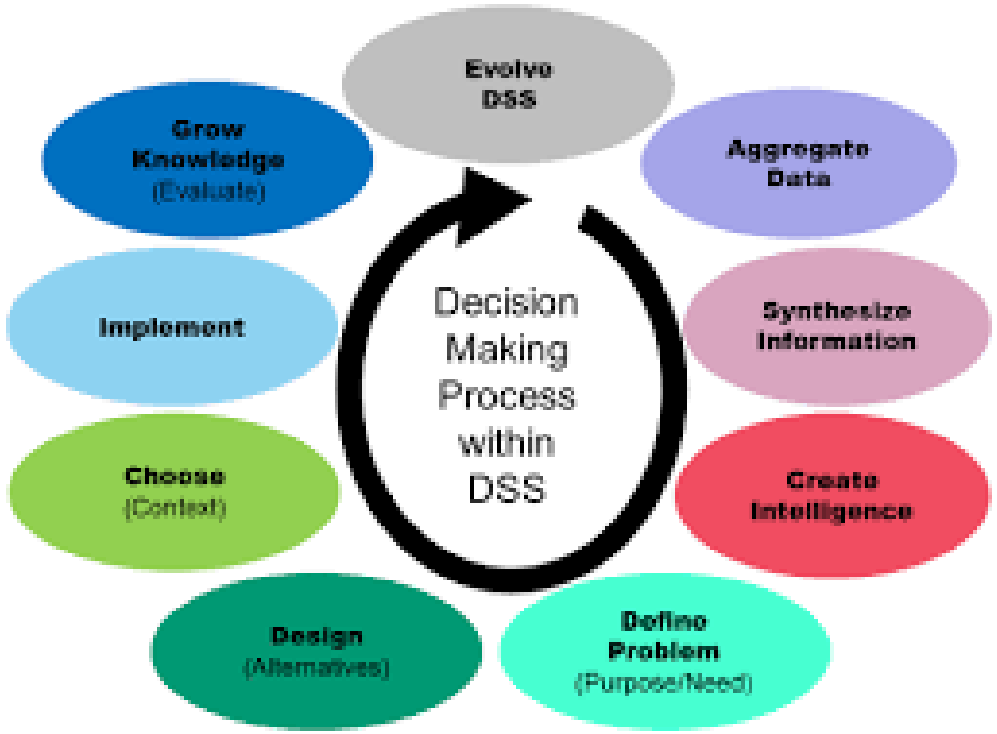
Introduction to Management Information Systems

Decision Support Systems

Data Resource Management

Learning objectives

- understand the use of decisions and the difference in decisions
- to know the difference between the structure of decisions
- to understand what is a decision support system (DSS), the components of a DSS and the benefits and types of DSS
- to be aware of other support systems such as expert systems



choice strategies

choice strategies

optimizing

- check all possible solutions
- rank
- choose best
  - e.g. shoes, financial investments

choice strategies

satisficing

- maybe not best, but OK
- e.g.
  - similar pair socks
  - router
    - best route, too long to optimize, best next node

choice strategies

heuristics

- rule of thumb
- DSS – spam or not spam
  - exceptions
    - d0 y0u l1ke ..,
    - computer-generated text (not spam)
- malware / anti-virus software
  - optimize? x too many
  - satisficing? x too dangerous

structures of decisions

support systems

IS support decisions = support system

- structured decisions
- semi structured decisions
- unstructured decisions

support systems

structured decisions

- can be automated
- records, payroll, inventory control

semi structured decisions

- not automated, use IT
- prepare budget, sales forecasting
- capital acquisition analysis

support systems

unstructured decisions

- one-off, intuitional
- difficult to support
- Research & development
- hiring & firing
- new products

