



DARIAH Newsletter

Digital Research Infrastructure
for the Arts and Humanities

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SDH 2010: Conference Report



Peter Doorn, DARIAH Director, welcomes delegates to Vienna

The European arts and humanities infrastructure projects DARIAH and CLARIN jointly organised and convened the conference "Supporting the Digital Humanities 2010" (SDH 2010) at the Technical University of Vienna, October 19-20. Approximately 150 delegates attended two days of presentations and discussions on a range of topics at the cutting edge of humanities research, focusing on how infrastructures can broaden and enrich research activities

across the spectrum of the arts and humanities.

The conference began with an interesting keynote from Neil Fraistat, director of the Maryland Institute for Technology in the Humanities and Co-chair of centerNet, on the subject of "Digital Humanities Centres as Cyberinfrastructure." Professor Fraistat emphasized the importance of DH centres in providing infrastructure services to the wider community - and in turn, how the implementation of such infrastructures can break down the tendency for resources to become 'siloed' in their local context.



Neil Fraistat

The parallel sessions of SDH 2010 covered such diverse topics as manuscript studies, linguistics, musicology, archaeology and socio-economic history. Delegates from many international universities and research institutions presented aspects of contemporary research in the context of research infrastructures. Many discussions focused on how to take arts and humanities research to the proverbial 'next level' in terms of its degree of integration and interoperability with similar resources at different locations.



SDH-NEERI Venue, the Technical University of Vienna

There was a strong emphasis on community-building and on the need for infrastructures to support researchers' efforts at collaborative projects. Wider access to data, and to a platform upon which to work in collaboration with others, was seen as critical to expanding the context of current and future research.

Many scholars reported a strong involvement with technologies which support their research, but lamented the

lack of a more formally established, and usable, research infrastructure to underpin their work. This echoes sentiments expressed by many members of the DARIAH community: the time is now for a research infrastructure for the arts and humanities.

NEERI 2010: Event Report

The Networking Event for European Research Infrastructures (NEERI 2010) took place at the Technical University of Vienna on October 21, 2010. NEERI 2010 was the second networking event of its kind, providing a follow-up to NEERI 2009 held in Helsinki. The goal of NEERI 2010 was to exchange ideas on a number of topics relevant for research infrastructures and to clear common ground on the further development and application of these topics. NEERI focuses on what we share and what we can learn from each other. Examples of such commonalities are architectural issues, communication with users and integration of services and tools.

NEERI Keynote: Laurent Romary

The day commenced with a very interesting keynote from Laurent Romary in which he discussed the European Commission's Report of the High-Level Expert Group on Scientific Data (October 2010), entitled *Riding the Wave: how Europe can gain from the rising tide of scientific data*¹ and its impact on the humanities and social sciences.

The expert group considers it of utmost importance that research infrastructures establish collaboration in all important organisational and technical aspects, towards a vision of a "scientific e-infrastructure that supports seamless

¹ <http://bit.ly/ag7sMT>

access, use, re-use and trust of data. In a sense, the physical and technical infrastructure becomes invisible and the data themselves become the infrastructure – a valuable asset, on which science, technology, the economy and society can advance."



NEERI Speakers engaging with their audience

This would enable better collaboration among researchers, increase the productivity of research, allow for sharing, use and re-use of data, while at the same time preserving data authenticity, integrity and trustworthiness. It is both a challenge and an opportunity to establish proper data management and data integration infrastructures - having in mind the scale, complexity and diversity of data, as well as its continuously accelerating growth.

Beneficiaries of such established, living and collaborating research infrastructures would comprise not only researchers, but also the general public, funders and policy makers, as well as enterprises and industry. Therefore, EU and national agencies must define clear strategies and ensure sufficient resources for their implementation.

The expert group had developed an initial wish list (adapted from a PARADE White Paper¹) containing minimum requirements that such an infrastructure

must fulfill: long term preservation, persistent identification, standardisation of metadata, format- and semantic-level interoperability, proper implementation of access rights, enabling large groups of researchers to operate on the data, regular quality assessment and metrics on data usage, availability and reliability to feed back into further improvement of the infrastructure.

