

Institution: Royal Holloway, University of London		
Unit of Assessment: 17 Business and Management Studies		
Title of case study: Realising the potential of open data for individuals, business and government through data literacy and digital innovation		
Period when the underpinning research was undertaken: 2015-2020		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s):	Role(s) (e.g. job title):	Period(s) employed by submitting HEI:
Dr Thomas Wainwright	Reader	2015-date
Period when the claimed impact occurred: 2015-2020		
Is this case study continued from a case study submitted in 2014? N		
1. Summary of the impact Open data has been heralded as the new raw material for the digital economy, accelerating innovation. Anyone can freely use and republish open data without restrictions or cost. However, limited understanding of its benefits is an innovation barrier. Dr Wainwright's research tackles this barrier, shaping and informing the Open Data Institute's (ODI's) international training and education on open data literacy in three ways. First, increasing global awareness of open data and its potential for innovation, by identifying and promoting specific benefits to over 7,000 learners in over 100 countries, in the public and private sector. Second, enhancing data literacy skills amongst government, corporations, and small businesses, to capture value from external open data. Third, increasing the publication and implementation of open data in organisations, through establishing three new types of 'good practice' to assist users.		
2. Underpinning research 1. Identifying the benefits of using open data in innovation Open data is data that is freely available for anyone to use and republish, although initial research focussed on the technical web science aspects of its development. Wainwright's research addressed how open data can be integrated and exploited within organisations. Practitioners and policy makers have heralded open data as the new raw material for the digital economy, with potential to fuel growth and innovation [R1]. However, open data has not yet met its full potential, due to limited understanding of its benefits [R2]. Wainwright's research examined the benefits of open data use by small businesses and corporations, and was the first to move beyond analyses of open data publication by the public sector [R1; R2]. Specific benefits include: how open data can be used to develop novel products; using sources of data that would not otherwise be commercially available; the reduction of operating costs through the use of 'free' data; the development of fast 'lean' innovation; through to capturing revenue streams from unique business models [R1; R2]. 2. Identifying digital literacies and skills to capture value from external open data Wainwright, working with colleagues Professor Franz Huber (Seeburg University) and Dr Francesco Rentocchini (University of Milan), identified new interdisciplinary, digital literacies and skills that are needed to successfully develop the absorptive capacities that enable small businesses to exploit open data. Three specific types of capability were identified [R1]. First, <i>open data acquisition and assimilation capabilities</i>, with skills related to locating, interpreting and evaluating external data assets. Second, <i>open data transformation capabilities</i>, particularly combining data science, data integration and digital marketing skills. Third, <i>open data exploitation capabilities</i>, encompassing skills related to open data availability forecasting,		

lobbying, legal and reputational risk management, strategic positioning analysis and open data publisher relationship development skills. The researchers devised a novel framework to showcase the combined open data absorptive capacities needed for successful innovation [R1].

3. Recognising barriers and knowledge to successfully implement open data publication

Wainwright's research moved beyond the focus on open data implementation strategies in public sector organisations [R1]. It is unique in identifying barriers to open data publication in small businesses and corporations, in addition to mitigation strategies [R2]. The research identified three main areas of 'good practice', and the processes needed to mitigate open data publication risks [R2]. First, processes to *recognise the business risks* of publishing open data through data audits and risk governance committees to facilitate 'selective revealing', where only particular types of data are published, when the risk can be identified and managed. Second, the development of an *open data publication business case* to ensure there are tangible business benefits to publishing open data, and in establishing alternate avenues of relationship monetization, which excludes charging for published data directly. Third, an *engagement and supply-led publication strategy* is needed, to engage with external users of open data, to identify useful types of data and formats. Related, is the development of open data champions and gatekeepers to support external users in using the published open data, to maximise the success of external innovation development.

All the impact reported in Section 4 was underpinned by research undertaken by Dr Wainwright, in partnership with the ODI. Dr Wainwright undertook the research design, data collection and analysis, in addition to working closely with the ODI as a fellow. He also designed and developed strategic consultancy tools and concepts as part of the analysis.

