> *"Personally, I find ITaaU the most diverse and stimulating forum that I participate in."*
>
> Sean Ralph, Defence Science and Technology Laboratory (Dstl)

> *"ITaaU has been a great community to connect research and business. I've had the pleasure to meet some really talented people which has led to great value for our business."*
>
> Alana Wood, design lead, ustwo

Research Councils UK Digital Economy Transforming Business and Society

ITaaU Network

WWW.ITUTILITY.AC.UK

IT as a Utility Network+

2013-2016:
FROM DIGITAL ECONOMY TO DIGITAL TECHSCAPE

ITaaU Network

Digital economy to digital techscape

2013

18/09/13
Libraries of the Future: 2

13/11/13
Libraries of the Future: 3

05/12/13
Libraries of the Future: 4

21/11/13
IT utilities: Security and Trust 2

02/10/13
Human-Data Interaction: big data gets personal

19/12/13
Food Standards Agency Data workshop

22/01/14
Winchester School of Art, IBM and ITaaU Design and Science workshop

16/12/13
High Performance Networks workshop

11/03/14
Smart Spaces and Diversity

10/04/14
Creative, Digital and IT Industries: digital platforms for media production

25/03/14
Libraries of the Future: community engagement

25/04/14
International Workshop on Weightless Machine Communications

07/05/14
Apps for Healthcare

13/05/14
Delivering Food Security from the Cloud to the App

08/05/14
User Interface/Experience Design workshop

19/06/14
IT as a Utility Network Community Conference 2014

09/06/14
Big Data and Analytics workshop

28/07/14
Trust and Security scoping meeting

16/07/14
ITaaU/ustwo UX boot camp

09/09/14
ITaaU/ustwo UX boot camp

30/09/14
Cloud Computing workshop: technology transition for business transformation

16/09/14
ITaaU Cloud Computing workshop: health, wellbeing and big data

10/12/14
ITaaU symposium on the rapid deployment of cloud and utility services for fast-moving emergency situations

11/02/15
ITaaU/ustwo User Experience (UX) Design boot camp on the lean approach to mobile app development

06/07/15
IT as a Utility Network Community Conference 2015

26/02/15
weM2M Workshop: enabling IoT/M2M solutions

15/10/15
Disruptive Technologies in Healthcare workshop

24/11/15
Threats to Openness in the Digital World conference

18/01/16
Food Standards Agency/ITaaU Internet of Things programme workshop

30/11/15
The Internet of Sound and Audio Things

07/03/16
Showcase for the Food Standards Agency Internet of Things programme

12/05/16
Internet of Surgical Things

2016

Introduction

Jeremy Frey

In 2013 the UN called for a “data revolution”. For the past four years I’ve been leading IT as a Utility, one of the Digital Economy Network+ challenge areas, to see how this data revolution can be made to work in practice.

It has been an exciting interdisciplinary journey through what feels like the whole of the UK research, application and development landscape, bringing together engineers, physical and social scientists, and the humanities, as well as academic, commercial, industrial, and governance sectors.

The digital revolution has had the most dramatic impact on the way we live since the industrial revolution, while the current pace of change in the natural environment is unprecedented in Earth’s history, and is altering our way of life. The only way in which we can meet the challenges presented and ensure we continue to live, grow and prosper is by working together.

Digital technology and the wider digital economy makes possible the vision of involving society at large with research and modelling; co-creation at its best, integrating physical and social models. This enables society to make the best use of intelligent infrastructure and to create an informed, engaged and responsive community (from the street to the world), all at an affordable cost.

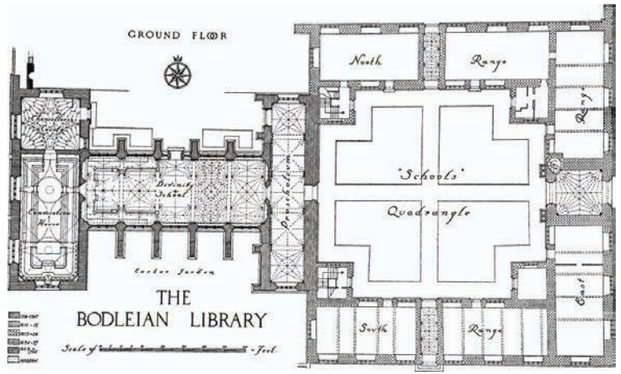
Using a design-thinking approach and always putting people at the forefront (we’re not interested in tech for tech’s sake), ITaaU Network has been building this community. Read on to find out more about the work we’ve been doing, from libraries and their people to disruption in healthcare and food security.

