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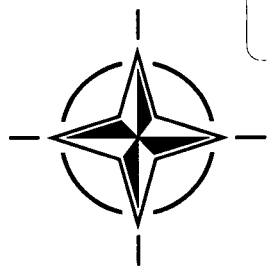
ADVISORY GROUP FOR AEROSPACE RESEARCH & DEVELOPMENT
7 RUE ANCELLE, 92200 NEUILLY-SUR-SEINE, FRANCE

AGARD ADVISORY REPORT 366

An International Aerospace Information Network - IAIN


Final Report of the AGARD Technical Information Committee Working Group No. 2.

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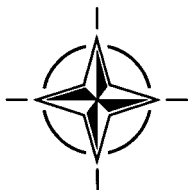
AGARD ADVISORY REPORT 366

An International Aerospace Information Network - IAIN

edited by

Walter Blados (US)

Final Report of the AGARD Technical Information Committee Working Group No. 2.



North Atlantic Treaty Organization
Organisation du Traité de l'Atlantique Nord

The Mission of AGARD*

According to its Charter, the mission of AGARD is to bring together the leading personalities of the NATO nations in the fields of science and technology relating to aerospace for the following purposes:

- Recommending effective ways for the member nations to use their research and development capabilities for the common benefit of the NATO community;
- Providing scientific and technical advice and assistance to the Military Committee in the field of aerospace research and development (with particular regard to its military application);
- Continuously stimulating advances in the aerospace sciences relevant to strengthening the common defence posture;
- Improving the co-operation among member nations in aerospace research and development;
- Exchange of scientific and technical information;
- Providing assistance to member nations for the purpose of increasing their scientific and technical potential;
- Rendering scientific and technical assistance, as requested, to other NATO bodies and to member nations in connection with research and development problems in the aerospace field.

The highest authority within AGARD is the National Delegates Board consisting of officially appointed senior representatives from each member nation. The mission of AGARD is carried out through the Panels which are composed of experts appointed by the National Delegates, the Consultant and Exchange Programme and the Aerospace Applications Studies Programme. The results of AGARD work are reported to the member nations and the NATO Authorities through the AGARD series of publications of which this is one.

Participation in AGARD activities is by invitation only and is normally limited to citizens of the NATO nations.

* AGARD merged with the Defence Research Group of NATO (DRG) on 1 January 1998 to form the Research and Technology Organization (RTO) of NATO. However, both AGARD and DRG will continue to issue publications under their own names in respect of work performed in 1997.

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An International Aerospace Information Network - IAIN

(AGARD AR-366)

Executive Summary

In the Spring of 1995, the Technical Information Committee (TIC) of the NATO Advisory Group for Aerospace Research and Development (AGARD) set up a Working Group to examine the issues, strategies, and actions required to develop and establish an International Aerospace Information Network (IAIN). The intention was to develop a mechanism for improving the access to, and use of, aerospace and aerospace-related information, by developing a self-sustaining, worldwide, network of partner organizations committed to sharing their data and information resources.

After exploring a number of options, and evaluating the many existing models of international cooperative databases, the Working Group decided that the Internet would be the most suitable vehicle to provide such a mechanism, and developed a prototype IAIN Homepage to be used as a Proof of Concept. In this prototype Homepage, several connections have been made to information sources as a demonstration of the concept and the capability that would be inherent in the final stage. Essentially, this is intended to be a limited version of the finished network. The prototype Homepage was inaugurated in April 1997 and now provides a limited catalog of aerospace information sources from which information searches can be launched. These sources will be expanded as new sources are identified.

In the short term, it is expected that the Homepage will continue to be based on a loose formation of interested organizations. However, it is hoped that an international organization will later endorse and support the concept, and that eventually a more formal endorsement, commitment, and participation by nations will be forthcoming.

The success of this concept will be determined primarily on its ability to deliver the desired data and information and needed services to the user. It should include:

- the ability to search for aerospace and aerospace-related data and information across heterogeneous systems
- aerospace and aerospace-related data directory information
- the facility to order data products through a simplified "one-stop shopping" procedure
- the delivery of data to users on a variety of standard media, including electronic delivery where appropriate.

Vers un réseau international d'informations aérospatiales

(AGARD AR-366)

Synthèse

Au printemps de l'année 1995, le Comité d'information technique de l'AGARD, le TIC, a créé un Groupe de travail ayant pour mandat d'examiner les enjeux, les orientations et les démarches qui permettraient de développer et de mettre en oeuvre un réseau international d'informations aérospatiales (IAIN). Le groupe s'est donné pour objectif de développer un mécanisme pour faciliter l'accès aux informations aérospatiales par le biais d'un réseau mondial autonome d'organisations partenaires, chargées de mettre en commun leurs données et leurs sources d'informations.

Après avoir examiné un certain nombre d'options et évalué les différents types de bases de données coopératives existant au niveau international, le Groupe de travail a choisi Internet comme mécanisme le plus approprié et a développé un prototype de page d'accueil IAIN, destiné à servir de "preuve de concept". Dans ce prototype, plusieurs liens avec des sources d'information sont établis, afin de permettre une démonstration du concept et de ses possibilités intrinsèques dans la phase finale. En substance, cette page d'accueil est une version abrégée du réseau définitif. Elle a été inaugurée au mois d'avril 1997, et elle offre désormais un catalogue restreint de sources d'informations aérospatiales, qui permet de lancer des recherches. Ce catalogue sera augmenté au fur et à mesure de l'identification de nouvelles sources d'informations.

Selon toute probabilité, à court terme, la page d'accueil continuera d'être basée sur un groupement libre d'organisations qui ont manifesté un intérêt. Cependant, il serait souhaitable que par la suite, le concept soit agréé et soutenu par une organisation internationale, et qu'à terme, les différents pays membres de l'OTAN lui accordent une approbation, une adhésion et une participation plus officielles.

La réussite de ce projet dépendra essentiellement de sa capacité à fournir à l'utilisateur les informations et les services demandés. Il doit inclure :

- la possibilité de rechercher des données et des informations aérospatiales dans des systèmes hétérogènes
- des informations aérospatiales et des données du même ordre contenues dans des répertoires de données
- la possibilité de commander des produits informatiques selon un procédure "supermarché" simplifiée
- la fourniture de données à l'utilisateur sur divers supports standard, y compris par transmission électronique, le cas échéant.

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Preface

This report contains the genesis, deliberations, conclusions, and recommendations of the AGARD Technical Information Committee Working Group established to examine the issues, strategies, and actions required to develop and establish a means to facilitate access to, and use of global aerospace and aerospace-related information.

