The 7 (Unhealthy) Habits of Highly Effective IoT Marketing

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Web: iot.mozilla.org | Twitter: @MozillaIoT | Source code: github.com/mozilla-iot

1. End-to-end encryption (device to cloud) - causes brand silos (no interop)
2. Works with... Alexa, Google, Siri... - smart home monopoly by too few companies (ones with top voice assistants)
3. Smart home "standards" bodies define device types within licensed protocols - Zigbee ≠ Z-wave ≠ BLE ≠ Wi-Fi ... presents need for protocol hubs
4. Works with ... smart home device attributes defined by each vendor - HomeKit ≠ SmartThings ≠ SimpliSafe ≠ Xiaomi ... consumers tied to a brand
5. Generic cloud and all-in-one-app services - aggregated consumer data in the cloud = big privacy/security exposure from one unauthorized hack
6. Easily send your data to the "Cloud" - send your data to the web yes, cloud should be optional, should be driven by the device/data owner not the OEM
7. "Tailored" solutions - everything custom means vertical use case silos
Agenda

- The 7 (Unhealthy) Habits
- Mozilla WebThings Demo

Who we are = explanation of Mozilla Foundation (mission-driven non-profit) and Mozilla Corporation (fulfill mission with products such as Firefox). Main mission is an open web, accessible to all.

ET = incubate “emerging technology” to extend the mission of putting people first, giving them better personal control of their digital lives (user agency)

WebThings = open source smart home gateway and framework to provide that personal user agency lacking in today’s products
Smart home concerns

Security
I don’t want hackers accessing my home network nor launching attacks.

Privacy
My data in the wrong hands would reveal when to break in. Analysts viewing my home habits feels creepy. I don’t want any of those listening devices!

Interoperability
I can’t figure out how pushing the doorbell can trigger turning on the outside light.

Overall Value
I worry that my investment in time, money, and effort will not provide sufficient value.

What qualifies an approach as unhealthy? Something NOT good for the people using the products and technology.

Caveat -- what I comment on as detrimental (unhealthy) relates to the people using or developing solutions for smart home use cases. These analyses are not necessarily applicable to other uses, such as industrial.
Where did I get my “smart home concerns” insights from? User surveys. One interesting result is how well-liked a voice interface is if you’ve had a chance to try it. But there are serious concerns over privacy (>75%).
End-to-end Device-to-Cloud Security

Secure links bring data to different data centers

Negative consequences

- Inhibits user-defined rules and business logic (local if-then style)
- Data silos into disparate clouds drives down interoperability
- More time consuming to manage individual devices
- Device diversity drives up number and complexity of remote access methods

End-to-end security sounds good, right? In case of https between your browser and your bank account, it’s definitely a good thing.
Works with … Smart Assistant Style

Amazon Alexa, Google Assistant, Apple Siri, ...

Negative consequences

- Globally, smart home device data still in silos, then aggregated into the hands of the few top voice assistant service providers
- Still need device apps to set up automations, and access details
- Dependent on skills upgrades for multi-device interoperability

Image sources: [https://gizmodo.com/how-to-choose-the-right-platform-to-run-your-smart-home-1834808865](https://gizmodo.com/how-to-choose-the-right-platform-to-run-your-smart-home-1834808865) and Amazon, Apple, Google

User data is shared with both the device brand vendors AND the smart assistant vendors
Zigbee and Z-wave device definitions as standards is helpful, now need to bring to the next level of interop across different protocols. Some device definition is better than none, but tied to the messaging or radio protocol still leads to silos that block interoperability.
Works With ... Interoperability Style

Works with ... Apple HomeKit, Samsung SmartThings, Nest, ...

Negative consequences

- Similar to smart assistants, user IoT data aggregated and controlled by only a few top brands
- Lowest common denominator for interoperability schema means rich device data, groupings, and automation rules still stuck in silos

“Note: SmartThings’ Philips Hue integration requires use of the Philips Hue Ethernet Bridge.”

Image Sources: Samsung, IKEA, Philips, Wink

Consumers don't know what works with what... silos
IoT-as-a-Service Clouds, Apps

AWS, Azure, GCP, IBM ...

Negative consequences

- In-depth data analytics tools limited to cloud platform offering
- Business operations secrets “in the cloud” not so secret?
- Can be discontinued (e.g., ARTIK)
- Ongoing fees
- NRE development often platform specific (hard to switch)

Images source: https://www.devteam.space/blog/10-best-internet-of-things-iot-cloud-platforms/
Easily Send Data to the Cloud

Tuya, Thingspeak, myDevices, Atmosphere, ...

Negative consequences

- “Your” data in their cloud. (Will they stay in business? Get acquired? Is data portable or locked-in?)
- Custom APIs per platform
- Often proprietary elements
- Non-web transports (e.g., MQTT) not as flexible for web devs
- Yet another cloud silo paradigm

Hold back that data! Does the user really need it in the cloud? What benefit to them for pushing to the cloud?
Tailored and Customized IoT Solutions

Kore, Breadware, IoT Consultants, ...

