MIS781
Business Intelligence and Database

Unit Chair: A/Prof William Yeoh

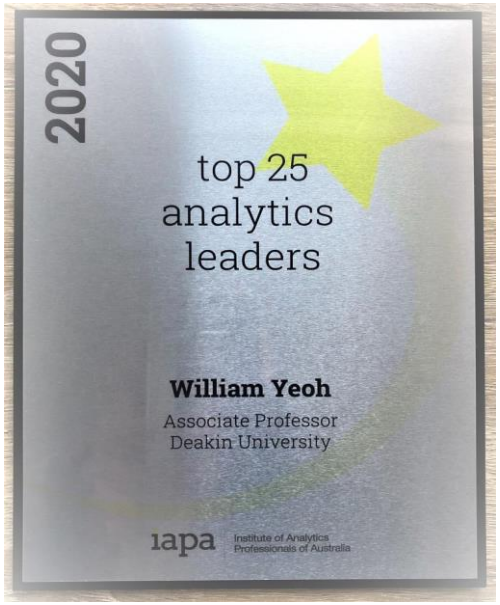
DEAKIN BUSINESS SCHOOL

MSBI

ICE BREAKING ACTIVITY

ABOUT ME

- **Associate Professor, Deakin University (15+ years of academic exp).** https://www.deakin.edu.au/about-deakin/people/william-yeoh
- **Editor-in-Chief Emeritus, International Journal of Business Intelligence Research (IJBIR)**
- **Co-Founder, Global Analytics Education Network (GAEN):** https://www.linkedin.com/groups/7040568/ [please join]
- **Twitter:** https://twitter.com/gsyeoh
- **LinkedIn:** https://www.linkedin.com/in/william-yeoh-36513628/ [please connect]



Leadership

Join GAEN:
https://www.linkedin.com/groups/7040568/

Mentoring

UNIVERSITY OF MARYLAND
University College
STATE UNIVERSITY • GLOBAL CAMPUS

7th Big Data and Analytics EdCon

Global Analytics Competition

June 3-4, 2019

Top 10 Finalist

Branu Jeyavarman, Christine Joyce Carlos, Virasak Sokun

Dr. William Yeoh

Deakin University

"Exploration of relationship between air pollution and population"

MIS781 TEACHING TEAM

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- Unit Chair, Lecturer:
  Associate Professor William Yeoh
  email: william.yeoh@deakin.edu.au

- Industry Guest Lecturer:
  Rob Hillard
  Managing Partner, Deloitte

- Tutors & Markers:
  Marina Liu (PhD candidate)
  Habib Rahman (PhD candidate)
  Alex Chang (PhD candidate)

- Lectures, Practicals & Tutorials
- Lecture (Zoom & Burwood Campus Hall LT13): Tue 6pm-7:50pm
- Online/Zoom Practical (all students are welcome): Thur 8pm-8:50pm

(**All Lectures, Tutes, Pracs & Asg Discussions are video-recorded)

Venue

Type/Stream/Recorded			Day	Start/End	Campus	Location
Computer practical 1	16		Tue	11:00-11:50	Burwood	B4.07
Computer practical 1	15		Tue	12:00-12:50	Burwood	B4.03
Computer practical 1	14		Tue	15:00-15:50	Burwood	B3.17
Computer practical 1	13		Tue	16:00-16:50	Burwood	B4.16
Computer practical 1	12		Tue	17:00-17:50	Burwood	B4.16
Computer practical 1	04		Tue	20:00-20:50	Burwood - Elgar Road	LB2.307
Computer practical 1	08		Wed	14:00-14:50	Burwood	HE2.011
Computer practical 1	09		Wed	15:00-15:50	Burwood	HE2.011
Computer practical 1	11		Wed	16:00-16:50	Burwood	HE2.011
Computer practical 1	01		Wed	17:00-17:50	Burwood	HE2.011
Computer practical 1	07		Thu	16:00-16:50	Burwood - Elgar Road	LB2.309
Computer practical 1	06		Thu	17:00-17:50	Burwood - Elgar Road	LB2.309
Computer practical 1	10		Thu	18:00-18:50	Burwood - Elgar Road	LB2.309
Computer practical 1	05		Thu	19:00-19:50	Burwood - Elgar Road	LB2.309

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MIS781 Business Intelligence and Database T1 2024				
Week	**Commencing**	**Topic**	**Special learning activities**	**Assessment due date**
1	4 March 2024	Introduction to business intelligence (BI)	Practical: Data Skills-Part 1	
2#	11 March 2024	Business intelligence lifecycle and management	Practical: Data Skills-Part 2	# Victorian Labour Day Public Holiday: Monday 11 March 2024 (University closed)
3	18 March 2024	OLTP Database	Practical: Power BI-Part 1	
4^	25 March 2024	Database Normalization	Group assignment consultation during prac hours	^ Easter vacation/intra-trimester break: Friday 29 March - Sunday 7 April 2024 (inclusive)
Easter vacation/intra-trimester break: Friday 29 March - Sunday 7 April 2024 (inclusive)				
5	8 April 2024	Industry Guest Lecture	Group assignment consultation during prac hours	Group Assignment (Database) due by 8:00pm AEST Thursday 11 April 2024
6	15 April 2024	Extract, Transform and Load (ETL)	Practical: Power BI-Part 2	
7*	22 April 2024	Data Warehouse (DW)	Practical: Power BI-Part 3	Monday 22 April: Examination timetable released on StudentConnect * ANZAC Day Public Holiday: Thursday 25 April 2023 (University closed)
8	29 April 2024	Data Warehouse Architecture and Development	Practical assignment consultation	

MIS781 Business Intelligence and Database T1 2024				
Week	**Commencing**	**Topic**	**Special learning activities**	**Assessment due date**
			during prac hours	
9	6 May 2024	Industry Guest Lecture	Practical assignment consultation during prac hours	
10	13 May 2024	Industry Guest Lecture	Practical assignment consultation during prac hours	Individual Practical Assignment (BI) due by 8:00pm AEST Thursday 16 May 2024
11	20 May 2024	Business Intelligence Trends & Exam Discussion	Readings	

Victorian Labour Day Public Holiday: Monday 11 March 2024 (University closed)
^ Easter vacation/intra-trimester break: Friday 29 March - Sunday 7 April 2024 (inclusive)
* ANZAC Day Public Holiday: Thursday 25 April 2023 (University closed)

UNIT LEARNING OUTCOMES

ULO	These are the Learning Outcomes (ULO) for this unit. At the completion of this unit, successful students can:	Deakin Graduate Learning Outcomes
ULO1	Explain and apply the business intelligence (BI) lifecycle concept, multidimensionality concept and database concept	GLO1: Discipline-specific knowledge and capabilities
ULO2	Appraise and apply data warehousing architecture, technologies and development methodologies and database for business intelligence	GLO1: Discipline-specific knowledge and capabilities; GLO3: Digital literacy
ULO3	Collaborate constructively in a team to use BI and database technologies for implementation of innovative BI solutions and better dissemination of information	GLO1: Discipline-specific knowledge and capabilities; GLO7: Teamwork

See unit website

ASSESSMENT

1. **Group Assignment (3 members/group): Design Database (20%)**

2. **Individual Practical Assignment: Develop BI Dashboards (30%)**

3. **Final Exam: 2 hours exam (50%; 50/100 Hurdle)**
   Note: More details will be provided during the exam discussion session

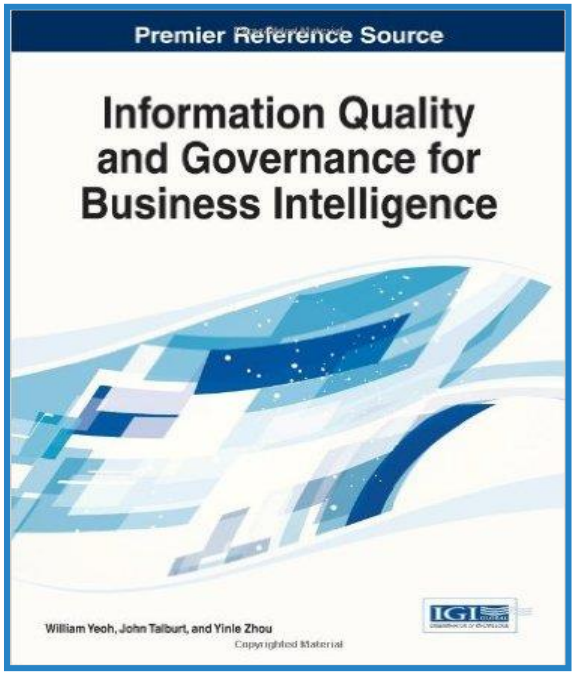
*Hurdle requirement: achieve at least 50% of the marks available on the examination

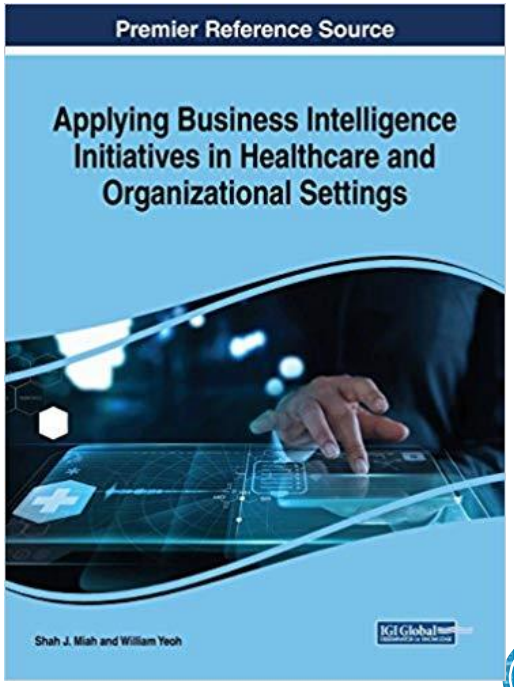
REFERENCE BOOKS

- IMPORTANT: See CloudDeakin **Unit Schedule** for weekly task
- Recommended book for this unit:

1. Sharda, R., Delen, D. &Turban, E. (2018) ***Business Intelligence – A Managerial Approach (Global Edition),*** Pearson Education Limited, Upper Saddle River, N.J. 4th edn

* See Deakin Library for e-Book





1924


2024

THE DAVINCI CODE FOR GETTING HD? ☺

	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
%	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26

