Transparency in IoT

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Limited Transparency

- The customer should be able to understand the types of data IoT applications generate and send
- Application provider should be transparent about their motivations

What information does the Nest Learning Thermostat collect?

The Nest Learning Thermostat collects:

- Information input during setup
- Environmental data from the Nest Learning Thermostat’s sensors
- Direct temperature adjustments to the device
- Heating and cooling usage information
- Technical information from the device

Why we collect the data

Environmental data from the Nest Learning Thermostat's sensors: We collect data from several sensors built into the Nest Learning Thermostat. These sensors collect data such as current temperature, humidity and ambient light in the room. They can also sense whether something in the room is moving. This helps your Nest Learning Thermostat keep you comfortable when you are at home and save energy when you are away. For example, if the Nest Learning Thermostat senses a light being switched on or that you've entered the room after an extended period of time, it can adjust the setting to a preferred temperature, based on an assumption that you've just woken up or returned home. Similarly, if the light goes off or no one is moving in the room, the Nest Learning Thermostat may turn the temperature down sometimes to save you energy.

Direct temperature adjustments to the device: If you change the temperature on Nest, it records and feeds that information to the Nest Learning Thermostat algorithms to learn your desired comfort level in different situations.

Heating and cooling usage information: Every time your system turns on and off, Nest records the time and duration during which your system was on in order to offer you features such as usage history.

Transparency != Privacy

- Private data and PII is a burden
  - Trust
  - Cost
  - Legal liability
- Needs to have a clearly stated purpose
  - customer experience
  - ?
- Generally to be minimized

Limited Transparency

- The details of the protocols between the device and cloud are not public
- Precise set of raw data and the results of the computation are not public
  - raw sensor readings
  - model outputs (e.g. occupancy models, house heating models, etc)

Full transparency considered harmful

- IOT's success depends on companies bringing great products to market
  - economic motivation
  - ability to protect intellectual property
  - trade secret protections depend on things being, well, secret
- Devices -> Sensing -> Data -> Interaction
  - different models are possible
  - significant success of highly integrated verticals -- Apple, Nest,
- Limited transparency as a legal requirement
  - example: custom HVAC controls
  - example: CO reporting


You can't handle
transparency

Other advantages

- Brand protection
  - expensive to build, relatively easy to destroy
- Fine tune products over their lifetime
  - faster time to market
  - expectations of lifetime of upgrades
  - algorithmic improvements over product lifecycle
  - ability to continually surprise and delight customers
- Customers POV
  - more data is not better
  - general acceptance and trust in filtered and processed information
  - better lives instead of information overload

Thank you!