Negative consequences

- Non-standard niches
- Speed-to-market focus
- Behind OEM may be multiple software maintenance dependencies
- Still more cloud data silos

Still more silos result from not thinking beyond a single product.
## 7 (Unhealthy) Habits vs Mozilla WebThings

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Decentralized Web of Things Approach

**WebThings Gateway**
A software distribution for smart home gateways focused on privacy, security, and interoperability

**WebThings Framework**
A collection of re-usable software components to help developers build their own web things

DECENTRALIZED and OPEN SOURCE on a local network
PRIVACY

Mozilla created software to allow hackers and makers to build their own smart home hub with a Raspberry Pi, with a pre-built software image downloadable from their website. It replaces the need for vendor-specific hubs in most cases (Philips, IKEA, Samsung, Xiaomi, ...).
Next step is to introduce a commercial-ready IoT hub, that would similarly replace the need for vendor-specific hubs in most cases (Philips, IKEA, Samsung, Xiaomi, ...), and support a wide range of off-the-shelf smart home devices.
Step one is to pick a subdomain so we can set up a secure certificate for your gateway, downloaded from Let's Encrypt. Until on routers, we also run a tunneling service to poke through your firewall for you. We created a user experience which allows you to monitor and control all your smart home devices through a unified web interface and create rules to automate them. Every home gets its own unique subdomain with a certificate signed by Let's Encrypt so you can directly monitor your home over the web, without a middleman.
Web of Things Interoperability

Linking together different smart home systems using the Web of Things.

IP Connected Devices (Wi-Fi, Ethernet,...)

Applying lessons learned from the World Wide Web to IoT, giving devices in the real world URLs on the web.
Open Source Community Development

All of our source code is on GitHub and you can find us in #iot on irc.mozilla.org or ask questions on Discourse.

github.com/mozilla-iot
(post issues to gateway repo)

OPEN.
Our code is open, our planning is open, our minds are open.
Value Proposition

Directly monitor and control your home over the web, without a middleman

- Affordable one-off purchase, no monthly subscription
- Private data stays in your home by default
- Expand with devices from multiple manufacturers
Live Demo

WebThings Gateway

or see:
https://youtu.be/hwQF_ELzVMs
https://youtu.be/KF2T58_c4dM

I will log into various WebThings gateways to show live UI. Using ONVIF add-on I can see snapshot or video stream of the things I am controlling in real time. Snapshot has about 5 second delay, video about 15 seconds. Can access from laptop, smart phone, any browser. I will demo voice and text message control of things. For the local voice demo, I make the Google Home "speak" the command and the Snips-based voice-controller listens to it.

QUESTION:
Do smart things need to connect to the "cloud" to be useful? No. Your data can stay in your own home. Remote access is via the Internet.
Thank You!

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THANKS.
Go to iot.mozilla.org and get started!
Backup Slides
UX.

Using the modern web to improve ease of use. Smart phones, tablets, and other screens need only support a browser, since the application is a progressive web app. There is still plenty more UX/UI design work to be done, but because it is open source, if you have creative design talent, contribute your suggestions! :)

WebThings Gateway UI
Useful Reference Links

- [iot.mozilla.org](https://iot.mozilla.org)
- [github.com/mozilla-iot](https://github.com/mozilla-iot)
Have any of you installed smart home products yet?
Of the smart home devices you have installed, what do you like best? least?

Smart home value example -- connected emergency sensors let you be alerted to fire, burglary, elderly falls... events that demand immediate attention no matter what your location.
Mozilla's Decentralized and Privatized Approach to IoT

*Enabling IoT devices to be discoverable “on the web” ≠ Connecting to IoT device data “in the cloud”*

Your data doesn’t need to leave your home for you to have secure remote access.
Sensors and actuators controlled via a progressive web app (PWA) that can run on any platform with a browser.
More Intuitive View Based on Thing Locations

Interactive Floorplan

View status of devices and control them directly inside the floorplan.

Floor plan helps you intuitively know what smart things are where. The future is an overlay with augmented reality (AR) in 3D.
Push buttons are like remote controls for TVs -- once you get used to them you’ll never go back to walking across the room to flip the physical light switch.
Say YES to “Allow Notifications” Dialog Box
(Because Only You Can Create Them)

Push Notifications
Create rules which trigger a push notification with a custom message.

Notifications help most when you’re not at home, or when you are home and can’t hear/see an alert. Useful for smart appliances and emergency alerts.
Go Crazy With Your Own Rules Logic

Advanced Rules Engine

Multiple inputs, multiple outputs.

If, while, and, or and equals operators.

Go crazy — homes are like snowflakes. Design yours in a way that works best for you.
Talk or Type

Control your home using speech and text via a chat style interface.

Usability is key for broad consumer adoption. Talk is most desirable if private, also remote control buttons, apps and web UIs, and text chat.
Secure Framework for 3rd Party Services

**Developer Settings**

- Enable/disable SSH, view logs, and create OAuth tokens for secure web service interaction.

OAuth framework is key to the future of enabling secure and private services, that give consumers the CHOICE of what to use.
WEBTHING LIBRARIES.
My favorite tool is MicroBlocks as a means to create web things. Try these other languages too.
WEB THING API (Schemas)
W3C Web of Things (WoT) spec is still draft so we have published what our framework implements.

WoT Spec (Schemas) & Example
https://iot.mozilla.org/schemas/

Capabilities
- properties
- actions
- events

Example

```json
{
  "context": "https://iot.mozilla.org/schemas/",
  "name": "light", "statelessSwitch",
  "value": "on",
  "description": "A web connected lamp",
  "properties": {
    "on": {
      "type": "statelessSwitch",
      "description": "whether the lamp is turned on",
      "default": "off",
    },
    "brightness": {
      "type": "brightnessProperty",
      "description": "The level of light from 0-100",
    }
  }
}
```

moz://a
**Add-ons: Bridge to JSON Web Thing API**

<table>
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<tr>
<th>Add-on</th>
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<td>ActivityPub</td>
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<tr>
<td>Netatmo Wx</td>
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<tr>
<td>Philips Hue</td>
<td>and more...</td>
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</tbody>
</table>

ADD-ONS. This slide is not up to date. Over 70 add-ons by now I think. Can't wait for smart device OEMs to get on board the web of things so we won't need so many add-ons. But for now, this framework is needed to bridge non-IP devices or any device that is not following the Mozilla/W3C web thing API. Lots of community contributions to add-ons. :)