This report was compiled and prepared by Mr. Walter R. Blados, Uucom, Inc., and reviewed by the following Working Group members:

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AGARD Headquarters, Paris

This report reflects the views of the vast majority of the Working Group members, but not necessarily those of their parent organizations. Decisions reached by the Working Group members are not binding on any organization.

Information included in the International Aerospace Information Network comprises that which is available through commercial sources or Internet, and any additional information an organization chooses to provide.

The documents referred to in the text may be obtained from the Headquarters of NATO's Research and Technology Agency:

RTA/TIC
7 rue Ancelle
92200 Neuilly-sur-Seine
France

Chapter 1: INTRODUCTION

The aerospace industry is unique. In many countries it leads all other industries in expenditures for research and development (R&D); it benefits heavily as a technological borrower from developments in other industries such as metallurgy, materials, chemicals, and petroleum; it is characterized by a high degree of systemic complexity embodied in its products; and in many countries, it is the beneficiary of federally funded R&D.

Worldwide, the aerospace industry is experiencing significant changes. Increasing cooperation and collaboration among nations has resulted in a more international research, development, and manufacturing environment, altering the current environment of domestic and foreign aerospace industries. International alliances have resulted in a more rapid diffusion of technology, increasing pressure on aerospace organizations to push forward with new technological developments and to take steps designed to maximize their inclusion into the R&D process.

The conduct of aerospace R&D requires massive quantities of highly diverse data and information. The primary sources of aerospace and aerospace-related information are derived primarily from national programs and efforts; to a much smaller extent, they are derived from international programs.

The ability of aerospace engineers and scientists to identify, acquire, and utilize scientific and technical information related to aerospace and aerospace related activities, is of paramount importance to the efficiency of the R&D process. The role of scientific and technical communication is thus central to the success of the innovation process in general, and the management of R&D activities in particular. There is a vast and rapidly growing amount of data and information concerning aerospace; recent evolution of electronic networks promises to provide us with a means to access and use these massive volumes of data more effectively. IAIN WD-01, Scope and Coverage of Aerospace Information, provides a listing of criteria for identifying information sources to ensure comprehensive subject coverage.

Considering the advances that have been made in information technology, the increased international participation in the aerospace field, and the realities of scarce resources for every nation, the strategies for international cooperation and resource sharing became readily apparent.

In 1992, the AGARD Technical Information Committee (TIC) proposed developing and establishing an International Aerospace Information Network (IAIN). There are several international cooperative centralized databases in other subject areas such as agriculture and nuclear energy, which provide a single source of information. A similar approach in the aerospace field would reduce input costs for all participants, and would enable information searches to be comprehensive from a single source, instead of requiring searches in several different databases, even if the requester had access to them all - which is generally not the case.

A working group to pursue the investigation of developing and establishing the IAIN was approved by the AGARD National Delegates Board in Spring 1993. This working group was to be sponsored by the TIC.

In preparation for the establishment of the Working Group, TIC sponsored a workshop in April 1994, entitled Development and Operations of Cooperative International Databases and Information Systems. Speakers from various organizations involved in sponsoring or operating international cooperative databases described the organization and operation of their databases, and included such specifics as sponsorship of the database; scope and coverage of the database; number of nations participating; description of the content of each record; how input is accomplished by the participating nations; how receipt of all relevant information is obtained from participating nations; the language requirements; how access to the database is provided; how document delivery is accomplished; use of a thesaurus; description of the role of the user; description of the role of the database producer or host; the pitfalls in developing and operating the database; and the budgeting/cost recovery mechanism.

A summary of this workshop is contained in IAIN BR-03, Development and Operations of Cooperative International Databases and Information Systems. A collection of the papers given at it is also available from AGARD.

Chapter 2: FORMATION OF THE IAIN WORKING GROUP

During its October 1994 business meeting, the Technical Information Committee finalized the plans for the formation and organizations of the Working Group.

GLADYS COTTER was elected as Chairman, and PAUL RYAN as Deputy Chairman by the Technical Information Committee.

The following individuals volunteered to participate in the Working Group:

- Walter R. Blados (Ucom Inc., United States)
- Anna Maria R. Correia (INETI, Portugal)
- Axel S.T. Tan (NLR, Netherlands)
- Chris J. Bigger (GEC Marconi, UK)
- Eduard T.H. Lapeysen (NCWTD, Belgium)
- Fernando Merida (INTA, Spain)
- John Blagden (University Of Cranfield, UK)
- Kurt Buerk (INIS, Austria)

The first meeting of the Working Group was held in Athens, Greece in May, 1995. At that time it was known as the International Aerospace Database Working Group, but during the first meeting, the Group decided to pursue a 'network' approach and so agreed to rename themselves the International Aerospace Information Network Working Group (IAIN). For convenience, this name is used hereafter. At the first meeting, the Working Group adopted the following Terms of Reference:

During the first meeting, the Working Group adopted the following Terms of Reference:

- The ability of aerospace engineers and scientists to identify, acquire, and utilize scientific and technical information related to aerospace and aerospace-related activities, is of paramount importance to the efficiency of the R&D process. There is a vast and rapidly growing amount of data and information concerning aerospace; recent evolution of electronic networks promises to provide us with a means to access and use these massive volumes of data more effectively.
- The International Aerospace Information Network (IAIN) is premised on the need to identify major collections of data relevant to aerospace R&D; to provide mechanisms to access these data and information resources; and to create a vehicle to stimulate the integration and access of multidisciplinary data related to aerospace R&D. The long-term goal of developing an IAIN is to achieve a self-sustaining worldwide network of partner

organizations committed to sharing their data and information resources.

- The mission of the IAIN is to facilitate access to, use, and understanding of aerospace and aerospace-related information worldwide. The IAIN will develop a prototype organizational and technical infrastructure that will serve the aerospace research scientists and engineers and the broader community of policy analysts, resource managers, educators, and to some extent, the general public.

In essence, the goal of the IAIN was to establish a prototype operational framework that would allow user communities to share data and information electronically among major international data archives and resource centers. It would serve a diverse set of users who are geographically separated and require access to disparate data and information. These resources would be made globally accessible through a system of computer and human networks.

The long-term goal of developing an IAIN was to achieve a self-sustaining worldwide network of partner organizations committed to sharing their data and information resources and/or identifying relevant resources.

The Working Group was tasked to examine the issues, strategies, and actions required to develop and establish an IAIN. The Working Group was to examine the models of existing cooperative international databases, make recommendations on the organizational structure, resolve issues, develop strategies, and identify actions necessary to establish as comprehensive and complete a database as possible.

There were many aspects that had to be investigated and resolved before cost estimates, scope of work and duration of the effort could be made. For example, a model upon which the IAIN would be built had to be determined, along with a determination of which nations would participate, extent of interactive communication facilities, etc. Only after such issues were determined, could the Working Group begin to estimate the costs, scope, and duration of the effort.

