The Internet of Things - Designing a system

Introduction

tinyurl.com/IoT-STM-2022

Course Plan

Together, you will learn, from researching real-life examples, what constitutes IoT.

You will research and contrast "good" and "bad" examples using design and analysis toolkits (some assembly required) in 2- or 3-person workgroups.

You will research real-life **users** and their **needs,** then research, design and model a **robust IoT system** for these needs.

You will develop **presentation models** (scale model, design canvas, process documentation, website, pitch video…) to interactively illustrate your concept.

You will all **showcase** your projects and their development in an exhibition-style format. This showcase will be open to all staff, employers, etc.

Today

The main objective of today is **discovery** of IoT and design tools, to provide you with **inspiration** for your main project.

You are **not** working on your main project, yet.

You are working with **temporary** teammates, and will change for each activity.

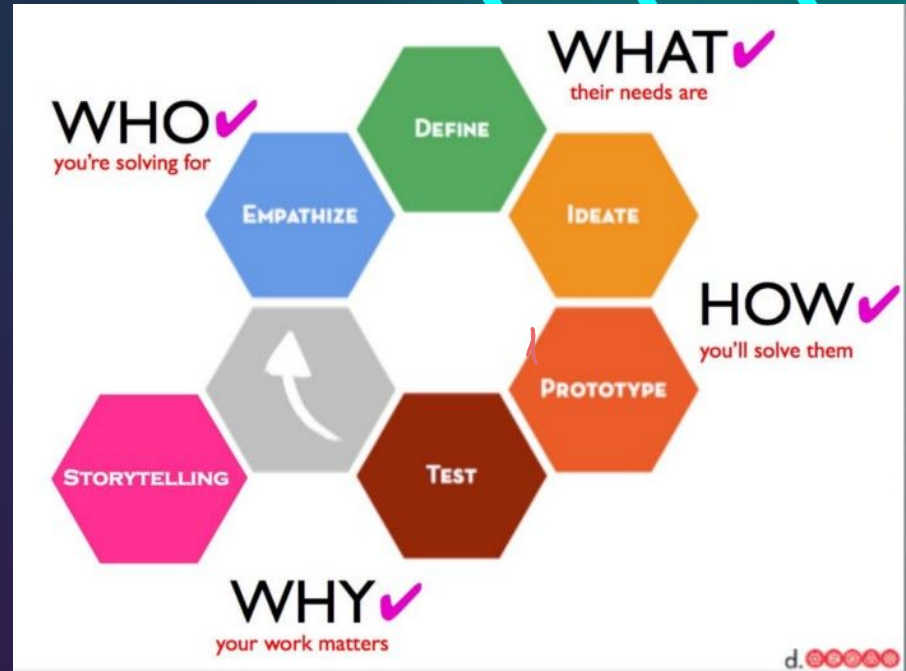Lots of new vocabulary? Don't understand? Ask! Or research online

(IoT) Design - Process

Overall, we'll be following a **Design Thinking** (DT) structure

DT is **iterative** (= cycle)

It is a tool, not an objective. Understand the rules of use and **why they exist.**

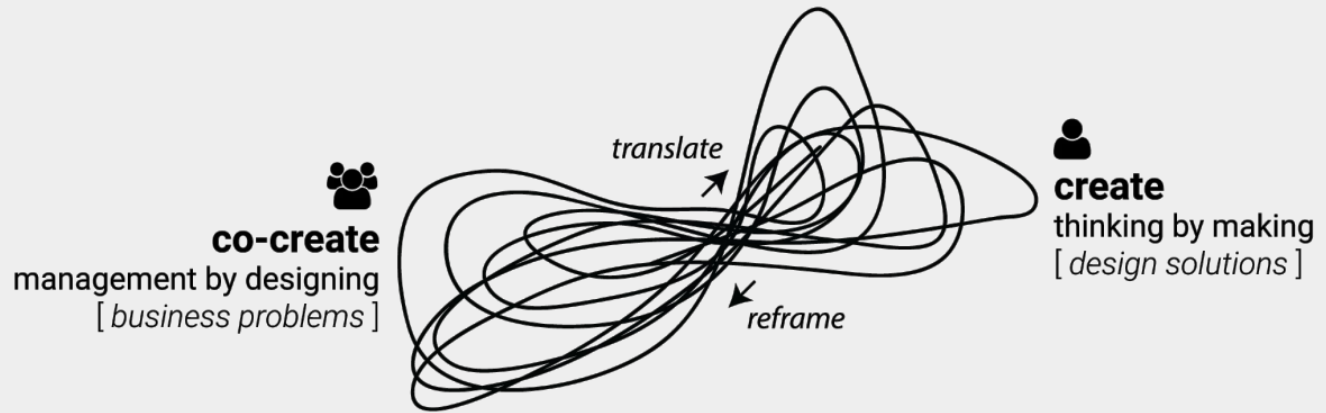*Source : https://servicedesignnotebook.nl/visualizing-the-essence-of-design-thinking-in-a-diagram-part-2-62b7559f0e10*

