Lecture 1

Course Overview and Business Analytics Framework

Bikesh Raj Upreti
E-mail: b.upreti@uq.edu.au
Room: 530 Joyce Ackroyd (37) Building

The University Of Queensland AUSTRALIA

UQ BUSINESS SCHOOL

Agenda Lecture 01

- Introductions
- Business Analytics (BA) and your career
- Course overview
- Business analytics framework
- Use of BA in business
- Next Seminar

Lecturer & Course Coordinator

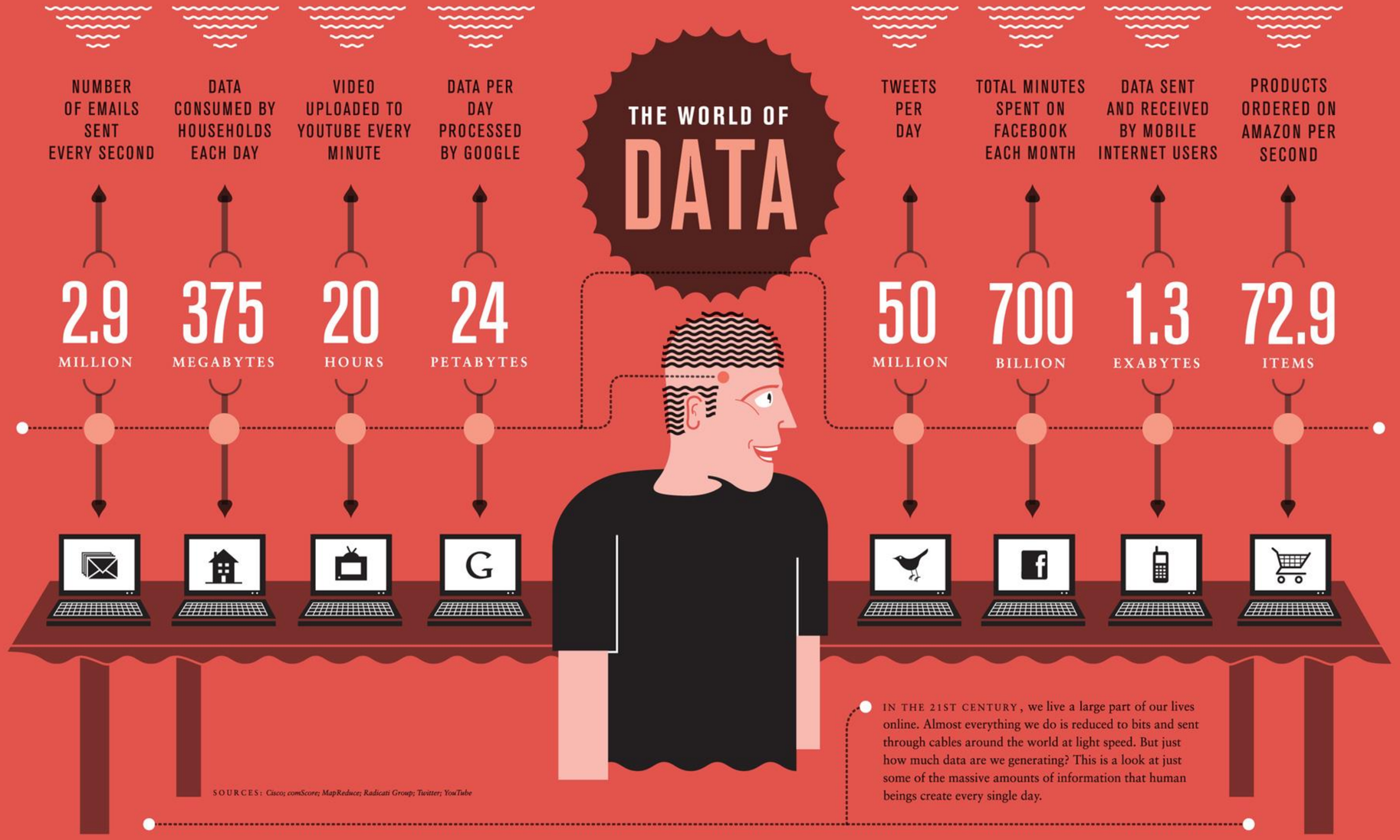
- Bikesh Raj Upreti
  - Lecturer in Business Information Systems,
    UQ Business School
  - Visiting Scholar, Aalto University, Finland
  - Room: 37-530 (St Lucia)
  - Email: b.upreti@.uq.edu.au

- Consultation:
  - Monday 9am to 11am
  - By appointment only (by appointment only; preferably via Zoom; to make an appointment please send an **email** with your **concern** at least a day in advance)

What did you do on the weekend?

- Smartphones (GPS sensor data & usage)
- Listening to music
- Browsing the WWW
- Shopping
- Banking (shopping transactions)
- Email & social media usage
- Exercise tracking

THE WORLD OF DATA



SOURCES: *Cisco; comScore; MapReduce; Radicati Group; Twitter; YouTube*

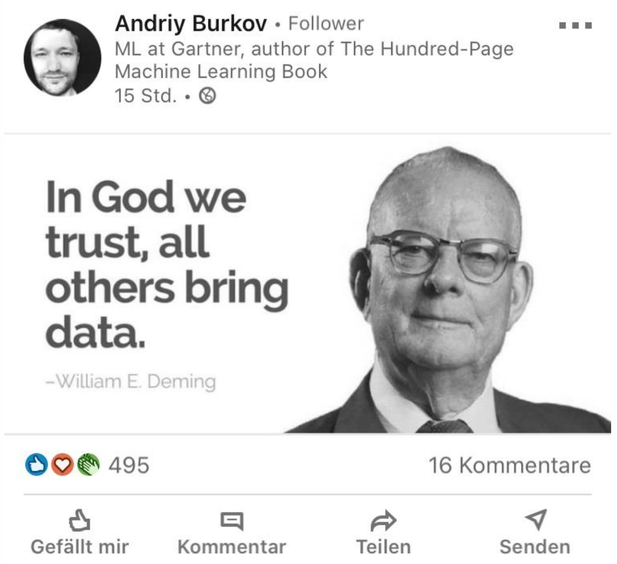
IN THE 21ST CENTURY, we live a large part of our lives online. Almost everything we do is reduced to bits and sent through cables around the world at light speed. But just how much data are we generating? This is a look at just some of the massive amounts of information that human beings create every single day.

