

Chapter 12

Capital Planning and Budget

If you will the end you must will the means.
(A parliamentary saying).

Abstract To introduce the concepts of capital and operating budgets. To describe the process for developing a capital budget. To introduce the concept of capital rationing. To consider capital budget prioritization, based on returns, risks, and criticality of assets. *Outcomes* After reading this chapter you will know:

- The difference between capital and operating budgets;
- The typical structure of capital budgets;
- The process for developing capital requirements for particular equipment types and consolidating them across types;
- The meaning of capital rationing and how it affects budgets;
- Methods of dealing with capital rationing including prioritization based on financial return, equipment criticality, equipment age, and condition and risk;
- How to summarize the capital budget and to be aware of factors involved in managing the capital project portfolio.

12.1 Capital Planning Considerations

The allocation of resources within a company involves top management judgment, taking many factors into account. The financial viability of the organization is the leading concern, and in this respect, resources should be directed to those areas which have the best prospects for producing value. Value can arise in several forms, the most common being a financial return on investment. Value may be sought by generating new business, or by increasing production leading to greater sales volume, and in turn to greater sales value. Or the return may arise by reducing costs or alleviating bottlenecks.

At the same time as financial returns are being sought, it is important to take into account of other factors which are more defensive in nature. These include the

sustainment of existing assets and existing business, meeting legal, environmental, safety, or regulatory requirements, and the reduction of risk.

12.1.1 Cyclic Aspect

The condition and performance of a company's assets can often be allowed to deteriorate while still providing adequate service. Eventually in the life cycle of assets, the condition may reach a critical threshold where performance is difficult to sustain without significant expenditure. Understanding where you are in the cycle, and being able to evidence it, is critical to sound asset management, and to preparing financial and regulatory submissions
P.C. Fordham, South West Water Limited (UK). ERA Report 99-0764 1999.

12.2 What is a Budget?

A budget is an allocation of financial resources to a specific function or area, and represents a commitment on the part of management to the corresponding activity. Conversely, lack of a budget allocation to an activity is a de facto indication of lack of management commitment to that activity.

Budgets are generally based on reasoned proposals, and they help to promote good planning and a considered allocation of resources. Changes to budgets require senior management approval and require significant justification. Budgets help managers at all levels to plan and control business activity.

12.3 Types of Budget

In asset management there are two types of budget:

- a. Capital Budget, known as CAPEX = Capital Expenditure
- b. Operating and Maintenance Budget, known as OPEX = Operating Expenditure

The capital budget is used to purchase fixed assets and the operating budget is used to operate the business and to purchase expense items. The difference between the two is dictated partly by taxation systems which allow operating expenditure to be deducted from income in the current year in determining taxable income, whereas, only the depreciation of fixed assets is allowed as a current year tax deduction. Also, the two types of budget require quite different management. The operating budget is used by operating departments to cover outlays required to support their immediate activities, such as wages, materials, rents, and equipment lease payments. The capital budget is used to acquire major items of plant and equipment, requiring analysis of the business needs and investment options, followed by detailed acquisition planning and implementation.

The separation of budgets into CAPEX and OPEX can have some undesirable consequences. For example, there may be excessive OPEX expenditure in order to maintain aging equipment which should have been replaced earlier from the CAPEX budget.

The term TOTEX or Total Budget Expenditure refers to the total of CAPEX and OPEX. The TOTEX concept has value in drawing attention to the need to consider the interactions between the budgets, and ultimately, the total cost involved in supporting the asset functions. However, the interaction between CAPEX and OPEX is quite complex.

12.4 Budget Structure

Figure 12.1 shows a typical budgetary structure for a large corporation.

