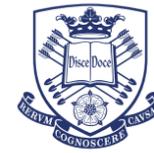
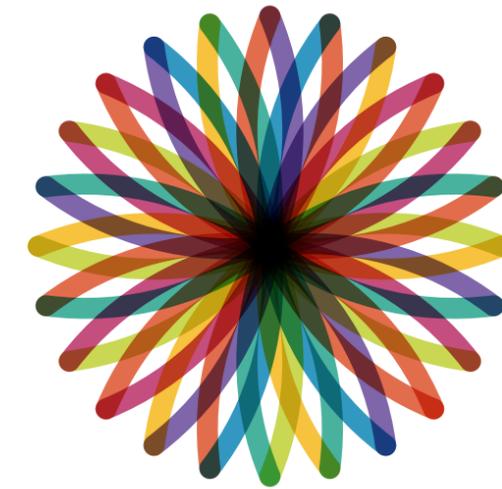




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Inform

RESEARCH AT THE
INFORMATION SCHOOL

The power of information

Information School

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Written by Richard Spencer, Charlotte Cremers and Professor Paul Clough.
Produced by Print and Design Solutions at The University of Sheffield.

Understanding
the power of
information is
the focus of
our research.



The Power of Information

Introduction from the Head of School

Information is power. We see the power of information every day in our lives and in the world around us. Information empowers people to make decisions about their health, encourages them to lead more active lives, helps people choose where to study, and customers where to get the best deals for shopping. Organisations are driven by information for financial planning and targeting their products and services, they need information about their clients and competitors to maintain and grow their business. And society is being increasingly shaped by the power of information to sway public opinion, to influence elections, create support for political campaigns and to galvanise resistance to governments.

The power of information is increasing. Thanks to the continuous development of new technologies, more information is more accessible to more and more people. Tim Berners-Lee's notion of developing a worldwide network of computers to share data transformed the way people all over the world access information. Web 2.0 technologies and social media have revolutionised how people share knowledge, ideas, opinions and daily experiences with their friends, family and complete strangers. Mobile technologies and devices are enabling people to access and share information 24 hours a day almost anywhere across the globe.

The increasing availability of information has clear benefits for individuals, groups, organisations, governments and society. Families and friends can keep in closer contact even though they are separated across the globe, carers of patients with long-term illnesses can reduce their social isolation by developing friendships with other carers online, information can be gathered and analysed to develop new treatments for life-threatening illnesses, businesses can

learn about their customer's searching behaviours and target their products, governments and political parties can quickly understand the effect of their policies on public opinion and relief organisations can provide help for people experiencing major disasters.

But power is a double-edged sword: with the benefits come risks and dangers. Sharing personal data with other people and with organisations creates risks of the information falling into the wrong hands and individuals being exploited and abused. Cyber-terrorist attacks have exposed organisations to losing access to their networks and information, without which they cannot function. Political organisations can manipulate information and people for nefarious purposes and autocratic governments can track individuals whose views they oppose. The benefits and risks associated with the increasing availability of information mean that we need a better understanding of the power of information and how it affects people, organisations and society.

Understanding the power of information is the focus of our research in the Information School. This publication presents a sample of our research and how it is helping to understand how data, information and knowledge are generated, stored, analysed and shared and how this is changing the world. I hope you find our accounts of our research exciting, and I encourage you to contact us if you would like to find out more about our endeavours to understand better the power of information.

Professor Peter Bath

Professor of Health Informatics and Head of School

A note from the Director of Research

This brochure provides an opportunity to showcase some of the research contributions of staff and postgraduate students in the Information School. Our research engages with a broad range of topics at various stages of the information lifecycle as information (in its broadest form) is created, collected, enriched, analysed, accessed, used and reused by individuals, organisations and society, in domains such as healthcare, media, cultural heritage, pharmaceuticals and government. This forms a value chain from production to consumption; from data to knowledge and insight, involving various stakeholders and emerging technologies interacting with data and information in context. The strapline of the Information School is 'the power of information' which recognises information has the ability to inform decisions, change views and ultimately transform lives. But this is only possible if information is properly managed, critically assessed and effectively and responsibly used by individuals, organisations and society. It is within this environment that the Information School operates and strives to provide world-class education and research.

Since taking over as Director of Research during the last year one of my goals has been to summarise the research capability of the School. Through discussions with staff and students I have come to better understand the breadth and diversity of research undertaken around areas such as social media, the digital divide, organisational learning and innovation, information behaviour, socio-political practices, crisis management, data modelling and analytics, and algorithmic trust and accountability. Our research profile includes people with backgrounds in library and information science, communications and media, business and computer science, which enables a broad perspective on data and information, and means we are able to view problems from multiple perspectives. We also have in-depth expertise within the School in qualitative and quantitative approaches to

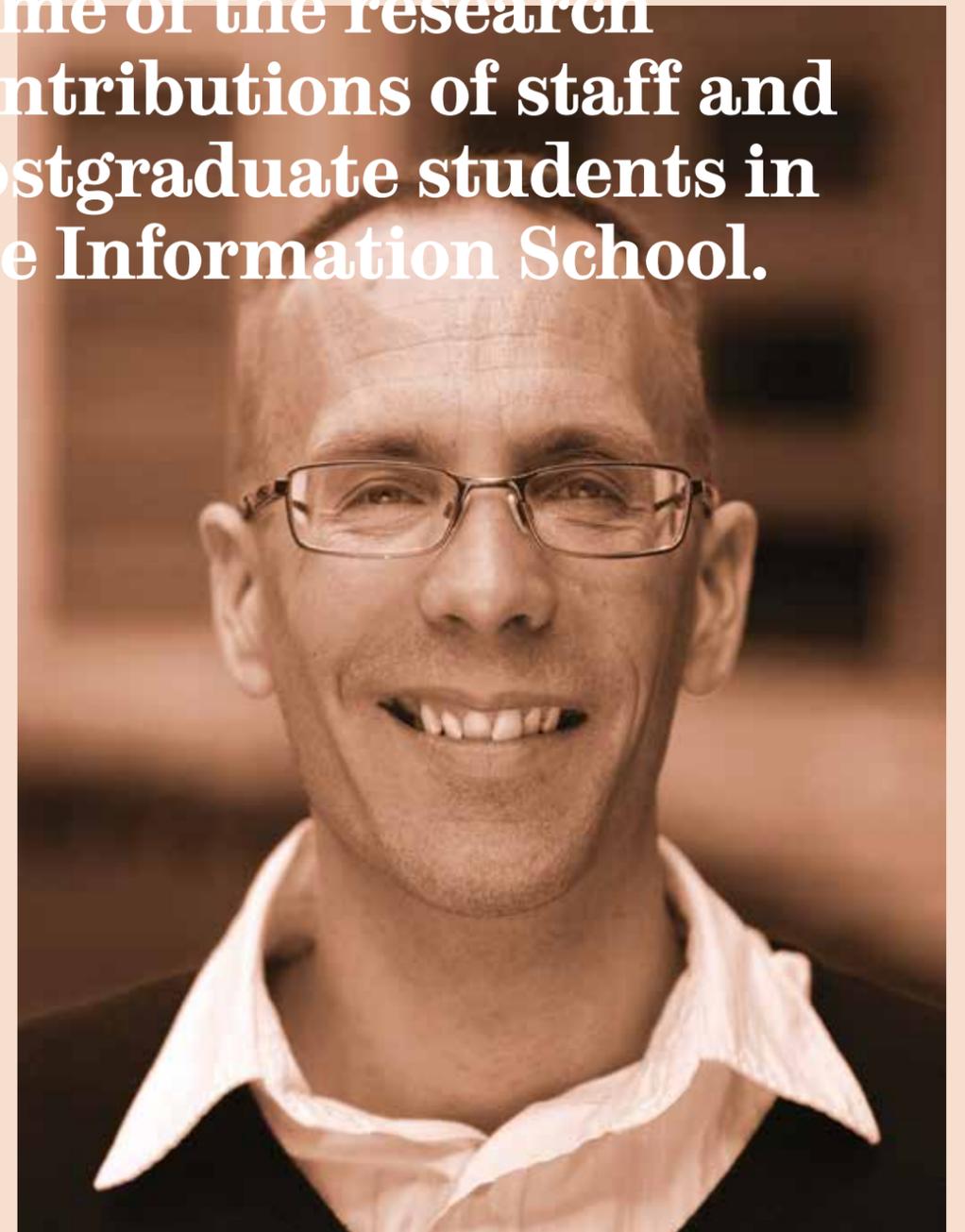
conducting research that equips us to tackle various research problems and educate the next generation of researchers. We will continue with developing our research capability through the provision of a stimulating and supportive environment where new ideas and people can thrive. I hope you will get a sense of the variety of high-quality research being undertaken in the School as you read this brochure.

