

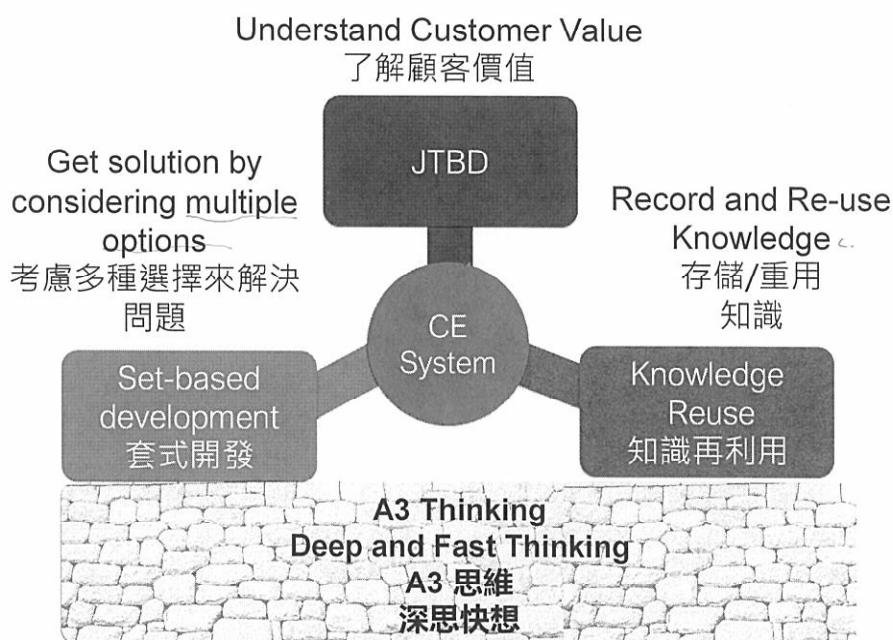
Integrated Lean Product Development

Unifying Product Planning and Product Development

集成精益產品開發： 串聯產品計畫與產品開發

Kimio Inagaki 稲垣公夫, Globaling Inc
Yu-Hsiu Hung 洪郁修, 成功大學

Major Components of LPD (LPD的主要組成部分)