Jeremy Frey

Principal investigator, ITaaU Network+

> *“The ITaaU Network has brought together a uniquely diverse community to explore some of the most interesting and exciting trends and developments in the digital economy.”*
>
> Kenji Takeda, solutions architect and technical manager, Microsoft Research

What does ‘library’ mean in the 21st century?



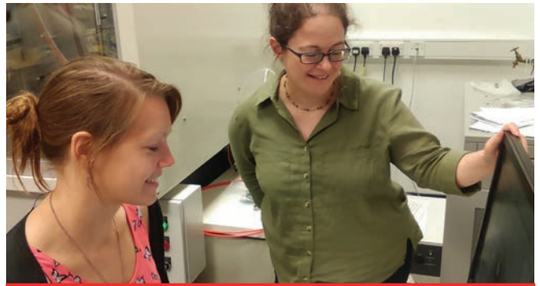
BRINGING KNOWLEDGE PRODUCTION BACK TO THE LIBRARY

Through workshops and projects we’ve been exploring the changing nature of the library and the librarian, from looking at mobile data, big data and the semantic web to libraries as social spaces and the changing role of the information professional.

We quickly determined that a library needs to be at the heart of the community that it serves – and that might mean taking the library directly into that community. So that’s what we did.

EMBEDDED LIBRARIANS: BRINGING CURATION TO THE LAB

We wanted to look at the contribution librarians could make if they were embedded in a research team, and the trust that would build up. So we embedded Isobel Stark, an academic liaison librarian who had never worked in a lab, in a chemistry research group at the University of Southampton, on secondment for eight weeks.



> *“I was there to persuade the postgrads to look after their data in a sensible manner so that it made sense to both them and other people in the future.”*
>
> Isobel Stark, research data development manager, University of Southampton

The digital threat to democracy

WHAT ARE THE THREATS TO OPENNESS IN A DIGITAL WORLD?

Paradoxically, in a world in which there is the potential for more information to be accessible than ever before, issues of sensitivity and access may result in less official material being released and technological issues may mean less will survive. Can technology also help?

We co-sponsored a high profile conference, Threats to Openness, to discuss the growing threats to citizens' rights to access public archives across the digital world and to share expertise about the role technology could play to mitigate threats to openness, access and, ultimately, democracy.

PROJECT ABACA

We've supported a team to develop a framework for digital sensitivity review that enables depositors of digital records to review records for sensitivity, at reasonable cost and at a manageable level of risk, prior to transfer to an archive.

Sir Alex Allan, the prime minister's independent advisor on ministerial standards and former permanent secretary at the Ministry of Justice, with Arthur Lucas, former principal of King's College London, at ITaaU's Threats to Openness conference.

We're facing a digital deluge in the coming decade as a result of a perfect storm of technological, political, legal and economic changes. Two major developments are hitting government records archivists simultaneously: over a 10-year transition period that began in 2013 and involves releasing two years-worth of records each year, records now have to be transferred to the National Archive after 20 years rather than the previous 30, and, soon, those sets of records will also be the first to be predominately digital.

> *"Not only is the challenge enormous, the rules are changing as pressure mounts to keep more and more data in the wake of Hillsborough and the child abuse scandals. Such data used to be routinely destroyed, but no longer. Worse still, it is widely anticipated that all government departments, including local authorities, will have to account for what is destroyed. The only way they can discharge such onerous responsibilities in the face of the digital tsunami is by the smart use of technology."*
>
> Michael Moss, professor of archival science, Northumbria University

Design for user experience (UX)

Design Thinking is a problem-solving approach that merges creativity with innovation and has people at its heart. It's been a crucial element of our work from the outset.

We have run a series of workshops at renowned digital product studio ustwo, and looked at the design of cities, 3D printing, healthcare and food safety.

MINECRAFT

We funded Mark Wright to develop CloudMaker, an internet utility that supports collaborative design between young people. It's an extension of Minecraft and includes the social online sharing of designs and a 3D printing server, crossing the physical/digital divide.

BLUPOINT

Find out more about Mike Santer's project to provide digital content in off-grid communities in developing countries further on in the booklet.

