

131<sup>st</sup> MPEG Geneva (Virtual), Switzerland, 29 June - 3 July 2020, Meeting Report  
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**A. AHG ACTIVITIES**

**1 AHG ACTIVITIES OVERVIEW**

Two meetings took place during the 131<sup>st</sup> MPEG meeting, Geneva, CH (Virtual), 29 June - 3 July 2020 as follows:

- Tue 30 June 2020 @ 15:00 CEST
- Thu 2 July 2020 @ 15:00 CEST

## 1.1 Input Documents

[M53998](#) - AHG on MPEG-21 Contracts to Smart Contracts

[M54748](#) - Revised Draft CfP on MPEG-21 contracts to smart contracts conversion

The Moving Picture Experts Group (MPEG) is an International Organization for Standardization/International Electrotechnical Commission (ISO/IEC) working group that develops media coding standards. These standards include a set of ontologies for the codification of intellectual property rights (IPR) information related to media. These IPR ontologies, developed in the last few years, under the MPEG-21 Multimedia Framework (ISO/IEC 21000) family of standards, and include: 1) The Media Value Chain Ontology (MVCO) facilitates rights tracking for fair, timely, and transparent payment of royalties by capturing user roles and their permissible actions on a particular IP entity. 2) The Audio Value Chain Ontology (AVCO) extends MVCO functionality related to the description of IP entities in the audio domain, e.g., multitrack audio and time segments. 3) The Media Contract Ontology (MCO) facilitates the conversion of narrative contracts to digital ones. Furthermore, the axioms in these ontologies can drive the execution of rights-related workflows in controlled environments, e.g., blockchains, where transparency and interoperability are favoured toward fair trade of music and media.

Thus, MPEG's aim is to further develop the means (e.g., protocols and application programming interfaces) for converting these MPEG-21 IPR ontologies to smart contracts executable on existing blockchain environments.

[M54302](#) - MPEG-21 IPR contracts in XML, RDF & JSON for OMI use cases

This contribution provides MPEG-21 IPR contracts in XML, RDF & JSON for the OMI use cases. These contracts may be part of the CfP on MPEG-21 IPR contracts to smart contracts conversion (N19246), so technology providers could use them for conversion to smart contracts. However, these contracts have only informative status. That is, technology providers may create and use their own MPEG-21 IPR contracts or enhance the ones provided considered that the OMI use cases and supporting requirements of the CfP are addressed.

[M54564](#) - MPEG-21 CEL to smart contract conversion

With the aim of using MPEG-21 contracts as an interoperability tool, a solution is proposed based on the *divide and impera* principle. According to this principle, the CEL contract will be converted into 2 smart-contracts:

- 1) ***the CEL token smart contract***: this smart contract is generated starting from the CEL contracts and represents the IPR rules translated into smart contract language; it is based on the smart contract prototype (which is blockchain agnostic) but it includes data types / methods that might be blockchain dependent
- 2) ***the IPR management smart contract***: this smart contract processes the first smart contract and ensures an abstraction layer between the governance (which is blockchain specific) and IPR monetization (which conceptually should be blockchain agnostic)

A live demo presented for the two uses cases of downloading on demand and streaming.

[M54820](#) - BoG Report on MPEG-21 contracts to smart contracts

## 1.2 Output Documents

[N19386](#) - AHGs Established at 130th Meeting

[N19504](#) - Call for proposals on technologies for MPEG-21 IPR contracts to smart contracts conversion

[N19505](#) - MPEG-21 IPR contracts in XML, RDF & JSON for OMI use cases

[N19387](#) - Press Release of 131<sup>st</sup> Meeting

## 1.3 Excerpt from MPEG Press Release of 131<sup>st</sup> Meeting

### Call for Proposals on technologies for MPEG-21 contracts to smart contracts conversion

In the last few years, MPEG has developed a number of standardized ontologies catering to the needs of the music and media industry with respect to codification of IPR information toward the fair trade of music and media. MPEG IPR ontologies and contract expression languages have been developed under the MPEG-21 Multimedia Framework (ISO/IEC 21000) family of standards. MPEG IPR ontologies and contracts can be used by music and media value chain stakeholders to share and exchange in an interoperable way all metadata and contractual information. However, a challenge has been identified, that is, how can MPEG IPR ontologies and contracts be converted to smart contracts that can be executed on existing blockchain environments, thus enriching blockchain environments with inference and reasoning capabilities inherently associated with ontologies? By addressing this challenge in a standard way for several smart contract languages would also ensure that MPEG IPR ontologies and contracts prevail as the interlingua for transferring verified contractual data from one blockchain to another.

Therefore, MPEG at its 131<sup>st</sup> meeting, issues a Call for Proposals (CfP) on technologies for **MPEG-21 IPR contracts to smart contracts conversion**. All parties that believe they have relevant technologies are invited to submit proposals for consideration by MPEG. These parties do not necessarily have to be MPEG members. The review of the submissions is planned in the context of the 132<sup>nd</sup> MPEG meeting. Please contact Jörn Ostermann ([ostermann@tnt.uni-hannover.de](mailto:ostermann@tnt.uni-hannover.de)) for details on attending this meeting if you are not an MPEG delegate.

