
**Information technology — Media
context and control —**

**Part 1:
Architecture**

*Technologies de l'information — Contrôle et contexte de supports —
Partie 1: Architecture*

Withhold & WMS

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Published in Switzerland

Contents

	Page
Foreword	iv
Introduction	v
1 Scope	1
2 Terms and definitions	1
3 MPEG-V System Architecture	2
4 Use cases	4
4.1 Information adaptation from virtual world to real world.....	4
4.2 Information adaptation from real world to virtual world.....	5
4.3 Information exchange between virtual worlds.....	6
5 Instantiations	7
5.1 Instantiation A: Representation of Sensory Effects (RoSE).....	7
5.2 Instantiation B: Natural user interaction with virtual world.....	12
5.3 Instantiation C: Travelling and navigating real and virtual worlds.....	19
5.4 Instantiation D: Interoperable virtual worlds.....	25
5.5 Instantiation E: Social presence, group decision-making and collaboration within virtual worlds.....	27
5.6 Instantiation F: Interactive haptic sensible media.....	31
5.7 Instantiation G: Bio-sensed information in virtual world.....	35
5.8 Instantiation H: Environmental monitoring with sensors.....	40
5.9 Instantiation I: Virtual world interfacing with TV platforms.....	42
5.10 Instantiation J: Seamless integration between real and virtual worlds.....	44
5.11 Instantiation K: Hybrid communication.....	47
Bibliography	50

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

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The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

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ISO/IEC 23005-1 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

This second edition cancels and replaces the first edition (ISO/IEC 23005-1:2011), which has been technically revised.

ISO/IEC 23005 consists of the following parts, under the general title *Information technology — Media context and control*:

- *Part 1: Architecture*
- *Part 2: Control information*
- *Part 3: Sensory information*
- *Part 4: Virtual world object characteristics*
- *Part 5: Data formats for interaction devices*
- *Part 6: Common types and tools*
- *Part 7: Conformance and reference software*

Introduction

The usage of multimedia content is becoming omnipresent in everyday life, in terms of both consumption and production. On the one hand, professional content is provided to the end user in high-definition quality, streamed over heterogeneous networks, and consumed on a variety of different devices. On the other hand, user-generated content overwhelms the Internet with multimedia assets being uploaded to a wide range of available Websites. That is, the transparent access to multimedia content, also referred to as Universal Multimedia Access (UMA), seems to be technically feasible. However, UMA mainly focuses on the end-user devices and network connectivity issues, but it is the user who ultimately consumes the content. Hence, the concept of UMA has been extended to take the user into account, which is generally referred to as Universal Multimedia Experience (UME).

However, the consumption of multimedia assets can also stimulate senses other than vision or audition, e.g. olfaction, mechanoreception, equilibrioception, or thermoception. That is, in addition to the audiovisual content of, for example, a movie, other senses shall also be stimulated giving the user the sensation of being part of the particular media which shall result in a worthwhile, informative user experience.

This motivates the annotation of the media resources with metadata as defined in this part of ISO/IEC 23005 that steers appropriate devices capable of stimulating these other senses.

ISO/IEC 23005 (MPEG-V) provides an architecture and specifies associated information representations to enable the interoperability between virtual worlds, for example, digital content provider of a virtual world, (serious) gaming, simulation, DVD, and with the real world, for example, sensors, actuators, vision and rendering, robotics (e.g. for revalidation), (support for) independent living, social and welfare systems, banking, insurance, travel, real estate, rights management and many others.

Virtual worlds¹⁾ (often referred to as 3D3C for 3D visualization and navigation and the 3C's of community, creation and commerce) integrate existing and emerging (media) technologies (e.g. instant messaging, video, 3D, VR, AI, chat, voice, etc.) that allow for the support of existing and the development of new kinds of social networks. The emergence of virtual worlds as platforms for social networking is recognized by businesses as an important issue for at least two reasons:

- a) it offers the power to reshape the way companies interact with their environments (markets, customers, suppliers, creators, stakeholders, etc.) in a fashion comparable to the Internet;
- b) it allows for the development of new (breakthrough) business models, services, applications and devices.