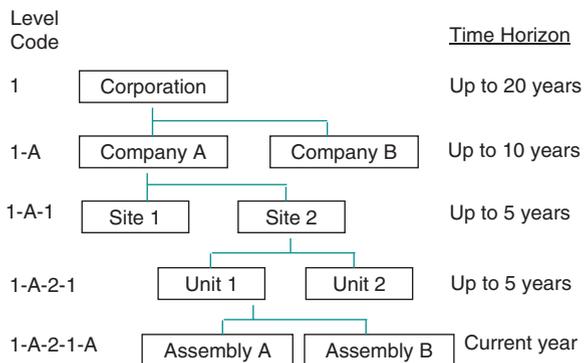
12.5 Devolution of Authority

An issue in the organization of a corporation is the extent to which authority should be delegated or devolved down to subsidiary levels. As an example, in a state-wide water supply system, initially there were 10 regions. Each region “owned” its local assets, and managed them—some well, some not so well. Because each region was small, their buying power, their access to capital funds, and their degree of technical support were limited.

To overcome these problems, ownership and decision making were centralized. This addressed the perceived problems, but had the disadvantage that local managers felt less interest in and less authority over, the assets in their region. In many cases the assets deteriorated.

“Not my problem,” the local managers said, as they disowned the remote centralized bureaucracy.

Fig. 12.1 Budget planning levels and time horizons



To strike a balance, the asset ownership was devolved back to four large regions, with positive effects. Technical and financial support functions remained centralized. The benefits and disbenefits of centralization are debatable, but it is important to keep users involved. The saying is: “big enough to cope, small enough to care”.

An example of a budgetary financial delegation policy is shown in Table 4.1 Financial Delegation Example.

12.6 Organizational Planning Process

Capital asset planning and budgeting involve identifying the most beneficial use of funds, planning, and scheduling the application of funds and arranging for the availability of those funds. Capital planning and budgeting are integral to the business development plan. The plan may involve consolidation, risk reduction, or outsourcing and is not necessarily expansionist.

The business development plan leads into a *capital expenditure program*. This will be consolidated across a number of different capability requirement areas. To check the financial viability of the whole program the organization will create analyses showing:

- i. Budgeted cash flow
- ii. Budgeted balance sheets
- iii. Budgeted profit and loss accounts.

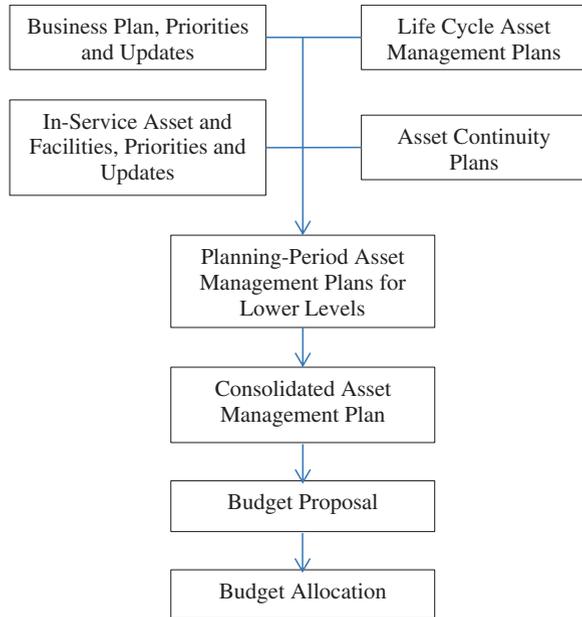
The detailed development of these analyses will be an accounting or financial planning function rather than an asset management function, so we shall not consider them in detail. However, it is important that the data provided as a basis for these reports is as accurate as possible and this will require asset management input. The results may lead us to question the choice of earlier options, and may require modification for risk.

12.7 Asset Planning Process¹

In earlier chapters we have seen how the asset planning process involves several areas of development. The life cycle of specific assets is taken into account in determining Life Cycle Asset Management Plans. The continuity of asset provision is taken into account in Asset Continuity Planning. The requirement to match the needs of the business is taken into account in all the plans, but specifically in Capability Requirements Planning. The need to provide for and respond to support

¹ ISO 55001 Clause 8.1 Operational planning and control: “The organization shall ...implement processes...to implement the...asset management plans...”.

