COMMISSION OF THE EUROPEAN COMMUNITIES

information management

Symposium on the transfer and intrepretation of scientific and technical information in agriculture

Luxembourg, from 2 to 3 February 1977

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Organized by Directorate-General
'Scientific and Technical Information and Information Management'
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PREFACE

During recent years the Commission of the European Communities has taken an active interest in problems associated with the dissemination of scientific and technical information in agriculture. At Community level activities in this field are currently coordinated by the Agricultural Working Group (AWG) of the Committee for Information and Documentation in Science and Technology (CIDST). AWG, comprising national experts in agricultural information and documentation, acts as an advisory panel to the Commission in this matter.

A major area of interest to be considered in next year's working programme of AWG is the utilisation of appropriate information - scientific, technical and practical - in agricultural production and marketing by agricultural extension services, taking into account the possible role which the European Information Network (EURONET) which is currently being implemented, might play in this field.

It is necessary,however, that both the Commission services and the AWG should at all times have up-to-date opinions on information systems suitable for agricultural advisory systems, as well as on problems related thereto. Accordingly, a symposium was held in Luxembourg on February 2nd and 3rd 1977 at which an in-depth discussion on these matters took place.

These proceedings issued herewith, include the papers presented at the symposium, the summary and conclusions of the discussion as well as specific recommendation for future action as formulated by the participants. These recommendations are being submitted to the Commission for consideration and, ultimately, for implementation as appropriate.

John S. SCULLY
Chairman of symposium

C O N T E N T S

RECOMMENDATIONS

The Symposium has recognized the unique nature of the information needs of extension work and the fact that these are not being met to any significant extent by existing information systems. Even if the present systems were adapted to include much more extension material, they would still provide only a small proportion of the adviser's total information needs and could therefore play only a supportive part overall. Nevertheless the problem merits further investigation.

Because of the breadth and complexity of the subject, and because it is to a great extent an unexplored field as far as advisory work is concerned, the feasibility of establishing formalized information systems in this area needs careful testing and proving. Accordingly the recommendations below are mainly concerned with setting up pilot projects to ascertain the scale and complexity of the problem and the likely cost-effectiveness of whatever developments are found to be feasible.

It is recommended :

1. that a pilot project be initiated to test the practicality and worthwhileness of setting up a comprehensive bibliographical data base **system catering specifically for the need of advisers.**

   Such a system should contain both conventional and non-conventional literature references and should be capable of embracing a very wide range of subject matter. It should be purpose-built for advisers, and would be examined, in the pilot project, as an alternative to incorporating extension references in existing information systems such as EUR-AGRIS;

2. that, as a supplement to the pilot project above, carefully selected topics should be examined to test the **practicality**

and worthwhileness of creating information analysis systems specifically designed to meet the needs of advisers;

3. that a further, and separate, pilot project be undertaken, covering only a very limited number of specific topics, to test the practicality and worthwhileness of creating data banks which would specially cater for the needs of advisers.

   As a preliminary, and in order to provide a reference point for the pilot project, it is recommended that a survey among member countries be initiated to determine the number, location and usage of existing data banks specially designed for advisers' use:

4. that, in order to stimulate cooperation between member countries, a referral service should be set up covering existing extension information systems. This would consist essentially of a central register of extension information systems.

CONCLUSIONS

INFORMATION NEEDS OF EXTENSION SERVICES IN RELATION TO FARM PRACTICE

In order to study the question it is first necessary to see what kind of information the Extension Service needs and how it deals with it.

The Extension Services needs up-to-date scientific and technical information, information about markets and prices of farm commodities and information on new products of use in agriculture. It needs to know of the work being undertaken at research centres of early relevance to extension work. It also needs information on the experiences of introducing new techniques, products and ideas into farming systems and enterprises. Furthermore in the context of family farming, extension workers need information on all matters of a socio-economic nature which have a bearing on the development of the farm unit. Because of the range of the information available in depth and scope and the specific local situation of farmers, the Extension Service has to structure itself to take the information into the system and to integrate it into a form suitable for farm practice.

Typically the system includes specialist advisers with a link to research, and general advisers. The specialist acquires the information from research workers who produce information relevant to his speciality. He combines this with information from the commercial sector and other sources and channels it to the general adviser and farmer. The general adviser takes the information from the different specialists, from commercial sources, from colleagues and from farm experience and integrates it in his advisory work with farmers.

The specialist adviser uses formal sources, the scientific literature and trade literature. He also uses personalized sources. The general advisor tends to use literature of a less scientific nature and he makes a good deal of use of personalized sources through which he gets not

alone knowledge but also experience of its commercial use in given sets of conditions.

An Extension Service does more than transfer information, it changes the information as it passes through the system. The system also enables a feedback from the farmer and adviser to the research worker.

The specialist in the system wants all the research information relevant to his subject that is available. He has recourse to librarians/ documentalists as does the research worker because their needs are rather alike. The literature the general adviser uses is not the kind used by the specialist and researcher. He looks to the specialist to provide literature at a level which he can grasp in a reasonable amount of time, leaving him as much time as possible for disseminating it to farmers. He tends to use proceedings of conferences, articles by specialists, the agricultural press, commercial literature etc. He draws on farm practice and farming problems in his area to direct him in seeking information and as a screen in what to read etc. He wants information of a more general nature than is typically available through international information systems which mainly cater for scientists, supplying them with lists of references. Should he seek the documents, he will likely specify only those in the one or a few languages he can comprehend. The same applies to the specialist to a somewhat lesser degree.

Improving the means of providing Information to Extension Services

The main areas discussed were as follows :

1. Providing extension workers with better access to the information they need. The information needs of the general adviser are broad so as to enable him to serve the varied needs of the farmers in his area, especially the innovators and modernising farmers but also those who are at a lower level in the application of scientific and technical information. He needs specific information for individual farmers with urgent problems and he needs general information to promote agricultural development to exploit local resources and opportunities.

Information relevant to extension work is contained in the volume of literature reaching or readily available to the extension worker; important information may also be contained in literature not normally crossing his desk. A big task is to sort out the information of most relevance to his needs and to organize its storage to facilitate extracting it for use as required. Assistance in identifying what is most essential to his needs would help to reduce the time spent in sorting information. Where advisers or groups of advisers, perhaps in co-operation with specialists, agreed on a classification system to suit their needs, the librarian/documentalist could help them in setting up and maintaining the system.

2. Linking research with extension work

In so far as research is one of the big contributors to agricultural development it is important that every provision be made for the speedy incorporation of worthwhile new information into the work programme of the Extension Service. The specialist adviser has a key role in assessing the commercial applicability of new information, in keeping general advisers up to date in their technical competence and in keeping research workers informed on farming problems requiring study or further research. His position in the Extension Service system and the working relations between research, extension and farmers have a big influence in providing the smooth flow of information essential for farm development.

3. Exchange of information

Greater provision of review articles and digest of relevant research findings would help advisers satisfy their information needs. Provision might be made for a referral and document exchange service among Member States.

Extension Services from different regions or Member States are interested in exchanging information on farmers' adaptation of technology and in the use of advisory methods. Certain information of a local character i.e. the state of technical progress in a particular region/member country might be of interest to another country. There is also information relevant to extension work which might be of national or of international interest.

4. Information Systems

Extension Services are generally unaware of the existence and possibilities of the new information systems. If they were more aware of them they would be more likely to use them. This in turn would encourage documentation and information services to collect information relevant to extension work in order to put it into international systems.

SESSION I

- Existing documentation and information services in the field of agricultural science and their possible usefulness to agricultural consultants and practitioners

- The European Information Network (EURONET) and its possible role in information transfer to agricultural advisory services

- Introduction to the ARIANE on-line system

Discussion on this papers

EXISTING DOCUMENTATION AND INFORMATION SERVICES IN THE FIELD OF AGRICULTURAL SCIENCE AND THEIR POSSIBLE USEFULNESS TO AGRICULTURAL CONSULTANTS AND PRACTITIONERS

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Abstract

There are two main questions on which the Symposium on information transfer in agriculture is focused : i) how can agricultural research, by means of documentation and information (D & I) services, be more efficiently and more quickly utilized for agricultural extension and practice ? and ii) what could be the role of the Community in addition to that of existing national services ?

Instead of defining agricultural D & I, this paper describes its development from manual to computerized systems. The estimated number of 200,000 to 250,000 agricultural primary documents which appear each year are covered by about 400 D & I services. There are also various research inventories. These secondary services are grouped together in reference services and information services stricto sensu. The former identify information sources, the latter analyse them in depth, so that in many cases they do not have to be studied by users. Various types of reference and information systems, such as research inventories, title bibliographies, abstract services and factual data banks, are described on the basis of selected examples.

Both reference and abstract services could be made more attractive to agricultural extension and practice by covering more review articles and extension literature which should be flagged in order to avoid noise in retrieval. The provision of original documents and translations must also be improved. But the question of creating special data bases and banks for extension and practice must be considered if the existing services are insufficient.

1) The problem

The symposium on information transfer in agriculture brings together representatives of two fields of activity : documentation and information (D & I) in the field of agricultural science on the one hand and agricultural extension on the other. The former produce and process information, the latter require and use information.

In reality, however, information is such a versatile product that information flow follows much more tortuous paths than those shown, the roles of those involved as information producers, processors and users being interchangeable to a large extent. But let us start by keeping the matter simple in order to accentuate the common interest in agricultural information in the widest sense shared by those involved. Four questions arise :

1) What information is required by the advisory services in order to be able to suggest appropriate solutions to the problems brought forward by those in practice who use the service (farmers, veterinary surgeons, and so on) ?

2) To what extent are existing scientific and technical D & I services of use to agricultural consultants and practitioners and how much do they need and are they able to be changed to be also of use to these users ?

3) Is it furthermore necessary and possible to set up specialized information services which are from the outset designed first and foremost for agricultural extension and practical applications ?

4) What additional work could be undertaken by the European Communities to expand the functions of the existing D & I services and the national advisory services in order to exploit more efficiently and quickly scientific findings in the form of information for agricultural producers and processors ?

The first question is directed primarily at the representatives of the national advisory services and the last question is to be discussed in depth on the second day of the symposium. The answer to the third question will largely depend on the answer to the second question. It is

the second question therefore which forms the focal point of this paper.

2) Developments in agricultural documentation and information (D & I)

If Albrecht Thaer can be rightly called the father of agricultural sciences, the latter are almost 200 years old. In fact the scientific approach to agriculture started in the wake of the discoveries in chemistry at the end of the 18th century (1772 nitrogen, 1774 oxygen, 1781 composition of water). The first agricultural college was founded in Germany by Thaer in 1806, the first agricultural experimental centre by Boussignault in 1834 in Alsace and the Institute of Rothamsted by J.B. Laws in 1843. In 1846 Liebig wrote his "Die Chemie in ihrer Anwendung auf Agrarkultur und Physiologie", (applications of chemistry in agriculture and physiology) and in 1855 his "Die Grundsätze der Agrikulturchemie" (the principles of agricultural chemistry) ("Put back in the field what you took out, no more, no less, just that much ... just as today we cure fever with a few grains of quinine where earlier the patient was given an ounce of wood to swallow").

Prescientific work in agriculture of course dates back to the times of the first human settlements, which in this part of the world was eight to ten thousand years ago. For the rural population agriculture was until recent times a way of living which had been handed down and adopted without query and which was not considered worthy of intellectual contemplation by the urban elite. Nevertheless, even in those early times there were writers who recorded the agricultural knowledge of their time. One of the oldest records is the Gezer agricultural calendar in Israel which dates from the 10th to 8th centuries B.C.*) Virgil wrote the "Georgica" between the years 38 and 29 B.C. Even if the main purpose of this didactic poem was a poetic transfiguration of the life of the peasants, it describes at the same time a host of details on agriculture and weather signs, fruit-growing and wine-growing, stock-breeding and beekeeping.

*) "It is two months that olives are picked. / It is two months that corn is sown. / It is two months the late seed takes. / It is one month that flax is stripped. / It is one month that barley is reaped. / It is one month the rest is gathered. / It is two months the vines are cut. / It is one month the summer's fruit is picked".

As early as the beginning of the modern age these publication on agriculture had increased to such an extent that it was felt they should be collected, classified and their titles and place of discovery recorded in bibliographies. In 1516, the "Elekta Georgika sive Opuscula quadam de re rustica" compiled by Camerarius of Nuremberg listed 100 prints, 170 manuscripts and 190 Greek and Roman documents on agriculture. In 1803 F.W. Weber quoted more than 6.000 documents in his "Handbuch der ökonomischen Literatur ...". In 1860 Kroker published the "Repertorium der preussischen landwirtschaftlichen Literatur" and in 1863/64 the "Archiv der landwirtschaftlichen Literatur des In- und Auslandes". The "Experiment Station Record" was published by the US Ministry of Agriculture for the first time in 1890. The beginnings of the Commonwealth Agricultural Bureaux (CAB) can be traced back to the year 1909, and the "Bibliography of Agriculture" has been published by the National Agricultural Library since 1942.

For many years it was the job of libraries to collect, classify and store these documents. Over the past few decades a new profession has arisen, partly within librarianship partly outside, viz. : documentation. The reasons for this can be found primarily in two developments :

1) the quantity and expansion of journals.(The list of agricultural journals compiled by Boalch contains approximately 13.500 titles). Consequently the need arose not only to cover journals in toto but also to cover the individual articles. However, this was no longer a task which could be tackled by traditional library methods.

2) The tendency of scientists to delegate the literature search which is understandable in view of the steadily increasing number of publications and the increasing complexity of literature search methods. Scientists have quickly realized that knowledge about knowledge is often just as difficult to acquire as knowledge about things.

In contrast to library management which attempts to manage documents as such, documentation attempts to manage information on the documents and also the information contained in the documents, in other words to acquire this information, collect it, classify it, store it and make it available again. This technology has developed at an enormous pace over the past decades. Initially manual indexes were used like

the ones found in the catalogue rooms of libraries while at the same time semi-mechanized, easily manageable slotted and notched card systems were being developed until in the middle of the fifties punched cards and punched tape technology was introduced to documentation, which was a fully mecanized procedure. The next step was automation, in other words application to documentation of computer technology to store the data on magnetic tapes or discs. The first large agricultural data bases to be automated were the Food Science and Technology Abstracts , automated in 1969, and the Bibliography of Agriculture, automated in 1970. A list compiled by the European Association of Information and Dissemination Centres (EUSIDIC) shows how the number of D & I services in general, and in agricultural science in particular, has risen sharply over the past few years. Compared with manually operated services the automated data bases, provided that they offer retrieval facilities, have the invaluable advantage of being able to be interrogated in free text on all important elements (e.g. any significant words in the titles of the documents in store) without a need to mark the data concerned as search elements in advance.Following the automation of a number of large D & I services there was a general desire to improve access to these magnetic tape services, in particular with regard to increased facility and speed (on-line instead of off-line) and also by linking up various services to form information networks which enables several data bases to be interrogated from the same point. The European Information Network (EURONET) that is under development at the moment is described in more detail in G. Davies' paper.

3) The current situation in agricultural documentation and information

A number of different institutions,for example the National Agricultural Library (NAL) in Washington (1) and the European Communities in conjunction with the FAO and CAB (2) have conducted surveys on primary literature and secondary (D & I) services in the past few years. Results show that in the field of agricultural science 200.000-250.000 publications appear every year. This number is of course heavily influenced by the inclusion or otherwise of specialist fields such as forestry, fisheries, veterinary medicine, etc. Agricultural primary literature is covered by approximately 400 D & I services which in turn produce about 2 million bibliographical references of which about two thirds contain abstracts. This means that every new publication is featured by about 10 D & I services on

average. This at first sight rather excessive multiplication can be seen in true perspective when it is considered that D & I services evaluate primary literature from various points of view in order to cater for the requirements of the users they supply, above all on the basis of language, various formal (aids to the identification and location of documents) and scientific factors (as determined by the field of interest of the user).

In 1971/72, 35% of the abstracts came from the USA, 25% from the countries of the European Community and 12% from international organizations. 40% of the title references were attributable to the Member countries of the European Community, 34% to the USA and 9% to international organizations (2). The proportion of the latter is likely to have increased considerably since the appearance of AGRIS in 1975.

60% of the title references and 45% of the abstracts appeared in 1971/72 in English, 11% and 14% respectively in French and 5% and 7% respectively in German (Federal Republic only).

Which of the 400 agricultural D & I services could be of interest for consultation and possibly even of immediate use for practitioners ? To narrow down answers to this question, an attempt will be made to group the various D & I services on the basis of certain criteria. In this way it is easier right from the start to estimate what can and cannot be expected of the various types.

4) Typology of agricultural documentation and information services with examples

Schematic grouping

of documentation and information services

Documents covered		Documentation and information services (D & I services, secondary services)	
		A Reference services	B Information services
Primary documents	I Descriptions of research projects	IA Research inventories without information on content	IB Research inventories with information on content
	II Primary literature	IIA Bibliographical data bases without information on content (title bibliographies)	IIB 1 Bibliographical data bases with information on content (abstracting services) 2 Information analysis services 3 Factual data banks
III D & I services (secondary services)		III Referral services (tertiary services)	

Two main factors underline the grouping of D & I services in the synopsis : 1) the object of reference about which information is supplied (research projects, primary publications, D & I services) and 2) the method by which information is supplied. A distinction is made here between reference and information systems stricto sensu.

Reference systems are exclusively or primarily used to identify and locate research projects, primary publications or other D & I services. Thus they require only a minimum amount of data elements and are relatively simple and not excessively expensive to operate. Information on the subject matter in addition to the title itself (such as key-words or indicative abstracts providing further information) are only included if they increase retrieval selectivity of the documents concerned. Reference services are useful or even adequate wherever the documents referred to can easily and quickly be acquired.

The more difficult and time-consuming access to original documents becomes irrespective of whether due to the language barrier or problems of acquisition, the more necessary information services in the stricter sense are and the more justified the cost involved becomes. The more sophisticated information services, such as information analysis services or data banks of facts and findings are even designed to make access to original literature unnecessary. At all events, information services which merit the name could act as substitute for primary texts whether exclusively or as a service in addition to supply of references. Thus they necessarily involve more data elements than simple reference systems, e.g. informative (and not merely indicative) abstracts, data on facts, findings, etc.

As plausible as this classification may seem it must be admitted that in reality pure forms are seldom available and hybrid forms all the more so. Nevertheless, the classification could be useful as synopsis of the field of existing D & I services and to describe a number of services on the basis of the criteria given.

Group I A and I B : Research inventories

These are indexes of research projects or programmes with data on the research centres involved and in most cases on the scientists engaged on the project. In addition to the national indexes of agricultural research projects of the Member states of the European Community - two of which are printed and published every year - the following four services should be mentioned : the Smithsonian Science Information Exchange (SSIE), Washington; the Computerized Research Information System (CRIS) of the UK Department of Agriculture; the Current Agricultural Research Information System (CARIS) which is currently being developed by the FAO, and the "Permanent Inventory of Agricultural Research Projects" (AGREP) of the European Communities.

AGREP is an important constituent of Council Decision n° 1728/74 on the Coordination of Agricultural Research. Input is collected yearly at national level on the basis of standardized guidelines and processed at Community level to a Community data base. It appears both as a printed edition and a magnetic tape. The first magnetic tape edition with

12.000 project titles was completed at the end of 1976; the printed version will appear shortly.

With the aid of AGREP agricultural research projects in the countries of the European Community can be sought on the basis of subject field (subject of research and orientation of research, scientific discipline) and on the basis of research laboratory and scientists involved. Questions which go beyond this must be answered by the national centres or the research institutes. The inclusion of project descriptions in AGREP is currently under discussion but is not yet feasible in all countries.

For some countries AGREP is supplying for the first time a generally accessible list of the research projects in those countries, and a first general synopsis for the European Community which needs, of course, to be extended and improved gradually. In my view the particular advantage for the advisory services is offered by the possibility of finding competent research centres in the Community area for any questions not yet adequately dealt with in relevant literature.

Group II A : Title bibiographies

Basically, the form and content of the documents acquired are analysed to a degree which supplies sufficient information, e.g. in the form of key words or indicative abstracts, to facilitate selection of the documents concerned, but not make study of them superfluous.

The following three services are examples of title bibliographies which among others are important internationally :

1) The AGRIS bibliography of world agriculture has been developed over the past few years under the auspices of the FAO in close cooperation with the European Community. It has been appearing since 1975 on a trial basis as a printed edition (as AGRINDEX) and on magnetic tape. The Member states of the European Community and the Commission already supply their joint input for AGRIS on magnetic tapes which in 1975 totalled 45%, in 1976 (on account of increased material from other countries) 35% of total input. AGRIS caters for all areas in the field of agricultural science in the broadest sense but coverage varies from area to area. In the first year of publication 60.000 documents were covered. Titles are given in the original language and in English. The

FAO Conference at the end of 1977 is to decide whether and how AGRIS is to be continued. It is the express aim of AGRIS to cover the agricultu - ral literature of as many countries as possible to the greatest possible degree. A great merit of AGRIS is its promotion of standardization which without real action, in other words the creation of data base, would not be possible. This permits not only input and processing but also access to bibliographical data on agricultural literature on a world scale.

2) The Bibliography of Agriculture (B of A) of the National Agricultural Library (NAL) in Beltsville, Maryland, has been published monthly since 1942. Since 1970 it has also been published on magnetic tape under the acronym of CAIN or, more recently, AGRICOLA. Every year 120.000-140.000 documents from every part of the world and from all areas of agriculture (excluding fisheries) are covered. The printed version contains only English titles, but the magnetic tape also includes original titles. As a national bibliography, the B of A covers agricultural literature of the United States completely and as a library catalogue it offers a guarantee that the documents indexed are available even when the country of origin is not the USA.

3) The Bulletin Signalétique published by the Centre National de la Recherche Scientifique (CNRS) in Paris has been published ten times a year since 1940 and covers approximately 20.000 documents from the field of agricultural science and 25.000 from associated fields every year. Section 380 is of particular interest to agriculture (Agronomy, Zoo- techny, Phytopathology, Food Industry). Titles are shown in the original language and in French and the indicative abstracts which make assess- ment of relevance considerably easier, are drawn up in French.

Group II B : Abstract services, information analysis services and factual data banks

Abstract services operating as real information services are bibliographi- cal data bases which in addition to bibliographical data for the identifi- cation of documents also contain informative, in other words detailed abstracts which make a study of the original literature at least in some cases unnecessary. As one example of the many existing services let me

mention the abstract services of the Commonwealth Agricultural Bureaux (CAB), with its headquarters in Farnham Royal, England. These bureaux publish 17 main and 14 auxiliary series most of which contain abstracts on various individual subject fields in agriculture which they publish both in printed form and, since 1973, on magnetic tape. Approximately 110.000 documents are covered each year.

Information analysis services take the matter a stage further than the conventional references services by analysing the documents covered to a greater degree and thus go a step further towards the objective of making recourse to original literature superfluous.

There are only a few information analysis services in general and particularly few in the field of agriculture. At the moment the establishment of a service of this type within the European Community to cover animal diseases is being discussed. A trial edition on cattle diseases was compiled in 1976 by the Central Laboratory for Animal Health in Weybridge, England on behalf of the Commission of the European Communities. It contains expanded abstracts instead of summary abstracts and above all includes numerical data and data on methods, allowing correct interpretation of the results. In addition to this the most important figures are listed in synoptical tables.

This example showed how heterogeneous the data contained in literature are and how this heterogeneity complicates any attempt at automatization. Standardization of input is likely to be one of the most difficult problems with regard to the creation of factual data banks. Examples of these are the various gene data banks, the International Feed Information Center (INFIC), a data bank on the composition of feedstuffs, and CRONOS, the data bank of the Statistical Office of the European Communities in Luxembourg. CRONOS stores the data groups by subject fields in chronological series. They appear periodically in printed form as EUROSTAT publications. The series ZPA1 on animal products, meat, milk and eggs is of particular interest to agriculture.

