FIB

Màster en Enginyeria Informàtica (MEI)

Internet, Seguretat i Distribució de Continguts Multimèdia (ISDCM)

Colección de problemas

Representación de contenidos multimedia (+ estandarización)

SOLUCIONES

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True/False Test questions. Indicate if the following sentences are true or false.

STANDARDIZATION

1. ISO is an SDO (Standards Development Organization), while IEEE is not.

☐ True ☐ False

Answer: False. Both are SDOs.

2. ISO and IEEE are examples of SDO (Standards Development Organization).

☐ True ☐ False

Answer: True.

3. Big companies like Samsung or Microsoft may be members of ISO.

☐ True ☐ False

Answer: False. The members of ISO are Standards Organizations of the countries recognized by United Nations ("National Bodies", 1 per country).

4. It is possible to have standards that have been developed in a closed environment but that are free of cost.

☐ True ☐ False

Answer: True.

5. You never have to pay to get the text of an openly developed standard.

☐ True ☐ False

Answer: False. The fact that a standard is openly developed does not preclude that getting its text is free of charge.

6. In the standardization process of ISO, the first version of a standard to ballot/comment is the CD (Committee Draft).

☐ True ☐ False

Answer: True.

7. A risk of the balloting process in ISO is that many members could vote NO without providing comments.

☐ True ☐ False

Answer: False. It is not allowed to vote NO without providing comments. In fact, voting YES without comments, which is allowed, could be a risk.

8. ISO standards are developed in Working Groups, where experts from different organizations collaborate, but standards are approved in a formal ballot process in which every National Body has one vote.

☐ True ☐ False

Answer: True.

9. ISO is an SDO (Standards Development Organization), while HL7 International is not.

☐ True ☐ False

Answer: False. Both are SDOs.

10. In the standardization process of ISO, the first document to ballot is the WD (Working Draft).

☐ True ☐ False

Answer: False, it is the CD (Committee Draft). WDs are not balloted

11. In standards developed by W3C, IETF and ISO/IEC, the last version of a standard (known as the Editor's copy) is publicly accessible in the Web.

☐ True ☐ False

Answer: False. This is not the case for ISO/IEC.

12. ISO, W3C and IETF are examples of SDO (Standards Development Organization).

☐ True ☐ False

Answer: True.

13. W3C (World Wide Web Consortium) is not a SDO (Standards Development Organization) because its members are companies and organizations.

☐ True ☐ False

Answer: False.

3 of the documents approved during the 126th meeting of ISO/IEC JTC1 SC29/WG11 (MPEG) include:

a) **Text of ISO/IEC IS 23009-1:2014 4th edition (ISO/IEC 23009-1 – DASH Media presentation description and segment formats)**

b) **Disposition of comments on DIS ISO/IEC 23092-3 (ISO/IEC 23092-3 - Genomic Information Metadata and Application Programming Interfaces (APIs))**

c) **Text of ISO/IEC FDIS 23092-3 Genomic Information Metadata and Application Programming Interfaces (APIs)**

14. Document a) is more advanced tan c)

☐ True ☐ False

Answer: True. IS is the final step, after FDIS.

15. Document c) should have been written before than b)

☐ True ☐ False

Answer: False. Once a ballot has been received, the next step is to produce a "Disposition of Comments". Then, those comments are implemented in the next step. In this case, the Disposition of Comments is on a DIS, and the FDIS is produced. Therefore, b) is before c).

2 de los documentos aprobados durante el "126th meeting of ISO/IEC JTC1 SC29/WG11 (MPEG)" en marzo de 2020 son:

a) **Text of ISO/IEC IS 23009-1:2014 4th edition (ISO/IEC 23009-1 – DASH Media presentation description and segment formats)**

b) **Disposition of comments on DIS ISO/IEC 23092-3 (ISO/IEC 23092-3 - Genomic Information Metadata and Application Programming Interfaces (APIs))**

16. El documento a) todavía necesita otro paso antes de llegar a ser un estándar internacional final.

☐ Cierto ☐ Falso

Answer: False. IS is the final step, the final International Standard.

17. b) se usa para producir un FDIS.

☐ Cierto ☐ Falso

Answer: True. Once a ballot has been received, the next step is to produce a "Disposition of Comments". Then, those comments are implemented in the next step. In this case, the Disposition of Comments is on a DIS, and a FDIS is produced.

Éstas son 3 de las Recomendaciones del "94th ISO/IEC JTC 1/SC29/WG1 Meeting" (JPEG) en enero de 2022:

a) **Approval of Final Call for Proposals for JPEG AI Recommendation**

b) **Approval of Use Cases and Requirements for JPEG XS v3.1**

c) **Approval of DIS text of ISO/IEC 19566-8**

18. El documento c) es el más avanzado, mientras que el b) es el que está en un estado más inicial.

☐ Cierto ☐ Falso

Answer: True.

19. El documento b) se ha generado después de una "Call for Proposals", como el caso de a).

☐ Cierto ☐ Falso

Answer: False. Use Cases and Requirements are needed to issue a Call for Proposals.

20. Otra recomendación de la reunión mencionada fue "Approval of CD text of ISO/IEC 19566-5 2nd edition". El siguiente paso para poder llegar a disponer de una segunda edición del estándar internacional ISO/IEC 19566-5 es la votación (ballot), por los miembros (National Bodies) de ISO/IEC JTC 1/SC29, del CD aprobado en la reunión 94.

☐ Cierto ☐ Falso

Answer: True.

LIFE CYCLE

1. Creation and Storage are the first steps of the multimedia content life-cycle.

☐ True ☐ False

Answer: True.

CHARACTERS

1. A Code Unit is a unique number assigned to every Unicode character.

☐ True ☐ False

Answer: False. This is a Code Point.

