



Project Exploitation and Dissemination

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Summary

This deliverable provides a report on the exploitation activities of the Provenance partners. Together with the final project bibliography provided as part of deliverable D1.2.1 Final Project Documentation, it identifies the dissemination, education and collaboration activities undertaken to promote the project in the wider research and business communities.

Members of the Provenance Consortium

- IBM United Kingdom Limited United Kingdom
- University of Southampton United Kingdom
- University of Wales, Cardiff United Kingdom
- Deutsches Zentrum für Luft- und Raumfahrt e.V. Germany
- Universitat Politècnica de Catalunya Spain
- Magyar Tudományos Akadémia Számítástechnikai és Automatizálási Kutató Intézet Hungary

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1 Introduction

As part of the EU Provenance Project, partners have been undertaking several exploitation and dissemination activities. These have been set out in the project exploitation and dissemination plan which constitutes previous versions of this deliverable. Within that document several exploitation and dissemination areas were identified as follows:

- Publications
- Teaching/tutorials
- Exploitation
- Standardisation
- Events

Within each of these areas, the project identified, for each partner, numerous actions that were to be met as project commitments. This document describes the project partner's activities in each of these areas.

More detail is provided on the various publications and deliverables produced by the project in the Final Project Documentation, deliverable D1.2.1.

2 IBM United Kingdom

The only industrial partner in the consortium is IBM United Kingdom Limited. For reasons of commercial confidentiality, IBM is unable to report its exploitation activities in full in this widely disseminated deliverable. To meet its obligations under the contract, IBM has reported its public exploitation activities in this deliverable and has also prepared a confidential report for the Project Officer which will be subjected to a restricted distribution.

In November 2005 and February 2006, IBM through its Analyst Relations department organised a series of briefings for groups from five IT analyst companies. This was conducted with Professor Luc Moreau of the University of Southampton. This resulted in some external reports on their websites which are cited in the project bibliography. A further day of meetings has been arranged for December 2006 to brief the analysts on the completion and outcomes of the project.

2.1 Publications / Dissemination

2.1.1 Case Studies

IBM published a case study that examined provenance in the context of regulated business areas such as financial markets, pharmaceutical and food products, import and

export of products and services in addition to rules relating to corporate governance. A key component of any compliance regime is the management of internal controls that can be subjected to internal and external audit processes. The paper briefly describes how Provenance may provide a solution to financial auditing as an example of a common internal control process [60].

3 University of Southampton

3.1 Publications / Dissemination

Southampton has published numerous papers and articles on various aspects of its work on the project. Four documents have been publicly released describing different aspects of the provenance architecture [54, 86, 58, 69] as well as two internal reports [52, 62] and a document that provides a FAQ to answer questions the different partners in the project might have about the architecture [61]. Additionally, an internal report has been released describing the architecture's Client Side Library design [36].

Two papers have been released that describe various parts of the Open Specification effort of the project, [72, 75], and two special events organised by Southampton (IPAW'06 and the Provenance Challenge) have had their proceedings published [53, 77]. Furthermore, a series of non-published but publicly available papers have been written describing the Open Provenance Specification. The series of documents comprise a set of two support documents [40, 50], four documents that introduce and specify the core framework [41, 42, 43, 44], four generic profiles that extend the basic framework [45, 46, 47, 48] and one example of a technology specific binding [49].

One paper has been published describing the Provenance methodology [79], and one has been published describing an application of the methodology to healthcare [66].

Southampton has also published several articles internally to the University as well as to external web sites.

- Building trust and validation into distrusted computer networks [125]
- Outline of the Provenance project [123]
- Improving authenticity of computer-generated information [124]
- Provenance for Grid Applications [126]

3.1.1 Case Studies

As part of the provenance Tutorial (see Section 3.2.1), two case study exercises were conducted with representatives from the OntoGrid and myGrid projects. This exercise involved a detailed discussion about each project's application to understand how the

provenance architecture could be applied in each, which involved identifying provenance use cases and applying the methodology. In the specific case of myGrid, the second day activity included a follow-up to the requirements capture that took place at the beginning of the project to discuss how requirements identified by myGrid were addressed by the provenance architecture. Separate reports from each of these case studies have been written [70, 71]

3.2 Teaching / Tutorials

Southampton's activities with regard to the development and deployment of teaching and tutorials took three main directions. First we designed and ran a provenance tutorial that involved the development of key materials and disseminating these to attendees at the tutorial, which was held in March. Second, Southampton enrolled two summer internship students at the beginning of July for three months to work on two different provenance projects. Finally, Southampton included material on provenance within one of its undergraduate student lecture series.

3.2.1 The Provenance Tutorial

One of Southampton's commitments was to organise and run a Whiterose Grid tutorial. However this was unfortunately not possible so, as an alternative, Southampton organised and ran the Southampton provenance tutorial [115]. The broad theme of the tutorial was "Making applications provenance-aware", and addressed this theme from different angles through several presentations, each of which focused on a particular area of the provenance architecture. The tutorial was a recognised success and led to the availability of materials that Southampton were then able to distribute at the IPAW workshop held in May 2006, and at the PASS Workshop (Boston, June 2006).

The tutorial lasted for four hours and each topic had slides aimed to take around 30 minutes, allowing time for questions and slippage.

Attendees

OntoGrid Pinar Alper, Rafael Gonzlez Cabero, Jose Manuel Gomez and Paolo Missier.

DataMiningGrid Martin Swain and Thomas Niessen.

myGrid Jun Zhao, Katy Wolstencroft and Danieli Turi.