## 2 AHG RECOMMENDATIONS

Name	AHG on MPEG-21 Contracts to Smart Contracts		
Mandates	<ol style="list-style-type: none"> <li>1. Disseminate the CfP to the identified recipients</li> <li>2. Present the CfP on 23 July @ 15:00 CEST for EU/Asia &amp; 19:00 CEST for EU/US</li> <li>3. Solicit further industry participation and responses to the CfP</li> <li>4. Evaluate the CfP responses Thu 8 &amp; Fri 9 Oct. before the 132<sup>nd</sup> MPEG meeting</li> <li>5. Identify / create tools for converting MPEG IPR Ontology based contracts to smart contracts (e.g., Go, Solidity, Move)</li> <li>6. Implement the chain XML/RDF to JSON to Abstract Syntax Tree to Smart Contract using for the last conversion different smart contracts languages (e.g., Go, Solidity, Move)</li> <li>7. Explore the use of MPEG IPR Ontologies as smart contracts in IM AF (ISO/IEC 23000-12) &amp; possibly CMAF (ISO/IEC 23000-19)</li> </ol>		
Chairmen	Panos Kudumakis (QMUL) and Xin Wang (MediaTek)		
Duration	Until the 132 <sup>nd</sup> MPEG meeting		
Reflector(s)	<a href="mailto:smart-contracts@lists.aau.at">smart-contracts@lists.aau.at</a>		
Subscribe	<a href="https://lists.aau.at/mailman/listinfo/smart-contracts">https://lists.aau.at/mailman/listinfo/smart-contracts</a>		
Meeting	Smart contracts Thu 16 July @ 17:30 CEST CfP presentation Thu 23 July @ 15:00 & 19:00 CEST Smart contracts Thu 17 Sept @ 15:00 CEST Evaluation Thu 08 Oct @ 15:00 CEST Evaluation Fri 09 Oct @ 15:00 CEST	Room Size	N/A

## B. CfP: MPEG-21 CONTRACTS TO SMART CONTRACTS CONVERSION

### 1 ABSTRACT

The Moving Picture Experts Group (MPEG) is an International Organization for Standardization/International Electrotechnical Commission (ISO/IEC) working group that develops media coding standards. These standards include a set of ontologies for the codification of intellectual property rights (IPR) information related to media. These IPR ontologies, developed in the last few years, under the MPEG-21 Multimedia Framework (ISO/IEC 21000) family of standards, and include, among others: 1) The Media Value Chain Ontology (MVCO) facilitates rights tracking for fair, timely, and transparent payment of royalties by capturing user roles and their permissible actions on a particular IP entity. 2) The Audio Value Chain Ontology (AVCO) extends MVCO functionality related to the description of IP entities in the audio domain, e.g., multitrack audio and time segments. 3) The Media Contract Ontology (MCO) facilitates the conversion of narrative contracts to digital ones. Furthermore, the axioms in these ontologies can drive the execution of rights-related workflows in controlled environments, e.g., blockchains, where transparency and interoperability are favoured toward fair trade of music and media.

Thus, MPEG's aim is to further develop the means (e.g., protocols and application programming interfaces) for converting these MPEG-21 IPR contracts to smart contracts executable on existing blockchain environments.

### 2 SCOPE

Therefore, MPEG issues this Call for Proposals (CfP) on technologies for **MPEG-21 IPR contracts to smart contracts conversion**. In this document use cases and requirements are provided. Proposals submitted to this CfP need to explain and/or demonstrate, how are addressing these use cases and supporting the identified requirements. Proposals will be evaluated according to predefined criteria which are also provided in this document. Additional use cases and requirements suggested by the proponents can also be considered.

All parties that believe they have relevant technologies, satisfying one or more of the requirements, are invited to submit proposals for consideration by MPEG. These parties do not necessarily have to be MPEG members. The review of the submissions is planned in the context of the 132<sup>nd</sup> MPEG meeting. Please contact Jörn Ostermann ([ostermann@tnt.uni-hannover.de](mailto:ostermann@tnt.uni-hannover.de)) for details on attending this meeting if you are not an MPEG delegate.

### 3 BACKGROUND

Copyright legislation has continuously evolved with the aim to support the media industry, in face of technology progress, so that fair revenues are returned to artists and rights holders, multi-territory licensing, timely payments, and overall more transparency are improved. US Music Modernisation Act [1] and EU Copyright Directive Reform [2] are examples of these trends. Meanwhile, several key artists and media companies have turned their hopes for resolving these issues to technology and in particular, towards blockchain [3][4].

Blockchain emerged in 2008 as the technology that underpins bitcoin. It operates as a shared ledger that continuously records transactions or information. Its database structure, where there is a timestamp on each entry and information linking it to previous blocks, makes it not only transparent but exceptionally difficult to tamper with.

Initiatives investigating blockchain have been launched around the world. In the United States, the Open Music Initiative (OMI) [3] has been launched by the Berklee Institute for Creative Entrepreneurship, harnessing the expertise of the Massachusetts Institute of Technology Media Lab, in decentralized platforms, whose mission is to promote and advance the development of open source standards and innovation related to music and to help ensure proper compensation for all creators, performers, and rights holders of music. OMI's focus is 1) on new works, rather than the vast legacy music catalog, with the aim that the same principles can be applied to legacy music retrospectively; and 2) on achieving interoperability among infrastructures, databases, and systems so they can be accessed, shared, and exchanged by all stakeholders.

