

PRACTICES FOR A **HEALTHY** INTERNET OF THINGS

A year with Mozilla's Open IoT Studio

Convening
Prototyping
Researching

2016

PRACTICES FOR A **HEALTHY** INTERNET OF THINGS

A publication by Mozilla's
Open IoT Studio & partners.

Edited by Michelle Thorne,
Jon Rogers and Martin Skelly.

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2016

FACIAL RECOGNITION – A POWERFUL AD TOOL OR PRIVACY NIGHTMARE?

- The Guardian

WHAT WE KNOW ABOUT FRIDAY'S MASSIVE EAST COAST INTERNET OUTAGE

- Wired

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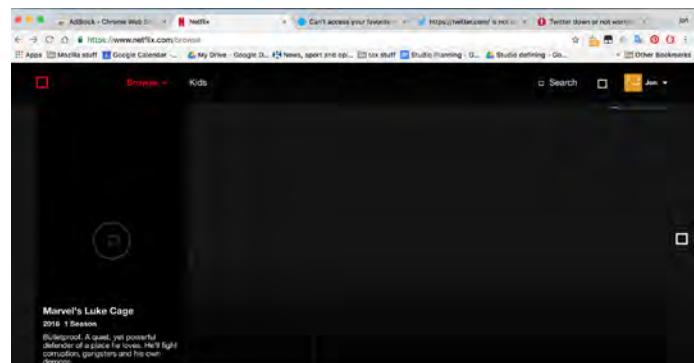
IS INDIA GETTING READY FOR SMART LIVING VIA IOT?

- Hindustan Times

MTN AND HUAWEI LAUNCH SMART WATER METERING SOLUTION

- SABC

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1. <https://www.theguardian.com/media-network/2016/aug/17/facial-recognition-a-powerful-ad-tool-or-privacy-nightmare>
 2. <https://www.wired.com/2016/10/internet-outage-ddos-dns-dyn/>
 3. <http://www.bbc.com/news/technology-35311447>
 4. <http://www.hindustantimes.com/tech/is-india-getting-ready-for-smart-living-via-iot/story-Fo7ZX7V5fue225PEf2uaM.html>
 5. <http://www.sabc.co.za/news/a/32f6a2804ee802ffad15b5750db21813/MTN-and-Huawei-launch-smart-water-metering-solution-20160911>



A letter from Revolv's founders:

We're shutting down Revolv.

Revolv was a great first step into the connected home. It wasn't perfect, but we worked hard to make something we - and other smart people - could build on.

And it worked. In 2014, we were bought by Nest and the technology we made became an integral part of the Works with Nest platform. Now Works with Nest is turning into something more secure, more useful and just flat-out better than anything Revolv created.

So we're pouring all our energy into Works with Nest and are incredibly excited about what we're making. Unfortunately, that means we can't allocate resources to Revolv anymore and we have to shut down the service. As of June 19, 2016, your Revolv hub and app will no longer work.

Thank you for your support and believing in us. We're sad for the end of Revolv, but this isn't the end of the connected home. This is the beginning.

- Tim & Mike

We all live in the Internet now

A foreword by Mark Surman and Michelle Thorne, excerpted from the Netgain report on the Internet of Things.

<https://netgainpartnership.org/internet-of-things/>

The Internet of Things (IoT) describes the ambient, networked computing environment that spans the globe, connecting everything around us: from what we wear to the homes we live in, to even medical devices embedded inside us. IoT is emerging from the proliferation of sensors, software, databases and massive data centers that link everyday things and behaviors to complex, connected systems. It is a world of ubiquitous computing and vast amounts of data. IoT is as much about connected objects as it is an amplification of humanity's ability to gather, analyze and act upon digital information.

IoT is not a new idea. Science fiction writers, futurists and computer scientists have been talking about it for decades.

The author Philip K. Dick foreshadowed it nearly fifty years ago in *Ubik* with a smart door that refused to open for its owner without payment. In 1995, MIT Professor William J. Mitchell predicted, "Increasingly, computers will meld seamlessly into the fabric of buildings, and buildings themselves will become computers—the outcome of a long evolution." Now that world is quickly becoming reality. According to Consumers International, two billion people on the mobile Internet are in developing countries.

Any one of those smartphone owners has sensors, cameras and an Internet connection in their pocket. Economies like China are at the heart of defining rapid manufacturing and the Internet of Things. And, countries with large scale poverty and limited regulation are increasingly the testing ground for more extreme Internet of Things experiments such as embedded remote control birth control chips designed for women in the developing world.

The door refused to open. It said, 'Five cents, please.'

He searched his pockets. No more coins; nothing. 'I'll pay you tomorrow,' he told the door. Again he tried the knob. Again it remained locked tight. 'What I pay you,' he informed it, 'is in the nature of a gratuity; I don't have to pay you.'

'I think otherwise,' the door said. 'Look in the purchase contract you signed when you bought this conapt.'

Excerpt from Ubik by Philip K. Dick, 1969

At this stage in IoT's development, it's not just about asking what it is possible, but rather, what is responsible. That's why Mozilla is focused on understanding the public interest issues that arise with IoT and what we can do about it.

Why is IoT taking hold now? It's due to a confluence of factors, including the rise of cheap sensors, cheap bandwidth, cheap processing, the proliferation of smartphones, ubiquitous wireless coverage, big data analytics and the availability of Internet Protocol version 6 (IPv6), which allows for a vastly greater number of Internet addresses.

IoT is in many ways an evolution of the Internet—a third wave. The first wave being the fixed desktop Internet, the second on mobile. This new wave is often defined by orders of magnitude: "...billions of devices connected, trillions in generated revenue, zettabytes of multi-directional data," as O'Reilly Publishing recounts. When we talk about IoT as ubiquitous computing, it is not an exaggeration: networked connectivity will be almost everywhere.

At this stage in IoT's development, it's not just about asking what it is possible, but rather, what is responsible.

Another major factor is the emergence of rapid manufacturing and what O'Reilly Publishing's Jon Bruner calls "the new hardware". Hardware is increasingly becoming like software: easily and cheaply programmed into something new. This trend is enabling new people to participate in the making of connected products and the Internet taking on new physical forms.

As this technology becomes more deeply infused into our everyday lives—by orders of magnitude—it's important to look at it critically, especially from a public interest perspective.

What happens when most people and most things are creating networked data all the time? How will algorithms connect to our physical environment and influence decision-making, relationships and power structures? As an organization who cares about the Internet, we must ask what impact we want these new technologies to have in our lives, our organizations, our cities and our societies.

Guided by Mozilla's principles and commitment to a healthy Internet, we began the Open IoT Studio in 2016 to investigate the opportunities and challenges of IoT as part of the Mozilla Leadership Network. This publication showcases the work and learning so far, as well as the breadth of expertise of our network and allies. To all of you who collaborated with us in 2016: thank you.

Welcome to the Open IoT Studio's first annual publication!



Michelle, Peter, Jon and Martin at MozFest 2016

We'd like to share what we've been learning and doing in 2016 as well as ideas about where we're headed next year and how you can get involved. Think of this object in your hands as a physical bookmark to many activities and a broader network that welcomes you to join in.

The Open IoT Studio is a program initiated in January 2016 as part of the Mozilla Leadership Network to advance a healthy Internet where people make meaningful connected things. We care about a responsible Internet of Things and how to support the professionals who are making the next generation of devices and services. We research and advocate for IoT practices that are private and secure, decentralised, inclusive, innovative and open.

It's been a privilege to collaborate with such thoughtful and committed practitioners over the last year. We are honored to share what we've learned and made together, and if the ideas in here spark something for you, we look forward to welcoming your involvement in the year to come.

Thank you,

**Michelle Thorne, Jon Rogers,
and Martin Skelly**

From Mozilla's Open IoT Studio
Berlin and Dundee, 2016

Katie
Babitha | Erika | Rachel | Tommy | Dean | Martin | Dietrich | Jayne.
| | | | | | | |
Mike | Rory | Julia.



Erika | Mike | Kate | Sarah | Jude | Rachel | Davide | Peter | Dan | Marianne | Zandri | Toby | Michelle | Dietrich | Babitha.
Martin | Jon | Pelly | Erika | Julia | Otis | Domenic | Djilani | Vladan | Holly | Rory | Katie | |
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Teresa | Stefano | | | | | | | | | | | | | | | |
Giovanna | | | | | | | | | | | | | | | | | |
Stefano | | | | | | | | | | | | | | | | | |

We want a
healthy Internet
where people
make meaningful
connected
things.

.....

The Internet of Things (IoT) describes an emerging global network connecting everything around us: from what we wear, to the homes we live in, and even medical devices embedded in our bodies. IoT encompasses everyday objects as well as complex data systems in cities and industries. This so-called “third wave” of the Internet is often defined by orders of magnitude: “billions of devices connected, trillions in generated revenue, zettabytes of multi-directional data.”

**Now is the time in IoT not
to ask what is *possible*,
but what is *responsible*.**

Mozilla’s Open IoT Studio supports professionals who want to make meaningful connected objects that contribute to and benefit from a healthy internet. We care about responsible IoT practices and how to advance next generation devices and services that are private and secure, decentralised, inclusive, innovative and open.

What is a healthy Internet?

Mozilla is committed to advancing a healthy Internet. We understand that to include the following issues, which we explore in the Open IoT Studio.

<https://github.com/openiotstudio/general>

Privacy and Security

How can we design contextually relevant privacy controls in IoT that are knowable, modifiable and empowering to the people using them?

We are particularly interested in exploring the professional practices of privacy and security that can empower individuals to grow trust and be in control of their connected products and services.

IoT will significantly amplify the security and privacy challenges we currently face. As IoT brings computing power much closer to us physically, it will inevitably become more pervasive. There are already examples of how this physical proximity and digital control of physical resources can result in life-threatening scenarios, such as a car being hacked or a pacemaker compromised.

IoT also collects more and different data than previous eras of the Internet. This includes our physical location, appearance, and even emotional state.

As we build meaningful connected things, we must ensure that these objects don't compromise agency. People must be able to understand and control their digital lives. And control depends on context. We want to understand how designing for specific contexts can inform privacy best practices broadly.

Decentralisation

How can locally relevant and locally produced IoT contribute to more resilient systems?

Currently, several large corporate players are shaping IoT. Their power is quite centralised, even though they compete against each other. Centralised power means there is a single point of failure. And it means that individual agency is limited, especially at the edges of a network. For this reason, we are committed to making meaningful things in local contexts. Open innovation at the edges can shift centralised power, leading to products that are locally relevant and adapted. We can break horrendously short cradle-to-grave lifecycle that the digital technology industry has artificially generated.

In this way, when the inevitable stresses and shocks occur, local communities are more resilient. They can repair their tools, they can repurpose them, and they will benefit for having meaningful things that last and make sense in their context.

We are particularly interested in exploring the contexts of decentralisation that can empower communities to be more resilient through making locally relevant IoT.

Open Innovation

How can open innovation help us make meaningful connected things?

People everywhere make things that are meaningful to them. And they make them in different ways. We want to understand and enhance making that is in tune with its context. At times this can look messy, reflecting the messiness of life and the world around us.

Local crafts are highly adapted to local contexts, such as language and local materials. We want to celebrate this diversity and support others in using local approaches to create meaningful things and share them openly.

We are exploring how open innovation happens across the Internet of Things ecosystem. We're not fully sure where this is heading right now, but one thing we are sure of is that it's good to start with actionable insights drawn from local contexts, and test designs through lived experiences.

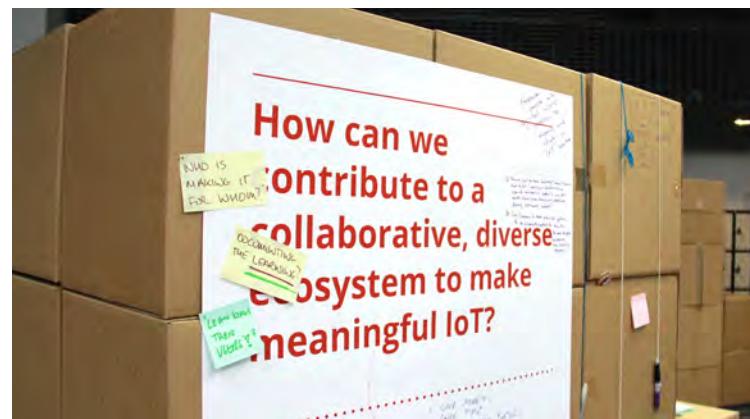
Digital Inclusion

How can we contribute to a collaborative, diverse ecosystem to make meaningful IoT?

When IoT is made by just a few power players, then the interests of some people might be overlooked or deemed not profitable enough to cater to. By innovating openly and making meaningful things locally, more people can have a voice and shape the technology environment around them.

We want to contribute to an ecosystem that is diverse and collaborative. That means championing things made by different people in different contexts to address different needs.

Through inclusive practices, we want to further challenge the centralisation of power and advocate for digital equity, ensuring that the Internet remains a global, public resource that is open and accessible to all.



Digital Inclusion discussion, MozFest 2016

Web Literacy

How can the making of meaningful IoT contribute to new learning opportunities?

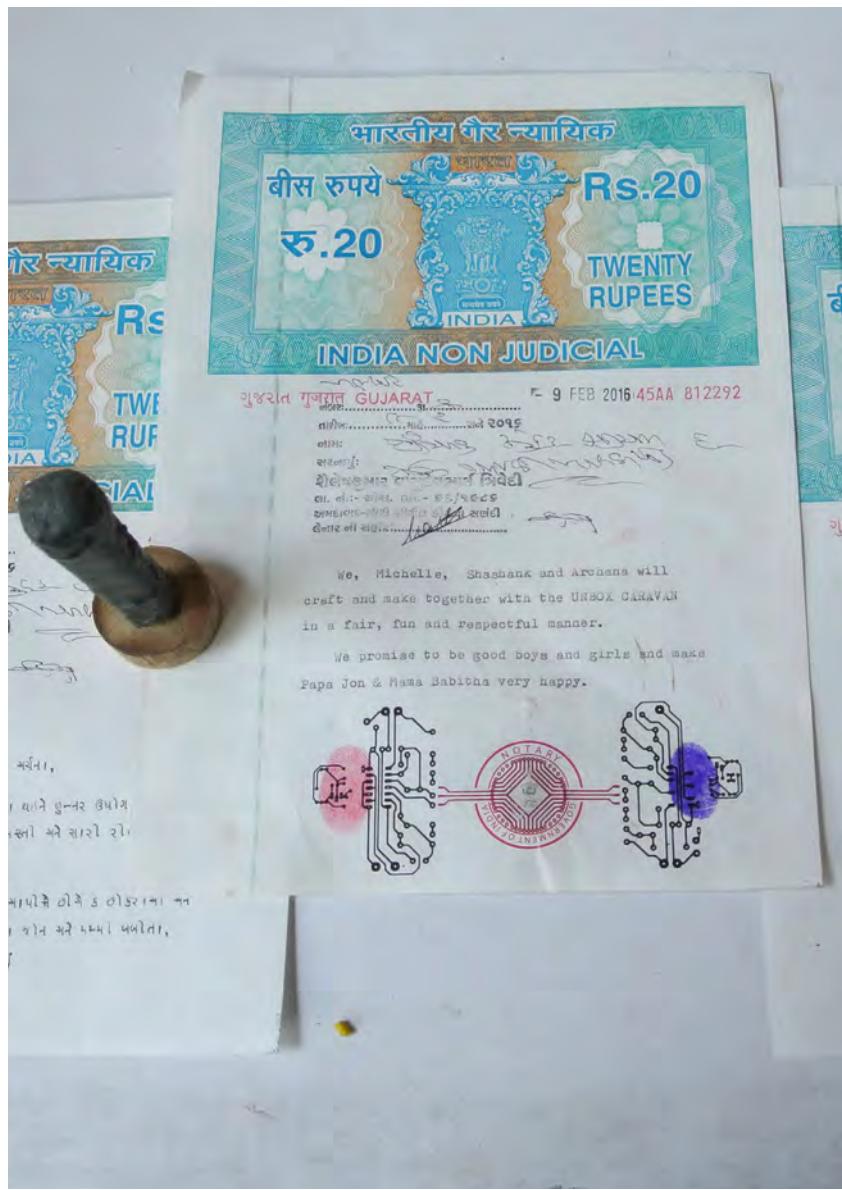
We learn to make and make to learn. The process of making reveals insights that will help us grow and improve. These reflections can be shared with others, and support them as they learn.

We are keen to collaborate with educators on learning opportunities and curricula that empower people in making meaningful IoT, especially professional practitioners seeking to improve their craft.

Through improved professional practice that embeds Internet stewardship and local context, we believe that the connected products we make will support more people to have agency in their online lives. They will be able to read, write and participate fully with technology.



Otis, Jude & Rachel, Anstruther 2016



Connected contracts, Ahmedabad 2016

How We Work

As a professional learning network, we build ecosystems through collaborative convenings and conduct action research to unearth insights around Internet health for IoT. Responding to those insights, we make prototypes through commons-based peer production to directly impact the professional development and the formation of best practices among the IoT professionals we work with.

We reflect on this process and share what we learn through participatory events and open publications, seeking to strengthen Mozilla's leadership network and influence the IoT larger ecosystem towards a healthier Internet. The following themes are central to the studio:

Open Internet

The Internet is an integral part of modern life—a key component in education, communication, collaboration, business, entertainment and society as a whole. It is a global public resource that must remain open and accessible. It is built on standards, interoperability and decentralisation. We build things with and for the open Internet.

Open hardware

We prioritise working with the development boards and physical artifacts offered by the open hardware movement. Thanks to their high quality through peer review, vibrant communities contributing to libraries and bug fixes, and the freedom to study, modify and manufacture parts, open hardware leads to better products, less duplication of efforts, and a healthier Internet.

We reflect on this process and share what we learn through participatory events and open publications, seeking to strengthen Mozilla's leadership network and influence the IoT larger ecosystem towards a healthier Internet.

Read/write/participate

To be a citizen of the digital world, you need the ability to read, write and participate in it. We research and prototype IoT so that individuals can also build, create and engage meaningfully through Internet-enabled products and content.

Crafting considered objects

We specialise in locally appropriate ways of building IoT that are sensitive to individual and community needs. At the heart of the studio, we explore ways in which craft can support sustainable manufacturing in terms of the environment, local economy, and local relevance.

Locating our work in places

Going hand-in-hand with our approach of crafting considered objects, we are locating activities in specific communities in diverse geographical locations.

This includes conducting studio activities in communities that are not usually associated with technology development. While the results are expected to be highly specific to the localised communities, we see this as an important way to approach global technology development in parallel with the studio's digital inclusion issues.

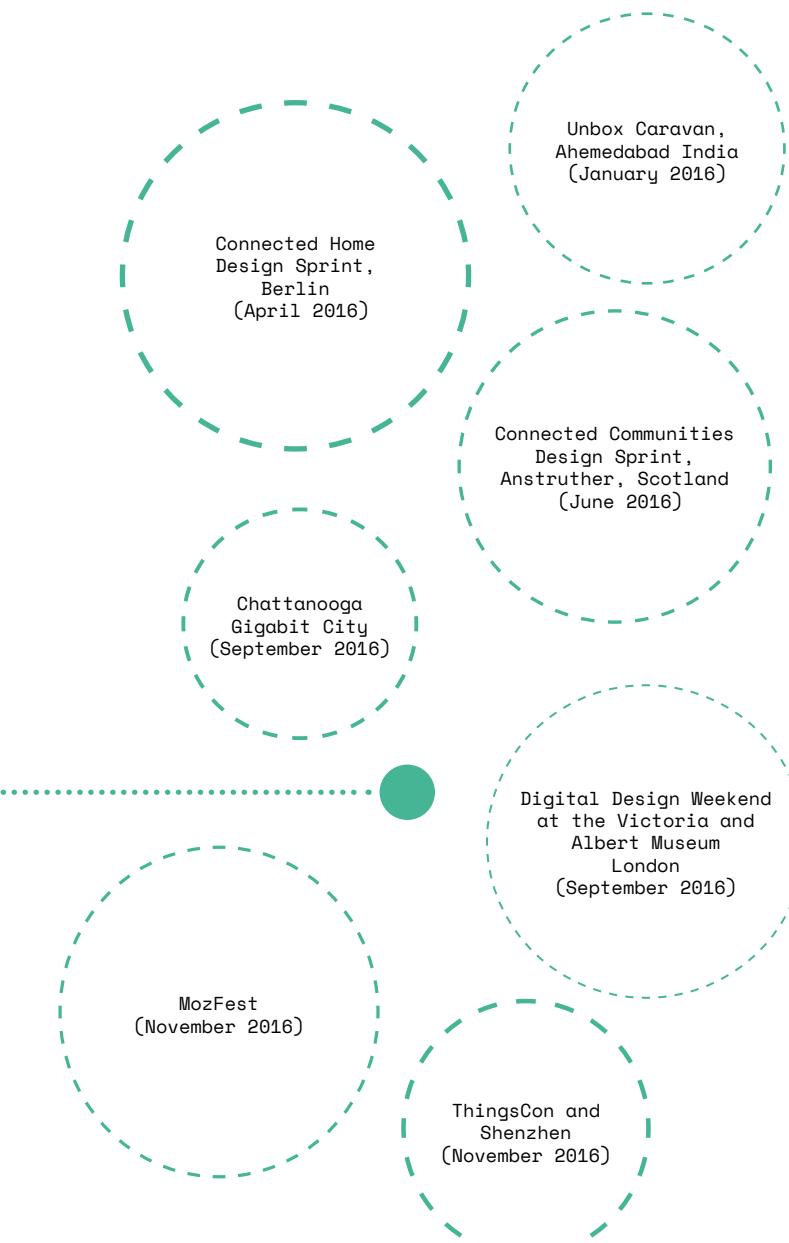
Working with people

Understanding the lives of people is fundamental to building the next generation of IoT. Market research and global trends will allow you to understand the existing landscape, but it will not bring you closer to concepts that are change-making. Drawing from design ethnography, field research and action research we are taking an insight-led approach to creating original ideas that matter.

