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## Human Environment Analysis Reasoning Tool (HEART)




### Integrating the Human Dimension into Operational Planning and Analysis

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DEFENCE DÉFENSE



NATO Research Task Group  
System Analysis and Studies (SAS) 074




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NATO RTG 074 has developed a visual reasoning tool – HEART - for incorporating human and social sciences into NATO operational planning and analysis.

NATO's approach to conducting operations currently and in the foreseeable theatres of asymmetrical/non-conventional conflict demands a comprehensive approach to achieve desired effects from the use of lethal and non-lethal means involving armed forces and other levers of coalition influence.


Successful application of a comprehensive approach requires an evolution of military capability in concert with an improved understanding of the human environment in theatres of conflict.




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## Overview

1. Motivation and purpose
2. Approach
3. Description of tool (including summary examples of Use Cases)
4. An example of using the tool on a fictitious case of avoiding food crisis among minorities in a conflict zone
5. Current Status of Tool
6. Potential Future Developments
7. Recommendations

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### HEART: Motivation and purpose

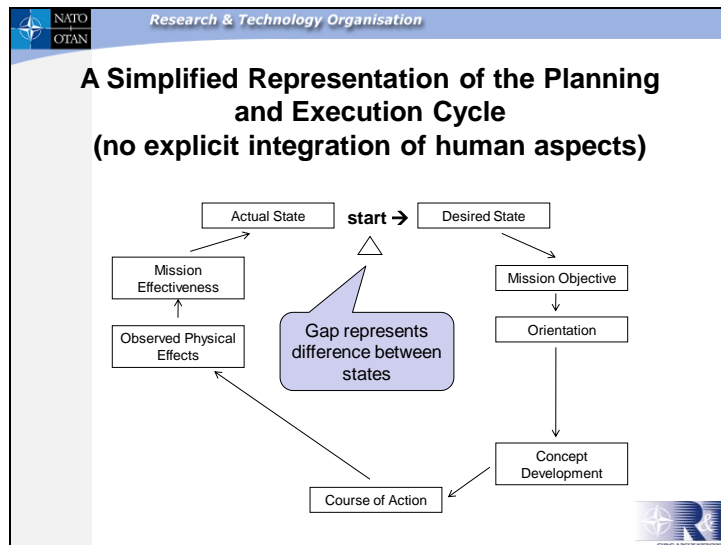
**Motivation for this work:**  
The observation that although the human is central to operations, most operational planning currently does not use social science to its full potential.

**Purpose of the tool:**  
To facilitate understanding of the human environment in an operational context, and assist the development of appropriate courses of action that take into account the human aspect.

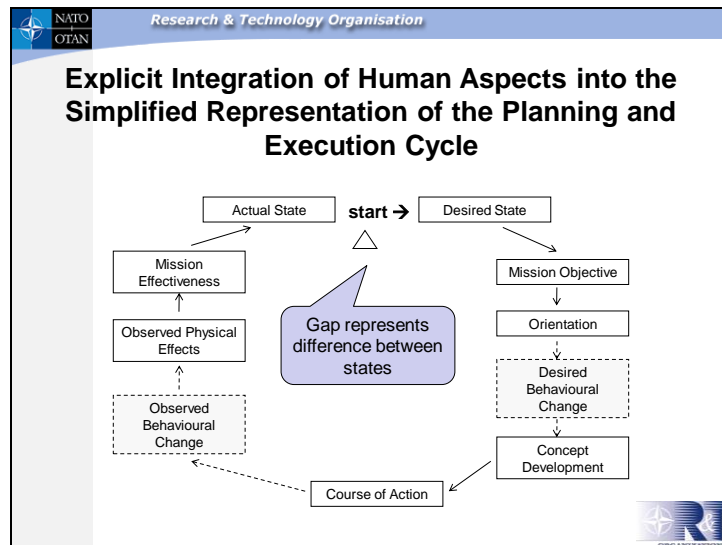
**Potential users of the tool:**  
Operational planners and analysts  
Scenario developers  
Trainers (for the two categories above)

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Emphasis placed on helping users to think about the human environment and plan accordingly, rather than providing a prescriptive process.



Here is a simple stylized outline of the planning-execution cycle, without explicit emphasis on consideration of the human environment




In this version there is explicit emphasis on the human environment. We now consider the behavioural changes we wish to induce

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## Approach

1) Architecture

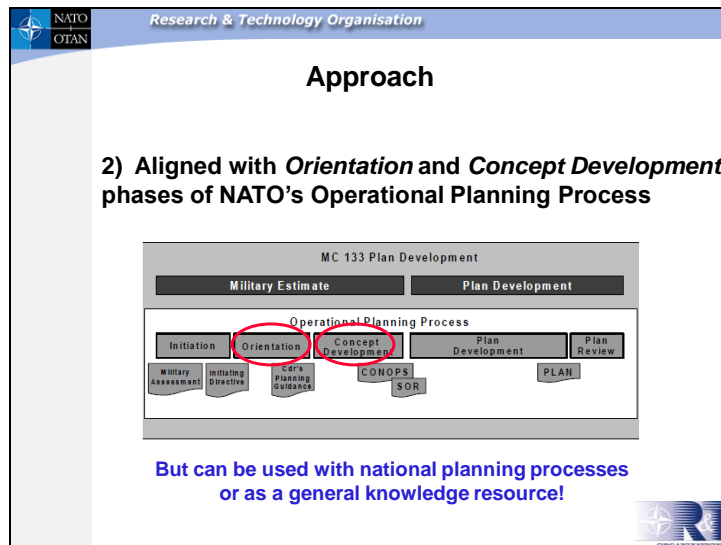


Free to download at [www.cmap.ihmc.us](http://www.cmap.ihmc.us)

The IHMC CmapTools software empowers users to construct, navigate, share, and criticize knowledge models represented as Concept Maps



The tool has been developed using the Cmaptools software, which is freely available from the web site shown.



