

111-2學期 SK計劃課程 授課教師教學內容

- 課程時間目前安排於：
3-B、3-CD、5-B、5-78
*各教師課程內容規畫可能會另調整安排
- 開課課程：個案研究、問題解決
一門課選擇兩位教師



教師授課時間

課程名稱：個案研究、問題解決

時間安排：3-B、3-CD、5-B、5-78

注意：

- 為學習多元，請舊生選填課程名稱及教師時，須和之前學期不同喔
- 請同學選擇教師時盡量避開時間有重疊的教師

| 時間 | 3-B | 3-C | | 3-D | 備註 | 時間 | 5-B | 5-7 | | | 5-8 | | 備註 |
|-------|--------------|-------------|-------|-------------|----------|-------|-------------|-------------|-------|-------|-------------|-------|----------|
| | 12:10-13:00 | 17:05~17:55 | | 18:00~18:50 | | | 12:10-13:00 | 15:10~16:00 | | | 16:10~17:00 | | |
| 教室安排 | 莊敬108 | 莊敬102 | 莊敬108 | 莊敬108 | | 教室安排 | 莊敬102 | 莊敬102 | 莊敬210 | 莊敬307 | 莊敬102 | 莊敬210 | |
| 2月15日 | 徐昕煒 | 許志華 | 戴淑賢 | 戴淑賢 | | 2月17日 | | 余燕薇 | 趙怡翔 | 王珮嘉 | 余燕薇 | 趙怡翔 | |
| 2月22日 | 徐昕煒 | 許志華 | 饒忻 | 饒忻 | | 2月24日 | | | 黃冠鈞 | 王珮嘉 | | 黃冠鈞 | |
| 3月1日 | 徐昕煒 | 許志華 | 戴淑賢 | 戴淑賢 | | 3月3日 | | 余燕薇 | 趙怡翔 | 王珮嘉 | 余燕薇 | 趙怡翔 | |
| 3月8日 | | 許志華 | 饒忻 | 饒忻 | | 3月10日 | | | 黃冠鈞 | 王珮嘉 | | 黃冠鈞 | |
| 3月15日 | 徐昕煒 | 許志華 | 戴淑賢 | 戴淑賢 | | 3月17日 | | 余燕薇 | 趙怡翔 | 王珮嘉 | 余燕薇 | 趙怡翔 | |
| 3月22日 | 運動會・正常上班(停課) | | | | | 3月24日 | | | 黃冠鈞 | 王珮嘉 | | 黃冠鈞 | |
| 3月29日 | 徐昕煒 | 許志華 | 饒忻 | 饒忻 | | 3月31日 | | 余燕薇 | 趙怡翔 | 王珮嘉 | 余燕薇 | 趙怡翔 | |
| 4月5日 | 民族掃墓節(放假) | | | | | 4月7日 | | | 黃冠鈞 | 王珮嘉 | | 黃冠鈞 | |
| 4月12日 | 徐昕煒 | | | | 期中考週 | 4月14日 | | | 趙怡翔 | | | 趙怡翔 | 期中考週 |
| 4月19日 | 徐昕煒 | | 戴淑賢 | 戴淑賢 | | 4月21日 | | 余燕薇 | 黃冠鈞 | 王珮嘉 | 余燕薇 | 黃冠鈞 | |
| 4月26日 | 徐昕煒 | 許志華 | 饒忻 | 饒忻 | | 4月28日 | | | 趙怡翔 | 王珮嘉 | | 趙怡翔 | |
| 5月3日 | | 許志華 | 戴淑賢 | 戴淑賢 | | 5月5日 | | | 黃冠鈞 | | | 黃冠鈞 | |
| 5月10日 | 徐昕煒 | 許志華 | 饒忻 | 饒忻 | | 5月12日 | | 余燕薇 | | 王珮嘉 | 余燕薇 | | |
| 5月17日 | 徐昕煒 | 許志華 | 戴淑賢 | 戴淑賢 | | 5月19日 | | | | | | | |
| 5月24日 | | 許志華 | 饒忻 | 饒忻 | | 5月26日 | | | | 王珮嘉 | | | |
| 5月31日 | 徐昕煒 | 許志華 | | | | 6月2日 | | | | | | | |
| 6月7日 | | | | | | 6月9日 | | | | | | | |
| 6月14日 | | | | | 期末考週・展演週 | 6月16日 | | | | | | | 期末考週・展演週 |

Case study: Ergonomics

個案研究: 人因工程

1. Core Ability Direction

- Problem finding & Problem solving.
- Develop an effective presentation narrative.

2. Prerequisite: Motion and Time Study, Ergonomics

3. Course Design: 12 hours



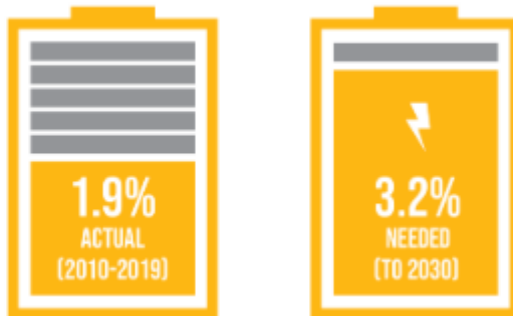
| No. | Hour | Teaching approach | Content |
|-----|------|-------------------|---|
| 1 | 2 | Lecture | Industrial ergonomics case studies |
| 2 | 4 | Field study | Case-1: Industry visit & ergonomic assessment |
| 3 | 3 | Group meeting | Case-1: Initiate & intergrate an ergonomic report |
| 4 | 4 | Field study | Case-2: Industry visit & ergonomic assessment |
| 5 | 3 | Group meeting | Case-2: Initiate & intergrate an ergonomic report |
| 6 | 2 | Presentation | Final presentation |



