

JPEG-1 history

- when and how the
Royalty-Free JPEG
patent policy got lost

JPEG = JOINT PHOTOGRAPHIC EXPERTS GROUP

DR. ISTVÁN SEBESTYÉN

(EX-CCITT SGVIII SPECIAL RAPPORTEUR ON
NIC "NEW IMAGE COMMUNICATION"
AND FOLLOW-ITU QUESTIONS
BETWEEN 1986 – 2000)

NOW, IN 2017

SECRETARY GENERAL OF ECMA INTERNATIONAL IN GENEVA, CH

Note: This presentation is part of a “series” of my JPEG “historical” presentations held since 2010 in Lausanne, Rennes, Leipzig and Saint-Malo. In these presentations I try to concentrate on different aspects of the JPEG-1 standardization process.

Here:

- ▶ Culmination of joint CCITT / ISO standardization projects in the 1980ies – including JPEG, JBIG
- ▶ Procedural background and working policies of JPEG in a changing environment - especially related to the JPEG patent policy
- ▶ Lessons to be learned for future co-operations

Culmination of Joint ITU-ISO projects in the 1980

– history and reasons

- ▶ “CCITT and ISO/IEC have long established cooperative relationships. In **June 1989**, an ad hoc group of CCITT and ISO/IEC JTC 1 leaders met to review the then existing situation of cooperation.
- ▶ Recognizing the continuing growth of these cooperative efforts, the ad hoc group felt it would be beneficial to formalize a set of procedures that builds upon past successes to facilitate future efforts. As a result, an **Informal Guide on CCITT and ISO/IEC Cooperation was prepared.**
- ▶ **Collaborative Group on CCITT and JTC 1 Cooperation.** It is intended that the results of the September meeting will be conveyed to the **October 1991** meetings of JTC 1 and the CCITT ad hoc Resolution No. 18 Group. **The objective is to have the agreed procedures for cooperation** formally adopted in the rules of procedure for CCITT (e.g., in an A-series Recommendation) and JTC 1 (e.g., in the ISO/IEC Directives for JTC 1).”
- ▶ This was applied on an experimental basis first but also came into force **in 1992.**
- ▶ **JPEG (ITU-T T.81) and JBIG (ITU-T T.82)** were one of the first standards where the common text template has been applied

Culmination of Joint ITU-ISO projects in the 1980

- ▶ Note: All text with white background are scanned from original documents

Guide for CCITT and ISO/IEC JTC 1 Cooperation

(Draft Revision for Review and Comments)

July 1991

**Developed by the Collaborative Group on Procedures for
CCITT and JTC 1 Cooperation**

JPEG started in 1986 - which was 3 years earlier than the activities of the CCITT/JTC1 Collaborative Group had even started....

Three projects triggered JPEG (coming all from the a telecommunication side):

1. The **Videotex Photographic Mode** project (CCITT, ISO)
2. The **ISO TC97/SC2/WG8** project on **picture coding** identification and code switching
3. The **CCITT SGVIII „New Image Communication”** (NIC) Project

Creation of JPEG (CCITT-ISO) Joint Photographic Experts Group – Parsippany, NJ, 1986 November

- ▶ Two parent bodies: ISO TC97/SC2/WG8 and CCITT SGVIII NIC Group
- ▶ JPEG was a joint work entity, but **with its own rules and procedures with elements from CCITT and ISO, but also with own features, like “JPEG Patent policy”, organizations as members, separate documentation etc. Though not everything very precisely specified, but flexible, very fast.... Maybe it was the 1st “ICT consortium and forum”.**
- ▶ “Parental” support was there: In 1986 there was already a strong desire that CCITT and ISO Standardization Groups working on the same standards should co-operate, but no concrete common ISO-CCITT rules and procedures existed.