However, there will be challenges to address as we move forward; economic and political issues putting pressure on Higher Education. For example, whatever form Brexit takes it is likely that funding from the European Union will be reduced which will have a great impact on the School and the UK more widely. Within the UK the funding landscape is about to change with the creation of UK Research and Innovation (UKRI) in April 2018 that will incorporate the seven UK Research Councils, Innovate UK and the research funding and knowledge exchange parts of HEFCE. Already we have seen funding being targeted to specific initiatives, such as the Global Challenges Research Fund and the Industrial Strategy Research Fund, and specific priority areas, such as health and well-being and justice. In 2021, the next Research Excellence Framework (REF) will take place to assess the quality of research undertaken in UK Higher Education Institutions, the results of which can affect the reputation and standing of departments. Of course, all of these also bring opportunities: the REF helps us to focus on producing high-quality research outputs and ensuring what we do has impact beyond academia; the amalgamation of the UK funding bodies and Brexit could release more budget. Despite these changes the School is well-placed to continue conducting world-class research; however, we must be ready and able to adapt to upcoming changes in the environment.

Professor Paul Clough

Professor in Information Retrieval & Director of Research

This brochure provides an opportunity to showcase some of the research contributions of staff and postgraduate students in the Information School.



Research Highlights

Academic Year 2016-2017

- 8 students successfully completed their PhDs at the Information School
- Several staff and PhD students visited the iConference 2017 in Wuhan. A particular highlight was PhD student Piyapat Jarusawat being shortlisted for the Most Interesting Preliminary Research Paper for her paper "Community involvement in the Management of Palm Leaf Manuscripts as Lanna Cultural Material in Thailand". Another of our PhD students, Shuyang Li, gave an excellent research presentation entitled 'A Framework of Critical Knowledge Sharing Skills (CKSS) for Project Managers'. We will be hosting the iConference in 2018.
- Dr. Gianluca Demartini was awarded EU-funding for a project entitled FashionBrain (see case study later on in the brochure) aimed at leveraging Data Science to inform the fashion industry.
- The School funded visits from three academics: Dr. António Lucas Soares (University of Porto) hosted by Ana Vasconcelos; Professor Annemaree Lloyd (University of Borås) hosted by Sheila Webber; Dr. Frank Fischer (National Research University Higher School of Economics, Moscow) hosted by Robert Jäschke. The visitors engaged with students and staff from across the School along with giving research seminars.
- We organised weekly seminars and over the past year we have had talks from a range of speakers from academic and non-academic organisations. A highlight was the talk by Dr. David Kenyon the Research Historian from Bletchley Park who gave a fascinating view of Bletchley Park from an information management perspective in his talk entitled "The Intelligence Factory" - Bletchley Park and Information"
- Matt Seddon, PhD student in the Chemoinformatics research group, won the CINF Scholarship for Scientific Excellence at the American Chemical Society meeting in San Francisco (April 2-6) for his PhD work.
- Jess Elmore, PhD student in the Libraries and Information Societies research group, won the inaugural Mark Hepworth Memorial Award for her abstract to the i3 conference. Her paper was entitled "Information Sharing in the ESOL (English Speakers of Other Languages) classroom: a case study"
- As part of the ESRC Festival of Social Science, the Space for Sharing project (led by Professor Peter Bath) hosted a photographic exhibition in Sheffield Winter Gardens featuring a series of powerful photographic images by photographer Anton Want, and quotations illustrating how people share information online when they are in extreme circumstances. You can read more about this project on page 26.
- Anne Burns from the Visual Social Media Lab, led by Dr Farida Vis, provided input for a report by the Food Standards Agency during a six month secondment. Anne's input focussed on the consumption of raw milk and the increased popularity of Food Trucks, using methods and skills developed during her work from the 'Picturing the Social' project on how social media users share images.
- Professor Stephen Pinfield co-authored a major new report on the Open Access market, conducted on behalf of OpenAIRE and the European Commission in late 2016 and early 2017. This report could make important policy recommendations relating to the future of Open Access.

Read about all of our research projects at www.sheffield.ac.uk/is/research

Research applications and awards

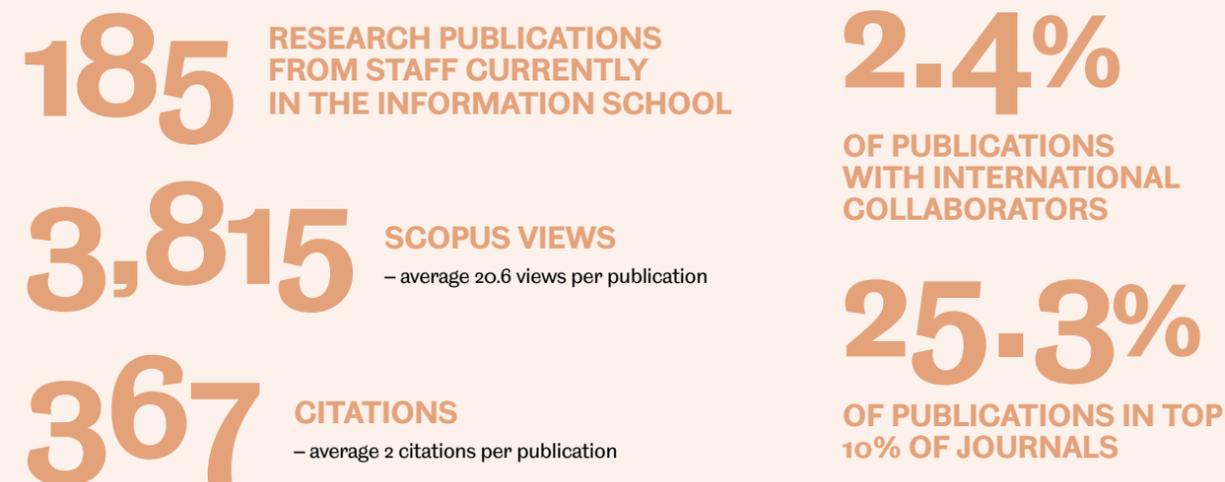
Active grants in 2016-17 have come from:

- Arts and Humanities Research Council (AHRC)
- Economic and Social Research Council (ESRC)
- Elsevier Ltd
- Engineering and Physical Science Research Council (EPSRC)
- European Commission - Horizon 2020
- European Commission - FP7
- European Commission - Communications Networks, Content and Technology Directorate General
- European Science Foundation
- Google
- The Society of College, National and University Libraries

Research publications September 2016-present



Research publications 2014-present



TOP 5 PUBLICATION SOURCES FOR JOURNALS:

- Journal of the Association for Information Science and Technology (10 publications)
- Journal of Librarianship and Information Science (5)
- Journal of Chemical Information and Modelling (5)
- Journal of Documentation (9)
- Journal of Academic Librarianship (3)



CAN WE PREDICT FASHION TRENDS?



