



# DATABASE, CLOUD BASED SERVICES AND COMPUTATIONAL THINKING

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Chinese University of Hong Kong

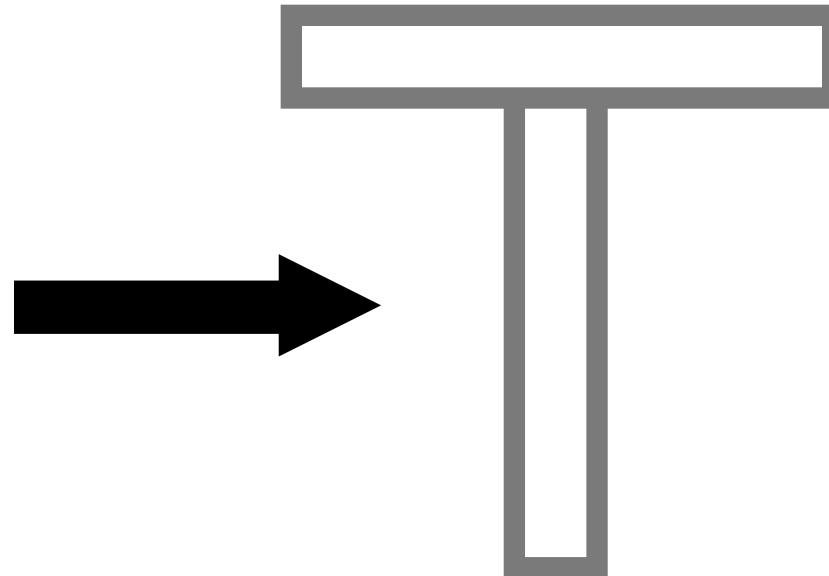


Center for  
Entrepreneurship

**I-Shaped Talent of  
the Industrial Age**



**T-Shaped Talent of  
the Network Age**



**The Power of an Interdisciplinary Team**



## CS50, Harvard's Largest Class Expands Its Line Up of Courses

# A place for explorers & experimenters at Stanford University.

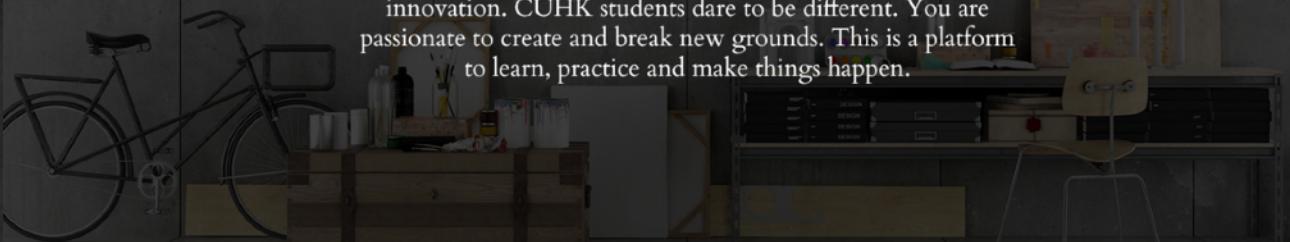
[What We Do](#)[How We Do It](#)[Our Impact](#)[The Home Team](#)[How to start a d.school](#)



# Minor in Entrepreneurship and Innovation (EPIN)

is coming in September 2017!

EPIN (pronounced as “\e-pin\”, sounds similar to “epic”) is a university-wide minor programme in entrepreneurship and innovation. CUHK students dare to be different. You are passionate to create and break new grounds. This is a platform to learn, practice and make things happen.



# Maker Bubble

Bring Design Concepts into Everyday Life





**BASc**  
Bachelor of  
Arts & Sciences



BASc AppliedAI Design+ FinTech GHD SDS

ENTREPRENEURSHIP

INNOVATION



Bachelor of Arts & Sciences

The University of Hong Kong



**BASc | HKU**  
Bachelor of Arts & Sciences

The new Bachelor of Arts & Sciences degrees, involving all ten faculties, are aimed at nurturing globally-minded thinkers and leaders able to leverage their interdisciplinary knowledge and skills to address the contemporary and future challenges of our increasingly complex world.



Bachelor of Arts & Sciences



AppliedAI



Design +



FinTech



Global Health & Development



Social Data Science

**HOW CAN YOU BECOME T-SHAPED?**

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# Turn STEM to STEAM with the Design Thinking Process

 METHODS/APPROACHES

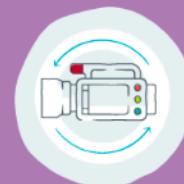
2 years ago

Tracy Hare

2 Comments

As I gear up to team-teach a STEAM course for the first time next semester, I've been thinking about what it really means to integrate all of these disciplines together. What does it really look like to teach in a collaborative environment where the focus is process, not product? How do I encourage the use of the 4 Cs while maintaining the integrity of my art curriculum?

Trying to find some answers, I've stumbled upon too many articles and resources arguing that the arts should be a "small a" in STEAM. Or, even worse, that exclude the arts because the authors feel they don't hold the same weight as the other subjects. This conundrum not only pops up in the STEM/STEAM conversation, but also with initiatives like Project-Based Learning and Makerspaces. Art can be a powerful tool in these collaborative frameworks. As art teachers, we should take



## Flipping the Art Room

Flipped teaching allows you to spend class time doing what you do best: teaching!

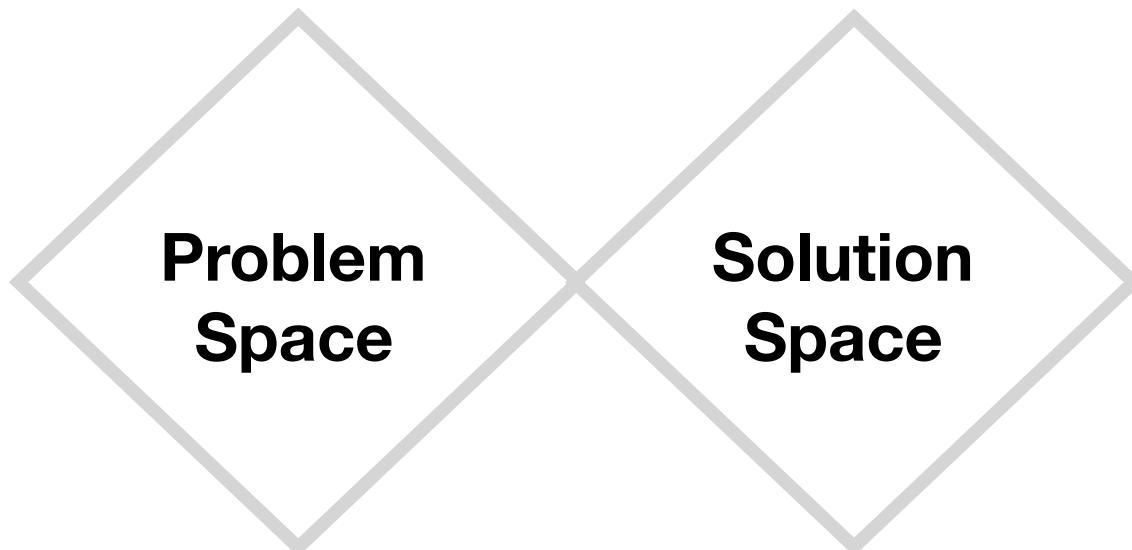
LEARN TO FLIP TODAY!

# **Design Thinking & Computational Thinking**

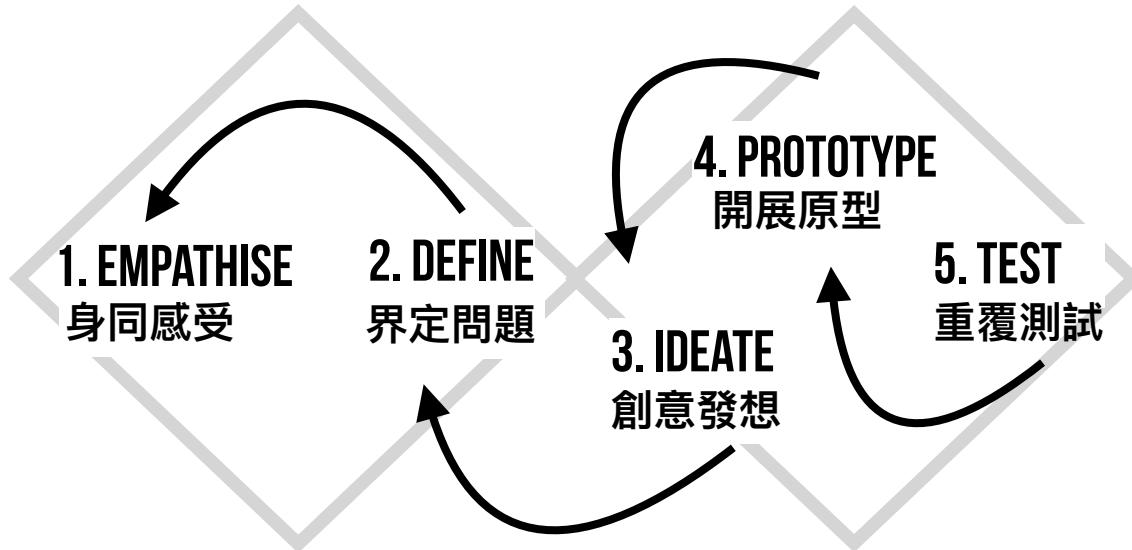
# **What is “Design Thinking”?**

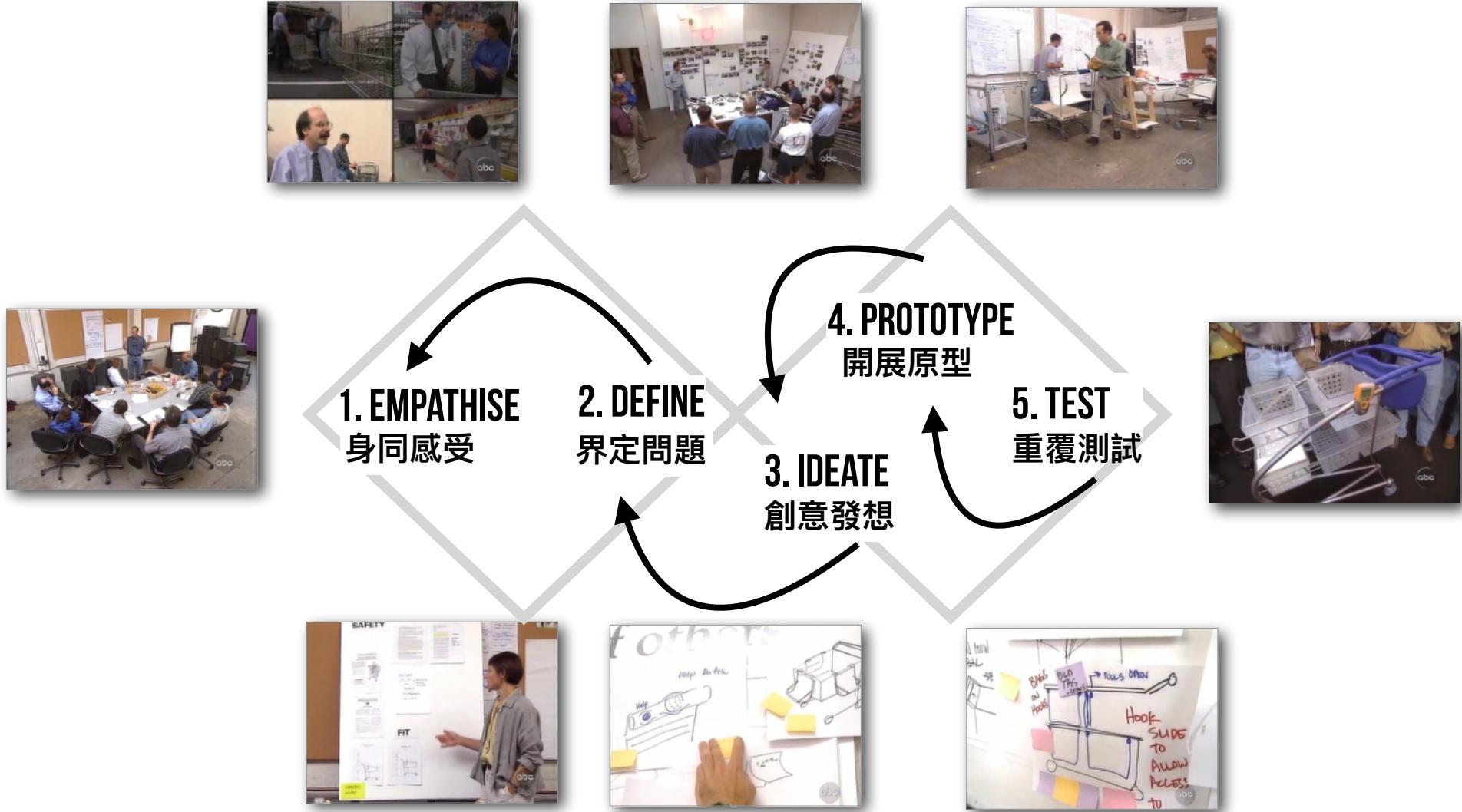
**Design Thinking is a process that turns  
needs into solutions.**

# **Double Diamond Model (雙鑽模式)**



# Double Diamond Model (雙鑽模式)





**EXPERIENCE OF USING**



**DESIGN "X"**

# THE SHOPPING CART EXPERIENCE



**USER EXPERIENCE AS JOURNEY AND STORY**



谁人的问题?谁人的需要?问题情境怎样形成?有那些持份者?用甚么产品或服务去满足需要?去解决问题?为何要满足这需要和解决这问题?当中能创造甚么价值?



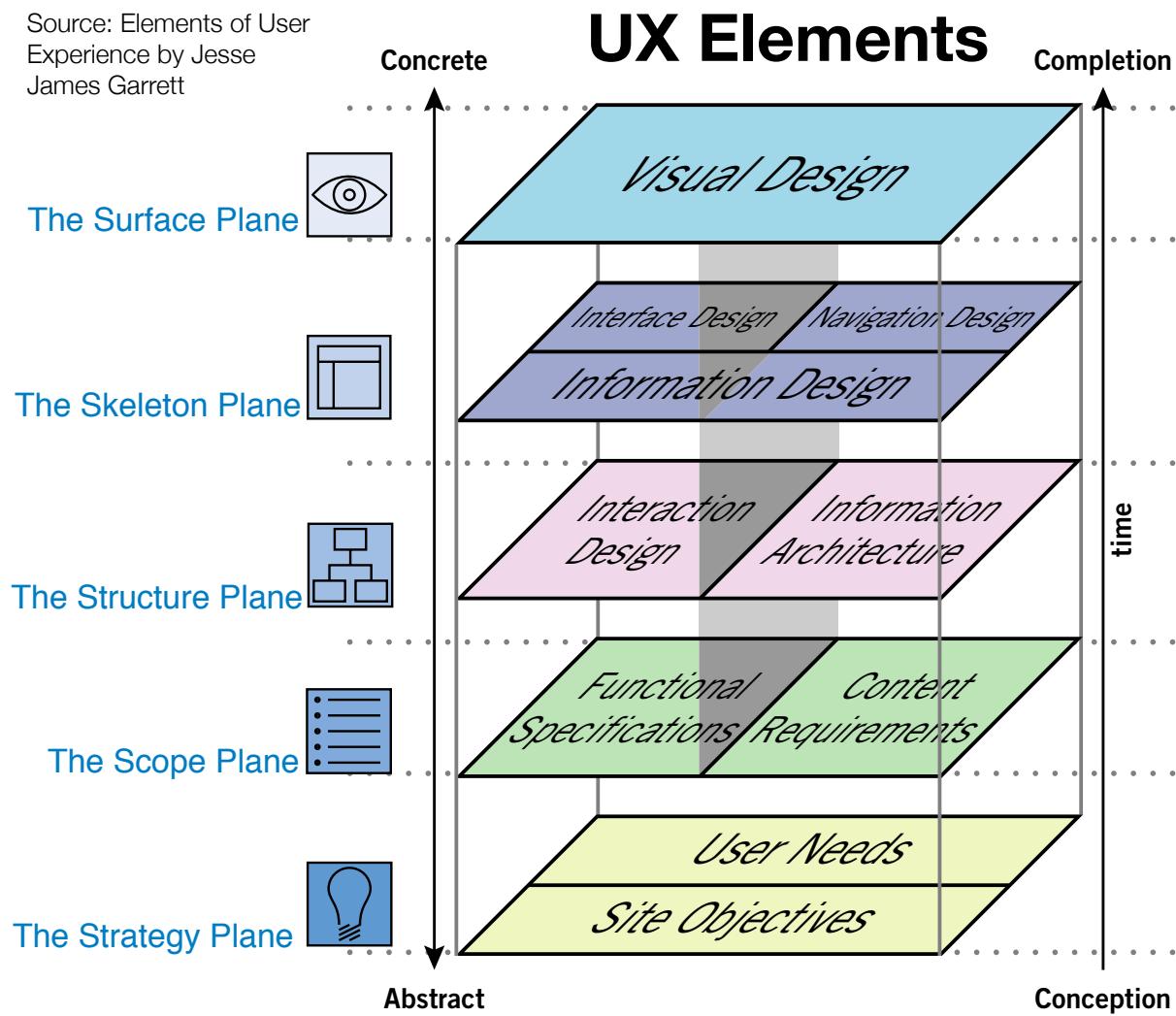
怎样去满足需要?有没有关键的技术?如何找资源?如何建立系统把资源启动起来?如何突出解决方案,比其他方案更有竞争力,拿到更多的资源?



