



Experience Design for IoT Security: Lessons from Architecture School

O'Reilly Experience Design for the Internet of Things
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Simply Secure





Agenda

Introduction

Lessons from Architecture School

- Start with people, in context

- Understand unspoken needs

- Homes are more than houses

Conclusion



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Buildings Are Becoming Sites of Surveillance

CONCONNECTING
COLLECTING

Buildings Are Becoming Sites of Surveillance

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>

Buildings Are Becoming Sites of Surveillance

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



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



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Architecture school teaches
problem finding

ÉCOLE NATIONALE DES BEAUX-ARTS — Architecture Atelier Pascal

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**

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Lessons from Architecture School: Learning to See



Start with people



Understand unspoken needs



Homes are more than houses



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

Pieter de Hooch, 1670



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**



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

Pieter de Hooch, 1670

Internet of 1670



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



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

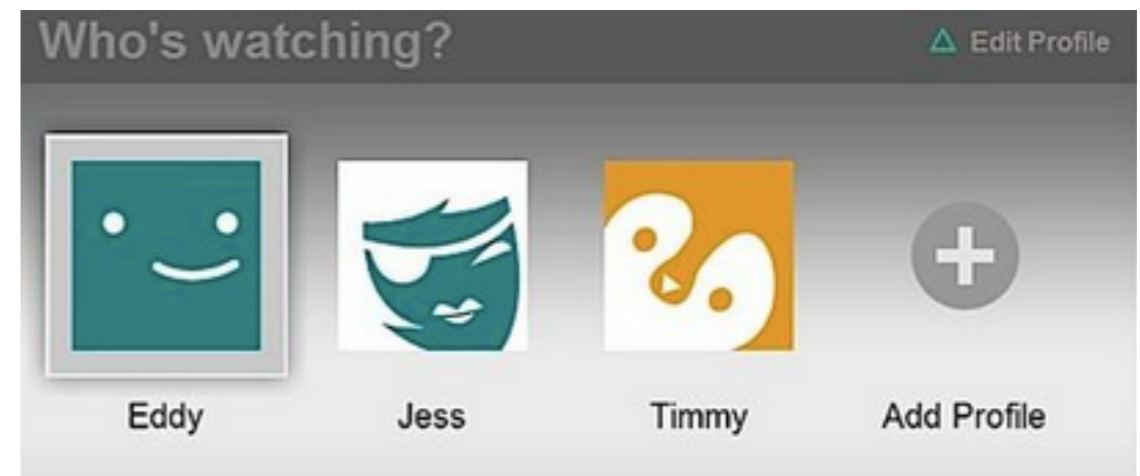
[http://ec.europa.eu/justice/data-
protection/article-29/index_en.htm](http://ec.europa.eu/justice/data-protection/article-29/index_en.htm)

Sandy Clark's "Honeymoon Effect"
paper

[http://www.acsac.org/2010/openconf/
modules/request.php?
module=oc_program&action=summar
y.php&id=69](http://www.acsac.org/2010/openconf/modules/request.php?module=oc_program&action=summary.php&id=69)

Appropriate Complexity

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.

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Design rooted in Finnish
Nationalism + Romanticism



