

## From Principles to Strategies to Practice : A Series on Online Course Design for Better Learning Experience

# Design Thinking as Methodology to Innovate Multidisciplinary Teaching and Learning

24 Feb (Thu) 12:30 - 1:45pm via [zoom](#)



Speaker

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Details and registration  
[www.cetl.hku.hk/coursedesign22](http://www.cetl.hku.hk/coursedesign22)

# Content

Principles

Brief history

Strategies

Using 5-stage DT in T&L

Strategies to Practice

Participation using Miro



# Design Thinking

“Wicked problems” Rittel and Webber, 1973

## **A process**

Way of thinking is often organized in multiple stages

## **Iterative**

Students explore different ideas to attain learning outcomes

## **Nonlinear**

The process branches into multiple directions

## **Solution oriented**

The objective of DT is more than critical thinking.  
The goal is to develop applicable innovations that solve problems for society

## **Coordinated**

Clear objectives defined for students to tackle problems as a team in a structured manner



## Brief history

- Cross, N. (1984) *Developments in Design Methodology*, John Wiley and Sons Ltd., Chichester,
- Cross, N. (2006) *Designery Ways of Knowing*. Springer Verlag, London.
- Cross, N. (2011) *Design Thinking*. Berg, Oxford.

Herbert A. Simon



Design as a  
"way of thinking"

