InterPARES 2 Project

International Research on Permanent Authentic Records in Electronic Systems

Areas That Should Be Covered Validated

Case Study 19: Preservation and Authentication of Electronic Engineering and Manufacturing Records

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Creator of the Fonds		
TOPIC	***SPECIFICS***	***SOURCE***
Name	Research partners in the experiment: 1) Element of the U.S. government with responsibilities in the science, engineering, design and manufacture of complex assemblies 2) Research Division of the Electronic Records Archives (ERA) that is part of the National Archives and Records Administration (NARA) 3) The San Diego Supercomputer Center (SDSC)	FR, pg. 2
Location	1) Secure government installation, United States 2) The United States—College Park, Maryland 3) San Diego—University of California San Diego (UCSD)	FR, pg. 1, 2
Origins	1) Requirements of the United States government for high-assurance, high-tolerance computer and science-based design and manufacturing. 2) The Research Division of the Electronic Records Archives Program was established to conduct research jointly with partners inside and outside the United States government to assess the feasibility and effectiveness of methods of preserving authentic electronic records. The ERA program is NARA's response to the challenges associated with the diversity, complexity and volume of electronic records being created by the U.S. government. The ERA was established in 2002. 3) The SDSC supports international discoveries in science and engineering through advances in computational science and high performance computing. The SDSC was founded in 1985 through a grant from the National Science Foundation.	FR, pg. 3; NARA Web site SDSC Web site
Legal Status	1) The originating research partner is part of a U.S. government agency. 2) The ERA is a program within NARA, a U.S. government agency. 3) The SDSC is a research unit of UCSD.	FR, pg. 1 NARA Web site SDSC Web site

Legislation	1) Agency is subject to U.S. laws and regulations governing the agency 2) The ERA is a program issued under direction of the archivist of the United States. The program is an element of NARA, a U.S. government agency governed by the National Archives and Records Act of 1984. 3) SDSC is subject to U.S. laws and regulations governing the unit	FR, pg. 2 NARA Web site FR, pg. 2
Norms	• The agencies followed the protocol of the experiment • The agencies abided by the provisions of formal Memorandums of Understanding between one another	FR, pg. 2
Funding	1) Information not available in the final report 2) Federally funded 3) Primarily funded by the National Science Foundation	 Inferred SDSC Web site
Resources	Information not available in the final report	
Governance	1) Information not available in the final report 2) The ERA falls within the governance of NARA. The ERA has a Program Director and an Executive Officer who oversee the management of the program. The system design of the ERA has been awarded through contract to Lockheed Martin Corporation 3) The SDSC has a Director, Executive Director and Division Director. There are four divisions, four laboratories and two departments that make up the SDSC centre	 NARA Web site SDSC Web site
Mandate	1) Information not available in the final report 2) To authentically preserve and provide access to any kind of electronic record, free from dependency on any specific hardware 3) To support international science and engineering discoveries through advances in computational science and high performance computing	 NARA Web site SDSC Web site
Philosophy	1) Information not available in the final report 2) Archival; to ensure that electronic records are as accurate decades in the future as they were when first created. 3) Computer science; to be a strategic resource to science, industry and academia, offering leadership in the areas of data management, grid computing, bioinformatics, geoinformatics, high-end computing and other science and engineering disciplines	 NARA Web site SDSC Web site
Mission	1) Responsible for the science, engineering, design and manufacture of complex assemblies 2) Be a leader in innovation in electronic records archiving; Develop policy and technical guidance to enable responsible electronic records creation and management; Develop and maintain technical capability to capture, preserve, describe and appropriately dispose of any government electronic record; Manage a coherent, nationwide, and sustainable system for permanent archival electronic records of the Federal Government; More detail is available on the NARA Web site 3) Extend the reach of scientific accomplishments by providing tools such as high-performance hardware technologies, integrative software technologies and deep inter-disciplinary expertise, to the community	FR, pg. 2 NARA Web site SDSC Web site

Functions	1) Manufacture high-assurance, high tolerance machined piece parts for the U.S. government 2) ERA: • Coordinate lifecycle management transactions (such as appraisal, disposition agreements, transfers, accessions) for all records • create, store, and search descriptions for all records • process and store electronic records • interface with other systems to provide them with relevant lifecycle management information • ingest the results of a conversion of non-electronic records to electronic format • ensure that electronic records transferred to NARA remain free from corruption and are accessible regardless of changes in information technology • dispose of electronic records as stipulated by a disposition agreement • enforce restrictions on access and release of electronic records • store electronic records that are unclassified, sensitive, and classified through Top Secret/Sensitive Compartmented Information (SCI) 3) Operate powerful high-end computing resources; support research projects	FR, pg. 2 NARA Web site (ERA – Request for proposal) SDSC Web site
Recognitions	Information not available in the Final Report	