Next Frontier - Real Process

JK, really it looks like this.

Quantity is a quality

Fail early and often

Kill your babies

Research is Key

WE ARE ALL IGNORANT (especially myself)

Our first ideas and our opinions are **always terrible**. We must accept this.

You need to **research external sources** (ie. **not** your opinion or imagination) to understand users, needs, existing technology and its limits, etc.

Your final project will need to be **robust**, which means you will need to justify all the decisions you made, **extensively**. Magic technology does not exist (yet).

Get into the habit of online research (at minimum) **immediately**.

Research Mission - What is IoT?

Objectives
- Answer Question: What is IoT (Internet of Things)?
- Get inspired

Mission parameters - 45'

In groups of 2 or 3

Make your own diagram that explains IoT in a clear, simple visual way. Identify major benefits and risks of IoT

Find 1 good and 1 bad example of IoT use

Present visually - Make it dynamic & shiny. You're presenting to one another.

Provide links to the websites where you found information

~ 1 slide & 30" max. per item - 2'30" total. Present to 3 other groups, then others provide feedback.
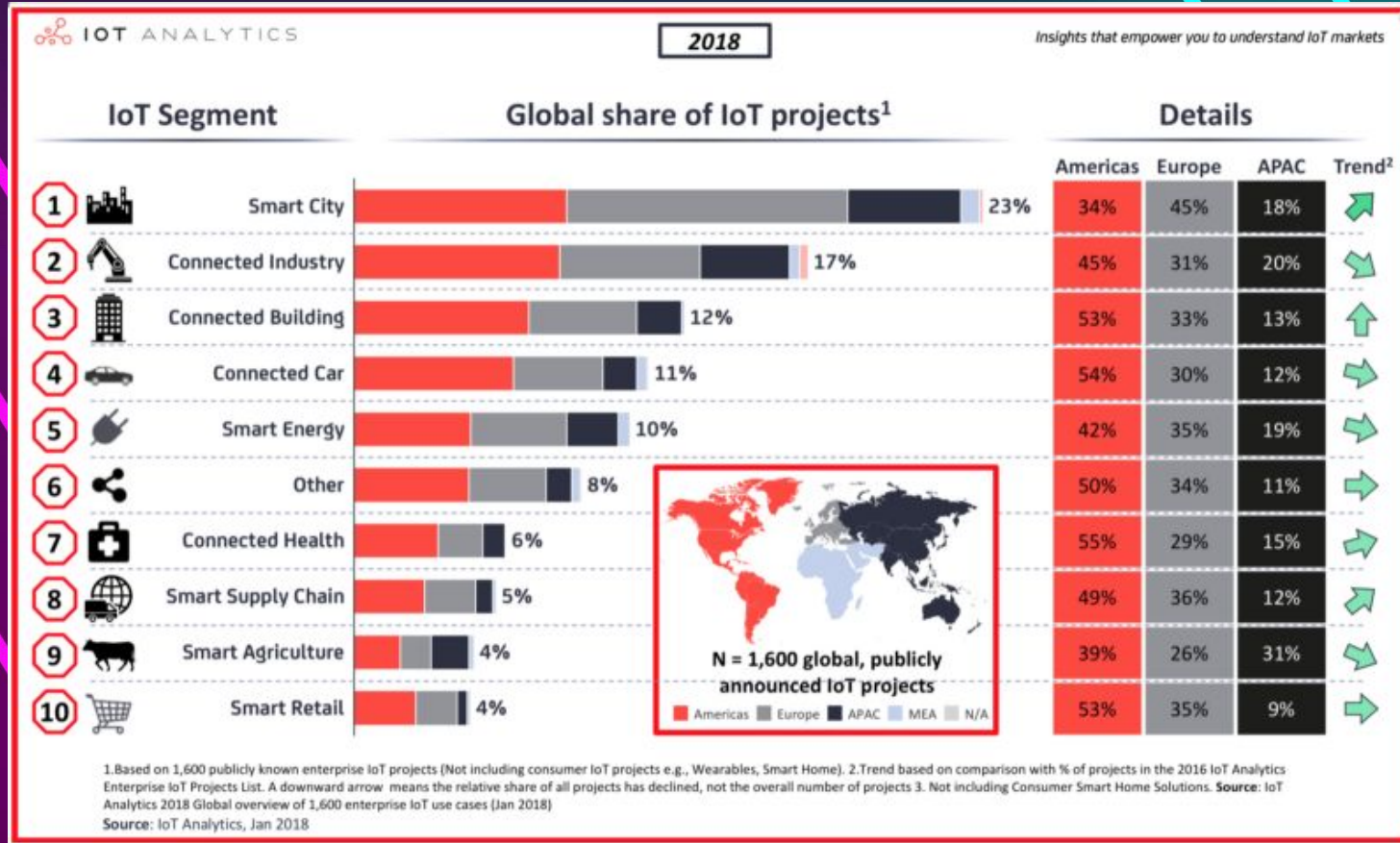
Trends - 2018

