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The London Charter and its Applicability

Sorin Hermon
Go Sugimoto
Hubert Mara

Vast-Lab, PIN, University of Florence, Italy

Abstract

The London Charter (www.londoncharter.org) aims to define the basic objectives and principles of the use of 3d visualisation methods in relation to intellectual integrity, reliability, transparency, documentation, standards, sustainability and access. The Charter seeks to enhance the rigour with which 3d visualisation methods and outcomes are used and evaluated in the research and communication of cultural heritage, thereby promoting understanding of such methods and outcomes and enabling them to contribute more fully and authoritatively to this domain. Our paper will discuss two projects having as a main outcome a 3D product (in one case a 3D reconstruction of an architectonic feature and the other one a 3D model of cultural heritage artefacts) and how these are related to the principles of the London Charter. The outcomes of this discussion are exemplary templates to guide future users of the Charter, while future work is aiming towards a codification for the use of the Charter.

Categories and Subject Descriptors: I.3.6 Methodology and Techniques, I.3.6 Standards I.3.8, Applications

1. Introduction

The London Charter (TLC) is an initiative that started in spring 2005 [BDN06] aiming at establishing internationally recognized principles for the use of three-dimensional visualisation by researchers, educators and cultural heritage organisations (www.londoncharter.org). The Charter directly addresses the Cultural Heritage (CH) research community which investigates Virtual Reality (VR) (and 3D outcomes) as an interrogation of data [HND05] and/or communication tool or makes use of it. Since its launch some two years ago, the Charter has been reviewed and discussed by several institutions and research groups; however, its applicability was yet to be tested. Therefore, we have decided to revisit two projects with a 3D outcome and analyse the applicability of the London Charter; one regards the virtual reconstruction of a mausoleum, using as the main source a historic document [NC03], while the other project [MAR*07] is dealing with the use of profiles of ceramics, originating from their 3D models, using methods proposed by [MK03] and presented in details in [MKN*07].

The first example was an exercise in semi-automatically creation of 3D models from non – structured data (a historical text as the single source of information), using X3D (extensible 3D), [NC03] and its final 3D outcome is available for consultation at a regional museum. The second example, regarding a 3D documentation of CH artefacts, created a series of 3D models (obtained by means of a laser scanner) of ceramic vases, now archived in a local museum and available upon request. These models were built in order to test the possibility of an automatic extraction of pottery profiles, volume measuring and analysis of design patterns, useful in their classification process and as an alternative to manual treatment of the objects, in case they are fragile.

The projects, as a whole, employed 3D models as a research tool; the 3D outcome of the first one is exhibited to the public. In the following paragraphs we will try to relate TLC and its principles to these projects.

2. The London Charter – basic principles

The London Charter is published and at www.londoncharter.org. Its objectives are to:

- **Provide a benchmark** having widespread recognition among stakeholders.
- **Promote intellectual and technical rigor** in such uses.
- **Enable appropriate evaluative criteria and methods** to be determined and applied.
- **Stimulate debate** on methodological issues.
- **Offer a robust foundation** upon which specialist subject communities can build detailed standards and guides.
- **Ensure appropriate access and sustainability strategies** to be determined and applied.
- **Enable 3d visualization authoritatively to contribute** to the study, interpretation and management of cultural heritage assets.

In order to achieve these objectives, the Charter defined eight principles that, according to the authors of the Charter, should be followed and taken into consideration when 3D outcomes are used as a research and communication tool of CH content. These principles are:

- **Subject communities** – each specialist community should evaluate the use of 3D visualization according to their research aims, objectives and methods, and, accordingly, define their principles.
- **Aims and methods** – the aim of the project should match with the tool and the methodology employed, in order to clarify whether 3D visualization is the most appropriate approach for achieving this aim. The documentation of the project should report this choice.
- **Sources** – according to the aims of the project and the context of its use and exhibit, relevant material used in the creation of the 3D outcome should be

considered to be published, together with the 3D outcomes.

