

WORLD METEOROLOGICAL ORGANIZATION

**A STUDY ON THE POSSIBLE POLICY ISSUES OF THE
FUTURE WMO INFORMATION SYSTEM
(FWIS)**

Content.	Page
Executive summary	2
1. Introduction	4
2. The concept of the Future WMO Information System (FWIS)	5
3. Possible impacts of FWIS on Members responsibilities, resources and infrastructure	6
3.1 National level (NC)	6
3.2 The Data Collection or Product Centre (DCPC) level	7
3.3 The Global Information System Centre (GISC) level	7
4. Other possible policy issues	9
5. Other considerations	10
5.1 Possible procedure in the nomination of FWIS centres	10
5.2 Capacity building in developing countries	10
5.3 Financing of FWIS	10
Acknowledgements	12

Attachments

Vision for the Future WMO Information System:

<http://www.wmo.ch/web/www/WDM/Documentation/FWIS-vision-2002.html>

CBS-Ext.(02)/PINK 6.2 (5):

ftp://www.wmo.ch/Documents/sessions/CBS-Ext.%2802%29/PINKS_ENGLISH/PINK-06-2%285%29final.doc

EXECUTIVE SUMMARY

The current WMO information systems have been developed to meet a diverse set of requirements. The principal system is the Global Telecommunication System (GTS) along with the related data processing and management functions that have been developed to serve the World Weather Watch (WWW). The GTS has a number of significant strengths: it is an operational private network that mainly provides for the exchange of real-time high-priority data, it is mature, well tested and operated according to well-defined procedures and shared responsibilities. Other information systems have been developed to meet the needs of other programmes and Commissions. These have their own advantages, most importantly; they have been developed to meet specific programme requirements. However, the multiplicity of systems operated for different Programmes has led to incompatibilities, inefficiencies, duplication of effort and higher overall costs for Members. Continuing to develop systems in this uncoordinated manner will exacerbate these problems and will further isolate the WMO Programmes from each other and from the wider environmental community.

Consequently, an alternative approach has been proposed: a single coordinated global information system infrastructure, the Future WMO Information System (FWIS). It is envisioned that FWIS would form a comprehensive framework for collection and sharing of information for all WMO and related international programmes. This framework would build upon and enhance the most successful components of existing WMO information systems.

Today the private dedicated communication system of the WWW (currently provided by the GTS) is used to exchange time critical meteorological data and corresponding data from other WMO programmes. This role would continue within FWIS. While the current GTS would be embedded within FWIS, FWIS is planned to be more flexible, providing more data from a larger range of WMO programmes and supporting different types of connections to the system, in particular ad-hoc data requests via a pull mechanism.

Today the Internet is used for the exchange of non-time critical data of WMO programs in many parts of the world. Within FWIS, the Internet would continue to be the connection medium of choice to handle ad hoc data but the use of Internet would be expanded to take advantage of the ubiquity of its connections, its decreasing costs and the positive experiences gained to date with its use.

Impact of FWIS on Members responsibilities, resources and infrastructure

It should be remembered that FWIS concerns only telecommunication and data management functions of the WMO and does not affect the Global Data Processing System (GDPS) of the WWW or the data processing components of other WMO Programmes.

It is believed that, for most Members, the introduction of FWIS would not result in new responsibilities or requirements for additional resources. Rather, it is expected that FWIS, through expanded use of commercial off the shelf technology and increased use of the Internet, would result in lower costs, especially for the least developed Members. However, Members wishing to operate a Data Collection or Product Centre (DCPC) or a Global Information System Centre (GISC) would incur some additional responsibilities and costs.