- Training: 20+18+1+9+14+9+14+7=69%
- Policy: 16+15+12+9+3+25=80%

- Attitude: 1+20+20+9+20+21+4+5=100%

- Be on time!
- Ask questions/active learning
- Enjoy the lectures ☺

Think BIG, Start small, *Move Fast*

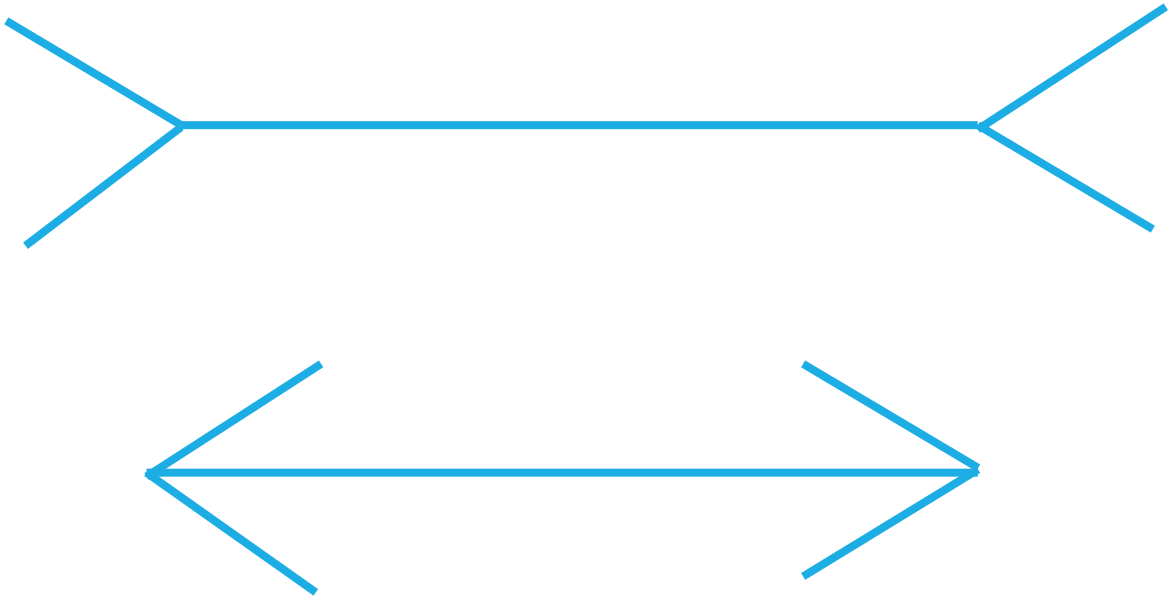
Lecture 1:
Introduction to Business Intelligence

LEARNING OBJECTIVES

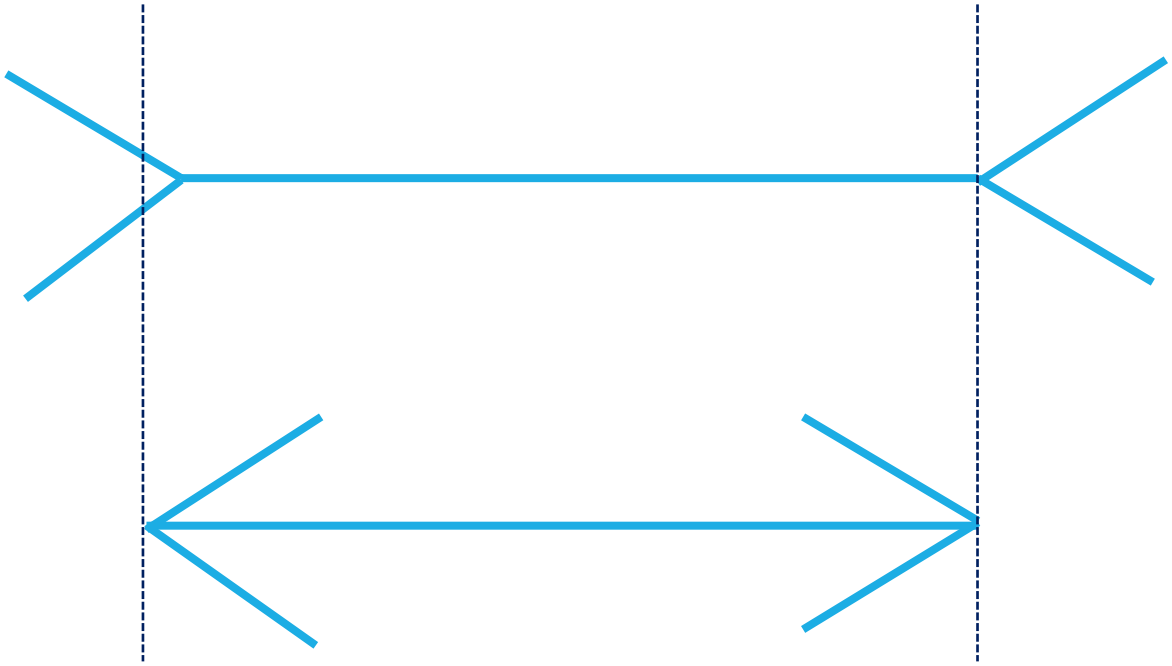
By the end of this class you should be able to:

- Explain and define what is Business Intelligence
- Understand and explain the high-level architecture of business intelligence system and its key components
- Articulate the differences between Transactional system and BI system
- Identify major types of BI users

