4 Case study – conceptual model demonstrated

4.1 Introduction

The developed model is generic and can be applied to any organization. It is required that all steps or components of the model should be addressed to a larger or lesser extent. It also supports the Balanced Scorecard approach of formulates, communicates, executes and navigates. If all steps in the model are not performed in a balanced manner, the following situations (among many others) are possible:

- By skipping or neglecting the formal strategy development component, very little of the strategy will be known to the people who must document it in the enterprise modelling repository, execute it through the business units and improve the performance of the organization.

- By neglecting the documentation of the enterprise in a central repository, or failing to maintain that when changes are made, the baseline (blue prints) of the organization is lost and the impact of future proposed changes cannot be modelled effectively.

- Without effective execution of the strategy through specific initiatives, a well-thought-out strategy will remain merely a brilliant idea in some people's minds and any performance change will be a coincidence.

- If performance measurements are not aligned with the intended strategy, the behaviour of people will not necessarily support the strategy and successful implementation will be in jeopardy.

- If performance measurements are not consistently measured from a stable platform that supports all identified measurements (typically a data warehouse), people will lose faith in the measurement process and it will become much more dfficult to establish whether a strategy is successful.

The author has been extensively involved in the development and evolutionary implementation of this model at a consulting firm that provides clients with business solutions, which are mostly based on information and communication technology. The following paragraphs will illustrate the application of the model in that environment, after a brief background of the company has been given.

4.2 Background of the consulting firm

Fourier Approach is a privately owned company that was formally established in the late 1990s during the height of the IT boom era. Its vision was to bridge the apparent gap between business needs and the endless supply of IT products and services (which confused and intimidated many business managers), by positioning itself on the side of business. This approach led the company to help clients to formulate their IT strategy that was derived from the business strategy and to provide a framework of necessary IT infrastructure and information systems to support their business processes. The IT strategy would then guide the business in the acquisition and implementation of relevant IT products and services.

After insight had been gained into the business and IT strategy, opportunities emerged for business process development, simulation of processes, development of new information systems (where no suitable products at affordable prices could be found for

the client), integration of systems, maintenance of systems and IT infrastructure. It was also clear that most clients needed business intelligence and that it would form an important part of the IT strategy of any business. The IT strategy was used as a vehicle (or road map) to explain to business managers that there should be a sequence in events when they acquire IT products and services - if real value was required! For example, the best workflow package would fail if the underlying business processes were not properly defined and designed for integration. Similarly, a fallacy can be created by vendors of business intelligence tools who show remarkable reporting tools, but fail to emphasize the importance of clean transactional data in electronic format.

A mixture of skills was needed to provide these services and products. Business analysts (mostly with an industrial engineering background), system analysts with an information system design background and programmers in the more popular programming languages of the day, as well as computer hardware and network specialists were drawn in. Not only the mix between different skills was important, but also the mix between senior and more junior resources.

As with many smaller, start-up companies, contracts were initially landed through the personal networking of the senior managers. A longer term outsourcing contract was negotiated with a large facility management organization to establish, support and in certain cases operate their information systems and IT infrastructure. A lot of development and integration work followed upon this contract and the company grew larger to accommodate all the work.

While a large component of the company concentrated on satisfying the needs of existing clients through various projects, the emphasis of senior management shifted to sustaining the company in the long run, by improving the way in which marketing was done and establishing the value chain of the organization. Formalization of policies and procedures, structuring according to focus areas and projects in a matrix organizational structure and establishing a common methodology took a lot of effort and management time. The basic support functions of general management (including infrastructure and IT support), finance, human resources management and procurement were also established to provide the necessary level of support to the company.

During the process of seeking solutions for clients, a number of non-exclusive partnerships were also attained from various product suppliers, for example in the workflow and BI areas. The reason for non-exclusive partnerships was to retain the right to advise clients according to their needs and not be bound by exclusive partnership agreements. It was found that businesses differ a lot in terms of their approach, sophistication level and above all their budgets. Therefore different solutions have to be offered for different circumstances.

The technical offering of the company was initially packaged into the following focus areas that were managed as lines within the production function of the organization:

- IT strategy development
- Business process design, simulation and workflow
- Information system development and integration
- IT infrastructure support
- Business intelligence

Figure 79 shows how these focus areas were positioned to bridge the gap between the normal business strategy of the client and the acquisition of IT related products and services.

The business solutions that are delivered to clients often need components and inputs from two, three, or more focus areas and therefore the concept of a matrix

organizational structure, where the development of a solution for a client is handled as a project, was introduced. Investment opportunities where the company itself is the client and sponsor are also handled as projects within this structure. An operational manager plays a supervisory role as the manager of project managers and provides guidelines on how all projects must be managed.