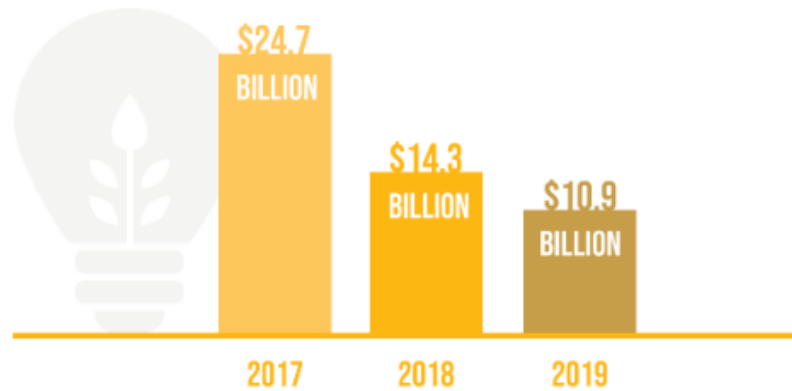
ENSURE ACCESS TO AFFORDABLE, RELIABLE, SUSTAINABLE AND MODERN ENERGY FOR ALL

PROGRESS IN ENERGY EFFICIENCY NEEDS TO SPEED UP TO ACHIEVE GLOBAL CLIMATE GOALS

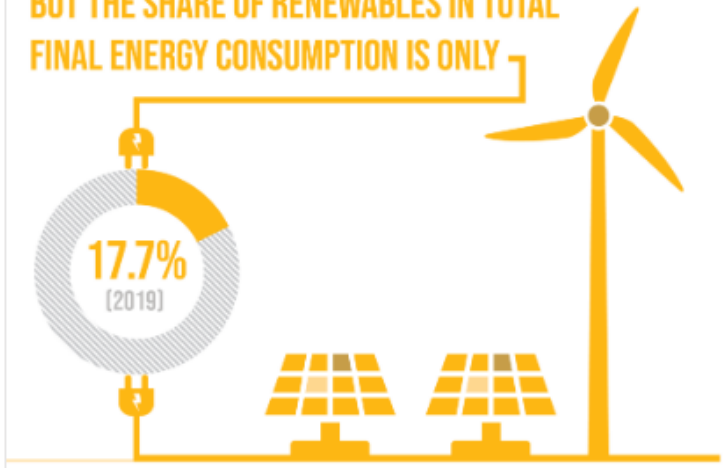
ANNUAL ENERGY-INTENSITY IMPROVEMENT RATE



INTERNATIONAL FINANCIAL FLOWS TO DEVELOPING COUNTRIES FOR RENEWABLES DECLINED FOR A SECOND YEAR IN A ROW



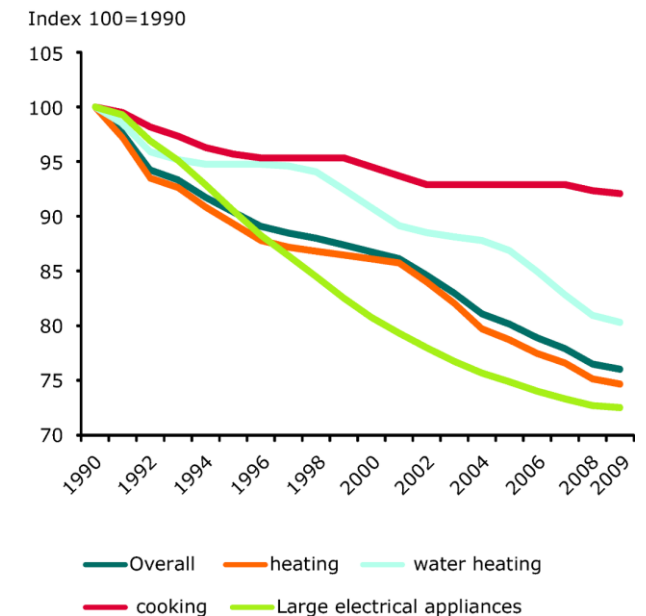
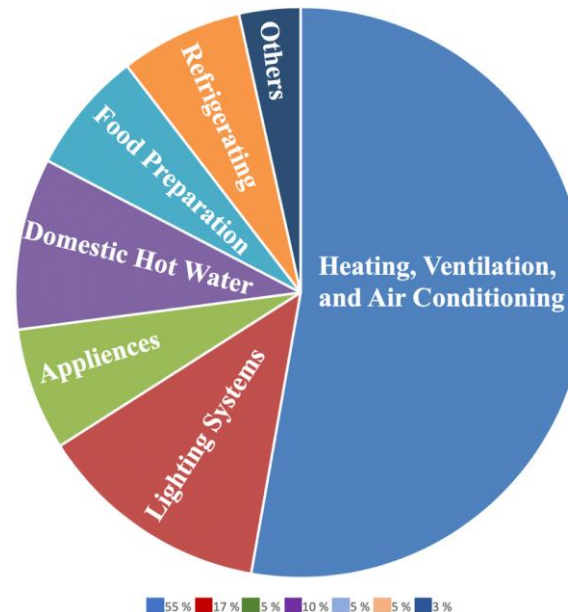
TOTAL **RENEWABLE ENERGY**
CONSUMPTION INCREASED BY
A QUARTER BETWEEN 2010 AND 2019,
BUT THE SHARE OF RENEWABLES IN TOTAL
FINAL ENERGY CONSUMPTION IS ONLY



Knowledge Management in Households about Energy Saving
as Part of the Awareness of Sustainable Development