- **Transparency requirements** – the possibility of the user to deconstruct and analyse the process of constructing the 3D outcome. According to the aims of the project, highlighting between visualization facts based on imagination, scientific outcomes and hypotheses should be considered to be published with the 3D outcome.
- **Documentation** – the creation of the 3D outcome should be sufficiently documented, in terms of explicitly presenting, upon needs, the decision taking processes that led to the creation of the 3D outcome.
- **Standards** – Appropriate standards and ontologies for documenting 3D visualisation should be identified at subject community level in order to enable optimum interoperability and comparability within and between domains.
- **Sustainability** – as a 3D outcome having the representation of a CH as subject becomes part of the Cultural Heritage itself, measures to store, archive and access it in the future should be taken into consideration.
- **Access** – should be provided, either for consultation, editing, or change, according to the aims of the project, in order to contribute to the wider study, understanding, interpretation and management of cultural heritage assets.

3. Applicability of the London Charter

In the following paragraphs the TLC will be reviewed, and each of its principles will be discussed, in the light of the two test projects briefly presented above.

Subject Communities: as stated in several occasions in the Charter, the field of CH itself is multi – disciplinary. Adding the 3D modelling aspect, a 3D outcome of CH reflects a symbiosis between humanities, social sciences and technology research, at the research community level. As such, it often may happen that a 3D outcome that is the result of a research activity in one field end up being used in another field, perhaps for completely different purposes. For example, when 3D products developed in order to answer a computer graphics problem of modelling are used as a communication means in a museum, web, etc. Therefore, it is extremely difficult to assess to which community a 3D outcome addresses – the producer, the user or the mediator between the 3D outcome, its message, its physical environment or its sources.

Taking these reservations into consideration, the subject communities of the first example, the 3D model of a historic building (the Mausoleum of the Etruscan king Porsenna), are apparently various: the research community interested in the use of X3D, CH professionals interested in the architectonic reconstruction itself or museologists interested in the communication performances of the 3D outcome, since the model, even though it started as a pure research project, ended becoming an exhibit artefact in a museum, without editing it and adapting it accordingly. As such, the subject community is an apparent dynamic concept, depending on the context where the 3D outcome is exhibited.

The case of the second example is apparently much simpler to address, since the subject community was restricted to computer vision specialists, their tasks being the creation of a system of analysing profiles of ceramics using 3D data acquisition. In this sense, all methodologies, requirements and specifications of standards are well established, while other specifications were developed during the project [MK03]. At the other end is the user community, archaeologists who use these models in order to extract features of their research interest.

Aims and Methods: in both cases the aims of the projects were clearly stated: the first one explored the possibility of creating 3D objects from text descriptions, using a well-defined method (X3D), while the second project focused on an exhaustive 3D documentation of vases, the method being employed being the use of a laser scanner. Therefore, the visualization method in the first example was the outcome of the exercise, ("translating" a text description into its 3D representation) itself, while in the second example, the 3D visualization reflected its aims – obtaining a measurable object for features extraction. Hence, the methods proposed in these projects matched their aims.

Sources: as for the previous principle, the sources used matched the aims proposed by both projects. Since both projects aimed at answering a particular, well – defined and focused in its scope question, the chosen sources were clearly selected and presented: the historical text describing the monument to be reconstructed (first example) and the acquired 3D clouds of points, representing the 3D documentation of the analysed pottery vases (second example). It must be stated that these examples were sought to test and improve technological methodological problems; therefore, only one (CH) source was explored, and, from a CH point of view, there was no need for any interpretation whatsoever.

Transparency requirements:

The problem of uncertainty and its difficult evaluation and application was already discussed in the past [HNP06], SIF*06, OGL07]]. It regards the presentation of the raw data in a format that is usable for interrogation and an evaluation of the "reliability" of the 3D outcome made by its author(s). A visualization of "facts" against "fictions" in the 3D outcome should promote the concept of transparency.