> *"I used some of the techniques demonstrated in the ITaaU workshops to run my own workshops, in both rural India and rural Africa. This involved looking at what IT as a utility meant to people living in that context. The design thinking workshop was very useful in formulating that, and the UX workshop with ustwo was great for looking into how the system would interface with humans."*
>
> Mike Santer, BluPoint

> *"This is a design process where you can introduce people to new technology in response to what they say and do, creating a really interesting model to let cultural knowledge unfold.... ITaaU was very aware of the key importance of design in any process of technology, so that seemed to fit."*
>
> Mark Wright, CloudMaker

A child takes part in a CloudMaker workshop

The Internet of Things and food security

ITaaU and the Food Standards Agency (FSA) have trialled a programme of pilot projects to look at how Internet of Things (IoT) technologies can play a practical role in improving all stages of the journey of food from field to fork and the potential for IoT to improve security across the food network.

UNIVERSITY OF ABERDEEN

A team from the University of Aberdeen investigated how inexpensive sensors can be used by catering businesses to operate more safely and efficiently, and potentially track food history that helps deliver recommended best practices.

UNIVERSITY OF LINCOLN

The University of Lincoln team worked with a consumer panel to help them understand how their fridge usage might lead to healthier habits and save money.

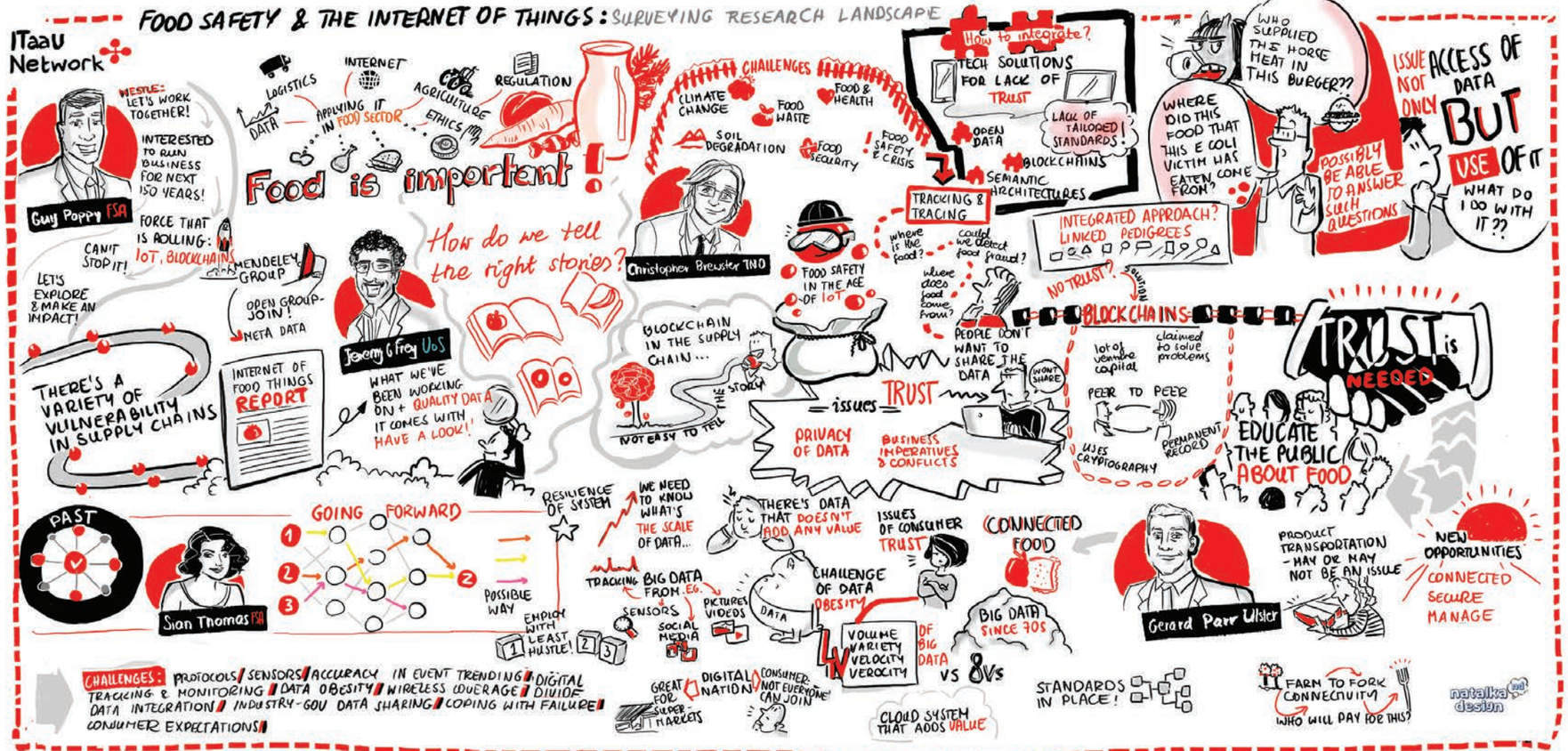
UNIVERSITY OF NOTTINGHAM

A team from the University of Nottingham looked at how growing communities can use IoT to share data that improves the accountability of local-produced food.