Group III A : Referral Services

Just as secondary D & I services inform about primary literature the tertiary "referral services" inform about secondary services which by

virtue of their great number have become difficult to keep track of. A referral service could be based in agriculture on Frauendorfer's "Survey of Abstracting Services" which appeared in 1969 (3) and on the subsequent "Survey of the World Agricultural Documentation Services" which appeared in 1973 (2).

5) How can documentation and information services in agricultural science be made useful for agricultural extension and practice ?

The vast majority of existing D & I services are title bibliographies and abstract services. They have been designed almost exclusively for users in research and administration. To what extent are they of use to final users in agricultural practice or at least to the consultants as intermediaries ? Or how must they be changed in order to make them useful without, however, depriving them of their value to the scientific user ?

Reference systems (without in-depth analysis of content) are useful where a) the literature indexed is read, b) the type of literature covered interests the reader and c) the original literature can easily be acquired.

As long as the data bases continue to select mainly or only scientific literature interest from the practitioner, the specialist consultant excepted, is likely to be minimal. Even if progressive agricultural production units can easily be compared technically and economically with industrial enterprises of a similar size, the notorious lack of staff and time from which farmers suffer make it impossible in most cases for them to obtain their practical information through the medium of scientific publications. However, perhaps one should refrain from being so categorical before it has been tried out. The National Agricultural Library quite recently reported on a pilot programme on "Automated Retrieval Services for USDA Field Personnel" (4) with the Bibliography of Agriculture (AGRICOLA), in other words purely a reference system. Several goals are envisaged :

" 1) Test the need for literature current awareness by field organizational units of the USDA which have not been heavy literature users.

2) Test the need for online, retrospective searching for this group ...." (4).

A few assumptions will have to be made with regard to the literature which could be of particular interest to practitioners and consultants even if at the end of the symposium the assumptions are shown to be in need of some correction. Even if the practitioner is not generally interested in research for the sake of new knowledge it can be assumed that he has some interest in agricultural progress as is recorded in scientific progress and review articles, irrespective of whether these deal with technical aspects of production or agricultural economics or economics in general (see also appendix 1).

Scientific literature on agricultural education, training and extension itself should also be mentioned which, if of no interest to the practitioner, may be of interest to the consultant. A third category is extension literature as distinct from scientific literature. It is not always easy to draw a line between the two and many an article in extension literature, for example on plant protection, experiments in cultivation and fertilization, etc. may also supply useful stimuli to science and enable conclusions to be drawn. The question is therefore whether existing data bases such as AGRIS should not be encouraged to cover more extension literature in future. In direct opposition to this is the claim by scientific users that data bases have already started to diversify too much at the expense of scientific literature and that consequently retrieval results contain too much noise. The problem would, however, be easy to solve technically by marking extension literature, synoptical reports and popular science articles accordingly so that during a literature search they can be ignored or taken into account as necessary. This has already been put forward for AGRIS.

The best source of advisory literature is probably at the moment the national agricultural bibliographies (e.g. the US Bibliography of Agriculture, PUDOC Bulletin, Wageningen, and various Eastern European services, the largest of which is the Selskohozyaistvennaya literatura SSSR). National bibliographies are usually obliged to be complete and advisory literature benefits from this.

National bibliographies also solve the problem of the provision of the original documents referred to, at least as far as they are affected by the collection of obligatory copies. For this purpose AGRIS is to be supplemented by AGLINET (Agricultural Library Network) which comprises a series of libraries which have all agreed to assist in the acquisition of documents. Since national bibliographies normally work in the language of the country, they offer a geographically limited solution to the language barrier which otherwise would be a double problem : in the use of international D & I services and in primary literature itself. A number of data bases, including AGRIS, show the titles of the documents referred to in the original language and also supply an English translation. The language barrier poses a much greater obstacle to European cooperation in the field of advisory services than in research. The Working Group on Agriculture of the Committee for Information and Documentation in Science and Technology (AWG/CIDST), believes however, that existing institutions which refer to translations, acquire them or produce them, are not sufficiently well-known or used and has thus produced a pamphlet on the subject. The question of multilingual operation in scientific and technical documentation and information in general will be dealt with more comprehensively at a symposium to be held in Luxembourg shortly.

What has been said so far about the usefulness of title bibliographies to practitioners and consultants largely applies also to abstract services.

Information analysis services and data banks of findings thus doubtless supply the need expressed by practitioners to have direct information available instead of mere literature references. Although the current trend is towards the creation of such services there are still very few of them, a fact explained not least by the high cost involved, and they mostly serve very specialized fields. A more important question is whether these systems are sufficiently flexible to satisfy user requirements if the latter are extremely varied and variable. Would it perhaps

be better to envisage specific information services for agricultural practitioners and advisory services which offer more than the simple literature reference systems and which can assist in solving practical problems along the lines of the ARIANE question-and-answer system used in the construction industry ?

The report on the survey conducted by the Directorate General for Agriculture of the Commission on the subject of agricultural advisory services in the Member States will doubtless refer to national services of this or that type. Do they contain information useful at international level and could they be used as a basis for European cooperation ?

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Vol. 2, n° 9, September 1976

National Agricultural Library, Beltsville, Maryland 20705

THE EUROPEAN INFORMATION NETWORK (EURONET) AND ITS POSSIBLE ROLE IN INFORMATION TRANSFER TO AGRICULTURAL ADVISORY SERVICES

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Abstract

An important part of the Community's Action Plan, 1975 - 1977, for scientific and technical information is concerned with the development of a network (EURONET) for helping users gain on-line access to a wide range of data bases. To this end a contract has been signed with the PTT administrations of the nine Member States to implement a telecommunications network, which will allow Community-wide terminal access to around 100 data bases located on some 20 host computers. Some of these data bases bill be concerned directly with agriculture itself but many others will also be potential sources of information on specific aspects of agriculture, e.g. geology, chemistry, pharmacology.

The presentation will describe the basic EURONET facilities to be offered and will indicate the likely range of data base services to be made available. The principles underlying the planning of the network and its services will be described, including consideration of such topics as : tarification, language, user convenience, etc.

1. The origins of the EURONET project

On June 24, 1971, the Council of Ministers of the European Communities passed a Resolution which defined basic Community policy for the coordination of activities in the fields of scientific and technical information within the Member States. This Resolution explicitly referred to the desirability of establishing a 'European documentation and information network', stating that:

> "... in order to achieve economic, scientific and technical progress it is important that scientific, technical, economic and social documentation and data should be made available by the most modern methods to all persons needing to use such information, under the most favourable conditions as regards speed and expense..."

After several years of complex consultation between the Commission and the Member States, the principles of the Resolution were made concrete in the form of an Action Plan, which was adopted by the Council of Ministers on 18 March, 1975. This Action Plan covers the period 1975 - 1977 and has an overall budget of around 7 million units of account (approximately 8.8 million U.S. $). The main strategies of the Action Plan are based on achieving coordination among the Member States in three broad areas:

- Development and creation of systems in the various subject fields (including agriculture)
- Created of a shared network for providing on-line access to information services

Development of skills and tools in information technology.

The EURONET project is centred on the second of these areas, but does embrace many aspects of the other two also, for example promotion of efforts to establish on-line Community services in certain subjects and development work in the field of multilingual tools. Its aim has been defined as the provision of an efficient and effective on-line Community-wide service to users of scientific and technical information at the lowest possible cost.

2. Range of expected services

The primary type of service to be offered via EURONET will be dial-up terminal access for on-line retrospective searching of a wide variety of data bases. Although discussions are still underway on the exact mix of data base services to be offered via EURONET in its initial stages, it is already possible to discern the broad spectrum of likely services. Over 100 different data bases have been offered by the Member States, to be available for on-line access through EURONET on 26 host computers. Hence, when taking into account the host computers of the European Space Agency's Space Documentation Service and of the Commission, the expected initial offering on EURONET is some 28 host computers with more than 100 data bases. The provisional details of these host computers and their associated data bases are presented in the Appendix. Present indications suggest that agriculture will be well represented among EURONET services, both in terms of specifically agricultural data bases and with regard to related fields, such as pharmacology.

To assist the user select the service most appropriate to his needs, the possibility of machine-aided referral is being investigated and it is hoped that this will eventually become one of the main user guidance features of EURONET. As a first step towards such support and guidance for users of scientific and technical information, the

Commission is participating in the EUSIREF project of the EUSIDEC organisation. This project has already established a European-wide service to answer enquiries from users and potential users on available services. The service is based on telephone/address contact points in Belgium, Denmark, Finland, France, the Federal Republic of Germany, Luxembourg (the CEC contact point), the Netherlands, Norway, Sweden and the United Kingdom.

3. Key aspects for users

3.1. Price

It is recognised that the primary responsibility for fixing the tariff level for a given service rests with the service supplier, but it is hoped that EURONET service suppliers as a whole will gradually harmonize the structures of their tariffs. Furthermore, it is intended that the price charged to Community users for access and use of information resources connected to EURONET should be related to actual cost, be as low as practicable, easily understandable to users and should be independent of the location of the user (excluding the local telephone charge for connection of users to national entry points to EURONET).

3.2. Conditions of sale

It is hoped to harmonise as far as possible the various types of agreement for the sale of on-line services via EURONET. Such a harmonisation process involves the collaboration of many different parties. Two major initiatives are already well underway to establish cooperation between the Commission and CIDST on the one hand and the suppliers of services to EURONET on the other.

They are:

- Cooperative efforts with data base suppliers. A joint working party has been set up between the Commission, aided by CIDST, and ICSU AB to draft guidelines on the means for coopera-

tion between data base suppliers and host operators on EURONET.

- A host operators' group has been established to act as a forum for discussion of common problems and development work, including liaison with the PTTs and the Commission.

Particular attention is being paid to the need for the rights of users to be protected, e.g. equality of conditions for all users, freedom of choice, etc.

3.3. User convenience

In view of the multiplicity of services which will be available via EURONET, special care is being taken with regard to the convenience of users, for example concerning arrangements for using the network, billing and payment procedures, referral and passage of users from one host computer to another,etc. Furthermore, efforts are being made to ensure that EURONET host computer operators will make available sufficient user support to ensure adequate accessibility to their services in all Member countries. In addition, the means by which EURONET can also help users who cannot afford on-line access is being studied. A further important aspect of user convenience will be to provide appropriate means for assisting users in the evaluation of services, handling suggestions and complaints, and generally consulting users on a regular basis.

It is believed that use of the many different retrieval systems to become available via EURONET would be more effective and more convenient for the user by means of a standardised command set, which could (at the option of the user and if available for a given service) be selected at the time of a search in preference to the original command language of the service being approached. A feasibility study for such a standardized command set for EURONET is now in its second phase. The first phase has in fact concluded that it is conceptually possible

to provide one common set which could provide most functions for most systems. The following major classes of functions have been identified:

- general features (guidance to the users, etc.)
- entry and initialisation
- data base selection
- query formulation
- output
- miscellaneous.

Standard commands to meet the functions have been proposed and in the second phase of the study are being tested against the ARIANE and GOLEM systems. Furthermore a major effort to help alleviate the typically European problem of coping with multiple languages while sharing information is being undertaken at Community level.

Four main types of multilingual tool are being developed:

- terminological data banks to help the human translation process
- computerisation of multilingual thesauri in a range of subject fields
- development of controlled-syntax automated translation systems, such as TITUS III
- development of free-syntax automated translation systems, such as SYSTRAN.

3.4. Access facilities

A central part of EURONET facilities will be the telecommunications network providing dial-up access and international connections from anywhere in the Community to the various host computers in the Member countries. To this end, an agreement has been signed between the Commission and the Community PTT administrations on a collective basis to establish an international data communications network for EURONET. Among the features of this network will be:

- Packet-switching technology will be used
- In its initial layout, the network will consist of four switching nodes, located in Frankfurt, London, Paris and Rome, and five remote concentrators, located in Amsterdam, Brussels, Copenhagen, Dublin and Luxembourg. The switching nodes will contain terminal interface equipment and hence users will be able to access the network through any of the 9 locations where nodes or concentrators are situated.
- The standard interface defined in the draft CCITT recommendation 'X 25' will be used for connecting host computers (or any packet-mode terminal).

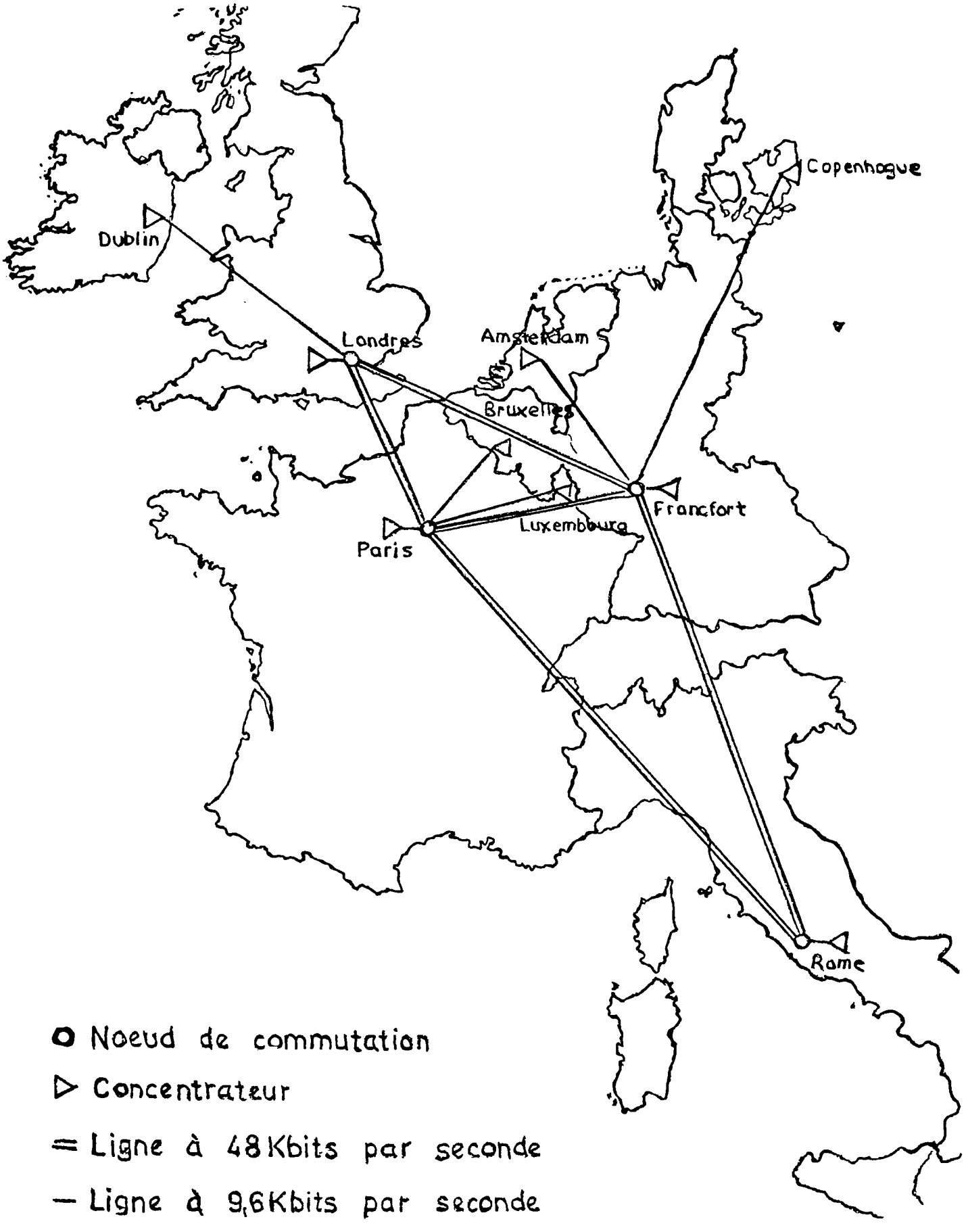
The proposed geographical layout of the network is illustrated on the following page.

4. Outlook

The date of entry into full-scale operation of EURONET is foreseen for end-1978, at which time Community scientists and technologists are expected to instigate several hundred thousand on-line enquiries per year via the network. However, EURONET is already acting as a focal point of a wide range of key information activities at Community level.

The current Action Plan covers the period up to the end of 1977. A second Action Plan for the ensuing period is in the process of discussion. One of the major goals of this draft second Action Plan is the provision for continuity of EURONET development and operation. Hence the forthcoming years should see the emergence of a major force on the Community scene of scientific and technical information, as EURONET provides on-line access for rapidly increasing numbers of users to a wide range of data bases and host computers.

APPENDIX I



Proposed telecommunications network for EURONET

APPENDIX II

Provisional list of host computers and data bases offered for the first phase of EURONET

No.	HOST	DATE OF AVAILABILITY	DATA BASES
1.	British Library - London	Early 1977	UK MARC.US MARC, MEDLINE*, TOXLINE*, Other British Library data bases.
2.	UK Consortium - London	End 1977/ March 1978	CAS*, INSPEC data bases*, and other mainly UK data bases.
3.	CADC - Cambridge	End 1977	Engineering design
4.	NCC - Manchester	Mid 1977	Computing Hardware, Computing Software, Computing Services, Computing Education, Computing Literature, Computer Installations.
5.	Belgian Ministry of Economic Affairs - Brussels	Mid 1977?	INIS*
6.	DIMDI/FIZ - Cologne	Host: Mid 1977 Data bases: Mid 1977/ Mid 1978	BIOSIS, CANCERLINE*, Poisons data bank, EXCERPTA MEDICA, IDIS (Social medicine) CAB Index Veterinarius, International Pharmaceutical Abstracts Hospital Affairs, MEDLINE*, Psychological Abstracts, Science Citation Index (ISI), TOXLINE*, Sport Science.
7.	ZAED/FIZ 4 - Karlsruhe	Host: Mid 1977 Data bases: Mid 1977/ Early 1978	Astronomy and Astrophysics Abstracts, COMPENDEX*, Energie, NTIS*, IKK, INIS*, Inspec-Physics/Electrotechnology/Computers and Control*, Mathematik, SSIE*, NSA*, Physikalische Berichte.

* Duplicated

No.	HOST	DATE OF AVAILABILITY	DATA BASES
8.	IDC/FIZ 3 - Frankfurt	Mid 1977	CAS*, Chemical Industry Notes, IDC-Speicher, DECHEMA, Kunststoffe/Kautschuk/Fasern, IDC-Patents data bank, Vt B.
9.	ZDE + DOMA/FIZ 16 - Frankfurt	Mid 1977	ZEDER, Inspec-Electrotechnology/Computers and Control*, Kraftfahrwesen, DOMA.
10.	ZMD - Frankfurt	Mid 1977	AGRIS*, Zentraler Datenpool der Agrardokumentation, Food Science and Technology Abstracts*, SDIM, Deutsche Bibliographie, and several prospective other data bases from various subject fields.
11.	Institut Textile - Paris	End 1976	TITUS III
12.	Institut G. Roussy - Paris	End 1976	Cancernet Sabir
13.	Fédération Nationale du Bâtiment - Paris	End 1976	Ariane
14.	Necker Hospital - Paris	End 1976	Drugs
15.	THERMODATA - Grenoble	End 1976	Thermodynamic Data
16.	PLURIDATA - Paris	Mid 1977	Chemical Data Banks
17.	INRA - Paris	Mid 1977	CAB , CAIN, APRIA, Zoology, Bioclimatology
18.	HOST 'X' - not yet known (France)	Mid 1977/ End 1977	Pascal data bases, NTIS*, SSIE*, ERDA, MEDLINE*.

* Duplicated

No.	HOST	DATE OF AVAILABILITY	DATA BASES
19.	SDS - Frascati	Mid 1977	CAS*, SCISEARCH, Inspec*-Physics, Electrotechnology, Computers and Control, COMPENDEX*, NTIS*, World Aluminium Abstracts, NASA, Electronic Components, AGRIS*, METADEX, Environmental Science Index, Pascal Data Bases, Pollution Abstracts, Oceanic Abstracts.
20.	Commission - Luxembourg	Mid 1977/ End 1977	?
21.	Datacentralen - Copenhagen	Mid 1977	CAS*, Food Science and Technology , MEDLINE* (through SCANNET), COMPENDEX*.
22.	CNUCE - Pisa		Data bases: on ecology, geothermical science, iconography, oceanography, legal documentation, fine arts, citation index (Italian authors).
23.	CINECA - Bologna		Data bases on: biology, general and inorganic chemistry, astrophysics.
24.	Supreme Appeal Court - Rome		Data bases on: legislation, jurisprudence, principles of national and Community law.
25.	Inter-faculty Computing Centre - Rome		US MARC
26.	Montedison - Milan		Technical and economic data bases on basic chemical industry. 'Access' to the Montedison libraries (bibliographic data).
27.	CSATA - Bari		Meteorological data bank (concerning the South of Italy).

* Duplicated

No.	HOST	DATE OF AVAILABILITY	DATA BASES
28.	CILEA - Milan		Data bases on: human sciences, geophysical information concerning Italy.

INTRODUCTION TO THE ARIANE ON-LINE SYSTEM

by M. Devoge
Center of Technical Assistance
and Documentation (CATED), FRANCE

It may appear surprising that a building construction expert should be giving a paper at a symposium on the transfer and interpretation of scientific and technical information in agriculture.

In fact my centre, the Centre d'Assistance Technique et de Documentation of the Fédération Nationale du Bâtiment, in France, has had an information processing and management system, called ARIANE, since 1972. This system was designed to meet the needs of the final users of information on building. It is not an offshoot of conventional automated documentation systems.

We decided to set up this system because the systems in existence at the time, although they met certain scientific needs, were unable to meet the needs of the final users, for whom an abstract is not sufficient and who need their information to be coordinated and immediately usable.

Actually, there is a good reason for my presence here and for the demonstrations which you will have in the course of these two days.

At the request of the Bureau National d'Information Scientifique et Technique, in France, an agreement has been signed with the Institut National de Recherche Agronomique whereby the latter would conduct a pilot experiment in managing

current agricultural research projects, using the ARIANE system.

This experiment was conducted in the second half of 1975 and the first quarter of 1976, and will be demonstrated together with the application of the system to building. A decision now has to be made by the Bureau National d'Information Scientifique et Technique and the departments concerned with agricultural information in France, as to whether to pursue this project, which could continue either with the management of agricultural research projects or with research projects on other topics so as to cover a multidisciplinary field.

That is why I am here.

To help you to understand ARIANE, I have prepared a number of documents which will enable me to explain to you how this system works.

First of all what does ARIANE mean?

ARIANE means (see diagram No. 1)

The nomenclature may appear a little complex at first sight, but, going back to mythology, we have tried to guide the consultant with a guiding thread like Ariadne's thread.

The data are arranged in networks (see diagram No. II). In these networks each node, which may be a concept, a keyword or a phrase, is linked to all the other concepts with which a relationship is to be established.

These relationships are set up by the designers of the network, in other words by human agency. Data processing aids may be given regarding existing data, but the human agency takes precedence in the layout of these data.

Thus the basis is a network of concepts (see diagram No. III). In this network of concepts, depending on what use is to be

made of it, any data you like may be entered.

For its application to building (see diagram No. IV), I am showing just a few concepts. There are many more, of course, and I could not fit them all on to the diagram - that would not be possible.

In applying the network as we have done to managing agricultural projects (see diagram No. V) - which I have abbreviated to 'agriculture' for reasons of space - the user has only to set it out in accordance with his own needs.

We will take one of the concepts selected and request the subsequent concepts which are offered on the terminal screen, and little by little we shall reach the concept which comes closest to what we have in mind, although it is not necessarily identical.

To make consultation easier, the concepts are classified under various categories. We have allocated what we call 'categories' to the nodes, and from the philosophical point of view, these categories can be grouped under three main headings (see diagram No. VI), viz:

- routeing nodes - i.e. the user finds a concept which is fairly relevant and which can be routed so as to reach the information required.

- nodes which we call 'doubt resolution' nodes. These doubt resolution nodes are used because the same word can often indicate two totally different things, and this doubt must be resolved.