Connecting the European Grid Infrastructure (EGI) to Research Communities

**Steve Brewer, Chief Community Officer,
European Grid Infrastructure (EGI)**

Steve Brewer gave an overview of EGI development and how EGI works towards achieving the goal of increasing the number of scientists and research groups that actively use and benefit from the grid. Communities have to be actively supported technically by enabling innovation in technologies (grids, clouds, virtualisation) and innovation in software which provide reliable and persistent platforms, and also by supporting international research (e.g. ES-FRI).

Additionally, human networks have to be developed and cultivated, because ultimately, humans are the users of such infrastructures. This is through both general (training events, material, help-desks, user and technology meetings) and discipline-specific services. Continuous definition and verification of user requirements has to be established as a main focus. Initiatives need to be grouped into virtual organisations to better address issues through setting up of virtual research communities, which is certainly an approach that can be re-used for humanities- and social sciences- oriented research infrastructures.

¹ <http://bit.ly/3AoEnZ>

Research Infrastructures and the DARIAH Approach

Sheila Anderson, Kings College London

Sheila Anderson opened up by discussing the notion of data from two perspectives: data as discrete sources, and data as information used and developed by communities. She presented DARIAH's approach towards supporting researchers in their choice of research networks via architectural participation and collective intelligence.

DARIAH is approaching research infrastructure development through direct engagement with users, i.e. via seminars, workshops, discussion groups to raise awareness and help with both general and concrete research questions. It was further emphasized that awareness-raising of research infrastructures should not be sole task of the projects. There is also a strong need for funders and evaluators to endorse and encourage their use.



The collective intelligence approach, which integrates data from isolated information sources and feeds this information back to the community, generates new insights into the data itself, as well as revealing details about who is using the data and how they are using it. One possibility is to include these activities in educational institutions via, for example, Master's programs, as well as

educating and supporting researchers, and federation of data with other research infrastructures (e.g. CLARIN).

Grids, Clouds and Research Infrastructure

Peter Wittenburg, Head of the Language Archive, Max Planck Institute for Psycholinguistics

Peter Wittenburg gave a very interesting definition of grid and cloud terms, and outlined how a humanities researcher would benefit from such a resource, having in mind the nature of research in humanities: it is highly unpredictable; usually small and focused projects but with scattered and diverse data; projects have a need for data to be sustainable.

However, there are still issues with willingness of researchers to share their data, most probably due to amount of non-automated and intellectual work invested in the data - researchers are sensitive to ownership. In general, computing over structured data is not an issue here, rather is the question how to quickly enable tools that can "simulate human mind".

DARIAH and CLARIN are certainly large European e-infrastructure projects trying to address some of these issues - to enable reliable, sustainable and trustworthy data storage that ensures data integrity, authenticity, visibility, accessibility, interpretability, etc. Such infrastructure must implement corresponding mechanisms for authorisation and authentication, but also offer services and tools to work across scattered data resources.

How do grid- and cloud-related projects contribute to social sciences and humanities (SSH)? Grids are mostly used for data storage in SSH sector, despite

projects such as TextGrid¹ (Germany; SSH researchers using TextGrid are not even aware if they are using cloud services or not. This may be considered as positive outcome). Whether SSH can benefit from grids/clouds is still not completely clear. There are many issues concerning financing, data ownership, long term data accessibility- especially when it comes to usage of cloud-based services - "is AMAZOOGLE for data what Elsevier are for publications"?



Even if cloud-based services do not have to be commercial, there is still considerable upfront work to enable research clouds to be interoperable and unburdened from commercial use. Standardisation is certainly an issue (work started at DMTF, see <http://www.dmtf.org/standards/cloud>). In the end, it is all about services that shall be offered to the researchers. Still the question is whether SSH related e-infrastructure projects can make an optimal use of all the knowledge and experience from decades of grid development?

Bob Jones, Senior Staff Member, CERN

Bob Jones provided insight into the Pan-European computing infrastructure, including high-speed networking (GEANT²), and suggested opportunities and challenges for how e-infrastructures can evolve in the future to satisfy Europe's research communities' requirements.

The European E-Infrastructure Forum (EEF³) is seen as one of the primary instruments which facilitate discussion of the principles and practices of the creation of synergies between various and distributed e-infrastructures, with the common goal of achieving interoperability. The Forum held several workshops in 2009 and 2010 to gather further information about ESFRI project requirements. In total, 28 projects were consulted including 5 from the SSH sector (CLARIN, ESS, DARIAH, SHARE, CESSDA). The resultant project requirements can be summarised as: usage of standards in technology and metadata; interoperability; rights management; advanced services for collections management; multilingual support; linked data and persistent identifiers; among others.