Others Sven van den Berghe (NextGrid); Stephen Davey (NeSC/OGSA Data/NextGrid); Uri Braun (Harvard) and Hugo Mills (CombeChem).

Tutorial Content

The tutorial comprised 8 presentations each covering a different aspect of the provenance Architecture. Each is described below.

Overview Tutorial The overview presentation provides the necessary background knowledge of the Provenance Architecture. It describes the concepts behind provenance and uses a number of example applications and domains to illustrate the need for provenance. It also provides an introduction to many of the central concepts within the Provenance Architecture, such as the *provenance store* and *process documentation*, that are discussed in more detail in the other tutorial presentations.

Provenance Data Structures Tutorial In overview presentation, the core concepts of the Provenance Architecture are introduced and explained. Content covers process documentation, *p-assertions*, the *p-header* and shared *contexts*. These foundational concepts are important to understand how the Provenance Architecture realises the recording and storage of provenance.

Recording and Querying Provenance Tutorials Both the recording process documentation and querying presentations are combined since they both describe the core functionality of the Provenance Architecture. In the recording presentation the recording functionality is described. The querying presentation presents a description of how to discover the provenance of an entity, and how to ask questions about past processes.

Distribution and Scalability Tutorial This presentation shows how to handle provenance issues in distributed applications, or where the documentation itself must be distributed. Various techniques for addressing these issues are introduced and explained.

Security Tutorial The security presentation describes in detail how to ensure the Provenance Architecture integrates with the target application's security infrastructure, and how to ensure that private data is not exposed.

Methodology Tutorial In the methodology presentation a step by step guide is presented to show to make applications provenance-aware. A suite of guidelines and heuristics are presented.

Summary and Conclusion The final tutorial presentation re-caps and summarises the previous presentations. The need for provenance in many modern Grid application domains is re-emphasised.

Materials

Along with the presentations, several other materials were distributed to the attendees listed above. A CD-ROM was supplied that not only contains all the above described presentations, but also several key publications from the project. In addition, the provenance software was included (both the client side library and a provenance store implementation).

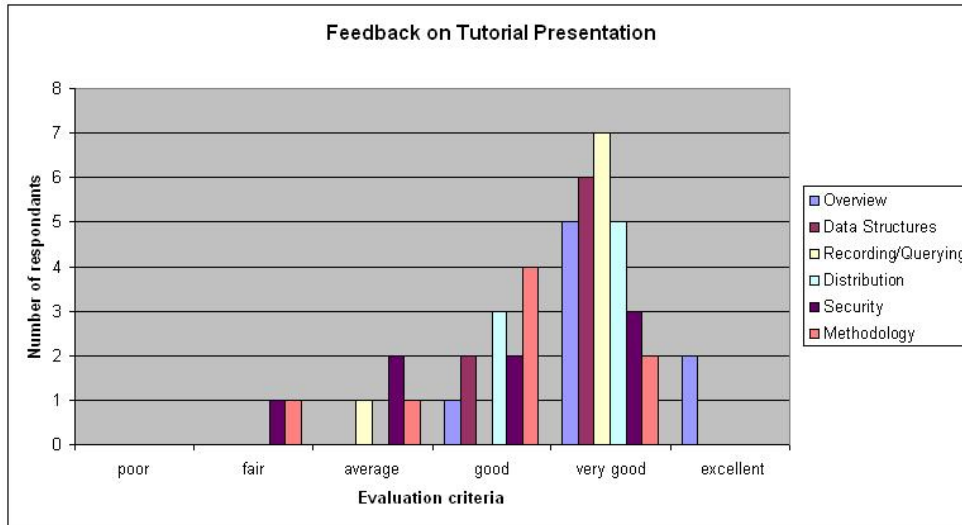


Figure 1: Results of the feedback given by tutorial attendees

Tutorial Website

To accompany the tutorial and the content provided on the CD-ROM we have also published a website that contains the tutorial information [115].

Feedback

In order to assess the successfulness of the tutorial we provided attendees with a feedback form. The form allowed the attendees to rate each presentation and to provide feedback in the form of comments. In Figure 1 we can see how the attendees rated each presentation. The x-axis represents the number of attendees who rated a given presentation according to several evaluative criteria (poor, fair, average, good, very good, excellent). As is clear in the figure, nearly all attendees rated the presentations either good to excellent, with the majority of presentation being rated as very good. Along with the evaluation of the presentation, attendees submitted specific, qualitative comments. Appendix A contains all the submitted evaluation forms.

Tutorial Summary

The Provenance tutorial provided attendees with a wide ranging overview of many of the central concepts pertaining to provenance. Ranging from the details of the data structures developed to broad methodological guidelines for making application provenance aware, the tutorial covered a breadth of material that attendees found to be both clear and informative. Received comments from attendees suggest that the tutorial has been very helpful in enabling them to understand how the Provenance Architec-

ture detailed throughout the tutorial could be of use within their own application domains. Discussions with participants indicated a clear need for provenance in other Grid projects. The tutorial has opened the door to deeper technical collaboration between projects. As an illustration, two separate case studies were undertaken with the OntoGrid and myGrid projects, and these contributed to Southampton's dissemination activities.

3.2.2 Summer Internships

Southampton also advertised and successfully attracted two summer internship students by advertising at various academic institutions. (see appendix A, Figure 11 for the advertisement we used to attract the students). The students each worked on a separate provenance mini project. The first project was concerned with looking at the development of a relational database backend to a provenance system. The second project investigated a graphical user interfaces for displaying provenance query results. Each student received extensive support by members of the Southampton provenance team. Results of the projects are presented in two reports [52, 62].