FWIS would have an impact on the responsibilities and functions of Regional Telecommunication Hubs (RTH) that wish to expand their responsibility and serve other WMO programmes as DCPCs, mainly due the added flexibility in connecting to the WMO information system. The extent of the impact would depend upon the wishes of the Members operating those RTHs. If they accept no additional responsibilities no additional resources would be needed. For those that expand their services, injection of time critical data from other WMO programmes into the system would mean an additional responsibility. The

increase in resources needed would possibly be a small fraction of the current resources needed to operate the existing RTH. Provision of data and products on the basis of request/reply services would likely be the most significant addition. While request/reply services would be provided via Internet, the experts have assumed that in most cases RTHs intending to serve as DCPCs would already have an Internet connection. It is expected that the increase in resources needed would be somewhat larger than above, but likely not prohibitive.

There are number of centres around the world that currently provide a variety of products for WMO Programmes (long term forecasts, hydrological products, climatological products, etc). Should those providers agree to participate in FWIS, they would either serve as DCPCs or would ask other DCPCs to receive and disseminate their products. In either case it would mean changes in agreed upon practices and procedures. This would require additional resources during implementation but would result in less duplication of effort and reduction of costs in the longer term.

Today, no centres provide all of the functions envisioned for GISCs. The services they would provide correspond most closely to those of RTHs associated with large numerical modelling centres, such as World Meteorological Centres within the present WWW. These RTHs have a higher workload due to their responsibility to provide global products. If these RTHs were to become GISCs, the largest need for resources would be for the creation and maintenance of a product catalogue. Definition of the structure and contents of such a catalogue is currently under active discussion in several expert groups and it is understood that the maintenance of a comprehensive catalogue of WMO would be a significant undertaking requiring many staff-years of effort.

Other possible policy issues

The introduction of FWIS could provide Permanent Representatives (PR) with an opportunity to increase the visibility and capability of the NMHS. FWIS should provide co-ordinated information services to all relevant WMO Programmes, which would enhance the role of the NMHS as the national focal point for information services to many new user groups within the country. For those NMHSs that wish to enhance their role by providing these information services, additional responsibilities and additional resources might be needed. However, NMHSs could make provision of additional services contingent on reimbursement from clients who request them. It is believed that this cooperation would reduce the total costs of WMO related programmes within the Member country concerned.

Currently, several data providers make meteorological data and products available over the Internet. For the most part, they have instituted procedures to ensure that any applicable conditions placed on these data sets, are followed. Considerable experience has been gained on the effectiveness of those procedures, but expanding the use of Internet to collect and distribute meteorological data could be a concern to some Members.

FWIS is intended to serve all relevant WMO programmes. It would bring savings to the meteorological/hydrological community as a whole and increase efficiency of their operations. However, shared use of telecommunications for time critical applications from all WMO Programmes with other players having other objectives would require careful planning and a comprehensive and accurate assessment possibly on case by case basis of requirements, risks and costs before moving into the use of Internet. The full benefits cannot however be realised unless all relevant Programmes participate in planning, development and operation of FWIS.

The technical training needed to support the GTS is, to a significant extent, specific to that system. In FWIS the need for such specific technical training would be reduced, since the technology to be used is already broadly applied. Therefore, after the implementation of FWIS, standard generic ICT training would meet operational and development requirements, facilitating specific training to be focused into more scientific and meteorological areas.

By making use of off the shelf technologies of a lower cost, FWIS would allow least developed Members, for the first time, to actively participate in the WMO Programmes, specifically the WWW. While lowering costs FWIS would also provide improved exchange of data and products and would enhance the role of developing countries within the meteorological community.

A STUDY ON THE POSSIBLE POLICY ISSUES OF THE FUTURE WMO INFORMATION SYSTEM (FWIS)

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6 March 2003

1. Introduction

The Executive Council, at its fifty-third session (EC-LIII, 2001), while discussing WMO information system development, emphasised that a number of policy issues are associated with the future WMO information system.

In particular:

- WMO objectives and policies must be considered in every WMO activity. These issues must be reflected in the organisational structure of the WMO information system;
- The possible impact of the introduction of a future WMO information system on Members responsibilities and resources must be carefully studied
- A smooth transition to the future information system must be developed to ensure there is no interruption in essential services;
- The extent to which the functions and responsibilities of existing infrastructure and centres should be used or revised should be investigated.