The tool may be used to support early stages of NATO's Operational Planning Process, or similar national planning processes.

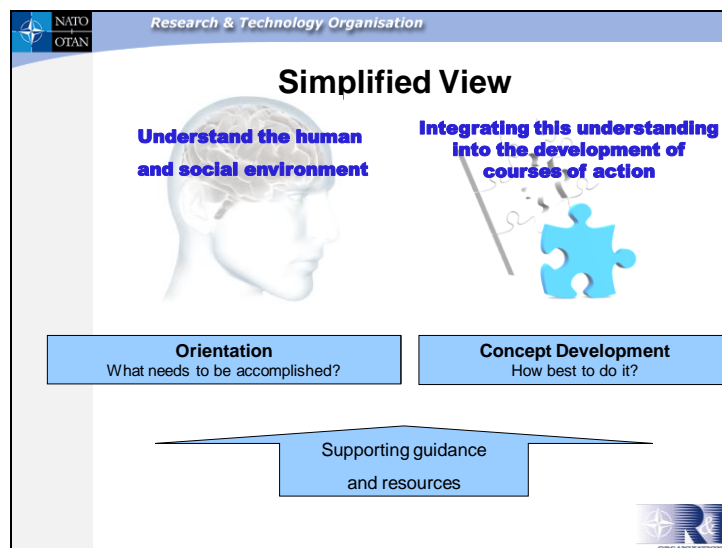
Ref: NATO AJP-5 Allied Joint Doctrine for Operational Planning 2006: Chapter 4 Section-IV-Stage II-Orientation & -Stage III-Concept Development

Two highly relevant statements:

*"An operations estimate will evaluate the probable effects of operational manoeuvre and the employment of lethal and non-lethal force capabilities." (0433 b)*

*"A Civil-Military Co-operation (CIMIC) estimate provides an evaluation of the likely effects of the civil environment on the military operation as well as the potential consequences of the effects of the military operation on the civil environment." (0433 h)*

Slide 8



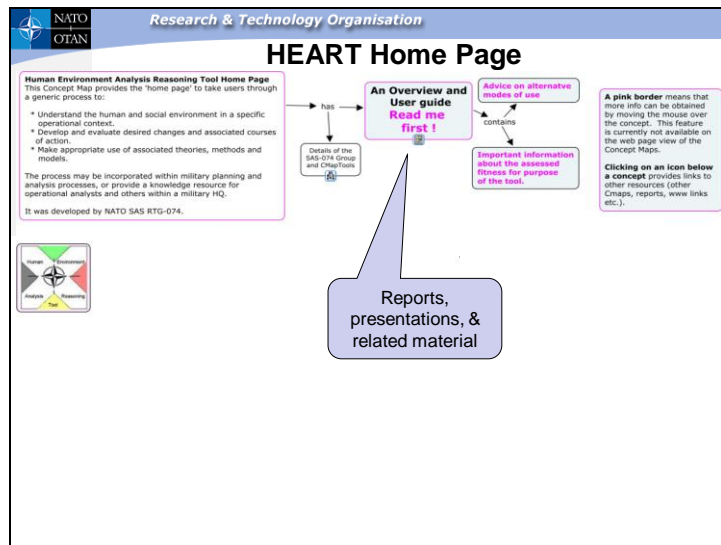
This is a simplified view of the HEART tool.

It helps users to understand the human environment and then uses this knowledge to help develop appropriate courses of action.

It also contains a wide range of supporting guidance and reference material.

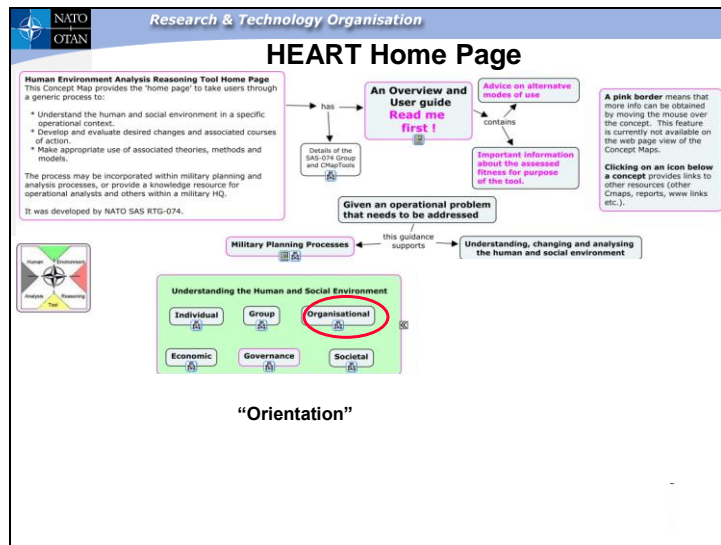
Now for the guided tour ...