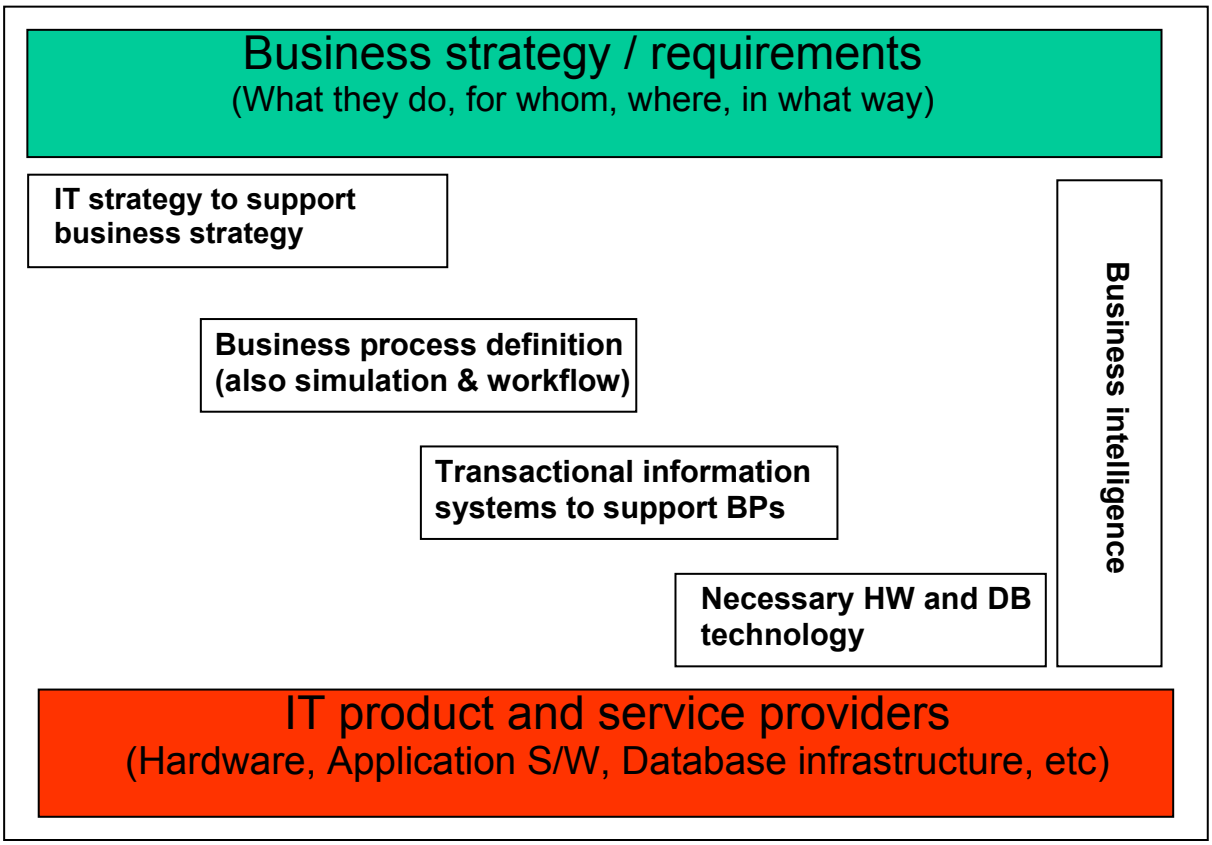


Figure 79. Focus areas to bridge the gap

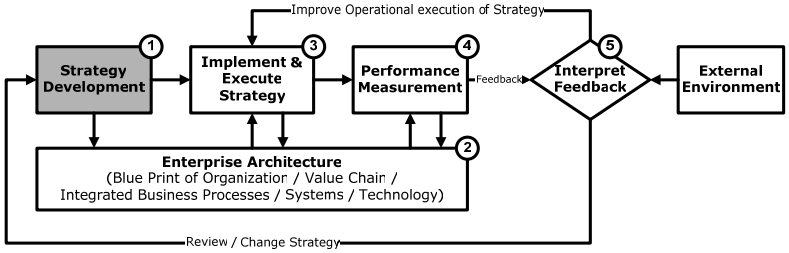
During the first few years the abovementioned developments took place without a formal, continuous strategic management process. However, some very fruitful sessions were held from time to time to discuss the long-term direction of the company and to develop certain aspects of the way in which operational activity could be improved. A formal vision and mission statement were formulated and communicated to everyone in the organization. The organizational structure, the definition of the focus areas, extension of the marketing function, a value system and decisions on the type of investments that the company should be involved in were all results of these ad hoc strategic sessions. Very often these strategic sessions were facilitated by using some of the ideas from Porter, Manning, Kaplan and Norton, or through the Foxy Matrix approach of Ilbury and Sunter. There was often a lot of enthusiasm after these sessions, but urgent operational issues often hampered the implementation of the decisions.

