RAILWAYS: INDUSTRIAL AND MARITIME ARCHAEOLOGY, GEOGRAPHIC INFORMATION SYSTEMS, HISTORY AND CULTURE
CAMINHOS DE FERRO: ARQUEOLOGIA MARÍTIMA E INDUSTRIAL, SISTEMAS DE INFORMAÇÃO GEOGRÁFICA, HISTÓRIA E CULTURA

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Dominic Fontana is Senior Lecturer in Geography at the University of Portsmouth and is a Fellow of the Royal Geographical Society. As a mature student he read for a BA in Geography at Portsmouth Polytechnic and then continued his studies, taking his PhD at University of Portsmouth, during which time he also became a lecturer in Geography. Earlier in his career Dominic worked for British Railways for five years following which, he spent five years working as archaeological photographer on the Mary Rose project. This major maritime archaeological project excavated and recovered Henry VIII’s warship from the Solent seabed in October 1982. More recently, he has been involved in making several television documentary films about archaeology, the Mary Rose and one exploring the events of the Battle of Hastings in 1066. He has worked on projects and exhibitions at The Tower of London and Hampton Court Historic Royal Palace. In conjunction with the Mary Rose Trust, he is currently researching the July 1545 “Battle of the Solent” in which the Mary Rose was lost. He is also working on a project with The Royal Collection to better understand two of Henry VIII’s major historical paintings.

Abstract

Railways, and their associated industrial archaeology, are an area of immense fascination to me as I began my working career as a railwayman at the age of 16.
Consequently, I must be one of very few academics who have used much of the 19th century railway technology in a real world context as part of a national railway system. After the railway, I worked on the maritime archaeological project to excavate and recover the remains of Henry VIII’s warship Mary Rose and subsequently, as an academic geographer specialising in the application of GIS technology to archaeological and historical studies. This unusual combination of career experience has provided considerable insight into the complexity of data, which arises from both archaeological and historical study within a spatial, geographical context. This paper considers some of the potential range of data which may be held within a GIS and offers some suggestions for innovative approaches for the utilisation of such data within historical, archaeological, cultural and railway projects. GIS technology is considered as an enabling technology which can assist researchers by providing an exploratory “tool for thought”.

Os caminhos de ferro, e a arqueologia industrial associada, são para mim uma área de grande fascínio, pois comecei a minha vida profissional, com a idade de dezasseis anos. Serei por isso um dos poucos académicos que usaram a tecnologia ferroviária do século dezanove no contexto real de um sistema nacional de ferrovias. Depois do caminho de ferro, trabalhei num projeto de arqueologia marítima, para escavar e recuperar os destroços do navio de guerra Mary Rose, do Rei Henrique VII, e depois como académico em geografia, sobre aplicações de tecnologias SIG a estudos históricos e de arqueologia. Esta combinação pouco habitual de experiências profissionais proporcionou uma visão aprofundada sobre a complexidade dos dados resultantes quer de estudos históricos como arqueológicos com um contexto geográfico e espacial. Este trabalho trata os vários tipos de dados que podem ser integrados num SIG e sugere algumas abordagens inovadoras para a utilização desses dados em projetos de arqueologia, caminhos de ferro, história e cultura. As tecnologias SIG são consideradas como tecnologias de apoio à investigação, uma ferramenta para exploração de ideias.
Railways: industrial and maritime archaeology, geographic information systems, history and culture

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Railways are large and complex entities, which are fundamental to the efficient functioning of modern society. They have a long past, active present and significant future. In Britain many railways are usually at least 150 years old and consequently, have a very long history but they are also very actively used as modern metropolitan or intra-urban transport systems and they are viewed as having a bright future in a world where low emissions and energy efficiency are extremely important attributes. Railways are both substantial and ephemeral, they are expressions of man’s ingenuity developed in stone, concrete and iron and steel engineering. They have created and nurtured their own culture and have dramatically affected and altered the culture and lives of all that they touch. Railways, may be measured, recorded and understood through their archaeology, history, geography, art, science, politics and economics. Railways are unlike almost any other form of human technology because they have a very substantial existence in physical terms, represented by the routeways and architectural infrastructure which are placed within a widespread geographical context, but at the same time have such historical and cultural depth, which has been recorded and expressed in many different modes and forms. Aspects of railways can be seen as networks or points, which maybe viewed collectively or individually. Railways comprise of many different elements including; architecture, permanent way, signalling, locomotives, carriages and wagons, railway staff and folklore, railway passengers and their memories, railway companies...
and their economic relations with their investors and customers and a whole host of other elements of their existence. Some of these are tangible and persistent others are intangible and ephemeral, some permanently located and others mobile or transient. It is undoubtedly a complex mixture of components. Understanding the past present and future of railways requires a detailed appreciation of the interaction of these many facets. Achieving this holistic integration of data is by no means a straightforward task and in order to develop a fuller understanding of railways and their contextual setting, researchers need to be innovative in the research methods which they employ. A geographical approach to such data integration has much to recommend it in such circumstances. GIS technology provides a tool set, which can assist researchers, by providing an exploratory “tool for thought” as suggested by Eastman (1992, p. 32). Specifically, Eastman writes “With experience, GIS becomes simply an extension of one’s own analytical thinking... The system has no inherent answers, only those of the analyst. It is a tool, just like statistics is a tool. It is a tool for thought.”

