INSTITUTO SUPERIOR TÉCNICO
Universidade Técnica de Lisboa

FINANCIAL MANAGEMENT

OF

INFORMATION TECHNOLOGY SERVICES

João Miguel de Melo Martins Carlota

Dissertação para Obtenção de Grau de Mestre em

Engenharia Informática e de Computadores

Júri

Presidente: Professor Pedro Manuel Moreira Vaz Antunes de Sousa

Orientador: Professor Miguel Leitão Bignolas Mira da Silva

Vogal: Professor…

Setembro 2007

Ackowledgements

I want to say thank you to Professor Miguel Mira da Silva because of his disposal to help although I didn't always use it as I should.

I'm very thankful to my colleagues, Artur Carvalho and, specially, to Jorge Vicente, who had worked with me in the project on Millennium BCP.

To my parents, I have to say that they were always there, interested and helpful in my entire course.

To all my other University colleagues which help me to pass through the difficulties with happiness and always learning with them.

To all my real friends!

Finally, to Adriana who always gave me a push in the final and very important moments.

Resumo

ITIL é uma biblioteca de boas práticas de gestão de serviços IT. A gestão financeira de serviços IT é um processo do ITIL que determina os custos dos serviços e fornece informação financeira para que seja possível uma diminuição das despesas segundo certos planos e para assegurar que o dinheiro disponível é bem gasto. Os processos da gestão financeira (orçamentação, contabilidade e gestão de proveitos) necessitam de ser planeados e controlados correctamente para que sejam eficientes. Esta área requer previsões antecipadamente e mecanismos de monitorização eficientes. É aqui que entram os cenários "what-if". Os cenários "what-if" são usados para prever as consequências em determinado cenário e compará-los numa situação real ao longo de um determinado espaço temporal. Servem para tomar melhores decisões segundo várias hipóteses com base na informação existente. Este trabalho descreve como os cenários "what-if" podem ser usados de forma a ajudar a gestão financeira de serviços IT.

Palavras-Chave

Gestão de Tecnologias da Informação, Gestão Financeira, Orçamento, Custos, Proveitos, Gestão de Serviços, Simulações, Cenários "What-if".

Abstract

The Information Technology Infrastructure Library (ITIL) is a framework outlining best practice in ICT Service Management. Financial Management for IT Services is an ITIL process which determines the costs of services and provides financial accoutings support to ensure expenditures fall within approved plans and that funds are well spent. Financial Management processes (Budgeting, IT Accounting and Charging) need to be well planned and controlled to be effective. This area requires a lot of predictions and forecasting, controlling and monitoring. That's where what-if scenarios take into action. What-if scenarios are used to gain operational information and to compare two or more alternatives in a well-known situation with a short time horizon where the researcher is familiar with the decision problem and can set defined hypothesis on the basis of existing data. This document describes how what-if scenarios can be used to help Financial Management for IT Services.

Keywords

Contents

Table of Figures

Table Index

Definitions and Acronimous

ICT – Information Communication Technology

IT – Information Technology

ITIL – IT Infrastructure Library

QoS – Quality of Service

ROCE – Return on Capital Employed

ROI – Return on Investment

SLM – Service Level Management

TCO – Total Cost of Ownership

VFM – Value for Money

1. Introduction

1.1. Information Technology Services Management

IT Service Management (ITSM) is the discipline that strives to better the alignment of IT efforts to business needs and to manage the efficient providing of IT services with guaranteed quality. A technical approach to these issues, namely infrastructure-oriented, technological IT Service Management, or Quality of Service (QoS) management, has been the focus of many research efforts in the area of networks and systems management (1). ITIL (IT Infrastructure Library) provides a Framework of "best practice" guidance for IT Service Management and is the most widely used and accepted approach to IT Service Management in the world. The key ITIL message is that IT Services are there solely to support the business and its efficient and effective operation (2).
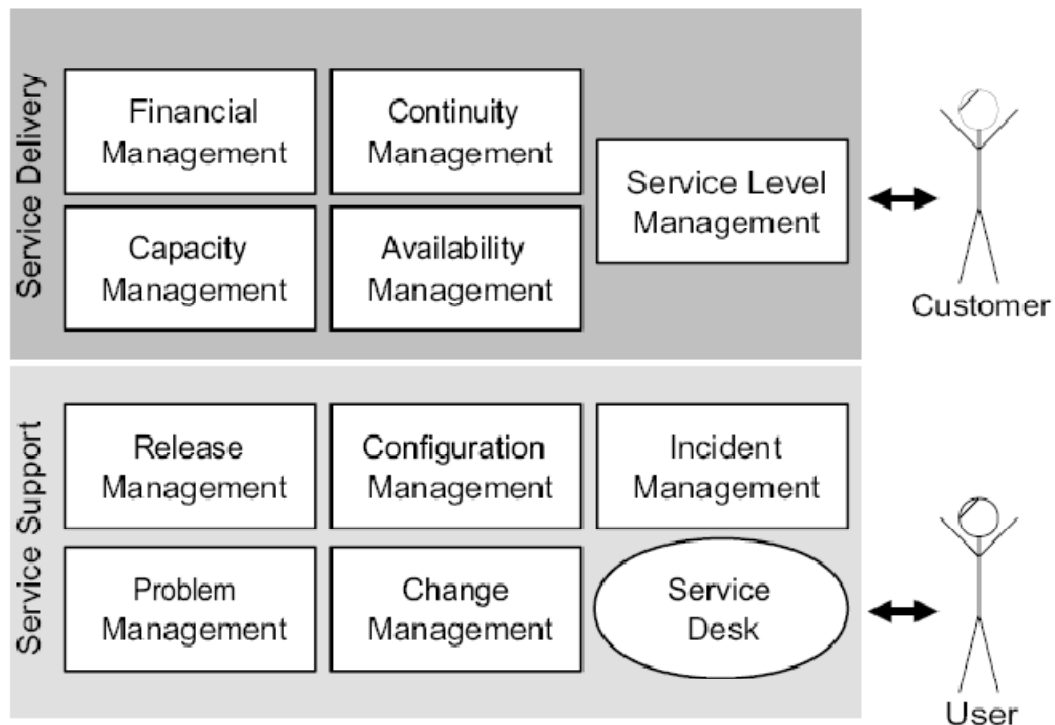
Figure 1 - Scope of ITIL (1)

Service Support and Service Delivery each define five processes, as depicted in Figure 1 - Scope of ITIL. Service Support also has a chapter for Service Desk guidance. The Service Desk is however a business function (or unit) and not a process. It generally fulfills the role of first line support and serves as a single point of contact for the user in all other concerns as well (1). This document talks about some aspects of the Financial Management for IT Services process.

1.2. Financial Management for IT Services

Financial Management is responsible for the oversight of all IT expenditures and for ensuring that funds are available for planned events. The team assists in the IT decision-making process by providing detailed financial information supporting proposed initiatives. Financial Management processes, through the use of chargeback systems, influence the use of IT assets to maximize the return on IT investments (3). Within an IT organization Financial Management is visible in three main processes (4):

- o Budgeting – is the process of predicting and controlling the spending of money within the enterprise and consists of a periodic negotiation cycle to set budgets (usually annual) and the day-to-day monitoring of the current budgets.
- o IT Accounting – is the set of processes that enable the IT organization to fully account for the way its money is spent (particularly the ability to identify costs by customer, by service, by activity). It usually involves ledgers and should be overseen by someone trained in Accountancy.
- o Charging – is the set of processes required to bill a customer for the services supplied to them. To achieve this requires sound IT Accounting, to a level of detail determined by the requirements of the analysis, billing and reporting processes.

The following simple diagram, Figure 2 - IT Accounting, Charging & Budgeting cycle, is used as a basis for the explanation of the Financial Management process.
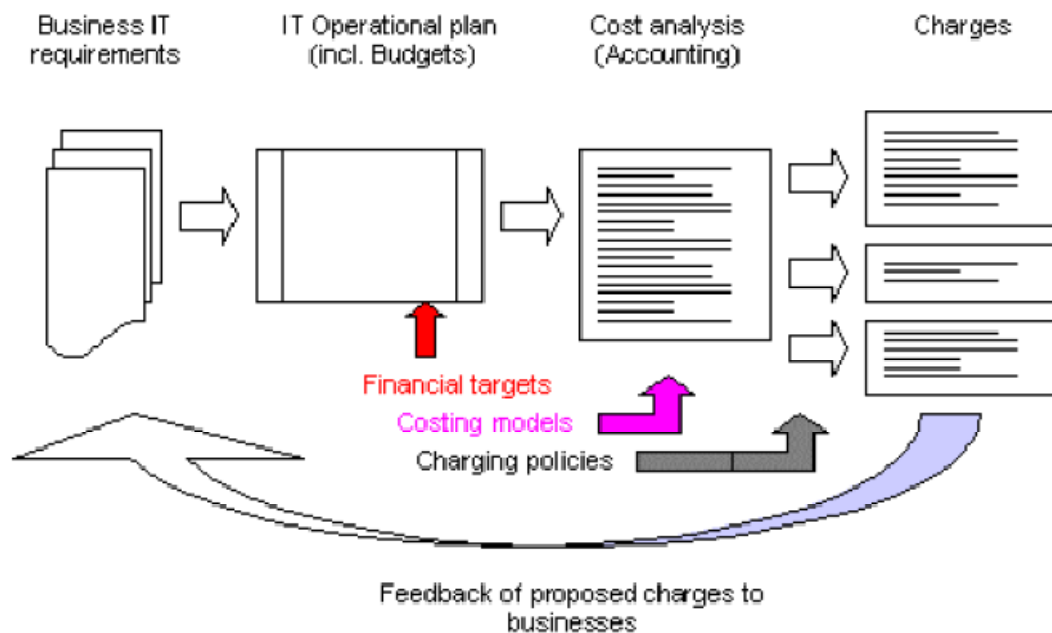
Figure 2 - IT Accounting, Charging & Budgeting cycle (4)

The benefits of Budgeting, IT Accounting & Charging for IT services, in summary they (4):

- o Increased confidence in setting and managing budgets
- o Accurate cost information to support IT investment decisions
- o Accurate cost information for determining cost of ownership for ongoing services
- o A more efficient use of IT resource throughout the enterprise
- o Increased professionalism of staff within the IT organization

As Financial Management requires being able to evaluate beforehand the impact of a strategic or tactical move, decision makers need reliable provisional systems. What-if analysis satisfies this need by enabling users to simulate and inspect the behaviour of a complex system under some given hypotheses, called scenarios (5).

2. Financial Management for IT Services

2.1. Overview of ITIL

In recent years it has become increasingly that information is the most important strategic resource that any organization has to manage. Key to the collection, analysis, production and distribution of information within an organization is the quality of the Information Communication Technology (ICT) systems and IT Services provided to the business. It is essential that we recognize that ICT systems are crucial, strategic, organizational assets and therefore organizations must invest appropriate levels of resource into the support, delivery and management of these critical IT Services and the ICT systems that underpin them. However, these aspects of IT are often overlooked or only superficially addressed within many organizations (2).

The challenges for IT Managers are to co-ordinate and work in partnership with the business to deliver high quality IT services. This has to be achieved while reducing the overall Total Cost of Ownership (TCO) and often increasing the frequency, complexity and the volume of Change. The main method of realizing this goal is the operation of effective processes and the provision of appropriate, Value for Money (VFM) services. To achieve this, the correct processes need to be developed and implemented with in-built assessment and improvement mechanisms. IT management is all about the efficient and effective use of the four P's: people, processes, products (tools and technology) and partners (suppliers, vendors and outsourcing organizations) (2).

Figure 3 - The four P's (2)

Management therefore needs to develop joint strategies and plans for all four areas within Figure 3 - The four P's. However, many organizations, in the past and still today, recognize the four P's but do not use them for maximum advantage. All too often products are bought to manage areas of technology and its limitations. The people and processes issues must be addressed and this is one of the core principles of ITIL (2).

2.1.1. Why Implement Service Management?

One of the main objectives of ITIL is to assist IT Service provider organizations to improve IT efficiency and effectiveness whilst improving the overall quality of service to the business within imposed cost constraints (2).