Fig. 12.2 The planning and budgeting process



for the In-Service Assets are taken into account in the creation of Planning-Period Asset Management plans. The Planning-Period Asset Management Plans for lower levels of the organization are subsequently consolidated to produce Consolidated Asset Management Plans. These form the basis for budget proposals, leading ultimately to budget financial allocations. The process is summarized in Fig. 12.2.

12.7.1 Planning Periods

The capital expenditure program will consider a range of planning periods, such as 1, 3, 5, 10, and 20 year horizons. A rolling review will also apply, as circumstances develop. A balance must be struck between stability and flexibility in regard to changing situations. An appreciation of the lead times involved in implementing asset acquisition plans is essential, so we will need to firm up on our plans for particular projects for a given period ahead, dependent on the lead times involved.

12.7.2 Source and Application of Funds

It is not unusual for owners or senior management to have favored areas which do not correspond to those which are most profitable for the business. For example, a

railway may get the bulk of its net revenue from freight operations, but may direct the major part of its budget to passenger operations. Significant mismatches in the source and application of funds create a danger for any organization and should be guarded against. However, King Louis XIV is said to have appropriated one-third of the revenue of France to his personal use. He got away with it, but eventually his successors did not.

12.8 Capital Requirement Plans for Asset Types

Capital requirement plans for all asset types are developed, usually as part of an annual activity cycle. These are then consolidated into a master development and capital budget plan. The steps are summarized in Fig. 12.3. The consolidation across types is summarized in Fig. 12.4. Asset managers need to be fully aware of, and actively involved in the organization’s capital budget planning process. The bringing together of asset knowledge and business and financial knowledge into a sound decision making process is an essential part of the asset management contribution to the well-being of the organization.

Fig. 12.3 Capital planning and budgeting outline steps for an asset type

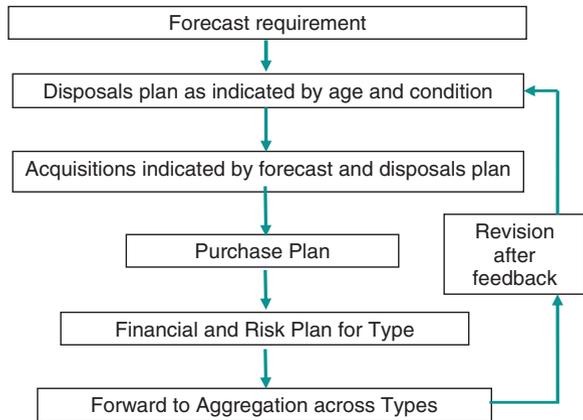
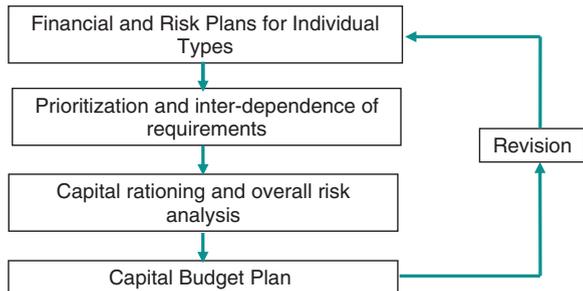


Fig. 12.4 Capital asset budget aggregation across types



12.9 Capital Budgeting Cycle

Within an organization, the capital budgeting process generally follows an annual cycle. There must also be provision for the response to emergency or unforeseen circumstances. A typical cycle can be as follows. This is based on a January–December annual cycle, but would vary to fit in with the relevant financial year timings.

1. February–March—Departmental level
 - a. Review life cycle asset management plans for major assets
 - b. Review current condition of assets
 - c. Determine status of current asset related projects
 - d. Review proposed acquisitions
 - e. Review proposed replacements
 - f. Review proposed overhauls
 - g. Review proposed disposals
 - h. Review proposed developments or opportunities
 - i. Review capital requirements for facilities.
2. April—Departmental level
 - a. Consolidate physical proposals in consultation with relevant managers
 - b. Prepare costings in consultation with finance personnel.
3. May–June—Business level
 - a. Consolidate physical proposals from departments and review priorities and costings. Prioritize list of proposals.
4. July–August—Business level
 - a. Capital budget proposals submitted for the following year.
5. September—Budget deliberations
6. October—Budget approved and issued for the following year.
7. November—Commence implementation of budget.