如何定价?生产多少?如何平衡成本及增长、创造经济性及非经济性——例如社会和环境的价值?

Adapted from IDEO Design Thinking Toolkit

Source: Elements of User Experience by Jesse James Garrett



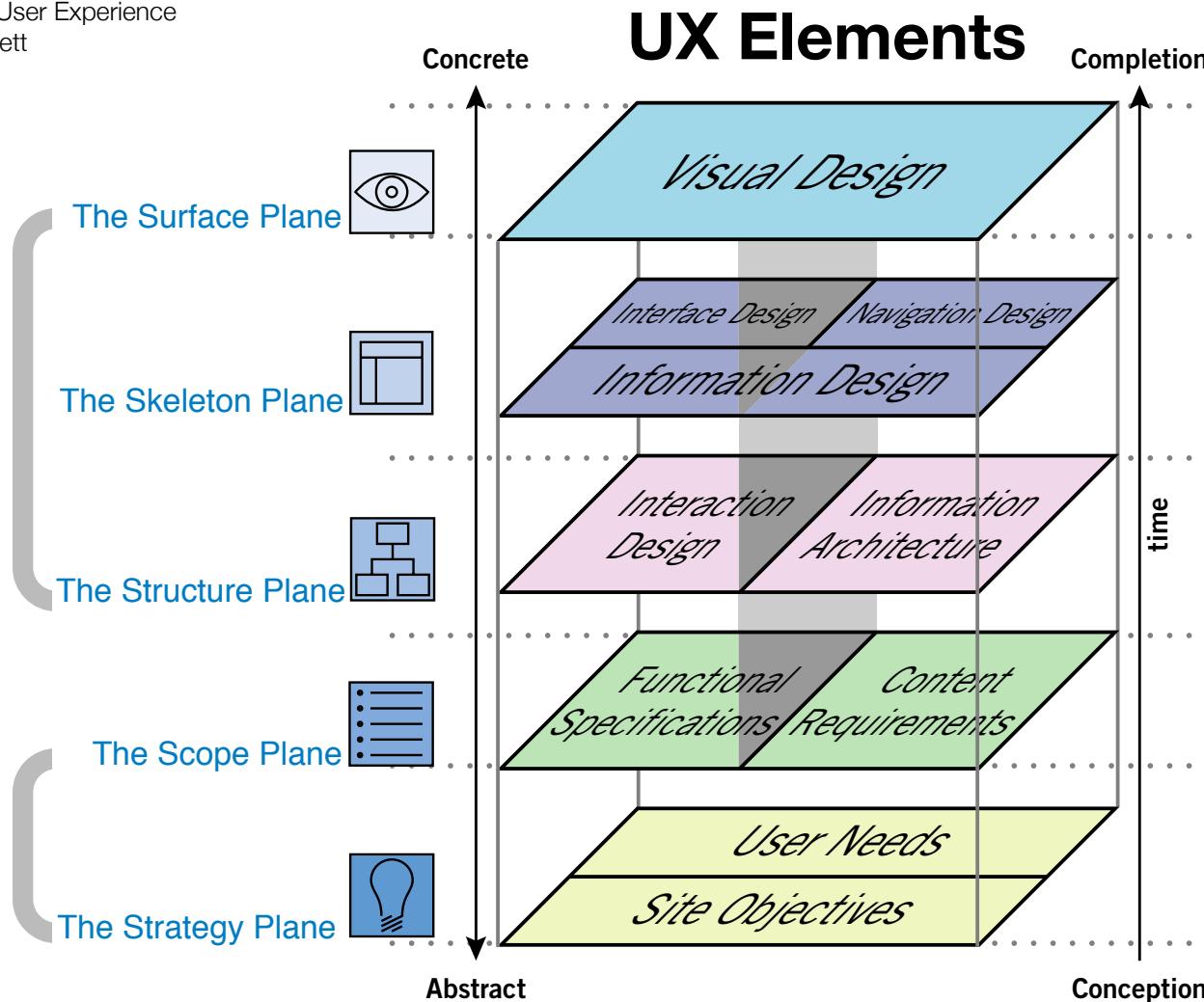
Source: Elements of User Experience  
by Jesse James Garrett

## Solution Space

how and  
how much

## Problem Space

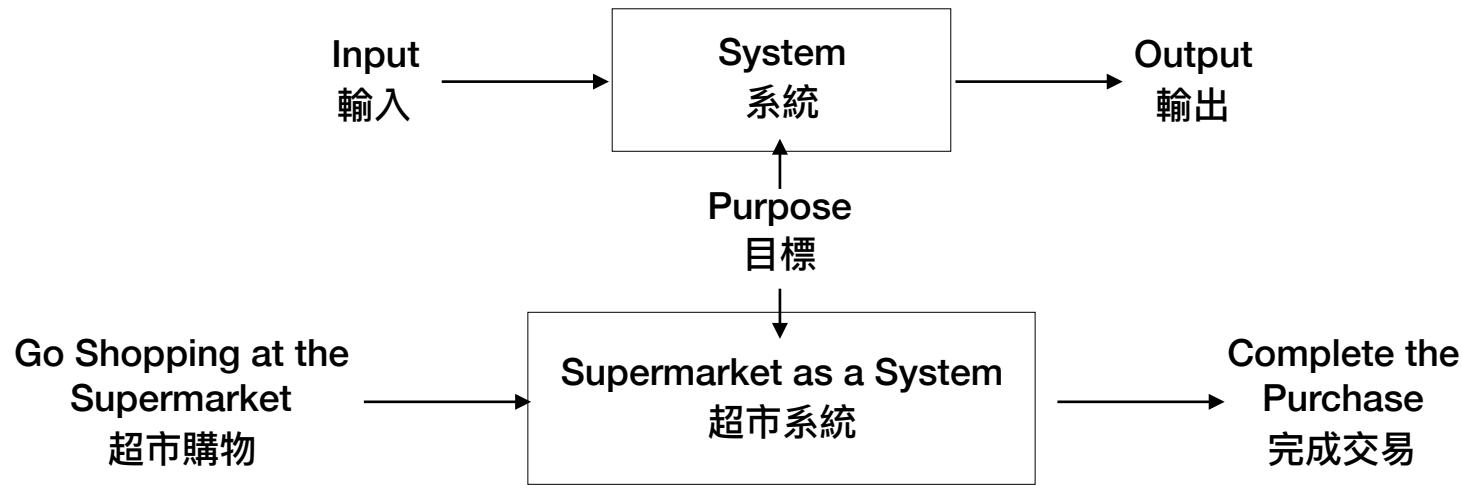
who, what,  
and why

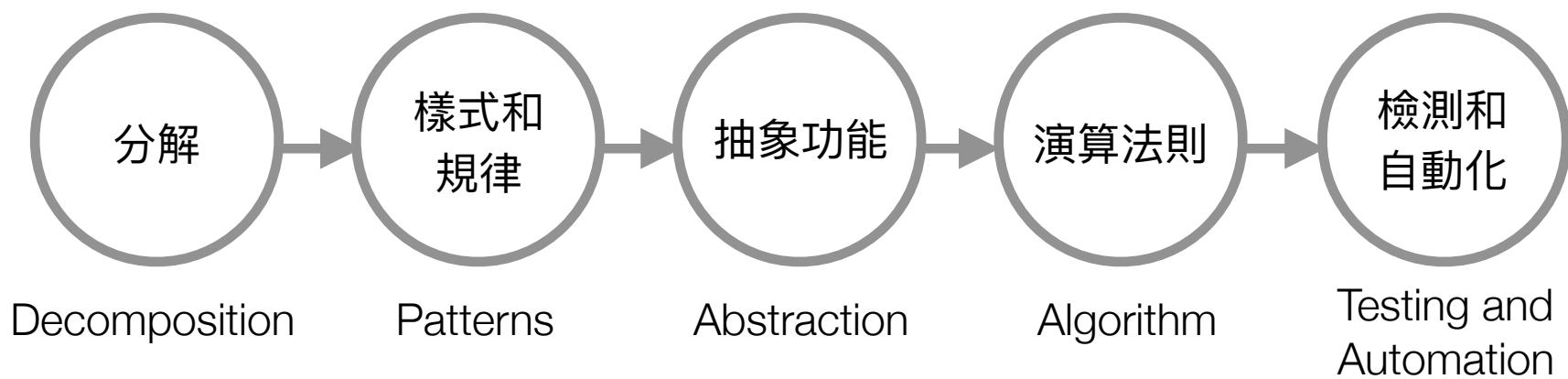


# **What is “Computational Thinking”?**

**Computational Thinking is a process of presenting problem and solution as a system of data operations for a computer to execute.**

**Computational thinking is about  
building system and processing  
data.**





Decomposition

Pattern

Abstraction

Algorithm

Automation &  
Testing

Decomposition

Break a problem down into smaller parts.

Pattern

Discover similarities between things.

## Abstraction

Ignore irrelevant details to focus on essential features to come up with one solution or classification that works for multiple situations.

Algorithm

Specify a sequence of steps that someone or computer can follow to complete a task.

## Automation & Testing

Codify and test the algorithm for automated execution by the computer.

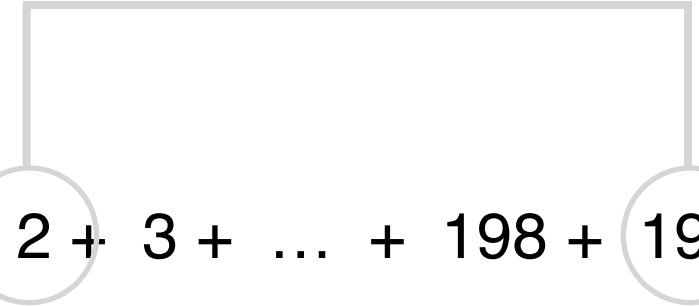
**That's is still too abstract - we want  
example!**

Summing up all the integers from 1 to 200  
in your head in 30 seconds.

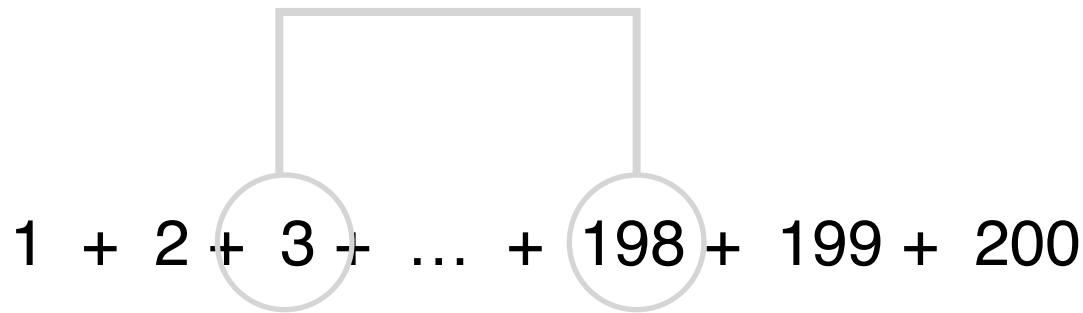
$$1 + 2 + 3 + \dots + 198 + 199 + 200$$

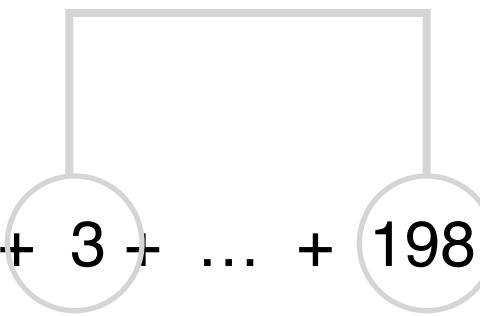
## Decomposition



$$1 + \overset{\circ}{2} + 3 + \dots + 198 + \overset{\circ}{199} + 200$$
A diagram illustrating a mathematical concept. A horizontal line represents a sequence of numbers. Two vertical lines extend upwards from the second term, '2', and the第一百九十九项 (199th term), '199'. The number '2' is enclosed in a circle with a grey outline. The number '199' is also enclosed in a circle with a grey outline. This visual representation likely corresponds to a proof or a specific step in a derivation involving the sum of the first 200 natural numbers.

Pattern

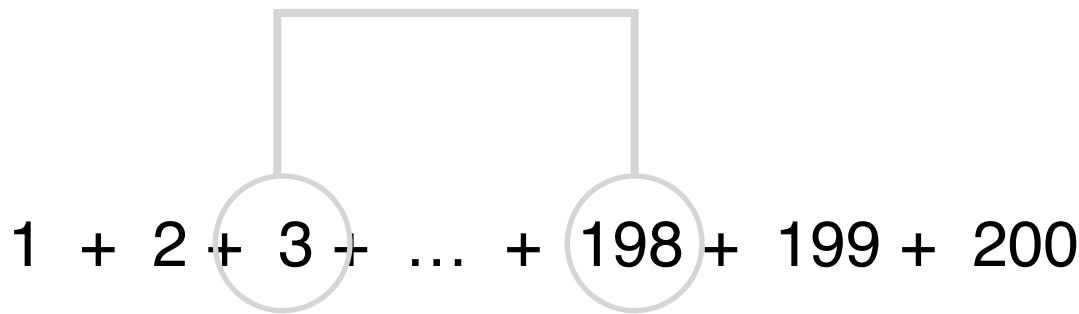


$$1 + 2 + 3 + \dots + 198 + 199 + 200$$
A diagram illustrating the sum of integers from 1 to 200. The terms 3, 4, 5, ..., 198 are grouped together by a bracket, visually representing the concept of abstraction or generalization in mathematics.

$$\frac{200 \times (201)}{2}$$

Abstraction

- Can we do it easily with 2,000?
- How about 20,000?
- What stays the same? What is different?



