



# **A New Perspective on Use of the Critical Decision Method with Intelligence Analysts**

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# Background: Intelligence Analysis

- **Sort through vast amounts of information to construct an accurate depiction of a situation**
  - Products of information foraging and analysis are used by senior decisionmakers to make high-stakes decisions
- **Complex process of assessing reliability of information from wide variety of sources and combining seemingly unrelated events**
  - Involves data mining, data correlation, human judgment
- **CTA – capture data to provide input to support development of a computational model of the IA's processes, biases, analytic strategies**
  - New method needed: scenarios do not fit typical pattern of making decisions and taking actions
  - Many CTA techniques have goal: elicit information on actions taken and decisions leading up to those actions
  - Greater emphasis on deductive reasoning, looking for patterns of activity, and making judgment about the level of risk present
- **Needed to take different tack during interviews to capture essence IA's job**
  - Participants were asked to describe an example of a strategic *analysis* problem



# Cognitive Task Analysis Methodology

- **Participants: 10 military officer-students enrolled in NPS graduate school program**
  - 6 Intelligence Information Management; 4 National Security Affairs
  - Average 10 years experience as intelligence analysts
- **Phase One: Semi-structured interviews - Knowledge Audit (ACTA)**
  - Identify challenging aspects of their jobs, cues and strategies
  - Needed broader set of probes to uncover bigger picture
- **Phase Two: Draws from a variety of CTA methods**
  - Critical Decision Method (Klein, et al.; Hoffman, et al.)
  - Tailored to Intelligence Analysts
  - Interview probes developed to focus on a critical assignment where analyst had to collect, analyze and produce report of strategic nature
    - Types of information used, how information was obtained



# Critical Decision Method



**We are interested in the collection, analysis, and reporting of intelligence of strategic importance (as opposed to tactical or operational intelligence). Examples of such strategic analysis problems might include assessments of the capabilities of nations or terrorist groups to obtain or produce weapons of mass destruction, terrorism, strategic surprise, political policy, military policy etc.**

**Please try to recall a recent significant assignment in which you had to collect, analyze, and report on an intelligence problem of a strategic nature (for example, a class assignment that resulted in a paper, talk, briefing, etc.).**

**When was it?**

**Where (in what course) was it?**

**What was the specific assignment?**

**What was the final product, product length, and product audience?**

**How much time was devoted to this task?**

**Over what period of time?**

**What specific training or experience did you have that was particularly relevant to accomplishing this assignment?**

**What did you do step by step? (use as much space as needed to construct timeline)**



# CDM - Deepening

Information	<p>What information were you seeking, or what questions were you asking?</p> <p>Why did you need this information?</p> <p>How did you get that information? What was the information source?</p> <p>Are there any difficulties in getting the information you needed from that source?</p> <p>What was the volume of information that you had to deal with?</p> <p>What did you do with this information?</p> <p>Would some other information been helpful?</p>
Mental models/Schemas	<p>As you went through the process of analysis and understanding did you build a conceptual model?</p> <p>Did you try to imagine important events over time?</p> <p>Did you try to understand important actors and their relationships?</p> <p>Did you make a spatial picture in your head?</p> <p>Can you draw me an example of what it looks like?</p>
Hypotheses	<p>Did you formulate any hypotheses?</p> <p>Did you consider alternatives to those hypotheses?</p> <p>Did the hypotheses revise your plans for collecting and marshalling more information? If so, how?</p>
Intermediate products	<p>Did you write any intermediate notes or sketches?</p>



# CDM - Follow-up

**In the last interview, you provided us with an interesting example of an analysis that you had performed. In today's interview we would like to go through that analysis again to verify and elaborate our understanding of that example analysis.**

Probe Topic	Probes
Goals	What were your specific goals at the time?
Standard Scenarios	Does this case fit a standard or typical scenario? Does it fit a scenario you were trained to deal with?
Analogues	Did this case remind you of any previous case or experience?
Hypotheses & questions	What hypotheses did you have? What questions were raised by that hypothesis? What alternative hypotheses did you consider? What questions were raised by that alternative hypothesis?
Methods	Were you following a method you had learned or developed in the past and, if so, can you describe it?
Information cues for hypotheses and questions	As you collected and read information, what things triggered questions or hypotheses that you later followed up?
Information tools	What sort of tools, such as computer applications, did you use? What information source did you use? What difficulties did you have?