3.2.3 Undergraduate Teaching Lectures

In 2005 Southampton introduced provenance material into its MSc course COMP6017, advanced topics on Web Services. The course currently teaches 25 MSc students.

3.3 The Open Provenance Specification

The Open Provenance Specification activity of Southampton is a significant effort to produce a family of documents that will go to support a standardisation proposal for provenance. Several foci for standardisation are possible, but the project determined that the key focus should be on the underlying data model for provenance and the core interfaces that allow users to interact with such a system.

In Figure 2, a circle identifies the scope of a standardisation activity in a first instance. It includes the provenance stores, their interfaces, and the libraries to interact with them. In a second instance, it would also be very valuable to standardise some specific processing services (e.g., compliance verification). However, such focus is beyond the motivation of the current effort.

In order to fulfil the standardisation commitments, Southampton produced the following documents to support a standardisation proposal:

- A document to supply a core model of process documentation [41].
- A document to supply a model for the transformation of process documentation [47].
- A document to supply a model for provenance recording [42].

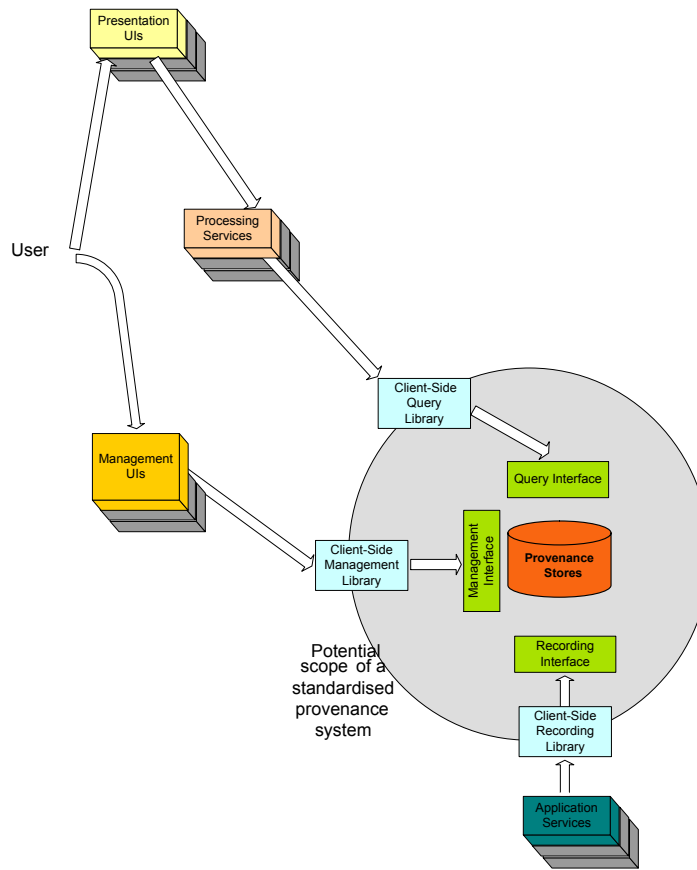


Figure 2: The scope of the standardisation effort

- A document to supply a model retrieving process documentation [44].
- A document to supply a model for provenance security [45].
- A document to supply a model for provenance scalability and distribution [46].

Other documents support the specification [40, 50, 48, 43, 49]

3.3.1 Southampton Standardisation activity

- IPAW discussion on standardisation, which resulted in the setting of the provenance challenge (see below).
- Numerous talks with other organisations regarding standardisation of provenance
 - Harvard’s Institute of Innovative Computing, Chicago’s Computation Institute “Provenance: an open approach to experiment validation in e-Science”

[104].

- Presentation at CT1 Technical Collaboration Meeting, Heathrow "Provenance: Progress Update" [107].
- University of Kent, Departmental Seminar "Provenance: an open approach to experiment validation in e-Science" [103].
- Invited presentation at HPC'06 "An Open Provenance Model for Scientific Workflows" [102].

(see http://www.gridprovenance.org/euprovenance_talk.html for links to presentations).

3.4 Events

Southampton organised and ran several key events during the course of the project, that helped to foster the provenance community and helped to bring together provenance practitioners for lively discussion and debate. These events are described in the next subsections.

3.4.1 The International Provenance and Annotation Workshop

In May, the International Provenance and Annotation Workshop (IPAW) was held in Chicago (see appendix A, Figure 12 for the call for papers). This workshop is a follow-up to workshops in Chicago in October 2002 and in Edinburgh in December 2003. It investigated the issues of data provenance, process documentation, data derivation, and data annotation. In total 31 presentations were given, in addition to several discussion sessions. Post-proceedings were published in the Lecture Notes in Computer Science series by Springer-Verlag [74].

3.4.2 The Provenance Challenge

During a discussion on provenance standardisation at the International Provenance and Annotation Workshop (IPAW'06, www.ipaw.info), the community decided that it needed to understand the different representations used for provenance, its common aspects, and the reasons for its differences. As a result, the community agreed that a "Provenance Challenge" should be set up to compare and understand existing approaches.

The first provenance challenge commenced on 2006-June-19 and concluded in September, where teams compared their approaches. A workshop to discuss the results of the first provenance challenge was held at the Global Grid Forum (GGF-18), in Washington, September 11 to 14, 2006. The provenance challenge workshop itself took place on the 13th and 14th September [77].

3.4.3 All Hands Meeting

At the All Hands Meeting (AHM) held in Nottingham in September, Southampton presented a provenance demo based around a multiple organisation implementation of a bioinformatics experiment.