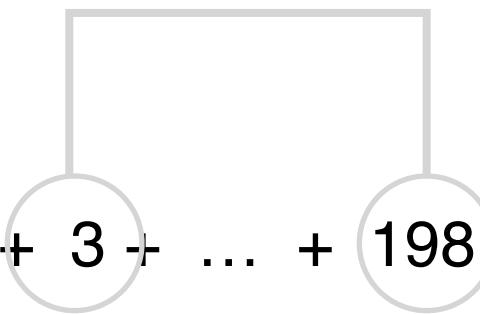
$$\underline{200 \times (201)}$$

2

Abstraction

- Work through the problem we ultimately get ? = ("blank"/2) \* ("blank"+1)

- Can we do it easily with 2,000?
- How about 20,000?
- What stays the same? What is different?

$$1 + 2 + \textcircled{3} + \dots + \textcircled{198} + 199 + 200$$


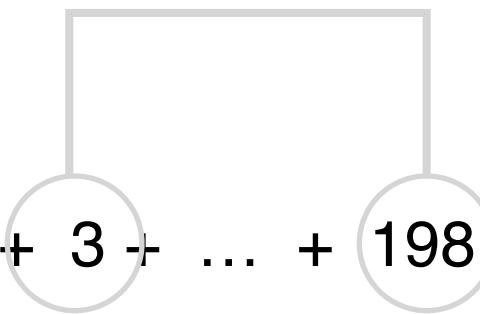
$$\frac{200 \times (201)}{2}$$

Abstraction

$$\frac{X \times (X+1)}{2}$$

Algorithm

- Can we do it easily with 2,000?
- How about 20,000?
- What stays the same? What is different?

$$1 + 2 + \textcircled{3} + \dots + \textcircled{198} + 199 + 200$$


$$\frac{200 \times (201)}{2}$$

Abstraction

$$\frac{X \times (X+1)}{2}$$

Algorithm

Algorithm = function

$$Y = f(X) \quad 20,100 = \frac{X}{2} \times (X+1)$$

variable

Table 1

	X	200	
	X+1	201	
	X/2	100	
	(X+1)x(X/2)	20,100	

Automate & Test in a spreadsheet or a program

# **Integrating Design Thinking and Computational Thinking**

**From User to Producer**  
**從使用者心智模式**  
**切換到生產者心智模式**





你有没有用多過50%的功能？

# 為何他們對產品所需的功能存 有不同想法？



Adapted from Donald Norman, "The Design of Everyday Thing"

MAKE VISIBLE

## The Product-Market Fit Pyramid



Source: A Playbook for Achieving Product Market Fit by Dan Olsen

**因為他們有不同的心智模式**

- ✓ 從使用者角色轉換成生產者角色
- ✓ 從人物故事轉化為生產系統
- ✓ 從了解使用者體驗進展至建立系統  
和數據
- ✓ 考慮成本效益

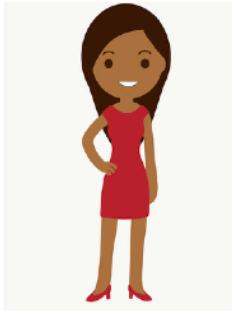
Design Thinking	Computational Thinking	Description
Empathy	Decomposition	Collect and analyse <u>stories and data</u> to understand the stakeholders and discover their needs.
Definition	Patterns	Synthesise recurring <u>persona</u> , <u>contexts</u> , <u>artefacts</u> , and <u>scenario</u> patterns to formulate problem ( <b>who, what, and why</b> ).
Ideation	Abstraction	Develop socio-cultural and technical systems to reshape user stories and data flow.
Prototyping	Algorithm	Build <u>experience prototype</u> and <u>computational models</u> to represent future use cases for validation.
Testing & Implementation	Automation & Evaluation	Continuous testing, improvement and automation to evaluate <u>functional</u> , <u>emotional</u> , <u>social</u> , <u>economic</u> and <u>environmental</u> impacts (how and how much).

**身同感受  
(Empathise)**

人物 (WHO)

# Persona (人物輪廓)

參考資料來源: Interaction Design Foundation



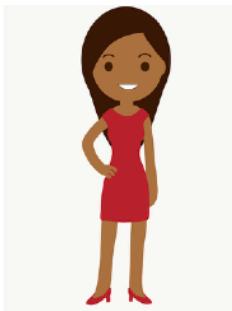
名字:  
年齡:  
性別:  
教育程度:  
家庭關係:  
職業:

生活方式偏好:  
購物習慣:  
媒體使用習慣:  
生活目標:  
對接受新事物的取態:  
生活日程:

方法:訪談及觀察

# Persona (人物輪廓)

參考資料來源: Interaction Design Foundation



**名字:** 李敏

**年齡:** 36歲

**性別:** 女

**教育程度:** 高中

**家庭關係:** 與丈夫共育一子(6歲)

**職業:** 全職家庭主婦

**生活方式偏好:** 喜歡煮菜，佈置家居，為小朋友編排活動。

**購物習慣:** 只會在線下實體店用現金或信用卡購物。

**媒體使用習慣:** 喜歡追劇，不論看電視或上網。也會看新聞。

**生活目標:** 希望孩子能進好學校，學業成績優異。

**對接受新事物的取態:** 比較保守，以安穩致上。

**生活日程:** 照顧小兒上學放學和打理家庭的起居飲食。

## 方法:訪談及觀察

# Persona Segmentation Table (人物分類表)

	年齡	性別	聘有家傭	家庭人數	居住狀況	教育程度	職業	網購習慣	每週買菜次數
1	18-24	男	有(同住)	1	父母親、兄弟姊妹及其配偶丈夫/妻子兒女	小學	漁農業	只會在線下實體店用現金購物	一週一次
2	25-35	女	有(不同住)	2	父母親、兄弟姊妹及其配偶	中學	製造業	只會在線下實體店用現金或信用卡購物	一週兩次
3	36-45		沒有	3-4	父母親及丈夫或妻子	高專	批發/分銷	在線下實體店用現金、信用卡或支付系統購物	一週三次
4	46-55			5-6	丈夫或妻子/男友或女友	大學	零售業	只會在線上用支付系統購物	一週四次
5	56-65			>7	丈夫或妻子及兒女	研究院	服務業	在線上或線下用支付系統購物	一週五次
6	66-				丈夫或妻子/男友或女友		政府/非政府	在線上或線下用信用卡或支付系統購物	一週六次
					獨住		全職照顧家庭	在線上或線下用現金、信用卡或支付系統購物	一週七次

方法:調查研究(例如問卷)

# Persona Segmentation Table (人物分類表)

	年齡	性別	聘有家傭	家庭人數	居住狀況	教育程度	職業	網購習慣	每週買菜次數
1	18-24	男	有(同住)	1	父母親、兄弟姊妹及其配偶丈夫/妻子兒女	小學	漁農業	只會在線下實體店用現金購物	一週一次
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					獨住		全職照顧家庭	在線上或線下用現金、信用卡或支付系統購物	一週七次

# 界定問題 (Define)

# THE SHOPPING CART EXPERIENCE



**USER EXPERIENCE AS JOURNEY AND STORY**

# THE JOURNEY AS A STORY

elements (元素)

1. 人 (人物) PERSONA
2. 景 (場景) CONTEXT
3. 物 (物件) ARTEFACTS
4. 用 (用例) USE CASE

structure(結構)

1. 起 (背景) BACKGROUND
2. 承 (問題) CHALLENGE
3. 轉 (回應) RESPONSE
4. 合 (結果) RESULT

資料來源---劇本導引：  
資訊時代產品與服務設計新法  
作者余德彰，林文綺，王介丘

# **Journey Mapping(歷程圖)**

# **Scope: Where to Start and Where to End**

## **如何開展，如何結束**

# **現在的歷程**

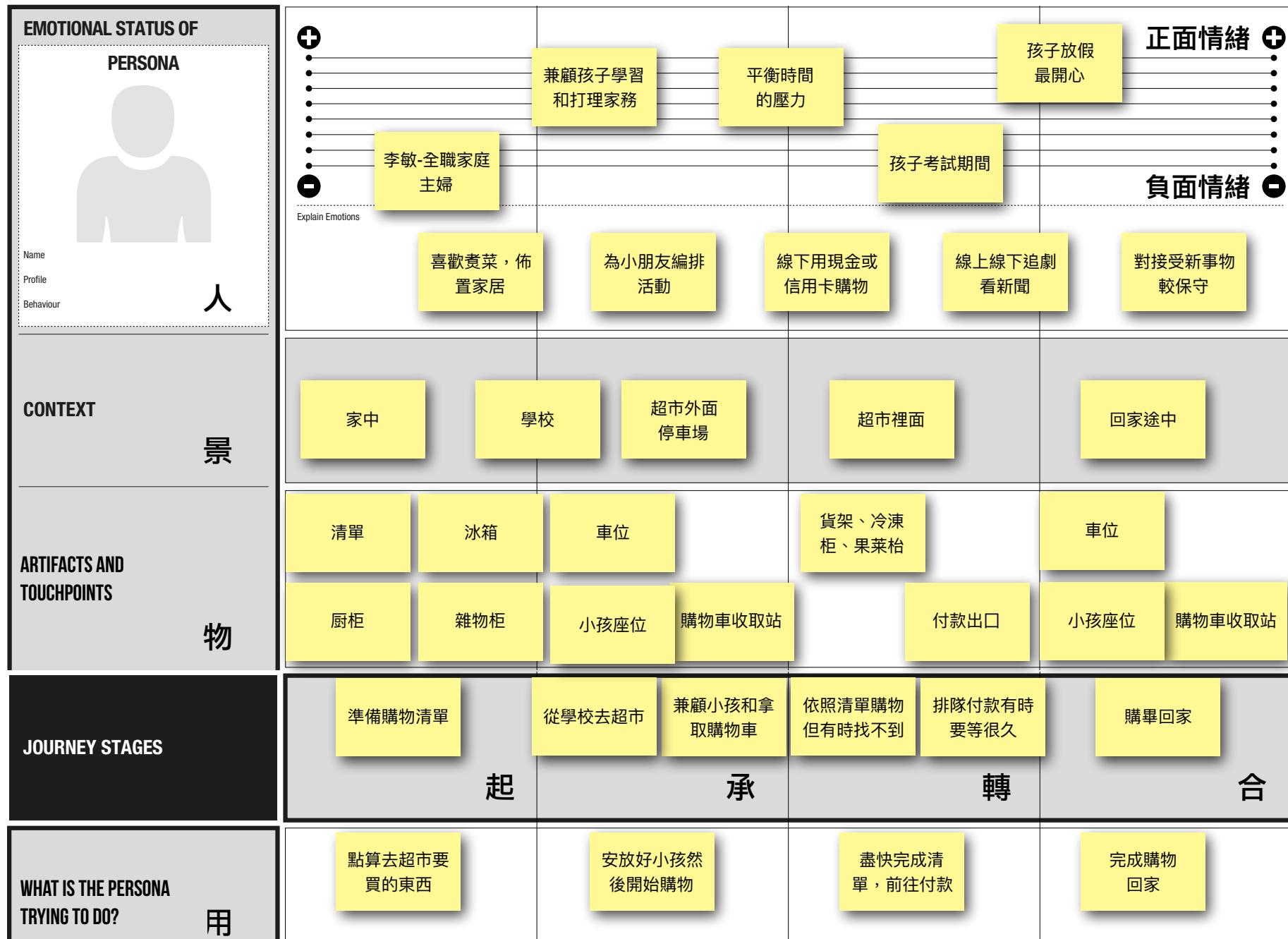
# Current Journey Mapping (現在歷程圖)

designthinkersacademy

EMOTIONAL STATUS OF PERSONA						
 <p>Name Profile Behaviour</p>	<p>人</p>					<p>正面情緒 </p>
						<p>負面情緒 </p>
		Explain Emotions				
CONTEXT						
ARTIFACTS AND TOUCHPOINTS						
JOURNEY STAGES		起	承	轉	合	
WHAT IS THE PERSONA TRYING TO DO?						

# Current Journey Mapping (現在歷程圖)

designthinkersacademy



# POINT OF VIEW TABLE (人物觀點表)

Persona 人物 Who	Need 需求 What	Insight 洞見 Why
全職媽媽	同時照顧小孩和在超市內方便購得所需物品。	她可以有充分的時間打理家務，照顧小孩，提升家庭和自我的幸福。
例子		

參考資料來源: Interaction Design Foundation

## 問題陳述 (Problem Statement):

我們怎樣使到 \_\_\_\_\_ (who) 能解

決 \_\_\_\_\_

\_\_\_\_\_ (what) 的問題，達到

\_\_\_\_\_ (why) 的目標。

## 問題陳述 (Problem Statement):

我們怎樣使到全職媽媽 (who) 能解  
決同時照顧小孩和在超市內方便購得  
所需物品 (what) 的問題，達到善用  
時間，提升家庭和自我幸福 (why) 的  
目標。

**能否重新界定問題？**

## 問題陳述 (Problem Statement):

我們怎樣使到全職媽媽 (who) 能解  
決同時照顧小孩和在超市內方便購得  
所需物品 (what) 的問題，達到善用  
時間，提升家庭和自我幸福 (why) 的  
目標。

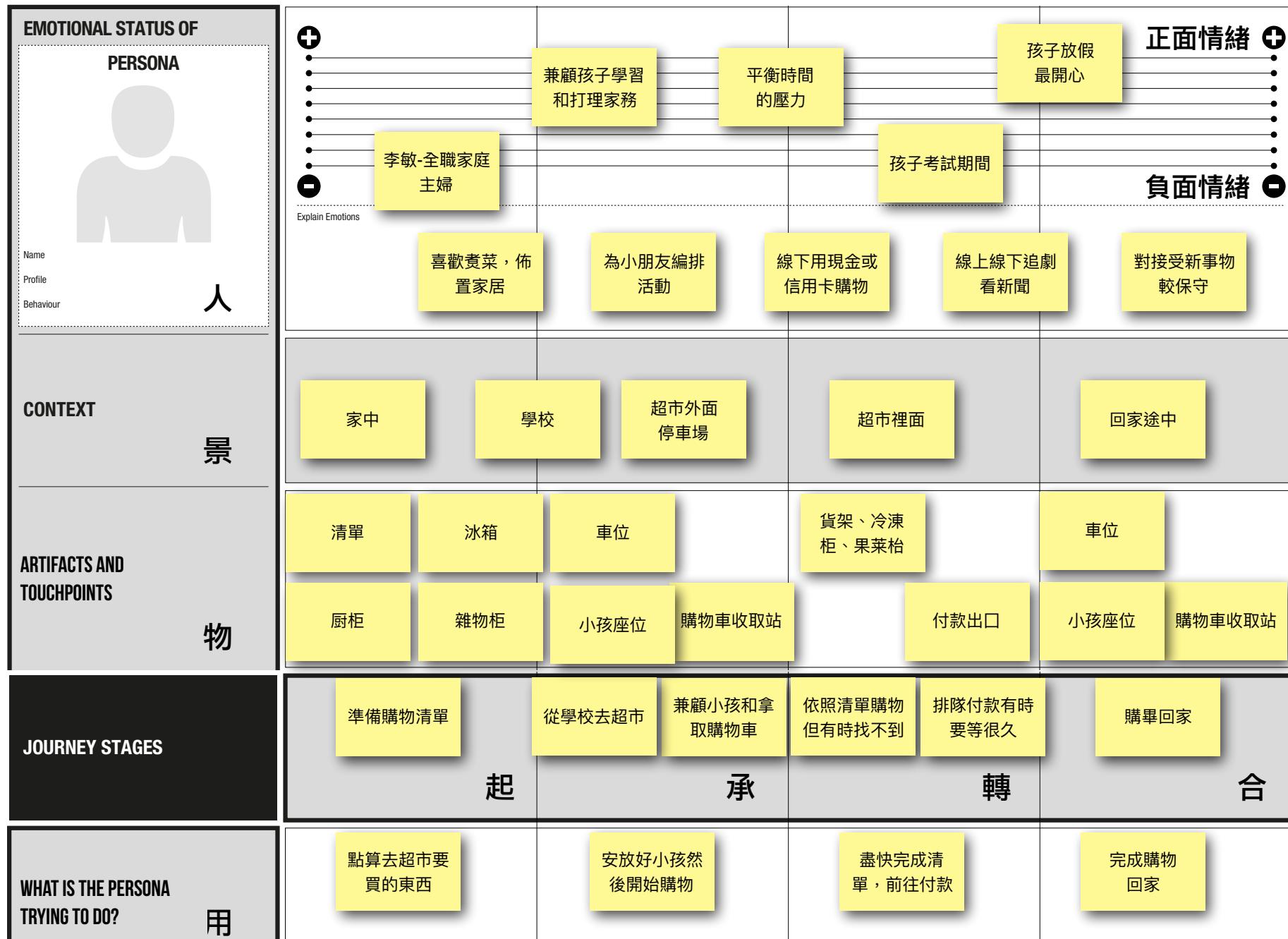
## 問題陳述 (Problem Statement):