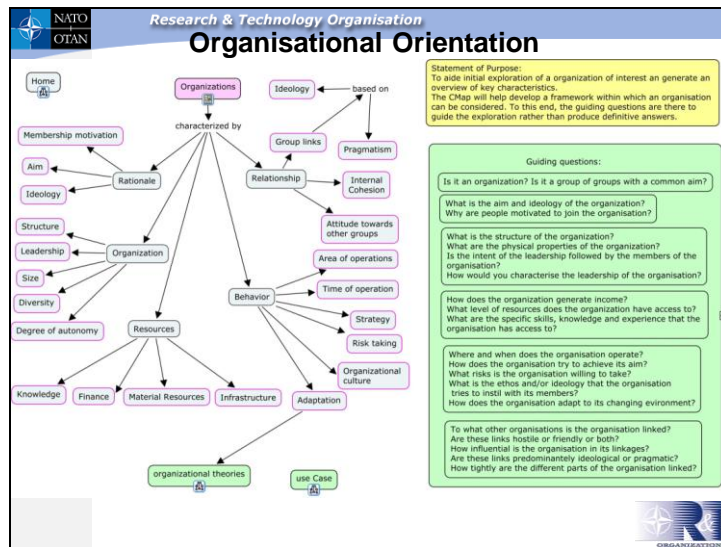


This is a screen shot of the top of the HEART home page.

Please take the time to read the user guide. This presentation is one of the resources linked from the Overview and User Guide box.

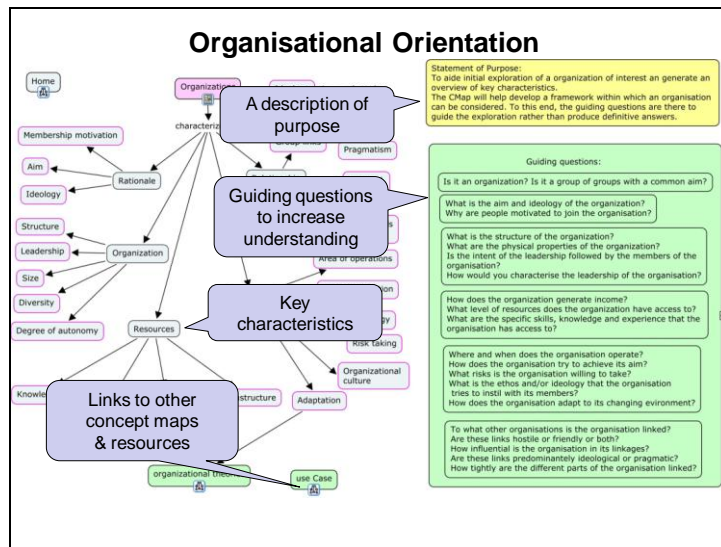


The *Understanding the Human and Social Environment* Concept maps help users to understand the human environment. We're going to click on the Cmap icon at the bottom of the *Organisational* box to open the associated Cmap.



This example demonstrates how concept maps can be used as a graphical tool for organizing and representing knowledge. They include concepts, herein enclosed in boxes, and relationships between concepts indicated by connecting lines. Linking phrases on these lines specify the purpose of moving from one concept to another.

Let's look at some of the individual components of the map.



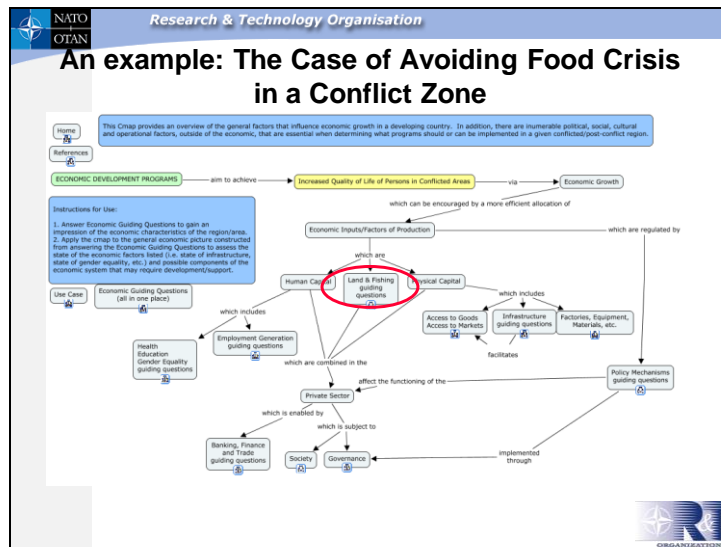
In this map we have:

A description of its purpose

Key characteristics which we need to consider to get an understanding of a specific organization.

Guiding questions that could be asked to improve the users understanding (this is not intended a prescriptive approach, in some contexts each question will provide more insights than others).

The concept maps can also contain links to other concept maps, references and internet resources.



Here we've taken a hypothetical humanitarian crisis scenario. The Economic Development Concept map is shown here. We can use the Land and Fishing Guiding questions to identify some key characteristics of land and sea use.