A COLLABORATION BETWEEN GOOD AND OLIVER MUNDAY

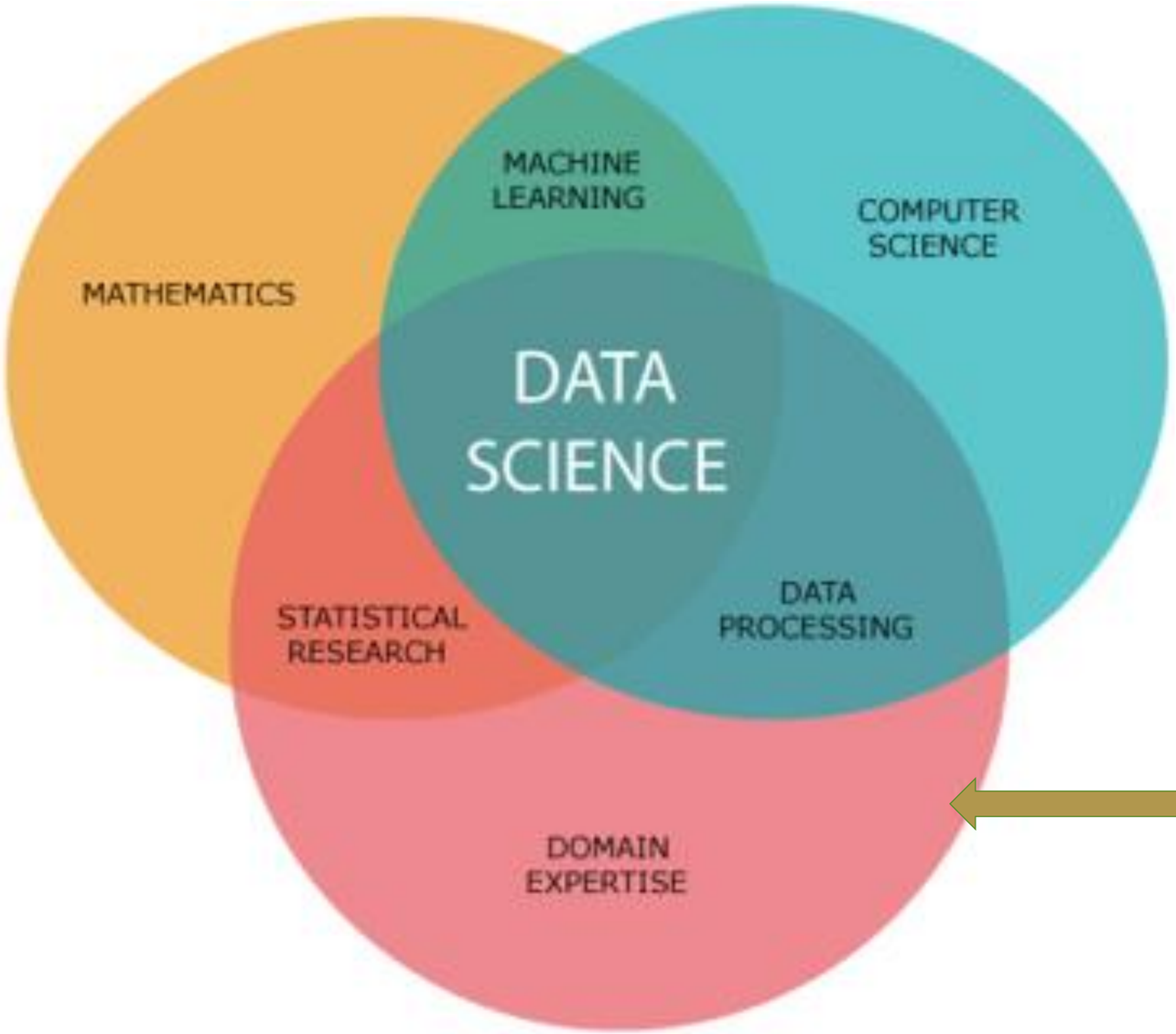
IN PARTNERSHIP WITH IBM

Business Analytics

- An approach to integrate, analyse and visualise data to solve business problems
- It relies on strong analytics and business knowledge
- Deliver the insights using dashboards, reports and visualisations
- Make ***timely*** and ***informed*** decisions
  - Using data to understand past and current performance
  - Using data to predict the future based on the past
  - Using optimisation to identify the best solutions based on a large number of variables



Related Fields



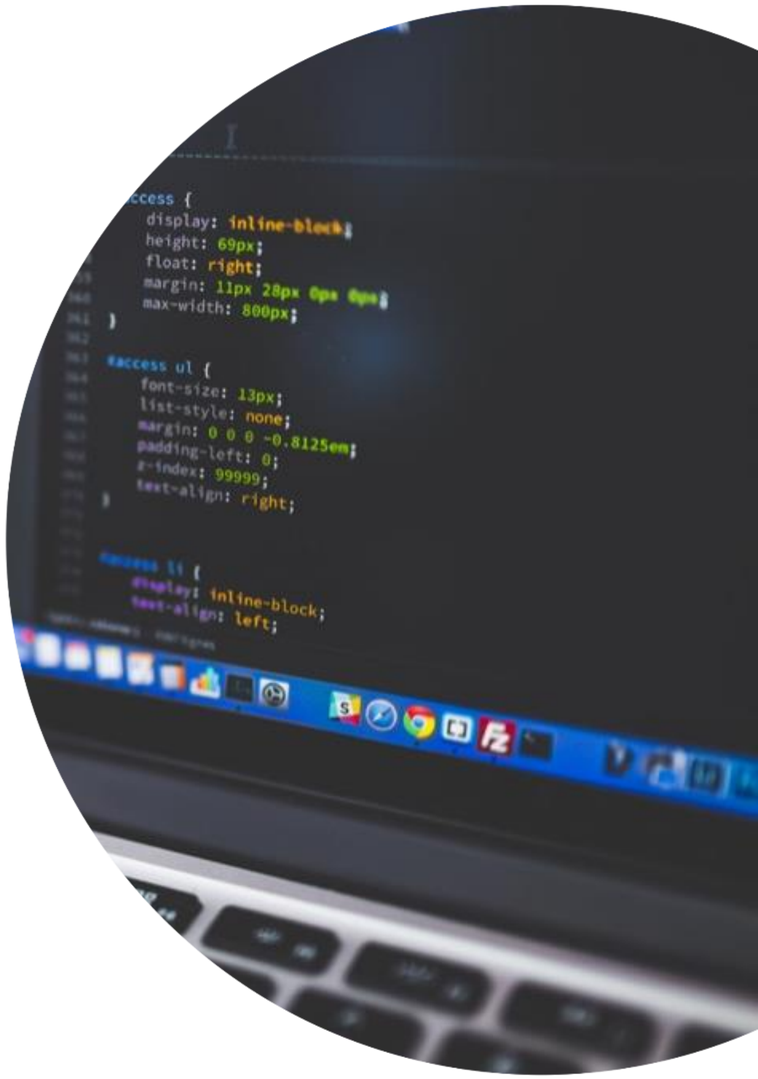
Business Analytics

Source: https://laptrinhx.com/introduction-to-data-science-1086838454/

Business Analytics and Your Career

How did it all start…?

- Transactional systems emerged to **automate** business processes
  - Sales, HR, Marketing, Finance…
- Automation created huge amounts of data…
- Organisations required analytics to make sense of data



Shift to a new economy…

- Data is the **Oil of the Digital Economy**
- Data scientist: **the sexiest job** of the 21st century
- Ranked as **number technology priority** for executive for the last nine years (SIM IT Trends Study 2018)
- 99% of organizations are on transformations to become **data-driven**

Shift from division of labour to division of learning

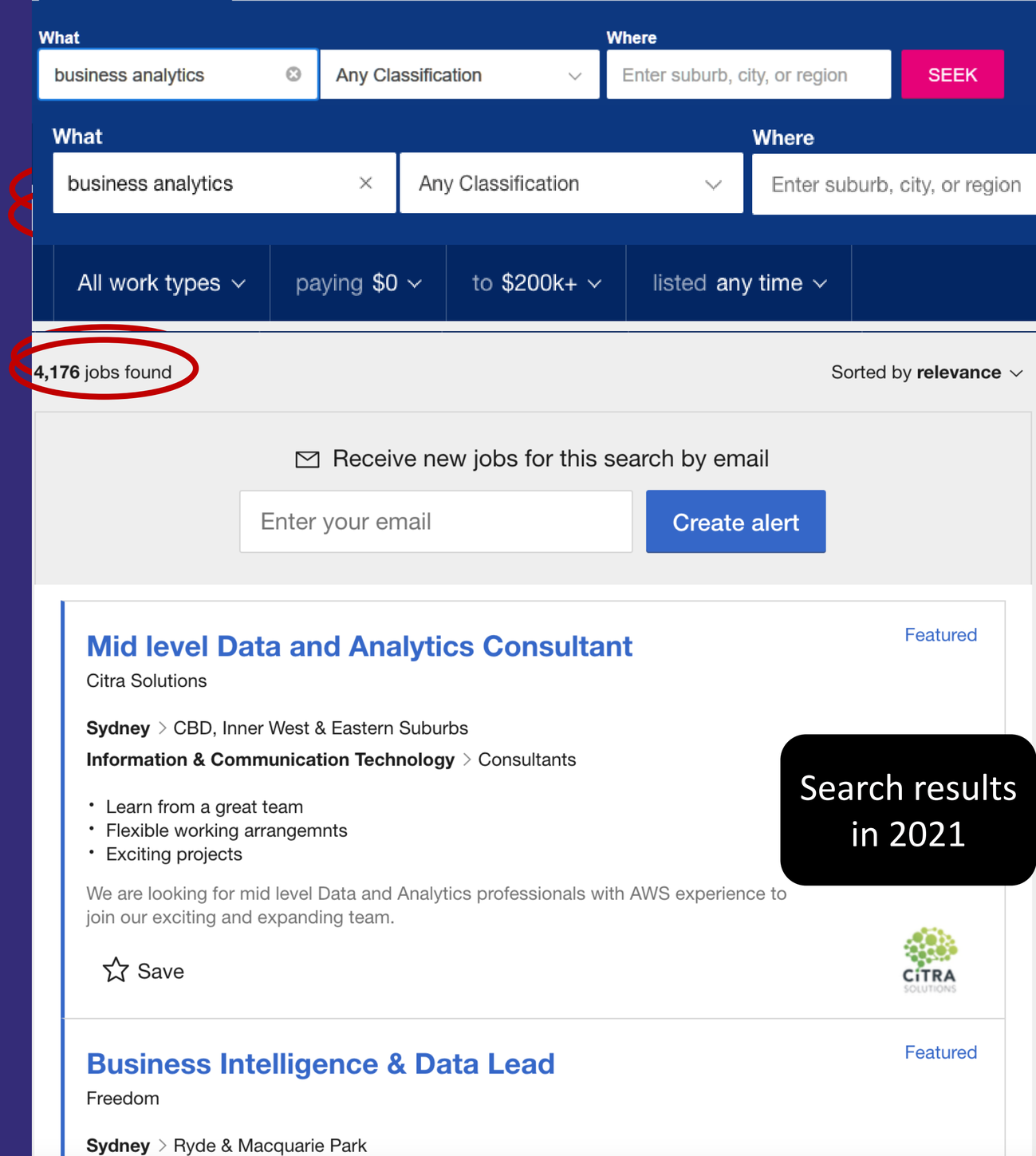
- Nature of jobs are changing
  - Focus is on explaining why certain things are happening
  - It requires analytical mindset and data savviness
- Organizations need data-savvy business users
  - Analytics tools are becoming user-friendly
  - Vendor sell analytics tools to business rather than IT
- IT professionals in silo are becoming irrelevant
  - Data groups are becoming part of the business
  - IT professionals are becoming business-savvy

There is an analytics talent gap that…

- Requires an **analytical** and **intuitive** mind
- Need to understand the **language of business**
- Strong capabilities in **data management**, **data analysis** & data **visualisation**.
- Need **good communication skills** to communicate insights to decision makers.