3. References to the research

R1. Huber, F., **Wainwright, T.**, and Rentocchini, F. (2020) Open data for open innovation: managing absorptive capacity in SMEs. *R&D Management*, <https://doi.org/10.1111/radm.12347> QI: Published in a journal rated as 3* in the Chartered Association of Business School's academic journal guide.

R2. Huber, F., Rentocchini, F., and **Wainwright, T.** (2016) Open Innovation: Revealing and Engagement in Open Data Organisations. *SPRU Working Paper Series 2016-19*, SPRU - Science Policy Research Unit, University of Sussex Business School <https://www.sussex.ac.uk/webteam/gateway/file.php?name=2016-19-swps-huber-et-al.pdf&site=25> (QI: peer reviewed paper: ISSN 2057-6668).

4. Details of the impact

The impact follows close collaboration with the Open Data Institute (ODI) as a partner, the world's leading NGO in promoting open data and education. By delivering training, consultancy concepts and tools, Wainwright's research enabled the ODI enhance digital skills and knowledge for new users of open data in three ways:

Promoting the benefits of open data to a new global community of learners

Promoting the benefits of open data is integral to unlocking digital innovation. Wainwright's research R1 and R2 informed the co-design a Massive Open Online Course (MOOC) with the ODI. The MOOC enabled registered learners to examine the benefits of publishing and using open data for small businesses and corporations, and his research was used to explain how to implement and innovate using open data. The MOOC established significant global reach to 7,329 learners in over 100 countries over 4 annual runs between 2017 and 2020 (Run 1 2,225 learners; Run 2 1,856 learners; Run 3 1,714 learners; Run 4 1,534 learners). For example, Run 4 was attended by learners from UK (15%), India (11%), Nigeria (6%), Pakistan (4%) and Egypt (4%). Data from Runs 2, and 3 and 4 indicate that 66% of learners were male and 44% female.

Their occupations were highly diverse, reflecting the variety of sectoral interest, including government, education, IT, healthcare, consultancy and agriculture (see Section 5, E1). The MOOC resulted in a diverse group of learners widening and deepening their understanding of open data's benefits, beyond the UK-context.

At the end of each week, MOOC learners were invited to report their intentions to implement their new knowledge and the extent of their successful internalisation of new digital literacies (E2, Runs 3 to 4). Intentions, as plans to apply new knowledge and to practice open data strategic concepts and tools in their organisation, resulted in high measures - ranging between 67% and 77% (N ranging from 97 to 224). Learners also had the opportunity to take part in quizzes each week which are used as an indicator for learning gain and acquisition of new knowledge (E3); data from Run 4 (2020) of the MOOC indicates that the proportion of correct responses to quizzes were 58% in Week 1 (N range across completed quiz items 141 to 253), 61% in Week 2 (N = 103 across all quiz items), and 61% in Week 3 (N = 32 to 33). A voluntary survey conducted at the end of the course for runs 2 to 4 (2018 to 2020, N = 98, E1) demonstrates the impact of the MOOC on learners, with 85% being satisfied with the course, 76% finding it intellectually stimulating, and 79% of learners reported clear intentions to accommodate open data in their organisation, demonstrating significant engagement as a result of the research.

The effect of the MOOC on organisations across the world was wide-ranging. In example cases, it resulted in extending the global reach of an NGO, building a new customer base and developing new products for Small and Medium-sized Enterprises. A testimonial from the ODI as an NGO, reported that the MOOC resulted in it widening its reach as the leading global body for open data: '[text removed for publication]'. (E4, ODI, UK). An SME testimonial reported that new knowledge from the MOOC resulted in them altering their services and finding new customers, growing their markets: '[text removed for publication]'. (E5, Precognox, Hungary). Furthermore, a [text removed for publication] testimonial outlines how the MOOC was used to design their business model and new web app, which resulted in it using open data: '[text removed for publication]'. (E6, whefi.com, Egypt)

Beneficiaries also reported enhanced understanding of open data, which was used to improve communication and awareness of business opportunities in organisations, shown in the MOOC's blog (E7), for example, a US executive noted: *'Open data is a bit of a buzzword at the moment...companies and their employees still don't really know what it's all about or what it has to do with them in their own organisation. Having this course material at hand allows me to prepare for those conversations from a place of some understanding', and 'OMG, where have I been all this time, just seen the vast amount of data on the EU site freely available. Wow, this opens up a world of opportunities'.*

Enhancing data literacy skills in government, corporations and small business to capture value from external open data

Enhancing open data literacy skills – to address a skills gap - is of paramount importance in facilitating digital innovation. Wainwright's research [R1; R2] informed the design of educational tools that enhanced the capabilities of organisations to capture value from external open data. These educational tools were co-developed with the ODI and used to enhance digital literacy skills as part of a broader EU project: '[text removed for publication]' (E9, ODI, UK).