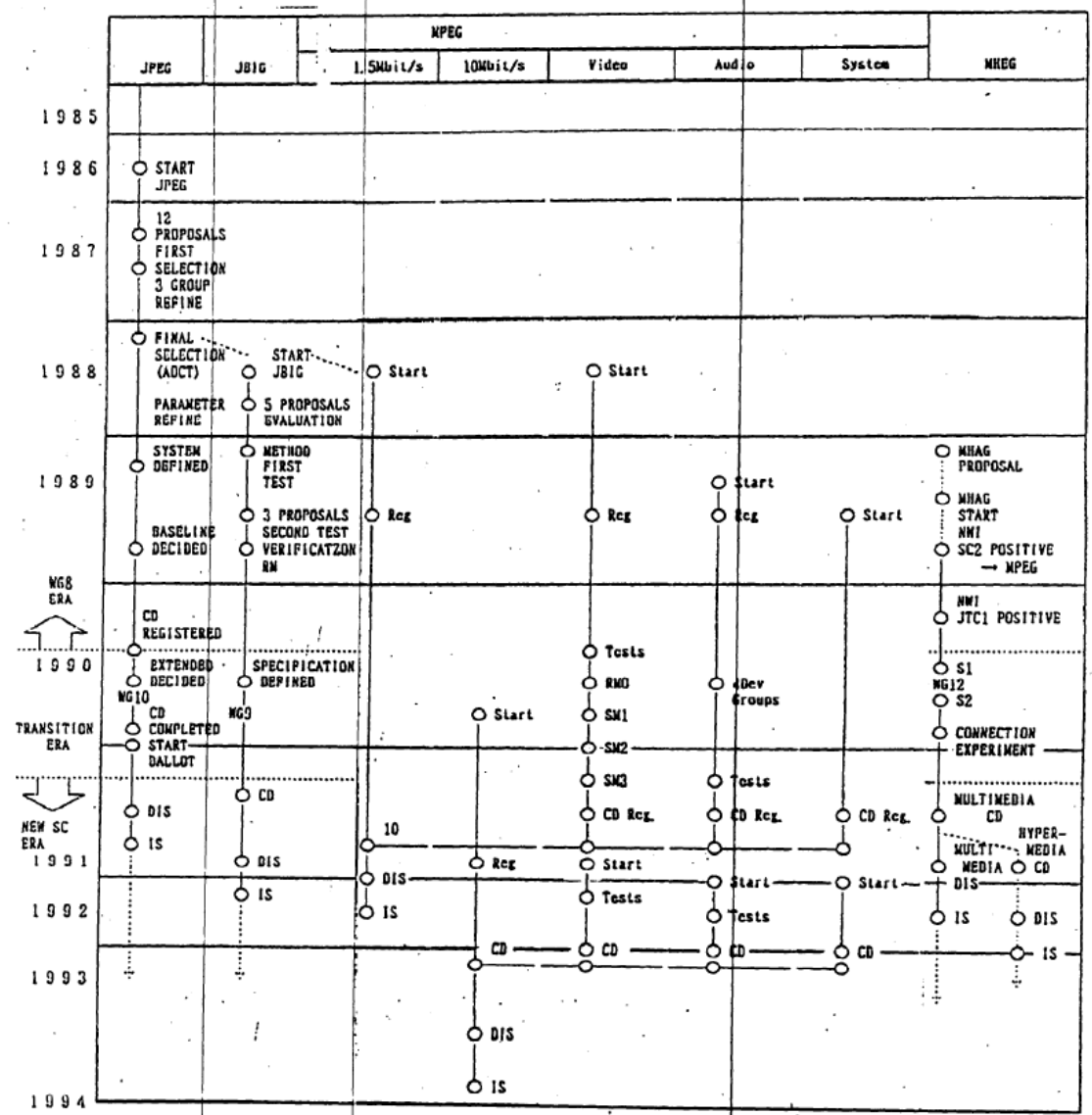
Liaison relationship of JPEG to the Parent Bodies (beginning - 1986)

- ▶ CCITT SGVIII (NIC Rapp. Group and Question) – **very close** to the ITU “parent” (M. Worlitzer / I. Sebestyén)
- ▶ ISO TC97/SC2/WG8 – **very close** to the ISO “parent” (H. Yasuda)
- ▶ CCITT SGVIII WP and Plenary – **close**, regular detailed reports, requirements, exchange of documents. But no mentioning of “JPEG” in official documents
- ▶ ISO TC97/SC2 – **less close**, it was mostly a “character coding groups”. Also no mentioning of “JPEG” in official documents.

Liaison relationship of JPEG to the Parent Bodies (later)

- ▶ CCITT SGVIII became ITU-T SG8 in 1989, CCITT became ITU-T, **approval process changed** from 4 years cycle to fast continuous (Res. 2, Res.1 process)
- ▶ ISO TC97/SC2 became ISO/IEC JTC1/SC2 in 1987
- First and only JTC between ISO and IEC – **big change**
- ▶ Creation of JBIG (joint), MPEG (WG8 only) in 1988, MHEG (joint) in 1989
- ▶ **Split up of ISO TC97/SC2/WG8 in April 1990 - Fundamental change!**
 - ▶ **WG8 multimedia co-ordination (H. Yasuda)**
 - ▶ **WG9 JBIG (Y. Yamazaki)**
 - ▶ **WG10 JPEG (G. Wallace) –**
 - ▶ **WG11 MPEG (L. Chiariglione)**
 - ▶ **WG12 MHEG (F. Collaitis, Kretz)**
- ▶ March 1990 Dr. Yasuda proposal to SC2 to create “SC29” (WG8/N971) – JTC1 approval Oct. 1991 – First SC29 Meeting in Tokyo December 1991

Activities related to AVNH C/P in ISO/IEC JTC1/SC2



AVNH C/P: Audio Visual Multimedia and Hypermedia Coding and/or Processing

Dr. Yasuda
 Presentation
 To JTC1
 Adhoc Tech.
 Study Group
 on Multimedia
 and Hypermedia
 (JTC1 N1118)
 Dec. 1990

Why fundamental change?

10

- ▶ Because the until then independent “JPEG” became just an “ordinary” WG10 under ISO TC97/SC2 and later under ISO/IEC JTC1/SC29. Some consequences:
 - ▶ Loss of JPEG patent policy and practice and replaced by the ISO and IEC patent policy (btw. no JTC1 patent policy exist...)
 - ▶ Full adoption of the JTC1 working methods and rules – lot of “red tape” and long delays
 - ▶ Loss of the flexible, fast and informal JPEG working methods
 - ▶ Change of membership (from companies to NBs)
 - ▶ Degradation of the CCITT “parent” to CCITT liaison
- ▶ It took some time to realize the effect of those changes. E.g. Effect of the patent policy change was not realized for years.

