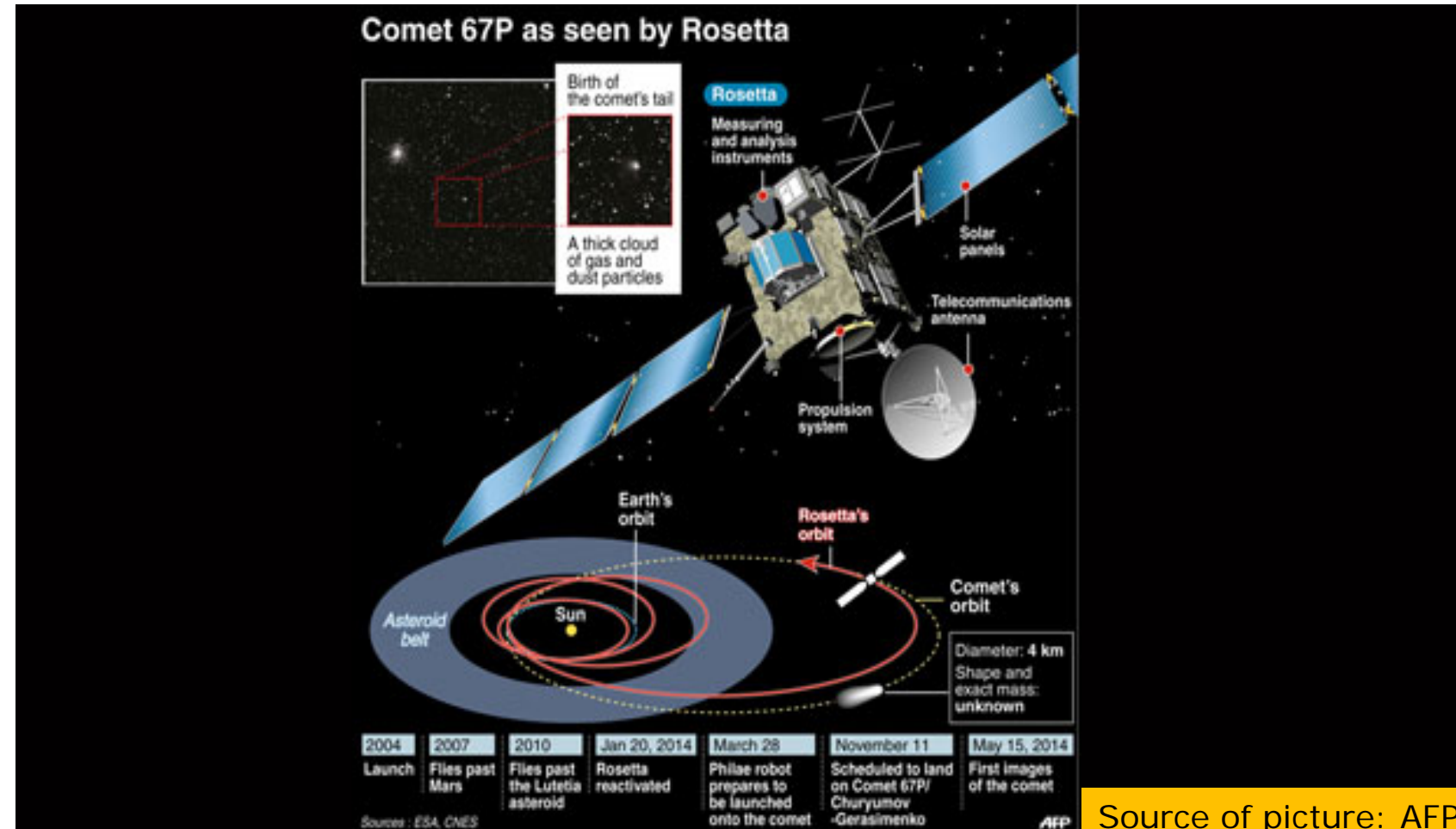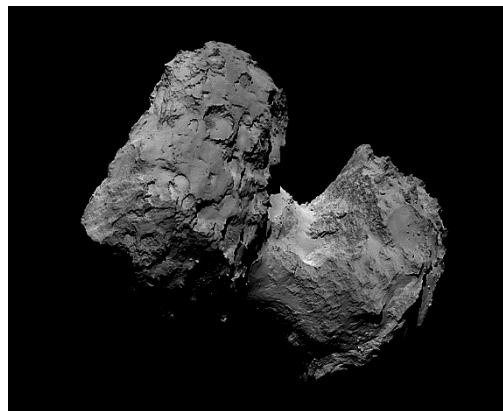# Digital Transformation
and
Education of Future Digital Leaders

