

# The Action Team Integrated Information System (ATIIS)

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## ABSTRACT

The IAEA Iraq Action Team (AT), established in 1991 by the United Nations Security Council Resolution 687, has developed an extensive information management system to support a variety of unprecedented nuclear inspection activities. Throughout a decade of verification activities in Iraq, custom databases have been developed to integrate raw and structured data to create a valuable field inspection tool.

## BACKGROUND

During the first 26 inspections over a three-year period, nuclear teams of 15-20 experts working 10-12 hour days generated a large amount of data in a wide variety of data formats (i.e., Excel, Word, Text, RTF, dBase, Lotus). Existing IAEA Safeguard information systems did not meet the AT information management needs in Vienna to plan for the destruction, removal and rendering harmless of all Iraqi nuclear items and they did not meet the AT information system needs in Iraq for the carrying-out of inspections. Over time, redundant word processing, spreadsheet and database files formulated the initial version of the AT information management system. In September of 1991, a large cache of documents was ceased during a momentous inspection. Even though structured databases had been developed to search and retrieve the data, the initial Iraqi declarations in 1994 required a database to integrate the structured data with the raw data. The declarations contained structured data (sites, buildings, equipment and materials) and unstructured data (drawings, layouts, photos, amendments and reports) in both electronic and hardcopy formats. To help link the data, the *On-Going Monitoring and Verification System* (OMVSUM) was developed for the expert in the field to prepare for an inspection, verify the declarations, and enter the post-inspection report directly into a structured database. In August of 1994, the AT formed the Nuclear Monitoring Group (NMG) -- a nuclear inspection team of two to six experts residing in Iraq 24 hours a day, seven days per week. In 1997, the NMG would be increased to 8-12 experts. As the AT information management system was enhanced for the needs in Vienna, support to the NMG in the Iraqi field office, known as the Baghdad Monitoring and Verification Centre or BMVC, created new requirements for the existing applications (i.e., data security in the BMVC and data synchronization between Vienna and the BMVC). Adding to the already large volume of data, shortly after the defection of Hussein Kamel in 1995, the Iraqi government turned over to the IAEA more than 70 large metal boxes containing more than 600,000 pages of documents, multiple rolls of film, open source catalogues, etc. Some of the information was in English but most of the information was in Arabic, both handwritten and typed documents. Existing OCR technology to convert Arabic images to Arabic text was limited and could not easily convert our large cache of Arabic documents.

## DESCRIPTION

The AT information management system utilizes a variety of commercial off-the-shelf (OTS) software, such as Microsoft SQL Server, Microsoft Office Professional, Microsoft Project, Visio and Org Publisher. Although the initial AT databases were developed using Microsoft

Access, the large amount of data collected in a variety of data formats created the need for a more robust database engine. After redesigning the data structure relationships to facilitate the integration of current and future data modules, the AT migrated their databases to Microsoft SQL Server to enhance performance and security. These custom applications provide the capability for an inspector to perform a comprehensive analysis of the past and present Iraqi nuclear programs. Original Iraqi documents, declarations, translations, inspection reports, analytical reports, photos, drawings and other image formats are all available through a unique system combining the flexibility of raw data with the efficiency of a structured database. Secure communications between Vienna, New York and the BMVC were available via a wide area network using encrypted (triple DES) hardware devices to ensure data privacy; to provide data and video file transfer; and to enable remote printing and scanning. Stand-alone local area networks in Vienna and the BMVC provided the ability to share network resources while improving data security.

## OMVSUM

OMVSUM (Figure 1) is the backbone of the AT information system as it integrates verified site, building, equipment and material data with an Iraqi declaration to support the inspection process. This custom field inspection tool is invaluable for both the new and experienced inspector.



Figure 1. OMVSUM Main Menu.

To help a new inspector prepare for an inspection, the system prints a default series of predefined reports based on a user-selected site (Figure 2). Quick and easy access to a full set of reports automatically delivers a comprehensive and pertinent set of prior inspection reports, summary lists for buildings, equipment, seals and materials, related photos, site and building drawings and declarations.

