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
Outline

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 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

- 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”.

- “Parential” 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)
- 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)
### Activities related to AVNH C/P in ISO/IEC JTC1/SC2

<table>
<thead>
<tr>
<th>Year</th>
<th>JPEG</th>
<th>MJPG</th>
<th>1.9Mbit/s</th>
<th>9Mbit/s</th>
<th>Video</th>
<th>Audio</th>
<th>System</th>
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**AVNH C/P:** Audio Visual Multimedia and Hypermedia Coding and/or Processing
Why fundamental change?

- 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)).
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...
Thanks... Questions?...
Further reading

FROM OLDER JPEG MEMORIAL PRESENTATIONS (RENNES, SAN MALO) + SOME NEW SLIDES
CCITT SGVIII Reports 1989-1992 with JPEG / JBIG
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 \((X.200 \text{ Series} – \text{CCITT SGVII})\)
- Message Handling Systems (MHS) /
  Message Oriented Text Interchange Systems (MOTIS) \((X.400 \text{ Series})\)
- The Directory \((X.500 \text{ Series})\)
- Open Document Architecture (ODA) /
  Office Document Architecture (ODA) \((T.400 \text{ Series} – \text{CCITT SGVIII})\)

Later also (between ISO/IEC JTC1/SC29 and CCITT SGVIII):
- Still picture coding \((\text{JPEG} = \text{ITU-T T.81}; \text{JBIG} = \text{ITU-T T.82})\)
1. The Videotex Photographic Mode project (CCITT, ISO)

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
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
Alain Leger
Stefan Guerillot
Kenji Ogura
Istvan Sebestyen
Gregg Wallace
Yasuhiro Yamazahi
Hiroshi Yasuda

BT  UK
CCETT  France
IPTC  France
NTT  Japan
Siemens  Germany
DEC  USA
KDD  Japan
NTT  Japan
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)

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
<th>Phone Number</th>
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<tbody>
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### JPEG-1 related timeline:

<table>
<thead>
<tr>
<th>Date/Location</th>
<th>Milestones</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>Introduce image coding for videotex at CEPT (Conférence Européenne des Administrations des Postes et Télécommunications)</td>
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<tr>
<td>June 1985, Ipswich</td>
<td>Launch the European Photovideotex Image Compression Algorithms (PICA) project</td>
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<tr>
<td>November 1986, Parsippany</td>
<td>ISO and CCITT form Joint Photographic Experts Group (JPEG)</td>
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<td>March 1987, Darmstadt</td>
<td>Register coding schemes and define requirements and selection process</td>
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<td>June 1987, Copenhagen</td>
<td>Hold initial selection meeting—10 techniques reduced to 3</td>
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<tr>
<td>October 1987, Washington</td>
<td>Revise specification and hold first selection process</td>
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<tr>
<td>December 1987, Winchester</td>
<td>Revise specification and hold second (final) selection process</td>
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<tr>
<td>January 1988, Copenhagen</td>
<td>Hold final selection meeting—adaptive cosine transform (ADCT) technique chosen</td>
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<tr>
<td>June 1989, Rennes</td>
<td>Refine and consolidate the ADCT technique by the JPEG international team</td>
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<tr>
<td>1989</td>
<td>Write the JPEG draft international standard with ITU/ISO/IEC common template</td>
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<tr>
<td>1992</td>
<td>Approve JPEG as Recommendation ITU-T T.81</td>
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<tr>
<td>1993</td>
<td>Approve JPEG as ISO/IEC 10918-1 Standard</td>
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Summary of JTC1 votes to establish SC29 in 1991

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.
Draft set of procedures for cooperation between CCITT and JTC1 in 1991
Notice to JPEG to apply Joint text template in 1991

ISO/IEC JTC1/SC2/WG8 N

Date: April 18, 1991

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

Source: J. Sebestyen

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.M.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

International Telegraph and Telephone Consultative Committee

Comité Consultatif International Télégraphique et Téléphonique

Geneva, 8 April 1991

Collaboration

Dr. Séredyn
Comité Consultatif International Télégraphique et Téléphonique

To the Chairman of the CCITT Study Groups 1, 3, 5, VII, VIII, X, XI, XV, XVI and XVIII

Copy to the Counsellors of CCITT Study Groups mentioned and Department B

Copy to Mr. Brett, Chairman, Sub-Group 2, Ad Hoc Resolution 18

Dear friends,

For your information, enclosed please find the copies of the letters sent by Mr. Grammon of 110/IEC Central Secretariat to the responsible of several Sub-Committees of JTC 1, i.e., SC 2, SC 6, SC 18 and SC 11.

Your attention is drawn to the last paragraph of the letters, showing a given light to the 110/IEC editors of joint texts on implementing the new rules as given in the present version of the "Presentation of common texts" for the OIS (Committee Drafts) and the DSS (Draft International Standards). It is my understanding that the new rules will also be implemented for the official 110/IEC International Standards of joint texts later this year, assuming that the second Collaborative Meeting on Procedures between CCITT and JTC 1 rescheduled in September 1991 endorses them.

The "present version of the 'Presentation of common texts'" mentioned above is the same version as included in Annex 2 of PAEC 1 of the three-volume draft report which I mailed to you early in March this year. This version supersedes its earlier version you received last October.

As the document of "Presentation of common texts" has been endorsed by the Director of the CCITT, the editors of Study Group VII have been instructed to apply these new rules for the joint texts of draft Recommendations. Study Group VIII has also circulated this document as a temporary document at its last meeting in Geneva, 18 - 27 March 1991, and their editors will do the same. You are kindly requested to inform your experts, by some means or other, of this document so that they will follow the new format of presentation of joint texts, if there will be any to your Study Group. On the other hand, I would appreciate receiving any comments from you or your experts on this document.

Sincerely yours

H. Grammon
CCITT Secretariat

Enclosure: mentioned

Copy to Mr. Grammon, 110/IEC
Instruction of ISO/IEC (Mr. K. Brennon) to use the common CCITT/ISO template in 1991

Dear Mr. Breton,

Presentation of ISO/IEC/CCITT common text

Following a meeting, on 2 October 1991, between Mr. Eicher, Secretary-General of ISO, Mr. Bankov, General Secretary of IEC and Mr. Imery, 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 ad hoc group was set up to minimize house style differences between CCITT and ISO/IEC texts when developing common texts.

The ad hoc group on harmonization of drafting rules for common CCITT/ISO text met a number of times in 1992 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 Executive of JTC 1 and ISO, SC 18 and SC 21 present at the Study Group VII meeting we should proceed if you would circulate copies of the attached document to experts of SC 2. In order that the ad hoc group may finalize the document before September 1992 we would appreciate receiving any comments SC experts may have by 30 June 1991.

It has also been brought to the attention of the ad hoc 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 in the present version, based on comments received from ISO/IEC JTC 1, 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 note 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
Mr. J.K. Soderman ISO/IEC JTC 1 Secretariat
Mr. Z.L. CCITT

*Note: The document contains a table and a diagram, which are not transcribed here.*
This is really the end...