Robert McKim



Bryan Lawson



Applied to  
architectural  
discourse

Nigel Cross



Brings design  
thinking to  
education

First significant  
use of the term

Peter Rowe



Rolf Faste



Stanford

David Kelley



IDEO

Design thinking  
adapted to  
business

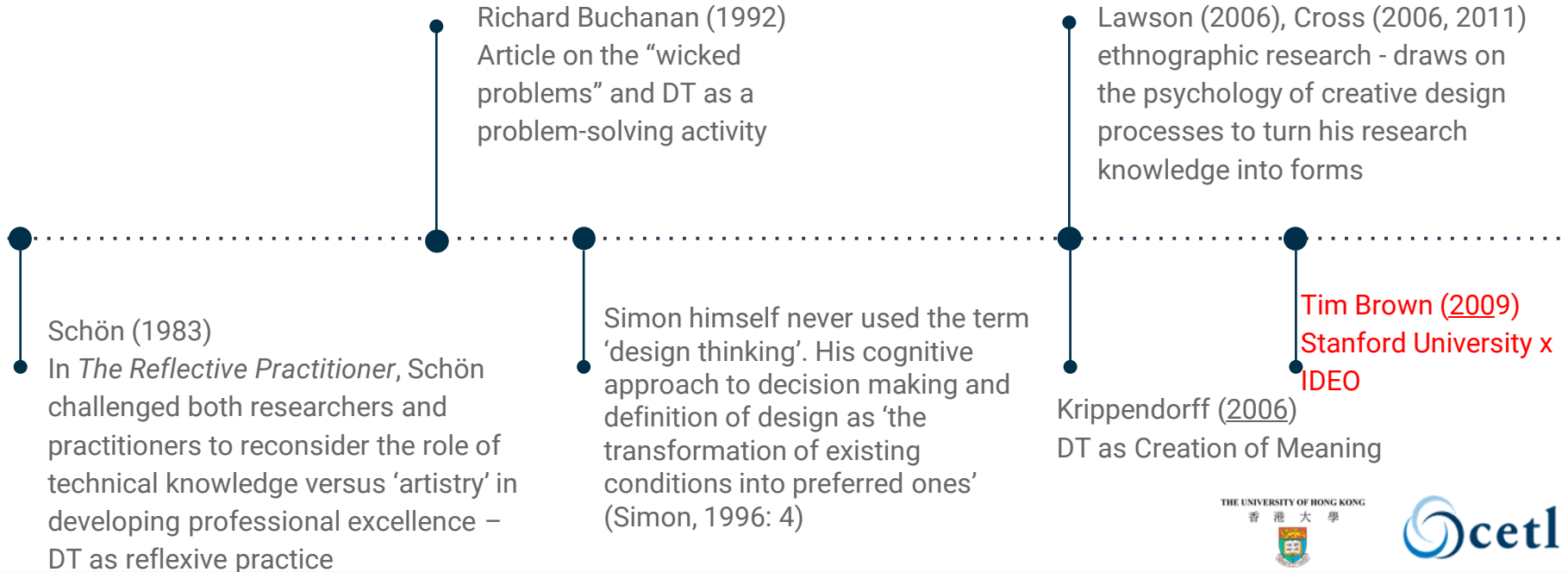
Richard Buchanan



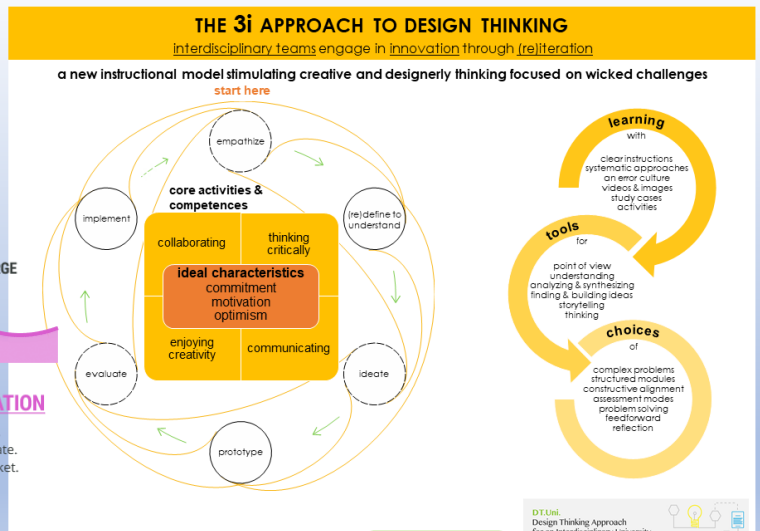
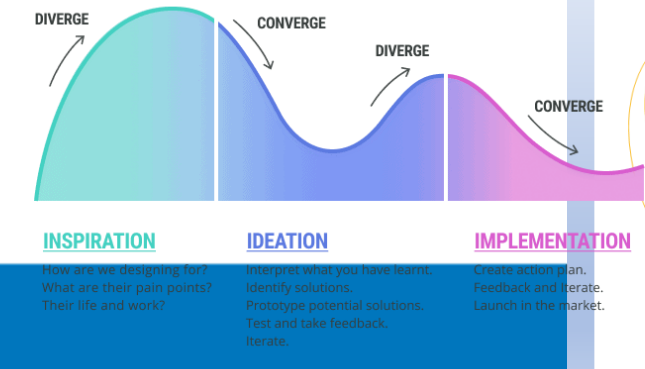
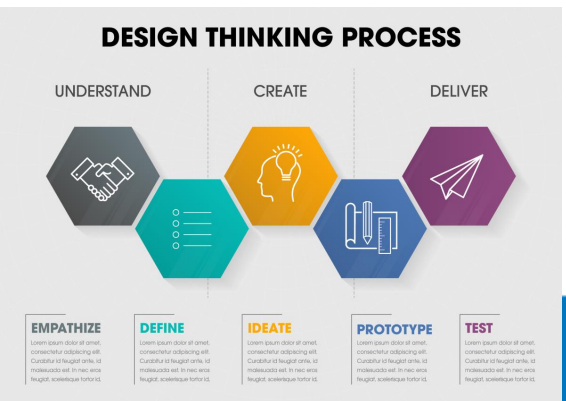
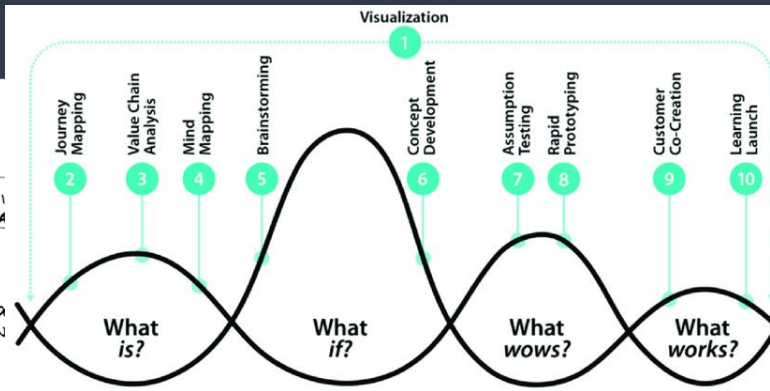
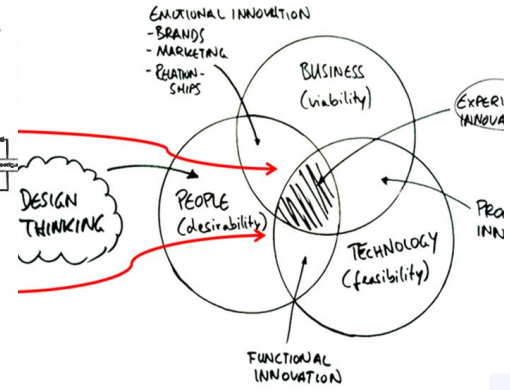
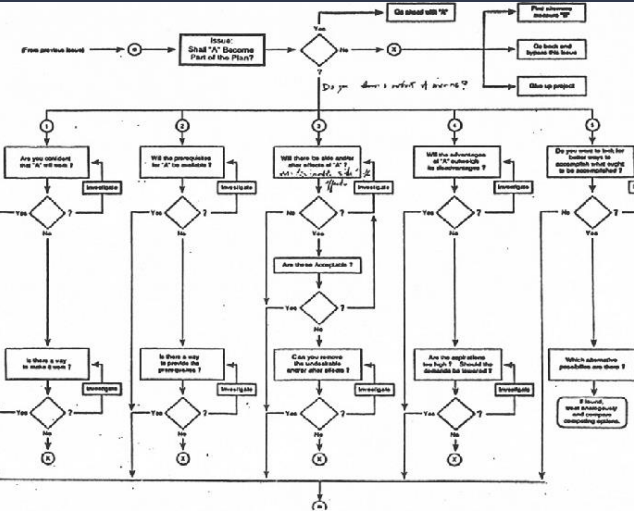
Address human  
concerns through  
design