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目標。

# 分解法:從歷程圖到故事圖 (Decomposition)

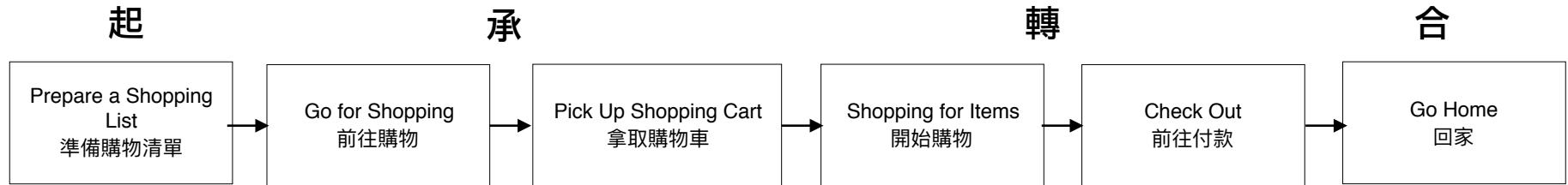
# Current Journey Mapping (現在歷程圖)

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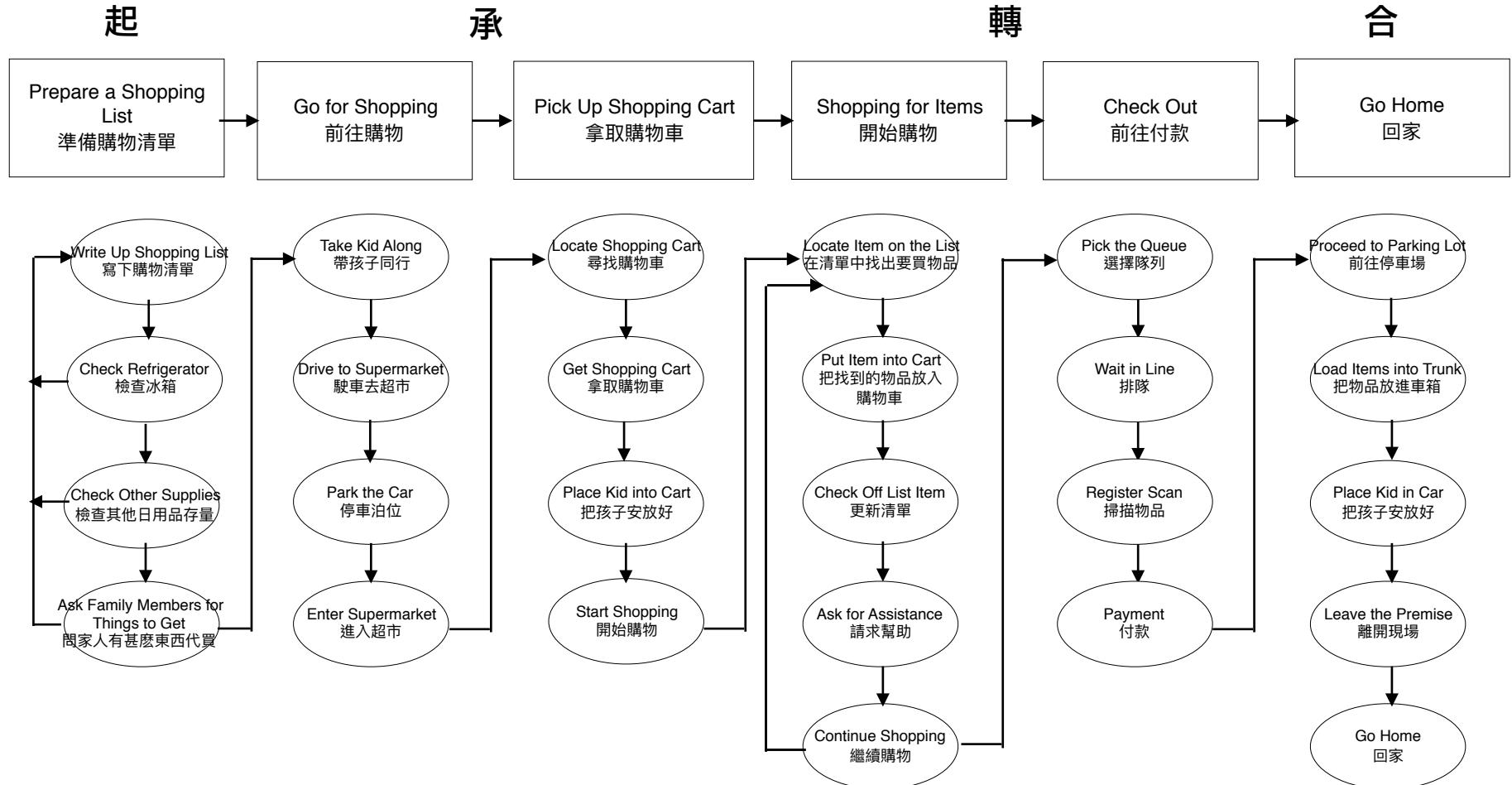
## Story Map of a House Wife Shopping at a Supermarket

### 家庭主婦超市購物故事圖



# Story Map of a House Wife Shopping at a Supermarket

家庭主婦超市購物故事圖



# 創意發想

## (Ideate)

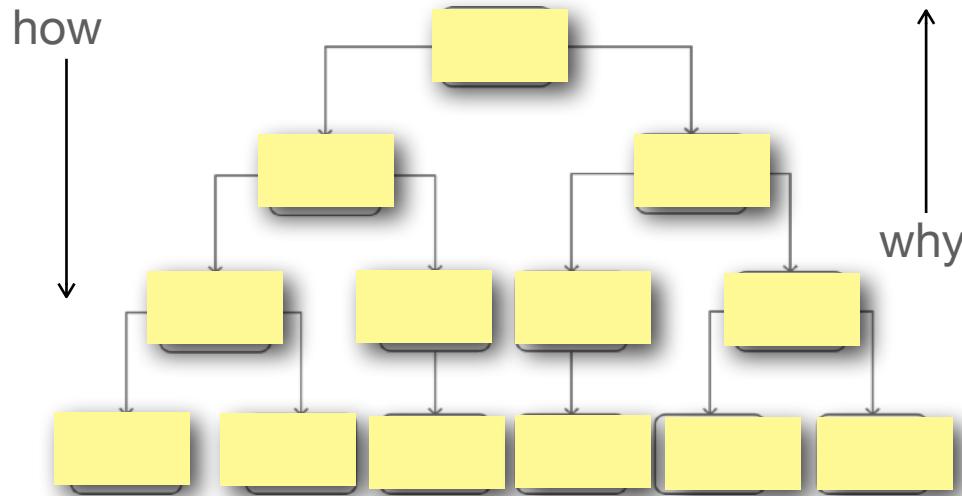
# **尋找樣式和規律 (Patterns)**

# **Why/How Laddering 為何如何層級圖**

# Why How Laddering 為何如何層級圖

參考資料來源: d.school

我們如何能..      HOW MIGHT WE...



## 問題陳述 (Problem Statement):

我們怎樣使到全職媽媽 (who) 能解  
決同時照顧小孩和在超市內方便購得  
所需物品 (what) 的問題，達到善用  
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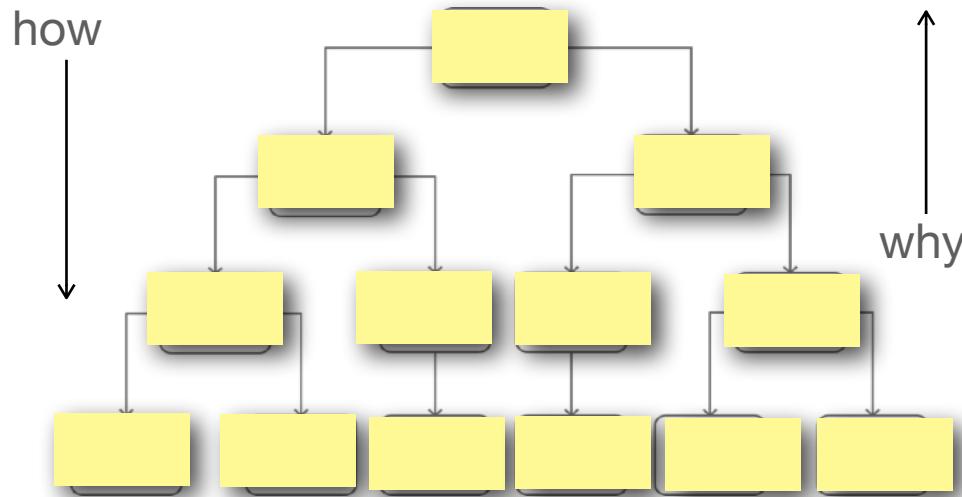
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# Why How Laddering 為何如何層級圖

參考資料來源: d.school

我們如何能..

HOW MIGHT WE...

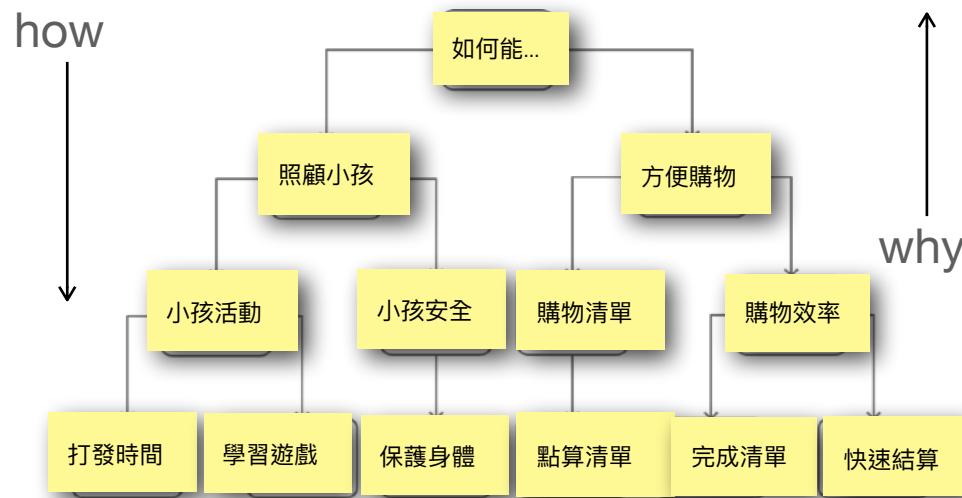


# Why How Laddering 為何如何層級圖

參考資料來源: d.school

我們如何能..

HOW MIGHT WE...



我們如何能使到全職媽媽 (who) 能解決同時照顧小孩和方便  
購得所需物品 (what) 的問題，達到善用時間，提升家庭和自  
我幸福 (why) 的目標。

# 頭腦風暴

# Brainstorming

打發時間 學習遊戲 保護身體 點算清單 完成清單 快速結算



## 頭腦風暴提示

- 意念越多越好
- 把post-it notes貼在白板上(每一張只有一個意念)
- 鼓勵每一個人都參與
- 放開懷抱，擱置批評
- 各自分析，選擇所好

隸屬關係圖

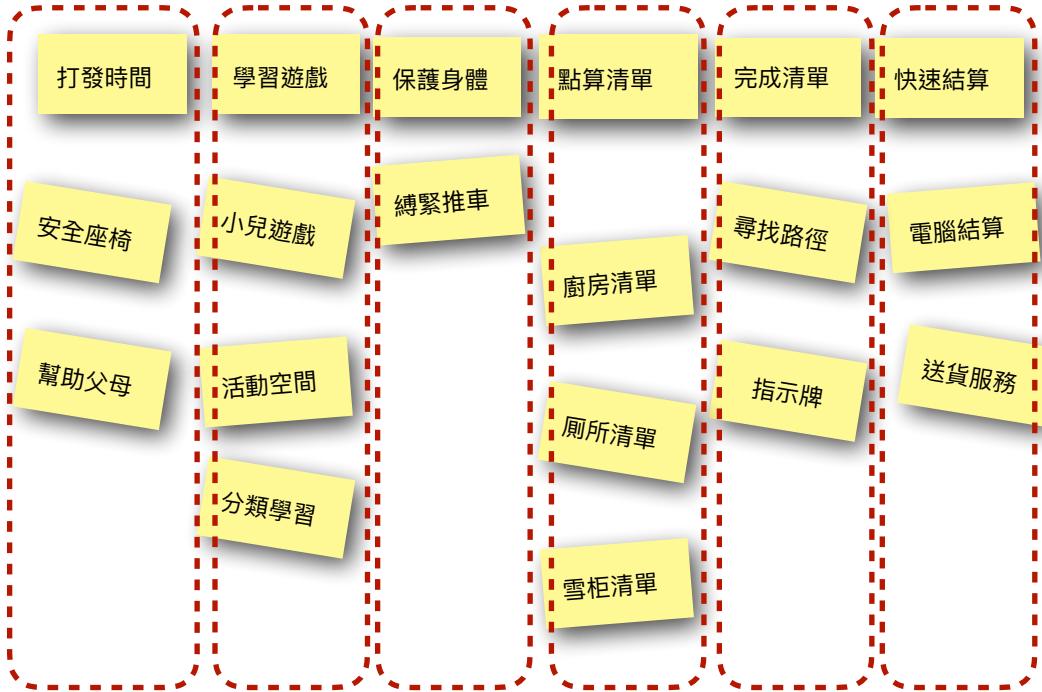
Affiliation Diagram

打發時間 學習遊戲 保護身體 點算清單 完成清單 快速結算



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## 隸屬關係圖

- 把相關的Post-it放在一起
- 重覆出現的可移除
- 意義一樣的可移除

# 樣式和規律(Patterns)

## Features

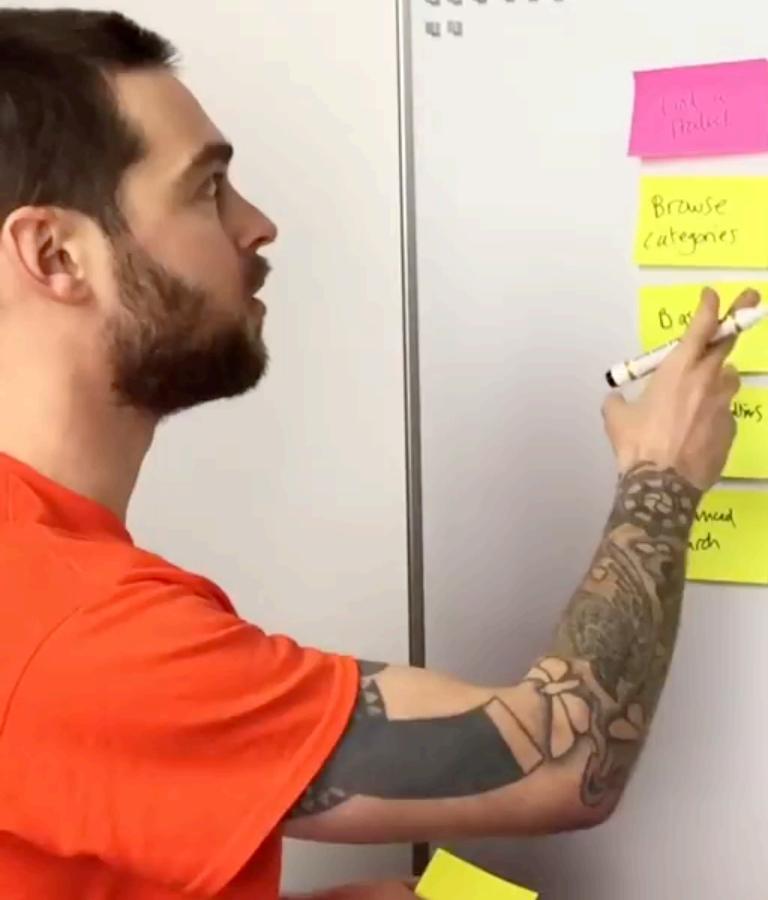


## Shopping List

- 建立清單
- 完成清單
- 計算支出費用

# 組合成清單系統(Shopping List)

**USER NEED: CONVENIENT SHOPPING WITH EASE AND PLEASURE**







Source: Alizilia

Design Thinking	Computational Thinking	Description
Empathy	Decomposition	Collect and analyse <u>stories and data</u> to understand the stakeholders and discover their needs.
Definition	Patterns	Synthesise recurring <u>persona</u> , <u>contexts</u> , <u>artefacts</u> , and <u>scenario</u> patterns to formulate problem ( <b>who, what, and why</b> ).
Ideation	Abstraction	Develop socio-cultural and technical systems to reshape user stories and data flow.
Prototyping	Algorithm	Build <u>experience prototype</u> and <u>computational models</u> to represent future use cases for validation.
Testing & Implementation	Automation & Evaluation	Continuous testing, improvement and automation to evaluate <u>functional</u> , <u>emotional</u> , <u>social</u> , <u>economic</u> and <u>environmental</u> impacts (how and how much).

