Case Study Exercise 1: Orient-Pacific Insurance Corporation

Introduction

This section introduces you to the Orient-Pacific Insurance Corporation. This case study is designed to enable you to apply the concepts covered in the fifth section of Unit 1. The case study allows you to practice with a ‘real world’ business problem, related to the Orient-Pacific Insurance Corporation. You are required to apply the knowledge you have gained from Unit 1 by solving a typical business information system problem. You should find this challenging but very rewarding.

The Orient-Pacific Case Study is used throughout the course. It prepares you for your assignments. You will be able to check your solution against a worked example, before you attempt a similar assignment. The assignments require you to follow a similar process related to a different case study, the Hong Kong Internet Marketing Company. If you work through the Orient-Pacific Case Study, you will have a good idea of what to expect in your assignments.

Now read the case study before you proceed to the problem statement that follows it. Remember, first read quickly through the case study. Make brief notes on what you believe are the key points. Next, reread the case study carefully two or three times, referring to your notes. Make sure you have identified the key points and that you have not been misled by minor problems. Finally, read the problem statement to find out what you actually have to do.

Orient-Pacific Insurance Corporation

Orient-Pacific Insurance Corporation (OPIC) is a well-established insurance company. It has grown over the years by taking over small insurance groups throughout the Pacific region. From its Salisbury Road headquarters in Hong Kong, it administers subsidiary companies in the Philippines, Singapore and New Zealand. There is a possibility of expanding into Thailand, Korea and Australia in the near future. OPIC deals in all forms of insurance: life insurance, marine, personal property, accident, business risk and aviation. Part of the reason for the company’s success is that in each country it has many regional offices that cater to smaller clients in their own environment, as well as a national office for larger clients.

The major problem facing the organization is that the companies that have been acquired have different, and incompatible, information systems. This means that day-to-day operations are conducted very differently in different countries, management information is very fragmented and the overall corporate position is hard to determine. OPIC’s management is considering whether or not to develop a system suitable for the whole corporation. Its major requirements of such a system are that it would make the organization more cohesive (allowing staff to move easily between offices) and that it would be possible to integrate management information across the organization.
The insurance industry issues insurance policies to clients that guarantee an asset against accidental loss or damage. This process is called ‘underwriting’. A client pays a ‘premium’ to OPIC. This is a portion of the value of the asset. The size of the premium depends on the degree of risk of a specified accident occurring to that asset within one year. If an accident does occur, a client makes a ‘claim’ on the insurance company.

For example, a trading company may wish to insure stock in its warehouse against fire and flood. The stock may be valued at $17 million and, in the opinion of the OPIC assessors, the risk of loss is 5%. The premium for one year will be 5% of $17 million plus estimated overhead costs for this type of product. Typical overheads include a commission to the agent who sold a policy, a profit margin and other factors relevant to a specific case. Should a fire occur in a warehouse totally destroying all stock, a client would claim a full payout of $17 million. If stock is only partially destroyed, a client would receive a partial payout.

In years when there are few natural or civil disasters, premium payments are much higher than claims. Then, insurance companies like OPIC make a profit. In a year where, say, an earthquake destroys a lot of property covered by OPIC, claims are high and may even exceed premium income for the whole organization. OPIC uses two ways to spread this ‘exposure’ to a particular accident. First, it deals with many branches of insurance including:

- air/marine — insuring aircraft and ships against typhoon, fire, terrorism, negligence, etc.
- life — paying an agreed sum on the death of an insured person. The premium depends on mortality factors including age, sex, whether the insured party is a smoker, etc.
- property — covering buildings and their contents against earthquake, fire and so on and insuring personal property such as jewellery, art works and travellers cheques. A policy of this kind usually has the specific items listed, as the risk for each class of item is different.

This spreads types of risk and reduces exposure. Second, OPIC reinsures with other insurance companies. For example, a maritime company might want to insure a new ship valued at $3 billion. A payout of this amount in the event of the ship being lost might endanger the finances of OPIC itself. So, part of the risk is reinsured with another insurance company. This again reduces the exposure.

Within each type of insurance there are standard ‘products’, e.g., product PB128F might be property insurance (P) of a building (B) which is of timber construction, less than 20 years old and in good repair (code 128) against the risk of fire (F). Each policy is likely to cover a number of items. A policy for the building described above might cover items PB128F, PB128W (for water damage) and PC128 (for the contents of the building). As the insurance business is so competitive, products are quite dynamic, with new ones being regularly introduced. All policies are written under the rules of a standard product. Premiums depend on the type of product and the sum insured.

The proposed integrated information system is to deal only with property insurance and must control the following basic transaction processing...
operations of the organization. When an OPIC regional office negotiates an insurance policy for a client, a ‘policy proposal form’ is completed. This is analysed and, if approved, the regional office is paid a commission appropriate to the product. Also, an invoice for the premium is sent to the client. The premium may be paid in stages (e.g. monthly) or in a single, initial payment. In the case of loss or damage to an asset, a client submits a ‘policy claim form’ describing the damage and claiming an amount from OPIC. This claim is assessed and, if found reasonable, paid.

The management information systems (MIS) aspects of the system are where the real payoff will be achieved. The following facilities are needed:

- exposure control — a report that lists the total amount insured for each product in each regional office, with totals by country
- product performance — a report of the performance of each product showing monthly premium income, claims and management expenses over the last 12 months
- exceptions — insurance fraud is the greatest operational problem of the industry, so the claim assessment is critical. One indicator of possible fraud is several claims being lodged on policies that have been written for members of the same family or group of companies.

Last, the system must be able to support a range of office automation facilities (e.g., word-processing). It must also allow staff to make reports that support their decisions on individual policies. An expert systems group is developing an expert system to assist in assessing the risk of new policy proposals.

**Problem statement**

The management of OPIC has decided to replace the incompatible information systems currently used by the different companies with a standard, corporate-wide information system.

Management has appointed you, a project manager from the Management Information Systems department, to recommend the development strategy that should be adopted for this development project. You are required to

1. identify the people who will be affected by the proposed systems; and
2. give examples of the four focuses of the proposed system.

You should attempt this exercise before looking at the worked solution provided below.

**Worked solution**

1. Managers at the headquarters, who will be using the MIS reports and the proposed DSS and expert system; managers of regional offices, in order to understand the way new contracts are negotiated and analysed; clerks in regional office and headquarters, who will be using the system
to understand the interface; the office staff, who will be using the office information systems.

2 Data — value of the property, risk factor, etc.

Processes — preparation of policy proposal form, calculation of premium, etc.

Interfaces — the format of the forms that will appear on computer screen.

Geography — regional offices, headquarters.
Case Study Exercise 2: Orient-Pacific Insurance Corporation

Introduction

This section uses the Orient-Pacific Case Study to enable you to identify the major phases related to the FAST methodology introduced in Unit 2. The case study allows you to practice with a ‘real world’ business problem. You are required to apply the knowledge you have gained from Unit 2.

Now read the case study introduced in Unit 1 before you proceed to the problem statement. Remember, first read quickly through the case study. Make brief notes on what you believe are the key points. Next, read the case study more carefully, referring to your notes. Make sure you have identified the key points and that you have not been misled by minor problems. Finally, read the problem statement to find out what you actually have to do.

Orient-Pacific Insurance Corporation

Read the description of Orient-Pacific Insurance Corporation presented in Unit 1. This will be used throughout the course. You will gradually become familiar with the background and will have to refer back to Unit 1 less and less often. At this early stage of the course, you should reread the description.

Problem statement

The management of Orient-Pacific Insurance Corporation (OPIC) has decided to replace the different and incompatible information systems currently implemented in the different companies with a standard, corporate-wide information system.

You are a systems analyst from the Management Information Systems Department. You are required to use the FAST methodology to develop a list of the major activities that will be involved in each of the eight phases. Also, outline the list of participants, along with their major roles in each phase. You should attempt this exercise before looking at the worked solution provided on the next page.

Worked solution

1. The Survey Phase

Major Activities:

- To define the size or scope of the project in terms of data, processes, interfaces and geography.
- To identify system users i.e. the staff at the headquarters and regional offices.
• To catalogue the perceived problems and opportunities of the OPIC.
• To establish budget, staffing and schedule.

Participants and Roles:

• You, the systems analyst — to facilitate the phase.
• Executive managers at the headquarters and regional offices — they are the system owners who act as executive sponsors, technical sponsors and project managers. Beside providing visible support and leadership to project participants, executive managers are also responsible for the staffing, budget and schedule.

2 The Study Phase

Major Activities:

• To learn the terminology, history, culture and nuances of the existing system in each office.
• To formally document the systems if necessary.
• To analyse and address the causes and effects of the perceived problems and opportunities of OPIC.

Participants and Roles:

• You, the systems analyst — to facilitate the phase.
• Staff at the headquarters and regional offices — since they are the ultimate users of the system, they have to actively participate in the study by giving suggestions about the system during group meetings, interviews, progress reports, etc.
• Executive managers at the headquarters and regional offices — since they are the systems owners who must visibly support the study to ensure that all the system users actively participate. They also review the findings of the study phase.

3 The Definition Phase

Major Activities:

• To identify, organize and prioritize business requirements.
• To document and validate users’ requirements by modelling and prototyping.

Participants and Roles:

• You, the systems analyst — to facilitate the definition and prioritization of business requirements.
• Project team members — to specify, clarify and document the business requirements.
• Staff at the headquarters and regional offices — they play an active role by providing perspectives and requirements.
4 The Configuration Phase

Major Activities:

- To define candidate solutions such as design ideas and opinions to the business requirements of OPIC.
- To evaluate each candidate solution by technical, operational, economic and schedule feasibility.
- To recommend a feasible candidate as the target system.

Participants and Roles:

- You, the systems analyst — to facilitate the phase.
- All members of the project team including systems owners, systems users, systems designers and technology consultants — to bring out their ideas and perspectives to the table.

5 The Procurement Phase

Major Activities:

- To research the technology and marketplace by studying the many periodicals and services, i.e. survey the technology marketplace.
- To solicit and evaluate vendor proposals.
- To recommend the proposal that best fulfils the business and technology requirements.

Participants and Roles:

- You, the systems analyst — to facilitate the phase and make a recommendation to the executive managers, i.e., the system owners.
- Information technology vendors — to supply formal proposals to OPIC.
- The project team — to research the information technology marketplace; to organize the business technology and relationship requirements and establish the mechanisms that will be used to evaluate the technical alternatives; to evaluate vendors’ proposals and quotes and determine the one that is most cost-effective but at the same time that best meets the requirements and specifications.
- Purchasing agents and legal staff — they are involved in negotiations for any final orders, licenses, contracts and service agreements between the information technology vendors and OPIC.
- Executive managers at OPIC — these systems owners must be present to justify the budget which may exceed the authorized spending limits.

6 The Design Phase

Major Activities:

- To design and construct the system as a series of prototypes to which the systems users, i.e., staff at the headquarters and regional offices, react by using a rapid application development (RAD) approach.
Participants and Roles:

- You, the systems analyst — to facilitate the phase.

- System design specialists — systems design specialists include database, network, microcomputer and human interface specialists.

A database specialist designs or approves the design of any new or modified databases in the systems.

Since the offices of OPIC are widely distributed over the Pacific region and that there is a possibility of further business expansion in other regions, network specialists are needed to design or modify the structure of any computer networks for OPIC.

Microcomputer specialists may be required to assist in the design of the workstation-based software components while human interface specialists are needed in the design of the user interface.

- Staff at the headquarters and regional offices - they play an active role by evaluating the new system’s ease of learning, ease of use, and compatibility with the stated business requirements.

7 The Construction Phase

Major Activities:

- To construct the database, application programs, user and system interfaces and networks.
- To install and test any new software packages.
- To construct and test any new programs.

Participants and Roles:

- You, the systems analyst — to facilitate the phase and act as a general contractor for the work done by technical specialists or subcontractors.
- Project team members — to construct the database, application programs, users and systems interfaces and networks.
- Staff at the headquarters and regional offices — to react to the functional system’s ease of learning and ease of use.