Household Energy Management

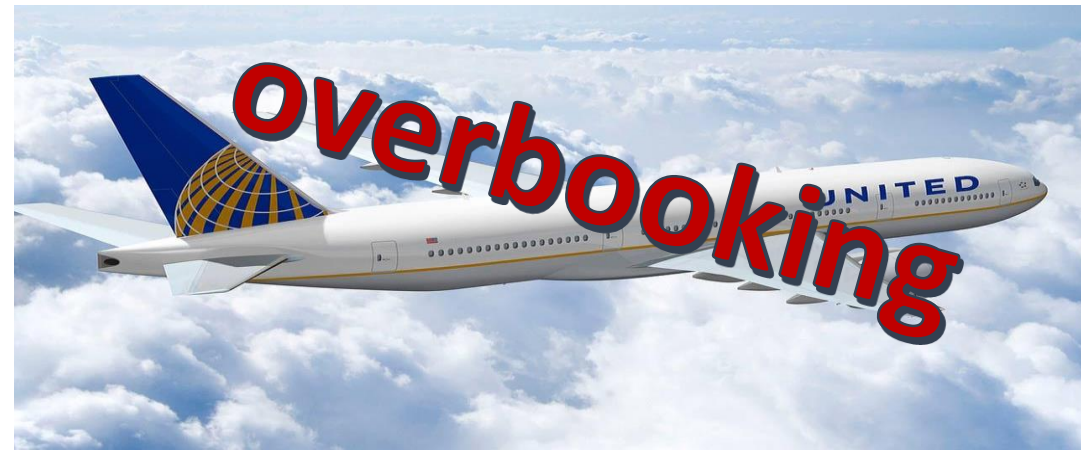
- Research Questions:
 1. Where a household uses its energy?
 2. What is an energy efficient home?
 3. What are the ways to motivate Taiwanese to save energy?
- Research Method:
 1. Questionnaire
 2. Survey



- **Case Study (Service Quality)**
- Overbooking of United Airlines-
- Service Failure that Impairs Corporate Image

Teaching Plan and Class Discussion:

1. Why Overbooking ? What the benefit and loss for airline and customers.
2. Service quality perceived by customers.
4. Service failure and recovery.
5. Crisis management.
6. Profit vs. customer satisfy.



Innovative Design – by Hsin Rau

Week 1: What Is TRIZ?

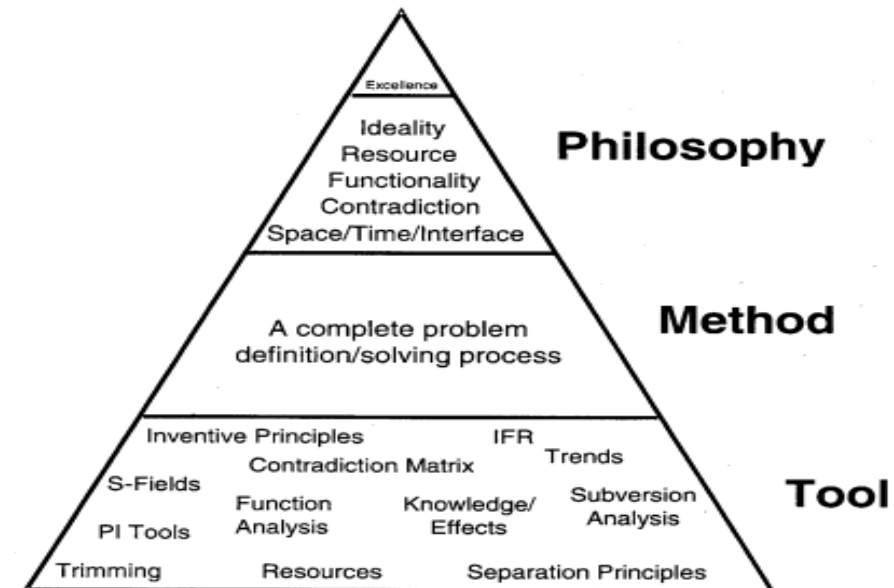
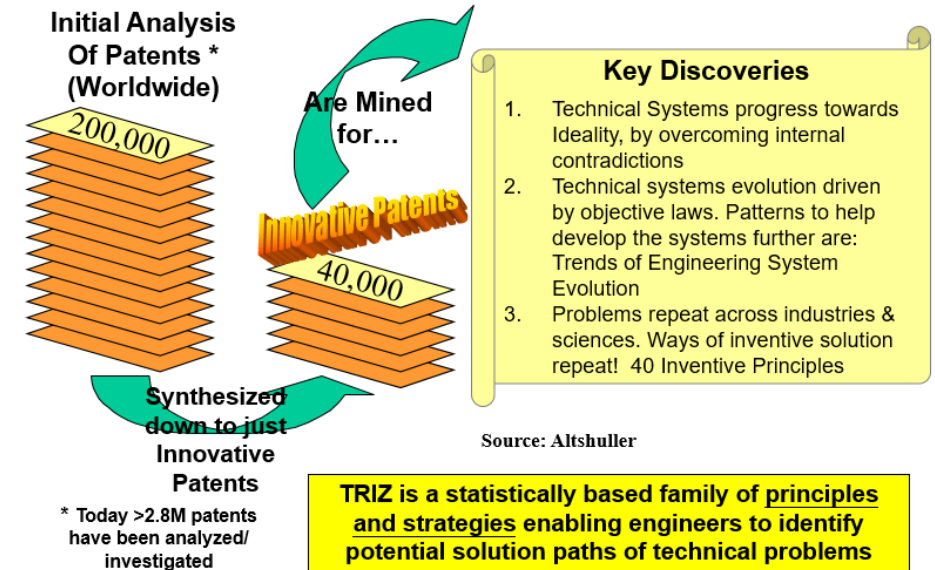
- Key Discoveries
- Hierarchical View
- Seven Pillars
- Success Stories
- Global Innovation Index
- Applications & Organizations

• Week 2: TRIZ and Systematic Innovation Tools (1)

- Six Thinking Hats with Practice
- Psychological Inertia
- STC Operator

• Week 3: TRIZ and Systematic Innovation Tools (2)

