

Development of Computerized Support Tools for Intelligence Work

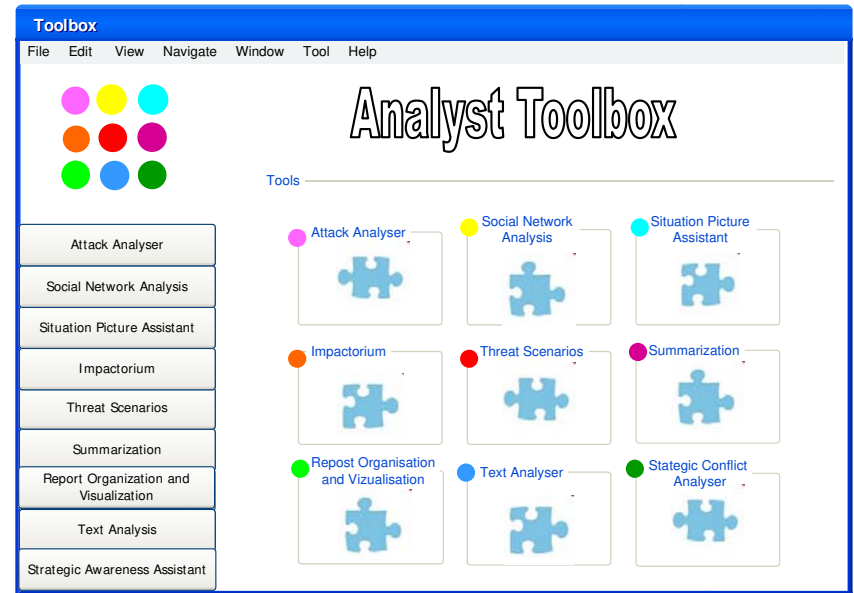
Joel Brynielsson, Andreas Horndahl, Lisa Kaati,
Christian Mårtenson, Pontus Svenson

Swedish Defence Research Agency

`firstname.lastname@foi.se`

Outline

- Review of the intelligence business
- Examples of tools to be included in a toolbox to be used by the intelligence analyst
- The presentation contains some preliminary work, but at the core is the *vision of an intelligence toolbox*—which is *work to be done*



Acknowledgement

Presentation material obtained from:

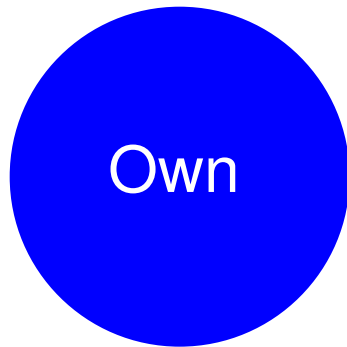
- the intelligence research project at the National Defence College (via Per-Arne Persson),
 - the 2008 Swedish Armed Forces intelligence doctrine (via Mårten Frambäck),
 - colleagues at FOI,
 - ...and probably more.
-
- Thanks!

Intelligence work: deliver basic data for decision-making to commanding officer



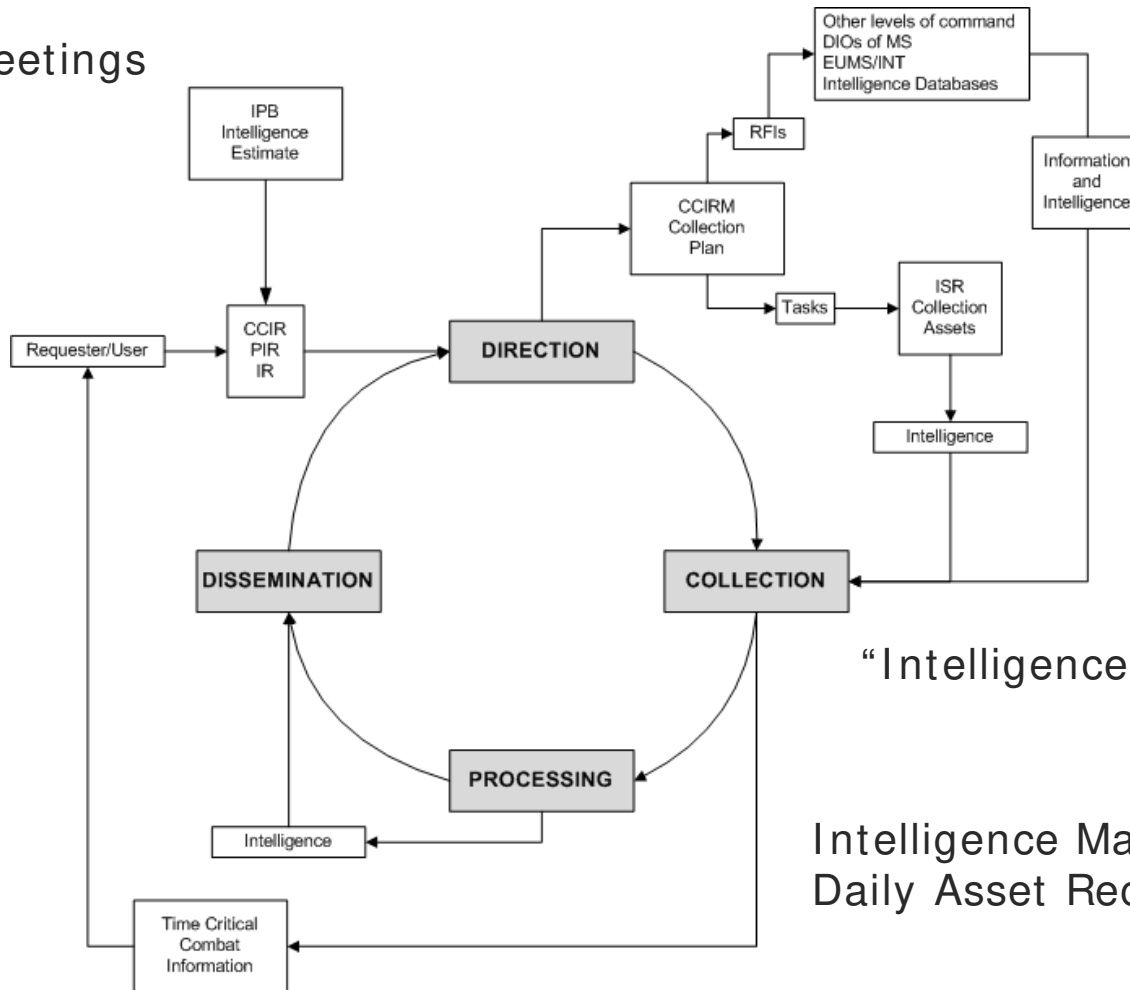
The intelligence service

- ❖ The intelligence service is both the *organization* and the *activity* producing intelligence *products* that describe, explain and predict “non-own” phenomena.



