Memory of the World Programme

International Advisory Committee

Report of Second Meeting of the
Sub-Committee on Technology

British Library, Novello House
London
November 4th and 5th, 1994

Report of Meeting

Those Present:

Dietrich Schüller (Chairman), Abdelaziz Abid (UNESCO Programme Officer), Michael Alexander (IFLA), Julian Bescos (ICA), George Boston (FIAF, FIAT, IASA)

1. Welcome

Dietrich Schüller welcomed the members of the Sub-Committee on Technology to the second meeting of the group and to London. He reported that Hans Rütimann of the U.S.A. Commission on Preservation and Access had been invited to attend as an Observer but had been unable to attend. Mr Rütimann had said, however, that the Commission would wish to attend any future meetings if invited.

2. Agreement of the Agenda

The draft Agenda was agreed.

3. The Report of the Previous Meeting

The Report was accepted as a fair record of the meeting held in Vienna. The Rapporteur thanked the members of the Sub-Committee for their help with the editing of the report. He asked for advice about the style of presentation and the spread of distribution for this and future Reports.

It was agreed that the full Reports were primarily working documents for the Sub-Committee and would, therefore, have a limited distribution. It was further agreed that the report for wider distribution should be more concise and consist of:

a. A general preamble containing the main recommendation that digital techniques be used for the provision of access copies of documents and, where necessary, to provide a high quality, preservation copy.
b. A listing of the recommendations of each working group with notes about the reasons for decisions.
c. The listing of the minimum technical standards to be used in the capture and storage of information.

It was also agreed that information about existing systems that are suitable for medium to long-term storage should be included.

4. Report of the Memory of the World Programme

Abdelaziz Abid reported on the latest developments in the progress of the main programme.

a. National Committees

All the National Commissions for UNESCO had been advised of the Memory of the World Programme and had been asked to consider creating National Committees to carry the work forward. The National Committees would be charged with:

i. Performing the initial selection of projects from their country.
ii. Forwarding the selected projects to the International Advisory Committee for consideration as part of the Programme.
iii. Increasing the general level of awareness about the Programme.
iv. Raising funds for Projects.

To date ten countries have replied to say that they are forming National Committees. Others are giving the matter serious consideration. Some are proposing to use existing bodies to perform the tasks.

b. Lists of Collections

Three lists of collections were being created:

i. A list of lost or destroyed collections is the subject of questionnaires being circulated to their members by ICA and IFLA. To keep the list to a realistic and manageable size, it has been decided to only include collections lost during the XXth Century. Earlier losses may be included at a later date if it proves practical.

ii. A list of current activities that may be considered as part of the Programme is also being drawn up by ICA and IFLA.

iii. The creation of a list of endangered collections has proved to be difficult. Because of the difficulty of defining "At Risk" collections, ICA and IFLA have not been willing to create the list. It has been agreed, therefore, that UNESCO will undertake this work.

It was pointed out that, frequently, only part of a collection is in danger. For example, at the Phonogrammarchiv of the Austrian Academy of Sciences, the acetate discs were in danger but the rest of the collection was in good condition. It was also the case that particular documents within a collection may be a greater risk than associated items because of their great interest to scholars and others. The danger here was of over-access causing damage from handling, light or other factors. Examples in print collections were quoted.

c. Selection Criteria

The selection criteria for the inclusion of Projects within the Programme are currently being reviewed by Jan Lyall of the National Library of Australia (a member of IFLA) under contract to UNESCO. The main difficulties are the legal aspects of the work. Jan has suggested that an International Convention on the Memory of the World be created. This would be a long process but, if successful, it would add strength to the work.

The Sub-Committee agreed with the idea of an International Convention.

d. Resource Requirements

There were some concerns that the level of resources and effort required by some countries would be too great. Advice on this point was being sought. It was suggested that UNESCO should endeavour to persuade governments to transfer the now under utilised resources and facilities previously used in the armaments and associated industries to help progress the age of information.

e. Pilot Projects

To date, the Programme was still supporting some pilot Projects as interim activities pending the completion of the review of the criteria for the Programme.

Some additional pilot Projects have been agreed by UNESCO. These include a Project entitled "The Memory of Russia" that is working with the collection of XVth and XVIth Century Slavic manuscripts held by the Russian State Library in Moscow. It also includes the archives of many of the major Russian authors such as Dostoevsky and Pushkin. The sum of $180,000 has been allocated to this Project by UNESCO.