FACT-BASED ANALYSIS



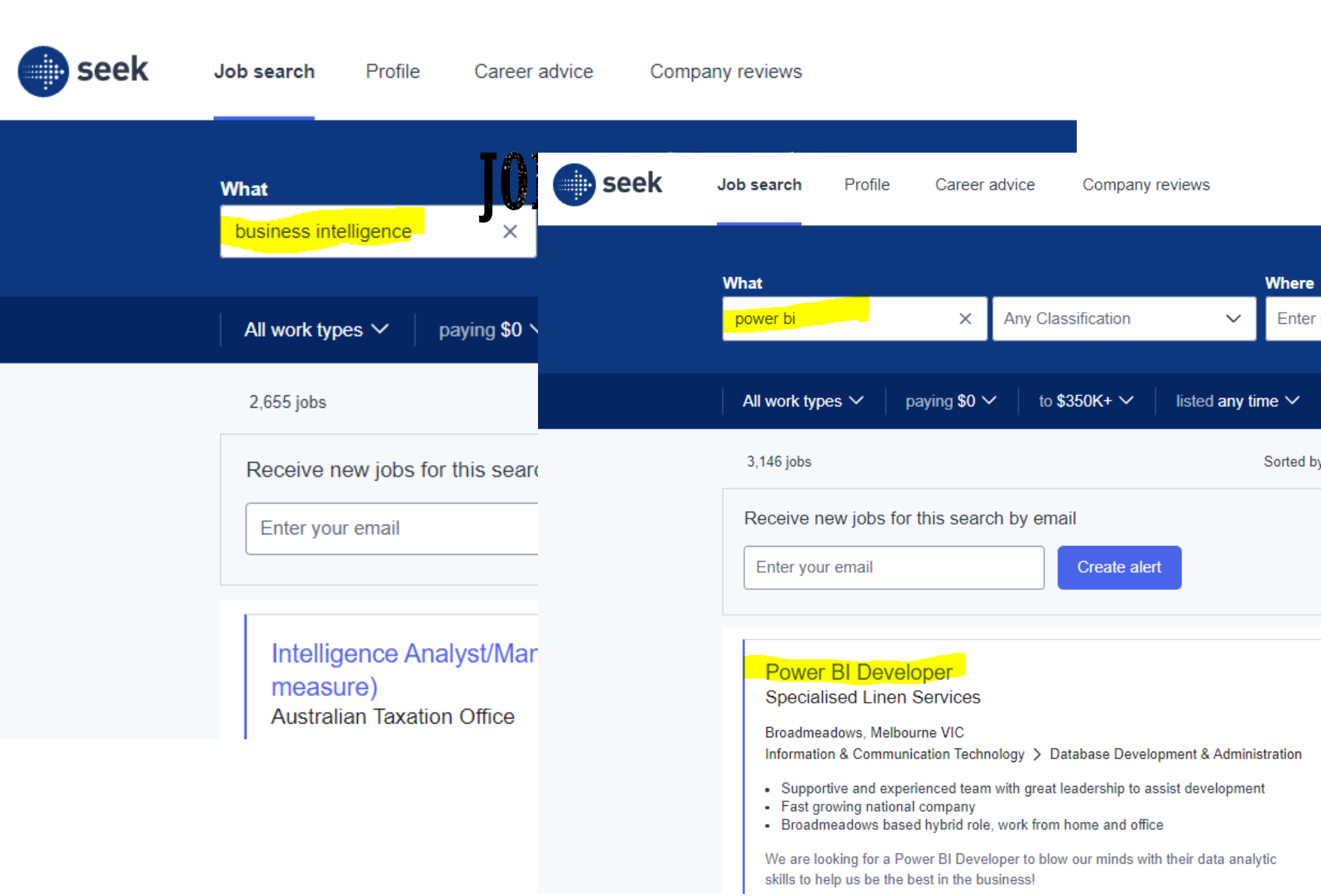
FACT-BASED ANALYSIS



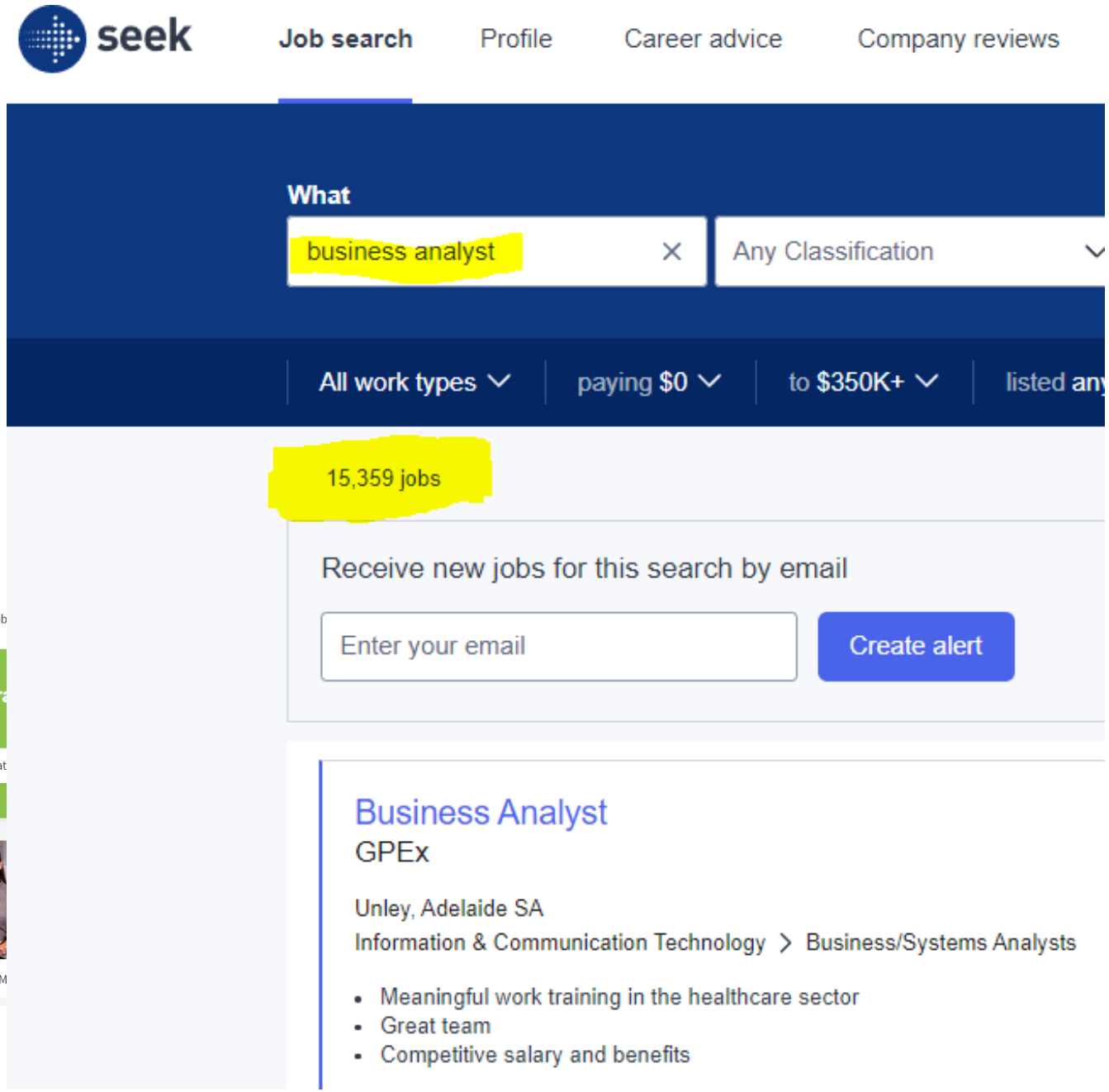
BUSINESS INTELLIGENCE IMPERATIVE

"Virtually everything in business today is an undifferentiated commodity - except how a company manages its information. How you manage information determines whether you win or lose."

Bill Gates, Microsoft



https://www.seek.com.au/business-intelligence-jobs
https://www.seek.com.au/power-bi-jobs



https://www.seek.com.au/business-analyst-jobs

THERE IS A CAREER IN THIS…

US$13+ billion

Worldwide business intelligence and analytics software market (Gartner)

- https://www.gartner.com/en/documents/3985421/market-share-analytics-and-business-intelligence-worldwi
- https://www.gartner.com/en/digital-markets/insights/software-market-insights-business-intelligence-and-data-analytics

State	NSW	NSW	VIC	VIC
Experience	1–2 years	3 years+	1–2 years	3 years+
Salary	$'000	$'000	$'000	$'000
DEVELOPMENT, DESIGN & ARCHITECTURE				
Analyst Programmer – Mainframe	65–90	90–115	65–80	80–105
Analyst Programmer – Client Server Technologies	60–80	80–110	55–75	75–105
Analyst Programmer – Web Technologies	60–70	70–90	55–70	70–90
Lead Analyst Programmer	80–100	100–125	75–95	95–120
Systems Programmer	70–85	85–110	60–75	75–100
Systems Analyst	75–90	90–110	65–80	80–100
Technical Writer	65–75	75–90	60–70	70–85
Enterprise Architect	120–140	140–200	110–140	140–200
Architect – Applications, Solutions, Systems, Data	120–140	140–180	110–140	140–170
Application Development Manager	110–130	130–180	95–130	130–175
TESTING				
Test Analyst	60–85	85–95	55–70	70–85
Test Team Leader	75–95	95–115	75–90	85–110
Test Manager	100–120	120–135	95–115	115–140
QA Manager	110–130	130–150	110–120	120–140
DATABASE MANAGEMENT				
Data Analyst	65–85	80–95	55–70	70–85
Database Administrator	75–100	100–135	65–85	85–110
Business Intelligence Specialist	70–100	100–130	70–90	90–120
Database Designer	85–95	95–130	80–100	100–120
Data Warehousing/Modelling Specialist	90–115	115–150	90–120	120–140
Data Architect	110–130	130–165	100–120	120–160

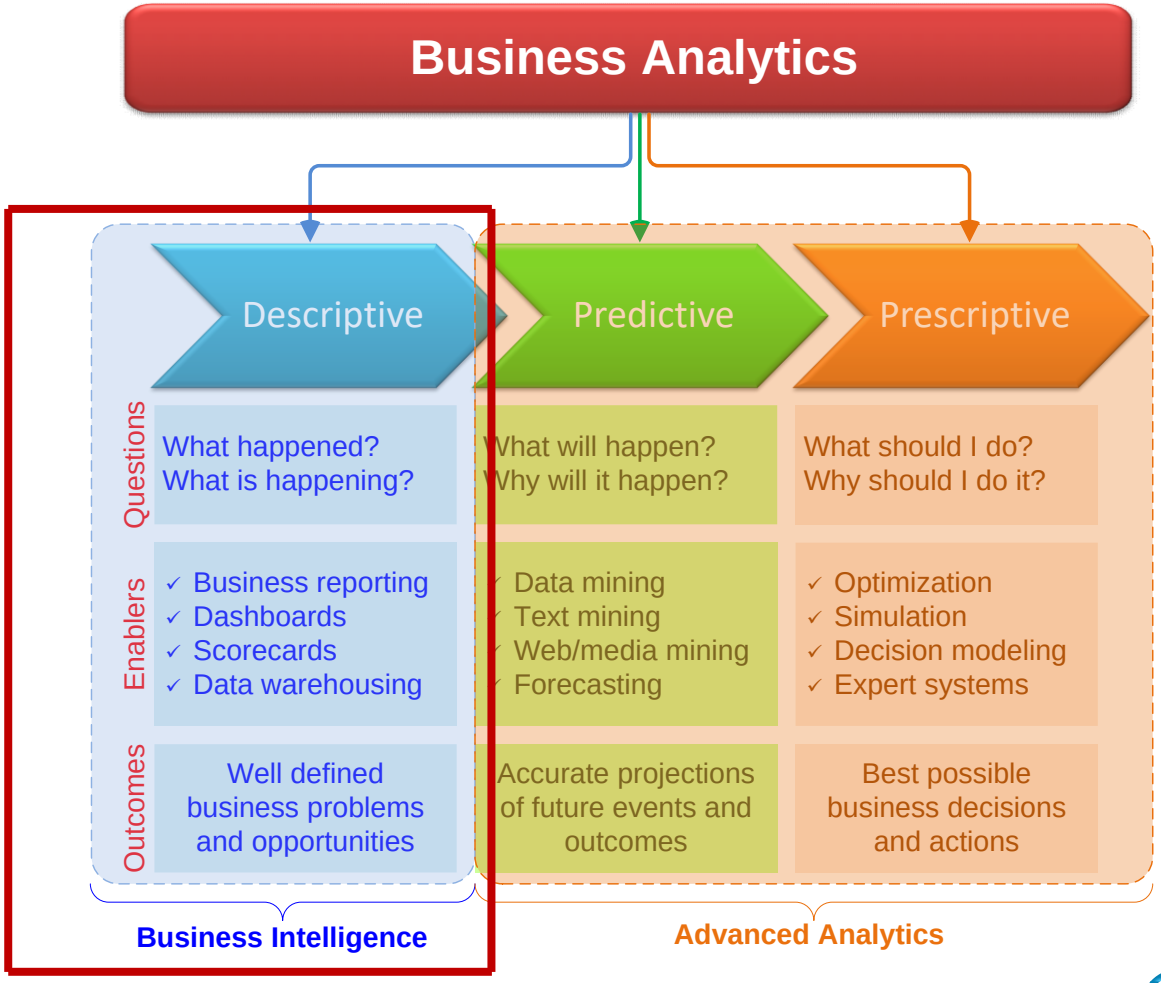
BI SOFTWARE VENDORS

BUSINESS ANALYST WORLD

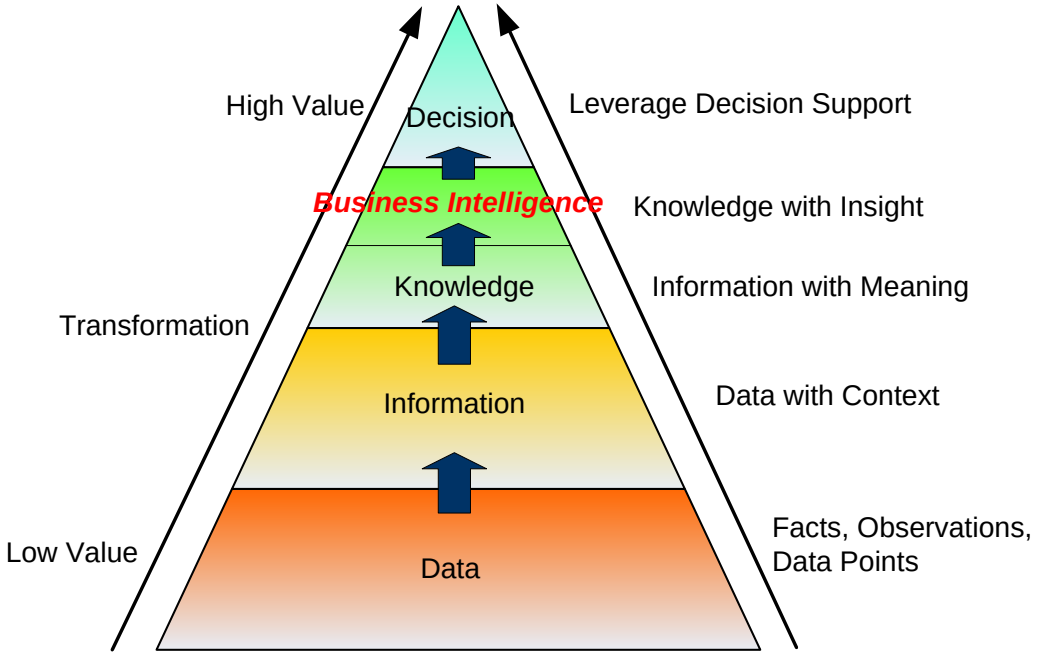
- How much **revenue** did the **product X** generate in the **last three months**, broken down by **month** for the **south-eastern sales region**, by individual **stores**, **compared to the previous version** of the product? **Apply multi-dimensional analysis (Rubik's cube)!**

WHAT IS BUSINESS INTELLIGENCE?