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## An example: The Case of Avoiding Food Crisis in a Conflict Zone

**ECONOMIC DEVELOPMENT PROGRAMS** aim to achieve **Increase Quality of Life of Persons in Conflicted Areas** via **Economic Growth**

which can be encouraged by a more efficient allocation of **Economic Inputs/Factors of Production**

which are regulated by **Society** and **Governance**

which are **Human Capital** and **Land & Farming** guiding questions

which includes **Employment Generation** guiding questions

which are combined in the **Private Sector**

which is enabled by **Banking, Finance and Trade** guiding questions

which is subject to **Society** and **Governance**

Health, Education, Gender Equality guiding questions

Instructions for Use:  
 1. Answer Economic Guiding Questions to gain an impression of the economic characteristics of the region/area.  
 2. Apply the map to the general economic picture constructed from answering the Economic Guiding Questions to assess the state of the economic factors listed (i.e. state of infrastructure, state of gender equality, etc.) and possible components of the economic system that may require development/support.

Use Cases

The country, given its desert climate, has limited arable land, fragmented into very small units that have limited efficiency. Hence, the country can only meet about 25% of its food demand. Fishing options are also limited. The net result is that the country imports most of its food.

Food imports are mostly financed through income generated directly and indirectly by the oil industry (which used to be almost 95% of the country's export income). Since the conflict started, the oil industry is only functioning at 1/3 of its capacity, in part due to the violence and in part due to the foreign expertise and labor fleeing the country. The deteriorating economic situation of the country may cause food shortages, and may affect more adversely minority groups.

Here's our summary.

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## An example: The Case of Avoiding Food Crisis in a Conflict Zone

This Cmap provides an overview of the general factors that influence economic growth in a developing country. In addition, there are innumerable political, social, cultural and operational factors, outside of the economic, that are essential when determining what programs should or can be implemented in a given conflicted/post-conflict region.

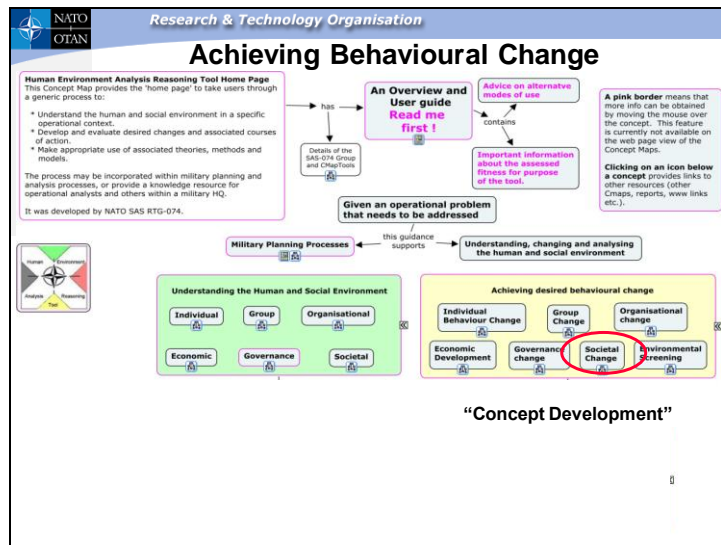
**ECONOMIC DEVELOPMENT PROGRAMS** aim to achieve **Increase Quality of Life of Persons in Conflicted Areas** via **Economic Growth** which can be encouraged by a more efficient allocation of **Economic Inputs/Factors of Production** which are regulated by **Government**.

**Instructions for Use:**  
 1. Answer Economic Guiding Questions to gain an impression of the economic characteristics of the region/area.  
 2. Apply the cmap to the general economic picture constructed from answering the Economic Guiding Questions to assess the state of the economic factors listed (i.e. state of infrastructure, state of gender equality, etc.) and possible components of the economic system that may require development/support.

**Use Cases:**  
 Economic Guiding Questions (all in one place)  
 Health Education Gender Equality guiding questions  
 Employment Generation guiding questions  
 Banking, Finance and Trade guiding questions  
 Society  
 Government

**The country has 2 key minority groups, namely the Blue (up to 10% of pop), and the Red foreigner (up to 20% of pop). In both cases, the regime, which is mostly Martian, has shown various forms of discriminatory attitudes towards these minorities. However, the Blue population has a diverse attitude towards the regime. Among the key Blue tribes, the Azur have sided with the regime while the Navy Blue tribe has sided with the opposition. The Azur are mostly employed in trade and transport industry and their loyalty with the regime has been long standing, while the Navy Blue are mostly engaged in farming in rural areas. The foreigners are usually found in urban areas in low paying employment.**

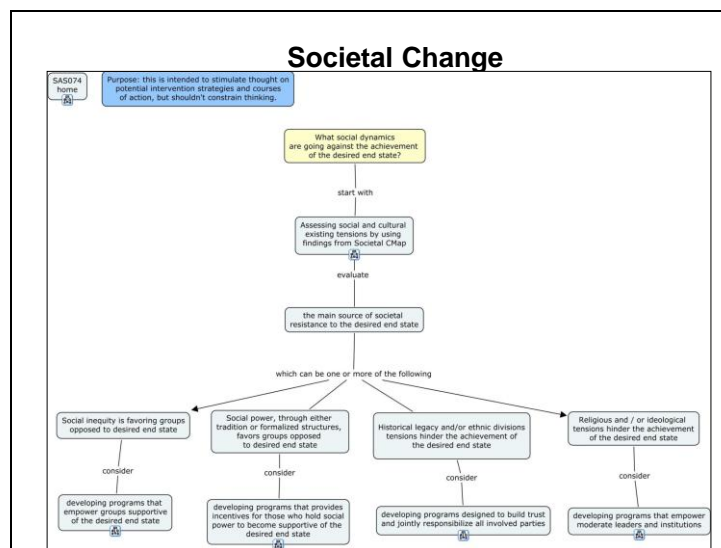
Similarly, we can look at employment issues.