The specific goals of IT are to develop and maintain IT services that (2):

- o Develop and maintain good and responsive relationships with the business
- o Meet the existing IT requirements of the business
- o Are easily developed and enhanced to meet future business needs, within appropriate time scales and costs
- o Make effective and efficient use of all IT resources
- o Contribute to the improvement of the overall quality of IT service within the imposed cost constraints

Benefits realized by many IT organizations through implementing ITIL and processes based on best practice guidelines are (2):

- o Continuous improvement in the delivery of quality IT services
- o Reduced long term costs through improved Return On Investment (ROI) or reduced TCO through process improvement
- o Demonstrable Value for Money to the business, the board and stakeholders, through greater efficiency
- o Reduced risk of not meeting business objectives, through the delivery of rapidly recoverable, consistent services
- o Improved communication and better working relationships between IT and the business
- o The ability to absorb a higher rate of Change with an improved, measurable rate of success
- o Processes and procedures that can be audited for compliance to best practice guidelines
- o Improved ability to counter take-over, mergers and outsourcing

However, care must be taken when developing IT Service Management within an organization. It is easy to view and interpret ITIL as bulky and bureaucratic and as a result implement processes that inhibit Change rather than facilitate it. It is important that ITIL is implemented with an "adopt and adapt" approach so that effective and appropriate processes are put in place. This can only be achieved where business driven metrics, Critical Success Factors (CSF's) and Key Performance Indicators (KPI's) are put in place to measure the success of the process implementations and their continuous improvement. Quality and the measurement of quality, in business related terms, is yet another core principle of ITIL (2).

2.1.2. ITIL Framework

ITIL provides comprehensive best practice guidelines on all aspects of end-to-end Service Management and covers the complete spectrum of people, processes, products and the use of partners. ITIL was initially designed and developed in the 1980s but has been revised and updated throughout the years. ITIL is the most widely used management approach to the delivery and support of IT services and infrastructure, world-wide. ITIL and its constituent modules were scoped and developed within an overall framework (2).

Figure 4 - The ITIL framework (2)

Figure 4 - The ITIL framework shows the overall environment and structure within which the modules were produced. It illustrates the relationship that each of the modules has with the business and the technology. From the diagram it can be seen how The Business Perspective module is more closely aligned with the technology itself. The Service Delivery and Service Support modules provide the heart of the process framework (2).

2.1.2.1. Service Delivery

Service Delivery covers the processes required for the planning and delivery of quality IT services and looks at the longer term processes associate with improving the quality of IT services delivered (2).
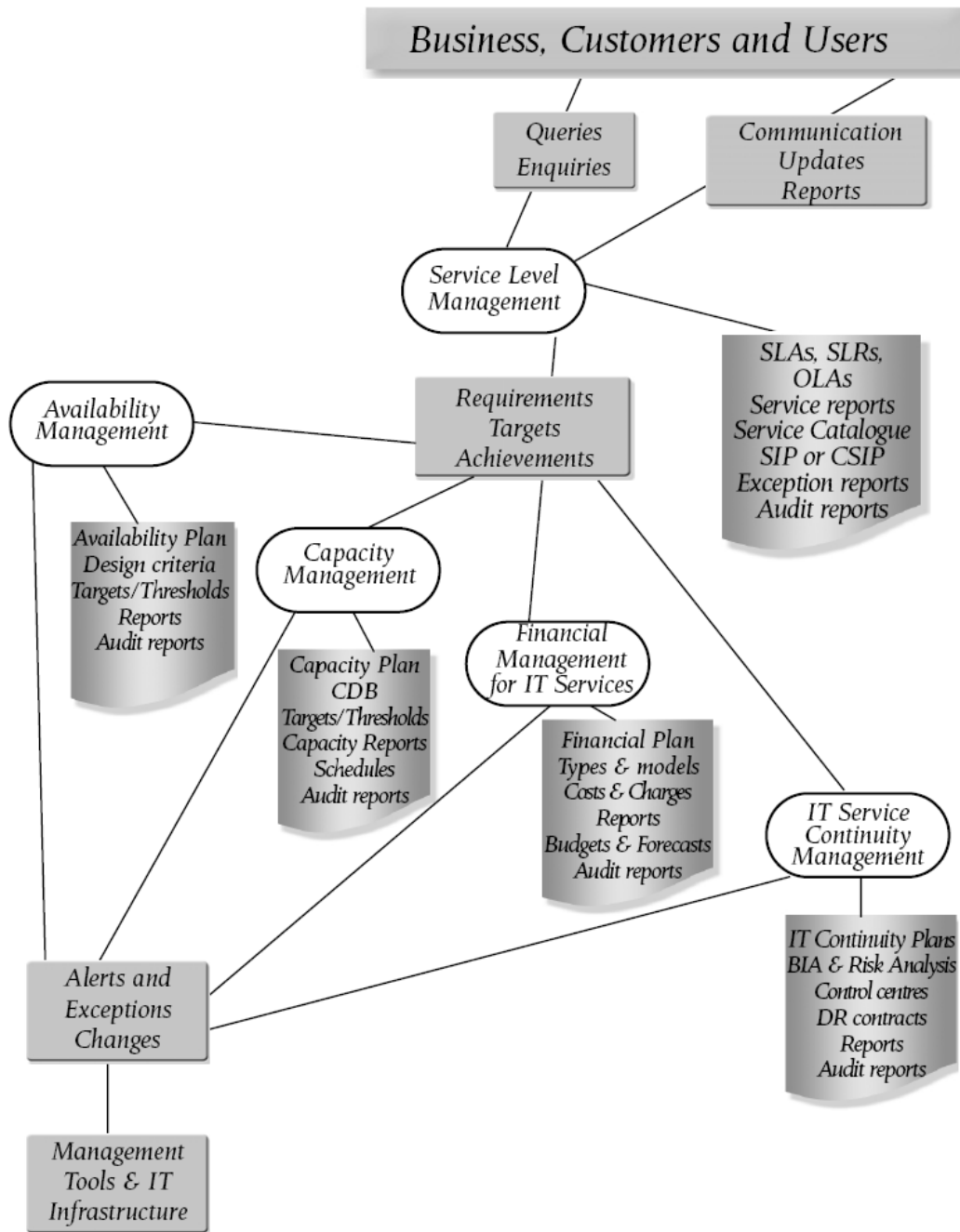
Figure 5 - The Service Delivery Processes (2)

Figure 5 - The Service Delivery Processes illustrates how Service Level Management (SLM) provides the major interface to the business and it also shows the major deliverables from each of the Service Delivery processes (2). Service Delivery includes the following processes (6):

- o Service Level Management – processes to manage maintain and improve the level of service provided to the organization.

- o Financial Management – processes to manage the cost associated to providing the organization with services or resources to meet the business requirements.
- o Availability Management – optimization of ICT infrastructure capabilities, services and support to minimize service outages and provide sustained levels of service to meet the business requirements.
- o IT Service Continuity Management – processes to manage an organization's capability to provide the necessary level of service following an interruption of service or major disaster.
- o Capacity Management – processes that enable the organization to tactically manage resources and strategically plan future resource requirements.

2.1.2.2. Service Support

The Service Support processes support the activities that actually deliver the services (7).
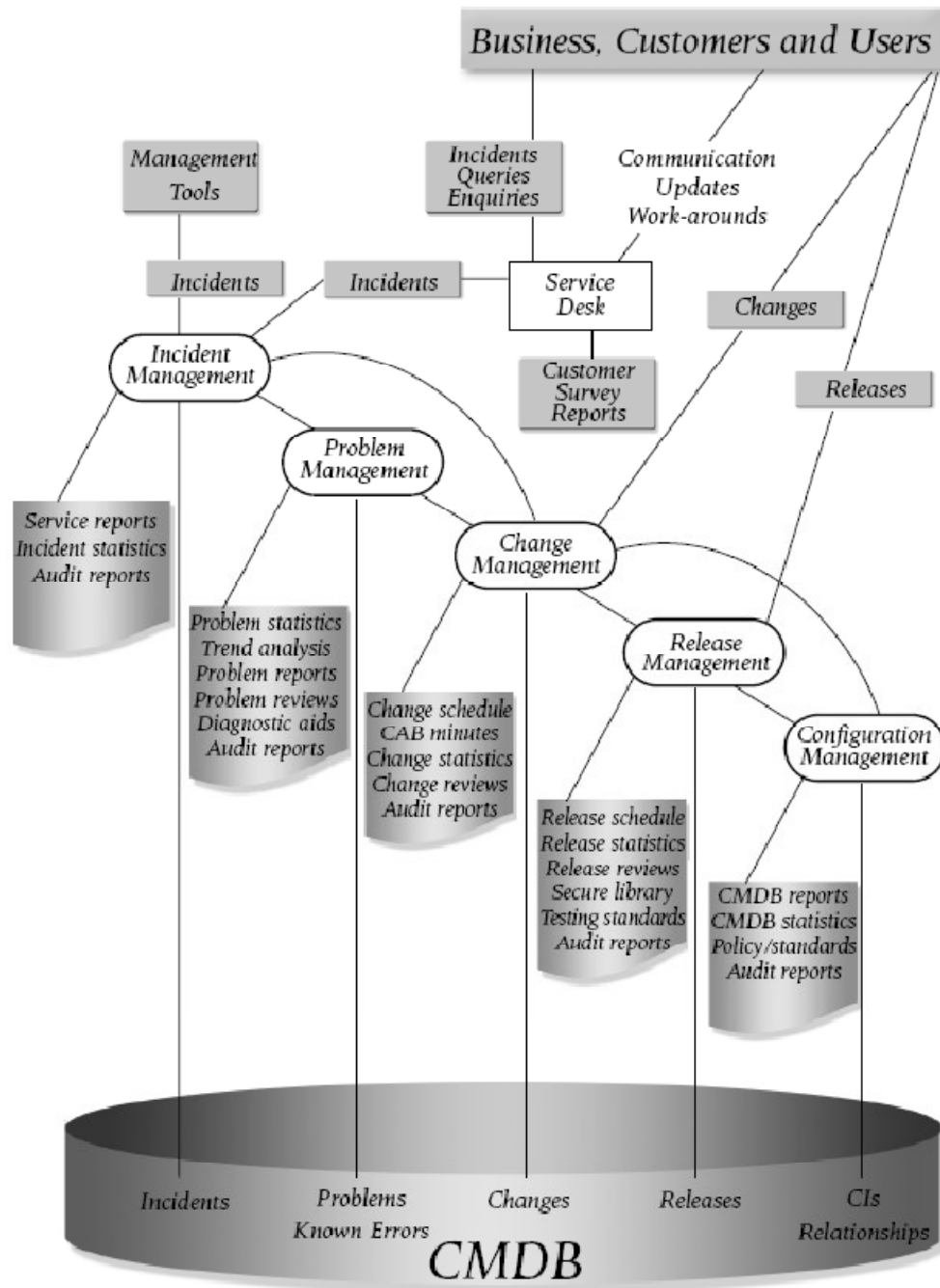
Figure 6 - The Service Support Processes (2)

Figure 6 - The Service Support Processes illustrates that the Service Desk function provides the major interface to the business and it also shows the major deliverables from each of the Service Support processes. The Service Desk is a business function (or unit) and not a process. It provides a single, central point of contact for all Users of IT within an organization, handling all Incidents, queries and requests. Service Desk provides an interface or all of the other Service Support processes (2). Service Support includes the following processes (6):

- Incident Management – the day to day process that restore normal acceptable service with a minimal impact to the business.
- Problem Management – the process of diagnosing root causes of incidents in an effort to proactively eliminate and manage service disruption.
- Release Management – the process of testing, verification and release of changes to the ICT environment.
- Change Management – standard methods and procedures for effective management of all changes in or to the ICT environment.
- Configuration Management – representing the physical and logical perspective of the ICT services provided or delivered.

2.1.3. Possible Problems with ITIL

There is an important yet often overlooked aspect about many ITIL implementations. In many cases, ITIL will make data center less efficient, because ITIL clearly articulates standard steps to follow as part of a process. Experienced systems administrators may have completed the same tasks as with ITIL but with fewer steps. In such cases, skepticism and downright resistance should be expected. Some ITIL processes may lead to make certain tasks less efficient (8).