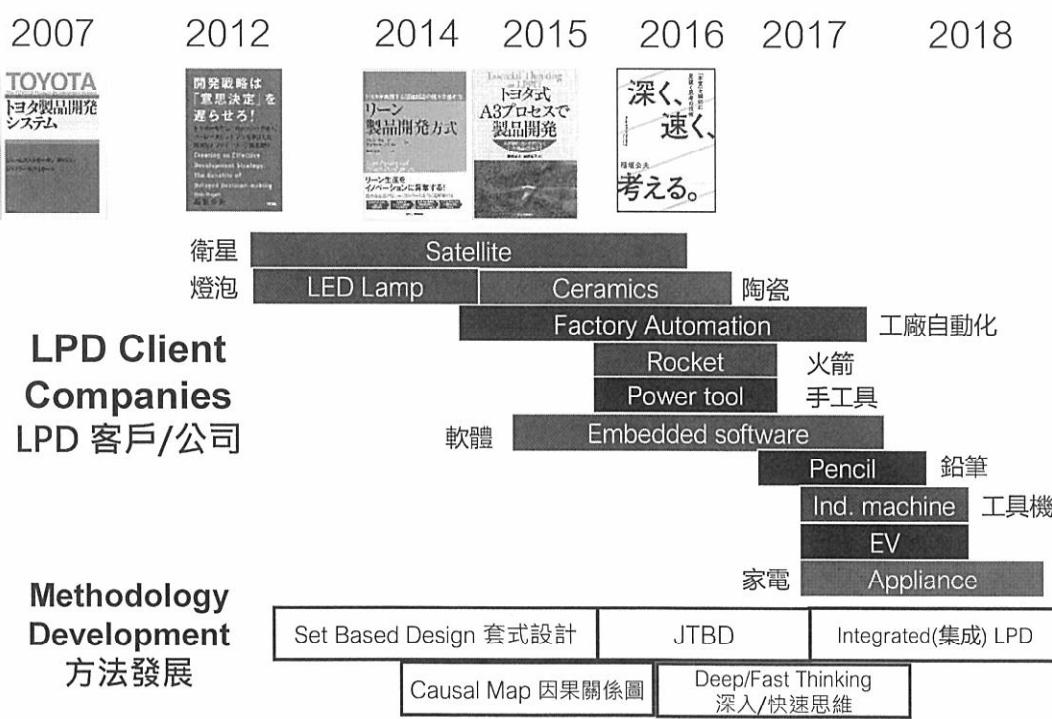
Evolution of Lean Product Development

精益產品開發的演變

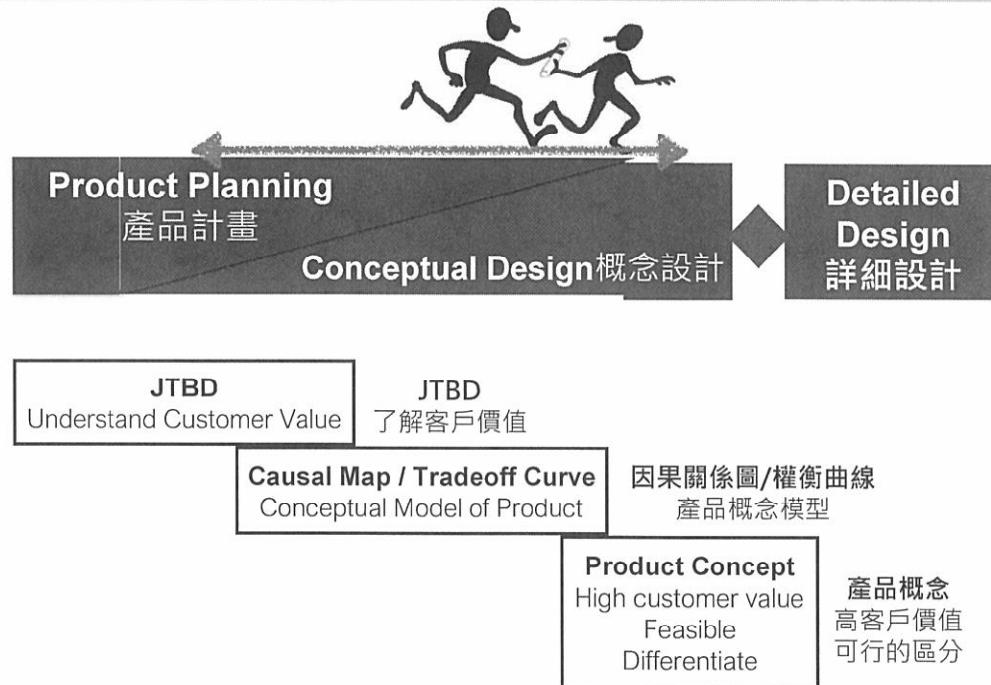
Traditional Product Development 傳統產品開發



My Journey in Lean Product Development 我的精實開發之旅



Integrated Lean Product Development 集成精益產品開發



Jobs To Be Done 鎖定在顧客想要需要被完成的「工作」上

Job 工作	Old Solution 舊的解決方案	New Solution 新的解決方案
<i>Deliver medicine into body</i> 將藥物送入體內	<i>Pills, injection</i> 藥丸 · 注射	<i>Skin patch</i> 皮膚貼片
<i>Listen to music outside your home</i> 在你家外面聽音樂	<i>Transistor radio, Walkman (晶體管)收音機 · 隨身聽</i>	<i>iPod</i>