8 The Delivery Phase

Major Activities:

- Construct tests to ensure that the new system works properly.
- Prepare a conversion plan so as to provide a smooth transition to the new system.
- Train the staff who will use the final system.
- Develop documentation to aid the users of the new system.
- Prepare a post-audit to gauge the success of the completed systems project.
Participants and Roles:

- You, the systems analyst — to facilitate the phase; to communicate implementation problems and issues among system users, system designers and system builders.

- Staff at the headquarters and regional offices — since they are the ultimate users of the system, they act as the cheerleaders for the new system.

You have now completed Unit 2. If you feel you need a break from your study, this is a good place to stop.
Case Study Exercise 3: Orient-Pacific Insurance Corporation

Introduction

Now read the case study introduced in Unit 1 before you proceed to the problem statement. Remember, first read quickly through the case study. Make brief notes on what you believe are the key points. Next, read the case study more carefully, referring to your notes. Make sure you have identified the key points and that you have not been mislead by minor problems. Finally, read the problem statement to find out what you actually have to do.

Orient-Pacific Insurance Corporation

Read the description of Orient-Pacific Insurance Corporation presented in Unit 1. This will be used throughout the course. You will gradually become familiar with the background and will have to refer back to Unit 1 less and less often. At this early stage of the course, you should reread the description.

Problem statement

The management of OPIC has decided to replace the incompatible information systems currently used by the different companies with a standard, corporate-wide information system.

Management has appointed you, a project manager from the Management Information Systems Department, to manage the project. You are required to draw a Gantt chart for the order processing system. Assume a total duration of 12 months for the project and guesstimate the time and duration of the eight major phases of the SDLC. Pay particular attention to the start and end of each phase.

You should attempt this exercise before looking at the worked solution provided below.

Worked solution
Case Study Exercise 4: Orient-Pacific Insurance Corporation

Introduction

This section uses the Orient-Pacific Case Study to enable you to apply the information gathering techniques covered in Unit 4. The case study allows you to practice with a ‘real world’ business problem. You are required to apply the knowledge in gathering information you have gained from Unit 4 in a typical business information system problem.

Now read the case study before you proceed to the problem statement. Remember, first read quickly through the case study. Make brief notes on what you believe are the key points. Next, read the case study two or three times carefully, referring to your notes. Make sure you have identified the key points and that you have not been mislead by minor problems. Finally, read the problem statement to find out what you actually have to do.

Orient-Pacific Insurance Corporation

Read the description of Orient-Pacific Insurance Corporation presented in Unit 1. This will be used throughout the course. You will gradually become familiar with the background and will have to refer back to Unit 1 less and less often. At this early stage of the course, you should reread the description.

Problem statement

The management of Orient-Pacific Insurance Corporation (OPIC) has decided to replace the different and incompatible information systems currently implemented in the different companies with a standard, corporate-wide information system. The Investigation Phase is complete. The Analysis and Design Phase is about to commence. Operations Manager, Gloria Wong, is to coordinate user involvement.

You are a systems analyst from the Management Information Systems department. You are required to develop an information gathering strategy for this project. Then, you are to plan an interview of the Operations Manager. Afterwards you are to outline the major activities in each of the three phases in the analysis, along with their inputs, outputs, required techniques and steps. You should attempt this exercise before looking at the worked solution provided on the next page.
Worked solution

PART 1 INFORMATION-GATHERING STRATEGY

Since Orient-Pacific Insurance Corporation (OPIC), with its headquarters in Hong Kong, has subsidiary branches all over the Pacific region, an information gathering strategy must be carefully developed in order to collect data that is necessary for the project.

As a professional systems analyst, you need to apply several fact-finding techniques throughout the project. Consider the following strategy:

• **Review the existing documents, forms, reports and files of OPIC**, including the ones from regional offices in order to have a better understanding of the different systems implemented in the subsidiary companies.

Examine the organizational chart of OPIC and trace the history that led to the project by studying documents that describe the problem and business function. Both internal and external documents should be reviewed. You should read the internal policy, procedure or user manuals that pertain to policies or claims of the company. You should also refer to industry publications and books or journals on insurance.

As it is impractical to study every occurrence of every form, especially when a large group of subsidiary companies is involved, you may need to use sampling techniques to get enough samples to identify all the possible processing conditions and exceptions.

• **Observe the existing systems of OPIC**. Observation can help you to identify tasks that have been missed or inaccurately described when you reviewed the documents. Complex tasks can also be more easily interpreted in observation than in words. As a large number of regional offices participate in this project, it is necessary for you, the systems analyst, to determine carefully the where, why, who, what, when, and how of the observation.

Observation should be done in low profile. You have to make sure that workers know that you are not evaluating individuals or else they will temporarily act in a more efficient manner. You also need to identify the ideal time to observe a particular part of the existing system.

• **Design and distribute questionnaires** to collect information and opinions from respondents, that is, the staff of OPIC. Conducting survey through questionnaires is suitable in this case because the sources of information are geographically dispersed. Questionnaires can help you to clear up things that you don’t fully understand and to solicit opinions on problems and limitations of OPIC’s systems. Again, you may need to randomly select a small sample of respondents from each subsidiary company as the number of people involved is large.

• **Conduct interviews**. Because you have already collected most of the pertinent facts by low-user-contact methods, you can now use interviews to verify and clarify the most difficult issues and problems.
Interviewing, however, is quite time-consuming, so you have to be careful in selecting appropriate individuals for the sample group to interview. Interviewees should include staff of different levels in OPIC, from senior management to clerical workers. However, your choice of interviewees should not be limited to the staff in OPIC. Representatives of other insurance companies with similar systems should also be considered. You should aim to interview any contacts you may have in other insurance companies. By interviewing outsiders, you may learn the cons and pros of other companies’ systems, which in turn helps you to develop a better system design for OPIC.

- **Follow up.** Use observation and other fact-finding techniques to verify facts gathered in interviews and questionnaires.

In summary, your strategy should try any low-contact fact-finding methods first and then proceed to interacting with the staff in the later stages.

As fact-finding affects severely the applications of systems analysis and design methods during the systems project, it is important for you to plan an information-gathering strategy that is cost-effective but at the same time allows you to get the most information you need within a given period.

Outline of interview

**Interview subject:** Gloria Wong, Operations Manager

**Objectives:** This interview is to determine basic day-to-day insurance operations. Also, it will establish management information needs. The need is to confirm what processes are carried out and what information is required.

**Topics:**


3. Exposure control. Total amounts insured for each branch in each geographic region. Total amounts for each country.


6. Office automation. Volumes and requirements of word processing, spreadsheets and decision support.

This is a lot of information to gather in a one-hour interview, but if you are fully prepared and the interviewee has been informed in advance as to the type of information you require, the task is feasible.
Memo confirming interview

Memo

Date: 4 October

To: Gloria Wong, Operations Manager

From: David Wilson, Systems Analyst, MIS

Re: Interview Appointment

This is to confirm our interview scheduled for 11th October. I will be at your office at 9:30 am. We should plan on spending no more than an hour on the topics listed below.

As you know, the MIS Department is investigating policy and claims processing in subsidiary companies. There is a possibility of implementing common information systems that standardize business operations throughout the organization. A particular benefit of such systems would be to provide consistent management information for the organization.

The investigation will gather information from most of the managers and supervisors involved in policy and claims operations. The purpose is to gain a basic understanding of the current procedures that are followed in each company. Also, the information required to manage these operations is to be determined.

I would like your assistance in the following areas and would be grateful if you could give some thought to these topics prior to our meeting. If possible, please provide any documentation and statistics that might be relevant.

1 Policy and claims processing, including staffing levels and volumes.

2 Management reporting requirements, including volumes and time deadlines.

3 Office processing requirements.

PART 2 FAST SYSTEMS ANALYSIS STRATEGIES

The FAST analysis techniques can be applied throughout OPIC’s project development. However, we will only examine the survey, the study and the definition phases in this case.

1 The survey phase

Activity 1.1: survey problems, opportunities, and directives

(A) Inputs

- The input is a request for system services by staff of OPIC. Problems, opportunities, directives, and expected solutions of the current systems are expressed by the staff in this request. An executive at the headquarters may complain about the difficulties in business and systems management
due to the different incompatible systems implemented in the subsidiary companies. A standard corporate-wide information system therefore is our aim.

(B) Outputs

- The principal output of this activity is a problem statement that documents the problems, opportunities, and directives that are described in terms of urgency, visibility, benefits, priority and possible solutions.

(C) Applicable techniques

- Fact-finding — you need to use fact-finding methods such as interviewing and meeting to interact with the staff of OPIC to identify problems, opportunities, and directives.

- Interpersonal skills — interpersonal skills are related to fact-finding skills. Good interpersonal skills help you to communicate and negotiate better with one another.

(D) Steps

1. Collect and review all documentation submitted to begin this project.
2. Schedule and interview the staff of OPIC as they are the owners and ultimate users of the system.

Activity 1.2: negotiate project scope

(A) Inputs

- The request for system services

- The problem survey statement produced in the previous activity, which is used for defining the project scope.

(B) Outputs

- The principal deliverable of this activity is a scope statement that is described in terms of data, interfaces, processes and geography.

(C) Applicable techniques

- Fact-finding — you need to use fact-finding methods such as interviewing and meeting to interact with the staff of OPIC to define the scope.

- Interpersonal skills — interpersonal skills are related to fact-finding skills. Good interpersonal skills help you to communicate and negotiate better with one another.

(D) Steps

1. Collect and review all documentation submitted to begin this project.
2. Schedule and interview the staff of OPIC as they are the owners and ultimate users of the system. The meeting should focus on negotiating the scope in terms of data, processes, interfaces and geography.
3. Document the project scope.
Activity 1.3: plan the project

(A) Inputs
- The problem statement
- The scope statement

(B) Outputs
- A project plan, which is expressed in phase level and activity level, serves as the major output of this activity.

(C) Applicable techniques
- Process management — process management defines skills requirements and training for the staff of OPIC, CASE tool standards, documentation standards, quality management standards, and project management standards.
- Project management — schedule planning, staffing and supervision, progress reporting, management of expectations, budgeting and schedule management are involved in project management.
- Presentation skills — you often need to orally present the project plan and scope to the staff. Therefore, good presentation skills are required.

(D) Steps
1. Review system problems, opportunities, and directives, as well as the project scope.
2. Select the appropriate FAST template that supports different strategies and/or different systems development goals.
3. Assign specific people to each FAST role. A person may play several roles. An executive of OPIC can be a system owner and a system user at the same time.
4. Estimate the time required for each project activity, assign roles to activities and construct a schedule.
5. Negotiate the schedule with the executives, that is, the system owners, adjusting the resources, scope, and expectations as necessary.

Activity 1.4: present the project

(A) Inputs
- The problem statement
- The scope statement
- The project plan
- Project templates
- Project standards
(B) Outputs

- The project charter — a project charter is the formal consolidation of all the inputs to the activity. It acts as an internal contract for the project, should the project continue to the next phase.
- The finalized problem and scope statements.

(C) Applicable techniques

- Interpersonal skills — you need good interpersonal skills to persuade and sell ideas to the staff in OPIC.

(D) Steps

1. Review the deliverables of prior activities.
2. Present the project proposal to the executive business and system managers.
3. Plan an event to communicate the approved project to any and all affected staff. This may take form in a soiree.

2. The study phase

Activity 2.1: model the current system

(A) Inputs

- The project and system scope statement

(B) Outputs

- System models are the main deliverables in this activity. They include a context-diagram, functional decomposition diagram and data model that is used for establishing business rule, policies and vocabularies. A geographical model is also required in this case to identify the operating locations relevant to the system. For instance, you may need to know the locations of the regional offices in New Zealand and Singapore so that you can design a system that can enhance smooth business and system operations of these offices.

(C) Applicable techniques

- Fact-finding — fact-finding methods such as interviewing, sampling, questionnaires and research are again unavoidable in this activity.
- Interpersonal skills — interpersonal skills are related to fact-finding skills. Good interpersonal skills help you to communicate and negotiate better with one another.
- Data, process, and geographic modelling.
- Joint Application Development (JAD) — system models can be developed in several facilitated group sessions with all the OPIC staff.