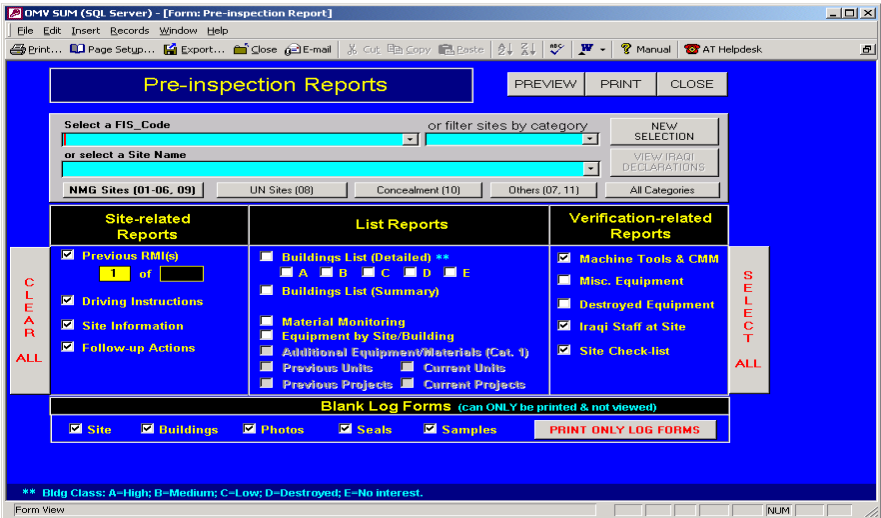


Figure 2. One-button quickly and easily delivers a comprehensive set of Preinspection reports

To help orient the inspector to an Iraqi Site, the system provides easy to follow driving instructions, aerial photos, gate photos and facility layout drawings (Figure 3).

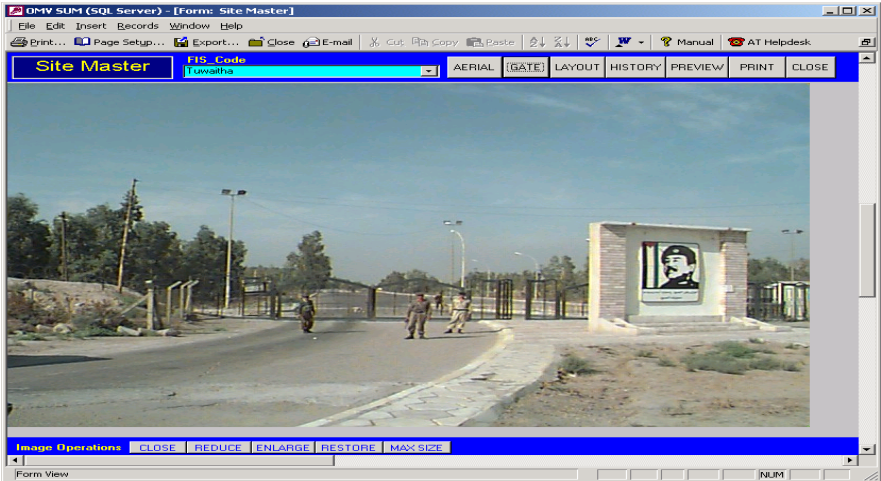


Figure 3. Site, building and equipment photos, drawings and layouts are integrated for easy orientation and navigation.

Any and all data collected during an inspection is entered directly into OMVSUM during the post-inspection process (Figure 4). Inspector names; location and date of each inspection; site, building, equipment and material descriptions, observations and drawings; and photos, seals and sample activities are all stored as a database record.