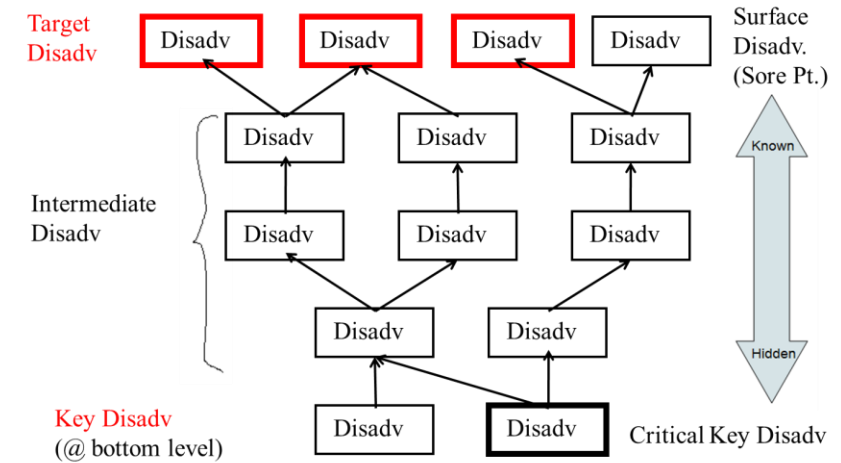
- Ideality
- Ideal Final Result
- 9 Windows Method with Practice
- S-curve



Innovative Design – by Hsin Rau

- Week 4: TRIZ Solution Procedure (1)
 - Problem Definition
 - Function Analysis
 - Cause Effect Chain and Contradiction Analysis
- Week 5: TRIZ Solution Procedure (2)
 - 40 Inventive Principles
 - Contradiction Matrix
 - Design Evaluation
- Week 6: Final Project
 - Project Proposal
 - Project Presentation

| | Weight | Idea 1 | Idea 2 | | Idea M |
|-------------|--------|--------|--------|------|--------|
| Criterion 1 | | | | | |
| Criterion 2 | | | | | |
| Criterion 3 | | | | | |
| | | | | | |
| Criterion N | | | | | |
| | | | | | |
| Overall | | | | | |



6

| Altshuller's Contradiction Matrix | | | | | | |
|-----------------------------------|-----------------------------|-------------------------|-----------------------------|-------------------------|-----------------------------|-----------------------|
| Worsening Parameters | | Weight of moving object | Weight of stationary object | Length of moving object | Length of stationary object | Area of moving object |
| Improving Parameters | | 1 | 2 | 3 | 4 | 5 |
| 1 | Weight of moving object | + | - | 15,8 29,34 | - | 29,17 38,34 |
| 2 | Weight of stationary object | - | + | - | 10,1 29,35 | - |
| 3 | Length of moving object | 8,15 29,34 | - | + | - | - |
| 4 | Length of stationary object | 35,28 40,29 | - | - | + | 17,7 10,70 |
| 5 | Area of moving object | 2,17 29,4 | - | 14,50 18,4 | - | + |

39 Parameters

39 Parameters

Inventive Principles

決策與柔性計算

Decision and Soft Computing

Dr. Hsin-Wei Hsu
Assistant Professor

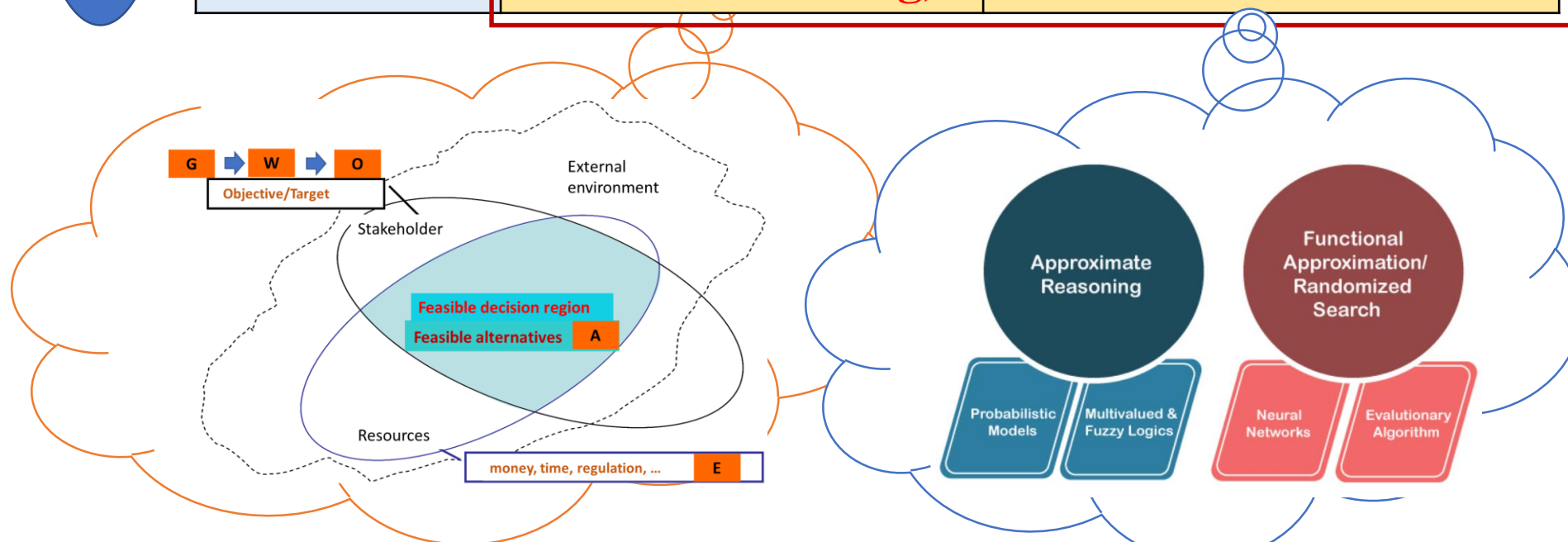
Department of Industrial and Systems Engineering
Chung Yuan Christian University