Trends - 2020
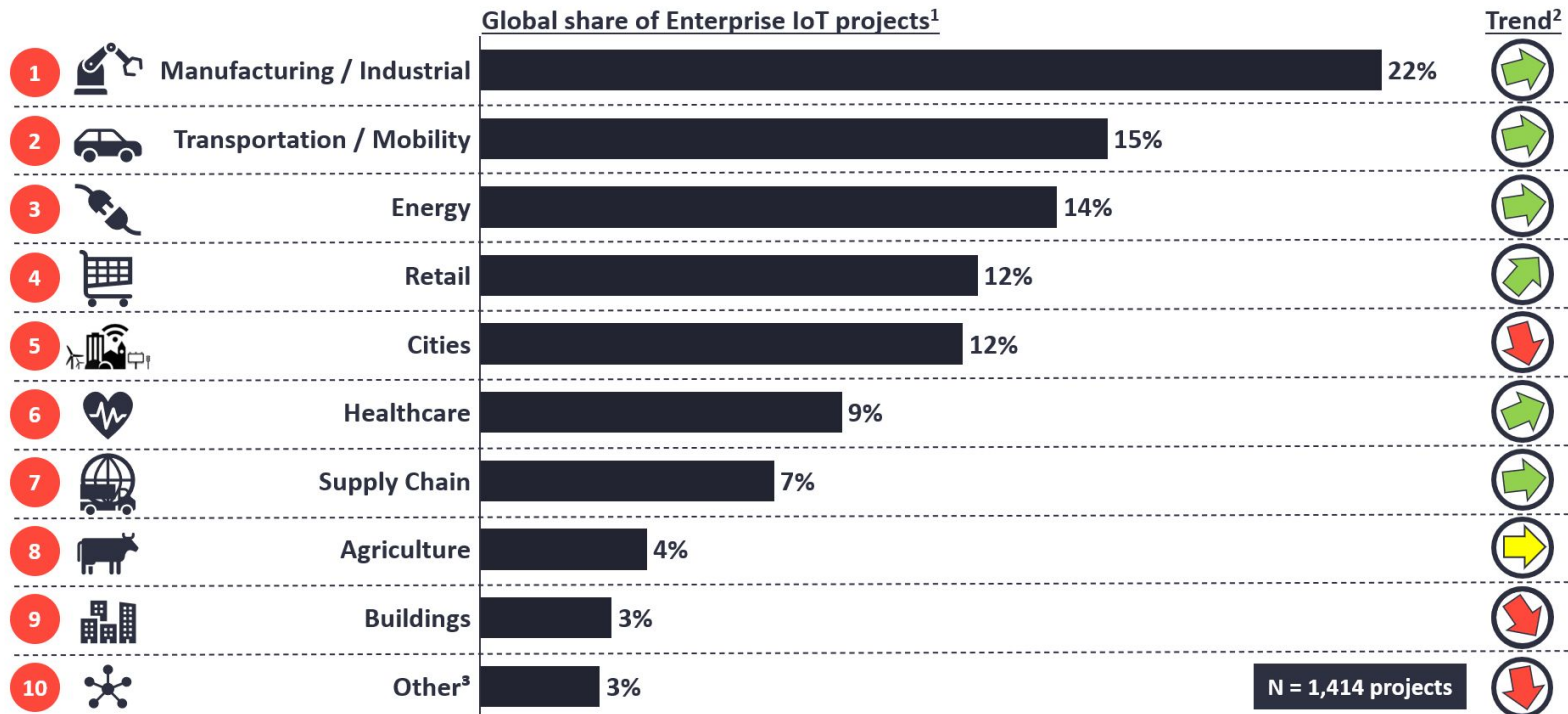
Trend - Smart city applications