The intelligence cycle and its context

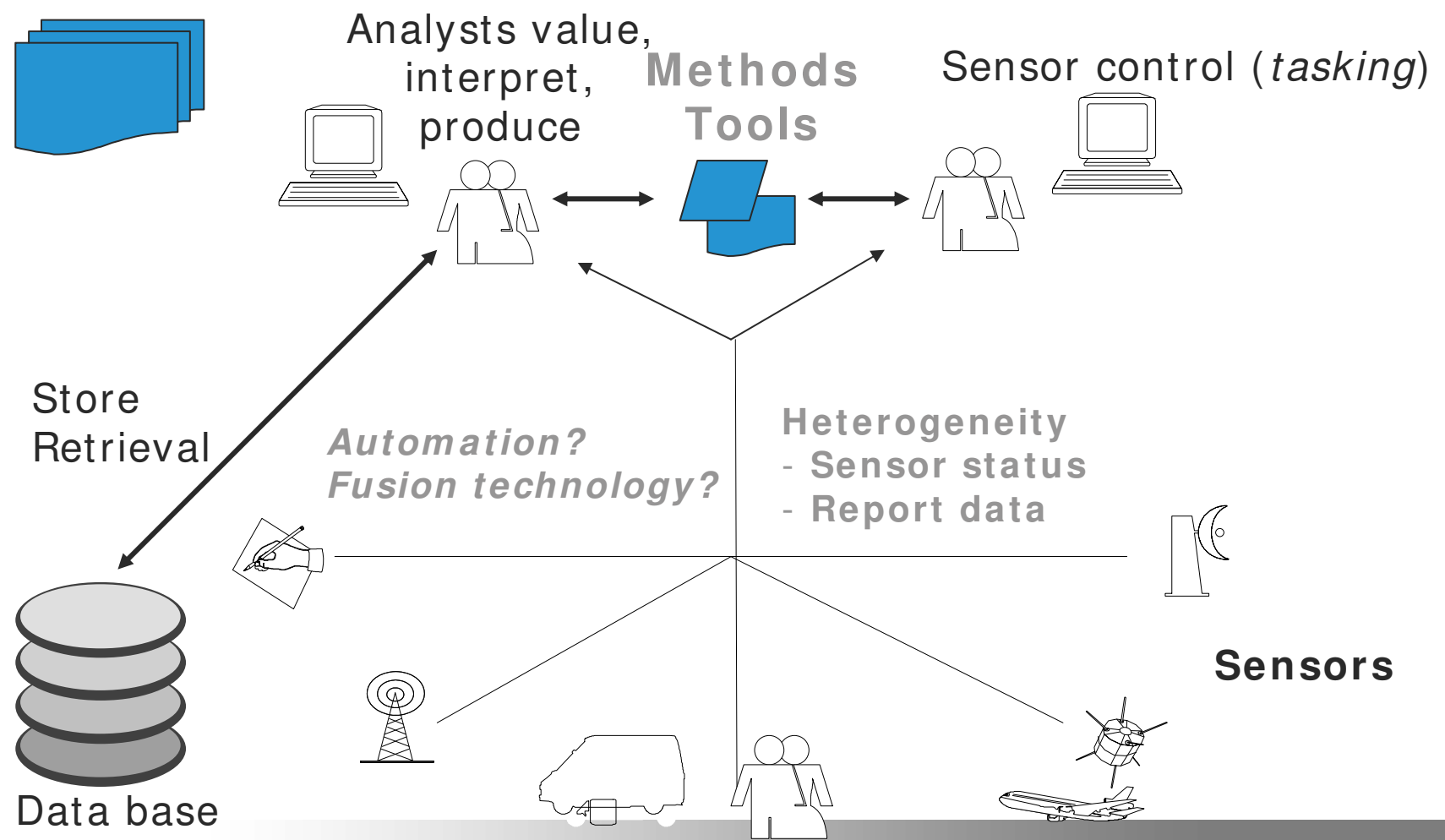
Weekly meetings
Targeting
Reflection



“Intelligence-internal” RFIs

Intelligence Management Plan (Br.)
Daily Asset Reconnaissance Board

The ISTAR-concept: a view taken by current Swedish research efforts



- There is a new era in the intelligence business
- What kind of support should we develop?
- When is automation possible?
- And to what extent?



Intelligence regulations from the 1980's: what can automation do?

35. Tablåer används när så behövs för att komplettera lägeskarta. Följande tablåer förs av bataljonsstab och högre staber vid behov:

Tablå över verksamheten vid underrättelse-, spanings- och observationsorgan

Förband: 1.Förd

Tid:

Underrättelse-organ	/			/			/			/		
	0600	1200	1800	0600	1200	1800	0600	1200	1800	0600	1200	1800
44. Undkomp												
1. Plut												
2. Plut												
12. Pspankomp												
1. Plut												
2. Plut												
3. Plut												
4. Plut												

- = verksamhet, spaning, observation, rekognosering
- - - - - = förflyttning till och från område
- = vila, reorganisation, övning

AKTUALITETSTABLA: 1.Förd Dag: 11/10.

