

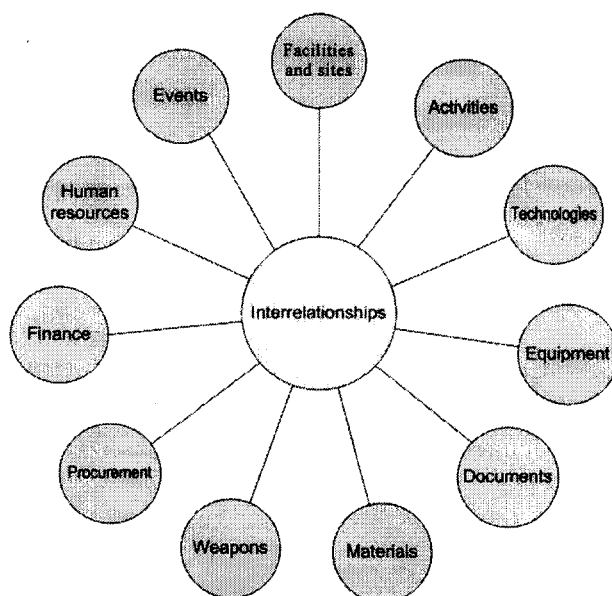
Annex

Use of indicators in the investigation of programmes of weapons of mass destruction

1. During a review of the experience of the United Nations Monitoring, Verification and Inspection Commission as regards United Nations inspections in Iraq, a number of important elements emerged, among them the value of indicators in leading to fruitful investigations, as well as an understanding of how and where those indicators were found (or, conversely, not detected). It has been recognized that many useful indicators may not always lie in the site being inspected or in equipment being used, but rather would arise from a systematic and comprehensive collection of information in a number of different areas in relation to a particular site or activity. Analysis of such information would often yield indicators of possible undeclared proscribed activity or show avenues of investigation that would not otherwise be readily apparent.

2. The figure below identifies separate domains of information where indicators could be found. Information can be drawn from a variety of sources including on-site inspections, the submission of declarations, sampling, aerial imagery, examination of open-source information, intelligence, supplier data and interviews with those involved in the programme. While each of these domains needs to be investigated separately and/or in parallel, it is clear that not all will have relevance in every case or will yield indicators that would lead to an outcome on their own. It is often the combination or association of indicators that may lead to a breakthrough or reveal evidence of proscribed activity.

Domains of information



3. The formulation of a specific framework dealing with indicators, based on the above findings, will be useful in providing clarity, awareness and a systematic approach to the use of indicators within an overall inspection methodology. Such a methodology is useful in training inspectors so that they will be more likely to explore systematically less apparent sources of information to derive a more accurate understanding of activities or uncover false or undisclosed information.

4. The section below sets out descriptions of the various domains shown in the figure, as well as some representative indicators that may arise from them in the course of inspection and analysis. The section concludes with some examples of situations where combinations of indicators have led to the uncovering of parts of Iraq's programmes of weapons of mass destruction and other information that had not been disclosed to the United Nations.

Examples of possible indicators in different domains of information

Facilities and sites

5. This domain includes physical location and its associated infrastructure, management and ownership. It also includes recent building construction or alterations within a building or modifications to a site, including the configuration of the production lines. The following are examples of indicators that fall within this domain:

- General layout of a site
- Civilian organization administered by a military authority
- Extraordinary security features and guard arrangements
- Recent or transient changes in affiliation and/or ownership
- Restrictions in access to the site that do not fit the level of classification of the site's products
- Presence of departments (especially with former military staff) without a reasonable explanation
- Recent remodelling and renovation

Activities

6. This domain includes site operations and functions (past, ongoing or planned) such as research, development, testing and evaluation, production, procurement and storage. The following are examples of indicators that fall within this domain:

- Activities inconsistent with the final product
- Inconsistencies in relation to work schedules or unusual work patterns
- Quantities of products, by-products or wastes inconsistent with the declared scope or scale of activities

Technologies

7. This domain includes the application of scientific knowledge for practical purposes, including processes. The following are examples of indicators that fall within this domain:

