ICT393
Advanced Business Analysis and Design

Topic 8

Software Evaluation and Selection

Readings and Resources

- Bandor, M. S. (2006). *Quantitative Methods for Software Selection and Evaluation* (No. CMU/SEI-2006-TN-026): Software Engineering Institute, Carnegie Mellon University

- Skidmore, S. & Eva, M. (2004) Software package approach. Chapter 14 in *Introducing Systems Development*. Palgave, Macmillan, 279-299

Learning Objectives

After completing this topic you should be able to:

- Discuss the advantages and disadvantages of meeting system requirements with commercial software

- Discuss the problems with subjective approaches to evaluation of software during software acquisition

- Describe the types of criteria that should be considered when evaluating software

- Use the weighted score method to evaluate software

- **Why do you think organisations might buy software as opposed to developing it specifically for the organisation?**

Advantages of Acquiring Software?

These are some benefits that it has been suggested exist when organisations meet their system requirements with packaged software (or customised packaged software):

- Cost savings
- Time savings
- Quality benefits
- Available documentation and training
- Organised maintenance and enhancement
- Try before you buy

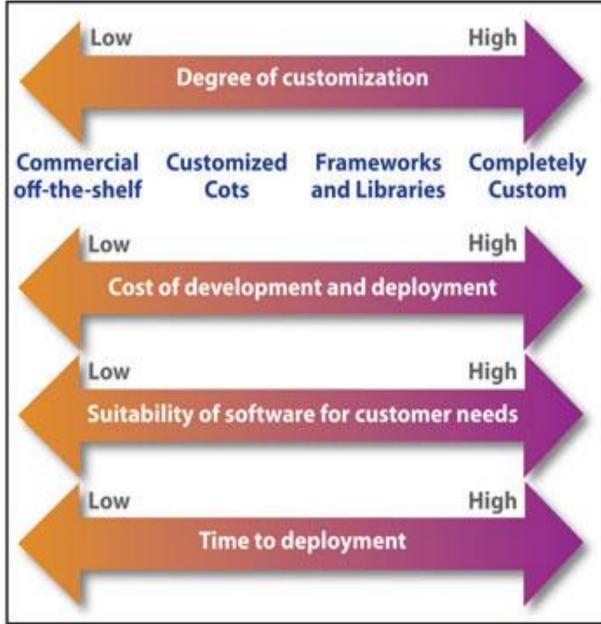**Why/how are these benefits achieved?**

Disadvantages?

The following are some possible disadvantages of meeting system requirements with packaged software (or customised packaged software):

- Lack of ownership
- Financial instability of supplier
- Lack of competitive edge
- Failure to fully fit requirements
- Inability to cope with changing requirements

What are the implications of each of these issues?

An application can range from being an unmodified, commercial off-the-shelf (COTS) software package to being a completely custom program

Advantages and disadvantages vary between these extremes

Low — Degree of customization — High

Commercial off-the-shelf | Customized Cots | Frameworks and Libraries | Completely Custom

Low — Cost of development and deployment — High

Low — Suitability of software for customer needs — High

Low — Time to deployment — High

Questions

- **What is software as a service (SaaS)?**

- **How does SaaS relate to other forms of commercial software?**

Initial Selection

- Some organisations use very ad hoc approaches that may result in them not being aware of appropriate products

- Should use a selection team to avoid single person bias **-** include technical experts, domain experts and end users

- **What approaches / sources of information can be used to identify products?**

Request for Proposal

If the organisation isn't already committed to a single product, get proposals from vendors. A request for proposal (RFP) communicates requirements and desired features to vendors, who then respond with proposals.

What should an RFP include?

Evaluation Criteria

- Many criteria can be used to evaluate software and they can be grouped in different ways

- Types of high level criteria can include:
  - Ability to meet functional requirements
  - Ability to meet non-functional requirements
  - Ability to meet supplier requirements
  - Ability to meet implementation requirements
  - Ability to meet cost and time constraints

- If a criterion is an **imperative** then if the product does not meet that criterion it must be excluded from the selection process.

- **What are some examples of imperatives?**

Ability to meet Functional Requirements

- **What are functional requirements?**

- **How are functional requirements determined and documented?**

Ability to meet Non-Functional Requirements

- **What are non-functional requirements?**

- **Provide some examples of non-functional requirements**

Ability to meet Supplier Requirements

Supplier requirements usually relate to issues such as:

•   Level of experience

•   Supplier stability

•   Financial robustness

Why are these of concern?

Ability to meet Implementation Requirements

Criterion associated with implementation can include issues related to:

- Initial training
- Hardware installation
- Conversion of data
- Quality of documentation
- Upgrade policy

Can you think of any other examples?