Activities Resulting in Document Creation

Administrative & Managerial Framework

TOPIC	*SPECIFICS*	*SOURCE*
General Description	• Maintain authentic records over time to enable production of pieces as long as the business requires them • Find solutions to guarantee the persistent archivability of digital records, maintained authentic	FR, pg. 4, 5
Type of activities	Information not available in the final report. The activities reported refer to the conducted experiment and are specifically related to the creation of the digital entities under study (see "Digital entity being studied – Type of activities" below)	
Documents resulting from activities	Information not available in the final report (see "Digital entity being studied – Documents resulting from activities" below)	
Existence of a RM and/or archives program	• There is an operational repository (Product Data Management System) that stores the work of product design engineers. This system captures all the digital entities created in the CAD system • The ERA is an electronic archives program	FR, pg. 3, 13
Individuals responsible for preservation	The design product engineer (as the creator of the initial digital entities studied in this experiment) has ultimate responsibility for the geometric solid model created using the CAD system	FR, pg. 3

Existence of Preservation Strategies	The experiment itself comprises part of a preservation strategy to find a reliable preservation format for the CAD engineering files. Additionally, an interim preservation strategy is identified as the "bill of materials" structure throughout the Final Report.	FR, pp. 1 FR, pg. 3, 8, 9, 13, 16, 17
Legal Requirements and Constraints	Information not available in the final report	
Normative Requirements and Constraints	The digital solid models are controlled by policy for operational use, but are not controlled for preservation	FR, pg. 14
Technological Requirements and Constraints	Infrastructure for the experiment: SDSC—Storage Resource Broker (SRB), Metadata cataloging system (MCAT) ERA Virtual Test Lab • all are linked to a secure government computer network	FR, pg. 12
Digital entity being studied		
General Description	Archival experiment activity: • Conduct an engineering experiment to examine the authentication of digital model (CAD) records using a content/message/semantic based methodology. • The basis of the study comprises the abstraction of complex information from proprietary CAD formats, expression of this information into enhanced logical forms, rendering it into archival format, sending it across a trusted network to form part of a persistent archive and returning it for verification of authenticity, reliability and usability. • The activity, which enhances the STEP file with additional knowledge, creates a knowledge-enhanced digital object file—the objects in this file are the objects of the case study	FR, pg. 1 FR, pg. 4
Type of activities	• Product designers using proprietary Pro-Engineer CAD systems create the initial digital entities to aid in the design and manufacturing of mechanical piece-part assemblies. • The proprietary CAD design records are then translated into Standard for the Exchange of Product Model Data (STEP) AP203 format • The logical form of the STEP records is enhanced into another logical form using C++ based knowledge representation tools • These entities are taken through a proprietary reasoning engine (Logistica) into WC3 Ontologic Web Language (OWL) XML format	FR, pg. 3 FR, pg. 6 FR, pg. 6-7
Documents resulting from activities	Resulting from business activities: • Knowledge-enhanced objects derived from CAD files and STEP files • TIFF image of the drawing generated from the CAD model Resulting from the archival experiment: • Enhanced STEP record to support the description of further geometric relationships and reasoning about the part shape	FR, pg. 4 FR, pg. 14 FR, pg. 3

Existence of Preservation Strategies	• The design engineer has no archives to persistently store his work • An operational repository exists (Product Data Management System), but it does not offer the capability to provide access to the data, guarantee the authenticity of the records or ensure its usability in a computer application • The generated drawings of the product engineer are registered in the Product Data Management System. • The solid model is encapsulated with a STEP file generated from the CAD model as well as a TIFF image of the drawing generated from the CAD model.	FR, pg. 3 FR, pg. 11 FR, pg. 14
Legal Requirements and Constraints	Information not available in the final report	
Normative Requirements and Constraints	An obligation on the part of the creator of solid models that their products are maintained over the long term and are accessible to make changes to the model without having to reconstruct the model altogether	FR, pg. 14
Technological Requirements and Constraints	Architecture: Creation tools: • CAD work station, Product Data Management System Media: • Graphic, textual Formats: • CAD, STEP, enhanced object form (stored in ASCI format), Logistica reasoning system, W3C OWL The knowledge-enhanced objects (created for the purposes of preservation) cannot be used to help realize mechanical assemblies without first being translated back to STEP and then to the CAD system	 FR, pg. 4 Inferred FR, pg. 6-7 FR, pg. 5