Documents IAIN WD-02, Draft Implementation Plan for Establishing and Developing the International Aerospace Information Network, and IAIN WD-05, IAIN Concept and Proposal, provide further details, including the Terms of Reference for the Working Group.

Chapter 3: REQUIREMENTS FOR THE DEVELOPMENT OF THE IAIN

The IAIN, as conceived by the IAIN Working Group, would utilize a combination of individual international organizational assets and a share infrastructure.

A. GUIDELINES

Fundamental to the overall program plan are several statements of principle. The overall purpose of these policy statements is to facilitate full and open access to quality data for aerospace and aerospace-related research, and a shared infrastructure.

1. The establishment of an IAIN requires an early and continuing commitment to the establishment, maintenance, validation, description, accessibility, and distribution of high-quality, long-term data.
2. Full and open sharing of the aerospace and aerospace-related data is a fundamental objective.
3. Preservation of all data needed for long-term aerospace and aerospace-related research is required.
4. Data archives must include easily accessible information about the data holdings, including quality assessments, supporting ancillary information, and guidance and aids for locating and obtaining the data.
5. National and international standards should be used to the greatest extent possible for media and for processing and communicating aerospace and aerospace-related data and information.
6. Data and information should be provided at the lowest possible cost to aerospace and aerospace-related researchers in the interest of full and open access to data. This cost should be no more than the marginal cost of filling a specific user request. Organizations should act to streamline administrative arrangements for exchanging data and information among researchers.
7. It is not the intent that data or information that is not available for proprietary or security reasons be made available through this network. When proprietary or security issues no longer pertain to the data or information, it should be made openly available as soon as possible.

B. REQUIREMENTS

A set of four high-level requirements were identified to guide the implementation of the IAIN. For the IAIN to be effective, it must accomplish the following:

1. Provide full and open access to data and information for all aerospace and aerospace-related researchers. Full and open access is necessary to support research in all of the aerospace and aerospace-related science elements, including as a basic tenet the delivery of data to all researchers at the lowest effective cost.
2. Identify, collect, and generate high-quality, long-term data and information. This includes establishment of processes to identify needed numeric, factual, and bibliographic information.
3. Preserve and archive aerospace and aerospace-related data. This includes agreement on responsibilities for archiving data and information relating to aerospace and aerospace-related parameters, and agreement on basic archive functions to ensure preservation of data.
4. Provide an open architecture that employs accepted standards. An open architecture utilizing standards allows the system to be both evolutionary and flexible to ensure effective use of existing capabilities, to take advantage of changing technologies, and to adapt to changing needs. It must also be interoperable to provide wide user access to aerospace resources, and it must be responsive to both user needs and to changes in scientific understanding.

C. SPECIFIC ACTIVITIES

The following activities were identified as necessary for the development and establishment of the IAIN.

1. Identify significant data and information resources that will be potentially available for aerospace and aerospace-related use.
2. Develop a model upon which to base the collection and exchange or access to international aerospace information.

3. Identify existing mechanisms that could be used to access aerospace data and information resources.
4. Provide a framework for the coordination of efforts and improvement of communication among national and international organizations that require access to aerospace data and information.
5. Develop a comprehensive list of issues that must be addressed.
6. Prepare a final report to include the results, recommendations, and the necessary follow-up actions to make the IAIN a reality.

Chapter 4: USER SERVICES AND FEATURES

The primary users of the IAIN will be the members of the aerospace community. These users include administrators, program managers, scientists and engineers concerned with aerospace R&D, educators and students, as well as users and audiences which may or may not be part of the R&D infrastructure or the academic milieu. Users will include not only individuals at the bench level, but in the managers office, at the corporate level, at the business level, and in the political arena.

The success of the IAIN will be determined primarily on its ability to deliver the desired data and information and needed services to the user. A summary of the principal user services and features to be implemented :

- The ability to search for aerospace and aerospace-related data and information across heterogeneous systems and to order data products through a simplified "one-stop shopping" procedure.
- Aerospace and aerospace-related data directory information, employing a common user interface.
- Guide information about data to assist the researcher in assessing data availability and suitability.
- Summary, reduced-resolution browse products and full-resolution data products in standard formats.
- Delivery of data to users on a variety of standard media, including electronic delivery for moderately sized products.
- International interorganizational user referral service.
- Agreement to standard methods for describing and documenting data.

Chapter 5: COMMITMENT BY ORGANIZATIONS PARTICIPATING IN THE IAIN

The IAIN program plan provides a framework for sharing data and information resources among international organizations willing to participate. Organizations participating in the initial development (see page 6) of IAIN made a commitment to:

1. Cooperate in the sharing and exchange of aerospace and aerospace-related data and information for mutual benefit.
2. Gather, manage, and share information on aerospace and aerospace-related data and information in a manner that conforms to IAIN strategy and plans.
3. Develop and maintain tools that help users to locate aerospace and aerospace-related data and information, including a comprehensive directory of data and information that describes salient features of key aerospace and aerospace-related holdings, and a catalog and networking infrastructure that makes it as easy as possible to access and acquire these data and information products.
4. Build upon existing digital and non digital data information resources to improve the access to high-quality aerospace and aerospace-related data and information by integrating appropriate activities of data centers, archives, libraries, and other information disseminating organizations, and by providing products in appropriate media, depending on the particular users need.
5. Use appropriate national, international, and de facto standards to the greatest possible extent to facilitate the archiving and exchange of data and information, to describe the quality of data and information, to improve the compatibility of media as they change over time, to access the data and information by networking, to develop accurate documentation, and to help with the consistency of data and information products and procedures across agencies and organizations.
6. Provide adequate resources, both fiscal and human, for accomplishing the strategies and plans of the IAIN.
7. Maintain contacts with the users, and with national and international organizations involved in key components of the IAIN program, such as networks, standards, and libraries.

Chapter 6: SUMMARY OF DISCUSSIONS

There were five Working Group meetings: Spring and Fall 1995, Spring and Fall, 1996, and the final meeting in Spring 1997. The deliberations during these meetings centered on basic concepts for developing and establishing an IAIN; namely, models, sponsorship, operations of the network, Homepage development, and integrity and quality of information identified. Details of the meetings are contained in IAIN SR-01 through IAIN SR-05.

A. MODELS

In discussing the models upon which to build the IAIN, it was agreed that we must look at the existing technology, as well as the technologies that are in development, to ensure that we can provide the best information support and services commensurate with the demand of the user.

The focus of the IAIN must be on the availability of databases, and on-line access to them. Furthermore, we must relate the IAIN to the customer (professional societies, government agencies, etc.); devise a matrix of producers/users, and then aim for the highest level for acceptance.