In Europe, one of blockchain's evangelists is the Grammy-award-winning U.K. singer, songwriter and producer Imogen Heap. She has launched a blockchain project, Mycelia [4]. Although still in its early stages, she intends Mycelia to be an entire ecosystem that uses blockchain as a way to shake up the music industry. Mycelia's mission is to

- 1) empower a fair, sustainable, and vibrant music industry ecosystem involving all online music interaction services
- 2) unlock the huge potential for creators and their music-related metadata so an entirely new commercial marketplace may flourish
- 3) ensure that all involved are paid and acknowledged fully
- 4) set commercial, ethical, and technical standards to exponentially increase innovation for the music services of the future
- 5) connect the dots with all those involved in this shift from our current outdated music industry models while exploring new technological solutions to enliven and improve the music ecosystem.

Such missions can be accomplished thanks to MPEG-21 IPR ontologies, which can be used by music and media value chain stakeholders to share and exchange all metadata and contractual information connected to creative works, in a standardized and therefore interoperable way, leading to transparent payment of royalties and reduced time spent searching for the right data. The latter is due to inference and reasoning capabilities inherently associated with ontologies. That is, knowledge and data can be derived by evidence (facts) and logic based on rich semantic copyright models expressed by MPEG-21 IPR ontologies. In this way, the data derived are unambiguously interpretable, facilitating efficient processing in business-to-consumer and business-to-business (B2B) music and media value chains.

However, while enthusiasm is growing for blockchain, it is likely to be several years before we see it rolled out in a wide-scale, mainstream capacity. Blockchain enables value to be transferred over the Internet. For contractual music and media asset trading, smart contracts can be used to encode the terms and conditions of a contract. They validate contractual agreements between stakeholders before a blockchain value transfer is enabled [5]. In other words, smart contracts, implemented via software, could allow music and media royalties to be administered almost instantaneously and manage usage allowances and restrictions. Rather than passing through intermediaries, revenue from a stream or download could be distributed automatically to rights holders, according to agreed terms and conditions (e.g., splits), as soon as an asset is downloaded or streamed [6], [7].

That is, while various smart-contract solutions abound, it is likely that the technology will really only take off once there is a clear consensus in business about which standards will prevail [8]. So the challenge that naturally arises is as follows. How can MPEG-21 IPR standardized ontologies be converted to smart contracts that can be executed on existing blockchain environments, thus enriching blockchain environments with inference and reasoning capabilities inherently associated with ontologies? Note that this process will increase trust among music and media value chain stakeholders for sharing data in the ecosystem since the data will be cryptographically secured and verified by a blockchain.

From the other side, while plenty of research literature deals with semantic-level interoperability of ontologies (linking different ontologies) and protocol-level interoperability of blockchains (transferring verified data from one to another), the interoperability gap between them has not yet been sufficiently bridged [9]. Toward this direction, MPEG is not going to develop any blockchain-based technology or any new language for smart contracts. However, in the last few years MPEG has developed MPEG-21 IPR ontologies, which facilitate the conversion of narrative contracts to digital ones. Thus, MPEG's aim is to further develop the means (e.g., protocols and application programming interfaces) for converting MPEG-21 IPR ontologies to smart contracts executable on existing blockchain environments. In that way, MPEG is going to close the interoperability gap between MPEG-21 IPR ontologies (and consequently the Semantic Web) and blockchains.

Last but not least, a standards-based fair and sustainable trade of music and media ecosystem is envisaged [10] based on widely deployed MPEG technologies (e.g., audiovisual codecs, file formats, and streaming protocols) [11], including emerging MPEG-21 IPR ontologies executed as smart contracts on blockchain environments.

## 4 USE CASES

### 4.1 Open Music Initiative (on-demand streaming, digital sale and radio broadcast)

These use cases are about how the money flows back to song writers, artists, publishers and labels, when their music is web cast or streamed on interactive services, sold on the digital platforms and played on the radio. In particular, for interactive streams and digital sales, how the money flows depends on what entity negotiated the license (e.g., record labels having a direct deal with services, record labels represented by a digital aggregator/distributor and artists owning recording copyrights and using distribution services), while for radio and radio-like services, blanket licenses determine who gets paid and how much [3]. In Table 1, high level contracts are provided for each of these use cases.