Solutions (Products) change over time, but JTBD is stable

解決方法(產品)隨著時間改變，但JTBD的概念是不變的

1955



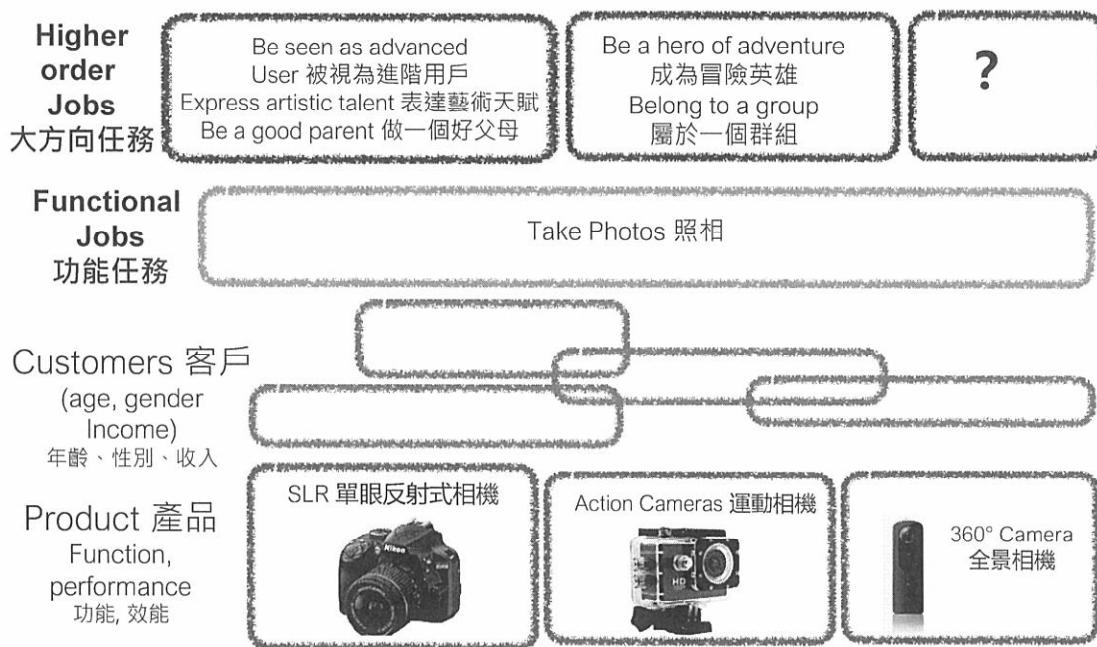
1979



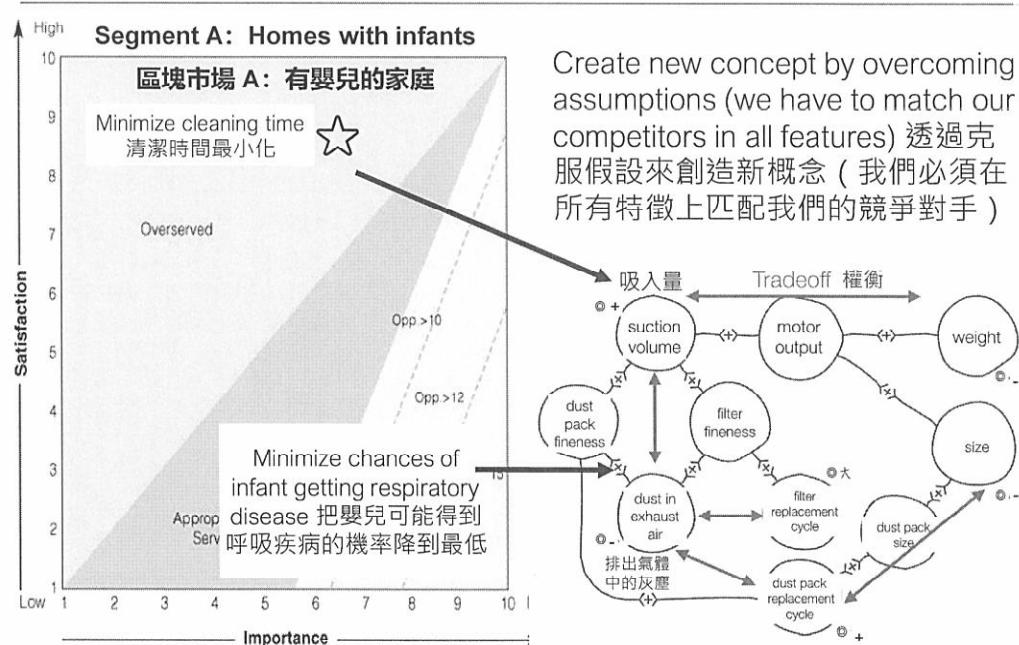
2001



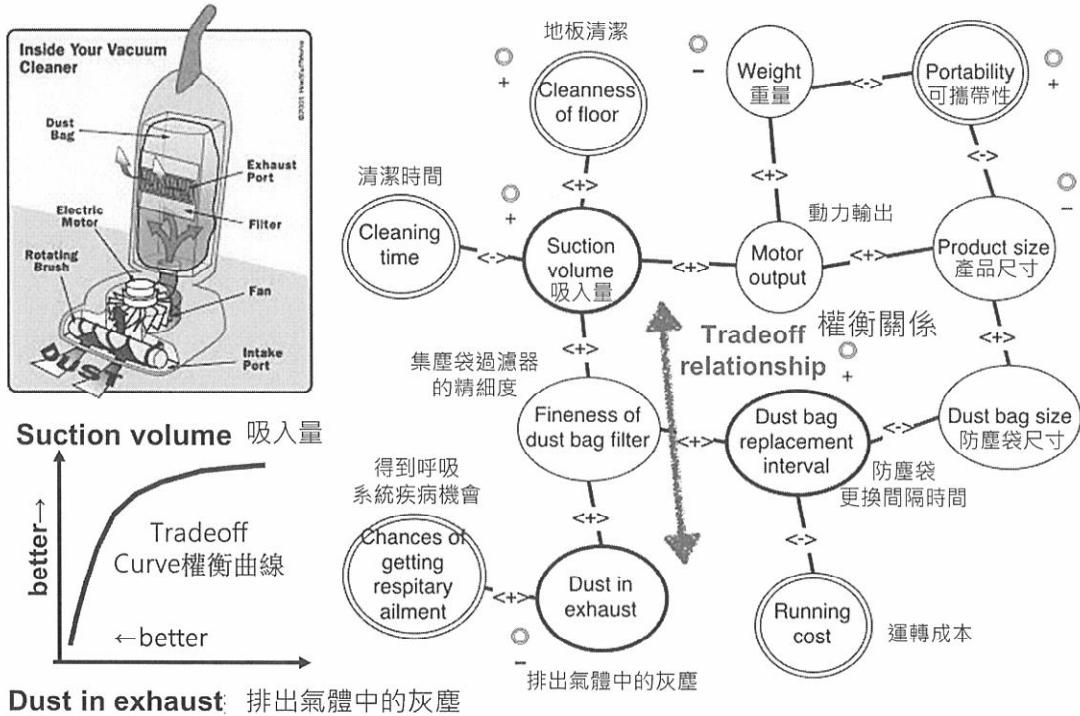
JTBD (Jobs To Be Done)



Jobs To Be Done of Vacuum Cleaner (吸塵器)



Vacuum Cleaner Causal Map / Tradeoff curve 吸塵器的因果關係圖/權衡曲線



Vacuum Cleaner Product Concept 吸塵器產品概念

Target Customer 目標客戶

Family with infants 有嬰兒的家庭

Customer Value 客戶價值

Reduce chance of infant getting respiratory disease by minimizing dust in exhaust air 當量減少排氣中的塵埃，減少嬰兒罹患上呼吸道疾病的機會

Higher Order Job 高階工作

Be a good parent 當一個好父母

Technical solution

技術方案

Use dust bags with smaller filter holes
with pleats to increase surface
使用褶皺較小過濾孔的防塵袋增加表面

Tradeoff 權衡

Less suction power (over-served for this segment)
較小吸力（於此市場區塊過度滿足）

Technical risk 技術風險

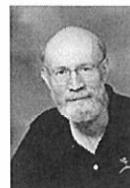
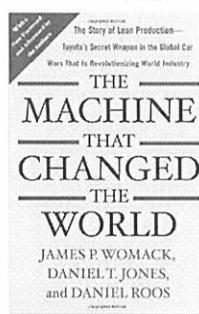
No risk, just using tradeoff
沒有風險，只是使用權衡