At the core of the FashionBrain research at the Information School is the effective combination of machine learning and a human element.



The fashion industry moves quickly and, as with most facets of modern life, the rise of technology and the internet is only increasing its pace.

Trends come and go seemingly instantaneously, and with ease of access to information higher than ever before and social networks spreading this information further than previously imaginable, European fashion retailers face innumerable challenges in keeping up, especially in an online world dominated by North American multinationals. The €2.8 million FashionBrain project, funded by the European Commission through Horizon2020 and coordinated at the Information School in Sheffield, aims to tackle this problem, whilst enhancing the consumer experience, too.

FashionBrain brings together three major Universities (the University of Sheffield, the University of Fribourg in Switzerland and Beuth University of Applied Sciences in Berlin) with three commercial companies (Zalando, MonetDB

Solutions and Fashwell). Dr Gianluca Demartini, who led the Sheffield team and also coordinated the whole consortium, says "We are building new data solutions for different types of data and bring value to Zalando and other fashion retailers across Europe".

Computer algorithms have the capacity to handle truly vast quantities of data, but as anyone who has used Google Translate will know, they still have blind spots and struggle with some tasks in which humans perform better. At the core of the FashionBrain research at the Information School is the effective combination of machine learning and a human element. "We are using hybrid human/machine solutions that leverage the scalability of computers to process any amount of data with the quality of human intelligence to make those algorithms do better" says Dr Demartini of the techniques the Information School team uses in the project.

The three-year project began in January 2017 and in Sheffield, the team (completed by post-doctoral researcher Alessandro Checco and project officer Kathryn MacKellar) are focussed on applying crowdsourcing and machine learning techniques to data from various sources such as product catalogues and online reviews, as well as social media platforms like Instagram. "In an Instagram image, we need to understand that there is, for example, a pair of shoes and a bag, and then work out exactly which product it is from a catalogue of products" says Dr Demartini. "One of the things we are building is an app which allows you to take a photo of a friend and buy the same pair of shoes they are wearing." Of course, to make such a simple-seeming app is a many step process, in which all partners are involved.

The European fashion market is fast increasing in size and competency. Italy has many small, family-driven fashion companies and Zalando is currently the main online fashion retailer in Europe, but it faces a threat from American corporate giant Amazon, who look poised to branch into fashion in the near future. They have been organising workshops on machine learning over the last few years and it seems they are bringing their knowledge to bear in the upcoming Amazon Echo Look, a product for the home which will take photos and videos of you trying on outfits and tell you which looks best. Dr Demartini says "the problem we are trying to solve is that online fashion is driven by search engines and social networks, which are typically American-based companies, who can drive customers where they desire. With this project, we want to take out these middlemen, which will help the European market."

Project partners in Fribourg are using time series forecasting to predict upcoming fashion trends, whilst research at Beuth, Berlin, is employing text mining and deep learning techniques to gain the highest quality results from large datasets. All the research is underpinned by Zalando's vast catalogue of products, manufacturers and reviews, whilst MonetDB Solutions provides data storage and indexing solutions on a large scale and Swiss start-up Fashwell extracts the fashion product data from Instagram images.

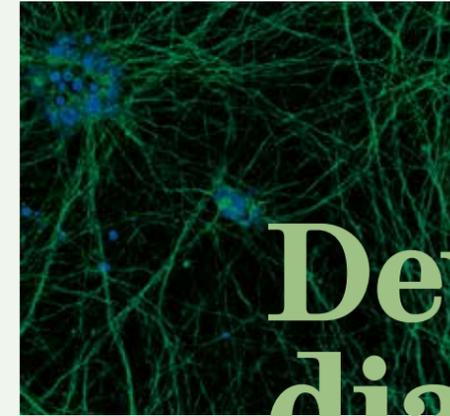
Though the project is in its early stages, a lot of data has already been collected and crowdsourcing experiments have begun in Sheffield. Product reviews are being analysed to identify specific product issues; for example, a recurring problem with the sizing of a specific shoe model which can then be highlighted to other users, making them aware of the issue before purchase.

The next project milestone at month 18 of the project (June 2018) will see preliminary versions of the image searching app and trend detection techniques presented to the European commission. The three universities are already on the way to publishing their findings in academic journals and the outcomes will eventually be put into commercial use, hopefully making the European market more resilient to mounting corporate monopoly. Dr Demartini is leaving Sheffield shortly to pursue a new role at the University of Queensland, Brisbane, but the project will continue under the guidance of Professor Paul Clough at the Information School, with Dr Demartini likely to remain in a consultancy role.

Having started the project with a solely data-related research background, Dr Demartini is learning a lot about fashion during the FashionBrain project. "I was very simplistic about shoe sizing issues – I was thinking 'it's either too big or too small'. It's far more complex than I was imagining!" This exemplifies the need for a human input; how could an algorithm possibly resolve the issue of which end of a shoe is too tight? Whether or not an expertise in fashion is required to provide this human element is still to be determined, but whatever the outcome, the future of shopping for your fashionable clothing may be changing.



The European fashion market is fast increasing in size and competency.



Developing diagnostic tools for Alzheimer's disease

Alzheimer's disease, the most common form of dementia, affects an estimated 850,000 people in the UK alone. According to the NHS, roughly 1 in 14 people over the age of 65 suffer the disease, and that increases to 1 in 6 above the age of 80. The debilitating condition, typified by memory loss, confusion, personality changes, anxiety, speech difficulties and other symptoms, currently has no cure. The treatments available today can limit or slow neurological damage, but none can reverse the damage already done by the disease and, as there is no reliable indicator by which to diagnose the disease early or predict its occurrence, treatments are usually administered too late to save sufferer's cognitive function.

"We're all living longer and getting older and it's going to be even more of an issue in the future, so it's an important area of medical research", says Professor Val Gillet of the Information School, part of the Sheffield team working on Diagnostic and Drug Discovery Initiative for Alzheimer's Disease (D3i4AD), a European Marie Curie Industry-Academia Partnerships and Pathways (IAPP) funded project. The four-year project, which began in 2014, aims to design tools to catch Alzheimer's earlier, as well as lay the groundwork for future findings on tackling this important and poorly understood disease.

Image above: Human skin cells from an Alzheimer's patient differentiated into neuron cells, including beta-tubulin, a protein which forms part of the cell's "skeleton" (in green).

It goes without saying that Alzheimer's disease is a huge area of concern which, right now, has no solution.

