

The World of Computerized Decision Support

(电脑化的决策支持世界)



Klang Valley Independent High School Computing Camp 2010
(雪隆八独中电脑工作营)

Specially for:



Presented by:



About Me



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What are Information Systems (什么是信息系统)?

- Information and communication technologies that help individuals and organizations to work more efficiently and effectively (应用信息和通信技术来帮助个人和组织更有效地工作).
- In a nutshell, we are.....

Computer Science + Business (电脑科学加商学)!



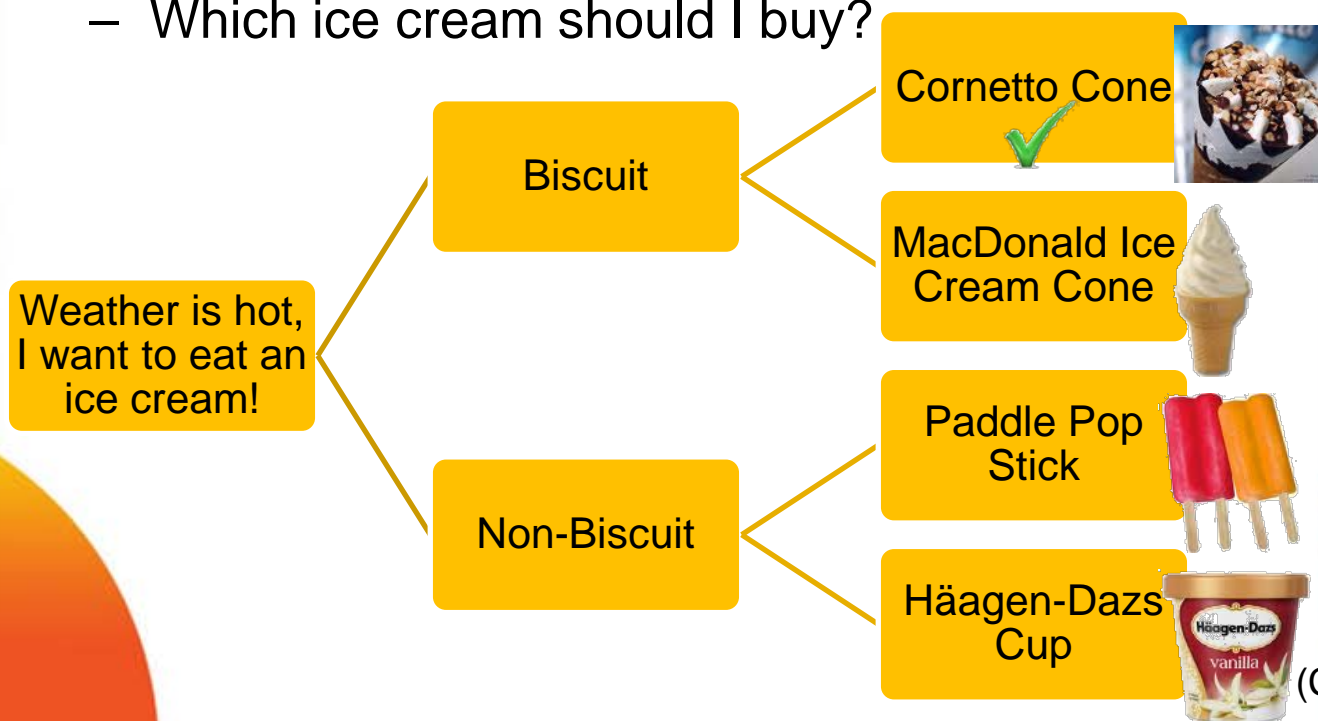
Today's Agenda

1. Introduction to Computerized Decision Support
2. Learning through Playing – The Ice Cream Game 🍦
3. Debrief


Introduction to Computerized Decision Support

What is Decision Making (决策)?

- A mental process that results in the selection of a course of action among several alternatives.
- Example:
 - Which ice cream should I buy?