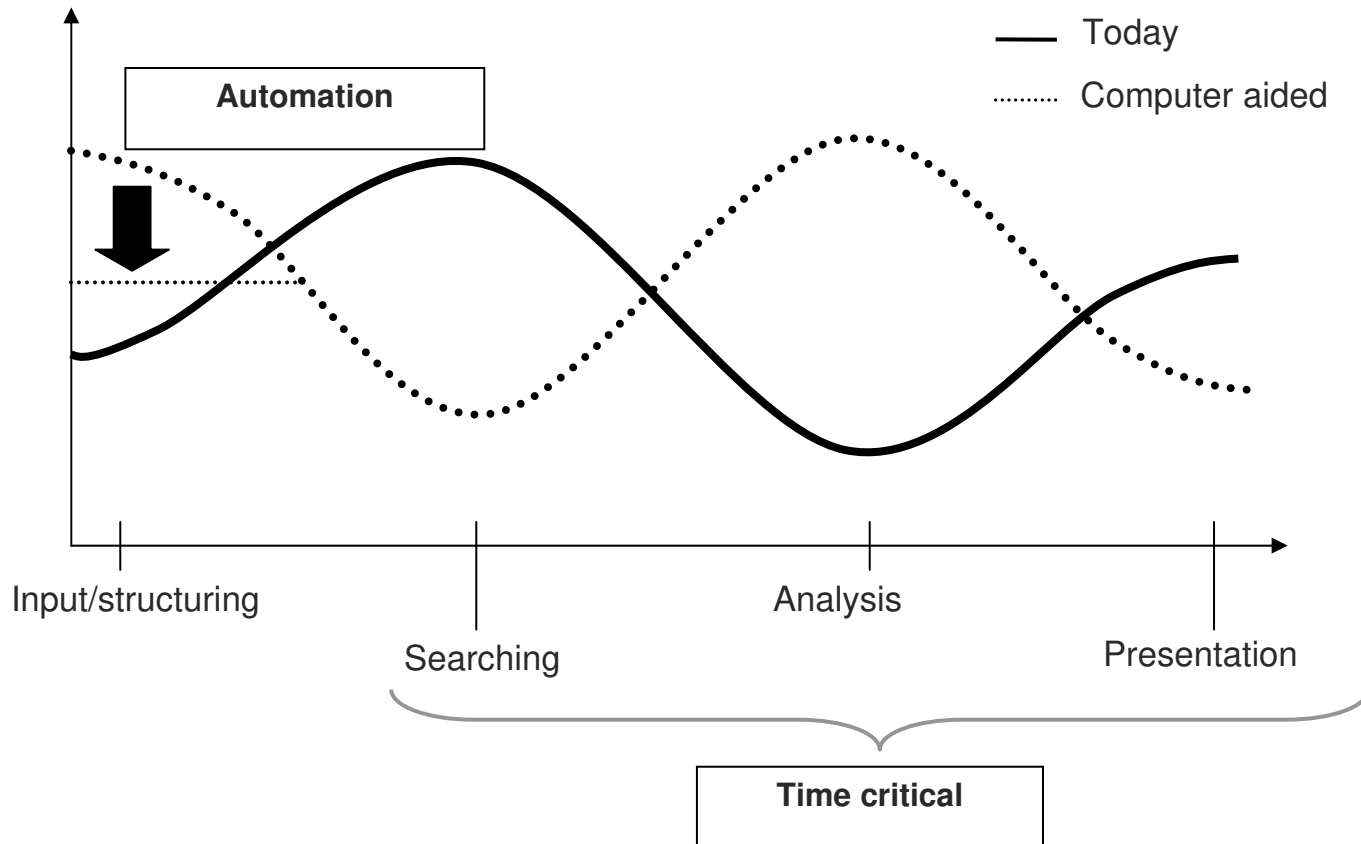
Vädret Kl 1200		INDELNING								Anteckningar
Den 12/10	Den 11/10	1300	1500	1700	1900	2100	2300	0100	Kontrollerad Kl 2100 av S.L.	
Molnhöjd 1000m	—									
Molnighet	—									
Nederbörd	—									
Vind	östlig 2 m/s									
Vindstyrka	10 m/s									
Tendens	överskuggad									
Temperatur	10°									
Tendens	8°									
Övrigt	Sjunkande									
Direkt underställda	PB 1	1B2	1B4	1. Art regstaben	3. lbat	70. Lv bat	3. Förd insbat	13. TNA komp		
STÄNDIG INDELNING		45. Puhhp komp								
UTGÅTT	1. Pbat		4. Lv komp							
UNDERSTÄLLDA	4. Lv komp	101. Vekomp 102. Vekomp 1. Pbat	3. Livplut 4. Livplut 3. Skbat F							

Bild 14

Bild 15

Intelligence workflow

Time spent [%]



Information fusion

• JDL-model

- Multi-sensor fusion
- Situation assessment
- Impact assessment
- Adaptation

• Role to support intelligence analysis process

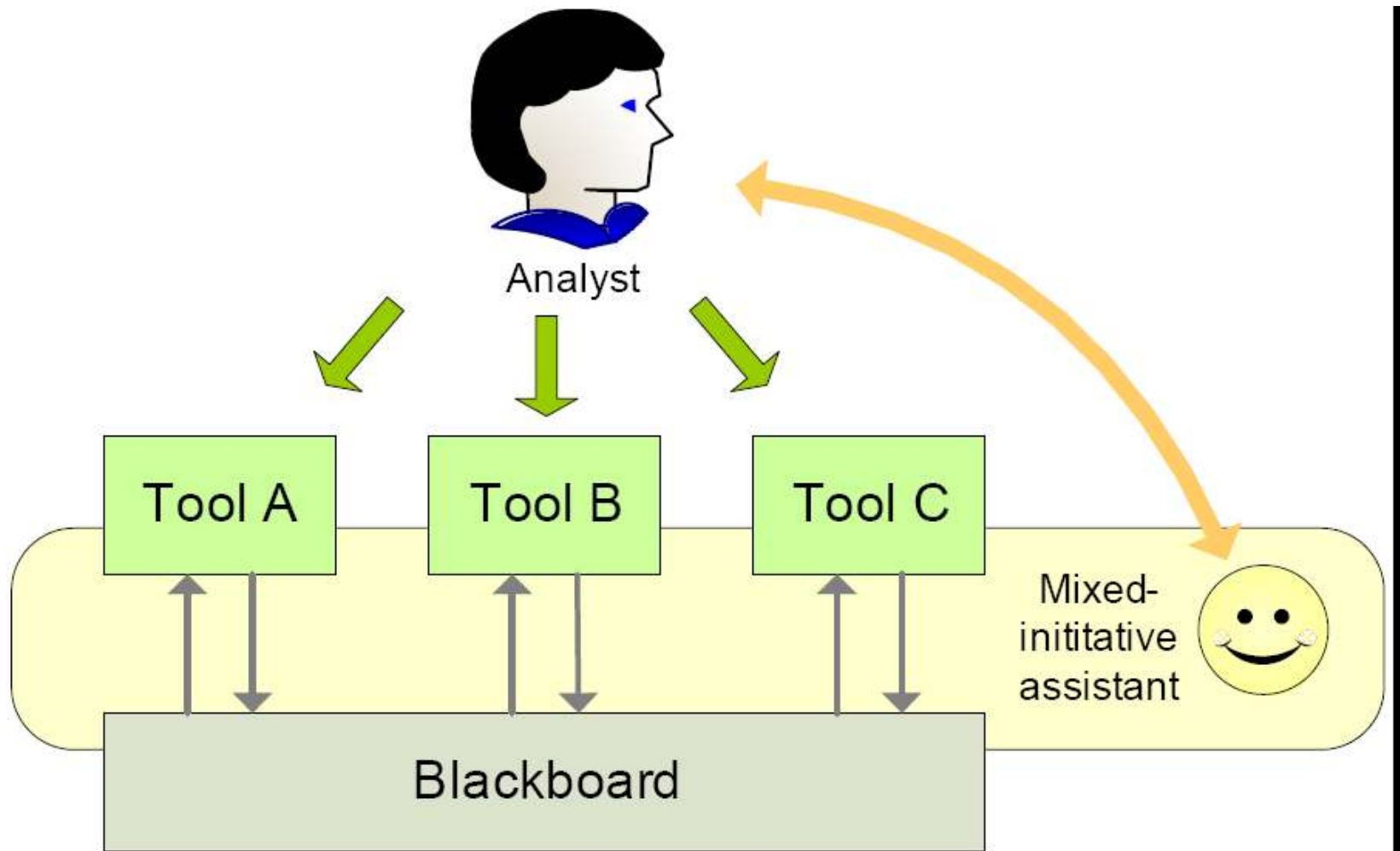
- Tools that help humans sort, filter, fuse information and data