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Rosetta Probe

- Rosetta probe, launched in 2004, rendezvoused with Comet 67P in November 2014 after travelling a total of 6.4B km at a distance of some 400M km from the Earth.
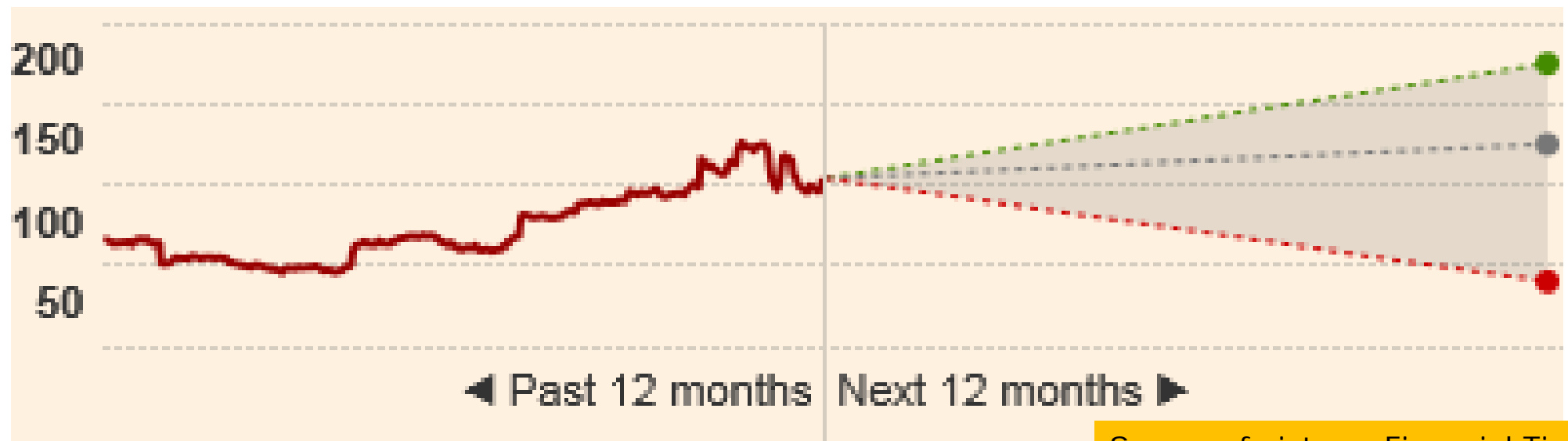

Source of picture: AFP

Apple Share Price

- 17 September 2015: $116.41
- Forecasts:
  - Max: $175.00
  - Med: $147.50
  - Min: $85.00

Source of picture: Financial Times

Netflix Share Price

- 17 September 2015: $104.08
- Forecasts:
  - Max: $175.00
  - Med: $125.00
  - Min: $40.00

Source of picture: Financial Times

Facebook Share Price

- 17 September 2015: $104.08
- Forecasts:
  - Max: $146.00
  - Med: $110.00
  - Min: $68.00

Source of picture: Financial Times

Alibaba Share Price

- 17 September 2015: $104.08
- Forecasts:
  - Max: $146.00
  - Med: $110.00
  - Min: $68.00

Source of picture: Financial Times

Stock Prediction

- The figures given are not from different "quality" analysts
- For example: the stock price of Santos (a major Australian Energy Company) has fallen by some 40% this year
  - Citigroup has a "buy" recommendation, and predicts the stock to go up by more than 100% within one year
  - Goldman Sachs has a "sell" recommendation and predicts the stock to underperform the market within one year

- You'd expect both analysts are looking at very sophisticated prediction tools
  - Clearly both cannot be right.

