ICT158

Introduction to Information Systems

Topic 6

Types of Information Systems: Traditional IS

Learning objectives

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After completing this topic you should be able to:

- *Discuss* the importance of different types of information systems common in organisations
- *Describe* the characteristics of the following systems: TPS; MIS; DSS; EIS
- *Assess* the challenges posed by enterprise applications in the organisation:
  - how they can improve organisational performance
  - the drawbacks of enterprise solutions

Readings

Stair, R, & Reynolds, G. (2014). *Principles of Information Systems* (11th ed.): Cengage Learning. Chapter 9 [in MyUnitReadings]

Bidgoli, H. (2014). *MIS4*: Cengage Learning. Chapter 12 [in MyUnitReadings]

Overview

Traditional information systems within the organisation - overview

- Transaction Processing Systems
- Management Information systems
- Decision Support Systems
- Executive information systems
- Business Intelligence

Integrating information systems

- Enterprise Resource Planning
- Supply Chain Management
- Customer Relationship Management Systems

6.1 IS in the organisation

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6.1.1 Overview

6.1.2 Transaction Processing Systems

6.1.3 Management Information systems

6.1.4 Decision Support Systems

6.1.5 Executive information systems

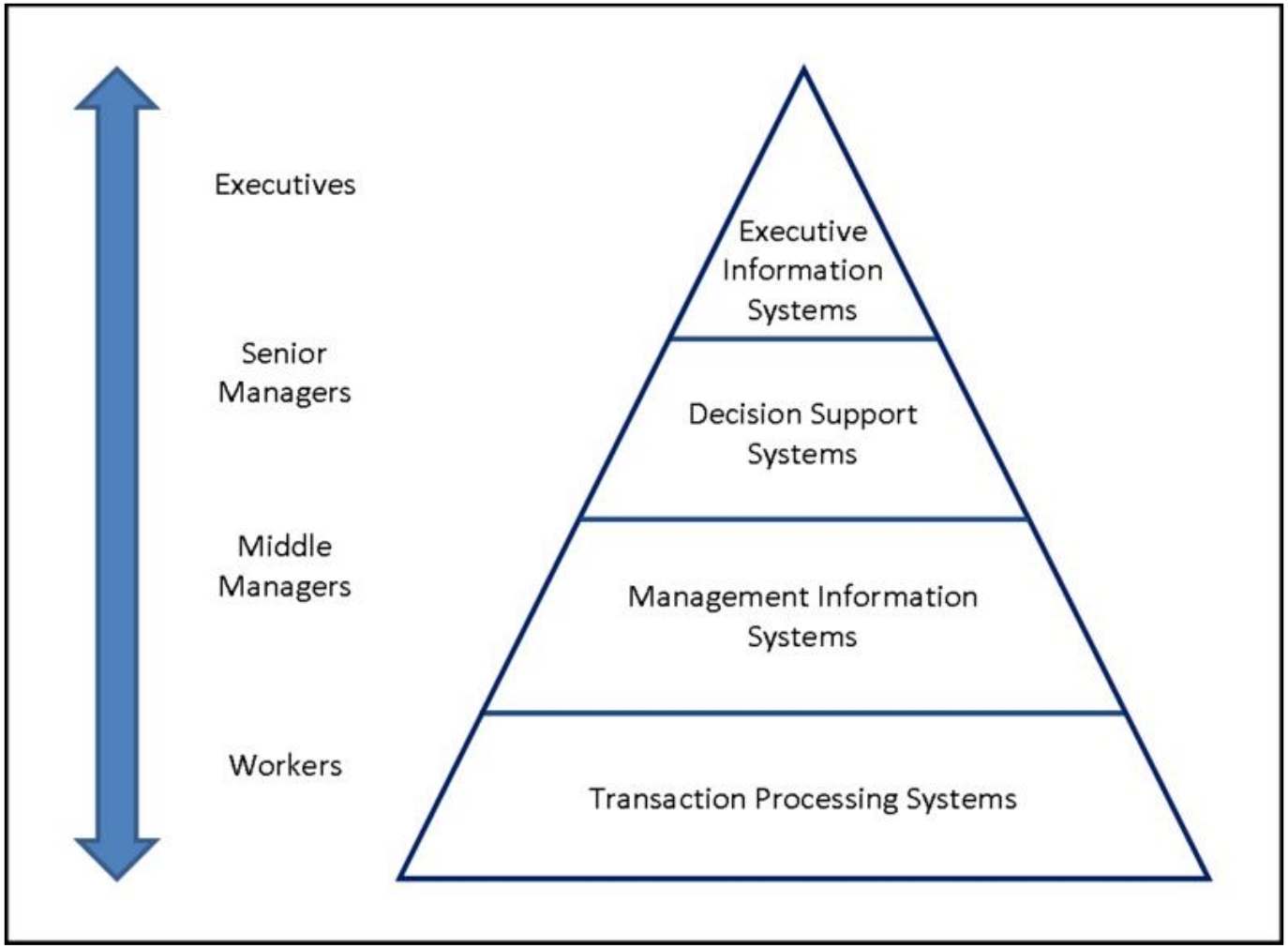
6.1.6 Business Intelligence

Information systems within the organisation

An organisation needs information systems

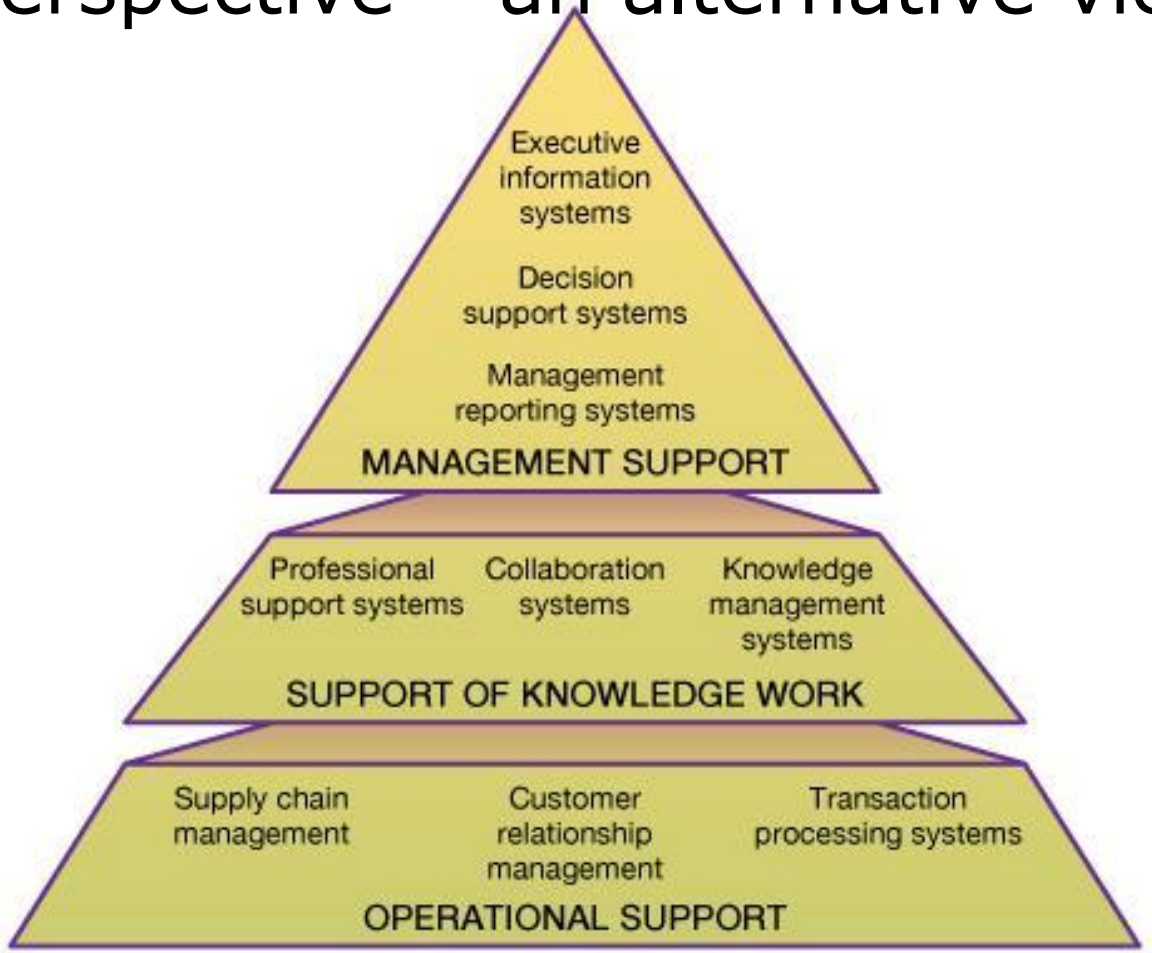
- that *support routine day-to-day activities* and that help it *add value* to its products and services
- that assist in *informed* management and *decision making*
- to *integrate* in order to provide added benefits

Information systems in the organisation



Source: http://syapinat.blogspot.com.au/

Organisational information systems in perspective – an alternative view



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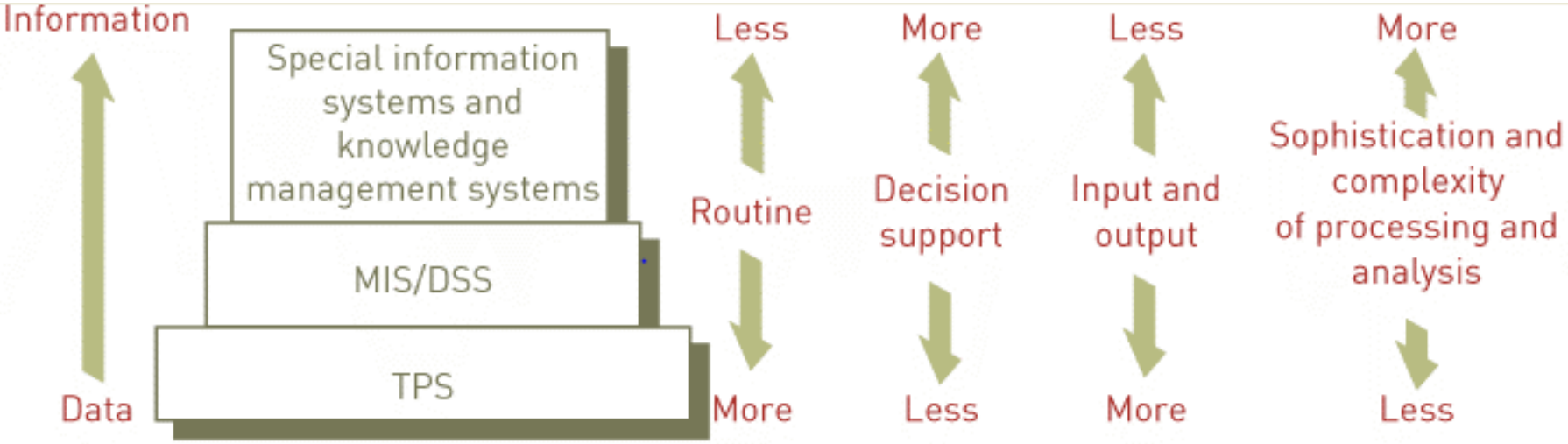
Topic 6