Environment inside reflects culture outside



This is the childhood home of
Eero Saarinen



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

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**

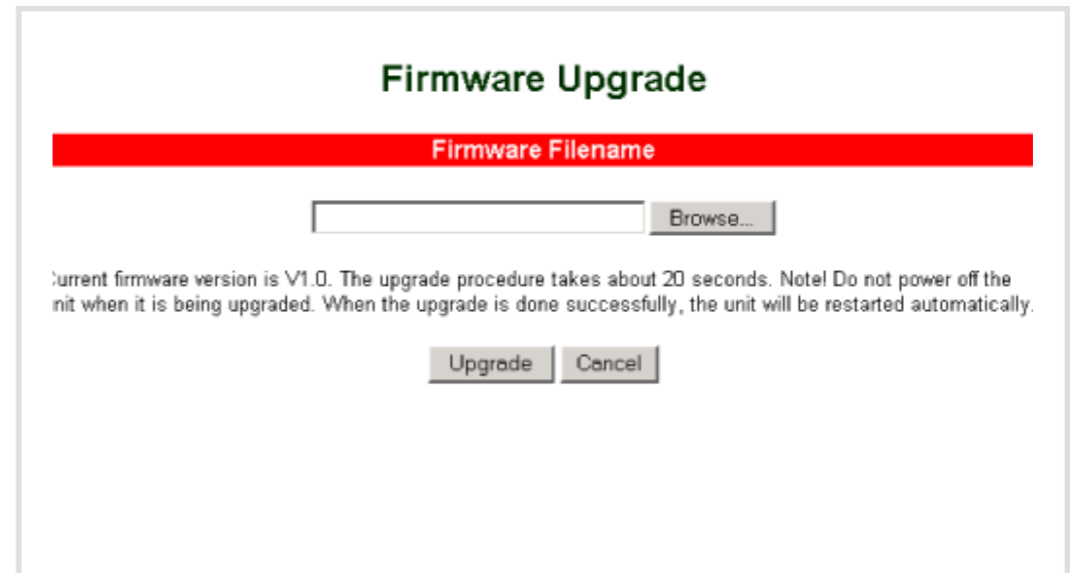
Internet Engineering Task Force (IETF)
working on firmware standards, e.g.
Carsten Bormann <http://www.ietf.org/proceedings/82/slides/plenaryt-7.pdf>

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



The image shows a web-based dialog box titled "Firmware Upgrade". At the top, the title is in a bold, dark green font. Below the title is a red horizontal bar with the text "Firmware Filename" in white. Underneath this bar is a text input field followed by a "Browse..." button. Below the input field is a paragraph of text: "Current firmware version is V1.0. The upgrade procedure takes about 20 seconds. Note! Do not power off the unit when it is being upgraded. When the upgrade is done successfully, the unit will be restarted automatically." At the bottom of the dialog are two buttons: "Upgrade" and "Cancel".

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



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Shophouses are Southeast Asian vernacular architecture



Covered awnings protect the public from sun + rain



Designed by social custom, then
Singaporean law in 1822



Vernacular is not the same as
amateur

Homes Are More Than Houses

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

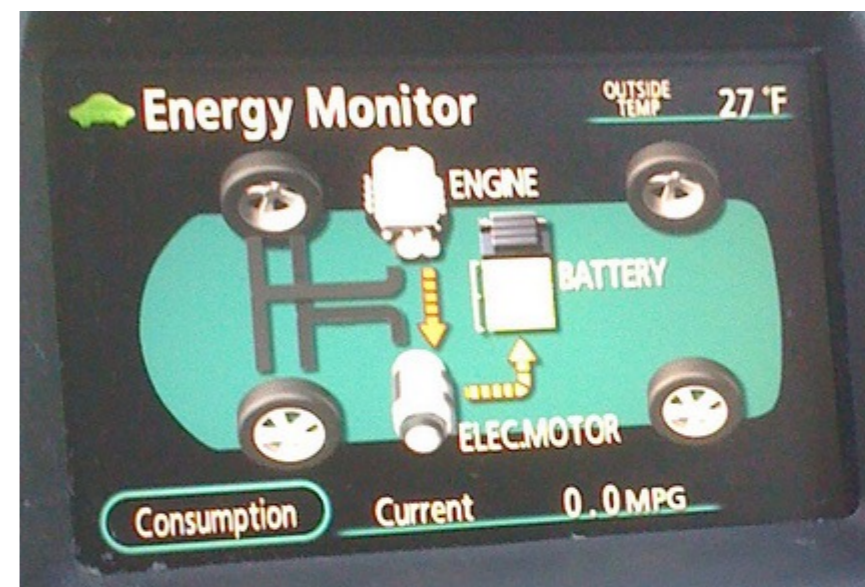
<https://threatpost.com/weak-homegrown-crypto-dooms-open-smart-grid-protocol/112680>

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



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Architecture school teaches lessons for UX for IoT security

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1905 Post Card.

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

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