Ecosystem events - our year in convenings

What we did in 2016

We knew we had to bring people together to think about IoT. We knew they had to be diverse as people, in skills and in thinking. We didn't quite know how or really who these people were. A year on and a number of convenings notched up like stickers on a tour bus, we definitely know more than we did - but we have so much more to do. We hope that by sharing what we did this year that you might take inspiration to get involved and take-part, host or support an event in 2017. Don't worry if you're not sure about the full details - as you'll see from the excerpts and glimpses of the events we ran, we didn't (and maybe still don't) either!



Unbox Labs - Caravan Edition

Ahmedabad, India 1st-13th February 2016

The Open IoT Studio embarked on a learning journey at the start of 2016 with a series of convenings planned to build an ecosystem, understand IoT issues, and explore the making of prototypes to further the understanding of these issues. This journey started in January this year with a 'caravan' in India. Here's our friend and mentor Babitha George writing about why we did this:



Unbox Caravan, Ahmedabad 2016

"After toying with a number of options, we came upon Caravan. India has had a long history of trade routes and journeys within the sub-continent as well as with the world at large. And caravans have been a big part of this. Ahmedabad in particular, situated in Gujarat, is at convergence of the trade routes over land and sea for several years. The word itself seemed to be brimming with possibilities and well encapsulated the tone in which we wanted to set a safe but challenging space for this edition of the LABS.

As a group together over the two weeks, we shared an open emergent journey, where we kept each other company while also being able to step away at times and venture on our own. The caravan had people staying on over the course of the entire journey and several others joining in at different points, similar to what happens in the caravans of lore.

We built the format of the caravan as a space to take some time off, develop nascent ideas (or well-thought out ones) with each other and immerse deeply in the context around us.

Like in any caravan, the only ask we had of participants was for them to come with an open heart and an open mind, and together we would make sure it is an adventure!"

Babitha George,
Unbox and Quicksand

Berlin Design Sprint

Berlin Fab Lab, 22nd-25th April 2016

The first “design sprint” was on User Control in the Connected Home, and started with our first in-depth commissioned report to the design research agency Quicksand. Quicksand are based in Delhi and Bangalore and have a deep, thoughtful history of conducting highly sensitive people-centric research in some of the world’s most diverse communities. For the full research report, read on to the final section of this publication. The following email will give you a sense of how the event was framed to participants.



Berlin Design Sprint, 2016

Hi there,

We’re hosting a design sprint in Berlin from April 22 - 25 (travel dates Apr 21 and Apr 26). There will be about 15 participants -- a nice mix of designers, technologists, researchers and privacy advocates.

We’ll be responding to a design brief about how users can understand and control personal data in the connected home.

The focus of the event will be on making prototypes. Before arriving in Berlin, we’ll share insights based on user research and expert interviews and generate ideas in collaboration with other participants. The time spent in Berlin will be honing these ideas by implementing them in objects and experiences.

The goal will be to have several working prototypes that reflect the design brief and deepened understanding of what it’s like to build experiences based on user research.

If there’s an additional topic or project you’re interested in testing or moving forward with a group of friendly, competent people, let’s also set that up!

Thank you Michelle and Jon

Reflections from Shashank Sriram on the Berlin Sprint

After an awesome experience of engaging with Mozilla people at NID in January, I was asked if I could make it to a Design Sprint in Berlin for a week. The answer was an obvious 'yes'.

After making myself comfortable in Berlin, it was time for me to start brainstorming with the other participants on the topic of "Connected Home", for which extensive research in the form of insights had already been provided by Babitha and her team at Unbox. The participants of the sprint were absolutely brilliant. Each participant was unique, with expertise ranging from Sociology, Narration, Story Writing, Product Design to Extreme Tech. This brought fresh and unique perspectives to solutions that were being generated in response to insights and problems, and all the exercises were time-bound, leading to proper prioritisation and affinity mappings.

My group was quick to ideate on the problems and come up with weird and whacko solutions - which we finally presented to the entire audience. After prioritisation we ended up selecting two solutions:

Active behavioural change

A device that dealt with monitoring anger levels in the house and solving tricky

situations with interruptions that were unusual to the general setup of the house. The same device also acted as an icebreaker when needed.

Passive behavioural change followed by active notifications

This device helped smokers by limiting their daily intake of cigarettes by giving an indication on the cigarette-box/lighter. Also it had the capability of working with other IoT enabled devices such as IoT inhalers (proposed) to warn smokers of their proximity to people around who sensitive to cigarette smoke.

Mozilla had organised this sprint at Fablab Berlin, which made the conceptualisation and fabrication of the prototypes a breeze. The workshop, along with the raw materials made available to us, ensured that prototypes were realised at amazing speed with the scope of going back to drawing board as and when needed.

One of the best aspects of the entire Design Sprint was the amazing hospitality the Mozilla community bestowed on us. Evening walks to interesting spots in and around Berlin, followed by amazing food doubled up as sessions to reflect back on the day's work as well as making sure that the participants were fresh for the next day.

I would like to thank Michelle, Jon, David, Michael, my team members and all other participants of the sprint for an amazing experience and hope to be a part of many more sprints yet to come.

- Shashank



Shashank working on a prototype, Berlin 2016

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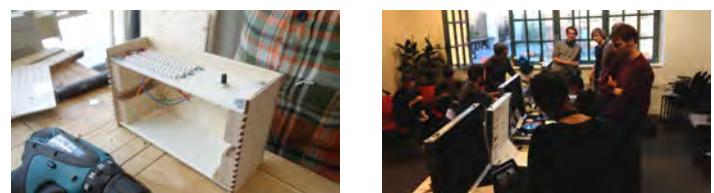
Shashank Sriram,
Participant

```
function convolution (imgData, option) {
    // check options object & set default variables
    option = option || {}
    option.monochrome = option.monochrome || false
    option.divisor = option.divisor || 1
    option.median = option.median || false
    if (!option.filter || !option.radius) {
        throw new Error('Required options missing. filter : ' + option.filter
+ ', radius: ' + option.radius)
    }

    // Check length of data & available pixel size to make sure data is good
    data
    var pixelSize = imgData.width * imgData.height
    var dataLength = imgData.data.length
    var colorDepth = dataLength / pixelSize
    if (colorDepth !== 4 && colorDepth !== 1) {
        throw new Error('ImageObject has incorrect color depth')
    }
    var newPixelData = new Uint8ClampedArray(pixelSize * (option.monochrome
|| 4))

    var height = imgData.height
    var width = imgData.width
    var f = option.filter
    var r = option.radius
    var ch, y, x, fy, fx, arr, s, result, i

    // do convolution math for each channel
    for (ch = 0; ch < colorDepth; ch++) {
        for (y = r; y < height - r; y++) {
            for (x = r; x < width - r; x++) {
                i = (x + y * width) * colorDepth + ch
                if (ch === 3) {
                    if (colorDepth === 4 && option.monochrome) {
                        newPixelData[x + y * width] = imgData.data[x + y * width]
                        continue
                    }
                    newPixelData[i] = imgData.data[i]
                    continue
                }
            }
        }
    }
}
```



EXPLORING THE INTIMATE IOT

background - physicality of data

Certain objects have a significant place in our lives, in how we relate to each other and certain events. Such objects often act as triggers for places, people and experiences that can transfer us in time and space and connect us with significant others. Over a period of time, some of the objects we gather and share find their way into our homes, in more open spaces like the living room, or other more personal spaces kept in a drawer. While still others are discarded and lost. Printed pictures often occupy space in our mum's and grandmother' homes. Pictures from my high school and university graduations, my brother's picture from the military, picture from my mum's wedding. Even though over the years the medium of creating, storing and accessing data have changed, most of us share an intrinsic need of connectivity with each other and things we love or wish to remember.

We take and share pictures via our smart phones and use social media to post our thoughts. We are all storing data in hard drives with a high capacity of storage. But with the new ways of taking pictures, video and audio files via our smart phones we store an abundance of data that might stay in hard drives for ever.

In the digital era working with IoT technologies it is interesting to explore how can we combine the physicality of objects and digital capabilities to explore new ways of sharing and storing data and enhance the emotional connectivity with each other through objects.

Sharing and Storing Data

Google Drive, Dropbox lets us store and share files online and access them from anywhere. A group of friends create a shared folder on the Cloud and share the pictures they have taken during their trip. Internet offers an **Immediate, Easy, Accessible** way to store and share data.

How can the IoT help us curate our personal archives in different ways?

How can the IoT potentially open new avenues for personal meaningfulness in storing and accessing our personal archive?

Can IoT respond to "togetherness", the sense of community?

Exploring Intimacy and IoT

A scenario that could be explored is the communication between family members that live apart. When someone wants to keep a thought, a recipe, take a picture that links him with the rest family can send it to an object/ a server where the information can be stored. The object could be a physical object in the house where the family members meet, a personalised object for each member of the family or a just server on the internet.

"togetherness" - unlocks data



blurred data pixelated data "hidden" data in a different object

"Togetherness" unlocks the data

When family members are apart and they send data to each other different interactions with data could occur. For example:

- only a part of the information can be revealed,
- the information is blurred and cannot be fully understandable
- or not accessible at all for a certain time.

Only when the family gets together, all the members can access all the context.

"Togetherness" is the way unlock the encrypted information.

IoT encourages for nuanced ways of sharing stories, pictures and the anticipating the "being together".

Collaborative Making in Anstruther Scotland

Dreel Halls, Anstruther, Fife, Scotland.
20th-24th June 2016

The Open IoT Studio believes IoT that embraces a distributed product development model through all areas of the globe and our society makes for much stronger communities; communities that are more resilient to changing economic, social, cultural and environmental landscapes. We wanted to test this by holding a convening in the small rural coastal town of Anstruther in Scotland. Population 5,000. Mobile data coverage: patchy.

The big change between the Ahmedabad Caravan and the Berlin Design Sprint was that we included community groups directly in the design process. This was a huge success. It also gave people more flexibility to choose to focus on research or prototyping, or a mix of both. We mixed the event up by commuting to the DJCAD Make Space in Dundee, hosted by Ali and Rob, to use their wonderful make space to build final prototypes and a publication.

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*Disclaimer Jon lives in Anstruther Fife and tends to get a bit excited about how beautiful it is and how it's turning into a small haven for Mozillians...

Hey all,

Looking forward to seeing you in Scotland!

With this message, we would like to share more about the event as well as a reminder for the group call on Wednesday and more logistical information.

#Preparing to meet the communities

Our goal for this event is to make experience prototypes that resonate with local communities and embed shared values for IoT. We want to learn and make together as professionals in this field, fostering a larger network of people who are advocating for more open, empowering and fair IoT.

In Anstruther, we're going to meet with three local groups around these themes:

Fisheries Museum (community home)
Farmers (clever countryside)
Teens (covert communication)

A mix of researchers, designers and technologists will be listening and responding to these groups with ideas and prototypes. There will be a few rounds of testing and observing how the ideas get on, and we'll end the week with a celebration of what's been made and learned together with the village of Anstruther.

All throughout, we have a lovely set of outings, meals and hikes along the Scottish shoreline where we can get to know one another and reflect on the impact we want to see.

Thank you Michelle and Jon

PHONE BOX → PERSONAL DEVELOPMENT.

LETS HACK A PHONE BOX.



'BRING'
'BRING'

①

TOUCH A
PHONE BOX



④



~ DEEP.
FRIED
PIZZA.



⑤

SWEEP OUT
PHONE BOXES

→ how easy they
are to hack

CALL THE BOXES



⑥

CLEAN UP THE

BOX



PROTOTYPE

VR DOCUMENTATION IN THE
BREAKS AND SPARE TIME!

Fisheries
Museum

This is a
NEIGHBOURHOOD
Area



CCTV

TELEPHONE

GREEN
RY



POST BOX

9 AM

7 AM

9 AM

7 AM

9 AM

7 AM

9 AM

7 AM

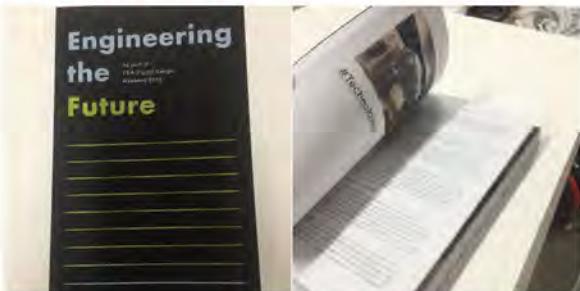
V&A Digital Design Weekend

V&A Museum, London. 25th-26th September 2016.

In its sixth year, the Digital Design Weekend brings together artists, designers, engineers, technologists and the public to celebrate and share contemporary digital art and design. Participants take over the Museum with pop up interactive installations, tinkering and creative electronics, workshops, labs, family-friendly events and more, exploring engineering and making, including a series of events using the new Samsung Digital Classroom. The Digital Design Weekend coincides with the London Design Festival at the V&A Digital Weekend.

 **Jon Rogers**
@iledigital

It's here! [@irini_mirena](#) [@Ajprescott](#) [@thornet](#) - great design job [@uniformtweets](#) and thanks to [@ahrcpress](#) [@mozilla](#)



RETWEETS
5

LIKES
16



Hello all

I hope you are very well!

A few follow up notes from the Digital Design Weekend :-) First, here are the total numbers for the event - a record!

Saturday:

9405 adults, 1395 under 18s - total: 10,800

Sunday:

12249 adults, 1438 under 18s - total: 13,687

Grand total for both days: **24,487**

Well done everyone!!

Also, Andrew Prescott and his amazing team are putting together a Storify, so we will share once ready.

If you have written anything e.g. notes, reflections, etc on the event that you would like to see included in the Storify, please send me the link.

Many thanks!
Irini

Chattanooga 48hr Launch

Chattanooga, Tennessee, USA.
9th-11th September 2016

Mentors from across Mozilla's extended network met at Hive Chattanooga to help local educators and entrepreneurs prototype the future of civic and educational technology in the Gig City. Our mission was to support the Company Lab's IoT edition of their increasingly popular 48Hour Launch event. For two days and nights, mentors collaborated with local entrepreneurs to harness the potential of connected devices to change the way we live, learn, and work.

Countdown to Launch

3 — Kickoff night

In order to explore ideas around emerging technology and education, the theme of Internet of Things (IoT) was chosen for the event. Prior to the weekend, CO.LAB worked with Mozilla to connect participating entrepreneurs with resources from the community to start thinking about their submissions. Friday night began with presentations from the finalists and an invitation to all participants to join their teams. Energy was high as people mingled between groups, deciding how they would devote their energy over the weekend.

2 — Product development

Saturday was a day of innovating, testing hypotheses, and foundation-building. Throughout the day, teams connected with mentors and experts to design brand elements, develop prototypes, prep with legal, and get their Arduinos and Raspberry Pis fired up. The CO.LAB crew provided room to think, a supply of energizing food, and an endless pitchers of delicious sweet tea and lemonade.



Matthew Nassar and Ashlanett Harris, Chattanooga 2016

1 — Pitch night

Throughout the final day of the event, teams worked feverishly to finalize their prototypes and business plans with their mentors and the local experts.

Participants were purposeful and focused through the home stretch, up until the 4:00pm deadline. Then it was time to practice pitching before the big moment on stage. We moved to a the beautiful Church on Main Street where we were joined by 125 attendees from the Chattanooga community.

"We at Mozilla believe super fast networks like the one we have in Chattanooga, TN, are the future of this web, and we're interested in bringing in more voices to help shape this future. To that end, we support collaborations between technologists and educators that explore these frontiers of technology- including the internet of things.

The IoT space is an area where a lot of people are trying to find their way and it's an area where Mozilla is excited to be exploring, as well."

— Katie Hendrix, Mozilla Hive Chattanooga

The Open IoT Studio at Mozilla Festival

Floor 6 - Dilemmas in Connected Spaces London
28th-30th October 2016

Mozilla festival is the largest community open innovation space that we have been to. It's a place to investigate potential, plant seeds, grow our ecosystem and harvest the results. It's a big open field to sustain and feed the Mozilla community. We love it. Our approach to how we show up has been inspired by the Tick Tock innovation model (allegedly introduced by Intel but made more famous by Apple). In a Tick year we want to show up big and loud - a rallying call to partnerships, to showcase the things we've achieved and to significantly grow our ecosystem. In a Tock year we want to be more reflective, to harvest what we know and to investigate new pastures for growth. A Tick year is characterised by big loud ambitions happenings; a Tock by a quieter discursive mode of coming together. 2015 was our first Tick; 2016 our first Tock. Be prepared for a rather loud Tick coming in 2017....

Security and Privacy featured heavily in our discussions and reflections this year. Ame Elliott our partner at Simply Secure led a workshop on contextualised trust and the everyday lives that IoT will inhabit. Davide Gomba from Officine Arduino showed us how we can create a Telegram Bot using the new MKR1000 Arduino open IoT platform. There was face painting to confuse facial recognition algorithms, there was a meeting of the monks of the dark temple and Rachel explored decentralised and localised Internet browsing when the Internet wasn't always there...

Who'd have thought that the best way to fool facial recognition AIs is to tilt your head. Will there be a new body language for machines? Body-to-Machine-Language.



MozFest, London 2016

Research and Prototypes



Decentralisation

How can locally relevant and locally produced IoT contribute to more resilient systems?

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"The spinning wheel represents to me the hope of the masses. The masses lost their freedom, such as it was, with the loss of the Charkha. The Charkha supplemented the agriculture of the villagers and gave it dignity. It was the friend and the solace of the widow. It kept the villagers from idleness. For the Charkha included all the anterior and posterior industries- ginning, carding, warping, sizing, dyeing and weaving. These in their turn kept the village carpenter and the blacksmith busy.

The Charkha enabled the seven hundred thousand villages to become self contained.

With the exit of Charkha went the other village industries, such as the oil press. Nothing took the place of these industries. Therefore the villagers were drained of their varied occupations and their creative talent and what little wealth these bought them. The industrialized countries of the West were exploiting other nations. India is herself an exploited country. Hence, if the villagers are to come into their own, the most natural thing that suggests itself is the revival of the Charkha and all it means."

- Mahatma Ghandi, 1940

Every object can tell a story. Take a moment and think of the clothes you are wearing and the objects you carry with you. Is there a single thing that doesn't link you to a memory. Most of the time it might be something pretty trivial. But occasionally a story about an object leaps up. The Indian flag is carries with it an incredible story. A story that is as close to the challenges of a healthy Internet that any object could represent.

The Indian flag is - by law - made from a handspun cloth called Khadi. It represents the fight to freedom through Ghandi's passive resistance movement. At the time, raw cotton from India was shipped to the west for producing cloth, a form of control that kept money flowing from India. Ghandi challenged this centralised cloth production by designing a very simple hand loom, or Charka, that people could make at home; a handloom to empower millions of rural Indian people to create their own cloth, Khadi cloth. This simple material, the material of the poorest people, gave a country freedom from oppressive rule. A material became a movement for large scale change. If ever there was something that embodied the values of the Open IoT studio, it would be this cloth. A cloth and a way of making that changed the lives of millions and brought about the end of one of the most brutal, oppressive imperial regimes in the world's history.

We don't know what this material or object or way of making might be today. But we are striving to find it.

In the next few pages we'll share some of the work we're doing with partners to explore a decentralised IoT that embraces individuals and crafted localised production.

Decentralising the IoT

Romit Raj & Babitha George,
Quicksand

The narrative of IoT is currently dominated by discourses set by large for-profit organisations. These discourses tend to revolve around closed systems where the touch points for casual users are usually appliances. Even in such cases as the Google Cloud Platform, which are technically open source, the channels of innovation and usage tend to be very narrow. For example, at present the narrative around the Internet of Things is closely linked with the narrative of Big Data. The Google Cloud Platform, which on the surface appears to be fairly open set of tools, including a developer hardware kit, is in fact a fairly closed narrative around sensors streaming data through google cloud servers. Therefore, while the systems may have diverse and scattered inputs, the data collected is channeled into a narrow utility zone of monitoring and only through the Google Cloud pipeline.

Even this, however, is a fringe component of the IoT ecosystem as it exists today. For most people, interactions with IoT systems will begin (and perhaps



end) with mainstream appliances such as refrigerators, washing machines, televisions, ovens, automobiles etc. An average user perhaps will understand IoT in her home as the communication paradigm between these appliances. The idea seems to be that these appliances will be able to communicate with each other and with a larger system architecture.

This seems to be not only a benign but also a fairly decentralised system where each household forms a contained whole capable of intelligently making the lives of their owners more convenient. However there are large systems and protocols in effect in this ecosystem that are definitely not decentralised and perhaps not so benign either. For an average user these systems and protocols may be invisible. However, they are apparent to any kind of careful consideration. A fitness device for example, is a closed electronic system collecting user data and communicating with proprietary servers while giving the user a narrow window into the data collected through an interface. Not only are these devices closed systems built with proprietary technologies but they often communicate with centralised server architectures that are proprietary as well.

The world of technology is often silo-ed, and works under the assumption that innovation emerges primarily in systems that are largely urban and often Western- in aesthetic, in function and in their inception.

It is in this context, that we are seeking to understand and learn from decentralised models of production, distribution and control. The world of technology is often silo-ed, and works under the assumption that innovation emerges primarily in systems that are largely urban and often Western- in aesthetic, in function and in their inception. The other aspect to this is the nature of the Western world being more 'dependent' in an intrinsic way on technology; the daily lives of people being more inter-twined with technology in a way that has maybe led to even surreal comical scenarios of dysfunction. Maybe there is a lot to learn from alternate contexts, in places like India, where some marginalised peoples, that are seemingly 'disconnected', continue to sustain communities of practice. These communities are involved in a diverse range of activities such as traditional crafts, sustainable harvesting of forest produce and water body restoration. They often feature a decentralised structure, a keen awareness of contextual needs, local participation and a deep connect with the context at large.