- BI used to be everything related to use of data for managerial decision support
- It is a part of Business Analytics
  - BI = Descriptive Analytics



BUSINESS INTELLIGENCE (BI)



Business Intelligence (BI):

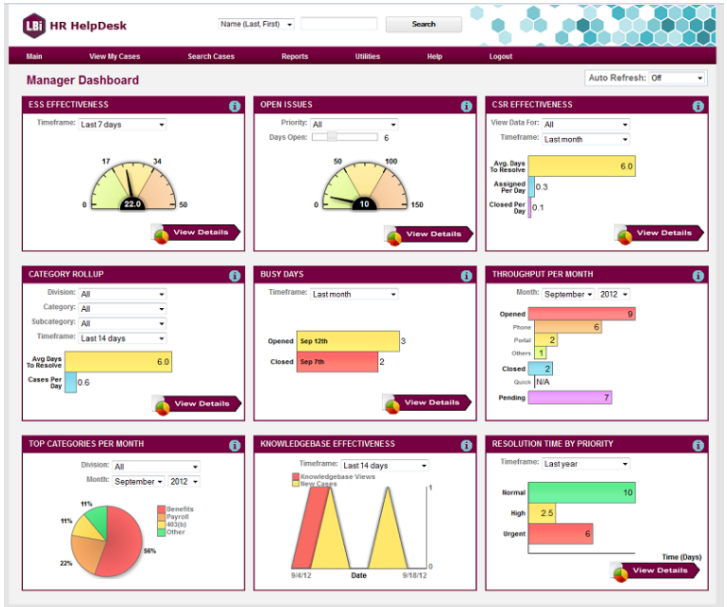
- a term used to refer to a set of concepts and methods based on fact-based support systems for improving decision making (Trieu 2017)
- "actionable information that supports strategic and operational decision making and risk assessment in uncertain and dynamic business environments"
- a broad category of technologies, applications, and processes used for gathering, storing, accessing, and analysing data to help its users make better decisions" Wixom and Watson (2010)

BUSINESS INTELLIGENCE SYSTEM

- ***A Business Intelligence (BI) System*** *is defined as an information system that presents historical information to its users for analysis, query and reporting, to enable effective decision-making and management support, to increase the performance of business processes* (Trieu 2017)

- BI system aims to **deliver the right information at the right time to the right people and in the right form**.
- BI system is an enterprise-wide platform that supports reporting, analysis and decision making.

- BI system leads to:
  - fact-based decision making
  - "single version of the truth"



A FRAMEWORK FOR BUSINESS INTELLIGENCE SYSTEM

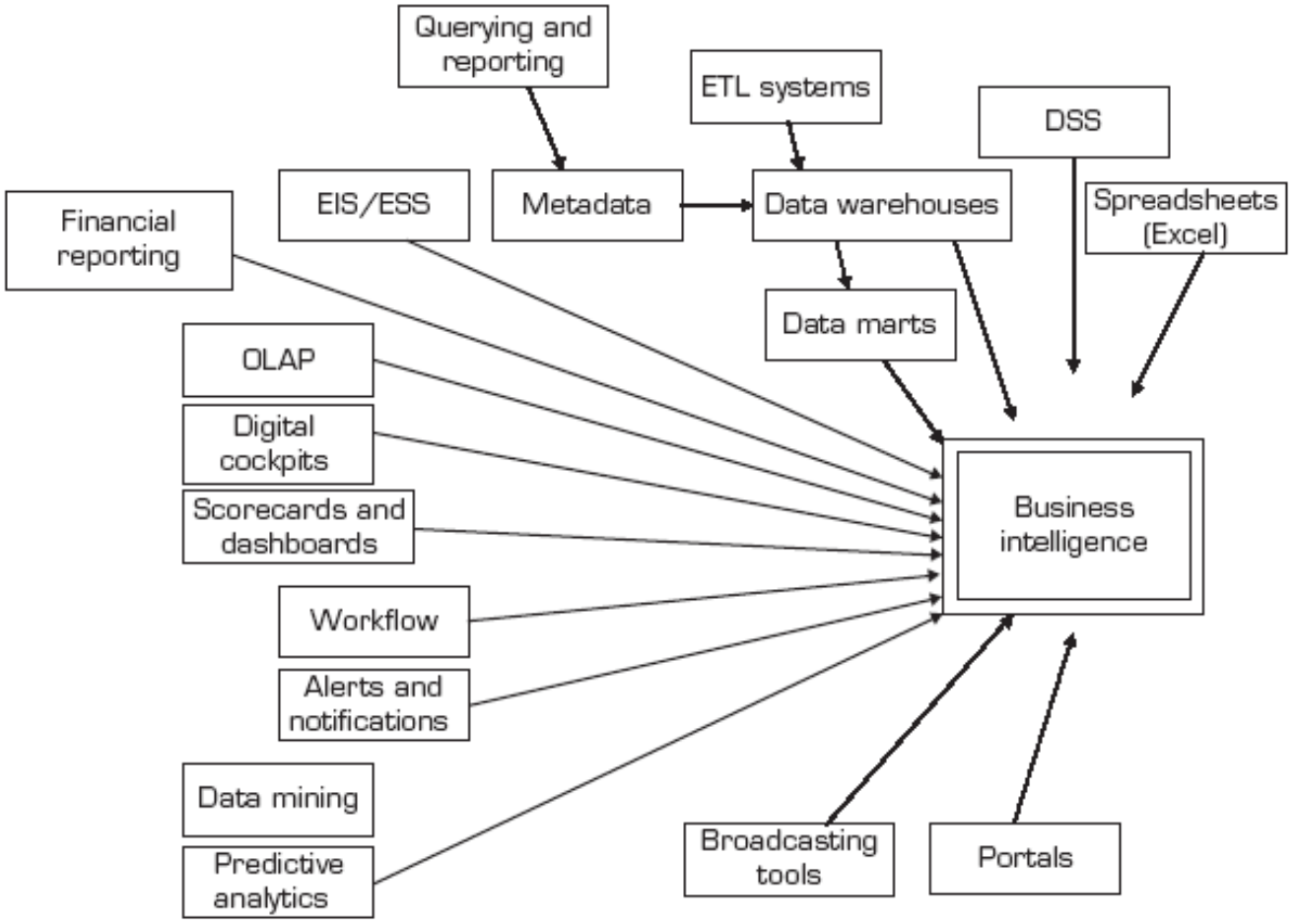


FIGURE 1.2 Evolution of BI

Source: Sharda et al 2019

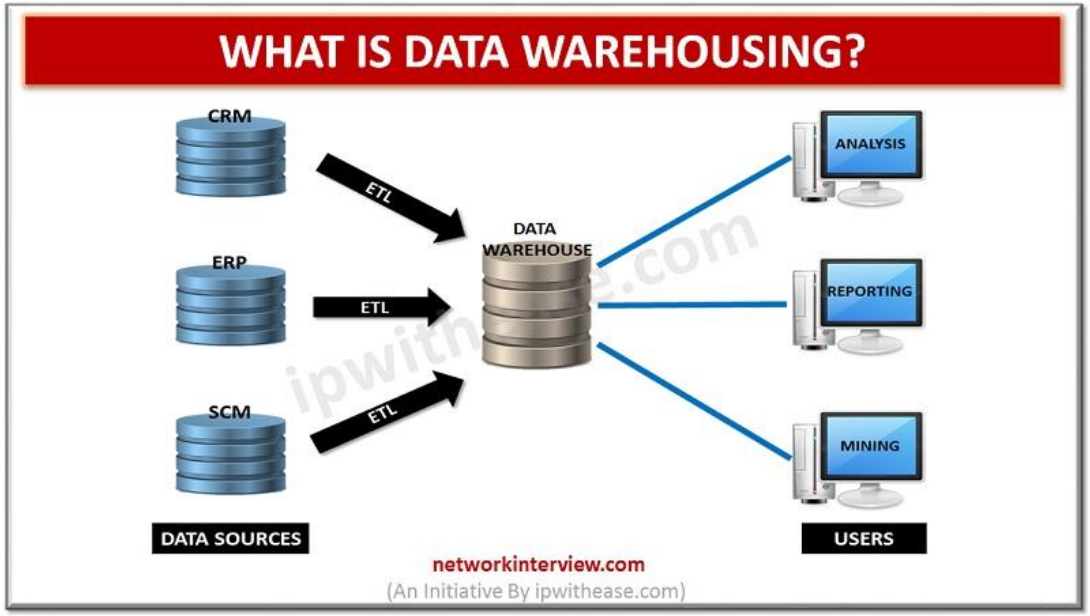
DATA WAREHOUSE VS DATA WAREHOUSING

Data warehouse

- A data warehouse is a collection of data created to support decision-making applications

Data warehousing

- Data warehousing is the entire process of data extraction, transformation, and loading of data to the warehouse and the access of the data by end users and applications

