Experience Design for IoT Security: Lessons from Architecture School

O'Reilly Experience Design for the Internet of Things
May 20, 2015

Ame Elliott
@ameellio
ame@simplysecure.org

Simply Secure

Agenda

Introduction

Lessons from Architecture School

- Start with people, in context
- Understand unspoken needs
- Homes are more than houses

Conclusion

Agenda

Introduction

Lessons from Architecture School

- Start with people, in context
- Understand unspoken needs
- Homes are more than houses

Conclusion

CONNECTING

COLLECTING

Samsung's Smart TVs recording and transcribing conversations and Mattel selling children's questions to Hello Barbie are recent examples.

http://www.theguardian.com/technology/2015/may/17/sold-our-souls-and-more-to-internet-giants-privacy-surveillance-bruce-schneier

There needs to be richer discussion than the tension between what's technically possible and what's legal.

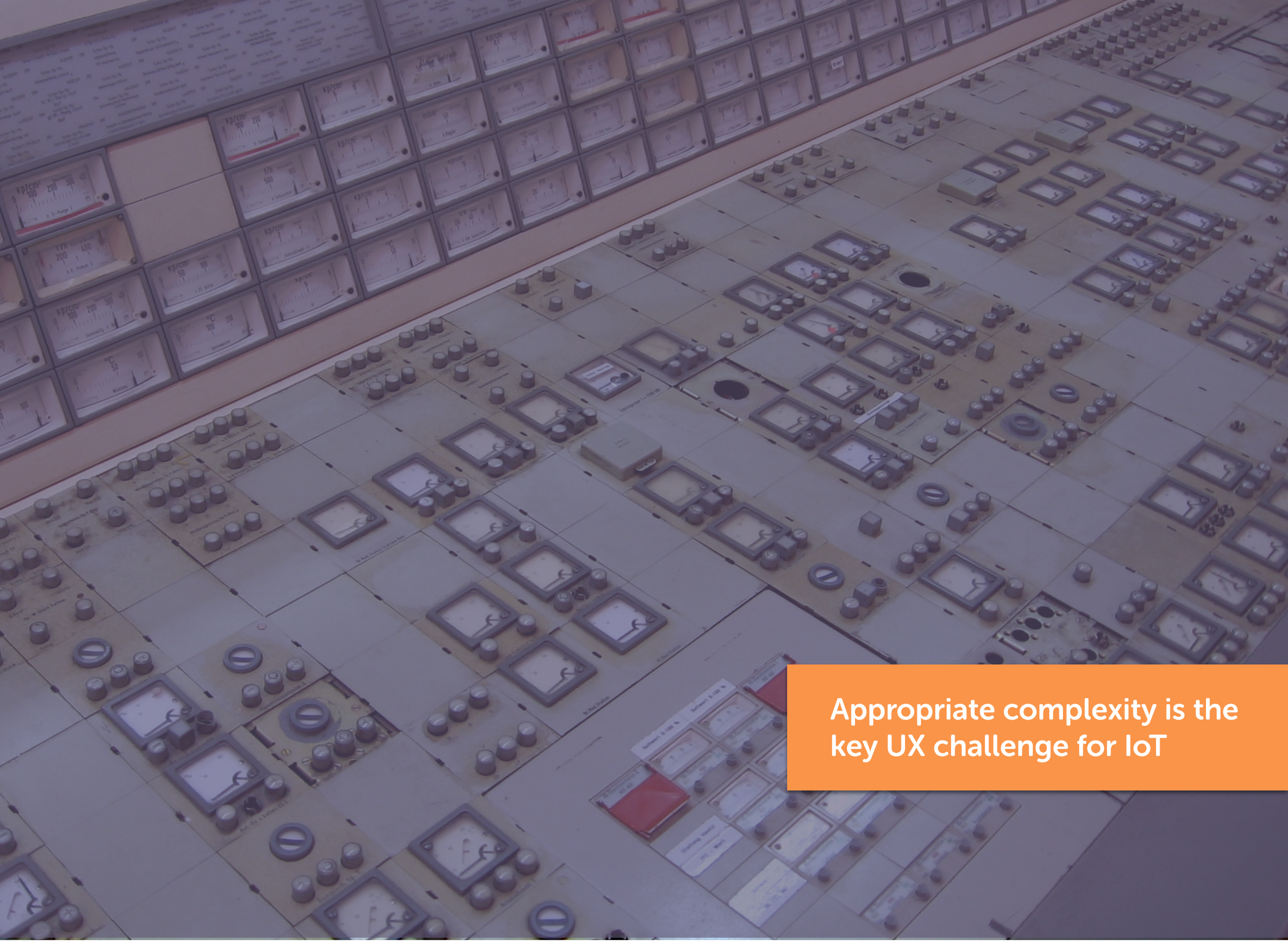
Security for IoT needs design.