The relevance of the Internet of Things is often narrowly defined in terms of collecting, analysing and reacting to big data where it could equally be about a seemingly unrelated challenge like empowering farmers to preserve crop diversity

The premise of our research is to explore what we can learn from these communities. What is it that enables them to be resilient to shocks and be able to serve local contexts and needs better? It appears that resilience is closely connected to the nature of control in such communities; in that it is contingent upon the community experiencing genuine agency outside of any control imposed by an outside agency.



A community organised around restoring water bodies in a village will not be able to preserve traditional restoration practices unless the external implementing agencies build around the community's recommendations.

Centralised technology narratives that are disseminated by large corporations offer little agency to the people consuming and scaling these narratives. The relevance of the Internet of Things is often narrowly defined in terms of collecting, analysing and reacting to big data where it could equally be about a seemingly unrelated challenge like empowering farmers to preserve crop diversity. An ecosystem of connected objects offers a far larger spectrum of possibilities than is currently recognised by the mainstream IoT narrative. A broader scoping is required to make this narrative itself more sustainable, resilient and relevant to large groups of people.

Technology companies often seek efficiency through specialisation and formal hierarchies. This setup compromises flexibility, thus making the core proposition of these companies more certain and predictable. For publicly held companies the organisational rhythms and product visions are dictated by the market. The communities that we seek to learn from often have a more organic form, evolved, as they have, through natural circumstances and not solely as a response to a market or business need. These communities thrive on shared and flexible notions of power and responsibility.

The problems of the real world are complex and largely evolve unpredictably. Lack of food diversity, for example, is a global problem that involves responding to climate change, soil preservation, nature of production systems and markets among others. These problems are perhaps more aptly addressed by the values and qualities of decentralised communities rather than those of the current technology ecosystem. These values that may appear chaotic and messy are

also flexible and organic and are therefore well suited to grapple with these complex evolving challenges.

In some of our initial conversations with practitioners and participants in some of these communities, we are discovering that while they could inform practices outside of themselves, they continue to deal with real challenges that they face within their context that impact their lives very directly.

Accountability, mutual responsibility, care and trust are prerequisites for any successful community of practice. These could potentially be seen as guiding principles that serve as a framework for resilient and sustainable systems. Maybe technology could be well-served to learn from these messy human systems that have evolved in an innately human-centered way. They allow for diversity to thrive, are more sensitive to the irrevocable scarcity of resources and recognise the limitations of scale.

The relevance of the Internet of Things is often narrowly defined in terms of collecting, analysing and reacting to big data where it could equally be about a seemingly unrelated challenge like empowering farmers to preserve crop diversity

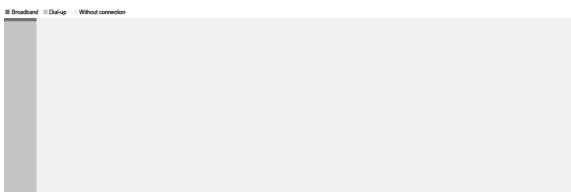
Exploring alternative Internets and unusual forms of networking in Havana

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An excerpt from Vladan Joler and the Share foundation's report in August 2016.

<https://labs.rs/en/exploring-alternative-internets-and-unusual-forms-of-networking-in-havana/>

According to ITU, there are 8,157 fixed Internet broadband connections (0,007%), on 11 million Cuban citizens, mostly reserved for government institutions and extremely privileged individuals. The slightly less privileged individuals in 5,6% of the households are lucky to access a painfully slow, government-controlled dial-up Internet connection at a speed of about 4-5 Kbit/s.



In 2015, the state owned ETECSA opened 35 public WiFi spots where Cubans could access Internet for 2 CUC (around 2 USD) per hour, which amounts to approximately 10% of their average 17 USD a month income (the average income of people who work for the state, i.e. majority of the population). In theory, if a regular Cuban citizen is lucky enough to live near some of those WiFi spots and gets the strange idea to be connected for a full month to the Internet, they would need to pay 1.440 CUC, or almost 50 times more than, for example, citizens of Bucharest in Romania are paying for 25 Mbits/s. They would need to work for approximately 6 years for a single month of slow WiFi Internet access.



We can speculate that this is probably not an example of the best socialist practice done by a government-owned monopoly in a communist country, but this is not the topic of this story.

WE ARE INTERESTED IN ALTERNATIVE FORMS OF NETWORKING AND CONTENT DISTRIBUTION, APPEARING AT THE EDGES OF THE CENTRALISED AND GOVERNMENT-RUN INFRASTRUCTURES, SOMETIMES DISCONNECTED FROM IT AND FUNCTIONING AS AN ENTIRELY INDEPENDENT "SERVICE", AND SOMETIMES EXPLOITING ANY POSSIBLE WAY TO APPROPRIATE AND TAKE CONTROL OVER THE SCATTERED RESOURCES.

In 3 short stories we will explore how one isolated society manages to override this gap and establish alternative ways to access, distribute, share and enjoy digital content.



*Screenshot from call of duty: black ops
Located in Havana, Cuba (source : call of duty wiki)*

United nano nations

Mr. X, in his mid-twenties, is a passionate Battlefield gamer and administrator of Los Pir@t@s sub-node situated in one of the not so wealthy neighborhoods of Havana. His computer is connected to the other six houses in the neighborhood using long UTP cables, that go through holes drilled in the walls, and stretched over the roofs, backyards and nearby streets.

On the roof of a nearby building he installed a WiFi nano-station allowing other houses, outside of the 100m reach of UTP cables, to join his local network using different types of DIY or brand made WiFi devices. All of them together form one local network of around 20 connected households, empowered to share, communicate and mostly play games together.

This small neighborhood network is connected to much bigger network nodes. One kilometer to the north, in the blocks of tall residential buildings in the

area called Nuevo Vedado, there is a much bigger network structure.



Nuevo Vedado Buildings

This part of the city, characteristic for the blocks of socialist Yugoslav-style architecture, hide one of the most dense neighborhood networks. Within the ventilation holes of the buildings there are kilometers of UTP cables, and the roofs of those buildings are the perfect spots for the network of nano stations.



Ventilation holes of Nuevo Vedado buildings

As you can guess, this network is then connected to another huge network node. This one is at the district of Havana called Cerro, and it has more than 2000 interconnected households.

In each city district of Havana, there is a network of connected computers, servers, and nano-stations and all together they form one huge city-wide network with approximately 12.000 connected households – SNet (Street NetWork).

STRETCHING OVER ALMOST 30KM FROM SANTA FE ON THE WEST OF THE CITY TO THE EDGES OF ALAMAR ON THE EAST, AND 20 KM FROM MALECON ON THE NORTH TO COTORRO ON THE SOUTH THERE IS A HIDDEN NETWORK OF CABLES, NANO-STATIONS AND REPEATERS COMPLETELY INDEPENDENT, OUTSIDE OF GOVERNMENT, STATE-RUN OR PRIVATE ENTERPRISE HANDS, THAT BELONGS TO NO ONE BUT TO THE PEOPLE, END-NODES THAT FORM THIS IMPRESSIVE NETWORK STRUCTURE.

Such networks exist not only in Havana, but in most provinces of the island. The second biggest is in Matanzas with around 2000 connected households. They exist as isolated islands of networks. Not connected to one another, but also not connected to the outside world, to the Internet.

Hidden safe havens

Every piece of this huge infrastructure belongs only to its users. Every user owns their own piece of this network puzzle: the nano-station, the server or cable. There is no fee for using the bandwidth or the content within the shared folders, which are there for anyone to copy and distribute. There are no paid services and advertising is forbidden. In a world where we forgot how it is to own your own infrastructure, where everything behind the screen belongs to someone else and where we are mostly just consumers, not makers, where we are constantly being profiled, targeted and quantified – those isolated, ad-free, owned by users networks look like some kind of techno utopian safe havens. To be there somehow reminds of the early days of the Internet. But, as usual there is another side of the medal.



Satellite picture of Cerro, Havana (source: Google Earth)

Rules of the game

The existence of this network depends on an invisible, unspoken and subtle dance with the Cuban state. This network should not exist according to the Cuban "reality". Even though connecting computers to the network is not forbidden, importing networking equipment to Cuba is.

Since there are no local factories that produce nano-stations or other networking equipment in Cuba, the existence of 30km wide independent network of 12.000 connected devices does not fit the picture. Government still has not made any move, and hopefully will not, but it is highly unlikely that this phenomenon is unnoticed. On the other hand, within network there are strong internal policies regulating any possible discussions about politics, distribution of pornographic content or "anything that can affect the image of SNET or our country" (Cuba). Those policies also forbid the network to be connected to the Internet and to be used for transmission of any foreign TV or radio program.

SNET users know that their precious network can disappear in a day if perceived as a ground for "counter-revolutionary" activities. So, self-censorship is deeply embedded in every end-node of this network, and sub-node and node administrators are able to block anyone who doesn't obey the rules clearly explained in the document "General rules of SNET".

Reglas Generales de SNET
I. Prohibido el uso de SNET para发起 contra el orden económico, la seguridad, o por parte de la comunidad del Estado Cubano.
II. Prohibido cualquier acción, actividad o contenido que dañe la infraestructura de SNET, sus servicios, o perjudique a otros usuarios de la comunidad vía robo de equipos, hacking, sabotaje a equipos o cables de red de enlaces, tráfico, spam masivo, flooding, u otro tipo.
III. Prohibido ofrecer o ofrecer servicios dentro de la red como: a. Internet. b. TVs a través de empresas. c. Servicios de correo. d. Servicios de carácter sexual. e. Otros de carácter ilegal en el país.
IV. Prohibido cualquier contenido que denigre o atente la imagen de GANET o de nuestro país (Cuba). Ejemplos: <ul style="list-style-type: none">• Contenidos que generan algún tipo de discriminación, ya sea de raza, sexual, religiosa, color de piel, o otro tipo.• Ideologías extremistas que afecten a personas o grupos, como el fascismo, entre otras.
V. SNET no es un espacio de debate político o religioso.
VI. Prohibido la promoción de drogas, drogas legales y la iniciación a su consumo.
VII. Prohibido la promoción de partidos, ideologías, sectas u otras.
VIII. Prohibido entrar a SNET.
IX. Prohibido usar, promocionar y/o comercializar la imagen de SNET fuera de:

We can discuss or criticise those internal policies from many different angles, but it is clear that they are the functional defense mechanisms allowing this network to exist in specific Cuban circumstances. On the other hand, we should be clear that the origins of this network are not in some kind of cyber-utopian-freedom-empowering dream – this network is mainly used for multiplayer gaming during the day and sharing movies and software at night.

Homebrewed Internet

But it's not just about multiplayer gaming and sharing. Within this network there is small universe of local websites, free services and small social networks made by the network members and visible just to them. The network has its own search engine – Look.me, a social network – Facebokito, and even their own version of Ebay called Timbirichy.

You can find an "offline" version of Wikipedia or regularly updated Revolico, the biggest and most important Cuban online auction and shopping website. These exist primarily on the "real" Internet, but are also replicated both on SNET and on El Paquete. Most nodes and city districts have their own news sites, forums and blogs and there are numerous dedicated servers for gaming. In this little Internet there are no domain names, just local IP addresses assigned to each user, probably by their own local reincarnated version of Jon Postel when they get initiated into the SNET society and learn by heart the "General rules of SNET".

Away from keyboard

Sometimes this community gets together "away from keyboard" in the form of gatherings in public places. On one recent occasion, following a single post on the network message board, thousands of people gathered on Malecon, a famous waterfront walkway in Havana. It was hard to explain to the police that all of those young people did not gather for a political protest, but to discuss computer games and new versions of hardware.

Decentralising access to information through IoT

Rachel Rayns

I no longer visit my local library - I have an e-reader and access to more books than any library network could hold. I no longer go to the cinema or record shops - there's more TV, movies and music on my live streaming subscriptions that I could ever consume. I rarely go shopping at all - I have a delivery pass which means groceries, gadgets, clothes and even gifts arrive the next day, sometimes with a single button press.

I use this technology every day. Why bother walking ~30 minutes into town and be bumped around by the crowds? I can order at 11.59pm at night and expect my item before noon. But I now recognise the names and faces of some delivery drivers. I see them more often than friends and family. From the return addresses on my parcels, they know I'm building robots, smoking bacon and doing up a campervan. They ask me how it's going. I never need step over the threshold of my own front door; I sign and take my boxes.

The irony of course is that I have access to these delivery services because I live within range of distribution hubs and broadband junction boxes. This wasn't the case growing up in rural Norfolk, UK ~15 years ago. We had a dial-up connection through our telephone line (rendering our home phone useless) and limited to 6pm - 6am. I would play on Neopets, chat on MSN messenger with school friends and if I was lucky, I could download up to 3 songs a night! I thought it was amazing. Unfortunately the connectivity infrastructure didn't improve much in the following 15 years, and up until 2015 we still had to deal with broadband speeds close to dial up (and it still sometimes knocked out the home phone line). Forget about streaming any media, it was difficult to load image-heavy webpages. There was no phone coverage of any kind for around 4 miles in any direction.

**I now recognise the names and faces of some delivery drivers.
I see them more often than friends and family.**

The vast majority of the UK is now within range; broadband in their homes, data signal on their mobile devices, couriers and supermarkets cater for their postcode. Even if all neighbourhoods have the infrastructure to deliver services (and this is definitely not the case), this does not mean everyone has the economic means. It's incredibly easy to forget about those out of range.

Zero connectivity

No access to the Internet via broadband or phone service. This could be due to lack of equipment, technical expertise or economic situation. It could be that there's no infrastructure; no mobile data signal, no broadband.

Limited connectivity

Slow speeds, school blocking website, high cost of data.

Intermittent connectivity

No Internet at home, so must be accessed via a school, library or Internet cafe. Connection effected by weather.

ATLIN

In June 2016 I was given the opportunity to work with the Open IoT studio in Anstruther, Scotland. We were invited to a local school to talk about how IoT could solve their problems or make something interesting for them.

I heard issues familiar from my own teenage years. They experienced zero mobile coverage and limited or intermittent broadband that caused particular problems with:

- doing web-based school work/research at home (limited or intermittent broadband)
- social - staying in contact with each other when not at home (no phone coverage)
- not being able to check bus service or communicate with parents on travel arrangements.

The group were interested in improving their situation, but rather than requesting better infrastructure, they wanted to build their own systems and use IoT in a fun, playful ways. They wanted reasons to get out of the house and they wanted interesting things to do with others.

I enjoy working with teenagers. They always want to push against whatever the current norm, not reinventing the wheel, but hacking and building on it to



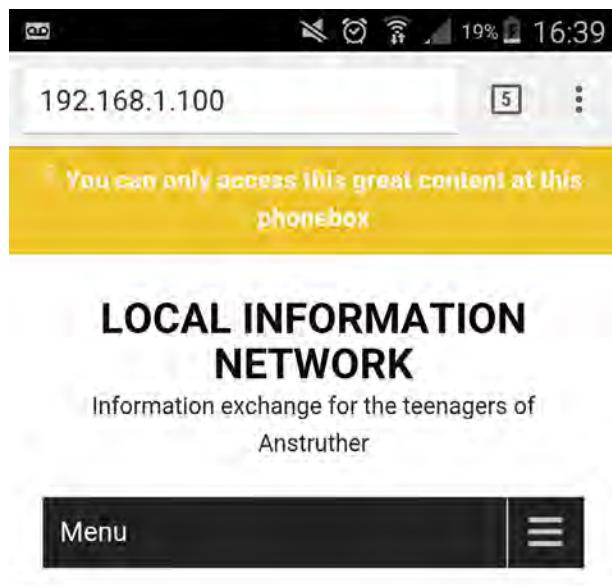
Rural phonebox, Anstruther 2016

make it their own. It's an exciting attitude to be around, particularly when we have the ability to prototype their ideas so quickly.

Within a couple of days to prototype I worked with 3 teenagers to produce ATLIN; Anstruther Teenage Local Information Network. A local network housed within a red BT telephone box. You don't need any mobile data coverage or credit to access ATLIN, you simply connect to the WIFI to access games, news, maps, timetables posted by teenagers of Anstruther. A simple wordpress site means it can either be open to anyone to post new content, or users may have to be invited or request access.



Jude building ATLIN prototype, Anstruther 2016



Welcome

Welcome to LIN; the Local Information Network.

A space to share games, music, tutorials and secrets.

Look through the menu to find cool stuff or contribute some of your own to LIN here.

ATLIN landing page, Anstruther 2016



Otis installing ATLIN prototype, Anstruther 2016

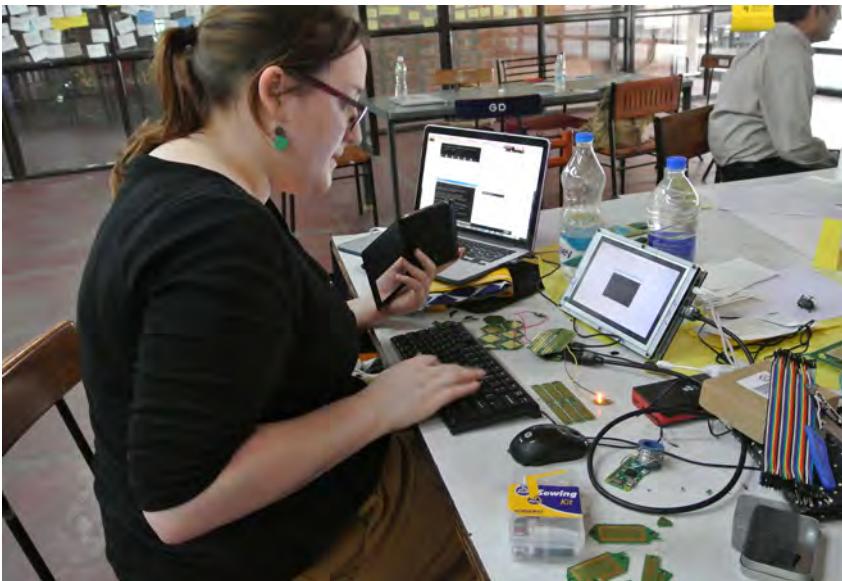
We worked out how ATLIN would be powered (we decided on solar), built an enclosure together and embedded it in a local phone box. It was then loaded with content, including a downloadable zombie game modeled on the harbour ATLIN is based andmMusic and poems about Anstruther, designed to be experienced in that spot.

Once tested, we discussed how this may be useful across the whole of the small town. What if ATLIN could be part of a mesh network? Although still not connected to the WWW, each module could share ATLIN content. Could the ATLIN hardware have inputs; sensors, buttons, cameras? What are the pros and cons of an approval process for content? What if ATLIN has intermittent WWW access, say if someone took ATLIN home once a week to download an update from their home broadband, would that change how it could be used?

Going forward

To explore some of these questions, Open IoT studio is looking to expand on this work by developing resources alongside small communities enabling them to build resilient and decentralised services that are meaningful for their community. We are focusing on building technology that brings people together in a place, rather than making it easier for people to stay home.

An important part of this progress is providing simple educational resources so any changes or maintenance can be carried out by the community.



Rachel prototyping, Caravan 2016

The Open IoT Workbench

Martin Skelly

<https://mskell.github.io/openiotworkbench/>

A traditional workbench... The place you go to when you want to make a project happen. These benches are robust, specialist and customisable, allowing you to create beautiful physical objects safely, quickly and methodically.

What's the natural starting point for an IoT project...? It's a bit digital, a bit physical, yet to be a success it has to merge these two worlds, be intuitive to set up and a delight to use. How do we create IoT prototypes and products safely, quickly and methodically with respect for a user's privacy? How can we create a meaningful IoT?

The Open IoT Studio's workbench is a little bit different from the traditional; it's a digital resource for designers, developers, technologists and user experience professionals working in the field of connected objects. The workbench is a constantly evolving collection of best practice tools, methods and case studies from the projects that have been created during the Open IoT Studio convenings and by practitioners within the studio.

It's a platform for sharing our research and the voices of our diverse community, but also a platform making this information openly available and easily accessible to the wider IoT community.

We ran a session at MozFest in collaboration with Bram from Wevolver to explore the potential of the Open IoT workbench, and uncovered five guiding principles for the development of the workbench for the IoT community.

01. Content has to be the priority. It's easy to get wrapped into discussions about the platform, but it's relevant, well written content that will make the workbench a valuable resource to practitioners.



A messy workbench in the Scottish Fisheries Museum, Anstruther 2016

02. It's not about archiving past projects or providing tutorials on building IoT systems; it's about sharing the learning and best practice that informed the project - although it could include some simple 'how to's'.

03. Start small, iterate often. We have to publish content to the bench frequently and provide opportunities to the wider community around the studio to contribute content.

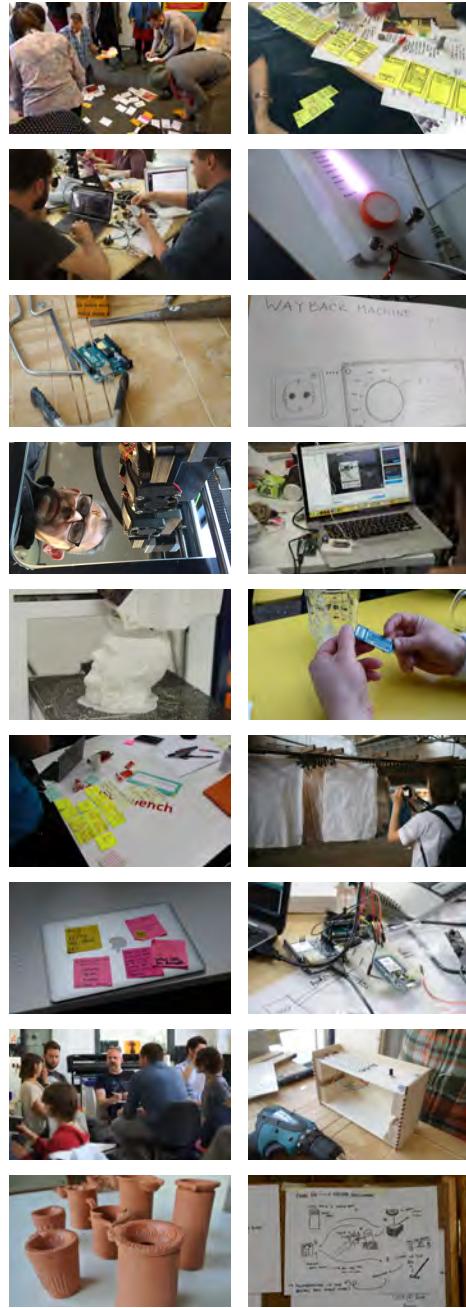
04. The workbench has to include the rich discussion that happens during convenings, particularly where insight generation (the why) and prototype creation (the how) came together to create meaningful IoT prototypes.