These issues are especially complex to address when one considers combination of grids, clouds, supercomputers and volunteer computing as a combined e-infrastructure ecosystem. There are a lot of issues to be worked out, and there is not yet a single, cohesive solution. It could perhaps be a useful approach to start to aim for interoperability and keep applications agile. The question still remains how could this be applied in the SSH sector (as P. Wittenburg also states).

Next steps could address the harmonisation of already existing services - by enabling them to talk to each other (interoperability, single-sign-on, standards, persistent storage and identification, monitoring, billing and accounting services) as well as improved user support, training and consultancy. Continuous work on the requirements and feedback from users and usage data has to be invested. The process is durable and itera-

¹ <http://www.textgrid.de>

² <http://www.geant.net>

³ <http://www.einfrastructure-forum.eu>

tive, and can be strengthened by joint projects and activities.

Rutger Kramer, Software Development
Coordinator, DANS

Rutger Kramer emphasized the possibility for using existing grid technologies and referenced the CESSDA-PPP Report on usage of grids and clouds in e-infrastructure.¹ Even though the report gives quite comprehensive overview of both grid and cloud technologies in terms of possibilities and drawbacks, it focuses on several main use-cases which are related to cross-national comparative research, data analysis, data set harmonisation, and survey producers. The report however does not make a clear recommendation for any particular grid/cloud technology and is missing further details on areas of overlap between the explored use-cases in a common e-research infrastructure.

Rutger pointed out that, in general, problems are not to be seen solely from the aspect of the possibilities/drawbacks of the existing technologies, rather it is about accelerating the coordination and distribution of efforts in development of standards for registries and information exchange, services (visualisation, transcription, etc) and persistent storage into a common platform. Considering grids as such a common platform, future e-infrastructure projects could use a single sign-on scheme or similarly implemented mechanisms to share resources. It certainly needs enhancement and adaptation; however it could be used as a basis for building of applications. Re-using existing grid platforms would be less costly and hazardous.

DARIAH on its way to Construction Phase



DARIAH is scheduled to embark on the construction phase of the project in 2011. As part of continuing preparations for the construction phase, a second meeting² with funding agencies from all countries participating in the DARIAH preparatory phase was organised, which took place on 22 and 23 June 2010 in Paris.

During the meeting, information on the progress of the preparatory project was presented. This included discussions of endeavours within the e-humanities to which DARIAH would be of service, a draft of the DARIAH statutes and financial calculation, information about the further development of the Virtual Competency Centres (VCCs), among other topics. The focus of discussion then turned towards seeking input from funding agencies about how DARIAH can help to implement national ICT strate-

¹ http://www.cessda.org/project/doc/D11.1b_Sustainability_CESSDA_e-Infrastructure.pdf

² The first funding agency roundtable was held in Oxford in December 2009. See article in DARIAH newsletter #5

gies and meet governmental and European ambitions for innovation, science, and technology in the arts & humanities.

One main topic was the joint signature of a non-binding memorandum of understanding (MoU) by the national funding agencies. As this could be a helpful step for the establishment of DARIAH and the promotion of the project on the national roadmaps, it was decided to write such an agreement.



L to r: Dr. Heike Neuroth, Hervé Péro, Antonis Antonopoulos, Prof. Jane Ohlmeyer

In general, the feedback during the round table meeting was very positive. There was consensus on DARIAH's plan to adopt the European Research Infrastructures Consortium Framework¹ (ERIC) as its future legal form and to establish a funding model proportionate to the GDP (Gross Domestic Product), a systemic approach which will provide DARIAH the flexibility necessary to respond to national conditions. As result, the DARIAH ERIC will be established by several founding countries, with many others planning to join at a later stage.

Within the next weeks and months, DARIAH is going to focus on several activities to prepare the transition to the construction phase. The memorandum of understanding will be finalised after national funding agencies have provided

their feedback on the draft prepared by DARIAH. This document can then be signed by the ministries.

In parallel, the ERIC statutes will be re-worked and distributed amongst the funders to get feedback. After finalisation of the statutes and agreement therewith by potential signatories, the DARIAH ERIC application can be submitted to the European Commission by the government of the prospective legal seat of DARIAH (France). This action is currently planned for the end of 2010. This would mean that the DARIAH ERIC will be expected to come into force in the middle of 2011.