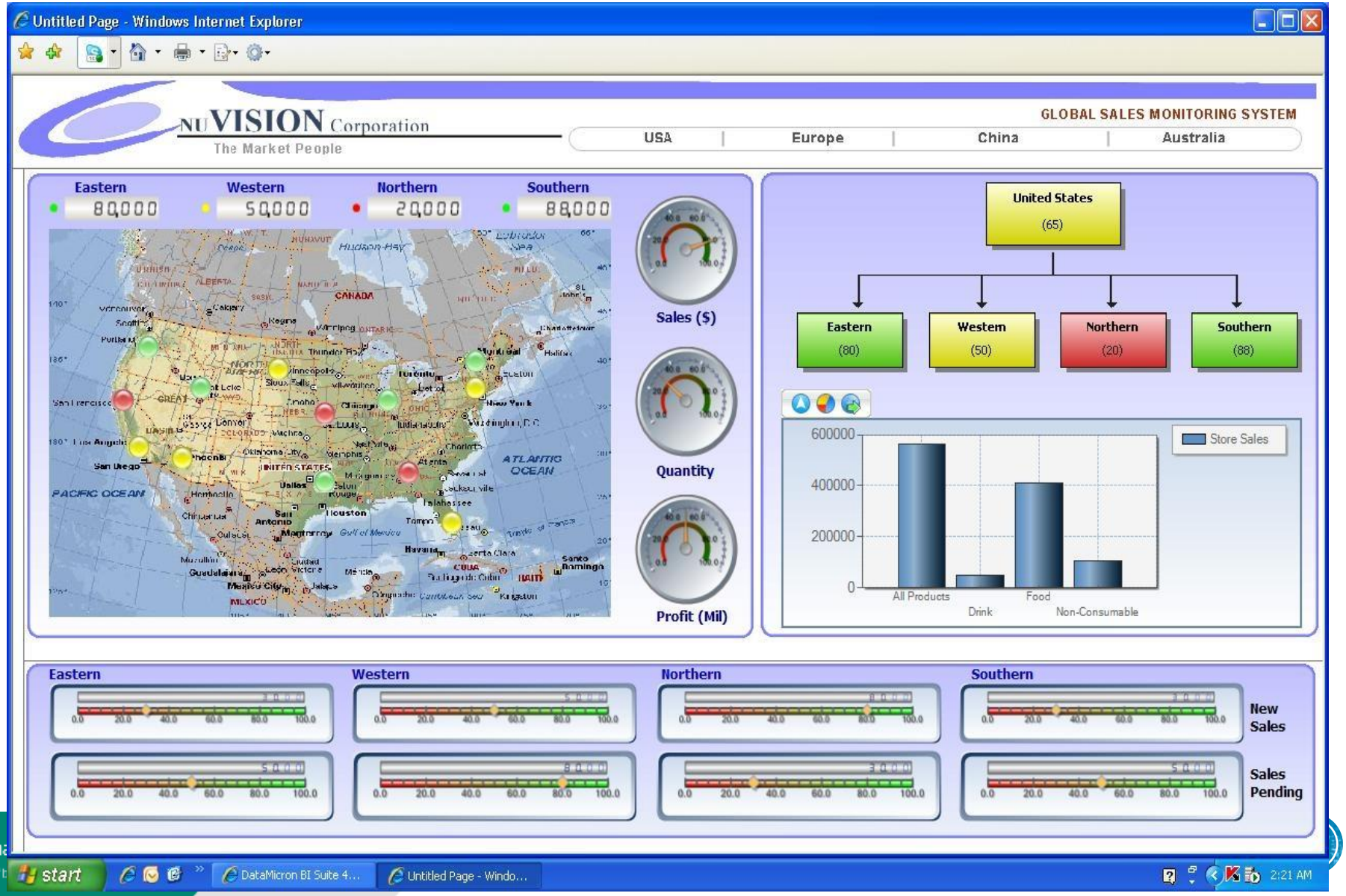


DECISION MAKING REQUIRES BI

Decision making today is more complicated;

- With more data and information being available there are more alternatives to consider and explore
- The cost of making a bad decision can be very large as an error may set of a chain reaction within an organisation

BI DASHBOARD EXAMPLE



BI DASHBOARD EXAMPLE

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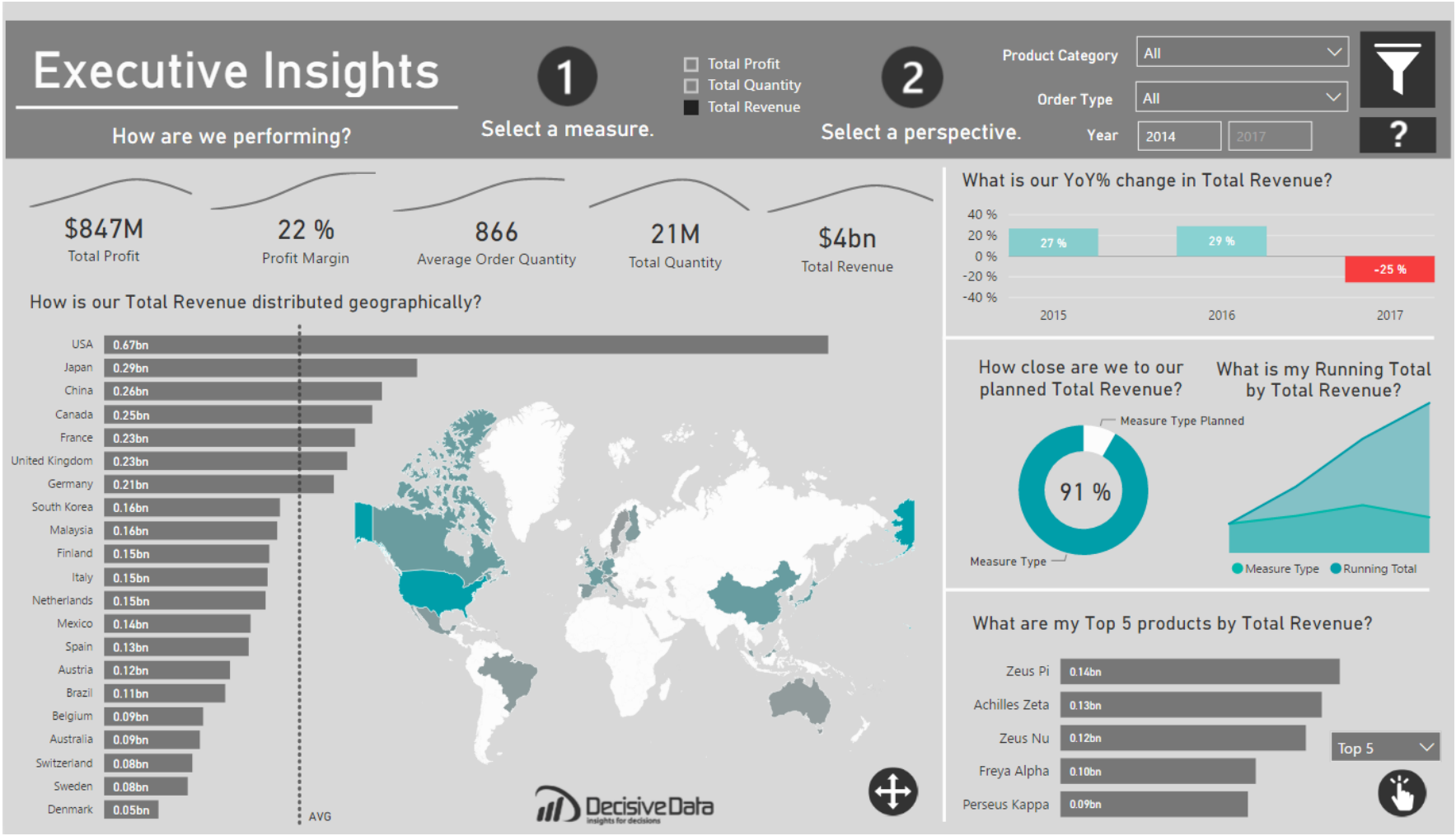
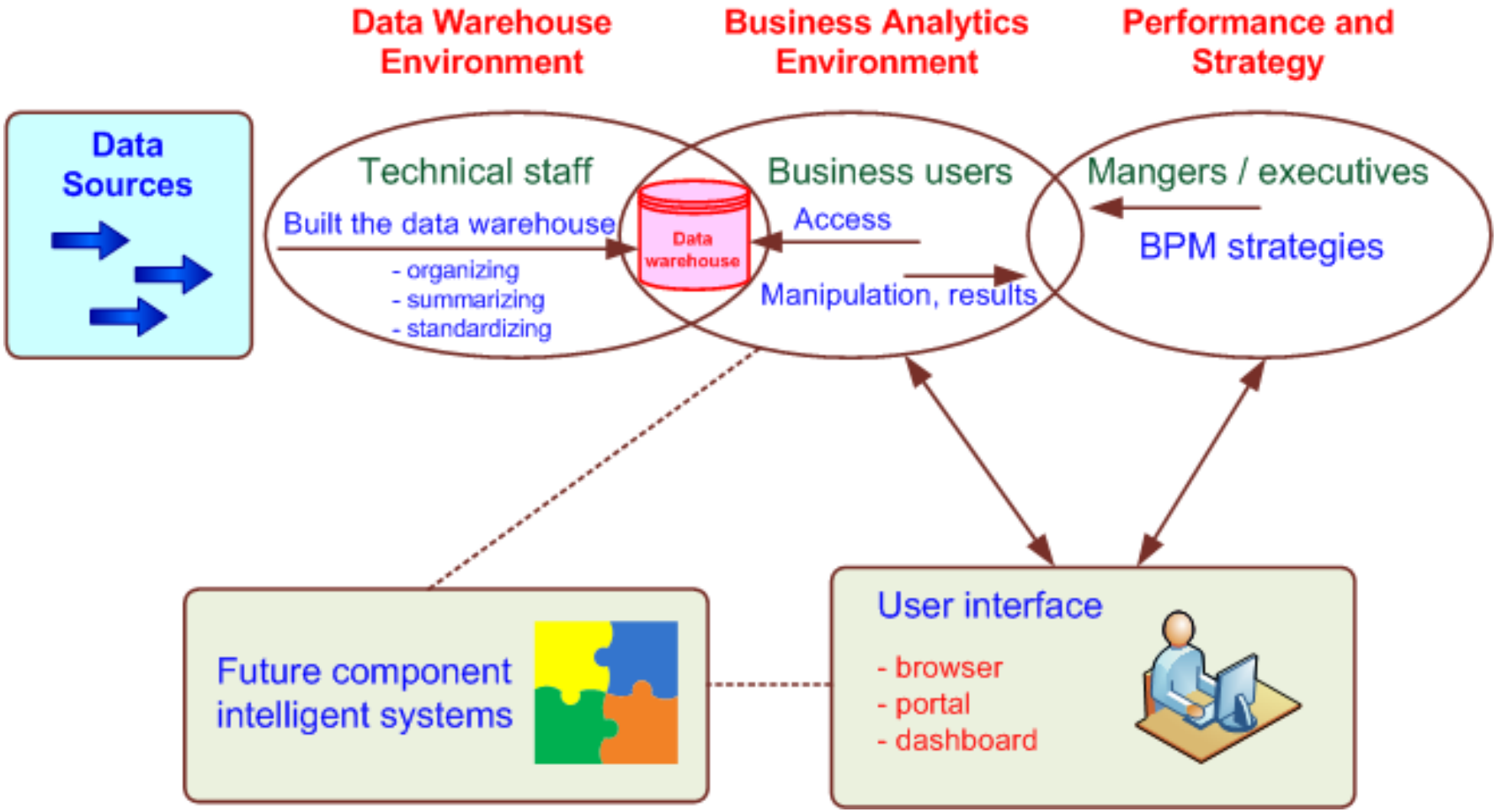
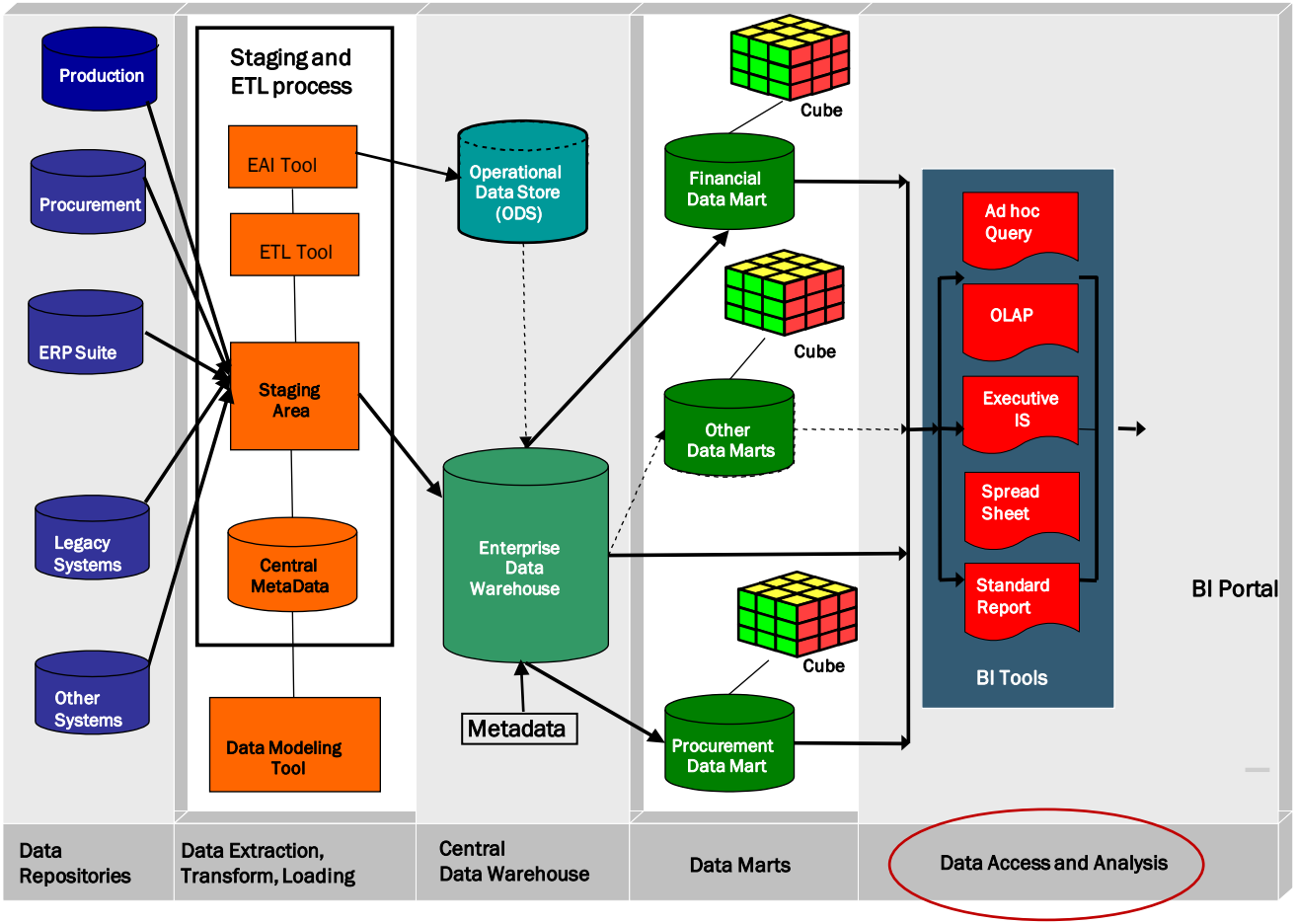