Technology from the EU Provenance project was used to visualise and query data about the experiment from a provenance store. Furthermore, a preliminary tool was implemented to print query result in natural language.

The EU Provenance booth at the All Hands Meeting was well attended and a range of demonstration highlighting various aspects of the provenance software were given. The posters describing EU Provenance in the context of the bioinformatics experiment that were displayed at the AHM can be found in the Appendix A Figures 13 and 14.

4 University of Wales, Cardiff

4.1 Publications / Dissemination

Cardiff have published six papers and articles based on the project results [56, 81, 82, 83, 88, 89]. The following talks and demonstrations also covered material in the EU Provenance project:

The following are presentation given by Cardiff at various event.

- Demonstration of Visualisation Tools at UK eScience All Hands Meeting, Nottingham, UK, September 2006 [92].
- Demonstration of Visualisation Tools at Open Grid Forum – within the “Provenance Challenge” event, Washington DC, USA, September 2006 [90].
- “Center of Excellence” model for Collaborative Problem Solving: A Case Study from Modelling/Optimisation for Engineering Design, at GridAsia 2006, May 19, Singapore. The workshop focused on UK-Singapore Collaboration in Grid Computing [109].
- Portlet Development in eXo, at the Virtual Research Environments workshop on “Developing and Deploying Tools and Services in the Emerging Portal Frameworks”, 18-19 January 2006 [91].

4.1.1 Case Studies

The first case study [84] describes Provenance questions of relevance to the Gravitational Waves/AstroPhysics project. This project makes use of the Triana workflow engine to undertake data analysis. These questions are primarily centred on the types of uses that could made of Provenance data recorded for analysing: (1) Galaxy formation data; (2) Inspiral search data.

The second case study [87] is based on the BDWorld project, which is investigating the impact of climate change on the distribution of particular species across the world. The project is aimed at running various "what-if" scenarios to investigate how: (i) change in climate is likely to impact a given species of plants (primarily) and animals; and (ii) which species are likely to be under threat as a result of a rise/fall in temperatures or increase/decrease in rainfall. The case study describes the types of Provenance questions that would be relevant for BDWorld researchers.

4.2 Teaching / Tutorials

The use of tools alongside workflow enactment was presented at a number of tutorials. Some of this material is also expected to be included in the CMP629 "Distributed Multi-Agent Systems" course, offered on the "Strategic Information Systems" Masters Programme at Cardiff.

Material about the Provenance project was included in two tutorials:

- Tutorial on "Distributed Scientific Workflows" at the EuroPar 2005 conference, in Lisbon, Portugal – August 2005. The tutorial was attended by 15 people. EuroPar is the leading conference in parallel computing in Europe, and also attracts a significant portion of the Grid computing community. The tutorial last for 3 hours – 10
- Tutorial on "Distributed Scientific Workflows" at the IEEE CCGrid 2006 conference, in Singapore – May 2006. The tutorial was attended by 25 people. IEEE CCGrid is the leading research conference in Cluster and Grid Computing, and has gained significant momentum since its beginning in 2001. The conference was co-located with the GridAsia 2006 event, which was attended by over 600 people. The tutorial last for 3.5 hours – 15% of the material covered Provenance related issues [110].

4.3 Exploitation

In order to support better exploitation of the results of the project, it was decided to evaluate how the Provenance tools could be used alongside an existing Astrophysics application. The Cactus software was chosen, and Tom Goodale (the main Cactus developer) undertook a Provenance requirements survey by visiting the AEI in Potsdam (Germany) in July/August. Subsequently, he has been demonstrating the importance of recording and analysing Provenance data within a Cactus toolkit – primarily looking at simulation of black holes. This work is included in Deliverable D6.3.1 from WP6 [25]. Work is underway to use the Provenance tools alongside the Triana workflow engine. The key focus here is to extend services within Triana with the Client Side Library – to allow submissions of p-assertions to a pre-defined Provenance Store. Subsequently, tools developed in the project can be used to view these p-assertions.

4.4 Events

Cardiff attended various events during the lifetime of the project where issue surrounding provenance were discussed.

- Knowledge-Grid workshop at IST 2006, Helsinki, November 2006. In Collaboration with OntoGrid, IntelliGrid and DataMining Grid projects.
- System Adaptation Workshop at Vrije University, Amsterdam, The Netherlands, September 2006. Participants included researchers from Vrije University and CSIRO(Australia).
- “Distributed and Autonomous Creative Society”, at the DMC Institute 5th International Symposium: Convergence: Towards A New Paradigm for Creative Society. Participation via the “Global Studio” site at Cambridge University. Other participants included: Kenji Saito (Keio University, Japan), Jong-Moon Chung (Korea Information Society, South Korea), Hangsub Choi (Future Korea Division, Korea Information Strategy Development Institute, South Korea), Yuko Tsuchiya (Keio University, Japan). The focus of this event was on the impact of “social networking” and “peer-2-peer” technologies on creativity in the arts. Provenance mechanisms in Grid systems vs. those in the arts were compared and discussed.
- Workshop on Trend, Technologies and Collaborative Opportunities in High Performance and Grid Computing, May 23, 2006, Kasetsart University, Bangkok, Thailand.

Cardiff also participated in the Provenance Challenge organised by the University of Southampton at GGF (September 2006) in Washington DC [90]. Provenance visualisation tools were demonstrated to the participants attending the Challenge.