structure of decisions

structured decisions

unstructured decisions

predictable

unpredictable e.g. weather

calculate mathematically

qualitative

objective

subjective e.g. music

well-defined

ill-defined e.g. unknown

Decision Making Concepts

	Type of Control			
Type of Decision	**Operational Control**	**Management Control**	**Strategic Planning**	**Support Needed**
Structured	1 Accounts receivable, order entry	2 Budget analysis, short-term forecasting, personnel reports, make-or-buy analysis	3 Financial management (investment), warehouse location, distribution systems	MIS, management science models, financial and statistical models
Semistructured	4 Production scheduling, inventory control	5 Credit evaluation, budget preparation, plant layout, project scheduling, reward systems design	6 Building new plant, mergers and acquisitions, new product planning, compensation planning, quality assurance planning	DSS
Unstructured	7 Selecting a cover for a magazine, buying software, approving loans	8 Negotiating, recruiting an executive, buying hardware, lobbying	9 R & D planning, new technology development, social responsibility planning	DSS ES neural networks
Support Needed	MIS, management science	Management science, DSS, EIS, ES	EIS, ES, neural networks	

decision making

decision making

requires

- intelligence
- design
- choice
- implementation

intelligence

environment & data

- what is the situation?
- required information for problem
- information on the solution(s)

design

problems requires solutions

goals – objectives – performance

example:

sales , increase sales, give estimate

e.g. 3% increase per month

what are the options?

options

increase sales staff

motivate / train sales staff

reassign sales staff

adjust product to customer

new advertising

change existing advertising

decision requires more information

choice

what are the options?

what is the best choice?