2.2. Financial Management Process

Financial Management for IT Services is the ITIL Service Delivery process responsible for managing an IT Service Provider's Budgeting, Accounting and Charging Requirements (9).

Financial Management determines the costs of services and provides financial accounting support to ensure expenditures fall within approved plans and that funds are well spent. The role of Financial Management varies depending upon the view of IT within the corporation. Different best practices are suggested for each role. Some companies view IT as an expense center, some as a profit center, and some as a cost recovery center. However in all cases, Financial Management supports the "business" of IT (3).

Financial Management is responsible for accounting for the costs of providing IT service and for any aspects of recovering these costs from the Costumers (charging). It requires good interfaces with Capacity Management, Configuration Management and Service Level Management to identify the true costs of service. The Financial Management is likely to work closely with the Customer Relationship Manager and the IT Directorate during the negotiations of the IT department budgets and individual Customer's IT spend (4).

2.2.1. Why Financial Management for IT?

Changes to Budgeting and IT Accounting or the introduction of Charging for IT services are strategic business decisions. They may impact service levels, perceptions of value and usage of services. They also require an investment in planning and maintaining the processes. Business leaders throughout the enterprise should be fully aware of the changes likely from the implementation of changes to any or all of the above (4).

It is essential that enterprise recognize the cost of introducing and maintain Budgeting, IT Accounting or Charging as well as the benefits. The proposed benefits must be clear to the IT organization and business users. Evaluation of these costs and benefits prior to implementing new systems is essential if the systems are to be quickly accepted by the users and IT services staff (4).

Charges for IT services must be simple, fair and accurate and this requires accurate, effective IT Accounting. The enterprise must also be clear on its overall policies on Charging e. g. whether to break-even, to subsidize or to make profits. It is essential that the enterprise is fully aware of the benefits and the pitfalls of the proposed system of Charging (4).

It is unlikely that IT Accounting can be introduced solely for IT services – the whole enterprise must be prepared to account in the same way for monies spent. If Charging is introduced in an enterprise where no other form of inter-departmental charges are levied, anomalies may have to be addressed when, for instance, IT 'charges' Personnel for running the Personnel database but Personnel cannot charge the IT department for their services (4).

Most of benefits discussed are benefits to the enterprise as a whole, or to the customers of the IT department. The benefits to users are realized through improved service, arising from efficient use of IT spend. Financial Management can be seen as the brace that "locks" IT to the business, preventing the IT organization from drifting away from the needs of the business and preventing businesses from pursuing private deals outside the enterprise (4).

2.2.1.1. Benefits of Budgeting

The benefits of Budgeting should be self-evident, but in summary are (4):

- Ensuring that the business provides sufficient funds to run the IT Services it requires
- Ensuring that IT Service Levels can be maintained throughout the year
- Providing early warning of under- or over-consumption of service (provided that some form of IT Accounting is in place)

2.2.1.2. Benefits of IT Accounting

The fundamental benefit of Accounting for IT Services (IT Accounting) is that it provides management information on the costs of providing IT services that support the enterprise's

business needs. This information is needed to enable IT and business managers to make decisions that ensure the IT Services section runs in a cost effective manner. Cost effectiveness is defined here as ensuring that there is a proper balance between the quality of service on the one side and expenditure on the other. Any investment that increases the costs of providing IT services should always result in enhancement to service quality or quantity. IT Accounting helps the business to (4):

- o Base decisions about the services to be provided on assessments of cost-effectiveness, service by service
- o Make more business-like decisions about IT services and investments in them
- o Provide information to justify IT expenditures
- o Plan and budget with confidence
- o Demonstrate under- or over-consumption of service in financial terms
- o Understand the costs of not taking advantage of opportunities for change

Put simply, there is no prospect of IT service providers maximizing value for money if the costs of providing the services are not accurately known. A key justification for investing in more IT resources is to support new or better business processes. IT Accounting provides the cost basis for cost-benefit analyses (4).

2.2.1.3. Benefits of Charging

The fundamental benefit to the enterprise of charging customers is that it provides a sound business method of balancing the shape and quantity of IT services with the needs and resources of the customers. Customers are charge for the services they receive and because they are paying they have a right influence decisions on its provision. If they do not think the services represent good value for money, they may stop using them or make formal complaints but professional IT departments will invest time in discussing the balance of charges and service levels with their customers. Services can be improved by spending more, if there is a business justification for it. The introduction of formal Charging, often provides more evidence to support this and hence more enterprises will choose to invest in IT. Conversely, if customers believe that they can save themselves money (directly or indirectly, by reducing overall enterprise expenditure) by changing the way in which they use the IT Services, they will be able to discuss this more openly with the IT department. Charging enables the IT Services management to (4):

- o Make formal evaluations of IT services and plan for investment based on cost recovery and business benefits
- o Recover IT costs in a fair manner
- o Influence customer behavior

2.2.2. Budgeting

Budgeting is the process of ensuring that the correct monies are set aside for the provision of IT services and that during the budget period they are not over-spent. The Budgeting process is a key influence on strategic and tactical plans. It is also the means of delegating control and monitoring performance against predefined targets. It is paramount that budgets are effectively integrated within the enterprise and that managerial responsibility and accountability is matched and communicated in an efficient way (4).

As all spend affects profitability, it must be recognized that decisions about investment in IT Services and the integrated management IT Accounting function can help provide the competitive edge necessary for survival of an enterprise. All enterprises have an annual round of negotiations between the business departments and the IT department covering expenditure plans and agreed investment programmes which ultimately sets the budget for IT. These are closely linked to reviews with the businesses (individually or collectively) that cover (4):

- o Current projects and service levels
- o A review of the last 12 months
- o Plans for the next 1 – 3 years

The final budget agreed for an IT department may include financial disciplines imposed by the enterprise, including (4):

- o Limits on capital expenditure
- o Limits on operational expenditure
- o Limits on variance at any point in time, between actual and predicted spend
- o Guidelines on how the budget must be used
- o An agreed workload and set of services to be delivered
- o Limits on expenditure outside the enterprise or group of enterprises

Further, the business departments which provide the revenue to the enterprise, from which departmental budgets are drawn, may themselves have rigid limits on the way in which they pay for services – they may not be able to fund a change in service or service level mid-year despite IT being able to provide it. An example, very simplified budget is shown in Table 1 - Example Budget Calculation (4).

Budget item	Capital	Purchase cost	Operational cost	Spend this year	Budget next year	notes	Annualised cost
Hardware							
UNIX Server	Yes	£80,000	£8,000	£8,000	£8,000	no changes	£34,667
NT Server	Yes	£10,000	£1,000	£1,000	£1,000	no changes	£4,333
Netware server	Yes	£3,000	£300	£300	£300	no changes	£1,300
PCs (50)	Yes	£60,000	£6,000	£6,000	£6,000	no changes	£26,000
Routers (5)	Yes	£3,000	£300	£300	£300	no changes	£1,300
LAN Cabling	Yes	£40,000	£4,000	£4,000	£4,000	no changes	£17,333
Software							
General Ledgers	No		£20,000	£20,000	£24,000		
ORACLE	No		£7,000	£7,000	£8,400		
Mktg & Sales	No		£3,000	£3,000	£3,600		
MS Windows (50-user)	No		£2,500	£2,500	£3,000	staff increase from 50 to 60	
MS Office (20-user)	No		£3,000	£3,000	£3,600		
Netware	No		£3,000	£3,000	£3,600		
NT	No		£2,500	£2,500	£3,000		
Employment							
Manager	No		£50,000	£50,000	£52,000	4% payrise	
Senior Op	No		£30,000	£30,000	£30,000	just joined	
Operator	No		£20,000	£20,000	£21,000	5% payrise	
Contractor	No		£100,000			paid by Mktg	
Accommodation							
Computer room	No		£10,000	£10,000	£10,200	2% rise in	
Office	No		£10,000	£10,000	£10,200	charges	
Transfer							
Wide Area connection	No		£20,000	£20,000	£20,000	fixed price,	
DR contract	No		£10,000	£10,000	£10,000	3-yr contracts	
Total				£210,600	£222,200		

Note : the annualised cost is taken as 1/3 of the purchase cost, plus the annual maintenance cost and will be used in the Cost Model in section 3

Table 1 - Example Budget Calculation (4)

2.2.2.1. Budget Items

The categorizations above, of Hardware, Software etc, are arbitrary but help ensure that all the budget items can be identified. Transfer items are those in which a service is bought rather than a physical product. Other categorizations can be chosen: the test is that all budget items are identified (4).

The cost of some budget items may not be known at the time a budget is drawn up, e. g. overtime payments, contractor payments, consumables, external network charges. These have to be estimated, usually based upon a previous IT Accounting period (4).

Some costs may vary from estimates depending upon the usage. An example of this is software licenses that may increase (in steps) as further users are introduced. Other costs may need to be estimated to cover out-o-hours support, major equipment re-location (4).

Capital items are those which are recorded in the assets of the organization (4).

IT Finance Managers must be cautious in estimating costs where they do not fully control them. For example, planning a reduction of 20% computer room usage costs by removing old disc drives may not result in 20% saving in costs, as the rental for the space may be fixed by the lease (4).

2.2.3. Accounting

The basic IT Accounting principles (why do it, what to do and whom it affects) are common to all business functions. To a large extent, the implementation of IT Accounting is similar throughout the enterprise but the detail of what to cost and how to cost it, is dependent upon the type of service being provided (4).

To implement IT Accounting may require improved IT Accounting in many areas, for example in staff time and activity recording, supplier contracts, software licensing, resource metering or accommodation costs.

Other items which rely upon the information provided by IT Accounting and hence may dictate the shape of a IT Accounting model include (4):

- o Budgeting guidelines
- o Charging policies
- o Investment guidelines

IT Accounting can be very complex and if implemented at too high a level of detail, may cost more than the benefits realized. The IT Accounting system described here should enable an enterprise to (4):

- o Track actual costs against budget
- o Support the development of a sound investment strategy which recognizes and evaluates the options and flexibility available from modern technology
- o Provide cost targets for performance and service delivery
- o Facilitate prioritization of resource usage
- o Make day-to-day decisions with full understanding of the cost implications and hence the minimum of risk
- o Support the introduction, if required, of Charging for IT service

2.2.3.1. Building the cost model

To calculate the costs of IT service provision, it is necessary to design a framework in which all known costs can be recorded and allocated to specific customers, activities or other category. This is called a Cost Model. Most Cost Models are based on calculating the cost for each customer but other models can be developed to show the cost for each service or the

costs for each location. The Costs-by-customer Cost Model requires that we first identify all major costs elements in the current or proposed IT budget and then attribute them to the customers who "cause" them. To do this we have to first identify costs as either Direct or Indirect (4).

- o Direct Costs are those clearly attributable to a single customer, e. g. Manufacturing systems used only by the Manufacturing division.
- o Indirect Costs (sometimes called overheads) are those incurred on behalf of all customers e. g. the network or the technical support department, which have to be apportioned to all customers in a fair manner.

Any Indirect Costs, which cannot be apportioned to a set of customers (sometimes called Unabsorbed Overheads), have then to be recovered from all customers in as fair way a way as is possible, usually by uplifting the costs calculated so far by a set amount. This ensures that the sum of all of the costs attributed to each customer still equals the total costs incurred by the IT organization – in Table 2 - Spreadsheet example of full Cost-by-Customer this is referred to as the "balance check". This "balance check" can be applied to costs divided in other ways e. g. by service or by location; always, the sum of the parts should equal the whole.

If the Cost Model is being produced for the first time the categories and Cost Elements for it, will have to be developed first, to a level of detail that meets the needs of IT Accounting and of any Charging to be performed. Hence an understanding of Charging policies is necessary when the Cost Model is drawn up.

If costs are mainly Direct, perhaps because each customer has independent hardware and software, the method of recording and of apportioning costs can be very simple. For example, if Finance are the only users of the General Ledgers and the system on which it runs, all costs directly associated with the General Ledgers, including purchase, maintenance and support, can be attributed to Finance department's code in the ledgers (often called a cost-centre or charge-code).