As is typical of a smaller company, senior management is also involved in operational activities and it is often not so easy to distinguish clearly between the urgent and important activities, as suggested by Covey (1992) when discussing the third habit of highly effective people - "Put first things first". Attention to strategic issues is often perceived to be important, but not so urgent. According to Covey highly effective people concentrate on the important, but not so urgent activities, they spend very little time on unimportant activities (regardless of their urgency) and that provides them with the room to handle urgent and important activities (like crises) when they occur. *(The author finds himself in a constant process of striving towards achieving the seven habits in personal and business environment, but must admit he still has to do a lot of saw*

sharpening!)

After this background on Fourier Approach, the next paragraphs describe how the process has changed since the adoption of the Bigger Picture BI Context Model and the implementation of an enterprise modelling approach. The emphasis is on the establishment of a data warehouse and the performance management component of the model to illustrate the approach to BI when it is driven from a strategic perspective. The aim is to show the links between the various components in the model and not so much to debate the selected strategies and choices. The design of the supporting data marts and key performance indicators are generic and can be used by similar organizations.

4.3 Strategy development



During the early 2000s it became clear that the requirements of the South African government for black economic empowerment (BEE) would have a major effect on all organizations that do business in South Africa. Apart from the legal requirements to develop and report against an employment equity (EE) plan, organizations are also strongly motivated to do business with BEE organizations through tender requirements that refer to their equity, management, employment and procurement status with regards to BEE. A number of models to address the question of BEE have been developed by businesses in South Africa - some more successful than others.

Fourier Approach decided to address the situation through a parallel strategy. Firstly, a BEE entity was founded with a black majority partner to provide programming services. The existing shareholding entities would channel their programming work to this new entity and with time it would generate more work that would enable it to grow and provide employment to previously disadvantaged people. Whenever BEE plays a significant role in any tender or proposal, this vehicle would also be used in the South African environment. The argument is further that the BEE partner would open up opportunities where Fourier Approach in its current profile would not be able to market.

Secondly, in parallel with this approach in the local market, it was felt that other African countries should be targeted to provide to them services and products similar to what the existing Fourier Approach could offer, but through local entities in those countries. Fourier Approach would directly or indirectly have shareholding in those entities. It was argued that if those markets could grow through the delivery of basic infrastructure (e.g. providing internet services), the need for transactional information systems, workflow and eventually business intelligence services would also grow in the long run. The provision of basic telecommunication services would therefore be a priority for the initial phases, although other products and services that Fourier Approach can deliver would also be available to the local entities. Two entities were founded with local partners in Botswana and Nigeria respectively.

The abovementioned strategies were derived from a traditional SWOT analysis, combined with a Foxy Matrix exercise. See **Figure 80** for an example of the Foxy Matrix exercise when the question of BEE (black economic empowerment) was discussed. It is obvious that a long debate led to the summary of the matrix as depicted in the figure.

The thought process of moving through the quadrants definitely helped to derive at certain decisions.

	(Strengths and weaknesses) CONTROL	
3 **Options:** 1) Business as usual - do nothing and hope that skills and expertise will always be wanted by entities that win the tenders. 2) Run away - withdraw from RSA (no option). 3) Weather the storm - implement a parallel strategy for the RSA and certain African countries.		**4** **Decisions:** 1) Establish a new RSA entity with a carefully selected BEE partner with similar value system and grow the entity with channeled work initially. Use the entity as vehicle where BEE is important. 2) Invest in new entities with local partners in promising African countries to position for expected growth in basic IT services.
UNCERTAINTY		CERTAINTY
a) Key uncertainties: How long will BEE factor "reign" in the RSA? Will a BEE partner in the RSA necessarily add value? How long will it take and how much will it cost to start up businesses in African countries? **b) Scenarios:** BEE drive will become stronger, despite possible damage to the economy. BEE will empower enough black businesses in the next 5-8 years to normalize the situation. Selecting the wrong BEE partner will lead to destruction of value, while selecting the right one may unlock opportunities far outside the current range. Thorough homework may lead to realistic African partners that may open opportunities cost effectively. **2**		**Rules of the Game:** BEE plays a more important role in the RSA. Various BEE initiatives from much stronger entities in the RSA have failed - it is a risky exercise. BEE does not play a role in other (African) countries, although local entities are always preferred suppliers. Certain IT services (e.g. desk top support) are becoming commodities in the RSA, while the rest of Africa is still growing. First world economies are in recession, but funding is available for African investment. **1**
	ABSENCE OF CONTROL (Opportunities and threats)	

Figure 80. An example of the Foxy Matrix applied to Fourier Approach.