Business analytics and your career

- Today’s job market requires analytics related skills
- Combined analytics and business knowledge is the key for success



Search results in 2021

Career skills

- **Data cleansing skills** - Clarify meaning, remove redundancies, investigate inconsistencies
- **Data analysis skills** - Correlation & association, data mining
- **Visualisation skills** - Geo-spatial, trend, social network analysis, infographics
- **Communication skills** - Presentation and written

Isaac Faber Ph.D. • 1.
Chief Data Scientist at U.S. Army AI Task Force | LinkedIn Top Voice
9 Std. •

A good data scientist is interested and not interesting.

Be interested in your customers and companies problems. Almost to the extent of being a detective. Solve problems with the best and most efficient solution after you fully understand them. Focus on understanding the nuances of pain points and what would improve the system you are a part of.

Don't focus in being interesting. Often time-wasting, but interesting, distractions come from using the latest hot **#machinelearning** model, **#datavisualisation** technique, or untested **#python** library. These things might get a lot of press but they often don't provide value. You might get some recognition on how smart and great you are; however your solutions will most likely not be implemented and you will grow more and more frustrated.

Why study this course?

This course will help you:

- develop fundamental analytics skills for a job in business analytics
- develop hands-on data skills during practicals
  - Power BI
  - Microsoft SSIS
  - Rapidminer

- for salaries in Australia refer to IAPA Salary Survey

Career roles

- Most common:
  - Data analysts
  - Business analysts
  - Business Intelligence developers
  - Process analysts

How Business Analytics affects business professions?

- Every business profession is becoming data-driven
  - Marketing
    - Analysis of clickstreams to figure customer preferences
  - Sales
    - Predictions on the likelihood of a deal to close
  - Human resource and talent development
    - Predicting staff turn over
  - Tourism
    - Predicting number of tourists and provisioning of local services
  - Education
    - Enhancing learning experience

Course Overview

General aim of the course

- Provides fundamental knowledge and skills necessary to model, integrate, analyse and visualise data

Course's Content Blocks

1. Introduction to Business Analytics
2. Data Modelling
3. Data Visualization
4. Data Integration
5. Data Analytics
6. Impact of Data on Organizations
7. Impact of Data on Society
Revision

Block 1. Introduction to Business Analytics

Week 1: Course Overview and Business Analytics Framework

Block 2. Data Modelling

Week 2: Relational Databases and Introduction to Data Warehousing

Week 3: Dimensional Modelling

Week 4: Advanced Dimensional Modelling and Warehousing Topics

Block 3. Data Visualization

Week 5: Performance Dashboard and Information Delivery

Block 4. Data Integration

Week 6: Data Integration and Metadata

Week 7: Mid-term exam

April 5: Mid-term exam
Contents of week 1-6 are relevant for mid-term exam

Block 5. Data Analytics

Week 8: Data Mining Process and Predictive Analytics

Week 9: **Mid-Semester Break**

Week 10: Data Analytics- Classification and Clustering

Week 11: Big Data Management (NoSQL and distributed databases)

Block 6 &7. Impact of Data on Organizations & Society

Week 12: Business Analytics in Action - Guest Lecture

Week 13: Privacy, Ethics and Acceptable Data Use

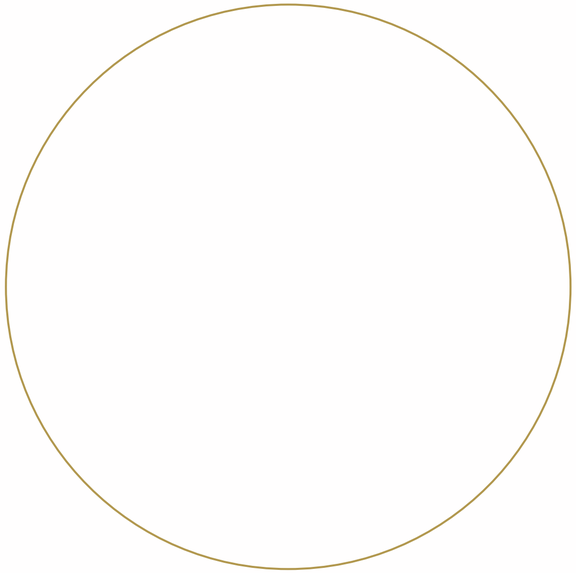
Week 14: Course Revision, Q&A

(submit questions by May 21)

Lectures Learning Outcomes

- Lectures aims to build your:
  - Foundational and in-depth knowledge
  - Hands-on activities, discussions, case studies, articles
  - Planned activities at the completion of each block
  - Ask questions and engage!

- 2-hour lecture each week
  - Zoom session every week (Recorded lecture on public holiday)
  - Additional: Weekly recap and Q&A based on questions submitted by Sunday

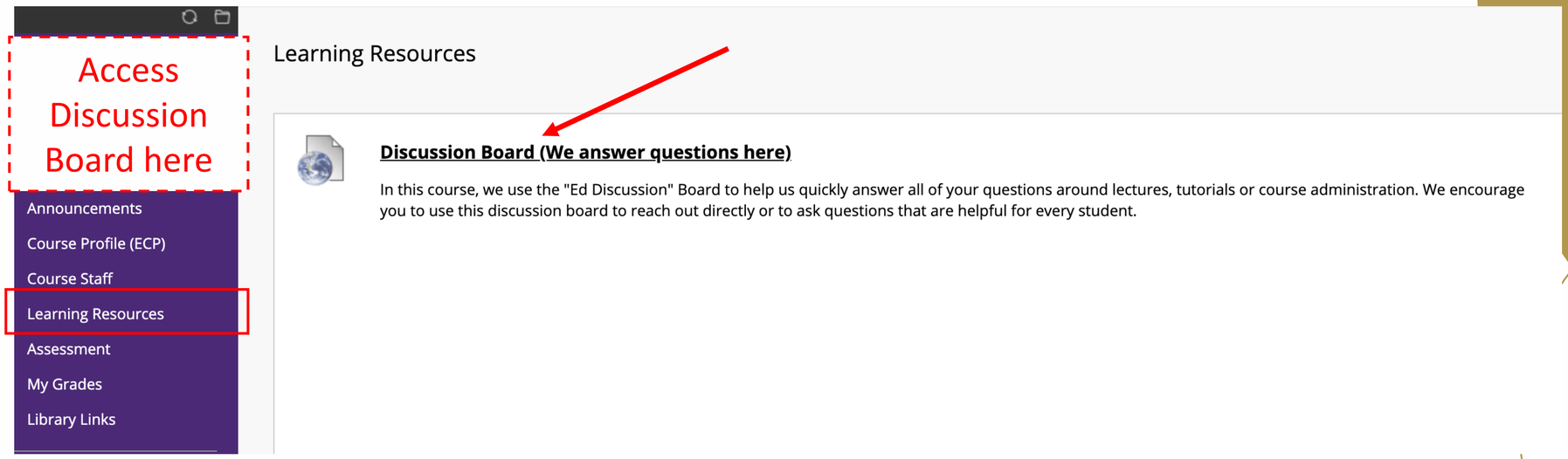


Tutorial Learning Outcomes

- Tutorials aims to enhance your:
  - practical data skills by working with actual data
  - learn to work as part of a team
  - employability by familiarizing you with Power BI, SSIS and Rapidminer
- NOTE: Tutorials will start next week

Course Communication Channels

- If you have a content related questions (e.g., lecture or tutorial or assignment), use Ed Discussion.