Also included within the Programme is a collection of manuscripts about astronomy held by the Kandilli Observatory at Bogazçi University in Istanbul, Turkey. There are some 950 works in Turkish, Persian and Arabic. UNESCO is providing $45,000 to assist with the work of cataloguing, micro-filming and producing a CD-ROM of the collection.

Amongst the collections currently being considered for inclusion is a collection of picture postcards from colonial times. This may be a joint Project by UNESCO and the Ministere de la Culture et de la Francophonie in Paris.

A request has also been received from Mali for help with a collection of oral histories stored on audio cassettes. It was suggested that a better long-term solution would be to assist Mali to set-up a National Audio Visual Archive. Mali would then be better placed to undertake the work of preserving the oral history and other collections with a minimum of outside aid. There were already many more requests for help with specific collections than could be funded by UNESCO.

f. Finance and Publicity

A Canadian bureau of fund-raising consultants has been examining possible ways of raising money. They were unwilling, however, to give any estimate of the sums that might be reasonably expected. UNESCO had, therefore, decided not to use them for the actual fund-raising campaign.

Promotional material was being prepared and two draft versions were presented to the meeting. Some suggestions were made by the participants and noted for future consideration by UNESCO.

The existing pilot Projects were jointly funded by the country concerned and UNESCO. Money generated by the pilot work, for example sales of the demonstration CD-ROM produced in Prague, would be used to further the Projects.

Commercial support was not ruled out but would probably be for specific projects and not the Programme as a whole. Publicity should be given to endangered collections to help attract sponsors.

Links with the European Union were being explored. The European Union was funding many research projects via the Directorate Generals of the Commission of the European Communities. Directorate General XIII based in Luxembourg were responsible for libraries. Initial talks with Ms. Ariane Iljon had been encouraging and a meeting was being arranged for later this year to continue the discussions.

5. Reports of Activities Since Last Meeting

a. Julian Bescos

i. The Archivo de Indias project is continuing the digitisation of documents at the rate of about 50,000 pages per month.

The following new technological developments were being introduced:

The digital images are now being stored on WORM optical discs for access and on R-DAT tapes as a back-up copy.

The consultation work-stations have been re-designed with a single computer screen that provides access to both the images and the catalogue.

A pilot project for access via the RDSI (?? ISDN ??) network was in progress.

New digitisation stations with a faster and more flexible performance have been installed. They can be used with either a digital scanner or a digital camera.

ii. Based on the technology used by the Seville Project, the Archive of the University of Salamanca has already digitised 400,000 pages of historical documents. They are accessible by researchers and archivists. The digitisation programme is continuing.

iii. Also using the technology developed for the Seville Project, the Fundación Sancho el Sabio in Vitoria have digitised 400,000 pages of historic Basque texts. A further 350,000 pages have yet to be captured. The image collection has been integrated with the existing MARC format catalogue of the library.

iv. The Archivo General Militar in Segovia and the Archivo del Monasterio de Poblet in Tarragona have both established a prototype system for digitising images for access purposes. They are also taking the opportunity to catalogue the documents.

v. The Archivo Histórico Nacional in Madrid and the Archivo General de Simancas are progressively installing the technology used in the Seville Project. There are three modules:

Archive Management
Information and Retrieval
Consultation of Images on the Screen

vi. The Archivo Histórico Ultramarino de Lisboa has recently installed the technology of the Seville Project and has begun the process of digitisation of documents.

vii. The Komintern Archives in Moscow have completed a study for a central information system. A funding proposal is to be submitted to the Council of Europe and the ICA for the installation of a digitisation system and the commencement of the capture process.

b. Michael Alexander

The British Library is carrying out research into the storage needs for digitised collections and the bandwidth required on networks. An initial specification for a mass store is being drawn up.

The Higher Education Funding Council has commissioned a report from Prof. Follett of ???? about the importance of information technology to university libraries. Some money is available for experiments and bids are being received from a number of institutions. Some of the projects are connected with scanning and digitisation of documents.

c. George Boston

The European Union was about to publicise a call for projects in the general area of multimedia to be considered for funding. A note, from M. Y. René de Cotret of Directorate General III based in Brussels, containing details of the call was circulated.

