

Essential Training for IoT Product Managers

Product Management for the Internet of Things – An Intensive Bootcamp

Daniel Elizalde Product Advisor DanielElizalde.com | @delizalde



© Daniel Elizalde. All rights reserved.

Today we'll cover:

- What is an IoT Product
- The IoT Decision Framework
- Introduction to IoT Decision Areas:
 - UX
 - Data
 - Business
 - Technology
 - Security
 - Regulations
- Putting it all together Hands-on case!



1		
ð) (
0		
		-
l		

Logistics:

0

- Lectures + Mini Exercises
- A couple of 10 min breaks

象

1

• Lunch: 1 hr starting around noon

° ,

OEÓ

Ŀ

14

Bootcamp Resources

DanielElizalde.com/bootcamp

- Download slides
- Additional resources



Hi, I'm Daniel Elizalde!

- Product Advisor for Climate Tech companies
- Author of the bestselling book: The B2B Innovator's Map
- Former VP, Head of IoT at Ericsson
- Former Head of Products at Stem (IoTpowered, energy storage solutions)
- Instructor at Stanford University
- Trained over 1,500 IoT professionals

About You





Today's Objective: Learn an easy-to-use framework to drive IoT Products with confidence





WHAT IS AN IOT PRODUCT?



A product that combines hardware and software, measures real-world signals, and connects to the Internet to provide value to a customer.



EXAMPLE: WIND TURBINE - PREDICTIVE MAINTENANCE





When to Perform Maintenance?

- 1. When wind turbine breaks...
- 2. On a fixed schedule
- 3. Only when needed

Wind Turbine Predictive Maintenance via IoT









© Daniel Elizalde. All rights reserved.

Cloud

What's Included in the IoT Tech Stack?





Device

Software

· Operating system

· Edge application

Edge APIs

· Supporting software



- Sensors
- CPU
- Radio
- Data storage (HD)



Networking technology



- Data ingestion
- CPU
- Data storage
- Device management
- · Analytics and reporting platform
- · Cloud security
- ID management
- · User management



Cloud Applications

- Business logic
- Custom analytics
- APIs
- User interfaces

An IoT product embodies the state-of-the-art of technology.



People don't buy loT, they buy a solution to a problem





The IoT Decision Framework



The IoT Decision Framework gives you and your teams a simple structure for creating a robust and cohesive IoT product strategy.

The IoT Decision Framework

The IoT Technology Stack



The IoT Decision Framework

The IoT Technology Stack



Decision Areas



Prerequisites



The Innovation Journey





Source: The B2B Innovator's Map: How to get from idea to your first ten customers

The Innovation Journey



© Daniel Elizalde. All rights reserved.

IoT & the Innovation Journey





UX DECISION AREA





Meet James (User Persona)



James Price, 35

Wind Turbine Service Technician 10 years of experience

"My average day is spent climbing and inspecting multiple turbines."

James' Needs:

- Monitor health of my wind farm, and look into problems with specific turbines
- Schedule and manage maintenance for each turbine that needs service
- Report health status of the farm quarterly to my boss

James' Needs (by Layer)





Device Hardware

- Robust, industrial grade
- Small size (needs to fit inside the wind turbine)
- Can store data for weeks if connectivity is lost
- Over-the-air software updates

Device

Software

- Real-time analysis and alerts
- Redundant communication in case main communications fail

Communications

 Works with the most common protocols already available in most wind farms Cloud Platform

- High reliability
- Provides easy tools for data mining and sharing

Cloud Applications

- Mobile application for detailed insights
- Learns patterns across all turbines and farms being monitored, to more accurately predict failures

Meet Marc



Marc Jones, 30

Manager at Tech company No kids *"I'm always pushing my limits, both physically and mentally. I want to see how much more I can take, how much further or faster I can go."*

Marc's Needs:

- Compare my training sessions and race stats with others at my same level
- Get recommendations and plans for performance improvement
- Get reports on my progress



Exercise – 15 minutes

Evaluating Marc's Needs by Layer

- What would create a great experience for Marc?
- Each person walks the IoT Technology Stack 5 mins
- Compare with your neighbor– 5 mins
- Share with group 5 mins

(Use this as an opportunity to meet somebody new)



Meeting Marc's Needs by Layer









Device Hardware

- Distinctive industrial design
- Light weight
- Water proof (for swimming in triathlons)
- Long lasting battery life
- Accurate calculations of fitness metrics
- Display basic analytics on the fitness band itself
- Calculate the time

 Works well offline, while outdoors

Communications

Cloud Platform

- High reliability
- Simple logins using social media credentials



Cloud Applications

- Mobile app to access quick insights and trends
- Rich web application with history, trends, competitive ranking, recommendations, etc.



Who is the user?

The IoT Customer Lifecycle



Break – 10 mins

- Return to a different seat
- Ice breaker: What IoT Product / Idea are you working on?



DATA DECISION AREA




The value of IoT is in your data strategy.

(otherwise, what's the point of having a connected device?)

What Is Your Data Strategy?