(D) Steps

1. Review the scope statement completed in the survey phase.
In addition to the traditional fact-finding techniques, JAD sessions can be conducted to gather facts and information about the current system of OPIC.

3 Draw the system models, that is, the interface, data, process and geographic models.

4 Verify the system models so as to enhance your understanding of OPIC’s current systems.

Activity 2.2: analyse business processes

(A) Inputs
• The system models

(B) Outputs
• Process analysis models
• Process analysis data

(C) Applicable techniques
• Process analysis
• Process modelling

(D) Steps
1 Refine process models to include all possible work flows and data flows that can occur in the business area under examination. This is essential because of the different systems implemented in the subsidiary companies. Some companies may experience dramatic changes in their business processes to adapt to the new system. Therefore, detailed analysis and refinement of their business processes are necessary.

2 Analyse throughput and response time, as well as any average delays that may occur for each primitive business process of OPIC.

3 Analyse cost and value added for each business process. Identify candidates for elimination, consolidation, and optimization.

Activity 2.3: analyse problems and opportunities

(A) Inputs
• The problem statement
• Problems and opportunities
• Causes and effects

(B) Outputs
• Cause-effect analysis

(C) Applicable techniques
• Fact-finding — fact-finding methods such as interviewing, sampling, questionnaires and research are needed to both identify and analyse the problems and opportunities.
• Interpersonal skills — good interpersonal skills help you to maintain a focus on problems and resolve conflicts.

• Cause-effect analysis — it can help the project team avoid a premature concern with solutions.

• Joint Application Development (JAD) — rapid problem analysis can be done by using the JAD.

(D) Steps
1 Review the problem statement completed in the survey phase.

2 Collect facts and gather information about the perceived problems and opportunities in the current systems of OPIC. For example, the system at the New Zealand office is in some ways better than the others. We therefore collect information about the features of that system and try to exploit any opportunities that may be found in later activities.

3 Analyse and document each problem and opportunity.

Activity 2.4: establish system improvement objectives and constraints

(A) Inputs
• The system models
• The cause-effect analysis

(B) Outputs
• System improvement objectives and constraints

(C) Applicable techniques
• Interpersonal skills — good interpersonal skills help you to maintain a focus on problems and resolve conflicts.

• Benefit analysis — tangible and intangible benefit estimation techniques are required in this activity.

• Joint Application development (JAD) — rapid brainstorming can be done by applying the JAD method. It is also a good technique for resolving conflicts.

(D) Steps
1 Review scope and problem analyses from the prior activities.

2 Try to solve each problem and take advantages of each opportunity by negotiating business-oriented objectives.

3 Try to find out any possible constraints that may limit your ability to fully achieve objectives with the OPIC staff during the JAD sessions.

Activity 2.5: modify project scope and plan

(A) Inputs
• The system models
• The cause-effect analysis
• The system improvement objectives and constraints

(B) Outputs
• A revised project plan
• A detailed definition phase plan

(C) Applicable techniques
• Process management — process management defines all the standards such as business rules and policies for this project.
• Project management — the tasks involved in project management are schedule planning, staffing and supervision, progress reporting, management of expectations, budgeting and schedule management.
• Presentation skills — you often need to orally present the project plan and scope to the staff. Therefore, good presentation skills are required.

(D) Steps
1. Review the original plan.

2. Review the systems models, problems and opportunities, cause-effect analyses, system improvement objectives, and scope.

3. Estimate the time required for each project activity in the definition phase.

4. Redefine the baseline estimates for the overall project plan if necessary.

5. Renegotiate the scope, schedule and/or budget with the executives i.e. the system owners of OPIC if necessary.

Activity 2.6: present findings and recommendations

(A) Inputs
• The system models
• The cause-effect analysis
• The system improvement objectives and constraints
• The revised project plan

(B) Outputs
• A detailed study findings

(C) Applicable techniques
• Interpersonal skills — good interpersonal skills help you to persuade, write, speak and sell ideas to the OPIC staff more easily.

(D) Steps
1. Review all the deliverables of the prior activities.

2. Write detailed study findings.
3 Present the findings to the executives, that is, the system owners.
4 Present findings to all the staff at OPIC.

3 The definition phase

Activity 3.1: outline business requirements

(A) Inputs
• The system improvement objectives

(B) Outputs
• A requirements statement

(C) Applicable techniques
• Interpersonal skills — good interpersonal skills are necessary for you to maintain a focus on the requirements of OPIC.

• Joint Application Development (JAD) — JAD is preferred for rapidly outlining business systems requirements. It is also a good technique for resolving conflicts.

(D) Steps
1 Review and refine the system improvement objectives.
2 For each objective, you need to identify and document: any business events to which the system must respond; any special policies, processing, or decisions that must be made to adequately respond to each event or input; any information that must be produced or made available; the normal business outputs of OPIC’s business events.
3 Compare the system improvement objectives and requirements against the original problem statements from the study phase.

Activity 3.2: model business systems requirements

(A) Inputs
• The requirements statement outline

(B) Outputs
• The system models, that is, the data, processes, interfaces, and geographic models

(C) Applicable techniques
• Fact-finding — fact-finding methods are required for the modelling processes.

• Data modelling — data modelling techniques can be used for expressing the business requirements for data that will be stored in the database of OPIC’s system.

• Process modelling — it is used for expressing business process requirements, work flow, inputs and outputs of OPIC.
- Object modelling — as object-oriented design is one of the major concerns of our project, the techniques of object modelling are necessary.

- Distributed modelling — it is used for expressing the business geography to be supported by the system.

- Joint Application Development (JAD) — system models can be developed in several facilitated group sessions with the OPIC staff.

**(D) Steps**

1. Review the system improvement objectives and requirements statement outline.

2. Collect or retrieve any system models that may have been developed in prior projects. Look into details of the different system models acquired by each subsidiary company.

3. Draw the interface model whose purpose is to establish the scope and the boundary for the entire project.

4. Construct, verify and synchronise the data, process, and object models.

**Activity 3.3: build prototypes**

**(A) Inputs**

- The system requirements outline
- The system models

**(B) Outputs**

- Prototypes of selected inputs and outputs

**(C) Applicable techniques**

- Prototyping — prototyping can speed up the project development process because it is based on design and construction of actual program components.

- Technology — many rapid application development (RAD) technologies are needed for prototyping.

**(D) Steps**

1. Review the system improvement objectives and requirements statement outline.

2. Study any system models that may have been developed.

3. Work directly with the staff of OPIC and then construct input and output prototypes for each business event. For instance, you may key in a client's information into a database prototype and generate a sample report of that client to see if the prototypes are working desirably.

4. Return to the system modelling activity to formalize the requirements that have been discovered through the above prototyping steps.
Activity 3.4: prioritize business requirements

(A) Inputs
• The updated business requirements outline
• The updated system models
• The prototypes

(B) Outputs
• Business requirements’ priorities

(C) Applicable techniques
• The technique needed in this activity is the ability to analyse the business requirements and to categorise them as mandatory, desirable or optional. The analysis helps you to come up with a business requirements’ priorities.

(D) Steps
1 Categorize each input and output as mandatory, optional or desirable.
2 Rank the optional and desirable requirements.
3 Define system versions.

Activity 3.5: modify the project plan and scope

(A) Inputs
• The initially completed system models
• The prototypes
• The business requirements priorities

(B) Outputs
• A revised project plan
• A detailed configuration plan
• A detailed design plan

(C) Applicable techniques
• Process management — process management defines all the standards such as business rules and policies for this project.
• Project management — schedule planning, staffing and supervision, progress reporting, management of expectations, budgeting and schedule management are involved in project management.
• Presentation skills — you often need to orally present the project to the staff. Therefore, good presentation skills are required.

(D) Steps
1 Review the original plan.
2 Review the up-to-date business requirements outline, system models, prototypes, and business requirements’ priorities.
3. Estimate the time required for each project activity in the design phase.

4. Redefine baseline estimates for the overall project plan if necessary.

5. Renegotiate the scope, schedule, and/or budget with the OPIC executives as they are the owners of the system.
Case Study Exercise 5: Orient-Pacific Insurance Corporation

Introduction

The section allows you to exercise the process analysis skills that you have learned in Unit 5. This is not easy, but analytical skill can only be developed with practice. There will be times when you feel frustrated by not knowing what to do next, or even where to start. When this happens, review the relevant sections in Unit 5, then start again. Remember, analysis is iterative.

Remember too that study is about changing the way you perceive and think about the world. Information and skills that do not fit your current patterns of thought are likely to be the prime mover in that change. Once again, the assignment that follows this unit requires you to follow a similar process related to a different case study, the HK Internet Marketing Co.

Read again the description of Orient-Pacific Insurance Corporation presented in Unit 1.

Problem statement

The project to replace the different and incompatible information systems with a standard, corporate-wide information system is in the Systems Analysis Phase. Interviews have been held and insurance systems similar to those of OPIC have been reviewed.

You are a systems analyst from the Information Systems department. You are required to document your understanding of systems processing requirements. Use the information given in this case study to evaluate data flows, data stores, processes and external agents. Then, using the techniques you learned in Unit 5, produce a set of Data Flow Diagrams, data dictionary and process logic specifications.

How do you complete this exercise? Perhaps the best way to tackle a modelling exercise that is presented in text is to look for key verbs and key nouns. Key verbs often denote important functions of a system. Key nouns often denote major data flows, stores or elements. Begin by sketching a Diagram 0 DFD as it allows you express these key functions and data. Then work down into child diagrams and up to a context diagram.

After you have completed your model, or if you are having particular troubles, check the worked solution below. Your model may be somewhat different, but it should not be essentially different. That is, it should contain similar data and functional elements, even though their names and some of the ways that they have been grouped may be different.
Worked solution

This is one model of the situation. Do not consider this as the only correct solution. Systems analysis is **not** like mathematics. This system can be represented by many different models. These models may be somewhat different to each other, but they should not be **essentially** different. This lack of a definitive answer is one of the most difficult obstacles for learners new to systems analysis to overcome. You need to have confidence in your own solution. Does it describe the system clearly and concisely?

When analysing systems requirements from a process point of view, you are trying to specify data flows and data stores, external agents of information and processes that are needed in a system to capture, manipulate and retrieve information.

Refer to the background description of Orient-Pacific Insurance Corporation in **Unit 1**. Paragraphs 1 and 2 are descriptions of the organizational situation of OPIC. While this is vital for an effective systems design, there is little to interest you in your role as process modeller. In paragraph 3, however, you can see that:

‘the insurance industry issues insurance policies to clients ... this process is called ‘underwriting’’.

On your DFD you draw a process called UNDERWRITE POLICY. This has a data flow, POLICY, that goes from it to an external agent, CLIENT. Your Level 0 DFD has begun. Notice that a process is described by a verb and a noun, data flows and external agents are described by nouns.

You should make entries in your data dictionary for data flows and data stores. You should also make some estimate of what each will contain. For example, a policy has a POLICY-NUMBER to identify it. It also contains CLIENT-NAME, details of an asset insured and so on.

As paragraph 3 proceeds, you read some processing rules:

‘premium ... is a portion of the value of the asset depending on the risk’

Now, you do not have enough information here to specify a CALCULATE PREMIUM process. However, you do have enough to recognise that such a process exists and that it will contain a statement something like:

\[
\text{Calculate premium} = \frac{\text{asset-value}}{\text{risk}}
\]

Add this entry to your process logic specifications. You should produce process logic specifications for all elementary processes on your DFDs.

Later in the background, you find the need for a process called something like PRODUCE INVOICE. This is where a premium calculation is made. You might now delete CALCULATE PREMIUM and move its contents into a larger process PRODUCE INVOICE.