05. The workbench should be visible during future convenings to encourage submissions and documentation of learning from the participants. This will allow it to be accessible for future convenings and participants, and will also build a network of regular contributors who can use the resource as a starting point for new projects.

The workbench is a work in progress, and will be evolving throughout 2017. It's currently hosted on github (<https://mskell.github.io/openiotworkbench/>). This gives us a live, open space to prototype the 2017 upgrades to the workbench.

Working in the field of IoT? Let us know what tools, methods and insights you would like to see featured on the workbench at @openiotstudio or iot@mozilla.org.

Some of the ways we work



Security Privacy &

How can we design contextually relevant privacy controls in IoT that are knowable, modifiable and empowering to the people using them?

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Inviting connected objects into our homes

Objects affect us. A comfortable chair makes us feel at ease and supports us. A cherished family memento makes us feel loved. A malfunctioning appliance causes frustration.

It's important to be mindful of what objects we choose to surround ourselves. The objects in our homes especially warrant a close look, as the home is a unique space which serves to support us by socially, emotionally and physically. It is one of the most private spaces in our lives, and increasingly, IoT companies are making plays to invade it.

"Solving problems" isn't the only criterion

In technology circles, a lot of attention is given to building useful things and then to optimizing them. Does this fix something? Does it solve a problem? If so, how can we solve it more efficiently?

Yet, the ability of an object to "solve a problem" isn't the only criterion humans have when choosing the things they surround themselves with. The urge to replace human judgments with algorithms and optimized efficiency has its limitations.

"Constructing a world preoccupied only with the most efficient outcomes—rather than with the processes through which those outcomes are achieved—is not likely to make them aware of the depth of human passion, dignity, and respect." —Evgeny Morozov,
[To Save Everything, Click Here.](#)

As we imagine responsible IoT, we must explore a fuller set of selection criteria when deciding what objects to invite into it.

Four categories of objects

A possible set of criteria for personal possessions is laid out by the science fiction writer and design critic Bruce Sterling in "The Last Virdian Note":

1. Beautiful things.
2. Emotionally important things.
3. Tools, devices, and appliances that efficiently perform a useful function.
4. Everything else.

Sterling explains how to assess the objects you own using these categories. He encourages the mindful selection of the objects you surround yourself with everyday.

You are not "losing things" by acts of material hygiene. You are gaining time, health, light and space. Also, the basic quality of your daily life will certainly soar. Because the benefits of good design will accrue to you where they matter—in the everyday.

An even more compressed approach is suggested by Japanese "tidying up" specialist and best-selling author Marie Kondo in her book, *The Life-Changing Magic of Tidying Up*. She advocates for using just one question when deciding whether to have an object in your home:

.....

Does it spark joy?

.....

Her argument is that if an object is useful, it will spark joy because you acknowledge its ability. If it's beautiful, it will also bring joy. If it's emotionally important, you will also recognize that through joy.

As we look to invite connected objects into our home, we want them to spark joy. We want to be able to trust them. This section explores the emotional as well as technical aspects of privacy & security in IoT through the lens of what is responsible and desirable.

Building a Trustworthy Internet of Things

Ame Elliott and Simply Secure

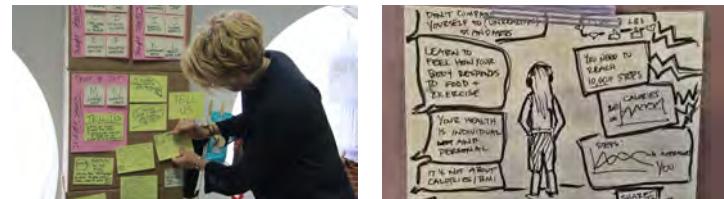
Information security has historically been a highly technical discipline, beyond the reach of all but a few skilled cryptographers. The Internet of Things (IoT) has exploded into our most intimate contexts. Now that we have devices in our homes, workplaces, and streets that may unobtrusively track us and cannot be turned off, IoT systems urgently require broader participation by more people with different skills. Front-end developers, makers, user experience designers, researchers, brand strategists, and more all have critical roles to play in protecting people's privacy.

By incorporating security and privacy into the notion of a trustworthy IoT, different kinds of professional knowledge become necessary to build systems. Trustworthy systems give people agency by communicating how they work and what data they

collect. Trust is contextually determined; it is revocable, transferable, emergent, and nuanced. Collaborating to build trustworthy systems brings people together to build a better Internet of Things.

As a first step, we are working with Mozilla to identify 1) end-user concerns about connected objects and 2) gaps in professional knowledge with the goal of developing tools for protecting people's privacy and protecting the open Internet.

Understanding the Nuance of Trust



[1] At MozFest in London and Underexposed in Berlin, we invited people to interact with an exhibit of everyday objects such as clothing and transit passes to explore how being connected to the Internet impacted trust.

[2] People shared hopes and fears of their interactions with connected objects. Instead of abstract technical conversation, we heard emotional stories that demand a nuanced view of trust.

[3] Capturing stories on notecards, we heard how IoT devices silently integrated into our environments in a way that makes it hard to simply turn them off or walk away.

[4] From jog bras and fitness monitors encouraging anorexia to how social media is reshaping Holy Communion in Ireland, the stories we heard were about trust, not only in technology, but in society.

An Insights Toolkit for People Building Connected Things



[5] We created worksheets as a research probe to help participants prioritise their concerns about the IoT, including sources of information they use to learn about security. The worksheets and conversations with participants help prioritise barriers to trustworthy IoT.

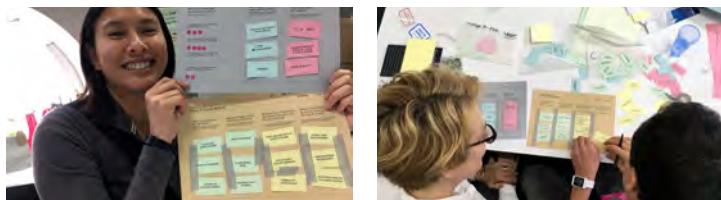
[6] Different worksheets targeted the needs of consumers and developers. Prioritising the security fears of lay users showed no clear understanding of the privacy risks posed by IoT.

“Stackoverflow isn’t going to cut it for privacy.”

“What’s the problem with a Raspberry Pi to get a cat to come to a web cam?”

One of the most evocative stories was a developer with a colleague who programmed a Raspberry Pi to rattle and call his cat to a video camera in his home. This participant scoffed at the idea that there was any security problem with that set up, and said that he would not be comfortable telling his colleague it was “wrong” to use an insecure camera in his home.

Building Professional Competence



[7] Developers used a different version of the worksheet to identify which technologies inspire them, which ones worry them, and where they go to get more information.

[8] Developers are curious and eager to get more information, but there is no consensus about reliable sources of security information. MozFest and ThingsCon were consistently mentioned as places people expected to get information about privacy-preserving technology.

“It’s just scaremongering by people who want your money.”

There is skepticism by both consumers and developers that privacy concerns are manufactured to drive sales of security products.

Mozilla values

There is an opportunity for Mozilla to lead in trustworthy IoT. Mozilla’s inclusive community can shift the conversation away from security as a purely technical conversation to “trust” as a shared value.

TLS certificates are part of security, but you don’t need to be a cryptographer to make meaningful contributions to trustworthy IoT. There are opportunities for front-end developers, UX designers, researchers, brand strategists, and more.

- U.S. Intelligence Chief

IoT & Surveillance

"In the future, intelligence services might use the [Internet of Things] for identification, surveillance, monitoring, location tracking, and targeting. "

- U.S. Intelligence Chief James Clapper

In the future, intelligence services might use the [Internet of Things] for identification, surveillance, monitoring, location tracking, and targeting.

- U.S. Intelligence Chief
James Clapper

IoT poses two security challenges. First, it can be turned into surveillance infrastructure to target vulnerable people. Second, insecure devices can be turned into botnets that threaten the open Internet, effectively censoring any website via DDoS attacks.

In fall 2016, ~500,000 hacked devices made the Mirai botnet, which used Distributed Denial of Service (DDoS) attacks to take targeted parts of the Internet offline, such as the country of Liberia, or websites such as Twitter. The prohibitive cost of securing sites against such an attack (estimated as \$150,000+/year), is effectively a form of censorship that could silence journalists."

Opportunities and Next Steps

We see many opportunities to counteract IoT surveillance and co-opting by botnets.

Prototyping & Scaling the Insights Toolkit

The Insights Toolkit we piloted at MozFest 2016 is a living prototype. Using feedback from the first round of participants, we're improving it. We need more feedback from participants around the world.

The worksheet assets can be forked, translated to other languages, adapted, localised, and continually improved. All of the resources for running a session with the toolkit are available on GitHub at https://github.com/simplysecure/resources/tree/master/Trustworthy_IOT.

Platform for Feedback

As more people give insights, there's a need to consolidate and share responses in an open, yet privacy-preserving way. By doing research in the open, others can follow along not only with the outcome, but also with the process. A larger audience can participate in Human-Centred Design research and build their skills. Best practices for research that protects participants' privacy could extend to other domains.

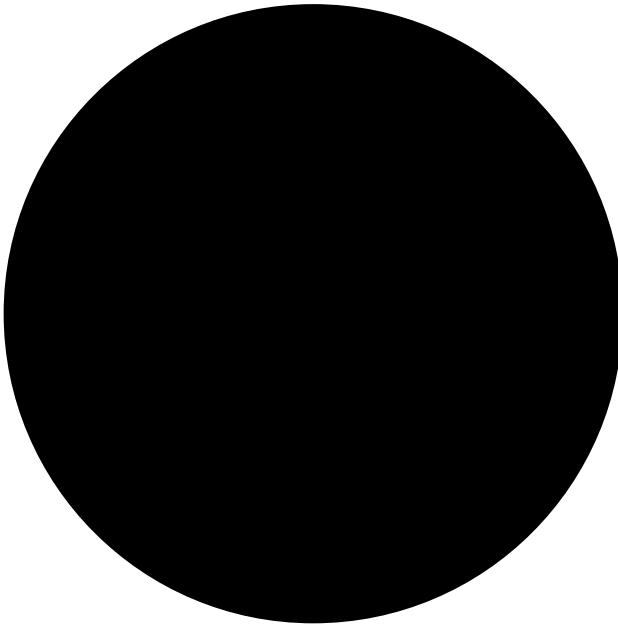
Prioritisation

In the fast-moving space of IoT, there are many emerging challenges. Identifying and prioritising the gaps in professional knowledge will get more trustworthy IoT systems into place more quickly.

Creating Resources for Building Professional Knowledge

The Insights Toolkit helps identify potential partners and communities for distributing knowledge about building trustworthy IoT. A broad group of people can come together to iteratively prototype tools, methods, and resources for a better Internet of Things.

CODE OF THE DARK TEMPLE



Dark Temple is aVoid in the spectrum, an absence of signal, sphere of not-self in the ocean of electromagnetic waves.

In the age of electronic communication, wireless transmissions, mass surveillance and total transparency of the Individual, the Dark Temple represents a non-place, an emptiness in which one can be alone with their inner self or with others without interference from the World of electronic communication, artificial sensors and The World of Immaterial Work.

It is an un-place which one neither adds anything to nor takes anything away from. It is a black hole that does not allow wireless data and meta-data to escape, and therefore cannot be directly observed.

Architecture of the Dark Temple

A Dark Temple is meta-architectural structure mostly existing in the realm of electromagnetic spectrum.

There are Natural and Artificial Dark Temples. Natural Temples are scarcity, disappearing existence of places without signals. The One Who Wants To Conquer all frontiers and Control the Waves will tend to transform all the Natural Dark Temples into The Network and exploit, privatise and control the resources of the electromagnetic void.

An Artificial Dark Temple is the void in the electromagnetic waves usually artificially created with a use of different techniques, technology and structures performed or built by monks of the Dark Temple.

An Artificial Dark Temple has the shape of a sphere. This sphere is filled with an electromagnetic signal that creates noise and by that transforms the inside of the sphere into a field of invisibility and emptiness. The inside of the sphere is fullness and emptiness at the same time. It can be understood as a Dark Temple or White Temple simultaneously. The Temple can be ephemeral or eternal. It is omnipresent. It can be small or big.

The membrane, border or walls of the Dark Temple are fields of disturbance. Anyone entering the Dark Temple eventually leaves a trace, a signal of lost connection with The Network. The sum of those signals can trace the shape of The Dark Temple. This is how The One Who Controls will have a power over the Realm of Waves* and The Network can see the existence of the Dark Temple within its domain. Similar to the theory of the event horizon surrounding a black hole, the All-Watching Eye of the One Who Controls the Waves can observe events on the horizon, the border of the Dark Temple but nothing behind it.

The architectural representation of the Dark Temple can be compared to the Garbha Griha or the Sanctum Sanctorum of a common temple. The inner void that disengages an individual from the realm of cyberspace.

Order of the Dark Temple

The Order of the Dark Temple is not an Order. It does not have a specific structure but has a set of fuzzy ethical principles that can evolve, be modified or disappear. The Order consists of all beings (human, non-human, transhuman or posthuman) that create or enjoy electromagnetic voids.

Dark Temple Dynamics

Even the Dark Temple is a void, and there can be just one void - there can be many Dark Temples. The Dark Temple can move, appear or disappear and merge with other Dark Temples. Dark Temples are nodes of the abstract network, The Internet of Nothing, that is the sum of all nodes existing in the present moment.

Ethics of the Order of the Dark Temple

Electronic nonviolence is the fundamental principle forming the cornerstone of its ethics and doctrine of the Order of the Dark Temple. Electromagnetic void, the substance of the Dark.

Temple should not be imposed on others without their consent. A Dark Temple is not about jamming others, it is about creating a void for the purpose of enjoying personal freedoms and gaining a silence in the World of Noise. The choice to step out from the World of Noise into the Dark Temple should be the choice of the individual.

The Dark Temple is not a manifestation of technophobia or neo-luddism philosophy and not an advocate for complete absence of digital communication. The Dark Temple Order advocates for the balance and possibility that one should be able to isolate him/herself and should have a right to create electromagnetic voids.

The Order of the Dark Temple practices different forms of Digital Veganism outside of the Temples according to individual needs and choices.

Code of The Dark Temple and its existence

Code of the Dark Temple can be changed, modified or distributed by anyone. The Code does not belong to anyone but belongs to everyone. There is no one Code, there can be many in different forms and substance.

Legality of Dark Temple or Right to be disconnected

In the realm of State, electromagnetic spectrum is highly regulated and owned by the governments or private entities. Creation of void, disturbance or interference in electromagnetic spectrum is considered illegal in most of the countries. This is against the values of the Dark Temple Order which believes that anyone should have a right to be disconnected and to create a void in a nonviolent way.

How to Create a Dark Temple

There is no one way to create a Dark Temple, there are many. One should seek The Open Knowledge of the Do It Yourself in the fields of signal jamming, electromagnetic interference or faraday cage.

The Order of the Dark Temple I Ahmadabad, India,
Earth, Milky Way

000001111100000

Connected Home India Report

Rikta Krishnaswamy,
Quicksand

As part of the Open IoT Studio Design Sprint in Berlin we commissioned our friends at Quicksand to develop a research brief that made the 'connected home' more about people than technology.

Their response was everything we hoped it would be.
Enjoy!

We are interested in exploring how the Internet of Things can enable a completely new form of connected home. Notions of technology in our home can conjure many different perceptions from many perspectives - from the "Smart Home" to a possibly more human-centric "connected Home".

While the "home" and how it can be upgraded by technology is a potentially endless topic for enquiry; as are social and ethnographic studies of how the home is used for design (just go back to the BauHaus and you'll see how designers have been modelling the home based on real human need and use). Yet, what we don't have (we think) is a great piece of design research that brings out the very social nature of our relationship to our homes, to the people in them and to objects and possibly pets that inhabit them.

We want to make sure the next caravan event we run - a Connected Home Design Sprint in Berlin - is grounded in powerful, meaningful, delightful and maybe surprising insights into the the social side to us, our objects, our pets and our homes.

SCENARIO 3 | Overview

Mindful Fitness and Wellbeing

How do we know how a family member or loved one is doing? Specially in the context where one is separated by distance?

Technology connects diasporas in very direct ways - from a mother calling her daughter to ask whether she's eaten, to a family installing a cctv camera to make sure their aged parents living in another city are okay - but often doesn't take into consideration issues of control and access.

In instances where technology is not used (because of choice, access or effectiveness), people often use their (intimate or personal) knowledge of each other's routines and activities to 'interpret' rather than 'monitor' their well being.



01/05/2016 13:50:12

CH08



IMAGE: Grabs from CCTV footage installed inside the house of an aged couple's home (who live with a care-taker) in Indore. Their children live in different cities of the country, and use this as a way of knowing they are alright by themselves.



SCENARIO 3 | Inspiration

Mindful Fitness and Wellbeing

Farida lives with her husband and 3 kids in a large joint family in Bangalore. Her mother's house, is a few blocks away from hers, and Farida refers to it as her 'happy place', as it is filled with caring and open people.

Farida's mother is a headmistress at a local school. She's also the figurehead for the household. Ever since Farida's father took to saint-hood, her responsibilities have increased. Her mother is, according to the Farida, a workhorse - both within the home and outside it.

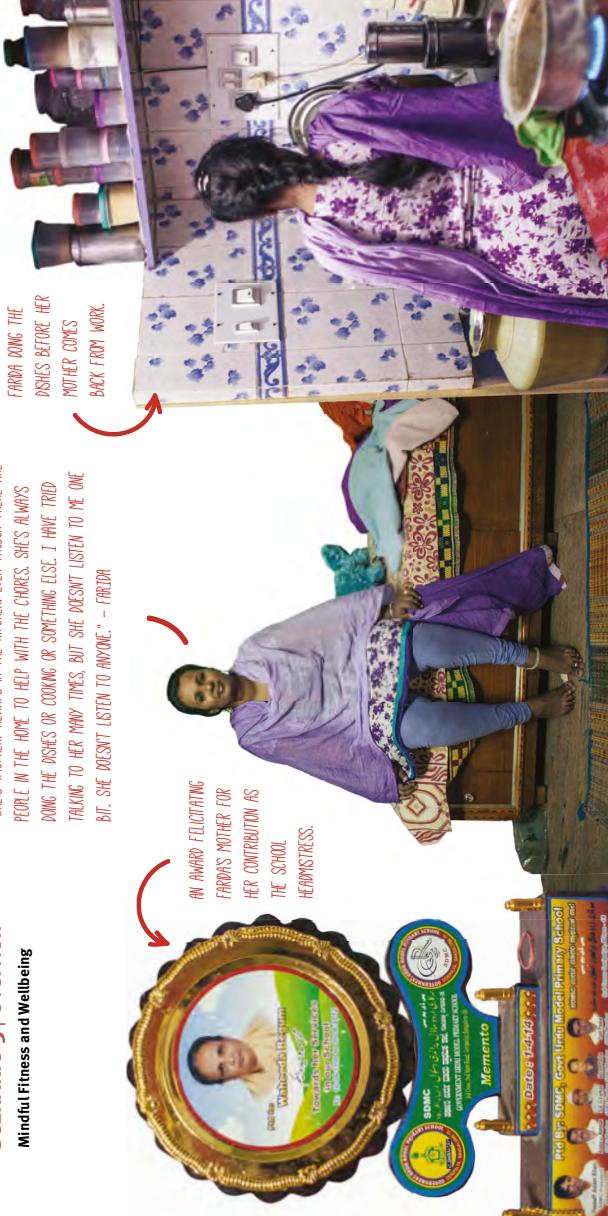
Farida is increasingly concerned of her mother's well-being, and feels that she exerts herself even when she doesn't have to. And even though her mother's obstinacy makes Farida love and respect her more, she wishes she could make her life easier in any way possible.

"THOUGH ALL OF US HAVE KIDS, MY MOTHER STILL TREATS US LIKE ONE. WHEN I COME OVER SHE WILL RUN INTO THE KITCHEN AND START MAKING ALL MY FAVOURITE FOODS OR SNACKS. SHE REALLY SPOLLS ALL OF US." - FARIDA

SCENARIO 3 | Overview

Mindful Fitness and Wellbeing

'SHE'S MOTHER ALWAYS IN THE KITCHEN EVEN THOUGH THERE ARE PEOPLE IN THE HOME TO HELP WITH THE CHORES. SHE'S ALWAYS DOING THE DISHES OR COOKING OR SOMETHING ELSE. I HAVE TRIED TALKING TO HER MANY TIMES, BUT SHE DOESN'T LISTEN TO ME AT ALL. SHE DOESN'T LISTEN TO ANYONE.' - FARIDA.



SCENARIO 3 | Opportunity & Challenges

Mindful Fitness and Wellbeing

How can we look at new ways of changing how health and fitness is delivered through IoT? Can we explore new relationships between existing domestic objects and rituals, to gather a healthy and mindful perspective on fitness and wellbeing of those we care about?

1

Can we find new ways of obtaining socially meaningful health & fitness data, and subtly enriching lives of those, who are unable, or not wanting to (for any reason) sign up to the current sports wearables culture of steps, miles and calories burned?

2

How do we consider the viewpoint of people not currently included in this technology trend and look at what might work for, say, a family concerned about the fitness and wellbeing of an elderly relative? Or to look at how parents of young children are integrating physical activity and mindfulness into their lives?

CHALLENGES : How do we 'reflect' rather than monitor how the family member or loved one is doing? What are the rights for privacy, even from family members? How do we break away from the stereotypical fitness technologies that are about competition or body image?