2. A Code Point is a unique number assigned to every Unicode character.

☐ True ☐ False

Answer: True.

3. UCS (Universal Character Set) is an ISO standard, while UNICODE it is not.

☐ True ☐ False

Answer: True.

4. In Unicode, a Glyph is a graphical representation of a character.

☐ True ☐ False

Answer: True.

5. In Unicode, a Glyph is a graphical representation of a unique Code Point.

☐ True ☐ False

Answer: False. It may correspond to several Code Points.

6. In Unicode, a Glyph is a graphical representation that may correspond to several different characters.

☐ True ☐ False

Answer: True.

7. In Unicode, a Glyph is a graphical representation that corresponds to only one character.

☐ True ☐ False

Answer: False. It may correspond to several characters.

8. Code Units for a specific UTF have a fixed length.

☐ True ☐ False

Answer: True.

9. *Code units* in Unicode are of fixed length, but every specific *code point* may need a different number of *code units* for its coding.

☐ True ☐ False

Answer: True.

10. UTF-8 and UTF-16 define how to code Unicode characters with 1 or 2 code units, respectively.

☐ True ☐ False

Answer: False. In UTF-8 and UTF-16, the code units have 1 or 2 bytes, respectively.

11. A given character coded in UTF-16 has double number of bytes than the same character coded in UTF-8.

☐ True ☐ False

Answer: False. The minimal unit for coding (*code unit*) has double number of bytes in UTF-16, but the number of minimal units needed for the coding is not necessary twice.

12. If the code point of a Unicode character needs 24 bits to be coded in binary form, then we will need more than 4 octets if we use UTF-8.

☐ True ☐ False

Answer: False. 4 octets is the maximum. There are no code points needing more than 20 bits.

13. If the code point of a Unicode character needs 33 bits to be coded in binary form, then we will need more than 4 octets if we use UTF-8.

☐ True ☐ False

Answer: False. 4 octets is the maximum. There are no code points needing more than 20 bits.

14. With 16 bits we have enough to represent all the *code points* of UNICODE, but due to the UTF mechanisms, in some cases we need more than 3 bytes to code them.

☐ True ☐ False

Answer: False. We need 20 bits to represent all code points.

15. If a *code point* has more than 16 bits, we need to use UTF-32 to represent it.

☐ True ☐ False

Answer: False. All Code Points may be represented in any UTF.

AUDIO

1. The MP3 audio format is specified in a part of an ISO/IEC standard.

☐ True ☐ False

Answer: True. In a MPEG standard, an ISO/IEC WG.

2. The audio formats from MPEG, such as MP3 or AAC, are based in PCM (Pulse Code Modulation).

☐ True ☐ False

Answer: False. PCM is the basic format for telephony (oriented to voice).

3. AAC is an audio format from MPEG-2.

☐ True ☐ False

Answer: True.

IMAGES

1. CGM is an ISO standard for vector graphics.

☐ True ☐ False

Answer: True.

2. SVG (Scalable Vector Graphics) is a vector graphics format based on XML.

☐ True ☐ False

Answer: True.

3. CGM and SVG are examples of vector graphics formats based on XML.

☐ True ☐ False

Answer: False. CGM is not based on XML.

4. SVG (Scalable Vector Graphics) is a graphics format based on XML that allows several resolutions in the images.

☐ True ☐ False

Answer: False. It is for vector graphics, which have no resolution.

5. CorelDRAW is a standard for vector graphics, so its MIME content type is `image`.

☐ True ☐ False

Answer: False. It is `application`, since it is proprietary.

6. *WebP* is a format for moving images developed by Google.

☐ True ☐ False

Answer: False. It is for still images.

7. JFIF is the file interchange format for JPEG.

☐ True ☐ False

Answer: True.

8. JFIF is a file interchange format valid for several encodings, such as JPEG, BMP o GIF.

☐ True ☐ False

Answer: False. It is only for JPEG.

9. HEIF (High Efficiency Image File Format) is an image format coming from a video standard.

☐ True ☐ False

Answer: True. It is the Image File Format of HEVC (High Efficiency Video Coding), i.e. MPEG-H part 12.

10. JPEG es un formato de imágenes *raster* del tipo "raw".

☐ Cierto ☐ Falso

Answer: False. It is a compression format.

11. .eps, .svg y .cgm son ejemplos de extensiones para formatos de imágenes vectoriales.

☐ Cierto ☐ Falso

Answer: True.

VIDEO

1. MPEG-4 AVC and H.264 are aligned, but they have some small technical differences.

☐ True ☐ False

Answer: False. Both are exactly the same (except the name), since they have been developed by a joint committee of ISO/IEC and ITU-T groups.

2. MPEG-4 defines two mechanisms for video compression (one in its part 2 and the other in part 10). However, H.264 from ITU-T only coincides with part 10.

☐ True ☐ False

Answer: True.

3. HEVC improves around 10 times the efficiency of AVC.

☐ True ☐ False

Answer: False. Only 2 times.

4. HEVC has been standardized by ISO/IEC as MPEG-H, and as H.265 by ITU-T.

☐ True ☐ False

Answer: True.

5. VP8 and VP9 are video compression formats designed to compete with H.264 and H.265, respectively.

☐ True ☐ False

Answer: True.

6. AV1 is an ISO royalty-free video content standard.

☐ True ☐ False

Answer: False. It is not ISO, but developed by the Alliance for Open Media.

7. AV1, developed by the Alliance for Open Media, is substituting VP9 as an open source video compression format.

☐ True ☐ False

Answer: True.

8. SMIL is a W3C standard based in XML to describe multimedia presentations and animations.

☐ True ☐ False

Answer: True.

9. The VVC (Versatile Video Coding) has higher compression that the HEVC (High Efficiency Video Coding).

☐ True ☐ False

Answer: True.