Wainwright's research was used in his design and delivery of open data literacy training for practitioners at the ODI's *Annual Summit*, examining business model development (c.[text removed for publication] attendees, 1.5 hour session – small businesses and corporations) and inbound risk management (c.[text removed for publication] attendees, 1.5 hour session - small businesses and corporations) (E4, ODI, [text removed for publication], UK; E7, ODI, UK). Wainwright also designed and delivered 2x1 day practitioner training courses on open data business innovation to over 30 practitioner beneficiaries attended by corporations, start-ups and public sector officials. These sessions resulted in the ODI and the attendees' businesses to plan

how to integrate open data within their business: '[text removed for publication]' (E4, ODI, UK). The skill training materials co-developed by Wainwright were later re-used by ODI trainers on an international scale, with the result of educating public officials on open data for use in devising their own policies and projects: '[text removed for publication]' (E4, ODI, UK).

Commenting on the acquisition of new digital literacies, identified through the underpinning research, [text removed for publication] (E6, whEFI.com, Egypt) for example, reported that their new digital literacies resulted in him being able to scan, identify and evaluate sources of open data for use in their app, assisting in the creation of an entirely new product: '[text removed for publication]'.

Increasing the publication and implementation of open data in organisations

Novel concepts and tools, drawing upon Wainwright's research, were co-created with the ODI to support its consultancy services. Beneficiaries included start-ups in the ODI's accelerator programmes, which resulted in the concepts and tools being used to create new open data business models (E4, ODI, UK). Core concepts were also used by small international businesses, more widely. For example, a [text removed for publication] in Hungary reported using Wainwright's tools to innovate in redeveloping their products and becoming an open data publisher to better support the Hungarian tech community: '[text removed for publication]'. (E5, Precognox, Hungary)

Wainwright's concepts were used by the ODI to inform their consultancy services that supported their larger, high-profile clients to enhance their digital products/transformation, including: Lloyds of London, to enhance staff digital literacy and assist its digital transformation; Thomson Reuters (now Refinitiv – part of the London Stock Exchange) which resulted in it publishing open data identifiers for their financial services customers, enhancing their product; and other clients such as Syngenta and Sainsbury's and a range of FTSE-listed organisations (E4, ODI, UK). These concepts and tools were outputs from a 6 month ODI Fellowship placement, where Dr Wainwright worked with members of the ODI, in their policy, research and consultancy teams (E8, ODI, UK).

5. Sources to corroborate the impact

- E1. Quantitative MOOC survey data: 4 runs of MOOC participants and future intentions. Full MOOC data available from HEI on Request.
- E2. Quantitative MOOC intention data: Data on planned intentions to apply new knowledge. Full MOOC data available from HEI on Request.
- E3. Quantitative MOOC weekly quiz data: Indication of learning gain. Further MOOC data available from HEI on Request.
- E4. Testimonial, ODI, [text removed for publication], UK, 2019, to corroborate impact
- E5. Testimonial, Precognox, [text removed for publication], Hungary, 2019, to corroborate impact
- E6. Testimonial, whEFI.com, [text removed for publication], Egypt, 2019 & 2020, to corroborate impact
- E7. Qualitative MOOC comments: Learners' future intentions from studying on the course
- E8. Testimonial, ODI, former researcher, UK, 2019, to corroborate impact
- E9. Testimonial, ODI, former trainer, UK, 2019, to corroborate impact
- E10. ODI blog article: Wainwright, T. (2018) What do SMEs and start-ups need to succeed in open data innovation? <https://theodi.org/article/what-do-smes-and-startups-need-to-succeed-in-open-data-innovation/>