On demand streaming	Digital sale	Radio Broadcast
<p><b>For record labels that are represented by a digital aggregator/distributor:</b></p> <p>on-demand stream (streaming services) → indie labels → PROs ASCAP BMI SESAC → songwriter → publisher → mechanical reproduction of compositions → digital aggregator/distributor → record label → artist/band → mechanical reproduction of compositions</p> <p><b>For record labels that have a direct deal with services:</b></p> <p>on-demand stream (streaming services) → big labels → PROs ASCAP BMI SESAC → publisher → songwriter → mechanical reproduction of compositions → record label → artist/band → mechanical reproduction of compositions</p> <p><b>For artists who own their sound recording copyrights and use services like CD Baby or TuneCore:</b></p> <p>on-demand stream (streaming services) → self-released → PROs ASCAP BMI SESAC → songwriter → publisher → mechanical reproduction of compositions → digital aggregator/distributor → record label → artist/band → mechanical reproduction of compositions</p>	<p><b>For record labels that are represented by a digital aggregator/distributor:</b></p> <p>digital sale (digital sale platforms) → indie labels → PROs ASCAP BMI SESAC → songwriter → publisher → mechanical reproduction of compositions → digital aggregator/distributor → record label → artist/band → mechanical reproduction of compositions</p> <p><b>For record labels that have a direct deal with services:</b></p> <p>digital sale (digital sale platforms) → big labels → PROs ASCAP BMI SESAC → publisher → songwriter → mechanical reproduction of compositions → record label → artist/band → mechanical reproduction of compositions</p> <p><b>For artists who own their sound recording copyrights and use services like CD Baby or TuneCore:</b></p> <p>digital sale (digital sale platforms) → self-released → PROs ASCAP BMI SESAC → songwriter → publisher → mechanical reproduction of compositions → digital aggregator/distributor → record label → artist/band → mechanical reproduction of compositions</p>	<p><b>For radio and radio-like services, blanket licenses determine who gets paid, and how much.</b></p> <p>broadcast radio (radio services) → PROs ASCAP BMI SESAC → songwriter → publisher → mechanical reproduction of compositions</p> <p><b>In the US, terrestrial broadcasters do not pay performers or sound recording copyright owners</b></p> <p>webcast (radio services) → PROs ASCAP BMI SESAC → songwriter → publisher → mechanical reproduction of compositions</p> <p>webcast (radio services) → SoundExchange → songwriter → publisher → mechanical reproduction of compositions</p>
<p>Contract For all P, C, W, S Party: Streaming Service Provider P Party: Streaming Service Consumer C Party: Digital Distributor D</p> <p>Statement 1 Subject: D</p>	<p>Contract For all D, C, L, S, X Party: Music Distributor D Party: Music Consumer C Party: Music Label L</p> <p>Statement 1 Subject: L</p>	<p>Contract For all D, C, L, S, X Party: Radio Broadcaster D Party: Music Label L</p> <p>Statement 1 Subject: L</p>

Act: Provide Object: "Performance of Song" S  Permission 1 Subject: P Act: Provide Recipient: C Object: "On demand Streaming Service" of S  Permission 2 Subject: Consumer C Act: Pay Recipient: P Object: Subscription Fee X of "On demand Streaming Service"  Permission 3 Pre-condition: ActionStatus{Permission 2}: ActionDone Subject: Consumer C Act: Consume Object: "On demand Streaming Service" of S  Obligation Pre-condition: ActionStatus{Permission 2}: ActionDone Subject: P Act: Pay Recipient: D Object: 10.5% * \$X	Act: Provide Object: "Performance of Song" S  Permission 1 Subject: D Act: Provide Recipient: C Object: S  Permission 2 Subject: Consumer C Act: Pay Recipient: D Object: Purchase Fee X for S  Permission 3 Pre-condition: ActionStatus{Permission 2}: ActionDone Subject: Consumer C Act: Consume Object: S  Obligation Pre-condition: ActionStatus{Permission 2}: ActionDone Subject: D Act: Pay Recipient: L Object: 95% * \$X	Act: Provide Object: "Performance of Song" S  Permission 1 Subject: P Act: Provide Object: S Constraint: Region  Obligation Subject: D Act: Pay Recipient: L Object: 95% * \$X
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**Table 1 - Open Music Initiative use cases with high level contracts.**

Furthermore, a collection of MPEG-21 IPR contracts in XML, RDF & JSON is provided in N19505. Technology providers responding to this CfP could use them for conversion to smart contracts. However, these contracts have only informative status. Technology providers may create and use their own MPEG-21 IPR contracts or enhance the ones provided considering that the use cases and supporting requirements of this CfP are addressed.

#### 4.2 Music authoring tools

Widespread adoption of interactive music services and applications (remixing, karaoke and collaborative music creation) - thanks to IM AF (ISO/IEC 23000-12) aka STEMS - raises the issue of intellectual property (IP) rights monitoring in such applications, for fair and transparent payment of royalties to artists and rights holders. The MVCO (ISO/IEC 21000-19) facilitates rights tracking for such services by capturing user roles and their permissible actions on a particular IP asset. While the AVCO (ISO/IEC 21000-19/AMD1) facilitates transparent IP rights management even when reuse of audio IP assets is involved, such as, tracks or even segments of them in new derivative works.