Decision Making is Complex

- Decision itself is complex:
 - Many factors to consider: Price, flavor, availability, etc.
 - Should I even eat an ice cream? How about a cold drink? 
- Decision making situation (局勢) is complex:
 - Group decision, time pressure, cause and effect, etc.

Decision Making is Complex (cont')

- Decision maker (决策者) is not capable of making the decision:
 - Limited information processing capability, cognitive laziness, irrational, bias, etc.

Computerized Decision Making

- Computer can process a huge amount of complex information in a fast and accurate manner.



- But computer lacks problem solving ability in general (一般来说):

- Cannot identify new problem or exception.
- Cannot interpret (阐释) information



Computerized Decision Making (cont')

- Example:
 - Computer chooses Chocolate Nuts Ice Cream for you.

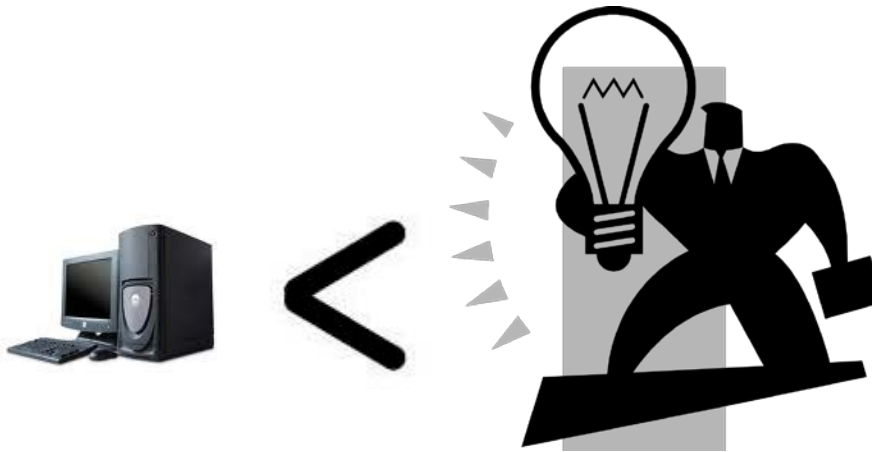


- But computer is unaware that you are allergic to nuts and peanuts.



Computerized Decision **SUPPORT**

- Thus, computer supports but does not replace the human decision maker.



- More specifically, Decision Support System (DSS – 决策支持系统) provides information and tools to help in decision making.

Components (组成部分) of DSS

- **Data (数据)** – Raw facts.
 - Temperature and ice cream sales figures.
- **Model (模型)** – Representation of the real world.
 - Logical (逻辑).
 - IF weather is hot THEN eat ice cream ELSE drink hot coffee
 - Mathematical and statistical (数学和统计).
 - Profit = Revenue – Cost

Components (组成部分) of DSS (cont')

- **User Interface (UI – 用户界面)** – How decision maker interacts with the DSS.
 - Visual interface (可视化界面).

Types of DSS

- **Data-driven (数据驱动)** – Provides internal data to support decision making.
 - Ice cream sales by regions – Help to decide where to open new outlet.
 - Ice cream sales by months – Help to decide when to launch promotion.
- **Model-driven (模型驱动)** – Provides access to and manipulation of models to analyze problem and make decision.
 - Ice cream retailer – How much ice cream to order?

Other Types of DSS

- **Spreadsheet –based (电子表格式) DSS** – Use spreadsheets to model data.
 - **Demonstration:** Ice cream sales and order.
 - Cross-tabulation (交叉制表).
 - What-If and Goal Seek analyses.
- **Web-based (网页式) DSS** – DSS that is operated using a web browser (浏览器).
 - *Ice Cream Game.*



Other Types of DSS (cont')

- **Geographic Information System (地理信息系统)** – Display and analyze geographically referenced data.
 - **Demonstration:** StreetSine and OneMap.