Privacy Machines: Exploring privacy through the metaphor of time

Peter Bihr

<http://thegoodhome.org/ldf-2016/wayback-machine/>

At the Mozilla Open IoT design sprint in Berlin, my group worked on Privacy Machines Inc, a fictional company's privacy products. (Our group consisted of Rachel Uwa, Martin Skelly, Vladan Joler and Peter Bihr. You can find photos and more descriptions of the various fictional privacy machines at thewavingcat.com.)

One of these machines was the WayBack Machine. It's a little box that explored how to control privacy in the home through the metaphor of time.

Concretely, it would switch off various media-related technologies one by one—much like the privacy dimmer—in the reverse chronological order in which they were introduced. Go back to 2013 and most smart home products would have stopped working. Turn the dial back to 2004, and you would have lost access

Privacy Machines

Giving you the tools to control your own privacy

Privacy Machine Inc (PMI) is a response to the research scenario "Mindful Fitness and Wellbeing". Also #empowerment #privacy #control.

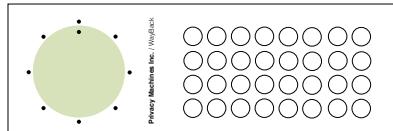
As our homes become increasingly connected, we feel a strong desire to understand the role that technology plays in our homes and lives. What does connectedness mean for our communication habits, interpersonal relationships, information diet, and privacy? How does immediate access to different types of connectivity, data, and media change our domestic experience? How does the bi-directional flow of information that internet-connected services inherently require impact our lives through behavior tracking and aggressive commercialization?

PMI explores these questions through a family of 3 products for the home that allow their users to control the way they share data in the connected home, and thus modify the way they experience connectedness, data and privacy and in and from within our homes.



Privacy Machines Inc.

WayBack Machine



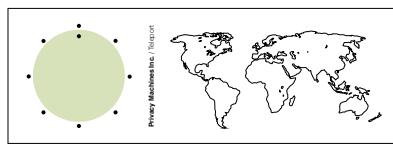
Wayback Machine

Wayback Machine turns back the technology level of a connected home to earlier times by dimming, filtering or disabling communication channels.



Privacy Machines Inc.

Teleport Machine



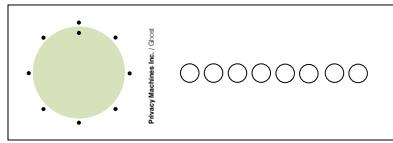
Teleport Machine

Teleport Machine is a physical VPN switch. It allows users to modify their experience of the internet by switching IP addresses to other countries.



Privacy Machines Inc.

Ghost Machine

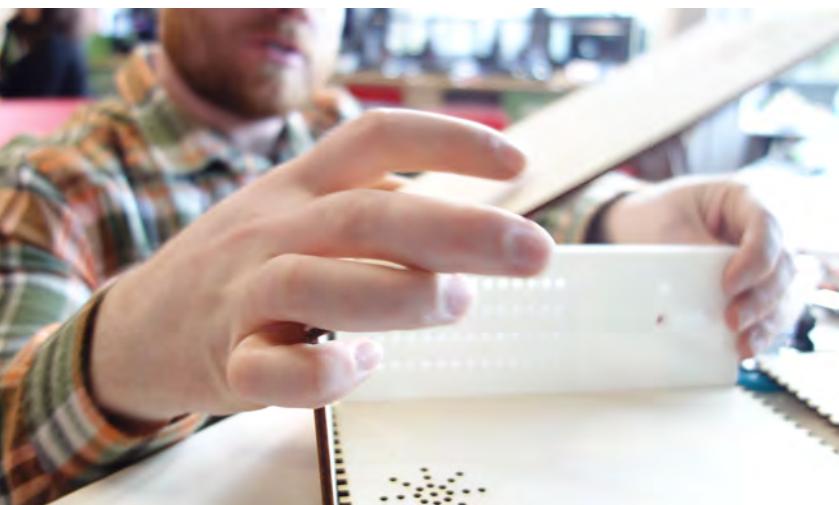


Ghost Machine

Ghost Machine is a smart home white noise generator. It generates fake energy consumption profiles and online activity to confuse commercial tracking algorithms.

privacymachines.com

to Youtube, Facebook, Twitter. Go back to 1996 and your Internet access might be turned off. The WayBack Machine plays with two notions:



WayBack Machine Assembly, Berlin 2016

First, the time angle makes it immensely relatable. While there are many issues with this—it fosters nostalgia, it's technologically and historically tricky, it doesn't necessarily make a lot of sense—it does help start great discussions. Because it removes technological barriers and works with simple metaphors and examples, we found most people would much more happily engage in this kind of debate than if you approached from a perspective of privacy, policy, or surveillance.

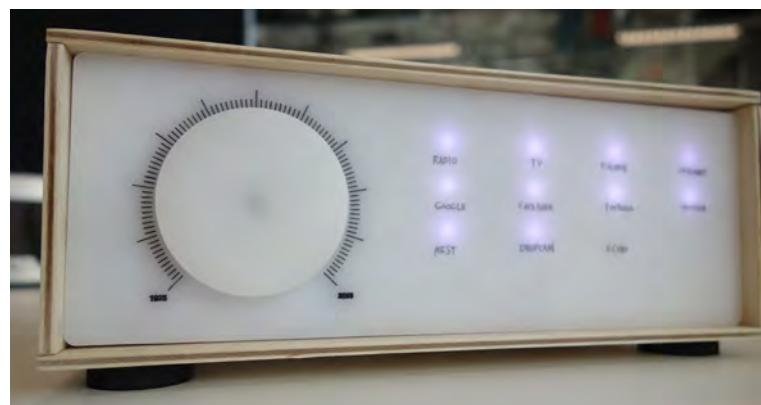
Second, it underlines that media and communications technologies have evolved from one-way (broadcasting) to two-way (phone) to systems that are tracking users' behaviors through cookies, traffic analysis, meta data, etc.

Since the advent of the modern web, media and communications infrastructure has turned from something watched or consumed into a system that stares right back at the user. Connected homes are extending this right into our living rooms.

What's next?

All of these examples are speculative, non-functional prototypes. Nevertheless, we do believe they might offer valid starting points for real products and services.

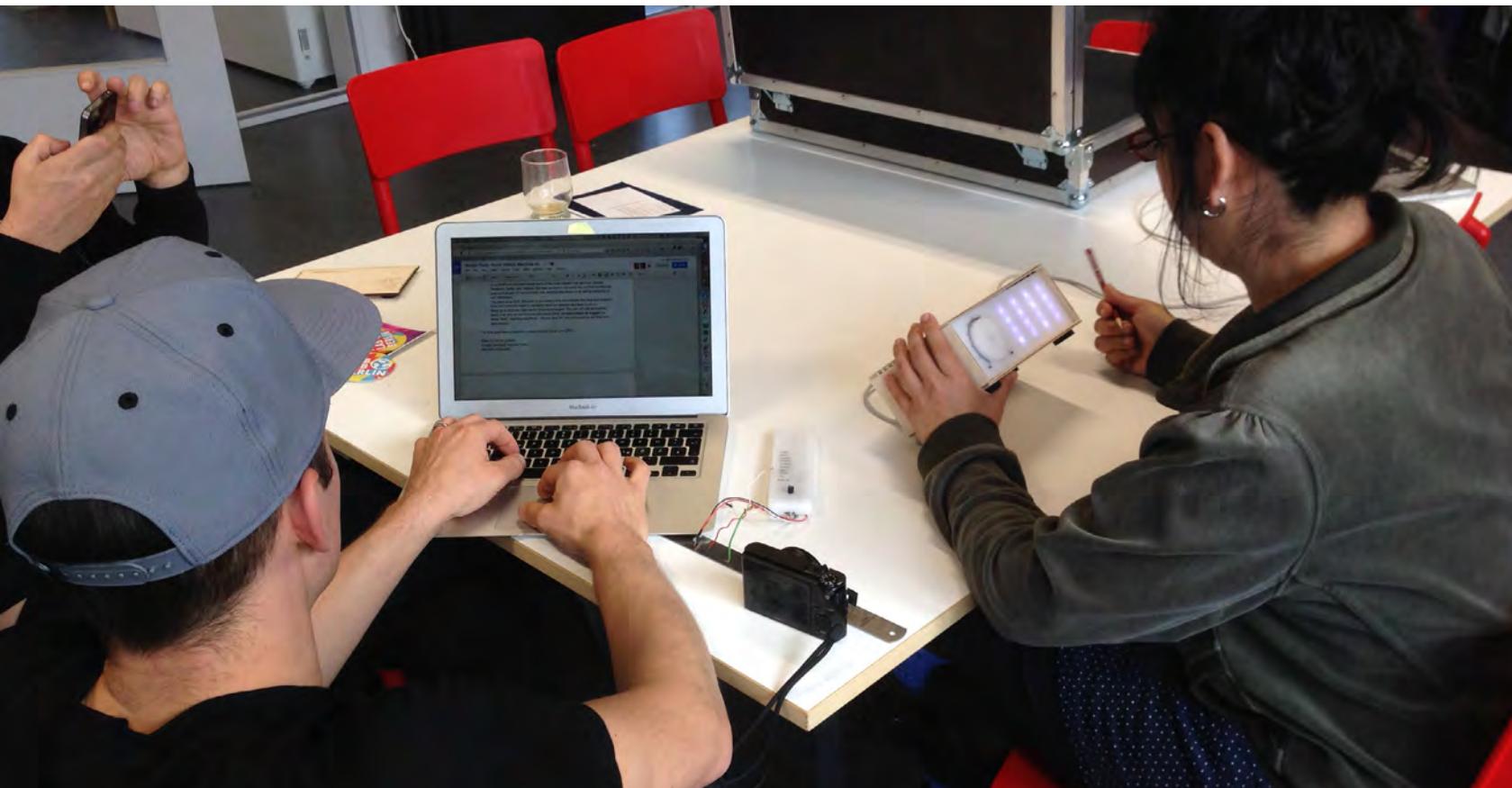
As connected homes become a mainstream reality, we need to design and build products that make it easy to make informed decisions. Users should be empowered and in control of their privacy, rather than relying on companies to determine the settings for them.



WayBack Machine, Berlin 2016

As these products are built, our policies need to adjust as well. Rather than playing catch-up (and failing to do their job well as they shoot at a moving target), or killing off innovation through over-regulation (which would likely just drive the development of connected home products outside our jurisdictions into less-strictly regulated regions), these policies need to be sensible and forward-looking.

This is no easy task, and law makers will need all of our support. In the meantime, the brunt of the burden is on the shoulders of UX designers. As a group, they might be the best positioned professionals with both the skill sets and the mandate to ensure users are empowered to control their own privacy.



Vladan, Peter and Rachel prototyping the details
Berlin Design Sprint, 2016

Collaborations Educational

An open curriculum for
the next generation of
designers

“As we engage in tackling harder and harder problems that require many fields and perspectives, the separation of disciplines appears to be causing more and more damage. The complex system that is the human body has become impossibly multi-disciplinary. We should really be working on “One Science”, but instead we are a mosaic of different disciplines sometimes not even recognizing when we are looking at the same problem because our language is so different and microscopes are set so differently.”

- Joi Ito, 2014

I really like the way that Jon Bruner frames the Internet of Things as much larger than objects, and about being a movement. A movement that he calls the New Hardware Movement. There is so much about this thinking that drives forward how we can view the development of IoT.

If you've not seen his Solid Con presentation, you should. A central part of his argument is that computing is coming into every aspect of the physical world, which presents a definition of IoT that rings true with much of the technology-centric practices. And there's the rub - it fundamentally puts computer science at the centre of everything and everything else in the periphery. It places the power of IoT development in the hands of programmers and hardware people.

To do this we need a curriculum that encompasses code as much as it does making as much as it does ethics.



India News Headline, 2016

However, if you flip this perspective and think about the physical world coming into all of computing, then we have something far more inline with Joi Ito's call for 'One Science' where the focus point is not what computing can do for the world, but what the world can do with computing. To do this we need a curriculum that encompasses code as much as it does making as much as it does ethics as much as it does every single aspect of the world we live in now, learning from the world as it has changed through history, and asking how we can make a world that we travel into with our children. Tall order? Of course it is. We need to understand people - what they need and want - as much as we need to understand how we write code.



Learning, Anstruther Connected Communities Design Sprint, 2016

We have to understand the lessons of the past as much as we do the ethical concerns of the future. We have to understand visual as well as scientific languages. We have to understand the economy, the environment, culture and society. A way to think of this is that we need a curriculum that understands how to understand. This is not going to be easy and might seem a little scary. But there's a leap to take and if you want to get involved with creating a curriculum that puts everything and everyone at the heart of understanding, then this is what we should and could be doing.

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1. <https://joi.ito.com/weblog/2014/10/02/antidisciplinar.html>
 2. <https://www.oreilly.com/ideas/how-the-new-hardware-movement-is-even-bigger-than-the-internet-of-things>
 3. <https://www.youtube.com/watch?v=0042ZUA9bYc>

National Institute of Design, India

Excerpts from the student blog for the Connected Pol

<https://medium.com/the-connected-pol>

The Connected Pol

Reflections after the caravan left town from Aboli Joshi.

The two weeks of our Arduino project have been an exercise in adaptation (I think Darwin would be proud). With a constantly evolving brief and Jon hitting us with code trucks from all directions, it was a challenge to come up with anything even resembling a working model for the display. We did it, though! And now here we are, looking back on everything we learned. Honestly, the biggest challenge in this course may have been creating and working in multidisciplinary groups without killing each other.

However, all the conflicts and clashes in perspective meant a combined, balanced point of view for the group. Yes, we spent three days discussing one concept, but the resulting clarity of thought was

a blessing. One of our areas of investigation was the difference between a house and a home. The overwhelming consensus from our fieldwork was that a house is made of bricks and cement, but a home is made of people.

Looking at the brief—"The Connected Home"—through this lens, we realised that it should have been more like "Connecting People". Instead of creating a super smart house which discounted the residents, we wanted to create a connection between the people in a home.

02.04AM 10th February 2016

Aboli Joshi

Supplemented by some hot chai and bun maskas from Irani's brought to us by Shashank and Reuben, we're working away at our prototypes. Everyone's slowly spiralling into hysteria as exhaustion chips away at our sanity. Hopefully we'll make it through the night.

Hacking it with the -ta team

Salil Parekh

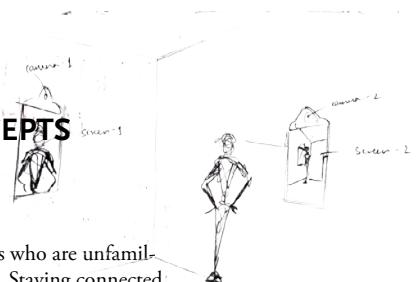
I've just spent a week with the Unbox Caravan and the -ta team, and it has been one of the best weeks of my student life. I have always had a fascination for hacking things and making them work, so when Jon Rogers came to town with the Unbox Caravan in tow, I've barely slept enough this week, such has been the level of excitement and work. It is difficult to condense a week's worth of work in one post, so I shall just run by the highlights. I bought an Arduino Uno in 2014, and didn't know how to operate it beyond the basic 'Blink' function, hence I kept it in cupboard till January of 2016.

IDEAS & CONCEPTS

Connected Illusions

For the visitors and guests who are unfamiliar with the environment. Staying connected via mirrors, creating an optical illusion.

camera 1 is connected to screen 2 & camera 2 is connected to screen 1. Two actually share the connectivity & illusion of the viewer.



Tessellate with light

For the tourists and old people without impeding their daily living or heritage while giving an interactive way of engaging with the 200yr old "unique" heritage flooring.

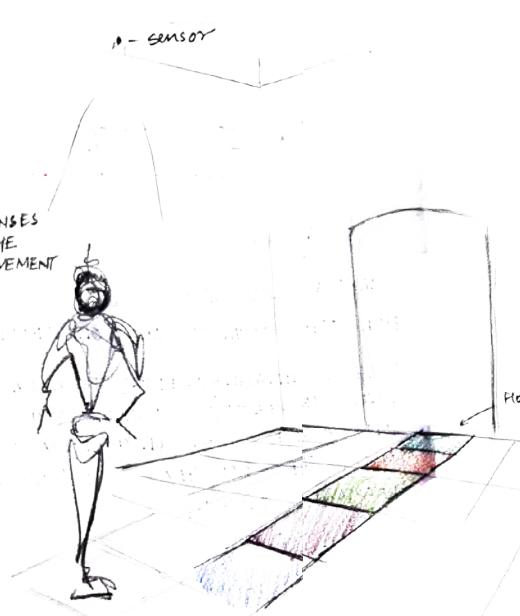
A Window to another World

For both, familiar and un-familiar people, it facilitates the element of mystery as well as connectedness witness amidst the pol windows, mirrors and doors.



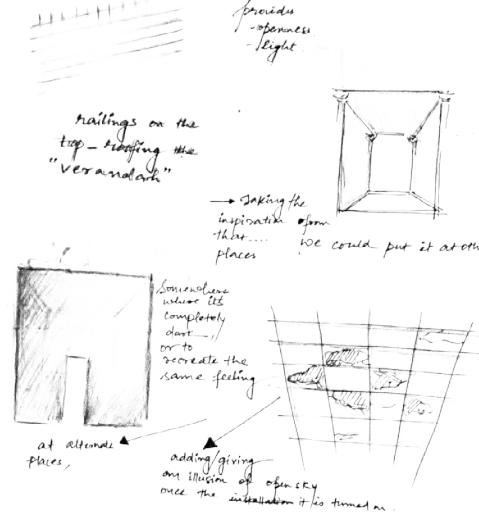
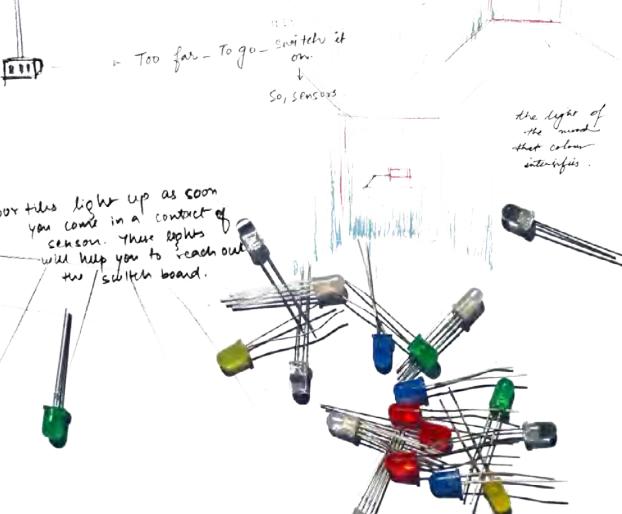
Sky High

For the older homes and new closed indoor environments, giving a feeling of an open environment under the sky as witnessed in old pol houses using adaptive, smart, subtle lights.



Rhythmic Drama

For all types of people, setting the mood through lights while talking, as music defines.



30th January, there is a massive kerfuffle in forming groups between the students of Exhibition and Product design. I emerge from the scrum with the best possible team. Team members include Uttishta Varanasi, Nikita Arora, Ishita Jain, myself, and a bonus member, Vishwanath Pasumarthi. We not only have Exhibition and Product designers, but a couple of Graphic designers as well. The team is cleverly named -ta team by me, and my name is also changed to Salilta with effect from 2/01/2016. Basic research is done into the definition of what makes a home in the pols of Ahmedabad. Nikita loses large chunks of her mind while ideating, and copious amounts of laughter ensues.

I've barely slept enough this week, such has been the level of excitement and work.

31st January, and I'm collecting parts for the Design Workshop course, and I have to go for a lie down, after getting overly excited on reading the list of parts available at the store. Uttisht does some terrible bargaining and saves us some money. But he now supply the entire class with high quality kits, and everyone bought from him after their terrible Chinese-made Arduinos go up in smoke.

1st February, I find out that Jon Rogers isn't actually a human, but some other form of being. I don't know what, but I am determined to find out. We get cracking with our Arduino IDE and quickly learn how to make simple circuits and get upto speed with coding with relative ease.

2nd February, the members of the Unbox Caravan present themselves, and we get to know who they are. Turns out, they're all just a bunch of eager and excited individuals who just can't wait to get their hands dirty and make something. I cannot wait to get working with them. Vishwanath and I take David and Emily (from Unbox Caravan) on a small tour to show them the

makers of Ahmedabad. We visit Kalamkhush to see hand made paper being made, and some exquisite hand assembled mechanical charkhas. We then go visit Geeta Mandir where we see how the wood suppliers and furniture makers of Ahmedabad operate. I meet some old friends at S.P. Jogi, and introduce them to my new friends from the Unbox Caravan. The Jogi brothers had just bought a new lathe machine, and were extremely excited to show it off and explain everything about their business. On returning to campus, I continue my investigation on the being known as 'Jon Rogers', and I can definitely confirm that this being is in no way, shape, or manner, the human it claims to be. This entity is composed of pure excited, fidgety energy, and not the 45-something human being as described.

3rd February, and the -ta team gets down and dirty with code. Unfortunately Jon Rogers sent a code truck (with a massive amount of complex code), and we get flattened. Fortunately, the -ta team pulls through with a recovery operation, and by late night we start to make some cool stuff with the Arduino and sensors. Vishwanath cracks some important bits of code, and saves the day. Difficult day this. We also start ideating on what a 'connected home' should be like, and sketch out our ideas. Some ideas turn out to be shit. Not actually shit, but about shit. We think of a toilet that measures your shit and tells you what you ate. Happily we also have other great ideas to work on. Ishita uses her graphic talent, and all our idea sketches look pretty ****ing wicked. I pat myself on my talentless back on getting her on the -ta team. In other news, Nikita falls asleep mid-conversation.