2021

決策不是硬梆梆， 「計算」也可以很溫柔？

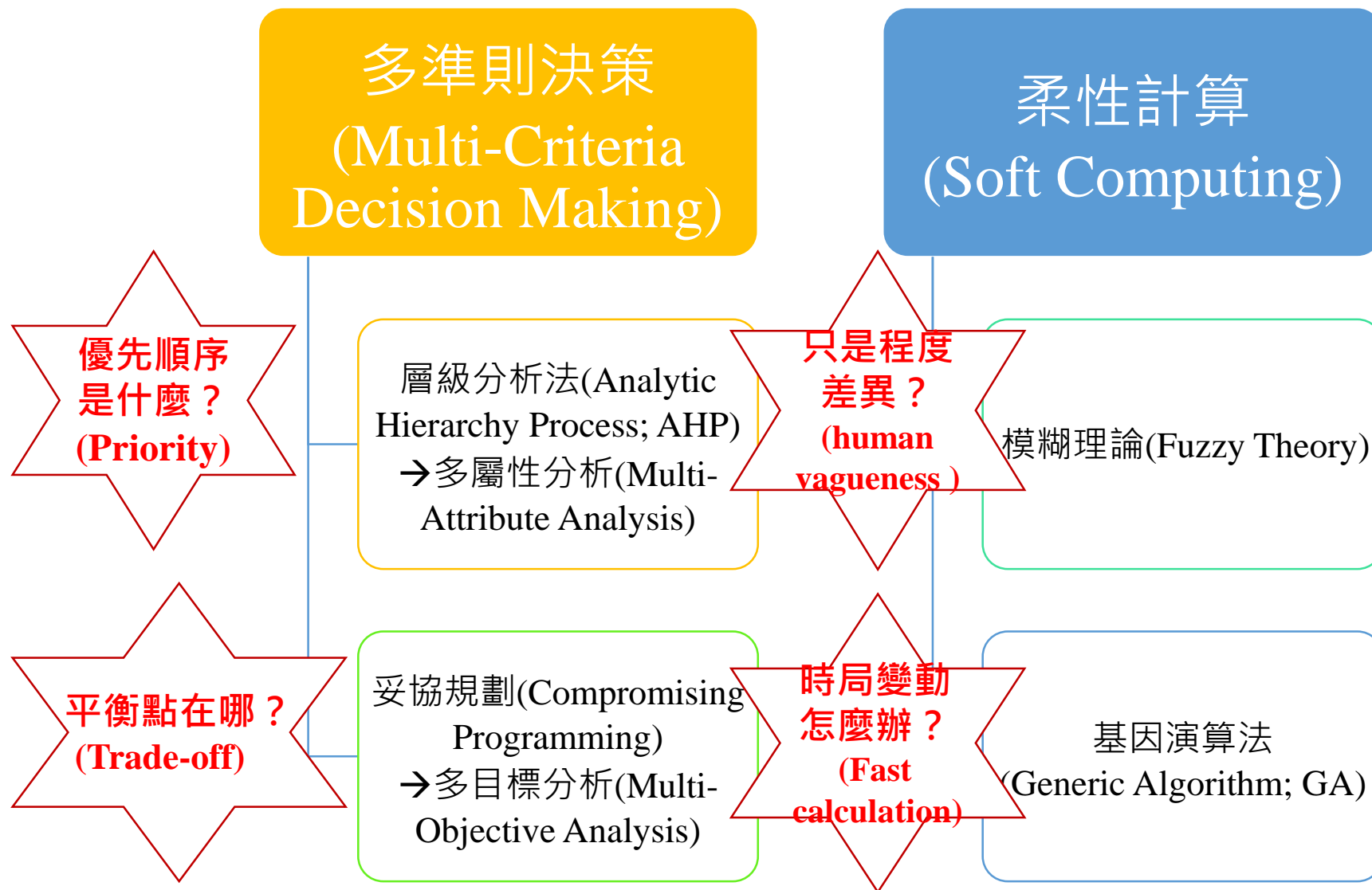
決策型態


| | 方案確定 (certain alternatives) | 方案不確定 (uncertain alternative) |
|--------------------------|---|----------------------------------|
| 單一任務 (single task) | 作業研究 (OR) | 主觀判斷 |
| 多重任務 (multiple tasks) | 多屬性/多目標決策 (Multi-criteria Decision Making) | 柔性計算 (Soft Computing) |