The IAIN was to be an amalgamation of existing databases which all have user inputs when developed. And, we must integrate traditional

systems into the technology as it develops; on the other hand, we must ensure the existence of traditional sources for the foreseeable future.

Some Working Group members believed that the best way to develop the IAIN was to improve the existing NASA/ESA database content and working agreements. They stated that since the main source of aerospace information is provided through the NASA and ESA assets, it was logical that the NASA/ESA relationship should be enhanced. This approach was problematic as NASA might not be in a position to focus on that effort.

Other members believed that a Homepage/Internet approach, targeting key sources of information, was the most useful way ahead. In order to reach additional sources of aerospace information which do not contribute to the NASA/ESA databases, an Internet-based system would be required. To this end, an IAIN Homepage would have to be developed which will allow linking sources of non-NASA/ESA assets. The Homepage would also allow entry into NASA/ESA assets.

A hybrid model encompassing both approaches was developed. The first model, based on using the improved existent NASA/ESA database is as follows:

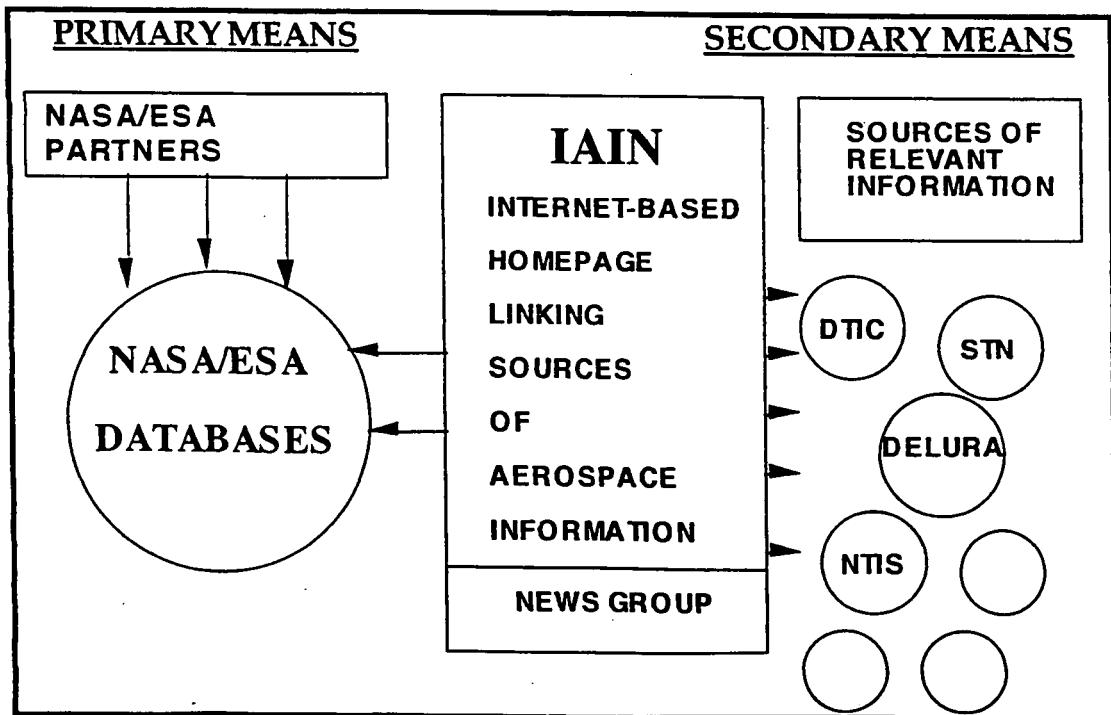


FIGURE 1. MODEL BASED ON NASA/ESA ENHANCED ASSETS

ESA agreed to the reinforcement of the NASA/ESA resources, stating that the ESA Homepage was in the top 5 of the European homepages being accessed.

The following remarks were made concerning the NASA commitment to support the IAIN:

NASA will continue to maintain its database. The NASA Scientific and Technical Information (STI) Program was still undergoing a program review, looking at electronic means versus paper. Initially, the focus within the NASA STI Program was on domestic issues; however, the international aspects are now being reviewed.

The NASA/ESA relationship remains a primary component of NASA international STI exchange and NASA expects it will continue to grow and improve. NASA also wishes to increase its international acquisitions in general.

NASA is conducting a user-based study on the future scope, coverage, and operation of the NASA

database. NASA anticipates that the scope and coverage of the NASA database will grow and expand. The user-based study will help determine what the users want; among the added options may be air transport information, civil aviation information, design drawings, and theses.

ESA spoke about the acquisition of aerospace literature in Europe. ESA has encouraged the nations to establish National Aerospace Centers (NAC) to be responsible for obtaining aerospace and aerospace-related information within their respective countries, and making it available to the European Aerospace Database; unpublished literature was most sought for, as well as limited circulation internal literature. The EAD is the marketing tool, and will be the channel for the IAIN. The costs for this concept is borne by the members.

The final conclusion of the Working Group was to pursue a Homepage- on- Internet approach, targeting key sources of information.