10. VP8 es el formato de vídeo con el que Google compite con HEVC.

☐ Cierto ☐ Falso

Respuesta: Falso. Es VP9.

CONTAINERS

1. WAV is a metadata set specific for audio.

☐ True ☐ False

Answer: False. It is an audio container.

2. RIFF (Resource Interchange File Format) is a generic container format that has been the basis for other formats, such as AVI, WAV or WebP.

☐ True ☐ False

Answer: True.

3. WebM is a video and audio container defined by Google.

☐ True ☐ False

Answer: True.

4. Containers (or file formats) may structure the video resources in segments or "chunks".

☐ True ☐ False

Answer: True.

5. MP3, Matroska and PNG are three formats that allow storing the same kind of information.

☐ True ☐ False

Answer: False. MP3 is an audio format, Matroska is a container and PNG is for images.

6. VOB is the format for DVDs.

☐ True ☐ False

Answer: True.

7. The ISO base media file format has been standardized by the MPEG ISO/IEC committee.

☐ True ☐ False

Answer: True.

8. ISO base media file format is specialized in still images, although it can also be used for video.

☐ True ☐ False

Answer: False. It is valid for all formats, although it was initially developed for video.

9. The ISO base media file format only allows storing content specified with MPEG standards.

☐ True ☐ False

Answer: False. It is a generic format that allows storing any kind of content.

10. The *ISO base media file format* is based in a format initially developed by Apple.

☐ True ☐ False

Answer: True.

11. The *ISO base media file format* is the basis for many file formats (containers).

☐ True ☐ False

Answer: True.

12. The ISO base media file format allows storing any kind of content, not only content from MPEG standards.

☐ True ☐ False

Answer: True.

13. WAV is an audio container, not an audio compression format.

☐ True ☐ False

Answer: True.

14. The *ISO Base Media File Format* is useful to represent several multimedia content structures, but not when we need *streaming*.

☐ True ☐ False

Answer: False. It is very appropriate for streaming.

METADATA

1. The description of audiovisual content must be embedded in the content itself.

☐ True ☐ False

Answer: False. It may be also separated from the content.

2. It is not possible to embed metadata in the resources they are describing.

☐ True ☐ False

Answer: False.

3. If metadata are not "embedded" in the resources they describe, then we need a container to be able to relate them.

☐ True ☐ False

Answer: False. There are other mechanisms to relate them, both from the resource or the metadata.

4. A metadata schema may define "high level" attributes, such as `Resolution` or `Color`, and/or the so-called "low level" attributes, such as `Keywords` or `Description`.

☐ True ☐ False

Answer: False. "high" and "low" are interchanged.

5. "Creator" or "date" are examples of the so-called "low level features", to be distinguished from the "high level features".

☐ True ☐ False

Answer: False. They are "high level features".

6. If we use the JPSearch metadata set, we can store information about the creation and modification dates of the images.

☐ True ☐ False

Answer: True.

7. If I have images described with Dublin Core, then I might search for them based on the photographer.

☐ True ☐ False

Answer: True. The name or identification of the photographer could be included in the elements Publisher or Contributor, for example.

8. Dublin Core is a very much used metadata schema, but it is not valid to describe audiovisual content.

☐ True ☐ False

Answer: False. It may be used, although the level of detail may be low for some applications.

9. Dublin Core is a very much used metadata schema, mainly for describing audiovisual content.

☐ True ☐ False

Answer: False. Dublin Core is generic, not specific for audiovisual content.

10. The key point of Dublin Core for metadata representation is that it has only 15 simple elements. The disadvantage is that it is impossible to extend that metadata set.

☐ True ☐ False

Answer: False. It is extensible. However, there is a risk of losing interoperability.

11. Dublin Core is a metadata standard that has 15 simple elements, thus facilitating the interoperability between repositories.

☐ True ☐ False

Answer: True.

12. Dublin Core allows describing the metadata of a physical object.

☐ True ☐ False

Answer: True. Apart from, of course, the digital ones.

13. The EBUCore metadata set is intended for educational content.

☐ True ☐ False

Answer: False. It is intended for radio and television information.

14. EBUCore allows storing information on TV programs originally described with Dublin Core.

☐ Cierto ☐ Falso

Answer: True. It is a superset.

15. If we describe information about TV programs with Dublin Core, we can include it in a repository using EBUCore, although it will be incomplete.

☐ True ☐ False

Answer: True. EBUCore is a superset of Dublin Core.

16. A metadata schema may define "high level" attributes, such as `Resolution` or `Color`, and/or the so-called "low level" attributes, such as `Keywords` or `Description`.

☐ True ☐ False

Answer: False. "high" and "low" are interchanged.

17. JPSearch Core metadata schema does not allow to specify `width` and `heigth`.

☐ True ☐ False

Answer: False. It is possible.

18. Dublin Core allows to describe content using 15 simple elements. In addition, it includes mechanisms to extend this set of elements.

☐ True ☐ False

Answer: True.

19. Dublin Core provides a mechanism to add new elements. In this way, we keep interoperability with all Dublin Core systems.

☐ True ☐ False

Answer: False. Any unilateral extension implies losing interoperability with systems not using the added elements.

20. Metadata sets as Dublin Core describe what it is called "low level features".

☐ True ☐ False

Answer: False. They are rather "high level features".

21. *Dublin Core* is a metadata schema that includes elements such as *Title* or *Creator*. However, since it is generic, it does not allow to indicate temporal information such as *Date*.

☐ True ☐ False

Answer: False. *Date* is included.

22. There are metadata schemas specific for television programs.

☐ True ☐ False

Answer: True. EBUCore is an example.

23. EBUCore allows to describe metadata on libraries specific content.

☐ True ☐ False

Answer: False. EBUCore describes television metadata.