In the cases of both projects, all data used for the construction of the 3D outcome was presented in the same context as the 3D visualization (first case study), or in the publication regarding the project (second case study). While the presentation of raw data together with the final 3D visualization may be only technical and design problems, the evaluation of data reliability is only in its infancy, and, despite several solutions proposed in the past, they are yet to be adopted at a large scale, both at a technological level and at a conceptual level, evaluation of uncertainty in general being largely discussed but rarely applied.

Documentation: the projects presented the documentation process of creating the 3D outcomes in scientific publications. Since a standard structure of recording this process is lacking, it was reported as a narrative focusing on the main steps of the decision making process, and omitted other aspects, referred in the TLC as "paradata" (information about human processes of understanding and interpretation of data objects).

Standards: this principle refers to subject oriented ontologies that would best describe the documentation process of metadata and paradata, and less on technical standards of the 3D outcome. However, since the concept of paradata has yet to be properly defined and the metadata of both projects regard mainly technical aspects, this principle was found to be most challenging in its applicability.

Sustainability: both case studies aimed at resolving a technological problem and employed CH subjects as a case study solely. Therefore, aspects of sustainability were poorly taken into consideration. In the first example, a CD-ROM with the 3D outcome and additional information regarding the project and its subject is available for the visitors of the museum, while the second project printed in hard copies images of the 3D outcomes, while the 3D objects themselves are stored in an archive to be accessible in the near future, by a personalized access.

Access: The 3D outcome of the first example is accessible in a CD-ROM format and as an exhibit in the museum. The second project printed hard copies of the images of the 3D outcomes, and is in the process of enabling a personalized on-line access to an archive containing the 3D outcomes. Therefore both projects offered different solutions to the accessibility problem, according to the aims of the projects.

4. Summary and Conclusions

The London Charter is a relatively new document, having the ambitious scope of "establishing internationally-recognised principles for the use of three-dimensional visualisation by researchers, educators and cultural heritage organisations". The document is the result of a series of discussions among specialists (see www.londoncharter.org for more details), which focused on defining principles, conduits of work when employing 3D visualization in the research activities of the CH domain.

In this paper we focused on some practical problems: we aimed at analysing the applicability of the London Charter in practice. For this, we used as case-studies two projects, one relating to the creation of a 3D outcome using text descriptions solely and the other using 3D outcomes for features extractions. While some of the principles detailed in the TLC were clearly addressed in these projects, others were more difficult to approach and implement (see above). This short analysis just emphasized the importance of such an initiative as TLC; its aim was to stimulate the collection of as many as possible feedbacks and remarks regarding the TLC, in order to sharpen its definition and applicability.

One of the conclusions deriving from this work is that the principles of TLC are easily applicable in projects aiming at solving technological problems. This task is more difficult when dealing with multi – disciplinary projects, given the fact that, rightly enough, each discipline has an epistemology of its own, and a coherent integration at theoretical and methodological level is difficult to obtain.

Another issue regards the life span of 3D outcomes that represent CH objects or concepts. These may start as projects in the technological field, but given their apparent potential as a communication tool, are exhibited in museums, without further modifications and adjustments, according to the new requirements of the 3D outcomes, as a communication medium. This process makes the application of the London Charter a difficult task, since, for example, even if at the beginning of the process aims and methods matched the 3D visualization, at the end the aims changed, but not the content and its 3D visualization method. This is apparently not a problem of the London Charter by itself, but the ways 3D outcomes of CH are approached in general. However, since in many cases a 3D CH object has a "shifting nature" (research outcomes used in the communication strategies of CH institutions), some aspects of the Charter's principles could reflect this aspect.

A last comment regards the approach of TLC to different 3D visualization outcomes, which are the result of different processes, such as data acquisition, using for example laser scanner, 3D visualization as data investigation tools and 3D visualization employed in the communication strategy of CH. While all are 3D "stuff", they have completely different production pipelines, methodologies, objectives and uses. Therefore, even if all have as content subject CH objects, clearer principles, addressing these differences, would be of great benefit. A future work would be therefore a revision of some of these principles and some suggestions of technological applications that can be applied when addressing them.

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