NODAL CONSULTANTS

Tour Paris-Lyon - 209-211 rue de Bercy, F-75585 Paris Cedex 12
Tél +33 (0) 1 40 02 75 57 - Fax +33 (0) 1 40 02 75 44
info@nodal.fr - http://www.nodal.fr

Etude EPMES

La prise en compte de la dimension environnementale dans les programmes d'armement

Executive summary

Bernard Bellot
Stanislas Noesperger
Serge Sidoroff
Jean-Baptiste Vaillant

January 20, 2003

Executive summary

Introduction

- The French Délégation Générale pour l'Armement (DGA) wishes to develop its environmental awareness as early as the design stage of defense systems.
- The place occupied by environment in the human activities represents major social, technical, economical and strategic stakes of growing importance.
- More especially for DGA and the defence industry, a global, environmentally-sound approach since the design stage of defense systems has many advantages :
  - a better fit with the constraints related to the end of « military exceptions », and the needs of inter-operable systems
  - for military forces, a reduction of the owning cost of the materials, or even sometimes a improvement in performance
  - a competitive advantage for manufacturers, especially to access new markets.
- The approach of Nodal Consultants for this study was based on:
  - a diagnosis of the level of environmental concerns by national stakeholders (including DGA)
  - the assessment of operations, needs and projects of industrial companies through a direct approach,
  - a benchmarking of international legislations and of their evolution,
  - the elaboration of a set of recommendations for DGA.

Diagnosis

- The level of environmental awareness in DGA's activity is recent and very low:
  - a lack of global approach, which can be explained by a lack of strategic will at the top level and the weight of inherited habits
  - a poorly-suited organisation (missing or insufficiently defined functions, responsibilities and procedures) and insufficient information (on existing standards, experts and tools)
  - the level of environmental awareness is higher for naval armaments (e.g. a directive elaborated by the Naval staff, the compliance with Marpol-related constraints).
- This environmental awareness is yet limited to:
  - few isolated actions, e.g. constitution of working groups, studies, ISO 14000 certification, participation in NATO works, a related convention with the Ministry of Environment and application of civil legislation to some military plants
  - the emergence of an organisational reshuffle within DGA, e.g. the creation of an environment department and a dedicated position at the Direction des Systèmes de Force et Prospective (DSP), the launching of specific tools (data bases)

- ❑ The environmental culture, corresponding organisation and tools are almost completely missing at DGA, and more specifically at the design stage:
  - a very parcelled account of environmental stakes, depending of the willingness of each program director, often based on personal initiatives
  - the lack of environmental performance goals and the attribution of relevant responsibilities to reach them
  - the weakness of tools and procedures:

- the lack of a chapter on environment in the design documents
- environmental functions poorly or not expressed as such
- missing or weak tools. for eco-design and for the analysis of life cycle global costs.

Commercial enterprises

- ❑ Commercial enterprises have taken the environment into account in their product design process at various stages for about ten years:
  - their motivation for eco-design is mainly driven by legislation or standards, through site management and materials use. These regulations and standards concerning civil equipments are progressively extended to military equipments.
  - more rarely, environmental awareness is viewed as a marketing argument or a competitive advantage
  - incentives from a partner, a subsidiary company, a mother company or a potential customer, e.g. Scandinavian, can be the starting point of a thorough eco-design approach
  - in some cases the improvement in the general performance level of a product may influence positively its environmental impact.
- ❑ The motivation of the firms determines its tools and internal organisation:
  - in the case of a mere legal or regulatory compliance, the scope and the impact of the environmental awareness are limited:

- the implemented means are limited to tools for identification of forbidden or restricted substances, especially for the late life cycle, and for optimising a single environmental constraint
- site and product environmental management systems are operating independently.
  - in the case of a voluntary approach, e.g. to get a competitive advantage (technical or commercial), the action is wider and generally coupled with the implementation of "disrupting" technologies or operations:

- a systematic approach of the environmental impacts throughout the whole life cycle, supported by specific and relevant tools (LCA and owning costs analysis, even if their assessment remains problematic)
- implementing ISO 14001 certification scheme to complement (through a feed-back from users and site managers) the eco-design effort made by designers.

Industrial partners of DGA

- A systematic co-operation and communication between civil and defense divisions of "dual" firms has strongly promoted the transfer of eco-design competence, especially:
  - in electronics, where DGA has most often replaced military specifications by civil ones
  - in aerospace, where environmental awareness is linked to a global corporate-level strategic decision applicable widely within the firm.
- However the transfer of competences from civil to military sectors of "dual" firms faces several problems:
  - the obsolescence of long-lifetime military systems, which require a re-design work, e.g. on electronic cards, during overhauls or retrofits
  - requirements of the confidentiality for some military topics, where civilian eco-design experts cannot intervene a priori
  - the scale of series, often much more important in civil activities than in defense.
- The “purely” defense firms, or the ones without many communication between their civil and defense departments, are generally less advanced regarding their eco-design practice than civil companies, i.e.:
  - environmental awareness is limited to a strict respect of constraints
  - standards and legislation evolutions are not anticipated
  - few or no LCA or cost assessment tools are implemented.