HIGH-LEVEL ARCHITECTURE OF BI



A TYPICAL BI SYSTEM ARCHITECTURE



Source: Griffin, J.

KEY COMPONENTS OF BI SYSTEMS

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- A set of three complementary data management technologies, namely data warehousing, OLAP and knowledge discovery
- To be specific, a BI system is composed of the following essential components:

1. **ETL** (Extraction-Transformation-Load) tools that are responsible for data transfer from operational or transaction systems to data warehouses;
2. **Data warehouses** to provide some rooms for thematic storing of aggregated and analysed data;
3. **OLAP** analytic tools to let users access, analyse and model business problems and share information that is stored in data warehouses;
4. **Data mining** tools for determining patterns, generalisations, regularities and rules in data resources;
5. **Reporting and ad hoc inquiry** tools for creating and utilising different synthetic reports;
6. **Presentation layers** that include customised graphical and multimedia interfaces to provide users with information in a comfortable and accessible form;
7. **Dashboard & business performance management (BPM)** for monitoring and analysing performance.

ADDRESSING MULTI-FACETED DEFINITIONS OF BI

Approach	**Managerial/Process**	**Technological**	**Product**
Definition	Focus on process of gathering data from internal and external sources and of analysing them in order to generate relevant information.	Focus on the technological tools that support the process.	Describe BI as the emerging result/product of in-depth analysis of detailed business data as well as analysis practices using business intelligence tools.

CHARACTERISTICS OF BI (AS A PRODUCT)

Characteristics	Descriptions
Integrated	Must have a single, enterprise-wide view (e.g., international student must be a full-time student)
Data integrity	Information must be accurate and must conform to business rules
Accessible	Easily accessible with intuitive access paths, and responsive for analysis
Credible	Every business factor must have one and only one value
Timely	Information must be available within the stipulated time frame

TRANSACTIONAL SYSTEM VS BI SYSTEM
(TE-TE ROW SYSTEM VS COLUMN SYSTEM)

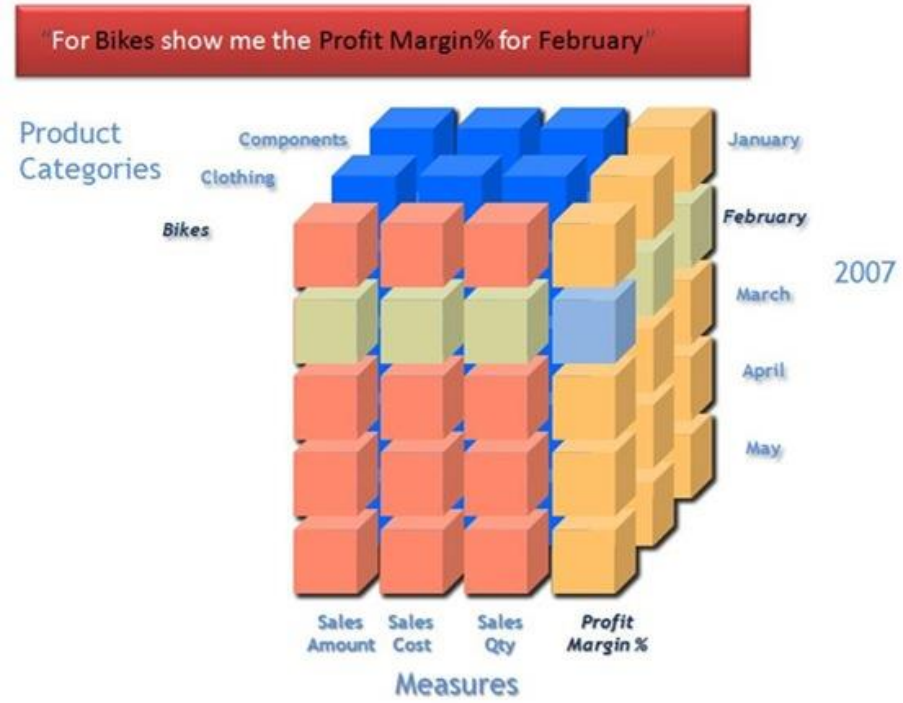
Hypothetical Relational Database Model

PubID	Publisher	PubAddress
03-4472822	Random House	123 4th Stree, New York
04-7733903	Wiley and Sons	45 Lincoln Blvd, Chicago
03-4859223	O'Reilly Press	77 Boston Ave, Cambridge
03-3920886	City Lights Books	99 Market, San Francisco

VS

AuthorID	AuthorName	AuthorBDay
345-28-2938	Haile Selassie	14-Aug-92
392-48-9965	Joe Blow	14-Mar-15
454-22-4012	Sally Hemmings	12-Sep-70
663-59-1254	Hannah Arendt	12-Mar-06

ISBN	AuthorID	PubID	Date	Title
1-34532-482-1	345-28-2938	03-4472822	1990	Cold Fusion for Dummies
1-38482-995-1	392-48-9965	04-7733903	1985	Macrame and Straw Tying
2-35921-499-4	454-22-4012	03-4859223	1852	Fluid Dynamics of Aquaducts
1-38278-293-4	663-59-1254	03-3920886	1967	Beads, Baskets & Revolution



TRANSACTIONAL SYSTEM (IN) VS BI SYSTEM (OUT)

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Get the data in

Making the wheels of business turn

- Take an order
- Process a claim
- Make a shipment
- Generate an invoice
- Receive cash
- Reserve an airline seat

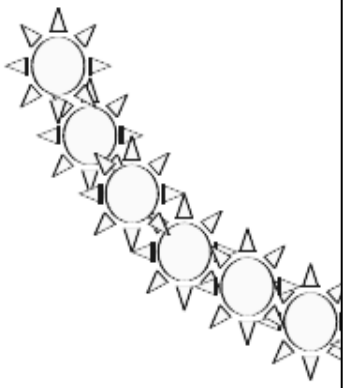


Figure 1-5 Operational systems.