24. *EBU Core* is a metadata set to describe television programs based on *Dublin Core*.

☐ True ☐ False

Answer: True.

25. *Title, Creator, Subject, Width* and *Height* are examples of elements from *Dublin Core*.

☐ True ☐ False

Answer: False. The first 3 are from Dublin Core, but not the last 2.

26. `width` y `heigth` no se pueden especificar con el JPSearch Core metadata schema.

☐ Cierto ☐ Falso

Respuesta: Falso. Sí se puede.

27. Algunos metadatos sobre imágenes que se pueden codificar en Exif se pueden incluir en recursos JPEG.

☐ Cierto ☐ Falso

Respuesta: Cierto.

28. Con Dublin Core sólo se pueden definir metadatos sobre la localización de un contenido.

☐ Cierto ☐ Falso

Respuesta: Falso. Dublin Core permite definir metadatos genéricos sobre un contenido como pueden ser el título, la fuente, los derechos, etc.

29. Los metadatos sobre vídeo que se pueden codificar en Exif se incluyen en recursos MPEG.

☐ Cierto ☐ Falso

Respuesta: Falso. Exif no tiene información de vídeo.

30. JPSearch es un esquema de metadatos orientado a educación.

☐ Cierto ☐ Falso

Respuesta: Falso. JPSearch está orientado a imágenes.

Problema 1

En el Anexo I tenemos un fragmento (2 de los 9 ítems) de la nota de prensa de la reunión de ISO/IEC JTC1 SC29/WG11 de agosto de 2013.

Contestar razonada y brevemente a las siguientes preguntas:

Respecto al ítem 1, sabiendo que "Type 1 licensing terms" es equivalente a "royalty-free":

1) ¿De quién puede ser la contribución a que se refiere la nota? ¿En qué estándar está basada?

   Google dispone de un formato de vídeo sin patentes, V8, que ha contribuido a MPEG para producir un nuevo estándar de ISO.

2) Asumiendo que se cumplen las fechas que están barajando, ¿en qué periodo de tiempo se produciría el DIS (Draft International Standard)?

   El DIS es el paso previo a FDIS y posterior a CD. Por tanto tendrá que ser entre Noviembre de 2013 y Julio de 2014.

Requirements -> Call for Proposals -> Working Draft -> Committee Draft -> -> DIS -> FDIS -> International Standard

Respecto al ítem 2:

3) ¿Qué es el ISO Base Media File Format?

   Un estándar de contenedor inicialmente desarrollado para vídeo. Es parte de MPEG-4.

4) ¿Qué es un FDIS?

   Un estándar prácticamente definitivo que ya no admite cambios técnicos y está pendiente de su aprobación final.

5) ¿Qué es "timed text"?

   Texto asociado a la secuencia temporal de un vídeo. Normalmente subtítulos.

6) ¿Qué otras SDOs (Standard Development Organizations) se mencionan?

   -> ya lo conocemos

   SMPTE y W3C. Aunque DECE se podría considerar una SDO, en realidad no lo es.

   -> hay estándares de metadatos de esta organización

Problema 2

En el Anexo II tenemos algunas de las resoluciones de la 65ª reunión de ISO/IEC JTC1 SC29/WG1 (JPEG), de Abril de 2014.

Contestar razonada y brevemente a las siguientes preguntas:

1) Ordenar las 4 resoluciones en función de lo avanzado del proceso del estándar (o parte de estándar) que se está desarrollando. Comentar el estado de cada uno de ellos.

   De más avanzado a menos: 18, 21, 11, 2.
   2 está todavía en elaboración de requisitos, 11 está empezando el WD, mientras que 18 y 21 ya están en votación de un Amendment. Sin embargo, 18 va más avanzado puesto que la disposición de comentarios de 21 es todavía un borrador.

2) ¿Qué puede significar la resolución 18?

   Que se ha aprobado la respuesta a los comentarios del voto de la modificación de la parte 5 de JPEG2000, que supera la fase de PDAM.

3) Respecto a la resolución 18, ¿qué estandariza JPEG 2000? ¿cuál es el cometido de la parte 5 que se está modificando?

JPEG200 es un formato de codificación de imágenes que intenta mejorar JPEG.

La parte 5 es de Reference Software, es decir, software que valida el estándar y da información sobre cómo implementarlo.

Exercise 3

These are 4 of the documents approved during the 110th meeting of ISO/IEC JTC1 SC29/WG11 (MPEG), in October 2014:

1) ISO/IEC 23009 – Dynamic adaptive streaming over HTTP (DASH). Part 1 – Media presentation description and segment formats: Text of ISO/IEC 23009-1:2014 FDAM 1 Extended profiles and time synchronization

2) ISO/IEC 21000-20 – Contract Expression Language: WD of ISO/IEC 21000-20 Contract Expression Language 2nd Edition

3) ISO/IEC 23000-15 – Multimedia Preservation Application Format: Draft text of ISO/IEC DIS 23000-15 Multimedia Preservation Application Format

4) ISO/IEC 23000-16 – Publish/Subscribe Application Format: WD of ISO/IEC 23000-16 Publish/Subscribe Application Format

Reasoned and briefly answer the following questions:

1) Which of the 4 documents is in a more initial standardization status? Why?

Number 4, since it is only a WD. Although number 2 is also a WD, it is a WD of a second version, so it is in a more advanced phase.

2) Which of the 4 documents are parts of the same standard? Which standard could be? Does it correspond to any of the MPEG standards with "letters"?

3 and 4 are parts of 23000. It corresponds to "Multimedia Application Format", known as MPEG-A.

3) Any of these documents is an MPEG-21 part? If so, which part?

Number 2. It is the second version of part 20 of MPEG-21: Contract Expression Language.

