Chapter 4 Selection of an appropriate project approach

Further exercises and pointers

1. *A building society has a long history of implementing computer-based information systems to support the work of its branches. It uses a proprietary structured systems analysis and design method. It has been decided to create a computer model of the property market. This would attempt for example to calculate the effect of changes of interest rates on house values. There is some concern that the usual methodology used for IS development would not be appropriate for the new project.*
   (a) Why might there be this concern and what alternative approaches should be considered?
   (b) Outline a plan for the development of the system which illustrates the application of your preferred methodology for this project.

a) With traditional business systems analysis there is usually an existing office procedure that managers are hoping to streamline in some way. There are people who understand the details of the jobs currently done. They can help the analyst draw up precise requirements to be met. There is, in short, a well-defined clerical equivalent of the application that is to be built.

With a computer model of the property market there is probably no equivalent of a well-defined clerical model. The analysts will therefore have to seek ideas about the working of such a model from a variety of sources. Experts, such as experienced estate agents, may be able to contribute observations, but these are likely to be fragmentary rules of thumb. The academic literature on economic modellling might be studied. In the end the analysts will probably have to resort to building a prototype of the model. They will then trial this to see if it behaves in a similar way to the property market. There is always the chance that the property market behaves in just too complex and inconsistent manner for a computer model to mimic accurately.

All this suggests that the 'traditional' IS development approach based on a waterfall framework would be unsuitable. A more iterative prototyping approach is sensible.

b) Expanding on the discussion in 1(a), the following is one method of working:
- Define objectives: what does the management of the organization want from the model?
- Survey existing software solutions and the literature on the subject. Has anyone done this already?
- Consult experts. JAD (joint application development) sessions are mentioned in text as one possible approach. There are many other techniques to elicit relevant knowledge from domain experts which should be considered.

- Based on the above draw up an initial prototype design
- Build prototype
- Test it, probably using real data from the recent past; you can compare the results of the model with what actually happened
- Analyse the causes of discrepancies; modify the model and rerun
- Stop this cycle when you run out of time, or are not getting significant improvements
- Carry out a general validation of how accurate the model it is, how easy it is to use – for example is the input data needed easy to collect?
- Write up recommendations

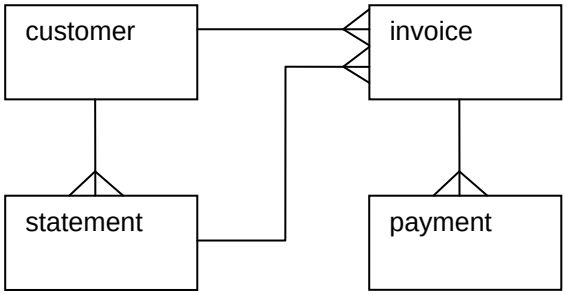
2. *A software package is to be designed and built to assist in software cost estimation. It will input certain parameters and produce initial cost estimates to be used at bidding time.*
   (a) It has been suggested that a software prototype would be of value in these circumstances. Explain why this might be.
   (b) Discuss how such prototyping could be controlled to ensure that it is conducted in an orderly and effective way and within a specified time span.

   a) Much of the discussion in the pointer for Further Exercise 1(a) above is relevant here as well. Software effort estimates are notoriously prone to error, and there is no existing method that can claim 100% accuracy. As will be seen in Chapter 5 on software effort estimation, whatever method is used there has to be some participation by experts in the development or application area.
   In this scenario, as in Further Exercise 1, the prototype would be focused on the internal functionality, rather than the interface, and this influences the approach needed.

   b) Among the points that might need to be considered are:
   - To run the prototype you need a set of test cases of some sort along with the expected results. If you keep changing the prototype to produce the expected results, you will end up with a product that works perfectly for your test cases, but is a big disappointment when you apply it elsewhere. You probably need at least two sets of test cases: one to develop the prototype and the others to validate it.
   - Version control will be very important. You might find that a change which you hoped would improve the performance of the model in fact makes it worse. You would in this case want to revert back to a previous version
   - There is a danger of repeating yourself. The changes made in each version need to be documented. The results of trialing each version need to be recorded: a record of what did not work is as important as that of what did not if mistakes are not to be repeated.

3. *An invoicing system is to have the following components: amend invoice, produce invoice, produce monthly statements, record cash payment, clear paid invoices from database, create customer records, delete customer.*
   (a) What physical dependencies govern the order in which these transactions are implemented?

a)



Given the data structure above, the order might be:

- Create customer
- Delete customer
- Produce invoice
- Amend invoice
- Payment
- Clear paid invoices
- Produce monthly statements

The last two could be reversed in order. You could argue that 'Delete customer' ought to wait until the invoice functionality has been developed so that the maintenance of referential integrity can be assured i.e. you cannot delete a customer who still has outstanding invoices.