As you continue to analyse the OPIC description, you discover more and more detail about its data and processes in an iterative manner.
Data Flow Diagrams

Figure 5.8 OPIC context diagram.
* premium payments

**Figure 5.9**  OPIC Diagram 0.

**Figure 5.10**  OPIC DFD 2 — process premiums.
**Figure 5.11** OPIC DFD 3 — analyse exposure.

**Figure 5.12** OPIC DFD 5 — product maintenance.

### Data dictionary

- **approved-proposal** = [client-number] + regional-office-name + client-name + client-address + client-date-of-birth + { related-client-number } + proposal-date + property-address + { item-description + item-value + product-number }

- **claims** = { claim }

- **claim** = claim-number + policy-number + claim-date + claim-amount

- **clients** = { client }
client = client-number +
      client-name +
      client-address +
      client-date-of-birth

commission = commission-date +
             regional-office-name +
             policy-number +
             commission-amount

exception-report = exception-report-date +
                   { claim-number +
                     { related-client-number +
                       related-client-claim-amount } }

exposure-data = [ exposure-report / reinsurance-data ]

exposure-report = exposure-report-date +
                 { country-name +
                   regional-office-name +
                   { product-type +
                     total-insured-amount } +
                   total-sum-insured }

invoice = invoice-number +
       invoice-date +
       client-name +
       client-address +
       policy-number +
       date-from +
       date-to +
       property-address +
       { item-description +
         item-value +
         item-premium } +
       invoice-amount

payment-period = [ annually | quarterly | monthly ]

payout = claim-number +
       payout-date +
       claim-payout-amount

policies = { policy }

policy = policy-number +
       client-number +
       payment-period +
       property-address +
       { item-description +
         item-value +
         item-product-number +
         ( reinsurance-policy-number ) }

premium-payments = { premium }
premium = policy-number +
  premium-payment-date +
  premium-payment-amount +
  date-from +
  date-to

products = { product }

product = product-number +
  product-description +
  premium-percentage +
  commission-percentage +
  estimated-management-expenses

product-changes = transaction-type +
  product-number +
  ( product-description ) +
  ( premium-percentage ) +
  ( commission-percentage ) +
  ( estimated-management-expenses )

product-performance = performance-report-date +
  product-number +
  product-description +
  total-premium-payments +
  total-claims +
  estimated-management-costs

proposal = client-name +
  client-address +
  client-date-of-birth +
  proposal-date +
  property-address +
  { item-description }

regional-office = regional-office-name +
  country-name

reinsurance-proposal = reinsurance-policy-number +
  reinsurance-premium-amount +
  reinsurance-date-from +
  reinsurance-date-to +
  reinsurance-company-name

transaction-type = [add | change | delete ]

Process logic specifications

1 Underwrite policy.
   • This process records new insurance policies.
Accept approved-proposal
Check details
If client-number not present,
    allocate new client-number and add new client record
    record new client relations
Allocate policy-number
Store policy record
For each property-item,
    check product-code
    store property-item.

2.1 Record payment.

• This function records receipt of a policy premium payment.

Accept premium
Retrieve policy using policy-number
For each item
    retrieve product using item-product-number
    calculate item-premium =
    (item-value x premium-percentage ) + (item-value x
    commission-percentage ) + estimated-management-
    expenses
    add item-premium to premium-amount
    calculate item-commission = item-value x commission-
    percentage
    add item-commission to commission-amount
If premium-payment-amount = premium-amount
    Write premium-payments
    Write commission
Else
    reject premium-payment

2.2 Produce invoice

• This function produces an invoice for client premiums

For each policy,
    Retrieve last premium-payment
    If payment not received
        For each item
            retrieve product using item-product-number
            calculate item-premium =
            (item-value x premium-percentage ) + (item-value x
            commission-percentage ) + estimated-management-
            expenses
            add item-premium to invoice-amount
        Case of payment-period
            • monthly
                divide invoice-amount by 12
            • quarterly
                divide invoice-amount by 4
    Write invoice.
3.1 Produce exposure report.

- Produce a report that summarises total exposure of OPIC to claims in a particular area.

For each area
  - For each product-type,
    - Retrieve product
  - For each policy
    - Retrieve policy
    - Sum the amount-insured
  - Write total-sum-insured for this product-type
  - Write total-sum-insured for this area

3.2 Produce reinsurance

- This function produces a reinsurance proposal for another insurance company for a policy where management feels that OPIC is too exposed to handle it alone.

Accept exposure-data
Retrieve relevant policy
Update with reinsurance-policy-number
Store policy
Produce reinsurance-proposal

4 Process claims

- This process examines insurance claims and determines a payout figure.

Accept claim
Check details against authorizing agency (police, death registrar, etc.)
Retrieve client
Check client details
Retrieve relevant policy
Determine payout figure and generate payout
Store claim record

5.1 Maintain product

- This function updates product changes

Accept product changes
Case of maintenance code
  - add
    - Check if product exists, if not add new product
  - delete
    - Retrieve matching product
    - Delete matching product
  - change
    - Retrieve matching product
    - Change attributes
    - Store product
5.2 Produce product report

- It is important to see how a product is performing in order to adjust standard premiums and so on.

For each product-type,
  Retrieve product
For each month,
  For each policy
    Retrieve and sum premium-payments
    Retrieve and sum claims
  Write monthly product report
Write annual product report

6 Produce exception report

- This function produces a report of unusual claims

For each claim
  Retrieve clients who are related to the client making the claim
  If there are any claims made by these relatives
    Write exception report.

7 Approve proposal

- This function examines a proposal from a client and if it is considered safe it is approved.

Accept proposal
Examine proposal against acceptance criteria
If acceptable
  write approved-proposal
Else
  reject proposal.

System Architect or other CASE tools

You should now understand the iterative nature of developing process models. You will have discarded a number of early versions before producing your final version. CASE tools such as System Architect make this labour intensive work easier. They enable you to develop and change process models automatically and produce very neat diagrams, even for your draft copies. Using any CASE tool or a diagramming software will save you a lot of time and enable you to produce work of a professional standard.
Case Study Exercise 6: Orient-Pacific Insurance Corporation

Introduction

The section enables you to use the systems analysis skills that you have learned in Unit 6. In particular you demonstrate your understanding of data modelling techniques. Again, this is not easy, but analytical skill can only be developed with practice.

You should now understand the iterative nature of systems analysis. Use System Architect or the drawing template (ABC SnapGraphics) provided to develop your data model rather than pencil and paper. You will save time by not throwing away your draft versions before producing your final version.

Problem statement

Process analysis of the Orient-Pacific Insurance Corporation system is complete. A draft set of Data Flow Diagrams, data dictionary and process logic specifications is available. Your next task is to complement the process model by producing a data model.

You use techniques you learned in Unit 6 to produce a data model. You will almost certainly find that you change some of your previous ideas expressed in Data Flow Diagrams, data dictionary and process logic specifications. This is natural. You should amend your previous work to embody your new ideas.

How do you complete this exercise? You use information given in the case study and from your previous analysis. Refer to data flows, data stores, processes and external agents identified in the case study section of Unit 5. Expect to revise early versions of your data model as your understanding of OPIC data develops.

After you have completed your model, or if you are having particular difficulties, check the solution. Your model may be somewhat different, but it should not be essentially different. That is, it should contain similar entities and relationships, even though their names and some of the ways that they have been grouped may be different.

Worked solution

This is one model of the situation. Do not consider this as the only correct solution. Systems analysis is not like mathematics. A system can be represented by many models. These models may be somewhat different from each other, but they should not be essentially different. This lack of a definitive answer is one of the most difficult obstacles for learners new to systems analysis to overcome. You need to have confidence in your own solution. Does it describe the system data clearly and concisely?
You did much of the work of isolating data to be stored in Unit 5. In producing a data model for OPIC, your task is to organize that data into entities. Then you specify relationships between them.

Looking back at your process model from Unit 5 you should see data stores CLIENT, POLICY, PRODUCT, CLAIM and PREMIUM-PAYMENT. This is an excellent basis for determining your entities.

First, check each data store to ensure that there is a key field that uniquely identifies each instance. POLICY, for example, has POLICY-NUMBER as a key. However, PREMIUM-PAYMENT does not have a natural key. There may be many payments for each policy as it is renewed year after year or as a client pays a premium monthly. This entity requires a concatenated key of POLICY-NUMBER + PAYMENT-DATE.

Secondly, check for logical arrangements of attributes. Most of the data stores are already simple structures. However, POLICY has a repeating group, ITEM (for example, a POLICY may cover a small art collection of ten oil paintings and seven sculptures — each piece is described and valued separately and different premiums apply to different kind of works). You make ITEM into a new data store with a foreign key of POLICY-NUMBER and another attribute, ITEM-NUMBER, to identify each item uniquely.

Now consider the relationships between entities. A POLICY has many ITEMS, many PREMIUMs and possibly many CLAIMs. A reinsurance policy involves many ITEMS. OPIC insurance products have, hopefully, many ITEMS. Look back to your process descriptions and see how each needs to navigate through data stores to retrieve data it needs.

Notice the recursive relationship between CLIENTs. This is necessary for production of an exception report. Here is a solution data model for OPIC.

### Data model

Your data dictionary is changed to reflect your improved data analysis. Your process descriptions must also be reviewed in the light of your new data stores. Revised data stores, with keys underlined are:

```plaintext
claim =
  claim-number +
  policy-number +
  claim-date +
  claim-amount

client =
  client-number +
  client-name +
  client-address +
  client-date-of-birth
```
commission =
    policy-number +
    commission-date +
    regional-office-name +
    commission-amount

item =
    policy-number +
    item-number +
    item-description +
    item-value +
    product-number +
    ( reinsurance-policy-number )

policy =
    policy-number +
    client-number +
    payment-period +
    property-address +
    { item-number }

premium =
    policy-number +
    premium-payment-date +
    premium-payment-amount +
    date-from +
    date-to

product =
    product-number +
    product-description +
    premium-percentage +
    commission-percentage +
    estimated-management-expenses

regional-office =
    regional-office-name +
    country-name

reinsurance-proposal =
    reinsurance-policy-number +
    reinsurance-premium-amount +
reinsurance-date-from +
reinsurance-date-to +
reinsurance-company-name

Figure 6.14 An E-R diagram of OPIC.
Case Study Exercise 7: Orient-Pacific Insurance Corporation

Introduction

This section enables you to use the network modelling skills that you have learned in Unit 7. This may not be easy, but such analytical modelling skills can only be developed with practice.

You should now understand the iterative nature of systems analysis. Use System Architect’s flowcharting tool or the network modelling drawing template (ABC SnapGraphics) provided on the OUHK website to develop your network model. As previously mentioned, using any computer-supported diagramming or CASE tool is better than pencil and paper. You will save time by not throwing away your draft versions before producing your final version.

Orient-Pacific Insurance Corporation

Now that you have completed your process and data analysis of the Orient-Pacific Insurance Corporation (OPIC) system, your next task is to complement these analytical models with geographical distribution using logical network modelling.

To expand on the OPIC case, include the following scenario information:

1) OPIC has Hong Kong offices in Central, Mong Kok, Shatin and Chai Wan.

2) The headquarters and existing information systems are located in Central.

3) OPIC is going to establish a network link to a re-insurance group called HK-RIG.

4) The future system would have an Internet access interface for existing and potential customers for policy quotes and information.

Problem statement

Use the modelling techniques you learned in Unit 7 to produce your network models. Again, you may find that you need to change some of your previous ideas expressed in data flow diagrams (DFDs), entity relationship (ER) diagrams, and data dictionary and process descriptions. This is expected. You should amend your previous work to embody your new ideas.

To complete this exercise, use information given in the case study and from your previous analysis. Refer to the geographic information regarding OPIC from Unit 1, plus the processes in Unit 5 and the data model in Unit 6. Expect
to revise early versions of your process and data models as your understanding of OPIC data develops.

You are expected to develop a location connectivity diagram (LCD) and a location decomposition diagram (LDD) for OPIC, in addition to the following synchronization matrices:

- a data-to-process CRUD matrix for client and policy entities
- a data-to-location CRUD matrix for client, policy and commission entities
- a process-to-location association matrix for OPIC.

After you have completed your model, or if you are having particular difficulties, check the solution. Your model may be somewhat different, but it should not be essentially different. That is, it should contain similar location partitioning and cross-references of data, processes and locations.

**Worked solution**

This is one representative set of network models of the situation. Do not consider this the only correct solution. Systems analysis is not as precise and definitive as in mathematics. A system can be represented by many models. These models may be somewhat different from each other, but they should not be essentially different. This lack of a definitive answer is one of the most difficult obstacles for learners new to systems analysis to overcome. You need to have confidence in your own solution. Does it describe the system geography, distribution and synchronization clearly and concisely?