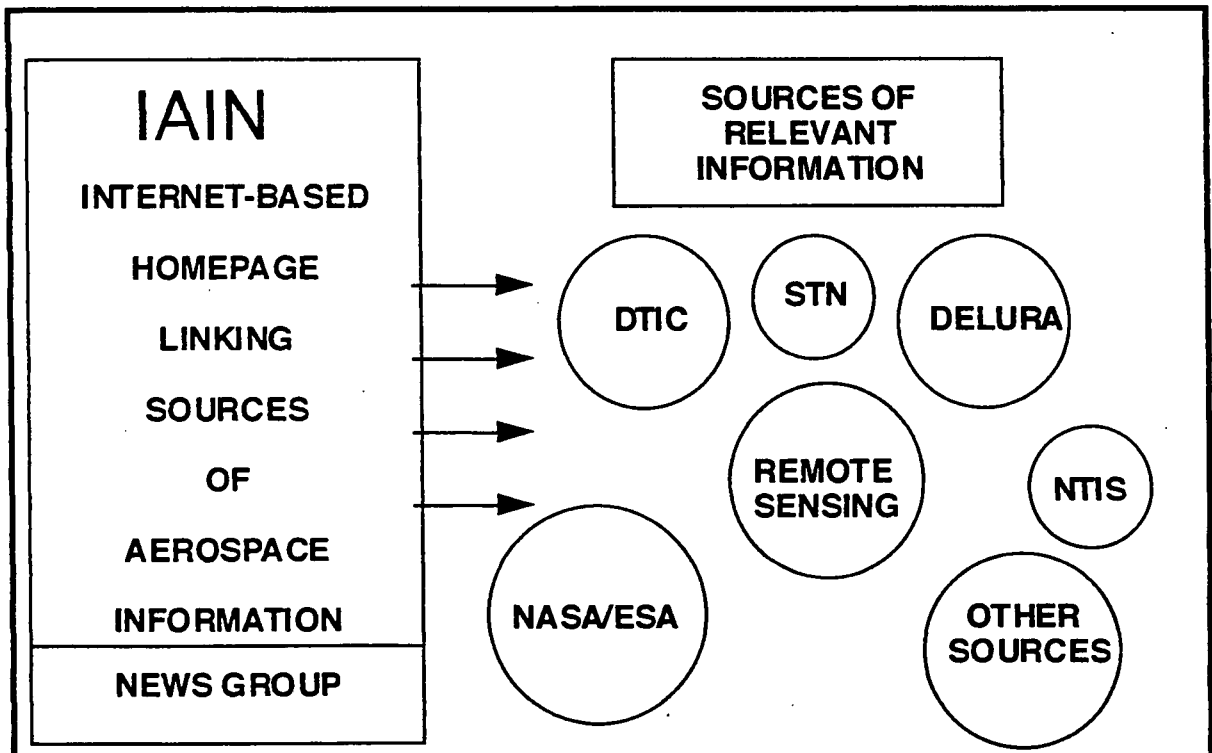


FIGURE 2. FIRST MODEL BASED ON HOMEPAGE-ON-INTERNET APPROACH

It was felt that the Homepage-on-Internet approach would be able to reach additional sources of aerospace information which do not contribute to the NASA/ESA databases. To this end, the Working Group agreed to develop an IAIN

Homepage which will allow linking sources of non-NASA/ESA assets, as well as allowing entry into NASA/ESA assets. The final model adopted by the Working Group is as follows:

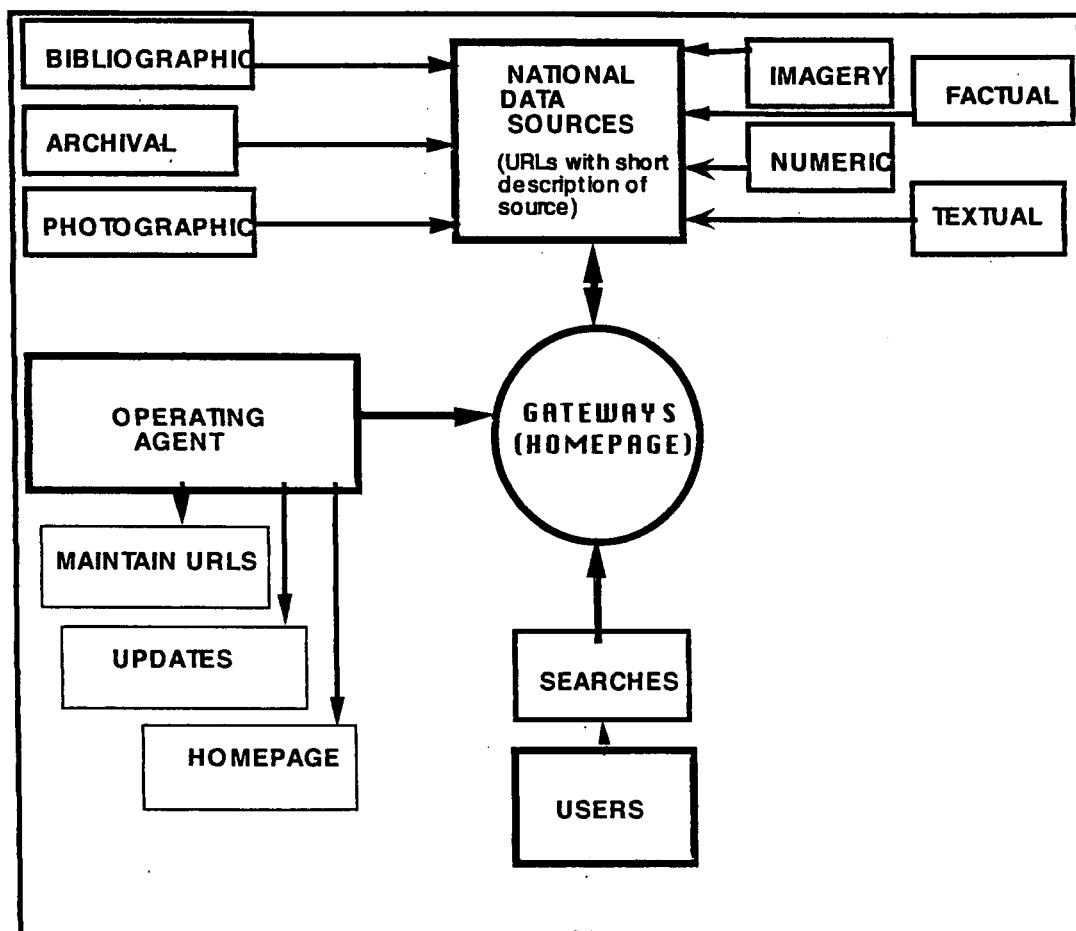


FIGURE 3. FINAL MODEL BASED ON HOMEPAGE-ON-INTERNET

B. ADMINISTRATION AND OPERATION OF THE IAIN

1. SPONSORSHIP

Sponsorship of the IAIN was another important item of discussion during the Working Group deliberations. A sponsoring agent is usually an international organization. For example, ESA and ETDE are considered sponsoring agents for aerospace and energy information exchange respectively, and are responsible for signing members and maintaining agreements.

It was agreed that there must be a long term commitment and appropriate staffing for supporting the IAIN. Questions must be resolved

such as "What is the minimum level of effort?" The sponsor should have an input into the efforts of the Working Group.

Initially, the Working Group considered using an identified international organization as a Sponsoring Agent who would coordinate the efforts of participating nations, organizations and agencies to provide oversight of the IAIN, develop policies and procedures for participation and use of the IAIN, and develop policies and procedures to encourage researchers to make their data and information available through the IAIN.

The WG Members suggested that perhaps the United Nations could play a vital role in assuming sponsorship, especially in view of the fact that the task was to provide a truly international aerospace

database. One suggestion was to investigate and discuss such a proposal with the United Nations Office of Outer Space Affairs (UNOOSA) organization within the UN, located in Vienna, Austria, even though this entity was currently involved mostly in legal issues.