Mixed-initiative

- Techniques for taking advantage of human and computer advantages synergistically
- Increased interaction
 - Human provides experience and intuition
 - Computer provides processing power and memory

Blackboard architecture



Tools

Report organization and visualization

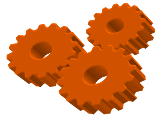

The screenshot shows a software application window titled "Report Organization and Visualization". The interface is divided into several sections:

- Toolbox:** Located on the left, it contains a stack of papers icon and a vertical list of tool buttons: "Attack Analyser", "Social Network Analysis", "Situation Picture Assistant", "Impactorium", "Threat Scenarios", "Summarization", "Report Organization and Visualization" (highlighted), "Text Analysis", and "Strategic Awareness Assistant".
- Menu Bar:** At the top, it includes "File", "Edit", "View", "Navigate", "Window", "Tool", and "Help".
- Event Log:** A table-like structure with columns for event name and date:

Event Name	Date
Demonstration central city	1/mar/08
Bombing at Foo square	2/mar/08
- Event Details:** A text area on the right showing details for the selected event: "1/mar/08 12:47", "Demonstration at central city", "- 200 – 300 persons", "- Aggressive atmosphere", and "- caught sight of weapons".
- Map:** A satellite-style map at the bottom right showing a city area with various landmarks and a red circle indicating a specific location. A scale bar shows 500 meters.

Impactorium

Toolbox
File Edit View Navigate Window Tool Help

Impactorium

- Counter Terrorism Developments
- Finance
- Significant events
- Support base

Events and Reports

- And Singapore southeast
- And West southeast
- Reach
- Research
- Skills base
- Terror Attack Trends

Local southeast

- Security
- Social network

Manpower


Resources (174)

- WMD
- Countdown
- Hiding
- Charitable
- Legal
- Other

Industries

- Acquisition
- Biological
- Nuclear
- Chemical
- Radiological
- Bomb
- Training
- Meeting
- Other

- 2008 Aug 27
- 2008 Sep 26
- 2008 Sep 26
- 2008 Sep 26
- 2008 Oct 28
- 2008 Nov 26
- 2008 Oct 21
- 2008 Oct 21



Resources (174)