At its next session (EC-LIV, June 2002), the council discussed again the future WMO information system and it also recalled the policy issues raised at its fifty-third session, namely:

- The possible impact of the introduction of a future WMO information system on Members responsibilities and resources;
- The extent to which the functions and responsibilities of existing infrastructure and centres should be used or revised.

It requested that a study be undertaken to explore these and other policy level implications of the future WMO information system, based on the outcome of CBS at its extraordinary session in 2002. The council requested the EC Advisory Group on the Role and Operation of NMHSs to consider the results of the study, analyse the relevant policy issues and report its findings to fourteenth Congress.

CBS in its extraordinary session in 2002 noted the request of the fifty-fourth session of the Executive Council related to FWIS. (The relevant PINK of CBS Ext.(02) is attached for convenience). It agreed, that although further refinement and consolidation of the concept was required as noted above, the technical background and orientations for the FWIS concept, that were required to support the study on policy level implications, were now available from the outcome of the session.

The commission was of the view, that the policy level study requested by EC, to be submitted to Executive Council Advisory group on the Role and Operation of NMHSs was beyond the Commissions mandate and should be carried out by

(a) consultant(s), with the technical assistance and support of OPAG-ISS chair, as required.

After the session of CBS Ext.(02), WMO hired a consultant and an expert to make the requested study.

2.The concept of the Future WMO Information System (FWIS)

The concept of FWIS is explained in detail in the Vision of the Future WMO Information System (1 October 2002), which is available from the WMO WEB server (<http://www.wmo.ch/web/www/WDM/reports/FWIS-vision-2002.html>). This is the refined new version of the vision and for convenience, it is attached to this report. In the executive summary of this vision it is stated, that:

"The multiplicity of systems operated for different Programmes has, however, resulted in incompatibilities, inefficiencies, duplication of effort and higher overall costs for Members. Continuing to develop systems in this uncoordinated manner will exacerbate these problems and will further isolate the WMO Programmes from each others and from the wider environmental community. It will increase the difficulty in sharing information between programmes, which is essential for them to fulfil their requirements. As a consequence, other organisations, environmental programmes or commercial concerns might assume responsibility for providing essential data and services and WMO would thus lose its leadership role."

In the statement by the EC on the Role and Operation of National Meteorological Services (NMS), which has been recently discussed, it is stated in the introduction, that:

"As the twentieth century drew to a close, however, governments the world over began seeking more effective and efficient ways of delivering essential government services to their national communities; taking advantage of scientific and technical advances to broaden the range of services offered while reducing cost. In particular, they sought to implement more flexible, more affordable and more cost-effective arrangements which would also be more user-oriented, more responsive and more innovative for delivering government services; and they sought to provide, or ensure the provision of, these services to higher and higher standards while seeking to stabilise, or even reduce, the public resources assigned to them."

Further down in the introduction of the statement it is stressed, that:

"The nature and pace of change have placed an increased financial burden on NMSs at a time when many Services, especially those in developing countries, are already finding it difficult to meet even their established obligations to their national and international user communities."

FWIS is designed with these requirements in mind. It will make the future WMO information system more flexible than that at present, cheaper especially for smaller NMHSs from developing countries and it will take into account requirements of other relevant WMO programmes besides WWW.

The private dedicated communication system of the World Weather Watch (WWW) of the WMO (currently provided by the Global Telecommunication System, GTS), is intended for the exchange of time critical meteorological data and corresponding data from other WMO programmes. This will not change with the introduction of the FWIS. The current GTS is embedded within the spectrum of FWIS, but FWIS is planned to be more flexible providing more data from a variety of WMO programmes and different types of connections to the system. GTS could handle also ad hoc data provided that there is spare capacity and that function would not have impact on time critical data. However in general, Internet would be more suitable to handle ad hoc data and it is already used for the exchange of non time critical data of WMO programmes in many parts of the world. In FWIS the use of Internet is expected to increase due to the ubiquity of connections, the price and positive experiences gained until now. FWIS considers only telecommunication and data management functions and does not affect the Global Data Processing System (GDPS) part of the World Weather Watch (WWW). The responsibilities and functions and the structure of Regional Specialised Meteorological Centres (RSMC) and World Meteorological Centres (WMC) need not be changed because of the introduction of FWIS.