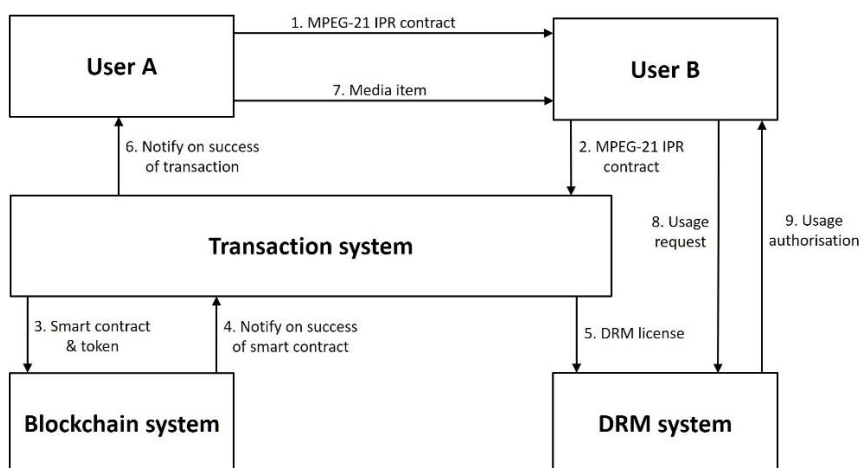
#### 4.3 Broadcasting operations

The MCO (ISO/IEC 21000-21) provides the means to express the rights for exploiting media content, as it is typical among audio-visual production companies and broadcasters. In such a context, the most commonly used rights for media exploitation are: public performance (e.g., where the public is present), fixation (e.g., when a performance is recorded on a tangible medium) and communication to the public (e.g., where the public is reached by means of a communication technology). As in narrative contracts, these exploitation rights might be associated with a wide set of conditions (e.g., number of broadcast transmissions, time periods, territories, languages, exclusivity, royalty percentages), modalities (e.g., linear/broadcast and non-linear/broadband) and access policies (e.g., free of charge, subscription, pay per view).

#### 4.4 Transaction system interfacing with a blockchain and a DRM system

MPEG has developed several standards in MPEG-21 media ecommerce framework addressing the issue of digital IPR licences and contracts. Blockchain can execute smart contracts, but is it possible to translate an MPEG-21 IPR contract to a smart contract?

Let us consider the following use case where User A and B utilise a Transaction system that interfaces with a Blockchain system and a DRM system. If the transaction on the Blockchain system is successful, DRM System authorises User B to use the media item.



**Figure 1:** Users A and B can communicate using the standard MPEG-21 IPR contract language and ontologies (see Annex C1), while the Transaction system is tasked to interface with the Blockchain system and the DRM system.

The workflow is

1. User A writes an MPEG-21 IPR contract and send it to User B
2. User B sends MPEG-21 IPR contract to Transaction system
3. Transaction system translates MPEG-21 IPR contract to smart contract, creates token and sends both to Blockchain system
4. Blockchain system executes smart contract, records transaction and notifies Transaction system of the result
5. If notification is positive, Transaction system translates MPEG-21 IPR contract to native DRM licence
6. If notification is positive, Transaction system also notifies User A
7. User A sends the media item to User B
8. User B requests DRM system to use the media item
9. DRM system authorises User B

In this use case, Users A and B can communicate using the standard MPEG-21 IPR contract language and ontologies (see Annex C1), while the Transaction system is tasked to interface with the Blockchain system and the DRM system.

A standard way to translate MPEG-21 IPR contracts to smart contracts will ensure users that the smart contract executed by a blockchain corresponds to the MPEG-21 IPR contract and consequently to the human-readable contract, as explained in the next section.

## 5 API TO BE STANDARDISED AND METHODOLOGY

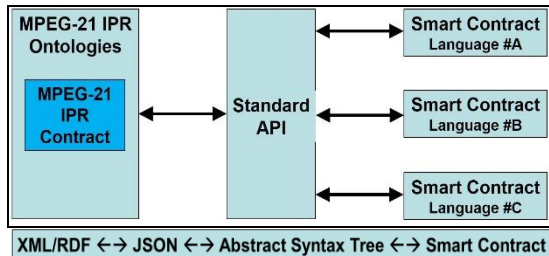
Electronic contracts are implemented in blockchains as smart contracts. One shortcoming is that there is no way to deduce from a smart contract the clauses that the smart contract contains. Publishing the human-readable contract does not ensure that the clauses of the human-readable contract correspond to the clauses of the smart contract. There should be a way that allows the other party of the smart contract to know beyond doubt what the clauses of the smart contract express. However, MPEG-21 IPR ontologies facilitate the one-to-one expression and linking of the clauses of the human-readable contract to the clauses in the MPEG-21 IPR ontology-based contract (electronic/digital contract).

A standard way to further translate MPEG-21 IPR ontology-based contracts to smart contracts will ensure users that the clauses of the smart contract executed by a blockchain correspond to the clauses

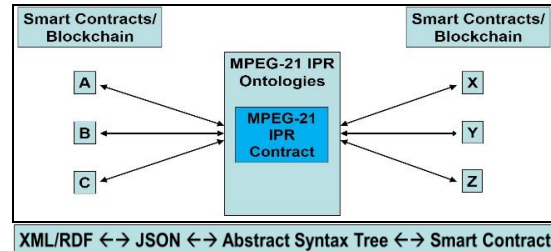


of the MPEG-21 IPR ontology-based contract and, thus to the clauses of the human-readable contract. By doing this conversion in a standard way for several smart contract languages would ensure MPEG-21 IPR ontologies prevail as the interlingua (Esperanto) for transferring verified contractual data from one blockchain to another.