- lastly, 'proposal' nodes - these enable proposals to be made to the user, depending on the specific application. These concepts of 'proposal', do not in any way change the principle of the 'routeing' network, whatever the ARIANE system may be used for.

The principle of the 'doubt resolution' network also remains

the same. On the other hand, the principle of the 'proposal' network changes, depending on whether the application is building or agriculture (in this case the application is building) (see Diagram No. VII). We have certain concepts which constitute families of building products, and these comprise different products of the same type, e.g. plaster tile partitions. The manufacturers of these products and the products themselves with their trade names are linked in these families of products.

When the system is used for managing agricultural research projects (see Diagram No. VIII), the proposal network nodes are used as follows:

- the building products family will correspond to the research family - research topic;

- the manufacturer of building product will correspond to the person carrying out this research, his place of work or laboratory and, linked to the research worker and the family or families of products (since there may be several) the title of the research project in hand.

Lastly, we need the information itself, the ability to supply the information required to the person making the interrogation.

Associated data, which may be of different types, can be added to each node in the routeing, proposal or doubt resolution networks (see Diagram No. IX).

At present our system uses eight categories of associated data. Its maximum capacity is 24. Here are a few examples:

- associated data on technical subjects;
  on regulations;
  on pathology;
  on implementation;
  on documentation;

- and data on economics

and so on up to 24 categories of data for one data title. I think that this is extensive enough to provide the necessary information, and I may say that as we apply it to building 8 types of data, stemming from one data title are amply sufficient.

Let us now pass on to the data themselves. These data are structured into what we call Items (see Diagram No. X). This structure is essential so that single - not multiple - updating can be carried out when a subject changes.

The Item is unique in itself and is cross-referenced as many times as required. This means, conversely, that a single updating ensures that every area where the information (Item) appears has been updated.

Our system operated in natural language and contains a number of error compensation procedures (see Diagram No. XI). There are several reasons for this. Not everyone can use a typewriter keyboard, the user often has something in writing but which contains spelling mistakes, or the request for information is made over the telephone (as happens with us) and this often produces 'scrambled' words.

We have developed certain compensation procedures which manage to correct certain errors. Obviously we do not correct them all, and I am sure that I shall make some errors myself in the demonstrations which I am going to give you.

To do all this we have installed a number of software packages (see Diagram No. XII) and the procedure is as follows:

- the user is there, he consults the data and he can update them using software for updating by conversational mode. The data are stored on discs. Software packages for updating the data bank are used and, in the building system, we carry out updating

every week.

- stemming from this data base we have consulting software which enables us to supply the information to the different terminals which are used by the different departments. We also have printed editing software since we sometimes need great masses of information which it is preferable to produce either directly as listings or on magnetic tape for photocomposition. Of course we also have software for updating which comes from the feedback from the users and is sent to the creator or to the person responsible for updating.

Our system uses IBM equipment on a 370/158 computer (see Diagram No. XIII). We use 200 K octets and the operating system is the MVS system. The building system has been in operation since December 1972. The system has a store of more than 250 million characters, which means more than 100 000 nodes in the networks whose structure I showed you, and over 100 000 items, i.e. units of information.

The turnover of information for the building system is 45 % per annum, which means that we have to amend 45 % of our 100 000 nodes or 100 000 items, which is a lot.

This, by the way, is why we have set up conversational updating procedures. We have 12 terminals which are used for consultation purposes and 6 which are used practically full-time for updating.

Our building system is used throughout France and there are seven bases (see diagram No. XIV), viz. Paris, Lille, Strasbourg, Lyon, Marseille, Toulouse and Nantes. It uses the CADUCEE network, which is a data transmission network operating at a rate of 4 800 bauds.

There is now a connection between Luxembourg and Paris via the

switched network, i.e. the normal telephone system, and this operates at a rate of 1 200 bauds. We may have a few small incidents because we are using the means available at present, since Euronet is not yet operating, and these are not as reliable as the data transmission network which the European Communities wish to set up.

I think this completes my introduction of the ARIANE system. I also think that the demonstrations will work very well and that I shall be able to show you both the building and agriculture systems.

I must ask your indulgence since I am not an expert on agriculture and there are some terms which I do not know.

Thank you, Mr. Chairman.

ARIANE

ARRANGEMENT	Arrangement
RETICULE	(coordinated)
DES INFORMATIONS	of information
POUR L'APPROCHE	for approaching
DES NOTIONS	concepts
PAR LEUR ENVIRONNEMENT	by means of their environment

DIAGRAM I

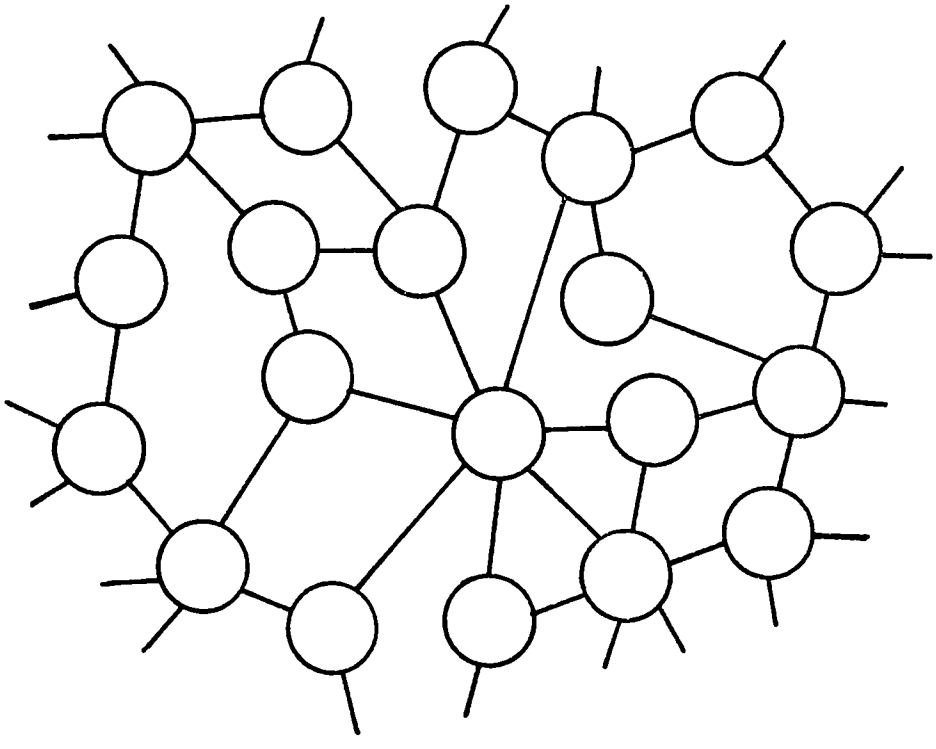


DIAGRAM II : NETWORK STRUCTURE

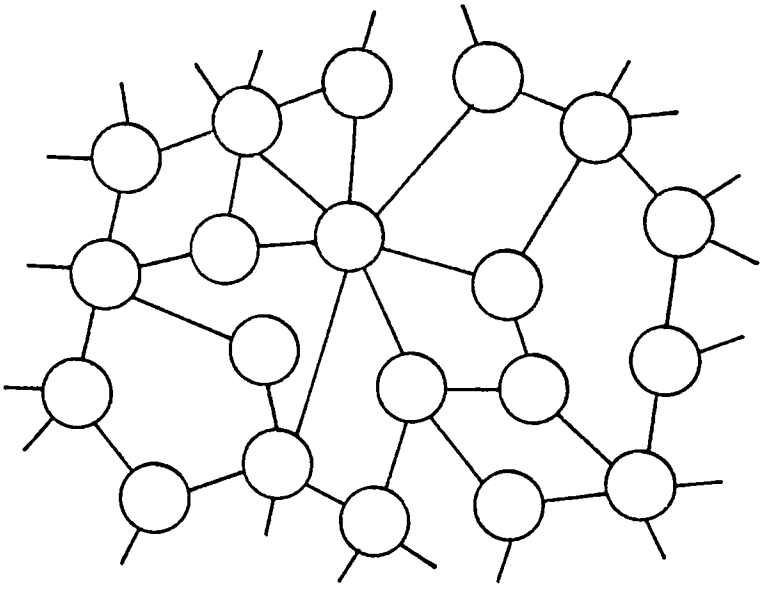
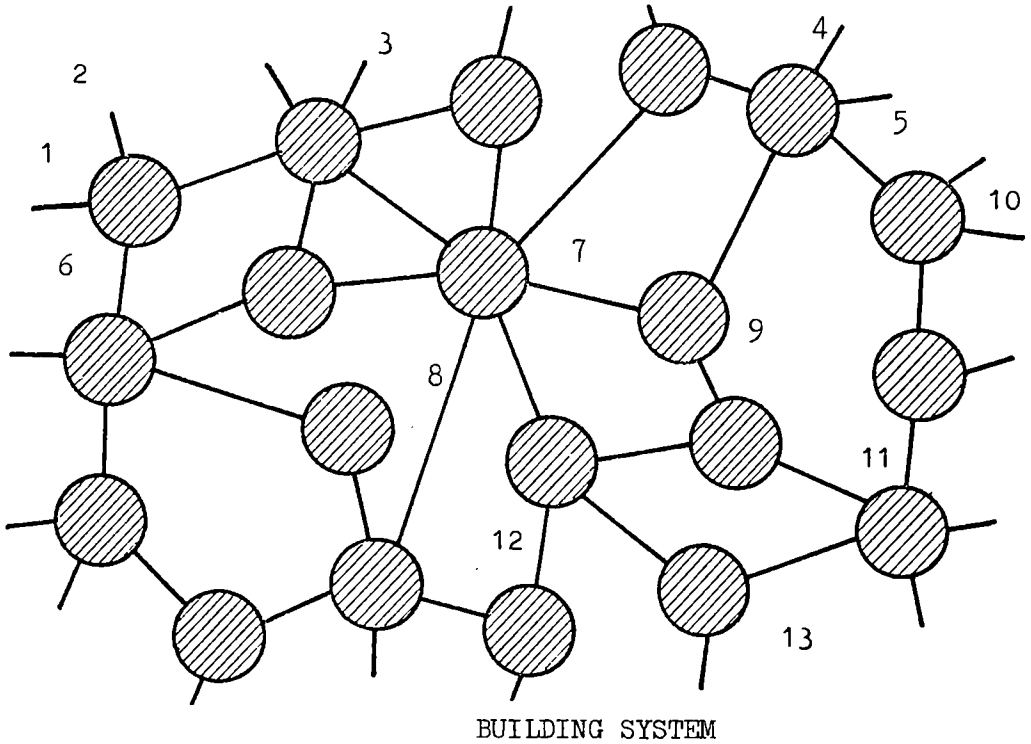


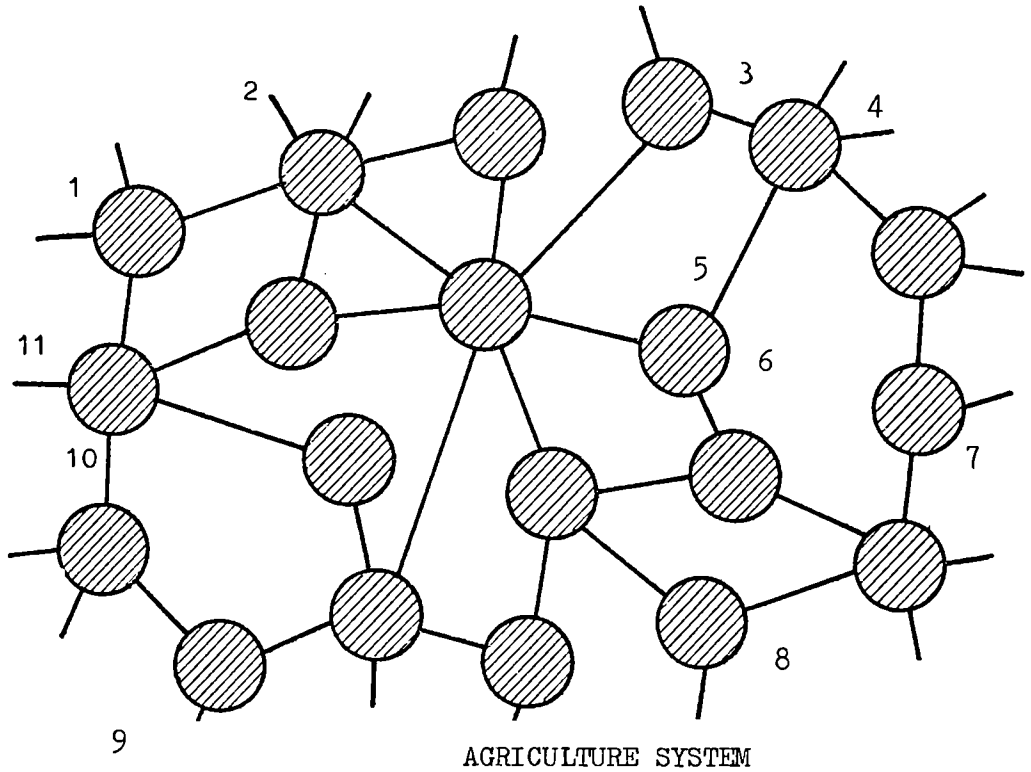
DIAGRAM III - THE BASIS : NETWORK OF CONCEPTS



BUILDING SYSTEM

1 Additive	4 Floor coverings	7 Concrete	10 Plaster
2 Aggregate	5 Painting	8 Acoustics	11 Heat
3 Cement	6 Form work	9 Electricity	12 Alpha coefficient
			13 Materials

DIAGRAM IV - THE BASIS - NETWORK OF CONCEPTS



AGRICULTURE SYSTEM

1 Geography	4 Soft wheat	7 Seed quality	10 Genetics
2 Metereology	5 Crop improvement	8 Weeds	11 Fruit
3 Durum wheat	6 Seed	9 Taste characteristics	

DIAGRAM V - THE BASIS : NETWORK OF CONCEPTS

Node categories

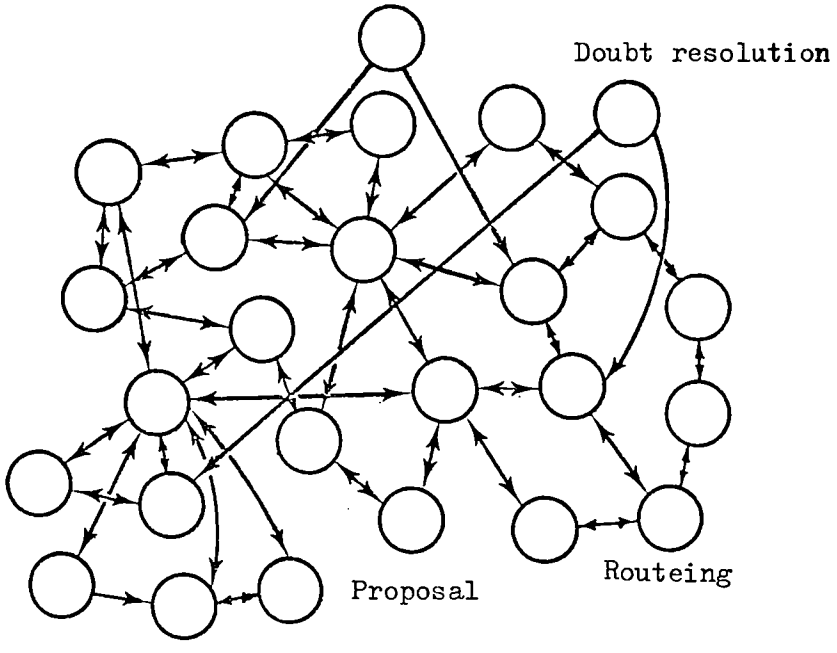
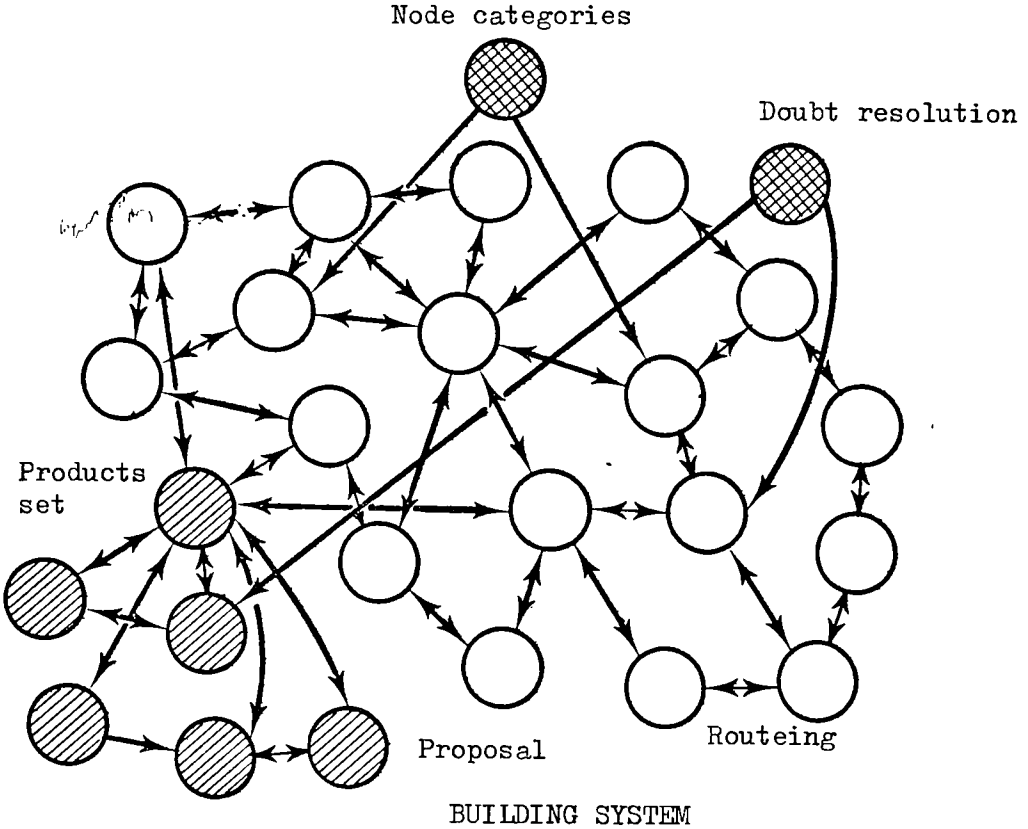
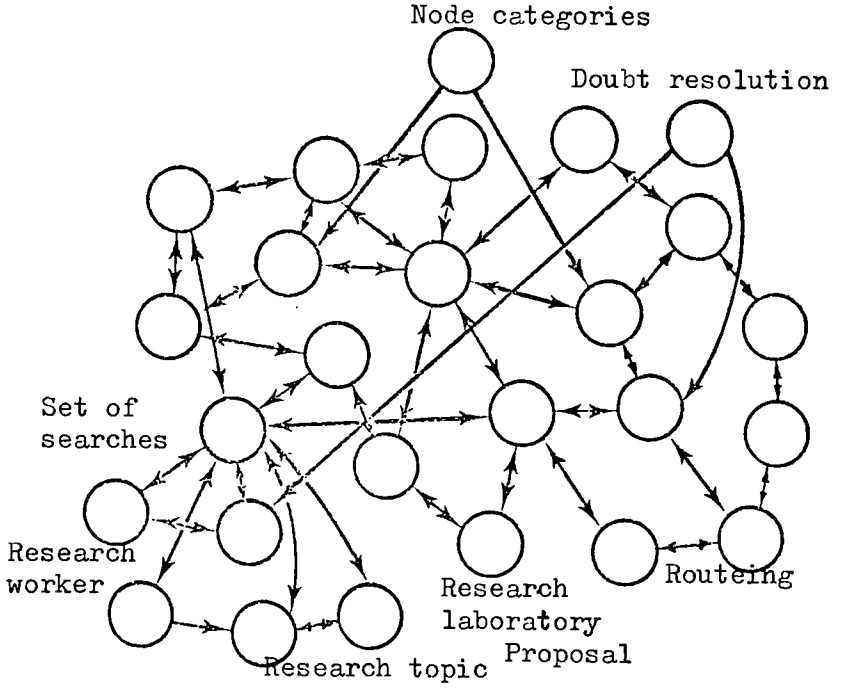


DIAGRAM VI - NODE CATEGORIES



BUILDING SYSTEM

DIAGRAM VII - NODE CATEGORIES



AGRICULTURE SYSTEM

DIAGRAM VIII - NODE CATEGORIES

EACH NODE HAS RELATED INFORMATION

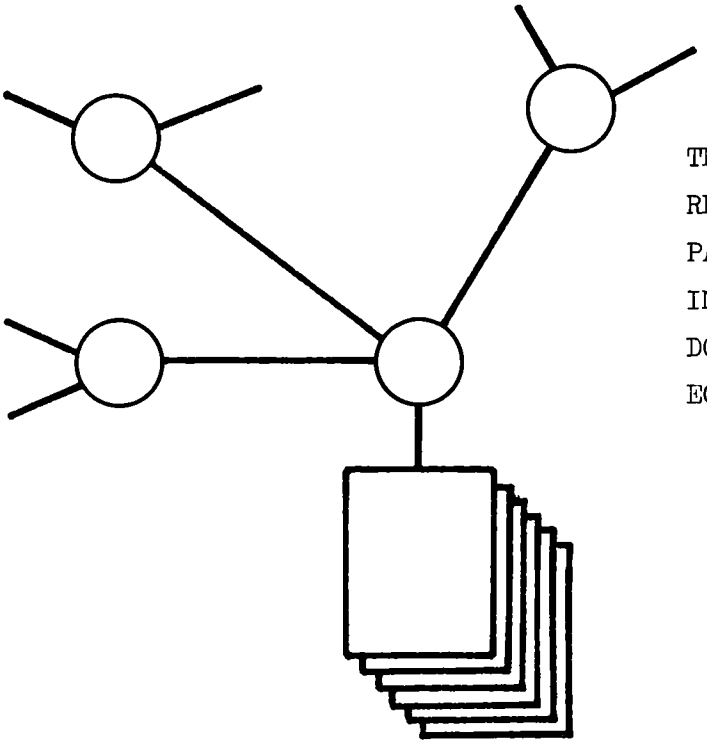
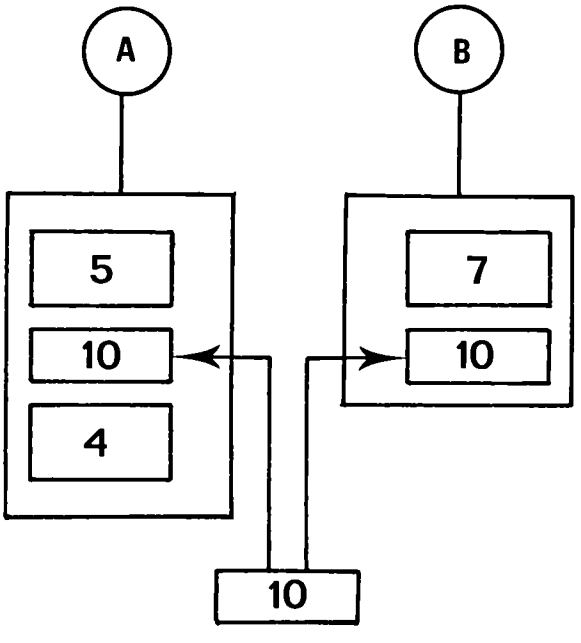


DIAGRAM IX

ASSOCIATED RELATED INFORMATION
STRUCTURED IN 'ITEMS'



1 single updating means that each area where the information is used is updated.

