

# Answer to the European Commission public consultation on the early challenges regarding the "Internet of Things"

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**If you reply on your own behalf, please indicate:**

- Name: [Mícheál Mac an Airchinnigh](#)
- Telephone: [+353-1-896-1765](#)
- Email: [mmaa@cs.tcd.ie](mailto:mmaa@cs.tcd.ie)
- Country of residence: [Ireland](#)

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## Towards a vision of an Internet of Cultural Things

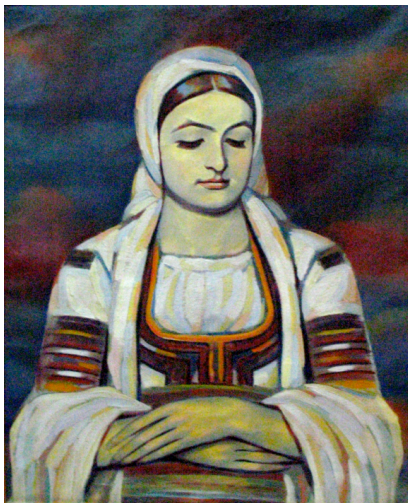
A new *picture* of the digital economy is being shaped, driven by technological progress and human vision.

How can we remove barriers, harmonize possibilities and raise the European project to the forefront of the knowledge economy? How can our rich heritage be harnessed for innovation, beyond the (very meaningful) accumulation of digital repositories of culture? This is the essence of innovation — we have the technology, the vision, the possibility. At the heart of this innovation is *culture* and *cultural diversity* — the humanizing and social foundations of the European project and the key to the success and sustainability of the future knowledge-based economy.

Culture is central to *meaningful* knowledge. Let us begin with a context...

It is, I believe, very important that we find a way to *tell other stories* about the Internet of Things that will humanize the technology and facilitate its deployment. As a first step in this direction, it might be appropriate to use a phrase such as “**The Internet of Cultural Things**” (IoCT). And having introduced the notion of culture we are immediately confronted with the need to address inter-culturality. In other words, if the cultural artefacts are not fixed but moveable heritage then, in the EU context, one expects interlingual interaction. This will inevitably be the case, for example, in the exhibition of paintings (used to ground the argument in the scenarios suggested below).

### The Internet of Cultural Things (IoCT)



So<sup>1</sup>. (Heaney, 1999). In order to break free from the narrowly perceived utilitarian machine view of The Internet of Things let us harness the good will of all those who respect diversity of Culture and who yet find themselves largely excluded from same. In particular I wish to address the policy issues and, in particular, that first one on the “how to build awareness and trigger action among all stakeholders” (Commission Staff, p. 12). Why not take advantage of the work already done in the multi-faceted aspects of digitization associated with Cultural Heritage in the European Union?

Let us first distinguish between the fixed cultural heritage<sup>2</sup> and the movable cultural heritage? In the latter category we focus on the paintings, the drawings, and

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<sup>1</sup> It is not known well enough that this is the opening sentence of Seamus Heaney’s translation of Beowulf. Heaney chose it to signal the remarkable way in which the translation key to unlocking the ancient Anglo-Saxon tongue was found in the traces of the Northern Ireland dialect of modern times. Heaney’s “So” translates into a very powerful multimedia explosion in the corresponding fully animated film by the same name. We need to do the same for the IoCT!

<sup>2</sup> It is self-evident that active RFID tagging of major fixed cultural artefacts will be of enormous benefit in all sorts of ways. Being fixed, the heritage has fixed geographical coordinates. And, for example, if public (bronze) sculptures are so tagged then it will be difficult for those thieves who are wont to travel around, collect, and destroy such solely for the purpose of the base metal (Bowcott, 2005)?

the photographs that are usually associated with the Art Museums and Galleries (both public and private) and are either on exhibition or (for the most part—up to 80%) stored out of sight.

One way in which to raise awareness is through high-profile demonstrator projects. The art exhibition is one candidate. The visual impact and surrounding publicity is always guaranteed (especially in those case where there is controversy such as in the recent exhibition of Matisse's *The Dance* (from Russia) in the Royal Academy, London) (Jones, 2008; *The Guardian*, 2008).