Figures 7.4 and 7.5 present OPIC’s LCD and LDD. Note that the location decomposition diagram does not contain the planned geographical extensions to potential new branch offices in Australia, Thailand and Korea. If your LDD has them as well, this is also fine.

![Location Connectivity Diagram for OPIC](image)
The following three cross-reference tables (Figs 7.6 to 7.8) are the synchronization matrices for the data, processes and locations of OPIC.

**Processes:**

1. Underwrite policy
2.1 Record payment
2.2 Produce invoice
3.1 Produce exposure report
3.2 Produce reinsurance
4. Process claims
5.1 Maintain product
5.2 Produce product report
6. Produce exception report
7. Approve proposal

---

**Figure 7.5** Location decomposition diagram for OPIC

**Figure 7.6** Data-to-process CRUD matrix for OPIC’s client and policy entities
### Data-to-location CRUD matrix for OPIC’s client, policy and commission entities

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<td>CR</td>
<td>CRUD</td>
<td>CRUD</td>
<td>CRUD</td>
<td>CRUD</td>
<td>CRUD</td>
<td>CRUD</td>
<td>CRUD</td>
<td>CRUD</td>
</tr>
</tbody>
</table>

**Figure 7.7** Data-to-location CRUD matrix for OPIC’s client, policy and commission entities

### Process-to-location association matrix for OPIC

<table>
<thead>
<tr>
<th>Process</th>
<th>ALL</th>
<th>SS</th>
<th>INDV</th>
<th>SS</th>
<th>SS</th>
<th>SS</th>
<th>SS</th>
<th>SS</th>
<th>SS</th>
<th>SS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underwrite policy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Record payment</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Produce invoice</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Produce exposure report</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Produce reinsurance</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Process claims</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Maintain product</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Produce product report</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Produce exception report</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approve proposal</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 7.8** Process-to-location association matrix for OPIC
Case Study Exercise 8: Orient-Pacific Insurance Corporation

Introduction

This case study section supplies a worked example of how to use the skills you have learned in Unit 8. As with previous exercises, you should attempt to develop your own solution to the problem before looking at the worked solution.

Problem statement

Your next task is to produce a feasibility analysis matrix. You are required to consider two options by producing a tentative cost-benefit analysis and making some judgements of its risk and organizational impacts. Produce a weighted matrix to compare your options.

Your evaluation of your two options should cover detailed cost-benefit analysis, risk analysis, financial evaluation, organizational impact analysis and requirements evaluation. Because the Orient-Pacific Insurance Corporation (OPIC) case study does not contain sufficient relevant information to enable you to complete this evaluation in detail, the worked solution contains comments on evaluation rather than an actual evaluation.

Worked solution

Since the Orient-Pacific Insurance Corporation is considering further expansion of business in the Pacific region, it is important for you, the system analyst, to study the existing system of the company carefully. Knowing the strengths and weaknesses of the existing system enables you to come up with candidate system solutions more easily.

Option 1: a centralized system

The first option proposed a centralized system for OPIC. That means, agents and regional offices no longer hold the corporate data. Rather, all the data will be stored at the Hong Kong headquarters. Most operations will be performed at the main office as well. Regional offices are only responsible for immediate dealings with clients. All the regional offices need to do is to enter client information, which is recorded on paper forms, into the central database.

High-speed telecommunications will be used to link terminals in regional offices to the central computer. Two large mainframes will be required, with one as a fail-safe facility. Powerful data communications and database software installed on high-speed hardware will be needed to cope with the traffic.
Evaluating option 1

Note: this section contains comments on evaluation rather than an actual evaluation. In your assignments, you are required to complete the actual evaluation.

- **Cost-benefit analysis**: No dollar figures are available. You need to consider development costs, implementation costs and operational costs. All of these are incurred only in Hong Kong (this enhances control and eliminates exchange rate problems). For a centralized system, implementation costs, definitely, and operational costs, possibly, are less than for a distributed solution. Your project manager is expected to estimate these costs. You then need to consider revenue raising, expense reduction and increased productivity benefits. This system is not intended to raise revenue but is expected to reduce operating expenses and increase productivity. Your users are expected to estimate benefits.

- **Risk analysis**: This centralized approach uses tested technology, but is dependent on high-speed telecommunications to link terminals in regional offices to the central computer. The OPIC environment is reasonably stable and well understood. Users are expected to be comfortable with computer-based systems and to have a positive attitude to systems development. There is no information regarding the experience or skills of the information systems developers. This is probably a low to medium risk option.

- **Financial evaluation**: No figures are available. Your finance department is expected to advise on company financial evaluation methods.

- **Organizational impact analysis**: Largely confined to Hong Kong, where staff must be consulted about changes to jobs and procedures.

- **Requirements evaluation**: This option appears to meet the requirements closely.

Option 2: a distributed system

The second option decentralizes the system to regional offices. Each regional office has the responsibility of running the business of OPIC. They can keep their client data, which will also be stored in the database at the headquarters, and control the operations.

Like Option 1, high-speed telecommunications will be needed to link local processors in regional offices to the central computer in Hong Kong. A medium-sized mainframe and mini-computers will be needed in each regional office.

Evaluating option 2

Note: this section contains comments on evaluation rather than an actual evaluation. In your assignments, you are required to complete the actual evaluation.

- **Cost-benefit analysis**: No dollar figures are available. You need to consider development costs, implementation costs and operational
costs. For a distributed solution, implementation costs, definitely, and operational costs, possibly, are more than for a centralized solution. Your project manager is expected to estimate these costs. You then need to consider revenue raising, expense reduction and increased productivity benefits. This system is not intended to raise revenue but is expected to reduce operating expenses and increase productivity. Your users are expected to estimate the benefits.

- **Risk analysis:** This distributed approach uses tested technology in each national office, but is dependent on computer-to-computer communications. The OPIC environment is reasonably stable and well understood. Users are expected to be comfortable with computer-based systems and to have a positive attitude to systems development. There is no information regarding the experience or skills of the information systems developers. This is probably a low to medium risk option.

- **Financial evaluation:** No dollar figures are available. Your finance department is expected to advise on company financial evaluation methods.

- **Organizational impact analysis:** Staff in all locations must be consulted about changes to jobs and procedures.

- **Requirements evaluation:** This option is considered to meet the requirements closely.

**Recommendations**

The analysis team found that either a centralized or a distributed computer-based information system is both feasible and necessary to satisfy the organization’s requirements.

The main determinant in deciding between the alternatives is the organizational structure that OPIC wants to pursue over the next seven years. If it wishes to consolidate the organization and enforce standards across all offices, then centralized architecture would facilitate this. On the other hand, if the national identity and relevance of OPIC to its clients in individual countries is to be preserved, then a distributed system with corporate oversight would be preferred.

The analysis team recommends that:

- management considers these alternatives and selects the architecture that best meets the future direction of OPIC.

- management approves a project to produce a detailed specification of the system.
<table>
<thead>
<tr>
<th>Feasibility criteria</th>
<th>Weight</th>
<th>Option 1</th>
<th>Option 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operational Feasibility</strong></td>
<td>30%</td>
<td>Since all the operations are done at the Hong Kong headquarters, the workload of regional offices is reduced.</td>
<td>As regional offices are responsible for their own operations, each subsystem can be designed to fully support the users' required functionality.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rating: 60</td>
<td>Rating: 100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Score: 30% *60=18</td>
<td>Score: 30% *100=30</td>
</tr>
<tr>
<td><strong>Technical feasibility</strong></td>
<td>20%</td>
<td>2 mainframe computers are needed. Data can be recovered quickly in case of a system breakdown because one of the mainframes is served as a fail-safe facility.</td>
<td>A medium+D67-size mainframe and minicomputers are kept in each regional office so that, instead of relying on a centralized system, transactions can be processed more quickly.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rating: 50</td>
<td>Rating: 95</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Score: 20% *50=10</td>
<td>Score: 20% *95=19</td>
</tr>
<tr>
<td><strong>Economic feasibility</strong></td>
<td>40%</td>
<td>Approximately $400,000</td>
<td>Approximately $418,040</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Approximately 3.3 years</td>
<td>Approximately 3.5 years</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Approximately $325,500</td>
<td>Approximately $306,748</td>
</tr>
<tr>
<td></td>
<td></td>
<td>To be supplied by the financial department</td>
<td>To be supplied by the financial department</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rating: 90</td>
<td>Rating: 85</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Score: 40% *90=36</td>
<td>Score: 40% *85=34</td>
</tr>
<tr>
<td><strong>Schedule feasibility</strong></td>
<td>10%</td>
<td>Less than 3 months.</td>
<td>9–12 months</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rating: 95</td>
<td>Rating: 60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Score: 10% *95=9.5</td>
<td>Score: 10% *80=8</td>
</tr>
<tr>
<td><strong>Ranking</strong></td>
<td>100%</td>
<td>73.5</td>
<td>91</td>
</tr>
</tbody>
</table>

*Figure 8.4  Feasibility analysis matrix for OPIC*
Note: Again, there is insufficient information in the OPIC case study to complete a weighted matrix. The ratings and weighting factors here are all made-up figures. You should consider executive and user management input when determining criteria, weighting factors and ratings.
Case Study Exercise 9: Orient-Pacific Insurance Corporation

Introduction

This case study section allows you to exercise the systems design skills that you have learned in Unit 9. In particular, you can demonstrate your understanding of an overall approach to software design.

As with the previous case study exercises, you should attempt to develop your own solution to the problem before looking at the worked solution.

Problem statement

Your updated feasibility report for the Orient-Pacific Insurance Corporation (OPIC) has been accepted by management, which has decided to develop a decentralized system (option 2 in the worked solution to the case study in Unit 8). You can now embark on systems design. You should use the techniques you have learned in Unit 9 to produce your system design.

List all the activities involved in configuration, procurement, and design and integration, along with their inputs, outputs, required techniques and steps. You should attempt this exercise before looking at the worked solution provided below.

Worked solution

FAST systems design methods

As your system analysis has been accepted by the OPIC management, you can now proceed to the system design by using the FAST methodology. In this case study, we will examine the configuration, procurement, and design and integration phases. These involve the following activities:

1  the configuration phase
   • defining candidate solutions
   • analysing the feasibility of alternative solutions
   • recommending a system solution.

2  the procurement phase
   • researching technical criteria and options
   • soliciting proposals from vendors
   • validating vendor claims and performance
   • evaluating and ranking vendor proposals
• awarding the contract and debriefing vendors
• establishing integration requirements.

3. The design and integration phase
• analysing and distributing data
• analysing and distributing processes
• designing databases
• designing computer outputs and inputs
• designing the online user interface
• presenting and reviewing the design.

The outline above is to help you to get a brief picture of the activities to be done in each phase. You should now be able to work out the details, which are as follows.

The configuration phase

Defining candidate solutions

• Inputs
  - the business requirements outline defined during systems analysis
  - hardware and software specifications from various sources
  - approved technology architecture
  - technical solutions that come up during the analysis stage (however, they are presented as candidate solutions in this stage).

• Outputs
  The principal outputs of this activity are the candidate solutions for a new system, which may be expressed in a candidate matrix. In OPIC’s case, we have come up with two candidates: a centralized system and a distributed system (refer back to the worked solution to the case study in Unit 8).

• Applicable techniques
  Fact finding: You need to use fact-finding methods to interact with outside sources, such as hardware and software vendors and stores, to gather product specifications for each candidate.

• Steps
  1. Review the business requirements of OPIC outlined in the definition phase of systems analysis.
  2. Review the technology architecture to determine the hardware or software standards required for the candidate solutions.
3 Brainstorm alternative solutions that fulfil the business requirements and identify solutions that were suggested before the design phase. This can be done through JAD sessions with the staff at OPIC.

4 Research technical specifications detailing the characteristics of each candidate solution.

**Analysing feasibility of alternative solutions**

- **Inputs**
  - the two candidate solutions of the new system
  - hardware and software costs
  - feedback from customer references.