DIAGRAM X

ACCESS IN NATURAL LANGUAGE
WITH ERROR DETECTION PROCESSES
- ALTERED WORDS
- SCRAMBLED WORDS
IN THE CONVERSATIONAL MODE

DIAGRAM XI

A SET OF SOFTWARE PACKAGES

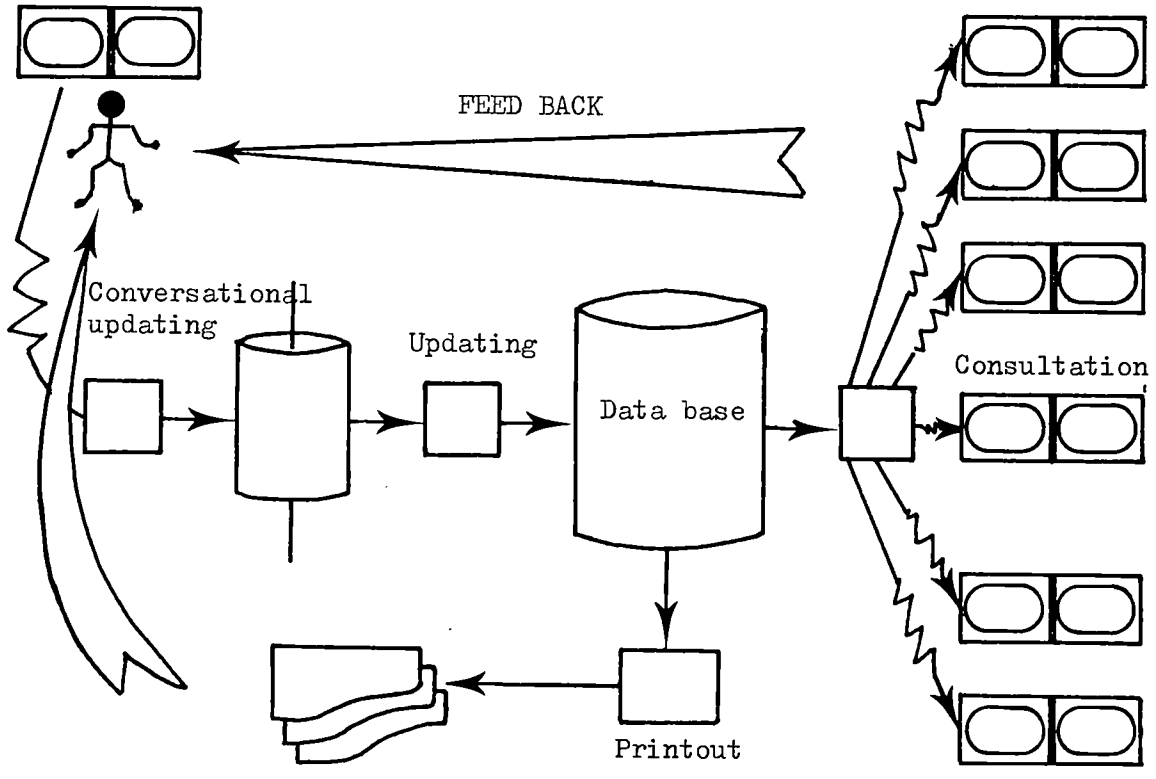


DIAGRAM XII

INSTALLED ON IBM EQUIPMENT 370/158

200 K octets in MVS

BUILDING SYSTEM OPERATIONAL SINCE DECEMBER 1972

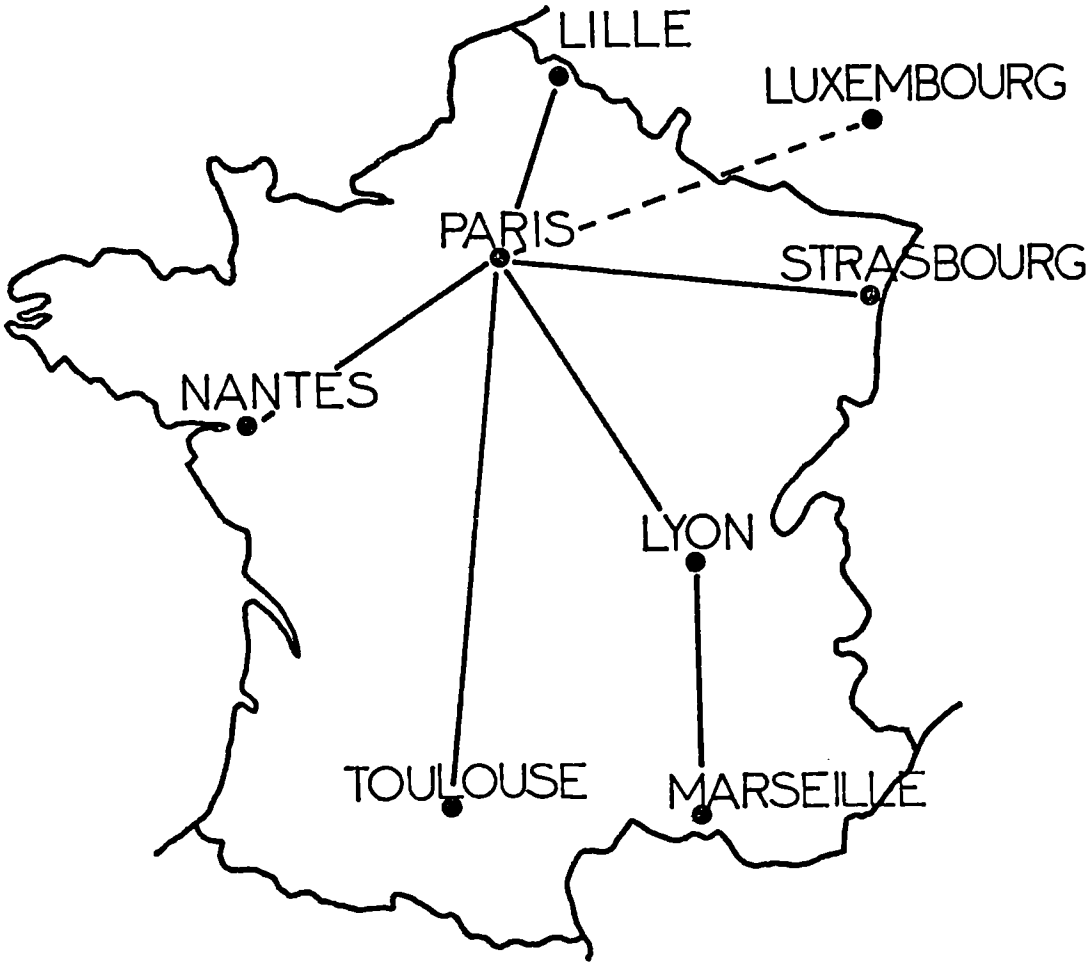
more than	250 000 000 characters
more than	100 000 nodes
more than	100 000 items

TURNOVER OF INFORMATION : 45 % PER ANNUM

12 TERMINALS FOR CONSULTATION

6 TERMINALS FOR UPDATING

DIAGRAM XIII



VIA CADUCEE	4 800 BAUDS
VIA SWITCHED NETWORK	1 200 BAUDS

DIAGRAM XIV

DISCUSSION ON THE PAPERS OF SESSION I
INFORMATION SERVICES

The discussion centered on three main aspects :

1. The degree of use of Information Services/Systems
2. Quality control of information entering the system
3. Operational aspects.

1. The degree of Use of Information Services

The main users of existing Documentation and Information Services are scientists. No information is available on total utilisation. Studies of the use of individual services had been made but these have not been comprehensive enough to permit generalisation. It requires an understanding of how to use the system to gain access to data bases so there is a good deal of indirect use (through intermediaries such as librarians and documentalists) and this has not lent intself to measuring total use.

As availability of data bases increase, the role of these intermediaries having control of access will become more and more important, at least in a transitional period.

2. Quality control of Information Entering the System

The value of having access depends on the quality of the information in the system. The point was made (Denmark) that documentalists accept what was offered. Who decides what is worth including and what should be excluded? Was a referee system required?

Mr BUNTROCK proposed to distinguish between coverage control for reference services and quality control for factual data banks. With regard to the first one he explained that at present two forms of coverage control were used for agricultural information - a central system like CAB where positive screening was done by one or more central agencies and a co-operative system like AGREP and AGRIS where National

agencies made the selection and all documents of a certain level were included. The vast majority of existing Services are title citation and abstract services. In the case of the reference type system, the documentalist took responsibility for the correctness of the bibliographical data only but not for the value of the document and he can point to the author as the person ultimately responsible for credibility of content. In findings type information or factual data banks, however, data have to be evaluated because recourse to original information sources is not always possible or no longer wanted. Who does this evaluation? Researchers, documentalists, or referees? Whoever would finally be responsible, he has to know both the subject matter and data handling.

3. Operational Aspects

EURONET serves simply to link existing and planned host computers in EC Member countries and make the data they contain accessible on an EC wide basis. The aim is to provide an efficient on-line (seeker can make contact with a computer terminal connected to data base) network at lowest cost. This requires making tele-communication arrangements between countries and within countries (contracts with the PTT authorities in the 9 countries have been signed). Agriculture forms a special sector of the system. At present the EC pooled information system on agricultural research projects (AGREP) is limited to lists of reference type data. EURONET will give access to other data bases including AGRIS, an international system devoted to agricultural literature information.

As an individual sector, agriculture poses no special technical problems for EURONET even accepting that there are a big number of points of passage in the flow of information from research to farmer or other user.

A person seeking access to EURONET can do so only by means of a computer terminal. For the vast majority of people (e.g. an Agricultural Adviser) this will mean going through another person who will physically carry out the keyboard actions on a computer terminal to get the information sought. This person would then telephone or mail the information to the adviser. All this, of course, assumes that the seeker is able te effectively communicate his needs to the person who is going to carry out the search.

In addition to the above, a referral service is available for persons seeking guidance as to where to find a specific item of information.

EURONET alleviates the international situation in regard to ease of connection, cost and so on. It does not in the present state of development alleviate the national situation where long distance telephone calls within a country (e.g. Hamburg to Frankfort) may be costly. However, the PTTs in the different countries plan (where necessary) to develop national networks (there already exists an experimental network in France.

There should be no apparent difference to the user between EURONET and the telephone communications network. The Telex system is not usable, but normal teletypewriter terminals will be able to access EURONET.

The point was raised (Germany) that advisers would be likely to turn to EURONET with very difficult questions and would want a written reply. Mr DAVIES saw no reason why EURONET should be an elite system for only very difficult questions. On the contrary, its aim was to be a general-purpose access mechanism for any type of on-line STI enquiry.

In regard to cost of using EURONET, in addition to the cost of the local telephone call, the following were the main items of cost, telecommunications, host processing charge (the largest element of cost) and data base royalty costs (the remuneration to the producer of the data base). A search requiring 30 minutes today typically costst 30 to 60 dollars, but it was anticipated that EURONET would help bring this cost down.

The point was made (Netherlands) that a general adviser with a difficult question would turn to the specialist adviser and who could then turn to EURONET. Mr DAVIES thought that in the first phase those with experience would be the main users. In future the scope could extend to the end user.

SESSION II

- General remarks on the dissemination of agricultural information and related problems in the Community

- Priority sources of information currently available to the official advisory service in England and Wales

- Organization of "Agricultural development" services in France, and the information sources at their disposal

Discussion on this papers

GENERAL REMARKS ON THE DISSEMINATION OF AGRICULTURAL INFORMATION AND RELATED PROBLEMS IN THE COMMUNITY

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Abstract

Technological changes and rapid socio-economic evolution have been instrumental in bringing about radical changes in agriculture in the countries of the Community. It is therefore essential for those engaged in agriculture to be able to make the necessary changes. For this reason efforts are being made in all the Member States to develop and perfect systems for the collection and dissemination of information and for guidance, so as to enable farmers to make these changes. The Member States recognize that the general object of the dissemination of information is to propagate technical, economic and social knowledge, so as to provide all persons engaged in agriculture with an opportunity to assess the possibilities for improving their agricultural holdings and for raising their own and their families' standard of living.

I. Conception and organization of dissemination of information

Certain Member States have entrusted the dissemination of information to professional organizations, others to the public services or even, to varying extents, to public, semi-public and private bodies simultaneously. In all the Member States the State is responsible for coordination and harmonization, and also intervenes by granting subsidies.

Dissemination of information is diversifying, becoming more specialized and developing new activities - such as socio-economic guidance (application of Title I of Directive 72/161/EEC) - and takes particular account of underprivileged areas and groups.

II. Problems encountered in the dissemination of information

Problems have been encountered in :

- the organization and coordination of the services;
- training and briefing staff engaged in the dissemination of information;
- the link between information, training and research;
- the way in which information is received by the rural and agricultural population;
- the rôle of the dissemination of information in solutions to environmental problems
- financing.

During the course of the last two decades agriculture has undergone considerable changes, and in the Europe of the Communities those changes have been speeded up by the implementation of a common agricultural policy. Ever more advanced technical progress and a socio-economic development which was both far-reaching and rapid have led the countries of the Community to seek the most efficient ways for their respective agricultural industries to adapt themselves to the economic growth, so as to achieve a balance between the number of people employed in them and the possible levels of income which they are able to offer. It is difficult to achieve such a balance, especially if, as has been the case in the last few years, the common agricultural policy has to face the impact of monetary instability and the economic recession which is affecting the whole Western world.

Under these conditions, it is more necessary than ever that people engaged in agriculture should be equipped for coping with the changing circumstances in ways which they themselves judge to be the most promising in an uncertain economic climate. It is with this object in view that some care is being taken to develop and perfect the information and advisory services.

The dissemination of agricultural information, taken in the widest sense, is on the one hand a two-way information channel between farmers and the bodies responsible for planning and carrying out improvements in agricultural structures, and on the other an effective guarantee that farmers can actively cooperate in such projects. It is designed to ensure that those working in the agricultural industry are supplied with sufficient technical economic and social information to enable them to assess possibilities for the improvement of their holdings and of the standard of living of their families and themselves.

The Member States of the Community have recognized these essential aspects. Apart from a few slight differences, they all assign more or less the same task to the dissemination services, all of which implement programmes designed to improve holdings, production and management, to raise standards of living and to improve the social conditions of farmers and their labour, both hired and family. It is nevertheless true that

the particular situation of each country is reflected in the ideas adopted and the means and methods employed, and the ensuing differences also have their origins in the circumstances of historical development and the psycho-sociological conditions prevailing in each country.

It is therefore necessary to summarize briefly how dissemination is conceived and carried out in the nine countries which make up the European Community at the present time.

Some countries have entrusted professional organizations with dissemination, others the public services, either alone or in conjunction with semi-public bodies and private organizations. In every country, the State assumes a coordinating and harmonizing role, and also grants financial aid.

In the United Kingdom a distinction is made between the different regions. In England and Wales, the Ministry of Agriculture, Fisheries and Food carries out the dissemination of agricultural information through its Development and Advisory Service, which since 1971 has also coordinated the work of the research and veterinary services, etc. There are also private services.

In Scotland, the agricultural information and dissemination services are in the main the responsibility of the three Scottish agricultural institutes and are financed by the Department of Agriculture and Fisheries for Scotland. As in England and Wales, various associations also take part in activities of dissemination.

In Northern Ireland, the Department of Agriculture is responsible for the dissemination of information, while a few other official bodies, either for the United Kingdom, or for Northern Ireland itself, take charge of specialist services.

In Ireland, the Ministry for Agriculture and Fisheries is responsible for the dissemination of agricultural information via the County Committees of Agriculture, while semi-public bodies supplement government activities where information and advice are concerned.

In Luxembourg, there is no longer a State department for the dissemination of information as such, a special information service is financed by the State but is the responsibility of the agricultural profession; however, advice can be given to farmers by the technical services for agriculture and the department of rural economy.

In France, the dissemination of information, which was made the responsibility of the professional organizations by a decree of 11 August 1959, was defined as 'développement agricole' (agricultural development) under a decree of 4 October 1966 and is still the responsibility of the profession : the State is participating less and less in direct action, except to fulfil its control, coordination and assistance role in some areas where there is insufficient professional organization. At the same time it continues to participate in the work of all the bodies concerned with agricultural development.

In Italy, as a result of the institutional reorganization of the State in 1973, the responsibility for agricultural dissemination has been allotted to the Regions, while the central authorities retain responsibility for market research and promotional activities at national and international level, as well as for research, distribution and experimentation.

In Denmark, the practical organization and the administration of advisory services in agriculture are in the main provided by two large agricultural organizations representing local associations, while the State itself limits itself to a supporting role.

In the Federal Republic of Germany the Federal Government grants aid for the dissemination of information. The organization and activities are the exclusive responsibility of the Ministries of Agriculture of the Länder or, where appropriate, of the chambers of agriculture.

Some professional associations for dissemination or specially constituted groups (Beratungsring) also exist in certain regions and are granted financial aid.

In Belgium, the dissemination of information is carried out primarily by the officials of the Ministry of Agriculture. However, at the local and regional level there are close contacts between the public authorities responsible for dissemination and other semi-public or private bodies, such as management committees.

In the Netherlands in 1969 the State authorities reorganized the national service for the dissemination of agricultural information, which became the service for the development of holdings; the dissemination of socio-economic information is carried out by professional organizations, while information on the service industries is carried out by commercial and industrial concerns. A national council for the development of holdings has the task of ensuring a certain homogeneity between the different forms of dissemination.

The very definition of the dissemination of agricultural information demonstrates the breadth of tasks which it must perform in all sectors of agriculture; no aspect must be neglected, whether it be techniques of production, management or domestic and rural economy. This means that disseminators must specialize and diversify, but at the same time must bear in mind the need to coordinate all the advisory and information activities.

Consequently, quite apart from the usual tasks of dissemination, namely technical assistance, advice on management, marketing, etc. , new activities are being developed, such as the provision of socio-economic information pursuant to Title 1 of Directive 72/161/EEC of the Council of the European Communities, which is now effective in the majority of Member States.

It is appropriate at this point to emphasize the main objective of socio-economic information, which is to provide farmers with the maximum of information on a comprehensive basis in order to throw light on all the possibilites open to them - the continuation of an activity in the content of a modernized agriculture, consideration of an activity in a non-agricultural sector, or the cessation of agricultural activities altogether. Information of this kind is very wide-ranging; it is

obvious that in order to be efficient the services and the counsellors who disseminate such information have to make an effort to define their spheres of activity and to act in close co-operation with advisers in technical and economic information services, with management advisers, and generally with all the other bodies in agriculture, as well as with those authorities, such as departments of employment, vocational guidance, manpower, etc., to which farmers may have recourse when changing from agricultural to other employment, giving up their present line of activity or when enquiring about prospects for their children.

In addition, in order to deal with situations which certain less-favoured areas or groups have to face, special efforts are being made. The dissemination services have to launch specific action programmes which they see as providing an answer to the most urgent needs which they can see in agriculture, or in certain sectors of agriculture, in their countries; these action programmes sometimes entail the use of new methods.

In Belgium, 52 demonstration centres (demonstrations on the principal varieties of farm crops and new crops, phytotechnical demonstrations, miscellaneous demonstrations, methods for keeping management records, etc.) have been set up to aid economic progress. There are also 112 management committees whose members have constituted a nucleus of people able to exert a beneficial influence on other farmers since 1962.

In the Federal Republic of Germany, a new drive is being undertaken, notably for the benefit of farming areas which are, or have been the subject of an economic development plan; special counsellors have been designated to carry out this task. The department for the analysis of both agricultural and domestic information has taken on new tasks of coordination and the use of resources; the resources for providing disseminators with better training and with up-to-date material are also being increased.

In France, dissemination of information is called 'développement' (development) in order to show that problems have to be studied as a whole at the level of the agricultural regions. The emphasis is on the programming of projects in such a way that they are planned and

implemented with the participation of the farmers. New management methods, which delegate increased responsibilities to the professional organizations, have led to each action programme being tagged with a series of indicators showing effects and results so that progress can be monitored continually.

In Italy, a country undergoing a period of radical changes, an effort has been made to step up technical assistance in certain central areas and parts of the Mezzogiorno and to consolidate farms in other regions. As far as methods are concerned, traditional systems adapted to the new situation in the regions have been chosen, and in some cases greater use has been made of audio-visual methods.

In Luxembourg special efforts have been made to encourage cooperation between holdings.

In the Netherlands the emphasis has been shifted from purely technical and economic information to more general information relating to all aspects of farming. The dissemination of information for agricultural and horticultural workers has been developed. As far as the dissemination of general information goes, priority has to some extent been given to areas where redistribution of land has taken place.

In the United Kingdom counsellors are requested to focus their attention on problems which have the most direct bearing on an increase in productivity and new techniques are being developed at experimental pilot stations; an additional information service for hill regions is projected.

In Ireland the less-favoured areas in the West have been the subject of a special dissemination programme, while a supplementary instruction programme has also been envisaged for over-populated districts. Local groups interested in the development of a particular activity receive the appropriate technical assistance. In addition, the State helps organizations responsible for dealing with social aspects in a rural context.

In Denamrk it was not judged necessary, for information and advisory purposes, to decide what rural areas were less-favoured, etc. A computerized system for agricultural accounts was set up in 1962.

Such a brief summary of the ways in which dissemination is carried out would be incomplete if limited simply to a description list of projects being executed at the present time. In these times of change, problems inevitably occur when putting ideas into practice. We must therefore establish which of the problems facing disseminators daily cause the most difficulty and which must be given precedence for that reason.

Although each country has its own specific conditions, it would appear that the following problems are common to all :

- as far as the internal organization of the services is concerned, there is the problem of the coordination and specialization of the different sectors within them;

- with regard to staff for the dissemination of information, there is the problem of training and keeping them informed;

- where the necessary link between information, training and research is concerned, there is the question of what methods should be employed so that the dissemination of information can fulfil its connecting role most effectively.

- Another problem is the attitude and reaction of the farming and rural population to information.

- The financial aspect must not be underestimated, and finally it is appropriate to bear in mind the role that dissemination can and must play with the cooperation of the entire rural and agricultural population in the serious problem of the environment.

In response to the scale and diversity of information requirements in the different sectors of agriculture, advisory services everywhere hav adopted staff specialization; however, a number of them have found it useful to use the services of general or multiple-field advisers as well as those of specialist information officers, and also those of socio-economic advisers who consider not only the technical and economic problems, but also their social and human aspects. This diversification, together with the necessity for an overall approach, means that the government or professional management has to consider carefully how best to gear and coordinate all the information and dissemination activities so as to avoid unnecessary duplication and frustrations. In that context the Departments of the Commission have always stressed that the advent of socio-economic information afforded an opportunity to re-examine how information services are organized with a view to introducing a greater degree of teamwork; indeed, it is only in this way that it will be possible to satisfy both the demands made by increased specialization and by the need for an overall approach.

This leads on quite naturally to the second priority, the training of information officers and counsellors and keeping them informed. In the light of their respective specializations, they must be provided with programmes, periods of practical training, further training and courses in communication. Given the nature of the objectives of dissemination, and its extension into other spheres of action, such as socio-economic information, which necessitate an extensive knowledge of economics and sufficient maturity as well as purely technical ability, the importance of a course of training which achieves the necessary balance between theory, practice and human aptitude cannot be over-emphasized.

This leads directly to a number of questions which again open up a number of avenues to be explored.

How should the training of agricultural engineers who intend to work in information be planned in the future ?

Is a university education indispensable in all cases ?

How could the practical training of counsellors be made more effective and therefore efficient ?

How could the teaching of the methodology of dissemination be efficiently incorporated into the programmes and how could the aptitude of potential disseminators for communication techniques be developed ?

All these problems can be summed up in the single question :

how can research, the dissemination of information and training be co-ordinated?

It seems desirable to strengthen contacts between research and dissemination, so that disseminators are in a position to play an efficient role as intermediaries between researchers and farmers, informing farmers of the results of research, and researchers of the farmers' needs. It is true that an effort has been made to increase the number of research and experimental centres and also to equip dissemination services in such a way that they obtain both the information they need and the specialists capable of evaluating and communicating it. It is nevertheless true that not enough has yet been done to enable researchers to obtain sufficient knowledge of the real needs of farmers. Moreover, in order to be able to benefit from the possibilities which the results of research may offer, farmers themselves must not only be informed by disseminators, but must also themselves have an adequate level of training. A number of tricky practical problems arise :

How can contacts between colleges, research institutes and dissemination centres be increased ?