The recent International Broadcasting Convention had an increased number of papers and exhibitors dealing with digitisation and storage of analogue material. Of particular note was the arrival of the major computing companies at an event that was for broadcasting technicians.

The British Broadcasting Corporation were examinining the suitability of several areas of their library operation as experimental projects to offer on-line access to sounds and images.

The Canadian Broadcasting Corporation were finalising a contract for a new digitised on-line sound library.

The forthcoming Joint Technical Symposium - Technology and Our Audio-Visual Heritage - to be held in January 1995 in London would have sessions on "Access to Sounds and Images" and "Digital and Computer Technology in A-V Archiving".

d. Dietrich Schüller

Several visits to Eastern European countries had been undertaken by members of the Phonogrammarchiv of the Austrian Academy of Sciences. One purpose was to encourage the institutions to co-operate and participate in joint ventures.

Some archives in Russia were found to be in good condition. The material in the collections was fully documented and well looked after. The problem that is looming, however, is money to pay the salaries of the staff and maintain the operation. There is a danger that, to generate cash, parts of the holdings will be sold to non-Russian collections. Specialist and private collections were in greatest danger from this source. It has been estimated that over $1,000,000 a year will be required to operate a "fire-brigade" rescue service.

The German phonogram industry has a working party on digital storage. It has put a specification for a very large mass-store out to tender and the bids are due to be examined later this year.

The Library of Congress/Eastman-Kodak survey of the holdings of sound and moving image archives has shown that over 1 ExaByte (one Billion Trillion Bytes) of storage is currently needed world-wide with an annual increase of between 5 and 10%.

6. Review of New Developments in Digitisation and Preservation

a. It was reported that at the recent International Broadcasting Convention in Amsterdam, IBM were showing a robotic tape storage unit using the standard Exobyte tape streamer. Also on show were a number of jukeboxes for a variety of optical disc media. The storage units fell into two main groups:

Formatted storage - emulating an existing digital audio or video recorder and restricted to storing that format only.
Un-formatted storage - storing any format of data.

Un-formatted storage offers the potential to store sounds, images and texts in the same store. The software interprets the data stream and displays it as text, as an image, as a sound or as any combination of these. This has many advantages for the Memory of the World Programme.

Some discussion followed about the cost and complexity of such robotic storage devices. It was agreed that basic computers such as the IBM PC and its clones should be able to access the information.

b. Julian Bescos presented a survey of the types of optical discs currently available. The basic requirements for any archival storage media were:

i. It should be available from more than one manufacturer and be widely used.
ii. It should meet an accepted technical standard.
iii. It should be reasonably priced.

Any media that is too specialised or employed by few users is at risk of being withdrawn without warning by the makers. Media can be grouped into two general categories by type of use:

Access
Back up and Preservation

The following discs are considered suitable for access.

1. 5.25" Optical Discs to ECMA 184/ISO 13549

This standard contains two types of discs:

A. 1.3 ?? GB ?? rewritable magneto-optical discs
B. 1.3 ?? GB ?? continuous composite WORM discs

Most major manufacturers produce discs to this standard.

2. Optical Discs to ECMA 167

This standard follows the file format "Non-Sequential Recording NSR" which writes the information to the disc independantly of the operating system.

3. 5.25" Optical Discs to the Panasonic Standard

This is a very common industry de-facto standard. There are two forms:

A. 1.4 ?? GB ?? WORM discs
B. 1.5 ?? GB ?? rewritable discs

4. CD-R

The newest form of recordable disc. Depending on the recorder, the user can record data in the CD-ROM and/or the CD-Audio formats. The file format for the CD-ROM is ISO 9660 and is independent of the operating system. One advantage is the availability of CD jukeboxes.

Concerns about the ability to manage a large collection of optical discs or tapes were expressed. The question of whether a collection was best stored as a set of optical discs or tapes housed on shelves or in a robotic store could only be answered by examining the needs of the collection and its users. This would take into account the size of the digitised collection, its pattern of usage, whether remote access was required and the length of operating day.