- **Outputs**
  A completed feasibility analysis for each candidate solution.

- **Applicable techniques**
  - Fact finding: In order to complete a fair feasibility analysis, fact-finding methods are required to obtain costs, opinions and other facts about candidates from a variety of sources.
  - Feasibility analysis: Feasibility assessment techniques and skills are required for performing the four feasibility tests (operational, technical, schedule and economic).

- **Steps**
  1. Collect all the cost information for each product.
  2. Discuss the two candidate solutions with the management and staff at OPIC in order to obtain a feel for how well the solution would be received from their perspectives.
  3. Obtain feedback from the companies who own or have used the hardware and software products. Product reviews that appear in various periodicals are also good sources of feedback.
  4. Determine what economic measures to use to conduct the cost-benefit feasibility analysis. Measures such as payback analysis, return on investment and net present value may be required.
  5. Evaluate the two candidate solutions independently for operational, technical, economic and schedule feasibility.
  6. Document your analysis of each candidate solution.
Recommending a system solution

- **Inputs**
  - the project plan
  - the system size and scope estimates
  - the two candidate solutions
  - the completed feasibility analysis.

- **Outputs**
  - a formal written system proposal to the management of OPIC; that is, the system owners
  - changes to the proposed design.

- **Applicable techniques**
  - Feasibility assessment: You need good feasibility assessment skills and techniques to assess the four feasibility tests.
  - Report writing: In order to communicate information about the systems development project, you need excellent report-writing skills to inform and/or persuade the staff of OPIC; that is, the systems users.
  - Verbal presentations: You often need to present the proposed system to the staff verbally; therefore, good presentation skills are required.

- **Steps**
  1. Establish the weighting to be given to each feasibility criterion.
  2. Rank the two candidates and determine the candidate with the best overall criteria ranking. We have in this case chosen option 2, a distributed system for OPIC.
  3. Prepare a formal written systems proposal containing the analysis and recommendations.
  4. Prepare and present an oral recommendation to the management of OPIC.

The procurement phase

Researching technical criteria and options

- **Inputs**
  - hardware and software requirements established in the configuration phase
  - product and vendor facts from various sources.
• Outputs
  - lists of potential vendors
  - product options
  - technical criteria.

• Applicable techniques
  Fact finding: Fact-finding methods are used to obtain additional facts about products from various sources.

• Steps
  1 Conduct research to collect important facts concerning the hardware/software product and vendor.
  2 Identify potential vendors from which the products might be obtained.
  3 Review the product, vendor and supplier findings.

Soliciting proposals from vendors

• Inputs
  - the potential vendors
  - technical criteria that resulted from the previous research activity.

• Outputs
  - request for proposals (RFP)
  - request for quotations (RFQ).

• Applicable techniques
  - Report writing: Excellent report-writing skills are required to produce requests for proposals and requests for quotations, so that systems requirements can be clearly communicated to prospective vendors.
  - Developing questionnaires: Good questionnaires, included in the RFP, are needed to validate vendors’ claims.
  - Data and process modelling: These are useful for communicating requirements in the RFP.

• Steps
  1 Collect and review the facts about potential vendors and technical criteria.
  2 Prepare a request for quotation and send to all distributors from which the products can be obtained.
  3 Prepare a request for proposals to solicit competitive proposals and quotes for some of the products required by the proposed system.
Since the new system has significant effect on OPIC’s future business development, important issues and questions must be addressed to the vendors. Therefore, meetings with vendors may be held to achieve this purpose.

Validating vendor claims and performance

- Inputs
  Proposals and quotations from prospective vendors.

- Outputs
  Validated proposals: Validated proposals are those vendor proposals accepted by the system designers.

- Applicable techniques
  Interpersonal skills: Good interpersonal skills and relations can help negotiating and communicating with one another easily.

- Steps
  1. Collect and review all facts pertaining to the product requirements and features.
  2. Review vendor proposals and eliminate any proposal that does not meet all the mandatory requirements.
  3. For each vendor proposal not eliminated, validate the vendor claims and promises against validation criteria.

Evaluating and ranking vendor proposals

- Inputs
  - the validated proposals
  - a set of evaluation criteria that is used to rank the validated proposals.

- Outputs
  A hardware and/or software recommendation.

- Applicable techniques
  Feasibility assessment: An ability to perform a feasibility assessment is important in this activity.

- Steps
  1. Collect and review all details concerning the validated proposals.
  2. Establish an evaluation criteria and scoring system.
  3. Evaluate and rank the vendor proposals.
Awarding contract and debriefing vendors

- Inputs
  - the validated proposals
  - the evaluation criteria to be used to rank the validated proposals.

- Outputs
  - a hardware and/or software recommendation
  - a contract order for the winning vendor(s)
  - a debriefing of proposals for the losing vendors.

- Applicable techniques
  Presentation skills: Good verbal presentation skills are required to persuade the management at OPIC to follow the recommendations.

- Steps
  1. Present a hardware and software recommendation to the management at OPIC for final approval.
  2. Negotiate a contract with the awarded vendor.
  3. Provide a debriefing of proposals for the losing vendors.

Establishing integration requirements

- Inputs
  The hardware and/or software specifications of the awarded vendor’s products.

- Outputs
  A set of integration requirements.

- Applicable techniques
  Data and process modelling: Since data and process models are frequently used to document systems in this activity, good data and process modelling techniques are required.

- Steps
  1. Collect and review the hardware and software specifications of the awarded vendor’s product.
  2. Review data and process models for the new system.
  3. Revise the data and process models to reflect the integration or impact of new products.
The design and integration phase

Analysing and distributing data

- Inputs
  The existing data and process models from system analysis.

- Outputs
  - normalized distributed data models.
  - revised process models.

- Applicable techniques
  - Data modelling: Good data modelling techniques are required for data models that allow development of ideal database solutions.
  - Process modelling: Process modelling techniques may be required to revise any process models established in preceding activities.
  - Data analysis and normalization: These two techniques are required to keep the data models as concise as possible.

- Steps
  1. Collect the existing data and process models constructed during systems analysis.
  2. Perform data analysis and normalization on the data models.
  3. Determine how the data will be distributed across the OPIC headquarters and regional offices.
  4. Perform event analysis on each data item on the data model.
  5. Revise any impacted models to reflect new business events and conditions.

Analysing and distributing processes

- Inputs
  - the existing entity-relationship (ER) diagrams
  - a detailed application architecture
  - the process models.

- Outputs
  - the distributed process models
  - design units.

- Applicable techniques
  - physical database design
  - physical process modelling.
• Steps
  1 Collect and review existing data and process models.
  2 Determine and categorize the manual and computer processes.
  3 Establish online versus batch computer processes based on response
time requirements.
  4 Factor the new systems into separate design units.
  5 Develop network topology diagrams to document the locations of
the subsystems. A star topology may be employed for the case of
OPIC.
  6 Distribute data and processes to the subsystems. Document these
decisions in design unit data flow diagrams.
  7 Assign appropriate technology to the different design units.

Designing databases

• Inputs
  The database design units.

• Outputs
  The database design specifications.

• Applicable techniques
  Database design.

• Steps
  1 Collect and review requirements for database design units.
  2 Design the logical schema for the database.
  3 Prototype the database and test it.

Designing computer outputs and inputs

• Inputs
  The input and output design requirements specified during systems
analysis.

• Outputs
  The input and output design specifications.

• Applicable techniques
  - input design and prototyping
  - output design and prototyping.
• Steps
  1. Collect and review input and output design requirements.
  2. Determine methods and medium for each input and output.
  3. Prototype inputs and outputs.

Designing online user interface

• Inputs
  Interface design requirements specified during systems analysis.

• Outputs
  An interface design specification.

• Applicable techniques
  User interface design and prototyping.

• Steps
  1. Collect and review input and output design specifications.
  2. Study the users’ behavioural characteristics. Learn about the type of
computer interfaces the staff of OPIC work with, the level of their
computer knowledge and their reaction to new system design.
  3. Review interface design standards.
  4. Prototype the user interface. Obtain feedback about the prototype
from users (i.e., the staff of OPIC) and see if improvements are
necessary.

Presenting and reviewing design

• Inputs
  Finished design units.

• Outputs
  The technical design statement.

• Applicable techniques
  - feasibility assessment
  - report writing
  - verbal presentations
  - project management.

• Steps
  1. Prepare an implementation plan that presents a proposed schedule
for the construction and delivery phases.
2 Prepare a final cost-benefit analysis that determines if the design is still feasible.

3 Prepare a written technical design statement.
Case Study Exercise 10: Orient-Pacific Insurance Corporation

Introduction

This case study section supplies a worked example of how to use the skills you have learned in Unit 10. As with the previous case study exercises, you should attempt to develop your own solution to the problem before looking at the worked solution.

Problem statement

The requirements specification you produced for Orient-Pacific Insurance Corporation (OPIC) has been accepted by management. Your next task is to produce two different and viable systems architectures using the techniques you have learned in Unit 10.

You can then evaluate each option through a tentative cost/benefit analysis and making some judgements of its risk and organizational impacts. The model for the cost/benefit analysis can be attained from Unit 8.

Your evaluation of the two options should be based on some of the latest and most successful architectural designs used today. However, the OPIC case study does not contain sufficient relevant information to enable you to complete this evaluation in detail. The worked solution contains comments on evaluation in general rather than an actual evaluation.

Worked solution

The following management report documents two alternative systems architectures. Each meets the requirements specification, but in different ways. The first is a highly centralized mainframe operation, while the second is a client/server architecture.

The competing architectures are evaluated and compared.

The analyst team recommends that:

- management considers these alternatives and selects the architecture that best meets the future direction of OPIC
- management approves a project to produce a detailed specification of the system.

This specification is a management report that sets out two competing systems architectures.
Management report

Summary of activities in the analysis and general design phase

The analysis team began by considering which functions in the requirements specification were suitable for automation, and drawing some physical DFDs showing the interface boundaries.

The many possibilities were eventually distilled into two major options — a centralized system and a system based on national headquarters. Physical DFDs were produced.

Each option was then double checked against all the requirements and costed using various financial techniques (Unit 8). Development strategies were agreed.

Systems architecture options

Normally, the technological options would involve establishing an automation (computer processing) boundary for each option. However, in this case the automation boundaries for the two options are identical, as shown in Figure 10.1. Needless to say, the systems architectures themselves are very different.
Figure 10.1  OPIC human-computer boundary

The main factors that governed this automation boundary are:

- The process of ‘approving proposals’ needs to remain a human function as the decision criteria are not able to be specified at the moment. It may be possible to investigate the use of an expert system for assessing policy proposals in the future.

- The processes of policies, premiums and claims should be online in order to maximize the timeliness of data and to trap errors as early as possible.

- All data stores should be automated, but paper records must be kept to satisfy audit and legal requirements.
Option 1: centralized system — description and evaluation

The first option largely centralizes the system in Hong Kong. Agents and national offices do not hold the corporate data; it is all centralized. Most functions are performed in Hong Kong, the national offices being responsible only for immediate dealings with clients. The physical DFD is shown in Figure 10.2.

![Option 1 physical DFD](image-url)
To meet system timing requirements, high-speed telecommunications will link terminals in national offices to the central computer. Regional offices will use paper forms to communicate with a national office, which will use data entry to input information.

This configuration requires two large mainframes; one to provide a fail-safe facility. Powerful data communications and database software installed on high-speed hardware will be needed to cope with the traffic.

**Development strategy**

While OPIC is aware of a number of insurance packages, it is keen to customize its systems and, in particular, its management reporting. This option is to be developed ‘inhouse’ using a monolithic approach. Developers are to use a CASE tool and a 4GL to enhance productivity. End-user tools are to be provided for ad hoc reporting requirements.

**Evaluating option 1**

*Note: this section contains comments on evaluation rather than an actual evaluation. In your assignments, you are required to complete the actual evaluation.*

- **Cost/benefit analysis:** No dollar figures are available. You need to consider development costs, implementation costs and operational costs. All of these are incurred only in Hong Kong (this enhances control and eliminates exchange rate problems). For a centralized system, implementation costs, definitely and operational costs, possibly, are less than for a distributed solution. Your project manager is expected to estimate these costs. You then need to consider revenue raising, expense reduction and increased productivity benefits. This system is not intended to raise revenue but is expected to reduce operating expenses and increase productivity. Your users are expected to estimate benefits.

