Missing Heritage: communications technology and the birthplace of globalisation

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Abstract

‘Globalisation’ is a word which is ubiquitous in the 21st century. However, its lineage, if defined as the point that nations began to communicate instantaneously without the barriers of oceans between them, began in the 19th century. Specifically, in 1858 a submarine telegraph cable was stretched from Europe to the North America. The significance of this event was unprecedented for humanity, for which the physical sites involved merit the highest possible international accolades. However, the European point of this achievement, on Valentia Island, Ireland, is currently in a poor state of disrepair. Nonetheless, it is hoped that with the appropriate recognition, the site and its accompanying ensemble of buildings, will be brought back to the glory that it once possessed.

Introduction

As soon as written communications existed, the need to move these documents accurately from one location to another, as fast and securely as possible, became obvious. This requirement, which has been with humanity for over four thousand years, saw revolutionary developments in technology with the Industrial Revolution and its aftermath. The quest to send and receive accurate, secure, suitable and ever faster communications remains a constant drive in the 21st century (Cady 2015; Fisher 2002; Lucky 2000).

Such communications technologies have consistently reconfigured human society. It is the one technology from the Industrial Revolution that did not cause mass pollution, unemployment or make working conditions intolerable. Despite being of such near unimaginable importance to humanity, communications technology is largely invisible from studies of heritage. Indeed, of the more than 1,000 sites which are recognised as World Heritage, only one site, Varberg Radio site, a well-preserved area related to wireless trans-Atlantic signals after the First World War, relates to communications (UNESCO 2004).

The European landing point of the first permanent transatlantic cable, linking North America to Europe was Valentia Island in County Kerry, in the Republic of Ireland. Although the event is marked by a small memorial (dedicated in 2002), the site where the first message was received, the ‘Slate Yard’, is unremarked and in a state of disrepair. This paper seeks to provide an outline of why the heritage of communications technology, and the telegraph and submarine telegraph in particular, is significant. This is not to suggest that the following waves of communications technology around the telephone (Menke 2013; Vanderbilt 2012; Beauchamp 2010; Oslin 1992) and then the wireless (Seymour 2011; Gardiol 2011; Hong 1994), of which Varberg is an example, are not only highly valuable and merit heritage recognition, but rather, that the point when communication went global in 1858, the
Slate Yard on Valentia Island, and that should be the focus for heritage studies in this area. However, the site that this significant event occurred, is currently a near ruin and will require considerable very careful restoration before it may be able to be fully recognised for its outstanding universal value by the international community.

Communication

The Egyptians are believed to be the first people to have had systems to move written communications around their empire. Over a thousand years later, the Greek historian Herodotus recorded the Royal Road of Persia which their king, Darius the Great, had built in the 5th century BCE to facilitate rapid communication throughout his empire. Similar roads existed in the comparable empires in China and India. In theory, a succession of fresh riders and fresh horses, taking a message in relay, could cover hundreds of miles per day. Herodotus recorded that, ‘there is nothing in the world that travels faster than these Persian couriers. Neither snow nor rain nor heat nor gloom of night stays these couriers from the swift completion of their appointed rounds’ (Herodotus 1972: 556; Calder 1925).

The Greeks attempted similar systems, in addition to systems of flags, torches and even homing pigeons to carry messages. The Romans, in addition to using carrier pigeons, flags and torches, developed an imperial post system comprised of riders on fast horses, who could travel, in ideal conditions, fifty miles per day. A supplementary service for non-governmental mail was slightly slower. The time added by ocean crossings could be substantial, so that imperial edicts could take up to four months to travel between Rome and the further most points of the Empire (Moatti 2006; Eliot 1955). This system barely changed for the following 1500 years, although additional tools of fire, smoke and flags were used. Accordingly, despite revolutionary technologies such as the printing press which transformed the way that the written word could be recorded, the speed at which such words or messages could be transported accurately over distance remained determined by the speed of horses, the routes to be traversed and/or the reliability of the pigeons to which the communications were attached. Accordingly, when Benjamin Franklin dispatched writers throughout the territories in America on July 4th with copies of the Declaration of Independence, the Declaration did not reach the furthermost point of Georgia until 22nd July (Dittmar 2011; Beyrer 2006).