Source: http://www.britannica.com/EBchecked/topic/287895/information-system

Organisational information systems in perspective



Source: Stair & Reynolds (2014)

Recap

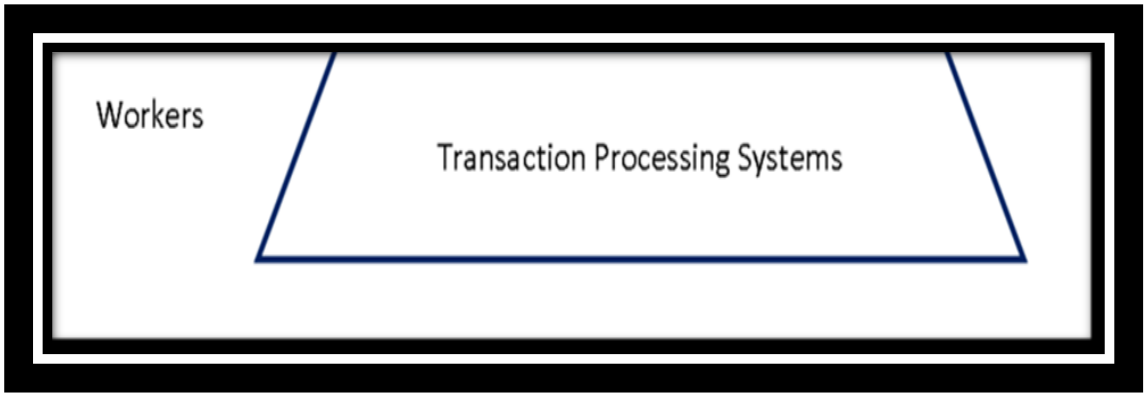
Information systems within an organisation:

- *support routine day-to-day activities*
- assist in *informed* management and *decision making*
- *integrate* in order to provide added benefits

We can view IS from several perspectives:

- What line level they support; what type of work they address; how 'sophisticated 'the data transformation is

Transaction Processing Systems



TPS

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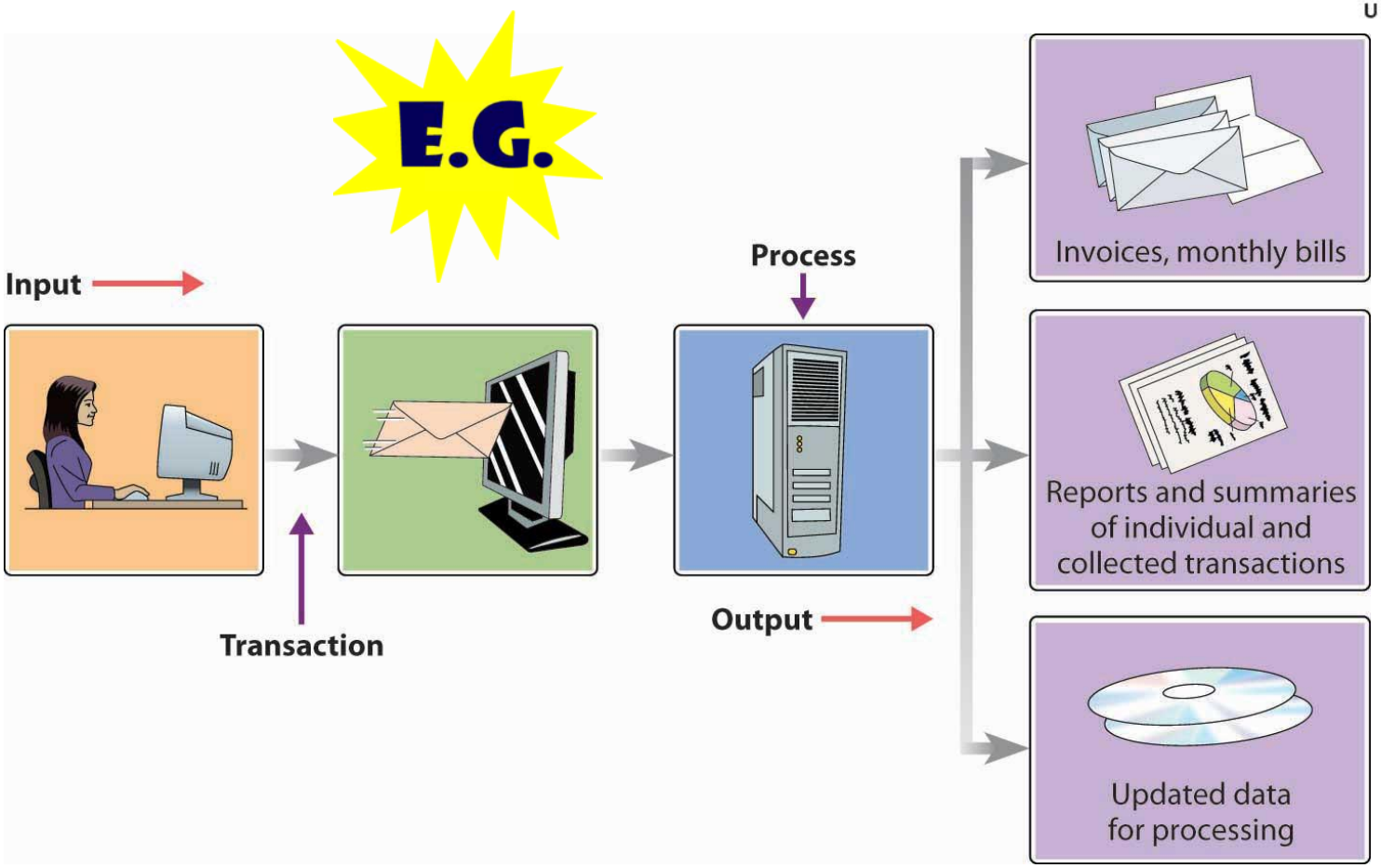
The **transaction** is the activity that changes stored data

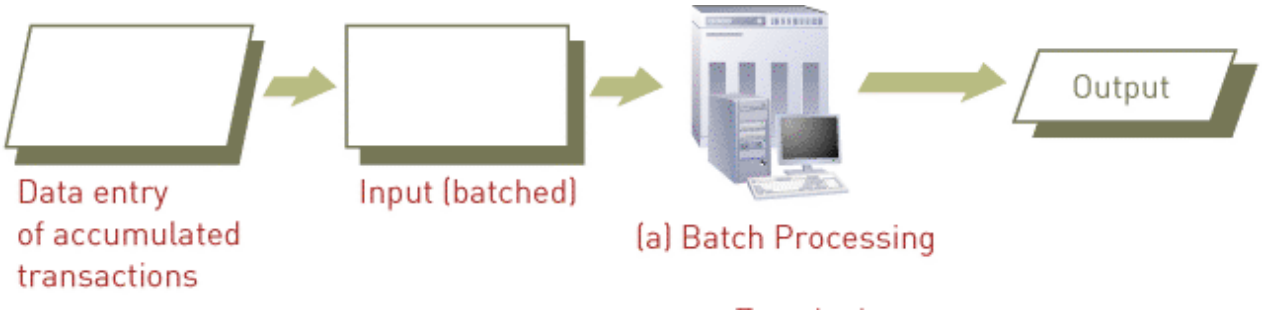
A TPS collects and stores data about transactions and sometimes controls decisions made as part of a transaction:

- **Batch** transaction processing (eg student information update)
- **Real time (on line)** transaction processing (eg bank accounts; library loans etc, etc)

TPS – fundamental processing

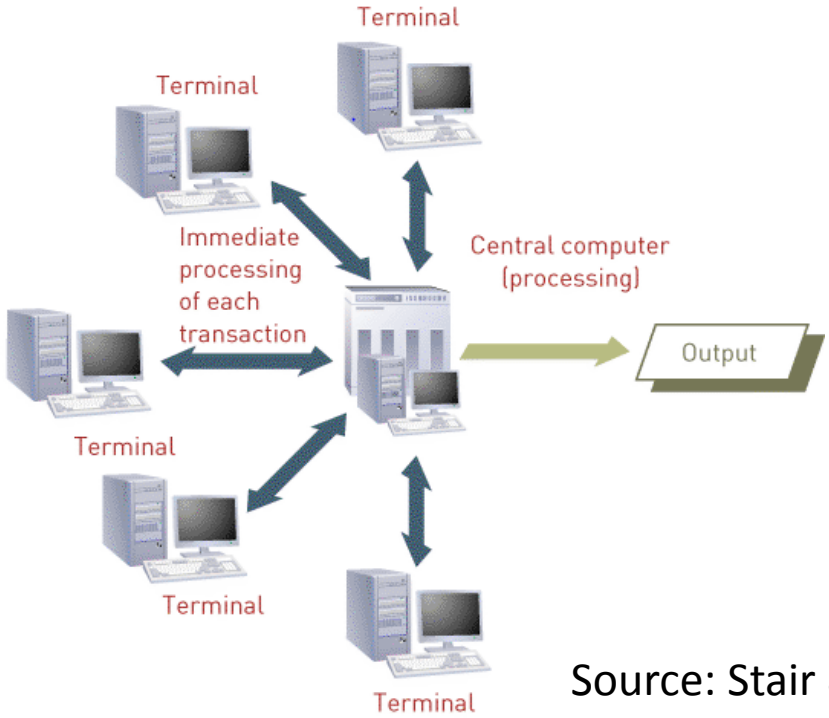


Source: http://catalog.flatworldknowledge.com/bookhub/reader/7?e=collins-ch15_s03



(a) Batch Processing

E.G.