# Recent discourses on DT and IDEO

Johansson-Sköldberg, U., Woodilla, J., & Çetinkaya, M. (2013). Design thinking: past, present and possible futures. *Creativity and innovation management*, 22(2), 121-146.



# Samples of DT frameworks...



# Stanford University's Hasso Plattner Institute of Design : Design Thinking process

## DESIGN THINKING PROCESS

UNDERSTAND



CREATE



DELIVER



### EMPATHIZE

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Curabitur id feugiat ante, id malesuada est. In nec eros feugiat, scelerisque tortor id.

### DEFINE

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### IDEATE

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Curabitur id feugiat ante, id malesuada est. In nec eros feugiat, scelerisque tortor id.

### PROTOTYPE

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Curabitur id feugiat ante, id malesuada est. In nec eros feugiat, scelerisque tortor id.

### TEST

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Curabitur id feugiat ante, id malesuada est. In nec eros feugiat, scelerisque tortor id.



# Tim Brown's definition

“ a methodology that imbues the full spectrum of innovation activities with a human centered design ethos.”

Tim Brown, June, 2008





## How to engage class participants in this 5-staged DT?



# 1. Empathize

Encourage students approach the context of inquiry from multiple points of view

- Step 1 – Observe
- Step 2 – Engage
- Step 3 – Immerse

# Empathize tools examples

Design Museum Everywhere! DESIGN ACTIVITY (4-12 GRADE)

## Empathy: Interviews

Learners will come up with an interview plan and conduct an interview.

Learners will...

- Formulate interview goals and open-ended questions.
- Lead and conduct an interview.
- Understand how to practice empathy when conducting research.

Conduct interview  
to  
understand the focus of  
inquiry by asking different  
stakeholders

## EMPATHY MAP

UX Knowledge Base Sketch #12

MAPING THE USERS' THOUGHTS, NEEDS, MOTIVATIONS, FEELINGS, ATTITUDES, BELIEFS, ISSUES

WAY TO SYNTHESIZE RESEARCH DATA TO BETTER UNDERSTAND THE USERS.

CONSIDER: GREAT TEAM EXERCISE, VISUALIZE USERS' NEEDS, GOOD STARTING POINT, QUICK & COST-EFFECTIVE

CREATE A MAP FOR EACH PERSONA (CUSTOMER SEGMENT)

PRODUCT DESIGN: AFTER COLLECTING RESEARCH DATA, BEFORE DEFINING THE PRODUCT REQUIREMENTS

PARTICIPANTS OF THE MAPPING: USER, TEAM MEMBERS, HOPONAL, STAKEHOLDERS

TOOLS FOR THE MAPPING SESSION: WRITEBOARD OR PRINTED OUT MAPS, STICKY NOTES & PENS/MARKERS

PREPARE THE DATA FROM THE RESEARCH (E.G. USER INTERVIEW, CENTRAL USER, ONLINE SURVEY, TESTIMONIALS & OTHER FEEDBACK)

OTHER ASPECTS / WORDING FOR EXAMPLE: TASKS, INFLUENCES, QUOTES, GOALS

PREREQUISITES: UX RESEARCH DATA, PERSONAS

DON'T FORGET TO DOCUMENT THE SESSION!