IRCHSS Signs DARIAH Memorandum of Understanding



L to r: Prof. Jane Ohlmeyer, Dipti Pandya, Maria O'Brien

(Note: see our profile of what's new at the IRCHSS further on in this newsletter. -ed.)

Following the recent DARIAH Management board meeting at Trinity College Dublin on Friday October 1st, 2010, the director of the Irish Research Council for the Humanities and Social Sciences² (IRCHSS), Dipti Pandya, signed the

¹ <http://bit.ly/9H3XPD>

² <http://www.irchss.ie>

DARIAH memorandum of understanding (MoU), expressing full support of the DARIAH project and its future both in Ireland and across Europe.

The MoU helps lay the path towards the construction of DARIAH under the European Research Infrastructures Consortium Framework¹ (ERIC).

In addition to IRCHSS director Pandya, Jane Ohlmeyer (IRCHSS/Trinity College Dublin) and Maria O'Brien (IRCHSS) were also on hand for the signing ceremony, which was attended by representatives from the university sector, the Irish research and IT sectors, along with members of the DARIAH management board.

Professor Ohlmeyer had this to say about the MoU signing: "This is an important moment for the continuing development and enhancement of the digital humanities in Ireland. We believe strongly in the potential of DARIAH for enabling and supporting research."

Such sentiments were echoed by DJ McCloskey from IBM Ireland's LanguageWare Group²: "We love what's happening in the digital humanities right now. The overlap between what IBM is doing and what DARIAH is doing points the way to fascinating future collaborations". These could include wider application of tools developed for natural language processing, said McCloskey.

Representatives of the FP7 Cultura project were also on hand. Dr. Owen Conlan, of Trinity College's School of Computer Science and Statistics, a partner in Cultura, underlined the importance of personalisation, social networking analysis and community building for leveraging the engagement of users with all manner

of digital humanities artefacts and collections. "Computer Science and Humanities research complement each other very well" said Dr. Conlan, pointing to the interplay between each and how they serve to "push each other to constantly innovate and develop."

CHAIN Panel Session at DH2010

In a panel session at the Digital Humanities 2010³ conference (July 7-10, King's College London, UK), representatives of key organisations and infrastructure initiatives explained some of the ways in which they are engaged in building services to support research in the humanities, and were asked to address the following questions: What are the main barriers to progress? What are the most exciting opportunities?

The panel was organised under the umbrella of CHAIN, the Coalition of Humanities and Arts Infrastructures and Networks.⁴ Session chair Martin Wynne introduced CHAIN as a forum for discussion, with a very light-weight organisational structure, with fluid membership and boundaries, no budget, and meeting only when necessary. CHAIN participants have resolved to work together on advocacy for improved infrastructure, and on aligning our infrastructure initiatives to allow the maximum interoperability of services.

John Unsworth for the Association of Digital Humanities Organisations⁵ (ADHO) gave an interesting overview of the current state of the digital humanities, and how it was becoming 'sexy', to

¹ <http://bit.ly/9H3XPD>

² <http://bit.ly/cCxUKI>

³ <http://dh2010.cch.kcl.ac.uk>

⁴ <http://www.arts-humanities.net/chain>

⁵ <http://digitalhumanities.org>

the surprise of many long-standing practitioners. He made an appeal for the audience to be more open and outgoing beyond our own cliques and sub-communities in order to make bigger impacts.

Neil Fraistat unveiled centerNet's¹ exciting new website, and emphasised the importance of digital humanities centers. He also drew attention to the dangers of creating digital silos, where collaboration only occurs on small scale projects, with no coordination on "big issues" such as linking and sharing data sets and providing shared services. Neil promoted centerNet's ambitious expansion plans, with already affiliate regional steering committees in Asia Pacific, Europe, North America, and Britain and Ireland. Neil saw the current challenges relating to crossing national boundaries, cultural divides, and language communities, especially given the lack of truly international funding opportunities. A key challenge now is for centerNet to deliver a sustainable governance and business plan, and there is the perennial problem of translating good intentions into effective action.