analysis

feasibility

calculations / cost-benefit ratios

- decision support can help

implementation

the plan

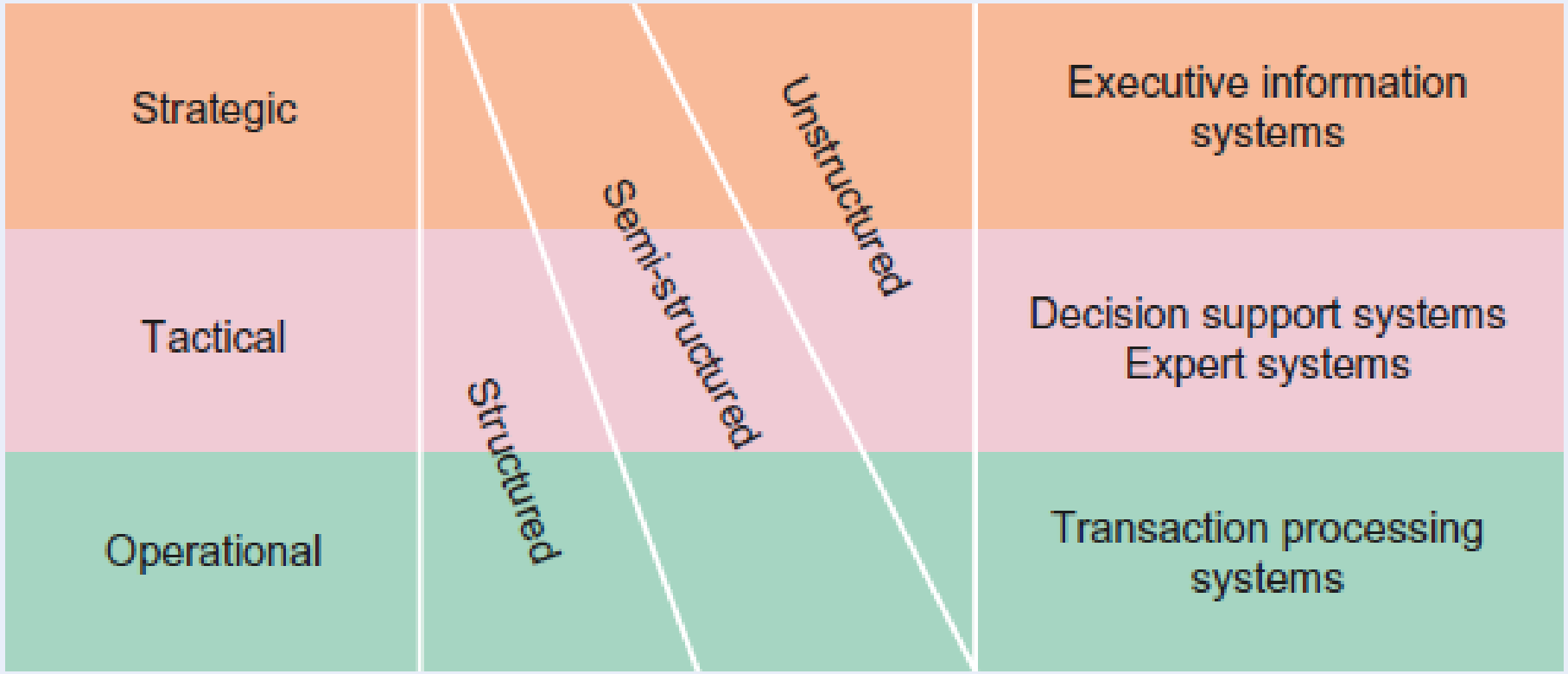
resources needed

resources affected

follow-up assessment

- decision support can help

decisions


Management level
Decision types
Information systems support
Strategic
Tactical
Operational
Unstructured
Semi-structured
Structured
Executive information systems
Decision support systems
Expert systems
Transaction processing systems

your
decision making

decisions

What decisions do you take every day?

decisions

What decisions do you take every week?

decisions

What decisions do you take every year?

decisions

What decisions are once-in-a-lifetime decisions?

decisions

what information is available?

what information do you gather to make the decision?

what type of information do you use?

- choosing a university
- choosing a husband / wife

decisions

- how much time does it take to make these decisions?
- how about in an emergency?
  - e.g. natural disaster
- what decisions would you need to take?
  - where to help?
  - how to help?
  - what is needed?

Decision support systems

reason for decisions support systems

computation

- information needs e.g. forecast weather

lots of data

- what data is used for the current weather?
- what data needed for product release (iPhone 13) ?

high consistency

- bank loan

rapid choices

- events, data changes quickly

‘informal’ look at DSS

spreadsheets

- what is analysis?
- meaning -> choices -> decisions

database systems

- what spreadsheets are not fit for purpose
- advantages of using a relational DB

more complexity

- DSS
- expert systems

DSS definitions

Decision support systems (DSS) provide information and models in a form to facilitate tactical and strategic decision making.

A DSS is an interactive information system that analyzes large volumes of data for informing business decisions.

DSS definitions

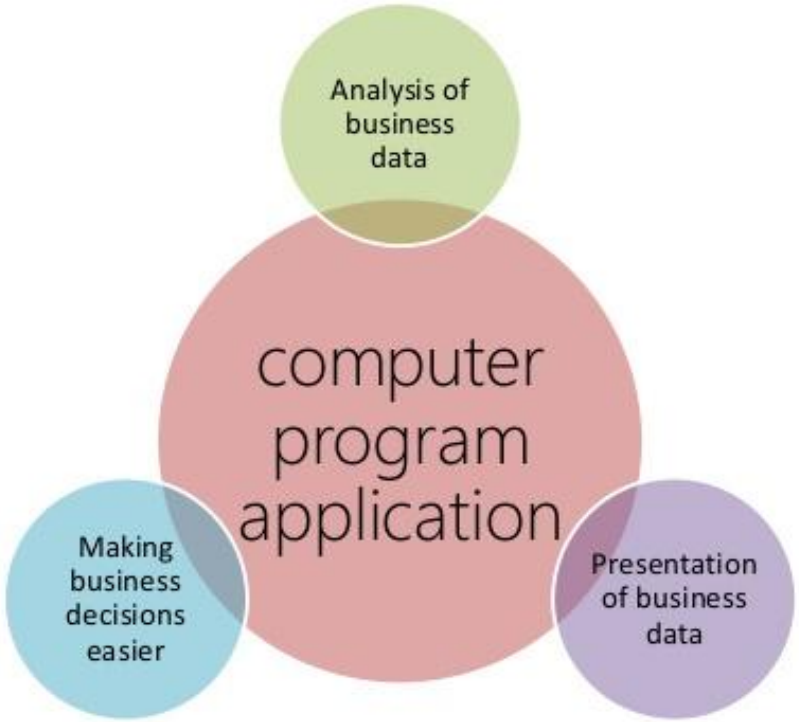
A DSS supports the management, operations, and planning levels of an organization in making better decisions by assessing the significance of uncertainties and the tradeoffs involved in making one decision over another.