3. Possible impact of FWIS on Members responsibilities, resources and infrastructure

3.1 National level (NCs)

At the national level, the PR is responsible for co-ordinating WMO programmes (Reference: Regulation 6 in General Regulations.). The introduction of FWIS does not generally bring in new responsibilities or a requirement for additional resources, unless the Member wishes to operate a DCPC. FWIS is intended to provide benefits to National Meteorological and Hydrological Services by lowering costs and increasing efficiency especially in the developing countries, but that is not the purpose of this study, and it is therefore not pursued further in this report.

On the other hand the introduction of FWIS might provide a PR with an opportunity to increase the visibility and capability of the national meteorological and hydrological service. FWIS is intended to provide co-ordinated technical services to other relevant WMO programmes, which makes PR the focal point nationally for those programmes. If PR wishes to take that opportunity, it might mean additional responsibilities and need for new resources to NMHS on which PR might try to negotiate for reimbursement from other agencies/departments. It is believed to mean reduction of total costs of WMO related programmes within the country concerned.

It is also believed to be entirely a policy level decision by the PR itself whether he/she wishes to utilise this opportunity and the decision is made easier with the flexibility of FWIS. On the other hand the decision is not mandatory due to the introduction of FWIS. FWIS is capable of providing data through a number of configurations within a country. Functions could be consolidated into a single NC or could be provided by several NCs (one of each of the different WMO programmes), if the PR so wishes.

3.2 The Data Collection or Product Centre (DCPC) level.

The introduction of FWIS would change the responsibilities and functions of RTHs. Within the present system there is only one gateway to the WMO telecommunication system and this is the NMHS. The PR might in some cases be reluctant to add other WMO programmes into the present WMO communication system due to complexity

of the procedures and costs involved. In FWIS there would be multiple possibilities and added flexibility in procedures to connect to the WMO information system.

Members running RTHs within the present GTS may wish to continue with that responsibility and not make any significant changes to their functions. That is possible in FWIS. In this case the only change would be the change of the name from RTH to DCPC. There would be no impact to the responsibility of the Member concerned and no need for additional resources. If all of the present RTHs wish to opt for that alternative, then all the possible increases of efficiency and cost savings, which are sought for in FWIS, would not be achieved. It is, however, very unlikely, that all the present RTHs would opt for this alternative.

There are different options for the increased functions of DCPCs in comparison with present RTHs, which are summarised in the following 2 paragraphs:

1. DCPC function might cover other relevant WMO programmes requirements in data collection and dissemination. This is an additional responsibility to the situation at present if there is a need for injection of time critical data from other programmes into GTS. Correspondingly there would be a need for additional resources. That increase of resources is possibly a small fraction of the resources needed at the RTH within the present WMO telecommunication structure.
2. DCPC might make data and products available on request/reply basis. For those RTHs planning to become DCPCs, which agree to continue collection and dissemination of regional data or products under FWIS, and making data and products available on request/reply basis, it would mean an increase of responsibilities and costs. It would also require description of its products in an agreed upon catalogue form. The amount of additional resources needed depends on the volume and variety of products to be disseminated and on the number of customers to be served. As noted above, it is assumed that request/reply services would likely be provided via Internet. Thus, any centre offering these services would need to have an Internet connection. The experts have assumed that RTHs that intend to become a DCPC probably already have an Internet connection. Thus although the increase of resources in this case is somewhat larger than above (para. 1), it is not likely to be prohibitive.

Other possible DCPCs.