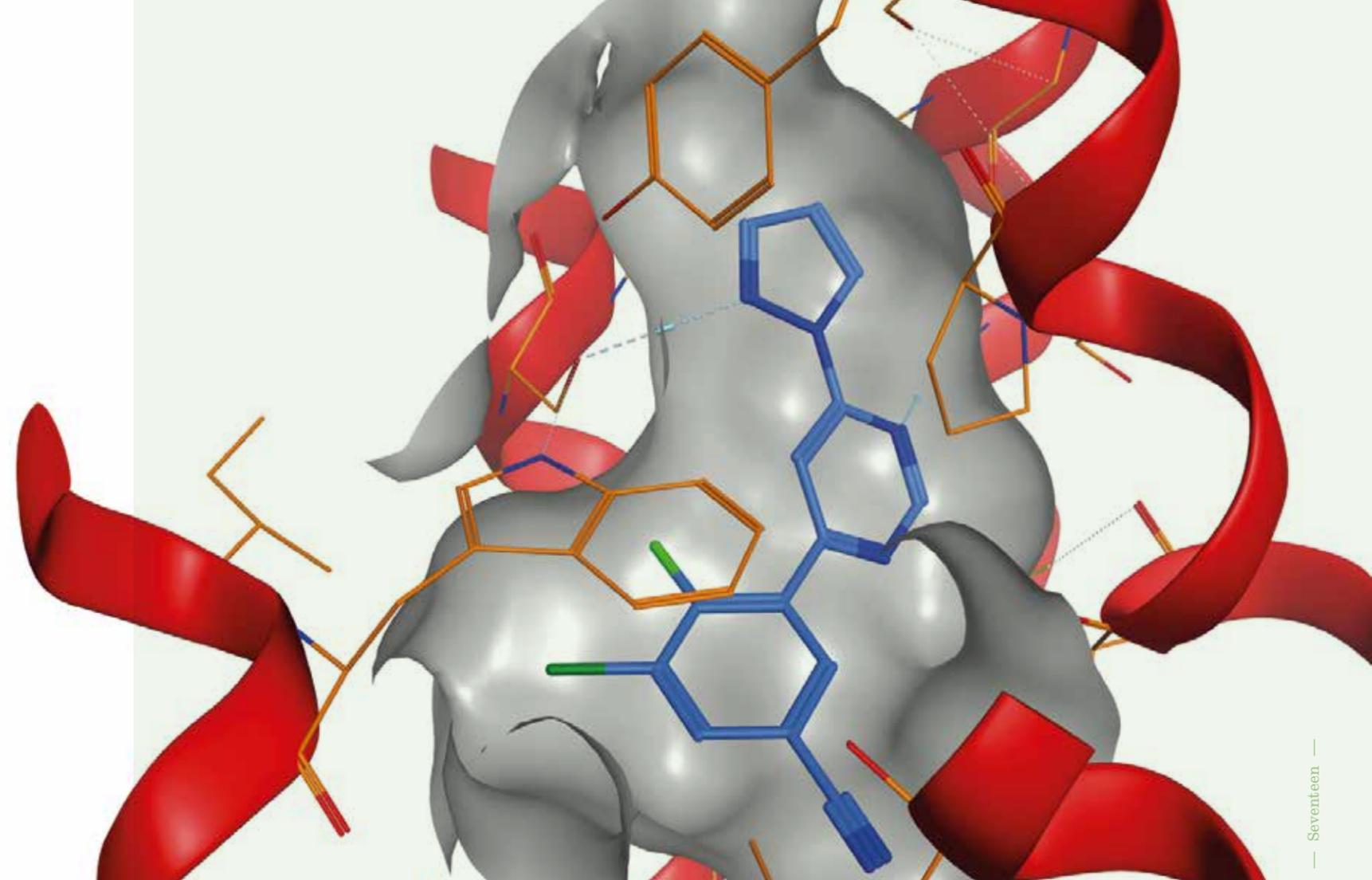
Led by the Department of Chemistry at the University of Sheffield, D3i4AD brings research-active academic institutions (the Information School and the University of Lisbon complete the trio) together with the expertise of industry specialists (UK pharmaceutical company Eli Lilly and small Italian biotech Biofordrug) with the aim of identifying small, drug-like chemical compounds which can be used as diagnostics for Alzheimer's. In order to find out which compounds these could be, they must be tested to see how they would bind to certain proteins in the body, but this cannot be done in actual humans. Instead, the Chemistry department are designing what are known as biological assays – processes of seeing whether compounds demonstrate a particular effect. Biofordrug are also involved in the assay process, specifically looking at the detection of copper (a copper-binding protein is one that is thought likely to be involved in Alzheimer's). Eli Lilly's and the Information School's roles in the project are closely aligned and involve identifying small molecules to be tested in these assays. The University of Lisbon use their expertise in synthetic organic chemistry to synthesise small molecules which are 'shortlisted' as possibly useful for this purpose.

"Chemoinformatics in general is about building computer models that help you select compounds that may be of interest in a particular biological setting", says Professor Gillet of her specialist field. In the Information School, research on this project is focussed on developing computer models that help predict and select the most useful compounds from the vast available set, using 'in silico screening', an alternative to the live testing techniques of 'biological screening'. "Our models are a surrogate for biological screening", says Professor Gillet.

Usually, drug and diagnostic tool discovery like this is done by designing assays based on very specific protein targets. However, since the specific proteins involved in Alzheimer's are not yet known, this cannot be done. The closest

information we have is some knowledge of the pathways involved, which are built up of multiple proteins, so the experimental processes have to be generalised, using what are known as 'cell-based' assays. Professor Gillet describes it as "a bit like putting your compound into a stew and testing that: you might see the effect, but you don't know which bit of the stew caused the interaction." The idea is to work out which ingredients to put into the 'stew', but also gradually work out which specific part causes the desired interaction. These computational processes are substantially cheaper, quicker and easier to run than biological screening tests and will hopefully massively focus the search for the potential diagnostic compounds by outputting a much reduced set to work with. "The hope is that once our models and the assays are complete, we would work closely with our partners on an iterative process to further hone the results", adds Dr Antonio de la Vega de León, the research associate working on the project in Sheffield alongside Professor Gillet. Their work is also bolstered by some PhD student work.

"One of the main aims of the project is building networks and sharing expertise across the different partners", says Professor Gillet of the other intended project outcome. There are many researchers involved in the project across the various partners, including five full-time post-doctoral researchers (of which Dr de la Vega de León is one) and several related PhD projects. Fostering the sharing of knowledge and best practice, the Marie Curie funding stipulates the movement of researchers and students between countries to enhance the expertise available on the project and build connections. "As a full-time researcher on the project, you cannot be a citizen of the country you are working in", says Dr de la Vega de León, who is Spanish but came to Sheffield from Germany. "The whole point is promoting mobility of researchers."



One of the main aims of the project is building networks and sharing expertise across the different partners.

It goes without saying that Alzheimer's disease is a huge area of concern which, right now, has no solution. "If you see some of the predictions of the social and human costs of Alzheimer's in the future, it is kind of scary", says Dr de la Vega de León. The motivation for the D3i4AD project is obvious, when the only currently available methods of detection of the disease are far too late in its progression (either by late-stage MRI scans or even by looking at a deceased brain).

"The project is more about diagnosis than cure", says Professor Gillet, "although one could reasonably lead to the other." Building on many years of collaboration with the Department of Chemistry, the Information School submitted the project proposal together with them, and following a long history and strong reputation in building predictive models, the research done here stands to be an important piece in one of the most threatening puzzles of modern healthcare.