The data sources used by a DSS could include relational data sources, cubes, data warehouses, electronic health records (EHRs), revenue projections, sales projections, and more.

DSS integrates

- company performance data
- business rules based on decision tables
- analytical tools and models for forecasting and planning
- an easy-to-use graphical user interface

What is a DSS?



DSS components

- Database Management System (DBMS)
  - knowledge base
- Model Management System
  - analysis, what if, forecast model
- User Interface (UI) & Support Tools
  - DSS engine – joins UI, models & databases

decision support systems (DSS)

- an information system that aids a business in decision-making activities that require judgment
- assists the mid- and high-level management
- analyzing huge volumes of unstructured data
- produces detailed reports by gathering and analyzing data
- accumulates information that can
  - help to solve problems
  - help in decision-making

decision support systems (DSS)

- interactive
- incorporates people
- internal & external data
- statistical / mathematical models
- supports decision-makers
- supports semi-structured and unstructured decisions
- user-friendly
  - used by senior executives

DSS attributes

Adaptability and flexibility

High level of Interactivity

Ease of use

Efficiency and effectiveness

Complete control by decision-makers

Ease of development

Extendibility

Support for modeling and analysis

Support for data access

Standalone, integrated, and Web-based

DSS capabilities

what if analysis - change variables

- e.g. increase cost by 1%

goal seeking - what needs to be done?