The only other communications technology that had the change to be faster that dispatch riders on horses was the optical semaphore (where signals were reproduced down a line of towers with mechanical arms, allowing a signal to go from Paris to Calais in four minutes). Remaining examples which heritage initiatives include the restored 1848 semaphore tower in Malta, the Cologne station from 1812 (Germany), and possibly the oldest, largely original semaphore, from the end of the 18th century at Castelnaudary, near Toulouse (France). Although this technology offered some promise, it was limited to how far, how fast, how accurately, and how much information they could be carried. Most of all, it was about to get completely eclipsed by a new technology (Field 1994).

Telecommunication

According to the 1992 Constitution of the International Telecommunication Union, telecommunication means, ‘Any transmission, emission or reception of signs, signals, writing, images and sounds or intelligence of any nature by wire, radio, optical or other electromagnetic systems’. It is this definition that divides discussions of communications to both before, and after, the Industrial Revolution, as one key ingredient made all of the new technologies possible (that the old technologies did not have). The key ingredient that allowed the break from the past was the discovery of the one medium which promised to provide instantaneous communication over great distances. That medium was electricity. Although electricity is commonly attributed to the so-called ‘second stage’ of the Industrial Revolution (with the electrification of industry and communities after the 1880s), its impact goes back much further. This is because the technological application of electricity to telegraphy made distant communication possible, pushing all other forms of communication to one side (Ross 2011; Behringer 2006).
The development of the telegraph is excellent proof that the ideal of a sole inventor is a myth. All great ideas stand on the shoulders of others, and this is especially the case in communications technology. This story began in the mid 16th century with the work of Otto von Guericke who found electricity in his globe of sulfur. In 1729, Benjamin Franklin sent a spark of electricity across the Schuylkill River, near Philadelphia, but no-one knew what to do with the experiment. The Italian physicist, Alessandro Volta, provided the next piece of the puzzle when he discovered that electricity could be contained in a battery and its current could be regulated. The idea of trying to control this output through differentiated wire transmissions excited the imaginations of Samuel von Sommering and Fancisco Campillo, who came to understand the magnetic field and the impact that an electric current held on a compass needle. Their work overlapped with the work of Johann Schweigger, who invented the galvanometer, with a coil of wire around a compass, which could be used as a sensitive indicator for an electric current (Schiffer 2008; James 2008; Poole 2006; Niedermeyer 2003; Steinle 2002; Schroder 2001; Other A 1999).

The first working, and very rudimentary, system of 8 miles of wire laid underground, insulated in glass tubes and using a static charge, was built by the English inventor, Francis Reynolds in 1816, but no-one could see its value. The German, Hans Christian Oersted, cracked the secret of electromagnetism in 1819, realising that a wire carrying a current exerted a magnetic force. Andre-Marie Ampere recognised that telegraphy could be done by a system of galvanometers in 1821. The Englishman, William Sturgeon, and the American, Joseph Henry, refined these inventions over the following years, before the German diplomat, Pavel Schilling began to put all of the pieces together, controlling the electrical current and linking galvanometers with magnetic needles via silk thread, in the early 1830s. When the work of the English scientist, Michael Faraday, on electromagnetic field theory was added to the equation, and the importance of copper as the primary conductor, the opportunities for telegraphic cables opened up even further. All of this work culminated in the mid 1830s when the German mathematician Carl Gauss and scientist Wilhelm Weber adopted and refined all of the existing theory and practice. They operated the first working telegraph system, in Gottingen in 1833, communicating at a speed of 6 words per minute, across a distance of three kilometers. Although some of the original sites related to this achievement have disappeared, it is possible that some, at the university, are still in existence (Lemley 2012).

The chances of economic reward stemming from the profits that could be made by patenting the new technologies excited the imaginations of many. The first patent on the electric telegraph with multi-needle instruments, following further refinements, was given in Britain in 1837, to Charles Wheatstone and William Cooke with the first commercial telegraph in Britain opened a year later, in 1838. Unfortunately, although one of the original factories in which telegraph machinery was made remains, much of the original infrastructure involved with telegraphy in England from this period has disappeared, with some of the key pieces being destroyed in the Blitz in 1940 (Liffen 2013; Nonnenmacher 1997).