In the rest of the response I have chosen 4 distinct types of scenario that might be used in demonstrator projects for the purpose of rolling out the Internet of Things in a way that might be picked up and appreciated by the wider public of the EU. The first scenario (with 2 subdivisions) concerns the use of the IoT technologies for facilitating the usual transactions involved in the organization of (conventional) art exhibitions. The second scenario (with 2 subdivisions) extends the conventional into the digital world of art. Scenario 3 (with 2 subdivisions) advocates IoT enabling technologies for the conventional Art Gallery. It is here that use of the NFC technology can be exhibited. The final scenario is, in a sense, the odd one out. Instead of paintings in an Art Gallery we have books in a library. The speculated use of the IoT technology to identify theft or damage of rare (one copy) books applies, inter alia, to art works in general. Let us begin then with the scenarios?

### ***Scenario 1A: conventional art exhibition between two EU member states***

Let us imagine we wish to organize an exhibition of the paintings of Vladimir Dimitrov—the Master (Wikipedia, Vladimir Dimitrov) (selected from the Art Galleries of Bulgaria<sup>3</sup>). The exhibition will take place in several EU capitals in a given sequence in 2009. Each painting chosen for the exhibition will have its active RFID chip<sup>4</sup>. The corresponding passport<sup>5</sup> of the painting will also have its active RFID chip. And the (master) digital dossier of the painting will be configured appropriately. We may also conveniently assume that the travelling exhibition will be monitored by the Schengen Information System (Wikipedia, Schengen agreement; Schengen information system).

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<sup>3</sup> The author visited most of the major Art Galleries in Bulgaria over a period of two years (2007-2008) and has seen most of the works of Vladimir Dimitrov currently being exhibited. In May 2008, he arranged for the Director of the National Gallery Sofia to visit the major digital photography facilities of the National Gallery Dublin. The image chosen to illustrate the scenario is used with permission. The original is in the Art Gallery of Smolyan (Dimitrov, 1943), Rhodope Mountains, Bulgaria.

<sup>4</sup> A painting provided with an active RFID chip for the purpose of being exhibited will also be open to the possibilities of being monitored in any environment in which it finds itself. In other words, once it becomes a member of the Internet of Cultural Things then its “health” may be checked regularly, whether it is in storage, in transit, or on exhibition.

<sup>5</sup> In Bulgaria every painting has its own dossier and passport. The passport usually contains a photograph of the painting, the name of the gallery to which it belongs and other essential identifying information such as one might find in a catalog entry. The dossier contains the complete record of the painting, its provenance, the fund used in its acquisition, and so on. One can easily imagine that every painting in the EU will have its own biometric passport.

The purpose of this (conceptual) exhibition is to demonstrate free and easy passage of the paintings across Schengen borders. This should cut down enormously the amount of time usually spent arranging insurance and so on.

### ***Scenario 1B: conventional art exhibition between EU member state and non-EU member state***

In this second scenario, one wishes to determine to what extent the Information system can facilitate art works crossing out of the Schengen zone (for example, from France to the UK) or into the Schengen zone (for example, from Ireland to Spain).

A further development of the scenario might focus on the capability of the Schengen Information System to cope with art works crossing out of the EU (and wider Schengen area) into other regions such as Serbia or Russia or USA.

### ***Scenario 2A: digital art exhibition for public display***

There nothing so annoying and disappointing for the visitor to an Art Gallery to discover that the work which they travelled to see, has itself already travelled elsewhere! But not only will the Internet of Cultural Things provide the information that will avoid disappointment for the casual visitor but also be useful in the anticipated near future when a moving art work will be replaced by a corresponding digital masterpiece, in that very place once occupied by the original. Such a replacement can be of benefit also in those cases where the original has been removed for cleaning or restoration.

Naturally, the great and wealthy Art Galleries will cope very well. But there still remains the majority of small public Art Galleries, for which the lending of an art work for exhibition elsewhere leaves behind an ugly gap on the wall, for the bewilderment of the casual visitor. This can be alleviated by providing a “hung digital image”. Such digital image replacements will need their own IPv6 address—one way in which to keep the digital images under control.

Once we have moved into the acceptability of IPv6-addressed digital masters, then it is but a small step to launch exhibitions of same anywhere in the world. But being digital implies that one can open up all sorts of new markets.

### ***Scenario 2B: digital art exhibition for private display***

Let us imagine that one wishes to organize a special event, say a banquet, in honour of a retirement. Given the nature of a digital master (identified uniquely by its IPv6 address) then one might wish to assemble an appropriate collection for the event. The cost would be minor in comparison to the enrichment of the cultural experience intended.