- Modification of known technologies
- Use of inappropriate or unusual process techniques
- Acquisition of new technologies without clear application to a declared purpose
- Unwarranted use of specific technologies

Equipment

8. This domain includes dual-use machines, devices or computer hardware used in an operation or activity. The following are examples of indicators that fall within this domain:

- Presence of special dual-use equipment (such as highly corrosion-resistant equipment)
- Presence of equipment inconsistent with the declared activities
- Absence of equipment required for the declared activities
- New equipment stored for a long time unused
- Dismantled equipment in good shape presented as “old and not working”
- Contradictory statements regarding use or working schedules of equipment
- Presence of health and safety systems and/or equipment for chemical and biological containment

Documents

9. This domain includes annual reports, logbooks and letters of instruction, personal notebooks, computer files and correspondence. Uncovering or obtaining this kind of information has in the past put pressure on Iraq to disclose more information. The following are examples of indicators that fall within this domain:

- Gaps in logbooks (production records, equipment, storage or quality control)
- Signs of destruction or relocation of documents immediately before the arrival of inspectors
- Working documents or drafts at variance with official statements or declarations
- Inability to demonstrate the commercial relevance of a civil programme
- Name of the facility and its subordinates used differently in different documents

Materials

10. This domain includes consumables or inputs for production processes such as raw materials, feed stock and intermediate industrial products used in production. The following are examples of indicators that fall within this domain:

- Presence of dual-use raw materials in quantities inconsistent with the end products or the purpose of the facility
- Presence of dual-use intermediates useful for weapons of mass destruction purposes that are not being converted into legitimate end products
- Acquisition or presence of decontamination materials not consistent with the profile of the facility

Weapons

11. This domain includes information on weapons systems, including aerial bombs, artillery projectiles, rockets and missiles, spraying devices and explosive devices that can be configured to disseminate weapons of mass destruction agents. The following are examples of indicators that fall within this domain:

- Presence of weaponization specialists at civilian industries
- Capabilities and examples of reverse engineering or modifications of imported munitions
- Presence of conventional munitions at incongruous non-military sites
- Special filling equipment or unusual internal coatings or design of munitions and/or weapons
- Unusual munitions design

Procurement

12. This domain includes contracts, bids, tenders, letters of credit and visits to foreign companies and the acquisition of promotional material from suppliers. The following are examples of indicators that fall within this domain:

- Procurement efforts for critical equipment (including black market and second-hand sources)
- Procurement requests from different facilities conducted by an intermediate facility or middleman
- Use of unusual transaction and financial arrangements (e.g. cash payments from embassies)
- Unwarranted or unusual specifications for dual-use equipment manufacture
- Undisclosed or incompletely declared procurement

Finance

13. This domain includes budget allocations, bank transfers and movements or transfers of capital or financial assets. The following are examples of indicators that fall within this domain:

- Signs of dual financing of the same activities
- Inability to demonstrate the commercial relevance or economic viability of the programme or activity
- Additional or unusual types of payment (special compensation for hazardous working conditions, and bonus payments to staff or gifts in kind)
- Expenditures that do not fit the stated reason and type of activity
- Unusual funding arrangements

Human resources

14. This domain includes information on persons who have been employed in or associated with a particular facility in a managerial, liaison, technical or support capacity. The following are examples of indicators that fall within this domain:

- Inconsistencies between the number of employees, their qualifications and the duties of the workforce and the declared activities of the facility
- Qualifications and background of the staff that do not match the declared activities
- Presence of active-duty military personnel in civilian facilities

Events

15. This domain includes a single happening or incidents (natural event, accident or occurrence) that may be associated with possible proscribed weapons activities. The following are examples of indicators that fall within this domain:

- Unusual outbreaks of infectious disease (unknown cause or unusual pattern)
- Unexplained toxic releases
- Patterns of efforts to deliberately destroy evidence
- Official statements by the country's leadership

Interrelationships between indicators

16. An individual indicator by itself may not be significant, but indicators from several domains taken together can be greater in value. The combination of indicators gathered over time may not prove to be conclusive, but they may constitute a picture or pattern that needs an explanation. Examples from the Commission's experience in Iraq show how the combination of several indicators can help to uncover undisclosed information or proscribed activities.

