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Background

I am an interdisciplinary researcher working at the interfaces of heritage, geoscience, remote sensing, plant science, environmental science, soil science, computing and knowledge engineering. I have undertaken research in a number of contrasting departments (humanities, social science and science) and am committed to approaches that maximize academic, industry, policy and public impact. As an advocate of Open Science I am active within the Open Knowledge community: specifically the Open Archaeology working group at the Open Knowledge Foundation (OKF)). My publications are available as [Open Access](#) with metrics on [google scholar](#), my presentations are [available on slideshare](#), my [illustrations are available on Wikimedia Commons](#) and my research data is available on the [DART portal](#) under CC-BY and ODbL licences. I believe that Open Data and Linked Data have the potential to dramatically transform the practice of science in society and social engagement with public and policy processes.

I retain an interest in a broad range of topics beyond my main focus on remote sensing, where I am particularly concerned with archaeological prospection dynamics and heritage monitoring. I have maintained an emphasis on practical applications and engagement with practitioners, the public and policy makers. Collaborative topics include:

- The impact of open digital approaches on archaeological practice, policy and engagement
- Ecology, environment and heterogeneous data management in Oman
- Characterising archaeological detection dynamics (soil and plant) and the use of heritage remote sensing to support the European Landscape Convention
- Worldwide archaeological satellite applications
- Integration of heterogeneous utility data
- Repurposing and enhancing Ordnance Survey and Open Street Map by integrating other open data resources

At the beginning of 2014 I started working for [1Spatial](#) as a geostatistical data administrator. Over a forty year period 1Spatial have developed enterprise level spatial data management tools which are in use by National Mapping Agencies throughout the world (including Ordnance Survey). The 1Spatial software management suite focuses on mining and rule based systems that can be used to

enhance quality, demonstrate conformance, generalise, re-purpose and analyse large scale data. The emphasis on establishing and improving underlying data quality will become increasingly important within the business, policy and research sectors when transparent workflows (that expose the transformations that occur to open data) can be used to scrutinise the decision making process. Quality, credibility and legitimacy are likely to be key criteria in the future open data landscape.

In this respect Open Data has the potential to fundamentally alter the digital ecosystem. Decisions can be made on the most up-to-date data which will improve the policy, business and research process, which is particularly important for national and trans-national management and policy formation activities. To maximize impact these approaches demand an Open ecosystem.

Problems I'd like to see discussed at the workshop

I would like to attend the workshop to get a different perspective on the issues surrounding:

- licensing
 - particularly the on-going development of license calculus to articulate both downstream licence types and licence incompatibilities during a data integration process (i.e. it should highlight that you can not create derivative products when you integrate a data set under a CC-SA licence with a data set under a CC-NC-SA licence as the licences are incompatible)
- ethics
 - the impact of ethics in a world where the default position is 'open'
- quality and credibility
 - the perceived importance of quality and credibility by the audience and how the community can develop meaningful metrics for these
- the impact of workflows, models and derivatives on decision making
 - in a world where fine scale data is openly exposed there are competing models which can be used to explain phenomena. The challenge for the decision maker is to determine, given the expected (or modelled conditions) which of the available models is the most suited for the decision making process. Issues of risk, benefit and impact need to be explored and articulated in a machine readable way.

I am also interested in how open data advocates can collectively improve the range, quality and licence openness situation from different data holders. I am looking into this issue from a heritage perspective and lobbying the Heritage Lottery Fund to relax the licensing conditions they mandate in their otherwise excellent guidance entitled [Using digital technologies in heritage projects](#). The preliminary working response from the community is [here](#).

I am too early in post to discuss 1Spatial related data integration issues and challenges although if the committee would like a presentation on this topic then I am sure something can be prepared for the workshop.

Presentation: First steps towards an Open Science approach in archaeology

I was the ‘champion’ and co-ordinator for the DART project. This project was funded through the Science and Heritage Programme to develop deeper understanding of the physical, chemical and biological contrast factors and detection dynamics associated with geophysical and electromagnetic detection of subsurface archaeology. This will allow the identification of appropriate sensors and conditions for archaeological feature detection. DART was established as an Open Science project. This presentation will focus on the experiences of developing an Open Science project which straddled the science, arts and humanities research sectors. A similar presentation was given at the recent Science and Heritage conference. A video can be found on [youtube](#)

The Royal Society report ‘[Science as an open enterprise](#)’ considers current methods of scientific enquiry and identifies how 21st century communication technologies are changing traditional scientific approaches leading to new ways in which scientists conduct, and society engages with, science. The document recognises that ‘open’ enquiry is pivotal for the success of science both in research and in society. This goes beyond open access to publications (referred to as Open Access) by increasing access to data and other research outputs (Open Data) and the process by which data is turned into knowledge (Open Science). The underlying rationale of Open Data is that promoting unfettered access to large amounts of ‘raw’ information enables patterns of re-use and knowledge creation that were previously impossible and/or largely unanticipated. The creation of an openly accessible corpus of rich data introduces a range of data-mining and visualization challenges that require multi-disciplinary collaboration across domains (within and outside academia) if their potential is to be realised. The corollary is that knowledge-led policy and practice can transform communities, practitioners, science and society. An important step towards this is creating frameworks which allow data to be effectively accessed and re-used.

The data collected by DART is of relevance to a broad range of different communities. Open Science was adopted with two aims:

- To maximise the research impact by placing the project data and the processing algorithms into the public domain.
- To build a community of researchers and other end-user around the data so that collaboration, and by extension research value, can be enhanced.

Open Science advocates opening access to data, and other scientific objects, at a much earlier stage in the research life-cycle. Open Scientists argue that research synergy and serendipity occurs through openly collaborating with other researchers (more eyes/minds looking at the problem). Of great importance is the fact that the scientific process itself is transparent and can be peer reviewed: by exposing data and the processes by which these data are transformed into information other researchers can replicate and validate techniques. As a consequence it is believed that collaboration is enhanced and the boundaries between public, professional and amateur are blurred. Whilst DART has not achieved all its aims it has made significant progress and has identified some barriers in achieving such open approaches.

Key to this is the articulation of issues surrounding data-access (accreditation), licensing and ethics. Who gets access to data, when and under what conditions is a serious ethical issue for the heritage sector. This needs a co-ordinated cross-cutting approach to be resolved.

The archaeological knowledge base should be, by definition, dynamic: It is predicated on the complex relationship between the corpus of knowledge, theory and classification systems. These relationships are fluid and contain many interlinked dependencies which means that variations in one constituent part can have complex repercussions. A better understanding of archaeological hermeneutics will occur as stakeholders become more used to dealing with a dynamic archaeological corpus.

Useful URLs:

- [Workshop page](#)
- [1Spatial](#)
- [Using digital technologies in heritage projects](#)
- [Heritage Lottery Fund licence lobbying](#)
- [Science and heritage presentation](#)
- [‘Science as an open enterprise’](#)