The 7 Ps model of Manning was also applied to Fourier Approach to identify the business model that is most appropriate for the organization. The results are given in **Figure 81**. From the different strategy development tools a number of strategic themes were identified:

- Deliver B2B (business to business) solutions - including hosting of generic services.
- Enter Africa (outside of the RSA) to deliver basic infrastructure and to prepare the environment for other services later.
- Position for work in the RSA through a new entity with a carefully selected BEE partner.
- Strive for a better mix of clients - get more, bigger clients with a long-term relationship.
- Strive for a better mix in income streams (product sales, services through projects and annuity income through hosting services and product maintenance fees).
- Improve corporate governance by formally defining and documenting all relevant processes in an internal enterprise modelling exercise.

1	PURPOSE	To assist customers in bridging the gap between their business strategy and the IT-related products and services that may add value to their organizations and support their business processes.
2	POSITIONING	Fourier positions itself on the side of medium-sized businesses that want to bridge the gap and use IT-related solutions to improve their operations. As value for money supplier Fourier can also develop information systems, if no suitable product can be acquired off the shelf.
3	PRODUCT	IT-related products and services to satisfy business needs, including services on information strategy; definition, simulation and enforcing of business processes through work flow; development and implementation of information systems to support BPs; infrastructure to support information systems and business intelligence services and products.
4	PHILOSOPHIES	To have various building blocks of solutions readily available (either in-house or with partners) to package a solution for each customer. The mix between industrial engineers (who relate to business needs) and system analysts and programmers (who relate to systems) forms a good foundation for IT-related business solutions.
5	PROCESSES	Core processes consist of marketing (to get the work) and project execution (to successfully deliver products and services to satisfy customer requirements). Normal supporting processes from HR, finance, procurement, R & D and general management are also accommodated.
6	PEOPLE	A healthy mix between junior and more senior resources in the following categories forms part of the work force: business analysts, system analysts, programmers, infrastructure specialists (including telecommunication specialists) and marketing and administration staff.
7	PARTNERS	Non-exclusive partnerships with workflow product suppliers (Staffware and K2.net), BI (Sagent), telecommunications (Palmtree) and Microsoft (various solutions). Also consulting partners with various entities to overcome peak times and provision of specialist services.

Figure 81. The 7Ps model applied to Fourier Approach.

To determine the balance with which Fourier invests in various initiatives the innovative profile exercise suggested by Grulke was done, using the adapted template. The results can be seen in **Figure 82**. Without discussing the investment projects in detail, it is clear from the results that Fourier has a fairly balanced spread of investment in the various quadrants, with perhaps too much investment in the "Radical innovation" area where the probability of success in the short to medium term is not so high. The profile changes from time to time, but provides a useful barometer when new investment opportunities are considered.

		200 Technology linkage	450
		Enhance	Disrupt
Market linkage disrupt		2 Disruptive innovation (Market)	RADICAL 4 INNOVATION
Market linkage enhance		Evolutionary innovation	Disruptive innovation (Tech)
		1 150	230 3

Identification of top activities:

No	Innovation Activity	Investment (R '000)	Position
1	Upgrade of Time Sheet system	30	1
2	Smart card - e-Unity	250	4
3	Promt (Project management)	200	2
4	K2-workflow investment	200	4
5	Hosting of generic processes	230	3
6	Establishment of DW	120	1
7		0	
8		0	
9		0	
10		0	

Figure 82. Innovative Matrix applied to Fourier Approach.

The strategy falls broadly into the strategic theme of "revenue growth and mix" as defined by Kaplan and Norton (see **Table 11**). Specific activities to sustain and grow the client base were identified and they featured prominently in the Strategy Wheel for a number of months (see **Figure 83**).

