Appendix

UNMOVIC information system

Introduction

1.   Following the establishment of the United Nations Monitoring Verification and Inspection Commission by the Security Council in December 1999, it was quickly realized that, in order to analyse and draw conclusions from the eight years of work by its predecessor, the United Nations Special Commission, and prepare for future inspections in Iraq, a much more dynamic information technology system would be required. It was also recognized that much of the data previously provided by Iraq, as well as that collected by the Special Commission, contained some very sensitive as well as proprietary information that required careful handling and a secure storage medium.

2.   Accordingly, UNMOVIC constructed both a secure local area network and a wide area network that are "stand-alone", that is, have no linkages to any outside computer networks. The system utilizes encryption between computers and networks.

3.   When the information technology system was designed, care was taken to ensure that the system was multifaceted and able to respond to the changing and diverse needs of the substantive disciplines.

4.   The evolution to the current system in use took several steps, each building both on what UNMOVIC inherited and on its own accomplishments. The work was completed within the framework of an information technology strategy adopted by senior management.

Overview of the UNMOVIC information system

5.   The information system currently in use supports UNMOVIC activities in a variety of ways, from the ability to store large amounts of data submitted, to the analytical processing and comparison of new information against historical data. The system itself consists of five main subsystems, which work closely together to create a flexible, responsive information system. The five subsystems are: Intranet, archives and search engine; site, inspection and declaration system; the geographical information system; analytical tools and the underlying information and communication technology infrastructure.

Intranet, archives and search engine

6.   As there are a large number of information tools available, a central access portal (Intranet) was built to give inspectors and analysts a consistent starting point to access all available information and to receive information about the system as well as updates.

7.   The UNMOVIC archives are first and foremost the physical collection of documents inherited from the Special Commission and all documents resulting from the execution of the mandated tasks of UNMOVIC. This expanding collection occupies about 1,500 linear feet, roughly 1 million pages and a wide variety of videos, photographs and audio tapes from inspections as well as overhead imagery.

8.   A substantial part of this information was produced electronically and is not always available on paper. This includes some declarations made by the Government of Iraq to UNMOVIC, information collected during the inspections, analytical reports produced by UNMOVIC staff members, and imagery and data entered into the UNMOVIC databases. The UNMOVIC electronic archives represent over 900 gigabytes of data, enough to fill 1,300 CD-ROMs.

9.   In addition to the daily ongoing work, documents are still being categorized, translated and digitized, many of which were acquired from the Commission's predecessor in paper form.

10.   To manage this collection, UNMOVIC uses an off-the-shelf document management system which allows UNMOVIC to systematically catalogue every record produced and received, and to manage the electronic and paper records.

11.   Finding a particular document can be achieved in one of two ways:

    (a)   Searching the title of a document or any other additional information (metadata) that was stored together with the document at the time the document was archived. The additional information that can be searched may consist of the document number, notes, site number the document pertains to, the particular physical repository, creation date, archived date, disciplines and document type (multimedia, inspection reports, Iraqi documents etc.) and author.

    (b)   Searching for a document that contains a particular word or concept. A simple word search has very serious limitations when dealing with documents containing complex technical information. The UNMOVIC search engine also looks at the relationships between all the words of all the documents and weighs them according to a sophisticated algorithm. When searching for a particular word, the search engine also catalogues and analyses other words that appear together with the search word in all other documents. The result set, therefore, would also include documents without the search word, but containing the words that are statistically related to the search word. The result set can be narrowed or broadened according to the user's wishes.

    (c)   The UNMOVIC search engine can produce "topic sets" or predetermined searches. For example, if an inspector or analyst searches for the word "anthrax" appearing in the same paragraph of the document as the word "vaporizer", but not related to the word "agricultural", he or she can do that directly. There are currently three topic sets in use at UNMOVIC; they were custom-designed in cooperation with the analysts and inspectors.

    (d)   The UNMOVIC search engine is also able to produce knowledge trees, which are hierarchical representations of the data, allowing the user to select folders and subfolders containing the desired information. These knowledge trees can be based on metadata fields (such as weapons discipline name or type of record) or based on abstract concepts. The knowledge trees greatly enhance the ability of UNMOVIC to cross-examine information, distinguish hidden patterns and quickly access details. Some of the knowledge trees used to refine and narrow the search for specific information are, for example, equipment by supplier company, equipment by material of construction, or equipment by weapons discipline. Additionally, the knowledge trees are used to refine the search for specific information, for example, by type of document (inspection report, declarations, open source information etc.) or by the physical location of the document.

Site, inspection and declaration system

12. The UNMOVIC information system deals with more than documents. A significant amount of information about facilities capable of producing or using materials falling under the Commission's mandate is stored in a large database. The UNMOVIC database was designed to be flexible and adaptive; it can be changed by modifying data in the database without having to resort to reprogramming the system.