When used in this way, the GIS becomes a tool for the exploration, investigation and interpretation of the data and therefore, the data itself becomes the most important part of the GIS. Its availability, form and mixture determines what can be done with the GIS. The specifics of the software and hardware system are of little consequence other than they should provide the necessary facilities to enable the researchers to store, access and display the requisite forms of data. Most current GIS software has the ability to use a very wide variety of different digital data types including text, facsimile documents, video and sound recordings as well as direct access to web-based resources. It is therefore, the data itself which becomes the all-important core for a study employing a GIS approach and, where possible, this should be at as high a temporal and spatial resolution as possible. In other words, the GIS hardware and software opens up the information contained in the data for a researcher, providing the mechanism through which a researcher may explore the data. In effect the GIS becomes an electronic, digital archive, which enables rapid access to the data contained within it and enables swift display of that data based on the relative geography. The GIS provides an exploration and integration mechanism with which a researcher may tap the potential informational value of the data more efficiently and effectively than might be the case with a traditional paper based archive.

Karl Popper, when considering the nature of scientific knowledge and understanding, (Popper, 1974) suggested that knowledge is finite whilst ignorance is infinite. It was his contention that it will never be possible to arrive at the definitive answer and that there are many possible answers to an infinite vari-
ety of questions. Researchers should, if possible, have access to uninterpreted, and preferably un-aggregated, data in order to be able to address these many, as yet, un-asked questions. Easy, speedy access to un-interpreted data will be far more beneficial to the advancement of their understanding than traditional linear narrative outputs of research, which largely present interpreted information. However, historical research is usually presented as such a linear narrative, derived from research attempting to develop an understanding of the past through records and evidence created or preserved at or nearer the time. These records themselves were rarely originally collected with this historical research purpose as their primary aim and such data is always incomplete, usually heavily filtered and is seldom more than a cipher for the reality it is attempting to capture. Consequently, we must be acutely aware of the Popperian view (Popper, 1974) of finite knowledge and infinite ignorance because of the problems, which will always be inherent within the data that researchers may employ. History however, and especially the history of railways, occurs within a geographical context, which is nonlinear, multi-temporal, multi-faceted, and multi-scale thereby adding considerable complexity to the situations which the researchers need to understand and appreciate. Railways are often huge geographical undertakings and placing relevant historical data within its geographical setting can greatly enhance the inherent and possibly unrealised value, of many historical records. Essentially, viewing the historical data within its geographical contextual setting may assist the researcher to arrive at a fuller understanding of its meaning and importance. It may also provide a researcher with greater insight, thereby encouraging the serendipitous discovery of new knowledge derived from the timely and efficient combination of datasets which may not otherwise be attempted or even envisaged. GIS offer researchers a tool set with which they can explore the possibility of integrating data from diverse and disparate data sources, through their geography, enabling the recognition, enhancement and extraction of greater levels of the informational value which all data contains.

This situation is experienced in maritime archaeological projects, such as the excavation of the Mary Rose (Rule, 1982), where immensely complex information can be recovered and recorded from the excavated remains of the sunken vessel.

Experience gained through research undertaken to better understand the events surrounding the sinking of the Mary Rose in 1545 can illustrate some of the potential of GIS technology when applied to the task of complex, geographically organised, research data.