Several usage levels could be identified:

i. The stand-alone optical disc or tape - often mass-produced and distributed physically. Only a basic multimedia PC would be required.

ii. A small collection of optical discs or tapes kept at the work-station and inserted into a drive at a PC work-station as required by the user. Frequent changes of disc or tape are not required. The operational equivalent of a personal library.

iii. A larger collection of optical discs or tapes, provided on request by an attendant or collected by the user from the shelves, for insertion into a drive by the user. Frequent changes of disc or tape are impractical unless all the carriers can be supplied in one delivery. The operational equivalent of a small, local public reference library.

iv. A large collection of optical discs or tapes with the information being made available to the user by an attendant placing the disc in a one of a central bank of drives. Frequent changes are impractical but offers the potential of remote access. The operational equivalent of a large, national public reference library.

v. A large collection where the optical discs or tapes are supplied and played by robotic machines. Offers the potential of frequent changes, remote access and 24 hour operation.

Fears of loss of control of master copies of digitised material by developing countries if sent abroad for mass copying were expressed. Since the start of the film industry at the beginning of the century, the practice has been to send the master copies of films - the negatives - to processing labs run by independent companies for developing and printing. It has also been the practice to store the master negatives of films at the processing labs for convenience. The level of abuse of the system by the labs and their staff has been extremely low. There is no reason to believe that the companies mass-producing optical discs and tapes would be any less trustworthy.

7. Working Group Reports

It became clear during the discussion of the reports that a fundamental misunderstanding existed between the texts and still images working group and the sound and moving image working group. The first group is primarily looking upon digitisation as an access tool. The second group is primarily seeking a tool to make high quality facsimiles for preservation purposes. This does not negate the work; on the contrary it strengthens the need for the dialogue. Both access improvements and document preservation can be often provided by the same systems producing digital copies at different levels of fidelity.

The making of digital preservation copies does not mean that the original documents should be destroyed as a result. The original documents should be preserved but with, perhaps, a lower level of restoration effort than previously used. The digital preservation copy means that heroic attempts need not be made to prolong the life of basic information carriers.

For some collections, a mass produced storage medium such as CD-ROM, which can be physically distributed to the users, will be the best solution. For other collections, a large capacity, robotic store offering the possibility of remote access via networks is the best solution. The decision as to what is the best route will vary from collection to collection. In some cases, both the mass-produced carrier and the robotic store will be required.

The question of which standard should be used to capture a document was one for the curator of the collection. For many documents, three standards can be defined and offered:

a. Facsimile - accepted as a duplicate of the original document and providing a safety or preservation copy of the document.
b. Intermediate - a high quality access copy which will satisfy the needs of 99% of users.
c. Access - a copy that will satisfy the needs of 95% of users.

The recommended standards for texts and still images will offer excellent access copies and good intermediate copies of documents. For sounds and moving images, the recommended standards will, when achievable, provide a preservation copy.

a. Texts and Still Images

Digital copies will normally be made to improve access. Copies of endangered documents may also be made to a higher standard to provide a safety or preservation copy. There will, however, always be a residual group of documents that can never be considered as suitable for preservation by digital methods. Any digital copy of these documents will be an access copy only. The reasons for their ommission are not normally technical but usually cultural and historical.

The main parameters that affect the quality of digitised copies of books, manuscripts and other paper-based material are the resolution of the image and the range of the grey-scale for each pixel. The figures that follow are the minimum value for each parameter for each group of materials. Some documents may require higher values of resolution and grey-scale. Examples include texts with very fine detail or small characters. The figures given are for intermediate and access copies. Copies being made to facsimile standards for safety or preservation reasons will require higher values.

Flat documents may be captured by flat bed scanners. Documents that are not flat and old books with bindings that cannot be opened fully should be captured by a digital camera.

i. Modern Texts - Printed Materials, Typed Documents etc

Capture parameters	200 dpi, bi-tonal (one bit per pixel)
Compression	CITT G IV
File Format	TIFF 6.0

ii. Manuscripts and Early Printed Materials

a. Monochrome Material

Capture parameters	100 dpi, 4 bits/pixel
Compression	JPEG Lossless Compression
File Format	TIFF 6.0

b. Colour Material

Capture parameters	200 dpi, 24 bits/pixel
Compression	JPEG Lossless Compression
	JPEG Lossy for non-critical images
File Format	TIFF 6.0

An alternative de-facto standard is Photo-CD.

iii. Photographic Stills

For monochrome material, capture at 8 bits/pixel and colour material capture at 24 bits/pixel.

a. Opaque

Capture parameters	100 dpi
Compression	JPEG Lossless Compression
	JPEG Lossy for non-critical images
File Format	TIFF 6.0

b. Transparencies

Capture parameters	
8 x 10 inches	200 dpi (depending on the reduction factor).
35mm and Microfilm	1000 dpi (depending on the reduction factor).
Compression	JPEG Lossless Compression
	JPEG Lossy for non-critical images
File Format	TIFF 6.0

An alternative de-facto standard is Photo-CD.

iv. Maps

For monochrome material, capture at 8 bits/pixel and colour material capture at 24 bits/pixel.