**We are interested in performing more detailed observations of analysts as they solve some tasks. Our general idea is to develop a set of tasks and related materials that we could present to analysts to solve. We would then record how they solved the task. We would like the task to involve the collection of open source information, some analysis, and some product such as a briefing or paper. We would like to see if there is some version of the case you just recalled that could be used in our studies.**

Is there some version of your case that could be done by an analyst in one day to a week?

What materials would be needed?

# Cognitive Demands for Intelligence Analysts

- **Noticing Data**
  - Time critical data difficult to obtain
  - Two analysts looking at same picture/ image can see different things
    - Need background knowledge, expertise working with each type of data e.g., trends of country, etc. influence interpretation
  - Classify data: Relevant/ irrelevant
  - Distilling the relevance: “5 gems” from 100 reports
- **Synthesizing Data**
  - Need to assimilate, verify, and disseminate in short time window
  - Combine seemingly unrelated events and see the relevance
  - Avoid cognitive biases
    - Tunnel vision: So focused on one thing, miss key piece of puzzle
    - Confirmation bias: Discount/ ignore data don't understand, emphasize type of data most experienced with
  - Prior knowledge used to assess validity, reliability
  - Domain expertise needed to analyze each class of data

# Cognitive Demands for Intelligence Analysts

- **High Cognitive Workload:** GOAL: Predict complex, dynamic events
  - Timeline compression coupled with organizational constraints → “channels thinking down a specific path”
  - High cognitive complexity entailed to assess reliability and synthesize info from wide variety of sources: Is it possible? Plausible? Other sources corroborate?
  - Difficult judgments dealing with ambiguous data
    - All types of data can include spurious signals, inaccurate information
    - How to filter and how much weight to give to each specific piece?
    - Domain expertise needed to analyze each type (SIGINT, HUMINT, ELINT, IMAGERY, MASINT, Open Source)
    - Which pieces tie together? Can I trust this info?
  - Overwhelmed with massive amounts of data
    - Need to resolve discrepancies across systems, databases, etc.
    - Need to interpret data in context
  - Time pressure becoming increasingly stressful requirement
    - “Incredible time crunch:” Pressure to give more info, and faster, to the customer
  - Sheer volume makes it difficult to process; yet no technology available to effectively help synthesize different types of info
- **Cumbersome Databases**
  - Poor correlation algorithms
  - System presents results users do not trust: “tracks out of whack”
  - Analysts processes data manually → Adds to cognitive load



# Cognitive Demands for Intelligence Analysts

- **Decisions regarding Information Requirements**
  - Decide whether additional data is required
    - Who to go to for specific information?
    - What system is best to get particular types of information?
    - Re-task an asset? (expensive, involves trade-offs)
    - How to be efficient with limited assets, yet many requirements?
- **Disseminate**
  - Need to understand customer, context, big picture
    - Don't overload "customer"/ but don't starve, i.e., don't decide for them when they need to know something
    - Customer doesn't articulate need/ provide reasons for needing info
  - Avoid Groupthink, "Boy who Cried Wolf"
- **Cultural Issues**
  - Credibility: Operational guys "rarely understand analysis"
    - Attitude: "Why do I need you?"