Coming back to the Home Page, the next group of concept maps consider how to achieve behavioural change at the different levels.

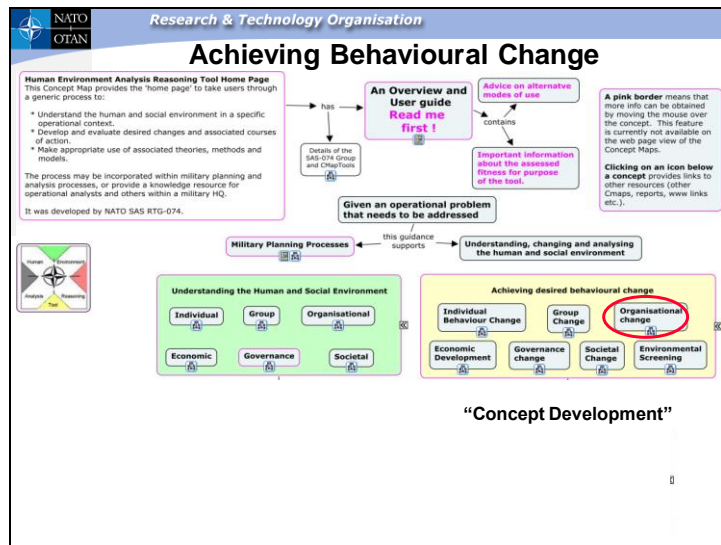
We'll take a look at the Societal Change Cmap.





Here we use the knowledge we've gained from the Societal Cmap to think about what kinds of societal change programs could be appropriate.

We can follow the lower level maps to identify possible approaches.



Coming back to the Home Page, we' will take another look at our hypothetical example. This time thinking about organisational change.

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## An example: The Case of Avoiding Food Crisis in a Conflict Zone

Some metaphors will be more fitting than others depending on the characteristics of the organization identified in the orientation activity. In turn this highlights likely organizational strengths and weaknesses to help develop appropriate courses of action.

Uses the ideas drawn from *Images of Organization* by Gareth Morgan

Views on organizations

organization as a whole

Machine → Organism → Brain

facets of organizations

Transition, Culture, Political system, **Domination**

**Instructions for use:**

- 1) Answer guiding questions from Organization overview to gain an impression of organizational characteristics
- 2) Apply each of the organizational metaphors for whole organizations (machine, organism, brain) and consider which are relevant to all or parts of the organization
- 3) Also consider which of the facets of the organization may also be relevant
- 4) Based on relevant metaphors identified, develop CONOPS for organizational change.

**For foreigners and non-Azur Blue in government held areas, the international community could use the regime's seized funds in foreign banks to purchase food and deliver it in coordination with the naval interdiction policy (i.e. ensure that only humanitarian is coming through). However, a fair distribution of food in these areas will be difficult to implement given that the international community has limited leverage.**

**RT**

Here we think about how domination of some groups in the country may affect distribution of food.

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## An example: The Case of Avoiding Food Crisis in a Conflict Zone

Some metaphors will be more fitting than others depending on the characteristics of the organization identified in the orientation activity. In turn this highlights likely organizational strengths and weaknesses to help develop appropriate courses of action.

Uses the ideas drawn from  
Intro by C

The regime has been constructed over the years as a dynamic system where various factions are continually played against each other to the benefit of the leader and his close circle. The regime remains determined to stay in power in spite of the substantial opposition supported by the international community. As well, religion does not play a crucial role in the political life of the country and cannot be used for creating an effective mean of influence. Hence, intra-regime disruption does not appear to be an effective path for action at this time.

An area of weakness for the regime is its will to ensure some sort of survival, even if it is through exile. Survival in turn requires that it keeps a degree of international legitimacy, especially if exile becomes the only option left.

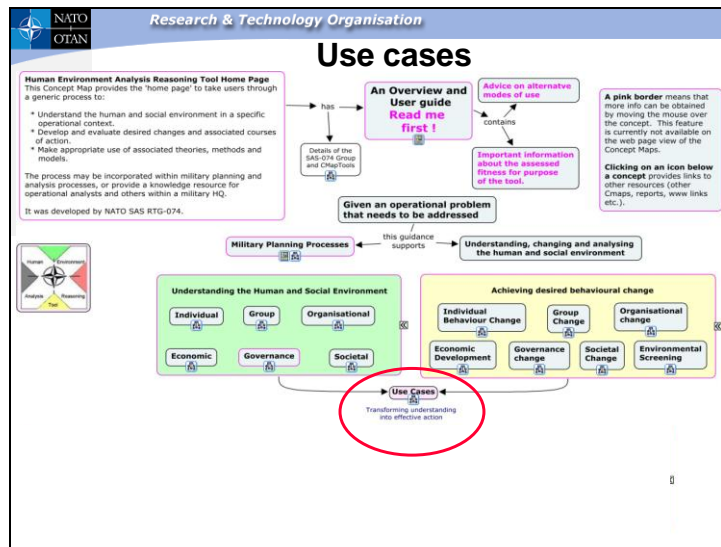
A possible course of action is to "trade" some international legitimacy (for future use by the regime) for a fair distribution of food. Given the leader's long involvement with the Venusian Union (VU), an VU led-mission in government held areas could ensure that minorities would receive a fair share of the food distribution.