5 Deutsches Zentrum fur Luft-und Raumfahrt (DLR)

5.1 Publications / Dissemination

A paper by DLR was presented at the IPAW06 conference in Chicago [67]. Furthermore, a number of talks within DLR and externally were given to various audiences:

- Seminar with talks on distributed computing topics, January 2006, DLR Cologne. General overview about Provenance and the EU Grid Provenance project. Attendees from a variety of DLR institutes and universities (approx. 30 people).
- Workshop on integration technology, October 2006, DLR Braunschweig. General overview about the EU Grid Provenance project and the Aerospace application. Attendees from a variety of DLR institutes (approx. 25 people).

- A talk given on Simulation and Software Technology Seminar at DLR [94].
- A talk on numerical simulation software integration with tent. at the Joint ESTEC-DLR Workshop, ESA/ESTEC in Noordwijk [113].

5.2 Exploitation

5.2.1 DataFinder Integration

The DataFinder is the standard DLR tool for scientific and technical data management. A couple of DataFinder users from different DLR institutes asked for the integration of the Provenance service in the DataFinder. Some users have already stated certain questions (queries). To go ahead with this topic, the integration of the Provenance Service will be done within a master's thesis starting in February 2007. To prepare the thesis, two students are currently working on a Python implementation of the Provenance Client Side Library.

5.2.2 AeroGrid Proposal

AeroGrid is a proposal for the second call of the German national Grid initiative D-Grid (<http://www.d-grid.de>). The proposed project aims to develop a collaborative Grid based working environment for the aerospace industry. Part of this project is the use of a provenance service. DLR proposed to provide the software of the EU Grid Provenance project to the D-Grid infrastructure, i.e. the software will be the standard provenance service for the German Grid infrastructure and for all community Grid projects of the D-Grid initiative. The final version of the project proposal is due November 24th, 2006.

5.3 Events

DLR attended the D-Grid data management meeting, May 2006, Berlin, Germany. The workshop aimed to be an information and discussion event about data management in Grids for all D-Grid participants. Every D-Grid community project presented requirements, needs, and solutions for data management tasks. The D-Grid integration project (DGI) presented available and ongoing software solutions. DLR presented the DataFinder software with a special emphasize on the possibility to integrate and provide the EU Grid Provenance Service. As a result, a couple of projects stated their interest and needs for a Provenance Service. DLR also attended the Joint ESA-DLR workshop, May 2006, Noordwijk, Netherlands.

6 Universitat Politecnica de Catalunya Spain (UPC)

6.1 Publications / Dissemination

Four papers were published by UPC in collaboration with SZTAKI. Applying provenance in distributed organ transplant management [51], privacy issues of provenance in electronic healthcare record systems [63], this paper was also published in the Journal of Autonomic and Trusted Computing [64] and, finally, Provenance in agent mediated healthcare systems [66].

6.2 Exploitation

6.2.1 CARREL@FIS

A demonstration application that exploits the technology developed under the Provenance project was developed. The application is described in Deliverable [29]. The OTM Application shows the benefits of applying provenance in distributed Organ Transplant Management. Some of the lessons learned will be incorporated in the CARREL@FIS Project, a Spanish-funded project Under the FIS programme. The aim of the Project is to create a fully functional demonstrator for organ transplant management, in close collaboration with Hospital de Sant Pau, in Barcelona.

6.2.2 EU CONTRACT

Since October 2006, the Provenance architecture will be one of the architectures that will be evaluated as a candidate in the CONTRACT Project, an FP6 EU IST STREP to create languages and libraries for electronic contracts in Digital Business Ecosystems. In particular the Provenance architecture will be evaluated as a candidate for the online contract monitoring mechanisms that will control the execution of contracts.

7 SZTAKI

7.1 Publications / Dissemination

Five papers were presented by SZTAKI at various events, the first Privacy Issues of Provenance in Electronic Healthcare Record Systems [63], was presented at First International Workshop on Privacy and Security in Agent-based Collaborative Environments (PSACE2006). The second was an extended version of the above paper, published in the Journal of Autonomic and Trusted Computing [64]. The third paper, Applying Provenance in Distributed Organ Transplant Management [51], was presented at the International Provenance and Annotation Workshop, and the fourth paper, Provenance in Agent-Mediated Healthcare Systems [66], was published in the IEEE Intelligent Systems Special Issue on Intelligent Agents in Healthcare. Finally, the paper,

Navigating Provenance Information for Distributed Healthcare Management [56] can be found in the Proceedings of the 2006 IEEE/WIC/ACM International Conference on Web Intelligence.

7.1.1 Case Studies

SZTAKI's case study examined the distributed nature of healthcare institutions and how it can sometimes hinder the treatment of patients, because documentation of the healthcare history and therapy of a patient is split into independent healthcare institutions. In order to provide better, user-centred healthcare services, they investigated how the treatment of a patient requires viewing the processes and data as a whole. In the case study they examined how to provide an integrated view of the execution of treatment processes, to analyze the performance of distributed healthcare services, and to be able to carry out audits of the system to assess that, for a given patient, the proper decisions were made and the proper procedures were followed [65].

7.2 Exploitation

A demonstration application that exploits the technology developed under the Provenance project was developed. The application is described in Deliverable [31]. The demonstration application shows the benefits of applying provenance in Electronic Healthcare Record (EHCR) systems. The demonstration application is deployed as the EHCR Subsystem of the OTM Application of the Provenance project. The lessons learnt in the EHCR subsystem of the OTM Application of the Provenance project are utilized in the K4Care project (<http://www.k4care.net>). The main objective of the K4CARE project is to improve the capabilities of the new EU society to manage and respond to the needs of the increasing number of senior population requiring a personalized healthcare assistance. The project will capture and integrate the information, skills, expertise, and experiences of specialised centres and professionals of several old and new EU countries, and will incorporate them in an intelligent web platform in order to provide e-services to health professionals, patients, and citizens in general. One of the specific objectives of the K4Care project is to define a solution for Electronic Health Record (EHR) incorporating lessons learned in past experiences (e.g. I4C/TripleC, PROREC and Provenance projects), and exploiting the knowledge of the consortium about standards within this field. The defined EHR will be implemented and used to store information about healthcare. This EHR will integrate different data types (e.g. text, numerical values, and multimedia parts) and documents coming from different sources (e.g. hospital services, laboratories, consultations, specialists, relatives and patients at home).