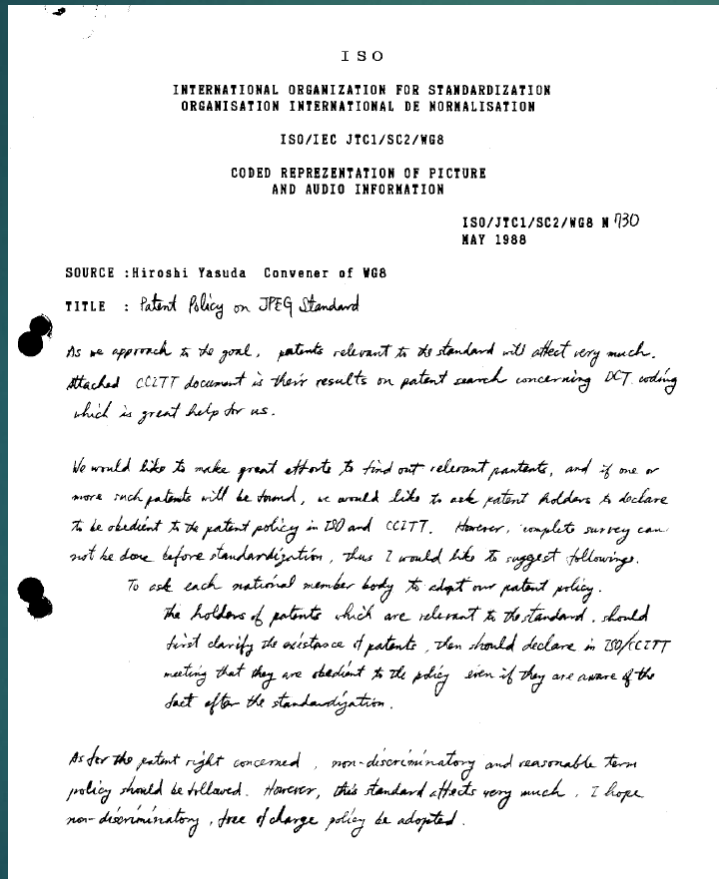
Consensus on the Royalty free (RF) aspect of the original JPEG

- ▶ Both CCITT and ISO patent policies were (and are still today) RAND (reasonable and non-discriminatory world-wide) policy regimes, **but the original JPEG had from the beginning a consensus for the RF nature of the “baseline” mode, with a Royalty Free policy regime:**
- ▶ Why?:
 - ▶ All earlier CCITT picture coding algorithms (like Facsimile) were also RF
 - ▶ Standardization was dominated by the “state owned” telcos, who were at that time much more generous with their IPRs

Consensus on the RAND aspects for the original JPEG on “Options” (“mixed regime”)

- ▶ For optional components of JPEG - of the “baseline mode” outside - CCITT and ISO RAND patent policy regimes were permitted, e.g. for arithmetic coding:
- ▶ Why?:
 - ▶ It was believed that RAND patents are reasonable for some advanced functionality
- ▶ In practice these components were not implemented (better published) in free open source JPEG code (e.g. by the Independent JPEG Group). And never became popular components in practice.

One example (Dr. Yasuda) of the consensus on the RF JPEG patent policy in May 1988



“Patent Policy on JPEG Standard”

“...I hope non-discriminatory, free of charge policy be adopted.”

The JPEG patent policy regime was unique and revolutionary at that time

- ▶ It went far beyond the CCITT and ISO patent policy regimes of today and was for-runner for later RF Patent policy regimes (like of W3C) and of mixed RAND-RF patent policy regimes (like of Ecma International)
- ▶ Organizational members of JPEG were the potential patent holders (unlike in ISO (NBs) and CCITT (member states)). For an SDO it is possible to control their members (not easy) but not possible the non-members.
- ▶ But the JPEG implementation of RF-policy was also not “perfect”, e.g. no formal written “sign-up commitments” of members, there were no “opt-out” points defined in the process etc. Also the parallel standard-development / patent-search/decision function was random and not organized.

Development of ITU and ISO (IEC) patent policies

- ▶ Mid 1980s: Both ITU and ISO policies existed, but rudimentary and incomplete. Starting experiences with patents in standards were made. The policy and practice has been under constant development since then:
- ▶ Different “business model pushers” existed, like:
 1. **Standards should be license free.** Developing countries (economy) and Ex-socialists countries (economy + ideology).
 2. **Patents in standards “exceptional”.** Market oriented economies. At “worse” minimal licenses (good in “competitive”-type standards (e.g. JPEG-1)).
 3. **Patents in standards “normal”.** Market oriented economies. Newest group. Maximum license income shall cover investments in “monopoly”-type standards (**This prevailed in ISO, IEC, ITU, ETSI,...**). Utilization of the fact that essential patents in standards have prime values.

Development of ITU and ISO (IEC) patent policies (cont.)

- ▶ In the 1980s the ITU and ISO patent policies were in their infancy and it was not quite clear where they would go in the 1990s...
 - ▶ RF as “normal”? RAND as “normal”? RF as “exceptional”? RAND as “exceptional”?
 - ▶ By mid 1990s in ISO, IEC, ITU in practice RAND patents were “normal” and RF “exceptional” and the Patent policy regime became “RAND”
 - ▶ Thus, I am not sure if we could have done JPEG-1 in such a way today...
- ▶ (Since about 2000 some SDOs changed this narrow scope regime - as result of the emergence of Internet and the Web - to “RF” based or “mixed” patent policy regime)

Emergence of IPR issues with JPEG

- ▶ Around the year 2000, when JPEG **was the still picture coding standard everywhere**: on the internet, on the web, in digital cameras etc. the huge success of JPEG has waken up the interests of companies who's business model was to utilize income from patents. Several small and large companies (**not JPEG core-members**) claimed patents on JPEG and the run to enforce those patents started (names of companies are known, but not shared here...).
- ▶ This has revealed the **too narrow scope** of patent policies in classical SDOs, like ITU, ISO, IEC
- ▶ but probably even of the „original“ JPEG patent policy would have had hard times...

What was (is) wrong with the ITU/ISO/IEC IPR (patent) policy for RF-only or mixed projects?