Exercise 4

These are a few of the 68 *Resolutions of the 73rd ISO/IEC JTC1/SC29/WG1 Meeting of ISO/IEC JTC1 SC29/WG1 (JPEG)*, in October 2016.

- Resolution 4: Approval of JPEG XS Use Cases and Requirements v1.2.
- Resolution 6: Approval of Second Call for Proposals for JPEG PLENO on Light Field Coding Technologies.
- Resolution 11: Approval of WD 1.0 of ISO/IEC 19566-4 (Privacy and Security).
- Resolution 17: Approval of the PDAM4 text of ISO/IEC 14492 to initiate balloting.

Reasoned and briefly answer the following questions:

1) Justify why Resolution 17 refers to a standard in a more advanced status than that of Resolution 11.

ISO/IEC 14492 is already a standard, which has a fourth PDAM to improve it. ISO/IEC 19566-4 still needs to be developed since it is in WD status, so no ballot process has started yet.

2) Justify why Resolution 6 refers to a standard in a more advanced status than that of Resolution 4.

The Call for Proposal needs Requirements to be approved before.

3) What could be the next step for the document in Resolution 11?

Either a new WD or a first CD.

Exercise 5

These are some of the *Resolutions* from the *74th meeting of ISO/IEC JTC1 SC29/WG1 (JPEG)*, in January of 2017.

Resolution 4 - Approval of JPEG Pleno Scope, Use cases and Requirements v1.7

Resolution 6 - Approval of JPEG Privacy and Security Scope, Use Cases and Requirements v1.3

Resolution 11 - Approval of WD 1.1 of ISO/IEC 19566-4: Privacy, Security and IPR features

Resolution 12 - Approval of Draft Call for Proposals for ISO/IEC 19566-4: Privacy, Security and IPR features

Resolution 17 - Approval of the DOCR of the PDAM4 of ISO/IEC 14492

Resolution 18 - Approval of the PDAM4 of ISO/IEC 14492

Resolution 21 - Approval of the PDAM2 of ISO/IEC 24800-2

Notes:

- ISO/IEC 24800 is JPSearch.
- DOCR means *Disposition of Comments Report*.

Reasoned and briefly answer the following questions:

If we have the following classification of images:

a. Still images vs. Moving images.
b. Vector images vs. Raster images.

1) To which group in both cases a. and b. does JPEG belong?

Case a: Still images. Case b: Raster images.

2) Provide examples, if they exist, of other standards for the 4 combinations of a. and b.

Still & Vector: CGM. Still & Raster: BMP (in addition to JPEG).
Moving & Vector: Animation (no standards presented). Moving & Raster: MPEG.

3) Is there any difference in the status (standardization process) of Resolutions 4 and 6?

No. Both are in the Requirements steps, even before WD. The fact that JPEG Pleno document is in version 1.7 and the one on JPEG Privacy and Security is in version 1.3 is not relevant.

4) What would be the next steps after Resolution 12 until the CD ballot starts?

This Resolution is approving a Draft Call. Therefore, the next step is to approve a Final Call. Then, a WD should be produced based on the answers to the Call, before the CD is produced.

Exercise 6

These are some of the *Recommendations* from the *128th meeting of ISO/IEC JTC1 SC29/WG11 (MPEG)*, in October 2019.

1) Approval of the WD of ISO/IEC 23009-8 Session based DASH operations

2) Approval of the Disposition of comments on ISO/IEC CD 23090-3 Versatile Video Coding

3) Approval of Working Draft 3 of Immersive Video, ISO/IEC 23090-12

4) Approval of the Text of ISO/IEC DIS 23094-1 Essential Video Coding

Reasoned and briefly answer the following questions:

1) After MPEG-4 AVC (or H.264), which are the standards on video coding or compression produced (or under development) by the MPEG standardization group?

HEVC (H.265), VVC (MPEG-I), EVC (MPEG-5).

2) According to the previous Recommendations from the meeting, which standard is in a more advanced phase, VVC or EVC?

Both could be at the same phase:

VVC has a CD approved, so a DIS should have been produced (Recommendation 2).

EVC has a DIS approved to start ballot (Recommendation 4).

Alternative answer: EVC is more advanced since a DIS is available. It is not explicit that VVC also has a DIS.

3) "According to 1, DASH is at the WD phase". Why the previous sentence is not correct?

Because the Recommendation 1 refers to a specific part of DASH, that is new. Many other parts of DASH are already approved standards. So, the correct sentence could be "Session based DASH operations (part 8 of DASH) is at the WD phase".

Problema 7

Éstas son algunas de las resoluciones de la 110ª reunión de ISO/IEC JTC1 SC29/WG11 (MPEG), de Octubre de 2014:

The Systems subgroup recommends approval of the following documents:

1) ISO/IEC 23009 – Dynamic adaptive streaming over HTTP (DASH). Part 1 – Media presentation description and segment formats: Text of ISO/IEC 23009-1:2014 FDAM 1 Extended profiles and time synchronization

2) ISO/IEC 21000-20 – Contract Expression Language: WD of ISO/IEC 21000-20 Contract Expression Language 2nd Edition

3) ISO/IEC 23000-15 – Multimedia Preservation Application Format: Draft text of ISO/IEC DIS 23000-15 Multimedia Preservation Application Format

4) ISO/IEC 23000-16 – Publish/Subscribe Application Format: WD of ISO/IEC 23000-16 Publish/Subscribe Application Format

Contestar razonada y brevemente a las siguientes preguntas:

1) Ordenar las 4 resoluciones en función de lo avanzado que estén en el proceso de estandarización. Comentar el estado de cada uno de ellos.

De más avanzado a menos: 2, 1, 3, 4.
2 es un WD de la segunda edición, 1 es el final de un Amendment, 3 es un Draft DIS, 4 es todavía un WD.

2) Dos de las cuatro resoluciones corresponden a dos partes del mismo estándar. ¿Cuáles son? ¿De qué estándar se trata?