Organizations  
Political system  
Domination

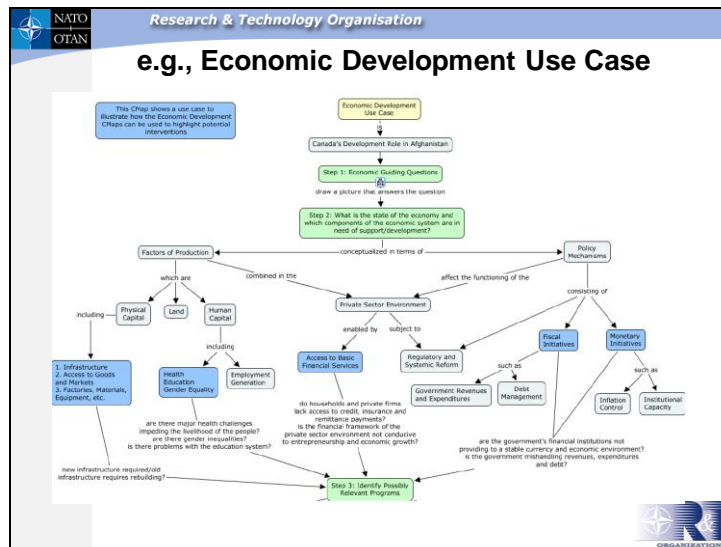
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Again, we use the contextual knowledge we've gained to think through possible courses of action.

Slide 21

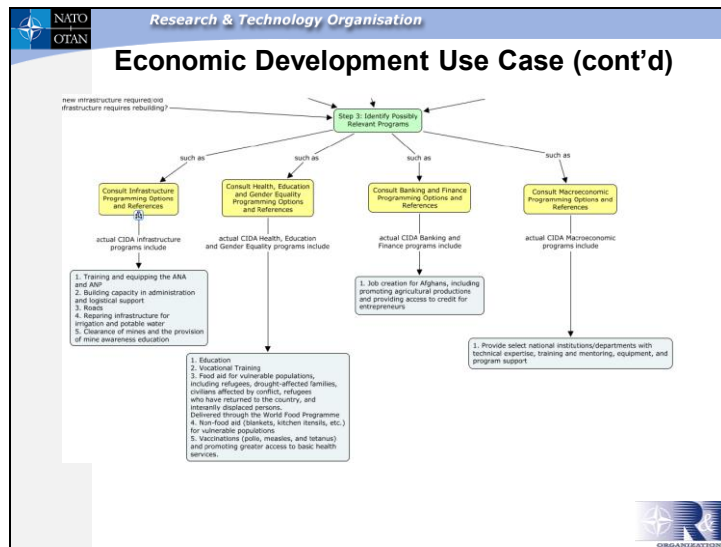


Back to the home page again: we have provided a number of Use Cases to illustrate how the tool can be used. Let's take a look at the Economic Development Use Case.

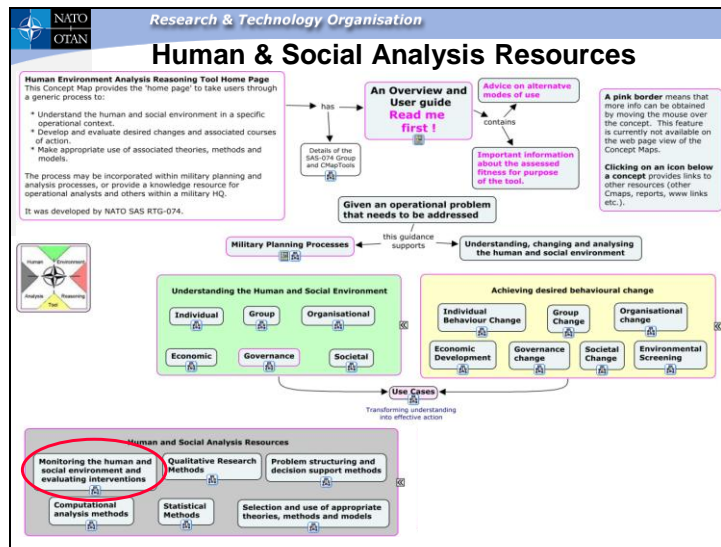


This use case shows gaining understanding of the human context, in this case economics, can help the user to identify appropriate economic development strategies.

This is the top half of the use case...