Across the Atlantic, following the work of David Alter, and then further refinement on technology and code by Stephen Vail and Samuel Morse between 1836 and 1838 (in the building of Old Speedwell Iron Works at Morristown New Jersey, which still exists, , the concept of telegraphy caught hold. When the Senate (narrowly) agreed to fund his proposal to build a telegraph line between Washington and Baltimore, Samuel Morse dramatically opened this telegraph line in 1844 with the phrase from the Book of Numbers 23:23: ‘What hath God wrought’. When the American physicist Joseph Henry devised a way to boost the impulses and defeat fading signals, all of the States east of the Mississippi became connected. Paris, Vienna and Berlin were all communicating by telegraph by 1849, and by 1850, all of the main towns of Britain were linked into the telegraph network (Metz 2015; Liffen 2010; Cavicchi 2009; Lowe 2007; Silverman 2003; Bektas 2001). The reason that this technology so quickly took-off, was not only that now it worked, but that the exceptional benefits of instant communication for commerce, military and civil security, media and social communication, suddenly became blindingly obvious (Fairclough 2013; Hochfelder 2012; Barton 2010; Carey 2009; Showalter 2004; Lubrano 1997; Standage 1999; Morus 1996; Tarr 1987; Kiebowicz 1987).
The limits of telecommunication

The difference between land and sea telegraphs was striking. By the early 1850s, overland telegraphy had achieved a high degree of sophistication. Signals could be transmitted more or less automatically and at high speeds. This was not the case when cables had to traverse through water. Although some scientists had recognised that some form of insulation for the cable was essential, and experimented with some materials, their success was limited. Nonetheless, all countries recognised that if the full potential of telegraphs was to be released, the technology, known as submarine telegraphy, had to be developed so as to be able to cross the oceans that divided countries (Spear 2003).

Despite this obvious goal, there were clear limits on crossing the oceans. The problem was that although scientists were working out that wires coated in some form of insulation could still conduct signals underwater, the length that the signal could travel was limited. Thus, although success could be achieved in 1845 for 12 miles down the Hudson river in New York, or 25 miles between Dover and Calais, the insulation was poor and the line would only exist for a short period. Increased distance and depth multiplied the difficulties. The distances were problematic because the signals became harder to transmit because the cables were poorly constructed, and badly insulated, resulting in signals that were weaker and harder to read. The depths of the ocean to be crossed added to the problems, as did the unknown nature of the ocean floor. Accordingly, two cables, the Spezia-Corsica cable (70 nautical miles and 325 fathoms) and Sardinia-Bona cable (130 nautical miles and 800 fathoms) ran into substantial difficulties as depths turned out to be more than double what was expected. Such repeated troubles and failures resulted in many of the leading scientists of the day to suggest, that international communication between continents separated by large bodies of water, would never be possible (Cookson 2006; Homes 2009; Wallace 2000).

The five challenges that had to be overcome before telegraphic communication could become truly global, whereby North America could be linked to Europe, were all overcome in the middle of the 19th century. The first challenge that had to be dealt with was how to better insulate cables. This was solved in 1847 by the German scientist and industrialist, Ernst Werner von Siemens, who developed a heat machine that eliminated leaky seams in insulation once gutta percha (a natural type of insulating rubber) was applied (Tully 2011; Godfrey 2013; Tully 2009). The second challenge was how to overcome the rudimentary knowledge of the ocean floor, so that excess depths and/or natural barriers could be avoided. Here, the work of Matthew Fountaine Maury who was a Lieutenant in the American navy was critical (Rozwadowski 2001). The third challenge was creating enough cable (over 2000 nautical miles) and boats big enough to hold and carefully release their previous cargo, to which the work of Charles Bright, was notable (Hearn 2004). The fourth challenge that had to be surmounted was that the science and its application needed to be improved in terms of cable design and constituents, understandings of currents and measurements, and the ability to read the electric signals which were very weak after being projected over such long distances. In this regard, the work of the famous Irish physicist William Thomson (later Lord Kelvin) was critical, especially with his development of the mirror galvanometer that allowed very faint telegraph signals to be read with accuracy (Flood 2008; Klassen 2007; Erlichson 2006; Hunt 1996; Whipple 1934; Bright 1898.