4th February, our ideas are further developed, and worked upon. The idea of writing and documenting what we do is discussed, and Medium is chosen as the medium of choice. I publish my first post, a pictorial definition of the word 'despair' using Ishita's face. Ishita is not happy, and the aforementioned post is censored to avoid legal conflict. We get our hands on some more cool sensors and cool input switches. Uttisht hooks up

SMALL WONDER

LIVWE WIRE

IDEAS & CONCEPTS



NO SPACE FOR GARDENS.

- TERRARIUMS

- AUGMENTED REALITY

CHILD CAN GO INSIDE & EXPLORE
PLANTS & ANIMALS.

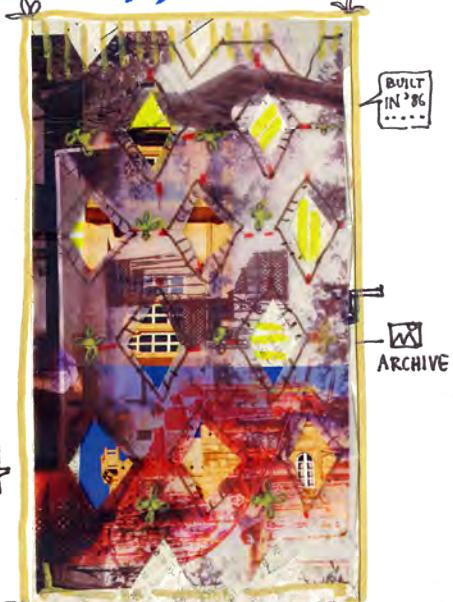
CAN TAG things, maintain a
Journal of adventures.



- TELLS YOU EXPECTED TIME OF DRYING
OR WHEN CLOTHES ARE DRY

- PREDICTS WEATHER CONDITIONS & TELLS YOU
PROBABILITIES INSTEAD OF SIMPLY RAIN, ETC.

Trapped in time.

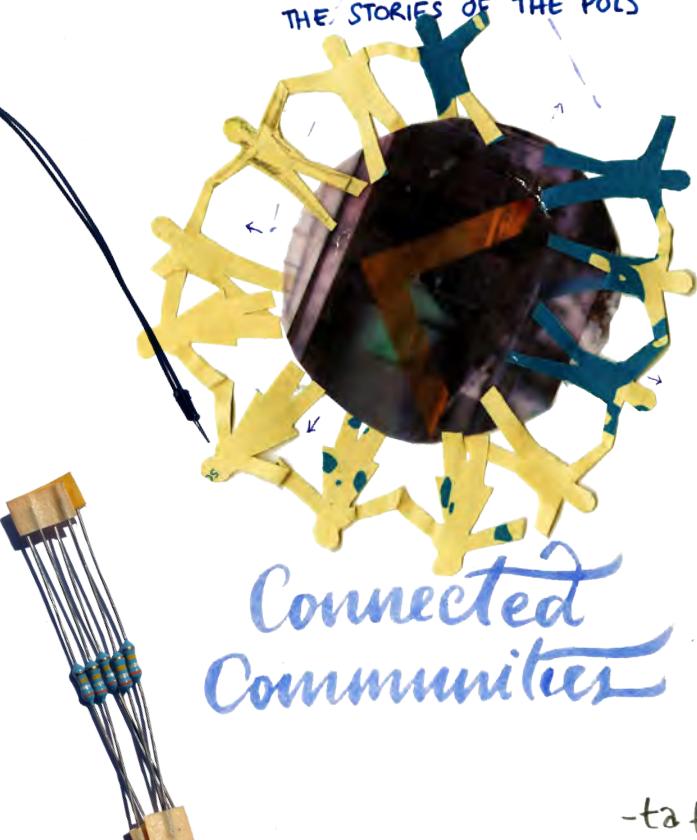


JAALES / INTRICATE WROUGHT IRON DOORS

- TOUCH SENSORS • STORIES • HERITAGE
• SOUND • VIDEO • HAVELIS • NOSTALGIA



JOIN HANDS TO COMPLETE THE
CIRCLE WHICH ACTIVATES
THE STORIES OF THE POLS



-ta team

some sweet circuits, and it all runs wonderfully with code written by Nikita and me. We spend the whole day making circuits and writing code in preparation for making prototypes the next day. Nikita and I go get milkshakes with Jon, Jayne, Shashank, Praveen, and members of a rival team. A bubble making device is acquired. The said bubble making machine created much shock and awe in the studio. Productivity drops to rock bottom levels, and much slo-mo trickery is recorded when Nikita loses control of hands when in presence of soap bubbles.

5th February, the day is spent preparing prototypes, and I get a crash course in Firmata, Python, and Raspberry Pi, with David Ascher, Michael Henretty, and Bobby Richter. They very patiently sit with me – a code n00b – and hook up a Raspberry Pi to an Arduino. I get very very excited working with the said Raspberry Pi, which has a Sensehat shield with neopixel LED goodness, and consequently forget a lot of what they taught me. While I figured out this code, and hardware dilemma, the -ta team successfully builds and codes a prototype which forms a human circuit. The rather excellent prototype and idea receives some great feedback from Jon, and we continue to add more meaning and functionality to the concept. Thus concludes a great week with lots to process over the weekend.

BONUS: 6th February, Mike and I plan to work on the weekend to figure out the Raspberry Pi-Arduino dilemma, and work together in the afternoon to try and hook them up together. What actually happens is Mike once again sits patiently teaching me basics of Unix programming, and how to make a github repository. Although I already should've known basic Unix and github commands before, we manage to get some degree of success with the integration, but the lack of a decent microphone lets us down, and a foray into the depth of Ahmedabad leads us to a dead end. Further ideation takes place, and the final idea is getting some definition.



Studying with the Open IoT Studio

Julia Gratsova

I am from Scotland and study Product Design at the University of Dundee. I got involved with Mozilla's Open IoT Studio during my final year project, which explores human-lighting interaction and behavioural awareness of objects through digital emotion recognition. It is at the early concept stage, but being part of Open IoT Studio helped me immensely to bridge the gap between physical and digital making. The Open IoT Studio also gave me the opportunity to network with people who were able to provide guidance and feedback and gain exposure to events and projects that helped me navigate idea generation and concept development.

Experiment yields experience. This might not be as obvious at the time, but will be useful in shaping your vision and personal development.

'Always say 'Yes' to opportunities' - was a piece of advice I had mixed feelings about. What about being focused and not wasting time? Now I would sign under every word of that advice, but would add 'diversify out of your comfort zone'. Experiment yields experience. This might not be as obvious at the time, but will be useful in shaping your vision and personal development. It has given me an entirely different direction to explore in terms of where I want to take my education and professional development, allowing me to take a step back and observe my own practice and then analyse the new possible paths that I hadn't considered before.

I would encourage anyone interested in IoT and the future of the Web to take a part in upcoming events, seek out collaborations and actively participate in projects that Open IoT Studio has to offer.

I was able to take part in projects that I didn't know what to expect of, and they turned out to be brilliant and extremely valuable because of being able to try myself out in something I've never done. The fast-paced and evolving nature was somehow liberating, and offered an entirely uncommon framework comparing to what I was used to. I met and spoke to people not only talented but also passionate about what they do and want to achieve, people who believe in education and sharing knowledge openly. I would encourage anyone interested in IoT and the future of the Web to take a part in the upcoming events, seek out collaborations and actively participate in projects that Open IoT Studio has to offer.

Unpacking how educators might think of design

Chad Sansing

To support the Internet of Things edition of Company Lab's (CO.LAB) latest 48Hour Launch (48HL) event, mentors from across Mozilla met at Hive Chattanooga to help local educators and entrepreneurs prototype the future of civic and educational technology in the Gig City.

During the mentors' pre-event orientation, we ran through a bunch of skill-sharing exercises so we could connect one another—and our areas of expertise—with teams in need. We heard from communications experts, curriculum developers, designers, engineers, event producers, and project managers. While listening to my colleagues' stories and responding to their prompts, it occurred to me that I could have used a much better language of design when I was a teacher.

Even though we ask classroom educators to plan year-long curricula (sometimes mapped by the teacher;

sometimes purchased by the system), we also expect them to work reactively at the same time, balancing the system's overall pacing demands with their students' individual needs for access, differentiation, and re-teaching. This complex set of demands is almost always rooted in systematic deficit-model thinking:

- We need to raise test scores.
- We need to increase pass rates.
- We need to close these gaps.
- We need to address what's "wrong" or "lacking" in preparing students to pass their end of year tests.

This kind of thinking assumes there's a deficit to overcome, educating kids as if overcoming deficits is the only acceptable outcome. We design school systems and teaching materials to say, "If only we could do things right, we'd eliminate deficits in our practices that lead to the deficits we see in test results." But what if we designed differently, in a more designerly way? For example, in one of our skill-shares we worked through a four-panel breakdown of a design problem based on human experience.

1. We each named and sketched a persona, a composite of people we know who face a common problem and need.
2. Then we attached demographic information to that persona to help us design for his or her needs. Next, we listed pain points to avoid in designing solutions for our personas.
3. Finally, we suggested some goals that our personas had. What were they looking for in a solution? What did they want to do in response to their problems or needs? How did they want to feel?
4. We also prioritized "delight" as a common need, explicitly naming and aiming for the positive emotion we could help people have.

What if we did the same thing in education, identifying “deficit thinking” as the pain point our students face and aiming for something more positive?

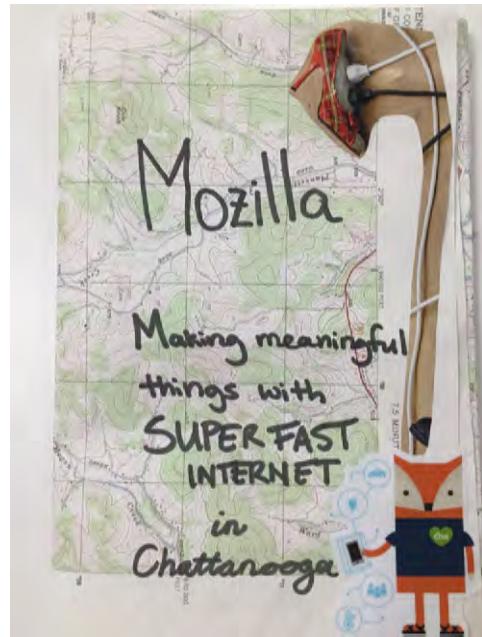
Right now, a typical design statement in education reads like this: “We believe kids lack the skills to be successful on tests, therefore, we will design activities for them that are like the tests.”

A more valuable, equitable and effective design statement might read: “We believe kids want to be delighted, therefore, we will design activities that will delight them.” The former is based on evidence from the test; the latter is based on evidence about people.

This is a simple but terrifying shift, because it unmasks traditional instruction and dethrones central authority in the classroom. Our pain points as educators are made secondary, but not insignificant, as we teach to the primary delight of students.

What’s a good first step? Start small and use concrete action. Let’s set aside a genius hour for ourselves—just a few hours a week to experiment with different kinds of instructional design that work against the pain points of our traditional adult-serving school curriculum.

- We need to raise test scores.
- What is the smallest possible prototype you could build?
- What is the shortest activity you could test to see if it validates your ideas about what might delight your students with learning?
- Do you have time for it in your classroom?
- Can you run multiple tests a week and iterate until more and more of the materials you design are about delight or students’ affinities, interests, and areas of inquiry?
- Can you prototype lessons that get you out of the way instead of putting you at the head of the column of your system’s campaign against deficiency?



Chattanooga Zine, 2016

I’m going to offer an enthusiastic Yes! but with one important note. Like any new prototype, we have to be okay with giving ourselves the freedom to experiment and constructively fail in the short term.

“Fail” is the scariest word in education, and we’ve made “pass” a virtue. Doesn’t that seem backwards? As I watch educators interact with developers, designers, startup mentors, and other people who come from a world where failing is a necessary and often vital step forward, I realize we can change what “fail” means in classrooms of all sorts. We can allow our kids and teachers to strive for a delight that’s beyond the limits of deficit thinking.

I’m ready for that change. For myself and for my learners of all ages. How about you?

Reflections

Reflections on a year of the Open IoT Studio

After a year of collaborating with so many brilliant people, we wanted to pull out a few pieces of writing that reflected on and in what we were doing. Some of this is at the time, some of it after the fact. Some of it is reflections on things that might be.

Don't forget that we want a healthy Internet where people make meaningful connected things. And that now is the time not to just ask what is possible, but what is responsible.



Patient Making in a Scottish Village

Babitha George,
Quicksand

I spent a week this June in Scotland as part of the Open IoT Design Sprint, organised by the Mozilla Foundation and hosted by Jon Rogers in his seaside village of Anstruther and the University of Dundee.

This was the third in a series of labs/sprints this year, that started with the UnBox Caravan at Ahmedabad's National Institute of Design campus in February 2016. The intent of all these events has been to bring together a group of interesting and interested people to explore our collective futures through multi-cultural and inter-disciplinary lenses.

There are two aspects that I would like to reflect upon with regard to my week in Scotland.

The first is about what it means to move beyond obvious spaces when we think of designing for the future. As my friend Jon likes to say, there is a same-ness and pace to the format and locales of design sprints and hackathons, that almost seems overbearing and arrogant. This is particularly true when these hacks are attempting to design real products and solutions for people. Unless we begin to see people as not just users, but also producers and collaborators, we cannot ever hope to 'design right'.

During the week in Scotland, we got to spend time with local teens, fishermen, and farmers. Most IoT conversations tend to focus on cities with their all-encompassing connectivity, so it seemed particularly meaningful to situate this sprint in a rural village with similar connectivity constraints that vast segments of the world still live with; thus opening up questions of access and participation. It was also humbling to attempt to put ourselves in the shoes of communities that have established systems and methods of efficient and cooperative functioning. It is easy to fall into the trap of thinking that innovation is emerging primarily in cities with affluent communities. However older communities have had years of experience dealing with ambiguity and hardship in ways that are extremely robust and flexible. And the sprint was a great experience in reminding ourselves about this and not forgetting where we come from.

Unless we begin to see people as not just users, but also producers and collaborators, we cannot ever hope to 'design right'.

I think this opportunity to immerse ourselves in a small community helped us think not about how we could 'help' them but instead about how we could learn from them. A lot of the local practices for example, had very relevant lessons for IoT, including the fact that ultimately everything has to be about security and trust- something that seems to be oft-forgotten, thus resulting in complex and opaque solutions that provide no agency or control to people to make informed decisions. Technology companies and practitioners tend to get swallowed whole in their obsession with the new and the shiny along with a misguided belief that the world revolves around them; this week was a welcome change in getting us all out of these patterns that we tend to be surrounded by.

It is easy to fall into the trap of thinking that innovation is emerging primarily in cities with affluent communities.



Drawing from a field in Anstruther, Rory Hamilton





Connecting through making, Anstruther 2016

The second aspect is one that we have been thinking about and experimenting with over several years now with the UnBox platform. While there is merit in action-packed fast-paced events in being able to see a lot of new things and people, we have always felt that there is a real need for slower events that allow people to be themselves and engage deeply with others and the space that they are in. The UnBox LABS have been a conscious effort in putting together a space of this sort and it was extremely valuable for me to be a participant (and not an anchor/host) and experience this from the other side at the Scotland Design Sprint.

Though there is value in challenging people and pulling them out of their comfort zones, surely there can be a more nurturing, safe way of doing this. What Jon and Michelle managed to do really well during the week was to create exactly this, with great food, spaces to unwind, chances to be with nature, and more than anything the opportunity to meet with new people and make friends in a manner that didn't seem artificial

or overly-directed. I am an adult and I hate going to events that continuously assume that I need to be always told what to do. This week didn't do that, thus giving me a chance to do what I really enjoy and work with people I ended up becoming friends with. Over the week I got to work with folks who were working on interesting projects for both teens and fishermen; all the while pushing ourselves to think about what we were learning and challenging ourselves to think about how we could make new ideas that were relevant to the community.

Doing the dishes, going swimming, drinking a lot, and walking through beautiful landscapes were all things we did together and a lot of the reflection, critical thinking, and ideation happened in these settings. What a lot of events forget are exactly these settings, that allow people to feel like they have agency and that they are in a co-owned process that everyone is in charge of, simultaneously leading and participating in. And over the few iterations of such events that we have hosted and been a part of, I am increasingly convinced that this has to be the way of the future for us, if we want to initiate and engage in truly trans-disciplinary work.

Most of all, the week was a brilliant demonstration of how we think and feel differently when we make together.

I also got to work with the amazing Tommy Perman & Sean Dooley (along with Sarah and Erika from Mozilla and many other folks) on a book that we made during the week. While it seemed like a separate exercise with not much to do with IoT per se, I think the book was made with exactly the same spirit that the sprint sought to bring forward:

- Being open to new ideas and new ways
- Working with new people and learning new things
- Pushing ourselves but also having fun along the way
- Working with local resources (we printed and bound using multiple techniques ranging from Jon's home printer, to Tommy's very versatile vinyl cutter to a fairly temperamental Riso machine at Dundee Contemporary Arts)
- Getting everyone involved in making
- Focusing on creating, even while making mistakes (instead of getting lost in the noise in our heads)

I haven't had as much fun making something in a long while!

The week brought together a lot of nascent thoughts that I had been toying with as a curator & producer at UnBox about the need for slower, more nurturing, friendlier events. Most of all, the week was a brilliant demonstration of how we think and feel differently when we make together. Thank you Jon & Michelle and all the other amazing folks at the sprint- each of you brought something special to an already magical setting and space.

LEARNING ABOUT IoT From BOATS..

↳ open source

↳ CRAFTED

↳ MEANINGFUL

↳ RELIABILITY

↳ TRUST

↳ SHADABLE

↳ MACHINES TELL YOU WHAT THEY WANT..

↳ SECURE

SIMPLE TOOLS → "YOU CAN FIX ANYTHING"

SUPPLY CHAIN

"Working WITH THE MATERIAL"

HACKABILITY

LEGIBILITY

FIXABILITY

GENERATION
OF KNOWLEDGE

MULTIPLE
OF FAIL-PROOF

"Hosting Mozilla and the Open IoT Studio was a great opportunity to showcase the makespace at DJCAD and the work that happens in Dundee.

It was a cracking few days exploring how digital fabrication could be applied to current IoT research and facilitate teams of makers, designers, technologists and ethnographers to get the best results out of our space."

- **Ali Napier,**
*Creative Technologist,
University of Dundee*



Ali Napier and Rob Jackson, Scotland Design Sprint, 2016

What can IoT learn from fishermen?

Peter Bihr, Holly Robbins
& Leonardo Amico

We were brought to the “edge of the world” not because it was beautiful, unspoiled, or quaint, but to work with and learn from local communities. We found a community that was very special in that it was both savvy and conservative in its adoption of technology: the men of the Fishery Museum’s boatyard, who preserve, maintain, repair and revive a number of historic fishing boats—primarily the Reaper. This group is special in that it cares deeply about technology, practices, and history, and does so in a way that focuses on a very specific time. This is a snapshot of technology in the 1920s, as sailing boats were transitioning from sails to engines: a boat like the Reaper would be built with the straightforward methods and technology of a sailboat, and enhanced by a powerful engine. Digital technology was not part of the picture.

Examining the boats and speaking to experts on historical fishing vessels, we found that the way these

fishermen—the crew of the Reaper was comprised of 8 men and 1 boy— interacted with technology, their expectations, skills, as well as the way the boat was built in the first place, has a lot to offer contemporary IoT practices.

A Scottish Fisherman’s vessel from the turn of the century was built for extreme conditions. The boat had to be a self-sustaining unit that could weather critical conditions. It had to make wise use of scarce resources. The crew had to be able to maintain and fix the boat, as well as improvise solutions to unexpected challenges.

A vessel like the Reaper betrays the practices and insights of hundreds of years of experience. It is, in tech parlance, a mature and self-contained ecosystem—one that has to work with a large degree of autonomy, be self-reliant, and adaptable, no matter what conditions it operates in. These constraints can provide valuable guidance for the way we can design and think about IoT systems, products, and services. For contexts of no/low connectivity, the parallels between a boat and those IoT systems are obvious.

However, we believe that even in contexts that allow for more reliable connectivity there is much to be gained from operating more like a boat: with a larger degree of autonomy, self-reliantly, adaptable, and built to work in less-than-perfect conditions.

IoT systems, like boats, are ecosystems

The vessel is operated by a finely tuned and responsive ecosystem. The boat is an ecology of the relationships among several notable nodes. It is where people, materials, technologies, and the environment converge and work together.

WHITE WING



Background: The Reaper

The boat we visited and examined is the Reaper. Reaper is a Fife Sailing Herring Drifter, the most popular design of fishing boat on the East Coast of Scotland for the greater part of the 19th and early 20th Centuries. Built in 1902 she began life as a two masted sailing lugger. She had an engine installed for the first time in 1916. In the late 1930's she held the record catch of herring in Shetland, some 223 crans - almost a quarter of a million fish.

Source: Scottish Fishery Museum



The Reaper's Capstan, Anstruther 2016

This ecosystem responds constantly to its environment: weather conditions will determine how the boat is powered (engine vs. sail), and how people work together to operate that technology.

The same should happen in a networked space (a home, a village, a city), where all nodes are equally important and each has its role. IoT is more than the Internet in Things. It is an ecosystem comprised of all the nodes that play a part.

Materials live and change

The wood that a boat is made of is never static, it changes shape and size based on how much water it has absorbed, and the content of salt in that water. It is constantly in flux. A fisherman and a boat maker respond to these changes in their materials to keep the boat seaworthy. The ship consists of materials, and those materials are living and responsive. They respond to the different nodes of the ecosystem. The materials of an IoT are also not static. The IoT also consists of familiar physical materials beyond chips and screens but we should also ask: what are the basic materials of our digital world, and how might we work with their characteristics and fluidity? For example, signal can be weak or strong depending on elements the radio waves encounter; algorithms depend on their interactions with input from human and non-human sources, including that of other algorithms.