- **Risk analysis:** This centralized approach uses well-tried technology, but is dependent on high-speed telecommunications to link terminals in national offices to the central computer. The OPIC environment is reasonably stable and well understood. Users are expected to be comfortable with computer-based systems and to have a positive attitude to systems development. There is no information regarding the experience or skills of the information systems developers. This is probably a low to medium risk option.

- **Financial evaluation:** No figures are available. Your finance department is expected to advise on company financial evaluation methods.

- **Organizational impact analysis:** Largely confined to Hong Kong, where staff must be consulted about changes to jobs and procedures.

- **Requirements evaluation:** This option is considered to meet the requirements closely.
Option 2: distributed system — description and evaluation

The second option decentralizes the system to national headquarters. Each national office has the responsibility of running the OPIC’s business in that country, including its processing and data. The functions in Hong Kong are only those that deal with the corporate position; namely, reinsurance, corporate exposure, and so on. Business with Hong Kong clients is conducted by a Hong Kong national headquarters which is separate from the Hong Kong-based corporate headquarters. The physical DFD is shown in Figure 10.3.
To meet system timing requirements, high-speed telecommunications will link local processors in national offices to the central computer in Hong Kong. Regional offices will have terminals linked to the national processor. Data entry will be direct from the regional office.

This configuration requires a medium-sized mainframe and minicomputers in each national office.

**Development strategy**

While OPIC is aware of a number of insurance packages, they are keen to customize their systems and, in particular, their management reporting. This option is to be developed ‘in-house’ using an incremental approach (this provides a possibility of parts of the system being developed by national offices). Developers are to use a CASE tool and a 4GL to enhance productivity. End-user tools are to be provided for ad hoc reporting requirements.

**Evaluating option 2**

*Note: this section contains comments on evaluation rather than an actual evaluation. In your assignments, you are required to complete the actual evaluation.*

- **Cost/benefit analysis:** No dollar figures are available. You need to consider development costs, implementation costs and operational costs. For a distributed solution, implementation costs, definitely and operational costs, possibly, are more than for a centralized solution. Your project manager is expected to estimate these costs. You then need to consider revenue raising, expense reduction and increased productivity benefits. This system is not intended to raise revenue, but is expected to reduce operating expenses and increase productivity. Your users are expected to estimate benefits.

- **Risk analysis:** This distributed approach uses well-tried technology in each national office, but is dependent on computer-to-computer communications. The OPIC environment is reasonably stable and well understood. Users are expected to be comfortable with computer-based systems and to have a positive attitude to systems development. There is no information regarding the experience or skills of the information systems developers. This is probably a low to medium risk option.

- **Financial evaluation:** No dollar figures are available. Your finance department is expected to advise on company financial evaluation methods.

- **Organizational impact analysis:** Staff in all locations must be consulted about changes to jobs and procedures.

- **Requirements evaluation:** This option is considered to meet the requirements closely.
Comparison of systems architectures

Note: There is insufficient information in the OPIC case study to complete a detailed study. Executive and user management input is required in determining criteria, weighting factors and ratings.

<table>
<thead>
<tr>
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<th>Weight</th>
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<th>Option 2</th>
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<td>210</td>
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<tr>
<td>Ability to control system</td>
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<td>?</td>
<td>?</td>
</tr>
<tr>
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</table>

Figure 10.4 OPIC evaluation matrix

Findings and recommendations

The analysis team found that either a centralized or a distributed computer-based information system are feasible and necessary to satisfy the organization’s requirements.

The main determinant in deciding between the alternatives is the organizational structure that OPIC wants to pursue over the next seven years. If it wishes to consolidate the organization and enforce standards across all offices, then the centralized architecture would facilitate this. On the other hand, if the national identity and relevance of OPIC to its clients in individual countries is to be preserved, then a distributed system with corporate oversight would be preferred.

The analyst team recommends that:

• management considers these alternatives and selects the architecture that best meets the future direction of OPIC

• management approves a project to produce a detailed specification of the system.
Case Study Exercise 11: Orient-Pacific Insurance Corporation

Introduction

This case study section allows you to exercise the system design skills that you have learned in Unit 11. In particular, it allows you to demonstrate your understanding of database design. As with previous case study exercises, you should attempt to develop your own solution to the problem before looking at the worked solution.

Problem statement

Your updated feasibility report for the Orient-Pacific Insurance Corporation (OPIC) has been accepted by OPIC’s management, which has decided to develop a decentralized system. Specifically, they desire a separate database to hold the INVOICE, CLIENT and POLICY data. In addition, you have to classify the above tables/files and calculate storage capacity requirements. You can now use techniques you learned in Unit 11 to produce your data design.

How do you complete this exercise? You use your requirements specification and refer to the data dictionary entries. Then follow the normalization process to get a good data model. Translate the data model into SQL data definition language suitable for implementation. Analyse each database table on its classification (e.g., master file, transaction file, etc.). In order to perform capacity planning, you have to come up with reasonable estimates of each field size. They should be declared in SQL DDL. Since no further information is given on the number of clients, policies, etc., you can only estimate record sizes for each table. This will serve as the multiplier for any capacity planning estimate you will perform.

Note: Your design of a particular file or database may be somewhat different from the solution, but it should not be essentially different. That is, it should contain similar data, even though their layout and organization may be different.

Worked solution

Here is an approach to data design. Remember, your design may be somewhat different, but it should not be essentially different. This lack of a definitive answer is one of the most difficult obstacles for learners new to systems design to overcome. You need to have confidence in your own solution.

In general, this OPIC system uses a database management system that allows coherent, systems-wide data specification; invisible modifications to database structures; automatic recovery; automatic security; and automatic integrity enforcement.
Original data dictionary definitions

invoice = invoice-number +
    invoice-date +
    client-name +
    client-address +
    policy-number +
    date-from +
    date-to +
    property-address +
    { item-description +
      item-value +
      item-premium } +
    invoice-amount

clients = { client }

client = client-number +
    client-name +
    client-address +
    client-date-of-birth

policies = { policy }

policy = policy-number +
    client-number +
    payment-period +
    property-address +
    { item-description +
      item-value +
      item-product-number +
      ( reinsurance-policy-number ) }
Normalized data model

**invoice (3NF)**

---Key Data---
- invoice-no (PK1)
- invoice-date
- policy-number (FK)
- date-from
- date-yo
- invoice-amount

---Non-Key Data---

**policy (3NF)**

---Key Data---
- policy-number (PK1)
- client-number (FK)
- payment-period
- property-address

---Non-Key Data---

**item (3NF)**

---Key Data---
- item-number (PK1)
- policy-number (PK2)(FK)

---Non-Key Data---
- item-description
- item-value
- item-product-number
- item-premium
- reinsur

---Non-Key Data---

**client (3NF)**

---Key Data---
- client-number (PK1)

---Non-Key Data---
- client-name
- client-address
- client-date-of-birth

---Non-Key Data---

**SQL for the database**

CREATE TABLE INVOICE

( INVOICE-NO CHAR(8),
  INVOICE-DATE CHAR(10),
  POLICY-NUMBER CHAR(10),
  DATE-FROM CHAR(10),
  DATE-TO CHAR(10),
  INVOICE-AMOUNT FLOAT,
  PRIMARY KEY (INVOICE-NO),
  FOREIGN KEY (POLICY-NUMBER) REFERENCES POLICY )

CREATE TABLE POLICY

( POLICY-NUMBER CHAR(10),
  CLIENT-NUMBER CHAR(8),
  PAYMENT-PERIOD CHAR(20),
  PROPERTY-ADDRESS CHAR(40),
  PRIMARY KEY (POLICY-NUMBER),
  FOREIGN KEY (CLIENT-NUMBER) REFERENCES CLIENT )

CREATE TABLE ITEM

( ITEM-NUMBER INTEGER,
  POLICY-NUMBER CHAR(10),
  ITEM-DESCRIPTION CHAR(40),
  ITEM-VALUE FLOAT,
  ITEM-PRODUCT-NUMBER CHAR(10),
  PRIMARY KEY (ITEM-NUMBER, POLICY-NUMBER),
  FOREIGN KEY (POLICY-NUMBER) REFERENCES POLICY )
ITEM-PREMIUM FLOAT,
REINSURANCE-POLICY-NUMBER CHAR(10),
PRIMARY KEY (ITEM-NUMBER POLICY-NUMBER),
FOREIGN KEY (POLICY-NUMBER) REFERENCES POLICY)

CREATE TABLE CLIENT
(CLIENT-NUMBER CHAR(8),
CLIENT-NAME CHAR(30),
CLIENT-ADDRESS CHAR(40),
CLIENT-DATE-OF-BIRTH CHAR(10),
PRIMARY KEY (CLIENT-NUMBER)).

Declaration of the database table/file classification

You should note that:

• transactions create or update master files

In some cases (for example, INVOICE), a transaction file is identical to a master file.

• transactions are potential transaction files.

If a system is online and real-time (that is, data is captured on a computer as an event happens and is immediately updated to a master file), then a transaction file is not created. If a system is online but not real-time (that is, data is captured on a computer as an event happens but is updated to a master file at a later time), then a transaction file is created (to store that data until required for update). If a system is batch (that is, data is captured on a computer after an event has happened), then a transaction file is created (to enable that data to be validated and verified before update).

The OPIC system is largely online and real-time. Only INVOICE is stored as a transaction file and later as a master file. CLIENT, POLICY and ITEM are master files.

You use your knowledge of information systems to determine what other files are required:

• archival files

All master files (CLIENT, POLICY, ITEM and INVOICE) and transaction file (INVOICE) are to be regularly copied and an archive maintained.

• Audit files

All critical master and transaction files (CLIENT, POLICY, ITEM and INVOICE) are to be logged.
Capacity planning

Let us assume that for each field-size definition that each character is 1-byte, each integer is 1-byte and each float is 2-bytes.

For the INVOICE table, the estimated record size is as follows:
\[8 + 10 + 10 + 10 + 10 + 2 = 50 \text{ bytes/record.}\]

For the POLICY table, the estimated record size is as follows:
\[10 + 8 + 20 + 40 = 78 \text{ bytes/record.}\]

For the ITEM table, the estimated record size is as follows:
\[1 + 10 + 40 + 2 + 10 + 2 = 65 \text{ bytes/record.}\]

For the CLIENT table, the estimated record size is as follows:
\[8 + 30 + 40 + 10 = 88 \text{ bytes/record.}\]

To estimate capacity for the tables, each of the above calculated record sizes will be multiplied by the capacity requirement over the life-span of the database/information system. The result will then be multiplied by at least 10% (buffer) and rounded up. This is the estimated capacity for each table. For a database, the estimated capacity is the sum of the capacity requirements of each table.
Case Study Exercise 12: Orient-Pacific Insurance Corporation

Introduction

This Case Study section allows you to exercise the system design skills that you have learned in Unit 12. In particular, you will demonstrate your understanding of screen and report design.

As with previous exercises, you should attempt to develop your own solution to the problem before looking at the worked solution.

Problem statement

Your updated feasibility report for the Orient-Pacific Insurance Corporation (OPIC) has been accepted by its management, which has decided to develop a decentralized system. Your next task is to produce a user-interface design of the system. You use techniques you learned in Unit 12 to produce a user-interface design.

How do you complete this exercise? You use your requirements specification and systems architecture. Refer to data flows and processes. Which data flows provide input data to the system? You design forms for this data. Which data flows cross your human-computer boundary? You design screens or reports for these flows. Which processes are entirely or partly manual? You design procedure descriptions for these processes.

For this case study, assume that, as computer-based systems are already in use, existing paper-based forms do not have to be redesigned. You are to focus on screen and report design.

After you have completed your user-interface design, or if you are having particular problems, check the solution. Your design of a particular screen or report may be somewhat different from the solution, but it should not be essentially different. That is, it should contain similar data, even if their layout and organization is different.