C O G N I T I V E D E M A N D S T A B L E : S#2

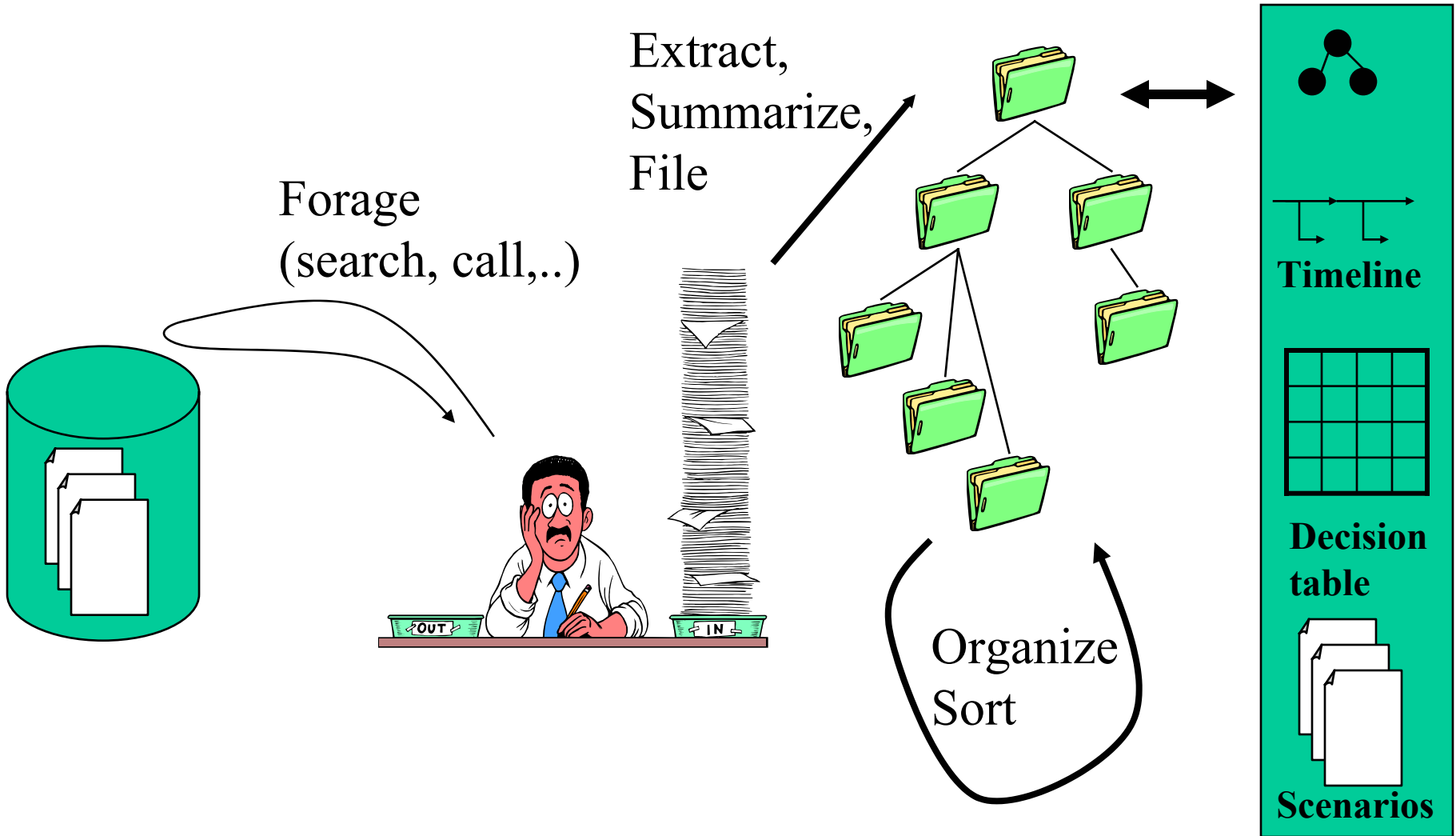
C O G N I T I V E D E M A N D	W H Y D I F F I C U L T	C U E S	S T R A T E G I E S	P O T E N T I A L E R R O R S
Synthesizing data	Lack of technical familiarity with different types of data. Domain expertise is needed to analyze each class of data (HUMANITY, SIGNATURE, IMAGE, etc.)	Difficult to know how to weight different kinds of data	Emphasize type of data analyst has experience with, and disregard	Potential for bias. Tendency to disregard what you don't understand. Tend to emphasize type of experience with disregard other
Synthesizing data	No one database exists that can correlate across systems. No database can synthesize all various inputs (from any different analysts) to form one coherent picture	Systems produce different "results," e.g., mensuration process produce different latitude / longitude coordinates they have	Users develop preferences for system they are familiar with. Different commands rely on different data bases in which they have developed trust	Users develop confidence with their and its associated database can lead to bias or wrong conclusion
Synthesizing data	Different platforms rely on different systems	Users don't always understand information the system presents	Users develop comfort level with their system	Tendency to emphasize size type of data analyst has experience with to disregard other information.
Synthesizing Data	Databases are cumbersome to use	Users don't always understand information the system presents. System presents that users don't trust, e.g., tracks are "out of wack."	Too many levels within system not transparent to results	Rely on trend information. Use own experience algorithms user
Noticing data	Time critical information is difficult to obtain	Need to decide whether the information is current enough to proceed with strike.	Need to rely on other sources to verify current location (e.g.,	Refer to other sources to verify. Need to assume SIGNATURE, or H
verify		in short time	and disseminate. How long has it been	Window
Noticing data	Two analysts looking different things	Need to consider time of day image was taken, how realistic/probable it is to see a certain	Need to have knowledge. Be aware of trends of the country, and	ZZZ Tendency to underestimate possibility for error