Chemical weapons

17. Early efforts to verify the chemical weapons declaration provided by Iraq to the United Nations in April 1991 soon showed that the declaration was far from complete. Inspectors obtained various indicators that Iraq had concealed important aspects of the chemical weapons programme, such as the extent of VX activities. The first indicators were the wastes containing VX degradation products found at the Muthanna site, Iraq's main chemical weapons research and production facility. The quantities of wastes found suggested that the research had been much more

extensive than declared. The second indicator was the presence of two dual-use chemicals, known to be capable of being used as VX precursors. A third indicator of intentional concealment of the programme was the unilateral destruction in 1991 of another dual-use chemical declared by Iraq in 1992.

18. The full significance of the presence of these three dual-use chemicals became fully apparent in 1995, when, after the discovery of additional documents and under pressure from inspectors, Iraq declared a much more advanced VX programme than before. Even that declaration remained only partly verified, however, owing to Iraq's unilateral destruction of the VX actually produced and gaps in the production records of the Muthanna site for 1990 and the beginning of 1991.

19. All the above indicators, although some of them were initially underestimated, contributed to a better understanding of Iraq's VX programme. Moreover, an investigation into pilot-scale production equipment acquired for chemical weapons purposes and kept hidden by Iraq until 1997 indicated its intention to preserve a chemical weapons production capability in contravention of its obligations under the provisions of the Security Council's resolutions.

Biological weapons

20. United Nations inspectors observed large quantities of bacterial growth media at Al Hakam, Iraq's main biological weapons agent production facility; this was not in itself conclusive evidence of a proscribed biological weapons programme. Later, bulk quantities of growth media were also observed in two warehouses. United Nations inspectors contacted the foreign companies involved in the supply of the media and found from export documents that even more media had been imported than Iraq had declared, which led to more intensive interviews of Iraqi personnel and repeated site inspections. Through the interview process and the procurement records as proof of delivery, it became difficult for Iraq to provide a coherent material balance for the media. In addition, United Nations inspectors had concerns about the Al Hakam facility because of its remote location, size and security arrangements.

21. With several indicators pointing to the need for further detailed investigation and with mounting pressure on Iraq for credible explanations, Iraq made an admission of a past proscribed biological warfare programme. Each indicator by itself was insufficient to develop a clear picture of events, but together these indicators proved more substantial.

Ballistic missiles

22. During the early period of United Nations inspections in Iraq, a number of admissions were eventually made by Iraq, based on cases built by inspectors using a combination of indicators. One example was Project 1728. Originally, Iraq had declared that the purpose of the project had been for the development of welding and other technologies for manufacturing agricultural pumps, but that there was also a group within Project 1728 charged with studying the possibility of manufacturing Scud engines by a process of reverse engineering.

23. Several indicators from the activities, human resources, procurement and equipment domains emerged, which when taken together strongly suggested that the production of liquid-propellant engines could have been the only purpose of Project

1728 and that it was more advanced than had been declared. Through an intense effort over a long period of time, the United Nations inspectors were able to identify more than 100 pieces of equipment that had not been destroyed during the Gulf War as claimed by Iraq and were shown to have been procured for and used in Project 1728. These included flow-forming machines, vacuum furnaces, special welding machines and a balancing machine. These machines, although not located within a single facility, collectively provided all the equipment necessary for the production of liquid-propellant engines. The United Nations inspectors' own conclusions about Project 1728, based on a number of interrelated indicators and subsequent investigations, were vindicated when Iraq finally acknowledged the truth in its declaration of November 1995, by admitting that Project 1728 had been established and operated specifically for the production of liquid-propellant missile engines, in particular for Scud missile engines.

Ongoing work on indicators

24. The use of indicators is being developed further by UNMOVIC as a valuable component of its inspection methodology. The emphasis is on identifying areas and types of data in a systematic way, including the use of computer-based tools.