Petr Lala explained the role of the UNOOSA. UNOOSA has the dual role of servicing the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) and assisting developing countries in using space technology for their development. Since 1959, the COPUOS prepared five international Treaties and five sets of Principles where were subsequently adopted by the UN General Assembly. Their main purpose is to preserve the outer space for peaceful uses and to promote international cooperation in this direction. The UNOOSA follows scientific and technical developments relating to space technology and applications in order to provide technical information and advice to UN Member States, international organizations and other UN offices. To this end, it conducts seminars and workshops on how to use space technology, and provides a limited information service.

As far as sponsoring the IAIN, the Office would have serious problems with sponsoring an activity organized by a small group of industrialized countries, and it also does not have any mandate to deal with the aerospace (air transport) and military aspects of the IAIN interests.

After determining that the IAIN would not be limited to NATO nations only, but would include all nations, worldwide, with an aerospace presence, the suggestion was again discussed with UNOOSA. Due to lack of funds, the UNOOSA declined the request.

DTIC and ESA were also considered to be viable organizations to assume the sponsorship role. The International Civil Aviation Organization (ICAO) and the International Air Transport Agency (IATA) were two international organizations that have an aerospace interest, and might be considered for sponsorship of the IAIN.

In response to whether DTIC could assume the sponsorship of the IAIN, Paul Ryan stated that no formal conclusion had been reached. The issue was discussed within DTIC and has not been rejected in kind. DTIC sponsorship would depend on what is required and approval of the Department of Defense. However, as a member of the Working Group, DTIC assumed the responsibility of developing and maintaining the IAIN Homepage for the foreseeable future.

Since all organizations that were approached were reluctant to accept sponsorship due to lack of funding sources, the Working Group deliberated whether to try to obtain sponsorship of the IAIN by industry or academia. The consensus was that these recommendations should be made in the final report, and we should not lose sight of the fact that this could be a viable solution.

In the meantime, in order to keep the concept and development of the IAIN alive, it was agreed that the lowest cost option would be pursued; namely, that we must identify cooperative volunteers to identify and link national key aerospace information sources. It was agreed that in seeking cooperative volunteers, the Working Group would ask nations/organizations to make a commitment of appointing a point of contact to identify and evaluate Uniform Resource Locator addresses in their nations, provide a short, one to four sentence description of the URL so identified, and agree to communicate electronically, with optional meetings as an informal group when deemed necessary by the membership. However, electronic communications would be used to the greatest extent possible between meetings. This commitment also includes the responsibility of reviewing and verifying their country's information sources included in the IAIN Homepage.

Hence, in the short term, IAIN will continue to be based on a loose formation of interested organizations; in the near term, IAIN will look to an international organization to obtain an endorsement and support of the concept. In the long term IAIN will consider obtaining a more formal endorsement, commitment, and participation by nations.

2. OPERATING AGENT

In addition to a sponsoring agent, the IAIN will require an operating agent to operate the network under the cognizance of the sponsoring agent

The operating agent will maintain the central Homepage and provide a pointer system to identified information sources, and will sponsor meetings of contributors. In short, the operating agent will coordinate the operations and content of the Homepage, and will make changes as they occur.

Since DTIC had already developed a prototype, proof-of-concept, Homepage for the IAIN, they agreed to fill the role of operating agent for the first year of operation after the end of the life of the Working Group. This would give the aerospace community a chance to see whether or not it would be a valuable service.

3. ADVISORY GROUP

Both ESA and ETDE have advisory groups which govern who has access to the databases, cost policies, etc.

It was agreed that an advisory/policy group for the IAIN should be determined at a later date, after a sponsor for the IAIN has been found, and more formal procedures have been established.

Documents defining the policy, role, and responsibilities of a sponsoring agent, operating agent, and an advisory group were drafted, and are included in the implementation plan.

A suggestion was made that perhaps the IAIN could become a commercial venture; it was felt that the potential marketplace would not be able to support a commercial venture. Another possibility would be a not-for-profit organization to sponsor and maintain the IAIN. These options could be reviewed at a later date.

C. DEVELOPMENT OF THE IAIN HOMEPAGE

Concerning the construction of an IAIN Homepage, it was agreed that a Proof of Concept approach would be important, and results would be included in the Working Group final report. It was agreed that in the prototype IAIN Homepage several connections would be made to information sources as a demonstration of the concept and capability that would be inherent in the final stage. Essentially, this would be a limited prototype of the finished network. Feedback from viewers would be essential for an assessment and willingness of users to embrace and support the final IAIN concept. Working Group members were requested to identify information sources that would volunteer be included in the prototype.

In the IAIN prototype Homepage, sources of information would include pointers to the following categories and subcategories:

INFORMATION REPOSITORIES AND DATABASES

- **AEROSPACE DATABASES** - repositories of textual aerospace and aerospace-related information
- **AEROSPACE DATA SETS** - repositories of numeric, factual, graphic, computer programs, imagery, and parametric data associated with experimentation and measurements
- **COMMERCIAL DATABASES AND HOSTS** - textual, numeric, and factual aerospace and

aerospace-related databases produced by commercial vendors.

- **IMAGE ARCHIVES** - photos and images of aircraft, spacecraft, space travel.
- **PUBLICATIONS** - journal literature, full text documents, newsletters, etc., relating to aerospace and aerospace-related subjects.
- **MUSEUMS** - museums and historical locations containing aerospace or aerospace-related displays and historical artifacts.
- **REPOSITORIES OF AEROSPACE INFORMATION** - locations of libraries and other facilities with collections of aerospace information, not necessarily available on-line.
- **AEROSPACE IN THE 21st CENTURY** - an electronic bibliography of aerospace studies and future projections.

RESEARCH AND DEVELOPMENT

- **GENERAL LINKS** - a collection of locations which list organizations related to aerospace and aerospace-related activities.
- **UNIVERSITY RESEARCH** - listing of university research and development organizations and facilities.
- **GOVERNMENT AND DEFENSE ORGANIZATIONS** - National Governmental and military agencies involved in R&D efforts.
- **SPACE AGENCIES AND ORGANIZATIONS** - organizations in various countries established to deal with the various aspects of space matters, including research, development, and engineering efforts.
- **SPECIFIC AEROSPACE R&D FACILITIES** - homepages of organizations concerned with aviation, aeronautics, astronautics, and space research.

EDUCATIONAL INSTITUTIONS

- **AEROSPACE ACADEMIC FACILITIES** - universities and institutions specializing in aerospace and aerospace-related education, research, development, and engineering efforts.

CIVIL AVIATION

- **AEROSPACE MANUFACTURERS** - commercial entities involved in the research, development, and manufacture of aircraft and spacecraft, or aerospace and aerospace-related components for aircraft and spacecraft.
- **COMMERCIAL AVIATION** - commercial airlines and organizations associated with commercial aviation.