The fifth, and final, challenge was finance. As it was, the climate was right for raising large amounts of capital. The Industrial Revolution already had a very strong link with profit. There was a strong link between the legal systems which granted patents, the political systems that established monopolies and/or the markets from which entrepreneurs could find financial reward. This was especially the case with telegraphs, which had already proven their economic potential before the Atlantic was crossed (Muller 2015). However, crossing the Atlantic was something extra special, and entrepreneurs could see clear economic benefits, if it could be done (Headrick 2001; Boyce 2000; Britton 2004). The man who solved the financial side of the equation was Cyrus Field, to which both the British and American governments assisted, and capitalist investors pledged, the millions required to find success. For their investment, they
were handsomely rewarded, as by the time the trans-Atlantic cables was fully working, the company (and those that followed) quickly became amongst the most lucrative multinational corporations of the day (Richardson 2015; Ramirez 2015; Cookson 2006; Hearn 2004; Oslin 1992; Carter 1968; McDonald; 1937; Russell 1865).

Success and the birth of globalisation

The investors obtained massive rewards because on 5th August 1858, the first telegraph exchange beneath the waters of the Atlantic took place, via a painfully slow 16 hours transmission. This telegraph expressed, in the words attributed to Queen Victoria, the bond of ‘friendship founded upon common interest and reciprocal esteem’ between Britain and the United States. The American President concurred, looking forward to what other examples of ‘science, skill and indomitable energy of the two countries’ would produce (Oslin 1992: 170).

The celebrations that followed this success were unprecedented. Parades, fireworks and parties were part of the celebrations in the United States. The US Congress awarded Cyrus Field a gold medal, and the newspapers called him Lord Cable. In Britain, in addition to public celebrations, Queen Victoria knighted four of the cable engineers. The feeling was well captured in the idea that the trans-Atlantic cable was the ‘Eighth Wonder of the World’.

These celebrations were merited because the trans-Atlantic cable, as opposed to national or regional cables, changed the world by making communication truly global as the United States and Europe could now directly, and in near instant time, communicate. At this point, all of the benefits (economic, media, military and social) that had accompanied the arrival of national telegraphs, now multiplied again, now with additional benefits (such as diplomacy, and the creation of new communities, 19th century versions of today high tech industries), being added (among many studies of this phenomenon, see Lampe 2014; Winseck 2008; Paull 2003).

The best proof of this new and novel globalisation was the creation of the first international organisation in international law. That is, although bilateral cooperation had begun in 1849 when Prussia and Austria agreed to create a shared telegraph system, the need for true international cooperation in this area became pressing when it became apparent the technical, scientific and political considerations that had to be reconciled were international, not local or regional. Accordingly, the French Emperor, Louis Napoleon III called for an international gathering, which ended up creating the world’s first international organisation, the International Telegraph Union in 1865. To suggest that this type of internationalism was a revolutionary development in international law is an understatement. It was a new world that the trans-Atlantic cable had enabled (Douglas 2015; Rutkowski 2011).

Valentia Island: the birth of globalisation

The trans-Atlantic cable was stretched from Saint Johns in Nova Scotia, Canada, to Valentia in Ireland. The following comments only refer to the Irish side of this landing at the western-most point in Ireland, on Valentia Island, in County Kerry. The specific point where globalisation began in Europe, as a near instant message flashed between Ireland and Canada was in the so-called ‘Slate Yard’, in Knightstown, Valentia, of which the words, ‘all-right’ were sent over an eleven minute period. After more testing, the first ‘official’ message (see above) was sent. In the following 20 days, before this cable broke, it carried 271 messages, at an average of 10 words each, from Newfoundland to Valentia; in the other direction passed 129 telegrams (Cookson 2006; Anon 1858).

Certainty is possible that this is the exact location of where the first trans-Atlantic message was received is through both written accounts which recall the location (Bright 1898; Field 1866; Mullaly 1858; Russell 1865. These written accounts are supplemented by a visual map, ‘Valentia and the Atlantic Telegraph’, drawn by Captain Frederick Brine for the 1858 expedition. Figure 1 shows the full map; Figure 2 is magnified to show the exact location of where the cable landed.
The exact location where the cable ended, and the first message was received was in what the locals called ‘the Slate Yard’. This site, which was also a world first in terms of steam technology with the cutting of stone. This site, which was one of the most dominant buildings in Knightstown, the hub of the island (Gwyn 1991).

