**ENSOM — Technical**

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**Technical Narratives: Novel Approaches to the Analysis and Technical Description of Software-Based Art**

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The term ‘software-based artwork’ refers to art where software is the primary artistic medium. Although software-based artworks might all be characterised as having code at their core, there is great variation in their constituents and form—ranging from arrays of material and hardware components installed in a physical space, to born-digital works created in 3D engines. Such works form complex systems, exhibiting a range of dependencies on changing hardware, software, interfaces, and technological environments. Software-based artworks may involve proprietary software or bespoke elements coded by the artist, and many exhibit particular behaviours, such as responding to a visitor or searching for keywords on the Internet. Such characteristics raise significant challenges for the long-term preservation of these artworks. This paper presentation will report on the early stages of the development of a documentation-centric approach to these challenges. These new strategies have potentially wider applications in digital preservation and might be applied to other complex digital objects, such as commercial software, video games, and scientific simulations.

Our primary research aim is to address how software-based artworks are to be described and represented for the purposes of preservation, understanding, and access. Up until recently, there has been little consensus regarding preservation strategies or established methodologies for identifying the characteristics or significant properties to be preserved. Appropriate strategies will typically be dependent on the specifics of each artwork; for example, in some cases it may be essential to preserve the code, in others the behaviour may be the crux of the work. There are a diversity of design approaches and implementation platforms used, and thus a variety of factors that can affect their sustainability, making it essential to capture detailed technical information about the components of an artwork and the digital environments in which they are created, curated, and stored. It is also increasingly important to provide a sense of what these works are like even when they are not on display (or for those unable to visit). We examine how to describe and represent a software-based artwork from various perspectives, ranging from that of a broad viewing audience to those involved in making decisions about the conservation and display of an artwork. Foundational in this is the development of a detailed documentation model for the management of these decisions, based on the preservation ecosystem concept. This approach considers the artwork a living object in a changing environment, shifting the focus of decision-making from the object to its dependencies. Preliminary work in the development of an ecosystem model for software-based artworks will be reported on. This work also draws upon museum practice in relation to cataloguing, and emerging standards of practice within conservation for creating technical documentation. As well as identifying the technical information that could or should be included in a hypothetical catalogue entry, we examine whether the nature and content of current conservation-focused technical studies need to be rethought. Part of this work will involve the creation of detailed technical entries for a number of software-based artwork case studies. The particular artworks to be examined include a broad range of different types of software-based artwork, including those in the Tate collection and a number of Internet-disseminated works.

Closely linked to the work outlined above is a secondary research aim: an exploration of what might constitute technical art history for software-based artworks. Technical art history is an evolving field that focuses on the material choices of the artist, the processes involved in creation, and the relationship of these to the meaning, history, and context of the work. Research in this field has up until now been largely framed around artworks that use traditional artistic materials such as paint (e.g., analysis of chemical composition), and so we examine the potential of digital analytical techniques to gather analogous information for software-based artworks.

In addressing both of the aforementioned research aims, this research draws on a number of fields. Existing techniques from areas such as digital forensics and software engineering provide ways by which software can be analysed and documented for purposes of appraisal and preservation. Particular avenues of interest include automated metadata generation, runtime and network analysis, disk imaging and analysis, and the use of software decompilers. An initial exploration into the value of analytical tools that enable the behaviour and live environment of software to be captured and described will be reported on.

In digital preservation this research shares a number of synergies with areas of current interest to the community, such as analytical approaches to describing complex digital objects and the modelling of technological and semantic change. This research represents the first detailed technical study of software-based art to be based on the use of such analytical methods applied to the software, systems, and media on which they were developed and presented. The knowledge created by this research feeds directly into the refinement of the conservation, risk-assessment, and cataloguing methods used to support Tate’s current and future collection of software-based art, and will potentially be of great interest to many other institutions and individuals collecting similar kinds of work. It also represents a significant contribution (in both theoretical and practical terms) to research in digital preservation in a cultural heritage context, and is likely to be of interest to many other areas of research within the digital humanities.

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