My Pleasant Surprise on Feb 2, 2018 in Tainan 我的愉快的驚喜：2018年2月2日在臺南

- Visited a Seminar at Department of Industrial Design, National Cheng Kung University 參觀成功大學工業設計系的研討會。
- Dr. Yu His Hung had developed a hands-on 6 month course on product development, based on my books (on set-based design and deep and fast thinking) and workshop at last year's Global Lean Summit on JTBD 洪郁修博士根據我的書(套式設計與深思快想)以及去年全球精益高峰論壇的工作坊提到的JTBD，開發了一個為期4個月的實作產品開發課程。
- Students had learned all the basic methods in my Integrated LPD Method and developed new products that can compete in the real market! 學生學習了我的精益集成產品開發方法中的所有基本方法，並開發了可以在真實市場上競爭的新產品！

History of Lean vs. Lean Product Development 精益的歷史 vs. 精益產品開發

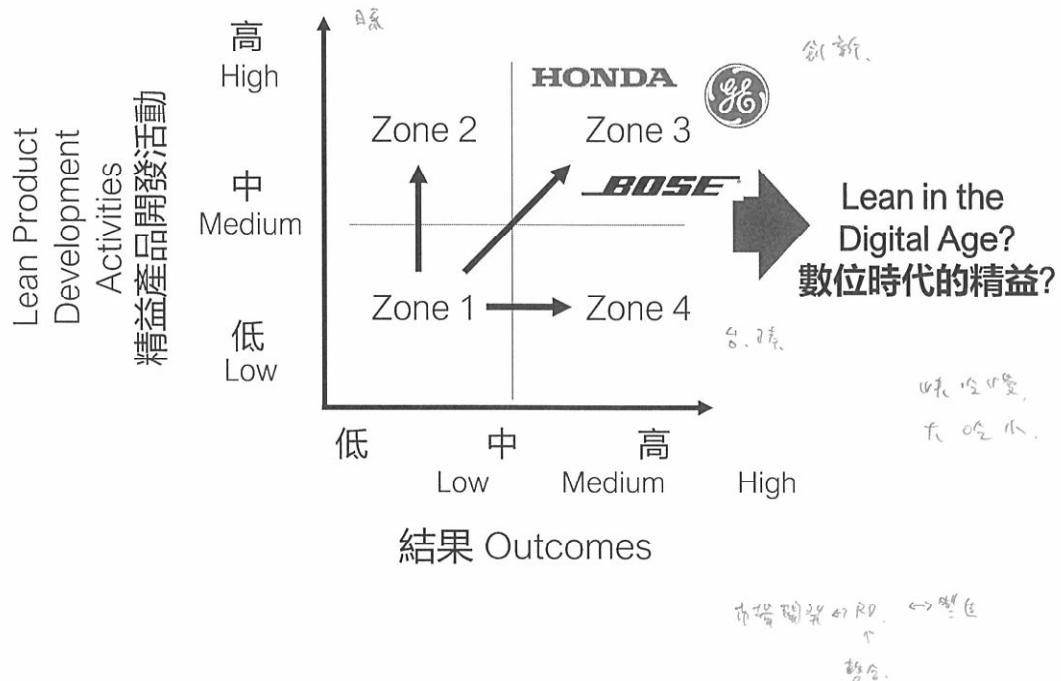
1990: 根源



- The elements of lean production 精益生產的要素
 - Running the factory (✓ 工廠營運)
 - *Designing the car (!)* 設計汽車
 - Coordinating the supply chain (✓ 與供應鏈合作)
 - Dealing with the customers 與顧客打交道
 - Managing the lean enterprise 管理精益企業

↓
Product development:
The most powerful leverage
point in creating a lean enterprise!
產品開發：最有效的施力點創造精實企業

Lean Product Development Activities vs. Outcomes 精益產品開發活動 vs. 結果



Lean Product Development: Wastes 精益產品開發：浪費

Status quo in most enterprises: 多數企業現況

- Scatter (散亂失序)
 - Communication barriers 溝通障礙
 - Poor tools 不良的工具
- Hand-off (交接脫節)
 - Useless information 無用的訊息
 - Waiting for knowledge 等待知識
- Wishful thinking (主觀臆測)
 - Testing to specification 限於規定參數的測試
 - Discarded knowledge 廢棄的知識

Source: Ward and Sobek (2014)

Lean Product Development: Inspirations! 精益產品開發：精益書籍的啟發

- Reducing Wastes = Creating Value 減少浪費 = 創造價值
 - Creating (re)usable knowledge and equipment that contribute to consistently profitable operational value streams. 創造可再使用的知識與設備，有助於獲利的作業價值流。



Implementation: Integrated Lean Product Development (1/2) 集成精益產品開發的實踐

Implementation and experimentation through a university course 透過大學課程進行實驗

- 1) Time: 3.5 months (16 weeks)
- 2) Credits 學分: 4
- 3) Participants: 10 Industrial Design junior students 工業設計大三學生
- 4) Products (with motors) 產品(馬達):

- Car polisher 打蠟機
- Dryer 吹風機
- Juicer 榨汁機
- Mixer 攪拌機
- Ice shredder 刨冰機



Implementation: Integrated Lean Product Development (2/2) 集成精益產品開發的實踐

- Warm-up 暖身:

- Disassemble products and build them up in SolidWorks (3D CAD Design Software) 拆解產品並進行建模

- Requirements:

- 2nd generation product design
進行二代產品設計
- Competitive in the market 市場競爭力
- Be a functional prototype 實踐運作
- Design for manufacturability 可量產
- Utilization of 3D printing (3D 打印)

