

Waves of Navigation

Celebrating the past and looking to the future

Hannah Sherrard, Peter Anderson and Clare Stead reflect on the celebratory event that launched our 75th anniversary celebrations.





Waves of Navigation welcomed RIN members and guests to the Royal Geographical Society for a networking reception, pop-up exhibition, keynote talks from Dr Paul Cruddace and Dr Colette Jeffrey, and the announcement of a new award.

From the outset, the Royal Institute of Navigation has been outward-facing, expansive, collaborative, and inclusive in its pursuit of navigational knowledge, both as an art and as a science. Its mission has been to celebrate both navigational heritage and advances in technology, innovation and renewal. As early as 1948, the Institute hosted a landmark exhibition, *'Navigation Through the Ages'*, also held at the Royal Geographical Society, which travelled on to Oslo, Norway.

Waves of Navigation marks the 75th anniversary of the Institute, charting its course since the Second World War. On display in the exhibition was a taste of the RIN collection, drawing from the archives and instruments held at the RIN offices as well as from the Richey collection normally housed in Brighton. The pop-up exhibition offered our guests a first look at some of history behind the Institute, which from its



founding days has been a wide-reaching and collaborative community. The *Waves of Navigation* pop-up also builds on an earlier exhibition, *Navigating the War*, curated by Dr Kai Easton (SOAS) and held at Georgetown University in 2017 to celebrate Richey's centenary. By showcasing a selection of highlights from the archive and spotlighting a few of the early Institute members, we aimed to demonstrate how connections between those early members were able to help foster a lasting collaborative environment.

As Dr Colette Jeffrey highlighted in her keynote talk, the success of the early Institute can be attributed to the expansive interdisciplinary network that was able to bridge disciplinary gaps between some of the great minds of the era. Michael Richey, as one of the most significant early presences in the Institute (director for 35 years, from the founding in 1947 to 1982), was undoubtedly influential in fostering this collaborative atmosphere. Richey had served first in the Royal Naval Patrol Reserve, by choice as a matelot on the lower decks, then, having survived the first of three shipwrecks (when HMS Goodwill was sunk by a mine in the Firth of Forth on 2 November 1940), as an officer in the Royal Naval Volunteer Reserve (RNVR). He also served in the Free French Navy as their British liaison. His formative years pre-war, in a British Catholic literary and artistic circle that included Tom Burns, Eric Gill, Graham Greene, Harmon Grisewood, René Hague, and David Jones, had a significant impact on both the Institute and *The Journal of Navigation* that he founded and edited.

The Institute's first logo featuring the arctic tern was commissioned by Richey and engraved by Reynolds Stone. Early materials for the Institute were designed, typeset and printed by Hague & Gill. Occasional readers of *The Journal* included the poet and artist David Jones and the writer Graham Greene. Examples of first editions from this circle with personal engravings to Richey were on display, alongside Richey's log books and his own writings including *'Sunk by a Mine: A Survivor's Story'* which won the Llewellyn Rhys memorial Prize of Literature.

The early Council was also populated with well-known figures. Robert Watson-Watt and Francis Chichester were both heavily involved with the Institute and held the positions of President and Vice-President, respectively (though not concurrently). To represent their involvement, the exhibition featured panels on both men as well as some examples of the aeronautical instruments that Chichester reportedly used. Watson-Watt's work also tied well into our second display, the 'Radio Timeline', which highlighted some key moments from 40 years of innovation developed by a small, but influential and innovative, group of engineers dubbed The Daventry Group.

The Daventry collection contains examples of Radio Navigation receivers developed over a 40 year period by



the UK development group based around the Daventry area which went by many names, including Polytechnic Marine in the early 1980's, through Navstar Systems in the 1990's, Parthus and Glonav in the 2000's then to St-Ericsson and Intel in the 2010's. In 2019 the collection was donated, partly to the Royal Institute of Navigation and partly to the National Maritime Museum, Greenwich.

The collection contains examples of Radio Navigation Equipment and shows how Radio Navigation has developed from an expensive and niche system to a utility that everybody depends on in their smart phones, cars, communication and other networks. The collection contains products that were developed for many different applications including military, industrial, marine, land, timing, portable navigation devices, smart-phones and the latest tablets.

The core group at Daventry started working implementing Decca and Loran receivers, and also Transit receivers (a precursor of GPS), from the late 1970's through to early 1990's. The GPS lineage at the group can be traced through the different generations of GPS receiver to the latest multi constellation GNSS receivers used in cell-phones and tablets. Very early GPS receivers were developed from near the start of GPS (the first GPS Satellite was launched in 1978), the XR1 receiver started development in 1981 with very few GPS satellites in orbit. In the later 1980's GPS was mainly used for Military and Industrial purposes as shown by the XR3 and XR4 receivers. During the 1990's the professional market (including survey and timing) emerged and the group

developed the XR5/XR6 and XR7 products. Since 2000 there has been a commercial expansion of GPS, especially in Phones and Tablets. The group developed single chip GPS receivers (e.g. GNS7560) and, more latterly, GNSS receivers as part of a more complex chip including a cellular modem or Bluetooth and WiFi as "GPS" has become ubiquitous.

The products in the collection also highlight how receiver technology has evolved in functionality, performance, miniaturisation and architecture development over the last forty years.

With over 50 items on display in the *Waves of Navigation* exhibition, the above is only a small glimpse of the content. Looking forward to September's expanded exhibition, we plan to use the opportunity to ask some of the questions which have popped up periodically throughout the last 75 years. We would like to explore the dialogue between art and science, and look into the transformative power of navigation technology through the lens of RIN members and the potential it has to solve some of the challenges we face globally.