However, if resources are shared, for instance a mainframe running applications for more than one customer, the hardware costs may have to be classified as indirect and apportioned to each customer, say by CPU-seconds from workload predictions. To do this requires a model that allows these costs to spread across a number of customers (4).

	Cost Elements	Capital	Annualised cost (see note 1)	Direct	Apportionment Method	Customer Marketing & Sales	Manuf-acturing	Finance
Hardware								
	UNIX Server	Yes	£34,667	No	50/50 split	£17,333	£17,333	
	NT Server	Yes	£4,333	Yes		£4,333		
	Netware server	Yes	£1,300	No	Infrastructure			
	PCs (50)	Yes	£26,000	No	by PC	£5,200	£19,240	£1,560
	Routers (5)	Yes	£1,300	No	Infrastructure			
	LAN Cabling	Yes	£17,333	No	Infrastructure			
Software (see note 2)								
	General Ledgers	No	£20,000	Yes				£20,000
	ORACLE	No	£7,000	Yes			£7,000	
	Mktg & Sales appl.	Yes	£3,000	Yes		£3,000		
	MS Windows (50-user)	No	£2,500	No	by PC	£500	£1,850	£150
	MS Office (20-user)	No	£3,000	No	by licence	£1,500	£1,050	£450
	Netware	No	£3,000	No	Infrastructure			
	NT	No	£2,500	No	Infrastructure			
Employment (see note 3)								
	Manager	No	£50,000	No	Unabsorbed overhead			
	Technical Support	No	£30,000	No	Unabsorbed overhead			
	Assistant	No	£20,000	No	Unabsorbed overhead			
	Contractor (see note 4)	*No*	*£100,000*	*No*				
Accommodation (see note 5)								
	Computer room	No	£10,000	No	Unabsorbed overhead			
	Office	No	£10,000	No	Unabsorbed overhead			
Transfer								
	Wide Area connection	No	£20,000	No	Infrastructure			
	DR contract	No	£10,000	No	Unabsorbed overhead			
	Total costs		**£275,933**					
	Direct & Apportioned costs		£100,500			£31,867	£46,473	£22,160
	Absorbed costs (Infrastructure)		£45,433		20% / 74% / 6%	£9,087	£33,621	£2,726
	Unabsorbed costs		£130,000	*89.1% uplift*		£36,482	£71,349	£22,169
			£275,933			**£77,435**	**£151,443**	**£47,055**

> **balance check for the 3 customers above: £275,933**

Notes

1 For capital items, this is 1/3 of the purchase price (the agreed depreciation) plus the annual maintenance cost

2 The M&S application will cost £100,000 to develop (one year of contractor), and the support contract is £3,000 annually

3 Includes NI, pension & other benefits, usually adding between 30% & 50% to salary

4 Contractor is employed to develop new system for Marketing & Sales and is funded directly by them

5 Accommodation costs set by Finance department

6 Marketing has 10 PCs with all software, Operations has 37 PCs but only 7 with Microsoft Office, Finance has 3 PCs with all software

7 Infrastructure costs will be added (absorbed) based upon numbers of PCs in each department, i.e. Marketing 20%, Operations 74%, Finance 6%

8 Unabsorbed overheads are added onto each cost centre by uplifting it by 89.1%, to ensure full recovery

Table 2 - Spreadsheet example of full Cost-by-Customer (4)

In the example in Figure 7 - Cost Model of Costs-by-Customer, it is assumed that there are 3 businesses or departments, who together are responsible for all of the IT costs. The three departments are Marketing & Sales, Manufacturing and Finance and all of the IT systems and services have been implemented on their behalf.
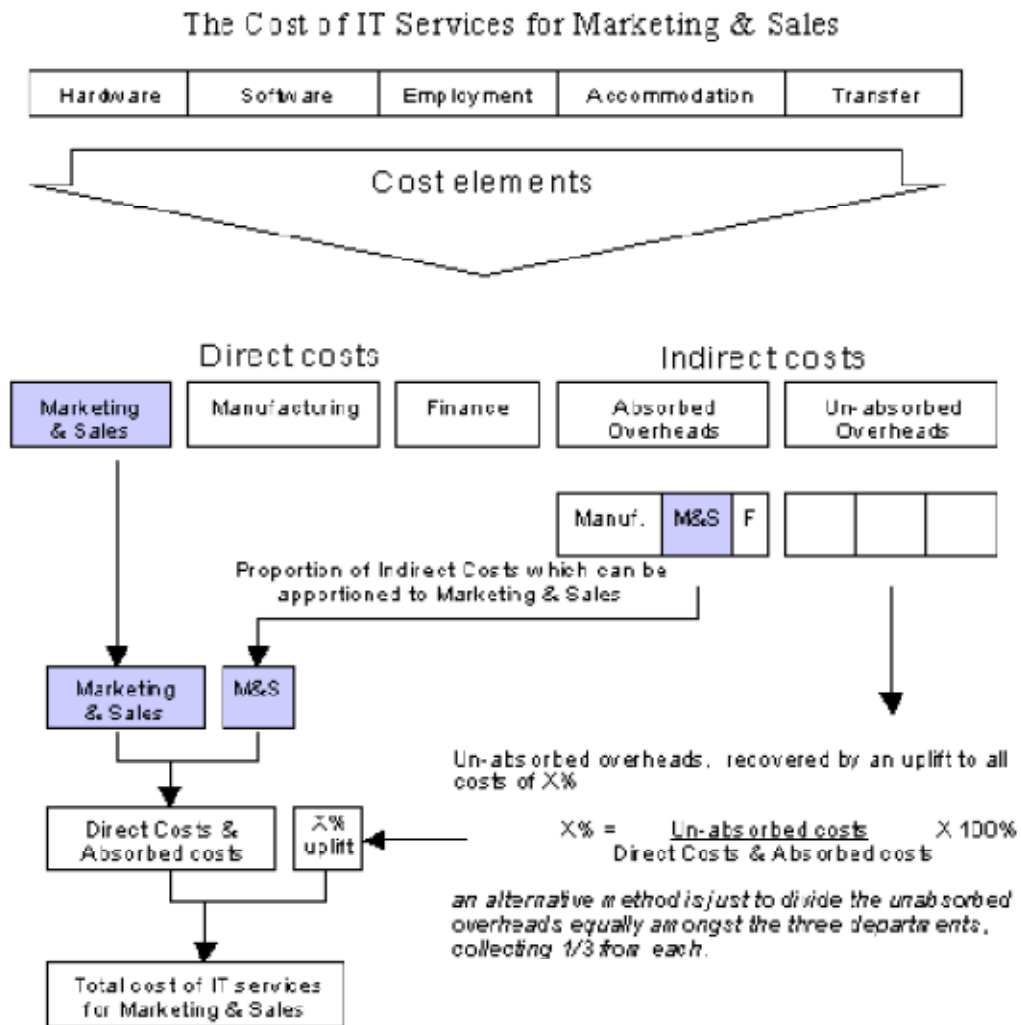
The Cost of IT Services for Marketing & Sales

Hardware	Software	Employment	Accommodation	Transfer

Cost elements

Direct costs

Marketing & Sales	Manufacturing	Finance

Indirect costs

Absorbed Overheads	Un-absorbed Overheads

Manuf.	M&S	F			

Proportion of Indirect Costs which can be apportioned to Marketing & Sales

Marketing & Sales	M&S

Direct Costs & Absorbed costs

X% uplift

Un-absorbed overheads, recovered by an uplift to all costs of X%

$$X\% = \frac{\text{Un-absorbed costs}}{\text{Direct Costs \& Absorbed costs}} \times 100\%$$

an alternative method is just to divide the unabsorbed overheads equally amongst the three departments, collecting 1/3 from each.

Total cost of IT services for Marketing & Sales

Figure 7 - Cost Model of Costs-by-Customer (4)

An example of the calculation of Cost Model for a simple Cost-by-customer is shown in Figure 7 - Cost Model of Costs-by-Customer. The same principles can be applied to calculating the costs of individual application services or even parts of a service e. g. support and maintenance. To be able to derive cost information and report it in the formats required by different parts of the enterprise, it is necessary to ensure that all costs recorded are classified to a standard system with a level of detail that anticipates future changes, e. g. new cost centres, new equipment types, new project codes (4).

2.2.3.2. Apportioning the IT Services Costs

Consider a company with three departments who require IT services – Marketing & Sales, Manufacturing, Finance. Each is asked to contribute towards the IT budget, based upon the services they require. Each Cost Element in the IT budget has to be identified; classifying them

by type (Hardware, Software etc.) helps ensure that all such costs are found. It must then be decided whether these are Direct Costs or Indirect Costs and how they will be allocated to customers (in this case, other departments of the company).

In the example in Table 2 - Spreadsheet example of full Cost-by-Customer, all the costs of providing the shared computer infrastructure – cables, servers, routers, software, have been grouped into a single Indirect Cost Element called 'infrastructure' for which a common apportionment method can be used; in this case, the number of users of the infrastructure. This simplifies the spreadsheet and enables a simple calculation of the cost of adding new users to the network.

Rather than trying to determine the actual usage of the infrastructure that all departments rely upon, it is simpler to group all infrastructure Cost Elements into one and determine a fair way of recovering those costs, e.g. by number of users in each department. In practice, the Cost Elements in each of the major Cost Types may be groups of items. For instance the UNIX server Cost Element may consist of a number of items e.g. central processor, UPS, filestore, peripherals but these rarely need to be identified individually unless the Cost Model has to show costs to that level (4).

2.2.3.3. Investment Appraisal

Sound IT Accounting methods, including the Cost Models described previously, enable businesses to determine the costs of IT service provision. These costs can be used in Investment Appraisal, a process of determining whether the business will benefit from changes to IT service quantity and quality. Techniques of appraisal have been developed mainly in the context of decisions on capital spending, but the general principles apply to any proposal for spending or saving money that involves changes in the use of resources. Systematic appraisal entails (4):

- o Being clear about objectives
- o Thinking about different ways of meeting them
- o Estimating and presenting the costs and benefits of each potentially worthwhile option

Used properly, appraisal leads to better decisions by policy makers and managers; it encourages both groups of people to question and justify what they do and it provides a framework for rational thought about the use of limited resources. It establishes the link between business operations and the cost of underpinning them; it enables the IT organization to support the business in its cost/benefit analyses (4).

Return On Investment (ROI)

Many enterprises now insist that IT projects, in line with other business projects, calculate a Return on Investment. This enables decision-making to be based on common business standards and allows comparisons between investments in IT and non-IT projects. The factors classed as a "Return" vary from enterprise to enterprise and from year to year. In concept, a return is a revenue or benefit, or the prevention of a lost benefit or revenue (opportunity cost), which is attributable to the project. If the return is divided by the expenditure required to complete the project, a figure is derived which can be compared with the returns on doing nothing (often taken as the bank base rate) or the returns from other projects or initiatives.

$$ROI = \frac{\text{average increase in profits}}{\text{Investment}} \quad \text{(average taken over an agreed number of years)}$$

The Investment figure may take into account the cost of borrowing money. The accuracy of the estimates for returns on investment is often challenged but that is the nature of estimating benefits. To improve the acceptance of these calculations, it is important to involve the business in determining the returns and how they are to be measured (4).

Return On Capital Employed (ROCE)

Shareholders and potential investors in a company will look very closely at a number of "ratios". The actual ratios felt to be important are subject to fashion but a primary one is the Return On Capital Employed (ROCE).

$$ROCE = \frac{\text{Net Profit Before Tax and Interest}}{\text{Total assets less current liabilities}}$$

This ratio, of the Returns over the Capital Employed, is one frequently used by business analysts to judge the effectiveness of the enterprise as a whole. Any changes to services or products would normally be expected to improve this figure and hence the ROCE calculated for a proposed project should be higher than the overall enterprise ROCE.

The use of ROCE enables comparisons of different investment opportunities in a fair way and represents how effectively an enterprise generates revenue from its assets (the capital employed). At its most basic, this can be compared with bank base rate that offers a Return on Capital Employed which has minimal risk (4).