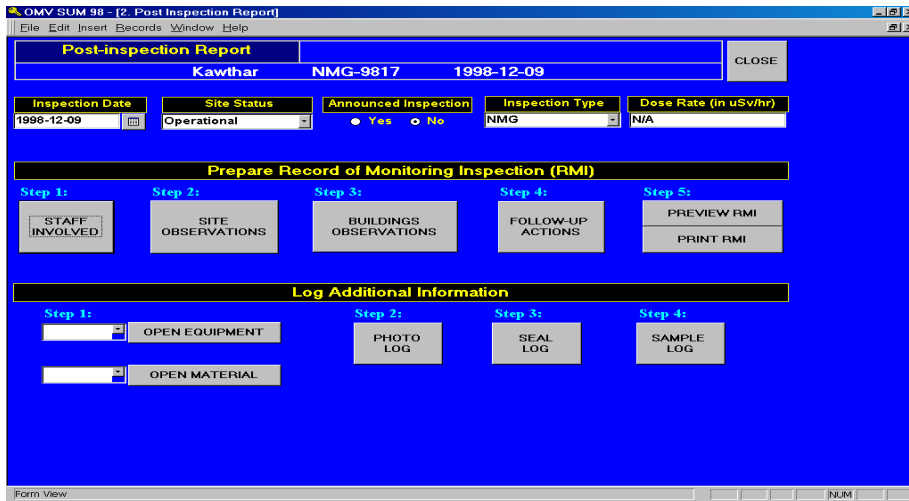


Figure 4. Integrated step-by-step menus provide a user-friendly interface to enter, modify and search post-inspection reports.

Where possible, Iraqi declarations are linked to AT verified data (Figure 5). In order to preserve the information, the declarations cannot be modified.

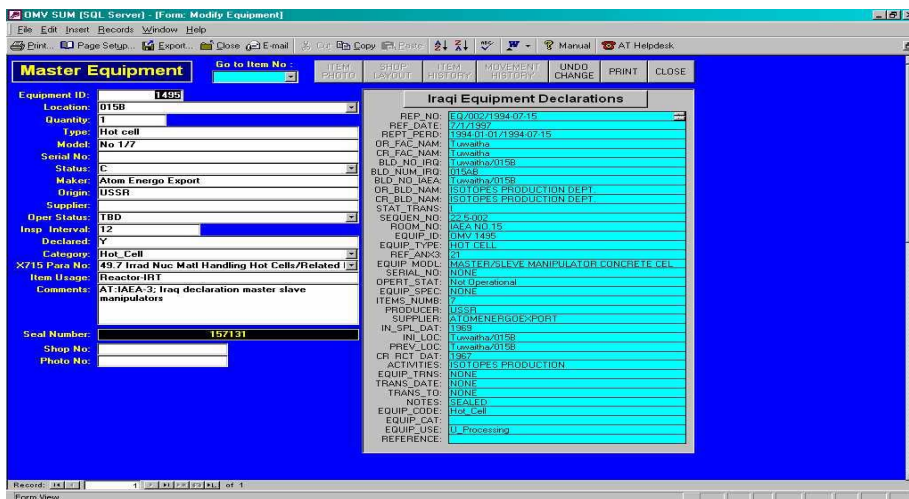


Figure 5. Comparison of declared and verified equipment.

To aid the chief inspector in the field, a comprehensive ‘Utilities’ menu provides easy access to an assortment of analytical, planning and administrative routines (Figure 6). The ‘Follow-Up Actions’ feature of OMVSUM is a task management system to record and remind an inspector of an activity during a visit to a site. To synchronize the data between Vienna and the BMVC, the ‘Export/Import Changes’ utility provides the capability to export or import changes to the database. In Vienna, before changes to the database are imported, automated check and balance routines help ensure data quality and integrity.

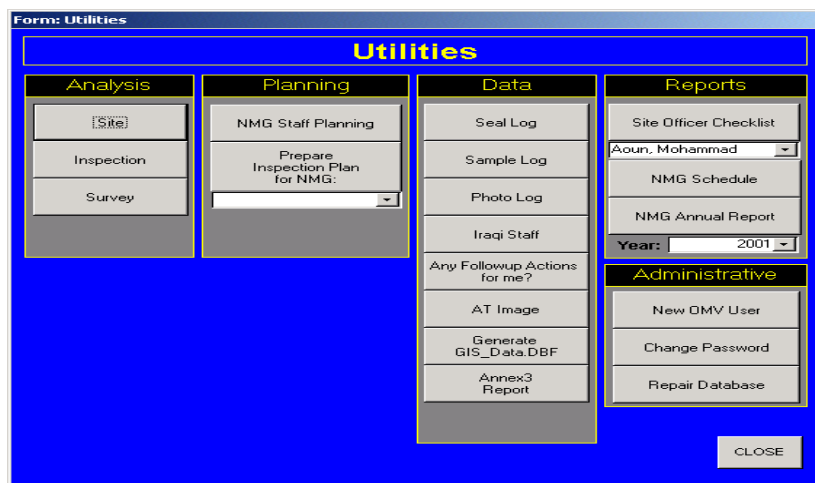


Figure 6. Quick and easy access to a variety of utilities.