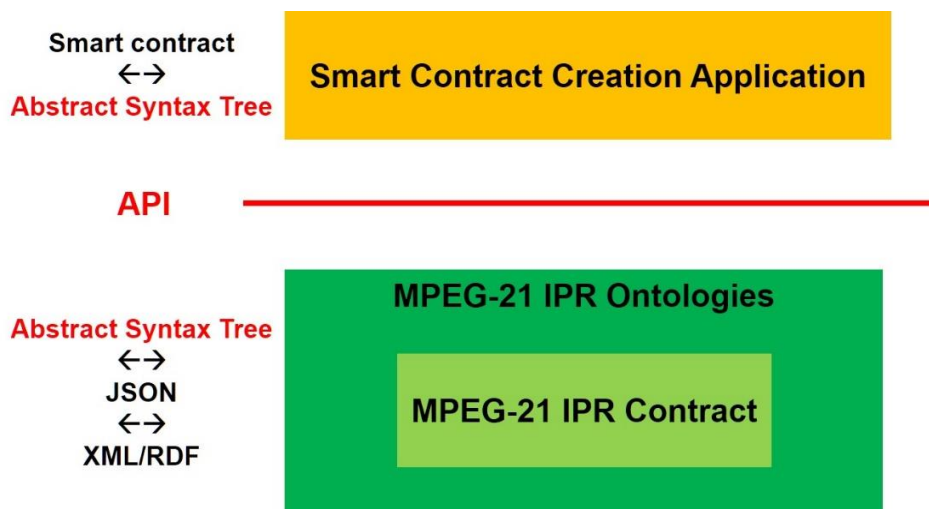
The API to be standardised and a potential methodology [18] for achieving the conversion from MPEG-21 IPR ontology-based contracts to smart contracts and vice versa are shown in Figures 2, 3 and 4.



**Figure 2:** API to be standardized and methodology for the MPEG-21 IPR ontology-based contracts to smart contracts conversion and vice versa.



**Figure 3:** MPEG-21 IPR ontologies as the interlingua for transferring verified contractual data from one blockchain to another.



**Figure 4:** Smart contract developers can use the API shown for the conversion between MPEG-21 IPR ontology-based contracts to smart contracts and vice versa.

## 6 REQUIREMENTS

Electronic contracts are implemented in blockchains as smart contracts. One shortcoming is that there is no way to deduce from a smart contract the clauses that the smart contract contains. Publishing the human-readable contract does not ensure that the clauses of the human-readable contract correspond to the clauses of the smart contract. There should be a way that allows the other party of the smart contract to know beyond doubt what the clauses of the smart contract express.

With this aim, in the following the **requirements for interoperable conversion of MPEG-21 IPR contracts to smart contracts are stated:**

1. MPEG-21 IPR contracts shall be converted to smart contracts for any blockchain. In that way the interoperability gap between ontologies and blockchains is bridged.
2. MPEG-21 IPR contracts shall be converted to smart contracts for any blockchain and in a reversible way. In that way the interoperability gap on data transferred between blockchains is also bridged.

Note: By addressing these requirements, each signing party of the smart contract would know what is signing, since from the clauses of the smart contract could also go back to the clauses of the MPEG-21 IPR contract and consequently to the clauses of the human-readable contract.

## 7 STANDARDISATION TIMELINE

### Timeline of the Call for Proposals, deadlines, and evaluation of the answers:

- **Call for proposals: 2020.07.03**
- **Submission deadline: 2020.10.06 (by 23:59 Hours UTC)**
- **Evaluation of answers: 2020.10.10–10.16 during the MPEG meeting week.**  
(Proponents are strongly advised to present their proposals in person.)
- **The first working draft: 2020.10.16**

### Preliminary Development Plan:

Year	Month	Day	MPEG meeting	City	Country	Stage
2020	07	03	131	Geneva (Virtual)	CH	Approval of CfP
	10	16	132	Rennes	FR	Draft WD
2021	01	15	133	Cape Town	ZA	Approval of WD
	03	30	134	Geneva	CH	Approval of CD
	07	16	135	Prague	CZ	Approval of DIS
	10	15	136	Antalya	TR	Approval of FDIS

## 8 PROPOSAL DESCRIPTION

### 8.1 Proposal form

To register a contribution, **an information form must be submitted within each proposal**. This form can be found in Annex A of this Call.

For each proposal, the evaluation form provided in Annex B of this document must be completed and submitted along with the proposal before the submission deadline as indicated in the Call.

Furthermore, proponents are advised that this Call is being made under the auspices of ISO/IEC, and as such, submissions are subject to the ISO/IEC Intellectual Property Rights Policy as approved by the ISO and IEC councils (<http://www.iso.org/patents>).

Interested parties are kindly asked to respond. The submissions shall be received by the **2020.10.06 (by 23:59 Hours UTC)**, by Jörn Ostermann, chair of the MPEG Requirements sub-Group, ([ostermann@tnt.uni-hannover.de](mailto:ostermann@tnt.uni-hannover.de)) who will upload all proposals both by MPEG and non-MPEG members to the MPEG site after the submission deadline.

Further information on MPEG can be obtained from the MPEG home page (<https://mpeg.tnt.uni-hannover.de/>).

## 9 EVALUATION CRITERIA AND PROCEDURE

### 9.1 Evaluation criteria

- Requirements: The **MPEG-21 IPR contracts to smart contracts conversion technology** shall support the identified requirements.
- Adaptability / Extensibility: If the proposed technology does not explicitly express the capability of supporting all the requirements, it shall be clearly extensible or shall demonstrate its extensibility to support other requirements and/or other smart contract technologies.
- Execution performance: Generation, processing/conversion, and integration of MPEG-21 IPR contracts with existing blockchain technologies shall be supported by a demonstration.
- Information loss: Amount and type of any information loss during the MPEG-21 IPR contracts to smart contracts conversion and, in particular, during the reversible process shall be identified.
- Validation: The conformance of MPEG-21 IPR contracts and corresponding smart contracts shall be validated throughout the processing/conversion chain (desirable).
- Availability: Software tools shall be available for the demonstration of the proposals (desirable).