- WMD
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Industries

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Attack Analyser

Social Network Analysis

Situation Picture Assistant

Impactorium

Threat Scenarios

Summarization

Report Organization and Visualization

Text Analysis

Strategic Awareness Assistant

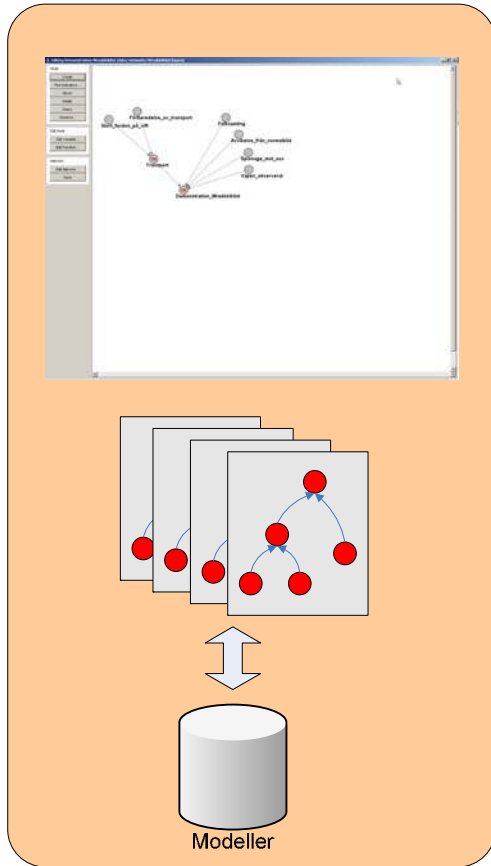
Three components

Create model

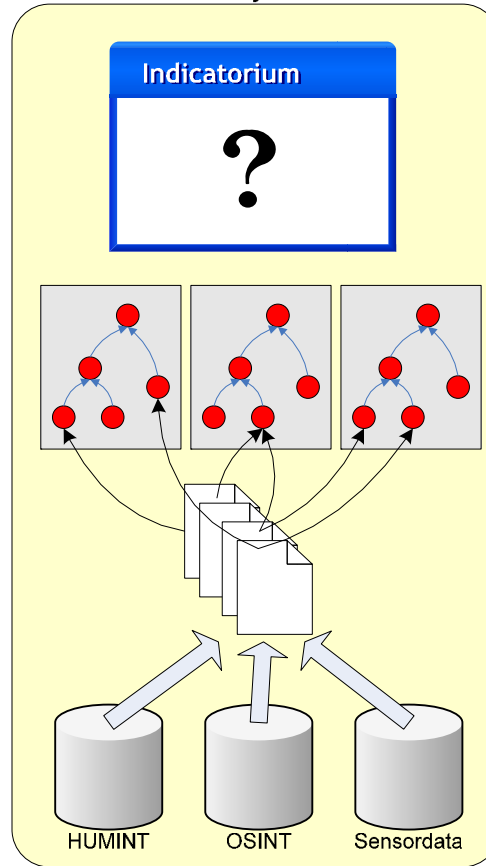
Associate reports to indicators

Compute and display results

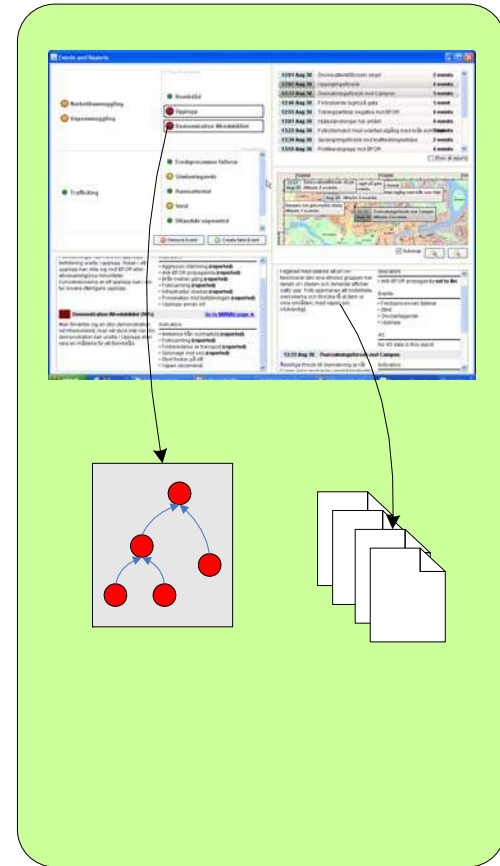
Identifiera/modellera



Strukturera/fusionera/
analysera

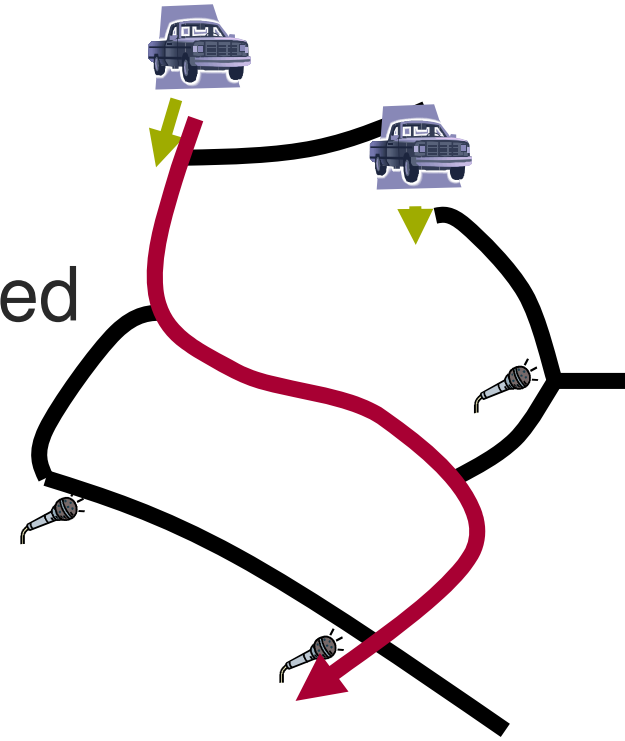


Besluta



Hypothesis management

- Analysts need tools that allow them to visualise their hypotheses about the future
- Collaborative tools
- Easy to visualise movements
- How to visualise more complicated intelligence analyses



Semantically tagging information by extracting knowledge from data

- ❖ Semantic tagging will be a major part of analysts' work in the future
 - ❖ Social networks, RDF triples, semantic wikis,...
- ❖ Automating (parts of) this work would be good
- ❖ *Entity extraction* can be used to present a list of entities to the analyst
- ❖ More challenging: present *relations between entities* (in possibly different documents)

Entity extraction

The screenshot shows a software interface for text analysis. On the left is a sidebar with a 'Toolbox' header and a menu of tools: Attack Analyser, Social Network Analysis, Situation Picture Assistant, Impactorium, Threat Scenarios, Summarization, Report Organization and Visualization, Text Analysis, and Strategic Awareness Assistant. The main window has a menu bar (File, Edit, View, Navigate, Window, Tool, Help) and a title 'Text Analysis'. Below the menu bar is a grid of colored letters. The main content area has a menu bar (File, Edit, Tools, Databases) and two tabs: 'Annotate single' and 'Annotate set'. The 'Annotate single' tab is active, showing a 'Single annotation' window. This window contains a table of extracted entities and a text view of the document with a tooltip for one of the entities.

Entity	count	type
type: Organization (10 Items)		
<input type="checkbox"/> Party of Unity	2	Organize
<input type="checkbox"/> UN	2	Organize
<input type="checkbox"/> CIA	1	Organize
<input type="checkbox"/> ECOWAS	1	Organize
<input type="checkbox"/> Ministry of Finance	1	Organize
<input type="checkbox"/> African Export-Import Bank	1	Organize
<input type="checkbox"/> Democracy and Development	1	Organize
<input type="checkbox"/> National Council	1	Organize
<input type="checkbox"/> Government	1	Organize
<input type="checkbox"/> Economic Community of West	1	Organize
type: Person (17 Items)		
<input type="checkbox"/> Lansana	4	Person
<input type="checkbox"/> Captain Moussa Dadis	2	Person
<input type="checkbox"/> President Conte	2	Person
<input type="checkbox"/> President Lansana Conte	1	Person
<input type="checkbox"/> President Ahmed Sékou Touré	1	Person
<input type="checkbox"/> Conte	1	Person
<input type="checkbox"/> Kouyate	1	Person
<input type="checkbox"/> Souare	1	Person
<input type="checkbox"/> Mr Kouyate	1	Person
<input type="checkbox"/> Mr Souare	1	Person
<input type="checkbox"/> Ahmed Tidiane	1	Person
<input type="checkbox"/>

Single annotation