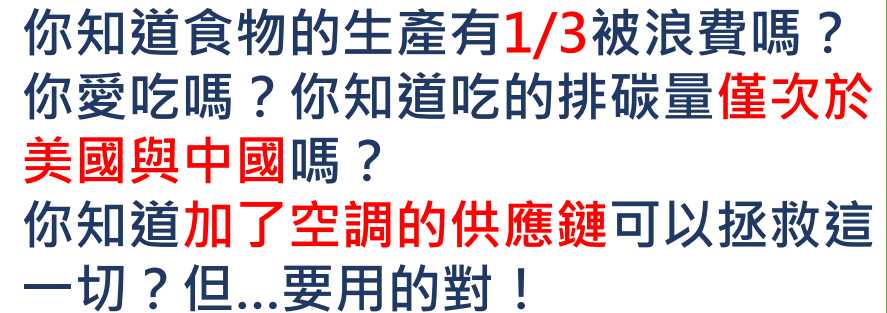
決策與柔性方法：

四個方法，解決四個問題

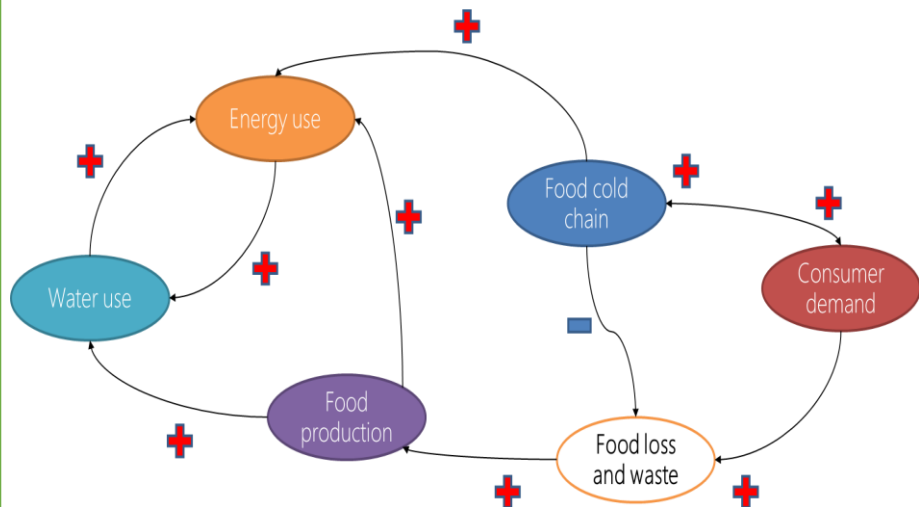




能源資料與案例



冷鏈與食品浪費案例





British scholar
Samuel Eilon,

俗話說(其實是英國學者說)

『最佳化是終極的科學；
然而，尋找足夠滿意的
答案是一門藝術』

“Optimizing is the science of the ultimate;
satisficing is the art of the feasible.”

中原大學，全人教育！
讓我們一起來學習**科學中的藝術**！

Curriculum planning

Expected hours: 12 hours (dynamic adjustment)

Requirement: Basic programming ability or willing to self-learn

(Warning: A rapid development of ability without the basic theory in depth)

| Multi-attribute Decision Making (AHP) | | Decision under Uncertainty (Fuzzy) | |
|---------------------------------------|--|------------------------------------|--|
| 1 st hour | Introduction to Multiple Attribute Decision Making | 1 st hour | The type of uncertainty and introduction of Fuzzy. |
| 2 nd hour | What's AHP? | 2 nd hour | Fuzzy theory |
| 3 rd hour | The case and application | 3 rd hour | Fuzzy programming |
| Assignment | Coding for the AHP method | Assignment | CPLEX or LINGO solver |

| Multi-objectives Decision Making (CP) | | Algorithms (GA) | |
|---------------------------------------|----------------------------------|----------------------|---|
| 1 st hour | Introduction to MODM | 1 st hour | Introduction to Algorithm |
| 2 nd hour | The nondominated solution | 2 nd hour | What is the Generic Algorithm used for? |
| 3 rd hour | How to define a “good” decision? | 3 rd hour | The case and application |
| Assignment | CPLEX or LINGO solver | Assignment | Coding for the GA |

Project and Scoring

Things beyond 12 hours

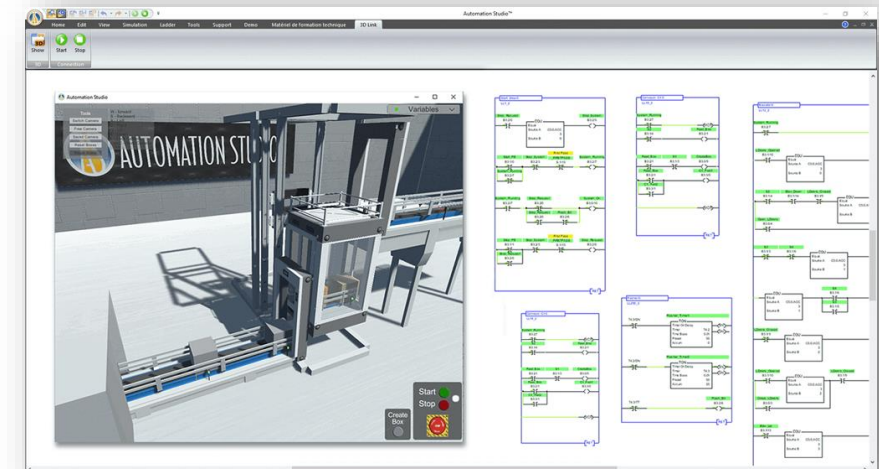
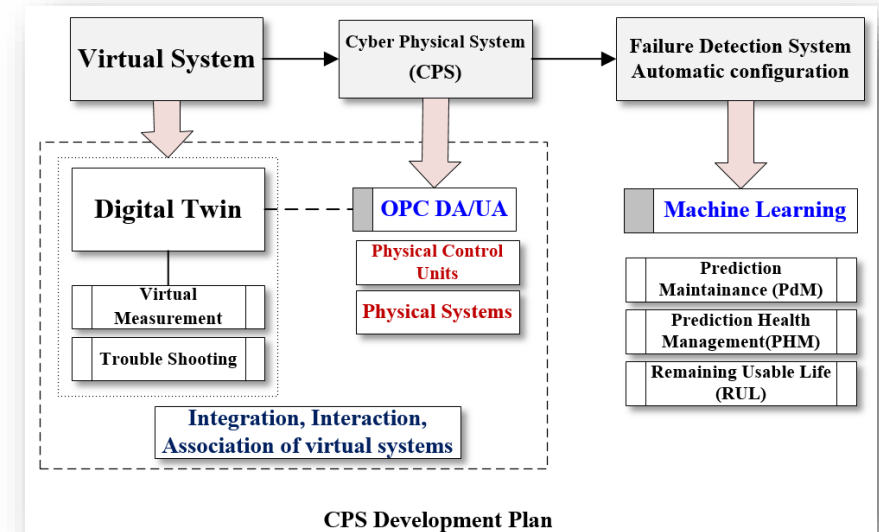
1. Self-learning the coding and software using ability
2. Paper or case reading and writing experience report
3. Reproduce the achievements of others or plan a special project by yourself, and complete the project.