sensitivity analysis – adjust variables, scenarios

exception reporting analysis

- monitors performance, sales, production, budget

graphical analysis

- forecasting, simulation, statistical & modeling analysis

DSS characteristics

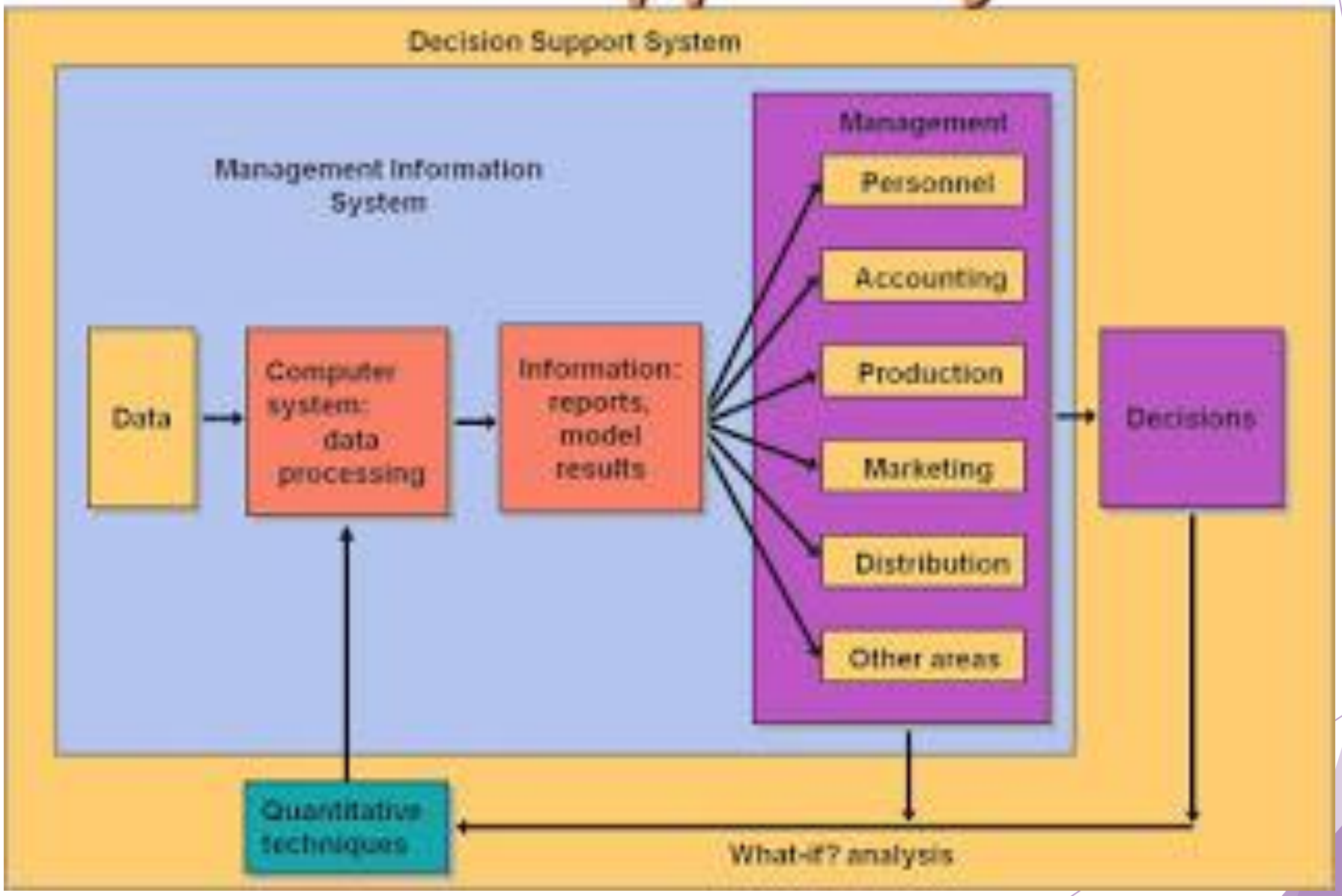
- Support for semi-structured and unstructured problems
- Support managers at various levels
- Support for individuals and groups
- Support for interdependent or sequential decisions
- Support for intelligence, design, choice, and implementation
- Support for variety of decision processes and styles
- DSSs are adaptive over time

DSS objectives

1. provide support for decision making, especially semi-structured & unstructured decisions.
2. not focus on a single level e.g. tactical, it should integrate across all levels as there is overlap
3. support all phases of the decision-making process
4. easy to use

Sprague (1980)

Decision Support System



DSS examples

forecasting sales

- e.g. geodemographic analysis
  - geo- regional
  - demographic – age, gender, social-economic status