Privacy and security are exciting opportunities for UX design

The Attic. Photo by Jamie Beverly

IoT may be new, but buildings have been around a long time

Parthenon, 447 BCE Athens, Greece. Photo by Jonathan Cohen



Appropriate complexity is the key UX challenge for IoT

Power Plant Control Panel. Photo by Marcel Wichary

Agenda

Introduction

Lessons from Architecture School

- Start with people, in context
- Understand unspoken needs
- Homes are more than houses

Conclusion

ÉCOLE NATIONALE DES BEAUX-ARTS — Architecture Atelier Pascal

Architecture school teaches problem finding

1905 Post Card from Dana Cuff's *Architecture: The Story of Practice*.

Architecture School Teaches the Design Process

Presenting work in charettes (pitch)	Learning by doing	Master and apprentice model
Building to think/ making it visual	Feedback via critique	Learning to see

Architecture School Teaches the Design Process

Presenting work in charettes (pitch)	Learning by doing	Master and apprentice model
Building to think/ making it visual	Feedback via critique	Learning to see

Lessons from Architecture School: Learning to See

Start with people

Understand unspoken needs

Homes are more than houses

Agenda

Introduction

Lessons from Architecture School

Start with people, in context

Understand unspoken needs

Homes are more than houses

Conclusion

Man Handing a Letter to a Woman in the Entrance Hall of a House

Pieter de Hooch, 1670

From the Rijksmuseum

Man Handing a Letter to a Woman in the Entrance Hall of a House

Pieter de Hooch, 1670

Windows, morality, and privacy as a dirty word

From the Rijksmuseum

Man Handing a Letter to a Woman in the Entrance Hall of a House

Pieter de Hooch, 1670

Internet of 1670

From the Rijksmuseum

Man Handing a Letter to a Woman in the Entrance Hall of a House

Pieter de Hooch, 1670

Multiple people with different privileges inhabit the home

From the Rijksmuseum

Homes have multiple people with varied permissions.

Children, and others who can't or won't consent, generate data.

More aggressive rules govern collection of their data, and regulatory changes are likely.

Security Thought-Starters

Plan for change and don't take on privacy debt in a quickly-changing landscape

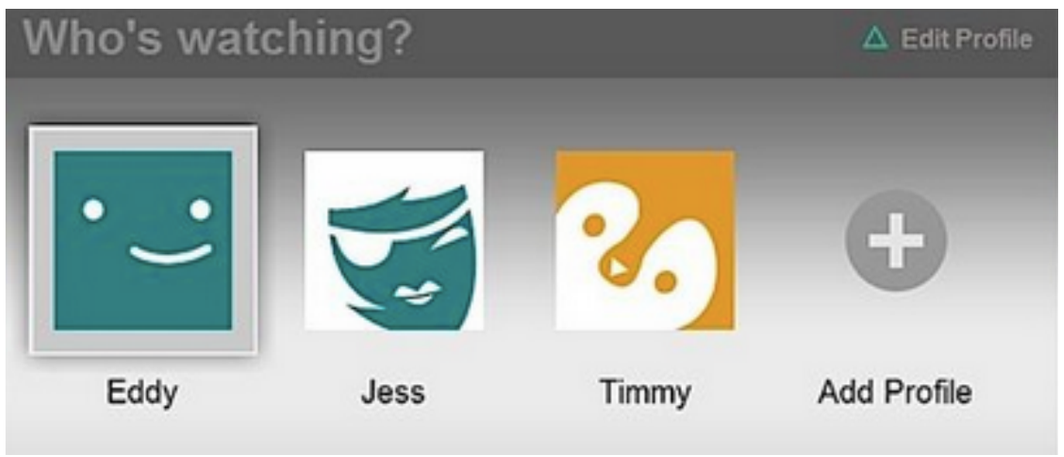
European Article 29 Working Party on information privacy

http://ec.europa.eu/justice/data-protection/article-29/index_en.htm

Sandy Clark's "Honeymoon Effect" paper

http://www.acsac.org/2010/openconf/modules/request.php?module=oc_program&action=summary.php&id=69

Managing profiles for ambient capture: right mode + right feedback



Netflix manages multiple profiles with explicit login, but many media services are struggling to identify group members present when video is played.

Agenda

Introduction

Lessons from Architecture School

- Start with people, in context
- **Understand unspoken needs**
- Homes are more than houses

Conclusion

Design rooted in Finnish Nationalism + Romanticism

Hvitträsk, Finland 1903. Photo by Markku Haverinen

Environment inside reflects culture outside

Hvitträsk, Finland 1903. Photo by Markku Haverinen

This is the childhood home of Eero Saarinen

Hvitträsk, Finland 1903. Photo by Markku Haverinen

Eero Saarinen was the architect of New York's JFK Airport T5

TWA Terminal at the former Idlewild Airport, 1962. Photo by Sean Masrhall

One generation of buildings is much longer than the 18-month hardware churn.