2.2.3.4. Total Cost of Ownership (TCO)

The Gartner Group pioneered a method of calculating the costs of a product or service with the title of "Total Cost of Ownership". This referred to assessing the lifecycle costs of an item rather than just the visible capital expenditure. The most widely known example was that for Personal Computers. In an era where the price of a PC on a desk had fallen to $2,000, Gartner

demonstrated that the 5-year cost of a PC, when taking into account purchasing overheads, upgrades, maintenance, a proportion of support staff and Service Desk costs, disposal etc. was closer to $35,000. They argued that the cost per PC per year was thus $5,000.

It remains a vivid demonstration of the difference between purchase price and ownership cost which many customers of IT departments still find surprising, particularly when IT budgets are discussed. The current extension of this is to include Social costs such as recycling, environmental damage or work injury to produce Total Life Cost (4).

2.2.4. Charging

The concept of Charging for incurred internal costs is not new but is often seen as too bureaucratic and too difficult to implement fairly. The Charging systems described should enable an enterprise to:

- o Determine the most suitable Charging policies for their enterprise
- o Recover fairly and accurately, the agreed costs of providing the services
- o Shape customer / user behaviour to ensure optimal return on IT investment by the enterprise

Such a system controls IT service costs and influences the proper use of IT resources, so that these scarce resources are used in the manner which best reflects business need. To calculate the charge for providing IT services internally, or between (or to) subsidiaries, an enterprise must decide, prior to implementation, what it is hoping to achieve. One key factor will be to analyze the motivational aspects of Charging, considering both the effects upon the provider and the user of the service. The objective is to optimize the behaviour of both parties in achieving the enterprise's aims (4).

2.2.4.1. Charging Policies

Traditional, centrally funded IT Service organisations are under pressure from many sides. They are expected to reduce overall costs while maintaining or improving service in an increasingly complex environment. Business divisions may make unrealistic, competing and unjustifiable demands on the fixed resource available. Within the organisation, staff may feel trapped into a slave role with little opportunity to manage workload or to develop new skills. Charging for IT Service is seen as a method of (4):

- o Forcing the business divisions to control their own users' demands
- o Reducing overall costs and highlighting areas of service provision which are not cost effective

- Allowing the organisation to match service to justifiable business need, through direct funding

"Users will only value what they have to pay for": the corollary is that once users have to pay, they will demand value for their money. To implement charging requires a management commitment to resolving the issues that this will bring to the organisation as a whole. Unless the IT Service organisation has the support of the whole company in introducing charging, it will fail. It has to be simple, fair and realistic.

- Simple – "I can see three more administrators but two less IT professionals" – the overheads of cost management must deliver the benefits of an improved overall cost-effectiveness without the bureaucracy commonly associated with IT Accounting for costs.
- Fair – "I can obtain the services cheaper elsewhere and that's what I'll do" – the system must be fair and realistic, services which are not cost-effective will have to be reviewed and hard decisions taken. Each business will have to pay the same money for the same service.
- Realistic – "I'm saving money, even though it must be costing the company more" – anomalies in the charging system will be exploited by businesses. The charging mechanisms must be designed to achieve optimal behaviour.

The image of the IT Service organisation is likely to change; they may be seen initially as demanding money without providing the required service, as having become bureaucratic and focused on trivial accounting. To limit this risk, IT organisations considering the implementation of charging should:

- Publicise the programme and work with the businesses to define charging policy
- Ensure that Service Level Agreements are in place and representative of actual service
- Ensure that the benefits are quantifiable and demonstrable

Four factors govern the requirements of a Charging system in the enterprise. For example, full commercial Charging requires that costs can be forecast and collated in a manner that provides profitable revenues in the chosen marketplace. In a simple environment, the aims of a Charging system may be solely to make costs more visible and to cause customers to pay more attention to them. The four factors are:

- Level of recovery of expenditure required
- Desire to influence customer / user behavior
- Ability to recovery according to usage
- Control of the internal market

Pitching services at market price in turn leads to being able to provide quality services consistently, and at reasonable prices, thereby establishing a professional interface with customers. Ideally, the Charging will be based on business deliverables, recognisable to the customers e.g. business transactions, monthly reports (4).

2.2.4.2. Billing

Three objectives are key to Billing:

- o The bills must be simple, clear and matched to the ability to pay (in amount, time and method)
- o Chargeable Items must be understood by the user, with reasonable correlation to usage of resources, including hardware, software, accommodation, and organization
- o IT Accounting data must be available to provide details on, and justification for, bills

Charging information is passed to customers to make them aware of the cost of the resources used by their business. This can be done by:

- o Calculating and circulating to managers the full details of the cost of providing each business's IT or services (No Charging)
- o As above, but including details about how much the IT organisation would charge, should a charge-back system be operated, without applying transactions to the financial ledgers (Notional Charging)
- o As above, but applying transactions to the financial ledgers (Full Charging)

Often the first two options above lead ultimately to the introduction of Full Charging. Whichever approach is followed, the presentation of the information to the customer must be simple, understandable and honest. Notional Charging is useful when a Charging system is being introduced for the first time. Notional Charging allows the IT Services section to gain experience and time to correct errors in the Charging formulae or cost recovery plans and familiarises customers with the concept of being charged for using IT resources. Notional Charging is not recommended for long-term use unless the enterprise does not intend to move to a real Charging system, because the incentive to become cost conscious is lessened when money does not change hands (4).

2.2.5. Implementing Financial Management

All successful projects start with a project plan. Implementing Financial Management is no different. A project with a record of success in implementing large, complex projects should be assigned. Additional staff as required by the company's project management process should be

assigned at the same time. Support staff will be needed to document the progress. Since this implementation is the pilot, the support staff should be sufficient to quickly handle any anomalies during the execution of the project plan and should be the ones to make adjustments to the general implementation procedures to smooth the way for future process implementations (3).

2.2.5.1. Gather the data

The first step is to identify a finance manager. In most shops this should be a "full time" position and probably already performed in some form by corporate finance. Separating this function permits one to focus on the peculiarities of finance as it pertains to IT. Substantial IT knowledge is desired to ensure proper oversight of IT expenditures.

Perform a current state assessment. This is frequently done with the assistance of a consultant or facilitator, however OCG does provide a self-assessment checklist that can be used to narrow the focus of assessment work. The project team should survey the entire IT organization and discover where and to what extent Financial Management work is being performed today (3).

A tools and software inventory should also be performed. In most organizations, spreadsheet and accounting programs are already being used, however facilities to relate IT consumption by users to expenditures may not be in place. As a result, data from Capacity Management organization may be available to Financial Management to support the Financial Management processes, otherwise commercial usage chargeback packages may be required (3).

Once the assessment and inventories have been completed, the next step is to perform a gap analysis. The gap analysis will show the areas that need process improvements or new work to be performed and where efforts are duplicated. Staffing needs and/or skills and training requirements will identify tool needs and duplication. The result of the gap analysis is essential to build the project plan, define the work that needs to be accomplished, identify tools that need to be acquired, and understand the staffing requirements and costs (3).

Now that the gap analysis has revealed the changes required to migrate to the new organization, the project plan can be developed and a cost analysis completed. Staffing, tools and equipment needs will be translated into costs and included in the cost analysis (3).

2.2.5.2. Build the Plan

Once the gap analysis has been completed, sufficient information will be available to tailor an implementation plan to attain the vision. The plan will be responsible for establishing the

three major components of Financial Management – people, processes and tools. The plan will also determine the costs necessary to sustain the organization, build a preliminary budget and compare it to the current expenditures for similar function – possibly spread across the organization. The components of the implementation plan are (3):

- Determine where the finance manager is located in the IT organization. The ideal placement is as a direct report to the CIO or IT Director.
- Sufficient time must be allowed to develop the process documents. The documents should have a description of all the data inputs, information outputs and work processes. A flow chart of the workflow should also be included. Much thought needs to occur to ensure all interfaces and work are identified. In addition, the project plan needs to develop a process and identify a team to handle any process gaps during or immediately following implementation.
- The plan must include tasks to identify and train the people performing the work. The plan will vary depending upon management's decision to staff from within or look externally for the appropriate talent. Job descriptions need to be drafted and sufficient time allocated to work with the Human Resources organization to review and adopt them.
- Sufficient time must be built into the plan to train the Financial Management team on the new processes and any other ITIL team that interfaces with Financial Management. Many organizations have chosen to train all IT staff on Financial Management processes to promote a better understanding of IT costs and their impacts on changes in business processes and volumes.
- Any work regarding acquisition, consolidation and/or implementation of Financial Management tools will be included in the plan. If tools are to be acquired, the project manager needs to allow sufficient time in the plan for corporate acquisition policies and procedures to be followed.
- The project manager needs to develop a plan item to communicate the organization and its processes. Many organizations use their internal corporate communications team to accomplish this task. Due to demands on their talents, the project manager should schedule the work with corporate communications well in advance so project goals can be achieved.
- The project should include members of the financial team so a comprehensive implementation and ongoing operations budget can be developed. In addition, these project team members will assist in identifying current expenditures across the organization that performs Financial Management for IT functions. All financial information s then fed into the Total Cost of Ownership document and submitted to management with the proposed project plan.
- Project plans should be determined and agreed. Many organizations employ the use of a dashboard report, using traffic light colors (Green, Yellow and Red) to signify project status.

o   Once the project plan and the budget have completed, the project manager and the project sponsor present the plan for approval.

2.2.5.3. Execute the Plan

Assigning the staff

The Financial Management staff should be assigned immediately. By participating from the onset, the staff is very familiar with all facets of the processes and busness and technology data (3).

Document and publish the Processes

Since this is a pilot, defining and writing the processes are more work than a "normal" ITIL implementation. Interim interfaces to existing IT units have to ve identified as well as those needed for end-state so work can be accomplished with a minimum of interruption while the rest of the organization rolls out (3).

It is necessary to document the workflow: inputs, outputs, work accomplished, steps to accomplish, who does the work, who receives the work, outside assistance needed to execute the processes. It may be advantageous to employ the services of a professional writer to do the bulk of the work with management and technical staff creating just an outline to minimize disruption to day-to-day activities (3).

Doing so ensures the processes are documented consistently in the same format and the same language (tone and wording) (3).

Acquire and Implement the Tools

Historical infrastructure performance data reporting tools are as important as the Financial Management staff. The accurate reporting of a service performance is critical to the team's success. Without the right detailed data it is difficult for the staff to efficiently or effectively execute processes and procedures. Ideally a single tool will provide all the functions mentioned below. However economics may dictate that a number of existing products must be used and integrated. The Finance Manager must review the portfolio carefully however to ensure that data from all tools is based upon the same collection interval and that data can be easily moved between tools. Manual input of data from one tool into another can be a productivity drain and subject to errors, therefore it is desired to have automated methods of integrating the tools. Temporary means may be utilized until the Capacity Management team is implemented and more sophisticated tools become available (3).

Build the accounting and budgeting framework~

The budget and cost model are put in place. Generally a budget in some form is already available, it may just need more detail depending upon the new structure. Interfaces to corporate finance and financial units within the business units will be needed to obtain invoices, staffing expenses, travel, supply, vendor services and depreciation schedules. A financial calendar needs to be put in place to determine when regular analyses and review points will take place. The calendar needs to be coordinated with the business planning calendar as both work efforts will depend on each other (3).

Identify, define and implement chargeback systems

Usage data is gathered and analyzed to confirm original estimates and allocations. Any changes to add detail to the usage data gathering applications need to be put in place. Rates need to be determined and put in place. Reporting needs will be finalized and reports will be built and put in place. This work will require close coordination with the Capacity Management team as they will be the primary data provider. If charging is based upon business volumes, business data interfaces need to be put in place and tested, then integrated into the chargeback system (3).

Define metrics to measure success

As with all ITIL processes, there needs to be a way to measure the success and ongoing performance of the different IT units. Metrics need to be meaningful and measurable. They should be tied to business value rather than technical measures. Metrics should be fewer in numbers yet succinct and to the point, still providing management with good representation of the effectiveness of the unit. Remember that each ITIL process will have at least one metric, which will be rolled up into an overall IT report. It is necessary to keep the metrics at a manageable level as executives and managers do not have the time or the desire to read through many pages of metric reports. In Financial Management, most metrics will be related to financial performance (3).