12.10 Capital Rationing

The requests on the capital budget often exceed the finance available. The prioritization of projects, and the making of decisions as to what items can be included in a given capital budget is known as capital rationing.

Some projects may be nondiscretionary in a regulatory sense—they have to be done. This typically includes, risk mitigation for health and safety, environmental protection, or reliability improvement in critical areas. Other projects may be essential to the business, such as maintaining the continuity of assets which provide essential services. Other projects may be discretionary, but nevertheless

important to the future success of the business. A major factor in capital budgeting is the financial return on capital invested.

The age and technical profile of major capital equipment will be determined by the pattern of installations in the past. We need to ensure that sufficient capital is allocated to meet the requirements for replacement and technical advance. Lumpy replacement patterns give rise to uneven capital requirements. Other things being equal, smoother capital demands through time are easier to manage. However, if major capital expenditure is justified it should be accepted and managed.

12.10.1 Capital Rationing Example—Postal Vans

A simple type of capital rationing decision occurs when a fleet of relatively small items requires on-going renewal.

Example Newistan Postal Service has a large fleet of vans, but a limited budget for van replacement. The replacement policy is to budget a selected amount each year to replace a number of oldest and highest mileage vans. Some contingency capital is also set aside for *spend-limit* replacements, that is where an expensive repair is required which is not justified in terms of the estimated remaining life of the vehicle, even though that vehicle would not normally be replaced on grounds of age alone.

The vans are identified by registration number. A list of vans is made by age in years and, within years, by kilometers run. Vans are then replaced down the list as far as the capital budget will allow.

Figure 12.5 shows an example in which vans at the oldest ages in the fleet have been listed in descending order by age, and within age groups, in descending order by kilometers run. A budget of \$200,000 has been allocated for replacements and the vans cost \$45,000 each. The budget allows the vans shown in the shaded area to be replaced. In practice some flexibility in application may allow engineering judgement of van condition to influence the precise outcome.

Registration number	Age (years)	Kilometers	Cumulative cost, \$	Policy
ABC123	12	246,897	45,000	Replace
ABD234	12	242,442	90,000	Replace
BWE876	11	189,342	135,000	Replace
BES541	11	163,903	180,000	Replace
BDF012	11	138,901	225,000	Keep
BBX945	11	99890	270,000	Keep

Fig. 12.5 Capital rationing—van replacement

12.10.2 Replacement Prioritization

In the vehicle fleet example just given, it is easy to rank the vehicles in priority order for replacement, since they are all basically the same. In other cases, we need to create a ranking system, based on factors such as condition and criticality. In order to establish a consistent terminology we can define descriptors for condition and for criticality as shown in Fig. 12.6.

The budget proposal then shows the condition and criticality of various proposed replacements. Figure 12.7 shows an example, with the replacement decision shown in the right-hand column. We see that replacement was approved for items 1–4 but not for items 5 and 6.

12.10.3 Condition/Criticality Plot

An example of a type of graphical display which can illustrate the status of many items on one page is shown in Fig. 12.8. This type of plot gives a compact view of the overall status of an organization’s assets to senior management.

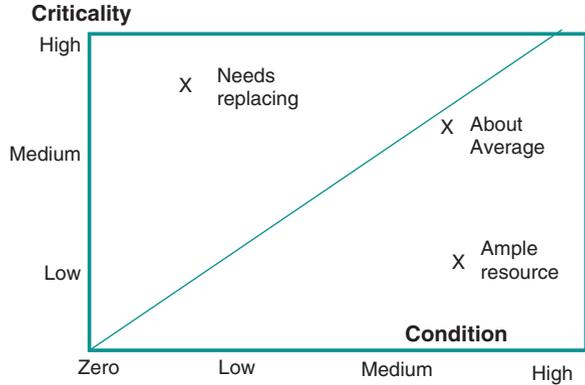
Very high
High
Medium
Low
Very Low
Zero

Fig. 12.6 Classification descriptors for condition and criticality

Rank	Asset	Condition	Criticality	Replacement Cost	Decision
1	Excavator A	Zero	High	\$845,000	Replace
2	Pump 12	Very Low	High	\$290,000	Replace
3	Air Motor B	Very Low	Medium	\$135,000	Replace
4	Pump 56	Low	High	\$225,000	Replace
5	Conveyor 3	Low	Medium	\$380,000	Keep
6	Generator 1	Medium	Low	\$270,000	Keep