### 9.2 Evaluation procedure

The evaluation will be based on the following steps:

#### 1) Presentation / Demonstration

**Goal:** The goal of this step is to assess the proposal based on a presentation and possible demonstration. The presentation shall demonstrate the appropriateness and disclose the appropriate range of use. The demonstration will provide evidence of the functionality claimed, and of how the proposal satisfies the evaluation criteria.

**Who:** MPEG experts and proponents whose submission is going to be evaluated.

**How:** Experts will interact with the proponents through a presentation and possibly a demo. Both demo and presentation will each have a time limit (to be determined).

**Output:** Complete proposal evaluation sheet in Annex B.

#### 2) Produce a conclusion

**Goal:** To summarize the results. This should allow:

- to identify the strong points of the proposal, and;
- to identify how the proposal might be adapted or combined with other proposals to enter the Working Draft stage, and/or be tested through Core Experiments.

**Who:** MPEG experts and proponents whose submission is going to be evaluated.

**How:** By consensus.

**Output:** Finalize proposal evaluation sheet, where the decision about the technologies to be further investigated will be taken during the 132<sup>nd</sup> MPEG Meeting

## 10 CONTACT PERSONS

Prospective contributors of responses to this Call for Proposals should contact the following people:

ISO/IEC JTC1/SC29/WG11 acting convenor	AHG chair on 'MPEG-21 contracts to smart contracts'
Prof. Dr.-Ing. Jörn Ostermann	Dr Panos Kudumakis
<a href="#">Institut fuer Informationsverarbeitung</a>	<a href="#">Centre for Digital Music</a>
Leibniz Universitaet Hannover	Queen Mary University of London
Appelstr. 9A	Mile End Road
30167 Hannover	London E1 4NS
Germany	United Kingdom
E-mail: <a href="mailto:ostermann@tnt.uni-hannover.de">ostermann@tnt.uni-hannover.de</a>	Email: <a href="mailto:p.kudumakis@qmul.ac.uk">p.kudumakis@qmul.ac.uk</a>

### ANNEX A: INFORMATION FORM

(to be filled in by the contributor of an MPEG-21 IPR contracts to smart contracts conversion proposal)

1. Title of the proposal
2. Organization (i.e., name of proposing company)
3. What does your proposal apply to?
4. What is the main functionality of your proposal?
5. Do you plan to attend the 132<sup>nd</sup> MPEG meeting and make a presentation to explain your proposal and answer questions about it?
6. Will you provide a demonstration to show how your proposal meets the evaluation criteria?

To clearly identify the requirements satisfied by each proposal, proponents should complete the table of requirements provided below.

Requirements on MPEG-21 IPR contracts to smart contracts conversion	Addressed functionality (Yes/No)

### ANNEX B: EVALUATION SHEET

(to be filled during evaluation phase / also to be used for self-evaluation)

**Name of the Proposed Description:**

**Main Functionality:**

**Summary of Proposal:** (a few lines)

**Comments on relevance to MPEG-21 IPR contracts to smart contracts conversion:**

**Evaluation:**

<i>Criteria</i>	<i>Evaluation facts</i>	<i>Conclusions</i>

**Content of the criteria table cells:**

Evaluation facts should mention:

- ✓ Not supported / partially supported / fully supported, e.g., if a particular criterion is not be addressed by a proposal.
- ✓ What supported these facts: paper/presentation/demo/test
- ✓ The summary of the facts themselves, e.g., very good in one way, but weak in another.

Conclusion should mention:

- ✓ Possibilities of improving or adding to the proposal, e.g., any missing or weak features.
- ✓ How sure the experts are, i.e., evidence shown, very likely, very hard to tell, etc.
- ✓ Global evaluation (Not Applicable / -- / - / + / ++)

**New Requirements Identified:**

**Summary of the evaluation:**

- **Main strong points, qualitatively:** (2-3 lines summary)
  
- **Main weak points, qualitatively:** (2-3 lines summary)
  
- **Overall evaluation:** (0/1/2/3/4/5)
  - 0: could not be evaluated
  - 1: proposal is not relevant to MPEG-21 IPR contracts to smart contracts conversion
  - 2: proposal is relevant to MPEG-21 IPR contracts to smart contracts conversion, but requires much more work
  - 3: proposal is relevant to MPEG-21 IPR contracts to smart contracts conversion, but with a few changes
  - 4: proposal has some very good points and is a good candidate for the WD
  - 5: proposal is superior in its category and very strongly recommended to the WD