Buildings last and are upgradable.

Security Thought-Starters

Think firmware and plan an upgrade path

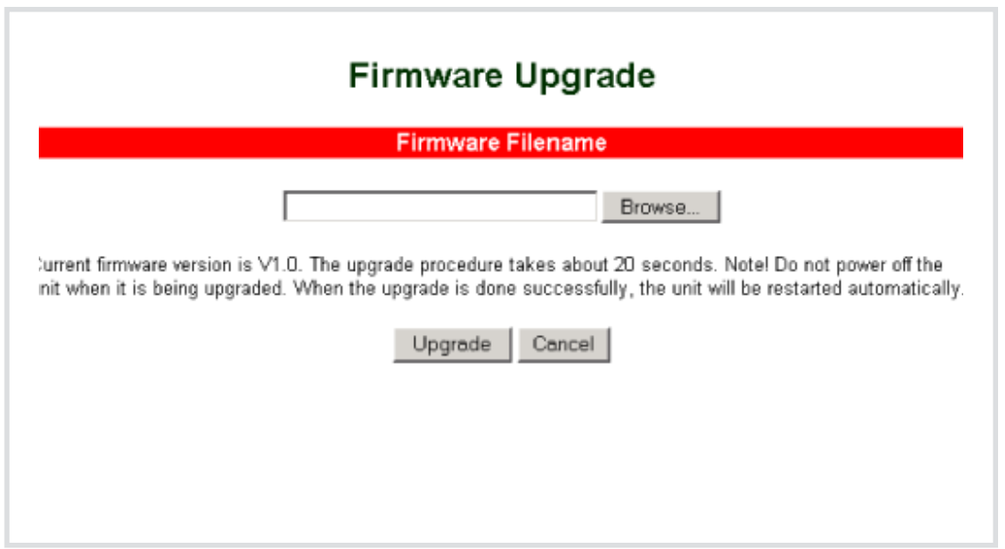
Internet Engineering Task Force (IETF) working on firmware standards, e.g. Carsten Bormann http://www.ietf.org/proceedings/82/slides/plenaryt-7.pdf

Supervisory Control and Data Acquisition (SCADA)

https://en.wikipedia.org/wiki/SCADA

Appropriate Complexity

Reimagining updates as a form of engagement: design for behavior change



Cautionary tale of routers, keeping the internet of 10 years ago alive

Agenda

Introduction

Lessons from Architecture School

- Start with people, in context
- Understand unspoken needs

Homes are more than houses

Conclusion

Shophouses are Southeast Asian vernacular architecture

Shop Houses, Singapore 2013. Photo by Peter Morgan.

Covered awnings protect the public from sun + rain

Shop Houses, Singapore 2013. Photo by Peter Morgan.

Designed by social custom, then Singaporean law in 1822

Shop Houses, Singapore 2013. Photo by Peter Morgan.

Vietnam 2008.. Photo by Ame Elliott

You can have cultural knowledge and still do a bad implementation.

There are roles for standards and for professional knowledge.

Security Thought-Starters

Don’t invent your own crypto - use professional standards

Open Smart Grid insecurity

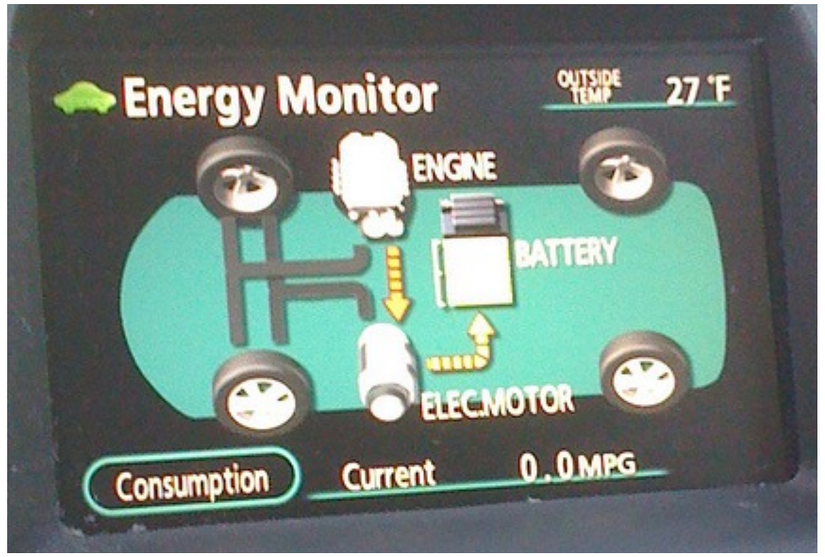
https://threatpost.com/weak-homegrown-crypto-dooms-open-smart-grid-protocol/112680