This desire to see the Institute play a part in global challenges was echoed through the talks given on the night. After a warm welcome from President Cynthia Robinson OBE that reflected on the founding year of the Institute, Director John Pottle noted that the RIN has helped to steer a revolution over the last 75 years and we are now applying our knowledge and skills towards a better and more sustainable world for the future. John reminisced about the

Peter Anderson (second from left) and members of the Daventry Group



International Navigation Conference in 2018, during which Prof Washington Ochieng challenged the audience to think about how the work that we do should be measured in terms of helping the world towards reaching the UN's Sustainable Development Goals. Indeed, since 2018 this has become a theme within the RIN and Washington is now a Vice-President. John mused that the more you think about it, Positioning, Navigation and Timing (PNT) technology is central to helping the world towards a sustainable future.

The first keynote speaker was Dr Paul Cruddace, Head of Innovation and Research at Ordnance Survey. Paul spoke about how mapping and navigation go hand in hand, and the role that location data plays in tackling our global challenges. Paul's presentation brought us through the last 75 years of maps, highlighting the influence that maps have over public opinion, society and politics, and looking to the future.

Paul selected a series of key maps from the last 230 years to demonstrate their influence. Starting with the first OS Map from 1801, Paul moved through John Snow's cholera map of 1854, an 1861 slavery map from the US that influenced Abraham Lincoln's decision to pass the emancipation act, to Charles Booth's London Poverty Map from the late 1800s. He showed us a 1919 suffrage map from the US, Marie Tharp's Ocean floor map from 1957, the Gall-Peters projection from 1973, and finished with Google Earth in 2005. Each of these case studies highlighted the myriad of ways in which maps influence and shape the world around us.

The presentation then moved on to explore a selection of advancements in navigation and positioning and the resulting developments of mapping over the last 75 years. The four examples that Paul chose to highlight were inertial navigation, transit and GPS, satellite-based interferometric synthetic aperture radar (InSAR), and machine vision. He walked us through these developments from the 1950's and showed how they have enabled some incredible work such as deformation monitoring of volcanoes.

In addition to looking to past developments, Paul also spoke about the role that location data has to play in supporting the big global challenges of our time going forward. He shone a light on recent examples of the role that maps have played in terms of COVID risk, climate change, refugees, economic

development, conservation and disruption to national infrastructure. The applications span such a wide breadth of fields.

Paul ended his presentation by showing how OS supports a series of small companies that are working towards the UN Sustainable Development Goals, stressing the importance to OS of nurturing and supporting others towards these goals. He wanted to end with a call to action for everyone to think about how we could do more in our professional lives to support these goals.

Paul dedicated his talk to Colin Beatty, a Past President of the RIN who gave Paul his first job and acted as a mentor to him at various stages throughout his career.

Dr Colette Jeffrey, Associate Professor of Wayfinding and Design at Birmingham University, delivered the second keynote presentation. Colette posed the question of whether art, design and science work collaboratively to create mutually beneficial and sustainable relationships for a more navigable world.

Reminiscing on another International Navigation Conference, this time the 2017 conference in Brighton, Colette recalled that she could not understand much of the technical jargon from most of the presentations, but that after her own talk many people came up to her to tell her how great it was to understand her. In particular, Colette recollected how long it took her to build the courage to ask someone what PNT stood for!

Colette told us that it is important to remember that we are talking about people – it isn't just science and design, but **scientists** and **designers**. She noted that maps are an area that demand a symbiosis between science, art and design. She noted that the cholera map shown by Paul was an excellent example of visualising science and using that to communicate it.

Having recently read Prof Kate Jeffery's new article from *The Journal of Navigation*, Colette said it was interesting to see how maps are used by different groups:

- Hand-drawn maps are used by designers to understand a navigator's mental map of a city and to identify landmarks





and routes

- Hand-drawn maps are used by scientists to understand navigators' cognitive mapping in virtual buildings
- Hand-drawn maps are created by artists for decoration and navigation

Colette went on to discuss the needs of inclusive navigation systems, one factor being a multi-disciplinary team. So, what stops artists, designers, navigators and scientists working collaboratively to create mutually beneficial and sustainable relationships for a more navigable world? Colette explained that we ask different questions, use different language and solve problems in different ways. She thinks the RIN has a big part to play in creating a neutral territory in which to meet and share ideas.

Again, Colette raised the UN Sustainable Development Goals, believing that the RIN can make a difference in particular for Goal 3 and Goal 11. In terms of Goal 3, Good Health and Wellbeing, Colette asks if we can help create inclusive routes and information, and encourage use of sustainable transport. She also asks if we can help create inclusive cities that are navigable for all, safe, resilient and sustainable, to help achieve Goal 11 (Sustainable cities and communities).

The main take-away from Colette's presentation was that we should work together and either use similar language or create an inclusive navigation language.

In keeping with this theme, the evening also featured the launch of a new annual award for the application of positioning, navigation and timing towards a sustainable future – the Spirent Award for Sustainability Through Navigation. Adam Price spoke on behalf of Spirent to launch this award, outlining Spirent's commitment in their roadmap towards sustainability. This award will be open for applications for 6 months and will have a monetary reward of £1000. Keep an eye out for e-mail communications with more information and application details.

Waves of Navigation provided the opportunity to reflect on the past 75 years of navigation while also looking at how PNT can shape the next 75 years and lead us to a more sustainable future. As our anniversary celebrations continue, the RIN will carry on bringing together different disciplines to allow us to do more than would be possible in our own bubbles of expertise.