Capture parameters	100 dpi
Compression	JPEG Lossless Compression
File Format	TIFF 6.0

Maps larger in size than A3 should be first photographed and the resulting image digitised.

The merits of using a digital camera in place of a photographic camera for large documents were discussed. Concern was expressed about the limited number of lines and pixels per line currently available with digital cameras. It was pointed out that the latest production systems for feature movies were using digital video cameras of 3000 lines vertical resolution and 2500 pixels horizontal resolution. The resolution of CCD cameras was limited mainly by the size of the chips. Larger chips can, in theory, offer higher resolution. It was also possible to capture a large document in sections and join the sections in software when viewing it.

It was agreed that whenever possible, documents should be captured at a higher standard and lower standard copies produced from this as required.

The recommended standards are seen as a statement of what is realistically possible today. The ideal standard may not be achievable today but it should be kept in mind as the long-term target. It was agreed that if a document is in good condition but technology does not yet permit its capture at the ideal standard, it should not be digitised but left until technology does permit its capture at the ideal standard. If, however, the document is in poor condition or access to it is frequently required, then capture at the best possible standard currently available is necessary.

b. Sounds and Moving Images

i. Sound

	Sampling Standard	Bits per Second	Bytes per Hour
Historical Material Cylinders, 78s			
Modern Analogue LPs, Tape	48 KHz/20 bit twin channel	1.92 MB	864.0 MBytes
Digital	Store at the same standard as the original material.		

It is the practice to use a stereo pickup to replay grooved recordings and to record both outputs from the pickup. By this means, information from the two walls of the groove is recorded separately and, therefore, aids any restoration processes. Monophonic tapes can be recorded twin channel or, if digital storage space is at a premium, they can be recorded using one channel.

ii. Video

1. Analogue Video

For 625 line colour, interlaced images. Other standards pro-rata. Where possible the images should be stored with no coding - basic red/green/blue is ideal. The use of component storage is also acceptable. This stores a brightness component - a monochrome image - in full fidelity together with two reduced fidelity signals carrying colour information. This works because the colour resolution of the eye is not as good as the monochrome resolution. By this means a saving of 33% in the the storage requirement is made.

Stored as a Red/Green/Blue Signal

	Sampling Standard	Bits per Second	Bytes per Hour
Red	13.5 MHz/10 bit	135 MB	60.75 GBytes
Green	13.5 MHz/10 bit	135 MB	60.75 GBytes
Blue	13.5 MHz/10 bit	135 MB	60.75 GBytes
Total		405 MB	182.25 GBytes

Stored as a Coded Component Signal

	Sampling Standard	Bits per Second	Bytes per Hour
Luminance (Y)	13.5 MHz/10 bit	135.0 MB	60.75 GByte
Colour Difference (U)	6.75 MHz/10 bit	67.5 MB	30.375 GByte
Colour Difference (V)	6.75 MHz/10 bit	67.5 MB	30.375 GByte
Total		270.0 MB	121.5 GByte

iii. Digital Video — Store at the same standard as the original material.

iv. Film

The minimum acceptable standard for access copies of 35mm feature films is that for High Definition Television. This is 1250 lines vertical resolution and 1952 pixels horizontal resolution with 10 bits per pixel for each colour.