13. The site database can be populated (filled/updated) in several ways. A new site information set can be created on the basis of information received, for example in an Iraqi declaration. This information relates to the physical aspects of the site (coordinates, address, location, buildings, equipment, materials, processes, capabilities etc.) and also to the internal and external organization of the site (point of contact, owner, parent organization etc.). Each time a new piece of information is entered or added to the database, a reference to an archived document or source of the new information can be added. Thus, most information in the database has documentary evidence (or a "paper trail") associated with it.

14. The UNMOVIC database includes information from inspections. The inspection data is closely related to the site information. This allows the site database to be fed directly from inspection results.

15. The site and inspection database is also used for planning, operational and analytical purposes. Inspection and monitoring schedules can be generated on the basis of past inspections. "Pre-inspection" documents can be generated to assist in the planning of missions and also to produce "inspection packages" to be used by the inspectors during a mission.

16. At the end of an inspection, the inspectors enter the data collected into the inspection report system. This system is then used to generate standard inspection documents. All documents collected during the inspection are imported into the archives. The site database is updated with the latest inspection findings and changed data is "tagged" with the inspection number, thereby providing a reference to the source of the data. The old data is stored in the database history and can be used to "backtrack" the information.

17. UNMOVIC has recently prototyped an application to collect declaration data electronically. In the past, Iraq's declarations were submitted on paper or electronically in a non-structured format, which made the analysis labour intensive. The new declaration system is fully integrated in the site database and inspection system and will provide for the automatic detection of changes (differential analysis) in declared information. In addition, the information provided in the first declaration can be used to feed the site database. This can significantly simplify the process of the initial population of the site data.

18. The UNMOVIC Intranet contains tools for performing detailed searches of the contents of databases:

- **Interview search system.** An application through which inspectors and analysts can search a series of past interviews and discussions with Iraqi personnel. They may search the actual text of the interviews and also find interviews with a particular participant.

- **Building information**. A search application that allows the user to view building information at a site. The inspectors and analysts can input the site number and then select the desired buildings or simply type in the building number directly. This is a complex search that retrieves the following information: basic building information, such as name, current use, description, photographs, location etc., and a list of equipment by location within the building, containing links and detailed information on each piece of equipment, including photographs, dimensions, uses, category, status etc. UNMOVIC is further extending this part to include links to past inspection reports that contain this item, in an attempt to create an equipment history; a list of materials, including suppliers and customers for each material, quantity, activities that used this material, and capabilities; and activities conducted in the building, including personnel involved, type of activity, material used etc.

- **Equipment search**. UNMOVIC has also developed an equipment search system that provides the user with the ability to perform accurate and specific searches for information contained in the "equipment" portion of the database, including the ability to narrow the search by site(s), manufacturer, equipment type, status of the equipment, weapons discipline, quantity, dimensions, serial number, model, description, comments, supplier, location within the site etc.

Geographic information system

19. High-quality satellite imagery has increasingly become commercially available. Such imagery was relied on by the inspectors in the planning and execution of missions. In order to strengthen the inspection process, UNMOVIC has developed a geographic information system which fully integrates imagery and maps with the site database. An analyst can expand a map of Iraq to the level of individual buildings and query the contents of a particular building. An inspector can use the same tool to plan a mission. The UNMOVIC geographical database contains almost 1 million geographical features like highways, ditches, land subject to flooding, wells, pipelines etc. Some of this data can be invaluable during the preparation of inspection missions.

20. The easily accessible high-quality imagery allows UNMOVIC to periodically procure and process new imagery of the same location. This allows analysts to perform "change detection" and analysis of major infrastructure at sites so that modifications can be identified and the database updated to improve inspection planning.

21. The combination of high-quality digital elevation models and satellite imagery can produce virtual 3-dimensional renditions of a site and surrounding landscape, thereby giving the inspectors an additional operational tool.

Analytical tools

22. Complex information systems make it difficult to find and correlate data, and for this reason, UNMOVIC utilizes analytical tools used by law enforcement agencies to find relationships between data elements in the database. The system can highlight linkages between seemingly unrelated entities. For example, it can show that linkages exist between sites by identifying that they have similar equipment or share the same personnel.

23. A large amount of monitoring data generated by remote sensors and cameras from different sites can be collected to a central depository. Specialized software enables the inspectors to quickly and efficiently review and authenticate that data. The monitoring equipment can be remotely accessed and controlled, allowing for real-time monitoring.

24. In order to ensure a rapid deployment of inspectors, UNMOVIC has set up a fully functional smaller version of the information system for training purposes. The inspectors on the roster as well as headquarters staff are being trained in the use of the systems used in UNMOVIC.