# **ENRICHING UX WITH COMPUTATIONAL THINKING**

# Case Study: Redesigning the Lobby Experience



Exploring the Hotel Experience of the Future with Marriott Hotels

Source: MIT Mobile Experience Lab



## THE PROBLEM STATEMENT (关注who, what and why):

了解用户体验、痛点及有待创造的独特价值。

## **PROBLEM STATEMENT:**

How might we make marriott guests  
feel like **nodes within a network**  
while encouraging  
interactions in the lobby space?

**Source: MIT Mobile  
Experience Lab**

# THE JOURNEY AS A STORY

## Elements (元素)

1. PERSONA - 人 (人物)
2. CONTEXT - 景 (場景)
3. ARTEFACTS - 物 (文物)
4. SCENARIOS - 用 (情況)

## Structure(結構)

1. BEGINNING - 起 (背景)
2. CHALLENGE - 承 (問題)
3. RESPONSE - 轉 (回應)
4. RETURN - 合 (收成)

資料來源---劇本導引：  
資訊時代產品與服務設計新法  
作者余德彰, 林文綺, 王介丘

HOME

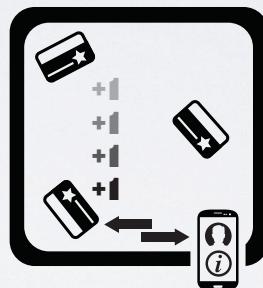


Joins loyalty program, creates a profile & installs phone app.

LOBBY



Given physical loyalty card on check-in — stores profile info, points & doubles as room key.



(Can be done in lobby or room)  
Set availability via orientation of card. (Lobby only) Loyalty points awarded to cards at the same table. Table lights up to show activity, interests shown on table & lobby display map. Profiles added to app network.

ROOM

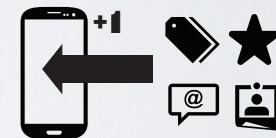
BOOKING

CHECK-IN

MEETUP

RETURN

## INTERACTIONS OUTSIDE HOTEL



Prompted by app to tag places visited, ratings & social media for points — added to in-app database of recommendations.

Source: MIT Mobile Experience Lab

## **KEY LESSON: UX + DATA**

**The data factor is pervasive throughout the journey.**

HOME

LOBBY

ROOM

BOOKING

CHECK-IN

MEETUP

Source: MIT Mobile  
Experience Lab

# USER JOURNEY MAP

profile, activity, points

Booking  
Data

Check-in  
Data

Interact-  
ion Data

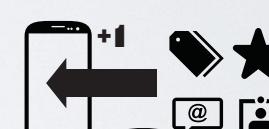
Review  
Data

Give  
check  
in point



profile, activity, points

Profile  
of user  
on table  
activity  
points  
of friends at  
the same  
table. Table  
lights up  
to show  
activity,  
interests  
shown  
on table &  
lobby display  
map.  
Profiles  
added to  
app network.



profile, activity, points

Places  
Media  
Group  
Actions.



Data-  
base

profile, activity,  
points

# **Patterns: Persona, Contexts, Artefacts, Use Cases**

# avid social explorer

Gen Y travelers seeking personalized yet serendipitous experiences, good company to share them with, and the ability to capture and celebrate them.



# PERSONA

# bored lobbygoer in transition

Anyone using the lobby as a meeting place or gathering point, looking to pass the time and avoid awkwardness.



## Source: MIT Mobile Experience Lab

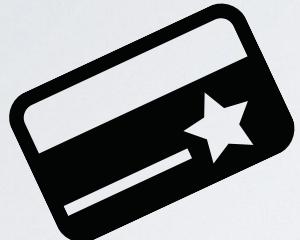


## CONTEXTS

Source: MIT Mobile Experience Lab

# ARTEFACTS

## THE CARD



## THE TABLE



## THE APP



room key  
point counter  
status symbol

the social hub

shared memory  
social networks  
recommendations

## LOYALTY

## INTERACTION

## DATA

Source: MIT Mobile  
Experience Lab



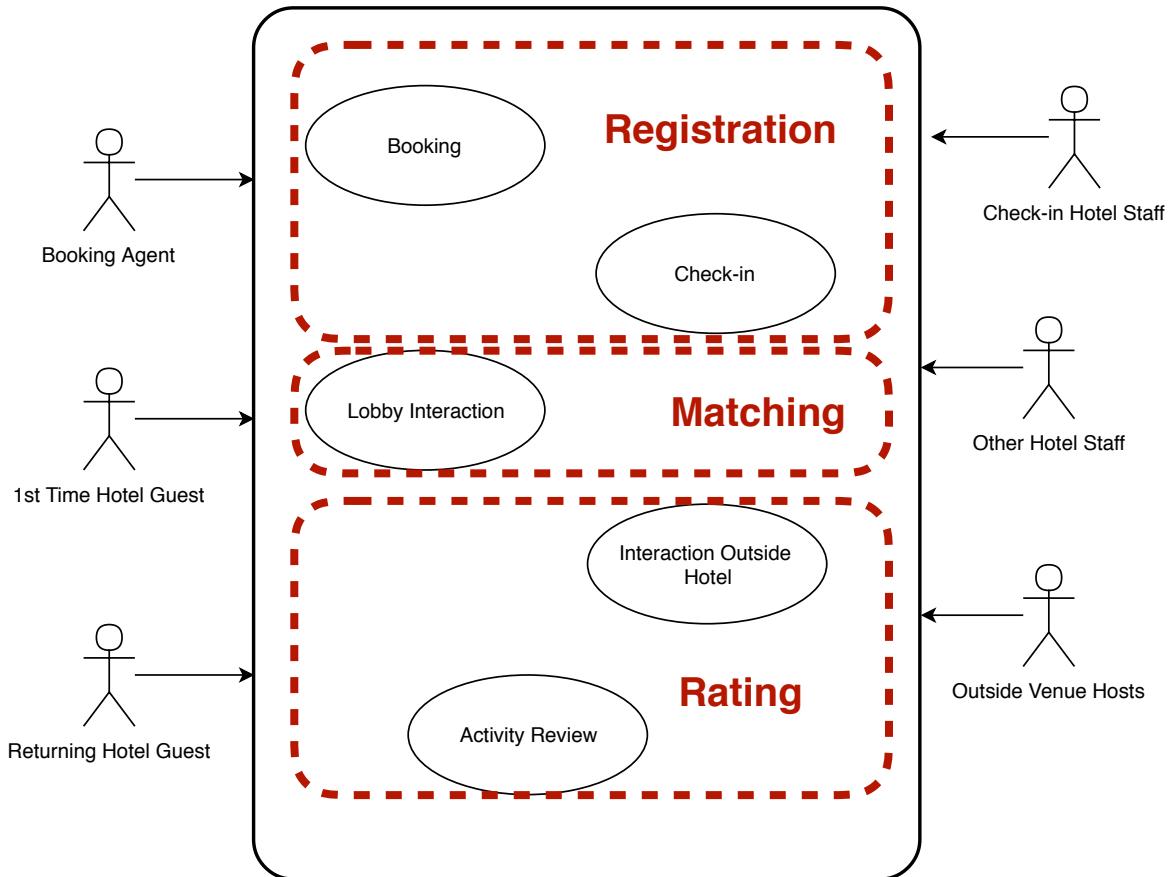
# ROLE PLAY PHYSICAL EXPERIENCE

## USE CASES

Source: MIT Mobile Experience Lab

**Develop use cases (用例) from journey map.**

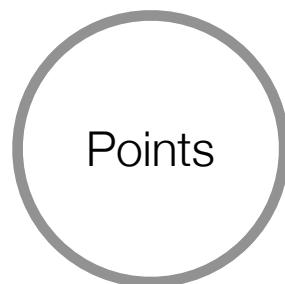
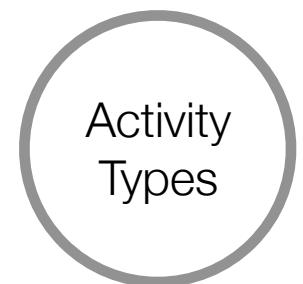
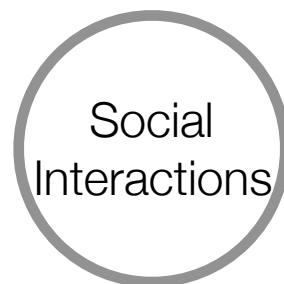
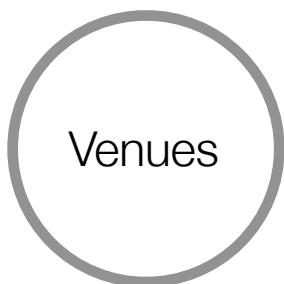
# **Abstraction**



## Use Cases of a Hotel Loyalty App

**Derive data entities from use cases.**

# Data Entities to be Tracked



- e.g.
  - 1st time guests
  - Returning guests
- e.g.
  - Starbuck
  - Bar inside hotel
  - Boston Metropolitan Museum
- e.g.
  - Add friends
  - Take pictures
  - Share rides
  - Split bills
- e.g.
  - Museum tour
  - Bar hopping
  - Scenic picture taking
  - Business meeting
- e.g.
  - Revisit
  - Dine in hotel
  - Shop in hotel
  - Initiate contact
  - Give reviews

# **Prototyping (開展原型)**

**How would the team find out if the new  
installation will be adopted?  
如何確保裝置會被採納?**



YOU'RE NOT BUILDING  
A PRODUCT...  
YOU'RE GETTING  
CUSTOMER FEEDBACK!

responses from customers. And while somebody might say well, I need another week to finish

KAUFFMAN  
FOUNDERS  
SCHOOL

MORE VIDEOS



## USE M.V.P.s TO RUN EXPERIMENTS

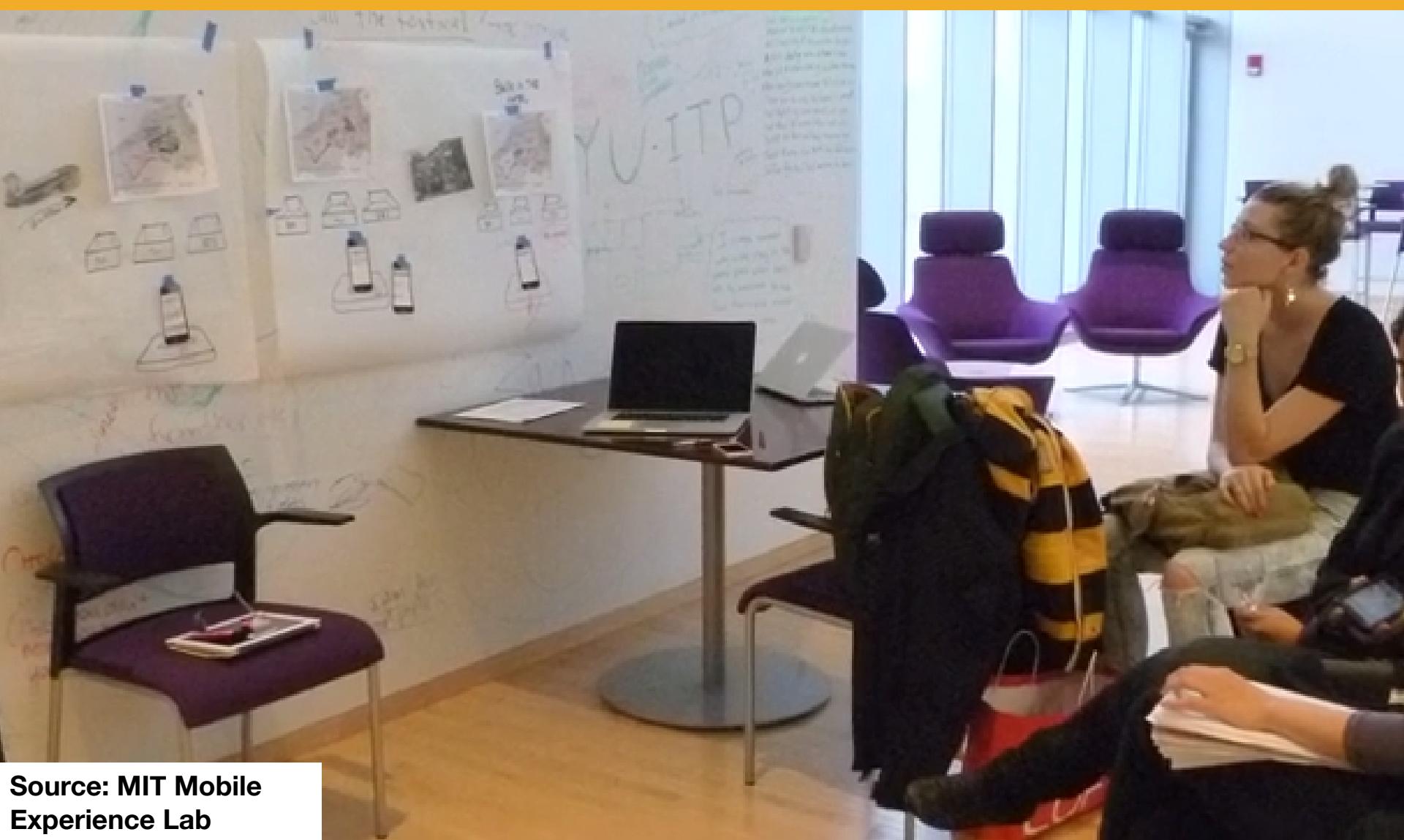
you're just throwing them out, when you go out of the building with an MVP, you have

MORE VIDEOS

KAUFFMAN  
FOUNDERS  
SCHOOL

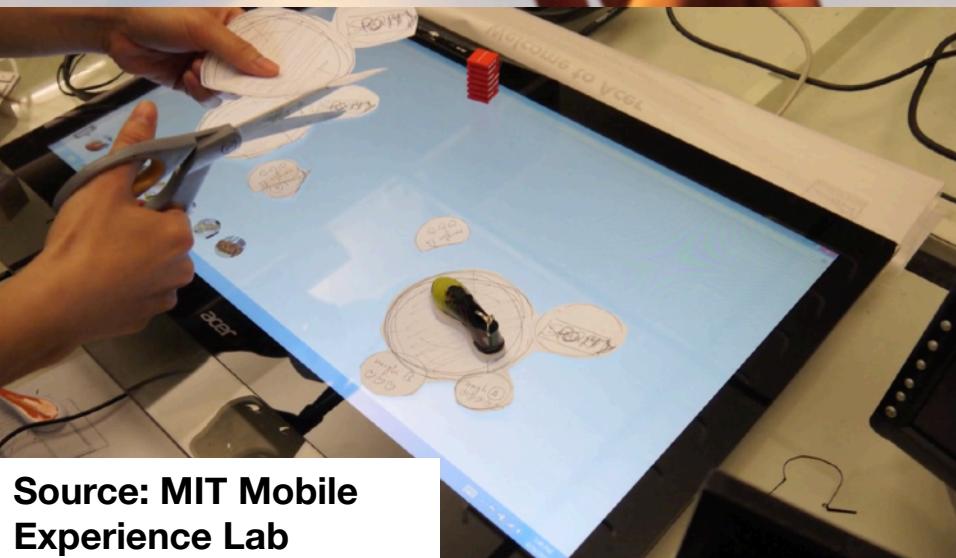
# 最小化可行产品 MVP(Minimum Viable Product)