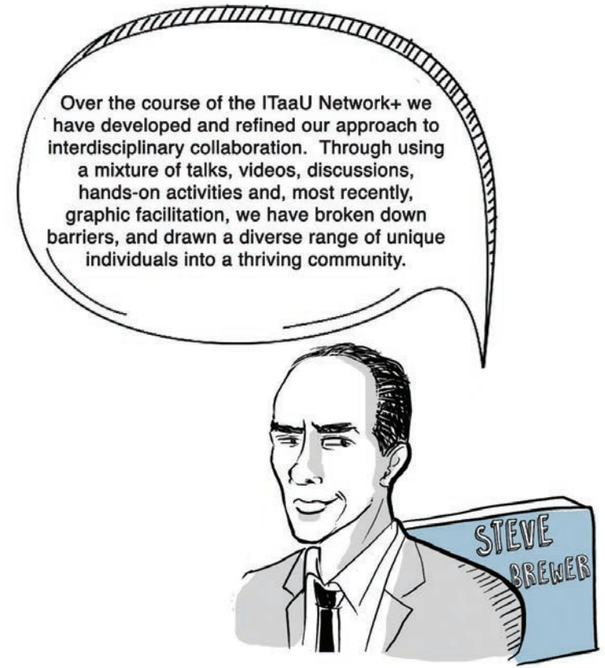
UNIVERSITY OF BIRMINGHAM

The University of Birmingham team used tiny data loggers to track the journey of shop-sold sandwiches to monitor their integrity and that of the cold-chain that supports their delivery.

> *"The ITaaU pilot projects have taken on a whole new dimension. It's the foundation of food regulation in the future. There is a chance here to develop something that's new – and not just in the food space. We can spread this learning across the other regulators."*
>
> Sian Thomas,
> FSA head of information management



ITaaU workshop: Food Safety and the Internet of Things: surveying the research landscape – Southampton: 27 June 2016



Growing BluPoint

BluPoint provides free access to curated content – from education and healthcare to humanitarian information - to areas without internet by empowering people through the technology they already have in their pockets. Its mission is to improve the lives of 20 million people in 20,000 communities by 2020.

ITaaU supported BluPoint at a crucial point in its development. It now has a £500,000 Innovate UK grant, additional equity funding and a fast-growing team dealing with customers on two continents.

> *"The timing was critical. If that ITaaU funding had not been there then the incubation would not have been feasible. ITaaU also shaped our thinking. The support of the Network throughout the process was great."*
>
> Mike Santer, founder of BluPoint

> *"Downloading one healthcare video in Sierra Leone can use a month's worth of data credit for a community health worker. Until now. Today, I had 15 people simultaneously 'sideloading' 11 films onto their mobiles. It only took minutes and cost nothing in data credit. Thanks to BluPoint."*
>
> David Deakin, director of healthcare and NGO services, BluPoint

Connecting communities

Technology rarely thrives in isolation. Social hubs and business clusters are typically the location for the competitive and collaborative mix of ideas, skills and energy needed for transformational technology to have impact and create value.

> *“Reports such as the two Tech Nation surveys on this phenomenon have captured where success has occurred around the UK, now we need to understand better the how and why.”*
>
> Steve Brewer, ITaaU

We set up secondments and supported projects to explore how previously disconnected and disempowered communities could harness the benefits of new technologies – and how that could be transformational. For example, we seconded **Karen Martin to Mapping for Change** at UCL, which helps community-led projects to use mapping and GIS to achieve their aims, to create a map for food banks to show clients where else they could get help locally. **Business models for CDIT clusters** explored the nature, characteristics and phenomena of IT-structured hubs such as Tech City, Salford Docks and Bournemouth. **Communities in the cloud** looked at technology’s role for people living in high rise developments.

BRING YOUR OWN HERITAGE

How can libraries harness new technology to enhance community heritage projects? We funded researchers at Robert Gordon University to work with Elgin library, near Aberdeen, to create a hi-tech community heritage network by involving local people in exploring ways to use laser scans of the local area.