Each virtual world however has a different culture and audience making use of these specific worlds for a variety of reasons. These differences in existing metaverses permit users to have unique experiences. Resistance to real-world commercial encroachment still exists in many virtual worlds where users primarily seek an escape from real life. Hence, marketers should get to know a virtual world beforehand and the rules that govern each individual universe.

Although realistic experiences have been achieved via devices such as 3-D audio/visual devices, it is hard to realize sensory effects only with presentation of audiovisual contents. The addition of sensory effects leads to even more realistic experiences in the consumption of audiovisual contents. This will lead to the application of new media for enhanced experiences of users in a more realistic sense.

Such new media will benefit from the standardization of a control and sensory information which can include sensory effect metadata, sensory device (actuator) capabilities/commands, user's sensory preferences, and various delivery formats. The MPEG-V architecture can be applicable for various business models for which audiovisual contents can be associated with sensory effects that need to be rendered on appropriate sensory devices (actuators).

Multi-user online virtual worlds, sometimes called Networked Virtual Environments (NVEs) or massively-multiplayer online games (MMOGs), have reached mainstream popularity. Although most

1) Some examples of virtual worlds are: *Second Life* (<http://secondlife.com/>), *IMVU* (<http://www.imvu.com/>) and *Entropia Universe* (<http://www.entropiauniverse.com/>).

publications tend to focus on well-known virtual worlds like *World of Warcraft*, *Second Life*, and *Lineage*, there are hundreds of popular virtual worlds in active use worldwide, most of which are not known to the general public. These can be quite different from the above-mentioned titles. To understand current trends and developments, it is useful to keep in mind that there is large variety in virtual worlds and that they are not all variations on *Second Life*.

The concept of online virtual worlds started in the late 70s with the creation of the text-based Dungeons and Dragons world MUD. In the eighties, larger-scale graphical virtual worlds followed, and in the late nineties the first 3D virtual worlds appeared. Many virtual worlds are not considered games (MMOGs) since there is no clear objective and/or there are no points to score or levels to achieve. In this report we will use “virtual worlds” as an umbrella term that includes all possible varieties. See the literature for further discussion of the distinction between gaming/non-gaming worlds. Often, a virtual world which is not considered to be an MMOG does contain a wide selection of mini-games or quests, in some way embedded into the world. In this manner a virtual world acts like a combined graphical portal offering games, commerce, social interactions and other forms of entertainment. Another way to see the difference: games contain mostly pre-authored stories; in virtual worlds the users more or less create the stories themselves. The current trend in virtual worlds is to provide a mix of pre-authored and user-generated stories and content, leading to user-modified content.

Current virtual worlds are graphical and rendered in 2D, 2.5 D (isometric view) or 3D, depending on the intended effect and technical capabilities of the platform: web-browser, gaming PC, average PC, game console, mobile phone, and so on.

“Would it not be great if the real world economy could be boosted by the exponential growing economy of the virtual worlds by connecting the virtual - and real world”; in 2007 the Virtual Economy in *Second Life* alone was around 400 MEuro, a factor nine growth from 2006. The connected devices and services in the real world can represent an economy of a multiple of this virtual world economy.

Virtual worlds have entered our lives, our communication patterns, our culture, and our entertainment never to leave again. It's not only the teenager active in *Second Life* and *World of Warcraft*, the average age of a gamer is 35 years by now, and it increases every year. This does not even include role-play in the professional context, also known as serious gaming, inevitable when learning practical skills. Virtual worlds are in use for entertainment, education, training, obtaining information, social interaction, work, virtual tourism, reliving the past and forms of art. They augment and interact with our real world and form an important part of people's lives. Many virtual worlds already exist as games, training systems, social networks and virtual cities and world models. Virtual worlds will change every aspect of our lives: the way we work, interact, play, travel and learn. Games will be everywhere and their societal need is very big and will lead to many new products and require many companies.

Technology improvement, both in hardware and software, forms the basis of this. It is envisaged that the most important developments will occur in the areas of display technology, graphics, animation, (physical) simulation, behaviour and artificial intelligence, loosely distributed systems and network technology.

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Information technology — Media context and control —

Part 1: Architecture

1 Scope

This part of ISO/IEC 23005 specifies the architecture of MPEG-V (media context and control), and its three associated use cases of information adaptation from virtual world to real world, information adaptation from real world to virtual world, and information exchange between virtual worlds.

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