Build the training materials and execute the training plan

As stated previously, sufficient time must be built into the plan to train not only the Financial Management team but any other team that interfaces with Financial Management. To accomplish this, it will be necessary to develop training materials based upon the processes previously drafted (3).

Self study seems to work well in a busy IT environment, however managers must ensure that each member of their staff has sufficient time to read and comprehend the information. Some organizations have opted to develop online training facilities, permitting staff to go through the material in a computer-based interactive environment (3).

To ensure retention, testing should be performed. Passing the test should be made mandatory. Some organizations offer financial incentives, others tie success to future compensation (3).

Once again, it cannot be stressed enough that organizations will experience fewer missteps when they spend more time testing. In most cases, the workflows will be substantially different than the work performed today; therefore it is necessary for each staff member to understand the work for which he or she is accountable and the value of the work to the organization (3).

Implement reporting and exception processes and procedures

Financial performance cannot be assessed without some type of reporting. Two types of reporting need to be put into place. High level reporting is used to keep senior management informed of service quality. These reports are generally in the form of a "dashboard", using colors to depict service quality. It is important that each service have two measures – current status and trend. In this way management will understand the current status and where it is trending. The Financial Management team and those staff assisting with corrective actions will need more detailed reporting to identify problematic service areas and to track results of actions taken (3).

2.2.5.4. Initiate the Ongoing Work of Financial Management

Once the initial budgets and accounting spreadsheets are put in place, work to automate and produce financial reports should be started. Intelligence should be built into the reports to alert the Financial Management team when financial targets are threatened and when substantial changes in user behavior occur. This proactive trending permits actions to be taken before financial targets are missed.

Financial review meetings should be scheduled on a regular basis to cover results. These meetings are normally held monthly or quarterly. The data presented should be concise and only address changes or trends in usage and determine corrective actions. This meeting should not be one of reading the financials line by line, citing the results.

The continuous improvement process will be engaged on an annual basis to review the processes and make adjustments where necessary. This work is performed by the Financial Management process champion (3).

2.2.5.5. Perform Post Implementation Review

At the end of the implementation project, the project manager should quickly put together a "lessons learned" document that identifies any changes that should be made to the process to facilitate future process migrations. Any implementation process changes should be made at

this time. Six to twelve months after completion, a post implementation audit should be performed to determine if the new processes are being adhered to and if the organization is delivering the expected business benefit (3).

2.2.6. Problems implementing Financial Management

There are a number of possible problems in implementing IT Accounting and Charging (4):

- o IT Accounting and Charging are often new disciplines in IT Services and there is limited understanding of leading practice in Cost Modelling and Charging mechanisms which could lead to over-complex or ineffective systems
- o IT Accounting relies on planning information provided by other functions both within and outside of IT Services management which may not be routinely available, delaying the project
- o Staff combining accountancy and IT experience are rare, so many activities may need to be shared with staff from outside IT Services who may not have this as their priority
- o Enterprises' IS strategies and objectives may not be well formulated and documented and prediction of capacity requirement not accurate
- o Senior business managers may not recognize the benefits of IT Acounting and Charging and may resent the administrative overheads and the limitations on workload
- o The IT organization may not be able to respond to changes in user demands once costs become an influence
- o The IT Accounting and Charging processes are so elaborate that the cost of the system exceeds the value of the information produced
- o The monitoring tools providing resource usage information are inaccurate, irrelevant or cost much to develop and maintain

3. Problem

Besides the problems described in the previous chapter there are some other problems for Financial Managers. Implementing effective and accurate Financial Management for IT Services requires good historical and current information so that the monitoring and controlling of Charging and Accounting can be efficient. There is a problem that is almost impossible to solve which is the lack of information needed to fully implement Financial Management. In some cases, simple expenditures are not registered because they are to simple but at a large scale it becomes very significant. This lack of information can cause a lot of troubles for Financial Managers.

Monitoring Charging and Costs is not an easy job even if correct information about the real expenses and revenues are available. That information must be understood so that IT Managers can be able to know if is everything going good or bad. For example, a cost may seem too high (or too low) at some moment of the year but according to other factors it may be normal. There must be a way to see if the values are normal or not.

Budgeting is a very hard work. It involves a lot of negotiation cycles and, many times, it consists in a struggle of IT Department to have more money. Usually, top managers ask where the money goes and why there is such a huge need for IT. IT Department function is to justify their needs, which most of the times it is hard to predict. So, IT Managers may have to resign and recalculate their budget. This is a hard job because sometimes there is no concrete formula to predict what IT is going to spend. A bad budgeting process is a very serious problem and it can lead to large costs to the organization.

In the next chapter, it is presented a possible solution to some problems described above.

4. Proposal

4.1. Monitoring IT Accounting and Charging

Controlling and monitoring IT Accounting and Charging can be done through previsions. This is a very simple solution and consists in using the historical information to understand when something goes wrong. From historical information and other data about future contracts and costs it is possible to know better if the current values are in conformity with the budget. If the information available is accurate, Financial Managers can see more clearly how their money is spent throughout the time. Recurring to alert systems they will be constantly informed about how the money is being managed. Valuable indicators about how expenditures and charges are going helps Financial Managers make better decisions.

4.2. What-if Concepts

4.2.1. Introduction

An increasing number of enterprises feel the need for obtaining relevant information about their future business, aimed at planning optimal strategies to reach their goals. In particular, in order to be able to evaluate beforehand the impact of a strategic or tactical move, decision makers need reliable provisional systems. Data warehouses, that indeed have been playing a lead role within business intelligence platforms in supporting the decision process over the last decade, are aimed to support detailed analysis of past data, thus they are not capable of giving anticipations of future trends. That's where what-if analysis comes into play (5).

4.2.2. What-if Analysis

In a nutshell, what-if analysis can be described as a data intensive simulation whose goal is to inspect the behavior of a complex system (i.e., the enterprise business or a part of it) under some given hypotheses (called scenarios). More pragmatically, what-if analysis measures how changes in a set of independent variables impact on a set of dependent variables with reference to a given simulation model (10); such model is a simplified representation of the business, tuned according to the historical enterprise data.

4.2.3. Scenario

The previous definitions of scenarios include three common basic elements: the definition of alternative future circumstances, the path from the present to the future, and the inclusion of uncertainty in the concept. The term scenario is widely used in a broad sense in various areas.

Especially in the field of military, games, theatre, software, and LCA the term scenario is used referring to the setting of frame conditions or a description of the system to be modelled. Other terms often found in this context include framework, outline plan, background story, and guidelines (11).

The term scenario has been used in two different ways: firstly, to describe a snapshot in time or the conditions of important variables at some particular time in the future; secondly, to describe a future history – that is, the evolution from present conditions to one of several futures. At least when scenarios are used in policy analysis, the nature of evolutionary paths is often important since policies can deflect those paths. It should also be noted, that the presentation of the development from the present to the future is not equivalent to dynamic modeling, it should rather be described as reasoning for the probability of a certain scenario giving snap-shots of time explaining the development (12).

In accordance with the uncertainty and unpredictability of the future it is understandable that flexibility and creativity are needed in the scenario development as well. More than a logical structure or a new kind of planning procedure, he suggests that scenario development is an approach, a joint working procedure basically aiming to cultivate and utilize the advanced intuitive knowledge of decision makers and combine it with objective information (13). Scenario development method should be selected according to the requirements of the studied case, its targets, and the available resources.

4.2.4. What-if Scenario

The What-if scenario is used to compare two or more options in a well-known situation where the researcher is familiar with the decision problem and can set defined hypothesis on the basis of existing data. These are often studies where some specific changes within the present system are tested and their implications to environmental impacts are studied. The results of a study using What-if scenarios are typically quantitative comparisons of the selected options: e.g. alternative A is better than alternative B by x%. This type of research could also be defined as one offering operational information in case of short or medium term decision-making situations. Operational information describes small changes of small scale systems with a short time horizon.

4.2.5. Interpretation

The objective of the interpretation is to determine the significant issues, in accordance to the goal and scope definition. The scenarios have to be checked in completeness, sensitivity and consistency. Moreover, the uncertainty of the results has to be analysed and the quality of data assessed. The procedure is iterative and interactive with other phases of LCA. Finally, in

the conclusions also the strengths and limits of the scenarios have to be considered and reported if the choice of scenario is important for the LCA results (14).

When presenting the results of a multiple scenario study, the issue of uncertainties included in each of the scenarios becomes extremely important. The decision-maker has to be fully aware of the uncertainties underlying each scenario in order to be able to make comparisons between them.

4.3.   What-if Scenarios in Financial Management context

What-if scenarios are used to gain operational information and to compare two or more alternatives in a well-known situation with a short time horizon where the researcher is familiar with the decision problem and can set defined hypothesis on the basis of existing data.

The concepts described are extremely useful for a Financial Manager. Financial Management processes, with focus on Budgeting, can be simplified with the use of scenarios. It is possible to illustrate how variables change according to possible situations. Various situations, or scenarios, can be compared so that Financial Manager can make the best decision. He will be able to better demonstrate to the other departments and top managers the consequences the decisions he made.
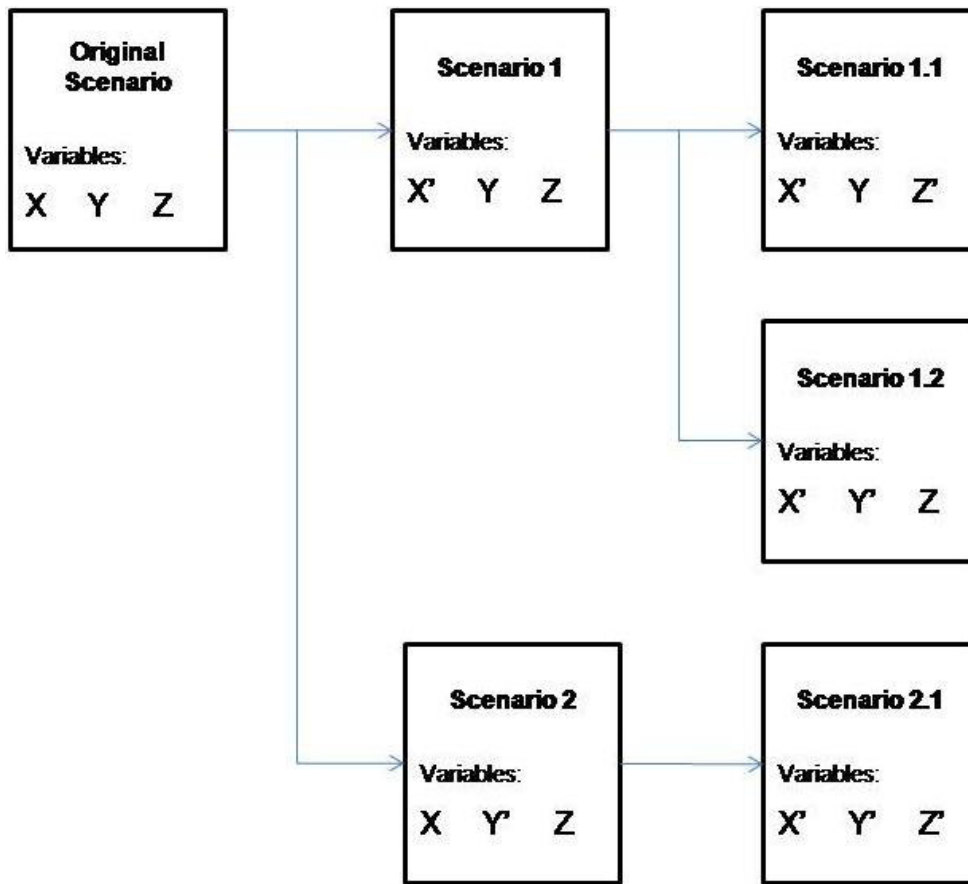
Figure 8 – Scenarios

Figure 8 – Scenarios shows how several scenarios can be developed from the original scenario. Changing the variables leads to a new scenario and it is possible to reflect the consequences of that changes. Next step is to compare the scenarios and choose which one is better for the business. The scenarios can be put side by side in order to analyze all the consequences. Once we find the best scenario, we have to find if it is feasible. Some variables cannot be changed.