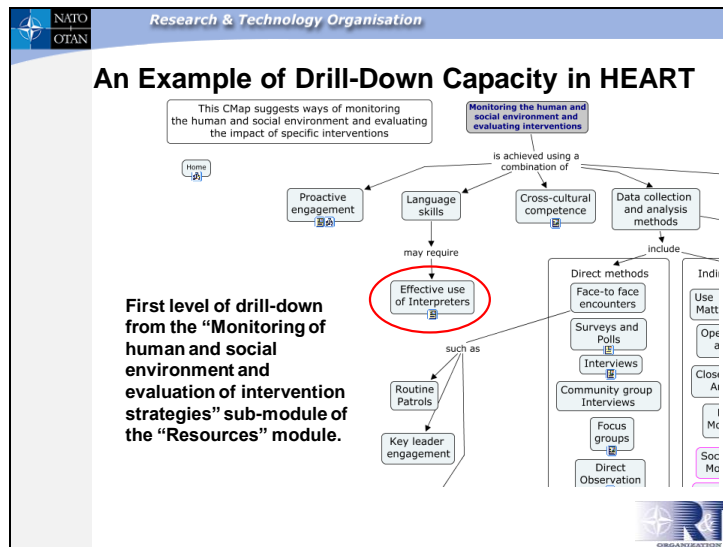
... and this is the bottom, showing some of the actual programmes undertaken by the Canadian Development organisation, CIDA



The sets of Cmaps at the bottom of the home page, provide links to a whole series of resources. On the left hand side they focus on analysis methods.

Let's open the monitoring Cmap.





We can drill down further to get tips about using interpreters.

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## An Example of Drill-Down Capacity in HEART (continued)

Effective use of Interpreters

Second level of drill-down...

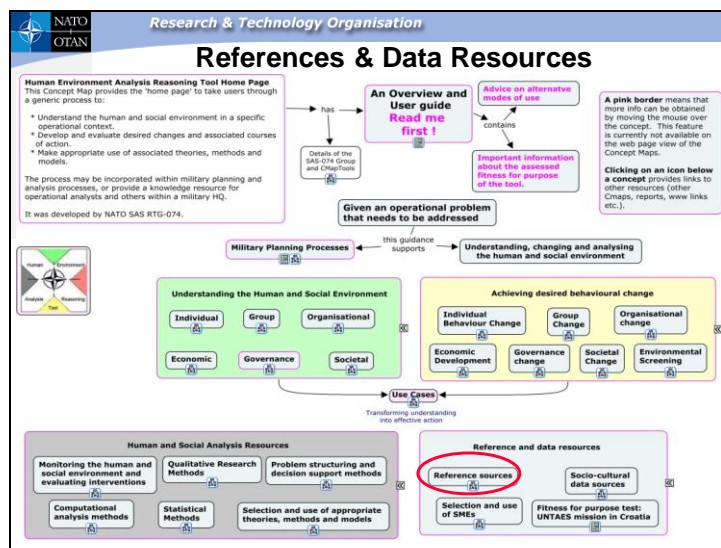
**USE OF INTERPRETERS: BEST PRACTICE**

**KNOWLEDGE OF LANGUAGE AND INTERESTS.** Ideally interpreters should not only have the required linguistic abilities, but also be trained in the research field so that they might best understand the line of thought or objectives of the researcher.

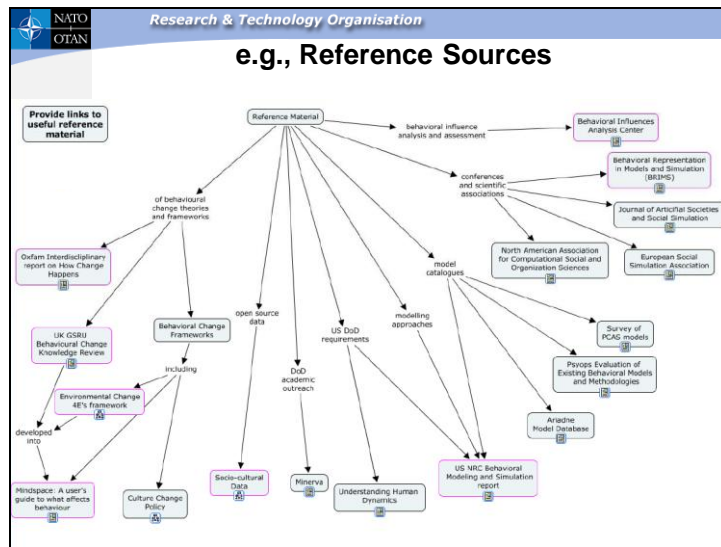
**CONTINUED TRAINING.** Training is not something to be done at the outset and then dispensed with; it should be understood as lasting throughout the research. Discussions and debriefings after interview sessions should be a regular practice, where difficulties of translation can be discussed.

**BACK TRANSLATING.** For quality assessment. This involves having one interpreter translate a text from the investigator's language into the local language, and thereafter have another interpreter translate it back again. The two versions are then compared and the discrepancies discussed with the interpreters.

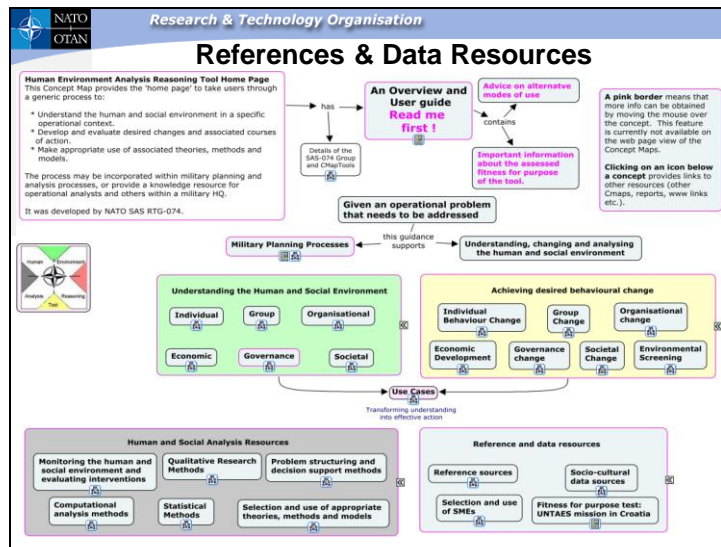
...