La 3 y la 4 corresponden a las partes 15 y 16 del estándar ISO/IEC 23000, que especifica "Application Formats" (o "Multimedia Application Formats").

3) ¿Cuál de las cuatro resoluciones anteriores corresponde al estándar MPEG-21? Razonar qué relación puede tener con el resto de partes de MPEG-21.

La 2. Corresponde a la parte 20. El CEL, o Lenguaje de Expresión de Contratos, va más allá del REL, o Lenguaje de Expresión de Derechos (otra parte de MPEG-21), sobre objetos multimedia ("Digital Items", definidos en otras partes de MPEG-21.

Problema 8

Éstas son algunas de las *Resolutions* del *70th meeting of ISO/IEC JTC1 SC29/WG1 (JPEG)*, en Octubre de 2015.

Resolution 6: Approval of JPEG Privacy and Security Scope, Use Cases and Requirements version 0.1
WG1 approves the JPEG Privacy and Security Scope, Use cases and Requirements version 0.1 as contained in WG1N70034.

Resolution 24: Approval of ISO/IEC WD 24800-6 AMD1 (Nota: JPSearch es ISO/IEC 24800)
WG1 approves ISO/IEC WD 24800-6 AMD1 as contained in WG1N70015.

Resolution 35 Approval of JPEG XT Work Plan
WG1 approves and reaffirms the following work plan for ISO/IEC 18477:

Part	Title	WD	CD	DIS	FDIS	IS
1	Core Coding System	13/01	13/07	14/01	-	14/10
2	Coding of High Dynamic Range Images	13/10	14/01	14/04	-	14/10
3	Box File Format	14/05	14/07	15/02	-	15/06
4	Conformance Testing	15/02	**16/02**	**16/06**	-	**17/02**
5	Reference Software	14/07	15/06	16/02	-	16/06
6	IDR Integer Coding	14/05	14/07	15/02	15/06	**16/02**
7	HDR Floating-Point Coding	14/05	14/07	15/02	15/06	**16/02**
8	Lossless and Near-lossless Coding	14/07	15/02	15/06	-	16/02
9	Alpha Channel Coding	14/10	15/02	15/06	-	16/02

(Nota: WD, CD, DIS, FDIS e IS son los diferentes pasos para el desarrollo de un estándar en ISO/IEC)

Contestar razonada y brevemente a las siguientes preguntas:

2) ¿En cuál de los pasos identificados en la Nota anterior está el documento aprobado en *Resolution 6*?

In none of them. Requirements phase is previous to the WD one.

3) ISO/IEC 24800 se aprobó hace unos años. ¿Cuál es la relación entre el documento aprobado en *Resolution 24* e ISO/IEC 24800? ¿Es relevante sólo para una parte de JPSearch?

It is the WD of an Amendment to Part 6 of JPSearch.

4) ¿Cuántas partes tiene ISO/IEC 18477 (JPEG XT)? ¿Cuál es el propósito de las partes 4 y 5? ¿Con qué tipo multimedia está relacionado este estándar?

It has 9 parts.

Part 4 is "Conformance Testing", which specifies how to test if an implementation follows (conforms to) the standard. Part 5 is the "Reference Software", which provides examples of software implementations

of the standard, helping developers of products according to this standard. These are common parts of JPEG, MPEG and other standards.

Still images (JPEG).

Problema 9

(Se adjunta un resumen de las reglas de codificación de Unicode) (AL FINAL DE ESTE DOCUMENTO)

Dado el Unicode Character 'CUNEIFORM SIGN PI TIMES U2', cuyo Code Point es 12288 (en Hexadecimal) ó 74376 (en Decimal).

Contestar razonada y brevemente a las siguientes preguntas:

1) Codificarlo en UTF-8.

   12288H necesita 17 bits 1 0010 0010 1000 1000

   --> 4 code units: 3 + 6*3 (no cabe en 3: hasta 16 bits)

   11110 **000** - 10 0**10010** - 10 **001010** - 10 **001000** =

   F0 92 8A 88

2) Codificarlo en UTF-16.

   74376-65536=8840=10 0010 1000 1000

   110110 **0000001000** - 110111**1010001000** =

   D8 08 DE 88

3) ¿Por qué hemos necesitado el mismo número de bits en ambos casos?

   Casualmente necesitamos 4 code units en UTF-8 y 2 en UTF-16.

Exercise 10

(A summary of the coding rules of Unicode is attached) (AT THE END OF THIS DOCUMENT)

Given a Unicode Character whose Code Point is F288 (in Hexadecimal) or 62088 (in Decimal),

Reasoned and briefly answer the following questions:

1) Code it in UTF-8.

   F288H needs 16 bits 1111 0010 1000 1000

   --> 3 code units: 4 + 6*2

   1110 **1111** - 10 **001010** - 10 **001000** =

   EF 8A 88

2) Code it in UTF-16.

   F288

3) Provide an example (a value range could be enough) of Code Point in which the needed number of bits for its representation in UTF-16 is bigger than in UTF-8.

The simplest case is when the Code Point is very small (ASCII values, for example) and its representation in UTF-8 is with one only byte. Since the minimum number of bytes in UTF-16 is two, it will be always greater than with UTF-8 for those values.

Exercise 11

(A summary of Unicode coding rules is attached) (AT THE END OF THIS DOCUMENT)

Given a Unicode character with *Code Point* 100 (decimal),

reasoned and briefly answer the following questions:

1) Code it in UTF-8.

Since the code point is below 128 (decimal), it is directly coded with 8 bits: 64 (hex), 01100100 (bin).

2) Code it in UTF-16.

Since the code point is below 65536 (Decimal), it is directly coded with 16 bits: 0064 (hex), 0000000001100100 (bin).