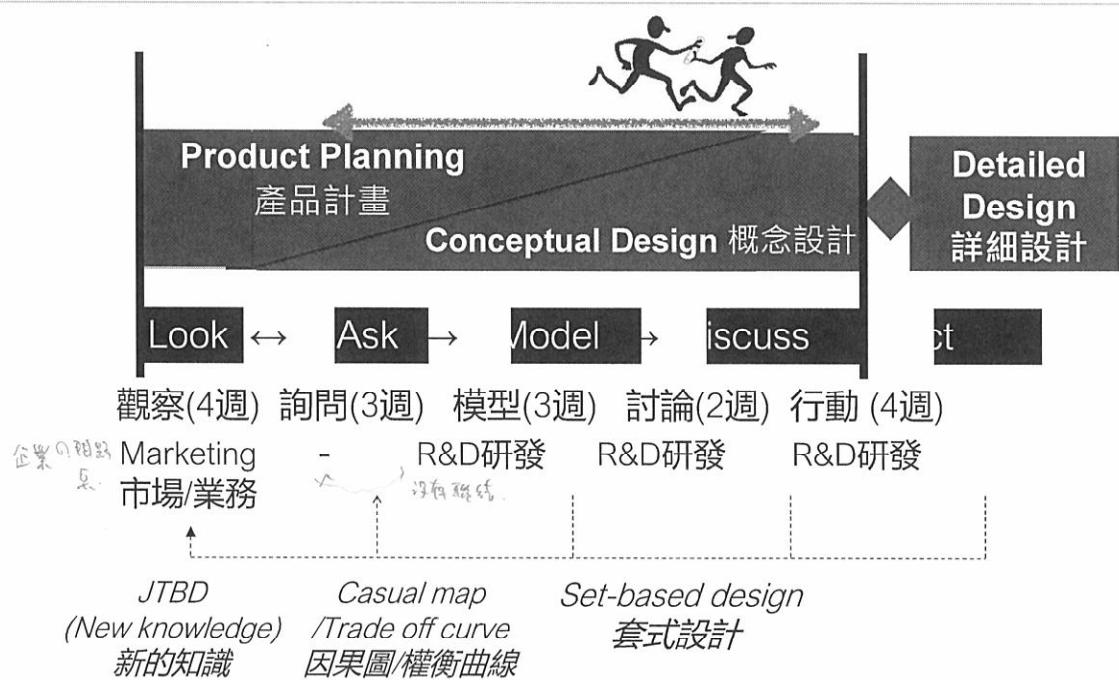
我們是怎樣的

降低 cost.



目標

Our Approach: LAMDA, Value-creating cycle (1/10) 我們的做法：LAMDA, 持續創造價值



Our Approach: LAMDA, Value-creating cycle (2/10) 我們的做法：LAMDA, 持續創造價值

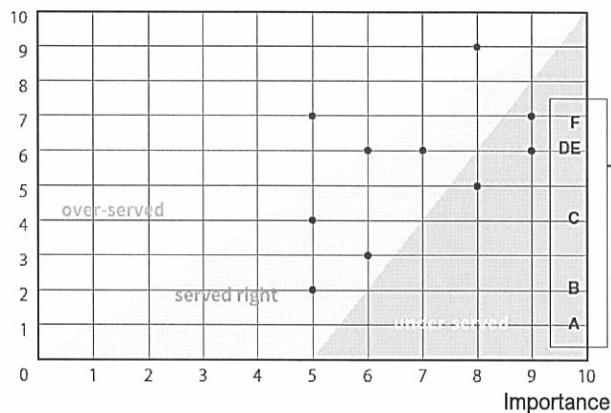
Look 觀察: Jobs to be done



THD-3000F
Taitung

1000W
NTD\$329

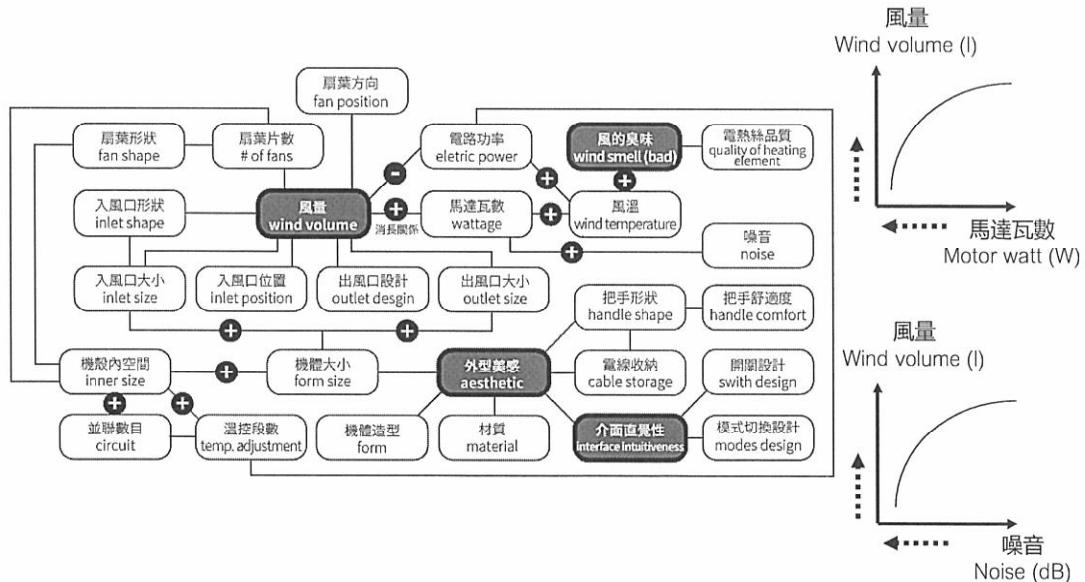
Satisfaction



Item	Outcome	Score
A	外觀美感 Esthetics	18
B	電線收納 Cord storage	18
C	風的味道 Odor	16
D	風量 Wind volume	14
E	介面直覺性 Interface Intuitiveness	14
F	風溫 Temperature	13