Image above: A small molecule (in blue) bound to protein mGluR5, thought to be involved in Alzheimer's (in orange).



OAMJ

— Open-Access Mega-Journals



Great research is meaningless without an audience. In the world of scholarly communication, this audience is traditionally found through the peer-reviewed journal. “One of the most important developments to impact that area is open-access – the increasing drive to make research outputs freely available to anyone”, says Stephen Pinfield, Professor of Information Services Management at the Information School and lead on the Open-Access Mega-Journals project.

The principle of open-access helps to disseminate research findings widely, through the academic community and beyond, into society at large. Now, with the advent of so-called ‘Mega-Journals’, the way in which this information is published is facing the possibility of further, controversial change.

Academic journals have for some time followed a trend of getting progressively more specialised and niche, with new journals set up as new fields of research emerge, all leading to a very high number of journals, each with a very narrow community of interest. “Open-access mega-journals have the potential to reverse what’s been happening in scholarly communication over the last 50 years”, says Professor Pinfield. These vast publications are very broad in their subject ranges, some covering an entire discipline (e.g. the whole of physics) and some even covering several (one such journal covers the entire of science, technology and medicine). “They are massive in their scope, and that also leads to them being large in their scale”, says Professor Pinfield. Some of the largest of these mega-journals, like *Scientific Reports* and *PLOS ONE*, publish tens of thousands of articles per year, compared to the tens or hundreds in conventional journals. The AHRC-funded Open-Access Mega-Journals project is developing an understanding of this new publishing trend as a phenomenon, looking at both how it works and what those involved think about it.

Working with partners at Loughborough University, Professor Pinfield works on the project in Sheffield alongside Professor of Information Science, Peter Willett, and full-time Research Associate, Dr Simon Wakeling, who is also a past PhD student of the School. The project began in 2015 and is due to finish at the end of this year.



The open-access mega-journal model of scholarly communication has been causing much debate and discussion in the academic publishing community, its most controversial aspect being its change in approach to the peer review process. "Peer review is seen as a mainstay of scholarly publishing, and open-access mega-journals are challenging conventional approaches", says Professor Pinfield. Peer reviewing in traditional journals is based on several criteria: novelty, impact, interest to the community and scientific soundness. Mega-journals dispense with all of these except scientific soundness, a judgement purely on whether the research follows the correct and expected processes and practices to make it 'good science'. "Proponents of mega-journals argue that judgements of novelty, significance and interest are subjective", says Professor Pinfield. "They are usually made by a small group of senior academics and are based on existing paradigms which, it is argued, can mean there are few departures from 'the norm.'" It is also argued that authors over-emphasise the novelty or impact value of their work, interfering with the objective reporting of the results. Open-access mega-journals simply publish any papers submitted which are considered scientifically sound. "That

creates a lower barrier for publishing, but the argument is that after publication, the community can decide whether it is original, significant or interesting by their use and citation of the work", says Professor Pinfield.

This model diminishes the traditional 'gatekeeper role' of senior members of the academic community. "That's why these journals are so controversial", says Professor Pinfield. "They're changing the approach to journal publication that has been around for a long time." Some argue that the traditional peer review process provides a useful filter for trivial research. "You could have an article published which is perfectly sound science, but all it's about is the boiling point of water", explains Professor Pinfield. The counterargument follows that the significance of research is often not known at the time of publication. Additionally, the replication of past studies to check validity often has value, particularly in some areas like clinical trials. "Some people see this as the democratisation of science, but other people say it takes out the valuable function of the senior members of the community doing their job", says Professor Pinfield.

"The idea of using both quantitative and qualitative methods in our project is that we get a holistic picture of what mega-journals are, what they're trying to be and what impact they are having", says Professor Pinfield of the choice to undertake a mixed methods study. "The project is bringing together the expertise of a team made up of different sorts of scholars. One of the strengths of the Information School is that we have that variety, and this project plays to that strength, as well as links with other institutions." The project began with a literature review, including looking at social media discourse on the topic, where a lot of the controversy can be seen to be playing out. Next, a quantitative look at the bibliometrics of who is publishing in mega-journals, where they are working, who they are citing and other statistics led to a published paper on the way things are right now. Qualitative work followed in the form of 31 interviews with publishers and editors of various journals, both mega-journals and otherwise. "We wanted to get inside their heads and find out what their strategy was", explains Professor Pinfield. Focus groups with a variety of researchers (from PhD candidates through to senior academics) then

asked about their attitudes to publishing and the new mega-journal phenomenon. "Different disciplinary communities have different traditions of scholarly communication and react differently to open access in general, as well as open-access mega-journals", explains Professor Pinfield of their findings. The final data collection method was an international survey of authors who have published in mega-journals (plus control groups of authors who have published in other open-access journals and selective traditional journals), asking their experience of publishing and their perceptions. "It's really exciting because we've got an exceptionally large data set we can now analyse", says Professor Pinfield of the 11,000 responses received.

The debates that surround mega-journals appear throughout the data so far. Are open-access mega-journals just a dumping ground for poor quality research? No, many would say; the peer review process is not necessarily any less rigorous just because its remit has been narrowed. And so, the arguments roll on.

“Mega-journals have been something of a lightning rod for the debate around open access in general because they bring together a lot of the issues that open access is about, from the business perspective but also in terms of the very way we ‘do science’.”

The project's results have potential commercial significance, in addition to contributing to the fledgling scholarly record on this new field. "Our research helps publishers understand what is going on in their commercial space", says Professor Pinfield. "That's also true for other practitioners: policy-makers, research managers, librarians. Most of the presentations we've done so far have been to these professionals." Having worked with open-access systems since 2001 and with a major research interest in the publication and dissemination of information, it's easy to see Professor Pinfield's interest in

what he describes as one of the biggest landmarks in the field in the last ten years. "Mega-journals have been something of a lightning rod for the debate around open access in general because they bring together a lot of the issues that open access is about, from the business perspective but also in terms of the very way we 'do science'", he says. "I'm a great believer in the potential of open access, which we're now just beginning to see realised in a major way, and mega-journals are potentially a huge part of that."



Some members of the public felt empowered by using Twitter to contact the authorities, for example to tell them where sandbags were most required to hold back the waters.

Social Media in Crisis Situations

As social media becomes an inextricable part of everyday life, organisations have to consider how to adapt their policies and processes to serve the information needs of an increasingly digitally reliant public. Providers of core services to society, like the emergency services as well as utility providers and transport companies, are no exception. Through involvement in two European projects (CascEff and IMPROVER), Senior Lecturer Dr Paul Reilly is researching ways in which these organisations can increase the effectiveness of their online communications during disasters, as well as how citizens and service providers alike use social media during crisis situations.

Finishing in July 2017, the 3-year, EU FP7-funded CascEff project (standing for 'Cascading Effects') looks at the management of escalating emergency situations which have the potential to disrupt multiple sectors in succession. "We're applying a systems theory approach to the effects of a crisis", says Dr Reilly. "Crudely, we're looking at a 'domino effect', though it is more complex than that."

The project has several international partners, both academic and infrastructural and is coordinated by SP Technical Research Institute of Sweden.