- ▶ ISO/IEC/ITU support a RAND patent development regime. RF is regarded as RAND “0”, which is also a permitted option.
- ▶ But the policies do not support a RAND “0” only regime (i.e. “RF-only”), where no other patent licensing options are permitted. Also not “mixed regime”, what JPEG-1 needs.
- ▶ (Non-RAND (“2.3”) patents are not permitted in any policies and end the standardization process (if it could be proved that those essential))
- ▶ The JPEG Group believed that its interpretation of the RF Baseline Mode in a RAND regime was sufficient. This view was challenged.

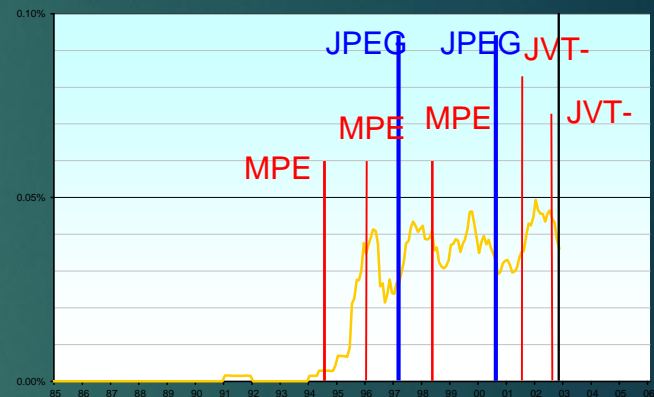
The following slide was used by the EPO in 2007 for a course with external participants and it is thus in the public domain.

“The slide relates to the *number of applications filed* in the class “*region based coding*” (e.g. not to the whole MPEG field like “systems” that are not linked to the mere video/image coding technology).

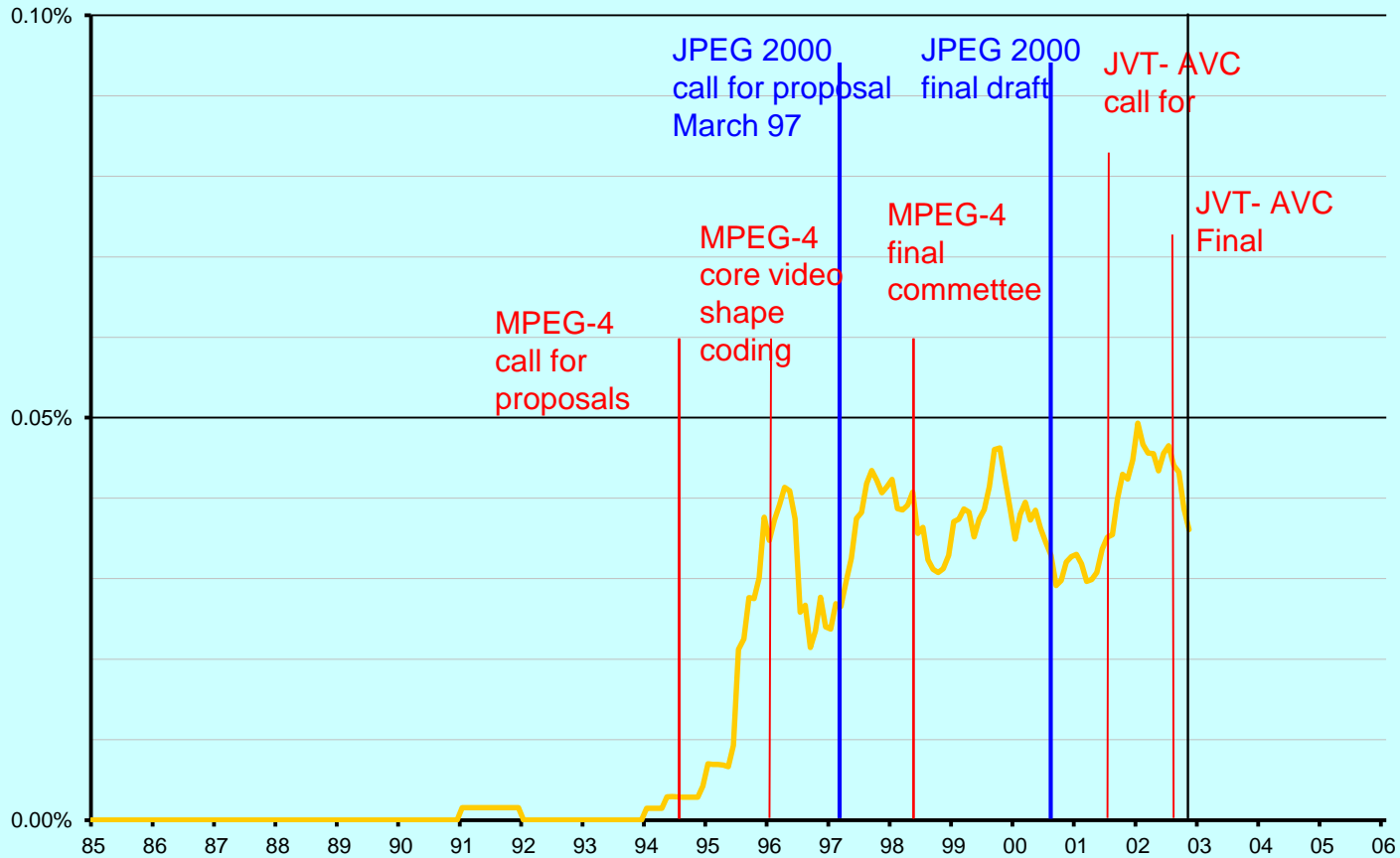
The reason for considering only this very specific field for illustrative purposes is that this technology was very peculiar to that specific time framework and was a clear *indicator* of standardization activities.

It was impossible to extract the MPEG or JPEG related applications since also applications in the generic field of video and image coding always mention the standard in the specification, only the applicants or the licensing authorities could ascertain that.