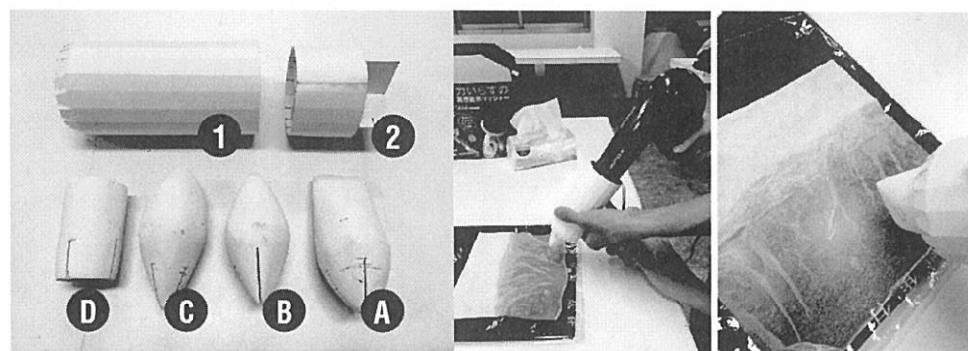
Our Approach: LAMDA, Value-creating cycle (3/10) 我們的做法：LAMDA, 持續創造價值

Ask 詢問: Casual map/Trade off curve 因果關係圖/權衡曲線

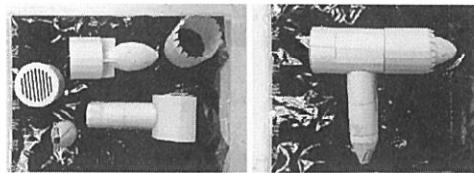


Our Approach: LAMDA, Value-creating cycle (4/10) 我們的做法：LAMDA, 持續創造價值

Discuss 討論: Set-based design 套式設計

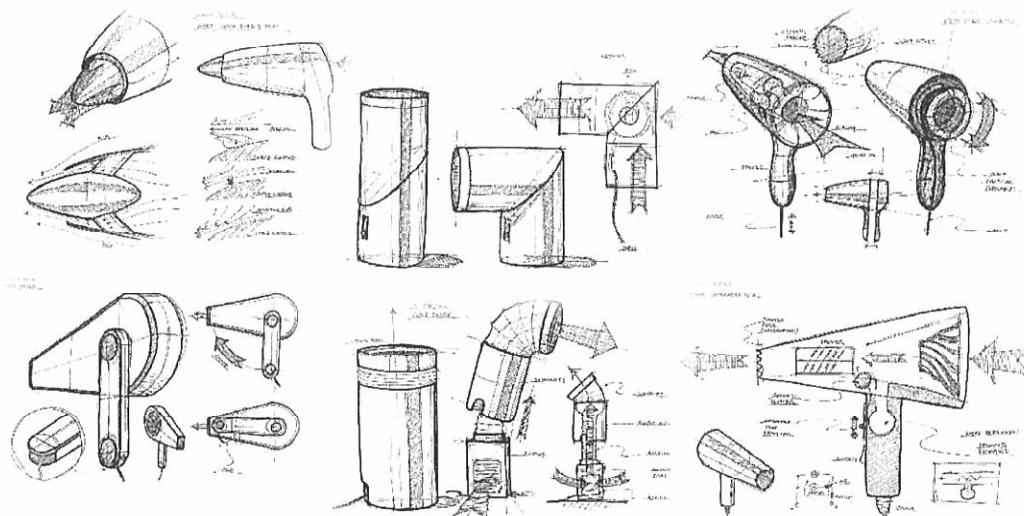


Option 模組	Time #1 風乾時間1	Time #2 風乾時間2	Ave. 平均	Ranking 速度排序
A	2'00"	2'07"	2'04"	3
B	1'50"	1'50"	1'50"	2
C	1'48"	1'46"	1'47"	1
D	2'14"	2'17"	2'16"	5
Original 原始設計	2'16"	2'11"	2'14"	4