The screenshot shows the StreetSine website interface. At the top, it displays '61,462 Home Reports generated & 24,359 SMS property leads'. A search bar is present with a 'Go' button. The main area features a map of Singapore with a pop-up window for 'Zhenghua Primary School'. The pop-up shows a 'StreetSine Quality Score' of 7 (10 - excellent) and a 'You Rate!' section with dropdown menus for Class Size, Teachers, Specials (i.e., art, music, etc.), Class Environment, and Student Performance, all set to 7. It also shows 'Total Votes: 1' and a 'Submit' button. The website has a 'my Control Panel' on the right with buttons for 'Property Listings', 'Home Report/Alert', 'Projects Search', 'Projects on Map', 'myResearch', 'myOrganizer', 'Sell', and 'Manage'. There is also a 'Show Amenities (On Map)' section with checkboxes for Transport, Groceries, Schools, Universities, and International Schools. At the bottom right, there is a 'Get a pricing report on your dream home!' section with links for 'Unit Pricing', 'Rental Info', and 'Investment Ratios'.

Source: <http://www.streetsine.com>

More DSSs

- **Consumer (消费者) DSS:**
 - Example:
 - Tools for online shopping.
 - **Demonstration:** Comparison shopping – CNET Shopper
 - **Demonstration:** Recommendation Agent – Zion
- **Organizational (组织) DSS:**
 - Big companies need to make decisions too.
 - These decisions are, of course, also made by human.



Summary

- DSS uses data, model and user interface to help human in decision making.
- There are many types of DSS that can be used by you and me.

Learning through Playing – The Ice Cream Game



Helping Organizations to Make Decision

- The case of supply chain management (供应链管理).
- Supply chain is a systematic way to move products from manufacturer to customers.

Ice Cream Supply Chain (冰淇淋供应链)



- **Problem** – How does each node along the supply chain decide the amount of ice cream to order (供应链各节点如何决定订购多少冰淇淋)?



Ice Cream Game

- You will find out for yourself by playing the ice cream game.
- Simulate the ice cream supply chain:
 - Each team will form a supply chain of 4 nodes (节点).
 - Each node receives order from the downstream (下游) node and makes order with the upstream (上游) node to fulfill downstream node's demand.
 - Ship ice creams received from upstream node to downstream node.
 - Ensure that you have enough ice cream in your warehouse to meet downstream node's demand.

Ice Cream Game (con't)

- But:
 - Each ice cream stored in your warehouse costs \$1.
 - Each shortfall ice cream that you cannot meet the order received costs \$2

- Unsatisfied customers.



我要吃
冰淇淋?!

- See which team has the lowest cost at the end!

Starting the Game

- Each node starts with:
 - 12 ice creams in the warehouse.
 - 4 ice creams in the receiving stage.
 - 4 ice creams in the transport stage from the upstream node.
 - An unknown “Order Received”.
- Altogether 25 periods.

Playing the Game

- Follow instructions on the game board.
- You receive an order and transport the required ice cream.
- There could be a shortfall.
- Then you place an order for more ice cream.
 - Period X – Order made (下订单).
 - Period X+1 – Order reached upstream node (订单传送到上游节点).
 - Period X+2 – Order transported (出货).
 - Period X+3 – Order received (收货).
- Update game record.

Organizational DSS

- Each team makes your own order decision.
- **Champion Ice Cream** will use a DSS to play the game.
 - Can choose to ignore the recommendation.
- At the end of 25 periods, the team with a total cost lower or equal to **Champion Ice Cream** will win a prize!
- Regardless, the non-DSS team with the lowest cost will still win a prize.

Debrief

Supply Chain Decision

- Uncertainty in the ice cream demand (需求不明确):
 - Order too much: Inventory cost and wastage.
 - Order too little: Shortfall / Backorder cost and unhappy customers.
- Lag time (滞后时间) in the ordering process:
 - Order goes from retailer to wholesaler, etc.
 - Factory needs time to manufacture and transport to distributor, etc.

Supply Chain Decision (cont')

- Each node keeps safety stock (安全库存) to meet demand surge (需求激增):
 - Each node further from the customers tries to stock more.