How can results of research be made accessible for dissemination, so that disseminators can then pass them on to farmers in a form which will be understood?

How can contacts and reciprocal information channels be improved and developed between research bodies, fundamental research institutes and applied research centres so as to coordinate their activities and to avoid duplication and the wasting of efforts and resources ?

That leads us to examine the problem of the dual nature of information : information for agriculture and information on agriculture.

For the first half of this question, information for agriculture, it is necessary to find out how to reach the large mass of farmers and to take into consideration the various methods of dissemination which exist for that purpose : individual guidance, advice in small groups, mass communication. Their use depends of course on natural, psychological and sociological circumstances, and also on financial resources. Methods must be adapted to the categories of farmer concerned, according to whether their holdings are modern, average, small or in difficulty.

In considering the aspect information on agriculture, one must be aware of the fact that the public often has a poor grasp of the problems of agriculture, which affect it mainly from the point of view of the consumer. The necessary awareness, necessary because ignorance in that respect constitutes an obstacle to the development of agriculture, can and must be facilitated by a new approach to dissemination, which also has a role to play in environmental problems.

It is certain that these problems, closely linked to those of pollution, which is beginning to be on everyone's mind, must be investigated in the immediate future by the dissemination services. Acting in cooperation with the environmental services and agencies which have been set up, they certainly have an important role to play in helping farmers, who are by their function the principal guardians of the environment, to adapt to the demands of environmental protection.

There remain of course the financial problems which are obviously entailed by the expansion, the diversification and the development generally of information and dissemination activities. The fact that Directive 72/161/EEC allocated Community aid for one of the new aspects of dissemination, 'socio-economic information', shows that there is a way in which Community support can create prospects for future action.

PRIORITY SOURCES OF INFORMATION CURRENTLY AVAILABLE TO THE OFFICIAL ADVISORY SERVICE IN ENGLAND AND WALES

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Abstract

The Ministry of Agriculture's Agricultural Development and Advisory Service (ADAS) is a multi-disciplinary force which has extension, research and development, and regulatory functions : these three mainstreams of activity comprise an integrated effort, and advisory work takes up about 25 % of the total. In essence, extension is organized on a two-tier basis. At the front line, providing the main source of advice to farmers, is a general adviser who advises on farming problems across a broad subject-matter spectrum and in a whole-farm context. In support of the general adviser is a corps of specialist advisers covering a wide range of scientific disciplines who, in the main, also undertake research and development work. This two-tier advisory structure, allied to the substantial involvment of ADAS in research and development work, has a considerable influence on the nature and pattern of information flows and the priorities attached to different information sources. Equally important, the STI needs of the general adviser differ fundamentally in certain aspects from those of the specialist adviser, and the problem requires examination in these two distinct facets.

The special features of the STI needs of general advisers in ADAS relate, first, to the great breadth of the subject matter on which they must be prepared to advise; secondly, to the necessity for most of the information to be directly applicable to commercial farming situations; thirdly, to the genuine urgency with which farmer and other clients require information; and fourthly, to the need for it to be relevant to, often transient, local climatic and economic circumstances. Because of these features the general adviser must depend heavily on his own private store of information - a good deal of it ephemeral and much of it "grey" - which he considers most likely to meet the urgent needs of the day in his locality. This is a sine qua non. The invisible college, in which leading local farmers figure prominently, is also an essential feature. Beyond these, the general adviser depends most heavily, across the whole extension field, on personal contact with ADAS specialists, and thereafter on the specialist advisory literature they produce. Apart from a few outside core journals, most of the generalist's written information needs are in fact met from within ADAS itself. Formal information retrieval systems specifically catering for general advisers have hitherto received little

attention. More development work is needed, but it remains doubtful whether sophisticated retrieval systems are likely to play a major part in meeting general advisers' STI requirements in an advisory service organized along ADAS lines.

The STI needs of the specialist adviser differ materially from those of the generalist and follow more orthodox lines. The detail and scientific depth are greater, and the subject field relatively narrow. Urgency, topicality and relevance to commercial farming are objectives shared with the generalist, but are not accorded the same degree of priority. Personal information stores for day-to-day requirements and the invisible college are an inevitable and inescapable feature of the specialist adviser's armoury. In a formal sense, the scientific literature assumes first importance as an information source. Principally these are scientific journals, internal ADAS literature from specialist groups, and material from research establishment and abstracting services. Personal contact with fellow specialist advisers and with research workers takes second place; and thirdly comes membership of scientific working groups. The tendency to even greater specialization amongst specialist advisers demands greater use of formalised information retrieval and current awareness facilities. Carefully structured retrieval systems operated by several scientific disciplines in ADAS make an important contribution.

There is also, however, a tendency by specialist advisers to make increasing use of professional librarians and computer-based scanning and retrieval systems - which is wholly consistent with the high priority allotted to the scientific literature as an information source.

I hope I will be forgiven for amending the title of the paper I was asked to present by relating it now to the "official" advisory services in England and Wales, and therefore to my own organisation, the Agricultural Development and Advisory Service (ADAS) of the Ministry of Agriculture. I do so in the interests of a simpler exposition of the issues, and in the knowledge that the problems of other advisory services in the UK are in principle not greatly dissimilar from those of ADAS. The paper itself concentrates on analysing the information needs and how these needs might best be met, approached from the point of view of the extension worker.

ADAS FUNCTIONS, OBJECTIVES AND ORGANISATION

The information needs of any advisory service are governed to a substantial extent by its functions, its objectives, its clientele, its organisation and its relationship with other organisations sharing mutual interests.

Functions

ADAS is a multi-disciplinary force which has extension, research and developement, and regulatory functions. It provides advice - principally to farmers, but also to other organisations ancillary to agriculture, e.g. private consultants, commercial firms, the veterinary profession. It also undertakes research and development work: the research work largely at central laboratories and the development work to a great extent at regional centres. Furthermore, ADAS provides the

largest part of the Ministry of Agriculture's professional and scientific input in connection with regulatory work and statutory schemes, e.g. animal health and farm modernisation measures. These latter functions provide an opportunity for ADAS to make a significant contribution to improved technology, and in England and Wales must not be ignored when considering information transfer. These three main fields of activity - advice, research and development, and regulatory/statutory work - are all part of an integrated effort, and to varying degrees all major units are involved in all three fields. Advisory work takes up about 25 % of the total, some 1200-1400 man years, but has to be seen as part of the research - development - advice continuum found within the one organisation.

Advisory Objectives and Clientele

The extension objectives of ADAS are essentially two in number: first, to provide information and advice to help farmers develop their individual businesses, and secondly to improve agricultural productivity generally. Its clientele are not only farmers and growers, but many other organisations who provide information and advice to the agricultural industry and who are part of a wider agricultural information network.

Organisation

The one outstandingly important aspect of ADAS organisation which has a vital bearing on information needs and sources is the existence of, and the relationship between, the general adviser and the specialist adviser respectively. Although in practice the distinction is not absolutely clear-cut, there is in principle, at the front-line, in close touch with the farming community, a group of general advisers who give advice on farming problems across a very broad subject-matter spectrum and in a whole-farm context. In support, is a corps of specialist advisers, covering a wide range of scientific disciplines, who provide advice to general advisers, and generally through them to farmers, but who also undertake research and development work. The scientific and technical in-

formation (STI) needs and problems of these two groups of advisers are fundamentally different in several important respects. I propose therefore to examine these separately and to look specifically, first, at the general agricultural adviser serving a local area and, secondly, at the science specialist based at a regional advisory centre.

INFORMATION SOURCES FOR THE GENERAL ADVISER

The General Adviser's Duties

The typical general agricultural adviser serves a locality containing 700 farms. His principal functions are to provide advice and information to any of those farmers who seek it, and to promote agricultural technology and productivity in that area generally. He will provide advice to individual farmers either by farm visit, telephone, letter or by meeting the farmer at the advisory office. The farm visit is the centrepiece of individual advice: it is generally the most effective and is essential to the adviser achieving and maintaining an adequate knowledge of local conditions. The general adviser will initiate group advisory activities and will arrange public meetings in the locality. He will use the written word widely through articles in local ADAS Bulletins, in the local press, or in advisory leaflets. He will also make use of the local radio, and use Telephone Information Systems, to create an awarenesss and better general understanding of local problems. For all these duties the general adviser needs information. His information needs are of course changing, to reflect changes in the pattern of advisory work. The volume of information transmitted to farmers mounts, and the importance of the individual approach is less predominating. The farmer is increasingly provided with information which he needs to evaluate himself as regards its relevance to his particular problems. In principle, therefore, the development of documentation and information services in advisory work can be seen as a natural extension of this trend.

Main Purposes for which STI is needed

There are four main purposes for which the general agricultural adviser needs STI:

(i) To provide solutions to the advisory problems posed by individual farmers requesting advice.

(ii) To provide material for the more generalised forms of advisory activity - notably group meetings, talks to farmers and those in occupations ancillary to agriculture, talks on local radio, written articles.

(iii) To enable him to keep up-to-date generally with developing technology, the more specifically with the new knowledge that might be applicable to the district he serves, so that he is in a position to stimulate technological development.

(iv) To better understand the locality and the problems peculiar to it - bearing in mind that on average a general agricultural adviser will move to a new district every 6-7 years.

Special Features of General Adviser's STI Needs

The general adviser's duties and responsibilities, and consequently the specific purposes for which he requires information, highlight certain special features of his information needs:

(i) The breadth of the subject matter.
This is especially important where mixed farming systems prevail and where a mixture of farming systems are found within a restricted locality.

(ii) The necessity for information to be directly applicable to commercial farming on the locality.
The information must relate to practical farming methods which are either feasible and justifiable commercially, or else likely to attract themselves to innovative farmers in the area.

(iii) The genuine urgency which attaches to many requests

for advice. The sub-optimal solution offered promptly is to be preferred to the ideal solution produced after the crop has failed, substantial livestock output lost or valuable commercial opportunity missed.

(iv) The ability to produce up-to-date information so that it is always relevant to local, often transient, circumstances of climate or economics.
For example, the 1976 drought dictated feeding practices completely new to many of the livestock farmers affected. Farmers often have to react quickly to changes in factor costs, product prices and the local physical availability of resources, and the effective general adviser must be amongst the leaders in the search for suitable solutions, even though these influences may be ephemeral.

(v) The many and varied sources of information which stimulate innovative and progressive farmers.
Simplistic orthodoxy sometimes implies that commercial adoption of new farm practices derives from a single stream whose source is research centres, which first flows through agencies developing research findings in order to prepare them for commercial adoption, then through advisory services, and so to commercial uptake. In fact, innovative and progressive farmers derive their ideas from a wide variety of sources, and if the general adviser is materially to assist agricultural progress, he has to be tuned in to this wider network to keep abreast of new ideas whether scientifically legitimised or not.

Main Sources of Information

Historically, for meeting ad hoc requests for advice from individual farmers, the general adviser has relied on three principal sources of information. In sequential order, and to a large degree in order of importance, these are:

(i) His personal collection of technical information. This may be his private 'shoe box' or a private card index system of reference most appropriate to his work. The 'shoe box' would normally contain copies of articles from farming journals; ADAS Advisory Leaflets (usually written by ADAS specialists); results of experiments; circulars from ADAS specialists; private communications. This 'shoe box' would generally be the first source of reference.

(ii) Personal consultation with the appropriate regional ADAS specialist - the visible college. For new problems requiring urgent answer this is outstandingly the most important source of information.

(iii) The invisible college. This would include farmers, ADAS advisers in other regions, advisers employed by commercial companies, scientists at Universities and Research Institutes. Each adviser is his own network.

As far the information on new farming methods is concerned, the general adviser depends first and foremost on personal contact with his ADAS specialist colleagues; secondly on literature from ADAS specialists; and thirdly on other personal contacts at meetings, conferences and demonstrations. For reference material for talks, the 'shoe box', general reading matter from essential (core) journals, and the library system, all make important contributions. The pattern which thus emerges is that of a general adviser requiring his own collection of advisory reference papers - perhaps unstructured and informal, and certainly ephemeral - to meet the urgent and specific needs of the farmers in the district. He is also greatly dependent on his specialist colleagues in ADAS for matters of great immediacy in the case of advisory requests and for making him aware of, and critically appraising, new techniques. For his own general promotional and informational activities, the general adviser finds a greater need for formal informa-

tion sources and in particular the use of library and similar services. Overall, however, formalised information storage and retrieval systems play only a small part and the accent is generally on informality and personal contact. What is also noteworthy in ADAS is that perhaps 75 % of the general adviser's technical literature needs are met from internal sources.

Future Need for Formalised STI Systems

I would not wish to suggest that the current state of affairs, as described, is the ideal. There is undoubtedly an information storage and retrieval problem peculiar to general advisers, and, with the exception of one or two worthy pioneering efforts, it remains to be seriously tackled. The prominent part played by the "shoe box" and its somewhat more sophisticated stable companion, the personal card index system, prompts the question as to whether we should tolerate these archaic systems. There is clearly a special problem which has hitherto received too little attention.

My colleague, Mr. Angelbeck, has developed a system at Worcester which possibly points the way forward. Its particular features are:

(i) It is essentially a local system covering an area of 500,000 hectares, although it is used by some others well outside that area.

(ii) The indexing is done by general advisers themselves on a selective and subjective basis against a criterion of "likely future need in the locality".

(iii) Subject matter areas are allocated to individuals in the general advisory team, but boundaries are not rigidly drawn.

(iv) The local Ministry library provides the reference material.

(v) Mechanically, an optical-coincidence feature card system is used.

The system has worked satisfactorily on this local basis and has provided, in a structured if selective way, a host of references most of which have not yet, and possibly never will, find their way into existing commercially-available STI reference retrieval systems. Many of the references are not of scientifically validated material but nevertheless they are the stuff of which farmers take decisions and which facilitate and expedite farming progress.

Looking to the future, this Worcester system raises a number of important issues. Should it be computerised, as is the case with a somewhat similar system being developed by Mr. Lilwall in Edinburgh? Should it remain a local system, and should there therefore be established a series of local systems covering the whole country? The balance of argument seems to me to point to a local approach. The nature of the general adviser's information needs favour the local rather than the national system, and some of the success of the Worcester system derives from the involvement of a local team who are in close day-to-day contact with one another in any event. Providing input for the information system is in many ways a natural extension of the traditional swopping of experience which goes on anyway. Or is this too modest a target? Then there is the question of alternative means of providing the general adviser with STI. How far, for example, is it possible to provide viable abstracting services to cater for his needs, supplementing other means? In an advisory service such as ADAS could we, for example, seek an even higher degree of self-sufficiency in advisory publications by looking to specialists to step up their already considerable output of written advisory material, e.g. state of the art reviews? These are some of the issues that future STI policy will need to embrace.

One thing seems plain however. The successful development of formal STI system for general advisers must be generated from within advisory services, with the close personal involvement of general advisers not only in defining the objectives and developing the systems but also at the next stage in executing

the processes, particularly in identifying the material. The need for such systems exists and a great deal more thought and effort requires to be devoted to the problem; but at the same time strategy of "organic growth" is strongly urged.

INFORMATION NEEDS AND SOURCES FOR THE SCIENCE SPECIALIST ADVISER

The science specialist adviser is in a situation in many ways very different from that of the generalist. The Agricultural Science Service in ADAS has a regional arm and at each regional centre are specialist groups of scientists organised on a discipline basis - animal nutrition, soil science, plant pathology, entomology, microbiology - with an analytical services group in addition. The functions of these Science Departments are firstly to provide advice, either by direct contact with farmers, or indirectly through other colleagues, particularly general advisers; secondly, to undertake research and development work which is orientated towards problem-solving in the farming industry; thirdly, to influence the direction and content of agricultural research and development generally and, in so doing, to work collaboratively with agricultural research personnel outside of ADAS.
The science specialist thus has a key strategic position at the information-flow junction between the general adviser on the one side and the research scientist on the other side.

Purpose for Which STI is Needed

The science specialist needs STI principally for the following purpose:

(i) To provide solutions to advisory problems posed by ADAS colleagues in particular general advisers, and by farmers and growers within the Region.

(ii) To provide material for more generalised advisory or promotional activity and the dissemination of scientific knowledge to other advisers, to farmers and to members of ancillary industries.

(iii) To provide material on the basis of which to initiate and design specific development projects in the service.

(iv) To keep abreast of developments in his particular science and those of closely related disciplines.

(v) To give advice to R & D policy makers on the R & D needs of the industry.

(vi) To understand adequately the Region in which he operates - its problems and potential.

Special features

The science adviser is less directly concerned with the day-to-day problems on the farm than is the general adviser and this is reflected both in the STI needs themselves and in their special features. The most noteworthy special features are:

(i) The greater scientific depth and greater detail in a narrower subject-matter field, than is the case with the general adviser.

(ii) The increasingly demanding information needs of specialists, as scientific knowledge increases and becomes more readily available to such a degree that specialisation amongst specialists is growing.

(iii) The need for a flow of intelligence about the state of the art in the farming industry, with which the specialist inevitably has limited direct contact, to ensure that he is able to provide advice applicable to commercial farming situations and at the same time provide advice to R & D policy makers which reflects the industry's needs.

(iv) The wide horizon to the specialist adviser's STI interests ranging from the field of international science on the one hand to the application of science to a highly localised practical farming

problem on the other hand.

In general, the needs of the Science Specialist are detailed and demanding; are growing increasingly so; and are less frequently capable of being met from internal ADAS sources.

Principal Sources of Information

Four main sources of information for ADAS science specialists have been identified - the scientific literature, personal contacts, farming activities, and "trade" literature. They are roughly in that order of importance and apply equally to STI needs for advising as well as for R & D purposes.

Scientific literature: (broadly in order of importance)

i. Scientific abstracts - mainly Commonwealth Agricultural Bureaux

ii. Literature from internal ADAS Working Groups

iii. Reports from Agricultural Research Units and Institutes

iv. Original scientific papers in journals

Personal Contacts:

i. In central laboratories

ii. In research establishments both at home and abroad

iii. In industries ancillary to agriculture

Training Activities

i. Attendance at scientific conferences and meetings

ii. Subject-orientated "workshops" organised within ADAS and by outside bodies

"Trade" Literature

i. Technical specifications

ii. Product promotion literature

STI Systems in Use

Historically the complex needs of science advisers have been met from a variety of sources all of which are being used to a greater or lesser degree by all science disciplines.

(i) Informal individual filing systems for the adviser's day-to-day requirements.

(ii) Regional Science Department Systems each serving the needs of the one discipline at the Regional centre - includes reprints of scientific papers and the like and generally has a fairly elementary retrieval mechanism.

(iii) Literature Scanning Services, covering each discipline nationally, aimed at providing an awareness of world literature relevant to the work or the discipline and with the scanning and index compilation undertaken by the specialists in that discipline.

(iv) Personal reading of selected journals and the farming press.

(v) Computer-based systems for scanning and retrospective retrieval, giving access for example to the Biological and Chemical Information Services and CAB Abstracts Database.

The Future

The immediate question is whether it is necessary or desirable that specialist science advisers maintain all of the five sources of scientific information listed above. It seems highly unlikely that the personalised indexing systems will ever be dispensable; nor is it likely that personal reading of selected journals and the farming press can be discontinued. The discussion of the future needs for STI systems must therefore centre around the respective roles of the manual literature scanning and indexing services and computer scanning and retrospective retrieval systems.

The mechanised information exploitation systems which have grown up of recent years offer many advantages to the science specialist. In the field of core journals, most things of note are likely to be included in the standard commercial abstracts and indexes. Mechanisation has effectively reduced the delay between primary and secondary publication, and mechanisation of production methods has provided mechanised databanks to aid current awareness (scanning) and retrospective searching of all important core journals. Should the science specialists therefore not be able to limit their own indexes to lesser known journals, materials of a semi- and non-published nature, purely local information and the like which are not normally covered by abstracting and indexing services? Although they may need to browse through a select few basic journals, should they not utilise computerised SDI Services to alert them to articles and reports in current world literature which match up to their own stated profile of subject interests. In abstracts journals, and computer print outs from them, they can be provided with summaries in their own language - whatever the vernacular of the original documents.

Could not the time saved in compiling indexes be devoted to the production of digests or state of the art reviews for which an extensive need has been recently evaluated by VETEC, to enable advisers to keep up-to-date with current scientific developments?

Another important factor is the register of on-going research activities in ADAS, supplemented by similar registers produced commercially and by research organisations. In agriculture we already have had one printed edition of AGREP.

CONCLUDE

Our experience in England and Wales makes it evident that the very nature of their work demands that advisers - whether specialists or generalists - must have their own personal information stores to enable them to perform their advisory duties effectively. This is vital in the case of the general adviser

as he responds to individual advisory requests on a host of topics and seeks to stimulate technological advance in his area. This personal information store, replete with "grey" ephemeral and local material is an essential part of his advisory armoury. It is also important to the specialist adviser, but in rather less striking fashion. Another essential ingredient of speedy and efficient information transfer is the network of personal contacts representing both the visible and invisible college. In an organisation as large and as comprehensive as ADAS the internal network of personal relationship predominate, but the network as a whole extends into many corners, and farmers from an important part. Thirdly, general reading of scientific journals and the more popular publications are a necessary source of knowledge, interest and stimulus for every adviser.

These are the three basic sources of the adviser's STI requirements. Formalised STI systems, whether mechanised or not, are supplementary to these and in my view STI policies must be developed in that context. This is not to discount the great help that mechanised information systems might be able to provide - although little progress has so far been made as far as the general adviser's needs are concerned - but to ask that the special character of the farm adviser's information needs be recognised. My plea, therefore, to those responsible for developing reference and information services is to have regard to these special needs, and, until a good deal further study has been made, also to accept that highly formalised systems must have only a supportive role. This supportive role may be an important one, however, and may have much to contribute towards the solution of some of the information transfer problems of extension services.

ORGANIZATION OF "AGRICULTURAL DEVELOPMENT" SERVICES IN FRANCE, AND THE INFORMATION SOURCES AT THEIR DISPOSAL

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Abstract

Since 1966, "agricultural development" activities (this notion having replaced that of "dissemination of information on progress in agriculture") have been the responsibility of agricultural engineers and technicians working at national level in specialized Technical Institutes dealing with a particular commodity or at local level in the Departmental breeding establishments (Etablissements départementaux de l'Elevage - EDE), or the Services d'Utilité Agricole Départementaux (SUAD).

The National Association for Agricultural Development (Association Nationale pour le Développement Agricole - ANDA), which is composed, on a basis of parity, of representatives of the government (Ministry of Agriculture, which is responsible for research, and Ministry for Economic Affairs and Finance) and of the four major broadly based professional organizations (Chamber of Agriculture, Farmers' Union, Young Farmers, and the organization for credit, cooperation and mutual insurance):

- administers the National Agricultural Development Fund (Fonds National de Développement Agricole), which is financed by special levies imposed on certain agricultural commodities,

- advises the Minister of Agriculture on matters concerned with agricultural development.

Each element of the structure plays a part in certain stages at least of a normal data processing system. The structure can be described as a set of centralized networks, some of which are interconnected.

There is a great diversity in the nature of the information and in ways of managing, preparing and distributing it. Moves are being made towards harmonization, at least with regard to the organization and management of data bases and the search for modes of communication which will reach as large a public as possible in the sector concerned.

This harmonization is in line with a general policy for scientific and technical information laid down and pursued by the BNIST (Bureau National de l'Information Scientifique et Technique - National Bureau for Scientific and Technical Information).

I - ORGANIZATION OF AGRICULTURAL DEVELOPMENT

1. Brief historical survey

Until 1959 the dissemination of information on agricultural progress was to some extent the responsibility of services run by the Ministry of Agriculture (Services Agricoles), while since the war an increasingly important part has been played by farmers organizations, such as the Chambers of Agriculture, the C.E.T.A.s (Centres d'Etudes Techniques Agricoles) and by organizations concerned with specific commodities, in particular the technical departments of the Association Générale des Producteurs de Blé (A.G.P.B.) - wheat producers), which were later to become the "Instituts Techniques".