People are nodes in the IoT

A fishing vessel is a complex technology that requires several sailors to operate. To ensure that the vessel can run smoothly, every crew member needs to be able to cover all the basics and to work together in synergy. The Reaper required 8 men and a boy to operate. The line of vision from the helm to the front of the boat is obstructed by masts and equipment. Navigating alone required one man at the steering wheel, and another

upfront to serve as the eyes of the captain. In the boat people worked collaboratively with technologies to perform the tasks needed. Humans were also nodes of the vessel's ecosystem.

IoT technologies should not replace people, but instead integrate and support them. People and technologies are part of the same network and they cannot prescind from each other.

Technology should be legible to people

A vessel was not stocked with many tools, but the tools that were there were those that could be utilised for many purposes. It was apparent how these tools could be used: rope could be used to hoist a sail, bind a broken rudder in an emergency, and when it was weak, be re-woven as a buoy to protect the side of the boat from scratches. Technologies on a boat are highly legible and hence easy to understand, modify, and work with. Many technologies on a boat didn't live a single life: Their simple technical construction made their use apparent, and made it also possible to repair or re-appropriate to address new uses when they arose. Nodes in IoT should not be black boxes. They should be legible to the general user. Low-tech can be the best tech if it is open; open in such a way that people not only can understand how to use it, but also how it could be used, repaired, or re-appropriated. This is empowering.

A technology should be robust within its environment. Fishermen make use of several modes of navigation. There are those that are observable to the naked eye such as landmarks and other orientational technologies such as compasses, maps, and stars. When visual cues can not be of service, such as in a fog, audial cues come from a fog horn. Later sonar, radar, and GPS joined the menu of tools available. Each of these tools are resistant to the natural elements that the fisherman faces: rain, sea water, changes in incline,

and wind. Also, none of these technologies retired the others—they complement each other and serve as mutual failsafes. The fishermen's technologies are robust because they are resilient in their environments. They promote redundancies and failsafes. IoT should be built with critical conditions in mind, offering alternative opportunities and avenues for the same needs to be met. It should rely on perfect connectivity as little as possible.

Pragmatism over perfection

The Herring Drifter the Reaper was originally designed to hold a massive mast that stands more than 56 feet tall. For the first 14 years of the boat's life, the boat was exclusively powered by sail. Despite the fact that this sail was a part of the original design, the mast does not perfectly fit into place on the boat as the materials live and change. Instead, there is a plank of wood wedged in next to this mass that's approximately 6 feet tall extending from the deck to the cabin below to hold the mast in place.

Things don't have to be perfect. Instead of aiming for what is theoretically ideal, the practices that prevail are those that are effective and realistic. These are systems where parts can be adopted and incorporated into other parts, and make sense in their own environment. IoT should be built to evolve, and in a way that can support emergent qualities. Expect for the system to grow and adapt within itself, and to be adapted and modified by its users.

Low fog leaves good weather (Sicilian proverb)*

Davide Gomba

<http://bit.ly/2faBdWn>

In the last years or so I've been wa/ondering after interesting paths. I used to be an Internet consumer. I still am, in a way. We all are. To me, the challenge shifted from being (willing to be, wannabe) a so-to-say aware citizen of the world wide web and of hardware products to being a silent conspirer, digging between /r/selfhosted and /r/OutOfTheLoop :)

Don't take me wrong, we are in the most interesting period of time. We are defining the interaction and relationships between technology and us. AI, Machine Learning, Conversational UIs, everything is there, asking us: what would I be?

The question is right, but it's not necessarily addressed to the citizens, rather to the consumers. Following someone else's agenda.

Oook. You want my (interesting?) data, which becomes yours. Ok take it.

Real question: what happens when this shifts to other scenarios? From my phone or computer to my home?

IoT is growing big, and apparently it hasn't found its direction yet. Nowadays security and consumption monitoring are the two main need that people would identify as IoT in their house.

Few months back Revolv* - a smart-home device maker - stopped working. The product itself was there, it simply didn't work anymore because its service was blocked. The company was bought, from a competitor. Service stopped. This story made me think about the concept of product vs service.

In nowadays cloud-based goods, we should update the terms we use to define what we once called product, and now may be a service. Stoppable. Possibly against consumer will.

Oddly enough, this shifting between product to service came back to me in an interesting trip I made with the IoT Studio folks in Scotland. Tractors, bought on hire purchase are "stopped" by the Internet if you have late payments. (Which is possibly what "hire purchase" means). Still the tractor-as-a-service vs tractor-as-a-product wonders me.

I am naive. I know. And romantic. This is one of the reasons why I started addressing my interest to what - I discovered far after - was defined, infrastructure-wise, as Fog Computing*.

Where should a service stand? Do I have to ping a server in California to switch off my apartment lights?
God no.

Back in Scotland I had the chance to toy around these topics with Harm van Beek from Incredible Machine. The Agrigator* project with EmonPi* and DTMF. A self connected farm with a low-connection. Late the same month I had the chance to bring in southern Italy an interesting experiment: RuralHack*, organized with RuralHub, addressing farmers to low-end, open-hardware IoT solutions for the farm.

In September, back in the office I tried myself to move a makerspace and office - my place - to a more conscious approach in managing a community and a coworking space, developing and digging into rocket, chat and the joys and sorrows of a physical, real place (entrance, security, internet shortages, power shortages, you name it).

When I stare at the home environment - and I do, often, in Casa Jasmina, our very own home experiment - my first concerns are in the without-the-internet situation. Connection-aware solutions like Home Assistant, Open Hab, or even privacy approaches like the dowse project.

The community is growing big, full of enthusiasts and naive guys willing to self-host their lives, with a online backup!

Twitter handles:
@vongomben, @TheIncMac, @spikeheap, @TrystanLea
@glynudson, @Openenergymon, @laltro,
@openiotstudio, @thornet, @iledigital, @casajasmina
@arduino

Links:
<http://bit.ly/2faBdWn>

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In the words of the author...

“qrcode is not dead!!”

"With your feet on the air and your head on the ground"

i uploaded all of my contacts to the servers of app companies twice this week so far. at least nine companies accessed my GPS coordinates today, that I know of. a room-scale computer sent multiple recordings of my voice back to its host, each carrying fragments of my personality embedded in them. a single bulb, lighting in reaction to a door opening, outlined my routine.

"Try this trick and spin it, yeah"

computers with sensors... and senses. computational scale beyond imagination. software that teaches machines to learn how to learn. endlessly capable. inherently directionless.

"Your head will collapse if there's nothing in it"

droplets of data, trickling through homes and cars, sliding across bodies, gathering together into streams, feeding tributaries, combining to power the great river... now overflowing its banks.

"And you'll ask yourself... where is my mind?"

your mind is still here, where it has always been. but it's also up there. it's more now, extended. it's only part you. you're only part it.

everywhere that it is.

- dietrich ayala

- Black Francis

A conversation on Open Craft

An excerpt of a conversation between Jayne Wallace and Michelle Thorne.

<https://lguariento.github.io/Engineering-the-Future/>

J - What kind of experiences did you have in India and Anstruther that made you reflect on what the IoT could be?

M - I did like how over those two events there was an openness with knowledge... there was also a real willingness to share knowledge or support across multiple projects - so if someone was like I need someone who can programme code... I thought it was quite fluid and supportive and I think that same openness with knowledge was also true in our interactions with all the craftspeople we met in India. They were very generous with showing the process and showing what they made, even in Anstruther too. Your experiences on the boat it seemed that people were very forthcoming with just the knowledge of how a boat works and again on the farm it felt very generous with

sharing how that process is. I think that openness to share knowledge wasn't in the way that, you know, we're trying to take that on as a profession, but rather, look into this world of mine, this is something I know a lot about and I see you are curious so I'm gonna share - I think that spirit took shape in a lot of different forms in the events.

J - Could you see, I'm trying to think how would IoT map onto that and where would the spaces for digital be in places like Indian craft? Because one of the tensions I felt was that with development, and with new ways of making and ways of living, a lot of things were being lost. It's a really tough question - how could the digital open up vistas for people who are in rural locations to have new channels to sell their work?

I thought it was quite fluid and supportive and I think that same openness with knowledge was also true in our interactions with all the craftspeople we met in India.

That being one thing and thinking about the kinds of things that the craftspeople make - it's not a template, but definitely a series of designs that have been made for decades and patterns that are reproduced meaning that there is a limited market for that if we're thinking about how this could be something to export for example, new ways for them to make money - Sean[1] and I have been thinking about pottery that feels quite western, but that has the traditional Indian oil lamps or diyas as part of them. And by

sending these back to India we're starting a conversation about what this could mean and I can see there would be a place potentially for IoT there to aid communication and nuanced exchange of information about how things are being made, maybe.

M - Yeah, like what are the craftsman to craftsman exchanges that are there if you and Sean represent a different location? Maybe there's new ways for IoT to become a bridge to share that knowledge if it goes back to this idea of genuine interest

How could the digital open up vistas for people who are in rural locations to have new channels to sell their work?

and exchange of practice and approach and methods and all that. I can imagine it being a way to facilitate that, I don't know what shape that takes, but...

J - That would be really nice in an educational setting as well wouldn't it? You know, maybe the way that a craftsman works... For instance when we watched the potters in India throw pots they did it in a completely different way to the way that we're taught how to do it in the UK - we take it (clay) out and then up (when throwing pots)- they were taking it flat and then bringing it right up, which is one of the hardest things to do, but it means that by taking it flat first it's not all full of water, making it a much more efficient process, and it worked with the clay that they had in a way that it might not work with the clay that we typically use, but it was different.



Paper making, Ahmedabad 2016

M - Just to be able to exchange those practices! I'm always amazed by how many videos I can find on YouTube. If there is anything I want to learn how to do, be it how to chop an onion or fix this or that, apply make up, whatever, there's always a YouTube video for it and not only that there's seven or more.

Imagine if you had a learning situation where you could hook up with a master in India who could be getting feedback of what a child or adult learner was doing, and be able to correct them. That would be a direct way for them to use their craft in a different way.

J - It's amazing, but, I can remember one evening I was looking up how you do makeup and trying to copy and I just looked like a mess afterwards - I just couldn't do it, which makes me think you can watch all of these videos, and lots of the way we learn is by observation, but could the IoT give us more multisensory ways of experiencing someone else's craft or knowledge base in some ways, I wonder?

M - That's a really nice question - multisensory and also interactive. I was also thinking, there is this video of an onion getting chopped, but you know I may not be aware enough of my technique. My knife holding technique maybe is already so off that... So what are the ways that the knife or the object could guide me? Is there a way for technology to help with these other types of adjustments?

J - Yeah, because if we think, taking the rural craftspeople as an example, how could they, because a lot of them are having to give up their crafts as they're not making money out of it anymore as what they make isn't wanted anymore by a population that wants to be more western - and you think "OK, so how could we find other markets or how could they assimilate some of these western qualities while retaining some of the very Indian qualities? But you're right, imagine if you had a learning situation where you could hook up with a master in India who could be getting feedback of what a child or adult learner was doing, and be able to correct them. That would be a direct way for them to use their craft in a different way.

A Mirror on AI and Ourselves

Jon Rogers, Jayne Wallace,
Mike Shorter & Pete Thomas

The SelfReflector is an Internet-connected mirror that uses online facial recognition to calculate your age and play in-store music from when it thinks you were a teenager.

For centuries we have looked at ourselves looking back at us through mirrors. We all have our own very special relationship with ourselves through the magic of the 'looking glass'. It might be a 3am reassuring conversation that all is well. It might be a motivational speech as we clean our teeth. We might give ourselves a telling off after an argument that we wished we hadn't had. The mirror opens a mental world to our telepathic selves - after all it is only when we look at the person in the mirror can we truly read their thoughts. The mirror provides a space and time for being together with just yourself. Is there anyone that knows you like the mirror knows you?



30% of shops in general and 59% of fashion retailers are using CCTV cameras connected to the web to covertly gather personal data

In SelfReflector we wanted to explore what this meant to people. We wanted to play with this sense of trust, with the sense of reflection, with the sense that a simple reflective surface opens up so much about who we are and what we think of ourselves. Yet we also wanted to reflect on what happens when technology comes into our lives in very personal ways. As an outcome of a research project exploring the Internet of Things (IoT) in the context of the UK High Street, we wanted to explore how the High Street supports our sense of self in a myriad of nuanced ways, and create propositions of how technology can enrich this. Acknowledging the High Street as a place where we find out about ourselves from our teenage years onwards, we wanted to create ways in which the IoT goes beyond supporting the purchasing of goods, instead enabling more meaningful experiences in line with the realities of what we do in shops.

At a time when 30% of shops in general and 59% of fashion retailers are using CCTV cameras connected to the web to covertly gather personal data on their shoppers, we wanted to offer alternative propositions that respond to the playful, exploratory nature of what humans do on the High Street in social and personal ways to learn more about themselves.

SelfReflector is a mirror that takes pictures of people looking at it. It uploads the pictures to a web service that uses image processing to estimate the viewer's age, facial expression and mood. This data is then used by the mirror to select music from when the viewer was fourteen – an age that has been identified by Prof Daniel Levitan (director of Music and Perception, Cognition and Expertise at McGill University) as the

"magic age for the development of musical tastes". The image is then printed on the IoT social network system TapWriters for secure sharing with a small number of trusted friends. Beyond the low-fi printed image, there are no copies of the image stored. If you are in doubt about the ability of music to connect us to ourselves, you only have to read David Bowie's letter to a 14 year old fan in America.

SelfReflector is currently installed in a boutique glasses shop, SPeX PisTOls, in Dundee. It was designed with the owner, Richard Cook, as part of a research programme investigating the role of IoT on the High Street. Richard has curated songs from 1925 based on knowledge of his customers and their musical tastes. The research is ongoing and you can visit Richard, play with the SelfReflector and think about how you might want the Internet of Things to come into your life.



Richard Cook with SelfReflector, Dundee 2016

Introducing Denti, a free smart toothbrush concept for talking about IoT products

Leonardo Amico

DENTI IS THE FREE OF THE INTERNET LEAKING INTO OUR EVERYDAY DEVICES. A SMART TOOTHBRUSH THAT IS GIVEN TO US AT NO COST IN EXCHANGE FOR SELLING OUT OUR BRUSHING TIMES AS AD SPACE.

WHAT IF THE SAME MODEL OF ONLINE DIGITAL PRODUCTS IS APPLIED TO OUR HOME DEVICES, CREATING PRODUCTS WE CAN HAVE AND USE FOR FREE, BUT HAVE LITTLE CONTROL OF, AND THAT CAN BE CHANGED OR DISCONTINUED WITHOUT OUR CONSENT? HOW MUCH OWNERSHIP, ESPECIALLY IN THE PRIVATE SPACES OF OUR HOMES, ARE WE WILLING TO GIVE AWAY FOR GETTING CHEAPER PRODUCTS? DENTI IS AN EXPLORATION OF A LESS-THAN-PREFERABLE CONNECTED HOME SCENARIO, HELPING US IDENTIFY OBSTACLES AND STEER THE SMART HOME TOWARDS FUTURES WE WANT TO LIVE IN.

The intro text is taken from a proposal for a speculative Internet-connected product we worked on earlier this year at Uniform, the design and innovation company where I work as a creative technologist. After having spent a week with the Open IoT studio in Anstruther, discussing with fellow designers and professionals about good practices for an open, inclusive and human-centered connected world, we decided to take a look to the other side, and set ourselves the task to imagine what a product distant from those values would be like. Our goal was to create a concrete example that allowed us to explore a particular (and in this case not ideal) technological future and its implications, borrowing the approach of Dunne & Raby's speculative design. At the end, we chose not to pursue the development of the project, but I thought it was worth spending some time wrapping up the thinking that went behind it and talking a bit about the product.

When it comes to the home, the notions of ownership and agency are important ones, and with Denti we particularly wanted to indulge on the sensitivities of those issues

Denti is a smart toothbrush like many around already, but its particularity is that the toothbrush, together with a subscription to unlimited replacement heads, is given to customers at no cost. In exchange, users allow the company to use their "brushing moments" as ad space. The product is equipped with a technology that allows audio to be transmitted via vibration from the toothbrush head to the user, who would then hear

audio commercial as they engage in their oral hygiene routine. From this basic idea, additional features could be added to the product, both aimed to convince potential investors and partners and also to attract buyers.

Such a toothbrush could track how often we brush our teeth and if we do it for long enough, providing valuable data to oral care insurance companies. Associating the product with the online profile of the user could assure advertisers that their commercials would be presented to an appropriate audience (and a particularly blatant promoter could even praise the benefits that exposure to commercial messages has to a mind still half floating in the land of the dreams). But there are also consumer advantages in choosing this smart toothbrush, apart from equipping the bathroom with a brand new gadget without paying a thing. From classic connected product features such as pairing with a smartphone and receiving reminders, implementing some sort of game involving badges, tracking past performance etc. to more specific features such as using the audio technology to transmit (between an ad and the other) traffic and weather forecasts, turning it into the perfect toothbrush for late risers.

But reality proved to be already beyond our fiction. The smart toothbrush is actually quite a common connected household (models are available from big players such as Philips and Oral-B and startups such as Kolibree), but we did not expect to see that bone-conduction musical toothbrushes are already available, marketed since 2007 by Hasbro. Under the name of Tooth Tunes, they come with a range of different songs, ranging from Queen's We Will Rock You to Justin Bieber's Baby to a special version of a Devo's song called Brush It (and I also highly recommend to check out their commercial: a reference to the classic Apple's 1984 spot, in its turn a reference to George Orwell's dystopian novel). But even more surprising was that even the idea of giving away a smart toothbrush for free is already a reality. If you live in the USA you can

sign up to Beam, a dental insurance company that gives you a smart toothbrush that tracks how often you brush your teeth and tweaks your insurance premium accordingly.

Leaving aside the involuntary Frankenstein feeling coming from those impressive similarities, the core reason of Denti was to provide a tangible example that served as a catalyst to discuss the future of connected households, the business models that could sustain them and their implications for the user. The starting point of the research comes from a very recurrent model found in the Internet. Many of the digital products we use everyday are given to us at no cost, in exchange such products collect data about us, which can in turn be monetised in a number of ways (mostly related to selling advertisement).

The drawbacks of such models are already evident when we realise how little control upon those digital goods we have. So, as more and more things in home becomes connected to the Internet, it's not too far fetched to imagine that some of those online digital phenomena would start leaking into our everyday objects. And in a way this is already happening. Two recent cases were the ones of Philips Hue and Revolv, two smart home products which, respectively, have been modified to stop interoperating with other devices and have been shut down altogether. In both cases those changes were applied remotely and users could do nothing about it.

Particularly when it comes to the home, the notions of ownership and agency are important ones, and with Denti, we particularly wanted to indulge on the sensitivities of those issues. The idea of not just being tracked during our daily bathroom rituals, but also allowing something external - so strongly tied to the interest of a business and disconnected from ours - inside our mouth seemed quite a suggestive metaphor for illustrating a less favourable vision of the home of the future. If some people are willing to trade

crappy experiences for money when watching films, is it likely that something like this would happen for Internet connected objects? In fact, continuing to draw references from media in the digital age, one can even imagine the inhabitants of the future connected home evolving into two different kinds. The Netflix dweller: a paid subscription user consuming nice experiences and retaining a sense of ownership and agency toward his/her things. And the Putlocker dweller, freely crawling through deceptive switches and low resolution smartness, with a far away "master" that can pull the plug on his/her device at any given time.

Finally, in our journey toward designing the smart home it's crucial to steer the present toward the future we want, and by highlighting potential pitfalls of modern technology we are able to do exactly this. The consumer IoT scenario we are witnessing is already populated by a number of questionable products (weputachipinit.tumblr.com/) and companies with also brilliant ideas but that didn't manage to sustain their business (formerinternetofthings.tumblr.com/). At Uniform, we've been making connected objects since 2012. Over those years we've been proudly putting our best efforts in trying to conciliate between our commercial needs and a human-centered approach for our innovation projects. We firmly believe that is possible for companies, designers and users to work together with the common goal of building the best future we can wish for; one that can benefit all the parts involved. But when designing that future we need to make sure to get the bad one right too, and experiments such as Denti could be a safe way to accomplish that.

Learning from Openness

David Ascher

Excerpt from Connected
Communities & Digital Futures
Part of UnBox Labs:
Caravan edition 2016

https://issuu.com/helloqs/docs/unbox_caravan_v4_web

India saw two quite different events unfolding in the two weeks of the Caravan (although it probably only noticed one).

The telecom regulator prohibited discriminatory tariffs for data, thereby making Facebook's Free Basics unviable as is. This is part of a broader discussion around net neutrality and the Indian public is remarkably aware of the issues around fairness and access, as I found out when chatting with one of the design students at NID. This graphic designer was well aware of the issues around Free Basics and the challenge of subsidizing partial Internet access. For him, the notion and importance of the open Internet as an unlimited and deeply open space was as crisp as it is to me, someone who grew up with a very different Internet and in a very different place.

While these policy and business decisions were being made, NID saw a convening of a very diverse group of people, all keen to collaborate, to learn from one another and explore sometimes difficult topics and situations. I suspect it'll take time for the results of this convening to emerge, as much will likely depend on how these collaborations continue, and on which ideas and projects born here find root, while others are allowed to wither. I came here to learn about India and from Indians (and others) about how the values of the open web may be relevant in a post-browser world, taking a non-western perspective as much as possible.

My first reflection is that, of course, India and Indians aren't that different from Americans or Europeans - living in such a physically connected world, the memes, tropes and habits of one culture cheerfully blend and adapt to different geographies and cultures. The news stories about startups, large online companies, and executive shake-ups commingle with stories about pop stars, sexual assault scandals, and human interest stories about soldiers caught in avalanches and scared elephants running over vehicles. The structure of it all feels quite familiar, as do the vast majority of interactions with Indians at all layers of society. Even when language barriers make communication hard, drawings, gift exchanges and mutual smiles make the commonalities obvious. Good tea, also. The exceptions, however, are worth noting.

First, Indians seem to have a very specific, deliberate and thorough understanding of the issues around technological dependence, independence and interdependence. Since the national independence campaign, India has invested decades in building an independent industry in all sectors, from textile manufacturing to automakers. Gandhi also emphasized the need for self reliance, and there appears to be a cultural resistance against middlemen and intermediaries.