Fig. 12.7 Replacement prioritization by condition and criticality

Fig. 12.8 Condition/criticality plot



12.10.4 Financial Return

For new projects the financial returns are usually measured by the Internal Rate of Return (IRR). The definition and calculation of this measure are considered in another chapter.

12.10.5 Risk

Another factor that needs to be taken into account is the risks involved if a project is or is not undertaken. This may be concerned with safety, regulatory requirements, or a risk of business loss or lost opportunity.

From the point of view of the asset manager, it is advisable to make clear to senior management the risks involved both in carrying out a project and also in failing to approve a project. It is then up to senior management to make a final decision. The advantage of the risk-based approach is that it can create a situation of positive dialog between asset managers and senior management as the merits and risks of various projects are discussed. A reasonably argued case should be presented for each project, without crying wolf or being smart after the event.

Figure 12.9 shows an example where a number of projects have been presented to a budget committee. The list includes projects which have been included for environmental or safety reasons, and ones which are profit motivated and show their internal rate of return (IRR). The right-hand column shows the ranking of the projects by the committee. The rank 1 project is seen as essential from an environmental and regulatory point of view. The rank 2 project has a high-internal rate of return and is seen as essential to the on-going needs of the business. The rank 3 project is a safety requirement, and so on.

Project	Cost \$M	IRR	Risk description	Risk rank	Project Rank
Extend tailings dam	1.6	-	Environmental	1	1
Second unloading station	3.6	36%	Production opportunity cost	-	2
Replace ventilation compressor No. 3	1.3	-	Safety risk if fails	2	3
Replace dewatering pumps on level 19	2.8	-	Production loss if failures	3	4
Acquire 2 loaders	1.55	22%	Production opportunity cost	-	5

Fig. 12.9 Project rankings with returns and risk

12.11 The Capital Budget

Ultimately, senior management brings together the various decisions into a consolidated capital budget. An example is shown in Fig. 12.10.

12.12 Managing the Capital Project Portfolio

The direction, monitoring, and control of the capital project portfolio is a major commitment of senior management. The summary in Fig. 12.10 shows a portfolio of capital projects which are at various stages of development. The status column shows the stage of progress for each project. The projects at the top of the list are those that are currently in progress of acquisition or development, projects 1–3. Project 4 is approved but not yet started. Projects 5 and 6 are in the feasibility planning stage, project 7 is in the pre feasibility planning stage, and projects 8 and 9 are at the requirements analysis stage. Projects will progress up the list as their status develops toward completion. In practice, the number of projects may be larger and separate tables may be made to focus on projects at particular stages of development or on projects for particular areas of the business.

Each project has a project manager who reports on the project to a senior manager in the area to which the project relates. Senior management will coordinate progress and financial requirements. The availability of finance can depend on many factors and is not necessarily smooth through time. Both the requirements of the projects and the financial situation of the organization can vary depending upon external and internal factors. It is common to find that projects slip back in time, although this should be avoided wherever possible. Delay factors include changes in scope (naughty), delays in specifying requirements, and delays in supply. In organizations with strict annual budgeting systems, delays in one project may work to the advantage of another.