- Why is it so difficult to predict the future?
  - And take reliable business/managerial decisions?

Uncertainty and Information

- It is indeed very difficult (impossible?) to predict the future.
- The price of a stock is a *dynamic* function of many many variables.
  - Company performance
  - Market movements
  - Present price
  - World economy
  - Weather, etc.

- In contrast, there are very few variables in the Rosetta Probe 'management'

- The two systems may be defined by their 'Information Contents'
- This may be used to better understand system dynamics, and management options
- How does information management empower 'Digital Transformation'?

What Is Information?

- Information theory was formulated in the middle of the 20th century by Bell Lab scientist
  - It was designed for digital telecommunications systems
  - Information was defined as a logarithmic function of probability of an event
    $$I(m_k) = -\log_2 (p_k)$$
    - A highly probable event has little information, and vice-versa

- Examples:
  - 'Summer is warm' has little information
  - 'There was a car crash' has little information
  - 'There was a plane crash' has large information

  - 'The full moon was on the 27th of August.'
 - 'Halley's Comet visited earth in 1986.'

Uncertainty and Complexity

- Uncertainty leads to complexity
- Compare these two games:
  - One is 'solved', it is no longer fun to play
  - One is unsolved with 'infinite' variations: there are no known *absolute* best moves
   - It is great fun to play!
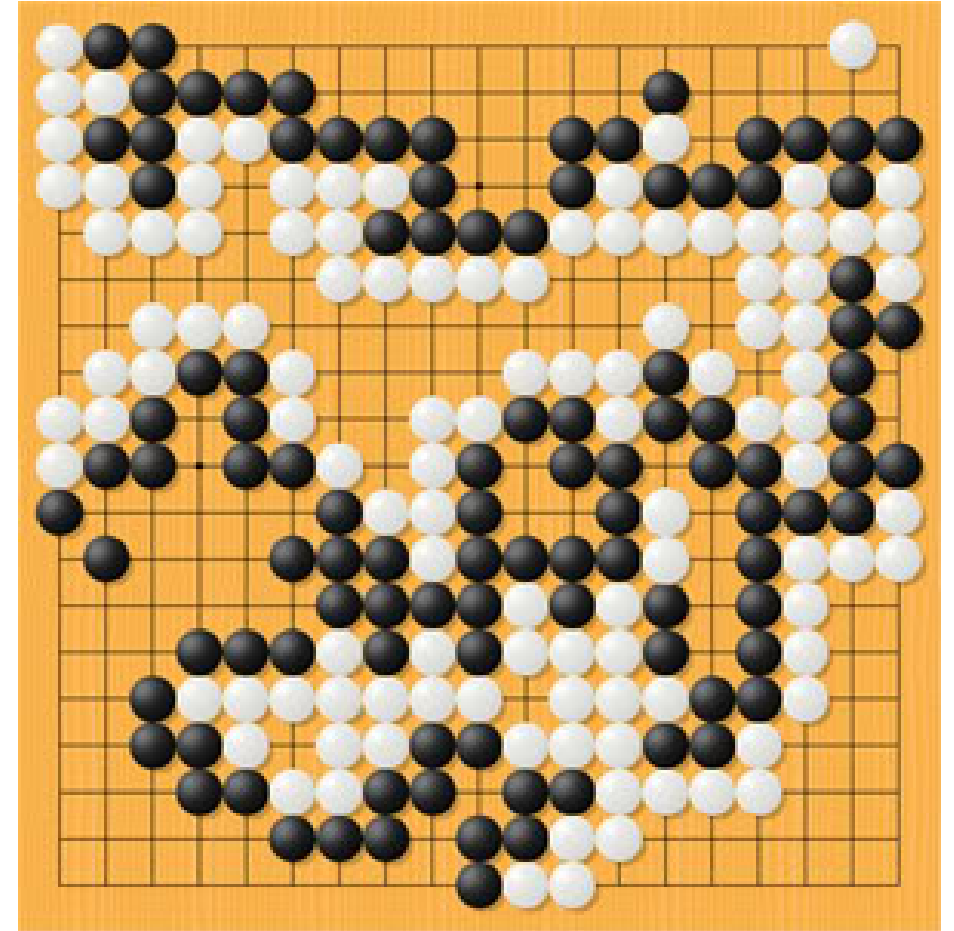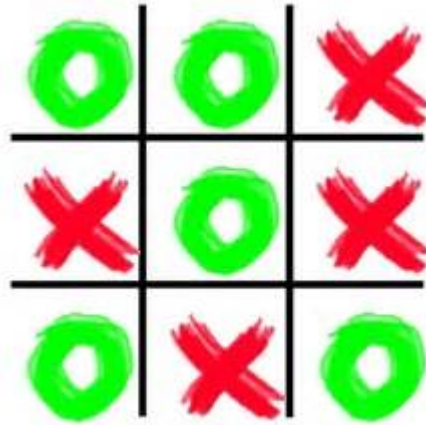
Complexity and Value