Dr Reilly leads the Sheffield CascEff team, supported by Research Associate Dr Giuliana Tiripelli. Research conducted by the team was based on 41 interviews with 'blue-light organisations' (police, fire & rescue services etc.) in France, Belgium and the UK and has produced the SPEAK guidelines for effective communication during crisis situations, in particular those 'cascading disasters' that have the potential to disrupt other elements and systems. "Really it's about principles and guidelines – you can't account for the specific characteristics of every national system of communication or infrastructure" Dr Reilly explains. "We try to provide flexible principles that can be applied in different contexts." Their research has also looked at the media's framing of incidents and how awareness is raised so that people know how and where to donate money or assist with aid efforts. "We've found in our case studies that social media is being used to help citizens to provide support, whether material or emotional, to those affected by these

incidents and tweeting that their lives or property are under threat" says Dr Reilly.

One case study investigated in the project was hashtags used during the flooding in the south-west of England during 2012 and 2013, like #forageaid. It was found that some members of the public felt empowered by using Twitter to contact the authorities, for example to tell them where sandbags were most required to hold back the waters. "There was also a sense that, especially when there may have been a lack of funding, citizens were able to self-organise and take back a little bit of control around these issues and also put pressure on the government, especially around the issue of the dredging of rivers, which hadn't been done" says Dr Reilly. Other case studies included both man-made and natural disasters, providing further insight into how social media can be used by these key stakeholders in times of crisis.

The CascEff project also raised questions about rumours and false reports shared on social media, potentially leading to emergency resources being deployed to the wrong areas. Building on data gathered from interviews conducted with police and fire & rescue service personnel in Belgium, The Netherlands, and the UK, the project's communication guidelines highlight the importance of verifying online claims (including tweets to emergency services Twitter accounts that make direct requests for help e.g. 'My house is flooding, please send help') via traditional modes of communication,

Through workshops with service operators, the aim of both projects is to help shape the future communication strategies of these organisations during crisis situations.

One year into the CascEff project, SP Technical Research Institute of Sweden asked Dr Reilly to join the Horizon2020-funded project IMPROVER, which draws on the work done in CascEff. Another 3-year, interdisciplinary project with many international partners, started in June 2015, IMPROVER aims to help critical infrastructure operators (for example electricity or transport companies) communicate and build more resilient infrastructures through the management of public expectations about the timescale for the full restoration of services in the aftermath of a major incident. "In Sheffield our focus is on a communication strategy which will hopefully improve how those operators work during those incidents" says Dr Reilly, who works on this project in Sheffield with Research Associate Dr Elisa Serafinelli and Research Assistant Rebecca Stevenson. Dr Reilly hopes that the communications strategies published from the projects will eventually be translated into other European languages including French and Portuguese.

such as the telephone. Nevertheless, there is often a lack of clarity in terms of how social media can be used by blue light organisations to mitigate the effects of such incidents when the platforms are so widely used. "It is very polarising", Dr Reilly explains. "Some police or fire services would be very positive about social media use in these situations, whereas others would be more negative and suggest that it undermines their authority."

"The good thing about conducting these research projects is that they have deepened our knowledge about how social media is used during these types of disasters" says Dr Reilly on the usefulness of his work on CascEff in the IMPROVER project. Using many of the same qualitative methods (interviews, social media data collection and extensive reviews of literature and previous EU projects), IMPROVER is based on case studies that include the Barreiro region of Portugal, the Øresund region in Denmark/Sweden, and France.

Through workshops with service operators, the aim of both projects is to help shape the future communication strategies of these organisations during crisis situations. For example, in January 2017, IMPROVER partner EMSC, a French earthquake-monitoring organisation, organised a workshop with transport services and journalists involved in the 2015 Paris terrorist attacks to discuss lessons that can be learned from the use of social media by both the public and emergency services during that tragedy.



Dr Reilly's research background is in social media use during protests and civil unrest and in particular how sites such as Facebook, Twitter, and YouTube are used during contentious parades and protests in Northern Ireland. In this way, the advantages and disadvantages of using of social media for crisis communication has been a recurring theme in his research to date. "It's been interesting from my perspective, having interviewed the police in Northern Ireland about how they monitor social media during riots; I now look at the same sorts of issues but from a different angle", he says. "Like many

EU projects, CascEff and IMPROVER really draw from a diverse set of disciplines. It's a very rewarding but challenging process. For example, modelling evacuation scenarios is something in which I previously had no expertise! Similarly, what I do in media and communication studies is very different to what the other partners do." With potentially life-saving outcomes on the horizon, the importance of working across disciplines could hardly be clearer.

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Digital Economy, led by the Engineering and Physical Sciences Research Council



in partnership with:



Online sharing in extreme circumstances

“The project is about the role of trust and empathy in sharing information online by people who are in extreme circumstances”, says Professor Peter Bath, Head of the Information School and primary investigator on the A Shared Space and A Space for Sharing project. “It is about how those three work together: trust, empathy and sharing information.” Having started in June 2014 and due to end this year, this £1.2million project involves six UK Universities, each looking at a different group of people in difficult situations from the background perspectives of different disciplines including philosophy, computer science, sociology and, of course, information science, the interdisciplinary approach giving a wide-ranging understanding of the issues around online sharing.

Data from the online forums for these charities and semi-structured interviews with forum users and moderators were analysed and formed the basis of the research. Using thematic analysis, commonalities in what was posted and discussed were pulled out to give a broad picture of how these online communities are used. “We looked at how people develop trust with other people who have the same condition as them, what kinds of information they share, how they share

At the Information School in Sheffield, the lead University on the project, research focusses on people who are suffering from life-threatening or terminal illnesses. The research in Sheffield, conducted by Professor Bath along with research associate Sarah Hargreaves and former student Suzanne Duffin, is run in collaboration with UK charities Breast Cancer Care and the Motor Neurone Disease Association.

it and how trust develops over time”, says Professor Bath. “More recently we’ve been looking at the role of empathy and how people empathise with each other in those online spaces. We looked at how people can get something from each other that they can’t get from healthcare professionals: a lived experience and understanding of what they have to go through.”

The various project partners are examining online sharing in different extreme circumstances.

University of Sheffield: Terminal Illnesses

People living with life-threatening conditions and how they use online health forums to share information and build relationships.

University of Edinburgh: Self Harm

People in emotional distress and considering self harm or suicide and how the Samaritans’ online services work.

University of Lincoln: Illicit Drug Use

People using online forums to share practices on the use of illegal drugs and their behaviour, including the criminalisation of previously ‘legal highs.’

University of Nottingham: Humanitarian Crises

People suffering during the 2014 floods in the Balkans and how communities, split by the civil war 20 years previously, came together.

University of Warwick: Organ Donation Requests

People posting personal blogs online requiring organs or tissue by sharing their stories and the ethical issues surrounding this.

Kings College London: Twitter Data

The Kings College team analysed Twitter data for both the Nottingham and Edinburgh projects, with reference to specific examples like the reaction to Robin Williams’ suicide, and the Ukrainian civil war.

Image above: The project photo exhibition in the Winter Gardens, Sheffield. Photo Professor Peter Bath. Image above right: Professor Peter Bath leading the discussion after a performance of the play based on the project’s research findings at the Festival of the Mind in Sheffield. Photo Wasim Ahmed.

One paper published on the study has found that 'Trust is a process that changes over time and which is influenced by structural features of the forum, as well as informal but collectively understood relational interactions among forum users.' The Sheffield team are working on more research with the Warwick team on ethical issues around online moderation. "What we're trying to do now, in the final stages of the project, is extract from those different work packages a common understanding of how people in extreme circumstances share information online", says Professor Bath of drawing together the work from the various project partners.