Steven Krauwer presented CLARIN², a European federation of digital archives with language data and resources, building an e-infrastructure with uniform single sign-on access to language and speech technology tools to retrieve, manipulate, enhance, explore and exploit data, with a target audience of humanities and social sciences scholars. In terms of barriers and problems, Steven was happy to report good progress in all technical areas, but that the risks appeared in relation to sustainability and take-up by users.

CHAIN offers an opportunity for CLARIN to work together with other infrastructures on issues such as defining business models and criteria for success, in order to make the infrastructures, data and tools sustainable. There are also opportunities for us to work together to address legal and IPR issues, to introduce simplified licensing schemes and to influence legislators. CHAIN also offers important routes to access communities of potential users of infrastructures outside of CLARIN's current network. Coordination is the key, otherwise a multiplicity of infrastructure initiatives risks making the problem of fragmentation even worse.

Sheila Anderson presented the ambitious plans of DARIAH to enhance and support digitally enabled research across the humanities and arts through the establishment of virtual competency centres, focusing on four areas: research and education; infrastructure; content and legal; and advocacy, outreach and promotion. Sheila explained how the vision for DARIAH was not just about technology, but as much social and cultural, involving changes in the ways in which we think about research objects and practice, and in a new social model for the exchange of data and ideas. Effecting these changes will involve harnessing the collective intelligence of the digital humanities in new and innovative ways.

David Robey introduced the Network of Expert Centres in Britain and Ireland³, a new network aiming to preserve some of the gains of former programmes such as the AHDS and Methods Network, and the large investments that have been made in digital outputs. The Network is based around arts-humanities.net, a community support and knowledge base that provides the minimum necessary

¹ <http://digitalhumanities.org/centernet>

² <http://www.clarin.eu>

³ <http://www.arts-humanities.net/noc>

virtual infrastructure in the current situation of a lack of national provision or funding.

Chad Kainz joined us via Skype in the middle of the night from Chicago and told us the latest developments in Project Bamboo¹. The Bamboo Technology Proposal, which outlines the project's plan for transitioning from a planning project to its first phase of implementation, has been reviewed and approved by the Andrew W. Mellon Foundation. Bamboo is a multi-institutional, interdisciplinary, and inter-organisational effort that brings together researchers in arts and humanities, computer scientists, information scientists, librarians, and campus information technologists to tackle the question: How can we advance arts and humanities research through the development of shared technology services? The Technology Proposal will provide such tools and services and platforms, and is set to be a key part of the jigsaw in the emerging international e-infrastructure. One of the key challenges today is to engage with European and other international initiatives in order to ensure that the maximum possible interoperability of tools and datasets.

This year's panel session demonstrated the gains of a year of development work and increased coordination activity. There is still much to be done, but there was a refreshing openness and willingness to cooperate which will be the key to overcoming the current fragmented environment.

Learn more about DARIAH!

Visit the DARIAH website: <http://www.dariah.eu>

Send us an e-mail: info@dariah.eu

Focus on DARIAH Partners

Archaeology Data Service



DARIAH partner the Archaeology Data Service (ADS), based at the University of York in the UK, has been busy on a number of research infrastructure projects both within the DARIAH project and without. The ARENA 2 cross-searching portal developed for DARIAH by the ADS is nearing completion and draws together a number of European monument inventories for cross-searching by archaeological researchers using SOAP based technologies. ARENA stands for 'Archaeological Records of Europe Networked Access', ARENA 2 will in the first instance feature datasets from the Netherlands, Scotland, Romania and England, with further data from Denmark and Poland being added in the near future. As well as the ability to search across these data using keywords and top-level 'site type' search terms the new portal features an mapping interface to allow users to interactively specify their area of interest.

This means that archaeological researchers looking for say, the occurrence of a particular form of prehistoric monument across many countries, should be able to search relevant datasets from a single site without having to laboriously track down the data from each individual country. Over the last couple of years the prototype portal has been demonstrated and well received at a number of archaeological events including the Institute for Archaeology

¹ <http://projectbamboo.org>

Conference 2010 in the UK, the Digital Heritage Symposium in Adelaide, Australia, several Higher Education Academy conferences and a Digital Curation Centre information day. This is in addition to as numerous presentations aimed directly at higher education researchers.