The *values are normalized* to the whole number of EPO applications, to give a visualization of the impact of the standard developments on the whole EPO activities.”



Slide of submission of patents in accordance with standardization phases: EC h04n7/26j



Calming down of the JPEG-1 patent discussions

- ▶ Around 2009-2010 all “claimed” JPEG patents (e.g. on the 2D Huffman coding) expired. So the business model of collecting revenues, threatening with legal cases in the USA, etc. found its end
- ▶ As far as we know all cases were settled out of court. This was probably intentional of the “patent owners” side...

What is the main lesson from all this?

- ▶ **Classical SDO patent policies** – as they work today - do **not provide** adequate regime for a “**RF Baseline**” type of standard, like JPEG-1.
- ▶ **There are SDOs** today who **can provide RF** (or mixed) standards development regime (e.g. WWW, Ecma,...). Such standards (or components) should be developed there first. Classical SDOs can via **„normative referencing“** or **„fast-track“** use those standards.
- ▶ (For the RF-policy the “guarantee” is: that at least inside the standards development group RF regime holds. Against potential 3rd party IPR holders such policy is not waterproof, but less risky.)

Looking back...in spite of some difficulties...
The long way from the start of JPEG until today it was not
only interesting but also worthwhile...

23



Thanks... Questions?...

24



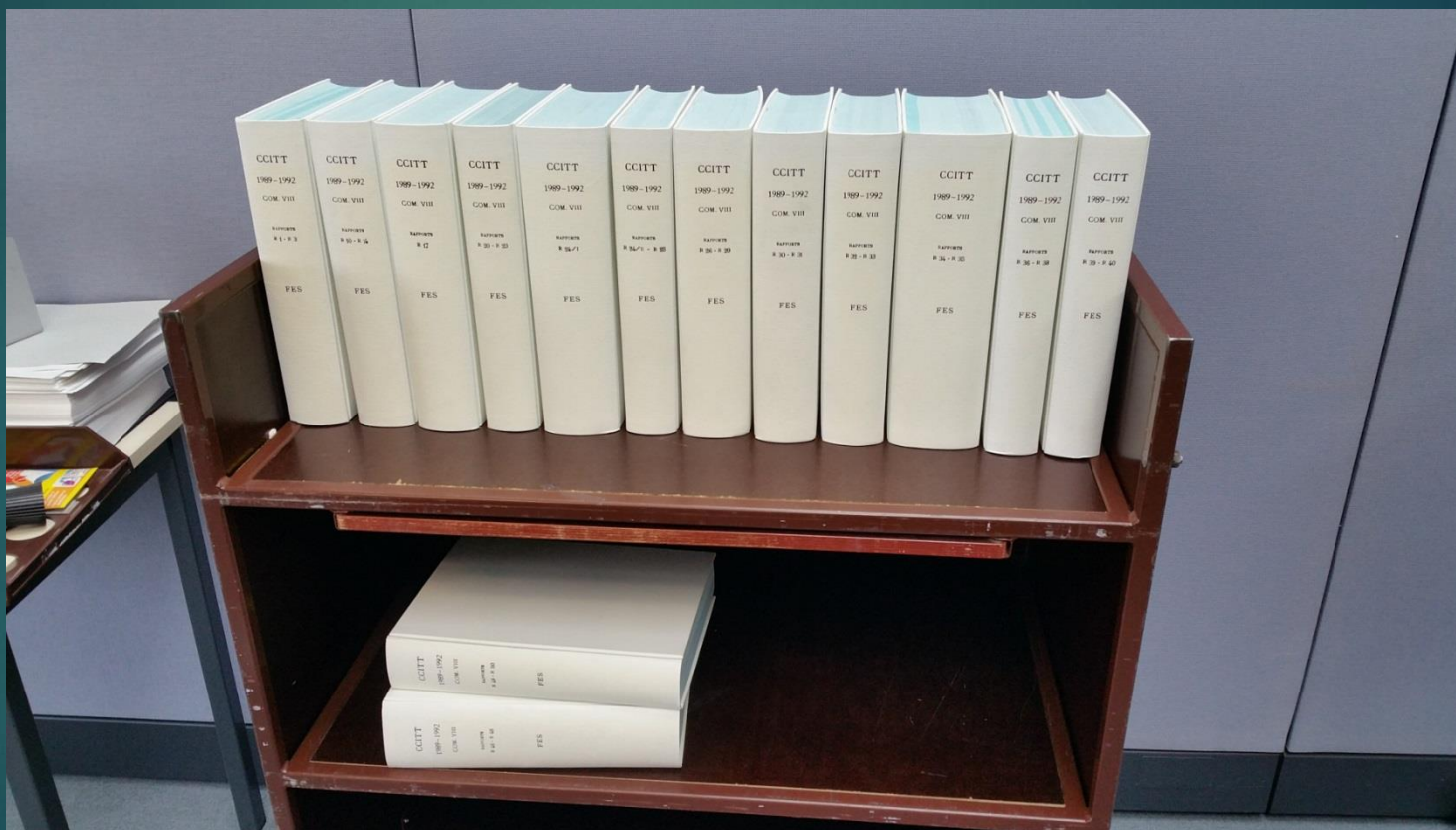


Further reading

FROM OLDER JPEG MEMORIAL PRESENTATIONS
(RENNES, SAN MALO) + SOME NEW SLIDES

CCITT SGVIII Reports 1989-1992 with JPEG / JBIG

26



Culmination of Joint ITU-ISO projects in the 1980s

Annex C

Listing of Approved Recommendations and International Standards
Developed Collaboratively and Having Technically Aligned Texts

About 70 Standards / Recommendations were involved by early 1990:

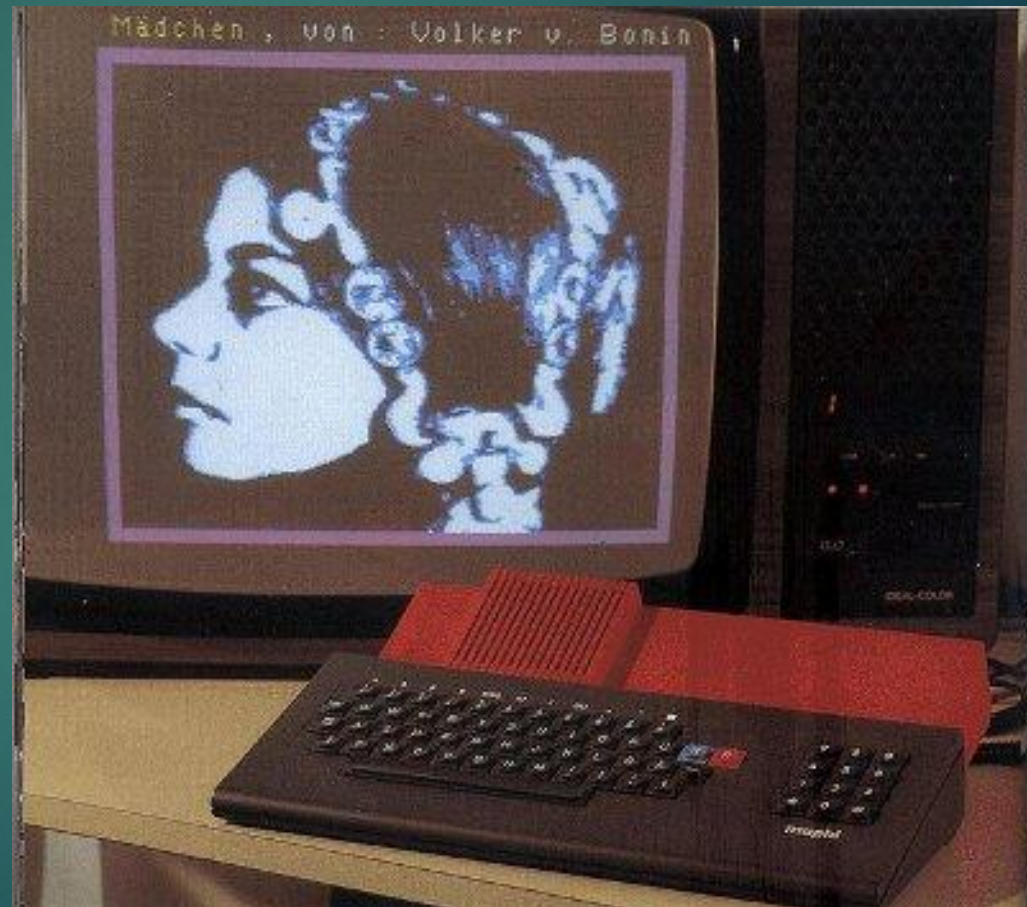
- OSI Model, Services and Protocols (*X.200 Series – CCITT SGVII*)
- Message Handling Systems (MHS) /
Message Oriented Text Interchange Systems (MOTIS) (*X.400 Series*)
- The Directory (*X.500 Series*)
- Open Document Architecture (ODA) /
Office Document Architecture (ODA) (*T.400 Series – CCITT SGVIII*)

Later also (between ISO/IEC JTC1/SC29 and CCITT SGVIII):

- Still picture coding (JPEG = ITU-T T.81; JBIG = ITU-T T.82)

1. The Videotex Photographic Mode project (CCITT, ISO)

28



*Mupid Austria – non
Standard photovideotex
Application. Too slow.
A good photographic
mode solution
was needed...*

2. ISO: “Serious” kick-off of photographic coding standardization (led by G. Hudson - 1986)

Meeting 7 Mar 86 Boston

N232 Revised Photographic Standard - Functionality and Coding

Agreed to split photographic standard, functionality - DPX3 and coding - DPX2pt2.

N266 European ESPRIT 563 Project

Examples of work shown.

N270 Progressive Coding of Multi-level Images

N286 Notes on Photographic Coding Meeting

Revise compression specification.

Test picture and results to be exchanged.

Picture manipulation commands to be considered.



3. CCITT SGVIII: „New Image Communication” (NIC) Project

APPROVED BY THE CCITT PLENARY ASSEMBLY IN 1985

SC2 WG8 Photogr. Experts Meeting in Rennes 8-11 July 1986 (G. Hudson) WG8 N346

31

In response to papers N310 and N320 from the newly formed CCITT SG VIII special rapporteur's group on New Image Communication Techniques (NIC), a liaison statement N341 was drafted. It was pointed out to NIC that WG8 had also identified image sources and coding techniques. The matrix of desirable properties of algorithms was further developed and will be used to compare techniques (Annex 1). A joint meeting of WG8 photographic and NIC is proposed for 10-14 November 86 in Parsippany, New Jersey, USA and the possibility of a joint expert's group to evaluate compression techniques could be discussed.

Ad-hoc group members -

Graham Hudson	BT	UK
Alain Leger	CCETT	France
Stefan Guerillot	IPTC	France
Kenji Ogura	NTT	Japan
Istvan Sebestyen	Siemens	Germany
Gregg Wallace	DEC	USA
Yasuhiro Yamazahi	KDD	Japan
Hiroshi Yasuda	NTT	Japan

Report of the 1st JPEG meeting (1986 November 11-13, Parcippany)

3. Roles Of CCITT SG VIII WP1 NIC And ISO TC97/SC2/WG8 PEG

Mr M Worlitzer rapporteur of the NIC group in N384 outlined the objectives and roles of the group. The PEG chairman Mr G Hudson responded with his ideas of the function of PEG in N400. An understanding of the roles of NIC and PEG are given in annexe 5.