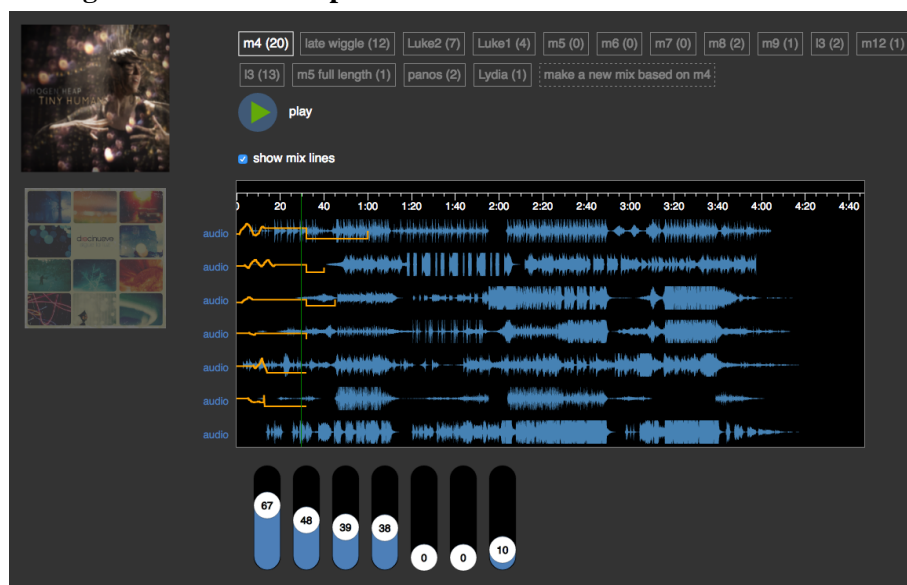
**Additional remarks:** (points of importance, not covered above.)

## ANNEX C: RESOURCES

### C1. Standards and Software

Acronym	Standard	MPEG Doc.	Ref. Soft.
MVCO	ISO/IEC 21000-19, ' <a href="#">Information technology -- Multimedia framework (MPEG-21) -- Part 19: Media value chain ontology</a> ', June 2010.	<a href="#">N11146</a> 91 <sup>st</sup> Kyoto	N/A
	ISO/IEC 21000-8/AMD2, ' <a href="#">Information Technology -- Multimedia Framework (MPEG-21) -- Part 8: Reference software / AMD2 Reference software for media value chain ontology</a> ', Nov. 2011.	<a href="#">N12135</a> 97 <sup>th</sup> Torino	<a href="https://tinyurl.com/y6tsr9as">https://tinyurl.com/y6tsr9as</a>
AVCO	ISO/IEC 21000-19:2010/AMD1, ' <a href="#">Information Technology -- Multimedia Framework (MPEG-21) -- Part 19: Media Value Chain Ontology / AMD 1 Extensions on Time-Segments and Multi-Track Audio</a> ', June 2018.	<a href="#">N17170</a> 120 <sup>th</sup> Macau	N/A
	ISO/IEC 21000-8:2008/AMD4, ' <a href="#">Information Technology -- Multimedia Framework (MPEG-21) -- Part 8: Reference Software / AMD 4 Media Value Chain Ontology Extensions on Time-Segments and Multi-Track Audio</a> ', Oct. 2018.	<a href="#">N17404</a> 121 <sup>th</sup> Gwangju	<a href="https://standards.iso.org/iso-iec/21000/-8/ed-2/en/amd/4">https://standards.iso.org/iso-iec/21000/-8/ed-2/en/amd/4</a>
MCO	ISO/IEC 21000-21 (2 <sup>nd</sup> Ed.), ' <a href="#">Information technology -- Multimedia framework (MPEG-21) -- Part 21: Media Contract Ontology</a> ', May 2017.	<a href="#">N15940</a> 114 <sup>th</sup> San Diego	<a href="https://standards.iso.org/iso-iec/21000/-21/ed-2">https://standards.iso.org/iso-iec/21000/-21/ed-2</a>
CEL	ISO/IEC 21000-20 (2 <sup>nd</sup> Ed.), ' <a href="#">Information technology -- Multimedia framework (MPEG-21) -- Part 20: Contract Expression Language</a> ', Dec. 2016.	<a href="#">N15994</a> 114 <sup>th</sup> San Diego	Included in N15994

### C2. MixRights software for experimentation



**Figure C2:** *Mixrights* application based on IM AF (ISO/IEC 23000-12).

*Mixrights* is an on-line Javascript application based on IM AF (ISO/IEC 23000-12). It works entirely in the browser and operates much like a typical desktop document-editing application. The user can load IM AF files by simply dropping them on the browser window. Then, she can remove tracks, add new tracks by dropping audio files on the browser, add images and lyrics in the same way, or edit mix presets by playing the sequence and recording fader movements. Furthermore, *Mixrights* users can share their musical creations by uploading them to the server and sharing the links. Users can create new mixes of existing songs and instantly share them. *Mixrights* also keeps a count of the number of times a mix has been played. *Mixrights* software can be used for seamless integration with MPEG-21 IPR ontologies based smart contracts for

rights tracking towards fair payment of royalties. Those interested to work on this latter integration could get [Mixrights](#) software by contacting the author of [M51376](#).

### C3. Content for experimentation

A song by Imogen Heap called ‘Tiny Human’ with all of its resources is made of, for experimentation purposes, can be found at: <http://imogenheap.com/home.php?article=2430>

- Tiny Human
- Tiny Human (instrumental)
- Tiny Human (7 stereo stems)
- Front cover image
- The music video
- Documentation about musicians, credits, lyrics, blockchain wallet address, and other useful info and links.

### C4. References

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