As the Space for Sharing project is one of five projects funded as part of the EMoTICON research programme, cross-council

funding has come from the Economic and Social Research Council (ESRC), the Arts & Humanities Research Council (AHRC) and the Engineering and Physical Sciences Research Council (EPSRC), as well as the Defence Science and Technology Laboratory (the research branch of the Ministry of Defence) and the Centre for the Protection of National Infrastructure. The motivation for the research having come from the funders directly, 300 applicants answered a call for participation in a 'Sand-pit' and only 25 were selected to be "locked away in a hotel in Cheshire for a week" to discuss ideas and present fully costed project pitches by the end of the week. The Space for Sharing project was the largest successful bid both in cost and number of partners.

Understanding the means available to us that can bring people together digitally is crucial for the wellbeing of patients.

The project has piqued the interest of a large number of parties and findings have been presented at events such as the Motor Neurone Disease Association Conference and various Sheffield community events. In addition, a play has been written and performed by local theatre company Dead Earnest Theatre based on the research and the issues it brings up. The play is based around five women with breast cancer who communicate with each other using the Breast Cancer Care forum, following the development of their characters and their relationships as they go through the stages of treatment and living with the condition. "It's very true to the findings from the research", Professor Bath says. "I'm so glad we did it because what has come out of it is so powerful, and it tells the story of how we found people interacting with each other online incredibly well." With further performances in the planning for Breast Cancer Care, NHS staff and Cavendish Care, Professor Bath and director Charlie Barnes hope to develop the already changing script to incorporate more of the complex issues around living with breast cancer. The reactions and evaluations the play receives seem to indicate that people are thinking and engaging with these issues and, appropriately, sharing more with each other, particularly during the audience discussion that follows each performance.

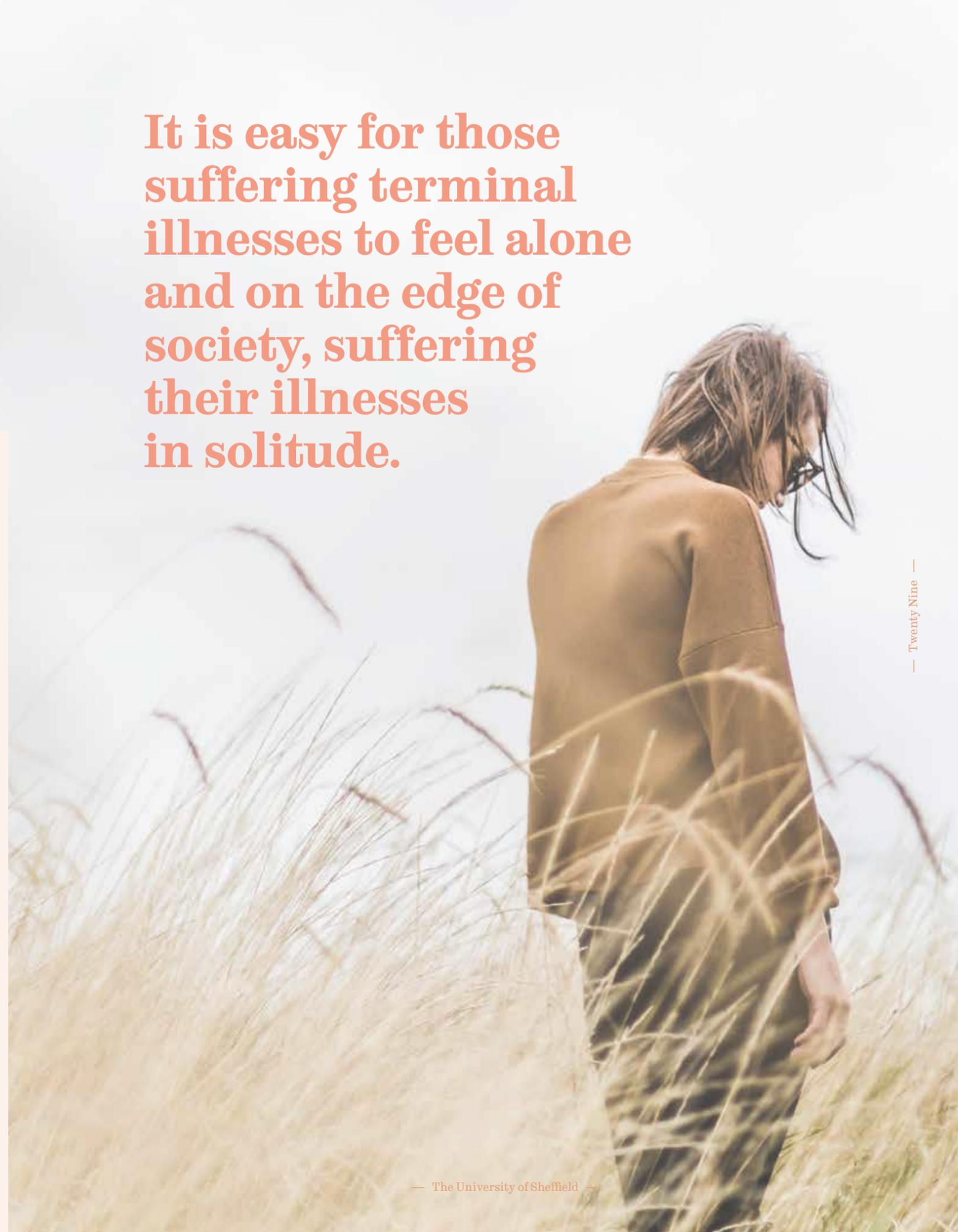
"At one performance, a woman stood up and said that she and the woman sat beside her had met on the online forum and

were now close friends", explains Professor Bath. "At another performance, someone who had suffered breast cancer many years ago expressed her wish that something like the forum had existed at the time. It's not just about entertainment; it's about the discussion of the emotive issues."

"From the very beginning, I could imagine a photographic exhibition in the Winter Gardens, so it was great to see that come to fruition", says Professor Bath of another engagement project undertaken with local photographer Anton Want. Twelve large photographs depicting people from each of the six project arms were put together with quotes from research. For some of the sensitive research areas, actors were used in the large photos, but some of the research is represented by real people in these situations who were interviewed in the study. As well as being shown in Sheffield's Winter Gardens, the exhibition travelled to London, Lincoln and Nottingham, always receiving lots of interest and praise.

It is easy for those suffering terminal illnesses to feel alone and on the edge of society, suffering their illnesses in solitude. Understanding the means available to us that can bring people together digitally to mitigate this is crucial for the wellbeing of patients, and with the positive engagement that A Shared Space and A Space for Sharing is still gathering, Sheffield is at the forefront of these discoveries.

It is easy for those suffering terminal illnesses to feel alone and on the edge of society, suffering their illnesses in solitude.





Our Research Culture

The Information School is proud to foster an active and welcoming research culture, supported by world-class facilities.

In the 2016-17 session, we had 39 PhD students studying in the School. We have also been home to 8 research staff, undertaking a range of projects alongside our academic staff and we hosted 11 visiting researchers over this period. All our research-active staff and students are aligned with one of our seven research groups, to bring them together with experts in their field.

Some of our research staff and PhD students have shared their thoughts on the environment at the Information School and what it is like to be part of our research community.