(b) Online Transaction Processing

Source: Stair & Reynolds (2014)

Characteristics of TPS

- Performance (rapid response)
- Continuous availability (low failure rate)
- Data integrity (inflexibility/controlled processing)
- Ease of use
- Modular growth

Types of TPS

Many others

Source: http://dc340.4shared.com/doc/doagZ4oh/preview.html

Can you think of any?

TPS in business

To achieve performance, reliability and consistency:

- data must be readily accessible
- backup procedures must be in place
- the recovery process must be in place

to deal with system failure, human failure, computer viruses, software applications or natural disasters

Recap

Most daily activities are recorded and processed by a ***transaction processing system (TPS)*** *which receives input data and processes them to produce output - information -intended for various users.*

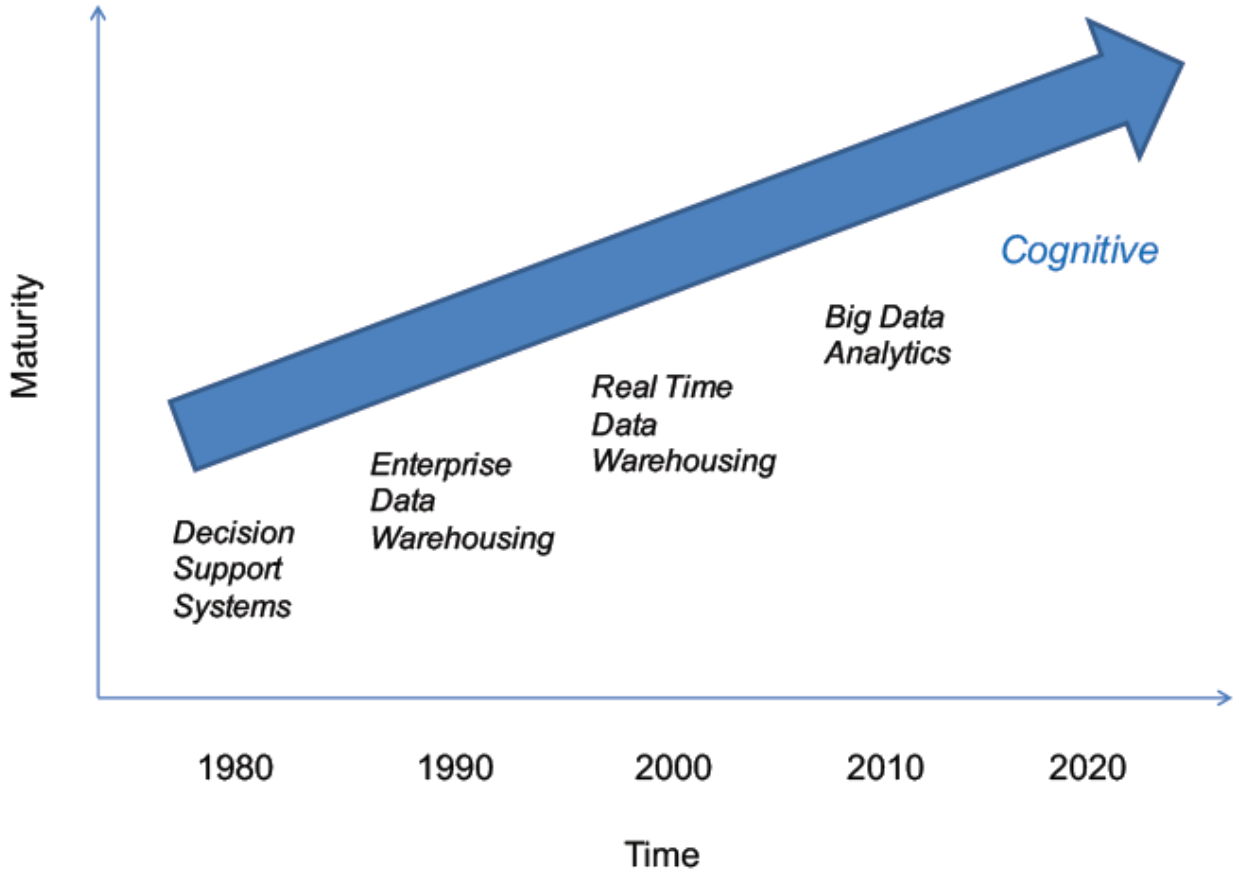
Recap

Transaction processing systems differ in character from other types of information systems in that they directly support business operations.

Other IS in the organisation

A TPS serves as a *foundation* and then provides valuable input to other IS in the organisation

Supporting management



Source: Watson 2017)

Management Information Systems

MIS

Managers review endless amounts of data that make their jobs easier and more efficient

However, they require information

- on a periodic basis instead of on a daily recurring basis provided by a TPS
- that identifies exceptions

MIS as an integrated system

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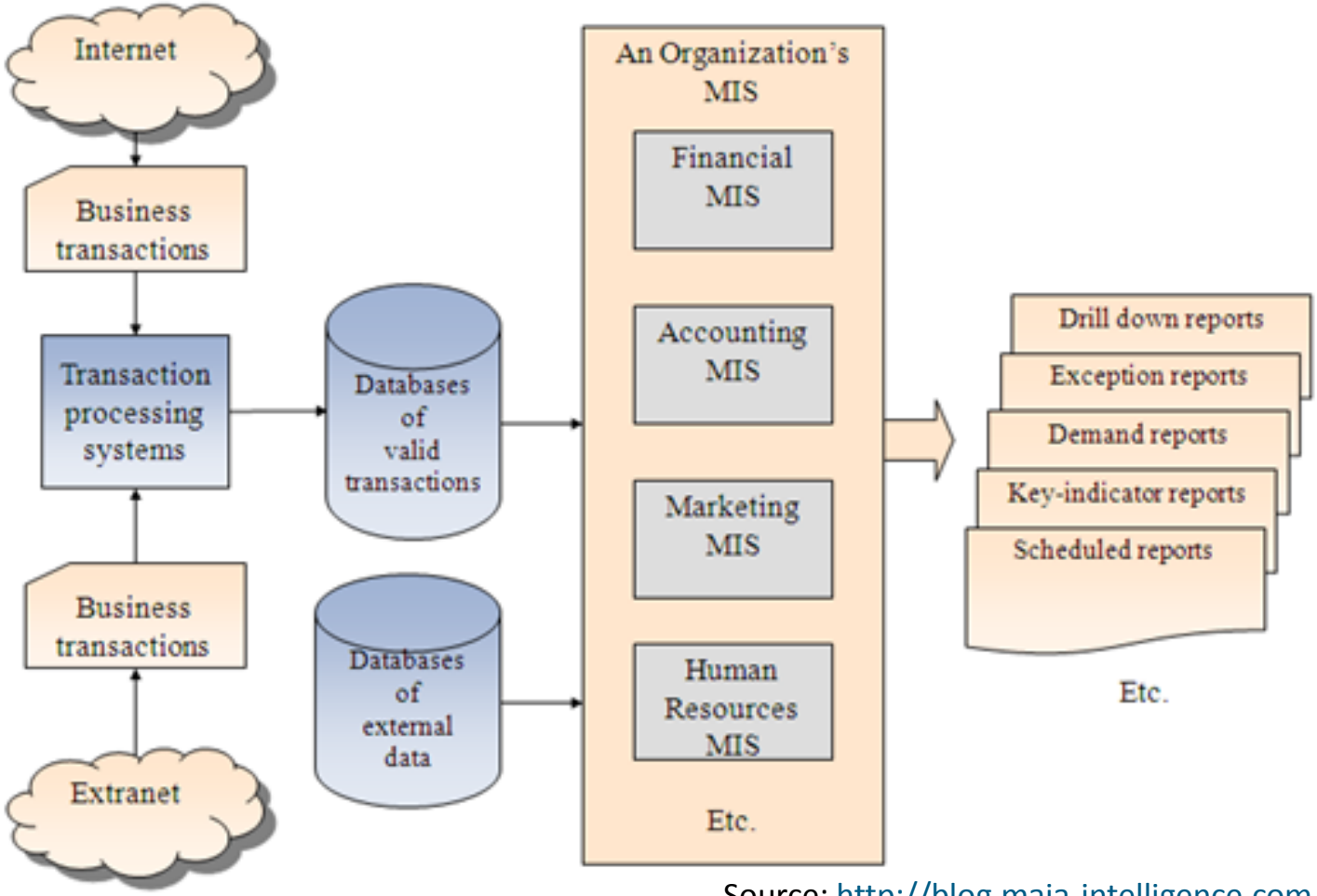
Before integrated systems, managers received periodic printed reports that gave them lots of data, but often didn't supply information that they could utilise to make timely decisions

The MIS will draw data from the TPS (therefore data *internal* to the organisation) to help managers answer *structured* questions

From TPS to MIS



Source: http://blog.maia-intelligence.com/wp-content/uploads/2008/04/041208-0602-characteris11.png

MIS across the supply chain

Consider the car manufacturing example:

- If I want to consider increasing production from 5 000 cars /month to 7 000
  - How many more of component x do we need?
  - How many more staff or robots?
  - Can our freight company handle that many?
  - Will our retail outlets cope with the increase?
  - etc etc

E.G.