Economical stakes

- Initial environmental additional costs regarding DGA or defense firms which may occur during the whole life cycle of systems lead generally to more important financial savings and an increased productivity of equipment.
- Higher acquisition costs from an additional R&T effort or a re-design of manufacturing process may lead to scale savings through for instance the elaboration of export versions for environment-sensitive countries (especially in Scandinavia).
- If the system is eco-designed, environment-related owning costs generally affect positively its operating costs:
  - fuel saving during the active period (up to 40 %)
  - value improvement of real estate by limiting pollution and/or re-use of releases on military sites (e.g. proving grounds)
  - reduced end of life deposit or recycling costs (0.5 to 2 % of the total system owning cost).

International institutional approaches

- The national translation of European Commission environmental directives represents more than half of French legal laws on environment. At least 24 among them, which went are enforced or still under discussion, may impact on the design of defense systems, as far as "defense exceptions" become scarcer and concern rather an implementation delay.
- After discussions between member States, NATO sets up application standards for technologies or methodologies. A Stanag dealing with general aspects of environmental management should be completed in 2003 by an eco-design oriented Stanag.

National approaches

- USA, Switzerland and Sweden are the most advanced western countries on environment issues in defense.
- The US Department of Defence (DoD) is deeply involved in environmental awareness during the design and deployment phases of defense systems:
  - a specialised Under-Secretary is dealing with DoD environmental affairs and sets up the general goals to be reached,
  - each program director has environmental tasks to carry out and the environmental impact of a system is considered as a performance criterion,
  - the DoD decided to adopt environmental constraints identical with civil ones,
  - a methodology for eco-design and systematic environmental impact assessment has been implemented.
- For the 2000-2003 period, the Canadian Department of Defence is formalising the implementation of environmental account in the design of defense systems and, as the DoD, requires environmental performance for new defense systems.
- The Swedish Department of Defence applies an environmental awareness policy as advanced as the DoD.
- The German Department of Defence has created a specific institute devoted to the environmental impacts of materials and uses LCA tools, but limits its approach to a strict respect of legal constraints.
- At the same time as it started to implement an ISO 14000 certification scheme, the Swiss Department of Defence started an eco-design approach where the environmental impacts of each of its activities is systematically assessed.

Key factors of success and recommendations

- **Upstream key factors of success** : the strategic orientations of DGA, and especially the involvement of its top management in the introduction of environmental awareness into its programs. Corresponding actions are:
  - the implementation of a voluntary and global approach registered as a strategic orientation of DGA and supported by the Ministry of Defense,

- the progressive globalisation in the environmental approach of DGA and its transition toward ISO 14001 and ISO 14062 standards for eco-design,
- the introduction of environmental awareness into R&T programs, especially through a higher involvement into "dual" approaches to identify disrupting technologies and develop upstream "clean" technologies.

❑ **A second level of key factors of success: the evolution of DGA culture, methods and environmental organisation,** allowing effective strategic decisions to be made concerning the introduction of environmental account into defense programs. The corresponding actions to be taken by DGA are:

- to adapt its organisation and procedures:

- definition of responsibilities (in programs and functional directions) and environmental performance goals of equipment
- design procedures integrating the systematic functional account of these environmental performances into specification lists

- to develop and implement environmentally-sound tools and resources:

- eco-design tools, environmental grids and LCA tools compatible with those of DGA industrial partners,
- legal means of studying and limiting environmental risks related to defense systems.

- to facilitate the evolution of the culture and competences of designers and program directors through consciousness-raising, communication and training actions for:

- directors and managers
- operational personnel.

❑ **Operational factors of success,** to integrate civil inputs through a reinforcement of partnership and international co-operations of DGA:

- integration of civil products and competences, already strongly submitted to environmental standards and directives:

- whenever possible, a priority to civil specifications and to the integration of civil already eco-designed products,
- introduction of an environmental chapter into DGA calls for tenders,
- reinforcement of "dual technologies" approach for a better environmental awareness, especially in collaboration with representative partners such as Gifas,

- reinforcement of the direct involvement of DGA with its industrial partners in eco-design during defense programs, e.g. through:

- the launching of "Plans d'Etudes Amont" specific to environment and related technologies,
- the capitalisation of feedback from users to managers of military and industrial sites, e.g. during the ISO14001 certification of military sites,

- the incitement of defense companies to sign an environment chart e.g. similar to the European PVC manufacturers chart,
    - a voluntary approach to develop eco-design with international partners will allow DGA to draw benefit of the experience of its homologues and the more advanced defense firms:
- American and European homologues, following actions already initiated by DSP,
- supranational institutions (OMI and NATO), including especially the designation of DGA observers of international eco-certification approaches,
- participation in international R&D programmes such as Eurofinder or Euclide.

Priority actions

- Priority actions for DGA have been established by integrating three main criteria:
    - number and importance of DGA partners involved in these actions,
    - implementation feasibility,
    - progress of DGA within concerned domains.
- According to these criteria, five corresponding domains have been identified by Nodal to promote the introduction of environmental awareness into defense programs:
    - a political involvement of environmental awareness from DGA and its tutelary Ministry,
    - a progressive globalisation of its environmental approach,
    - the development of specific eco-design tools,
    - the evolution of DGA designers practices,
    - a stronger involvement of DGA in international collaborations and eco-design programs.