## IDOC2000

The *iDoc2000* custom document management system provides easy access to all original Iraqi documents. Document keywords and summaries are stored in the database and link to the original Iraqi document as well as to an English translated document. To expedite the entry of an enormous number of Arabic documents, custom document screening forms (Figure 7) were developed to record and highlight key features of a document in order to prioritise the need for a full translation. Documents can be linked to many other AT systems, for instance the OMVSUM database is linked via an Iraqi site name.

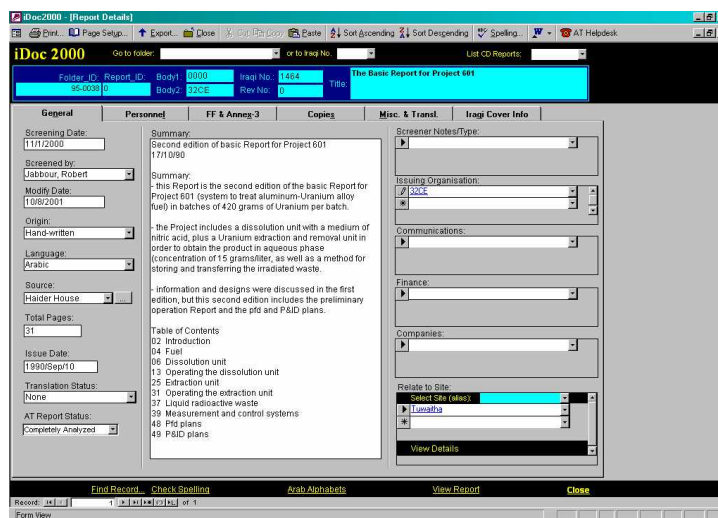


Figure 7. Custom document screening forms expedite data entry of partially translated

# COINS

The *Comprehensive Inspection Planning System* (COINS) integrates inspection-planning activities with existing verified data from the OMVSUM database (Figure 8). In a few words, COINS automates routine activities and helps optimise the use of available resources. In Vienna, COINS automates routine administrative tasks and routine inspection planning tasks. In principle, COINS relies on the communication between OTS software such as Microsoft Project and Microsoft Office (particularly Outlook and Access) to incorporate the features of various software packages and to avoid duplicate data entry.

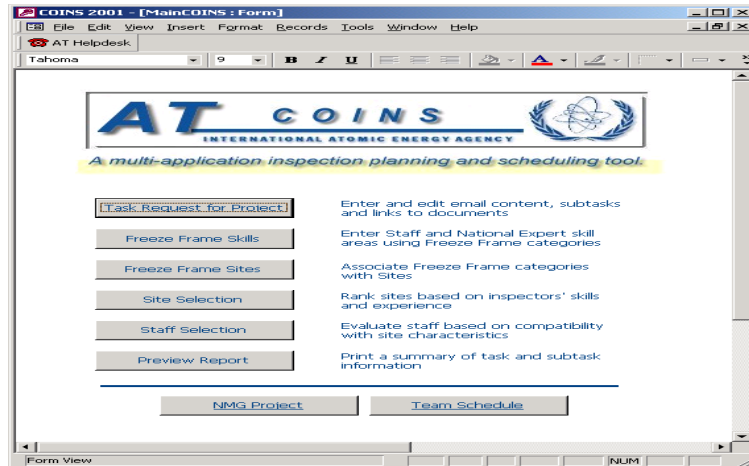


Figure 8. The COINS tool automates a variety of routine planning tasks to select sites and inspection teams, streamline travel procedures and clarify field assignments.

Utilizing a nuclear fuel cycle diagram (Figure 9), the AT databases can link its data to specific areas of the model. In COINS, the AT can link site, equipment and materials to a specific section of the nuclear process. When an expert completes a survey relating their skills to the nuclear fuel cycle model, the computer can help the AT select experts who are more technically suitable for a specific inspection or mission.