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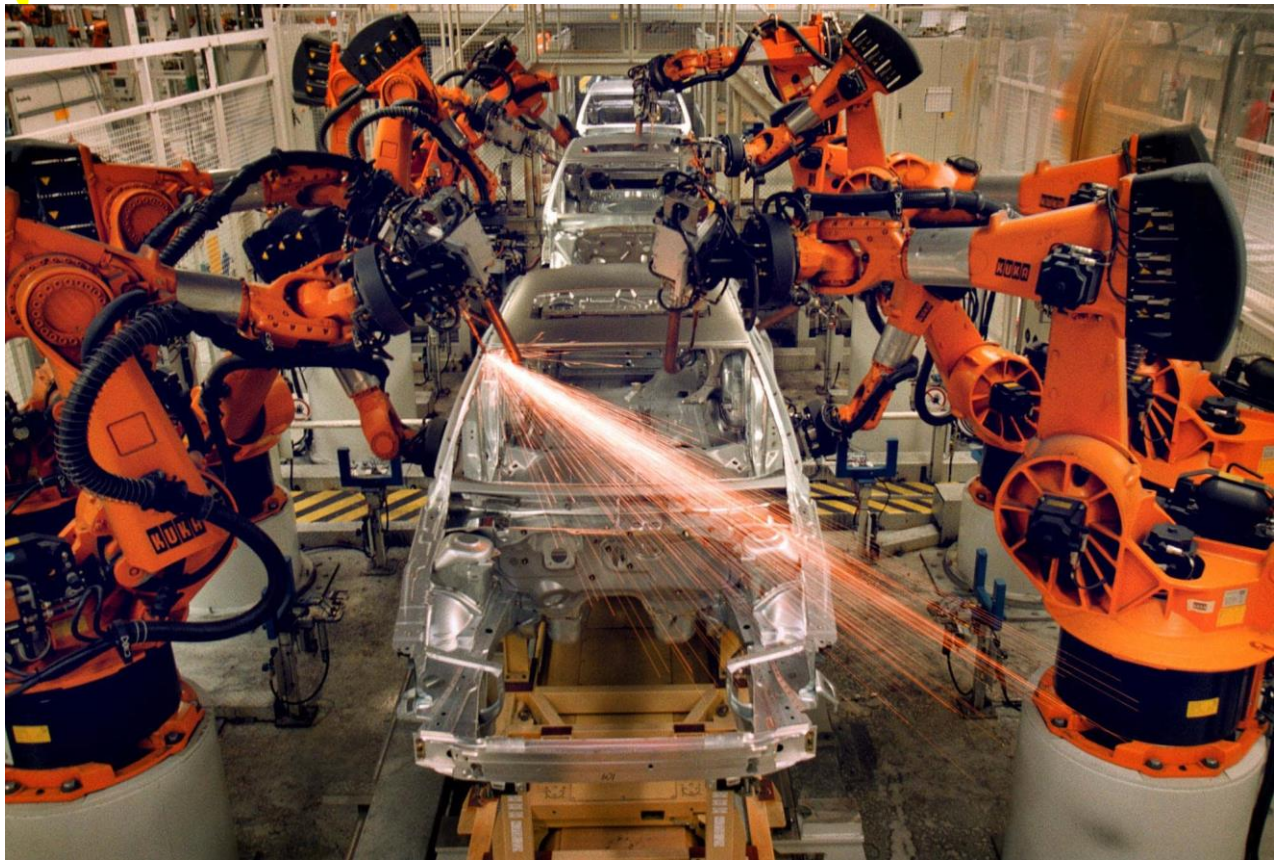

Source: http://thebreakthrough.org/index.php/voicesroger-pielke-jr/its-not-about-the-machines

Recap

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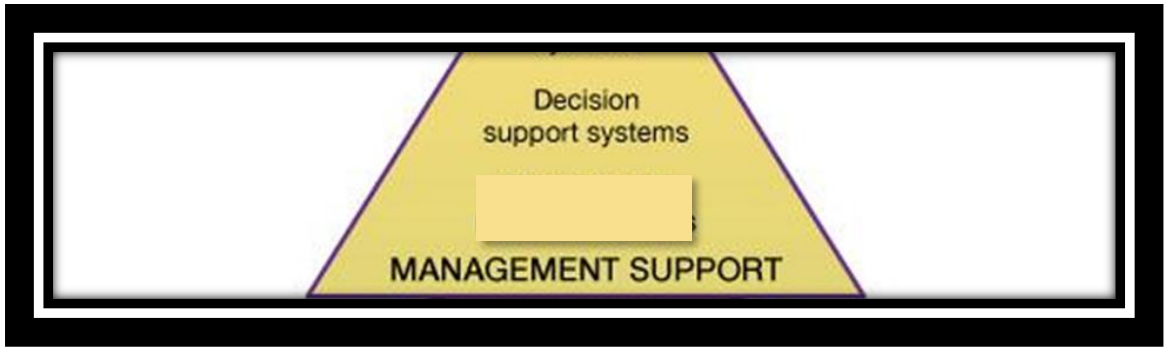
*A **management information system (MIS)** extracts data provided through TPS to compile reports needed for making routine decisions.*

*An MIS uses **internal** data to supply useful information and answer **structured** questions.*

Decision Support System



DSS

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A DSS uses *internal* data but also combines it with *external* data to help **analyse** various decisions management must make

The emphasis is on s*emi-structured* and *unstructured* tasks

Analysing complex, interactive decisions is the primary reason for a company to use a DSS

DSS capabilities

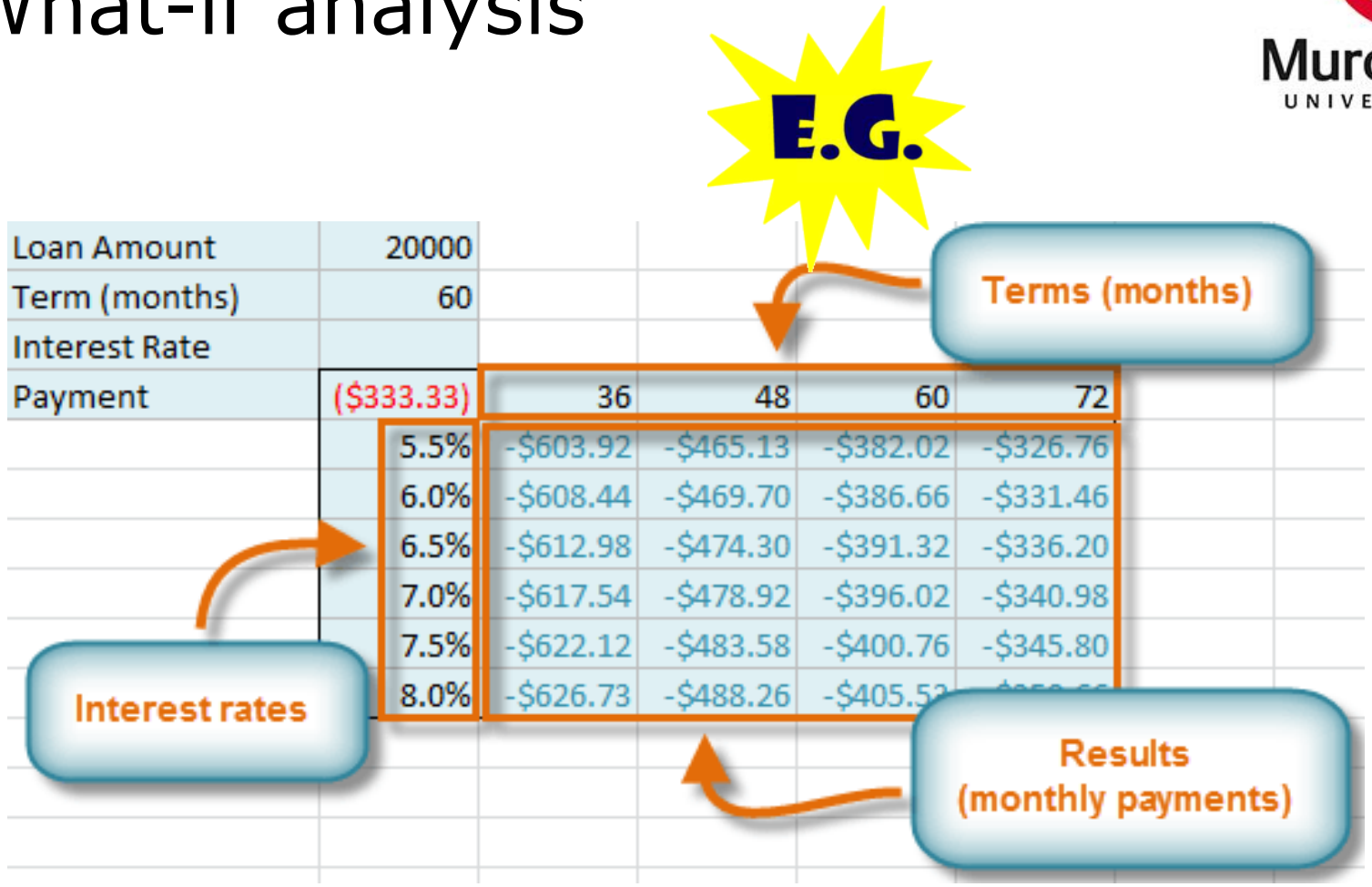
Features to support decision-making:

- What-if analysis
- Goal seeking (opposite of 'what-if')
- Sensitivity analysis
- Exception reporting

- Others – graphical analysis, forecasting, simulation, statistical analysis, modelling