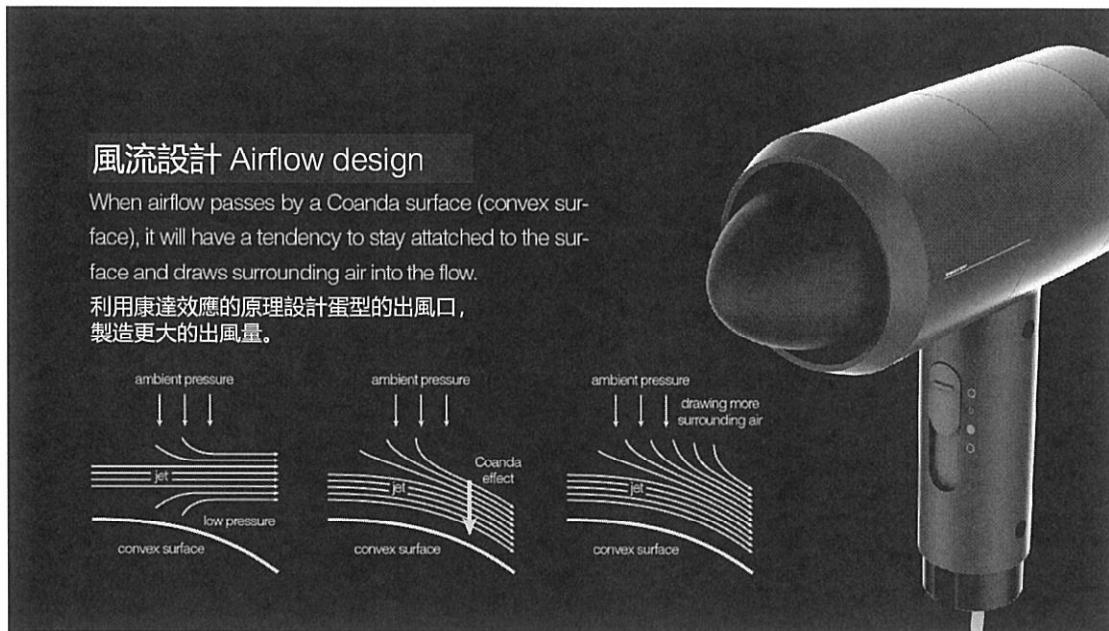


Our Approach: LAMDA, Value-creating cycle (5/10) 我們的做法：LAMDA, 持續創造價值

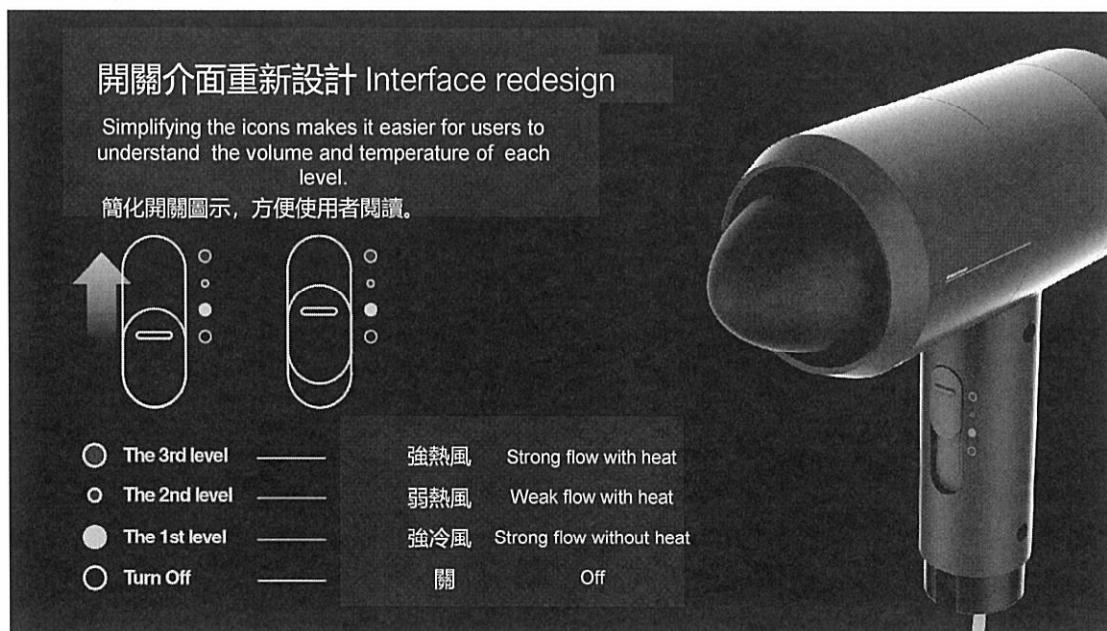
Act 行動:



Our Approach: LAMDA, Value-creating cycle (6/10) 我們的做法： LAMDA, 持續創造價值



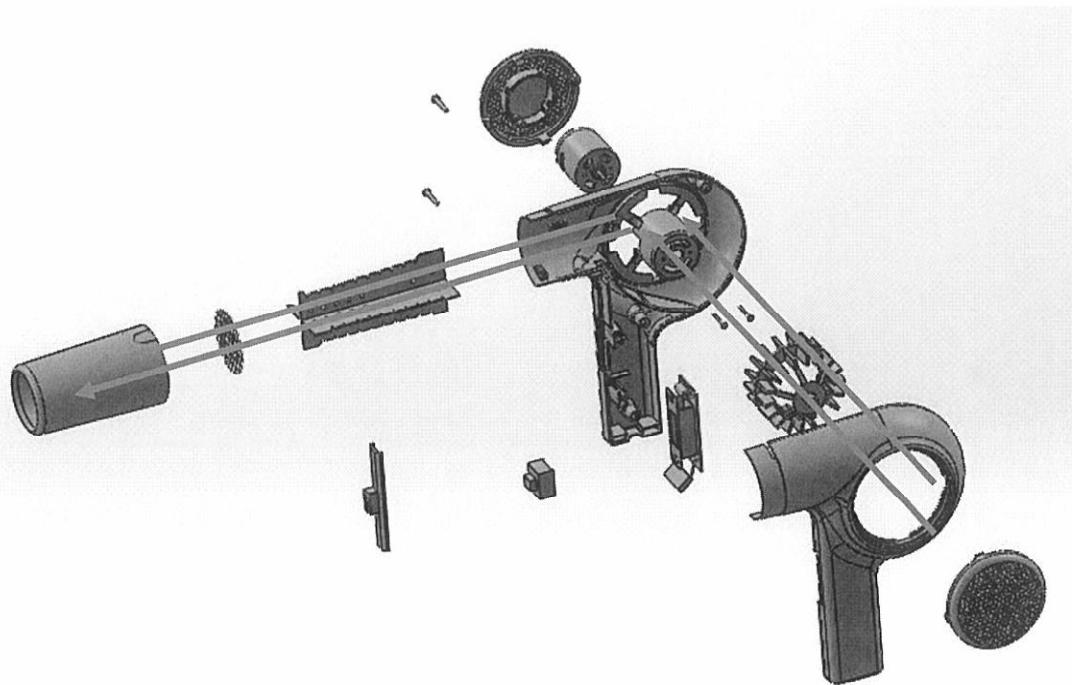
Our Approach: LAMDA, Value-creating cycle (7/10) 我們的做法： LAMDA, 持續創造價值