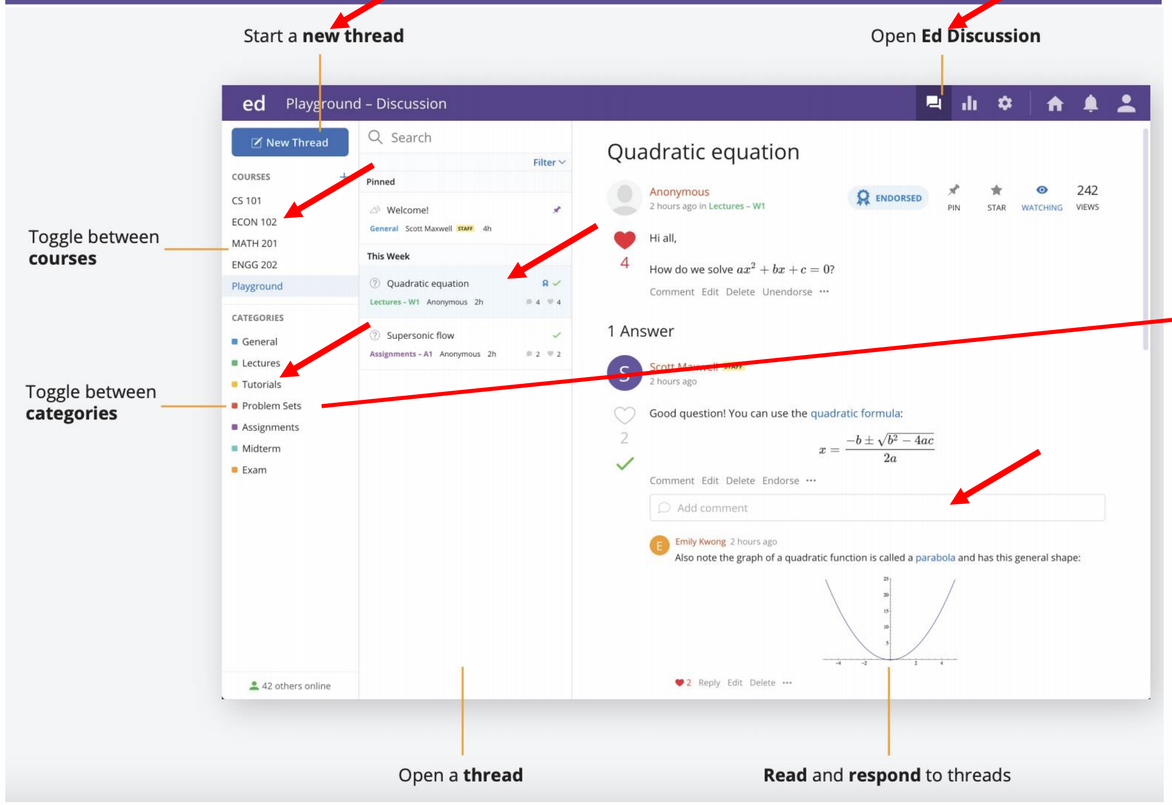


In your communications, please be polite, courteous, and professional

Course Communication Channels (cont.)

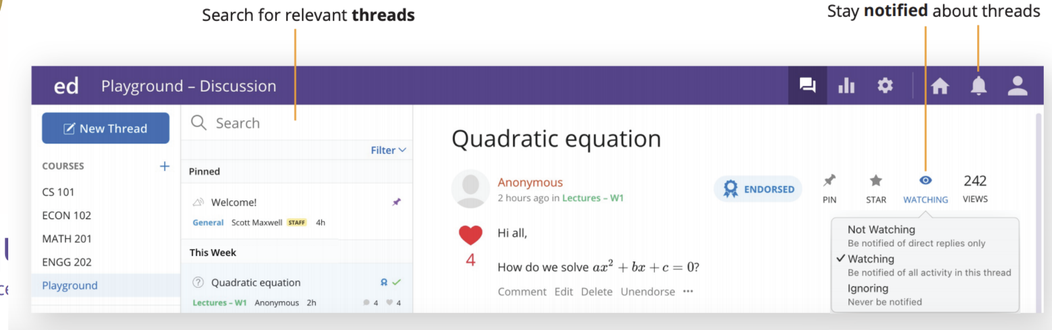
Ed Discussion | Quick Start Guide

Ed Discussion centralizes class Q&A and saves time. Supports equations, runnable code and more.



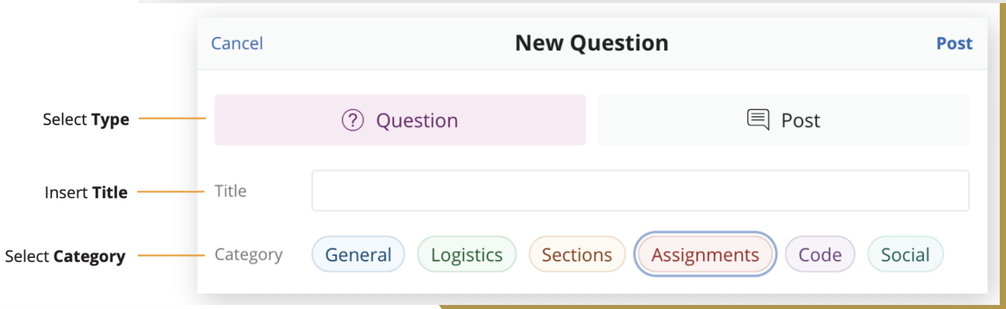
Tips and tricks

Search and stay notified about threads.



Post a qu

Ask, with confidence



CATEGORIES

- General
- Lectures — Lecture specific questions (name lecture and slide #)
- Recap Questions (weekly recor… — Submit weekly questions for Q&A video
- Tutorials — Tutorial specific questions
- Mid-Semester Exam — Questions for your Mid-term preparation
- Individual Assignment — Questions that help complete the assignment
- Social

Resources

- http://www.elearning.uq.edu.au
  - Features: Course outline, learning guide, useful links, formative assessment, progressive results.
  - Provides all materials: lecture materials, tutorial materials, useful videos, assignment materials
- Books:
  - Ralph Kimball, Margy Ross. The Data Warehouse Toolkit: The Definitive Guide to Dimensional Modelling, 2013
  - Sharda, Ramesh, Dursun Delen, and Efraim Turban. Business Intelligence, Analytics, and Data Science: A Managerial Perspective. Pearson, 2018.
  - Papers and other resources will be added to **week-by-week schedule.**

Expectations from you

- Engage, interact, share, question…
- Give us feedback all the time…

- Connect and work as a group…
- Equitable contributions
- Focus on task and your unique contribution
- Be humble, listen to each other
- Complement each others' skills

What about your expectations from the course?

Image: https://www.modernanalyst.com/Resources/Articles/tabid/115/ID/3359/Do-we-really-know-what-the-Analyst-in-the-Business-Analyst-means.aspx

Course Assessment

Assessment 1: Individual assessment

- Mid-Semester Test
- Weight: 40%
- Content of the first 5 weeks
- 20 multiple choice questions
- 4 scenario-based problem-solving questions
- Scheduled on **5 April.**
- Hosted on **Blackboard**, 2 hours (can be completed in 90 minutes but we allow for a buffer of 30 minutes for potential technical issues)

Assessment 2: Individual assignment

- Topic: BA Case Study
- Report: 2000 words
- Weight: 60%
- Due: 27 May 2022, 17:00
- Released by April 15th
- Electronic Submission on Blackboard/Turnitin
- Details will be published on the Blackboard site

Introduction to the Business Analytics

Agenda

- Competing with Data
- Business Analytics Framework
- Use of data in business

Competitive Advantage

- Consistently superior performance, ROI
  - compared to competitors
  - based on unique (rare) resources (assets) that cannot be easily imitated, long-lived, sustainable

- Innovation key source of CA
  - product/service and process innovation
  - innovation process, information, R&D investment
  - irreversible resource commitment, asset renewal

Two Fundamental Questions

- How do organisations identify areas of new business opportunities?

- What do organization consistently innovate not to stay behind?

Competing with Data - Theory

- Impossible to differentiate one company from their competitors based on products alone
  - Rivals sell similar offerings
  - Cheap offshore labour
    - hard-pressed to beat overseas competitors on product cost
- How a company can get ahead?
  - Become an data focused competitor:
    - Use sophisticated data-collection technology and analysis
      - Don’t only know what your customers want
        - know how much they will pay and how to keep them loyal.
      - Don’t just track existing inventories
        - predict and prevent future inventory problems

Competing with Strategic Data

- Complexity of the business world
  - Global environment
  - Information drives the bottom line
  - Strategic information becomes important in creating Competitive Advantage

- Who needs strategic information
  - Those who
    - Formulate business strategy
    - Establish goals
    - Set objectives
    - Monitor results
  - Usually the Executive and Manager levels, but this is extending these days to everyone in the business….

What is strategic information?