There are number of producing centres globally of different types providing products (long term forecasts, hydrological products, climatological products, etc) and making those products available to users on an agreed upon basis. If those providers wish to contribute to FWIS, it would mean either that they become DCPCs (on the agreement with PR) or they convince another DCPC to receive and disseminate their products. In both cases it would mean changes in the agreed upon practices and procedures. It correspondingly means need for additional resources at least at the implementation phase. On the other hand it may mean less duplication of efforts and reduction of total costs in the longer time frame. It may also offer those centres a wider audience to present their work results,

3.3 The Global Information System Centre (GISC) level

Within the present WWW there are no centres corresponding to GISCs - so GISCs are not replacing any existing centres. It is the principal new functionality offered by FWIS.

A GISC is also a DCPC, and it has a defined area of responsibility for its activities. GISCs have all the routine data intended for the global dissemination from all over the world. That part of their database would be the same at every GISC. In the DCPC function they would have more regional data for their area of responsibility. To support the request/reply function they should hold all the exchanged data and products for an agreed upon minimum period of time. They may also store the data for longer time periods if they so wish.

Today responsibilities of RTHs associated with large numerical modelling centres like WMCs have a higher workload than other RTHs mainly due to the responsibility to provide global products. Considering the impact of introduction of FWIS into those Members responsibilities and resources, one may come to the conclusion, that the largest individual addition needing considerable amount of resources is the formation and maintenance of the product catalogue. Going through the listed responsibilities of GISCs (CBS-Ext.(02)/PINK 6.2(5), APPENDIX pages 5 and 6) one by one, the following conclusions may be drawn:

- a) Receive observational data and products that are intended for global exchange from NCs and DCPCs within their area of responsibility, reformat, as necessary, and aggregate into products that cover their responsible area;
 - This is closely aligned with the present function of the large RTHs referred to above, so this does not mean any significant addition to the present responsibilities.
 - However the number and volume of products from other relevant WMO programmes is not defined yet.
- b) Exchange information intended for global dissemination with other GISCs.
 - This is a new function compared with the present situation. In practise this is already done to a certain extent in the present structure, which means, that it does not require major additions to those centres responsibilities referred to above. It also would ensure, that all the GISCs have the same global database.
- c) Disseminate, within its area of responsibility, the entire set of data and products agreed by WMO for routine global exchange (this dissemination can be via any combination of the Internet, satellite, multicasting, etc. as appropriate to meet the needs of Members that require its products);
 - This is already done for WWW data and products. Corresponding requirements of other relevant WMO programmes would mean an addition to the present task. The increase in responsibilities due to this addition can not be quantified yet.
 - The introduction of new and flexible methods of delivery would probably result in some additional costs to GISCs. At the receiving end of the system this flexibility means reduction of costs.
- d) Hold the entire set of data and products agreed by WMO for routine global exchange and make it available via WMO request/reply ("pull") mechanism;
 - This responsibility is new but as such it is not considered to be a major, but it depends fundamentally on the availability of the product catalogue (See the next item).
- e) Describe its products according to an agreed WMO standard and provide access to this catalogue of products;

- This responsibility is new. It is considered a largest single task of the new tasks in the list of GISC functions. Definition and agreement of the structure of the catalogue and what should be included in it is not yet done. The need for a general product catalogue for various purposes is at the moment under active discussion in several expert groups (UNIDART II in EUMETNET, VGISC Project in RA-VI, Global Change Master Directory in the USA (NASA)). It has to cater for all the observations from all the observing stations, all the products generated, all data from the relevant WMO programmes, etc. It is estimated that the catalogue finally will contain a large number of items, which means, that the maintenance of the catalogue is also not a trivial task. The formation of the product catalogue will be a major undertaking requiring many man-years. It is not a major scientific or intellectual activity, but it requires much work, the amount of which should not be underestimated.

- f) Provide around the clock connectivity to the public and private networks at the bandwidth that is sufficient to meet its global and regional responsibilities:
 - This is partly already the responsibility of the centres referred to above. Addition is not considered to be significant to their present responsibilities.