In parallel to the development of the this cross-search portal the ADS has been working in collaboration with Arizona State University in the United States on a JISC(UK)/NEH(USA) funded project to apply the same principles to cross-searching UK and US based archaeological archives. The Transatlantic Archaeological Gateway (TAG) project uses a similar technical approach to ARENA 2 with the metadata for archives being query-able remotely via web services and a mapping interface allowing for the selection of relevant geographical areas. This holds out the promise of researchers on both sides of the Atlantic being able to cast their searches wider beyond Europe to cover archaeological data hosted in the United States institutions, much of which actually takes place in Europe itself.



The King's Manor, where ADS is based

The ADS has also joined with other heritage bodies, including DARIAH partners, in participating in a Europeana content provision project called CARARE. Europeana is an EU funded project to make accessible digital cultural resources, such as paintings, music, films and books from Europe's galleries, libraries, ar-

chives and museums from a single searchable interface. CARARE's objective is to bring content for archaeology and historic buildings to Europeana users. CARARE has a role, both as an aggregator, i.e. drawing together data from the archaeology and buildings sector, and in developing access to online 3D content which is not currently well represented in Europeana.

The ADS will be delivering lots of exciting content to the Europeana in the form of archaeological images, 3D models and other resources, but in addition the ADS is tasked with looking to the important question of how such aggregators continue after their initial funding has run out. This aspect of sustainability is a vital question for the development of much research infrastructure in Europe and around the world, there are some important questions to be asked about how such infrastructure can be sustained after the initial set up funding period is over. Working together with partners from all over Europe the ADS is carrying out a review of funding models in the cultural heritage data curation sector and over the next two years will be developing that review into analysis and recommendations on ways that exciting projects such as ARENA2, TAG and CARARE can have a long term future as part of the European research landscape.

Focus on DARIAH Partners

Irish Research Council for the Humanities and Social Sciences (IRCHSS)

Exciting Developments for Digital Humanities in Ireland

Taoiseach Brian Cowen and Batt O'Keeffe, Minister for Enterprise, Trade

and Innovation recently announced the results of Cycle 5 of the Programme for Research in Third-Level Institutions (PRTLII). PRTLII 5 brought some excellent news for digital humanities in Ireland. Under this cycle two major digital humanities projects will be funded, with a combined investment of c. €12M starting in 2011 for 4 years.



The first, the **National Audio Visual Repository**¹ (NAVR), is a pan-island consortium, led by the Royal Irish Academy, involving universities, devolved/supporting partners, cultural institutions, HEA-net and industry which will build a trusted digital repository for audio/visual research materials (full list of partners below).

The second is a **Graduate Research Education Programme in Digital Arts and Humanities** involving TCD (lead), NUIG, NUIM, UCC and the RIA, in partnership with QUB and UU in Northern Ireland and Google, IBM, Intel and Microsoft. This graduate research programme is unique and will provide world-class training in innovative models of arts practice and theory, and humanities research, archiving and pedagogy.

The programme will promote advanced practical and academic research in the application of new media and computer technologies in the arts and humanities. It will be multi-disciplinary and inter-institutional and will provide coherent exposure to transferable skills in digital

content creation that will be enabling, academically rigorous and commercially viable. The programme will help to ensure that Ireland becomes a centre of excellence in digital humanities research and education.

National Audio Visual Repository (NAVR)

Partners: Royal Irish Academy; National University of Ireland, Maynooth; Trinity College Dublin; Dublin Institute of Technology; National University of Ireland, Galway

Devolved Partners: National College of Art and Design

Supporting Partners: Dublin City University; Queen's University Belfast; University College Cork; University of Ulster; Centre for Cross Border Studies; Chester Beatty Library; Consortium of National University Libraries; HEAnet; IBM; Intel; International Centre for Local and Regional Development; Microsoft Ireland; National Archives of Ireland; National Economic and Social Forum; National Gallery of Ireland; National Library of Ireland; Raidió na Gaeltachta; Raidió Telefís Éireann; Telefís na Gaeilge 4; Western Development Commission

Digital Arts and Humanities Structured PhD Programme (DAH)

Partners: Trinity College Dublin; National University of Ireland, Galway; National University of Ireland, Maynooth; Royal Irish Academy; Trinity College Dublin; University College Cork

Devolved Partners: Queen's University, Belfast; University of Ulster

Supporting Partners: Google; IBM; Intel; Microsoft

¹ <http://bit.ly/9PO5AC>