(b) How could the system be broken down into increments which would be of some value to the users (hint – think about the problems of taking existing details onto a database when a system is first implemented)?

b) when an application like this is installed, careful thought has to go into how the information about existing accounts is to be carried over to the new application. Obviously details about existing customers will need to be set up before the new application can become operational. It would be helpful to release the functionality to set up customer details well in advance of the change-over.
Details of invoices that have already been sent out but have not yet been paid would also need to be recorded for the new application. If the invoices have a lot of complex detail it might be worth releasing that functionality earlier, even if the users would have to transfer the invoice number and amount due to their existing accounting system. It might at least save them typing if the old system is a purely clerical one.

4. *In Section 4.9. the need was stressed for defining what is to be learned from a prototype and the way that it will be evaluated to obtain the new knowledge. Outline the learning outcomes and evaluation for the following.*

   a) *A final year degree student is to build an application that will act as a 'suggestions box' in a factory. The application will allow employees to make suggestions about process improvements, and will track the subsequent progress of the suggestion as it is evaluated. The student wants to use a web-based front-end with a conventional database. The student has not previously developed any applications using this mix of technologies.*

   Here it would appear that the prototype is mainly a technical one to learn how to connect a web front-end to a database. It should also examine how well such a configuration works in a real operational environment. Further questions relate to what would be an effective and easy-to-use web interface for use in a factory environment. The application could be implemented in one factory first for a trial period to see if employees were willing to participate in the scheme. The student would need to be careful in making clear what the main focus of the project was.

   b) *An engineering company has to maintain a large number of different types of document relating to current and previous projects. It has decided to evaluate the use of a computer-based document retrieval system and wishes to try it out on a trial basis.*

   Does the package meet its requirements? Is it easy to use? Does it have all the functionality that they need? Is it secure? Etc., etc.

   c) *A business which specializes in 'e-solutions', that is, the development of business applications that exploit the world-wide web has been approached by the computing school of a local university. The school is investigating setting up a special web-site for its former students. The web-site's core will be information about job and training opportunities and it is hoped that this will generate income through advertising. It agreed that some kind of pilot to evaluate the scheme is needed.*

   The learning objectives here seem to relate mainly to the business case. Would former students want to access the web-site? Would employers want to put job vacancies on the site? Would they be willing to pay to do so?

   If you wanted to use a physical prototype you would have to get the system up and running and to have it well-publicized. Preliminary surveys of former students and of employers might be a cheaper and safer way of getting the information you need.

5. *In a college environment, an intranet for students that holds information about courses, such as lecture programmes, reading lists and assignment briefs, is often set up. As a 'real' exercise, plan, organize and carry out a JAD session to design (or improve the design) of an intranet facility.*

   This will require:

- *preliminary investigation representative key stakeholders (for example, staff who might be supplying information for the intranet);*
- *creation of documents for use in the JAD proceedings;*
- *recording of the JAD proceedings;*
- *creating a report which will present the findings of the JAD session.*

You just have to do it!

6. *What are the major shortcomings of the waterfall model? How have those shortcomings been overcome by the agile model?*

Major shortcomings of waterfall model:

- No provision to accept user feedback.
- No provision for risk handling.
- Phases are sequential, no provision for overlapped phases.
- No provision for incremental development

Agile model largely overcomes these problems through the following features:

- User feedback is encouraged
- An agile project usually includes a customer representative in the team.
- The requirements are decomposed into many small parts that can be incrementally developed.

7. *Identify the pros and cons of using pair programming over programmers working alone. Based on your analysis, point out if there are any situations where the pair programming technique may not be suitable.*

The pair of programmers continuously review each other's work. Several studies indicate that programmers working in pairs produce compact well-written programs and commit fewer errors as compared to programmers working alone.

Some studies show that productivity falls with pair programming. Also, programmers may not be compatible and that leads to contentious behaviour. Other factors that make pair programming ineffective are the following:

- Disengagement – One of the members may disengage from programming and instead spend time on e-mail, phone calls, or web surfing. Sometimes this can be as extreme as one member falling asleep.

- Watch the Master – Sometimes one member will be more experienced than the other and the less senior will be relegated to observer status.

- Silence – Pairs cannot work together if they are not in talking terms with each other.