optimizing distribution networks

- using a model
- select the best retail locations

optimizing product mixes

- variety of products a business offers its customers

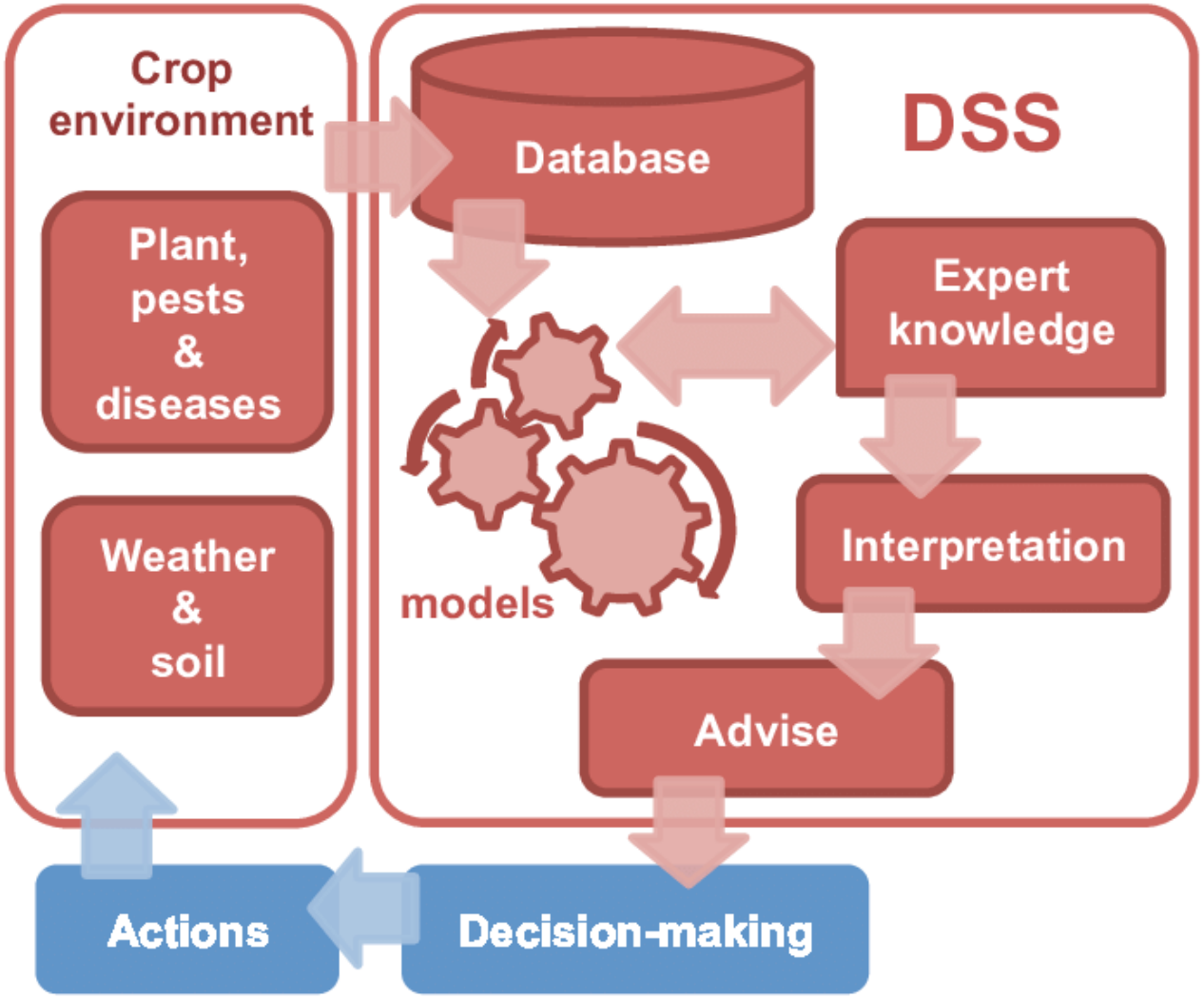
DSS examples

GPS route planning

- plan the fastest and best routes
- capable of monitoring traffic in real-time to escape congestion

crop-planning

- best time to plant, fertilize, and reap crops
- e.g. Bayer Crop Science including “virtual factories” to perform “what-if” analyses at its corn manufacturing sites


Crop environment
Plant, pests & diseases
Weather & soil
Database
DSS
Expert knowledge
models
Interpretation
Advise
Actions
Decision-making

DSS examples

Clinical DSS

- help clinicians diagnose their patients
- Penn Medicine has created a clinical DSS that helps it get ICU patients off ventilators faster