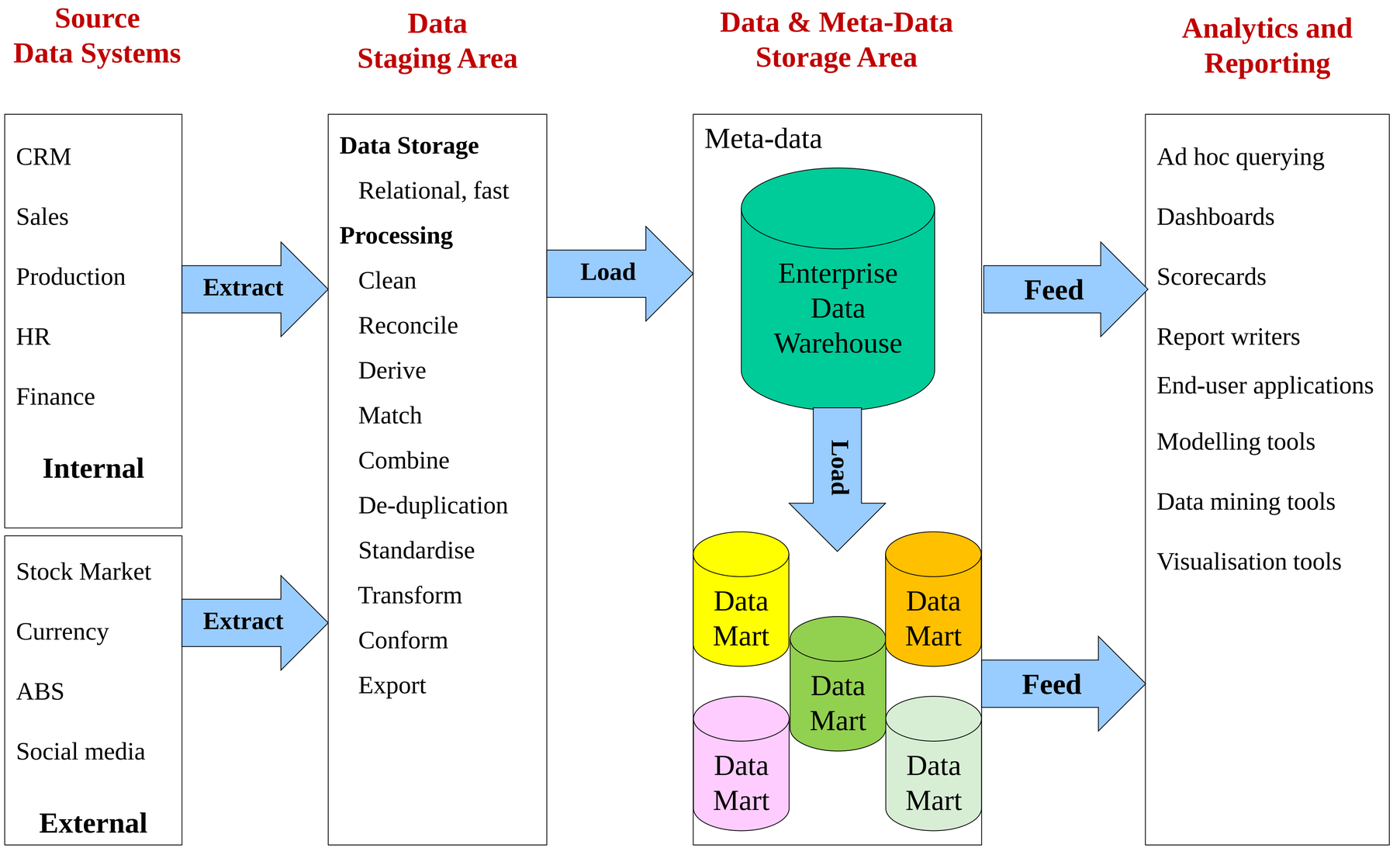
- Information that helps to make decisions on the formulation and execution of business strategies and objectives
- It is not!
  - Information for the daily business operations
    - Its not information to
      - Produce an invoice, Make a shipment, Settle a claim etc.
- Characteristics

Integrated	A single view of the firm. An Enterprise wide view
Data Integrity	Accurate and conform to business rules
Accessible	Easily accessible, intuitive access, responsive analysis
Credible	Trusted values – every business value has ≡ 1 value
Timely	Must be available with the correct timeliness for the data

A Question?

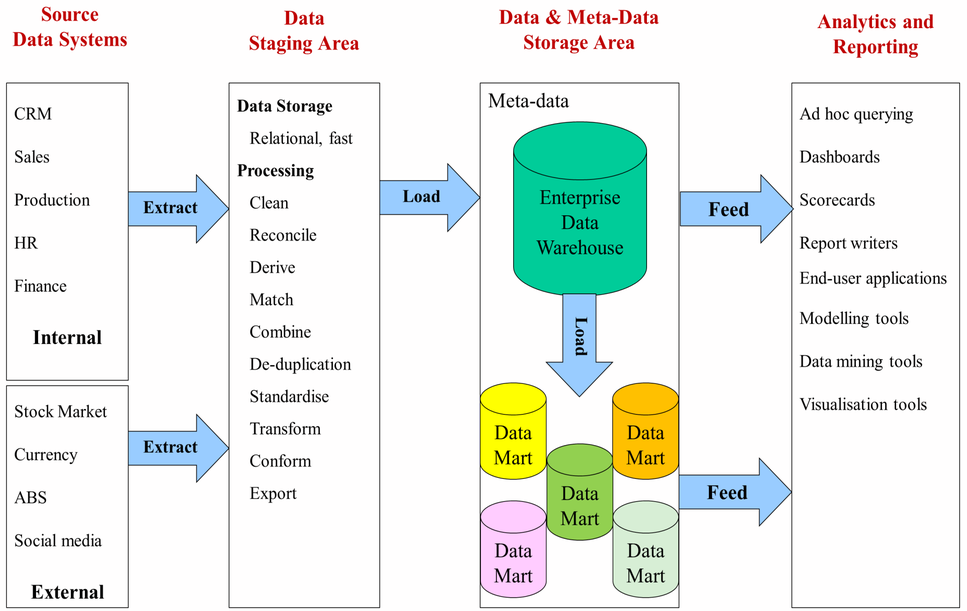
- How do we source Strategic Information in an organisation?

Business Analytics Framework



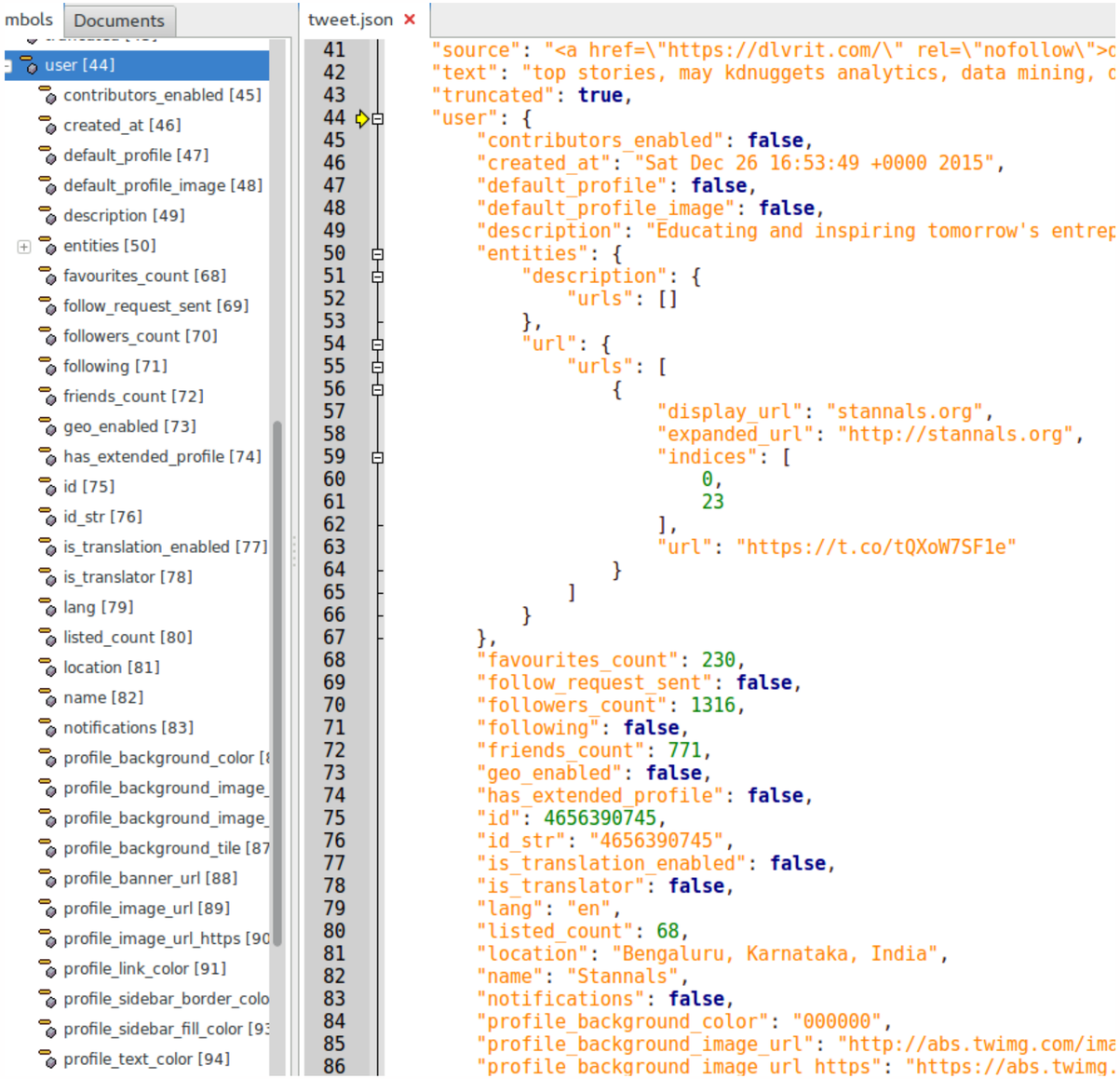
BA Components – Source Data Systems

- Internal data
  - Operational systems producing data
    - CRM
    - Sales,
    - Production
    - Finance
- External data
  - Social media
  - Stock markets
  - News
  - Currency
  - ABS