# Naval Intelligence Analyst NPS2-2

- **Task:**
  - Will Estrada be deposed from presidency of Philippine Islands? Will there be a coup?
- **Deadline:**
  - 6 weeks
- **Time worked on task:**
  - Student estimate 72 h/week x 6 weeks
  - Our estimate 300~400 h.

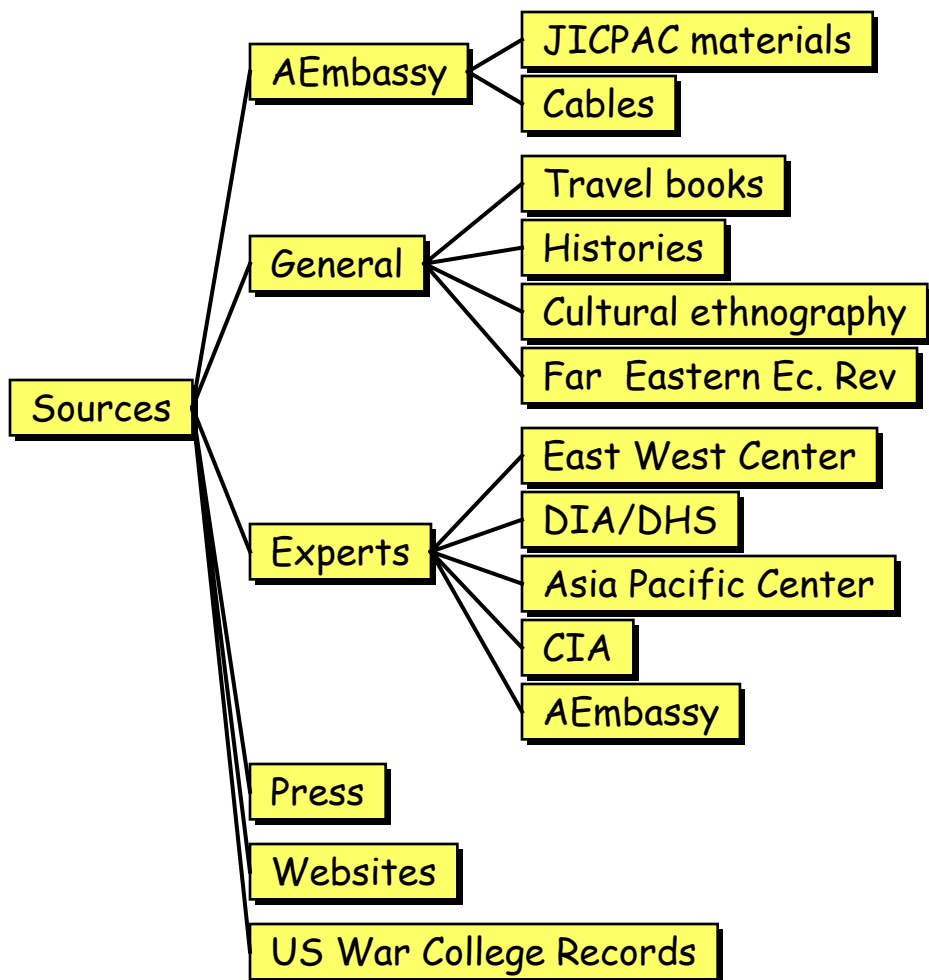
# NPS2-2: Will Estrada be Overthrown in a Military Coup?