Real World Crypto Conference: Stanford, CA in Jan 2016

http://www.realworldcrypto.com/rwc2016

Appropriate Complexity

Exposing the underlying systems to build knowledge



Interfaces on electric cars like the Toyota Prius teach engine function and driver behavior

Agenda

Introduction

Lessons from Architecture School

- Start with people, in context
- Understand unspoken needs
- Homes are more than houses

Conclusion

ÉCOLE NATIONALE DES BEAUX-ARTS — Architecture Atelier Pascal

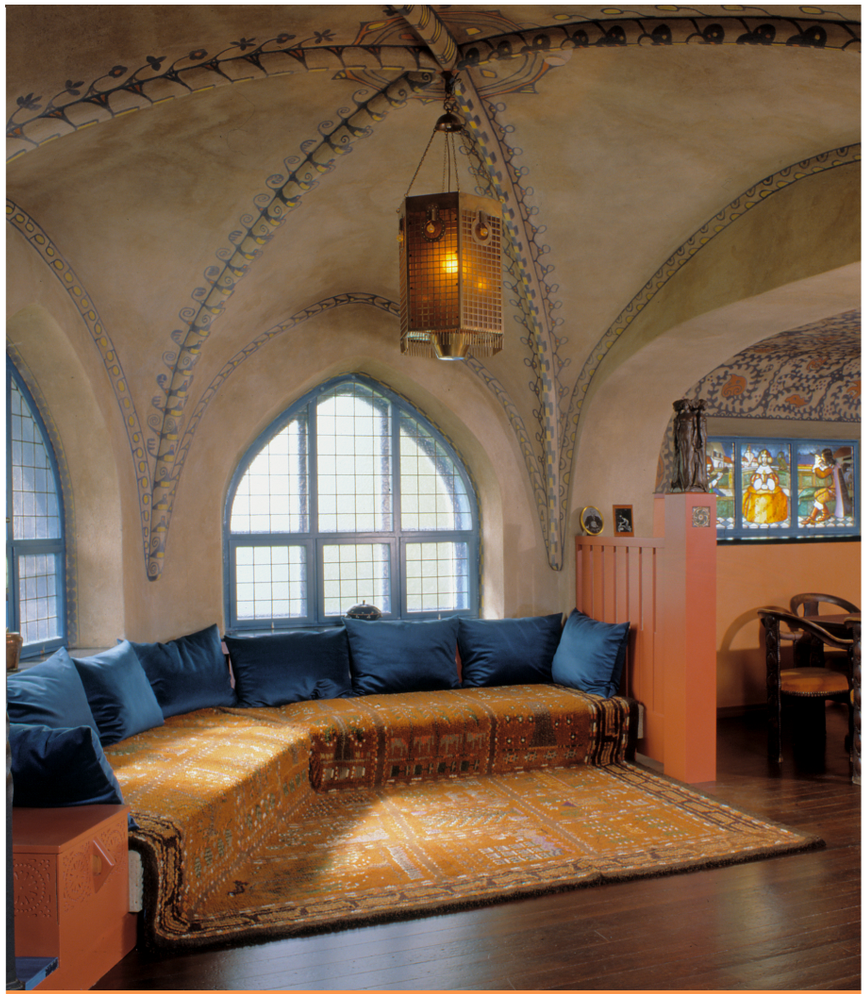
1905 Post Card.

Architecture school teaches lessons for UX for IoT security

Lessons from Architecture School

Start with people, in context

Homes have multiple people with varied permissions



Understand unspoken needs

Buildings last and are upgradable

Homes are more than houses

Implementation matters in vernacular architecture

Security Thought-Starters

Plan for change and don't take on privacy debt

Think firmware and plan an upgrade path

Don't invent your own crypto– use professional standards

Appropriate Complexity: UX Challenge for IoT

Managing profiles for ambient capture

Reimagining updates as a form of engagement

Exposing underlying systems to build knowledge

There's a need for design to shape the conversation between possible and legal.

The UX problems for IoT are inspiring and important.

Thank You

Ame Elliott
@ameellio
ame@simplysecure.org

SimplySecure

Creative Commons 2.0 Photo Credits

p. 7 https://www.flickr.com/photos/thesoupboy/400278091/

p. 8 https://www.flickr.com/photos/jonathancohen/6253733297/

p. 9 https://www.flickr.com/photos/mwichary/2251347415/

p. 11 http://www.cparama.com/forum/cartes2013b/1372353539-Beaux-Arts-Atelier-pascal.jpg

p. 16 https://www.rijksmuseum.nl/en/collection/SK-C-147

p. 24 http://www.nba.fi/sv/Image/13215/hvittrask-ruokasali.jpg

p. 27 https://www.flickr.com/photos/7119320@N05/7452651372/

p. 31 https://www.flickr.com/photos/pmorgan/9611965697/