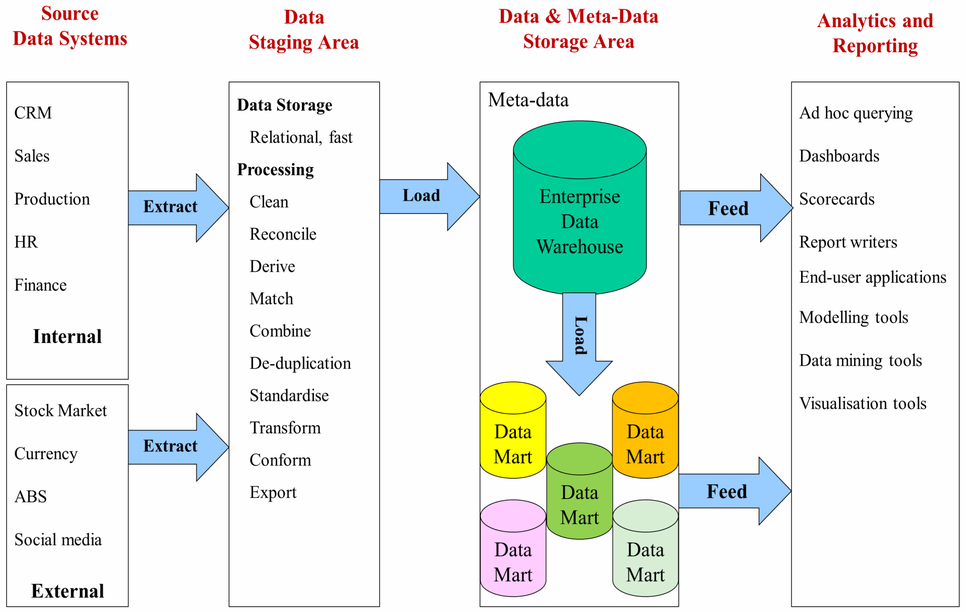
External data example

- API's (may) allow for the extraction of data from external systems.
- The image on the right shows some of the data that is available from a single tweet!
  - There are 103 pieces of information in this single tweet
  - Look at what is being captured under a user field



BA Components – Data Staging

- So now you've got the information...
  - You need to store it, conform it, put it in the DW
- Data Staging Area
  - Necessary to prepare data for DW upload
    - Remember MANY sources, formats etc
    - Need space to store data while we play
  - 3 steps (ELT)
    - Extraction
    - Transformation
    - Loading

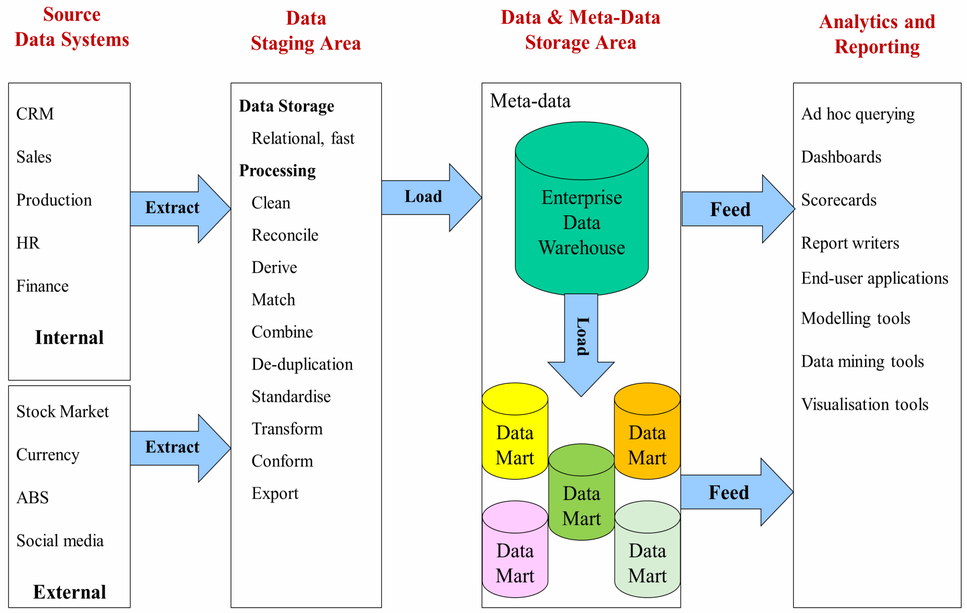


BA Components – Data Staging

- Data Extraction
  - For each data source get the data into the staging area
  - May need lots of different methods and tools
    - Commercial or In-House...
  - Could store the extracted data in a DBMS, flat files etc.
- Data Transformation
  - Get the data into the correct format for the DW
    - Type conversions, character sets, summarising or extrapolating data to same time segments
    - Data quality issues (Spelling, incorrect fields, duplicates etc)
- Data Loading
  - Initial loading done the 1st time you load the DW
  - Subsequent loading transfers new info to the DW

DW Components - Data Storage:

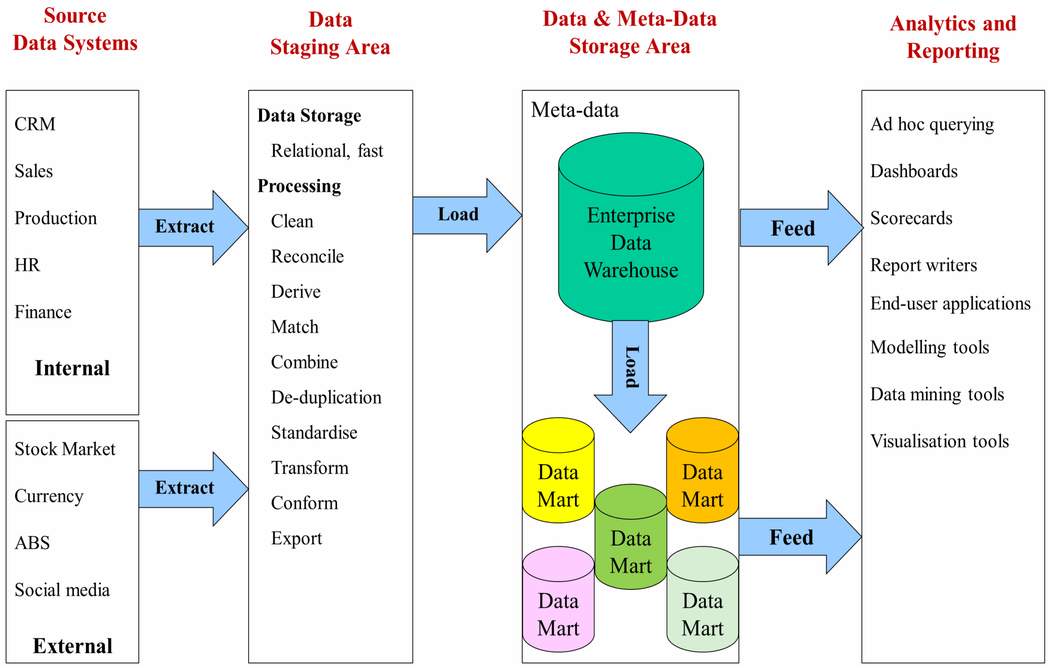
- A Data Warehouse
  - A central repository of data
  - Read only to users
  - Read write only to ELT processes
  - Relational (usual) or multidimensional or NOSQL databases
    - Can be a combination of all of the above
- Data Marts
  - Subsections of the data warehouse (called Data Marts) to report on specific areas of the organisation.
  - The Data Mart optimises metrics for the business area which it reports on
- Meta-Data
  - Information about data



BA Components– Analytics and Reporting

- Data is visualised for the user
  - Lots of users, different expertise levels, different complexity of queries
  - Combination of prefabricated reports and build it yourself queries and reports
  - Lots of different methods of delivering the information, via lots of different sources

- Data is further analysed to create insights
  - Descriptive analytics
  - Diagnostic analytics
  - Predictive analytics
  - Prescriptive analytics