On the right hand side there are other open source reference and datat resources.

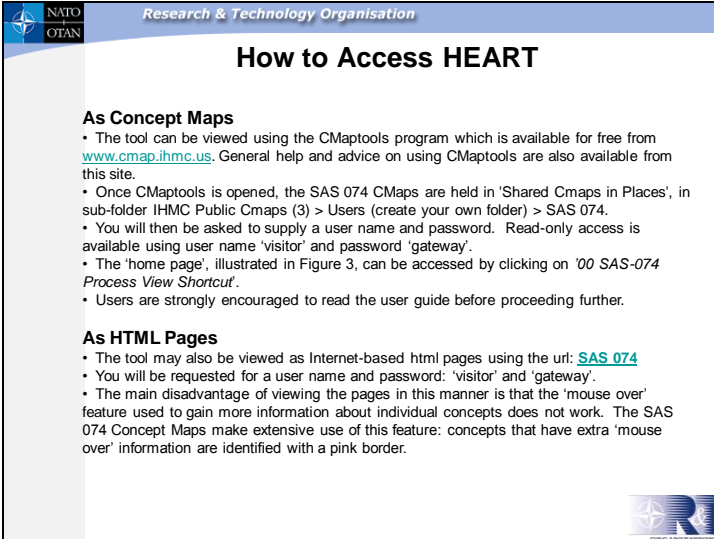


This site highlights a range of reference sources, from key documents to web sites.



That concludes our tour of HEART's main features.

Now for some information about how to access it.



The slide is titled "How to Access HEART" and is part of a presentation from the NATO OTAN Research & Technology Organisation. It provides instructions on how to access HEART (Human Information Management Concept) through two methods: using CMaptools software or viewing HTML pages. The slide includes a list of steps for both methods and a small logo in the bottom right corner.


**How to Access HEART**

**As Concept Maps**

- The tool can be viewed using the CMaptools program which is available for free from [www.cmap.ihmc.us](http://www.cmap.ihmc.us). General help and advice on using CMaptools are also available from this site.
- Once CMaptools is opened, the SAS 074 CMaps are held in 'Shared Cmaps in Places', in sub-folder IHMC Public Cmaps (3) > Users (create your own folder) > SAS 074.
- You will then be asked to supply a user name and password. Read-only access is available using user name 'visitor' and password 'gateway'.
- The 'home page', illustrated in Figure 3, can be accessed by clicking on '00 SAS-074 Process View Shortcut'.
- Users are strongly encouraged to read the user guide before proceeding further.


**As HTML Pages**

- The tool may also be viewed as Internet-based html pages using the url: [SAS 074](#)
- You will be requested for a user name and password: 'visitor' and 'gateway'.
- The main disadvantage of viewing the pages in this manner is that the 'mouse over' feature used to gain more information about individual concepts does not work. The SAS 074 Concept Maps make extensive use of this feature: concepts that have extra 'mouse over' information are identified with a pink border.



Full functionality is gained by using the Cmaptools software – which can be downloaded for free.


However, all the maps and associated resources can also be viewed as Internet html pages.



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### Status of the tool

- A concept demonstrator
- The Netherlands have already taken the idea further with their ADAPT tool
  - In a simulated Brigade HQ planning experiment it was beneficial in improving the planning process
- Evaluation was undertaken with several sets of potential users during development
- Was awarded the Ken Bowen Award (DSTL) for innovation

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HEART is a concept demonstrator, but it has already benefited from some user testing.


An experiment using the TNO ADAPT tool (which takes HEART further with addition of a background wiki to make it fully stand-alone and includes other enhancements) has demonstrated how such tools can enhance the quality of planning.




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### Potential Future Developments

- Improve usability of tool (make it more intuitive and user-friendly through development of new user interfaces)
- Further in-depth testing and evaluation of tool
- Enhance visual representation by using additional software packages (e.g. a wiki back-end and topic-centered mind maps)
- Increase portability of the tool (e.g. as an executable on an external disk drive or USB stick)
- Produce a video (or online tutorial) on how to use the tool
- Tune the tool to national and NATO requirements









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## **Recommendations of SAS-074 RTG**

- Socialization of HEART by means of a NATO Lecture Series
  - NATO Defense College in Rome
  - US National Defense University
  - Other National Defense Colleges
- HEART should be hosted on, or advertized from, the NATO Research and Technology (RTO) and Allied Command Transformation (ACT) websites
- Further technical enhancements to the tool would be better achieved through a full-time effort that could be undertaken by NATO ACT, potentially supported by NC3A. An RTG could be created to provide direction and oversight of such developments






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### Contact Information

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Many thanks for taking the time to go through these familiarisation slides.

If you have further questions about the tool, please contact the national leads within the group.



What a lovely bunch!