8 Conclusion

This document records the exploitation activities for the EU Grid Provenance project. In it we describe the activity of the partners across several dimensions: publications, teaching and tutorials, exploitation, standardisation, promotional materials and events.

Project Deliverables

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9 Appendix A



Tutorial Evaluation




PASOA/EU Provenance Tutorial Evaluation

Please fill in this form to provide the training team with feedback about the tutorial:
Provenance Tutorial
 Location: Southampton University
 Date: 30-31 March 2006


Please note that all data is collected anonymously and there is no link to your identity, organisation or location.
 Please continue your comments on the back of the form if necessary.

Rating	Poor	Fair	Average	Good	Very Good	Excellent	Comments
Presentation 1: Introduction to provenance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Presentation 2: Provenance Data Structures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Presentation 3: Recording and Querying Provenance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Presentation 4: Distribution and scalability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Presentation 5: Security	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Talking too fast
Presentation 6: Methodology	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	too much fact on slides
Materials (Handouts, CD)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
What did you most like about this event?							Very comprehensive & helpful
What did you least like about this event?							No hands-on session
Is there anything else you would like the event to have covered?							
Further Comments							

Figure 3: Results of the feedback given by tutorial attendees



Tutorial Evaluation




PASOA/EU Provenance Tutorial Evaluation

Please fill in this form to provide the training team with feedback about the tutorial:
Provenance Tutorial
 Location: Southampton University
 Date: 30-31 March 2006


Please note that all data is collected anonymously and there is no link to your identity, organisation or location.
 Please continue your comments on the back of the form if necessary.

Rating	Poor	Fair	Average	Good	Very Good	Excellent	Comments
Presentation 1: Introduction to provenance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Presentation 2: Provenance Data Structures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Presentation 3: Recording and Querying Provenance	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Presentation 4: Distribution and scalability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Presentation 5: Security	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Presentation 6: Methodology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Materials (Handouts, CD)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
What did you most like about this event?							
What did you least like about this event?							
Is there anything else you would like the event to have covered?							
Further Comments							

Figure 4: Results of the feedback given by tutorial attendees



Tutorial Evaluation



University
of Southampton


PASOA/EU Provenance Tutorial Evaluation

Please fill in this form to provide the training team with feedback about the tutorial:
Provenance Tutorial
 Location: Southampton University
 Date: 30-31 March 2006


Please note that all data is collected anonymously and there is no link to your identity, organisation or location.
 Please continue your comments on the back of the form if necessary.

Rating	Poor	Fair	Average	Good	Very Good	Excellent	Comments
Presentation 1: Introduction to provenance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Presentation 2: Provenance Data Structures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Presentation 3: Recording and Querying Provenance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Presentation 4: Distribution and scalability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Presentation 5: Security	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Presentation 6: Methodology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Materials (Handouts, CD)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
What did you most like about this event?							THE INTEGRATION OF THE A ^{PROVENANCE}
What did you least like about this event?							
Is there anything else you would like the event to have covered?							
Further Comments							

Figure 5: Results of the feedback given by tutorial attendees



Tutorial Evaluation



University
of Southampton

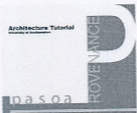
PASOA/EU Provenance Tutorial Evaluation

Please fill in this form to provide the training team with feedback about the tutorial:
Provenance Tutorial
 Location: Southampton University
 Date: 30-31 March 2006


Please note that all data is collected anonymously and there is no link to your identity, organisation or location.
 Please continue your comments on the back of the form if necessary.

Rating	Poor	Fair	Average	Good	Very Good	Excellent	Comments
Presentation 1: Introduction to provenance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Presentation 2: Provenance Data Structures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Presentation 3: Recording and Querying Provenance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Presentation 4: Distribution and scalability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Presentation 5: Security	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Presentation 6: Methodology	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Materials (Handouts, CD)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
What did you most like about this event?							scalability issues
What did you least like about this event?							the p-structure is a bit confusing
Is there anything else you would like the event to have covered?							
Further Comments							

Figure 6: Results of the feedback given by tutorial attendees



Tutorial Evaluation



University
of Southampton

PASOA/EU Provenance Tutorial Evaluation

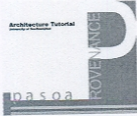
Please fill in this form to provide the training team with feedback about the tutorial:

Provenance Tutorial
Location: Southampton University
Date: 30-31 March 2006


Please note that all data is collected anonymously and there is no link to your identity, organisation or location.
Please continue your comments on the back of the form if necessary.