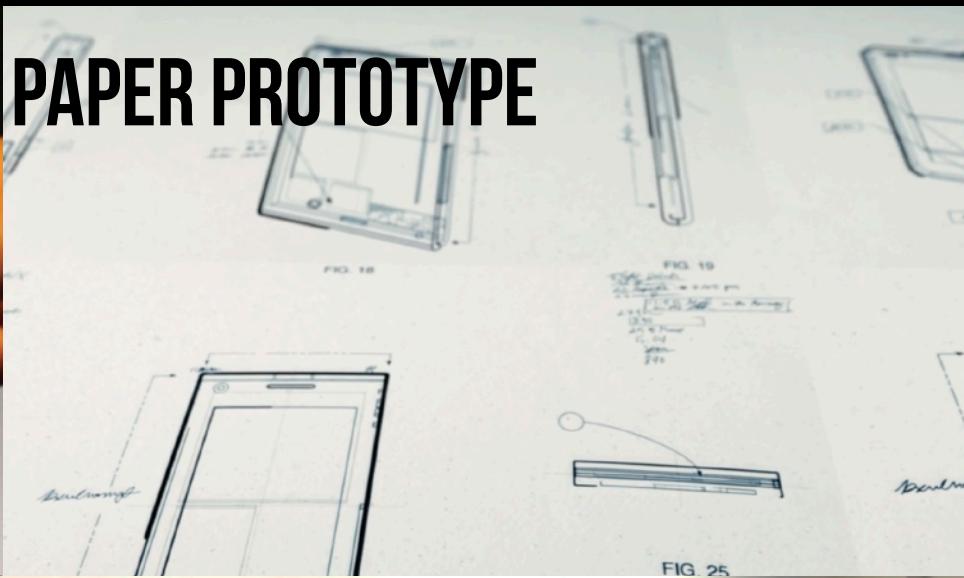


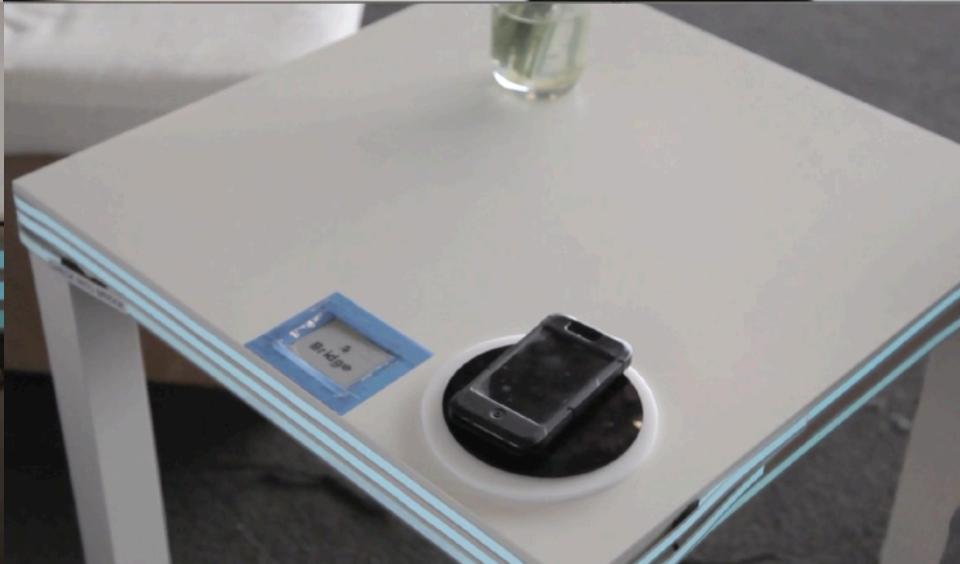
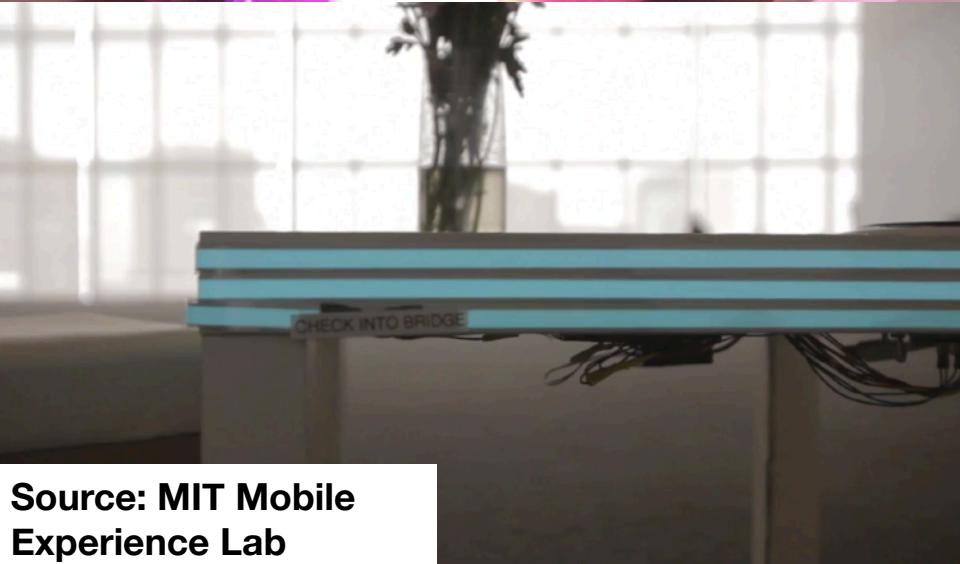
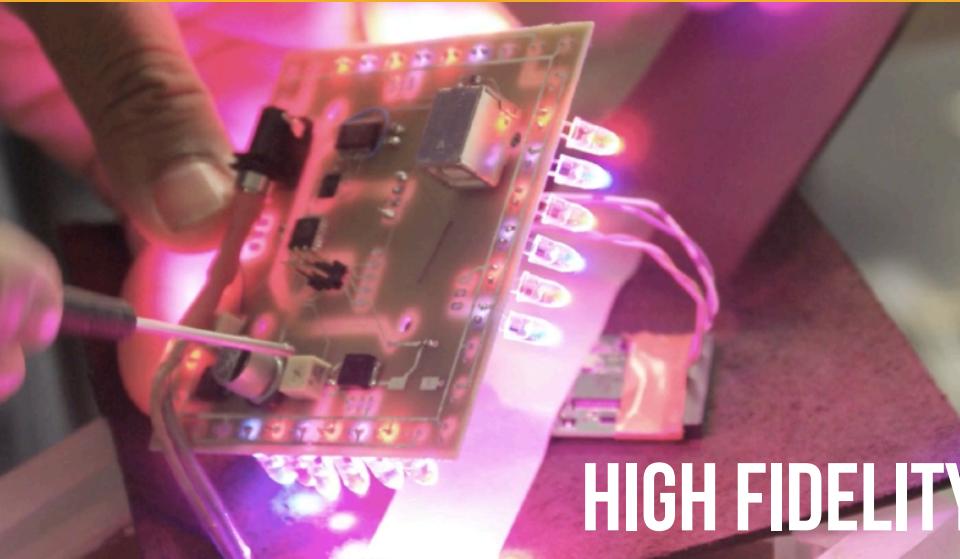
**Source: MIT Mobile  
Experience Lab**

# SKETCH AND PAPER PROTOTYPE



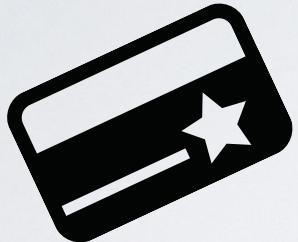
Source: MIT Mobile Experience Lab





Source: MIT Mobile Experience Lab

## THE CARD



room key  
point counter  
status symbol

## THE TABLE



the social hub

## THE APP



shared memory  
social networks  
recommendations

## LOYALTY

## INTERACTION

## DATA

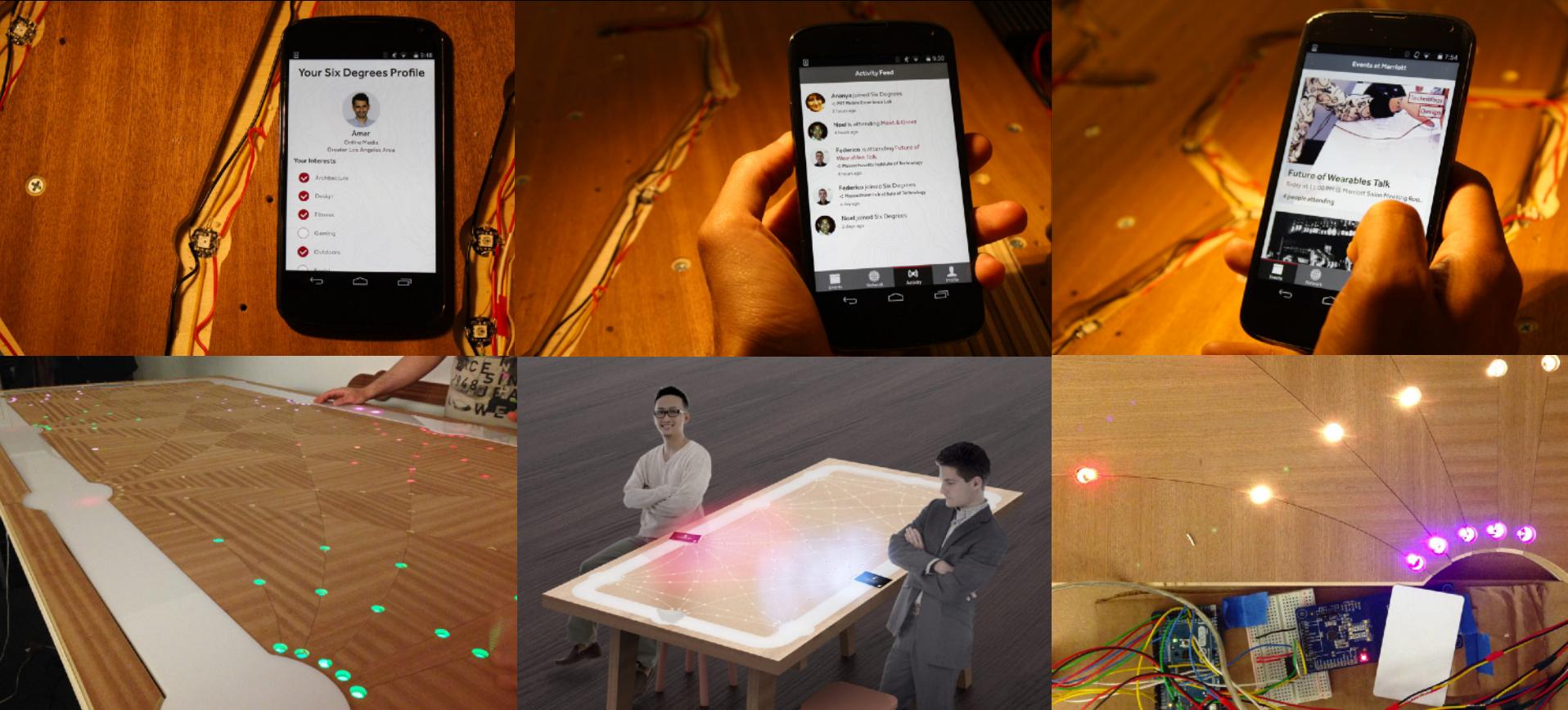
Source: MIT Mobile  
Experience Lab



## THE SOLUTION (关注how, and how much):

建立组织、社群系统、不断创新的科技平台，及持续具扩展性的商业模式。

# **Algorithm, Automation & Testing**



“Computer Science itself is not really about computers or programming for that matter. It’s really **about information, how you think about it** and how you represent it with what methods or algorithms you can process it.”

David J. Malan , Gordon McKay  
Professor of the Practice of Computer  
Science at Harvard University