Ability to meet Cost and Time Constraints

Criteria related to cost and time provide an opportunity to balance cost and time against other issues in the selection process

But if cost or time is an imperative the product will just be ruled in or out and cost and/or time omitted from the evaluation matrix

Evaluation Approaches

- In order to systematically select a product or proposal each candidate solution must be evaluated on the selected criteria and ranked

- But not all criteria are likely to be of equal importance to the organisation. **Why not?**

- A large variety of techniques that take this into account have been proposed - see Land, Blankers, Chaudron and Crnkovic (2008) for some examples

Weighted Score Method

- The **weighted score method** is the most commonly used formal approach

- Variations exist but it generally works as follows:
    1. Criteria are defined and each criterion is assigned a weight
    2. Each alternative is rated on each criterion
    3. Weighted scores are then tabulated in some way for each alternative
    4. Alternative with highest score is chosen

Weighted Score Method Example

Which criterion is considered the most important?

Which alternative would you choose?

Criteria	Weight	Alternative 1		Alternative 2	
		Raw Score	Final Score	Raw Score	Final Score
Functionality	10	5	50	3	30
Ease of use	5	4	20	4	20
Security	5	4.5	22.5	4	20
Documentation	5	4	20	4	20
Ease of installation	4	5	20	5	20
Flexibility	4	5	20	4	16
Vendor stability	8	5	40	5	40
Total			**192.5**		**166**

Weighted Score Method

Problems include:

- Difficulty of assigning weights when large number of criteria

- Difficulty of assigning scores

- As the results are numbers, they can easily be interpreted as if they represent true differences between the alternatives – they don't

- Difficult to define criteria so that they are independent (i.e. don't overlap) or if this can't be done, difficult to adjust weights to compensate for overlap

Variation on Weighted Score Method - Example

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How does this example vary from the previous one?

Which alternative would you choose?

Criteria	Possible Points	Alternative 1	Alternative 2
Cost	30	25	15
Functionality	40	35	20
Supplier	20	15	10
Usability	10	5	2
Total	**100**	**80**	**47**

Analytical Hierarchy Process (AHP)

- AHP is a complex multiple criteria decision-making technique

- It is based around decomposing a multiple criteria decision making problem into a hierarchy

- Involves pair wise comparisons of alternatives

- Creating a hierarchy helps with understanding of the problem/decision

- For a worked example see: Kutlu et al. (2014) - http://www.ijastnet.com/journals/Vol_4_No_6_November_2014/15.pdf

Analytical Hierarchy Process (AHP)

Problems include:

- Can be time consuming because of the complex calculations and number of pair-wise comparisons

- Need to re-evaluate alternatives if the number of criteria or alternatives is changed

- Ranking depends on alternatives considered, adding or deleting alternatives can lead to changes in rank

Commonly proposed in the academic literature - but little practitioner use

Other Approaches

- See Land et al. (2008) Table 1 for an extensive list of examples of other proposed software evaluation techniques

- See Jadhav and Sonar (2009) Table 3 for a list of examples of software tools to support the evaluation and selection of software. These include knowledge-based systems and expert-systems, but many do not support the whole process

Use of Formal Techniques

- Research by Land et al. (2008) suggests that IT practitioners have relatively little knowledge of formal published selection methods

- They believe that while formal approaches can bring structure they are still subjective and use incomplete input

'It is inevitable that new criteria emerge'

'Too detailed specification might make it unlikely that suitable components can be found'

Learning Objectives Revisited

- What are the advantages of meeting system requirements with commercial software?
- What are the disadvantages of meeting system requirements with commercial software?
- What problems can occur when informal approaches to evaluation of software are used during software acquisition ?
- What types of criteria should be considered when evaluating software for acquisition?
- Can you use the weighted score method to evaluate software?

Additional References

- Jadhav, A. S. and Sonar, R. M. (2009). Evaluating and selecting software packages: A review. *Information and Software Technology*, 51, 555-653.

- Kutlu, B., Bozanta, A., Ates, E., Erdogan, S., Gokay, O., & Kan, N. (2014). Project Management Software Selection Using Analytic Hierarchy Process Method. *International Journal of Applied Science and Technology*, *4*(6), 113-119.

- Land, R., Blankers, L., Chaudron, M. and Crnkovic, I. (2008) COTS selection best practices in literature and in industry. *Lecture Notes in Computer Science*. 5030, 100-111. Available from Murdoch Library through SpringerLink.

- Webster, B. (2008) Buy vs. build software applications: The eternal dilemma. *Baseline.* Available from: http://www.baselinemag.com/c/a/Application-Development/Buy-vs-Build-Software-Applications-The-Eternal-Dilemma/