Rating	Poor	Fair	Average	Good	Very Good	Excellent	Comments
Presentation 1: Introduction to provenance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Presentation 2: Provenance Data Structures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Presentation 3: Recording and Querying Provenance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Presentation 4: Distribution and scalability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Presentation 5: Security	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Presentation 6: Methodology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Materials (Handouts, CD)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	NOT SEEN YET
What did you most like about this event?							WELL ORGANISED, CLEAR PRESENTATIONS
What did you least like about this event?							
Is there anything else you would like the event to have covered?							MORE IMPLEMENTATION DETAILS
Further Comments							

Figure 7: Results of the feedback given by tutorial attendees



Tutorial Evaluation



University of Southampton

PASOA/EU Provenance Tutorial Evaluation


Please fill in this form to provide the training team with feedback about the tutorial:
Provenance Tutorial
 Location: Southampton University
 Date: 30-31 March 2006

Please note that all data is collected anonymously and there is no link to your identity, organisation or location.
 Please continue your comments on the back of the form if necessary.

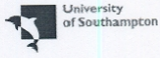
Rating	Poor	Fair	Average	Good	Very Good	Excellent	Comments
Presentation 1: Introduction to provenance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Presentation 2: Provenance Data Structures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Presentation 3: Recording and Querying Provenance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Presentation 4: Distribution and scalability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Presentation 5: Security	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Presentation 6: Methodology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Materials (Handouts, CD)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
What did you most like about this event?							everything was nice
What did you least like about this event?							nothing
Is there anything else you would like the event to have covered?							no
Further Comments							

I like a lot the proposed approach to provenance, specially the logical view of assertions.
~~The~~ The only problem that I find is that, in my humble opinion, is too intrusive. Tracers could be made transparent to the message interchange, I don't see any point in adding more XML to the already overloaded SOAP messages.

Figure 8: Results of the feedback given by tutorial attendees



Tutorial Evaluation



University
of Southampton

PASOA/EU Provenance Tutorial Evaluation

Please fill in this form to provide the training team with feedback about the tutorial:


Provenance Tutorial
Location: Southampton University
Date: 30-31 March 2006

Please note that all data is collected anonymously and there is no link to your identity, organisation or location.
Please continue your comments on the back of the form if necessary.

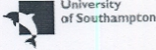
Rating	Poor	Fair	Average	Good	Very Good	Excellent	Comments
Presentation 1: Introduction to provenance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Presentation 2: Provenance Data Structures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Presentation 3: Recording and Querying Provenance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Presentation 4: Distribution and scalability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Presentation 5: Security	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Presentation 6: Methodology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Materials (Handouts, CD)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
What did you most like about this event?							
What did you least like about this event?							
Is there anything else you would like the event to have covered?							
Further Comments							

I THOUGHT ALL THE TALKS WERE VERY GOOD, CLEARLY PRESENTED
AND CONTAINED LOTS OF INTERESTING & RELEVANT INFORMATION.

Figure 9: Results of the feedback given by tutorial attendees



Tutorial Evaluation



PASOA/EU Provenance Tutorial Evaluation

Please fill in this form to provide the training team with feedback about the tutorial:
Provenance Tutorial
 Location: Southampton University
 Date: 30-31 March 2006

Please note that all data is collected anonymously and there is no link to your identity, organisation or location.
 Please continue your comments on the back of the form if necessary.

Rating	Poor	Fair	Average	Good	Very Good	Excellent	Comments
Presentation 1: Introduction to provenance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Presentation 2: Provenance Data Structures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Presentation 3: Recording and Querying Provenance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Presentation 4: Distribution and scalability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Presentation 5: Security	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Presentation 6: Methodology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Materials (Handouts, CD)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
What did you most like about this event?							Clear Presentations
What did you least like about this event?							—
Is there anything else you would like the event to have covered?							—
Further Comments							

Figure 10: Results of the feedback given by tutorial attendees

SCHOOL OF ELECTRONICS AND COMPUTER SCIENCE
UNIVERSITY OF SOUTHAMPTON

SUMMER 2006 INTERNSHIPS

EU Provenance

Enabling and supporting
Provenance in Grids for
Complex Problems

An exciting opportunity for
undergraduate students entering
their final year to spend the
summer working on the EU
Provenance project

- ✧ Experience real research
- ✧ Work on a project that interests you
- ✧ Be part of a research group

Internships run for three months; salary is £1000 per month. Open to UK/EU students graduating in 2007, who are on course for a First or good 2.i degree.



Contact Professor Luc Moreau
Email L.Moreau@ecs.soton.ac.uk
Deadline for application 28 April 2006
<http://www.ecs.soton.ac.uk/research/projects/euprovenance/>

ECSS
Electronics & Computer Science
University of Southampton

Figure 11: Poster used to attract summer intern students



International Provenance and Annotation Workshop (IPAW'06)

Chicago, Illinois, USA
May 3-5, 2006

<http://www.ipaw.info/ipaw06>

PROGRAMME COMMITTEE

Dave Berry, NESC, UK
Peter Buneman, Univ. of Edinburgh, UK
Ian Foster (co-chair), ANL/Univ. of Chicago, USA
James Frew, Univ. of California, USA
Carole Goble, Univ. of Manchester, UK
Jim Hendler, Univ. of Maryland, USA
Reagan Moore, SDSC, USA
Luc Moreau (co-chair), Univ. of Southampton, UK
Jim Myers, NCSA, USA
York Sure, Univ. of Karlsruhe, Germany
Ziga Turk, Univ. of Ljubljana, Slovenia
Mike Wilde, ANL/Univ. of Chicago, USA
Hai Zhuge, ICT, Acad. of Sciences, China

IMPORTANT DATES

Submission deadline: February 10, 2006
Acceptance Notification: March 6, 2006
IPAW'06 date: May 3-5, 2006

LOCATION

Gleacher Center, downtown Chicago, Illinois.

INFORMATION FOR AUTHORS

IPAW'06 encourages the submission of theoretical, experimental, methodological, and applications papers related to the issue of provenance and annotation.