A DSS does not always give a decision itself

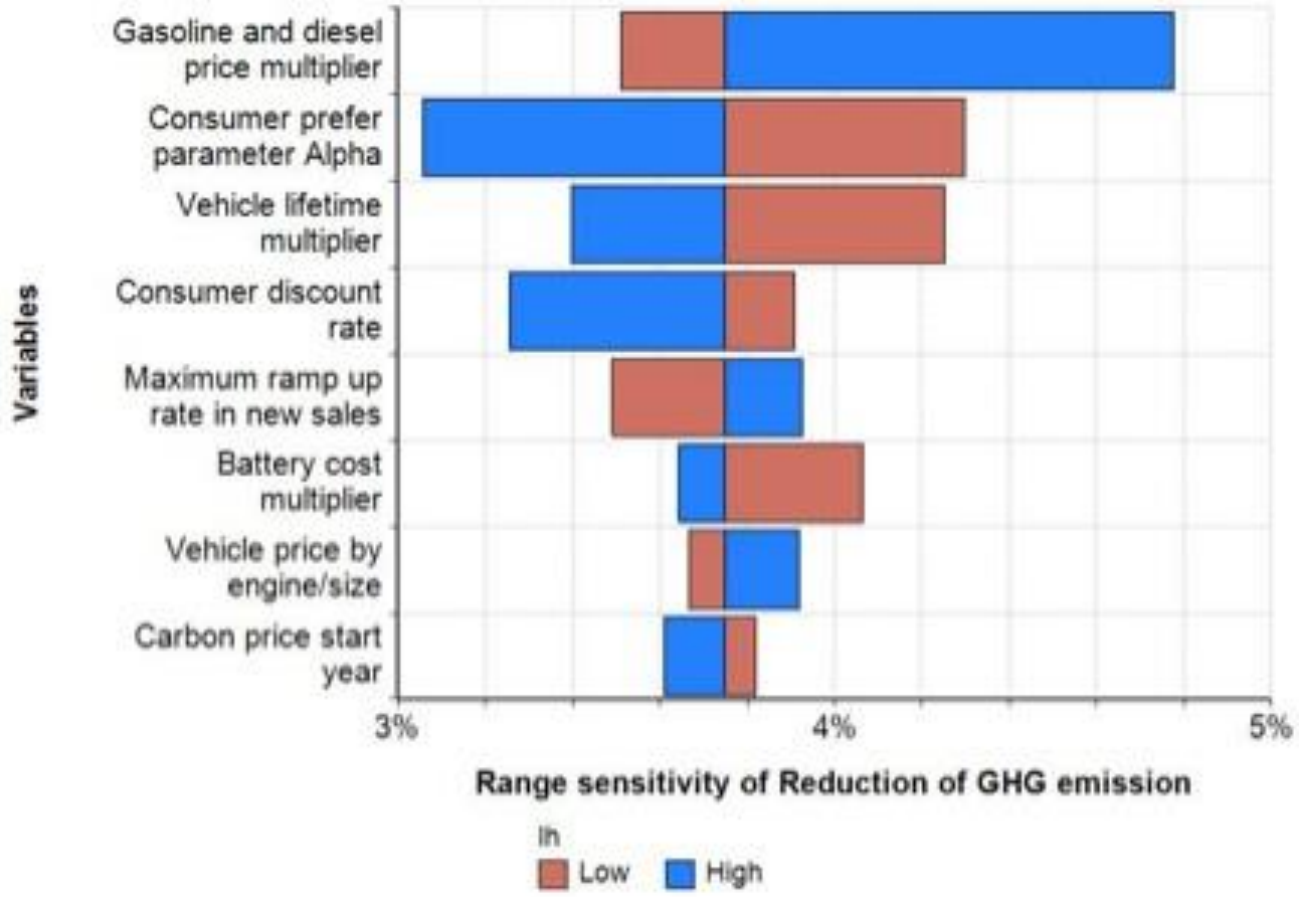
What-if analysis



Loan Amount	20000				
Term (months)	60				
Interest Rate					
Payment	($333.33)	36	48	60	72
	5.5%	-$603.92	-$465.13	-$382.02	-$326.76
	6.0%	-$608.44	-$469.70	-$386.66	-$331.46
	6.5%	-$612.98	-$474.30	-$391.32	-$336.20
	7.0%	-$617.54	-$478.92	-$396.02	-$340.98
	7.5%	-$622.12	-$483.58	-$400.76	-$345.80
	8.0%	-$626.73	-$488.26	-$405.52	

Source: http://content.gcflearnfree.org/topics/175/whatif_data_table.png

Sensitivity analysis



E.G.

Source: http://www.lumina.com/case-studies/ateam/

Exception reporting

Source: http://cached.imagescaler.hbpl.co.uk/resize/scaleWidth/620/offlinehbpl.hbpl.co.uk/news/PGH/07E7D05E-B7E6-6BFE-05756AEDDD2AE534.gif

DSS in the future

Initially, decision support focused on supporting decisions made by employees

But the scope of the decision-support field has been expanding to include customers and suppliers

In future generations of decision support, there will be more attention paid to understanding how customers make decisions and how to generate revenues by supporting customers' decision making (as Trivago is already doing)

Source: Watson (2017)

Recap

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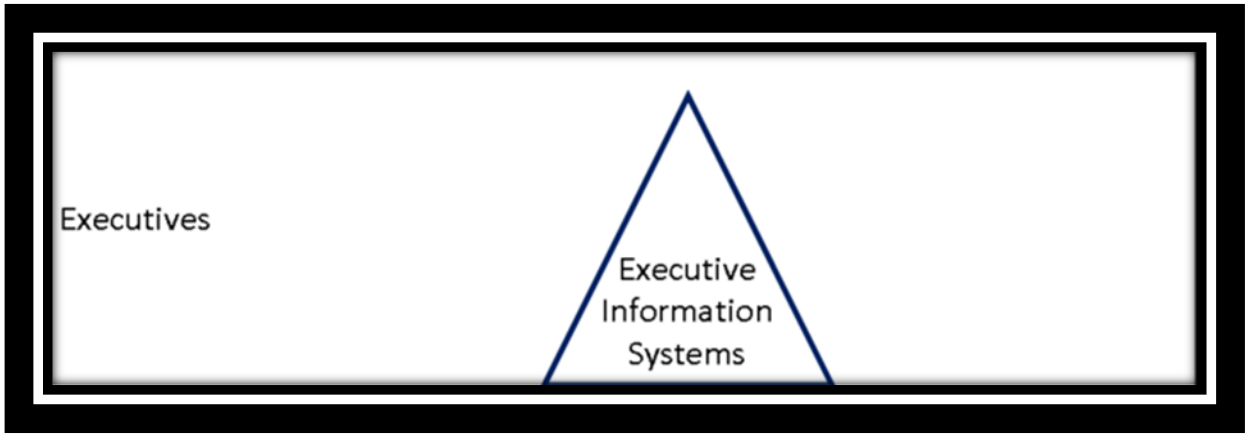
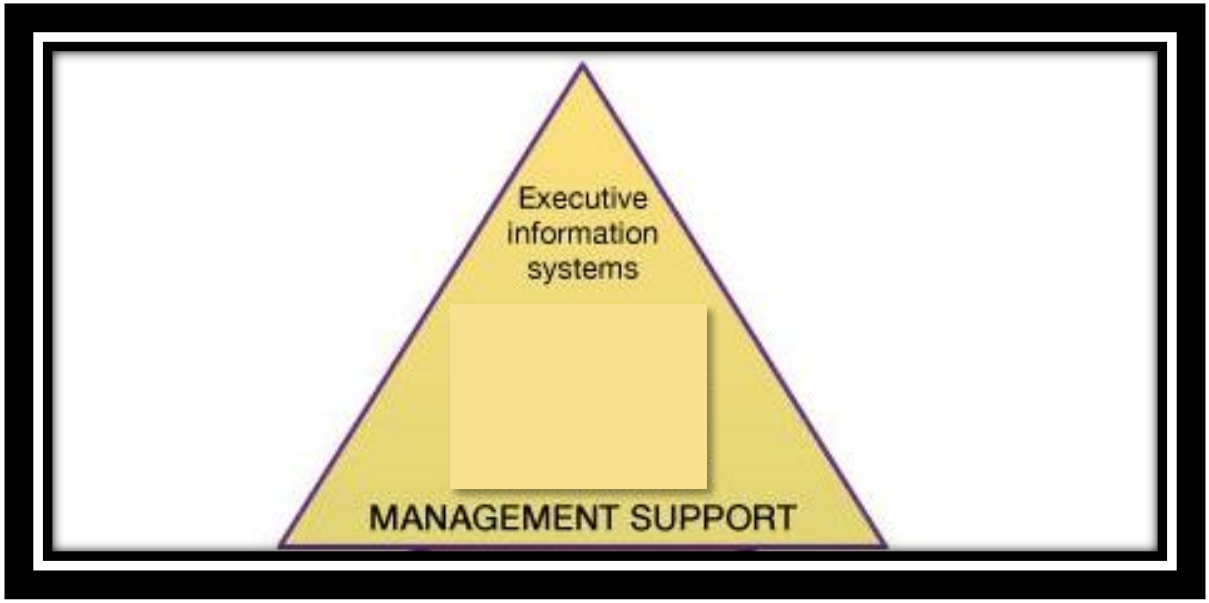
*A **decision support system (DSS)** is an interactive system that collects and integrates data from multiple sources (external as well as internal) to assist in making nonroutine decisions.*

Such decisions tend to be semi- or unstructured.

Executive Information Systems





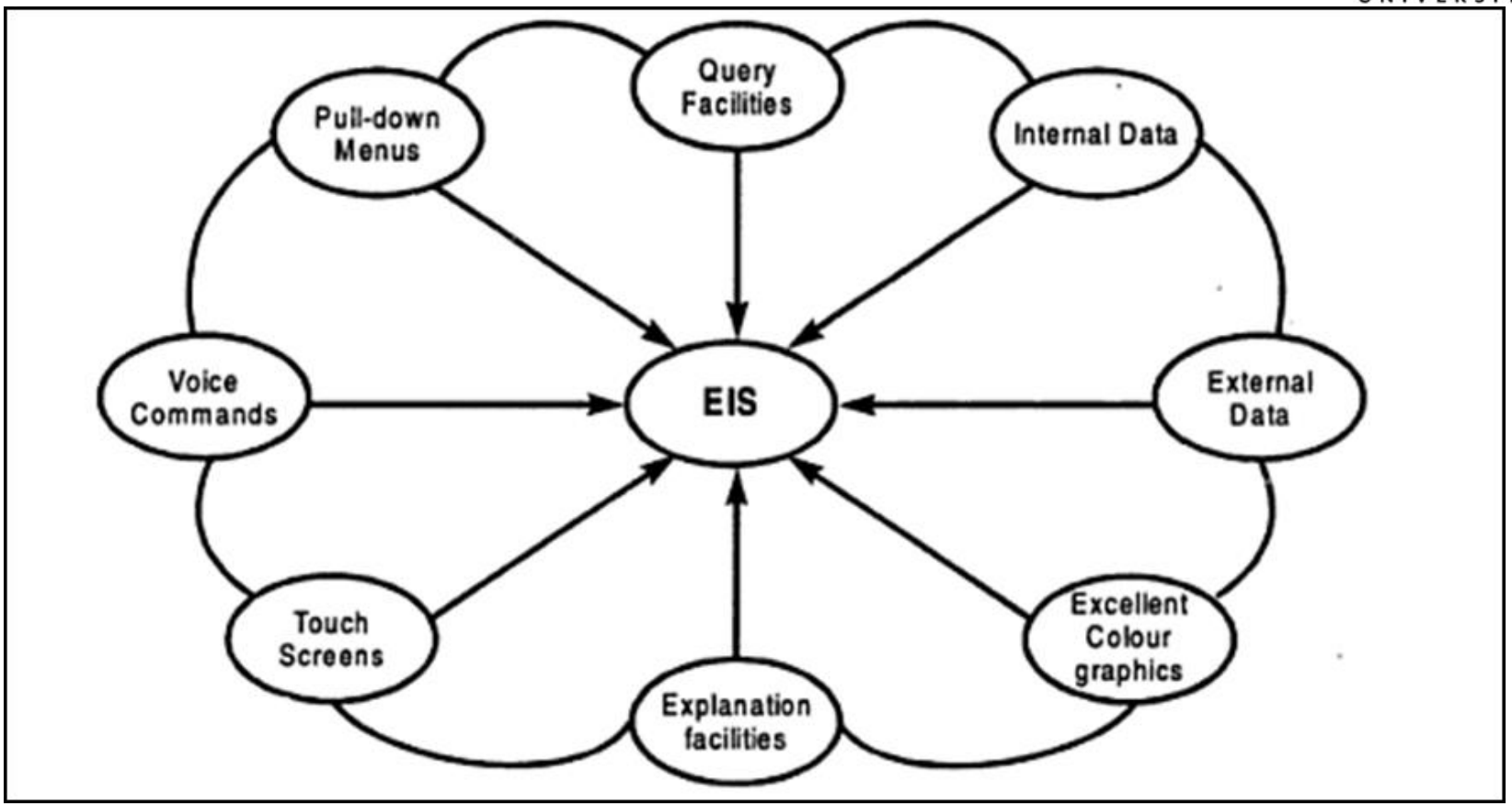
EIS

Executive information systems (EIS) are used at the strategic level, where the typical decision is **unstructured**