Exercise 12

(A summary of Unicode coding rules is attached) (AT THE END OF THIS DOCUMENT)

Given a Unicode character with *Code Point* 256 (decimal),

reasoned and briefly answer the following questions:

1) Code it in UTF-8.

256 (decimal) is 100000000 (bin), so 100 (hex). We need 9 bits to represent it. Therefore, we need two code units with the structure: 110xxxxx 10xxxxxx.

Including the required value: 11000100 10000000

2) Code it in UTF-16.

Since the code point is below 65536 (Decimal), it is directly coded with 16 bits:

0100 (hex), 0000000100000000 (bin).

Exercise 13

(A summary of the Unicode coding rules is attached)

Consider the 4 following Unicode characters and associated *Code Points*:

1) 20000 (Hexadecimal) or 131072 (Decimal)
2) 200 (Hexadecimal) or 512 (Decimal)
3) A000 (Hexadecimal) or 40960 (Decimal)
4) 10 (Hexadecimal) or 16 (Decimal)

reasoned and briefly answer the following question:

From a coding size point of view, justify if it is better to use UTF-8 or UTF-16 for each of the 4 characters.

The clearest situation for using UTF-8 is for *Code Points* below 128 (Decimal), since they are directly coded with 1 byte. This is the case for 4).

The clearest situation for using UTF-16 is for *Code Points* between 128 and 65535 (Decimal). In this case, we need 2 bytes for UTF-16. In the range between 128 and 2047 (until 11 bits for the *Code Point*), we also need 2 bytes for UTF-8. However, between 2047 and 65535 we need 3 bytes for UTF-8. Therefore, for 3) is better to use UTF-16, while for 2) it does not matter.

When the *Code Point* is over 65535, we need 4 bytes for both UTF-8 and UTF-16. This is case 1), where both UTFs are equivalent in size.

Exercise 14

(A summary of the Unicode coding rules is attached)

Consider the 4 following Unicode characters and associated *Code Points*:

5) 78 (Hexadecimal) or 120 (Decimal)
6) 12288 (Hexadecimal) or 74376 (Decimal)
7) F288 (Hexadecimal) or 62088 (Decimal)
8) 100 (Hexadecimal) or 256 (Decimal)

reasoned and briefly answer the following question:

From a size of coding point of view, for which of the 4 characters is better to use UTF-8 coding in front of UTF-16 coding?

The clearest situation for using UTF-8 is for *Code Points* below 128 (Decimal), since they are directly coded with 1 byte. This is the case for 1).

The clearest situation for using UTF-16 is for *Code Points* between 128 and 65535 (Decimal). In this case, we need 2 bytes for UTF-16. In the range between 128 and 2047 (until 11 bits for the *Code Point*), we also need 2 bytes for UTF-8. However, between 2047 and 65535 we need 3 bytes for UTF-8. Therefore, for 3) is better to use UTF-16, while for 4) it does not matter.

When the *Code Point* is over 65535, we need 4 bytes for both UTF-8 and UTF-16. This is case 2), where both UTFs are equivalent in size.

Exercise 15

(A summary of the Unicode coding rules is attached)

Consider the 3 following Unicode characters and associated *Code Points*:

1) 11 (Hexadecimal) or 17 (Decimal)
2) A001 (Hexadecimal) or 40961 (Decimal)
3) 10001 (Hexadecimal) or 65537 (Decimal)

reasoned and briefly answer the following question:

From a coding size point of view, justify if it is better to use UTF-8 or UTF-16 for each of the 3 characters.

The clearest situation for using UTF-8 is for *Code Points* below 128 (Decimal), since they are directly coded with 1 byte. This is the case for 1).

The clearest situation for using UTF-16 is for *Code Points* between 128 and 65535 (Decimal). In this case, we need 2 bytes for UTF-16. In the range between 128 and 2047 (until 11 bits for the *Code Point*), we also need 2 bytes for UTF-8. However, between 2047 and 65535 we need 3 bytes for UTF-8. Therefore, for 2) it is better to use UTF-16.

When the *Code Point* is over 65535, we need 4 bytes for both UTF-8 and UTF-16. This is case 3), where both UTFs are equivalent in size.

Exercise 16

(A summary of the Unicode coding rules is attached)

Consider the 2 following Unicode characters and associated *Code Points*:

a) 7FE (Hexadecimal) or 2046 (Decimal)

b) 800 (Hexadecimal) or 2048 (Decimal)

reasoned and briefly answer the following questions:

1) From a coding size point of view, justify if it is better to use UTF-8 or UTF-16 for each of the 2 characters.

For *Code Points* between 128 and 65535 (Decimal) we need 2 bytes for UTF-16. In the range between 128 and 2047 (until 11 bits for the *Code Point*), we also need 2 bytes for UTF-8, so for a) both options are equal. However, between 2047 and 65535 we need 3 bytes for UTF-8. Therefore, for b) it is better to use UTF-16.

2) In general for UTF, in which situation (which UTF and which values) we only need one byte to encode one character?

It should be UTF-8 for *Code Points* below 128 (Decimal), since they are directly coded with 1 byte.

Problema 17

(Se adjunta un resumen de las reglas Unicode)

Considerar los 3 siguientes caracteres Unicode y sus *Code Points* asociados:

a) 30 (Hexadecimal) ó 48 (Decimal)

b) 8001 (Hexadecimal) ó 32769 (Decimal)

c) 7001 (Hexadecimal) ó 28673 (Decimal)

Contestar razonada y brevemente a las siguientes preguntas:

1) ¿Cuál (o cuáles) de los 3 caracteres necesita(n) mayor tamaño en bytes para codificarlo(s) en UTF-8?