Get the information out

Watching the wheels of business turn

- Show me the top-selling products
- Show me the problem regions
- Tell me why (drill down)
- Let me see other data (drill across)
- Show the highest margins
- Alert me when a district sells below target

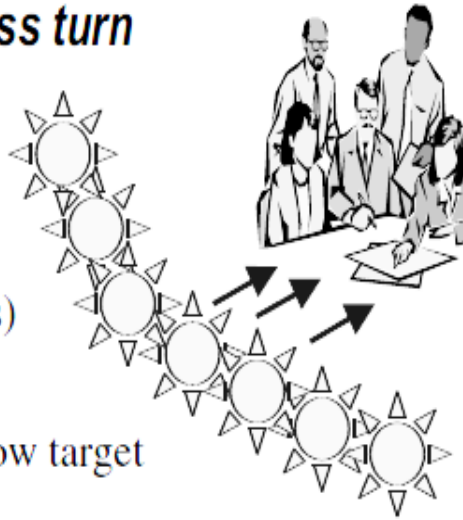


Figure 1-6 Decision-support systems.

TRANSACTIONAL SYSTEM VS BI SYSTEM

Attributes	Transactional system	BI system
Business purpose	Support the operational business activities in an efficient manner.	Support strategic and tactical activities by giving the right information and new insights to the business.
Characteristic	Operational processing	Informational processing
Orientation	Transaction	Analysis
Function	Day-to-day operations	Long-term informational requirements, decision support
Business	The users often have no choice whether or not to use the system; he or she is not obligated to use the system in order to conduct business.	"Voluntarily", in the sense that analyses and reports can often be done with other tools (such as spreadsheets), even though it may be less efficient.
Education	Easy to plan, because an operational system often consists of fixed business process that need to be taught.	Difficult to foresee, as most BI systems allow for many non-processes based ways to create reports and analyses.
User type	Frontline worker, operational staff	Knowledge worker, managerial staff

TRANSACTIONAL SYSTEM VS BI SYSTEM

How are they different?

	OPERATIONAL	INFORMATIONAL
Data Content	Current values	Archived, derived, summarized
Data Structure	Optimized for transactions	Optimized for complex queries
Access Frequency	High	Medium to low
Access Type	Read, update, delete	Read
Usage	Predictable, repetitive	Ad hoc, random, heuristic
Response Time	Sub-seconds	Several seconds to minutes
Users	Large number	Relatively small number

BI PROCESS VS IT APPLICATION PROJECT

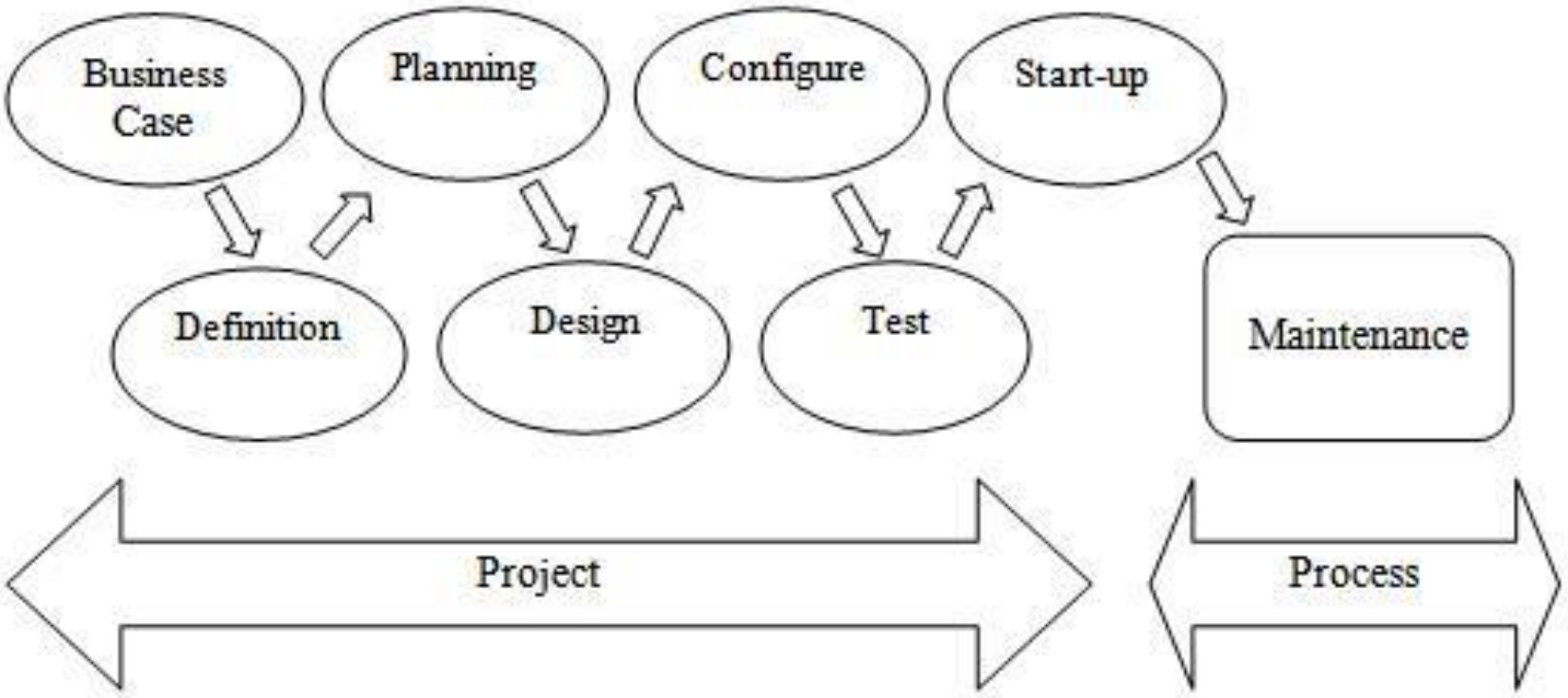
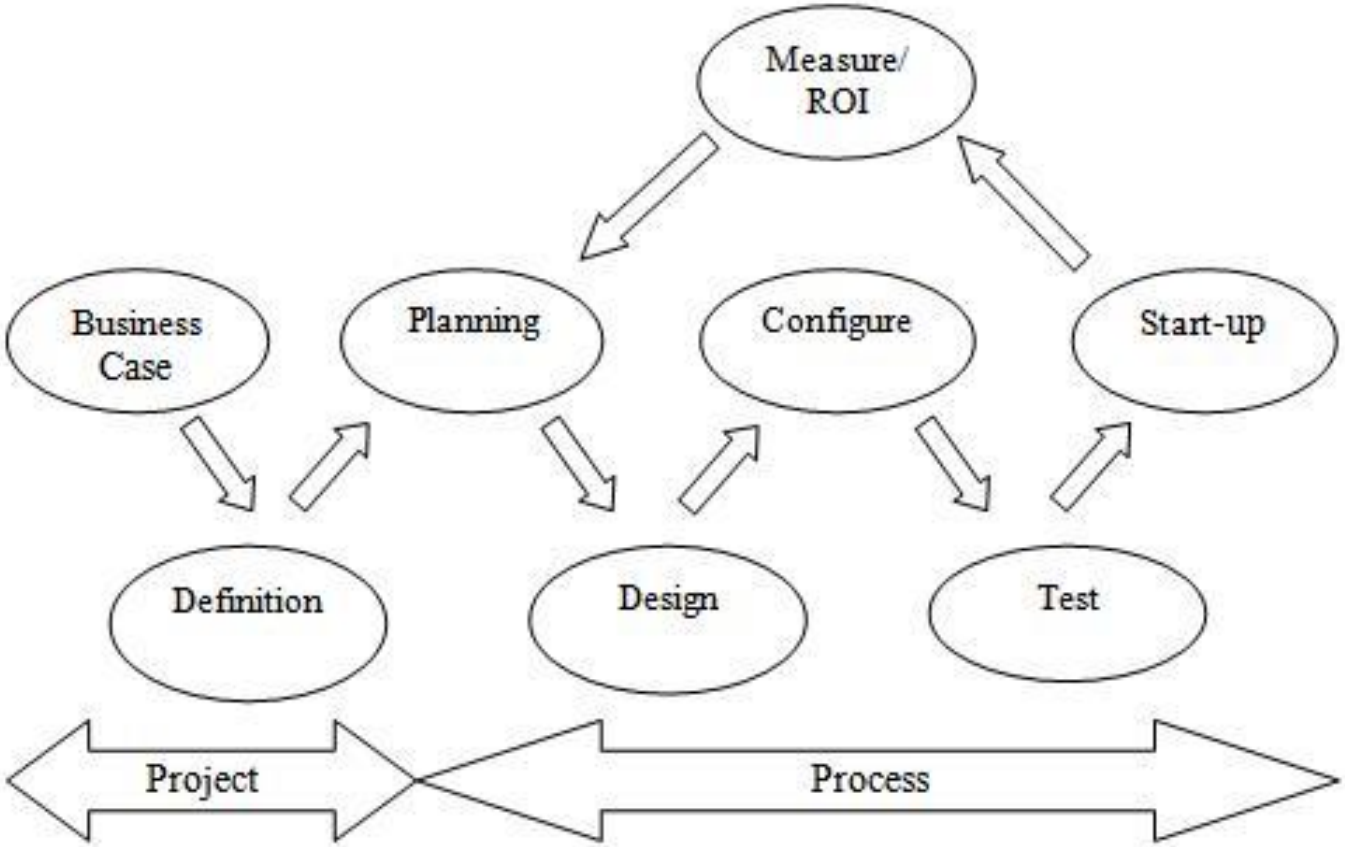