EIS target *executives*, not managers

Executive support systems must be *easy to use* and the information must be easily *manipulated*

Common features of EIS



Source: http://research-methodology.net/executive-information-systems/

Features of EIS

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- Real-time visibility into work management activities
- Consistency in metric and status reporting
- A single place for tracking, managing and reporting on work based on automated interfaces
- User-friendly layouts and fully customisable dashboards => BI

Dashboards for EIS

E.G.

Source: http://www.informationbuilders.com/sites/www.informationbuilders.com/files/demo/thumb/screen-grocery-rework4.png?1385487238

Recap

*An **executive information system (EIS)** helps managers make strategic decisions affecting the entire company.*

*The decisions use internal and external data to give executives the information they need to determine the proper course of action in **unstructured** situations*

Business Intelligence

Source: http://cybercorptech.com.au/consulting/business-intelligence/

BI

More than just information, BI provides historical, current & predictive views of business operations & environments

BI output is used to enable more effective strategic, tactical, and operational insights and decision-making

Source: http://www.forrester.com/Topic+Overview+Business+Intelligence/-/E-RES39218?objectid=RES39218

BI is a tool that helps organisations improve decision making by tracking, processing, storing and analysing data and transforming it into insights. Business users can in turn use these insights to make the right decisions in the right time, cutting costs, identifying new business opportunities and improving their organisation's performance.

Source http://www.huffingtonpost.com/laiza-king-/how-business_intelligence_1 b_11207388.html

BI

Business Intelligence tools consist of

- a data warehousing mechanism
- querying and reporting framework
- user friendly dashboards with drill down capabilities

Source: http://www.redkiteqatar.com/bus_int.html

BI

Source: http://www.redkiteqatar.com/bus_int.html

BI dashboard

Source: http://twimgs.com/informationweek/galleries/automated/798/06_Qlikview_full.jpg

Bed Management

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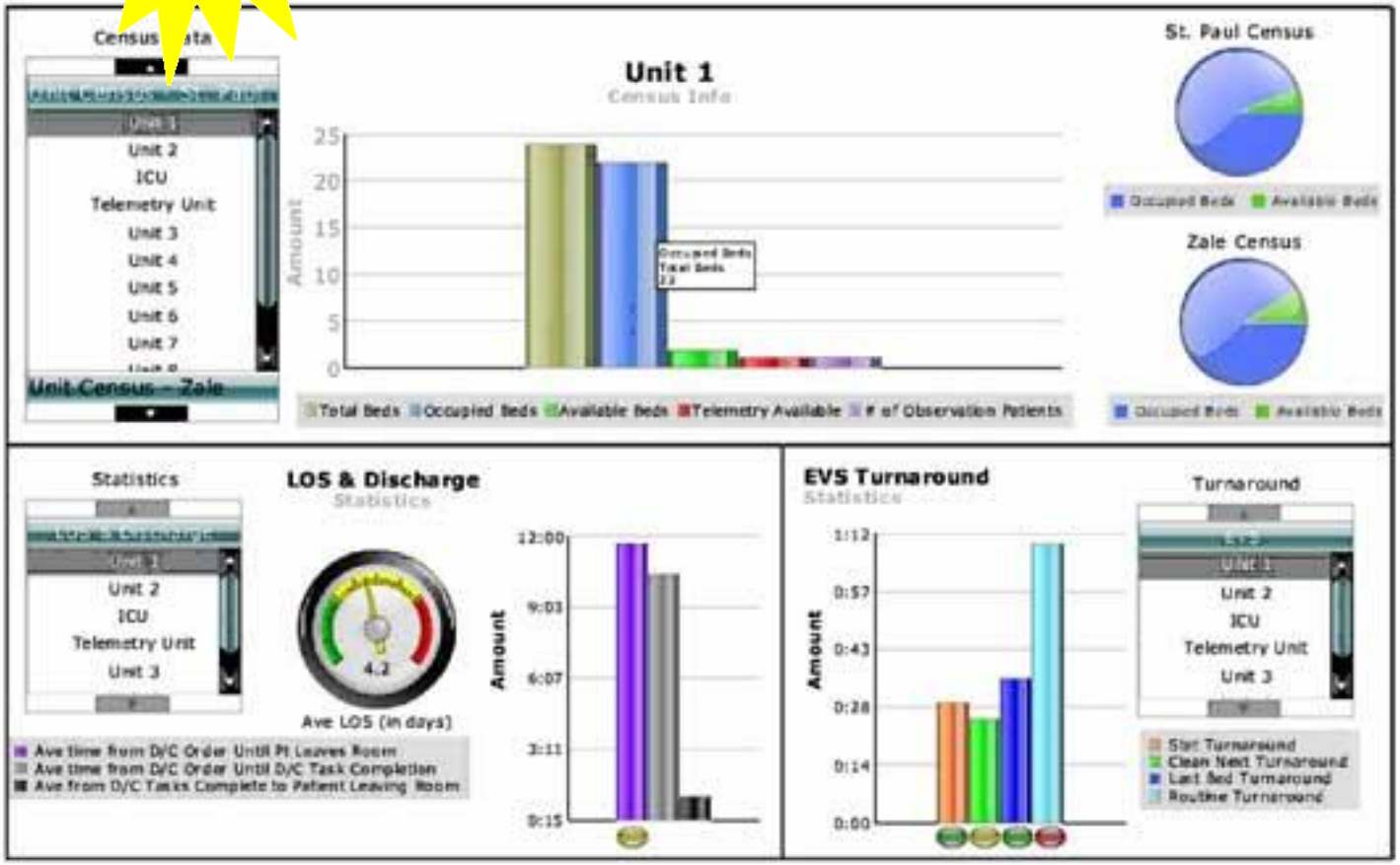

Source: http://www.dashboardspy.com/img/bed-management-dashboard-for-hospital.jpg

BI future

Technology advances are making it possible to create, collect, store and analyse “dark data” (eg images, IoT data streams) with advanced analytics

In the future, there will be fewer humans “touching” and analysing the data, and making decisions, as AI augments and automates many processes

Source: Watson (2017)

Recap

To develop plans and make major decisions, executives may gather relevant, timely, easily understood information through an ***executive information system (EIS)***

An EIS provides ready access to strategic information that's customised to their needs and presented in a convenient format.

Recap

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Business Intelligence (BI) *covers a broad spectrum of technologies that gathers business related data and converts them into meaningful information and reports that can be used for smarter decision making.*

6.2 Integrating information systems

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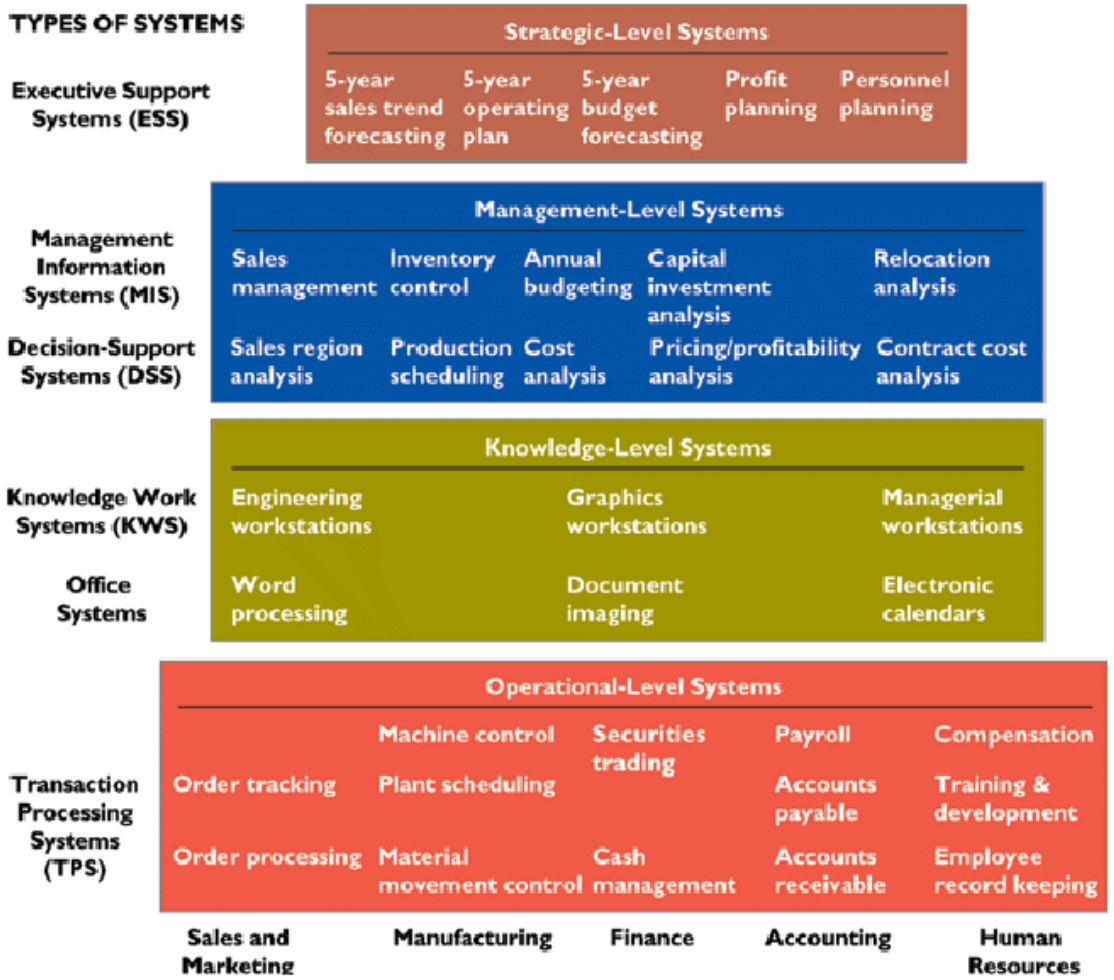
6.2.1 Enterprise Resource Planning