### ***Scenario 3A: personalized art exhibition***

It is currently the case that in many Art Galleries one is offered the possibility of “audio guides” by means of which one is aided to see and understand the works being exhibited. However, such audio guides have major drawbacks. The two most obvious

problems are (1) the herding effect by which the listeners are directed to the key works, and (2) the imposition of the narrator's voice that pre-empts the user's direct visual experience of the art exhibited. (Marincola & Philadelphia Exhibitions Initiative., 2006, pp. 24-25)

In the context of the Internet of Cultural Things both the audio guides and the catalogs will be directly responsive to the needs of the visitors on a personalized basis. With respect to each painting (or exhibit, in general) there is also the significant issue of what is sometimes known as the "Wall text", the title or brief description that is often see placed in proximity to the work of art (Schaffner, 2006). Such wall texts are also amenable to the Internet of Things technology. Indeed, one might imagine that the wall text would be displayed on the visitors hand held device and no longer on the wall.

### ***Scenario 3B: mobile phones welcomed in the Art Gallery***

The current conflict between the ubiquitous presence and use of the mobile phone and the Art Gallery's need for a certain amount of non-distraction may now be overcome by some very simple Near Field Communication (NFC) technology (Wikipedia). Upon entering the gallery, the mobile may be used as the primary device for negotiation of services. Specifically, the very act of entering may be used to disable the usual functions (such as phone ringing or image acquisition by "onboard" camera) and enable others (such as capture of wall text of pleasing image together with thumbnail for later identification).

As the user navigates the exhibition (s)he will want to note those paintings which deserve a further look or even acquire a personal digital or print copy. Now there is really no need to buy the whole exhibition catalogue. Only that portion which is wanted need be acquired and paid for. The transaction will be automatic.

Naturally, given the nature of the medium, the user will be given the information in the (natural) language(s) most appropriate to the needs and wants. For example, for a Slavic Exhibition is, say Bruxelles, visitors might wish to receive commentary in their language in addition to that of the host country<sup>6</sup>.

### ***Scenario 4: rare book protection***

Although today every newly published book is identified generically by its own European Article Number (Wikipedia), only a few such books can ever be expected to have their own IPv6 address. However, where the book (or manuscript) in question is unique, as such is the case in the great libraries, then it is to be expected that for reasons of security, if nothing else, each will have its "Web address". One obvious purpose is to avoid either theft or misplacement. Another possibility is to prohibit the sort of vandalism and theft that befell the 150 books or so of the British Library, reported recently (Laville, 2008). Furnished with an active smart RFID tag it ought to be easy to sound the alarm if certain kinds of cutting actions/motions are determined (the cutting object might be ceramic, metal, or even laser).

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<sup>6</sup> A typical example of such an exhibition was "Paintings from Poland: Symbolism to Modern Art (1880-1939)", held in the National Art Gallery of Dublin in 2007 (Croke & Folga-Januszewska, 2007).

## Even things are multi-cultural

«The phrase "Internet of Things" heralds a vision of the future Internet where connecting physical things, from banknotes to bicycles, through a network will let them take an active part in the Internet, exchanging information about themselves and their surroundings.» (Commission Staff, p. 3)

The phrase “*from banknotes to bicycles*” conjures up “delicate” things that are both practical and artistic — the banknote, and the more robust functional things associated with industrial design and practical transport — the bicycle. Both kinds of things are pleasantly surprising examples in the context of the Internet of Things.

A comparable text from Wikipedia (last access 2008-11-21) is not so pleasing:

«If all objects of daily life, from yogurt to an airplane, are equipped with radio tags, they can be identified and managed by computers in the same way humans can.» (Wikipedia, Internet of Things)

One imagines that it is the yogurt *container* that will be equipped with a radio tag. And one hopes that the humans will **not** be managed by computers as one ambiguous reading of the text implies. More recently, Sean Dodson, in *The Guardian* (Dodson, 2008), reported on the recent foundation of the Ipso (IP for Smart Objects) Alliance (Dunkels & Vasseur, 2008). In addition to giving examples of the usual sorts of intended applications such as smart houses, he throws in a googly:

«... in Japan cows grazing in the fields of Hida Takayama have their own IPv6 addresses embedded on wireless RFID chips beneath their skin. Farmers can now track their livestock through the growth and distribution process.» (Dodson, 2008)

This evocation of “RFID chips beneath the skin” conjures up all those (latent) memories of humans being controlled or monitored by computers — an idea made manifest by Prof. Kevin Warwick of the University of Reading, UK. (Wikipedia, Kevin Warwick). In concluding his brief report, Dodson chooses to cite the opinion of a London-based architect who is an early adopter of the Internet of Things techno-philosophy:

«But, warns Haque (Haque), there could be disadvantages too. "It depends whether we end up treating the internet of things as a system where we become enslaved to our devices, or whether we treat it as a truly open framework in which we are putting our devices and machines on to this system in order to facilitate our existence," he says. "It could go either way."» (Dodson, 2008)

In this Response I have argued the need and rightness for a focus on the Culture of Europe in the context of the Internet of Things, a culture that is exceeding rich and diverse, marked apart by the very wide diversity of language and yet held together by a fine art heritage. The visuality of the image transcends boundaries and speaks directly to the people. The interpreting language of description and debate and appreciation follows.

21<sup>st</sup> century cultural spaces will be participatory, flexible, integrated and responsive. They will be shaped by citizens and mirror the space and currency of new, integrated and networked knowledge transactions. They will be intercultural spheres, promoting harmony, growth, empathy and understanding for communities of users. The type of innovation and knowledge transfer promised by the activation of the **Internet of Cultural Things** across the Community must become a reality to lend credence to our ideals that Europe will become a knowledge-based economy. An appreciation of culture and cultural diversity form the basis for enhanced citizenship and community engagement, enhanced cross-cultural empathy and understanding. This Community stimulus for meaningful knowledge and engagement with the global economy. This is not only a pan-European necessity, but points to how we might meaningfully ‘network’ with the global world on issues which are highly pertinent on the European and world stage, through channels of culture which are citizen-focused and inclusive.

It is streamlined, effective and integrated, but most importantly, it is evidence of coherent and tangible innovation, turned into concrete practice. It mobilises culture. It mobilises participation. It mobilises citizenship. It eliminates barriers and borders. In short, it strengthens the foundations and sustainability of the European social project.

## Acknowledgements

The author gratefully acknowledges the insightful remarks of each of the following reviewers on an earlier draft of this brief position paper. Any errors or infelicitous phrasing that might remain are entirely all my own work:

**Prof. Khurshid Ahmad**<sup>7</sup> strongly advised a rearrangement of material that would make a better impact on the reader and hence get the point across in a very succinct manner. Specifically, he advised that the **Internet of Cultural Things** be right up front on page one. I agreed and so it is.

**Prof. Bill Harrison**<sup>8</sup> cautioned against using the “visions of people managed by machines to make a point”. This potentially offending “administrator’s Freudian slip”, is now in the concluding section of the Response, where it will do least harm now (I hope)! He also advised a short expository text on the nature of a painting’s passport before linking it to the RFID chip.

**Ms. Thérèse Mac an Airchinnigh**<sup>9</sup> provided the basic text for the introductory and concluding paragraphs to give a needed EU aspirational focus to the entire Response.

**Mr. Gerry O’Brien**<sup>10</sup> was excited by the potential for tagged works of art: “if works of art had an associated semantic network of description, content, composition, colour, history, cultural context, etc. then it would be easier to organize more interesting virtual thematic collections that would come together for a period of time and then disband. For me, often the most interesting exhibitions are those that show non-obvious relationships between disparate works from other times and cultures

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<sup>7</sup> Head of the Intelligent Systems Research Laboratory, Trinity College Dublin.

<sup>8</sup> Head of the Software Systems Research Laboratory, Trinity College Dublin.

<sup>9</sup> Higher Education Authority, Dublin.

<sup>10</sup> Systems Administrator, School of Computer Science and Statistics, Trinity College Dublin.

when these works (or in this case their digital copies) are physically displayed together.”

**Prof. Donal O’Mahony**<sup>11</sup> identified much of the weakness of the original text in both the existing and proposed technological background of wireless. He raised many salient issues and questions which have not yet been fully resolved in this Response.

**Dr. Declan O’Sullivan**<sup>12</sup> elaborated at some length on the putative special advantages enjoyed by paintings tagged with (active) RFID chips.

**Ms. Kalina Sotirova**<sup>13</sup> provided background cultural and technical information on the use of the passport and dossier in the Art Galleries of Bulgaria and the formal relationships between the latter and the Ministry of Culture.

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<sup>11</sup> Director of the Centre for Telecommunications Value-Chain Research (CTVR), Computer Systems Laboratory, Trinity College Dublin.

<sup>12</sup> Intelligent Systems Research Laboratory, Trinity College Dublin.

<sup>13</sup> Humanities Informatics, Institute of Mathematics and Informatics, Bulgarian Academy of Sciences, Sofia

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