DATA ANALYTICS

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OPERATIONAL ANALYTICS

- Operational analytics push the boundaries of what companies do with analytics.
- Operational analytics will over time increase the number of analytics processes that must be built and the speed with which those analytics must execute.
- Operational analytics require a disciplined and organised approach across an organisation and a lot of technological, process, and cultural change as well.

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- Operational analytics is where analytics have become an inherent part of the individual decisions made and the individual actions taken within a business.
- An operational analytics process does not simply suggest an action but directly causes an action to take place.
- Driving decisions and actions without human intervention.

- Traditional analytics generate results that inform a decision or feed into a decision process which can also involve human judgement/intervention.

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- Of course it takes human intervention to decide that an operational analytics process is needed and to build the process.
- Having automated operational analytics in place also leads to the need for careful monitoring of the processes.
- Descriptive analytics: summarising what has happened, describing the data. Traditional analytics.
- Predictive analytics: Goal is to predict what will happen in the future.
- Prescriptive analytics: actions based on the analysis of the data, operational analytics are an example of this

OPERATIONAL ANALYTICS

- Characteristics:

- Operational analytics are embedded and automated.
- Operational analytics are prescriptive.
- Operational analytics make decisions.
- Operational analytics are executed in decision time.

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- Organisations cannot skip straight into operational analytics they must master traditional analytics first.
- Analytics 1.0
  - Descriptive statistics, reporting, very small amount of predictive analytics
  - Internally sourced, transactional data, ERP systems.
  - Then it was large volumes, I.T. dept gathered data and made it available for analysis. Slow process.
  - Data aggregated, transformed, combined with other data before analysis could take place.
  - Data analyst use SAS, SQL, other BI tools
  - Creating a simple report took time and was formalised, few users were able to create their own reports.

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- Analytics 2.0
  - In the early 2000's the analytics 2.0 began to guide us into the Big Data area.
  - More complex data, larger in volume, not as structured as transaction data 1.0
  - Documents, photos, videos, sensors.
  - External sources
  - New analytics techniques and new computational capabilities
  - Data scientist's role emerged and use R, Python in Hadoop environment.
  - Tools and techniques still immature, 2.0 actually has not increased the sophistication of analytics that much as sources are complex and getting the data into the required format is difficult. 2.0 still has a lot of descriptive analytics, reporting, and only a small amount of predictive or prescriptive analytics.

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- Analytics 3.0
  - Focuses on evolving 1.0 and 2.0 not replacing them.
  - Big data doesn't replace traditional data they have to be integrated.
  - Operational analytics is a natural part of this trend.
  - Renewed focus on the discovery process. Aimed at rapidly finding new insights in data and identifying actions, products, and services that might be derived from the insights.
  - Must be core part of enterprise strategy.
  - Variety and novelty of the data types and sources available is one of the challenges of 3.0
  - Analytics is centralised, large-scale enterprise systems, and in operational applications deployed to end users, e.g. mobile devices, ATMs and kiosks.

OPERATIONAL ANALYTICS IN ACTION

1. **Improving customer experiences-** day to day interactions with organisations. OA enables progress in customising and personalising.

   - Providing magical moments: Disney – sophisticated in analysis of guest behaviour. They aim to understand the patterns and preferences of guests so an improved experience is delivered. Crowd analysis using MagicBands. Helps to identify different types of customer groupings and to drive traffic patterns and distribute the guests through the park better. Also possible to personalise the experience for a guest using the magicband. (privacy implications)

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- Enabling customer transparency- how sensors can serve customers:
  - SenseAware from FedEx. It allows a device outfitted with sensors to be included with a package that is being shipped. Sensors track a variety of environmental factors. The sensor is suitable for expensive items and sensitive to the environment. Fine art, collectibles, perishable items.
  - Metrics include location, temperature, humidity, barometric pressure and light.
  - Data transmitted back to FedEx in real time so the customer can monitor the package.
  - Good for customer and for FedEx

OPERATIONAL ANALYTICS IN ACTION

- Upgrading customer service – improve customer satisfaction and lower operational costs:
  - Re-routing customers when flights are disrupted.
  - Once it is known about a delay the airline can identify which passengers will have an issue, who needs assistance and what alternatives are available. It can prioritise which customers get which alternatives based on ticket price, frequent flyer status, prior travel disruptions and many other factors. (also possibly using models of how a customer will respond to varying degrees of disruption).
- Enhancing the online experience – web personalisation.
  - Optimise personal experience real time based on all customer data up to an including the last click made

OPERATIONAL ANALYTICS IN ACTION

2. **Time is of the Essence –** Speed of analytics is increasing.

- Security through analytics: The international air transport association (IATA) envisions a future where security lines at airports are monitored by very sophisticated and real time analytics. Security tunnels where each passengers risk is assessed prior to arrival and the tunnel conducted appropriate security checks based on that risk assessment. (10 second window) analysis determines if a threat exists or not.
- Hundred million dollar millisecond: complex analytical algorithms now predominately buy and sell stock automatically. Flash Crash 2010, a massive drop in the market occurred out of nowhere for no reason. It was a trading program gone wrong.

OPERATIONAL ANALYTICS IN ACTION

3. **Making us safer** – some OA aims to keep people, products or property safe.
   - Avoiding adverse events: mechanics now need as much computer systems knowledge as mechanical knowledge. Cruise control with crash avoidance techniques (vw golf). Analyses current speed and whats in front of the car, applies brakes where necessary. Reverse parking sensors.
   - Product freshness: fresh produce stored on pallets requires temperature control and humidity. Specific pallets impacted by breakdowns in air conditioners can be identified easily.
   - Governement: predictive policing – crime levels, staff levels, move resources as needed, social media monitoring

OPERATIONAL ANALYTICS IN ACTION

4. Increasing operational efficiency – efficiency of business operations.
   - Maximising power capture: wind turbines – sensors track and assess information on the turbines operation and performance then altering the settings in real time.
   - Optimising power generation: gas turbines and generators analysis, tracking operating conditions and heating the fuel going into the turbines to improve performance.
   - Increasing fuel efficiency: train engineers accelerate until they have to slow and stop, this is not optimal fuel efficiency. Analysis of gps, traffic and fuel consumption allows better fuel efficient ways to cover routes. Calculating what speed to travel to arrive at the next point so as to travel through without stopping.

OPERATIONAL ANALYTICS IN ACTION

5. Improving our lives in the future – large impact on our lives
   - Freeing out time: driverless cars are possible in terms of analytics
   - Keeping us healthy: fitness bands, intersection of medicine, the internet of things and operational analytics offers vast opportunities. Diabetes – testing with blood sticks, now sensors to monitor glucose levels constantly.