Worked solution

Here is an approach to screen and report design. Do not consider this as the one correct approach. Many different designs may be appropriate. Remember, your design may be somewhat different, but it should not be essentially different. This lack of a definitive answer is one of the most difficult obstacles for learners new to systems design to overcome. You need to have confidence in your own solution. Does it describe appropriate screens and reports?
In general, this OPIC system is a ‘user-directed’ information system that provides users with a range of computer-based functions. Users are presented with a series of menus and select a particular function from a range of options presented on a menu.

**Dialogue chart**

Screens and their relationships to one another are shown below:

![Dialogue chart](image)

**Figure 12.9** OPIC dialogue design

This dialogue chart is generated directly from the DFDs developed in *Unit 5*. Screens at the top of the chart are menus that control access to lower level screens. These lower level screens implement user processes.
Screen design

Each screen has a number of zones:

- the heading zone of each screen shows a screen identification number, a screen title and the current date and time
- the body zone of each screen contains a system function (a menu or a user process)
- the message and action zones of each screen contain helpful messages and instructions on how to progress to other screens and functions.

The heading, message and action zones are standard for each screen of the system (and, ideally, for all systems in an organization). You design these zones first — see Figure 12.10. At all points in the system, function key 1 provides 'help' (information about a function or menu you are processing); function key 10 returns control to main menu; and ‘Esc’ key returns control to the operating system (exits the OPIC insurance system). In addition, ‘Pg Up’ and ‘Pg Dn’ scroll up and down a list displayed in the body zone of that screen. Other function keys are available for special operations related to a particular screen. Finally, an area is defined for error and help messages that are displayed when appropriate.

```
#X.X  30/01/2001 13:05

Orient Pacific Insurance Corporation

SCREEN DESCRIPTION

F1=Help   F2=Client Name Search   F3=Show Next Item
F10=Return to Main Menu

Message:________________________________________________
```

Figure 12.10 OPIC screen template

Now, you design the body zone for each screen described in your dialogue chart. You use your data dictionary to describe data that is presented in the body zone of each screen. Figure 12.9 describes 13 screens. Not all of these screens are illustrated in this worked example. Figure 12.11 shows a main menu (contrast this version with Figure 12.2) and Figure 12.12 illustrates a record payment screen (contrast this version with Figure 12.3). These versions of screens reinforce the idea that there is no ‘one correct’ solution.
Orient Pacific Insurance Corporation

MAIN MENU

1 - Underwrite Policy
2 - Process Policy
3 - Analyse Exposure
4 - Process Claims
5 - Product Maintenance
6 - Produce Exception Report

Enter Option> _

Select Option and Press <Enter>

F1=Help Esc=Exit OPIC System

Figure 12.11 OPIC main menu

Orient Pacific Insurance Corporation

RECORD PREMIUM

Client Name:
Address:

Policy Period:
Premium Due:

Enter Policy Number:
Payment Amount:
Method of Payment:

Enter Policy Number <Return>, Enter amount and select method of payment <Return>

F1=Help F2=Client Name Search F3=Show Next Item F10=Return to Main Menu

Figure 12.12 OPIC record payment screen

Report design

Each report has a number of zones:

- the heading zone of each report shows a report identification number, a screen title, a security classification, date and time of printing and a page number
- the body zone of each report is the report contents
• the footing zone of each report contains a message indicating the end of
the report and the number of pages printed.

The heading and footing zones are standard for each screen of the system
(and, ideally, for all systems in an organization). You design these zones first — see Figure 12.13.

Now, you design the body zone for each report described in your requirements
specification. You use your data dictionary to describe data that is presented
in the body zone of each report. The OPIC system has five output reports:
invoice, exposure report, reinsurance, product report and exception report. Not all of these reports are illustrated in this worked example. Figure 12.14 illustrates a product report.

---

**Figure 12.13** Heading and footing zones

---

**Figure 12.14** OPIC product report
Other user-interface design components

Your user-interface design should also include forms, procedures for using your system and job descriptions. Forms are specifically excluded from this exercise on the assumption that existing forms are retained. Procedures and job descriptions are very dependent on physical work environments and individual users. These factors cannot be simulated in a case study such as this and are excluded from this exercise.
Case Study Exercise 13: Orient-Pacific Insurance Corporation

Introduction

This Case Study section allows you to exercise the Internet system design skills that you have learned in Unit 13. In particular, you demonstrate your understanding of the Internet/intranet aspects to systems design.

As with previous exercises, you should attempt to develop your own solution to the problem before looking at the worked solution.

Problem statement

You have been asked to investigate the possibility for implementing some components of the OPIC system for both the public Internet access and for internal intranet use. In particular, you are asked to prepare a brief assessment of how this technology could benefit OPIC in future systems development.

Worked solution

In reviewing the OPIC case, in particular the network model of OPIC, it is clear that the following Internet/intranet systems can be considered for future extensions to the existing systems development efforts.

Internet site for marketing of insurance. Customers who are curious about the types of insurance policies, plans, and procedures can conveniently visit the site for the latest information. Customers can submit personal information for quotes on insurance policies. They should also be able to leave an address for additional mailings, or a phone number so that an agent can contact them.

Intranet database and information sites. Web-servers need to be available at all branches (local and international) that will provide access to local site databases and the central databases of clients and policies. In addition, each site will publish additional information regarding local rules and regulations governing insurance issuance.

Since this is just an evaluation of the technology, it will not be implemented at this time as the impact on the overall systems development effort is likely to be disrupted. Therefore, the above initiatives should be addressed as a maintenance effort if it is considered to be small scale. If it is considered to be of a larger scale, then it will be classified as a major development effort and the whole lifecycle process needs to be followed.
Case Study Exercise 14: Orient-Pacific Insurance Corporation

Introduction

This Case Study section supplies a worked example of how to use the skills you have learned in Unit 14.

Problem statement

System design of the Orient-Pacific Insurance Corporation system is almost complete. Your next task is to embark on systems implementation.

List all the activities involving implementation, along with their inputs, outputs, required techniques and steps. You should attempt this exercise before looking at the worked solution.

Worked solution

The FAST methodology can be applied throughout OPIC’s project development. However, we will only examine the construction and delivery phases in this case.

1. The construction phase activities
   - build and test networks
   - build and test databases
   - install and test new software package
   - write and test new programs.

2. The delivery phase activities
   - conduct system test
   - prepare conversion plan
   - install databases
   - train system users
   - convert to new system.

The outline above is to help you get a brief picture of the activities to be done in each phase. You should now be able to work out the details which are as follows:
The construction phase

Build and test networks

- Inputs
  Network design requirements defined during systems design.

- Outputs
  - an installed network
  - network details that are recorded in the project repository for future reference.

- Applicable techniques
  Knowledge of networking.

- Steps
  1. Review the network design requirements outlined in the technical design statement developed during systems design.
  2. Construct and test the new network for OPIC.

Build and test databases

- Inputs
  - the data design requirements specified in the technical design statement during systems design
  - sample data from production databases for testing the databases.

- Outputs
  - an unpopulated database structure for the new database
  - a revised database schema and test data details which will be placed in the project repository for future reference.

- Applicable techniques
  - Sampling: Sampling methods can be used to obtain representative data for testing database tables.
  - Data modelling: A good understanding of data modelling is required in this activity.
  - Database Design: Thorough understanding of database design requirements is necessary for completing this activity.

- Steps
  1. Review the technical design statement for database requirements.
  2. Locate production databases that may contain representative data for testing database tables. Generation of test data for database tables may also be required.
3 Build and modify databases per design specifications.
4 Load tables with sample data.
5 Revise database schema and store as necessary for future reference.

Install and test new software package

• Inputs
  – new software packages and documentation obtained from the system vendors
  – integration requirements and program documentation developed during system design.

• Outputs
  The installed and tested software package.

• Applicable techniques
  Programming experience and knowledge of testing.

• Steps
  1 Obtain the software package and review documentation.
  2 Install the software package.
  3 Conduct tests on the software package to ensure that it works properly.
  4 Revise software specifications to reflect modifications.
  5 Add the software to the information systems software library.

Write and test new programs

• Inputs
  – the technical design statement
  – plan for programming
  – test data
  – reusable software components
  – quality recommendations and requirements.

• Outputs
  – the new programs and reusable software components
  – program documentation.

• Applicable techniques
  Testing: Three levels of testing can be performed: stub testing, unit testing, and systems testing.
• Steps
  1. Review the design specifications. Modify the specifications documentation if critical changes are required. Minor changes can be recorded as future enhancement requirements.
  2. Develop a detailed programming plan. The steps are as follows:
     (i) Formulate the project team and assign responsibilities.
     (ii) Write and document programs and perform unit testing.
     (iii) Review program documentation for quality standards.
     (iv) Conduct system testing to ensure all programs work properly together.
     (v) Update the project repository with revised program documentation for future reference.
     (vi) Place new programs and reusable components in the software library.

The delivery phase

Conduct system test

• Inputs
  – the software packages, custom-built programs and any existing programs comprising the new system
  – the system test data.

• Outputs
  – modifications to programs
  – a successful system test.

• Applicable techniques
  A good understanding of testing is required for this activity.

• Steps
  1. Obtain system test data. These test data may be existing information of the clients.
  2. Ensure that all software packages, custom-built programs, and existing programs have been installed and that unit testing has been completed.
  3. Perform tests to check that all programs work properly together, making appropriate revisions as needed and testing again.
  4. Record any required modifications to programs in the project repository.

Prepare conversion plan

• Inputs
  – a successful system test
  – the design specifications for the new system.
• Outputs
  A conversion plan.

• Applicable techniques
  Project management: Good project management techniques are necessary to ensure a smooth transition from the old system to the new system.

• Steps
  1 Collect and review design specifications for the new system to identify databases to be installed and user training needs.
  2 Establish a schedule for installation of databases.
  3 Identify a training program and schedule for the staff of OPIC as they are the ultimate users of the system.
  4 Develop a detailed installation strategy to follow for converting from the existing to the new production information system. As the regional offices are widely distributed in the Pacific region, a location conversion using parallel strategy may be employed for OPIC’s system transition. This strategy minimizes the risks of major flaws in the new system causing irreparable harm to OPIC’s business.
  5 Develop a systems acceptance test plan. By conducting a systems acceptance test, staff of OPIC can have their last opportunity to reject or accept the new system.

Install databases

• Inputs
  The existing data from the production databases, coupled with the database schemas models and database structures for the new databases.

• Outputs
  The restructured existing data that has been populated in the databases for OPIC’s new system.

• Applicable techniques
  Database and application programming skills.

• Steps
  1 Review the database structures for new databases.
  2 Identify existing data currently in production databases to be used to populate the databases for the new system.
  3 Obtain additional manual resources to do on-time keying of data not obtained from existing production databases. OPIC may invite its lower-level staff such as clerks to do the data entry.
  4 Write programs to extract data from production databases.
  5 Write programs to load new databases.
  6 Conduct another system test to ensure new system is unaffected.
  7 Revise the database schema and update the project repository.
Train system users

- Inputs
  Appropriate documentation for the new system.

- Outputs
  User training and documentation.

- Applicable techniques
  Written and oral communication skills: You need these skills to communicate with the staff of OPIC on how to operate the new system.
  Familiarity with organizational behaviour and psychology: Converting to a new system may bring about fears to the staff of OPIC as they are not familiar with the new system. They may become confused at times. By understanding their behaviour and attitude towards the new system, you can help OPIC’s staff through the learning period in a more comfortable way.

- Steps
  1. Collect documentation that may prove useful in developing user documentation and training guides.
  2. Write user documentation manuals.
  3. Review the training needs of OPIC’s staff by referring to the conversion plan.
  4. Schedule training sessions for the staff.
  5. Conduct training sessions and distribute user documentation.

Convert to new system

- Inputs
  The conversion plan created in an earlier delivery phase activity.

- Outputs
  The production information system that is put into operation in the business.

- Applicable techniques
  Project and process management techniques.

- Steps
  1. Review the conversion plan.
  2. Complete the detailed steps outlined in the conversion plan.
  3. Schedule meeting with the project team to evaluate the development project and the production system.
  4. Conduct review meeting. Collect feedback from the staff of OPIC and record any enhancements or modifications requirements.
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