Although a number of periodicals and artists who accompanied the laying of the trans-Atlantic cable recorded representations of the Slate Yard, these tended to be with it as part of a much larger landscape. Perhaps the best picture of this period is the watercolour (Figure 3) of 1857 by Robert Dudley (1826-1900). The original, by Dudley, is currently in the MET, in New York City.

Figure 1: Valentia and the Atlantic Telegraph 1858. The full title of this work is, ‘Map of Valentia: Showing the Positions of the Various Ships and Lines of Cable connected with the Atlantic telegraph. Compiled from the Latest Government Surveys and other Authentic Sources by Captain Frederic Brine, R.E. F.R.G.S. This is now held in the Smithsonian Institute in Washington. The reference number is OCoLC, ocn23019689.

Figure 2: Magnified section of the ‘Valentia and the Atlantic Telegraph’ 1858.

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Figure 3: ‘Valentia in 1857-1858 at the Time of the Laying of the Former Cable’, by Robert Dudley 1865, Metropolitan Museum of Art, in New York (Accession number 92.10.85).
However, the pictures which give an even greater impression of what the ‘Slate Yard’ actually looked like are photographs from late 19th century Ireland. The pictures specific pictures are from Robert French, probably from 1890. They are currently in the Lawrence Collection in the National Library in Dublin. Although these are taken over 40 years after the event, they still convey the outline of the Slate Yard (and especially its chimney and large windows where the cable entered) very well (Figures 4 and 5).

Figure 4 and Figure 5 are from Robert French, probably from 1890. They are currently in the Lawrence Collection in Dublin Library. I am obliged to John Griffin for finding this remarkable image.
Figures 8, 9, and 10 are views of the chimney. Figure 11 is the room from which the first trans-Atlantic cable message was successfully sent and received. The end result is that although the authenticity of this site is exceptional, the integrity of it is very poor (Stovel 2007).

Figure 11: The building, where globalisation began in Europe, is largely an overgrown ruin. Aside from the complete lack of an internal workings, machinery and a roof, parts of the walls are missing and the chimney is also largely gone (having being lowered in the 1950s for safety reasons). Figures 6 and 7, are taken from behind the Slate Yard, looking out towards the ocean.

Figures 6, 7, 8, 9, 10 and 11 are all by Michael Lyne (2015), a local on Valentia Island.
The integrity of the location in the 21st century

Despite being in poor repair, there is a strong case for conservation, which would involve, at a minimum, the protection of the site, reroofing and rebuilding the chimney. This rests on the national significance of this site, irrespective of its World Heritage potential. Thankfully, good images remain of what that building, front windows (where the cable probably came in) and chimney actually looked like. If conservation is considered, it must be done in three phases. First, the site must be fully excavated. This excavation needs to document its significance to the Industrial Revolution and also any evidence (such as the trench for the wire) that adds to the physical evidence of the final resting point of the cable. Second, plans must be drawn up and these must be in full cooperation with the International Council on Monument and Sites (ICOMOS), both domestically (ICOMOS-Ireland) and internationally, in terms of both national and international contexts (Cameron 2008).

Conclusion

Improved methods of communication have been a never-ending quest for humanity. Despite a history going back thousands of years, the most radical advances occurred with the Industrial Revolution, and the discovery, and utilisation, of electricity. The telegraph, followed soon after. This technology made accurate communication over land almost instant. The national and regional impacts were monumental, at the economic, social and military levels. In addition, at the local level, a new type of worker was created, the life of which was very different to many other workers in the Industrial Revolution. Despite this importance, telegraph heritage remains invisible as heritage. This is especially the case with submarine telegraphy, from which it can be argued that achievements like the Trans-Atlantic cable, fundamentally changed the world, as for the first time history, Europe and North America could communicate directly in a near instantaneous fashion.

The good news, is that it is possible to see exactly where this monumental event occurred, and the type of building it happened in Europe, on Valentia Island, on the western most point of Ireland. The bad news is that the building is in a poor state of repair and in urgent need of significant management and appropriate restoration. Only then, may it be possible to get the international recognition that an area like this deserves, as the birthplace of globalisation.

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