- Which of these products has more 'information' content?
- Which has a higher price?
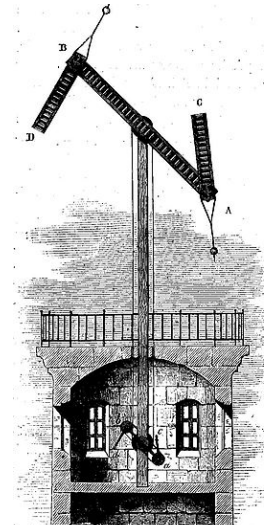
Information Flow Model

- We define a model based on which we can understand 'information' assets of an organisation and how it may be enhanced
- We call this as the Information Flow Model.
  - While it is drawn as a linear process, there exist many feedback links and, and dynamic interaction
  - The model defines processes that have existed for millennia
  - We use this model to explore how 'digital transformation' changed information flow in present day
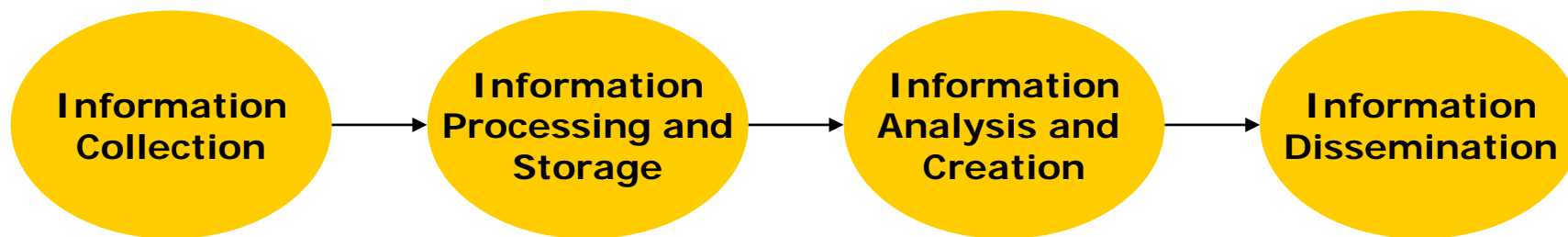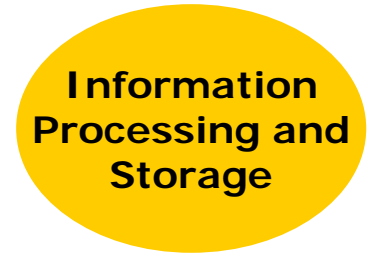
Element of Information Flow Model

- Information may be collected in many different ways
- Information technology tools and 'digital' have transformed this process significantly:
  - Partner networks
  - Points of sales
  - Sensor networks and Internet of Things
  - Social networks
  - Automatic collection
  - Global scope of collection
  - Etc.
- The term 'Big Data' refers to the broad range and amount of information we collect
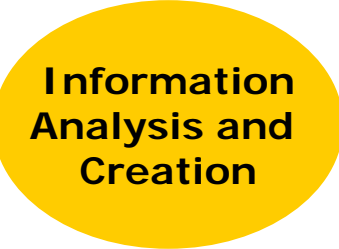
Information Collection

Element of Information Flow Model

- Information Processing and Storage has also changed
- IT has provided a capacity to store large amounts of information
    - Analog to digital
    - Storage disks
    - Data warehousing techniques
    - Multi-dimensional data storage
    - Etc.