6.2.2 Supply Chain Management

6.2.3 Customer Relationship Management Systems

Integrating information systems



Source: http://dc340.4shared.com/doc/doagZ4oh/preview.html

Major types of information systems integration

Includes integrating:

- content from different sources
- tools and applications
- different types of information
- organisational processes

in order to repurpose for specific audiences and needs

Source: http://www.slideshare.net/iaald/iaald2010-sessionreport-integratedinformationsystems

Enterprise Resource Planning

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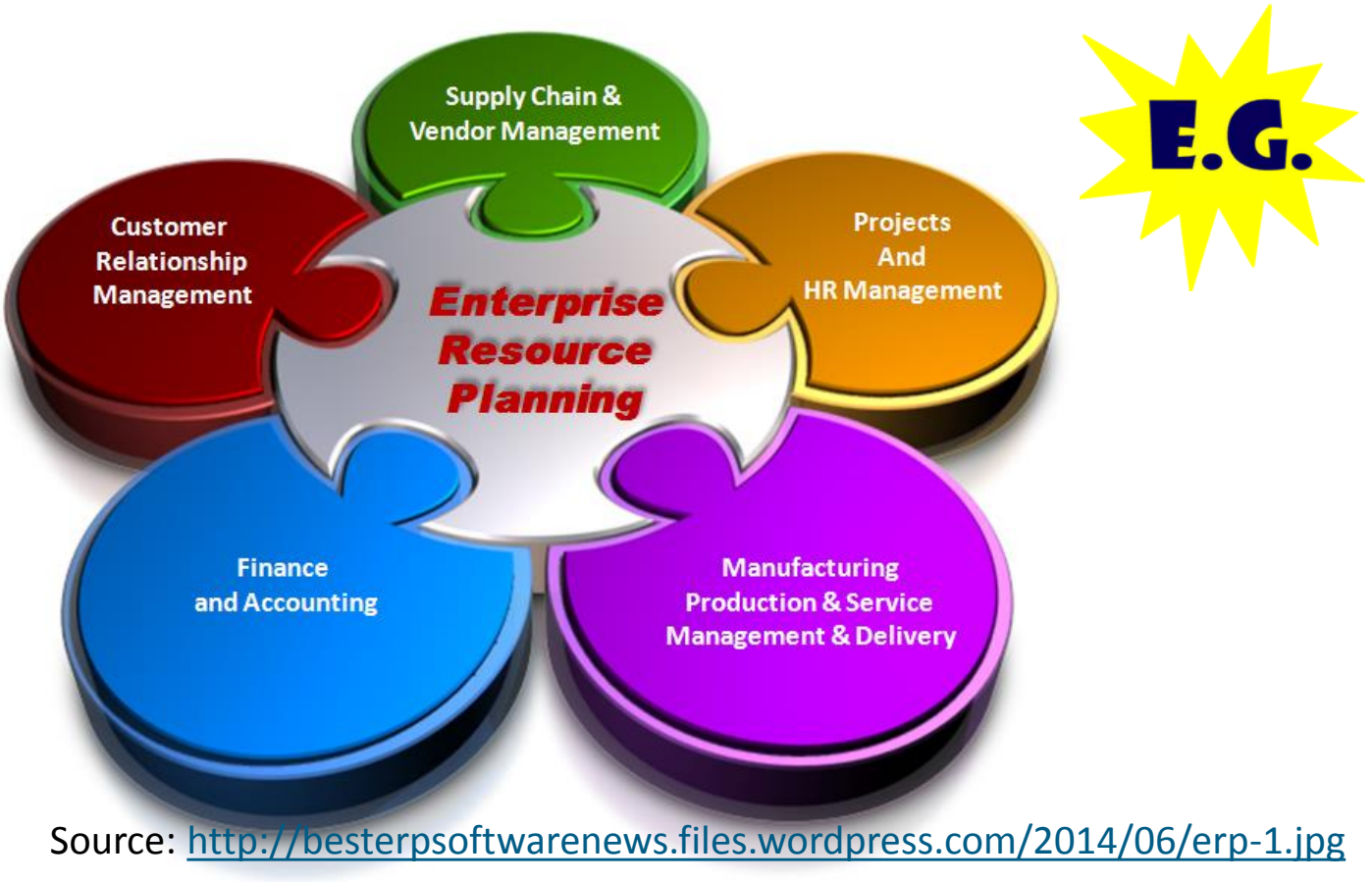

Source: http://besterpsoftwarenews.files.wordpress.com/2014/06/erp-1.jpg

ERP

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During the 1980s & early 1990s, organisations realised that legacy TPS lacked the integration needed to coordinate activities and share information across all business functions

Enterprise Resource Planning (ERP) systems have, as their main goal, to bridge the communication gap between all departments and all users of information within an organisation by provide one central repository for all information that is shared

ERP characteristics

- An integrated system that operates in (or near) real time without relying on periodic updates
- A common database that supports all applications
- A consistent look and feel across modules

Source: Sheilds (2001)

Advantages of ERP

- Improved access to quality data for operational decision making
- Elimination of costly, inflexible legacy systems
- Improvement of work processes
- Upgrade of technology infrastructure

Disadvantages of ERP

- Cost (of infrastructure, software, deployment, migration, training)
- Customisation
- Participation by users
- Vendor lock in

ERP's scope usually implies significant changes to staff work processes and practices

Recap

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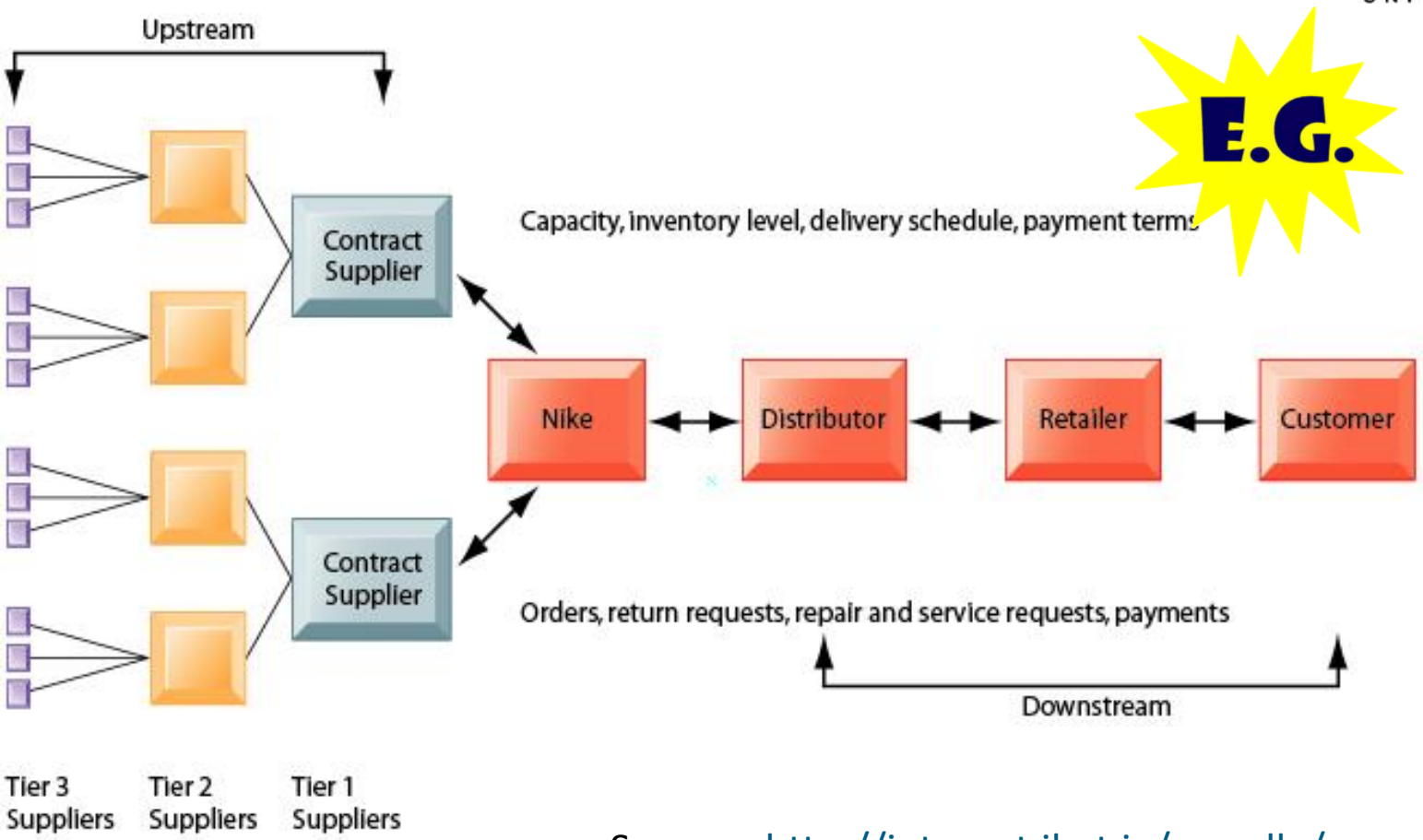
***Enterprise resource planning** (**ERP**) is business process management software that allows an organisation to use a system of integrated applications to manage the business and automate many back office functions related to technology, services and human resources*

Supply chain management

Supply chain management is the streamlining of a business' supply-side activities to maximise customer value and to gain a competitive advantage in the marketplace

SCM offers new opportunities for companies to integrate with suppliers and customers and lower costs for everyone

SCM



Source: http://intranet.ibat.ie/moodle/course/is_management/mis10e/images/img09_02.jpg