The Mary Rose was vice-flagship of Henry VIII’s fleet, and on the 19th of
July 1545 she was assembled together with the English fleet, in the Solent on the central south coast of England, to oppose the landing of a French army. This had been sent to invade England by Francois I, King of France. The English fleet consisted of about 60 ships and the French 225. The French army was 30,000 strong; the English forces about 12,000 at the most. For King Henry VIII and the English this was a national emergency and the English were significantly outnumbered, both on the land and sea. Over a period of two or three days a series of engagements took place between the French and the English, which ultimately resulted in a stalemate position. Although the English lost the Mary Rose and the French lost a Mediterranean galley, Henry retained his crown, the French departed the shores of southern England to lay siege to Boulogne, which the English had captured the previous year, and the Mary Rose settled into the muddy seabed of the Solent where she remained for over 450 years.

During the 1970s and early 1980s the Mary Rose was excavated on the seabed, using painstaking archaeological techniques, to recover as much of the data from the wreck as was possible. Over 19,000 artefacts, the remains of 179 individual men, as well as the hull of the Mary Rose herself were recovered during the project. Much of this is now on display in the historic dockyard in Portsmouth where a new, permanent, museum is now under construction and is due to open in 2012. The data recovered during the archaeological excavation represents an extremely complex dataset in which the spatial relationships between the objects and their surroundings within the ship are of tremendous importance. These can tell, not only a rich story of daily Tudor life aboard a warship, but also of life more generally within Tudor England. They also hold evidence of the process by which the Mary Rose sank. The distribution and movement of material and objects within the ship have recorded elements of the sequence of events during the actual sinking itself. However, this data is immensely complex and requires not only an understanding of what each individual item of data is, but of how it interrelates with everything else. In addition to the archaeological data collected during these sites excavations there are also a number of contemporary written accounts, which describe the events on that fateful day in July 1545. These are traditional historical documents and present linear accounts of what happened, as it was perceived to be by their writers. Geographically, we also have the physical coastline and sea areas, which constitute the contextual setting within which these events were played out and within which the Tudor technologies of shipping and warfare came together to create the story. This geographical context might be considered as the “Theatre of War” which staged the events of the battle. Further to these data we also have contemporary and near contemporary maps of the town of Portsmouth itself and a fabulous and detailed
image of the battle, which presents the events as a series of vignettes representing individual actions that took place over a number of days.

The data, therefore, by which we may examine and explore “The Battle of the Solent” of 1545, comprises an immensely complex and diverse set of data, which needs to be viewed in an integrated way and to be interpreted as part of a whole. A traditional historical documentary or archaeological approach for studying such material, and its consequent dissemination of its research findings, often produce views which largely ignore one of the most important elements; the geographical context within which all this took place. The topography of the Solent dictated the potential initial distributions of the fleets and the movements that could be subsequently undertaken by the ships of both the French and English fleets. The timing of the tides and the specific nature of individual tidal currents within the Solent determined the speed, direction and route that any individual ship could make. The combination of these factors and therefore dictated the tactics which could be employed by the soldiers and sailors of both sides and their commanders. (Fontana and Hildred, 2011), Consequently, having a good understanding of the geographical environment and context can significantly help researchers to develop a much fuller picture of what happened from the available evidence.

Such rich and diverse data needs integrating if it is to be fully utilised and geography is key to this integration. Geography can act as the mechanism by which these diverse sources of data that can be meaningfully joined or associated. GIS technology provides the tool set. Holding the data with geographical coordinates, for use in a GIS, will make the data much more useful to both present and future researchers. This is because GIS technology makes it possible to integrate documentary, archaeological, environmental, geographical and other diverse data in a way that is both accessible and potentially meaningfully organised.

Despite the potentially efficient data handling, integration and exploration provided by the technology, Historians have not so far greatly employed GIS in their research. Traditionally, it is normal practice for them to disseminate information and research findings by use of a linear historical narrative, which, it could be argued, has stood the test of time and provided an effective means of research dissemination. And yet, the question should be posed “can a researcher convey the full complexity of relationships inherent in the detailed and diverse data gathered and examined in projects such as the Mary Rose or research into the history of railways, through the mechanism of a linear narrative?” Certainly, traditional research publication outputs can provide some of the information but
it is unlikely that they will be by any means as full and complete as they might. GIS technology can make a valuable contribution to the enhanced transmission of historical research data making it more accessible and easier to explore by future researchers and thereby possibly effect the serendipitous discovery of new and deeper understanding. GIS technology presents current researchers with more effective means of holding, accessing and exploring complex geographically located data and it also offers future researchers new and better opportunities to explore the past than might otherwise be available to them.
REFERENCES