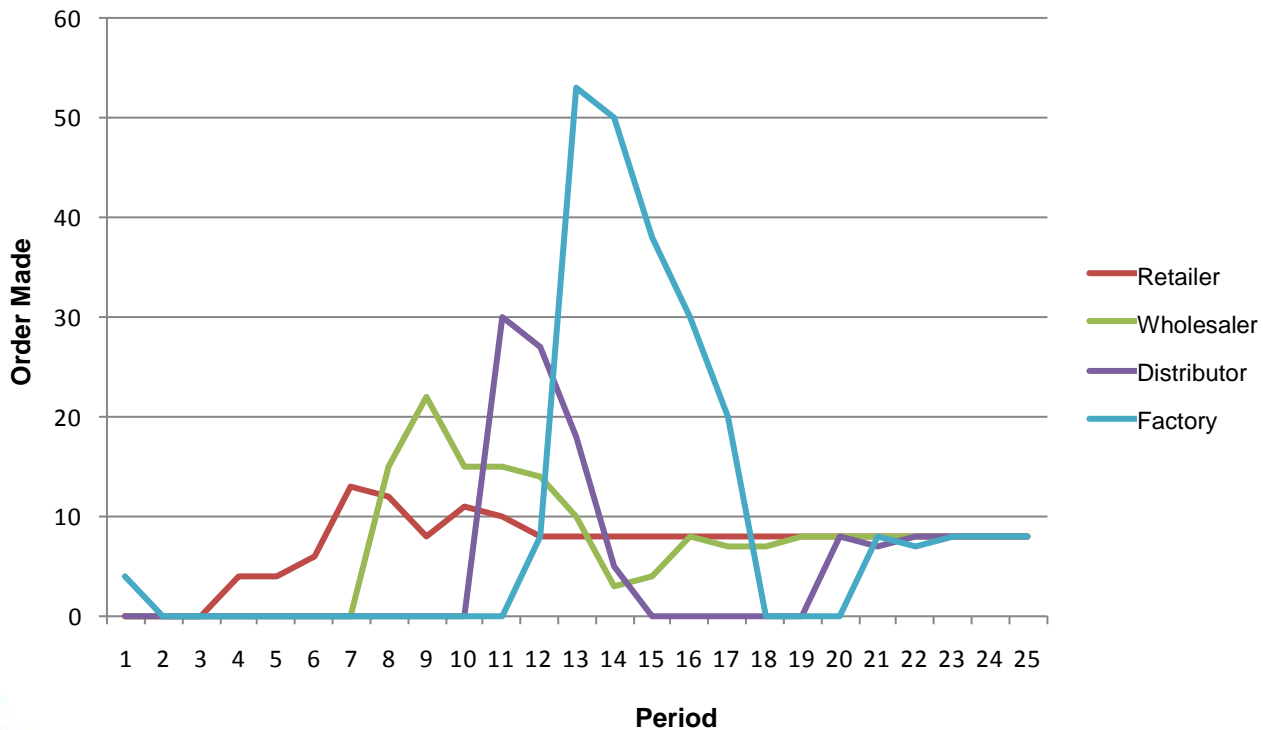
Bullwhip Effect (牛鞭效应)

- Order variability is amplified upstream in the supply chain (供应链上游的订单变异被放大).
 - Resembling a “cracking whip”



Source: http://en.wikipedia.org/wiki/Bullwhip_effect

Bullwhip Effect (牛鞭效应) (cont')



How to Remedy the Problem?

- Use information system to propagate ice cream orders to all nodes in the supply chain (运用信息系统，以传播各供应链节点的冰淇淋订单到所有其它节点).
 - Reduce the lag time in the flow of information.
- Use DSS to recommend the ideal amount of ice cream each node should order (运用决策支持系统来推荐各节点应订购的冰淇淋数量).

Expected Outcome (预期结果)

- **Champion Ice Cream** should have the lowest cost if it had followed all the recommendations (\$228).



Summary

- Appreciate how information system and DSS can help individuals and organizations to work more efficiently and effectively (了解到信息系统和决策支持系统如何帮助个人和组织更有效地工作).
- Take up Computing today and choose Information System or Electronic Commerce (今天就选择信息系统或电子商务课程) ☺

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