| Scoring | | |
|-------------------|---|-----|
| Four Assignments | 1. Coding for AHP 2. CP homework 3. FP homework 4. Coding for GA | 40% |
| Experience Report | 1 international paper or case study | 10% |
| Project | 1. Reproduce the achievements of others (low level) 2. Your own project (High level) | 50% |

Manufacturing/AI : CPS introduction

- Phase 1: Virtual system development
 - Platform : Automation Studio
 - 1. Introduction of technologies applied to manufacturing systems
 - 2. Process control introduction
 - a) Actuators
 - b) Electric control system (JIC and IEC standards)
 - c) PLC and Ladder diagrams
 - d) Sequential Function Charts (SFC)
 - e) 3D virtual system development (Case study and existing equipment)

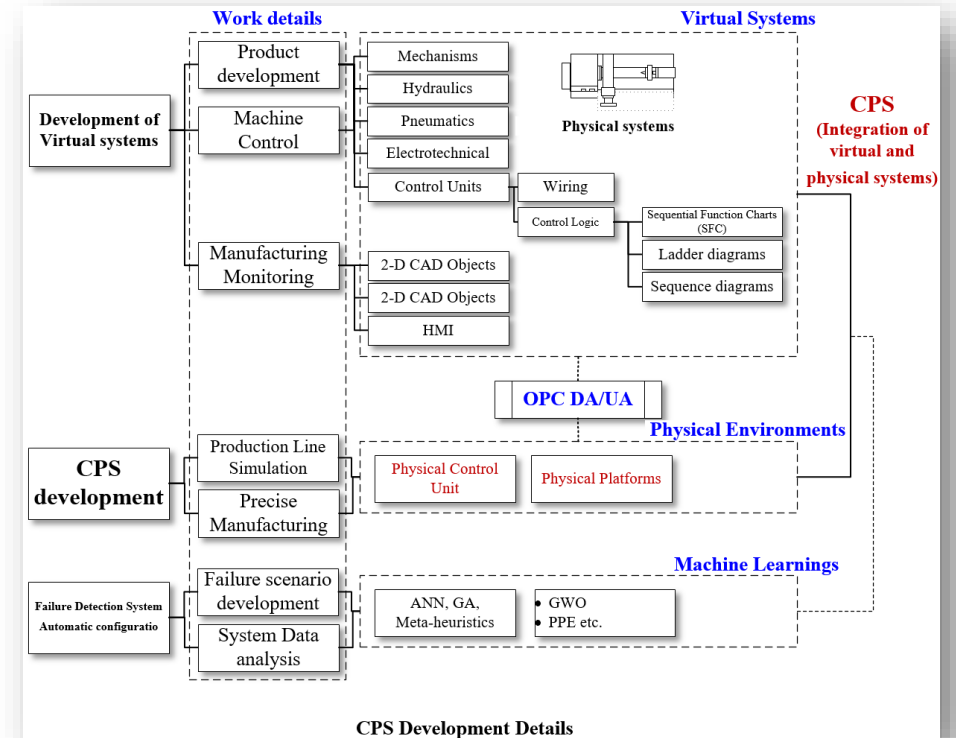
*Note: Please refer to the figures
(1) CPS development Plan and
(2) CPS development details*



Manufacturing/AI : CPS introduction

- Phase 2: CPS development
 - Platform : Automation Studio
 - 1. Introduction of physical control units
 - a) Mitsubishi
 - b) Omron
 - 2. Introduction of communication strategies
 - a) OPC servers
 - b) OPC DA/UA
 - c) Communications

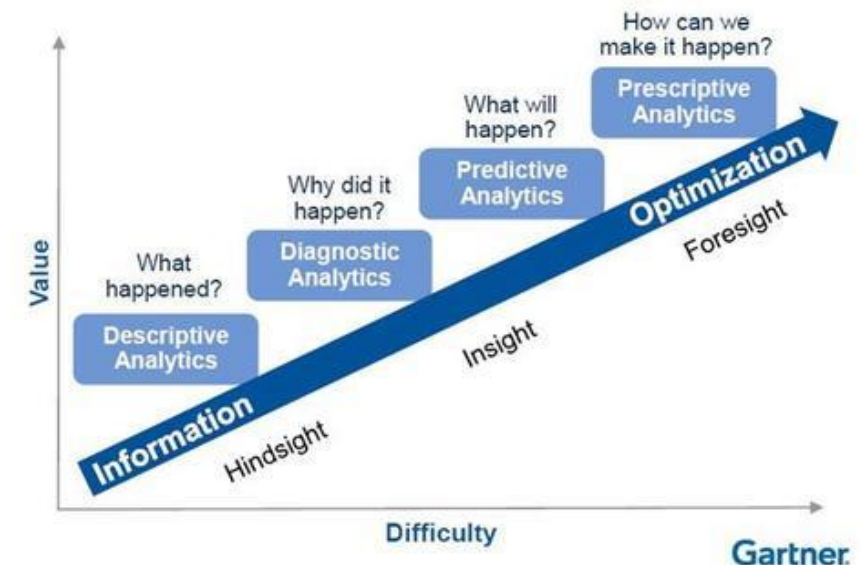
*Note: Please refer to the figures
(1) CPS development Plan and
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Business Analytics (商業分析)