Paper N392 to be presented to CCITT in December by Dr Sebestyen gives a proposed overview of NIC applications, characteristics and terminals. The NIC concept results from the possibility in the office of the future to have interactive workstations with hard and soft copy facilities connected to integrated services networks.

- We did not know at that time what JPEG was and what the working rules for such joint group were (no CCITT / ISO policy existed on joint work... that was formulated later)

Participation list of the 1st JPEG Meeting (Parcippany, November 1986)

Annexe 2

Delegates Attending The Joint Photographic Experts Group Meeting

Name	Affiliation	Phone Number
Alain Leger	CCETT	+33 99 024223
Herbert Lohscheller	ANT	+49 7191 132724
Gerhard Seelmann	Univ of Hannover	+49 511 762 5312
Charles F Touchton	IBM	+1 813 872 3084
Donald Thelen	AT&T	+1 201 644 3728
Manfred Worlitzer	FTZ	+49 6151 835254
Graham P Hudson	BTRL	+44 473 642581
Istvan Sebestyen	Siemens	+49 89 722 47230
Didier LeGall	Bellcore	+1 201 829 4511
Atsushi Itoh	Mitsubishi	+81 467 44-1385
Yasuhiro Yamazaki	KDD	+81 3 241 6731
Kenji Ogura	NTT	+81 468 3851
Greg Wallace	DEC	+1 617 568 5873
John Minting	IPTC	+1 202 955 5566
Hiroshi Yasuda	NTT	+81 468 59 2810



JPEG-1 related timeline:

Table 1. Historical milestones.

Date/location	Milestones
1982	Introduce image coding for videotex at CEPT (Conférence Européenne des Administrations des Postes et Télécommunications)
June 1985, Ipswich	Launch the European Photovideotex Image Compression Algorithms (PICA) project
November 1986, Parsippany	ISO and CCITT form Joint Photographic Experts Group (JPEG)
March 1987, Darmstadt	Register coding schemes and define requirements and selection process
June 1987, Copenhagen	Hold initial selection meeting—10 techniques reduced to 3
October 1987, Washington	Revise specification and hold first selection process
December 1987, Winchester	Revise specification and hold second (final) selection process
January 1988, Copenhagen	Hold final selection meeting—adaptive cosine transform (ADCT) technique chosen
June 1989, Rennes	Refine and consolidate the ADCT technique by the JPEG international team
1989	Write the JPEG draft international standard with ITU/ISO/IEC common template
1992	Approve JPEG as Recommendation ITU-T T.81
1993	Approve JPEG as ISO/IEC 10918-1 Standard

Summary of JTC1 votes to establish SC29 in 1991

35

  ISO/IEC JTC 1 N 1421
Date: 1991-07-09

ISO/IEC JTC 1
INFORMATION TECHNOLOGY
Secretariat: USA (ANSI)

TITLE: Summary of Voting on Document JTC 1 N 1277, Letter Ballot Regarding the Establishment of JTC 1/SC 29

SOURCE: ISO/IEC JTC 1 Secretariat

PROJECT: --

STATUS: The proposal to establish SC 29 has been approved by a majority of the P-Members of JTC 1. Comments on the title, scope and programme of work of SC 29 will be referred to the JTC 1 Plenary Meeting in Madrid, 2-4 October 1991.

The JTC 1 Secretariat has been informed by the Japanese Secretariat that the first Plenary meeting of SC 29 will be held in Tokyo, Japan during the week of 18 November 1991.



REQUESTED ACTION: For review and discussion at the 2-4 October JTC 1 Plenary Meeting in Madrid, Spain.

DISTRIBUTION: P and L Members
SC 29 Secretariat

Address reply to:
Secretariat: ISO/IEC JTC 1—American National Standards Institute, 11 West 42nd Street, New York, NY 10036
Tel: 212 642-4934, 212 642-4884; TX: 42 42 96 ANSI UI; FAX: 212 398-0023

Draft set of procedures for cooperation between CCITT and JTC1 in 1991

36

  **ISO/IEC JTC 1 N 1444**
Date: 1991-07-11

ISO/IEC JTC 1
INFORMATION TECHNOLOGY
Secretariat: USA (ANSI)

TITLE: DRAFT Procedures for CCITT and JTC 1 Cooperation

SOURCE: Chairman, Collaborative Group on CCITT and JTC 1 Cooperation

PROJECT: --

STATUS: The attached draft contains a set of procedures for cooperation between CCITT and ISO/IEC JTC 1. It is being distributed for review and comment in preparation for the 17-18 September 1991 meeting of the Collaborative Group on CCITT and JTC 1 Cooperation.

REQUESTED ACTION: National Bodies or Subcommittees of JTC 1 wishing to comment on this document should provide their comments to the JTC 1 Secretariat no later than Friday, 6 September 1991.