External Data Strategy

- Offer monitoring services
- Optimize a customer process
- Provide asset tracking
- Optimize asset utilization
- Provide BI/reporting

Internal Data Strategy

- Make data available to 3rd parties
- Optimize your product development process
- Optimize your supply chain
- Provide BI/reporting
- Improve support processes
- Provide insights to marketing and sales
- Support billing

. . .

. . .

•

The Power of One-to-Many

IoT allows you to aggregate and analyze data across X number of devices.

How will you add value using aggregate data?



Use data to improve your own products.

Data Decisions





for how long

needed

needed

data is needed

· Other sources of data

· Local / edge analytics

Device

Software

How much data to store and

· What diagnostic and health











Device Hardware

- Real-world signals to be measured
- Sample rate
- Connectivity to other hardware

- Communications
- What data to transmit
- How much and how often to transmit
- Robustness of the connection

Cloud Platform

- How much data to store and for how long
- Real-time vs historical data gathering
- Fleet diagnostic / health data
- Other sources of data needed
- · Cloud analytics needed

Cloud Applications

- What data to display to users
- Real-time vs historical data





- Set room to desired temperature locally or remotely
- Learns your temperature preferences
 and auto-adjusts
- Gives you reports on energy consumption on your phone

Exercise – 15 minutes

Answer the following questions for the Nest thermostat

- Each person completes ALL layers of the IoT Technology Stack 5 mins
- Discuss with your neighbor 5 mins
- Share with group 5 mins



Device Hardware

 Real-world signals to be measured



Device Software

 Edge control and analytics needed Communications

 What data to transmit and how often



Cloud Platform

 Other sources of data needed



- Cloud Applications
- What data to display to users

Nest Data Exercise







Real-world signals to be measured

- Actual temperature
- Desired temperature
- Motion

Edge control and analytics needed

Control the HVAC

Device

Software

• Learning user patterns

•

Communications

What data to transmit and how often

- Current temperature every 10 minutes
- Change of user temp setting in real-time
- Energy consumption every 15 minutes

Other sources of data needed

Cloud

Platform

- Weather
- Utility commands

Cloud Applications

What data to display to users

- Current temperature
- Energy consumption



BUSINESS DECISION AREA





IoT enables recurring revenue and "as-a-service offerings"

1- Flat Recurring Fee

- Customer pays for the hardware plus a flat fee for the service
- Small increment for adding new devices into the network





\$2 per month per thermostat

2- Flat Recurring Fee – A la Carte

GRUNDFOS X

• Customer pays for the services they use





3- Variable Fee Based on Usage

Inetromile

Last Trip 18th Ave to 3rd St Car Health (Ch Awesome! Insurance (A) \$292 - \$356 metromile

Save big with pay-per-mile car insurance

 Customer pays for <u>how much</u> of the product/service they use

4- Variable Fee Based on Outcome

- Charge for measurable results
- Share the responsibility of success with the customer



5- Ecosystem Model

- Provide a marketplace or platform
- Charge partners for marketplace access, and/or
- Charge percent of each sale



6- Dual-Sided Market / Aggregator Model

- Sell a basic service to customers who host your IoT solution
- Aggregate the data or assets from your customers and sell them to 3rd parties



7- Enable Other Sources of Revenue

 Increase sales of other products in your catalog





8- Monetize Your Data

- Open APIs to access raw/processed data
- Sell insights via reports
- Use data to discover upsell opportunities

otonomo

Use Cases Platform & Privacy Data Resources Blog About Us Sign in

Powering the Mobility Economy

Igniting a new generation of mobility services and experiences

Schedule a Demo



9- Enable Professional Services

• Develop a product that enables paid deployments, customization or consulting.



10- Enable Managed Services



© Daniel Elizalde. All rights reserved.

Experiment With Various Models

What you charge for:

Predictive Maintenance as a Service on wind turbines

How you charge: (options)

- 1. Flat Monthly Fee
 - \$1,000/mo/unit
- 2. Usage Based
 - No monthly fee
 - \$1,000 per service incident per unit, billed quarterly
- 3. Outcome Based
 - \$1,000/mo/unit if uptime 90% or higher
 - \$750/mo/unit if uptime is 70-89%
 - Otherwise \$0!



Fitbit – What can you monetize?



- Each person completes ALL layers of the IoT Technology Stack 5 mins
- Discuss with your neighbor 5 mins
- Share with group 5 mins



Fitbit – What can you monetize?







Device

Software

Monetize API to build apps

Monetize API to access

Paid upgrades

Feature bundles

· Open a market place

· Paid support

Advertising

data



- · Buy the device
- Lease
- Offer an extended guarantee
- Service contract
- · Paid upgrades

- - Bandwidth



Cloud

Platform

· Amount of data stored

Monetize API to build apps

Monetize API to access data

· Additional insights via analytics

Monetize the data





Cloud **Applications**

- Advertising
- Functionality bundles
- Premium support





Communications

- Throughput

Lunch – 60 mins

- Return to a different seat
- What's your biggest Product Management challenge today?