After independence, Guinea was governed by Ahmed Sékou Touré. Touré pursued broadly socialist economic policies and suppressed opposition and free expression. Under his leadership, the Non-Aligned Movement and pursued close ties with the United States. After Touré's death in 1984, Lansana Conté assumed power and immediately changed his predecessor's economic policies, but the government remained dictatorial. The first elections since independence were held in 1993, but the results and those of subsequent elections were disputed. Conté faced domestic criticism for the condition of the country's economy and for his heavy-handed approach to political opposition.

While on a visit to France with his family in 2005, François Lonseny Fall resigned and sought asylum, citing corruption and increasing interference from the , which he felt limited his effectiveness as the head of the government. Fall's successor, Cellou Dalein Diallo, was removed in April 2006, and Conté failed to appoint a new one until the end of January 2007 after devastating nationwide strikes and mass demonstrations. During 2006, there were two nationwide strikes by government workers, during which 10 students were shot dead by the military; strikes were suspended when Conté agreed to more favorable wages for civil servants and a reduction of the cost of the basic amenities, rice and oil.

At the beginning of 2007, citing the government's failure to honor the terms of previous agreements, trade unions called new strikes, protesting rising costs of living, government corruption, and economic mismanagement. Lasting for more than two weeks, these strikes drew some of the largest demonstrations seen during Conté's tenure and resulted in some 60 deaths. Among the unions' demands was that the aging and ailing name a consensus prime minister to fill the post vacant since Diallo's removal, and allow him to his certain presidential

President Ahmed Sékou Touré

Type: Person

Case-based reasoning crash course

- Look at current situation
- Find similar previously encountered situations in case database
- Present most similar case(s) to user, if possible adapt solution to current case
 - Defining “similar” is difficult...

Tools based on case-based reasoning

❖ Threat model construction assistant

- ❖ Fusion tools need models
- ❖ Idea: use CBR to help analysts create models by letting the cases correspond to “situations”
- ❖ Situations can be described by the currently relevant parameters in, e.g., a probabilistic model

❖ Situation picture construction assistant

- ❖ The needed views, services, etc., changes from person to person and from time to time
- ❖ Idea: help analysts to select the appropriate view using CBR


Threat model construction

The screenshot displays the 'Threat Scenarios' software interface. The main window features a menu bar with 'File', 'Edit', 'Tools', and 'Databases'. The central workspace shows a network diagram with red circular nodes and directed arrows. A callout box with a yellow background points to a specific node, containing the text 'Consider using this fragment:' and a smaller version of the network diagram. To the left is a vertical 'Toolbox' with a red shark icon and buttons for 'Attack Analyser', 'Social Network Analysis', 'Situation Picture Assistant', 'Impactorium', 'Threat Scenarios', 'Summarization', 'Report Organization and Visualization', 'Text Analysis', and 'Strategic Conflict Analyzer'. On the right, a 'Node' panel includes buttons for 'Create', 'Pick Indicators...', 'Move', 'Query', 'Observe', and 'Delete'. Below it, an 'Edit Node' panel has 'Edit function', 'Edit variable', and 'Observe' buttons. At the bottom, a 'Network' panel contains 'Edit Network', 'Suggestions', and 'Save' buttons.