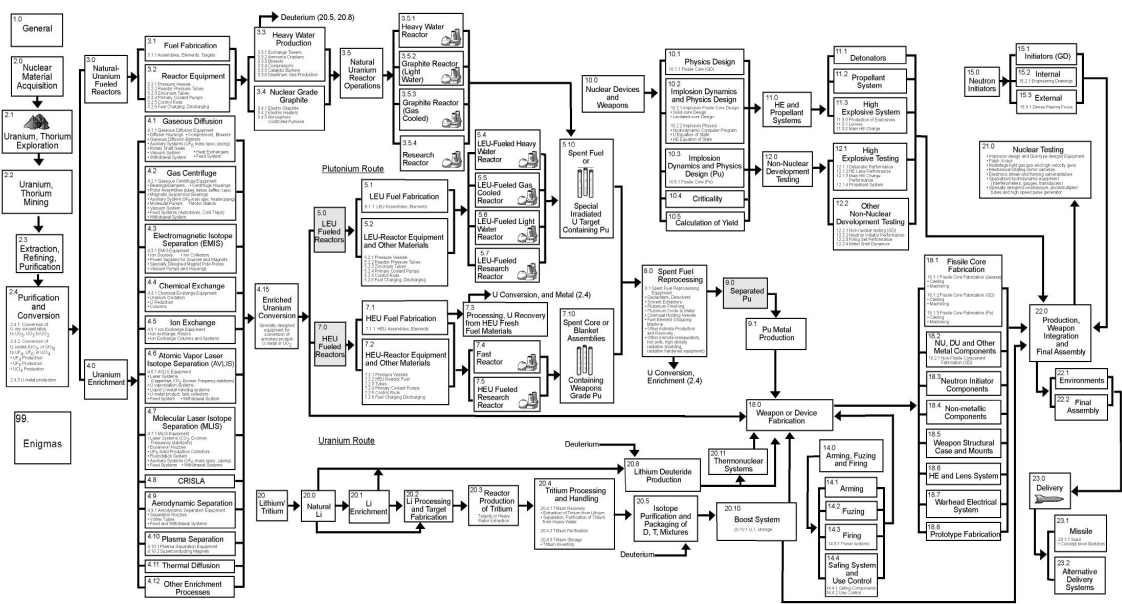


Figure 9. The Nuclear Fuel Cycle Model

In the BMVC, COINS automates routine tasks for each inspector. Regardless of who is in the field, various common inspector roles and routine tasks can easily be documented (i.e., preparation and maintenance of sampling and seal kits, preparation and maintenance of video and still film, preparation of preinspection notebooks and maintenance of office and automobiles). Experts are rotated in and out of Iraq one or two at a time to cross-train and support the overlap of inspectors in the BMVC. With up to 10-12 nuclear experts rotating into and out of Iraq at different times, COINS facilitates the management of experts and their tasks during each mission or inspection. When an inspector is assigned a specific role, COINS provides a checklist of predefined tasks. For new inspectors, COINS helps orient the expert to the environment (i.e., pickup hand radio, obtain call-sign, convert money, attend briefing, obtain identification cards, review Iraq orientation manuals, review inspector guidelines and procedure manuals).

## ORG PUBLISHER

*ORG Publisher* (OP) is a commercial OTS software package to chart and display organizational structures. To help the AT create an organizational chart of the Iraqi nuclear program (Figure 10), a Microsoft Access database was developed to store organizations, divisions and departments. By selecting a specific unit, the database transfers the data to OP and displays the parent-child relationship as an organization. Considering the many changes in the Iraqi Nuclear scientific program, OP proved to be a valuable software tool.