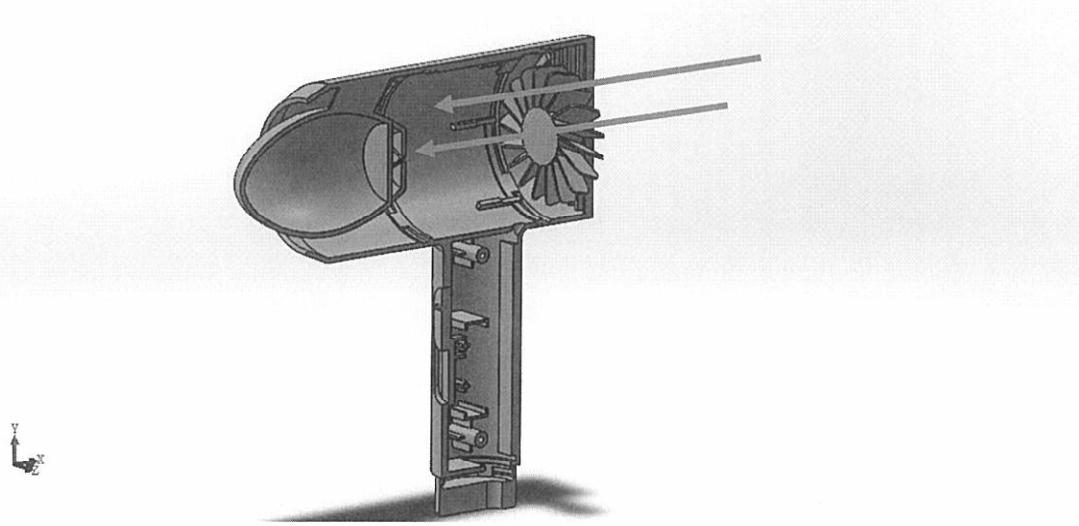
Our Approach: LAMDA, Value-creating cycle (8/10)
我們的做法：LAMDA, 持續創造價值



Our Approach: LAMDA, Value-creating cycle (9/10)
我們的做法：LAMDA, 持續創造價值



Our Approach: LAMDA, Value-creating cycle (10/10) 我們的做法：LAMDA, 持續創造價值

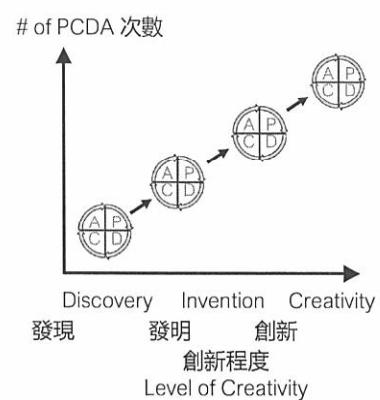


Reflections (1/3) 實驗結果與心得

產品規劃A3報告書			
主題	製作人	日期	
平滑度表面之改善研究	王士光	06/27/2017	
研究背景		產品說明	
產品規範A3報告書		總頁數	
總頁數		報告日期	
研究背景		報告人	
研究目的		日期控制方法	
研究方法		實驗結果	
研究進度		實驗結果	
研究方法		結論	
研究方法		附註	

A3 reports are “documented design knowledge/standards” to be used going forward.
A3報告是設計的知識/標準文件，可供後續產品開發使用。

A3 thinking promotes status review for thorough exploration of alternative solutions, problem solving, communication, & learning. A3 促使團隊進行現狀瀏覽，以達到探索解決方案的各種可能性 (問題解決、溝通、互相學習)。



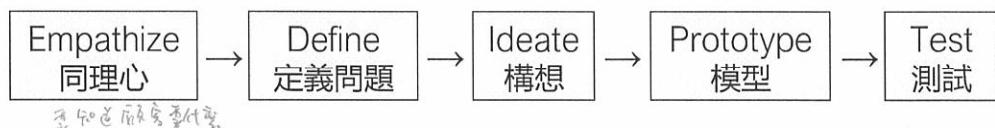
Reflections (2/3) 實驗結果與心得

- 1) Causal maps visualize design challenges and enable deep thinking. 因果關係圖視覺化設計挑戰，幫助設計深層思考。
- 2) Set-based design facilitates rapid learning cycles (synchronized sets of experiments to remove uncertainty, manage risk and build knowledge before key decisions need to be made during a product development project).
套式設計加速學習週期。
- 3) Integrated Lean Product Development expedites the product development process. 集成精益產品開發加速產品開發流程。
- 4) Integrated Lean Product Development could be used as a framework to facilitate learning and to train future “Chief-engineers.”
集成精益產品開發提供了全思考的教育訓練架構，甚至可用於訓練未來的總工程師。

Reflections (3/3) 實驗結果與心得

The differences between Design thinking and LAMDA in Integrated Lean Product Development (設計思考和集成精益產品開發的LAMDA的差異)

- Design thinking (設計思考)



- LAMDA



→ 互補性 →