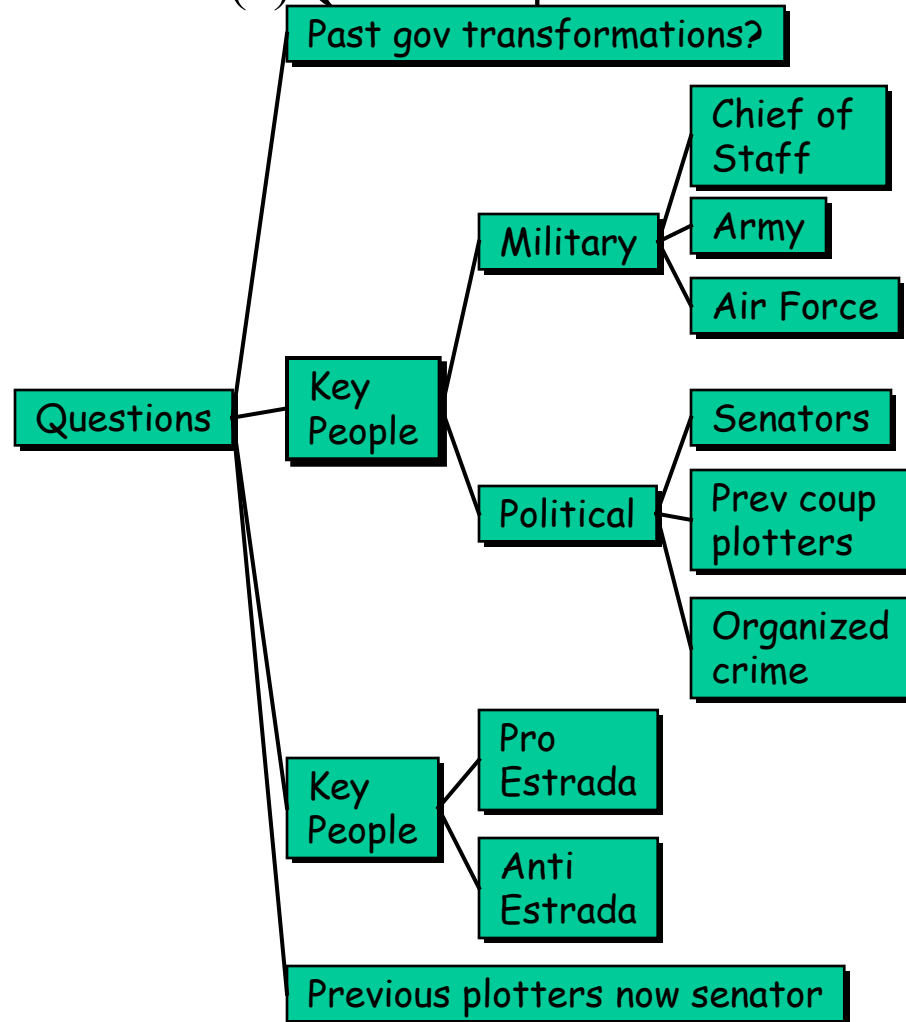


# INFORMATION FORAGING: Dual Problem Space Space

## (1) Source space



## (2) Question space



# Schemas

- **KEY PLAYERS**

MILITARY

ARMY

REGION 1

<Commander>

FAMILIES

<Assistants>

REGION 2

<Commander>

<Assistants>

...

LOGISTICS

INTEL

PERSONNEL

AIR FORCE

...