As India is a globally connected economy however, even this independence-centric industrial model requires connections with others. As an example, I met with some local entrepreneurs who are specialists in making wooden handles for striking tools (hammers, chisels, etc.). They were both proud of their local expertise and deeply aware of their part in the global supply chain, using a Swiss-designed, Chinese-made computer controlled lathe to cut both Indian and American lumber for export back to the West and assembly into consumer products. Pride of Indian craftsmanship and enterprise combined with a global role.

These connections between people, countries, and value exchange are relatively transparent when it comes to physical goods – you can see the trucks moving stuff. When it comes to digital goods and services, these connections are much more opaque. Especially given the widespread use of English, there are few obvious markers of origin on websites. Booking a flight on ClearTrip feels much like Travelocity, but the former is Indian. Zomato is just as effective as Yelp at finding a restaurant, but it, too, is Indian. Flipkart is a \$15B e-commerce giant that is defending against an incursion from Amazon. Those are just a few examples I picked up after a few days of exposure. The global services that seem to be widely used (Gmail, WhatsApp) are, as in much of the world, considered infrastructure without much thought as to the country of origin.

It seems to me that digital India differs from many other countries in two specific ways: first, because of its technical education system, Indians are well aware of their contribution of talent to digital giants. Papers publish stories about recent graduates who get highly lucrative jobs at Microsoft; we learn that 75% of Oracle's management team is from India. Engineers from Bangalore are clearly among the wealthier tourists in popular destinations, and being a software engineer is clearly a broadly appreciated path

to success. In addition, the size of the Indian market means that companies can grow very large before they need to tackle international markets.

Much more locally, a reflection on the design students, NID has a stellar reputation worldwide. NID students are, by definition, exceptional – rumour has it that there are 2000 applicants for each available slot.

The conversations I've had with the students do nothing to dispel that reputation-- they are all bright, engaging, curious, ambitious, thoughtful, and from what I can tell, talented. As graduates from a world-class design school, I am keen to see what work they'll do to shape the world. They are younger than the Web, grew up with a smartphone mobile ecosystem, and are imbued with both a sense of place and heritage, and the cheerful ambition of youth. After only two weeks, I don't have worthwhile predictions to make about the future of India, so I'll instead comment on how I'd like to learn from this caravan experience, when thinking about the future of the open Internet and the critical issues it's facing today.

First, it's never been clearer to me that the smart bet is on those who find ways to elicit collaborative projects by bringing in a diversity of minds, skills and experiences. It is hard to make this more complex chemistry work, but any other approach to envisioning or designing the future will either rely on the blind luck of genius or fall back on known patterns. I'm drawn to Jon Rogers' quote: "Ignore notions of discipline. Bring people who want to collaborate." As my high school math teacher would attest, I've always had a hard time with discipline. These days, I find that concept is often used to exclude, at a time when all of the interesting and important problems lie at the intersection of disciplines defined in a prior era and for a vastly different problem set.

The second point is a demographic one: many of my concerns around ensuring an inclusive Internet, working towards an Internet that represents the diversity of people around the world, that keeps people secure and respects their privacy, are concerns that come from a position of privilege. I've enjoyed and benefitted from an Internet with fairly few restrictions, and I worry that various concentrations of power will restrict that access and opportunity for others. But after these two weeks, I am more hopeful that, because the world is constantly being replenished with young people who, as a matter of course, understand the power of technology to shape their societies, they will just make it happen. In this way, the Internet is not special - it is just another facet of society that evolves as people get a chance to shape it.

Finally, it seems to me important to realize that big things start small, and even big ideas start small. This makes me confident that we need to find and refine ways of eliciting good conversations, nourishing them, and then watch them grow. And we need to do this all over the place, in many kinds of ways, with all kinds of people. In some ways we're just starting this process of inviting more people to help shape our own thinking. I look forward to see what starts to emerge.

The Philosophical Engineer

Andrew Prescott

Excerpt from Engineering
The Future

<https://lguariento.github.io/Engineering-the-Future/>

The Scottish scientist, engineer and inventor James Watt (1736-1819) is remembered chiefly as a pioneer of steam power, who improved the efficiency of steam engines by inventing a separate condenser, devised revolutionary steam-powered mechanical drives, and introduced the concept that steam power could be measured by reference to the power of horses. Watt's achievements as 'The Great Steamer' were fundamental to the Industrial Revolution.

Watt had a restless curiosity that led him into all types of experiments and inventions. He invented a machine to make it easier to produce perspective drawings. At the time of his death, he was working on machines to copy sculptures that seem like an analogue form of 3D printing.

Watt developed and marketed the first apparatus to produce duplicate copies of handwritten documents using chemically impregnated paper. He made musical instruments and invented new types of clocks. A pioneering chemist, Watt experimented with processes to produce alkali from sea-salt, and claimed to have been among the first to realise that water was a chemical compound.

Watt trained as a mathematical instrument maker. The hands-on process of making and the trial and error of experimenting with different materials was a constant source of fascination and inspiration to him. His friend at the University of Glasgow, the scientist John Robison (1739-1805), remembered how Watt could not resist playing with anything that came into his hands to see how it worked:

"Every new thing that came into his hands became a subject of serious and systematical study, and terminated in some branch of Science ... A Mason Lodge in Glasgow wanted an Organ ... We imagined Mr Watt could do anything, and tho' we all knew that he did not know one musical note from another, he was asked if he could build this organ. He had repaired one and it had amused him. He said Yes - but he began by building a very small one for his friend Dr Black ... In doing this a thousand things occurred to him which no Organ builder ever dreamed of - nice indicators of the strength of the blast regulators of it, etc etc. He began to build the great one. He then began to study the philosophical theory of Music ... Before Mr Watt had half finished this Organ, he and I were completely masters of that most refined and beautiful Theory of the Beats of imperfect Consonances - He found that by these Beats it would be possible for him, totally ignorant of Music, to tune this Organ according to any System of temperament - and he did so, to the delight and astonishment of our best performers" (E. Robison and A. E. Musson, *James Watt and the Steam Revolution* (London, 1969), p.38).

Watt appreciated how every act of making is also a theoretical statement, and building and making machines was for him a stepping off point for deeper intellectual exploration and investigation. His advances in steam power were partly inspired by his friendship with chemists at Glasgow University and their theoretical advances in areas like latent heat. In the words of Ben Russell of the Science Museum, Watt's steam engines combined in a tangible product 'an astonishing concept, a feat of experimental science and precision engineering'. As Ben emphasises, it is only through considering Watt's diverse achievements as acts of making that we can draw together Watt as engineer, craftsman, chemist and philosopher.

Glasgow University (where I work) celebrates its connections with James Watt, naming its engineering school, two professorship and a prize after him. However, Watt was employed by Glasgow University not as a professor, but as a mathematical instrument maker, initially to repair some astronomical instruments left to the university that had been damaged in a sea voyage. Glasgow University in the eighteenth century placed a great emphasis on practical knowledge, also employing a university type founder (who afterwards became Professor of 'Practical Astronomy'), while the Professor of Natural Philosophy, John Anderson, threw open his physics lectures to artisans and others who were not members of the university. Watt's workshop at Glasgow became an intellectual hub of the University, as John Robison recalled:

"All the young Lads of our little place that were in any way remarkable for scientific predilection were Acquaintances of Mr Watt, and his parlour was a rendezvous for all of this description - Whenever any puzzle came in the way of any of us, we went to Mr Watt. He needed only to be prompted - everything became to him the beginning of a new and serious study, and we knew that he would not quit it till he had either discovered its insignificance or made

something of it ... Every thing became Science in his hands, and I took every opportunity of offering my feeble Aid by prosecuting systematically, and with the help of Mathematical discussion, thoughts which he was contented with having suggested or directed" (Robinson and Musson, pp. 24-5).

Watt's work on steam engines was prompted by John Anderson asking him to make improvements on a model of the type of steam engine invented by Thomas Newcomen in the seventeenth century. The liminal space of Watt's workshop was the home of a stream of innovations.

The story of Watt's life has been retold in many different ways to justify different social, cultural and political ends. But although Watt worked in a very different environment to the modern digital world, his story still seems to have many current resonances. Many of the greatest achievements of the Industrial Revolution were incremental improvements which took technologies to new levels, like the separate condenser. Progress in the digital world is often more incremental and less disruptive and transformational than we might think - it has been pointed out how Steve Jobs was a 'tinkerer' rather than an inventor of completely new concepts, and there are many parallels between the career of Jobs and those of industrial pioneers like Watt.

The nature of spaces of innovation is also significant. Innovation often takes place in liminal spaces outside the mainstream, in places like James Watts' workshop, where people with different types of background, interests and enthusiasms can meet together, talk and play and enjoy what Robison called 'an inexhaustible fund of instruction and Entertainment'. After he settled in Birmingham, the meetings of the Lunar Society, so called because it met on nights with a full moon, provided Watt with a similar space for a mixture of scientific, philosophical and practical discussion. At the heart of this wide-ranging and often philosophical

conversation was a constant concern with making - to quote Ben Russell again, 'Britain depended for its movers and shakers on its doers and makers, and Watt stands for all of them, regardless of their specific trade or profession'.

Watt was also creating a new type of profession - part scientist, part craftsman, part businessman. At the end of the eighteenth century, the word 'engineer' was most frequently applied to military engineers (it was for this reason that the term 'civil engineer' later emerged). The assumption was that those who erected and operated machinery like the Newcomen steam pumps were just mechanical operatives. However, high-end mathematical instrument makers required a considerable amount of scientific knowledge. John Morgan, who Watt worked with in London, described himself as a 'philosophical instrument maker'.

James Watt proudly appropriated the word engineer to capture the distinctive mix of art, craft, science, making, serious play and philosophy that characterised his work. Watt described himself as 'James Watt, engineer' in his publications for the Royal Society at a time when the Royal Society was promoting the idea of the gentleman scientist. Watt sought to make the case for the philosophical engineer.

It is our feeling that one of the transformative and exciting aspects of digital technologies is its ability to support new types of interaction between artists, engineers scientists, historians, writers and makers in a way that recaptures that idea of the philosophical engineer. In the activities of the 2016 Digital Design Weekend, you will see projects supported by the Arts and Humanities Research Council, the major funder of arts and humanities research in the United Kingdom, the Victoria and Albert Museum, the Mozilla Foundation and other bodies which explore the way in which these intersections are revivifying our engagement with the philosophical engineer.

Participant reflections

"I don't believe great ideas can be derived from great research the same way a mathematical proof can be derived from assumptions. Great ideas take sustained thought, a high level of personal interest, and a sizeable body of knowledge about the problem space. And then just time."

"Most importantly, sprint models still work. The main outcome was a successful sprint that allowed us to focus, build and explore the problem we were actually trying to solve for."

"I had one of the best Mozilla experiences with y'all in Chattanooga, and I think this event demonstrates exactly how the Mozilla Foundation and Mozilla Corporation should work/play together in the open innovation space."

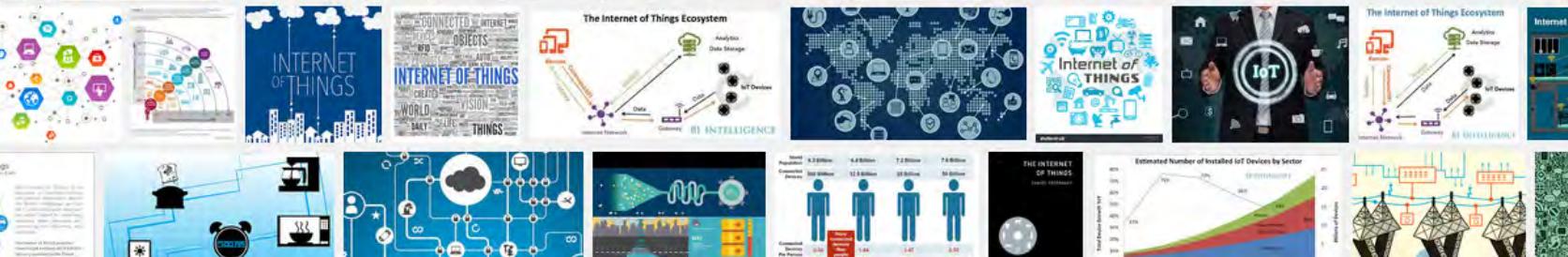
"A bit of tech wasn't just dropped into the phone box, it was considered and planned while painting the phone box! I thought that was quite nice, particularly because local people and visitors kept stopping to ask what we were up to, so a great way for getting some direct feedback on the project."

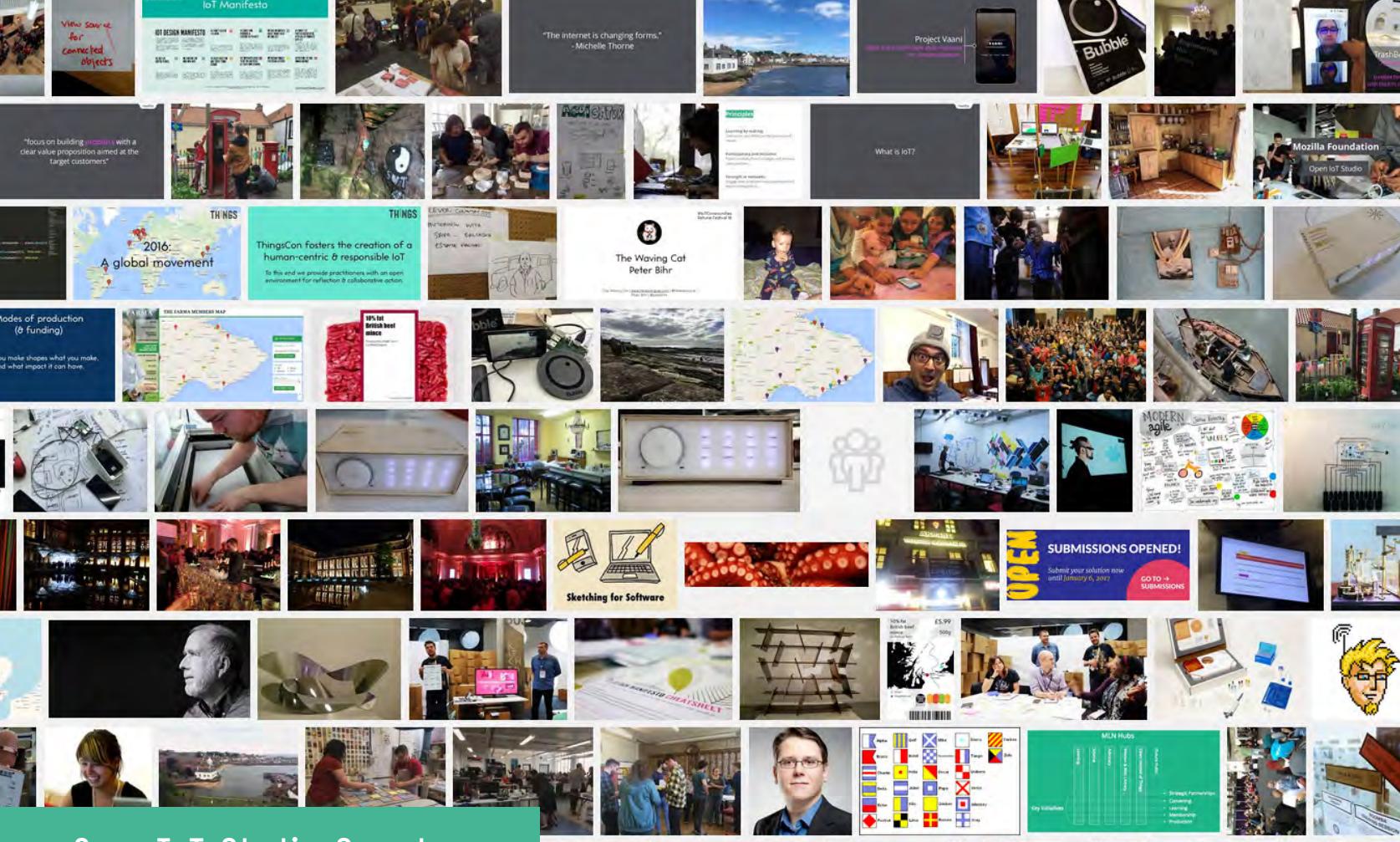
"I really felt free to explore scenarios and technologies and to work with very different people, this is an essential part of the design process that rarely happens. Also (as a True Arduino Boy) I totally share your messages of openness and digital literacy. I hope you'll keep doing these events because they are a big inspiration, especially for young designers like me."

"I so love the idea of co-design with local communities. When we work with people and begin to understand their lives, their struggles and challenges, their needs, etc.-only then can we help design and create for impact."



IoT Google Image Search,
November 2016





Open IoT Studio Search, November 2016



What have we learned from our year in IoT?

.....

One year on in the Open IoT Studio

.....

Michelle Thorne, Jon Rogers
& Martin Skelly

As a visual litmus test of the health of IoT, we regularly do an image search for “Internet of Things”. The search results give you a good impression of what people associate with the field along with IoT’s latest news and products.

In 2016, five years after Cisco announced that IoT “will change everything—including ourselves,” the only change we’ve seen in these search results is more systems diagrams in shades of blue. Where are the social photos of people playing with connected objects? Or clever memes that aren’t only satirising the field? Or the real, lived environments of human beings, not stock photos of homes or offices? These images clearly indicate that IoT is currently a field for consultants, corporations and governments. It’s not part of people’s playful and political lives.

Compare the image search of “Open IoT Studio”. Now this is our vision for what we want IoT to look like. You can see humans (you may know a few of these faces!) and things being made. You’ll see a 100-year old boat, a 50-year old phone box, a graveyard and a harbour. You’ll see life. You see a creative mess.

And we hope you'll see how one year of a new program can slowly make a difference.

So what have we learnt from this year? What are the things we critique and respond to? We know this is early days, so we're not saying "this is the future of IoT." This section is more reflections and points of reference for you to act on or push back against. Let's figure out how we can build a healthy Internet where people make meaningful things.

Open innovation.

Necessity is the mother of all invention. The pressing issues of our era are political, social, environmental and economic. As such, the technology we make must take on the challenges of our time. However, technology is not neutral—it embeds values and propagates power. To create change, we must analyse power structures and enact our values in what we build. If we want a more equitable world—where access, knowledge and capabilities are distributed equally and fairly—then we must embed those practices in how we work. Openness is a commitment to sustainable and egalitarian innovation.

Located learning.

Technology embeds values and propagates power. Currently, this power is centralised by a handful of companies located in a handful of places. We must understand where technology is made, by whom and for whom. And because we believe in a more equitable world, it is essential to make technology for and with people not in the centers of power. Our practice must be decentralised. By locating learning and making in a specific place, we can respond to local affordances and challenges in a meaningful, authentic way. These insights can then be shared globally and adapted by the network in other locations.

Diverse thinking and inclusive practices.

Relatedly, our practice must be inviting and rewarding to diverse participants. It must honour the uniqueness

of each of our experiences and expertise, while cultivating a common cause that gives us shared focus and impact. Just as we analyse the power structures of technology, we must critique our own efforts and organisations towards more welcoming collaboration and inclusive projects.

Literacy through legibility, fixability and participation.

To be able to read, write and participate with technology is essential to participating fully in society today. In the technology we build, and the practices we cultivate, we strive to ensure that complex systems become legible, so that they may be comprehended, and modifiable, so that they can be fixed and adapted to better serve the people using them.

Privacy, user control and collective control.

Learning about technology and achieving equitable participation in society requires the ability to think and express yourself on your terms. That includes the right to have private communications, so that you can learn and discuss safely and without self-censorship or fear of judgement. It means having spaces in your life where you can control your image. Similarly, as you participate in communities and groups, there must be ways to communicate amongst yourselves.

10 THINGS WE LEARNED IN 2016

IOT AMPLIFIES MANY OF SOCIETY'S DIGITAL ISSUES AND OPPORTUNITIES.

PEOPLE DON'T UNDERSTAND WHAT IOT IS. YET BILLIONS OF PEOPLE HAVE THEIR FIRST IOT DEVICE IN THEIR POCKET: THEIR SMARTPHONE.

IOT IS BIGGER THAN ANY ONE OF US, BIGGER THAN ANY DISCIPLINE. IT IS AN ERA OF POSSIBILITY AND OF THREATS. IT'S GOING TO BE WHAT WE MAKE OF IT.

THE NORMS OF IOT ARE NOT YET ESTABLISHED. THROUGH COLLABORATION, WE DEVELOP SHARED PRACTICES AND UNDERSTANDING OF WHAT IT LOOKS LIKE TO BETTER EMBED THESE VALUES IN THE TECHNOLOGY WE BUILD.

CLOUD BASED SERVICES ARE THE HIDDEN FORCE BEHIND IOT, AND THEY MAKE IOT INCREDIBLY VULNERABLE AND IMMUTABLE.

AI IS A POWERFUL TOOL FOR IOT. HOWEVER, FEARS ABOUT AI ARE MISPLACED. CONSCIOUS ROBOTS WON'T TAKE OVER, BUT OUR PRIVACY IS BEING INVISIBLY ERODED.

THERE'S NO ESTABLISHED PLACE TO FIND RESOURCES ABOUT MAKING RESPONSIBLE, OPEN IOT.

OFFERING A FRAMEWORK FOR PARTICIPATION IS ALSO GIVING PERMISSION TO BREAK IT.

MAKING THINGS IN A LOCATED WAY IS A POWERFUL TOOL FOR ECOSYSTEM BUILDING.

IT'S ABOUT TAKING THE TIME TO LISTEN, OBSERVE, BE IN A PLACE, BE PRESENT IN YOUR PRACTICE. YOU CAN STILL BE RAPIDLY PROTOTYPING, BUT WITH A SLOW PHILOSOPHY.

And what are we going to do in 2017 and beyond?

To learn more about what we're planning for 2017 and how to get involved, check out our Github page:
github.com/openiotstudio/general

To stay in touch and share your feedback, contact us on Twitter @openiotstudio and email iot@mozilla.org

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