The reform of the external offices of the Ministry of Agriculture in 1959 led to a change in the role of the public services which, through the Ingénieurs d'Agronomie (agronomists), are responsible mainly for technical training and also for supervising and promoting the dissemination of information, tasks entrusted exclusively to the professional agricultural bodies. The 1959 reform law also introduced a link between research and the dissemination of information - the Section d'Application de la Recherche à la Vulgarisation (S.A.R.V.), run jointly by the Ministry of Agriculture and the Institut National de la Recherche Agronomique (I.N.R.A.). The S.A.R.V. split into two groups in 1964, the technical and guidance sections coming under the Ministry of Agriculture, while the Service d'Experimentation et d'Information (S.E.I.) remained with the I.N.R.A.

The present "agricultural development" structure was substituted for "the dissemination of information on agricultural progress", by a decree issued in 1966 and by certain provisions of the law on stock farming, issued roughly at the same time.

In my opinion, two main distinctions may be drawn between these two concepts :

- increased participation of users, in that they are no longer considered merely as receivers of advice or information but as active participants in a process which they help to shape. This means that they collect information needed by the other participants and that the flow diagrams for information collection, transmission, storage and management should follow a completely different pattern from the linear and centralized organization associated with the"dissemination of information on progress".

- the wider scope of "agricultural development" which covers areas of the human sciences and is not restricted to technical and economic fields. G. de CAFFARELLI defines the objectives as follows : the purpose of "agricultural development" is to enable farmers to manage their farms more efficiently, taking in account problems of environment which would arise. It therefore helps to improve not only productivity, but also general living conditions.

2. Existing structures - their roles

A non profit-making association based on the Law of 1901, the A.N.D.A. (Association Nationale pour le Développement Agricole) :

- administers the national agricultural development fund (F.N.D.A.), for which levies akin to taxes are imposed on agricultural produce;

- advises the Minister of Agriculture on matters connected with agricultural development.

The following bodies are represented, on a basis of parity, in the A.N.D.A. :

- the Agriculture and Economics and Finance Ministries,

- the four major professional organizations pursuing broad interests :

A.P.C.A. : Association des Présidents de Chambres d'Agriculture
F.N.S.E.A. : Fédération Nationale des Syndicats d'Exploitants Agricoles
C.N.J.A. : Centre National des Jeunes Agriculteurs
C.N.M.C.C.A. : Centre National de la Mutualité, du Crédit et de la Coopération Agricole.

The representatives of the Ministry of Agriculture include the Director-General of the I.N.R.A., acting in that capacity. Research is also represented by all the working parties or other national and local bodies, which are modelled on the A.N.D.A. and deal with the organization and content of development programmes.

The activities undertaken fall under various headings, ranging from applied research to the collection and processing of certain kinds of data, individual counselling, training, the encouragement of group projects, etc.

They relate to farm produce or matters of more general importance, e.g. farm management, the preparation of regional development plans, etc.

They are led by organizations which operate on a national scale, such as the technical institutes which specialize in specific products and whose spheres of responsibility include applied research or experimentation, or by local bodies, such as the Services d'Utilité Agricole Départementaux (S.U.A.D.) and the Etablissements Départementaux de l'Elevage (E.D.E.), which are concerned with the implementation of comprehensive local development programmes and which provide a direct link with farmers. We may note in passing the special role of the E.D.E.s, which collect information on genetic livestock improvement, a national programme carried out in close cooperation with the specialist research workers of the I.N.R.A.

II - INFORMATION IN THE FIELD OF RESEARCH AND DEVELOPMENT

The term "information" should here be interpreted in its widest sense, as it is not in this case restricted to the field of documentation.

As may be seen from the above, each of the elements comprising the research and development structure collects,processes (or has recourse to a processing organization) and disseminates by various means and through various channels information for the use of its members or of interest to a wider public. The networks involved are centralized, some of them being interconnected to varying degrees.

For example, the Management Centres, which from the foundations of the networks, collect data for their participants, process them using various methods and programmes, and then forward the results to the farmers concerned, if necessary with comments. The Management Centres are affiliated to the Institut de Gestion et d'Economie Rurale (I.G.E.R.) and supply to this national body part of the more general data which they have collected for processing, the conclusions being forwarded to all the centres.

A similar system is applied to the genetic improvement of livestock : index calculation programmes are drawn up and conducted on a national scale, while certain intermediate processing operations are carried out by regional associations. A star network may therefore be said to exist, which is partially decentralized.

The two examples quoted above represent highly complex situations, in which data banks are managed with the help of a computer. Reference may also be made in this connection to the experimental networks run jointly by the Instituts Techniques and the I.N.R.A., or certain types of survey (e.g. soil analysis), for which similar, specially adapted software is available.

It should be emphasized that in every case the computer output needs to be prepared before being distributed to those concerned, whether they be on-the-spot agricultural advisers or farmers.

The same applies to other kinds of information, including that of bibliographical origin, part of which is stored in computerized files (RESEDA) or in a classification system adopted initially by the S.A.R.V., and subsequently by the S.E.I. of the I.N.R.A., the main professional bodies concerned, and by the Services de l'Enseignement Technique (Technical education departments). These analytical files usually contain information which may be assimilated by on-the-spot advisers or advanced modern farmers, and which is prepared by engineers and technicians, both of the I.N.R.A. - S.E.I. (bibliography) and of the development organizations (C.E.T.A., the institutes, etc.). They differ one from another as regards the field and the users (customers, participants, etc.) for whom information is stored, and subsequently distributed,by each of the information holders. An attempt is to be made to merge and modify the system of data base management in order to increase computerization in conjunction with the use of controlled vocabularies. The first step has been made in the form of AGRIDOC, but the large number of channels and modes of distribution which become a fixture in such an organization make this a difficult task, as does the present diversity of the equipment of the possible partners in such a scheme.

The model provided by RESEDA, the documentation network for agricultural economics, could be extended to cover other areas.

At present the preparation of information for a specific circle of users is carried out by researchers (the presentation of results at information meetings, the minutes of which are published), engineers and documentalists (analysis of experimental data or surveys), and sometimes ultimately by specialist editors and journalists (information via the mass media). It may be possible to computerize this work, at least partially, as is sometimes the case with language translation. While this is conceivable in view of the continued progress made with the TITUS software, for example, a great deal has still to be done towards building up controlled vocabularies, including at least the necessary equivalence relations between scientific and every-day terms. The participation in AGRIDOC of engineers belonging to development organizations underlines this need.

Information media are generally very conventional, e.g. books, manuals, minutes of meetings, seminars, conferences, experiments, articles of specialized reviews from regional or local publications, etc. Audio-visual techniques are making very little headway despite the efforts of those who favour them. The Bureau National d'Information Scientifique et Technique (B.N.I.S.T.) the new board of which has opened its doors to the public, in particular to specialist journalists, is examining this question. Therefore, exchanges of profile tapes of conversational exchanges (by means of TRANSPAC and EURONET) would still be of interest, at least to organizations equipped with computers, e.g. S.U.A.D., E.D.E., management centres, agricultural loan funds, cooperatives. The last stage in the distribution process i.e. the adviser-farmer link, will no doubt retain traditional methods (i.e. oral, written or audio-visual) the longest.

DISCUSSION ON THE PAPERS OF SESSION II
SOURCES OF INFORMATION FOR THE EXTENSION SERVICE

Aspects discussed included existing arrangement for managing information and what information systems had to contribute.

1. Existing Arrangements for Managing Information

The problem of managing information is most evident at the level of the general adviser. A great miscellany of information is available to him from scientific, commercial and other sources ranging from the very technical to rather general. His is the task of identifying and extracting from the wealth of information that which is most relevant to the needs of his clientele - a clientele which is becoming more sophisticated in its information requirements. The problem is naturally all the greater in a mixed farming area. The credibility of the adviser depends on his ability to satisfy the specific needs of the farmers with whom he works. This requires that he be well informed on what is coming from the information sources used by leading farmers in his area, the agricultural media, trade literature etc.

Extension Services are coping with this problem by increasing the number of specialist advisers and making them readily accessible to the general adviser. The specialist adviser keeps himself informed on up-to-date developments in his own field. His sources of information include the scientific literature, research centres, trade literature, contacts with colleagues and research workers individually and at conferences etc.

2. Contribution of Information Systems

Computerized systems could help the specialist by short circuiting the big number of documents they get and read (especially where the systems give an abstract or such like indication of the contents of these documents). This would leave the specialist more time to read other literature which he might not otherwise read or which did not normally appear in information systems.

In the UK, specialist advisers kept in touch with the CAB services, and as the mechanized services develop they offer possibilities for use by the specialist advisers. The position was different with the general adviser. Data bases did not provide what the general adviser was looking for. The need here is for sorting and classifying the information the local adviser finds of use - scientific yes, but broader and more general information as well - the kind of information a good farm manager sought in making decisions. Groups of general advisers working as a team can benefit from the help of the librarian or documentalist in developing systems for the storage and retrieval of relevant information. This is likely to be more successful where the advisers make the decision on what to include.

The point was made that the general adviser was no less an expert than the specialist adviser. The former bore responsibility for his recommendations to local farmers. A number of countries (the UK, Denmark, and Ireland) stressed the usefulness of the existing specialist/general adviser division of work which had grown up in response to the needs of a developing agriculture. Information networks like EURONET could have a role in supplementing existing provisions.

There was general agreement that advisers go beyond the simple transfer of information. The point was made by Professor ANDERLA that while information and advice were different concepts, they are part of the same job. He agreed that the existing formal systems were geared to the level of the scientist and that advisers used seminar papers, field notes, commercial sources etc. in the course of their work. There was no reason why mechanized information systems should be restricted to carrying scientific information only. A computerized information system was a new tool - still in its infancy - and it had a great capacity to carry information. If the Extension Services specified their needs the information scientists would see how these needs could be satisfied using this new tool.

Some new countries gave instances of use of data from computerized systems. In the Netherlands groups of dairy farmers get dairy management analysis data on computer printouts which needed to be understood by

advisers and farmers. In the UK, similar type data is issued on a regional basis.

In regard to information transfer, the documentalist could not take the place of the scientist. Evaluation had to be made on the basis of relevance and value and this was outside the ambit of the documentalist. In the UK the specialist adviser performed the key role in the interface between the mass of information and the general adviser. This is not to say that the documentalist has not an essential role. He can reduce the number of reference documents to a manageable level. A computerized service facilitated this by making possible rapid searching. After the documentalist finished, the expert had to take over and select on the basis of his own judgement of their relevance to his needs.

There was general agreement on the need for review articles and digests delimiting the current state of the art. PUDOC and CAB carried some of these in the past and more such articles are needed.

SESSION III

- Anticipating information needs of tomorrow's farmers

- Forecasting the information requirements of the farmers of tomorrow

Discussion on this papers

ANTICIPATING INFORMATION NEEDS OF TOMORROW's FARMERS

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Abstract

The aim of this paper is to suggest ways in which farmers' needs for information in the future may be anticipated. Information needs, as an integrated part of the decisionmaking of individual farmers and groups, will depend on the character of their farming. The paper, therefore, considers the nature of Western European farming in the future, based on a subjective extrapolation of recent trends, and on several views or images of possible desirable futures. This leads to differing perspectives and prospectives of information needs, and of the research and information systems which might provide relevant information. From all points of view, future information needs are likely to be more diverse and of a broader coverage than at present. They are likely to have to be provided in ways compatible with the value systems existing among farmers and in society as a whole, which will probably be more varied than at present. This also reflects the multiplicity of demands which will be placed by society on its farming and rural communities.

" What do you know about this business?" the King said to Alice.
" Nothing", said Alice.
" Nothing whatever?" persisted the King.
" Nothing whatever," said Alice.
" That's very important", the King said.

(Lewis Carroll - Alice's Adventures in Wonderland)

* * * * * *

Once upon a time, most Europeans were peasant farmers or land-owners. Agricultural knowledge was part of what they talked about every day, knowledge which had been handed down over the generations, added to slowly by individual experience and travelling which gave the observant traveller knowledge of farming practice elsewhere.

By the late fifteenth and early sixteenth centuries, some of this accumulated knowledge and wisdom was being written down in books. But two centuries were to pass before this began to approach scientific agricultural knowledge, with its dissemination being recognised as a means towards improvements in farming practice and performance. Throughout the nineteenth century, as agricultural science developed, so did simple systems of purposefully transmitting its findings among farmers. A century ago, over most of Western Europe, agricultural scientists were rarely specialised research workers. Commonly, the few which existed combined teaching agriculture or one of its cognate sciences (at one or more of the growing structure of farm schools, agricultural high schools, colleges and universities), travelling the countryside to teach and advise farmers on farm improvements and to conduct simple tests on their soils or purchased seeds and fertilisers, as well as conducting simple research into a variety of aspects of farm husbandry and the

underlying sciences.

By today, complex systems, consisting of highly specialised and differentiated parts, have evolved to deal with agricultural research, agricultural education, agricultural information dissemination and advisory work. The prime aim of these systems continues to be the solution of farming problems, to apply scientific advances to agriculture of specific types conducted in specific environments, and to encourage and assist farmers and their successors to be capable of adapting and adjusting to their changing milieu (of which, in addition to economic, social and political changes, the scientific and technological changes form a crucial part). However, in agriculture, as in most fields of science and technology, the output of new, improved or refined information grows in quantity, while problems facing farmers, as a whole and as individuals, continue to proliferate and become more complex.

The title given to this paper implies a view into the future, a future in which, as in the past century at least, farmers will have information needs. It also implies that compatible information systems will exist which have been devised or planned to serve the future needs. But, as in the past, so today it is impossible fully and accurately to predict the future. It was in this sense that Alvin Toffler in Future Shock could state: "No serious futurist deals in 'predictions'". But that in no way inhibits human beings from imagining, wondering about and critically considering and explaining future conditions and future needs; the science of futurology has become more or less accepted and respectable in recent years, with its own collection of alternative methodologies and approaches. It is a characteristic feature of our 'modern' societies and their inhabitants to have become conscious of change as a social norm. And thus, paradoxically, they devote much energy to controlling the direction, nature and pace of change, and to creating futures of a kind they imagine to be desirable. In the felicitous words of Professor Dennis Gabor: "The future cannot be predicted, but futures can be invented". But it is not only the creators of knowledge and art who are the inventors. The capacity to contribute to the inventive processes lies in everybody.

It is, therefore, not unrealistic to direct some attention towards considering what Western European agriculture and those who live and work by it might become in a foreseeable future, say up to the end of this century. This will, in the event, result from many processes each as unpredictable in detail as the outcome (in terms of agricultural production methods, the social and economic structure and organisation of agriculture, or the role of agriculture in the larger social economy). But, even so, it is also proper to consider how future farmers might be served by and react with information and information systems which will have been partly responsible for whatever agricultural situations emerge, and which will both sustain and be sustained by the farmers and farming systems of the future.

However, it is first necessary to consider by what means a view of these future systems can be developed, even though the perspective may be vague and dim. Two main ways can be suggested for planning towards the future, a necessary part of which process is to discern, to establish and to describe likely future conditions. If these are considered desirable, planned social activity can aim to stimulate them, or, conversely, if deemed undesirable, planned actions would aim to avoid or prevent them.

The first method involves attempting to forecast the outcome of existing trends, both of a quantitative and qualitative kind, and their interactions, covering as wide a range as possible of the characteristics which are relevant to a particular society or sector of society. Planning in this case could be characterised as 'responding to predicted futures', either as planning towards the future accepting the inevitability of trends, or as planning with the future, aiming to beat the trends, that is, exploiting and making the most of the trends, in order to modify a possible future by taking advantage of predictions.

The second way is to imaginatively construct, according to one or more of a variety of procedures, (which, when formally used, are certainly scientific) what are variously termed 'sketches', 'images', or 'scenarios' of alternative, desired futures. From a planning point

of view, this implies creating the conditions and therefore the trends in order to achieve, or at least to move towards, one or, more realistically, several of the imagined desired futures which could or should co-exist. This is to plan from the future.

Historical evidence would confirm that, at least in Europe over the past 200 years, changes have occurred by a combination of trends continuing, of trends being exploited, and by the utopian vision of individuals working towards the attainment of desired conditions which, during their early development, bore no relation to any perceptible trends. In addition, as always in societies where the expression of individual will and action is permissible (at least within certain limits), unplanned and unpredictable acts by various individuals, as well as unforseeable events, influenced the aspirations and visions of people as well as the course of on-going trends. Historically, the situations or conditions of a society, or any of its sectors, at any time, thus arose from a combination of previous trends, of people's vision and aspirations, and of idiosyncratic behaviour and unanticipated events. As in the past, so in the future; though the balance between the three modes will vary especially according to the prevailing political situation, itself an outcome of the three processes.

Trends

This is not the place to enter into details of any of the multitude of technical, economic and social trends present in Western European agriculture, nor of the differences in these trends between areas, or types of farming, or categories of farmers. Still less is it my intention to offer any value judgements of them. Most trends that I shall mention are well-known; I state them merely as indicators of what may result if some of the contemporary trends continue.

It is a strongly held view among many agricultural scientists that the next quarter century is unlikely to see any major scientific or technical breakthrough in agriculture. However, a large reserve of ideas await development into practical innovations or to be used as significant improvements to existing practices. More, and possibly of more importance, the adoption of technical innovations by farmers, as

well as of innovation in farming systems and in farm production and marketing organisations, still proceeds relatively slowly (though considerably more rapidly than a generation ago). Continuing technological improvement is likely to mean innovations which are more compatible with farming of different types and scales, carried on in specific environments, trends which will probably mean that greater skill and understanding will be required by farmers if the innovations are to be used efficiently. Although an acceleration in the speed of innovations creates various economic and social problems, their increasingly rapid diffusion may be expected to continue, along with the progressively more complete penetration of various innovations into geographical areas and sectors of the farming community which previously have considered them inappropriate.

The proportion of the population engaged directly in farming continues to decline. The adoption of various forms of technological innovations, however, has meant that the output of most farm products has been growing and this despite a decrease in the area devoted to farming in many parts of Western Europe as it becomes transferred to urban, industrial and other non-agricultural uses. Associated with these changes is the growing scale of farms and farm enterprises, worked by fewer people, accompanied in many cases by more enterprise specialisation on individual farms and an increasing specialisation in the agriculture of particular areas. The acceptance of technological innovations in so far as they represent a substitute for labour, lead generally to progressively greater labour productivity in agriculture. The process also implies a growing capacity and willingness by the remaining farm people to make a greater intellectual investment in their farming, that is to be able and willing to use the institutions which can enlarge their knowledge and information resources. Inevitably, also, the trends converge to dictate a more rational economic approach to farming. Inputs derived from outside the farm impose an economic discipline on farmers and their families - capital investments have to be paid for (or at least costed) in ways and at rates dictated by the capital market and other financial and fiscal institutions and policies. Farm products,

in order to provide an income to be used in part to purchase inputs, have to be passed through marketing channels organised in more and more sophisticated urban ways. Market relationships into which farmers are drawn continue to become increasingly complex, their complexity and power originating from institutional developments in society at large. Their interference in farming and its economy is only partially a reflection of or reaction to endogenous agricultural needs.

The historic peasantry of Europe appears to have all but disappeared in our contemporary urbanised societies. But this is not to imply that many millions of peasants are not still involved in Western European agriculture, and are likely to continue into the foreseeable future. The very loss of political and economic power of the farm population, which accompanies the dwindling proportion of the total population in agriculture, is reinforcing a latter-day peasant mentality and status of innumerable farm people. That farm families enjoy modern emenities of life (tractors, modern farm equipment, cars, colour televisions, telephones etc.) is no indication that their status in society is not still partial, arising from numerous dependencies. The growing dependence on agricultural policies (of nations, as well as the Common Agricultural Policy of the European Communities) is one formal example. In turn such dependent relationships appear to lead to further change within the remaining farm population, since policies and other forms of dependencies between farmers and their larger societies often support and sustain on-going trends. One result appears to be a growing polarisation within the farm population in terms of the distribution of scale in farm business, and thus its social implications. At one end, a substantial proportion who are small and at best near the margin of viability under the cost-price relationships of farming at any time, whom the socio-structural policies of the CAP are intended to assist to 'get on' in farming, or to 'get out'. At the other end are a small proportion of very large farm businesses, often accounting in any region or county for a relatively high proportion of the agricultural production, whose management is increasingly professional and whose ownership is increasingly 'institutional' (i.e. large industrial commercial businesses,

or various organisations).

The interface between the farm population and the non-farm population in Western Europe in recent years has also increasingly exhibited significant trends. Most obvious are the ways in which the non-agricultural population are demanding more from the land than the production of food and agricultural raw materials. For example, in addition to food production, farmers are expected to be custodians of an environment which preserves or conserves certain properties or features, and they are expected to be keepers of areas available for recreation and tourism (and, if they will maintain their old social customs and habits and folklore, so much the better). Not surprisingly, peasant farmers and their families have not been slow to react to these demands. Consequently, at the same time as many farming activities have continued to become more specialised and involving greater technological inputs, paradoxically the sources from which farm families derive their incomes have been becoming more diverse. Similarly, at the level of local areas and regions, while their commercial agriculture may have become more specialised, the total rural economy has become more varied and complex. In essence, this represents one form of reaction by farm and rural people which aims to minimise some forms of growing dependencies (although it may give rise to new ones); it certainly exhibits the entrepreneurial capacities of farm families in the context of their main aspiration - to retain the traditional independence, albeit within some forms of dependence of the peasant, and to secure a future for at least some of their children in farming or in rural communities. Thus, for numerous farm families, agriculture in a strict sense is becoming increasingly only part of their livelihood. Such part-time farming considered at the family level (which is the most meaningful unit) is also attracting many from outside farming into similar ways of life. Unfortunately, one of the greatest deficiencies in our knowledge of what has been controversially termed the "rural residuum" of Western Europe is a realistic typology (ideally with numerical data on their populations and geographical distribution) of the contemporary sociological and socio-economic structures of the

farm and rural sectors.

The trends would seem to indicate that by towards the end of this century, Western European agriculture, ceteris paribus, will continue to be highly diverse, probably more diverse than in the recent past. Average farm size and scale of farm business is likely to be larger than at present. The typical farm business will probably be more specialised, based to a greater extent on up-to-date technology and operated on more rational economic criteria (presumably of a capitalist kind). However, as always, specialisation will be relative to the total range of income-generating possibilities open to farmers in particular locations; and the probability is that the available enterprises which might be conducted on a farm by the farm family will be greater than at present. Thus, though relatively specialised, a diversity of farm economies are likely in any given geographical territory. Moreover, the income of the farm family, the typical social unit involved, will probably be derived from various land uses and rural activities - given that the opportunities exist in local areas. Such opportunities will often have to arise from rural development policies, themselves evolved in large part to accompany and complement agricultural policies and the production and structural changes which will result largely from them. It is thus likely to be a diversity based on a broader base of economic expectation and social aspiration among the farm population, as well as the greater and more varied demands upon them from the urban majority.

As a final point on trends, the larger international situation and its implication for Western Europe must not be ignored. The rapidly growing world population, predominantly in the Third World, with the consequent increase in the real need (whether or not it is an effective demand) for food, and the issues surrounding the changing population distributions with their rising political consciousness and demands, are well-known. Nothing is likely to alter these trends radically in the next quarter century. It may be argued that among the consequences will be that Western Europe will have to become more self-sufficient in food

and other farm products. More realistically, significant changes are likely to emerge in the conditions by which the European Economic Community will be involved in international trade, in exports as well as imports, of the basic requirements of human survival -food, energy and raw materials. One result could be a general acceptance in Western Europe of a deeply-felt social value being accorded to farm and rural life. If this occurred, it would intensely influence not only the character of the potentials available to the then farm and rural populations, but also their aspirations and their intellectual, social and economic needs.

But this is to take us already into the realm of imaginative speculation.