POLITICAL

SENATORS

CLERGY

PREV COUP PLOTTERS

POLITICAL PARTIES

POLITICAL ACTION GRPS

POLITICAL FRONT ORGS

OTHERS

ORGANIZED CRIME

PRESS

PROMINENT

INVOLVED SOME WAY

- **CLIQUE ASSOCIATIONS**

SAME UNIT

SAME REGION OF ORIGIN

CLASSMATES

FAMILY RELATIONSHIP

PAST CO-PLOTTER

BOARD CO-MEMBERSHIP

BUSINESS TIES

- **SOURCES**

GENERAL LIT

JICPAC

CABLES

WEBSITES

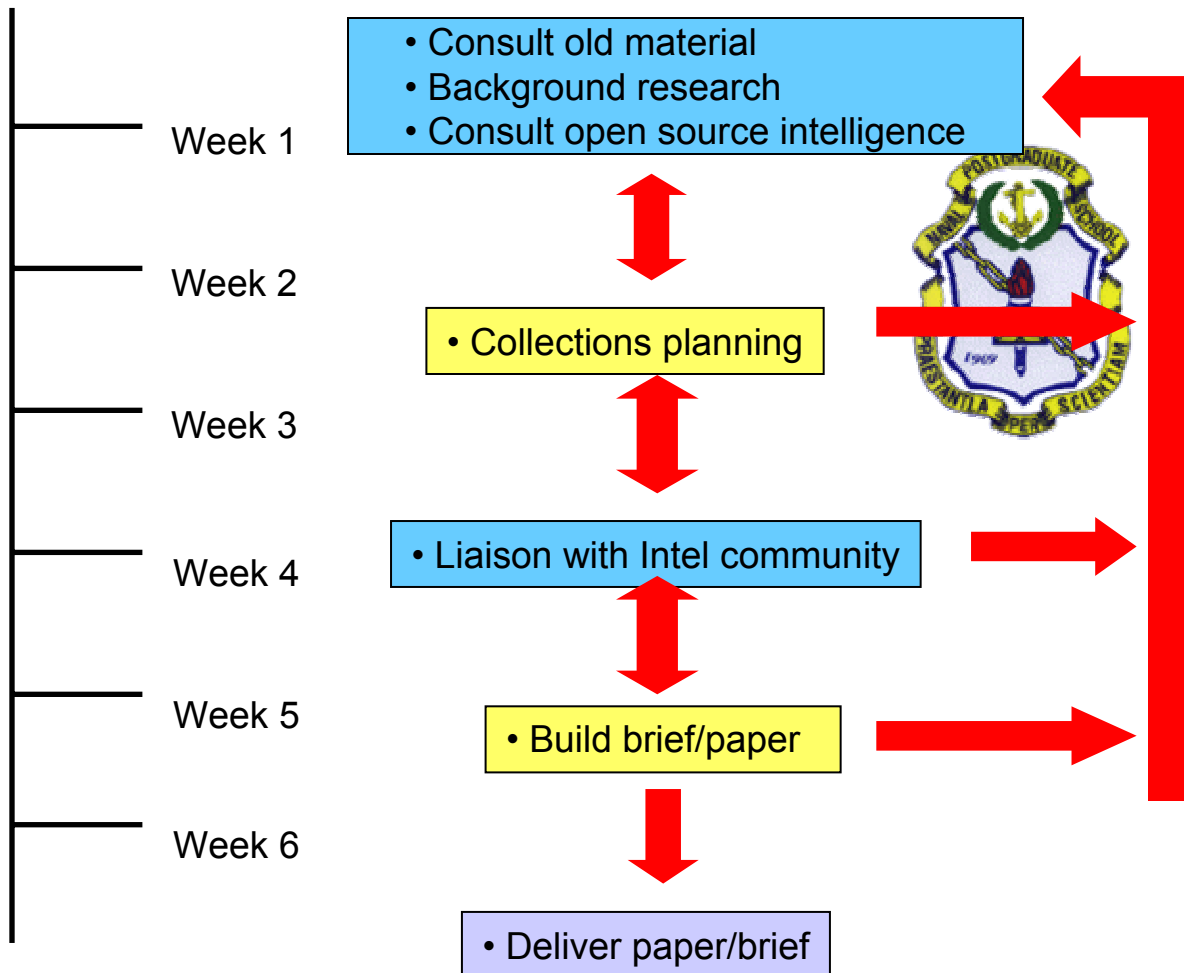
EXPERTS

- **ATTITUDES**

PRO-AQUINO

ANTI-AQUINO

# Example





# Just-in-Time Capsule Briefings

**Support post-graduate education in intelligence analysis**

**JITC Briefing toolkit**

**Quickly gather info, organize, analyze, and communicate an intel briefing**

**E.g., Observed Chinese naval maneuvers vs stated doctrine**

**E.g., Immediate likelihood of unfriendly military coup in the Philippines**

**Build on**

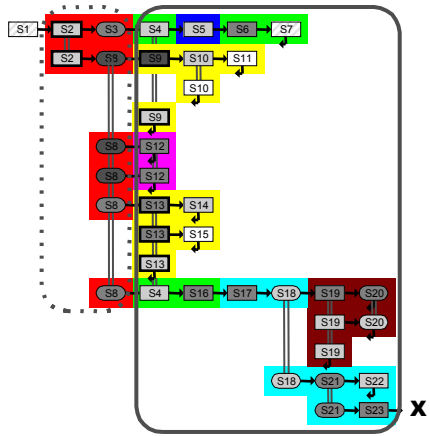
**Psychological studies of intelligence process**