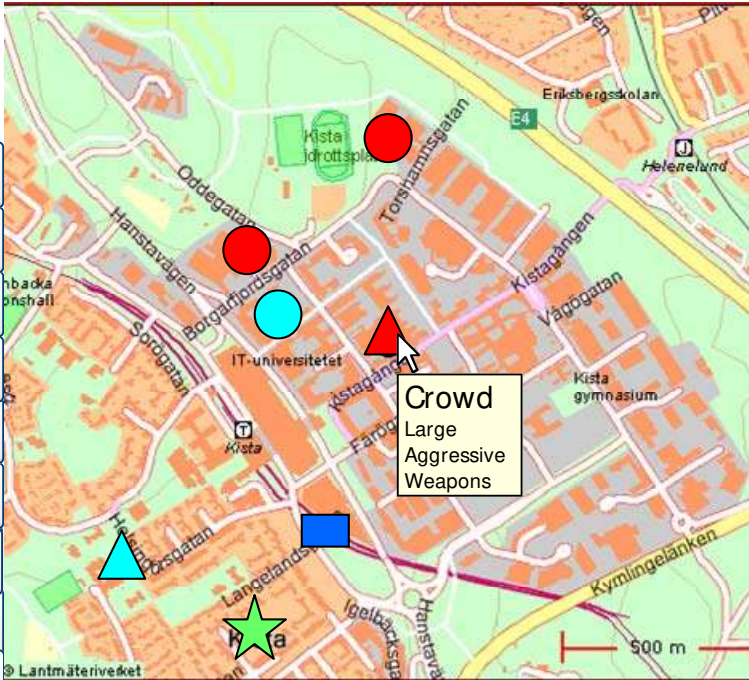
Situation picture construction

Toolbox

File Edit View Navigate Window Tool Help



Situation Picture Assistant



Attack Analyser

Social Network Analysis

Situation Picture Assistant

Impactorium

Threat Scenarios

Summarization

Report Organization and Visualization

Text Analysis

Strategic Awareness Assistant

Actions

- Actions
- Reports
- Information
- Location
- Save

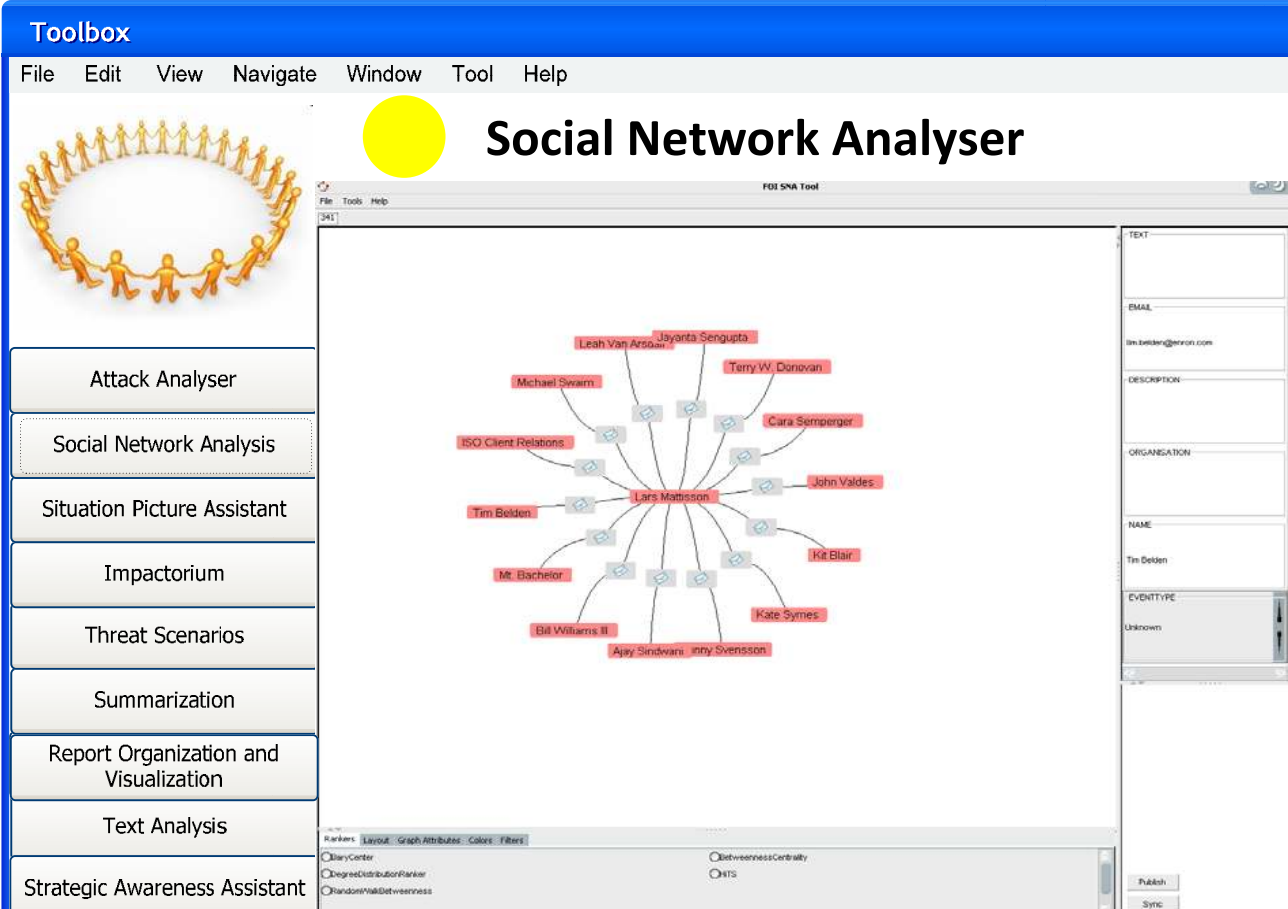
Map

- New map
- Zoom
- Related

Social network visualization and analysis

Toolbox

File Edit View Navigate Window Tool Help



Social Network Analyser

Attack Analyser

Social Network Analysis

Situation Picture Assistant

Impactorium

Threat Scenarios

Summarization

Report Organization and Visualization

Text Analysis

Strategic Awareness Assistant

ISO Client Relations

Leah Van Arsooi

Jayanta Sengupta

Michael Sworm

Terry W. Donovan

Cara Semperger

John Valdes

Tim Bolden

Kit Blair

M. Bacheior

Kate Symes

Bill Williams II

Ajay Sindwani

John Svensson

Lars Mattsson

TEXT

EMAIL

DESCRIPTION

ORGANIZATION

NAME

EVENTTYPE

Rankers Layout Graph Attributes Colors Filters

DegreeCentrality

DegreeDistributorRanker

RandomWalkBetweenness

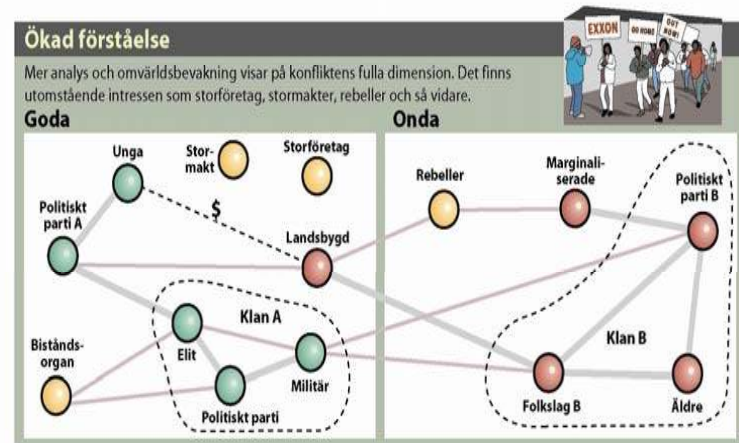
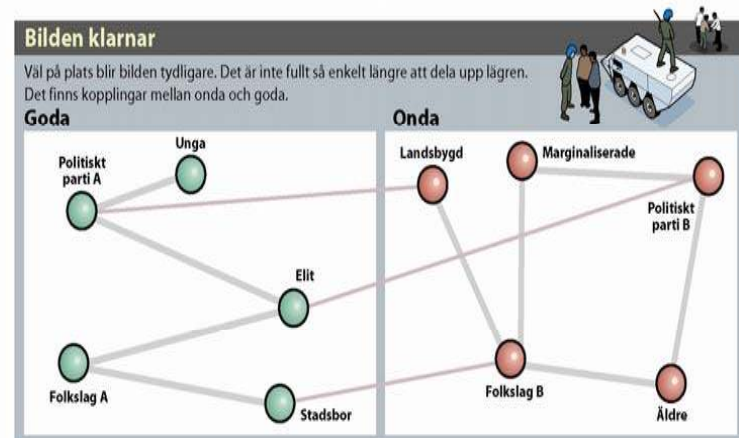
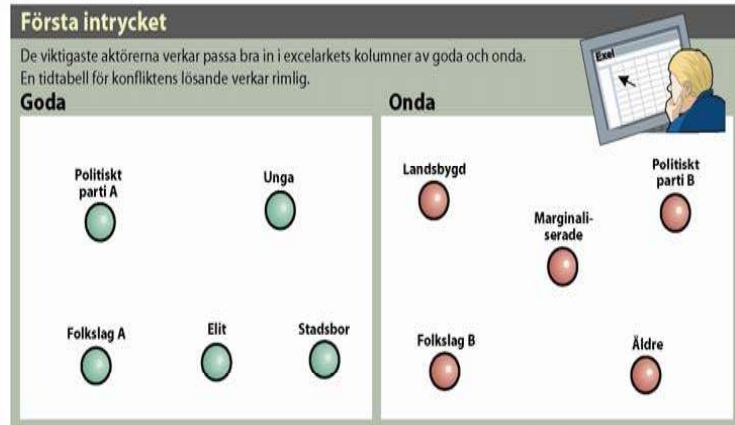
BetweennessCentrality

HTS

Refresh

Sync

❖ Social network analysis: ultimately an interactive *support* tool with *possibility* to acquire data automatically at the discretion of the analyst



Attack tree assistant

Toolbox

File Edit View Navigate Window Tool Help

```
graph TD; A((Attack president)) --> B((Stabb)); A --> C((Shoot)); B --> D((Knife)); B --> E((Close location)); C --> F((Gun)); C --> G((Nearby location)); D --> H((By knife)); E --> I((Work in P:s staff)); E --> J((Work where P goes)); J --> K((Hairdresser)); J --> L((Restaurant)); J --> M((Gym));
```