Capital Budget Summary		Years ahead					
Project	Status	1	2	3	4	5	6
1. Vehicles type A	Implementation in progress	200	150	100	250	250	150
2. Building C development	Implementation In progress	250	4000	1500	0	0	0
3. Site X clear and dispose	Implementation In progress	500	-3000	0	0	0	0
4. Building B extension	Plan approved	0	1500	1500	0	0	0
5. Pumping system replace	Feasibility stage	0	2000	0	0	0	0
6. Vehicles type B	Feasibility stage	0	0	550	675	300	750
7. Building A refurbishment	Pre-feasibility stage	0	0	0	2000	0	0
8. Production stream A upgrade	Requirements /Analysis	0	0	0	0	3500	0
9. Power transformer replace	Requirements /Concept	0	0	0	0	5000	0
Total cost \$k		950	4650	3650	2925	9050	900

Fig. 12.10 Capital planning budget summary, \$k

Care must be taken to identify cases where projects are interrelated, since progress in one may then influence the development of another.

12.12.1 Capital Budget for Current Year

In the shorter term, we also need to manage the capital budget for the current year, and for other medium-term horizons. Figure 12.11 shows an example of a current year capital budget, showing for a number of items, expenditure year to date (YTD) and planned expenditure for the rest of the year (ROY). Uncommitted funds are also shown. The management of the budget will involve working with the managers responsible for the various task items or projects. An understanding

	A	B	C	D	E	F	G
1	Item	Budget for year	Actual YTD	Planned ROY	Actual+Planned	Uncommitted	Date
2	Road Section A	\$3,692,450	\$745,990	\$540,221	\$1,286,211	\$2,406,239	4-Oct
3	Road Section B	\$1,458,321	\$580,432	\$993,450	\$1,573,882	(\$115,561)	
4	Storm Water Area K	\$2,576,449	\$903,034	\$840,453	\$1,743,487	\$832,962	
5	New Recreation Bldg	\$760,652	\$188,930	\$650,000	\$838,930	(\$78,278)	
6	Parkland Development	\$275,500	\$98,405	\$48,775	\$147,180	\$128,320	
7	Totals	\$8,763,372	\$2,516,791	\$3,072,899	\$5,589,690	\$3,173,682	

Fig. 12.11 Current year capital budget

of the lead time factors in projects, the need to manage resources within and between projects, and awareness of the risks involved, will assist the budget manager to work toward the best achievable outcome.

12.13 Contingency Allowances

Emergency, urgent, or critical work can arise which the original asset management plan and budget have not allowed for. A contingency budget should be held to cover such situations. It is important that asset managers respond adequately to actual or potential failures and to situations involving risks to safety or the environment. Financial support should be sought as the situation justifies.

12.14 Exercises

12.14.1 Self-Assessment Exercise 12.1

1. What is a budget?
2. What do the abbreviations CAPEX and OPEX stand for?
3. What is capital rationing?
4. How would you monitor budgetary expenditure?

12.14.2 Long River Ferry Company Exercise

The Long River Ferry Company currently operates a fleet of small wooden ferry boats. They are planning to introduce three new, larger boats which are faster and have air-conditioning. The larger boats will require new pontoons and there is also a requirement that work to protect the riverbank from erosion be undertaken before large boats are introduced. It is believed that the larger boats will increase revenue, but some of the customers for the larger boats will be displaced from the

Fig. 12.12 Small boats cost data

Year	1	2	3	4
Boats req. overhaul @\$0.5M per boat	4	4	2	2
Overhaul cost \$M	2	2	1	1
Boats req. replace	6	3	0	5
Replacement cost \$M @ \$2M per boat	12	6	0	10

Fig. 12.13 Large boats cost data

Year	1	2	3	4
Acquisition Boat#1, \$M	3	5	0	0
Acquisition Boat#2, \$M	0	3	5	0
Acquisition Boat#3, \$M	0	0	3	5

smaller ones. If Long River does not introduce larger boats there is a distinct possibility that a rival company will introduce similar boats and capture the higher priced end of the market.

Long River has three divisional managers who respectively are responsible for:

1. Small boats,
2. Large boat project, and
3. Shore facilities.

The divisional managers have produced the following budget information:

Shore Facilities

Pontoons \$2 M required in year prior to commencement of large boat#1, and \$1 M in year prior to commencement of large boat#3.