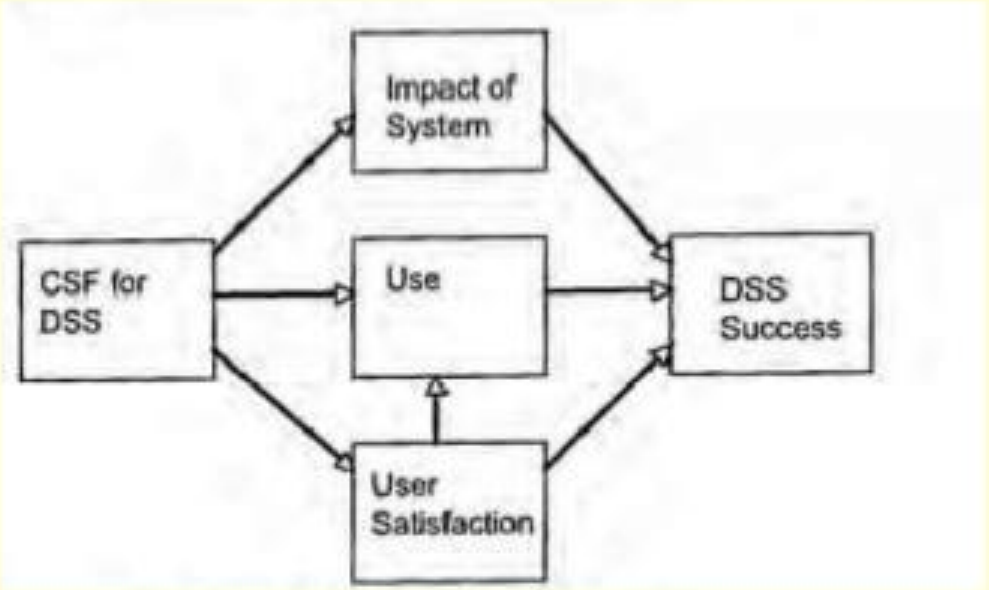
ERP dashboards

- help managers monitor performance indicators

What makes a DSS successful?

10 Critical Success Factors
1. Committed and informed executive sponsor
2. Widespread management support
3. Appropriate team skills
4. Appropriate technology
5. Adequate resources
6. Effective data management
7. Clear link with business
8. Well-defined information and systems requirements
9. Evolutionary development
10. Management of project scope

Critical Success Factor Model (CSF) Method



"The implication of the table is that if a reasonable number of CSF's are not attained or achieved, a project is likely to fail."*

*Handbook of decision support systems, vol. 1: Basic Themes: Chapter 34, David Arnott

DSS benefits

- improves efficiency and speed of decision-making
- increases the control, competitiveness and capability of decision-making of future events
- facilitates interpersonal communication
- encourages learning or training
- it reveals new approaches
- sets up new evidences for an unusual decision
- helps automate managerial processes

DSS benefits

- alternative solutions
- fast response
- ad-hoc support
- insight
- improved communications
- improved control over operations
  - e.g. cost of production
- cost savings
- better decisions
- more effective teamwork
- time savings
- better use of resources

Types of DSS


Communica
tion-driven
DSS
Data-driven
DSS
Document-
driven DSS
Knowledge-
driven DSS
Model-
driven DSS
DSS

DSS classification

Hoi Apple and Whinstone classifies DSS as follows –

- Text Oriented DSS
- Database Oriented DSS
- Spreadsheet Oriented DSS
- Solver Oriented DSS
- Rules Oriented DSS
- Compound DSS
  - using two or more of the five structures above

course

THE LAST DAY TO WITHDRAWAL
WITH RECEIVING GRADE 'W' is
FEB 7th, 2025

Friday, week 11 (this is week 10)

- all marks will be given by this week (week 10)
- if you are asked to withdraw then you may get an ‘F’ if you don’t withdraw

- nest lesson each group will need to have 1 device with SQLite
- look on alps.academy for help – I plan to make a video
- to prepare:

1. visit https://sqlitebrowser.org/dl/
2. download DB Browser for SQLite - Standard installer for 64-bit Windows

Thank you!

any questions?