Conduct initial research  
by  
Empathy Map

(on-line versions using Padlet / Miro)

## CUSTOMER JOURNEY MAP Shopping for a New Car

EMOTIONAL ERIC

Eric is an emotional car buyer. He purchases based on aesthetics and status. Scenario: Eric recently moved to the area. He is shopping for a car that is fun to drive and dependable enough for use for everyday commuting.

**EXPECTATIONS**

- Ability to compare cars and their breakdowns
- Good photography with closeups, inside and-out
- Video overview of car with demonstrations

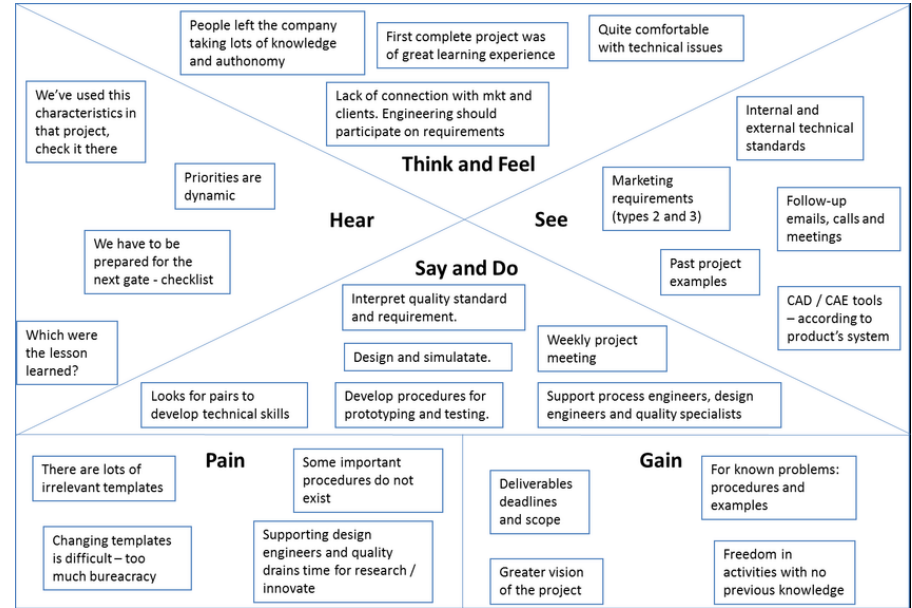
CONSIDER 1 week	EXPLORE 3 months	COMPARE 1 month	TEST 2 weeks	NEGOTIATE 1 week
<ol style="list-style-type: none"> <li>Sees TV commercial for a website, YouCarRent.net, which helps people shop for vehicles; visits the website</li> <li>Sees ad on Facebook</li> </ol>	<ol style="list-style-type: none"> <li>Explores site and looks at all vehicles in his budget</li> <li>Creates account, saves favorite cars in wishlist</li> <li>Downloads mobile app while at his office</li> </ol>	<ol style="list-style-type: none"> <li>Reads Consumer Reports and reviews; keeps a spreadsheet to compare cars</li> <li>Consults with trusted individuals</li> <li>Constantly checks site for new options that meet his criteria</li> </ol>	<ol style="list-style-type: none"> <li>Selects a set of cars he plans to test-drive</li> <li>Looks up location of each dealership on Google Maps</li> <li>Visits dealership; fills out lead card; discusses process with sales person; drives car; discusses more; repeats process for each car</li> <li>Discovers he can take notes about each car he drives in the app</li> </ol>	<ol style="list-style-type: none"> <li>Decides on a car</li> <li>Gets financing terms, total price, monthly payment from salesperson</li> <li>Researches more, specifically about price</li> <li>Makes a competing offer and buys his new car</li> </ol>
"Wow that website looks great for car shopping!"	"I like that I can save cars and a list is automatically made!"	"This mobile app is missing a lot of features."	"I'm so happy with my new car!"	"I'm so happy with my new car!"
"This website looks much different from the commercial."	"I'm disappointed by the quality of some listings... very few photos."	"I wish all car dealerships were shown on a single map, so I can plan my route."	"I love that I can take notes about these cars in the app. So helpful!"	"I wonder if I can get a better deal!"
	"I might miss the perfect car if I don't check the site multiple times a day"	"It's difficult to compare down options and parse through competing resources. Have to use a spreadsheet."		"Why does it take sooo long to test drive a car? I wish I knew I was going to be procedural end sales."