Research Staff

Monica Lestari Paramita

Research Associate, Information Retrieval Group.

"As a member of the Information Retrieval group, the regular research group meetings have been extremely valuable in providing a supportive environment to discuss my research and get constructive feedback on my work. I have learned many research skills and improved my confidence as a researcher due to the fantastic support from my supervisors and peers in the Information School. The Information School has also supported me to present my work in major conferences in my field and to build networks with researchers from other universities. The wide range of research seminars presented in the department also provide exciting opportunities to continuously learn new things. I would like to further improve my skill as an independent researcher by gaining experience in applying for research funds and pursuing a collaboration with other research groups."



Dr Simon Wakeling

Research Associate, Open-Access Mega-Journals project.

"I've been conducting research within the Information School since 2010, first as a PhD student, and since 2014 as a post-doctoral researcher. I've always found the research environment to be engaging, challenging and productive. The variety of expertise offered by Information School staff has allowed me to work on a diverse set of projects that have broadened my perspectives on Information Science, offering me experience of a range of fields, methods, and approaches. I believe the skills and knowledge learned during my time at the Information School have thoroughly prepared me for a career in academia."



PhD students

Wasim Ahmed

Project title: Using Twitter data to provide insights into health conditions and health-related events.

"The Information School has a great research environment that has helped me tremendously in building my academic profile. Whilst studying here, I have delivered over 24 talks on my research, and my blogs have been read in 136 countries with over a quarter of a million page views across a number of channels. I have always found it easy to approach colleagues and bounce ideas off academics who are experts in their respective fields. This helped me work towards producing research papers and has increased the chance of securing an academic post."

Sophie Rutter

Project title: Activities and tasks: A case of search in the primary school information use environment.

"What I've enjoyed at the Information School is that we have department-wide seminars, specialist research groups and dedicated workspace for PhD students. Through these I have gained a wide understanding of the field as a whole as well as specialist knowledge of my area. Furthermore, I have felt supported by peers and academics at all levels."

Liliana Sepulveda Garcia

Project title: Informal Caregivers perceptions of Ambient Assisted Living Technologies for Alzheimer's Disease and Related Dementias: An Interpretative Phenomenological Analysis in Mexico.

"My experience in the Information School has been very challenging and rewarding. I have been able to learn different ways of thinking thanks to the multi-cultural environment around the research labs. There are so many different workshops and seminars to improve your development as a researcher too like the teaching assistant programme, workshops that help you understand the ways you can produce research with impact, skills and techniques for networking and even writing quality research for important journals among many others. I find that the research environment is very collaborative and full of resources that can help us to improve as we have access to prestigious databases and high quality books at the different libraries at the University. In addition, we have access to computers and a wonderful lab space where we can work comfortably."

Matthew Seddon

Project title: The application of spectral geometry to 3D molecular shape descriptors.

"I've really enjoyed my time as a member of the Chemoinformatics Research Group in the Information School. The research at the Information School covers a broad range of research areas in information science, which has allowed me to hear different academic approaches to similar research, keep up to date on the latest issues in information and society, discuss relevant literature and interact with other researchers from very different backgrounds. It is a lively environment and there is always someone to talk to to get a new perspective and presenting my own work in this context has helped me develop as a researcher."

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Our Advisory Panel



Trends and challenges in our field

The Information School's Advisory Panel is a group of respected information professionals who meet with our own staff once a year to assist in the School's strategic planning and provide their insights on current trends and how we can fit in.

Coming from a wide range of organisations, the panel members each bring their own experiences to bear on our approaches to research and teaching.

Our advisory panel discussed upcoming trends and challenges in the information field today and these are some of the themes that emerged from the discussion.

Libraries in Society

Facing cuts in funding as well as rapid changes in the way that information is available, many public and youth libraries are struggling. Some are having to reinvent themselves to remain relevant. Research at the Information School is trying to understand these troubles and inform policy making to preserve the important roles that libraries play in society.

Cloud Computing

Cloud computing is becoming an ever larger trend in the world of business, but many organisations have huge investments in non-cloud systems. These companies face challenges in transitioning from one to the other without making losses either financially or in terms of assets, but they cannot afford to ignore this movement as it increasingly becomes the way of the future. Data governance principles are vital in managing such services.

Big Data

Businesses across different sectors are looking into big data analytics but are sometimes unsure how to apply their findings in a meaningful way to their operations. These professionals understand the metrics and their insights, but need advice on how to act on them and measure their outputs in terms of business value. Information professionals and researchers can provide this advice.

Search Technologies

People often complain about the 'search' function in online services not working effectively, and this is a challenge to be overcome by information professionals working in Information Retrieval. New legislation around data protection requires companies to know where their information is stored, but there is a dearth of people who are trained to know this. Our research is providing principles that can be applied practically to the community in this area.

Large organisations also face challenges in the development and implementation of new systems when the key services that they provide are still necessary throughout the transition and huge volumes of data are involved. The complex issues around data security also come into play here, especially with ever-changing legislation in this area.

In the modern world, people search online platforms on a wide variety of devices in a wide variety of ways, even now including novel input methods such as voice recognition. The information profession faces challenges in adapting to make sure all platforms meet these different needs in all contexts.

Panel Members

Andy Ball

Managing Director, Peak Indicators

Sarah Gates

Policy & Governance, Government Digital Service, Cabinet Office

Madeleine Greenhalgh

Policy & Governance, Government Digital Service, Cabinet Office

Anne Horn

Director of Library Services and University Librarian, University of Sheffield

Geoff Kendall Smith

Interim Director of CiCS, University of Sheffield

Dirk Lewandowski

Professor of Information Research & Information Retrieval, Hamburg University of Applied Sciences & Editor, Aslib Journal of Information Management

Chris Lowry

Policy and Improvement Officer, Sheffield City Council

Alice Mathers

Good Things Foundation

David Pearson

Director of Culture, Heritage and Libraries, City of London Corporation

Daniele Quercia

Site Leader, Bell Labs

Ian Radmore

Big Data Specialist

Martin White

Managing Director, Intranet Focus Ltd.



Work with US

— Thirty Eight —

The Information School has worked with a wide variety of high profile organisations from all sectors, including Universities, commercial companies, charities and government bodies.

As you have read in this magazine, we currently have ongoing collaborations with European fashion company Zalando, pharmaceutical company Eli Lilly and cancer charity Breast Cancer Care, to name but a few. We are also working with a range of other higher education institutions in the UK and internationally, including the University of Loughborough, University College London, the University of Lisbon, the University of Fribourg and the University of Nottingham.

Previous research projects have included successful collaborations with the UK National Archives, Unilever, the Leibniz Institute for the Social Sciences, Sheffield Libraries, Online Computer Library Center (OCLC), Blast Theory, Research Libraries UK, Peak Indicators, Ordnance Survey and GlaxoSmithKline, as well as academic institutions including the University of Toronto, the University of Manchester and the Technical University of Athens.

The Information School has had a close relationship with CITY College Thessaloniki, Greece, for over 10 years, through the South-East European Research Centre (SEERC). We are currently working with CITY College on the supervision of four PhD students, and have co-supervised many students with the College throughout our relationship.

We are always looking to build new collaborative research relationships. We are also able to offer consultancy and training in our specialist areas. If you would like to discuss working with one of our research groups or individual academics on a future research project or to discuss any ideas you have, please get in contact via the email addresses listed on the previous pages or contact us at is@sheffield.ac.uk