Riverbank \$4 M required in year prior to commencement of large boat#1 (Figs. 12.12 and 12.13).

Large boats require a payment of \$3 M in the year prior to acquisition and \$5 M in the year of acquisition.

Task Prepare a capital budget for Long River for the four-year period. Indicate options which may benefit the business in overall financial and operational terms.

12.15 Are Your Assets Liabilities?

Shortly after Jock joined the asset management group his boss Dan called him in. “We are going to do a due diligence on Front-IT,” said Dan.

Jock was not sure what a due diligence was so he kept quiet. All he knew was that Albany—the large conglomerate where he and Dan worked—were putting together a bid for Front-IT.

“What is the main idea?” asked Jock.

“We need to check out their assets,” said Dan. “They have nice offices in a smart location, lots of modern computer gear and the managers all have swishy company cars so it looks pretty good as far as I can see.”

Check it out they did. The cars and the computer equipment were all leased. The office building was 6 months into a 3-year lease—making it a cost commitment. The only fixed asset on the books was a backroom computer system valued at \$5,000,000—but when they got specialists to look at it, it turned out to be obsolete and to have zero market or practical value.

Dan and Jock made their report. Later at a drinks session to celebrate the acquisition, Sean, a lead guy on the takeover team spoke to Dan and Jock.

“You did a good job on the asset evaluation,” he said.

“But they weren’t worth anything,” said Jock.

“Too right,” said Sean, “It brought the price down a treat.”

“But why did we go ahead,” said Jock, puzzled.

“They had some heavily amortized intangibles we were interested in,” said Sean, turning away as though he had said too much.

Jock did not know what an intangible was, much less a heavily amortized one. Front-IT looked like a dead duck from where he saw it.

At home that night it occurred to Jock that Sheila might know about intangible assets.

“Can I ask you a question?” said Jock.

“Yes,” said Sheila, brightly.

“It’s not that kind of question,” said Jock, “It’s about intangible assets and amortization.”

“Oh,” said Sheila, and she explained that an intangible asset was something like a patent, or intellectual property or goodwill. It had value but was not money and was not a physical thing. The value declined over time, and the decrease was called amortization.

“It’s like depreciation,” she said.

At work later Jock asked Dan if he knew why Albany had bought Front-IT.

“Apparently Front-IT developed an advanced safety relay for electricity transmission systems years ago,” said Dan.

“They still own the patent. It seems that our guys reckon they can develop the idea further and that we can use it on our upcoming projects and also license it out.”

“I see,” said Jock.

12.16 Exercise Solutions

12.16.1 Self-Assessment Exercise 12.1 Solution

1. *What is a budget?*

A budget is an allocation of financial resources to a specific function or area.

2. *What do the abbreviations CAPEX and OPEX stand for?*

CAPEX is Capital Expenditure and OPEX is Operating Expenditure.

3. *What is capital rationing?*

Capital rationing is the determination of which items can be included within a limited allowable expenditure of a given budget.

4. *How would you monitor budgetary expenditure?*

- a. Create a budget in a spreadsheet (or other established system) indicating the various cost categories and the amounts allocated.
- b. Record actual expenditure as it occurs.
- c. Calculate planned expenditure for rest of the planning period. This is based on the original budget, adjusted to allow for known or expected changes. These may be increased or reduced relative to the original plan.
- d. Calculate the balance of commitments. This will be a positive amount if there is a projected budget surplus and a negative amount if there is a projected budget shortfall.
- e. Take steps to remain within budget, or discuss the situation with management if an unavoidable shortfall or surplus is emerging.

12.16.2 Long River Ferry Company Exercise Solution

The capital expenditure as proposed is as follows:

Year	1	2	3	4
Small boats	14	8	1	11
Large boats	3	8	8	5
Shore facilities	6	0	1	0
Total	23	16	10	16

Suggestions Propose cutting back expenditure on small boats in years 1 and 2 in case demand is taken by large boats from year 3. Better demand information may emerge over years 1 and 2. Market may switch to large boats, or may grow in total.

Is it possible to lease boats to cover the short term?