NNGROUP.COM NN/g

Probe questions  
by  
Journey map



# Empathy map



Example of an empathy map for product engineering (Guzzo, 2016)

## 2. Define

Clearly articulate the main issue of inquiry so students can stay focus /coordinated

Provide meaningful and actionable problem statement –in line with learning objectives (PLO, MLO etc.)

Analyze

Arrange

Articulate



### 3. Ideate

Stimulate creatively  
and generate class  
discussions

Trans / interdisciplinary  
collaboration

Social impact

Critical thinking



# Case Study

## IDEActivity Centre – DT Flipped Classroom

Design Thinking via Flipped Classroom  
Canina and Bruno, 2018, Polytechnico di Milano  
paper at International Conference on Engineering Education at  
the Dyson School of Design Engineering, Imperial College.



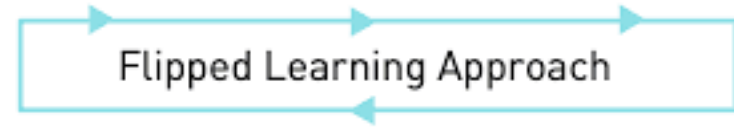
PREPARATION  
MATERIALS



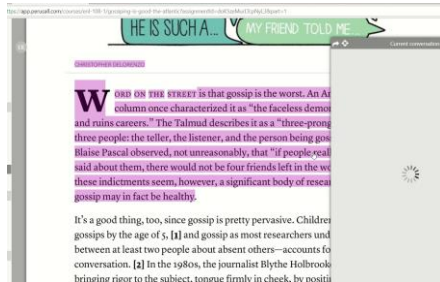
IN CLASS  
ACTIVITIES



POST-CLASS  
ASSIGNMENTS



## On line version: Perusal



<https://www.designsociety.org/publication/40800/DESIGN+THINKING+VIA+FLIPPED+CLASSROOM>

# Brainstorming

- Quality through quantity
- Refrain from judging ideas
- Interdisciplinary collaboration





# Co-creation workshops

- “Break the ice” and dispel shyness among participants
- Collective creativity
- Suggested on line version – Mentimeter / Miro



# Menu of ideas

- A catalog displaying a synthesis of all ideas generated
- Document the partial result for feedback / feedforward
- Suggested on-line version: ConceptBoard / Notion



# Decision matrix

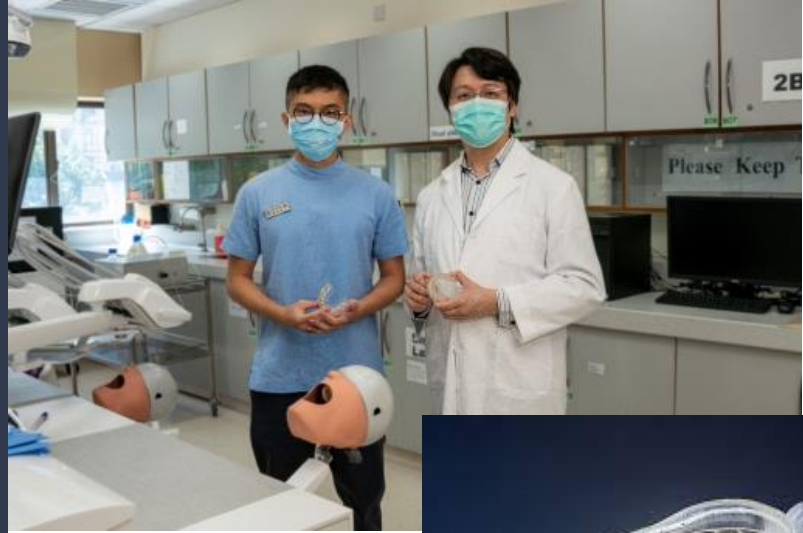
- Strategy tool for analysis
- Validate guiding criteria
- Show how ideas meets requirements