- g) Ensure that they have procedures and arrangements in place to provide swift recovery or backup of their essential services in the event of an outage (due to, for example, fire or a natural disaster):
 - This is already one of the present responsibilities of the centres referred to.

- h) Participate in monitoring the performance of the system, including monitoring the collection and distribution of data and products intended for global exchange;
 - This is also already covered by the present responsibilities of the centres.
 - Possibilities for data and product monitoring would be improved by FWIS.

4. Other possible policy issues

FWIS is planned to use commercial off the shelf technology and increase the use of the Internet. That approach would make the planned system cheaper and more flexible than the GTS today. With that it brings an issue of accepting the use of these systems especially for time critical applications, with other players also using the same bandwidth for other purposes. That might lead in some places and some periods to the risks not achieving the required service level. This is a policy issue to be considered and an issue that needs careful considerations before overloading FWIS. The most logical solution for those cases might be, that centres concerned study the possible implications of introduction of Internet connections for the transport of time critical data on case by case basis, and decide according to the risk and costs assessed, whether to move to the Internet or not.

The introduction of Internet to the collection and distribution of meteorological data makes that data available to other users of Internet. There are already now several data providers on the Internet making meteorological data and products, at least to a certain extent, freely available. There also are procedures for ensuring, that any conditions put by the Members on their data sets, are followed. Experience has been collected already over some time of the results of those procedures. This activity will increase with FWIS so further consideration of this policy issue may be needed.

FWIS is intended and planned to serve, besides WWW, also other relevant WMO programmes. If achieved, it would bring additional savings to the meteorological/hydrological community as a whole and increase efficiency of their operations. By this co-ordination unnecessary duplication of efforts and resources would be avoided. To achieve this it would be very important, that other relevant WMO programmes actively participate in the planning and implementation of FWIS and contribute their own expertise and resources in all phases of the development of the FWIS as called for in the decision of CBS.

As a policy issue, other relevant WMO programmes should therefore be strongly encouraged to take this opportunity, which is opening in the introduction of FWIS.

5. Other considerations

5.1 Possible procedures in the nomination of FWIS centres

CBS Ext. (02) noted, that the FWIS concept was consistent with the WWW structure. The FWIS should also identify and acknowledge the national level of the WMO information system, that which is currently included in the GTS structure and is of crucial importance for the national data collection. FWIS therefore does not request changes to the systems at the national level, but it offers multiple choices for connecting into it.

For DCPCs and GISCs there should be a formal mechanism in place for their selection and nomination similar to those currently in place for designation of RSMCs and RTHs of WWW. This mechanism should involve RAs and other relevant technical commissions in addition to CBS.

5.2 Capacity building in the developing countries

For developing countries, FWIS would allow them, for the first time, to be able to actively participate in the World Meteorological System. The technology required in FWIS is cheaper, than that for the present system. It would utilise international industry standards for protocols, hardware and software. It is the strong belief of the designers of FWIS, that its introduction would lower costs especially for the NMHSs in the developing countries and also by offering better possibilities for data and products exchange, improve developing countries possibilities to play their role in the meteorological community.

The technical training needed to support the GTS is, to a significant extent, specific to that system. In FWIS the need for such specific technical training would be reduced, since the technology to be used is already broadly applied. Therefore, after the implementation of FWIS, standard generic ICT training would meet operational and development requirements. The training effort after introduction of FWIS might be shifted from the specific GTS expertise into more scientific and meteorological area providing NMHSs of developing countries improved possibilities to perform their main role within the meteorological community.

5.3 Financing of FWIS

It is assumed, that the present thinking in the financing of WWW components would continue also in the FWIS era. This means, that Members would voluntarily accept responsibilities to build and run and finance relevant FWIS parts. It is however widely known, that there are at the moment arrangements close to WWW, which are financed jointly (EUMETSAT, ECMWF). Introduction of FWIS might provide an opportunity for further innovative collaborate activities.

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