Stored as a Red/Green/Blue Signal

	Sampling Standard	Bits per Second	Bytes per Hour
Red	61.0 MHz/10 bit	610.0 MB	274.5 GBytes
Green	61.0 MHz/10 bit	610.0 MB	274.5 GBytes
Blue	61.0 MHz/10 bit	610.0 MB	274.5 GBytes
Total		1830.0 MB	823.55 GBytes

Stored as a Coded Component Signal

	Sampling Standard	Bits per Second	Bytes per Hour
Luminance (Y)	61.0 MHz/10 bit	610.0 MB	274.5 GByte
Colour Difference (U)	30.5 MHz/10 bit	305.0 MB	137.25 GByte
Colour Difference (V)	30.5 MHz/10 bit	305.0 MB	137.25 GByte
Total		1220.0 MB	549.0 GByte

The standards recommended by the Sub-Committee for sounds and moving images will provide at least intermediate level digitised copies to be made. Data compression is not recommended but is acceptable if storage space forces it. This is a reversible process: the signal is fully restored after de-compression. Data reduction is never acceptable as it is not reversible. The disadvantages of a data reduced copy may not be realised until some future date when manipulation of the digital copy is attempted for special purposes eg. to enhance certain colours to help detect watermarks or writing that has been partially erased.

The obsolescence of video formats and the problems that this is creating for the video collections was discussed.

The video world is currently tackling the problem of the earliest commercial recording format - the Ampex 2" quadrature tape format. This format was introduced in the late '50s and a crisis is looming. Many tapes are showing signs of decay; the machines needed to copy the material are old and spare parts are no longer made; the trained operators are nearing or have reached retirement age; the quantity of tapes to be examined and copied is very large in the order of millions of hours; the documentation available for many tapes is inadequate to permit the selection of material for copying without playing the tape. To preserve the material, it has to be copied. The work of copying the tapes to a digital format has been started by many broadcasters and archives but it is a race against time.

The format that followed the 2" tape format - the 1" tape format - is also approaching a similar crisis. This format came into use in the late '70s and was used as the main production format until the early '90s.

There are at least seven other analogue recording formats that have been heavily used by amateur and professional cameramen. The problem is compounded world-wide by the different video standards used in various regions of the globe. Material on any of these formats may be offered to archives and libraries. Only the largest and best equipped video archives can be expected to deal with this range of formats and standards.

Since the first digital video format (D1) was introduced in the mid '80s, at least four others have been launched. None of them is in a dominant position in the market. D1 itself is now virtually obsolete.

The problem requires technicians who understand the operation of a range of formats. The collection also needs to own working examples of obselete machines. This increases the need for highly trained, specialist technicians. There is currently no training for archive technicians anywhere in the world. There are some establishments that can, potentially, provide such training but finance will be required to enable them to organise and run suitable courses.

The training of technicians is not a purely technical matter. Modern technology provides many ways of making changes when copying a document. The ethical considerations of archival copying need to be taught as well as the technical considerations.

Archives and libraries require a storage format that is not linked to the demands of the broadcasters, publishers or manufacturers. It must be able to contain documents of several types so that the digitised sound of an LP record may be stored with the image of its cover photograph and the text of the sleeve notes. A storage system that does not restrict the digital data-stream - a free-formatted store - is prefered. Most of the commercial, mass-produced systems available at present require the information to be in a specific formation before recording.

8. The Next Meeting of the International Advisory Committee

Abdelaziz Abid reported that this will be at UNESCO Headquarters in Paris from April 10 to 12. The Committee is being re-shaped slightly to improve the geographical, cultural and collections balance.

It is envisaged that the International Advisory Committee will meet in Plenary Session every two years. A smaller Bureau will meet more regularly to review progress and select Project proposals for inclusion in the Memory of the World Programme.

9. Further Activities

a. By the Sub-Committee on Technology

It was agreed that the Recommendations be produced for consideration by the International Advisory Committee.

It was further agreed that the members of the Sub-Committee on Technology would draw up a list of experts around the world able to advise on the technical aspects of Project Proposals.

The Sub-Committee on Marketing and Finance require a number of samples of work from Projects to help interest potential sponsors. The CD-ROM produced by the Prague Project is one. Other examples are required. The Sub-Committee members will offer suggestions of suitable material for consideration by UNESCO.

b. In Co-operation With Other Groups

In the textual field, two groups in particular were mentioned as important potential partners - the European and U.S.A. Commissions for Preservation and Access. Although the brief of the two Commissions included sounds and moving images, it was not a major part of their work. The Technical Co-ordinating Committee of the Sound and Moving Image Archive N.G.O.s was considered a more active partner in this field.

10. Any Other Business

The address list for the members of the Sub-Committee was updated.

11. Future Meeting

It was agreed to seek advice from the International Advisory Committee about future meetings of the Sub-Committee on Technology.

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