5. Implementation

5.1. A Methodological Sketch for What-if Design

As summarized in Figure 9 - Methodological Sketch to What-if Design, one possible methodology adopted relies upon the seven phases described in the next subchapters (5).

5.1.1. Goal Analysis

This phase is aimed at determining which business phenomena are to be simulated, and how they will be characterized. More precisely, the goals of analysis are expressed by:

- o Identifying the set of business variables the user wants to monitor and their granularity
- o Defining the relevant classes of scenarios in terms of business variables the user wants to control and other additional parameters – such as the temporal width of the simulation window

5.1.2. Business Modeling

A draft model of the application domain is built, to the extent suggested by the requirements expressed during phase 1. In general, three sub-models will be included:

- o One to statically represent the main entities involved in the business phenomenon and their associations
- o One to express how business variables are functionally derived on each other
- o One to describe the dynamic interactions between the entities involved

Overall, this phase should help the designer to understand the business phenomenon as well as give her some preliminary indications about which aspects can be either neglected or simplified for simulation. A set of standard UML diagrams can be used here, e.g.:

- o A class diagram
- o An activity diagram
- o A sequence or state diagram

5.1.3. Data Source Analysis

The relevant data sources are carefully analyzed, in order to understand what information is available to drive the simulation and how it is structured. Specific attention should be devoted to

evaluate the quality of each data source, which significantly impacts on the actual applicability of the simulation model to be built.

5.1.4. Multidimensional Modeling

The multidimensional schema describing the prediction is built, taking into account the static part of the business model produced at phase 2 and respecting the requirements expressed at phase 1. In particular, the requirement concerning granularity is crucial for defining the dimensions of the prediction cube, which in turn will determine the maximum detail for analyzing the prediction. Any formalism for conceptual/logical modeling of multidimensional databases can be effectively adopted in this phase.

5.1.5. Simulation Modeling

This is the core phase of design. Its aim is to build, based on the business model, the functional/dynamic model allowing the prediction to be constructed, for each given scenario, from the source data available. The most crucial issue the designer has to face during this phase is the achievement of a good compromise between the level of precision of the simulation model and its complexity.

5.1.6. Data Design and Implementation

The multidimensional schema (phase 4) and the simulation model (phase 5) are implemented on the chosen platform, to create a prototype for testing.

5.1.7. Validation

During this last phase the designer evaluates, together with the users, how faithful the simulation model is to the real business model. The simplest approach to validation consists in running the simulation on a past period and comparing the prediction obtained with the actual values recorded. If the approximation introduced by the simulation model is considered to be unacceptable, phases 4 and 5 should be iterated to produce a new prototype.
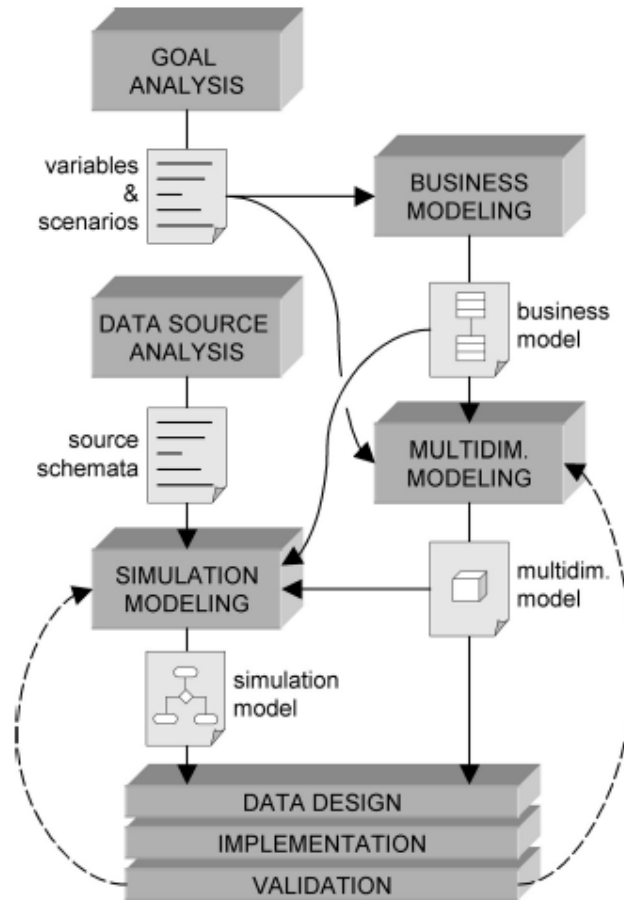
Figure 9 - Methodological Sketch to What-if Design

5.2. Case Study

Millennium BCP is a bank and it was developed a project in the Business Support Division (BSD) of the organization. The project consisted in a system which supported the Financial Management Process.

5.2.1. Problem and solution

IT Managers needs was an information system which would help them in the Financial Management processes. They needed to control their expenses more accurately and there was an enormous difficulty to find the budget for the next year.

For the first problem, it was implemented an alert system which advises IT Managers if something is going wrong. To do this, it is extremely necessary to make a precise evaluation of information so that IT Managers are alerted only in critical or bad situations. Information about

expenses and revenues must be analyzed to understand how it is affecting the business. This is done, recurring at the historical information and analyzing past results and behaviors. With precise data about the concrete future expenses which are well known, some previsions can be found.

What-if scenarios appear in the project, not only to help IT Managers in the budgeting process, but also to make previsions, in any time of the year, about future situations.

5.2.2. Development Process

5.2.2.1. Project Requirements

The first phase of the project was to define IT Managers needs. This wasn't a very hard job because they have in mind all the problems they faced in the financial processes. A web based decision support system to help them:

- o In the budgeting process
- o Controlling Charging and Accounting
- o Predicting and forecasting their charges and expenditures
- o Automate the Financial Management processes

Requirements were discussed and decided in regular meetings. Possible solutions were presented to IT Managers and they were giving their feedback and opinion. After several meetings it was defined the scope of the project.

5.2.2.2. Current Processes

Next step was to find the current Financial Management Processes to automate them. There were some data that was inaccessible to the BSD and that was the main problem of the project. So, the current processes were made with the support of a lot of spreadsheets that was filled, in some cases, by other departments. So, there was the need to adapt these spreadsheets to the project and all the data was from the spreadsheets.

The budgeting was defined after negotiation cycles. There were expenditure and chargeback predictions. Charging was divided by activity (charges were associated with a service which IT supports). Accounting was divided in several headings.

5.2.2.3. Prototype

The final prototype is described here and the essential functions are:

- o Visualize current costs and gains through charts and tables

- o   Drill down to specific charging and accounting items to understand anomalies
- o   Build scenarios, manipulating some variables and see the reflections it causes
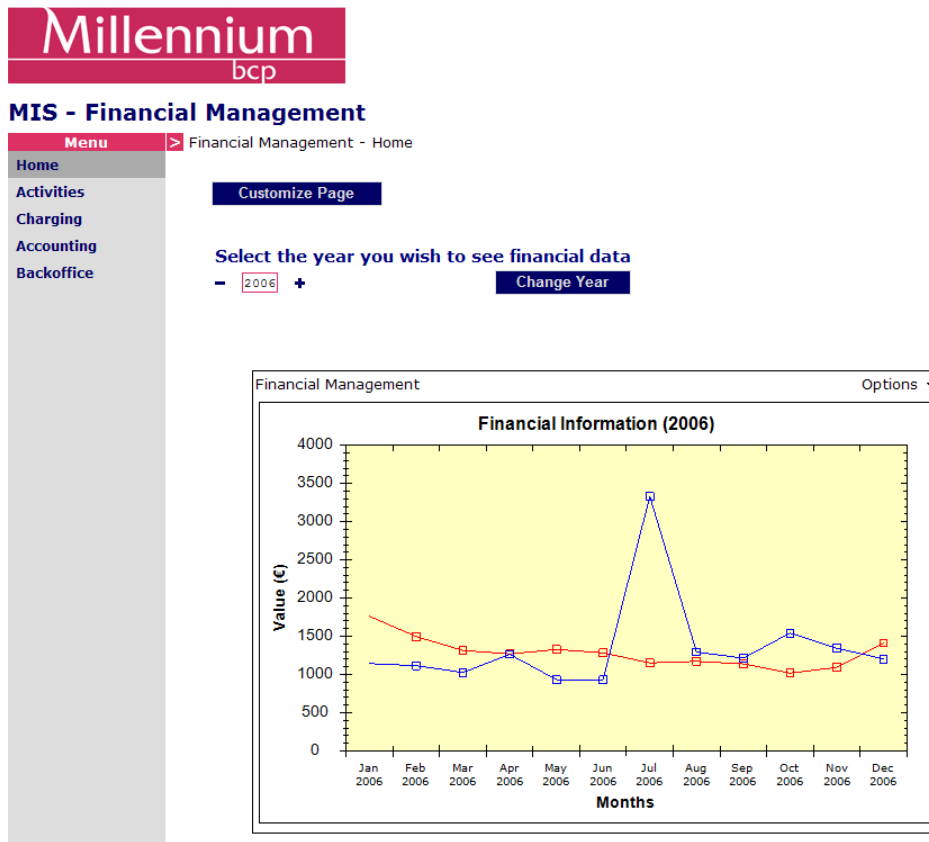- o   Compare scenarios to make the right decisions

Figure 10 - Application main screen

Figure 10 - Application main screen, shows a chart with the variance of charging and costs throughout the year. As we can see, the blue line, which is correspondent of Charging, has a very different value in the month of July. To better understand what is happening in this month it is possible to analyze only the July information. It can be done successively until we reach the end. Drill down makes possible to go to the root of the problem and clarify what was the main cause of such anomaly. In this case, as it represents a charge, maybe it is not a problem but just an anomaly.

Graphical Visualization of Financial Data

Charging and Accounting are divided by several items. A good visual representation helps to understand where some problems are. Figure 11 - Charging chart shows a pie chart with the repartition of charges by each activity. Drilling down to the root of each activity may help to see what each component is contributing to the overall values.
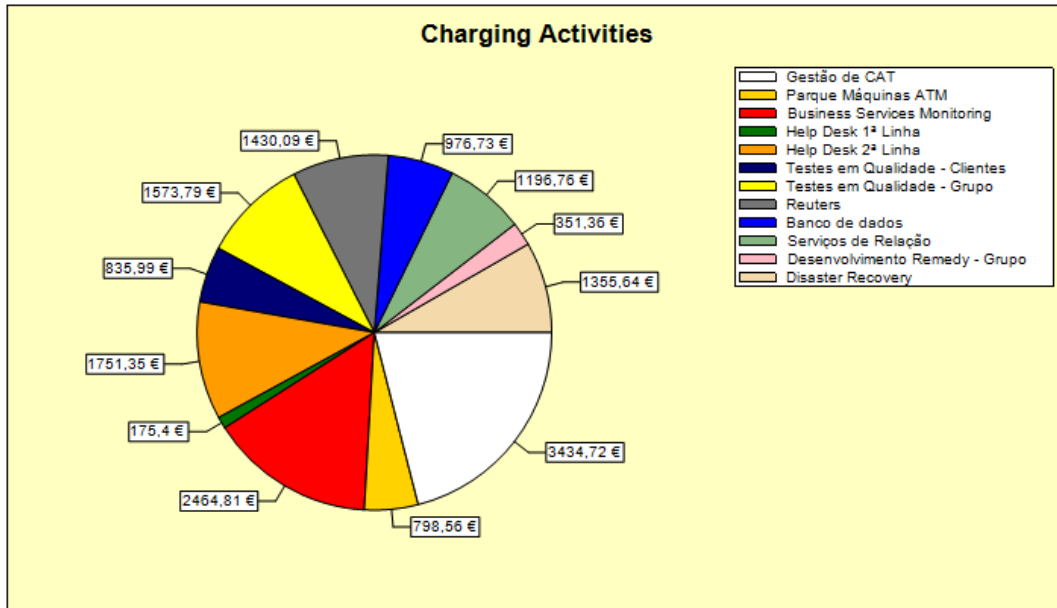
Figure 11 - Charging chart

Building scenarios

Table 3 - Example of an Accounting Table – shows all the detailed costs. From here, we can change values to see what if reflects in the end. This table shows all the costs. It is a little harder to understand the costs information in this way comparing to the graphical perspective. This table only helps to change some variables with more detail.