ORGANIZATIONS AND NEWSGROUPS

- NEWSGROUPS - world-wide distributed discussion groups relating to aerospace and aerospace-related subjects.
- PROFESSIONAL ORGANIZATIONS - societies and organizations composed of scientists and engineers and other professionals interested in aerospace and aerospace-related subjects

CONFERENCES, SYMPOSIA, WORKSHOPS

- Listings of projected meetings worldwide.

GENERAL SITES

- Locations which provide subject - based services and access to aeronautical engineering, aircraft, and aviation resources.

REGULATORY INFORMATION

- Locations providing access to regulatory, non-regulatory and support documents, and other published material.

Figure 4 shows the IAIN Homepage.



Figure 4. Primary International Aerospace Information Network Homepage

D. INTEGRITY OF DATA SOURCES

As previously mentioned, the IAIN is being developed and established to facilitate access to, and use, of aerospace and aerospace-related information. The IAIN is an attempt to identify major collections of data relevant to aerospace R&D; to provide mechanisms to access these data and information resources; and to create a vehicle to stimulate the integration and access of multidisciplinary data related to aerospace R&D.

The IAIN aims to identify, select and evaluate, describe, and provide access to aerospace network resources for the aerospace research, development, and education community. In order to provide the most complete, up-to-date, meaningful sources of information, the WG established the following general guidelines to determine resources to include in the IAIN:

- Information resources should be included only if they contain substantive information of relevance to the aerospace user community.
- Personal web pages or simply collections of pointers to other resources normally will be excluded. However, collections of resources

equivalent to a resource guide (offering at least some evaluative and descriptive information in addition to a catalog of links), or single aerospace-related organizations' pages offering one stop resource lists on specific topics, or home pages of institution or their departments, often constitute valuable resources in their own right and should be included.

- Material that is strictly local in context, out of date, or no longer available should not be included.

In assessing the value of an Internet resource for inclusion in the IAIN, the WG approved evaluation criteria to be used as an aid to selecting resources of real value to the aerospace user community. See IAIN WP-12, Evaluation Criteria: A Checklist (attached as an Appendix). The evaluation process will take in a number of the criteria listed here, some of which will not be satisfied.

The evaluation criteria document is intended for guidance purposes only. In the final analysis, it will be one's overall impression of the value of a resource to the aerospace community which will decide whether it should be selected for inclusion in the IAIN.

Chapter 7: CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

- Information managers within the NATO nations support the concept of providing a centralized source of aerospace information.
- There is a vast and rapidly growing amount of data and information concerning aerospace; recent evolution of electronic networks provide a means to access and use these massive volumes of data more effectively.
- The IAIN must identify major collections of data relevant to aerospace R&D; provide mechanisms to access these data and information resources; and create a vehicle to stimulate the integration and access of multidisciplinary data related to aerospace R&D.
- The long-term goal of developing an IAIN is to achieve a self-sustaining worldwide network of partner organizations committed to sharing their data and information resources.
- The IAIN must facilitate access to, use, and understanding of aerospace and aerospace-related information worldwide.
- The IAIN must develop an organizational and technical infrastructure that will serve the aerospace research scientists and engineers and the broader community of policy analysts, resource managers, educators, and to some extent, the general public.

B. RECOMMENDATIONS:

- Publish the results of the IAIN Working Group as an AGARD publication.
- Current and future participants in IAIN identify resources to continue development of the prototype IAIN Homepage.
- Task the Technical Information Committee to oversee continuation of the IAIN concept.
- TIC attempt to identify an organization (governmental, commercial, not-for-profit) to coordinate the efforts of participants, and to provide oversight of the IAIN, develop policies and procedures to encourage researchers to make their data and information available through the IAIN.
- Attempt to identify an operating agent to maintain and operate the Homepage and connections thereto.
- Address comments and suggestions to the Technical Information Committee. Additional details may be obtained from the Technical Information Committee.

INTERNATIONAL AEROSPACE INFORMATION NETWORK

EVALUATION CRITERIA: A CHECKLIST

The International Aerospace Information Network (IAIN) is being developed and established to facilitate access to, and use, of aerospace and aerospace-related information. The IAIN is an attempt to identify major collections of data relevant to aerospace R&D; to provide mechanisms to access these data and information resources; and to create a vehicle to stimulate the integration and access of multidisciplinary data related to aerospace R&D.

The IAIN aims to identify, select and evaluate, describe, and provide access to aerospace network resources for the aerospace research, development, and education community.

Before proceeding to the evaluation criteria, the following general guidelines are provided in determining resources to include in the IAIN:

- Information resources should be included only if they contain substantive information of relevance to the aerospace user community.
- Personal web pages or simply collections of pointers to other resources normally will be excluded. However, collections of resources equivalent to a resource guide (offering at least some evaluative and descriptive information in addition to a catalog of links), or single aerospace-related organizations' pages offering one stop resource lists on specific topics, or home pages of institution or their departments, often constitute valuable resources in their own right and should be included.
- Material that is strictly local in context, out of date, or no longer available should not be included.

In assessing the value of an Internet resource for inclusion in the IAIN, the following evaluation criteria are provided to be used as an aid to selecting resources of real value to the aerospace user community. The evaluation process will take in a number of the criteria listed here, some of which will not be satisfied.

This document is intended for guidance purposes only. In the final analysis, it will be one's overall impression of the value of a resource to the aerospace community which will decide whether it should be selected for inclusion in the IAIN.

I. ESTABLISHING CONTEXT

A. SCOPE

- Is the subject area, breadth, depth, time period and format or type of information covered relevant to the aerospace community?

B. AUDIENCE

- Who is the intended audience of the information in the Uniform Resource Locator (URL), and does this affect the suitability of the resource for the aerospace community?

C. AUTHORITY

- Has an individual or institution taken clear and unambiguous responsibility for the resource? Material unsigned by an author cannot easily be assessed as to the authority of the information content.
- Is it possible to ascertain the status, qualifications or reputation of the author?
- Is the publisher a reputable, recognized organization?
- Does the resource document the sources the information is based on and how that information was obtained?
- Is the resource sponsored in any way or funded by grants?
- Is an e-mail discussion list or newsgroup moderated?
- Is an electronic journal refereed?
- Is an electronic journal indexed? (where?)
- Has the resource been reviewed elsewhere? (is that source reputable?)
- Does a recognized professional association or a specialist information service link to the resource?

For many resources, the authority of the publishing organization will carry sufficient weight to allow one to select a resource. Information from peer reviewed journals, government agencies, national and international aerospace organizations and research centers is generally valued highly.

Many resources are maintained directly by universities, professional associations, government bodies or international organizations that are well known to the aerospace community.

If a resource is provided or sponsored by a recognized institution, or the author is providing the information in their capacity as employee of such an institution, there may be no need to establish authority further.