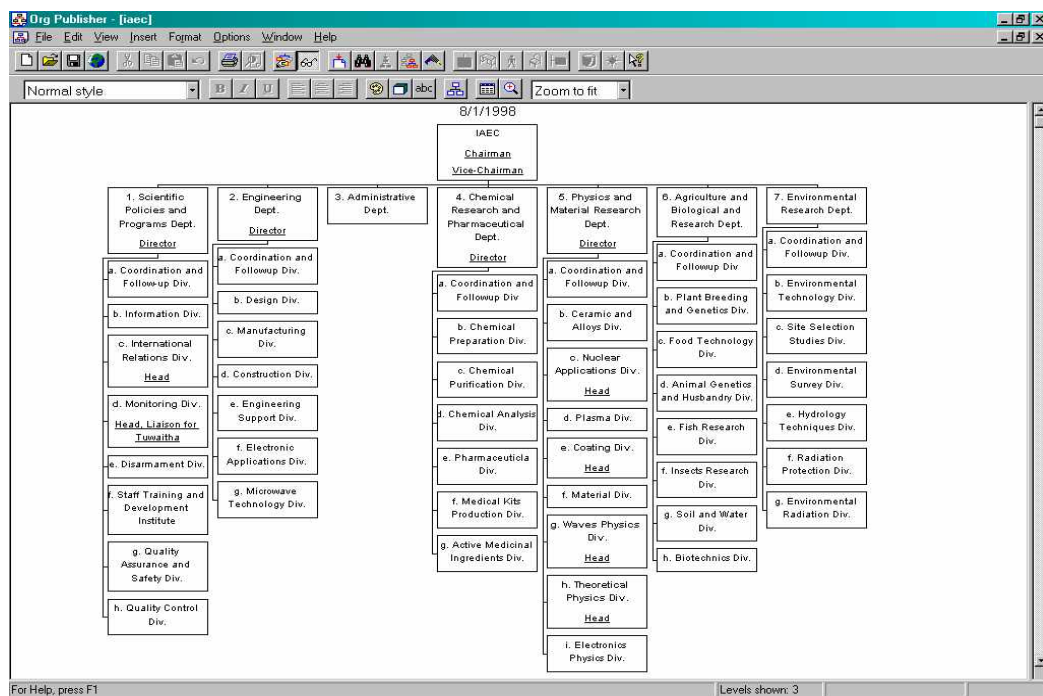


Figure 10. Organizational charting software.

## IEAMIS

The Iraq Integrated Equipment/Material/Activities Information System (IEAMIS) provides access to multiple sources of data (Figure 11). Until information can be verified, all collected data is recorded, linked, and retrievable. Even though a lot of past programme Iraqi equipment was destroyed during the Gulf War or under IAEA supervision, the AT must continue to analyze all available data regardless of its origin. As OMVSUM integrates declared and verified data, IEAMIS integrates various sources or origins of information. Using IEAMIS, any reference to a piece of equipment from any origin during any period can be located.

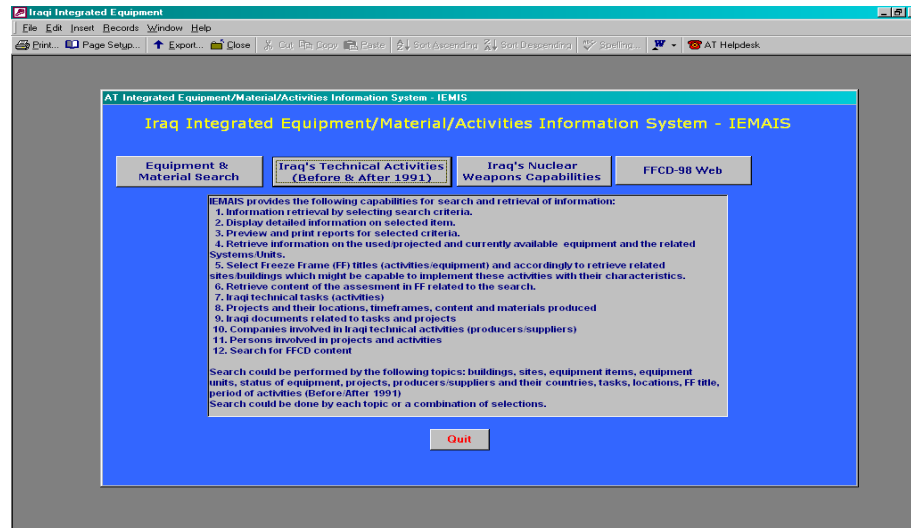


Figure 11. IEMAIS provides the analyst with a tool to search and retrieve data from Iraqi past and present nuclear programs.

## AT INTRANET

The AT Intranet organizes the network resources for the new or experienced user (Figure 12). Even though long-term staff in Vienna are familiar with the layout of the network, newcomers as well as many experts in the field will be new to the AT network environment. A key requirement for the BMVC user is the need to browse, search, filter, and locate information from any application. A copy of the 'Public Information' module of the AT Intranet can be viewed from the IAEA World Atom website ([www.iaea.org/worldatom](http://www.iaea.org/worldatom)).