Desired Futures

Many'observers of the future' maintain that one main way of approaching the practical matters of planning and policy decision-making which, by definition, are concerned with a future, is to develop 'guiding images'. Such images, products of imagination, are explications of what is deemed desirable and possible at some future time, often stated in the form of scenarios which are more or less idealistic or utopian in character. Increasing numbers of such scenarios have been produced and published in recent years by forward-thinking individuals (a breed which has always existed) and by various groups (often of 'experts') and organisations, including several well-known, formally organised 'think-tanks'. Various methods have been developed to establish the images, generally regarded as alternative views of the future, of which the best known is probably Olaf Helmer's "Delphi Technique" evolved in the Rand Corporation. All reject the inevitability of trend extrapolations, a position which is amply supported by historical evidence, although this is not to deny the importance of recent and present conditions in influencing most individuals' imaginative views of the future. They are views of a future based not on an ignorance or a neglect of history, nor on a re-writing of history, but rather on the albeit incomplete knowledge of historical trends held by individuals and their perceptions of the trends and their meaning.

During the post-war years, but especially since the formulation of the Treaty of Rome, during the preparatory thinking to the "Manshot Plan" of December 1968, and in developments over the past 8 years, there have been clear indications that European-level agricultural policy-making has been based in large part on some ideal future having been imagined and posited for agriculture and for the farm population. The 'official' consensus arising from various starting points, views the family farm - itself a different concept in any meaningful cultural sense in various parts of Western Europe - as the ideal basis for an agricultural structure. This image is in no way surprising, given the historic bases of our rural societies in Western Europe and the contemporary tendencies towards polarisation in agricultural and rural structures. It is a view which aims to assure the production of required farm products (given appropriate price policies) and the maintenance of fertile land in production. This implies, also, a landscape which is populated in economically and socially viable rural communities, which is thereby a continuing amenttity to society at large. It is a view which confirms the value of a 'neo-peasantism' as being economically, socially and politically feasible and desirable. However, in this form it is somewhat general; other possibilities which have been proposed are more specific in many respects.

One interesting exercise in constructing images of a future Western European agriculture was conducted in the early 1970s as one of four Projects within "Plan Europe 2000" sponsored by the European Cultural Foundation". * Without going into details, four broad kinds of imagined future were derived for agriculture and rural life. The 'data' for them were produced at ten, similarly organised and structured

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* The "agriculture" project and its work of this kind was terminated by the European Cultural Foundation in 1973. This was before the start of its final two years in which it had been intended to test the feasibility of the images produced, to refine them, and to develop policy strategies compatible with their achievement.

'workshops' held in Western European countries, followed by an international workshop which aimed to assess the reality and feasibility of the four images. The process used, basically, was one of asking individuals who were involved in and knowledgeable about farming and rural life to consider, first, what they imagined their society would look like a quarter of a century or so in the future, and then, what would be the role of agriculture in that society: what would that kind of society expect of its agriculture and of its farm and rural population. A very detailed analysis of the material thus produced formed the basis of the four, more or less different images of the agriculture of the future; however, they need not (should not) be regarded as alternatives, but rather as possible future forms of agriculture which might co-exist.

I shall briefly summarise these four images (the details can be found in Jansen's bulletin) and draw particular attention to aspects of their "cultural structures" which include, explicitly or implicitly, considerations concerning issues such as information and knowledge, training and education.

The first image is one which foresees agriculture as an efficient production system within, and fully integrated with, a larger, efficient economic system. Agriculture is seen thus as equivalent to every other industry, with various types of agricultural production being concentrated in the most favourable locations. Free-market forces and the economic rationality of capitalism would dominate, with a minimum of interference by states or supra-national bodies. Farming would be based on private property. Those involved would have 'freely' decided to enter the industry (assuming they had access to adequate and suitable resources). Farmers ("Agriculturalists") would, thus, be highly professional and entrepreneurial, aiming to optimise the productivity of land, labour and capital (aims expected of them by the larger society), would use the most up-to-date technology, would tend to specialise, and be involved in various kinds of horizontal and vertical integrations which assist the achievement of their aims. Their income would be directly related to their performance and its efficiency.

A second, rather different image (though in some aspects overlapping the first) sees agriculture as the basis of a stable economy in the future. This arises mainly from a view that growth economies lead to a depletion of natural resources, a deterioration of the natural environment, and considerable changes for the worse in the quality of life. These concerns, therefore, become the prime criteria in the formulation of an image of agriculture which is foreseen as being required by society both to produce food and to manage the land and water resources. Farmers would thus need to be recompensed for both these functions and to be supported by a socio-economic system which influences and encourages them to practise forms of "good" husbandry which would involve a minimal use of non-renewable resources. Diverse farming structures (in the agronomic, economic and social senses) are envisaged as most likely to assure this. Farmers would need to rely mainly on co-operation rather than competition, among themselves as well as with urban dwellers, in order to assure the dynamism of the system.

Another image, again partially overlapping with the first two images, considers agriculture in the future as a basis for a harmonious society. Such a society, as well as the agricultural population, would be individual-centred, allowing a free and full development of individual personality, potentialities and interests, as the means towards attaining individual self-fulfillment and basic social and economic justice. Agriculture would thus be open to all who might realise their individual ideals and enjoyment of life through becoming involved in farming, in which man and nature would meet and interact, where production as well as rewards and satisfactions would result from self-management within a context of mutual co-operation and the common good. Styles of life would be highly varied among the farming population (as in society as a whole) and be continuously changing. In agriculture and rural life, therefore, a wide diversity of forms, organisations and scales can be envisaged. Farming and farm life being as diverse as society at large, farmers would no longer be a marginal social sector, while significant disparities in economic standards and social well-being between rural and urban areas would disappear.

The final image is one which foresees agriculture as the foundation for an egalitarian society. This image differs fundamentally from the others, arising from a vision of the class society of contemporary Western Europe being radically transformed. The society as a collectivity is seen as being based on, and maintaining its solidarity through its exercise of permanent control over all economic and social affairs, a control based on participative planning. Agriculture is seen as a key sector within a non-competitive economic and social system. Farmers would be involved in the collective occupation of the land, since there would be no private property. They would practise "geo-culture" - the husbandry of the entire natural environment and production therefrom. This would be organised in large, diverse collective enterprises which integrate the production and processing of food and raw materials from land, water and air, recreation and tourism, landscape building, and the conservation of natural resources and wildlife. Each person involved would contribute according to his capabilities and be provided for according to his needs.

Each of these images is intentionally idealistic, necessarily incomplete, and less than real. Each expresses viewpoints which are ideological. But elements of each, even some manifestations in forms approaching the ideal, already exist in Western Europe. The possibility, indeed the probability (given reasonably liberal policies of all kinds) is that in the future they will co-exist rather than any one becoming a predominant reality; but they will each exist more obviously than at present.

Each presents different situations and problems to those responsible for the production and dissemination of information relevant to farmers' needs. Their co-existence compounds the problems. How can information systems be organised in their content and in terms of their communication channels and staffing which will serve the needs of the plurality of farmers, farm workers and their families operating under very diverse possible forms of agriculture - a diversity which is of a different order from that suggested earlier from the extrapolation of trends?

Future Information Needs

Whatever the kinds of farming which may be evolved by European farmers in the future, they will most certainly be living within societies which are changing. These environmental changes will be the sources of farming situations which will be perceived as problems which will require solution, or as opportunities which some farmers, at least, will seek to realise.

Decision-making by farmers, as individuals or in groups, leading to change and adjustments, involving what to them are innovations, will depend to a considerable extent, as always, on relevant information. This will need to have been developed and interpreted for specific situations, and provided in appropriate ways which will be acceptable to the final users, the farmers. This implies research work relevant not only to different types or systems of farming, conducted at various scales, but also concerned with the wider economic and social needs of the farm people, needs which reflect their values, the ethos of their culture.

Information systems, in their turn, must be capable of transmitting and conveying adequate and appropriate information among the various centres in the scientific agricultural community in such a way that the knowledge and skills of the agricultural advisers in contact with farmers are suitable to their tasks. The system must also be capable of carrying farmers' problems and needs back to those points which can provide the information or conduct the necessary research. Most importantly, as always, farmers will evaluate not only the adequacy, reliability and comprehensibility of the information they receive during their decision-making, but also its carriers and interpreters. A sympathetic understanding by information and advisory agents of the aspirations held by farmers for themselves and their families, and those of local groups, is therefore a primary prerequisite. Learning how to be sensitive to these aspirations could be the most difficult aspect in the training of advisers, and also of all others involved in the agricultural research and information systems, particularly if farming is being conducted under **differing ideals and values.**

An evolutionary view, that family farming will, and should, dominate in Western European agriculture, implies also an evolutionary development of the agricultural extension or advisory agencies and of the research services and information systems which serve them. This is more than a qualitative strengthening of the existing information networks. It involves a subtle reorientation in much research and advisory work (and of other policies affecting agriculture) so that the focus is consistently on the family farm, as a farm and a family. Of course, this is not to deny the availability of information and advice to larger farm businesses, nor to smaller (at least theoretically, part-time) farming operations.

For the family farm situation, all advisers would need to be knowledgeable and kept up-to-date by the research and information systems (which include those responsible for the initial and in-service training of advisers), on a range of production, farm management and marketing matters relevant to the farming in their areas. They would also need to be adequately informed on, and competent to advise on numerous socio-economic matters concerning occupational possibilities open to farmers and their families, both on and off the farm, on the training opportunities available to farmers and their family members, on issues involved in the transfer of farms from one generation to the next, and on the economic and social developments possible in rural areas. Such information is a proper need among family farmers, now required to be provided under Directive 72/161/EEC. It is so far only beginning to be provided, but the need for it may be anticipated to graw in the future with varied emphasis within it according to the existing socio-economic and other cultural conditions of farming communities in specific areas.

The four images of future agriculture pose different informational considerations, particularly if they co-exist. The first image, possibly more akin to present-day situations in the more 'advanced' sectors of European farming, would involve the provision for farmers of up-to-date

technological and economic information. This might involve highly specialised information centres, possibly supra-national in their coverage, dealing with complex and advanced technological possibilities. The image thus implies farmers will be willing learners and interpreters of innovative possibilities and of their complex technico-economic relationships. However, the co-ordination of a large range of specialised sources of information would present organisational problems, although farmers would have to accept most of the responsibility for seeking information and combining information to their specific needs.

Although the second image contains some similar considerations, the emphasis would necessarily be on the evaluation of all innovative possibilities, largely by the research and information systems, to ascertain their impact on resources and their contribution to resource conservation. Advisory work to farmers, to accord with their needs would thus be primarily educational in purpose. It would also have to be able to satisfy equally the information needs of farmers of a wide variety of farm types and organisations.

In the third image, the information system would need to be able to serve, to inform and advise, an even wider variety of farmers and be even more educational in its intent; many clients might be envisaged to be new entrants to farming, or as those remaining in farming in order hopefully to satisfy their needs for self-fulfillment. The research and information system, in order to be credible, would have to conduct research and communicate knowledge based on values which would correspond to those of the users - it would have to be very broad in its coverage with an inevitable loss in the widespread applicability of new information.

Finally, the fourth image implies that this collective form of farming will largely generate and be responsible for its own information needs. In other words, the information system would be a fully integrated part of the agricultural/geocultural collective system being envisaged, closely controlled by the larger society.

As in the case of the farming systems envisaged by the four images, elements of the differing information systems already exist. Even today, all research workers, all farming journals and agricultural mass media, all agricultural advisers do not assume that all farmers are petty businessmen, aiming solely for technical and economic efficiency and larger scales. But there are fundamental incompatabilities between the four images in the content, organisation and values underlying the information required and thus in the information systems which might provide it. In the first and last images, the responsibility for obtaining relevant information rests with the farmers within larger social systems which are supportive of this, though in radically different ways. But even in the other two images, very differing requirements are placed on the research and information systems which society at large would provide.

This is not the place to attempt to reconcile the incompatabilities involved. Co-existence of differing value systems is always problematic. But if nothing else can be said, from on-going trends, from 'official' views of a family farming future, or from any guiding images of desired futures, the information needs of farmers will be more diverse in the future that at present. They will need to cover far more than farming narrowly defined as farm production and management. They will necessarily embrace all possible uses of the land to meet the varied and changing needs of society, and the complex, ever-changing social and economic relationship of farmers and rural communities with their larger society. Flexibility and variation will, therefore, be required in the research information systems, involving many areas of research and information which have been largely neglected so far - at least by agricultural scientists, agricultural information scientists and agricultural advisers, qua agriculturalists. In many respects, some fundamental changes in direction will be necessary to the conventions which are implicit in present-day agricultural information, conventions which have evolved over the past century.

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FORECASTING THE INFORMATION REQUIREMENTS OF THE FARMERS OF TOMORROW

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Abstract

This paper is not an attempt at forecasting by an expert in the field of scientific and technical information, but rather the thoughts of an economist on how requirements in this field will develop.

My first remark concerns the development of the concept of research and development systems itself, a development which explains the inclusions in the symposium programme of a discussion on the future requirements of farmers with regard to scientific and technical knowledge. Today, the production of this knowledge is no longer considered to be the independent process it was implicitly understood to be a few years ago; it forms part of an economic and social system; its direction is dictated by information requirements; it cannot claim to have a part in general progress where the system involved is characterized by natural, economic and social disparity. To raise the question of scientific and technical information requirements is to raise the thorny problem of the choices that will have to be made when trying to satisfy these requirements with new research and development programmes.

The progressive integration of agriculture into the economic system, whether it be according to capitalist or socialist principles, has a profound effect on the technical and scientific information process and on the nature of the information requirements as such. In France the way in which agriculture is integrated in the rest of the economy ensures that the upstream and downstream agricultural industries also benefit from the network for the production and dissemination of information of traditional interest to farmers. The industrial sector has assumed a number of tasks formerly undertaken by agricultural producers (processing and marketing of certain products, manufacture or processing of an increasing number of production factors) : thus, it is the industrial sector which is becoming the normal target for information on new developments relating to these tasks and it has a special relationship with the research and development system. Industrial concentration further changes the situation by establishing a de facto interdependence of farmers and companies, it being possible to persuade the latter to undertake what amounts to guidance in supplying information to the farmers or in interpreting the requirements of the producer, whereas this has been the job until now of public and/or professional bodies in the field of development. The internationalization of economic relations is progressing rapidly in the agricultural/food sector as a whole. This has a number of implications with regard to the information networks of the

research and development system. The diminished self-sufficiency of the farmer with regard to information is also evident in cases where firms integrated in this system introduce the technology of factors, including machines, ingredients in animal feedstuffs and genetic strains. This internationalization also involves the creation of new conditions of interregional competition in the context of ever-expanding economic complexes : vast areas risk finding themselves in need of very extensive scientific and technical information on the possibilities of reorganizing their production systems, (e.g. : Mediterranean farming within the context of an enlarged European Common Market). The aspect which could have most impact in the immediate future on the type of information to be supplied to farmers is doubtless the question mark which again hovers over the relations between the industrialized world and the countries of the Third and Fourth Worlds; this review of attitudes will probably have to be conducted in the very wide context of the problems affecting food for the world's population, sensible use of limited natural resources, management of replenishable natural resources, the conditions for development in certain countries, etc. In this context it is doubtless the whole concept of present-day agriculture and stockbreeding methods which requires re-thinking. This involves a reorientation of research and development programmes along more comprehensive and coherent lines. Nevertheless, it must be stressed that this new direction seems hardly compatible with the one currently being established in answer to the requirements reflecting the processes brought about by economic evolution over the past thirty years.

I should first of all like to crave your indulgence for this report, which is to form part of a symposium on the transfer and interpretation of scientific and technical information in agriculture. I am an economist, not an information specialist, and my limited experience of the problems under discussion relates only to my own country. This rather unusual interpretation of the term "expert" should be borne in mind if what follows is to be fully appreciated. As the general theme of our meeting is scientific and technical information, I shall try to confine my observations to this field. However, I have found it difficult and often dangerous to separate scientific and technical information from economic information, without which the former is in many cases completely worthless. No mention will be made of ther farmer's social information systems, although these have for some years been more widely used than the scientific and technical information systems; to appreciate this, one only has to compare the relative proportion of the research and development budget and that of the social intervention budget in overall public expenditure on agriculture.

I shall be very cautious when referring to "tomorrow". When does tomorrow begin, and what will it involve? Twenty years ago - like many people more competent than myself - I would certainly not have hesitated to paint a picture of the future of agriculture in which everything was completely transformed.

I would have predicted the end of the smallholder, the advent of the agricultural corporation, the merging of agriculture with industry and the whole array of foreseeable upheavals which called for a fundamental reappraisal of ideas then current on a system of scientific and technical information for farmers.

We all know what has happened since then: our agriculture system has indeed changed, but family undertakings - like inadequately informed farmers - are still in the majority. This symposium is in itself proof that consideration of the dissemination of the results of research is as urgent as ever. I shall therefore try to avoid the pitfalls of economic fiction and shall merely comment on some aspects of current trends in agriculture within the context of the economic and social system as a whole.

Before discussing some of these aspects which may give rise to changes in the nature of scientific and technical information for farmers and in the way this information is made available, I think it should be pointed out that the very concept of research and development has changed considerably over the past few decades. For a long time, the production of innovations resulting from progress in science was thought to have little bearing on the economic and social system. The new technologies developed by researchers were regarded as reserves of "progress" - the term itself illustrates the conception then held of the direction in which the agricultural sector was felt to be developing. The main concern was how to disseminate this mass of technical knowledge, i.e. how to inform farmers. Improved training for the young and adults seemed likely to eliminate gradually all irrational attitudes, while the diehards were to be left to the psycho-sociologists responsible for explaining and proposing ways to remove the last barriers to the dissemination of progress. The development of economics and the social sciences as applied to agriculture and the farming world has gradually resulted in a change in this attitude. At production unit level, pro-

gress in farm management has shed a different light on certain conventional concepts; it is no longer frowned upon to maintain that technical progress does not necessarily imply economic progress, far less social progress. Pilot studies - although misused in a number of cases - have revealed the inadequacy of the concept of technical optimum, with the result that the term 'technical progress' has been replaced by the less ambitious term 'new technology'. However, this merely provides a further means of linking products and production factors: it may prove useful generally or only in individual cases. An innovation which may remove a bottleneck for one kind of producer in a certain area at a given point in time may equally well ruin a different category of farmer in another region and in a different economic situation. Economic analyses have gradually revealed the disparities which may exist between the various production units as regards natural resources or economic potential for production, and as regards the way in which these economic units function, as well as in the aspirations and attitudes of farmers.

If one accepts that there are marked differences between undertakings due to limiting factors or how their objectives are defined, obviously similar discrepancies exist in their need for innovation. Analyses of the development of the agricultural sector within the economic and social system as a whole have shown that this development is the result of a series of conflicts between categories of social agents who may or may not be engaged in agriculture, conflicts which result in the elimination or marginalization of a section of smallholders, increased specialisation in certain undertakings or regions, and the abandonment of other areas, etc. Even if they deny this charge, those responsible for research and development cannot disassociate themselves from this process: innovation is usually the result of selective research carried out under pressure from various categories of agents acting in accordance with their own objectives. Even when this claim can be denied, it is still a fact that innovations which are inherently impartial enable some to advance at the

expense of others, so that they become vectors of economic and social change.

It is widely known that the financial resources available for research into the application of scientific knowledge are at present limited. While a great amount of basic information remains to be found in all fields connected with food technology, the experience already acquired is undoubtedly sufficient to produce positive results in a given sector, given adequate funds and a reasonable amount of time. In the case of a species of animal or vegetable placed in a new environment, for example, improved results - according to any criterion - could be virtually guaranteed by juggling with the disciplines of genetics, nutrition biology and pathology, etc.

This convergence between the awareness of the role played by research and development and the practical need to establish priorities for most of the organisations administering this system highlights the acuteness of the problems currently involved in the objectives of the programmes. A number of major economic, social and political factors are found to conflict at this point: should priority be given to food or industrial crops in this or that developing country, should priority be given to research into extensive crop growing or stock farming methods for regions hitherto neglected, or should our food industry be helped to achieve greater autonomy or equip itself for wider international competition? These are only examples, of course, but the importance of what is at stake shows that it is no longer possible to regard research and development merely as a means of making the socio-economic spheres involved the privileged recipients of information on research. However, to raise the question of defining the scientific and technical information requirements of a society is also to raise the question of the transfer of this information and of the choices which will have to be made when research and development programmes are being drawn up.

The gradual integration of agriculture into the prevailing

economic system alters the process whereby scientific and technical information circulates between the producers and the research and experimentation centres. I should mention in passing that this problem is not unique to the capitalist economies - the socialisation of agriculture has for a long time caused similar problems, as it still does in some countries, for example Poland.

While, as in France, this trend has not resulted in the spread of capitalist type undertakings, the agricultural sector has been penetrated in other ways, and the majority of undertakings are now integrated into the overall economic system, although they frequently retain classical small-scale structures. To start with a number of functions previously performed by agriculture have been transferred to the agricultural and food industries, or are today controlled by commercial undertakings. While the importance of cooperative systems should not be overlooked, it should also be borne in mind that in a number of sectors, these cooperatives are themselves competing with private capitalist firms in markets organised along similar lines and are obliged to adopt similar attitudes on numerous questions.

This has various implications for the scientific and technical information networks. Within the overall food/farming sector, agriculture is becoming less and less important as a target for information; research into the technology of processing or preserving animal or vegetable products is thus intended for industry, and the work being carried out on product quality - a field which is expanding very rapidly at the moment - could also be aimed at industry. Industrial companies may well thus become the privileged recipients of research results relating not only to their need for innovations likely to have a direct bearing on their functions(such as new processes or materials), but also to anything which might affect the quality of the raw materials, the economic conditions governing their production, or even the living conditions of the producers supplying them. The inevitable outcome of this

process is that the economic organizations take over part of the work of disseminating scientific and technical information at production level (for this reason many milk-processing cooperatives already have a large number of development agents).

These phenomena have lead to a certain loss of autonomy for farms. According to the classical pattern of economic theory, the farmer who is at liberty to act of his own free will receives information on the economic conditions of purchase and sale of the various factors and products (outlets and market prices), as well as scientific and technical information on the various food technologies available. Initially, the system for the dissemination of technical information set up in France was based implicitly on this pattern, but this approach is becoming increasingly difficult to reconcile with the actual situation of most farmers.

These difficulties are caused by some of the effects of present trends in the economic system, such as the concentration of enterprises and the specialisation in production units and regions. Production potential can therefore very soon become academic when traditional outlets disappear, e.g. when local poultry or pig markets are closed in some regions, or when vegetable canneries are shut down, etc. Industrial concentration further reduces the real opportunities open to farmers, who may find themselves in the extreme situation of a smallholder in an area of grazing land who is forced to choose between leaving or producing milk for the only company or cooperative which has become established in his area. The only solution, therefore, is specialisation and intensification. The interests of the farmer are linked to those of the company which processes and markets his products, even if this dependence is not legally established by contract. Conditions are therefore favourable for the company to assume responsibility for development in accordance with the process described above.

This trend has to be borne in mind today when launching an expansion programme for a new product, as part of a reconversion project, for example. The chances of success generally depend on the existence, of a dynamic downstream sector willing to take an active part in the programme and to stimulate development, acting as an intermediary between research and producers and liaising with local development bodies for the transmission of scientific and technical information. This is what we see happening at the moment in connection with the introduction of new crops in the south of France (soya beans, donax reeds, etc.). Taken to its extreme, this pattern could, under certain circumstances, lead to production under contract in which the major technical information is included in formal agreements between processors and producers (designation of varieties, crop cultivation methods, harvesting dates etc.).

Collective production methods (e.g. producer consortia) also affect independence of decision-making. This may even involve the standardization of technologies because of the need to gain a thorough understanding of sophisticated technical processes in order to maintain profit margins which are narrow and unreliable (poultry and pigs).