D. PROVENANCE

- How long has a resource been available (either in print or as an electronic version)?
- If a print equivalent exists, how well established is that?
- Are there any indications of some established history and continued maintenance?
- How extensive are the archives of electronic journals or discussion lists or newsgroups? Are they available for retrospective searching.

Indicators such as these can help you select resources which are sustainable.

II. ASSESSING CONTENT

A. COVERAGE

- Does the resource cover a subject adequately? Are there inexplicable omissions?
- Is coverage integral, or is the resource part of a greater whole?
- Does the resource contain substantive information or is it simple a list of links? If links are provided are these evaluated or annotated in any way?

B. ACCURACY OF INFORMATION CONTENT

- Is the information factual, or opinion?
- Can its objectivity be assessed? Is there any evidence that it may be representing vested interests or undeclared biases?
- Is it possible to determine the accuracy of the information provided?

Questions of information accuracy can often be answered only by subject experts; nonetheless, positive evaluations of authority and provenance can provide strong indications of likely accuracy.

C. UNIQUENESS/COMPARISON WITH OTHER SOURCES

- Is the resource original, or has it been derived from other sources? Are these documented?
- Does it complement another resource, for instance by providing updates to a print source?
- Is this an original or a mirror site? Is the resource mirrored elsewhere? How do they compare?
- Are there any print or other equivalents (e.g. CD-ROM) (e.g. for electronic journals, are illustrations available as well as text? How do they compare with the print original?
- If the resource is available in different formats, how do they compare? (e.g. FTP-able resource may be available as ASCII, pdf or Postscript files, etc.)
- If mirrored, does a resource provide the same extent of coverage (retrospectively, e.g. archives, as well as current), currency of data, ease of use?
- Does it provide special features, unavailable from the original site? Is the user interface significantly different?

Much of the evaluation process can be applied comparatively to identical or near identical alternative versions of a resource. It may be possible to identify the original resource to establish which mirror sites are recommended.

D. CURRENCY/FREQUENCY AND REGULARITY OF UPDATING

- Is the resource static or reliant on regular updating.
- Can the currency of the information be ascertained? Is it possible to assess the currency relative to another source?
- In the case of a document, is a date given?
- For software, is there a version number?
- How often is a resource updated? Is a policy for maintenance stated (e.g. frequency of updates)?
- How current is the material included in each update?
- If a resource is meant to be updated regularly, how reliable is the updating? (e.g. for a weekly electronic journal, are updates as regular as expected? If it is mirrored, might it fall behind schedule? If there is a choice, how does one source compare with another?)
- Are time sensitive resources (e.g., news) available in near real time?

Browsers may allow you to view the date a resource was last modified (in Netscape select View/Document Info). This may not be the date the information was originally created or materially altered.

III. ACCESS ISSUES

A. ACCESSIBILITY

- Is the resource easily accessible, at least some times of the day?
- Is access to a resource reliable or is it intermittent due to server maintenance?
- Is there a charge to access the resource? How do charges compare with alternative sources?

If there are access restrictions:

- Is a resource available only during certain specific access times?
- Do geographical access restrictions apply?
- Is special registration or institutional subscription required?

If there are special requirements:

- Has the information provider allowed for different modes of access to a resource?
- Is use of a resource possible at all with a text mode browser, e.g. Adobe Acrobat.
- Are there special software or hardware requirements? (e.g. software available only by Macs)

B. USE OF GRAPHICS

Are images used appropriately (e.g. are thumbnail images used)? or are they merely decorative?

For an electronic journal: are tables and graphical material included? If not, are they referenced and are captions included?

C. DESIGN AND LAYOUT/USER INTERFACE

- Is the general layout of a resource functional. Are menus, headings and formatting used effectively?
- Are navigation aids available to guide users?
- Are hypertext links used appropriately? Are they relevant? Are they maintained?

Is a simple search facility available?

- Is a full complement of search options available?
- Is the search speed acceptable?
- Is a choice of display formats available?
- For a database, is there a consistent record layout? Is the data presented in a standard fashion (e.g. not in all-upper-case)? Are the data elements easily distinguishable? Are they tagged consistently? Can the data be recommended for importing into spreadsheets or reference management software?

Although the appearance and functionality of the interface of a resource will have a significant bearing on the overall impression a resource creates, it is primarily the value of a resource in terms of information content that you are likely to be most concerned with; unless, of course, usability is significantly compromised by design or interface factors.

D. USER SUPPORT/DOCUMENTATION

- Is the resource accompanied by an introductory or explanatory material (e.g. home page or parent document) or FAQs or README files? Does this outline policies regarding the scope and coverage of a resource, currency and maintenance?
- Is on screen help available? Is it context sensitive?
- Is there a contact name and e-mail address for further advice and information?
- Is on-line or print documentation available? Is it accurate and clear? Is it available free or at a nominal cost?

Most resources accessible in the network environment are likely to offer a modicum of user friendliness. Some, though, may be sufficiently complex that an element of user support would be needed to make the best use of them.

Please note: as a rule the information source should make point to useful resources wherever they appear in the hierarchy of a site, i.e., they are linked at the level of individual web page of interest, rather than merely the top level Homepage. The exceptions to this would be where resources do not stand on their own, i.e. individual discussion item from a Newsgroup or Listserv or article from an electronic journal, unless this was of particular significance or importance.

IAIN will normally point to the homepages of electronic journals and archives or FAQs of e-mail discussion lists and newsgroups.

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<p>Reports the outcome of the deliberations of a Working Group set up by the Technical Information Committee of AGARD to examine the models of existing cooperative international databases and make recommendations for the establishment of such a database to serve the aerospace sector.</p> <p>The report recommends the Internet as the most suitable vehicle for this and describes a prototype International Aerospace Information Network (IAIN) Homepage which was developed by the Group for use as a Proof of Concept. In this prototype Homepage, which is intended to be a limited version of the finished network, several connections have been made to information sources as a demonstration of the concept and the capability that would be inherent in the final stage.</p> <p>It is stated that in order to deliver the desired data and information and needed services to the user, the network should include:</p> <ul style="list-style-type: none"> • the ability to search for aerospace and aerospace-related data and information across heterogeneous systems • aerospace and aerospace-related data directory information • the facility to order data products through a simplified "one-stop shopping" procedure • the delivery of data to users on a variety of standard media, including electronic delivery where appropriate. 			

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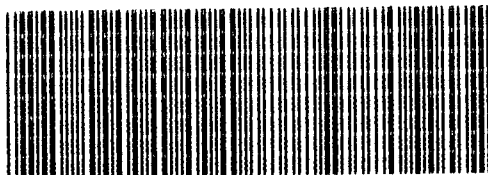
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