Figure 12. The AT Intranet organizes, links and presents a wide variety of data for the experienced user in Vienna and the new inspector in the Iraq.



## ATIIS GLOBAL

Every piece of the AT information management system was developed with a specific purpose. Over time, as the database structures became normalized, the systems grew into modular building blocks. Even though a master Iraqi Site table resides in the OMVSUM database, iDoc2000, COINS, IEAMIS and other AT systems required a link to one single master site table. The AT Integrated Information Management System (Figure 13) correlates all of this data for the analyst on one screen.

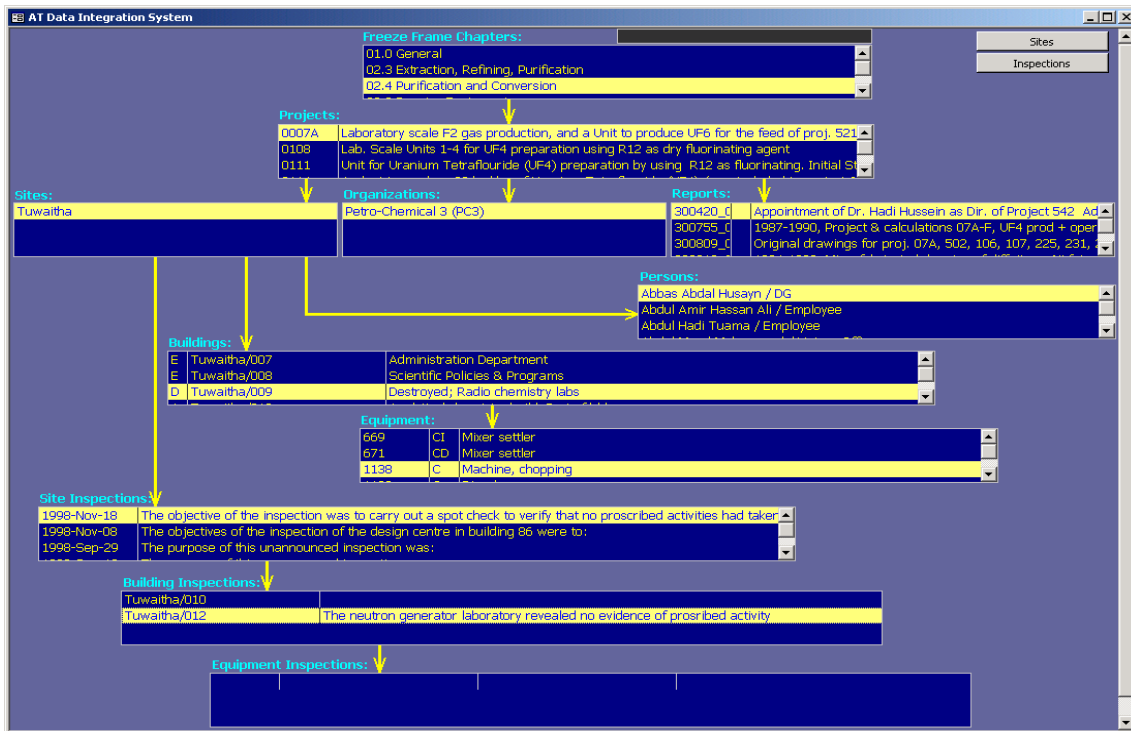


Figure 13. The ATIIS displays verification, declaration and analyses information as a series of relationships.

## CLOSING

In December 1998, the AT evacuated from the BMVC in Iraq. For more than seven years since the first AT nuclear inspection in Iraq, a large amount and wide variety of data has been collected and stored in a series of custom databases as existing IAEA applications did not meet the unique system requirements faced by the inspector in the field. As required by a United Nations Security Council Resolution, many member states provided assistance to the AT by offering nuclear experts for an NMG assignment. Although the assistance was vital to the success of the AT mission in Iraq, the unique nuclear inspection regime and the complex collection of databases presented many challenges to the AT to process and analyze the information.

The AT information management system is the integration of a large amount of data linking an assortment of data types in an environment which proved to be a fundamental tool for the efficiency of the IAEA in carrying out its mandate in Iraq.