IoT ANALYTICS
MARKET INSIGHTS FOR THE INTERNET OF THINGS

Aug 2020

Insights that empower you to understand IoT markets

The top 10 Smart City use cases

#	Use Case	Share	Category
1	Connected Public Transport	74%	Mobility & Transportation
2	Traffic Monitoring and Management	72%	Mobility & Transportation
3	Water level / Flood Monitoring	72%	Environment
4	Video Surveillance & Analytics	72%	Public Safety
5	Connected Streetlights	68%	Energy & Utilities
6	Weather Monitoring	68%	Environment
7	Air Quality / Pollution Monitoring	68%	Environment
8	Smart Metering - Water	66%	Energy & Utilities
9	Fire / Smoke Detection	66%	Buildings & Infrastructure
10	Water Quality Monitoring	64%	Environment
...	... 21 more use cases		

Share = Percentage of cities that have fully or partially deployed the use case as part of their Smart City initiative; n= 50 cities across the globe
Source: IoT Analytics Research – August 2020 (For more information, refer to: Smart City Use Cases & Technology Adoption Report 2020)

Design Training Mission : IoT Toolkit

Objectives
Grasp the ingredients of an IoT system by designing them
Learn to use IoT design toolkits as rapid analysis and design tools
Flex your creative muscles

Mission parameters
Cut up the cards + either glue matrix together, or reproduce it on paperboard
Identify a user + need that could benefit from an IoT system (you, or someone you know, is a good start)
Follow suggested workshop processes and learn, by trying and failing to design an IoT system around users.

Design Training Mission : IoT Cards

Context

(1) Personas (10 cards) – provide examples of user groups one can decide to design for. They do not address only single individuals but also groups or communities, e.g. elderly or construction workers.

(2) Scenarios (5 cards) – provide examples of scenarios that tackle societal challenges that affect modern cities. They are inspired from the sustainable development goals adopted by the United Nations in 2015

IoT ingredients

(3) Things (42 cards) - list most common, everyday low-tech objects. These things are to be augmented with IoT technology; for example, to act as physical avatars for digital services.

(4) Services (27 cards) - propose a number of popular online, digital services like social networks, data providers and APIs. These provide information that can be accessed from augmented things.

(5) Human Actions (11 cards) - suggest a number of user-interaction metaphors people can use to interact to a service via an augmented thing. They focus on physical and embodied interaction rather than screens.

(6) Feedback (10 cards) - indicate a set of ways an augmented thing can display information to people.

(7) Sensors (9 cards) - are a collection of ways an augmented thing can sense information from the surrounding environment.

Creativity help

(8) Missions (22 cards) - are a set of provocative design goals to inspire creative combinations of things, services, human actions, feedback and sensors.

(9) Criteria (14 cards) - are a collection of critical lenses to reflect, evaluate and refine the ideas generated.

Design Mission - IoT Toolkit Process

(1) Explore - Draw a Persona and Scenario card. What specific needs or problem are you trying to solve for them?

(2) Challenge - Draw a Mission Card. Challenge your team to think creatively how to accomplish the mission and what values it brings for your Persona.

(3) Combine - Draw a card from each technology deck. Think what objects are central to your user and combine services, human actions and triggers to serve the needs you have identified.

(4) Sketch - Flesh out your idea! The storyboard is your sandbox to illustrate the idea you are working on.

(5) Refine - Look through Criteria cards and discuss how well your concept scores on each. What are strengths and weaknesses of your concept? Can you change your idea to resolve the weaknesses?

(6) Pitch - Write down a brief description of your final idea and present it to your public in a 60-seconds elevator pitch. You should convince your audience that this is the greatest idea ever!!!! (4 exclamation marks. That's how you know I'm insane).

Design mission - references + resources

https://www.tilestoolkit.io/

http://mappingtheiot.polimi.it/

http://simonemora.com/papers/conference/2018_CSERC.pdf

https://www.interaction-design.org/literature

https://iot-analytics.com/