DISTRIBUTION: P and L Members
SC Secretariats
Meeting Participants

Address reply to:
Secretariat ISO/IEC JTC 1—American National Standards Institute, 11 West 42nd Street, New York, NY 10036
Tel: 212 642-4934, 212 642-4884; TX: 42 42 96 ANSI U; FAX: 212 398-0023

Notice to JPEG to apply Joint text template in 1991

37

ISO/IEC JTC1/SC2/WG8 N

Date: April 18, 1991

*ISO/IEC JTC1/SC2/WG8
Coded Representation of Pictures
and Audio Information*

Title: CCITT/ISO Guidelines for drafting rules of joint CCITT/ISO recommendations/standards

Source: I. Sebestyén

Purpose: For information and action

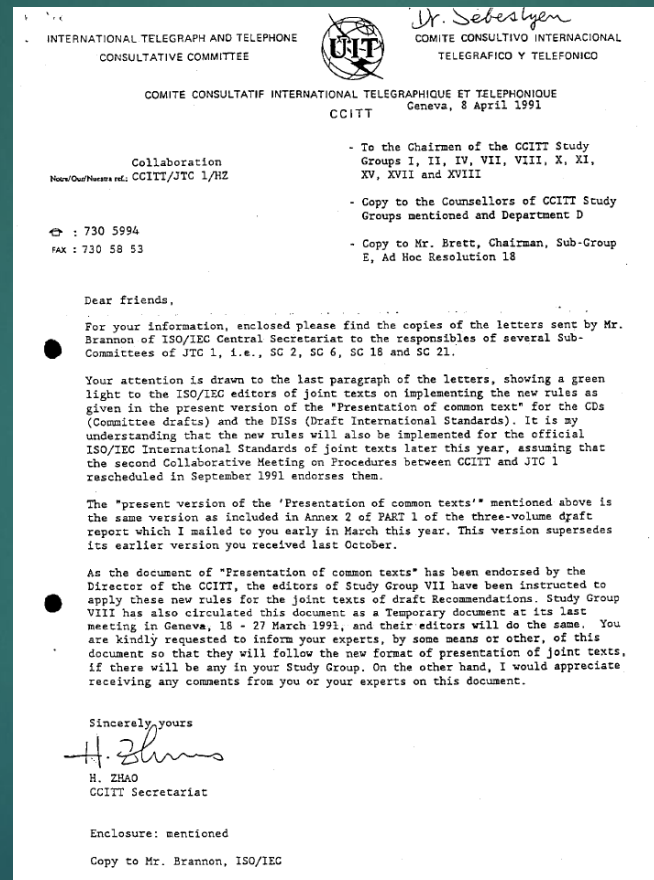
The CCITT Secretariat has informed me in February this year about the existence of draft guidelines for the drafting rules of joint CCITT/ISO recommendations and standards. Since JPEG and JBIG are joint working groups of ISO and CCITT, I have informed the JPEG and JBIG Chairmen about the existence and content of the draft rules. The text of the drafting rules were distributed in both working groups.

Since at that time I did not have a clear permission from CCITT and ISO to apply actually the drafting rules, the purpose of the contribution was just to inform JPEG and JBIG, with the aim that at one point in time the text of the current JPEG and JBIG draft standards/recommendations have to be changed according to the joint drafting rules.


At the last CCITT SGVIII meeting in Geneva (18-27.3.1991) I had talks with CCITT Secretariat on the applicability of the drafting rules. Mr. Zhao from the CCITT Secretariat advised that for joint ISO/CCITT standards/recommendations the draft rules should be applied if there is no intention of having the standards/recommendation as ISO IS or CCITT Recommendation available in 1991. Thus, the rules - although not yet officially approved by CCITT and ISO - can/shall be applied for ISO CD, DIS and CCITT Draft Recommendations if the standard/recommendation is coming out in 1992 or later. That is the case for both the JPEG and the JBIG drafts.

Instruction of the CCITT (Houlin Zhao) to use common ISO/CCITT template in 1991

38



Instruction of ISO/IEC (Mr. K. Brennan) to use the common CCITT/ISO template in 1991

		ISO Central Secretariat	
our date	1991-03-26	our reference	ISO/IEC JTC 1
your date		your reference	

Mr. J.M. Borde
 ISO/IEC JTC 1/SC 2 Secretariat
 Association française de normalisation
 Tour Europe Cedex 7
 92049 PARIS LA DEFENSE
 France

Dear Mr. Borde,

Presentation of ISO/IEC/CCITT common text


Following a meeting, on 2 October 1989, between Mr. Eicher, Secretary-General of ISO, Mr. Raaburn, General Secretary of IEC and Mr. Irmer, Director of the CCITT, and their staff to discuss a constructive collaboration between the organizations and in accordance with a recommendation from that meeting, an adhoc group was set up to minimize house style differences between CCITT and ISO/IEC texts when developing common text.

The adhoc group on harmonisation of drafting rules for common CCITT/ISO/IEC text met a number of times in 1990 in order to develop guidelines for the "presentation of common text"; the attached document is the final draft of that document.

Although this document received a general endorsement from both CCITT Study Group VII and the experts of JTC 1/SC 6, SC 18 and SC 21 present at the Study Group VII meeting we should be grateful if you would circulate copies of the attached document to experts of SC 2. In order that the adhoc group may finalize the document before September 1991 we would appreciate receiving any comments SC experts may have by 25 June 1991.

It has also been brought to the attention of the adhoc group that certain project editors developing common text wish to implement the present version of "the presentation of common text". In order to take account of any modifications to the present version, based on comments received from ISO/IEC JTC 1/SC 6, SC 18 and SC 21, it has been agreed with CCITT that project editors of joint texts may already implement the present version at the stage of committee draft and draft International Standard. Any final texts for publication in ISO/IEC must continue to be prepared in accordance with the ISO/IEC Directives Part 3 "Drafting and presentation of International Standards" until the final version of "Presentation of common text" has been endorsed later this year.

Yours sincerely,




Keith Brennan
 ISO/IEC Information Technology Task Force

cc. Ms. F. Schrotter ISO/IEC JTC 1 Secretariat
 Mr. Zhao, CCITT

KE/bs

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION - MEMBRES DE L'ORGANISATION INTERNATIONALE DE NORMALISATION

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		Telegrams	ISOGATEL



This is really
the end...