**To understand and construct our world  
through data models.**

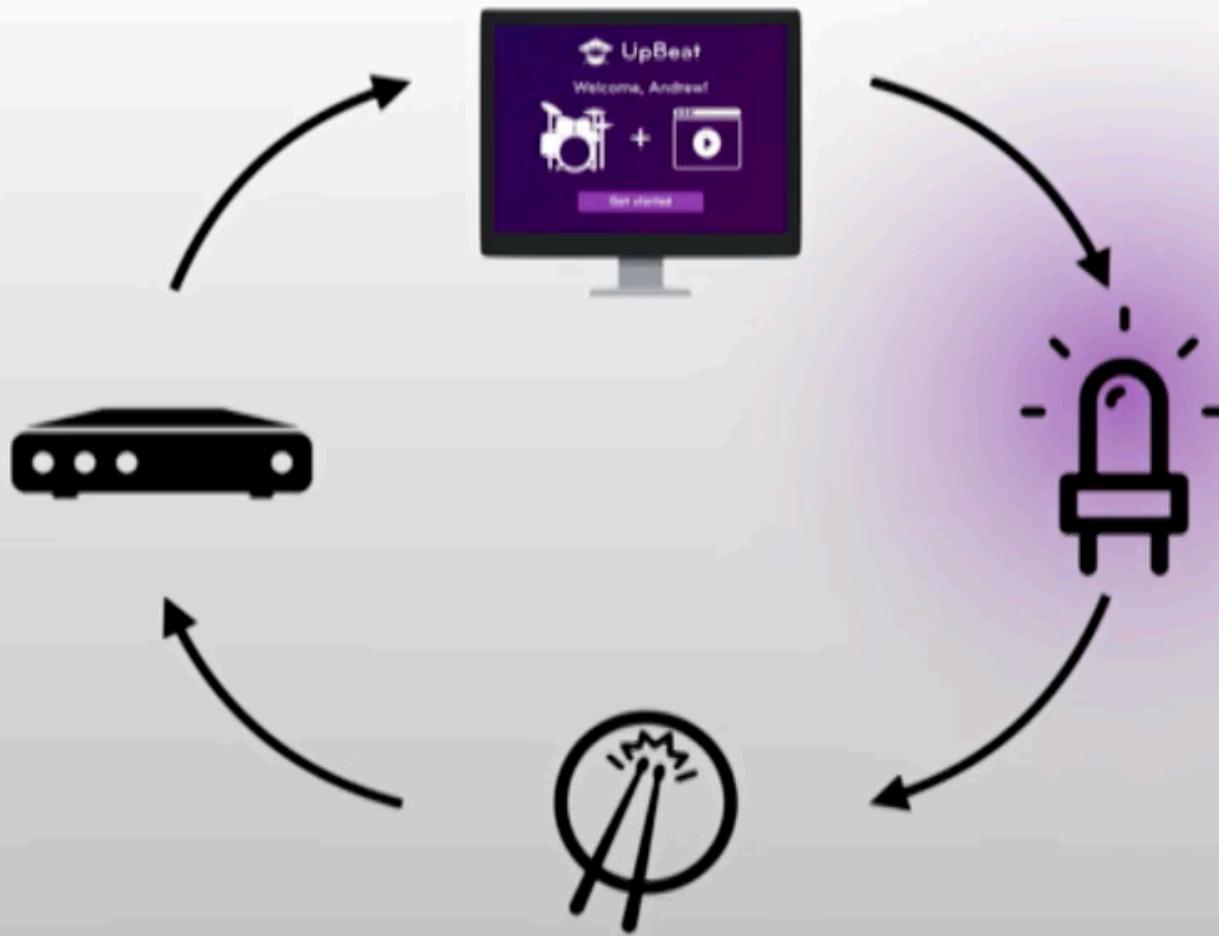
**HOW DOES THAT RELATE TO DATA DRIVEN PRODUCT & SERVICES?**

# **INFRASTRUCTURE FOR NEW MEDIA APPLICATIONS**

## Case Study: Upbeat

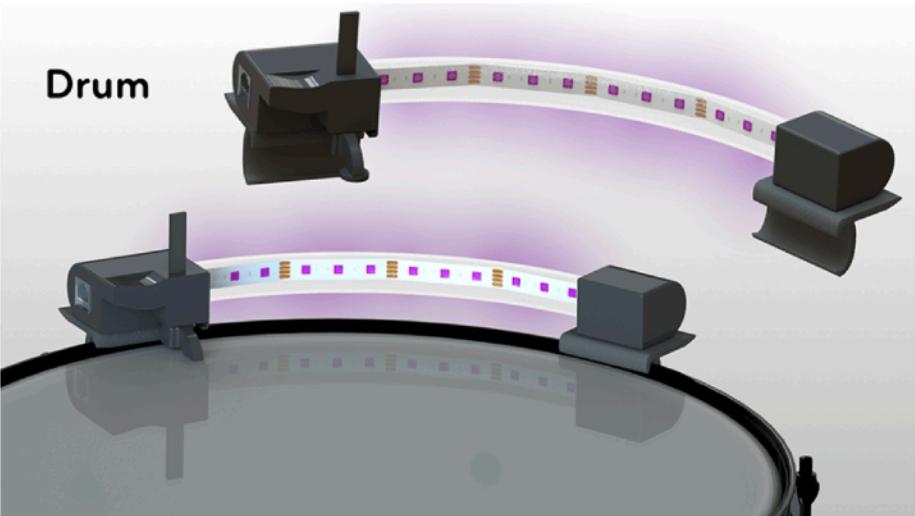


<https://vimeo.com/114149570>

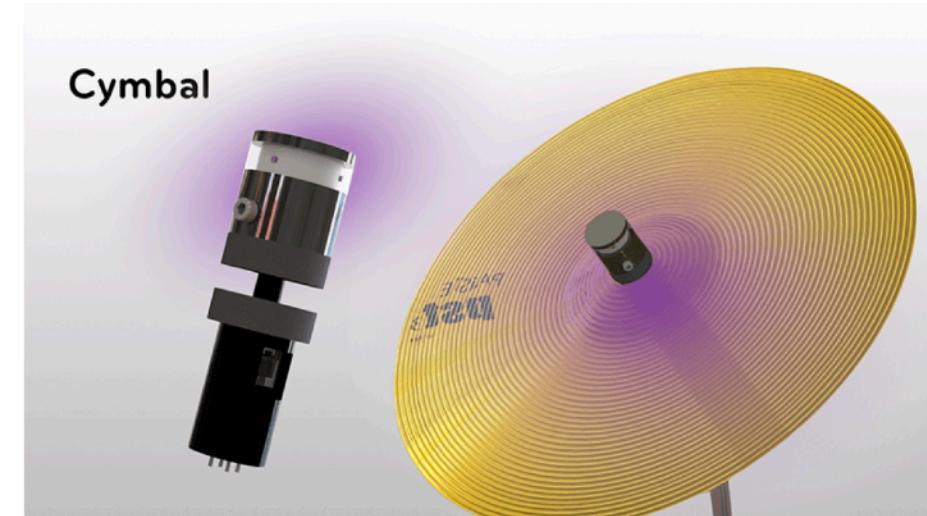


<https://vimeo.com/114149506>

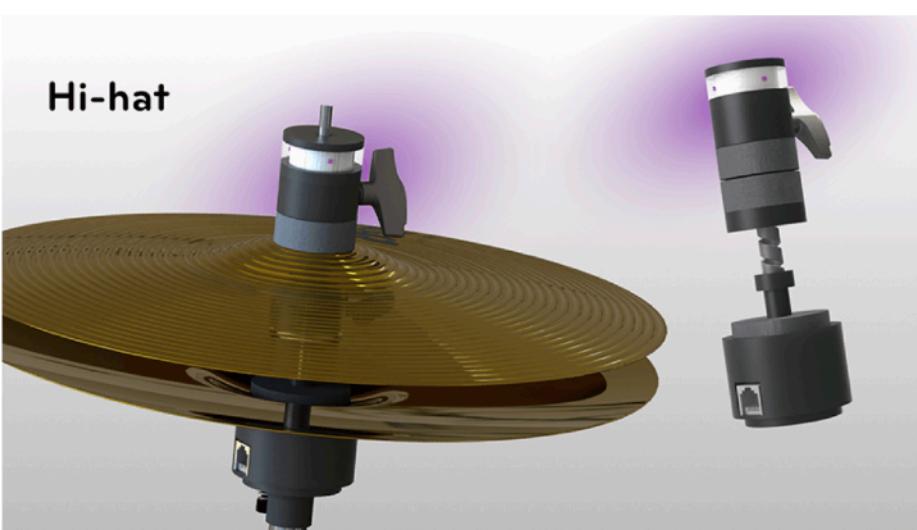
**Drum**



**Cymbal**

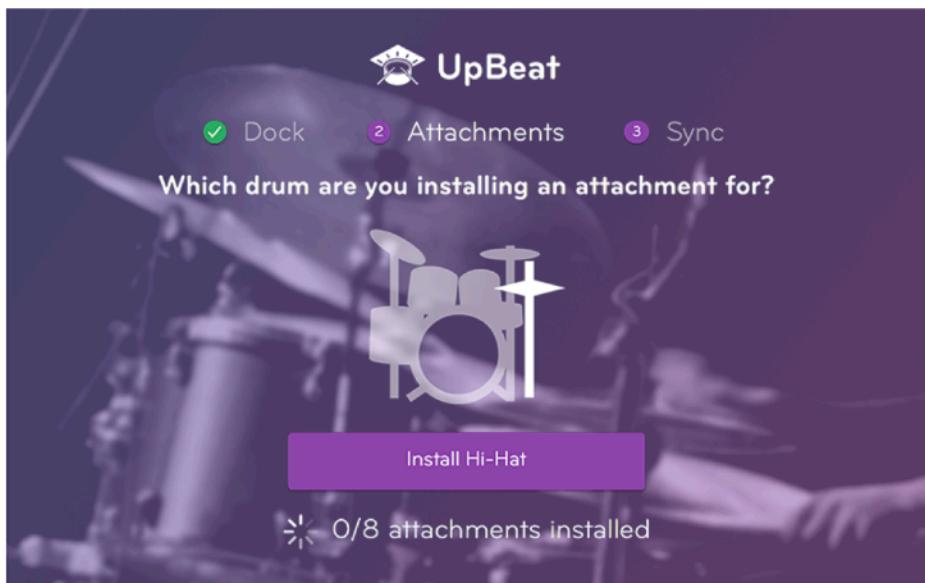


**Hi-hat**



**Dock**





Installing a new UpBeat attachment

A screenshot of UpBeat's practice mode. The interface has a purple header bar with the word "Practice" on the right. Below the header, the title "Eighth Note Rock Beat 1" and the author "Jim Chapin" are displayed. On the far right, there's a "GOOD!" message with a small circular icon. The main area shows two staves of musical notation. The top staff is highlighted with a purple glow. Both staves consist of eighth notes, some of which have an "X" through them, indicating they are to be played or missed. The time signature "4/4" is indicated at the beginning of both staves.

UpBeat's practice mode, similar to Guitar Hero or Rock Band

**Library**

SORT BY DATE ADDED ▾

**Drum Rudiments**  
Terence Fletcher

Amen, Brother    2:32    135 BPM    87% RECORD

The Winstons

Seven Nation Army  
The White Stripes

Brianstorm  
The Arctic Monkeys

+ ⌂

**Learn**  
Amen, Brother

Closed Hi-Hat + Snare

||

**Practice**  
Amen, Brother

23 HITS

PERFECT!

||

**Record**

BAR 0005 BEAT 3

||

**Settings**

SENSORS

**Snare Drum**  
Connected, 54% battery

**Bass Drum**  
Connected, 48% battery

**Hi-Hat**  
Not connected

Tom-Tom

☰

**Settings**  
Sync New Drum

**Drum Type** Snare Drum ▾

**Drum Name** optional

Calibrating...

Done

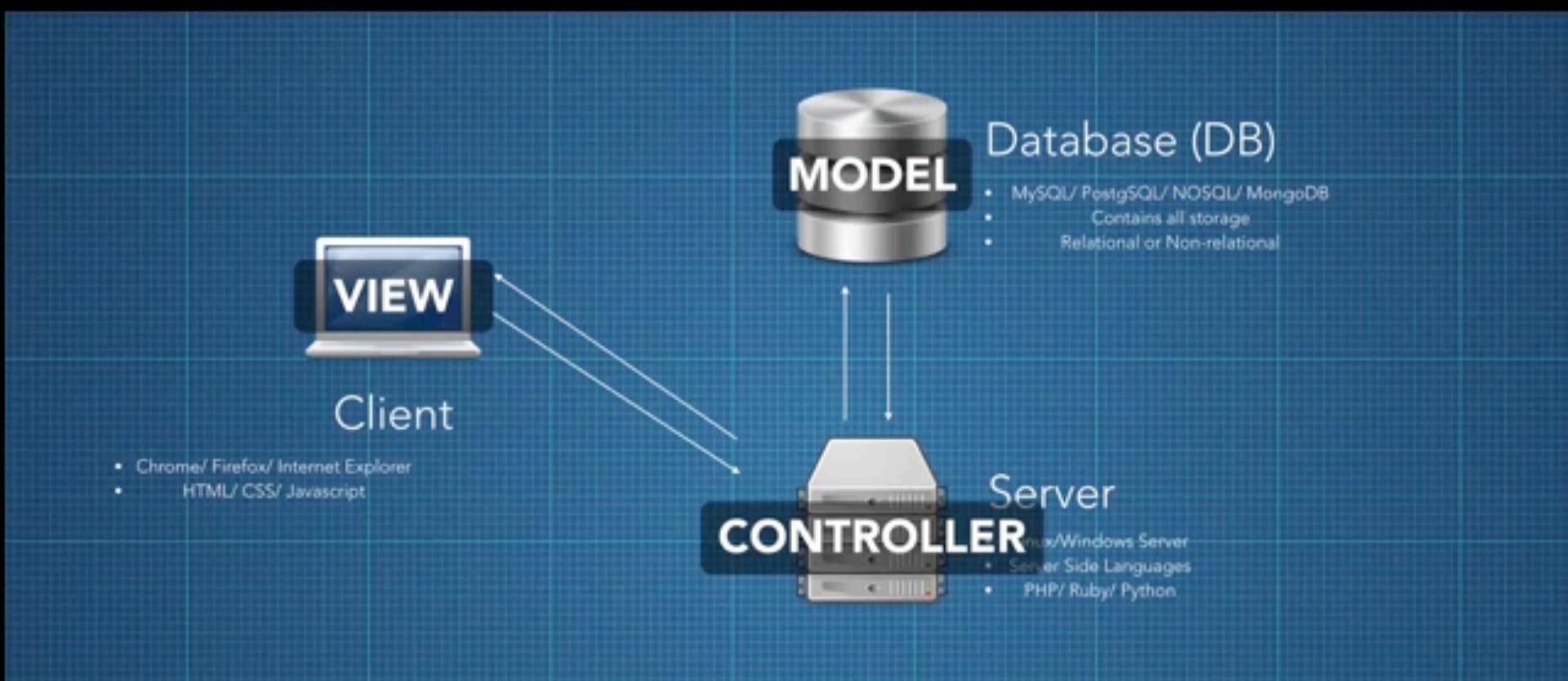
Hit your drum now.

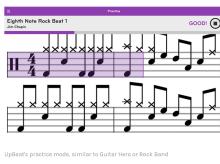
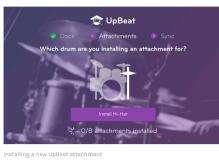
☰

User flows and early wireframes for the three modes of the UpBeat app

# **CONCEPTUAL FRAMEWORKS FOR UNDERSTANDING THE SIGNAL/DATA FLOW**

## HOW DOES A WEBSITE WORK? THE FLOW

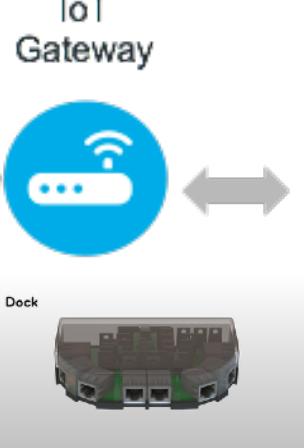




Connected  
"Things"



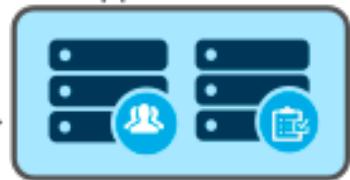
TIER 1 - CLIENT  
(VIEW)



IoT  
Integration Hub

(CONTROLLER)  
TIER 2 - APP SERVER

Enterprise  
Applications



Centralized Data Mgmt. &  
Analytics Platform

TIER 3 - DATABASE SERVER  
(MODEL)

### 3-TIER CLIENT-SERVER ARCHITECTURE (MVC FRAMEWORK)

- Modular, secure, and end-to-end architecture
- Streaming analytics and machine learning
- Open, interoperable on Hybrid Cloud
- Modern application agility & integration

Source: <http://cloudera.com>

# **FROM 3-TIER ARCHITECTURE/MVC FRAMEWORK TO COMPUTATIONAL THINKING**

**TO UNDERSTAND DATA, WE NEED TO  
UNDERSTAND DATABASE**

# **WHAT IS A “DATABASE”?**

“A **Database** is a computerised system that makes it easy to search, select and store information..”

*BBC Website*



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# Create, your way

Part spreadsheet, part database, and entirely flexible, teams use Airtable to organize their work, their way.

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What will you be using Airtable for?

Select an option ▾

Skip

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Good news! Your workspace will receive a **14-day free trial** of our **Pro plan**, which includes:

- ✓ Increased record & attachment limits
- ✓ Extended revision & snapshot history
- ✓ Extended functionality with blocks
- ✓ Advanced calendar features
- ✓ Custom branded forms
- ✓ More colors and styling options
- ✓ Personal views

Priority support Not available during trial  
And more!

