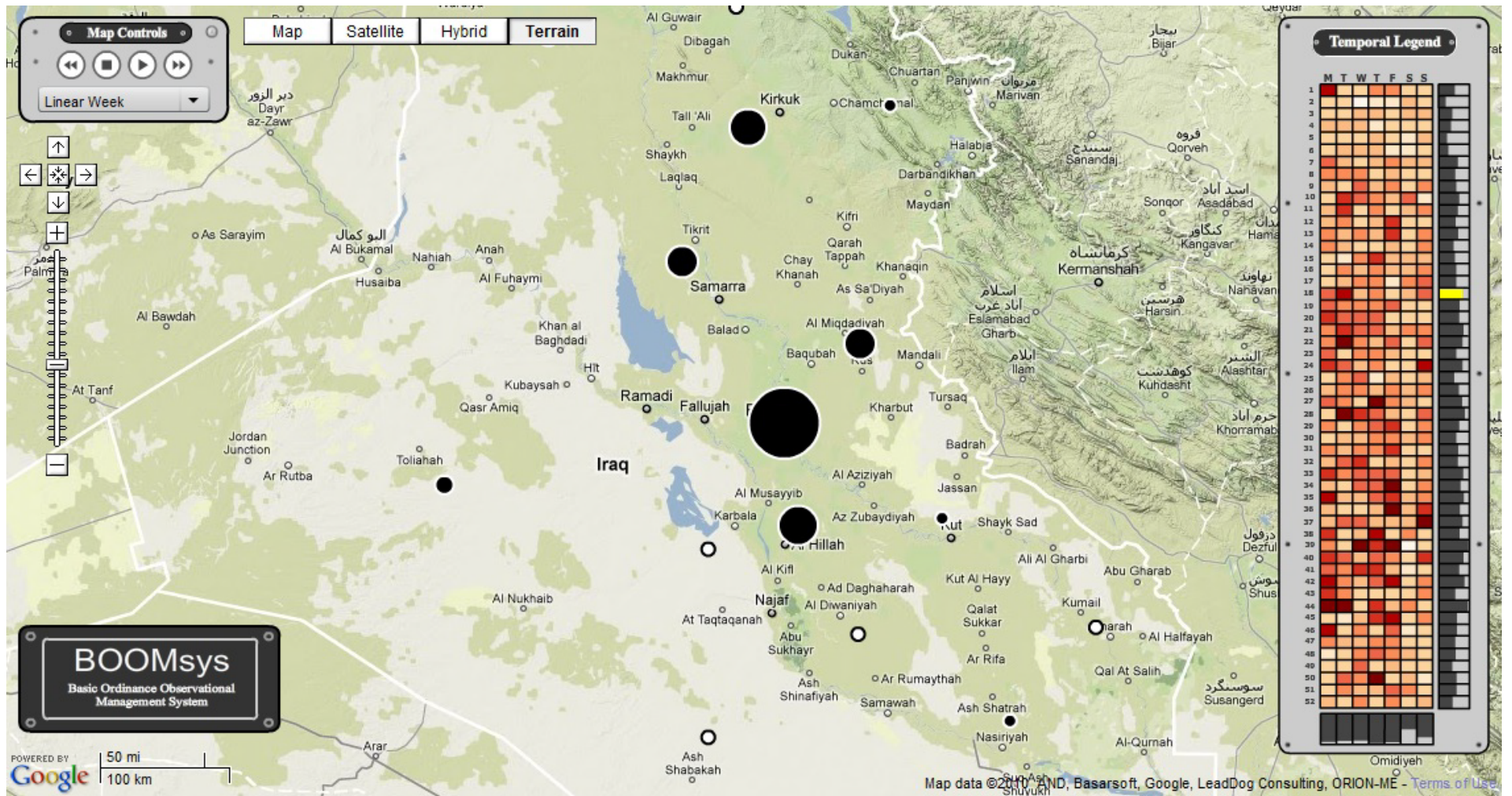
Pirolli & Card (2005)

# BOOMsys 1.0





# BOOMsys 2.0





# CONCLUSION

- **BOOMsys**
  - geovisual analytics (prototype)
  - spatiotemporal visual analysis
  - IED incidents & the IPB cycle
- **Synthesize**
  - information / extract temporal & spatial patterns in past IED activity
- **Increase understanding of the operational environment & IED affects on geographic space**

# FUTURE DEVELOPMENT

- **Increase**
  - analytical capabilities of prototype application.
- **Scale**
  - larger geographic and temporal extent (i.e. GWOT)
- **User Studies**
  - MOS 35 series (MI) in order to refine and extend the system to better support the needs of the targeted end users

# QUESTIONS & COMMENTS

- **QUESTIONS?**
- **COMMENTS**
- **GeoVISTA Contact Information**

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