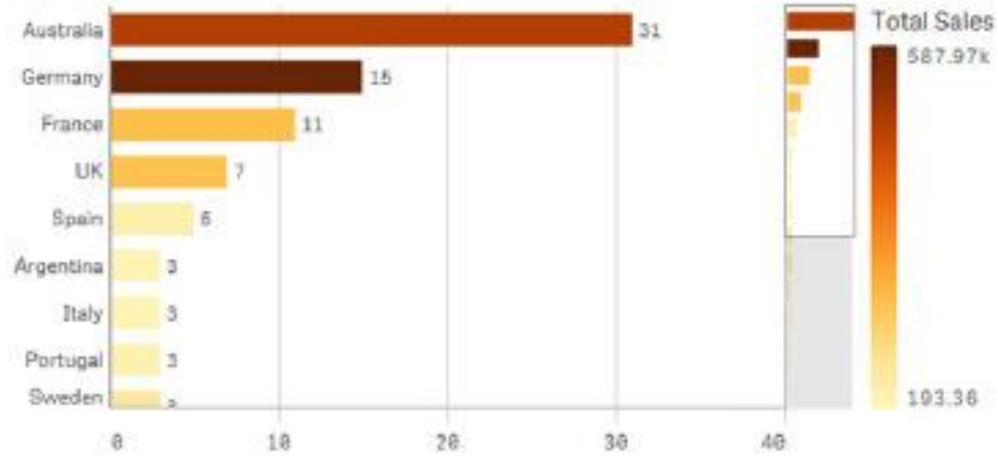
Dashboard

Total Sales
$1,783,148

Total Costs
$1,420,297

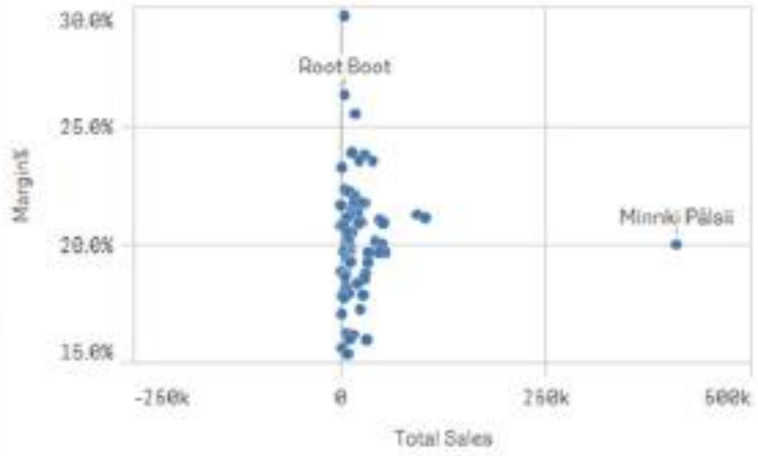
Margin%
20.3%

Customers by Location

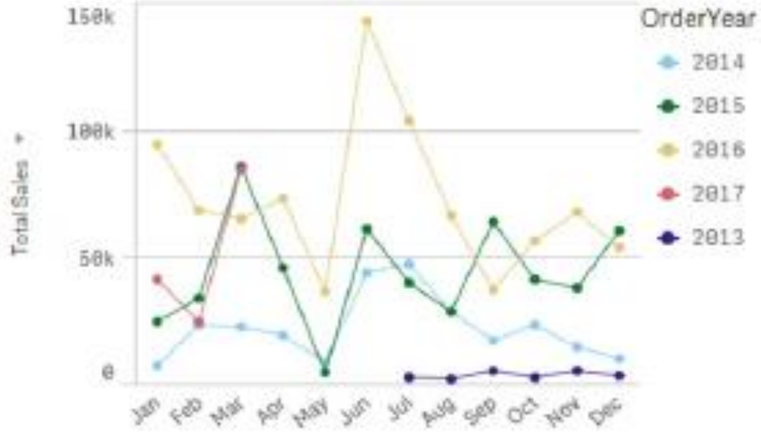


Sales by City

Product Profitability

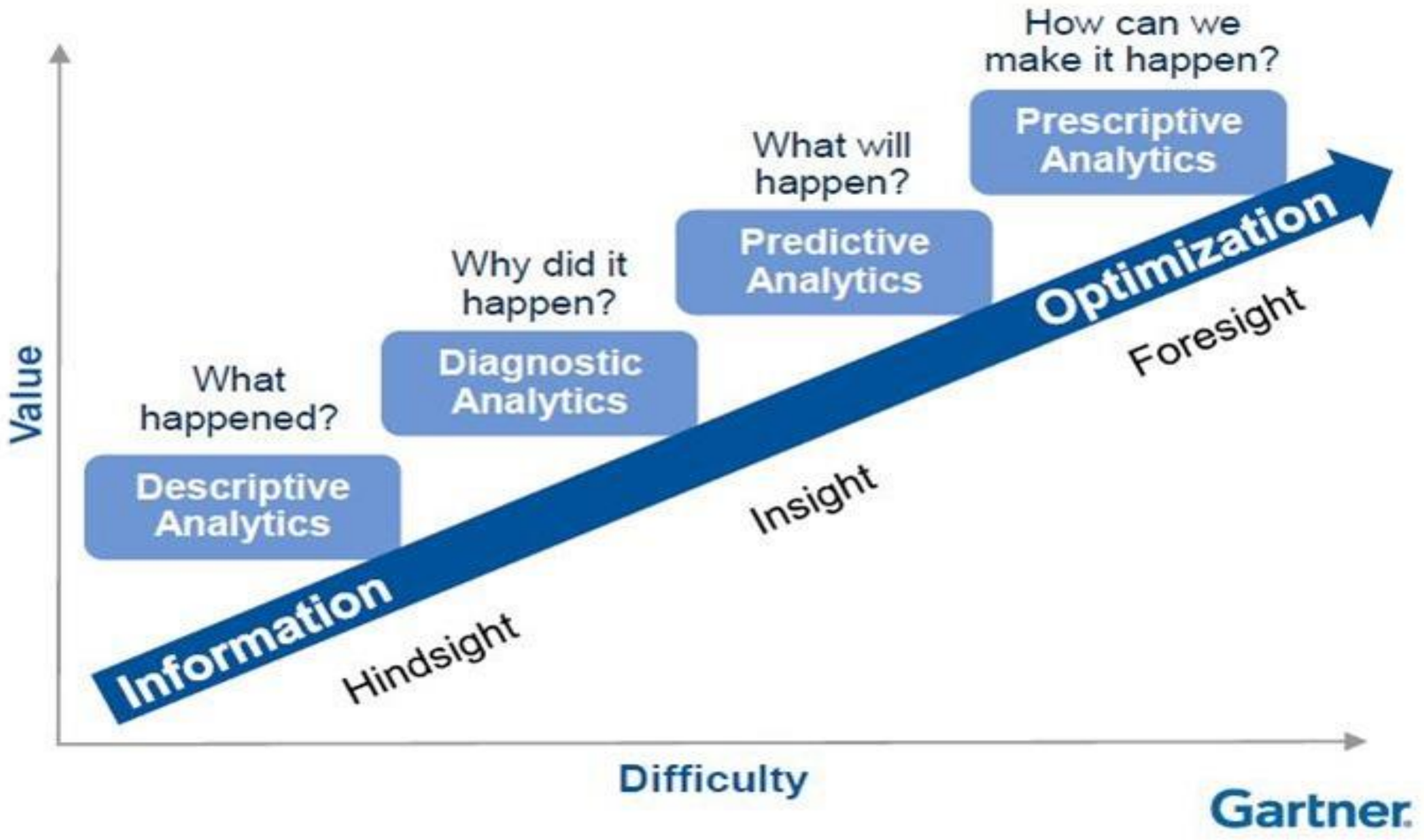


Sales Trend

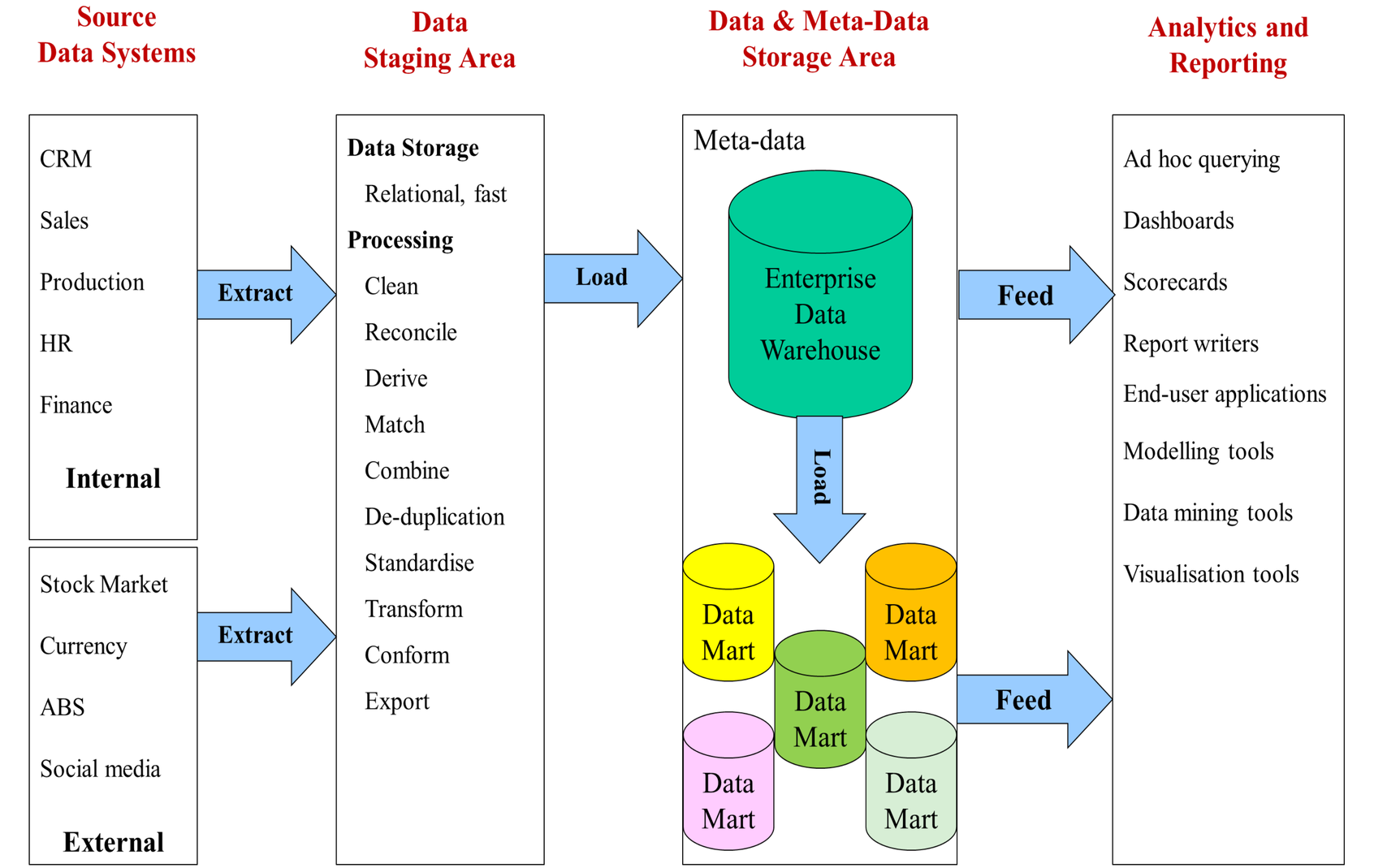


Category Sales

BA Components– Analytics and Reporting



Business Analytics Framework- Our Scope in this Subject



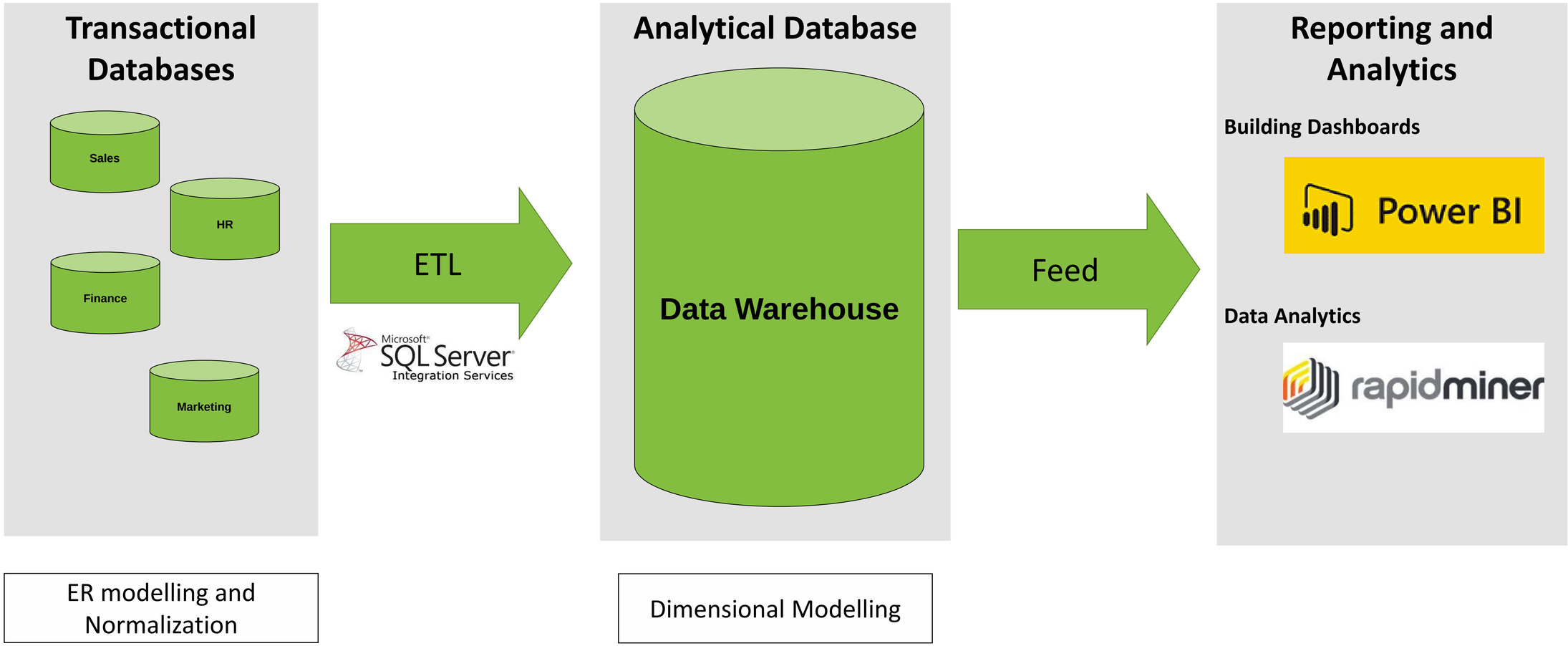
1. ER models to understand transactional or relational databases

3. Data Integration

2. Design a DW (dimensional Modelling)

4. Dashboarding and basic analytics

Learning Outcomes Schematically!



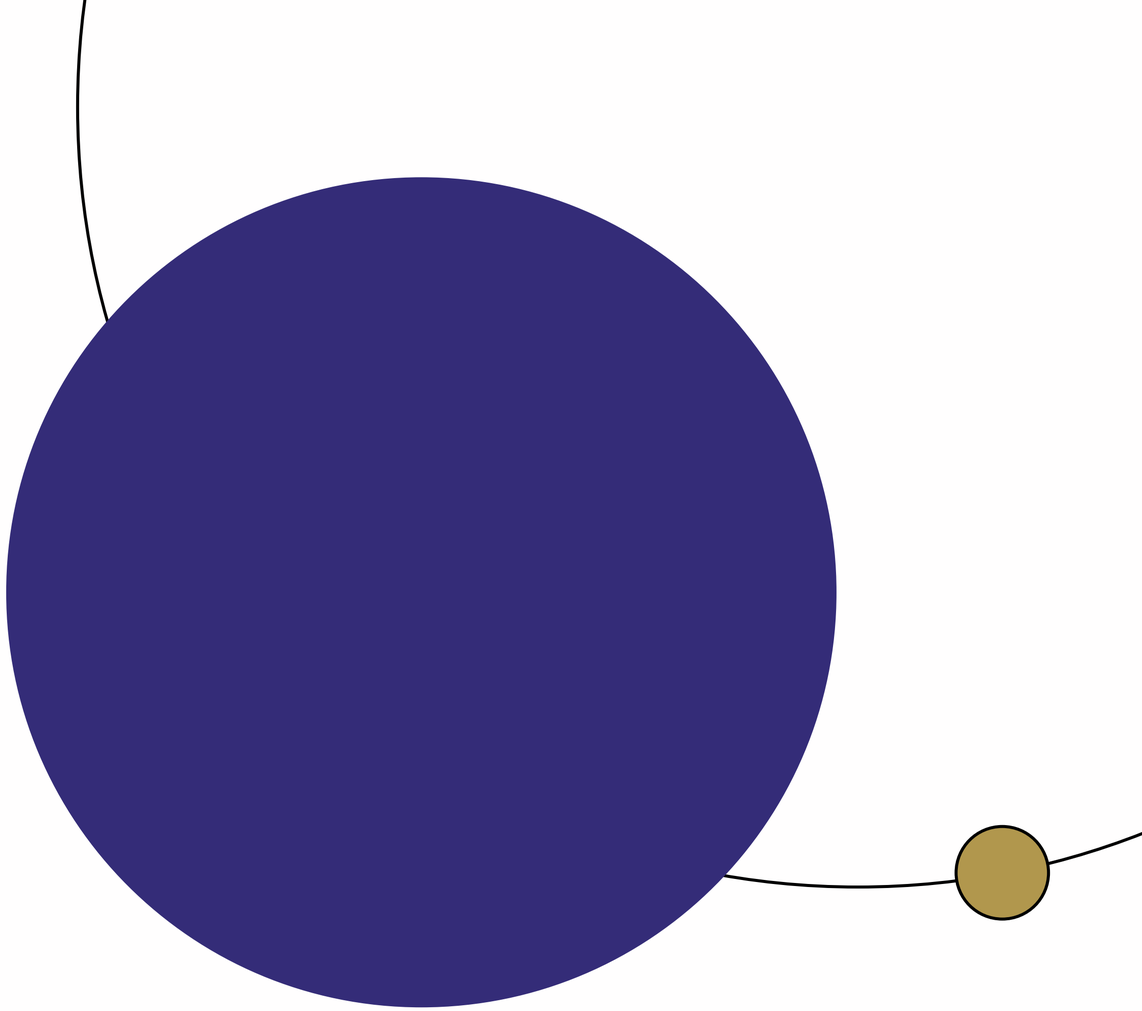
Use of Business Analytics in Business

- Supply chain
  - Simulate and optimize supply chain flows; reduce inventory and stock-outs.
    - Dell, Wal-Mart, Amazon
- Customer selection,
  - Identify customers with the greatest profit potential;
    - Harrah’s, Capital One,
- Loyalty and service
  - increase likelihood that they will want the product or service offering; retain their loyalty.
    - Barclays
- Pricing
  - Identify the price that will maximize yield, or profit.
    - Progressive, Marriott

Use of Business Analytics in Business

- Human capital
  - Select the best employees for particular tasks or jobs, at particular compensation levels.
    - New England Patriots, Oakland A's, Boston Red Sox
- Product and service quality
  - Detect quality problems early and minimize them.
    - Honda, Intel
- Financial performance
  - Better understand the drivers of financial performance and the effects of nonfinancial factors.
    - MCI, Verizon
- Research and development
  - Improve quality, efficacy, and, where applicable, safety of products and services.
    - Novartis, Amazon, Yahoo

Any Question?



What is Examinable:

- Components of business analytics framework
- What are characteristics of strategic data with examples

Next seminar

Next Seminar

- How data is stored in operational databases?
- Relational databases and normalization!