When a variable is changed a scenario is created. The scenario reflects the consequences of the changes according to other information that is available. This information can be from historical data or some values that are well known and that will be for sure applied in the future.

	Jan 2006	Feb 2006	Mar 2006	Apr 2006	May 2006	Jun 2006	Jul 2006	Aug 2006	Sep 2006	Oct 2006	Nov 2006	Dec 2006	Accumulated	Budget	Offset Value	Offset Percentage
7102 - Gestão de CAT	285,01	284,31	285,01	287,1	286,75	287,79	285,7	286,05	286,4	286,4	286,75	287,45	3434,72	3503,66	-68,94	-1,97 %
-- BCP - BCP Geral	0	0	0	0	0	0	0	0	0	0	0	0	0	3503,66	-3503,66	-100 %
-- BCP - C.Custo Não Enquadrados	0,7	0,7	0,7	0,7	0,7	0,7	0,7	0,7	0,7	0,7	0,7	0,7	8,36	0	8,36	
-- BCP - Corporate	2,79	2,79	2,79	2,79	2,79	0,35	0,35	0,35	0,35	0,35	0,35	0,35	16,38	0	16,38	
-- BCP - Direcção de Inovação e Promoção Comercial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
-- BCP - Numismatica e Metais Preciosos	0,35	0,35	0,35	0,35	0,35	0,35	0,35	0,35	0,35	0	0	0	3,14	0	3,14	
-- BCP - Retalho	280,83	280,13	280,83	282,92	282,57	280,83	281,52	281,87	282,22	282,57	282,92	283,61	3382,81	0	3382,81	
-- BII - Banco Investimento Imobiliario	0,35	0,35	0,35	0,35	0,35	0	0	0	0	0	0	0	1,74	0	1,74	
-- MBCP - Application Development Division	0	0	0	0	0	4,88	2,44	2,44	2,44	2,44	2,44	2,44	19,51	0	19,51	
-- MBCP - Business Support Division	0	0	0	0	0	0,7	0,35	0,35	0,35	0,35	0,35	0,35	2,79	0	2,79	
7103 - Parque Máquinas ATM	5,41	5,43	5,49	5,5	5,55	5,55	428,73	66,31	67,13	67,24	67,68	68,53	798,56	793,36	5,2	0,66 %
8523 - Apoio a Utilizador Resolução de Problemas - Cliente	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8524 - Business Services Monitoring	63,96	53,33	48,86	9,35	0	0	1263,17	205,52	204,03	205,53	205,53	205,53	2464,81	2466,32	-1,51	-0,06 %
8525 - Help Desk 1ª Linha	16,66	16,85	17,22	14,42	17,51	12,55	16,51	12,37	11,43	13,09	15,19	11,59	175,4	292,22	-116,82	-39,98 %
8526 - Help Desk 2ª Linha	157,63	149,99	152,07	130,83	163,17	122,55	148,39	136,74	136,59	155,62	168,56	129,21	1751,35	2291,35	-540	-23,57 %
8537 - Testes em Qualidade - Clientes	61,64	58,8	100,19	73,19	43,8	68,55	95,99	68,98	67,21	87,58	58,87	51,18	835,99	625,57	210,42	33,64 %
8538 - Testes em Qualidade - Grupo	191,15	138,01	130,65	108,77	110,74	146,08	123,58	87,97	122,92	130,22	158,21	125,49	1573,79	1649,24	-75,45	-4,58 %
8684 - Reuters	17,99	141,92	0,67	362,95	0	4,28	557	0	6,74	226,88	111,67	0	1430,09	2206,65	-776,56	-35,19 %
8685 - Banco de dados	130,59	54,23	73,43	58,87	92,72	70,32	92,33	132,27	58,55	115,48	16,88	81,06	976,73	1080,5	-103,76	-9,6 %
8687 - Serviços de Relação	99,73	99,73	99,73	99,73	99,73	99,73	99,73	99,73	99,73	99,73	99,73	99,73	1196,76	1196,77	-0,01	0 %
8689 - Desenvolvimento Remedy - Grupo	0	0	0	0	0	0	105,04	85,52	42,14	43,07	42,76	32,84	351,36	496,72	-145,36	-29,26 %
9335 - Desenvolvimento Soluções Organizativas - Cliente	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
9336 - Desenvolvimento Soluções Organizativas - Grupo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
9339 - Gestão Sistemas Departamentais - Cliente	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
9340 - Gestão Sistemas Departamentais - Grupo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
9344 - Exploração Sistemas Departamentais - Grupo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
9720 - Disaster Recovery	113,79	113,79	113,79	114,04	114,01	113,79	113,18	112,4	111,92	111,7	111,63	111,62	1355,64	1395,75	-40,11	-2,87 %
Total	1143,56	1116,4	1027,11	1264,74	933,98	931,19	3329,36	1293,86	1214,79	1542,52	1343,45	1204,23	16345,2	17998,11	-1652,91	-9,18 %

Table 3 - Example of an Accounting Table

Comparing Scenarios

Finally, with the constructed scenarios we can put them side by side and compare them. Figure 12 - Comparing Scenarios, shows the comparison of two scenarios with different consequences in the values of an item. Again, we can drill down to see a division of values and more detailed information. Because of the complexity of some values, the differences between scenarios are enhanced for a better comprehension of the user.

Costs	Version 1	Version 1.1	
Custos com Pessoal	6881970,2	6911970,2	details [+]
Amortizações do Exercicio	1071755,97	1071755,97	details [+]
FST - Quota Parte de Edificios	337667,02	337667,02	details [+]
Fornecimento e Serviços de Terceiros	5415726,68	5415726,68	details [+]
Encargos Financeiros	0	0	details [+]
Outros Custos e Proveitos	-124187,39	-124187,39	details [+]
Transferências Recebidas	1862883	1862883	details [+]

Figure 12 - Comparing Scenarios

As we said, the drill down is a very important function because it takes us to the root of the differences. In Figure 13 - Comparing scenarios (more detailed), it is presented a more detailed version of Figure 12 - Comparing Scenarios, when clicking in the yellow button. Again, it is always enhanced the difference between the scenarios.

Figure 13 - Comparing scenarios (more detailed)

At the moment, there aren't enough results to evaluate the work but the feedback from the sponsors of the project was good enough to think that the ideas resulted might be very useful in the future.

6. Conclusion

Financial Managers need good information to make decisions. They need to know certain things and to be alerted so that they can decide and react to possible financial problems. A system which alerts them to the financial state of the organization will help them to solve problems when they're occurring, in the exact moment that is needed. Some information has no value if it is not presented at the right moment. So, with alerts, Financial Managers will always be noticed if something there is wrong.

Financial Management for IT Services requires predictions for how much money will we spend in the future, or how much it cost to make some investment decisions. What-if scenarios are the proposal to solve this problem. What-if scenarios are helpful because:

o Define alternative future circumstances – this is very useful, not only for the budgeting process, but also to predict the values of costs and charges
o Can be compared and better decisions are made considering several scenarios

6.1. Future Work

In the future there might be possible to generate automatic scenarios with historical data. Statistical models make possible the study of past data to find possible scenarios.

In the case study, in Millennium BCP, the next step to improve Financial Management is to find concrete linkage between the costs and charges. It will be easier to relate the money spent with the money earned. This is a hard work but if this is done, charging and accounting will be more precise and justifiable.

References

1. *Classifying ITIL Processes - A Taxonomy under Tool Support Aspects.* **Brenner, Michael.** Munich : University of Munich.

2. **Rudd, Colin.** *An Introductory Overview of ITIL.* s.l. : itSMF, 2004.

3. **Teamquest.** Teamquest and ITIL - Enterprise IT Best Practices. *Implementing Financial Management for IT.* 2005.

4. **Office of Government Commerce.** *ITIL Service Delivery.* Norwich : The Stationary Office, 2002.

5. *Designing What-if Analysis: Towards a Methodology.* **Golfarelli, Matteo, Rizzi, Stefano and Proli, Andrea.** s.l. : University of Bologna, 2006.

6. *Evidence that use of ITIL framework is effective.* **Potgieter, B. C., Botha, J. H. and Lew, C.**

7. *Software maintenance from a service perspective.* **Niessink, Frank and van Vliet, Hans.** Amsterdam : Journal of Software Maintenance: Research and Practice, 2000.

8. **Santosus, Megan.** IT service management, ITIL forces cultural change. *SearchDataCenter.com.* [Online] May 14, 2007. [Cited: August 10, 2007.] http://searchdatacenter.techtarget.com/originalContent/0,289142,sid80_gci1254921,00.html.

9. **Office of Government Commerce.** *ITIL IT Service Management - Glossary of Terms, Definitions and Acronyms.* 2006.

10. *Structured What-if Analysis in DSS models.* **Philippakis, A.** s.l. : Proc. HICSS, 1988.

11. *Framework for Scenario Development in LCA.* **Pesonen, Hanna-Leena.** Denmark : s.n.

12. **The Futures Group.** *Scenarios.* Washington : United Nations University, 1994.

13. **Malaska, P.** *Coping with unpredictability and uncertainty of the future.* Turku, Finland : Turku School of Economics, 1983.

14. **Sonnemann, G.** *Scenarios and Modeling in the Interpretation within LCIA.* s.l. : SETAC Working Group Scenario Development, 1999.

15. **Pink Elephant Inc.** The Benefits of ITIL White Paper.

16. **Office of Government Commerce.** *ITIL Service Support.* Norwich : The Stationary Office, 2002.

17. **Weil, Peter.** *Don't Just Lead, Govern - How Top-Performing Firms Govern IT.* s.l. : MIT, 2004.

18. *Aligning Business and Information Technology through the Balanced Scorecard at a Major Canadian Financial Group.* **Van Grembergen, Wim and Saull, Ronald.** s.l. : Proceedings of the 34th Hawaii International Conference on System Sciences, 2001.

19. *A Product Based Information System Approach.* **Zarnekow, Ruediger and Brenner, Walter.** s.l. : University of St Gallen - Institute for Information Management.

20. **Grupposo, Diana.** Answers to FAQ About Adopting the ITIL Framework. s.l. : Numara Software, 2006.

21. **Cater-Steel, Aileen and Tan, Wui-Gee.** Implementation of IT Infrastructure Library (ITIL) in Australia: Progress and success factors. s.l. : Faculty of Business University of Southern Queensland.

22. **TechRepublic.** Implementing the ITIL Framework. s.l. : TechRepublic, 2002.

23. *Information Technology Governance Best Practices in Belgian Organisations.* **De Haes, Steven and Van Grembergen, Wim.** s.l. : Proceedings of the 39th Hawaii International Conference on System Sciences, 2006.

24. **Galup, Stuart, et al.** Information Technology Service Management: An emerging Area for Academic Research and Pedagogical Development.

25. **Praeg, Claus-P. and Schnabel, Ulrich.** IT Service Cachet - Managing IT Service performance and IT-service quality. s.l. : Proceedings of the 39th Hawaii International Conference on System Sciences, 2006.

26. **Sallé, Mathias.** IT Service Management and IT Governance: Review, Comparative Analysis and their Impact on Utility Computing. s.l. : HP Research Labs, 2004.

27. **Hochstein, Axel, Zarnekow, Rüdiger and Brenner, Walter.** ITIL as Common Practice Reference Model for IT Service Management: Formal Assessment and Implications for Practice. s.l. : University of St Gallen.

28. **Beaman, Ian, Waldmann, Erwin and Krueger, Peter.** The Impact of Training in Financial Modelling Principles on the Incidence of Spreadsheet Errors. s.l. : Accounting Education: an international journal, 2004.

29. **Niessink, Frank and van Vliet, Hans.** Towards Mature IT Services. s.l. : Software Process - Improvement and Practice, 1998.

30. **Cater-Steel, Aileen, Toleman, Mark and Tan, Wui-Gee.** Transforming IT Service Management – the ITIL Impact. s.l. : 17th Australasian Conference on Information Systems, 2006.