**Exemplary human-information interaction technology**

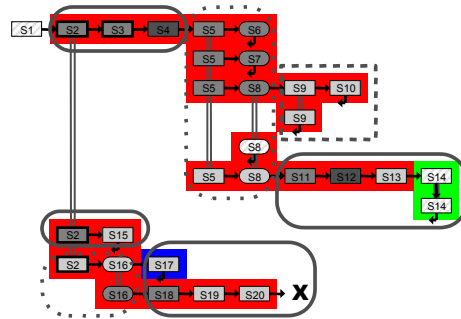


# Web Behavior Graphs (WBGs)

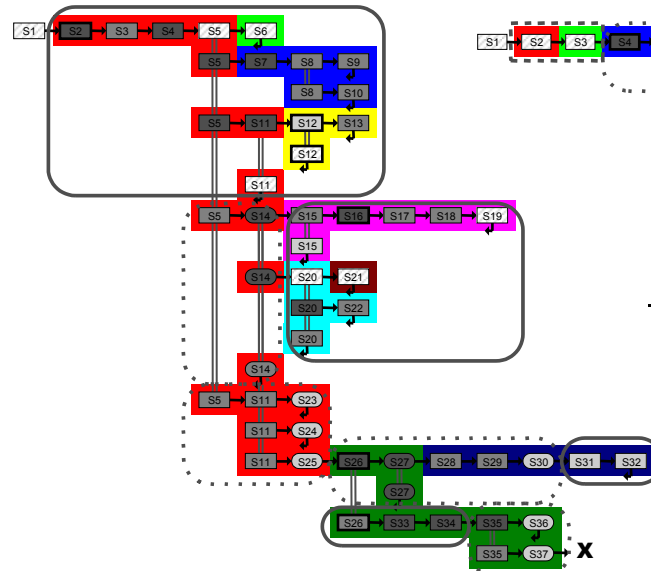
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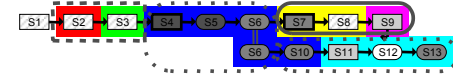
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S7

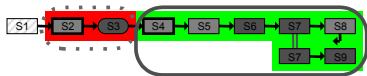


ANTZ  
S10

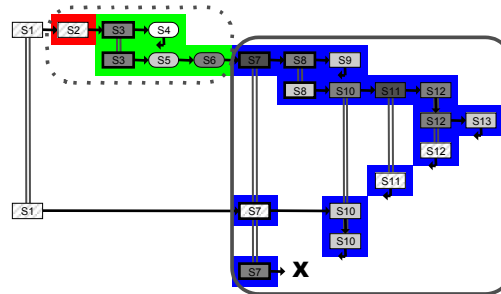


## CITY

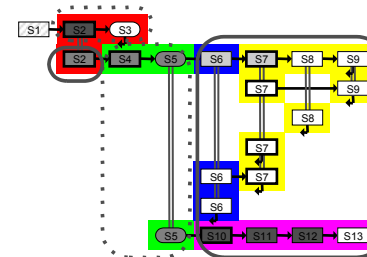
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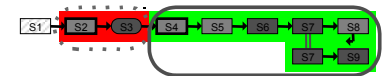
S6



S7



S10



# Summary: Critical Decision Method

- **CTA was conducted to support development of a model of the intelligence analyst's processes, biases, and analytic strategies**
  - **Goal: Provide input to build a computational model of analysis process**
- **Needed to uncover a different kind of domain knowledge**
  - **Critical Decision Method was tailored to focus on analysis**
  - **How an Intelligence Analyst goes about the task of analyzing a complex issue of strategic concern**
- **Analysis of a complex cognitive task, such the intelligence analyst's job, often requires the use of multiple techniques.**
  - **When results from several techniques converge, confidence is increased regarding the accuracy of the CTA model.**
  - **Method is still evolving**
  - **Next steps: Additional interviews and observe analysts perform task using open-source information on www**