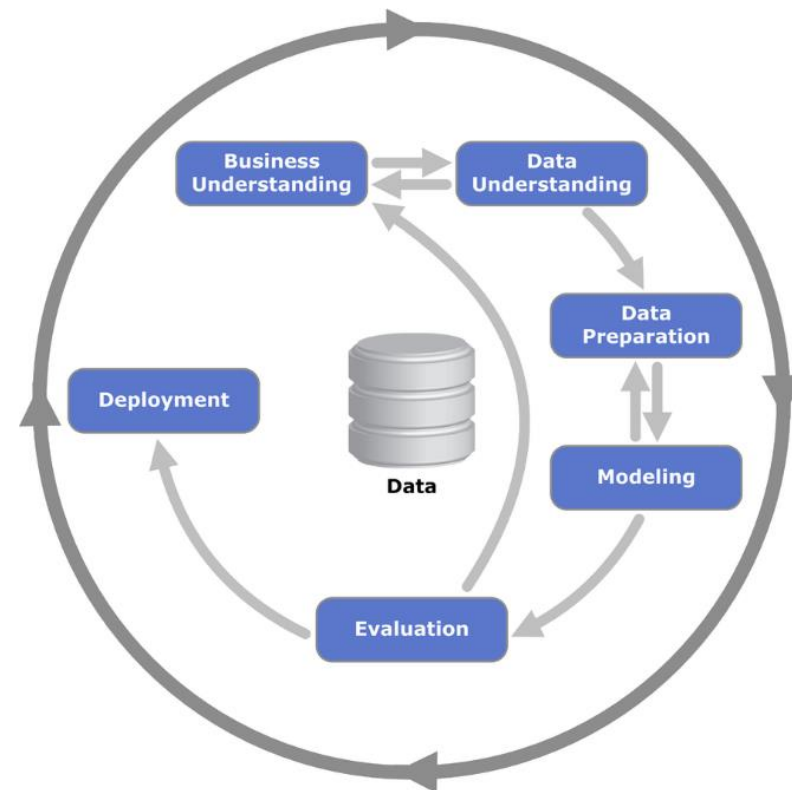
- (MIT) apply the tools of modern data science, optimization, and machine learning to solve real-world business problems
- Machine learning: A branch of AI
- Prerequisite: Any programming language, knowledge of basic probability and matrix notation (in high school)
- Quality: Willing to learn and code (in Python)
- YouTube: 許志華 最佳化和機器學習1.2.2 Data to analytics to AI

M.Y. Sir, et al., Optimization of Multidisciplinary Staffing Improves Patient Experiences at the Mayo Clinic, *Interfaces*, 2017, 47(5), pp. 425–441



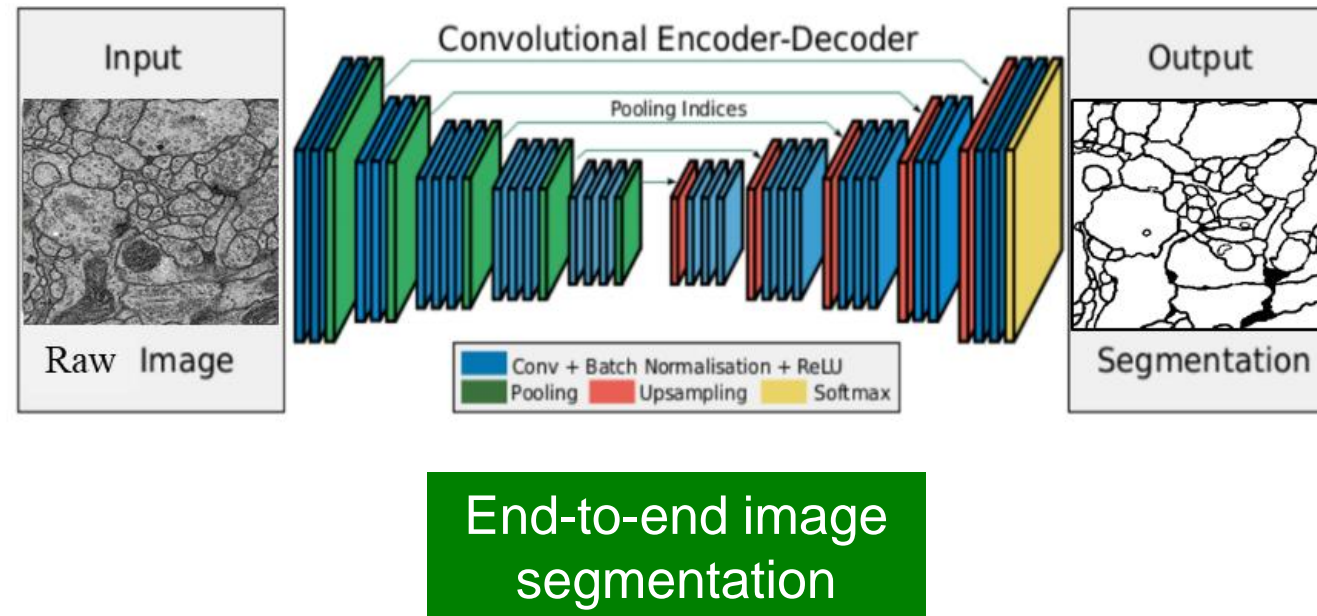
Course design: 12 hours

- Topic: We will discuss. In service, manufacturing, and anything.
- Listen to my video before the class: Python, machine learning, operations research
- We will discuss your progress during the meeting: Learning by doing



Wiki: Cross Industry Standard Process for Data Mining

AI Technology for Smart Healthcare: Biomedical Image Segmentation using CNN (1/2)



- Course Objectives

- To learn the SOTA medical image segmentation method: **Unet**
 - » This method won the 2015 IEEE International Symposium on Biomedical Imaging (ISBI) challenge
 - ✓ Only 30 cell images in the training dataset

AI Technology for Smart Healthcare: Biomedical Image Segmentation using CNN (2/2)

- Course Outline
 - What is Image Segmentation ?
 - Fundamentals of Convolutional Neural Network (CNN)
 - The biomedical image segmentation method : Unet
 - The implementation of Unet using Pytorch or Keras
 - » Train a Unet model using the cell image training dataset
 - » Inference the cell image testing dataset using your Unet model
- You can apply Unet in other applications
 - Lesion Detection
 - Cell Tracking