2) Codificarlo(s).

a) The first character is an ASCII one that just needs one byte. With two bytes we encode code points until 5+6=11 bits. With three, 4+6+6=16 bits. With four, 3+6+6+6=20. Number 8001 (b) needs 16 bits, while number 7001 (c) needs 15 bits. Therefore, both (c) and (b) need 3 bytes.

b) Their encodings are (in binary and hexadecimal):
8001 = 11101000 10000000 10000001 - E8 80 81
7001 = 11100111 10000000 10000001 - E7 80 81

Problema 18

(Se adjunta un resumen de las reglas Unicode)

Considerar los 2 siguientes caracteres Unicode y sus *Code Points* asociados:

a) 8001 (Hexadecimal) ó 32769 (Decimal)

b) 10001 (Hexadecimal) ó 65537 (Decimal)

Contestar razonada y brevemente a las siguientes preguntas:

1) ¿Alguno de los 2 caracteres necesita más bytes que el otro para codificarlo en UTF-8?

2) Lo mismo para UTF-16.

3) Codificar 10001H (b) en UTF-8.

4) Codificar 10001H (b) en UTF-16.

a) In UTF-8, with two bytes we encode code points until 5+6=11 bits. With three, until 4+6+6=16 bits. With four, until 3+6+6+6=21. Number 8001 (a) needs 16 bits, while number 10001 (b) needs 17 bits. Therefore, (b) needs 4 bytes, while (a) only need 3 bytes.

b) For UTF-16, we need 2 bytes for code points until 65535D inclusive, and 4 bytes for higher code points. In this case, we need 2 bytes for (a) and 4 bytes for (b).

c) 10001 = **11110**000 **10**010000 **10**000000 **10**000001 - F0 90 80 81

d) 10001 = **110110**0000000000 **110111**0000000001 – D8 00 DC 01 (we need to subtract 65536D)

ANEXO I. Extracto de "MPEG Press Release" de agosto 2013 *(Problema 1)*

Item 1:

MPEG evaluates response to Call for Proposals for royalty-free video coding standard
In response to a Call for Proposals that MPEG had issued for the purpose of defining a video coding standard under Type 1 licensing terms, MPEG has received a submission for which formal subjective testing was also performed prior to this MPEG meeting. The results reveal that the underlying technology fulfills the expected compression capability, and further investigation suggests that the intended goals for the standard could be achieved. Therefore, a Working Draft has been issued to perform further study on the proposal and progression to the Committee Draft stage in the standardization process could be expected by our next meeting in November 2013. The standard is envisaged to reach Final Draft International Standard status in July 2014.

Item 2:

ISO Base Media File Format supports timed text
MPEG is pleased to announce the carriage of timed text in the ISO Base Media File Format standard which has been promoted to Final Draft International Standard (FDIS) status at the 105th MPEG meeting. The new addition to the file format standard provides a standard mechanism for all applications of timed text and guidance to users for efficient carriage as well as design considerations. This work is in response to the needs of industries represented by the Society of Motion Picture and Television Engineers (SMPTE) and to requirements from the World Wide Web Consortium (W3C), and The Digital Entertainment Content Ecosystem (DECE). The carriage will be formally referenced as ISO/IEC 14496---12:2012 /15444---12:2012, AMD 2:2013 and 14496-30:2013. The amendment to Part 12 Covers the basic syntax and semantics for a set of new text track types for a broad range of timed text formats. Part 30 Provides specific guidance for two popular timed text format technologies defined by W3C - Timed Text Markup Language (TTML) and Web VideoText Tracks (WebVTT). This technology is used for the encoding of media subtitles and closed caption information, particularly for Internet delivered media, including a TTML derivative, and for SMPTE Timed Text.

ANEXO II. Extracto de algunas resoluciones de la 65ª reunión de ISO/IEC JTC1 SC29/WG1 (JPEG), de abril de 2014 *(Problema 2)*

Resolution 2 – Approval of the Requirements for JPEG Privacy and Security
WG 1 approves the updated requirements for JPEG Privacy and Security in WG1N6708.

Resolution 11 – Approval of the Preliminary Working Draft of JPEG AR
WG 1 approves the Preliminary Working Draft of JPEG AR as contained in document WG1N6675.

Resolution 18 – Approval of Disposition of comments report on PDAM of 15444-5 (JPEG 2000 PART 5: REFERENCE SOFTWARE)
WG 1 approves the DOCR text of ISO/IEC PDAM 15444-5 as described in document WG1N6605.

Resolution 21 – Approval of Draft Disposition of comments report on ISO/IEC 24800-2:2011/PDAM 1 (JPSEARCH (ISO/IEC 24800))
WG1 approves the Draft Disposition of comments report on ISO/IEC 24800-2:2010/PDAM 1 as contained in WG1N6694.

UTF-8

- A code unit is a single byte
- A code point is from 1 to 4 code units
- Code units between 0 and 127 directly represent the corresponding code points
- `110XXXXX` indicates that 2 code units are used
- `1110XXXX` indicates that 3 code units are used
- `11110XXX` indicates that 4 code units are used
- The remaining code units looks like `10XXXXXX`

UTF-8 Example

- `11100011 10000001 10010101`
- `1110`0011 `10`000001 `10`010101
- `11000001010101`
- `12,373` 3055 H
- `HIRAGANA LETTER SA`

UTF-16

- A code unit consists of 2 bytes
- Code points below 65,536 are in a single code unit
- Higher code points are represented as:
  - `110110XXXXXXXXXX 110111XXXXXXXXXX`

  (after subtracting 65,536)
- This makes sense because Unicode assign no code points between the numbers:

  `1101100000000000 (55,296)`

  and

  `1101111111111111 (57,343)`

UTF-16 Example

"Big-endian byte order" / Character

- `11111110 11111111 00110000 01010101`
- `00110000 01010101`
- `12,373` 3055 H
- `HIRAGANA LETTER SA`