It is important to bear this factor in mind in research, since an innovation in the production process will only be accepted if it does not disturb the production chain as a whole. This kind of producer expects detailed and exhaustive information covering an entire production system. This situation is somewhat similar to that of production, and this is how it is frequently referred to in everyday language. It is tempting for upstream industrial undertakings to include scientific and technical information in the production factors sold to livestock farmers (cattle fodder, compound feeding stuffs, animals selected for fattening and veterinary pharmaceutics)and to take charge not only of the spreading technology but also of applied research. In fact, the technological advancement of a country may enable it to adopt a privileged position on the international market for one of its products (e.g. soya beans

in the case of the United States).

This observation brings us to one of the most important aspects of present agricultural trends. Agriculture has established a firm position in the economy as a whole, as a result of increased dealings with the upstream and downstream industrial and commercial sectors, and is also involved in increasing internationalization of economic relations. French agriculture, which for a long time sheltered behind its frontiers, now has to adapt not only to the competitive conditions of the EEC (first the Six, then the Nine, and maybe soon the Eleven or Twelve), but also to the conditions on the world market, which is no longer a mere outlet for occasional surpluses and will gain decisive importance in the years to come. In the short term, the information requirements of cereals or protein-crop producers must be established on the basis of a detailed analysis of the international situation with regard to the main products (wheat, maize, soya beans etc.). These requirements will depend partly on how the Community countries decide to cope with the problem of cereals and vegetable protein supplies.

The possible accession of certain Mediterranean countries to the Common Market and the preferential agreements concluded with the Mahgreb and African countries, will very soon have considerable repercussions on the information requirements of Community farmers living in what, up till now, have been the the Community's most southerly regions. The problem of conversion is frequently the most difficult to overcome, since the question of knowing "what" to produce is supplemented by that of knowing "how" to produce. It is highly likely that research will be asked for to provide the basic scientific and technical information essential for reaching these decisions - e.g. how new species will react to different soil and climatic conditions, the possibilities offered by irrigation, available genetic potential and expected improvement of varieties, etc. Although such information has not yet been requested by producers, it should nonetheless be regarded as an ur

gent need for political and economic authorities who have to take decisions affecting the future of agriculture in entire regions.

If we consider further this international aspect of the economic problems connected with agriculture, we come to the fundamental question of future relations between the developed countries and the countries of the Third and Fourth Worlds and of how to feed the world's population. Will food production - already considered by some to be tomorrow's strategic weapon - lead to a new "arms race"? This is something that not even the threats of famine which have long been hanging over millions of people have achieved. There can be no doubt that, if the world's potential food resources were to be used wisely, there would be certain changes in present agricultural systems, not only in the developing countries, but also in the major advanced agricultural countries - e.g. avoidance of certain forms of energy and protide waste during animal processing, research into ways of using vegetable proteins directly, attempts to preserve and renew biological resources, stricter management of production potential,etc.

This fundamental problem cannot be dissociated from certain current factors deriving from attempts to transform the international economic situation, such as the energy crisis and the increase in the price of certain raw materials. The problem is not one of seeking ways to do without raw materials which up till now were easily and cheaply obtainable from the developing countries; nor is it a question of making exports compensate for imports. Everyone loses out in the long run, because it would deprive third countries of any opportunity to develop independently. In any case, not all those involved hold the same trumps: the poorest of the poor countries are rather more deprived, and in the developed countries it is by no means certain that agriculture is not one of the most disadvantaged sectors. The main thing is to progress gradually from an economy based on exploiting natural resources (preferably other peoples') to more balanced growth based

on the maintenance and if possible increase of world production potential. The implications in the field of scientific and technical information for farmers are numerous, but they should be defined within a general and cohesive framework. Those resources which could become a genuine limiting factor on a world scale should be determined, so as to avoid wasting research funds on short-term, temporary solutions. The alternative use of agricultural waste to produce various forms of industrial energy for instance, may be justified if it is certain that this will not prevent the humus from performing its essential function of converting solar energy into vegetable produce: in fact, the results would be catastrophic. According to economic theory, the rarer a factor is, the lower its optimum rate of use. However, this point merits amplification. Adjustments can only be made if price is a true reflection of rarity; but resources now considered to be dwindling were for a very long time exploited cheaply and were thus available at prices which encouraged wastage (petroleum, minerals, the soil in certain parts of the world, water, etc.)

We have inherited a production system based on such practices, and now we must devise and introduce different systems. Economic theory also states that, while it is obviously important to eliminate wastage, we should go still further and use scarc resources to optimum effect. While it is necessary to reduce the use of certain factors in parts of some countries, it may be essential to use them much more than in the past in other areas, where the level of use has hitherto been below the efficiency level. Among the wealth of natural resources one should not forget the genetic capital represented by certain animal species and breeds. This has occasionally been dissipated as a result of premature crossings with "productive" breeds which one day may be considered to be too demanding, since they are incapable of adapting to practical farm conditions and of benefiting from the type of resources which may be made available for stock breeding. The new economic conditions emerging from trends in international relations crea-

te a need to theoretical and applied research in order to control production factors and devise new production systems.

The scientific and technical information requirements of farmers may therefore be classed under two major headings: on the one hand, there are the requirements induced by an economic system based on a fundamental approach which is at the root of a number of the current difficulties, and on the other hand, there are the requirements deriving from the limits of this trend.

In the present situation it is easier to highlight the discrepancies between these two trends than to discern any convergence between them.

What compromises will the world of tomorrow find to counter the increasing number of irreconcilable situations such as pollution and safeguarding of natural resources, intensification/extensification, the intensive feeding of animals/the malnutrition of part of the human race? In the long run, science can improve many things (for example by harnessing new sources of energy), but at best it will only be postponing the fundamental choices which will have to be made for the future of mankind.

DISCUSSION ON THE PAPERS OF SESSION III

The main aspects discussed were as follows.

1. Effectiveness of the Extension Service

There is evidence to suggest that the Extension Service has been more successful in helping farmers with substantial physical resources than it has been with the poorer farmers, thereby perhaps, increasing the gap between the two. In recent years a number of countries have had policies and programmes with the objective of decreasing the difference in income, knowledge and power between the better off and poorer farmers but these do not appear to have reduced the gap. What are the implications for the Extension Service?

The point was made that the gap is inherent in the socio-economic system and that extension work is only one of the inputs in eliminating the gap. Research should aim to identify ways and means of helping disadvantaged areas and disadvantaged segments of the community. If the Extension Service is to be effective it will have to be more innovative in choice of methods used and in the content of the information being disseminated. The programme should take into account that disadvantaged farmers have a very different orientation to that of well off farmers and this has implications for the training, appointment and deployment of advisers and for the organization of the Extension Service.

Rural development requires a plurality of policies as reflected in the Community Directives for structural improvement in agriculture.

The question was raised as to what proportion of farmers are Extension Services reaching. In France it was estimated that about 20 % of farmers are directly reached by advisers. Local Farmer Associations are used to contact farmers not directly reached by traditional methods.

This is seen as a pre-development phase - a preparation for more specific information and advice. Also training courses had been found successful, especially where farm development was grant aided on the basis of the technical capability of the farmer.

2. Extension Work by Commercial Firms

Many of the functions previously performed on the farm have now been transferred to the food processor and marketer. As a consequence agricultural research is being oriented to the technology of food processing. Marketing arrangements between farmer and processor enable intervention by commercial firms in disseminating information to increase overall efficiency. The commercial enterprise will engage in information dissemination to the extent that it is profitable for the firm - not necessarily because it will improve the situation of the farmer. Farmers have shown a willingness to trade some of their independence for greater security of market outlet. Extension Services have a role in keeping farmers informed on developments in marketing systems and the consequent implications for decisions on production.

3. Co-ordination of Extension Work

In a developing agriculture farmers become more specialized with a consequent demand for specialist advi e. This together with increasing output of new information has required greater specialization in the Extension Service and a consequent increase in different kinds of specialized advisers.

In this situation the general adviser must perform a co-ordinating role. This role is especially emphasized where farmers specialize in different enterprises within a small geographic area. The Extension Service needs to re-organize itself accordingly as adoption of technology changes the work environment. Perhaps in the future, farmers, particularly those highly commercialized and specialized, may be more capable of integrating the information coming from the different specialists.

4. Information Systems to cater for future needs

If, in the future, agricultural production responds to rather contrasting societal expectations varying from maximizing economic efficiency to emphasizing preservation of the environment, its information needs will increase in breadth and in depth. This means that its information systems must be able to carry information of a wide nature. Even in the current situation it would appear that existing information and research are not satisfying the needs of all farmers.

It may be that existing organizational arrangements which have evolved over the past one hundred years are not the best for the future. A regrouping of agencies and institutional provisions may be necessary to deliver the information required for various forms of agriculture and of land use.

APPENDIX I

'TRANSFORMED' REVIEW ARTICLES IN AGRICULTURE

Summary of part 2 of the 'Study of a pilot project for compiling review articles in agriculture' - Study project AWG-A 13/1976

This study was carried out on behalf of the Commission of the European Communities, Luxembourg, by the Centre for Agricultural Publishing and Documentation, Wageningen, the Netherlands, 20 December 1976.

Introduction

Review articles, i.e. articles in which information about a subject is compiled, evaluated and interpreted, and which contain a carefully compiled bibliography, are considered as important sources of information. Over the years the number of primary articles has so increased that scientists and agricultural advisers have serious problems in keeping up with literature. They no longer can read all publications published in their own special fields and areas related to those fields. As an alternative, reviews are often regarded as a suitable information source.

In 1976 an E.C. study was carried out to investigate the possibilities for a close co-operation between the E.C. countries in producing agricultural reviews. The study was based on the philosophy that co-ordinating the production of reviews would accomplish a more adequate coverage of all agricultural subjects and improve the exchange of agricultural information between the E.C. countries.

The study was divided into two parts: Part 1 which deals with reviews for scientists (not included in this summary) and Part 2 which deals with 'transformed' reviews, i.e. reviews for persons at different levels between science and practical agriculture. Some findings on the 'transformed' reviews are presented in this paper. Information for the study was mainly obtained from editors of periodicals and practical agriculture, consultants of advisory services and agricultural informa-

tion specialists in six E.C. countries.

Types of agricultural reviews

The broad variety of reviews makes it necessary to define the different types of agricultural reviews. For that purpose first agricultural publications are classified.

Scientific agricultural research supplies basic scientific information recorded in basic scientific publications. As farmers rarely have the necessary training and time to evaluate research results for application on their own farms, intermediate steps have to be taken to inform farmers about agricultural research results. The first step is to select and digest basic scientific information which might be useful for practical agriculture. This scientific information should be digested, transformed, in such a way that it is serviceable for university level specialists involved with practical agriculture. The resulting publications must have a scientific character and may be called transformed scientific publications. The next step in the transfer process of information from basic scientific research to practical agriculture consists of a simplification of the transformed scientific publications in such a way that the information becomes understandable and usable for, for example, those who have had vocational training below university level such as local advisers. This type of publication may be called transformed publications. Another step in the information transfer process is to include information which is, for example, for local advisers directly applicable in practical agriculture. Publications of this type may be called applied transformed publications. Practical publications for farmers, in which simplified directly applicable information is given, are seen as the last link in the information chain from science to practice.

publication:

basic scientific → transformed scientific → transformed → applied transformed → practical

readership:

(1) (2) (3) (4) (5)

basic research → practical agriculture

The readership of the different types of publications mentioned above may be categorized as follows:

(1) scientists involved with basic scientific research
(2) specialist agricultural consultants (university level), scientists at agricultural research stations or institutes, trade & industry, agricultural education
(3) and (4) agricultural advisers in the field, trade & industry, farmers with vocational training, agricultural education
(5) farmers.

The term 'transformed' has been chosen to indicate that the data in the publication have been selected, digested and refashioned for a special readership (see above) or purpose. The purpose of 'transformed' publications may be - distributing information for general orientation or - distributing specific information which is directly applicable in practical agriculture.

Agricultural publications for direct practical application are often restricted to a limited distribution area; in contrast, for example with results of chemical research that can often be applied throughout the world, agricultural research results generally must be interpreted under regional or local circumstances, as environmental factors such as soil type and climate must be considered.

According to the above mentioned categorization of agricultural publications, agricultural reviews can be distinguished in several categories dependent on the level of the intended rea-

dership and on the purpose of the review articles:

1) Scientific reviews: for scientists involved with basic scientific research. This type of review gives an overview of purely scientific noteworthy data and concepts.

2) Transformed scientific reviews: for consultants at a level between basic scientific research and advisers in the field, scientists involved with practical agricultural research (e.g. at agricultural research stations), trade & industry. These articles must be considered as a first step in the transfer of scientific and technical information from basic scientific research to practical agriculture as these reviews survey research findings which might be useful for practical application in agriculture. The articles have a general character and give a general impression; although the research results are evaluated to some extend for practical application, the articles cannot be used for direct practical application in the field (for direct practical application usually the local circumstances must be taken into consideration).

3) Transformed reviews: for agricultural consultants in the field, well-educated farmers, trade & industry. The articles have the same character as transformed scientific reviews (general orientation 'readers' interpretation required for direct practical application as local circumstances often differ).
The articles should be written in easily understandable language. They should give sufficient information about the scientific backgrounds of the subject described. The review should be compiled in such a way that the reader can easily judge which data are of importance for his situation.

4) Applied transformed reviews: for the same audience as transformed reviews. The articles give an overview of a subject and can be used for direct practical application since in these articles the regional or local circumstances have been taken into consideration.

5) Practical reviews: reviews for farmers. These reviews must

be easily digestible surveys of subjects that contain information for direct practical application. The articles have a 'problem solving' approach.

The term 'transformed' reviews includes the types 2 to 5 described above.
The 5 types of review mentioned should meet the following requirements:

1. the articles must not contain previously unpublished research results
2. they should give an overview of a subject and an evaluation of the findings and theories on a subject.
3. they must contain a carefully selected bibliography appropriate to the style and function of the review
4. they should to some extend evaluate the literature quoted as well as the subject discussed.

Many articles commonly regarded as 'reviews' do not fulfil criteria 3 or 4. Especially in articles for farmers and local advisers, bibliographies and overviews of the literature on a subject are often left out because this information is not considered useful. Such articles cannot be regarded as reviews. It is felt that a review should give an overview of a subject as well as an overview of the literature on a subject, whatever topic it refers to, and regardless of its technical level.

Need for 'transformed' reviews

The investigation shows that there is a definite need for transformed scientific reviews. For general orientation and to keep up with new research results and theories, this type of review is considered very valuable for specialist consultants, i.e. consultants at the level between basic scientific research and advisers in the field.
Consultants below university level (and well-educated farmers) were believed to derive much benefit from transformed reviews. As these consultants generally are less interested in spending

much time on reading trade literature, a concise form of presenting main research findings on a subject by means of a transformed review was considered very valuable.
The need for applied transformed reviews was estimated to be very low. Review articles were considered less suitable for the transfer of directly applicable information. As environmental factors, such as soil type and climate, can differ much between different regions, the research results and theories quoted in those review articles intended for direct practical application, must be interpreted for regional or local circumstances. Thus applied transformed reviews would be written for a very limited readership. As local advisers generally can easily call on specialists of the advisory services and at research stations, it seems doubtful whether there is really a need for applied transformed reviews.
The need for practical reviews was also considered to be very low. Farmers would be more interested in short articles with the latest direct applicable findings and in simple short overviews of special subjects without literature quotations. Including an overview of the literature (a criterion a review should fulfil) in an article at this level would be of no use as the literature quoted is not easily available for the farmer or is too scientific for him. Besides many farmers, when interested in more information on a particular point in an article, will ask an agricultural adviser for further information. Farmers with a higher level of education could use transformed reviews.

Stimulation of the production of reviews

Despite the apparent need for transformed scientific and transformed reviews, the present production of these reviews (and applied transformed and practical reviews) is very limited. The intensive work involved in preparing a review and the fact that most researchers are primarily interested in publishing their own research results, are two reasons for the small number of reviews. The following suggestions were made on how and by whom the production of 'transformed' re-

views should be stimulated:

- Governments and organizations should financially support the preparation of reviews.
- Editors of periodicals should be more active in the acquisition of reviews.
- More attention should be given to the possibilities to simplify and shorten scientific reviews into 'transformed' reviews.
- Training programmes for scientific journalists in preparing 'transformed' reviews should be established.
- Advisory services should take more initiatives to publish 'transformed' reviews, as consultants of these services form a substantial readership of 'transformed' reviews.

With respect to this last suggestion it must be mentioned that although many booklets, handbooks and pamphlets are published by these services in the various E.C. countries, 'transformed' reviews are hardly ever published under the authority of these services. Most of the 'transformed' reviews are published by commercial publishers and research stations.

Language of 'transformed' reviews

In view of possibilities to publish joint E.C. 'transformed' review publications, investigations were made to what extent the readership of the different types of 'transformed' reviews were capable of reading foreign languages. From these investigations it appeared that all 'transformed' reviews should be published in the national languages. Although most people for which transformed scientific and transformed reviews are written have had courses in English for 3 to 5 years (and to a less degree French and German), many of them would not be capable or willing to read technical literature in a foreign language. Even transformed scientific reviews, which are of such a level that one might assume a reading knowledge of English by the intended readership, should be published in the national languages. Although further investigations will be required, these findings seem to indicate that all possible

joint E.C. review publications will have to be translated into the various national languages.

Co-ordination of the production of 'transformed' reviews

Because of the language barrier and because not all agricultural subjects are of interest for every E.C. country, the establishment of joint E.C. transformed scientific and transformed review publications may not be the most desirable and feasible way to co-ordinate the production of these reviews.

As it is recognized that a review, published on a particular subject, can be of interest to other E.C. countries and because distribution on a wider scale makes the compilation of a review more worthwhile, the following exchange-programme for 'transformed' reviews was proposed: In each E.C. country a central agency should be assigned the task of registering each 'transformed' review published in that country and should inform the agencies in other E.C. countries about these publications. The central agencies should pass on the foreign articles to publishing organizations, or advisory services in their country to judge whether the foreign review article should be translated and published in the national language. To promote this exchange of reviews and to stimulate organizations to publish more reviews, financial support should be given, for each review, to both the organization that publishes the original article and to the organization that publishes the translated article.

Final remarks

- In investigating how information and documentation centres could assist authors of reviews in preparing a review*, it was found that the services these centres can provide are largely unknown to scientists, editors of periodicals and agricultural consultants. In view of the useful services the-

* assistance by providing them with literature lists on the subject of the review, providing them with photocopies of obscure publications translating publications

se centres can provide, it is highly recommendable that much attention should be given to make these services better known and improve the facilities of these centres.

- The rather negative attitude of the persons interviewed towards the publication of joint E.C. transformed scientific reviews is not necessarily a reason for not taking any initiatives in this field. Particularly initiatives to publish transformed scientific reviews should be considered, as this type of review lends itself to a wider distribution.

- With respect to 'transformed' reviews, the possibilities for an exchange-programme should be considered. A Commission of the E.C. could initiate the establishment of such an exchange programme, and settle arrangements between publishing organizations.

APPENDIX II

PAPER BY THE ITALIAN DELEGATION PREPARED ON THE BASIS OF THE QUESTIONS FOR THE SYMPOSIUM ON THE TRANSMISSION AND INTERPRETATION OF SCIENTIFIC AND TECHNICAL INFORMATION IN AGRICULTURE

1. The information requirements of the advisory services and consequently those of the individual consultants are vast, not only from the point of view of scientific and technical information, but also as regards other information, in particular socio-economic information.

   1.1 Specifically in the field of scientific and technical information the dissemination services are having to work under increasing difficulties due on the one hand to the increased demand for information from the agriculturists, which is increasingly short-term and more exacting, and on the other to the fact that they themselves are unable to obtain updated and complete information.

2. What is needed is a 'ring link', a primary link-up service connecting research with dissemination and researcher with the disseminator.

   2.1 Before it can be disseminated, the results of the research must be interpreted and evaluated, not only from the scientific point of view, but also on the basis of the socio-economic background of the areas of application and in the light of any existing or forthcoming regional development plans.

   2.2 The above could be achieved by arranging for :

      2.2.1 'Scientific consultants', i.e. top-level technologists, who are not research workers, to be available at the research institutes to provide advice in each sector of research (e.g. animal production, fruit farming, grain farming, etc). Training programmes or at least specialization and refresher programmes, should be organized and coordinated by the European Community for these consultants; and

2.2.2 the setting up of committees comprising research workers, scientific consultants (as defined above), disseminators, farming instructors, documentalists, socio-economic consultants (see Directive EEC 161/72) and practical farmers (i.e. the final users).

The committees should be set up at Community level, national and sub-national level with the following main briefs :

- establishment of the subjects to be disseminated in order of priority in the field covered by the committee;
- establishment of the most suitable ways and means for providing complete information and updating for the dissemination services and the disseminators (e.g. synoptic articles or review articles, exchanges of views, guided visits, information meetings on current research, films, video-cassettes, etc.

3. a) Existing data bases (e.g. AGRIS and AGREP) should be used to make all scientific and technical data available to the scientific consultants (see item 2.2.1) and the committees (see item 2.2.2) and also to facilitate the selection of subjects for dissemination and take stock of the state of the art in the fields concerned.

To this end the existing data bases should if possible be improved by introducing abstracts and/or title completion by sub-titles or keywords.

b) In addition to this consolidation and improvement of the existing data bases, specific data bases should be set up which are designed from the outset to meet the requirements of agricultural dissemination services and other intermediate users (government departments, secondary teachers, farming instructors). These requirements should be pinpointed by organizing a suitable Community level survey which takes the particular features of the sector concerned into account.

4. Any feasible step should be studied and organized at both Community and national level so that the dissemination services can more easily tackle the difficulties outlined in Item 1.

At the moment, the information services would not appear to be able to meet the demand for dissemination; the Community could, therefore, comply with the objectives of the Treaty of Rome, and in particular those outlined in Articles 39 and 44 on the dissemination of knowledge and raising of the standards of living of the population, and play a major part by promoting and coordinating such action.

4.1 In practical terms the Community should study the possibility of promoting the necessary action to ensure that :

- scientific consultants are on hand at the research institutes (see item 2.2.1);
- dissemination committees are set up as suggested in item 2.2.2;
- the scientific consultants mentioned above have the opportunity to extend and update their knowledge of the subject and discuss their views, and this also applies to those responsible for the national dissemination services;
- a broader input spectrum is achieved with resultant wider coverage of the operational information systems (e.g. AGRIS and AGREP) in conjunction with a strengthening of the structures;
- the system currently under study, the Agricultural Management Information System (AMIS) becomes operational, taking into account any possible correlation with the Council Directive N° 161/72 on socio-economics;
- the initiatives aimed at setting up controlled multilingual sectorial vocabularies (FOODTERM, AMISTERM, VETTERM) are implemented and extended to cover all sectors of agriculture;
- projects to set up factual data banks are launched (i.e. qualitative and quantitative) in specific sectors to be determined;
- projects likely to result in the periodical publication of synoptic articles (review articles, see programmes of the AWG) are continued and given more support;
- the Council Regulation on the coordination of agricultural research (1728/74) insofar as it concerns exchange of information (Article 4.2) and the dissemination of scientific results (Article 6.2) is interpreted and applied;

specialists are trained in the field of agricultural information and documentation so that they will be able to instruct users, with a possible view to the use of EURONET in the agricultural sector.

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A major area of interest to be considered in next year's working programme of AWG is the utilization of appropriate information – scientific, technical and practical – in agricultural production and marketing by agricultural extension services, taking into account the possible role which the European Information Network (Euronet), which is currently being implemented, might play in this field.

It is necessary, however, that both the Commission services and the AWG should at all times have up-to-date opinions on information systems suitable for agricultural advisory systems, as well as on problems related thereto. Accordingly, a symposium was held in Luxembourg on 2 and 3 February 1977 at which an in-depth discussion on these matters took place.

These proceedings issued herewith include the papers presented at the symposium, the summary and conclusions of the discussion as well as specific recommendations for future action as formulated by the participants. These recommendations are being submitted to the Commission for consideration and, ultimately, for implementation as appropriate.

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