TECHNOLOGY DECISION AREA





To learn more...

- Visit <u>danielelizalde.com/bootcamp</u> for a library of resources
- Recommended technical articles for PMs:
 - Data Acquisition: A Primer for Product Managers
 - How Does an IoT Device Work?



"What are we building, anyway?" -Every executive, ever

Solution Diagrams

- Help you communicate your vision and progress to all teams (executives, engineering, marketing, sales, etc.)
- Serve as the basis for discussion and collaboration



Smart Heartrate Monitor



Smart Heartrate Monitor (Better Solution)



Smart Building – Occupancy Sensing



Smart Building – Occupancy Sensing (Better Solution)





© Daniel Elizalde. All rights reserved.

Pro Tip:

A Solution Diagrams has no value by itself. It becomes valuable when you use it to start conversations and ensure everybody has a shared understanding of what your product is and is not.

Source: The B2B Innovator's Map
SECURITY DECISION AREA



The IoT Decision Framework

UX

Data

Business

Technology

The IoT Technology Stack Device Device Communications Cloud Cloud Hardware Software Platform Applications

Decision Areas Security Standards & Regulations

You are

here

Security is one of the biggest challenges in IoT

The goal of this lecture is to scare you...

IoT Introduces Additional Attack Points

- Traditional IT cybersecurity risks
- New physical attack points, usually within attacker's reach



A compromised device can pose real threats to real people. It's not only about compromised data.

Example: Hacking A Car (In Motion)





You can't eliminate all threats.

Planning for security is an exercise in risk management.

A Process for Managing IoT Security



Plan for Security Across the IoT Stack



Exercise – Smart Pacemaker

Brainstorm top 3 security threats:

- How can your product be hacked across the IoT Technology Stack?
- How likely is it (low, medium, high)?
- How can you prevent each one?

Exercise:

- Discuss with a neighbor 5 mins
- Share with group 5 mins





STANDARDS & REGULATIONS DECISION AREA



The IoT Decision Framework

The IoT Technology Stack Devices Embedded Communications Applications Cloud Software Platform UX Data You are **Business** here! Technology Security Standards & Regulations

Decision Areas

Regulation:

A rule made and maintained by an authority.

Regulations vary by industry and geography.

They also vary by stack layer.

Regulations can:

Break your business if you ignore them.

Provide business opportunities.

Regulation Examples by Industry

- Healthcare = HIPAA
- Energy = Rule 21 (In California)
- Smart buildings = Building code



Regulatory Organizations - Examples

- If your product transmits data wirelessly = FCC (Federal Communications Commission)
- If your product flies = FAA (Federal Aviation Administration)



• If you produce energy = PUC (Public Utilities Commission), Fire Department



Regulations by Country/Region

• GDPR – General Data Protection Regulation



Regulations Through the Life of Your Product

- During product development:
 - Walk the IoT Technology Stack to identify areas where regulation might impact you
- After deployment:
 - Walk the Customer Lifecycle to identify areas where regulation might impact you



Example: Smart Solar Panels

- Building code
- Residential code
- Electrical code
- Energy code
- Fire code
- Wireless communications regulations
- Labor regulations



Define Compliance Personas

- Behind every regulation, there's always a person with a need
- Examples:
 - Compliance officer
 - Regulations inspector
 - Auditor

Include Regulation In Your Roadmap

- Add the needs of your "compliance personas" to your roadmap
- Prioritize regulatory work as you would with any other feature

Seek expert advice—this is an extremely complex and sensitive area.



Break – 10 mins

- Return to a different seat
- Ice breaker: What is your favorite IoT product?



Putting It All Together Final Case

Company Profile: Smart Lights, Inc

- Founded in 2012
- ~ 750 employees today
- Profitable
- Current markets (USA only):
 - Office buildings
 - Warehouses



Offering

Problem:

 Office buildings and warehouses waste a lot of money due to poorly managed lighting systems. Facility managers have no visibility into how much energy their current lighting system is wasting.

Solution:

• A smart lighting system that connects to the Internet to monitor and manage your lights in a central place. We provide programmable schedules. The added visibility and control results in thousands of dollars saved in energy costs.



We monetize our solution in several ways:

- Charge for the installation of our system
- Charge a monthly subscription to access our web applications
- Based on the data we collect:
 - We offer energy audits to suggest more areas to improve
 - We implement the necessary energy efficiency upgrades

Scenario

- Smart Lights, Inc just raised a new round of funding of \$100 million!
- New board member:
 - Brings deep experience and connections into the residential market
 - Knows that the residential market is one of the fastest growing areas for smart products
 - Believes its a great opportunity for Smart Lights, Inc to expand its existing expertise and products into this market (since they are similar)

Question

- CEO asks you:
 - What are the pros and cons?
 - What is your recommendation (pursue/abandon)?
- Work with a neighbor 15 mins
- Class discussion 10 mins



Essential Training for IoT Product Managers

Thank You!

Keep in touch: daniel@danielelizalde.com



© Daniel Elizalde. All rights reserved.