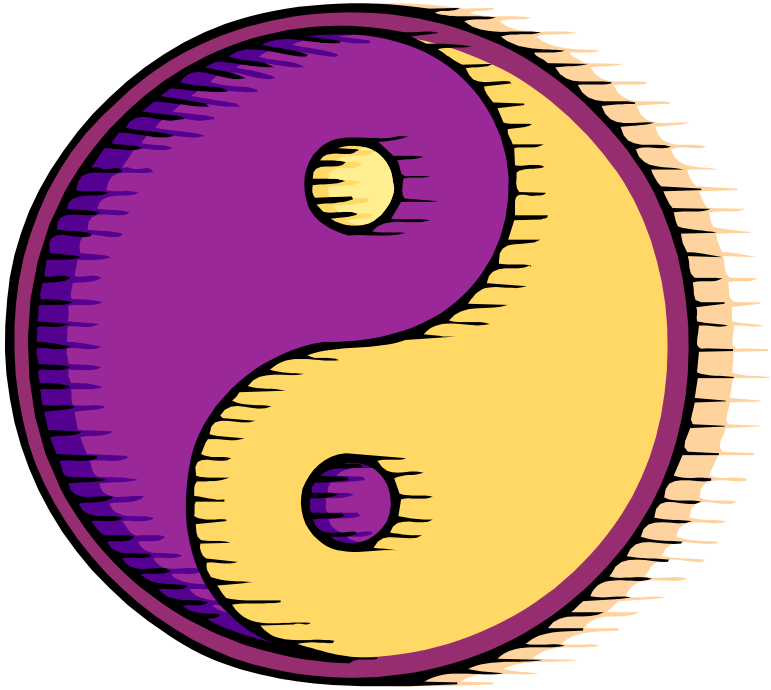
Figure: The Average IT Project Planning

BI PROCESS VS IT APPLICATION PROJECT



SUPPORTING A COMPLETE SOLUTION

Transactional System (data in)



BI System (info out)

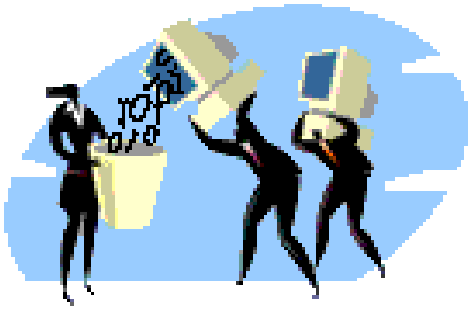
SIX MAJOR TYPES OF BI USERS

Types of Users	IT Staff	Power Users	Executives	Functional Managers	Occasional Information Customers	Extranet: Partners, Consumers
Number of Users	Few	Dozens	Dozens	Dozens to hundreds	Hundreds to thousands	Hundreds to thousands
BI Tools and Functions	Developer Admin Metadata Security Data Management Applications Integration	Ad hoc query OLAP Reports Data mining Advanced analysis	Dashboard Scorecard Reports CPM (corporate performance management) BPM	Reports Spreadsheet OLAP view BAM (business activity monitoring) CPM	Reports Spreadsheet Queries	Reports Tracking
Strategic Value	Low	High	Very High	Medium	Low	High

*Matching user types with the right functionality to optimise value

SUMMARY

- BI is an umbrella term which covers the tools and techniques that help support the decision making process.
- Within BI environment, information is on-line, interactive, integrated across lines of business, and immediately available for analysts use in a single environment.
- BI empowers Business users.
- BI is a different type of system vs transactional system.
- BI system needs to cater for different types of users.

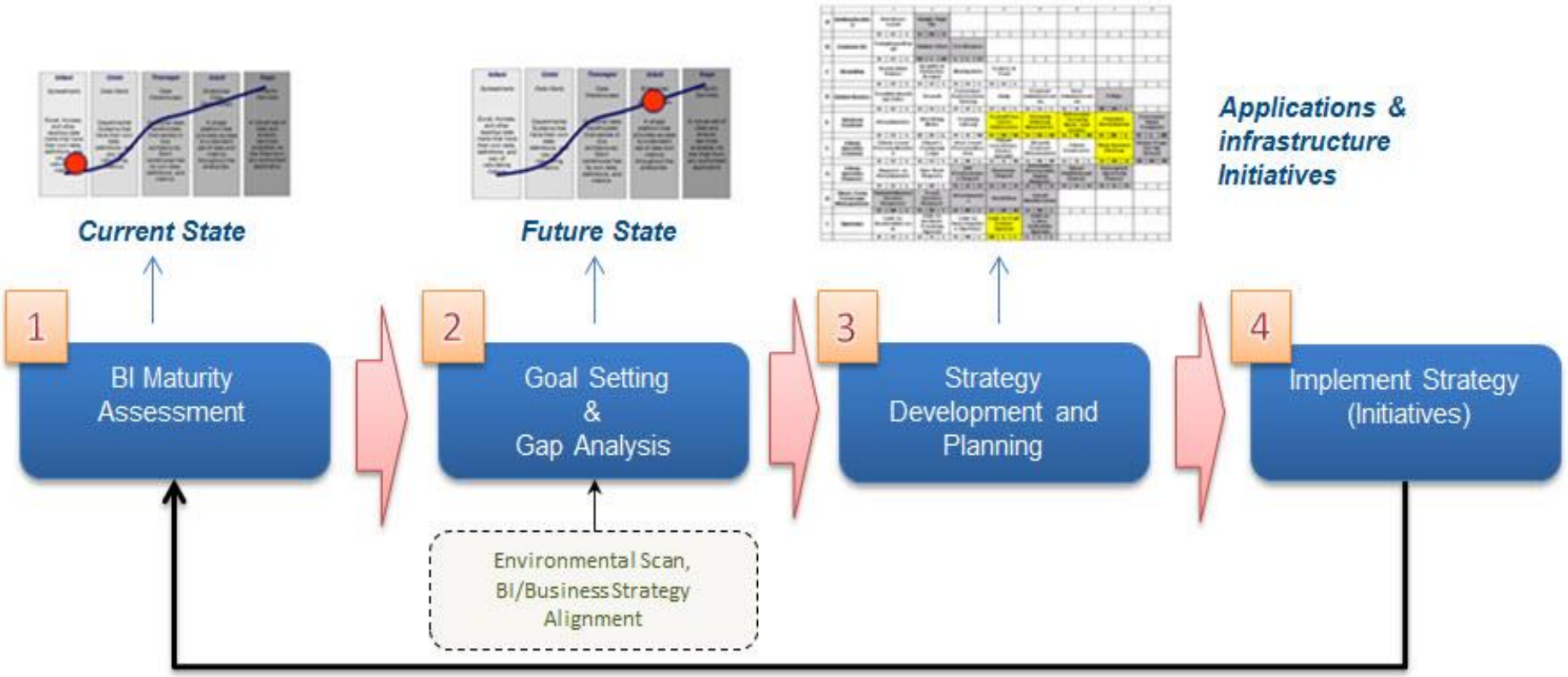


Q&A

"BI is all about making figures accessible and useful to the right audience within an enterprise"

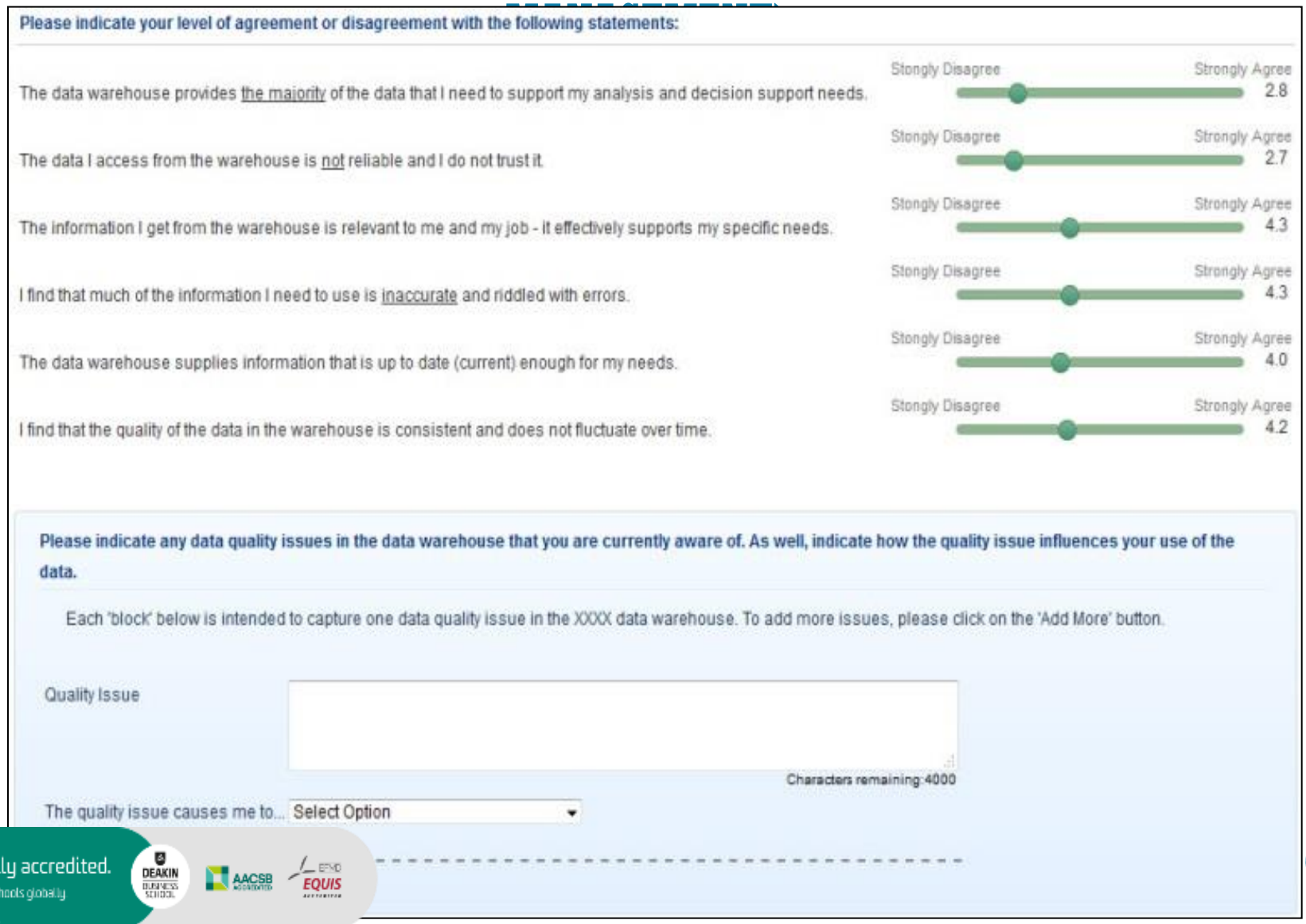
AND...

RESEARCH: BI EFFECTIVENESS DIAGNOSTIC FRAMEWORK



OPERATIONALISED SURVEY INSTRUMENT

(300+ QUESTIONS; BI USERS, BI TECHNICAL TEAM, AND



AND SEE YOU NEXT WEEK!