> *“People really want to be included and like interaction with their local heritage. They also enjoy a games platform. We have found that scanning is a great tool for collating data, and our record of Elgin today could be used by people in 100 years. There is strength in networks such as ITaaU, because it brings together people in all different backgrounds, who can share their findings with others.”*
>
> Elizabeth Tait, lecturer, Robert Gordon University

Trust and security in a connected world

> *If we start with a small specific group of users, who either need technology to support them day-to-day or use it as a necessary adjunct to their work, we really want to establish what it is about technology they trust, if at all; why they are willing to trust it; and what makes them trust it at all. Is it because we are simply being forced to take ever greater risks because there are no alternatives? Are we relying on legal regulations? Or is there something inherent in design or implementation that makes it feel OK?*
>
> Brian Pickering, IT Innovation Centre, University of Southampton

From the moment that IT as a Utility was set up, it was clear that trust, trustworthiness, security and perceptions of security would be a crucial thread running through all our discussions and explorations. Alongside workshops, we supported two major research investigations in the area.

TRIFoRM

TRIFoRM brought together computer science, health science, social science and engineering to explore the trusting beliefs of users of IT systems, looking at factors that influence individual trust of systems and ways to model those factors and trust levels. The TRIFoRM team focused particularly on healthcare technologies for monitoring chronic conditions.

Two major threats were identified. The first is User Disengagement – if the medical team don't adopt the technology, then patients will lose interest in that technology. The second is an Unusable System – causing all users, clinicians as well as patients, to lose interest and disengage. User Disengagement can be mitigated with appropriate training and support; Unusable System can be helped with appropriate design expertise.

DIGITAL PROSUMER

Could you trade your own digital personal data in a futures market and make money out of it? What if, instead of companies like Google, Facebook and Twitter monetising your data without your control, consumers could sell their anonymised data directly to companies that want to buy it? If data is the new oil, how should its extraction be regulated? These are the scenarios and questions being explored by the Digital Prosumer project, which is developing a 'micro-Persona eXchange' (MPX) - an online exchange that allows prosumers to monetise their anonymised "digital personhood" data by selling it directly to the end user.

The living lab

> *“The Digital Economy programme has succeeded in its aim of taking research and researchers out into the real world of living and working, and making the ideal of co-creation a reality.*
>
> *Going forward we need also to bring real life into the research environment and forge viable living labs across many disciplines, underpinned by the concepts of design thinking to ensure that everyone moves smoothly through and beyond the digital age.*
>
> *IT as a Utility Network+ became itself a living lab – an approach underpinned by the way we brought diverse communities together to co-create, explore, experiment and evaluate and refine complex solutions in real world contexts.”*
>
> Jeremy Frey, ITaaU PI

IT as a Utility Network+ Community Conference 2015

Our six key recommendations

1

COLLABORATE

Work together – collaborate across disciplines, sectors and any other traditionally disparate communities; co-creation delivers innovation and novelty.

2

DESIGN

As we evolve from the digital to the data-driven economy, the role of design will be paramount; we need “Data by Design”, not just “Digital by Default”.

3

EMBED

Embed researchers – both physically and virtually - deep into the living world;

citizen science enables the wider community to be become a research community.

4

GRASP

Take hold of the circular economy: whether from the field to the fork; or the molecule to the medicine; utilities and services will replace ownership of things.

5

PERVADE

Pervasive, interactive and supportive services will be all around us; technology becomes a social context, humans and computers interact for real.

6

SHARE

Think open source, open standards, open data and open ideas: talk, discuss and benefit by sharing, but in a secure and trustworthy environment.

Who to contact

Find out more from the experts:

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ITaaU Network

Cover Image: Ada.Ada.Ada. Photo by Rachel Burnham. Copyright Philpott Design @AdaTheShow – www.adatheshow.com

"Ada.Ada.Ada." is a one-woman show about the world's first computer programmer - Ada Lovelace - who is just one of many incredible women to have been marginalised by history. Her story is told by the show's creator, Zoe Philpott, using an interactive dress covered in 4,400 LED lights. These are operated by programmable gloves made in collaboration with world-leading technologist and founder of Hackspace London, Charles Yarnold.

Zoe Philpott was a speaker at ITaaU conference in July 2015.

Living Lab image – Alix King

Bodleian Library image © Chris Chabot

Internet of Surgical Things image © Association of Surgeons of Great Britain and Ireland

Thank you to all who took part in our events and projects for your active participation – the hallmark of a successful community.