Information Processing and Storage

Element of Information Flow Model

- Analysis of Information, and further complexity and creation is a topic of great interest
- This is specially important in the light of great uncertainty and broad range of information that 'digital' enables us to collect
- A number of field of study have emerged in recent years to address this part of the Information Flow Model
  - Relational data
  - Data and text visualisation
  - Data Mining
  - Data Analysis

**Information Analysis and Creation**

Element of Information Flow Model

- The final process in the Information Flow is to disseminate it to those who need it
- Again IT facilitates timely information dissemination:
  - Mobile networks
  - Actuators
  - Partner networks
  - Aggregators
  - Global network
  - Etc.

Information Dissemination

Information Custodianship

- The role of Chief *Information* Officer (CIO), or Chief *Data* Officer (CDO) is the custodianship of the Information Flow

Office of Information

Information Collection → **Information Processing and Storage** → **Information Analysis and Creation** → **Information Dissemination**
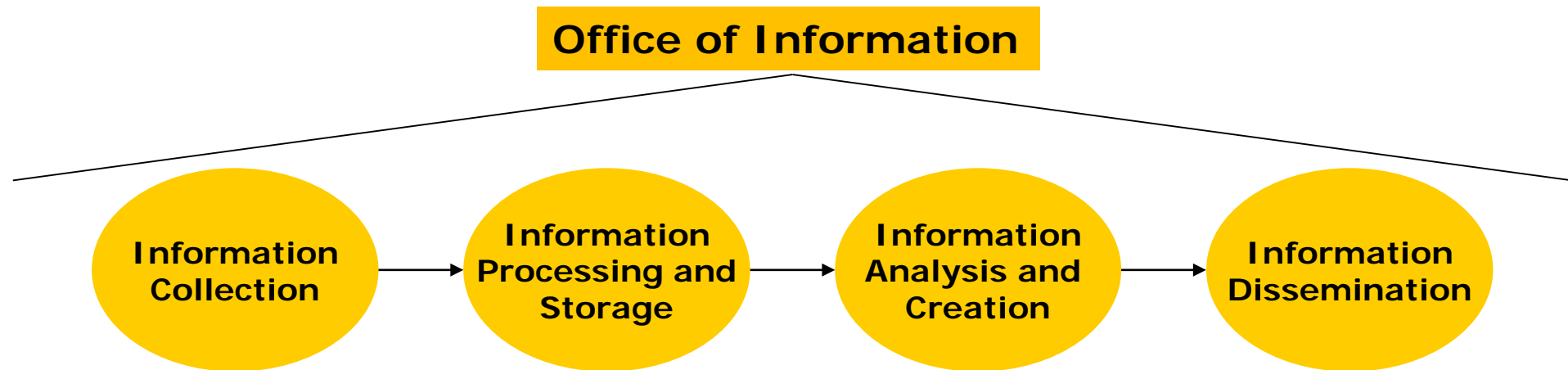
Education of Future Digital Leaders

- Our Master of Science in Information Technology (MSIT) and Master of Information Science Management (MISM) programs are designed to train the future digital leaders
- On one hand, we cover the technologies necessary to realise the processes in the Information Flow Model
  - Java, Telecommunications, Data Analysis, Risk Analysis, Statistics, Internet Technologies, etc.
- On the other hand, we cover the business and policy issues of importance to the growth of complexity and information to create value
  - Finance, Economics, Organisation Management, Ethics, Strategic Analysis, Planning, Etc.

- We train our students to be the leaders of the digital economies of the future, which utilise and enhance information-based products and services