Attack Analyser

Attack Analyser

Social Network Analysis

Situation Picture Assistant

Impactorium

Threat Scenarios

Summarization

Report Organization and Visualization

Text Analysis

Strategic Awareness Assistant

Tree

Related

Draw

New

Save

Analyze

Min/Max

Possibilities

Cost

Cost

Countermeasure

Add

Suggest

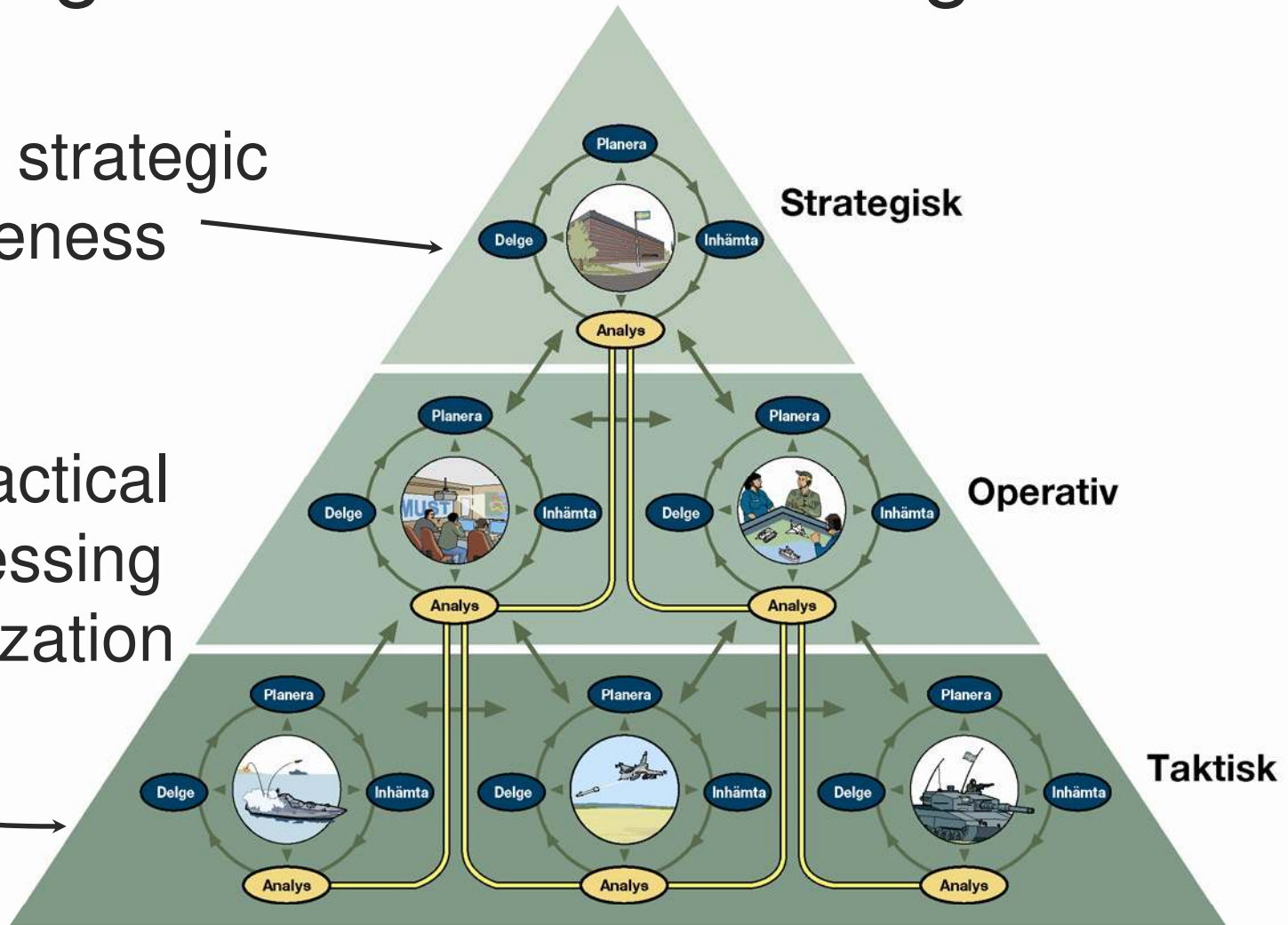
Strategic awareness assistant

The screenshot displays the 'Strategic Awareness Assistant' software interface. At the top, a blue header bar contains the word 'Toolbox'. Below this is a menu bar with 'File', 'Edit', 'View', 'Navigate', 'Window', 'Tool', and 'Help'. The main window title is 'Strategic Awareness Assistant', accompanied by a green circular icon. A secondary menu bar below the title includes 'File', 'Edit', 'Tools', and 'Databases'. On the left side, there is a vertical toolbar with ten buttons: 'Attack Analyser', 'Social Network Analysis', 'Situation Picture Assistant', 'Impactorium', 'Threat Scenarios', 'Summarization', 'Report Organization and Visualization', 'Text Analysis', and 'Strategic Awareness Assistant' (which is highlighted with a dashed border). The main workspace is divided into three sections: 'Actors' and 'Coars of Action' (note the misspelling) at the top, and 'Assessment' at the bottom. Each section contains a large, empty rectangular area with vertical scrollbars on the right side. The interface uses a light blue and white color scheme.

Strategic and tactical intelligence

Need for strategic awareness

Need for tactical data processing and visualization



Strategic awareness in practice according to intelligence expertise

- Estimate possible courses of actions:
 - Actor A can perform actions A1, A2, A3
 - Actor B can perform actions B1, B2, B3
 - Actor C can perform actions C1, C2, C3
- Judge what will happen given some action:
 - A1 => B3, C2
 - ...
- The judgments result in 3–5 scenarios that are used for further discussion using cognitive decision making principles:
 - What scenario is the most dangerous one?
 - What scenario is the most probable one?
 - ...

A game-theoretic assistant for strategic awareness

→ GUI letting the analyst:

- List actors (including nature), available courses of actions, and possible outcomes
- Estimate probabilities for outcomes

→ Algorithms helping out with:

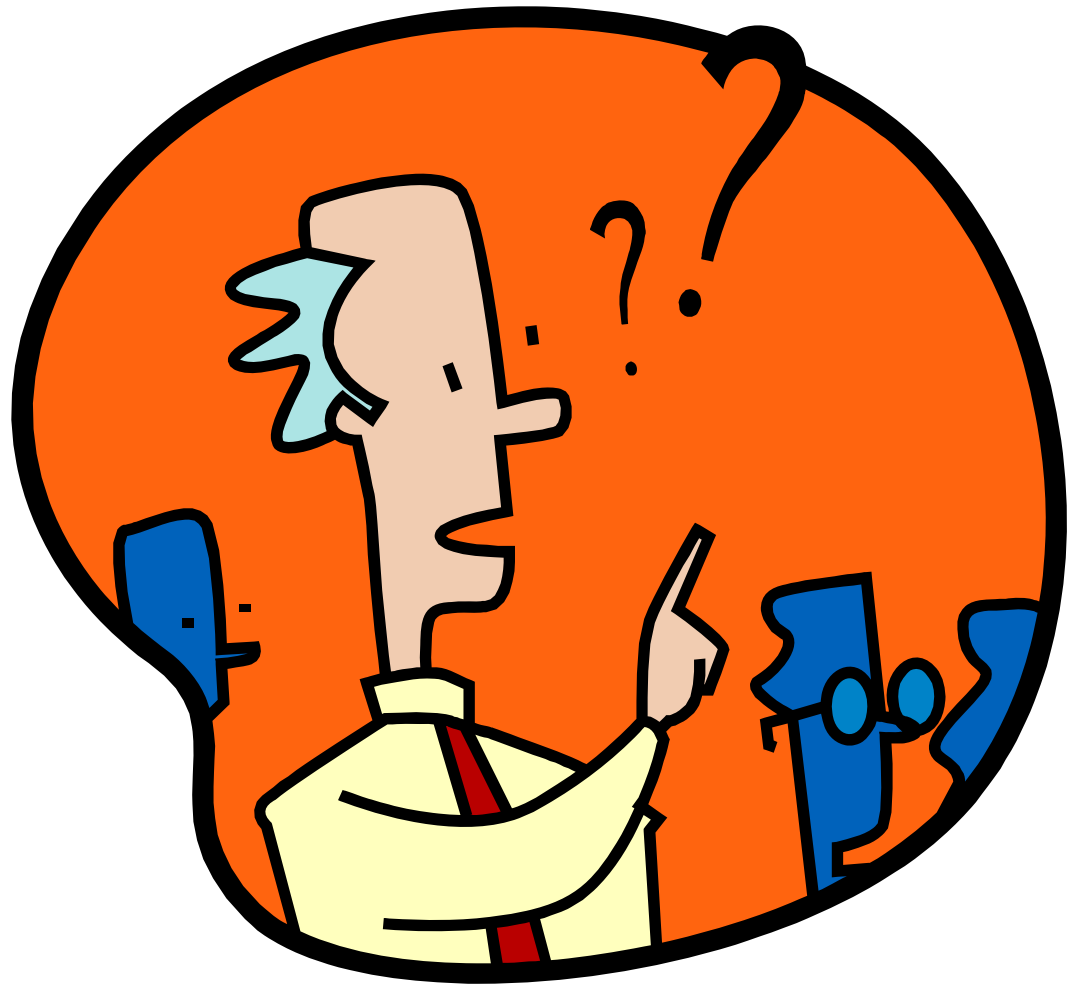
- Probability calculations
- Strategic awareness in the form of equilibria taking opposing actors into account

→ Visualization

- Requires user experiments and creative solutions

The end...

❖ Questions?



❖ ponsve@foi.se