Decision Matrix		Group A				
	Problem 1	Problem 2	Problem 3	Problem 4		
Criteria 1	<p>What are the main objectives of this project and how to achieve them?</p> <p>Students of college students and teenagers usually happens in areas with this type of issue. This category is a product can be used as a will between the floor from getting dirty. The cleaners can also be used on the top of the floor.</p>	<p>The person who uses this product will have to use it every day. It will be used in the public areas of the school. The person who uses this product will have to use it every day. It will be used in the public areas of the school.</p>	<p>In public areas, there is no floor mat. The person who uses this product will have to use it every day. It will be used in the public areas of the school.</p>	<p>Students of college students and teenagers usually happens in areas with this type of issue. This category is a product can be used as a will between the floor from getting dirty. The cleaners can also be used on the top of the floor.</p>	<p>Criteria 1</p>	<p>1</p>
Criteria 2	<p>Something regular is a regular when the customer can use it. The more the customer can use it, the better.</p>	<p>The person who uses this product will have to use it every day. It will be used in the public areas of the school. The person who uses this product will have to use it every day. It will be used in the public areas of the school.</p>	<p>In public areas, there is no floor mat. The person who uses this product will have to use it every day. It will be used in the public areas of the school.</p>	<p>Students of college students and teenagers usually happens in areas with this type of issue. This category is a product can be used as a will between the floor from getting dirty. The cleaners can also be used on the top of the floor.</p>	<p>Criteria 2</p>	<p>2</p>
Criteria 3	<p>Utility: Use of the product in a number of ways. The more the better.</p>	<p>The person who uses this product will have to use it every day. It will be used in the public areas of the school. The person who uses this product will have to use it every day. It will be used in the public areas of the school.</p>	<p>In public areas, there is no floor mat. The person who uses this product will have to use it every day. It will be used in the public areas of the school.</p>	<p>Students of college students and teenagers usually happens in areas with this type of issue. This category is a product can be used as a will between the floor from getting dirty. The cleaners can also be used on the top of the floor.</p>	<p>Criteria 3</p>	<p>3</p>
Criteria 4	<p>Practical solution to help students?</p>	<p>The person who uses this product will have to use it every day. It will be used in the public areas of the school. The person who uses this product will have to use it every day. It will be used in the public areas of the school.</p>	<p>In public areas, there is no floor mat. The person who uses this product will have to use it every day. It will be used in the public areas of the school.</p>	<p>Students of college students and teenagers usually happens in areas with this type of issue. This category is a product can be used as a will between the floor from getting dirty. The cleaners can also be used on the top of the floor.</p>	<p>Criteria 4</p>	<p>3</p>
Total		9	10	11		15

Example of decision matrix (Loh, Kwek and Lee, 2017)

# 4 Prototyping

To aid the validation of ideas generated and presented as an outcome from DT



HKU Faculty of Dentistry develops a mouth guard device with micro-mist injection for improving oral condition of elderly and disabled people

(source :  
[https://www.hku.hk/press/news\\_detail\\_21939.html](https://www.hku.hk/press/news_detail_21939.html))



# Prototyping

Prototyping can take many shapes

1. Paper prototyping
2. Presentation
3. Staging scenario
4. Story board
5. Service prototyping
6. Scaled Models
7. Virtual Reality (VR/ AR)
8. Inforgraph



# Story board

Well defined ideas to be communicated, eg.

- Screen play
- Comic strips



# Rapid prototyping / 3 D printing

User-interface  
Schematic ideas

Executed by hand, on  
computer

Evaluate the information,  
validate hypothesis



# Scaled models / building information model

T&L technology such as BIM, AutoCad, Rhino

Animation to simulate real-life context

360 degree immersive experience for students

Multidisciplinary engagement – Heritage Conservation, Landscape, Architecture, Real Estate and Construction, Building Engineering