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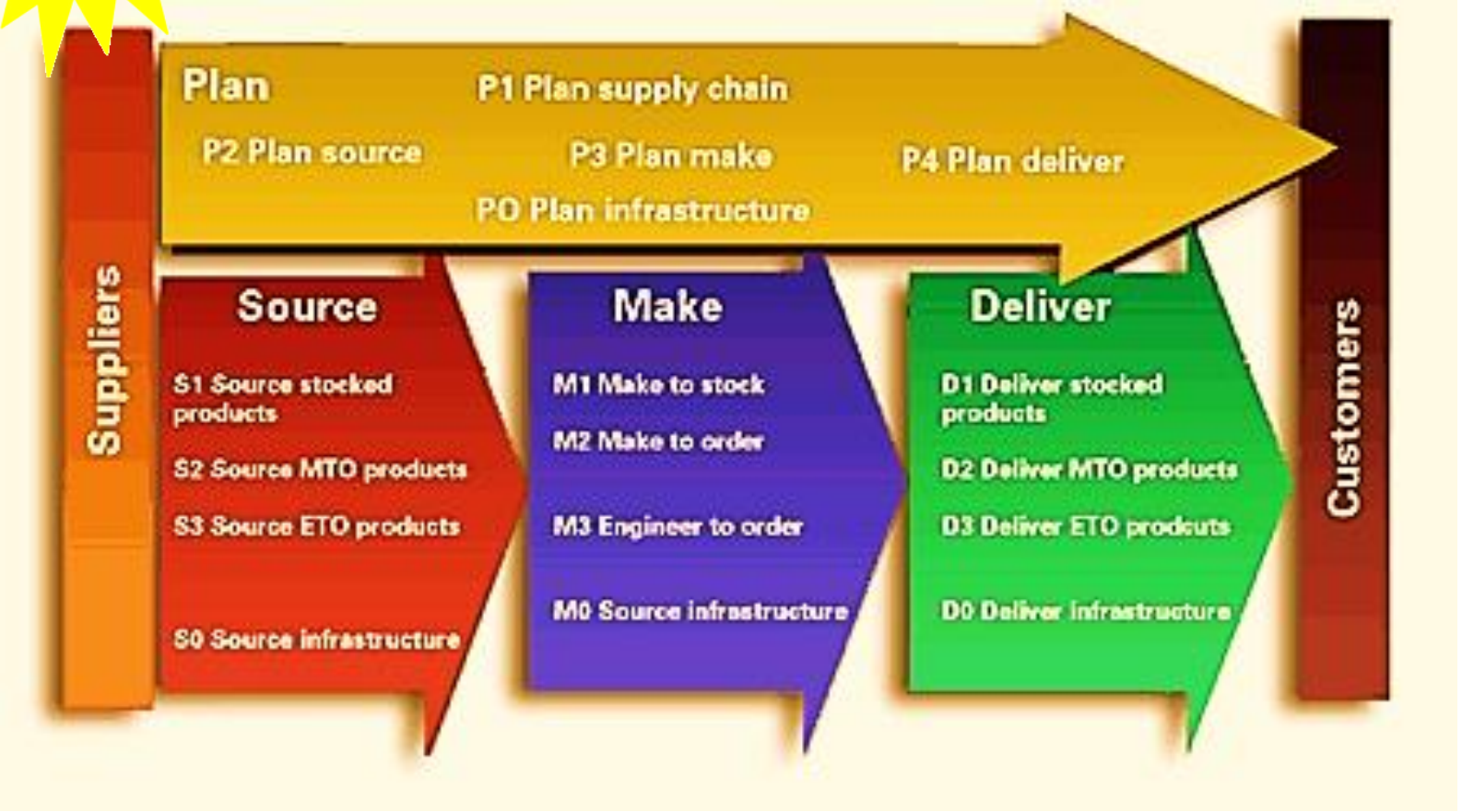

Source: http://www.imaginesms.com/images/supplychaingraphic20010449.gif

Information systems facilitate SCM

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INFORMATION FROM SUPPLY CHAIN MANAGEMENT SYSTEMS HELPS FIRMS:
Decide when and what to produce, store, and move
Rapidly communicate orders
Track the status of orders
Check inventory availability and monitor inventory levels
Reduce inventory, transportation, and warehousing costs
Track shipments
Plan production based on actual customer demand
Rapidly communicate changes in product design

Source: Stair & Reynolds (2014)

Recap

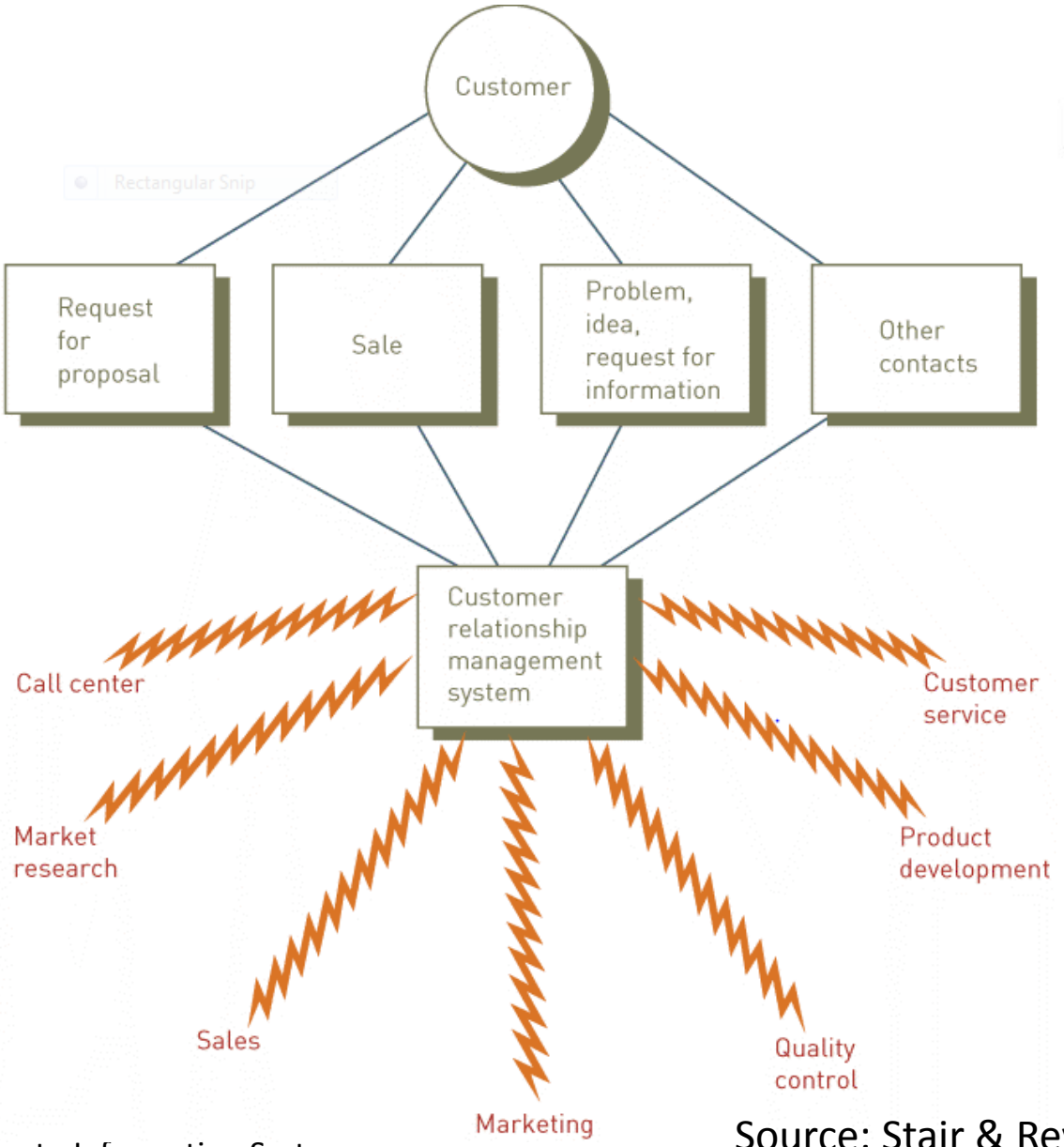
Supply chain management is the streamlining of a business' supply-side activities to maximise customer value and to gain a competitive advantage in the marketplace

Customer relationship management

Customer relationship management systems manage, track and measure all aspects of customer encounters, including:

- Marketing & advertising
- Sales
- After sales service
- Loyalty programmes

The goal of CRM is to understand & anticipate the needs of current and potential customers to increase retention & loyalty while optimising how products & services are sold



Source: Stair & Reynolds (2014)

Functional systems

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TABLE 2-2 *Examples of Sales and Marketing Information Systems*

System	Description	Organizational Level
Order processing	Enter, process, and track orders	Operational
Pricing analysis	Determine prices for products and services	Management
Sales trend forecasting	Prepare 5-year sales forecasts	Strategic

TABLE 2-3 *Examples of Manufacturing and Production Information Systems*

System	Description	Organizational Level
Machine control	Control the actions of machines and equipment	Operational
Production planning	Decide when and how many products should be produced	Management
Facilities location	Decide where to locate new production facilities	Strategic

TABLE 2-5 *Examples of Human Resources Information Systems*

System	Description	Organizational Level
Training and development	Tracks employee training, skills, and performance appraisals	Operational
Compensation analysis	Monitors the range and distribution of employee wages, salaries, and benefits	Management
Human resources planning	Plans the long-term labor force needs of the organization	Strategic

Source: Stair & Reynolds (2014)

Recap

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*The goal of **customer relationship management (CRM)** is to understand and anticipate the needs of current and potential customers to increase retention and loyalty while optimising how products and services are sold*

Summary

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An organisaton makes use of a large number and variety of information systems to:

- support routine day-to-day activities and that help it add value to its products and services
- assist in informed management and decision making at operational, tactical and strategic levels
- provide input to integrate in order to provide added market competitiveness

Resources used in this topic

Bidgoli, H. (2014). *MIS4*: Cengage Learning

Stair, R, & Reynolds, G. (2014). *Principles of Information Systems* (11th ed.): Cengage Learning.

Shields, M G. (2001) *E-Business and ERP: rapid implementation and project planning*. John Wiley. p. 9-10

Watson, H J (2017) *Preparing for the cognitive generation of decision support*. MIS Quarterly Executive (16:3) pp153-169