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Please verify your email address by clicking the link sent to  
[bernardsuen@hotmail.com](#). [Resend verification email](#)



[Invite your friends and coworkers to earn account credit!](#) [No thanks](#)

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## My First Workspace

Pro trial 14 days left

[SHARE](#)[Event Marketing](#)[Digital Content Calendar](#)[User Studies](#)[Product Launch](#)[Product Planning](#)[Content Marketing Management](#)[Digital Video Production](#)[Digital Asset Management](#)[Applicant Tracking](#)[Add a base](#)



## WORKSPACES

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Please verify your email address by clicking the link sent to  
[bernardsuen@hotmail.com](#). [Resend verification email](#)



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## ▼ LEARNING AND RESOURCES

[Guide to Airtable](#)[Video tutorials](#)[Help center](#)[Ask a question](#)[Importing](#)[Understanding views](#)[Advanced linking](#)[What's new](#)

## My First Workspace

Pro trial 14 days left

[SHARE](#)

Event Marketing

Digital Content  
Calendar

User Studies



Product Launch



Product Planning

Content Marketing  
ManagementDigital Video  
ProductionDigital Asset  
Management

Applicant Tracking



Add a base

- Start with a template
- Import a spreadsheet
- Start from scratch



## My First Workspace

Pro trial 14 days left



### WORKSPACES

- My First Workspace Trial
- + Add a workspace



Event Marketing

Digital Content  
Calendar

User Studies



Product Launch



Product Planning

### LEARNING AND RESOURCES

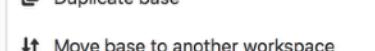
- Guide to Airtable
- Video tutorials
- Help center
- Ask a question
- Importing
- Understanding views
- Advanced linking
- What's new

Content Marketing  
ManagementDigital Video  
ProductionDigital Asset  
Management

Applicant Trac

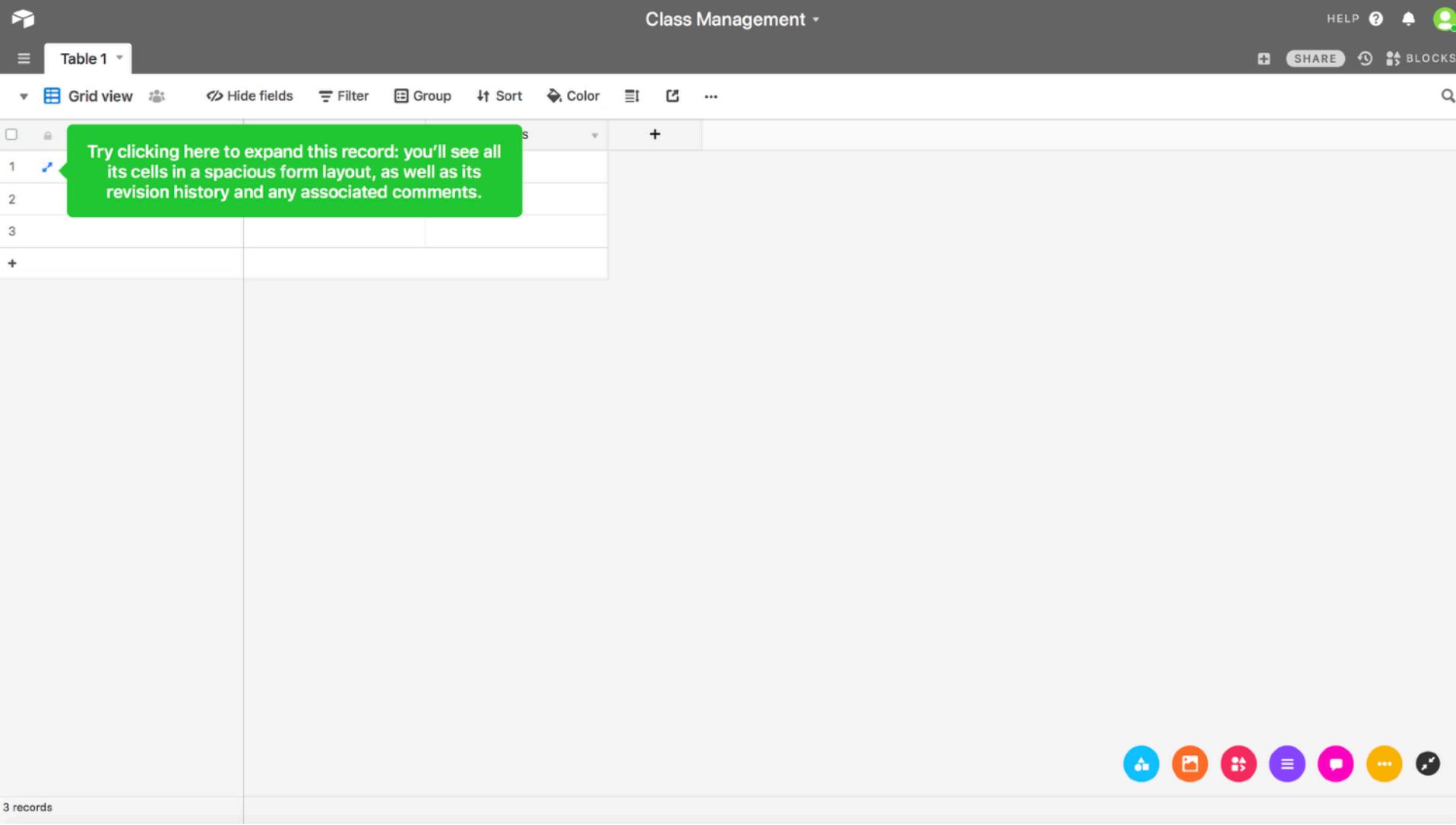


Class Management



+ Add a workspace

Add a base



Class Management ▾

HELP ? 🔔 🙋

Table 1

SHARE

Grid view Hide fields Filter Group Sort Color ...

A Course ID A Course Title Notes Attachments

Course ID

1  
2  
3  
+

3 records

Blocks

+ Add a block

Course ID Course Title Notes Attachments

Blocks give your base superpowers.

ORT COUNTDOWN SUMMARY PIVOT TABLE

Add a block

Blocks icons: Refresh, Document, Chat, Clock, Search, Bell, Hashtag

Small circular icons: Magnifying glass, Share, Print, Copy, More options

Reconnecting... 🔄

## Class Management

Courses

Grid view Hide fields Filter Group Sort Color ...

Create empty table Import a spreadsheet

Course ID Course Title Notes Attachments

	Course ID	Course Title	Notes	Attachments
1		Course ID		
2				
3				
+				

Trying to reconnect... please check your internet connection

3 records





Reconnecting... ☰

## Class Management ▾

HELP ? 🔔

☰ Courses

Students

+ SHARE ⓘ BLOCKS



Trying to reconnect... please check your internet connection

Saving... ☁

## Class Management ▾

HELP ? 🔔

Courses Students

Grid view Hide fields Filter Group Sort Color ...

Course ID	Course Title	Notes	Attachments
com5961	Data Driven Product & Service Design	Course ID	
2			
3			
+			

3 records



Louisa from Airtable

Welcome to Airtable!

Here's some other resources to get you started:

Thumbs up, thumbs down, confetti, play button, lightbulb, star, and a small circular icon.

All changes saved

## Class Management

Courses Students

Grid view Hide fields Filter Group Sort Color ...

Name Notes Attachments

Customize field type

Rename field

Edit field description

Duplicate field

Insert right

Sort A → Z

Sort Z → A

Add filter

Group by this field

Field moved to trash UNDO

SHARE BLOCKS

HELP ?

4 records

...  
...

All changes saved

## Class Management

Courses Students

SHARE BLOCKS

Grid view Hide fields Filter Group Sort Color ...

	A Student ID	Notes	Attachments	+
1				Add field
2				
3				
4				
+				

4 records

Add field

4 records

All changes saved

## Class Management

HELP ? 🔔 

Courses Students

+ SHARE ⏱ BLOCKS

Grid view Hide fields Filter Group Sort Color ...

	A Student ID	A Notes	Attachments	A Field 4
1				<input type="text" value="Field 4"/>
2				
3				
4				
+				

Field 4

A Single line text

A single line of text. You can optionally prefill each new cell with a default value:

Default text

Enter default text

Cancel Save

4 records





## Class Management ▾

HELP ? 🔔



Courses

Students ▾

SHARE 🔍 BLOCKS

Grid view Hide fields Filter Group Sort Color ...



	A Student ID	A Notes	Attachments	A Field 4
1				<input type="text" value="Student Name"/> <span style="border: 1px solid #ccc; padding: 2px;">A Single line text</span>
2				
3				
4				
+				

Student Name

A Single line text

A single line of text. You can optionally prefill each new cell with a default value:

Default text

Enter default text

Cancel

Save



4 records

# **FROM TABLES TO VIEWS**

https://airtable.com/universe

Apps Cyberport Bootc... Blockchain NLP and Chatbot FinTech E-Commerce Classes Development Tools Data Science Machine Learning Music Drupal Cloud Providers Other Bookmarks

Airtable Bases Templates Universe HELP ? 🔔 e

[Search Universe](#)

Sort by featured ▾

CATEGORIES

- Featured
- Arts and culture
- Community and local interest
- Creative production
- Education
- Entrepreneurship
- Fashion and style
- Food and drink
- Government and politics
- Health and self-improvement
- Journalism and publishing
- Marketing and sales
- Nonprofits and volunteering
- Operations
- Product, design, and UX
- Products and consumer reviews
- Professional
- Real estate
- Science and technology
- Sports and games
- Travel and outdoors

[Publish your own!](#)

**AIRTABLE UNIVERSE**

**Explore, discover, and share your passion**

## Cole Haan Creative Operations

Cole Haan Brand Creative is an in-house, full service agency. Our Creative Operations team manages...

Andrew Coulter Enright

## Twilio's Lightweight CMS

Tony Mataya

## Britannica's Digital Content Management System

Alison Eldridge

## Insomniac Events' Staffing Template

Insomniac Events



Project Tracker

Design Projects Tasks Clients +

SHARE ⏪ BLOCKS 🔍

Find a view

Main View

- Incomplete projects by leader
- Completed projects
- Project calendar
- Due dates only
- Gallery
- Kanban
- Form

Add a view: Grid Form Calendar Gallery Kanban

Project Photos	Category	Client	Project Lead	Project Team	
	Brand identity	New York City Parks	Chuck Harrison	Emily Pilloton, Eddie Opara	15/9/2017
	Brand identity	Second Home	Jasper Morrison	Chuck Harrison, Anishka Clarke	25/9/2017
	Brand identity	Metro Loft	Gail Anderson	Gail Anderson, Patricia Urquiola	28/9/2017
	Brand identity	Codecademy	Chuck Harrison	Anishka Clarke, Patricia Urquiola	6/10/2017
	Brand identity	Mohawk	Emily Pilloton	Patricia Urquiola	12/10/2017
	Brand identity	Bigelow Tea	Patricia Urquiola	Emily Pilloton, Jasper Morrison	16/10/2017
	Brand identity	Massachusetts Institute of Tech	Emily Pilloton	Anishka Clarke	17/10/2017
	Brand identity	Museum of Modern Art	Gail Anderson	Eddie Opara, Naoto Fukasawa	24/10/2017
	Brand identity	GRiD Systems Corporation	YiuSin Suen		

CATEGORY  
Industrial Design Count 2

Ultimate Utility Bike		Industrial Design	Oregon Manifest	Gail Anderson	Naoto Fukasawa	4/10/2017
C17 Bike Saddle	✓	Industrial Design	Brooks England	Chuck Harrison	Chuck Harrison	11/10/2017

CATEGORY  
Healthcare Design Count 2

Hand Hygiene System	✓	Healthcare Design	SwipeSense	Chuck Harrison	Jasper Morrison	21/9/2017
HGH Injection Device	✓	Healthcare Design	Eli Lilly and Company	Gail Anderson	Emily Pilloton	5/10/2017

18 records

Project Tracker

Design Projects Tasks Clients +

Project calendar Using "Kickoff date" field Filter Sort Color ...

Today < > October 2017 Month 2 week Week 3 day Day Q Find a record All records

Mon	Tue	Wed	Thu	Fri	Sat	Sun
25 Second Home Brand Identity	+ 26	27	28 443 Greenwich Brand Ident...	29	30	1
2	3 Compass Notebook Compu...	4 Ultimate Utility Bike	5 HGH Injection Device	6 Codecademy Brand Identity	7	8
9	10 C17 Bike Saddle	11 PalmPad	12 Mohawk Brand Identity	13	14	15
16 Tea Packaging	17 MIT Media Lab Logo	18 Melon Headband	19	20	21	22
23 MOMA Brand Identity	24	25	26	27	28	29
30	31	1	2	3	4	5

Tea Packaging Oct 16, 2017 

C17 Bike Saddle Oct 11, 2017 

Second Home Brand Ide... Sep 25, 2017 

Ultimate Utility Bike Oct 4, 2017 

Compass Notebook Com... Oct 3, 2017 

MOMA Brand Identity Oct 24, 2017 

PalmPad Oct 11, 2017 

Codecademy Brand Iden... Oct 6, 2017 

Convertible 2260 Laptop Sep 20, 2017 

443 Greenwich Brand Id... 

Project Tracker

Design Projects Tasks Clients +

SHARE BLOCKS

Gallery Customize cards Filter Sort Color ...

NYC Parks Brand Identity  
COMPLETE  
Prototyping  
PROJECT PHOTOS

Convertible 2260 Laptop  
COMPLETE  
PHASE  
PROJECT PHOTOS

Hand Hygiene System  
COMPLETE  
PHASE  
PROJECT PHOTOS

Second Home Brand Identity...  
COMPLETE  
Research  
PROJECT PHOTOS

443 Greenwich Brand Ide...  
COMPLETE  
PHASE  
Prototyping  
PROJECT PHOTOS

Compass Notebook Comp...  
COMPLETE  
PHASE  
PROJECT PHOTOS

Codecademy Brand Identity  
COMPLETE  
PROJECT PHOTOS

Ultimate Utility Bike  
COMPLETE

HGH Injection Device  
COMPLETE  
PHASE

PalmPad  
COMPLETE  
PHASE

C17 Bike Saddle  
COMPLETE  
PHASE

Mohawk Brand Identity  
COMPLETE  
PHASE

<https://airtable.com/tblbZlxfgBuuk2O3x/viw6z2UcS9BXyBSWb/recmnpTieT9J0vHWw>

Project Tracker

Design Projects Tasks Clients +

Kanban Stacked by Phase Customize cards Filter Sort Color ...

Uncategorized

Convertible 2260 Laptop  
COMPLETE ✓

Research

Second Home Brand Ide...  
COMPLETE ✓

Problem Definition

Tea Packaging  
1 record +

Ideation

No records +

Prototyping

443 Greenwich Brand Id...  
mit media lab

Testing

MIT Media Lab Logo  
COMPLETE ✓

NYC Parks Brand Identity  
COMPLETE ✓

Mohawk Brand Identity  
COMPLETE ✓

Hand Hygiene System  
COMPLETE ✓

9 records +

5 records +

2 records +

<https://airtable.com/tblbZlxfg8uuk2O3x/viwItXQhtUPszSfW6/recdZb9L3SVN4Ey1K>

Project Tracker

Design Projects Tasks Clients +

Form Share form Open form ...

Fields remove all

Drag and drop fields here to hide

+ Add a field to this table

Add a cover image

Add a logo

## Form

Add a description for this form

Name

Complete

Phase

# **RECAP OF “AIRTABLE” AND THE “DATABASE” CONCEPT**

- 1. Creating a database (called a “Base” in Airtable)**
- 2. Create a table or import from a spreadsheet (e.g. csv file)**
- 3. Add fields to the table and customise field type.**
- 4. Build relationships between fields and tables.**
- 5. Create views (calendar, kasan and gallery views)**

- 6. A database is a collection of tables.**
- 7. A table is a collection of records (rows) with each record containing information about one unique entity (e.g. student, class, product)**
- 8. A record is collection of fields (columns) with each field representing an attribute of the entity.**
- 9. A key field is a unique attribute for differentiating one record from another (e.g. student id)**

# **RECAP**

**From journey mapping to data mapping: Turn story into system, UX journey into use case and data.**

**The data lives on an infrastructure built with the integration of client (view), server (controller) and database(model) using 3-tier architecture and MVC framework.**

Design Thinking	Computational Thinking	Description
Empathy	Decomposition	Collect and analyse <u>stories and data</u> to understand the stakeholders and discover their needs.
Definition	Patterns	Synthesise recurring <u>persona types, contexts, artefacts, and scenario</u> patterns to formulate problem ( <b>who, what, and why</b> ).
Ideation	Abstraction	Develop socio-cultural and technical systems to reshape user stories and data flow.
Prototyping	Algorithm	Build <u>experience prototype and computational models</u> to represent future scenarios for validation.
Testing & Implementation	Automation & Evaluation	Continuous testing, improvement and automation to evaluate <u>functional, emotional, social, economic and environmental</u> impacts (how and how much).

## REFERENCE LINKS

1. Airtable 介绍 1：為什麼要使用 Airtable 、案例说明  
<https://www.youtube.com/watch?v=de16zUwt48k>
2. Airtable 2 介面介绍  
<https://www.youtube.com/watch?v=uKh6AaP-SLY>

## **PROBLEM SET #1**

- Find a subject of interest to you (KPop, books, movies, fashion, traveling, etc.) and build a database using Airtable to study it.
- Create tables, build relationships, and use views (Calendar, Gallery, and Kanban) to display your contents (At least 10 entries).
- Share you Airtable base with me:  
[bernard@cuhk.edu.hk](mailto:bernard@cuhk.edu.hk)

**THANK YOU FOR YOUR TIME!**