Virtual Field Trips using EasyVR, 360, Metterport

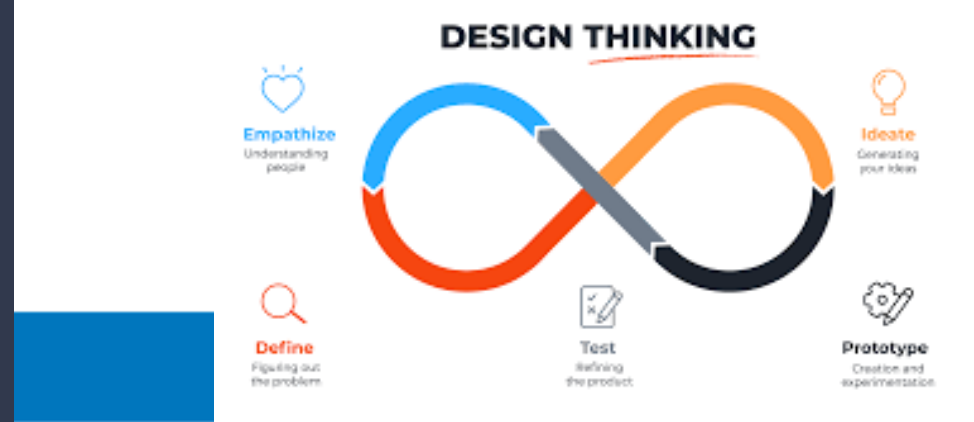




# 5. Testing

Offers reflection,  
constructive feedback  
and feedforward to  
students

Peer-review



# DT empowers learners to become... ignited, inspired and innovative



Active and experiential learners



Proficient in multitasking



Dependent thinkers on  
communication



Collaborative and interactive

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## Miro participation

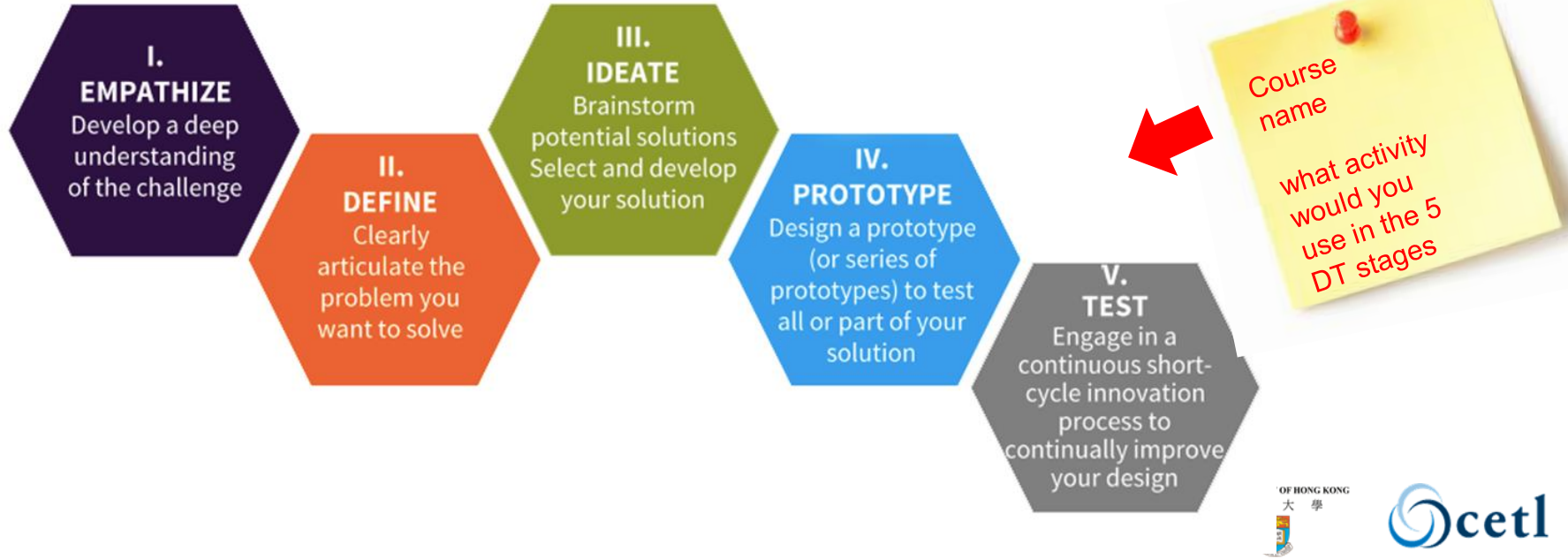
THE UNIVERSITY OF HONG KONG

香港大學



# Practice by Miro using a simplified DT framework

1. click to Miro link
2. please press “n” to initiate a post-it notes on Miro and input your particular course and what activity would you use in the 5 DT stages



# From Principles to Strategies to Practice

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Thank you  
Q & A  
Survey