Papers should be original, not submitted elsewhere, and no longer than 8 pages (LNCS format). Submissions will be peer reviewed and selected for presentation at the workshop; papers will be evaluated on the basis of the quality of their technical contribution, originality, soundness, significance, presentation, understanding of the state of the art, and overall quality.

Proceedings will be published after the workshop in the Lecture Notes in Computer Science series by Springer-Verlag. Submission instructions can be found at www.ipaw.info/ipaw06/submission.

IPAW'06 is a follow-up to workshops in Chicago in October 2002 (www-fp.mcs.anl.gov/~foster/provenance/) and in Edinburgh in December 2003 (www.nesc.ac.uk/esi/events/304/). It will further investigate the issues of data provenance, process documentation, data derivation, and data annotation.

In scientific, engineering and business workflows, typically data is repeatedly copied, corrected, and transformed as it passes through numerous databases or services. Understanding where data has come from and how it arrived in a database or filestore is of crucial importance to the trust a user will put in that data, yet this information is seldom captured properly.

The importance of provenance goes well beyond verification; it is closely related to archiving and annotation, also important in the context of scientific, engineering and business data. Moreover, it may be used in data discovery. Knowing the provenance of a data item may help a user to make connections with other useful data. Alternatively, a user may want to understand a derivation in order to repeat it with modified parameters, and being able to describe a derivation may help a user to discover whether a particular kind of analysis has already been performed.

Annotation is closely related to provenance. End users do more than produce and consume data: they comment on it and refer to it, and to the results of queries upon it. Annotation is therefore an important aspect of communication. One user may want to highlight a point in data space for another to investigate further. They may wish to annotate the result of a query such that similar queries show the annotation.

Topics of interest to IPAW'06 include but are not limited to:

- models of provenance and annotation
- authenticity metadata (assertions made by the data creator)
- integrity metadata (assertions managed by a preservation environment)
- annotations (assertions made by users)
- curation metadata
- applications requiring provenance, use cases, methodologies
- provenance systems, functionality, protocols, implementation
- relationship between provenance, annotation and metadata
- provenance-based reasoning and Semantic Web technologies
- relationship between workflows, processes and provenance
- security considerations for provenance
- scalability issues
- granularity of provenance
- (design) intent capturing through provenance
- legal issues relating to provenance
- provenance, business processes and compliance

Figure 12: Call for papers at IPAW06

Collaborations

Organ Transplant Management

A distributed healthcare application in the
EU Provenance Project
UNIVERSITAT POLITECNICA DE CATALUNYA

Aerospace Engineering

An aerospace design engineering simulation
in the EU Provenance Project
GERMAN AEROSPACE CENTER, DLR

The Amino Acid Compressibility Experiment

KLAUS-PETER ZAUNER, UNIVERSITY OF SOUTHAMPTON

China Grid

One of the world's largest Grid implementations
UNIVERSITY OF LEEDS AND UNIVERSITY OF BEIHANG.

Karma performance comparisons

A Provenance framework for scientific workflows
UNIVERSITY OF INDIANA

The e-demand Project

A demand-led service-based architecture
for dependable e-Science applications
UNIVERSITY OF LEEDS

SoCa

The Southampton Chicago Activity
UNIVERSITY OF SOUTHAMPTON AND
UNIVERSITY OF CHICAGO



Figure 13: All Hands Meeting Poster 1

Southampton Provenance Infrastructure

Software

PreServ

A provenance-specific storage service that allows the recording and retrieval of process documentation.

SimpleDom, DomMap, LaxQuery

A set of tools comprising a mapping technology which exposes arbitrary data sources containing potentially large data as queryable XML.

PreView

A set of visualisation tools for investigating provenance.

Grimoires

Hosts descriptions of services and workflows, which a scientist can use for forming complex scientific experiments.

The Provenance Client Side Library

A collection of functions that allows application developers to provide the provenance recording and querying functionality to application components.

Validation Engine

A component that evaluates past processes from documentation of their execution using semantic descriptions of services and data.

Projects

EUProvenance: www.gridprovenance.org

PASOA: www.pasoa.org

Grimoires: www.grimoires.org

Sponsors

EPSRC

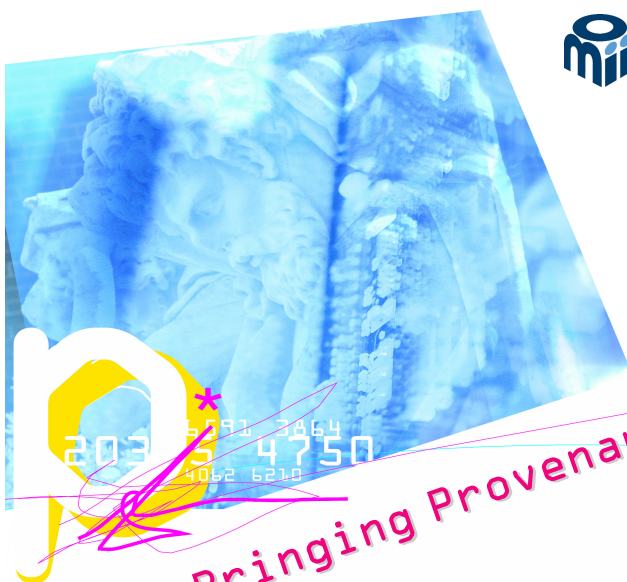
Engineering and Physical Sciences
Research Council



Information Society
Technologies



open middleware
infrastructure institute uk
www.omii.ac.uk



provenance.ecs.soton.ac.uk

Figure 14: All Hands Meeting Poster 2