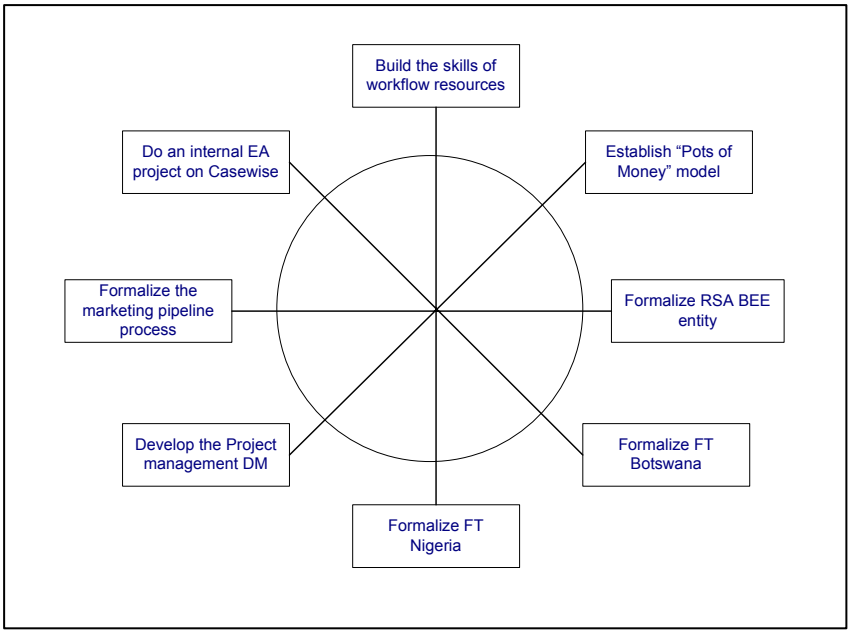


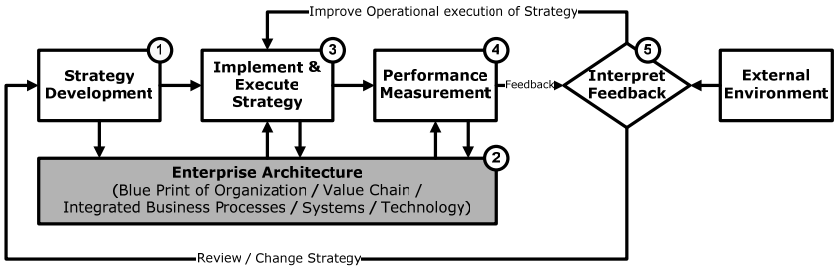
Figure 83. Example of a Strategy Wheel for Fourier Approach

The issues on the Strategy Wheel were monitored on a monthly basis and were

supported by an activity list with more detailed actions, responsibilities and target dates, as suggested by Manning. For example, the author was responsible for the establishment of a Pots of Money Model and for the development of a data mart for project management. The Pots of Money Model was identified as a necessary conceptual tool to communicate to all stakeholders what the impact of certain decisions would be. For example, if more money is paid on project bonuses, less money will be available for investment projects that should ensure long-term survival. Although this sounds logical on a qualitative level, the quantified effect of a spreadsheet model with actual figures to which managers can relate helps a lot when trade-off decisions and priorities are discussed. The model will be discussed in more detail under the section on implementation and execution of the strategy.

The data mart for project management focuses on the profitability of all projects (recoverable, as well as investment projects) and will be discussed in more detail under the section on performance measurement.

4.4 Enterprise architecture



By far the the most time consuming step in the whole process is the initial population of the enterprise architecture repository. Although Fourier has been busy with this exercise for a number of months, it is not finished - partly because it is handled as an internal investment project with lower priority than recoverable projects, but also because the methodology forces the organization to make certain choices and to clarify how certain processes work, who is responsible for each step, which systems are involved, etc.. In many instances it is the first time that the processes are analyzed to that level of detail and it takes a while to get everybody to agree.

The main higher-level objects have been identified and in many cases the prime associations have been defined. Screen dumps from *Casewise* (the enterprise modelling tool that is used) of some of those elements are shown in this paragraph, without discussing them in detail. The goal is to let the reader get a feeling of the process and the way in which an enterprise modelling tool supports this important step in the Bigger Picture BI Context Model. It would not be practical for purposes of this thesis to show more than just a number of representative examples.

The first step was to document the strategic goals that were identified during the strategy development phase. See **Figure 84** for a hierarchy of the strategic goals. It is important to understand that each object can be exploded into lower level goals and can also be linked to various other objects through associations, for example to other business goals, other diagrams and a list of issues. Dialogue boxes facilitate the process to describe each object fully, to categorize it and to define an owner and version control parameters for each object. Since enterprise modelling tools are generic in nature and will accommodate almost any personal preference in terms of layout, categories, colours, etc., it is good practice to define a number of naming conventions and templates that everybody can use at the beginning of the project.

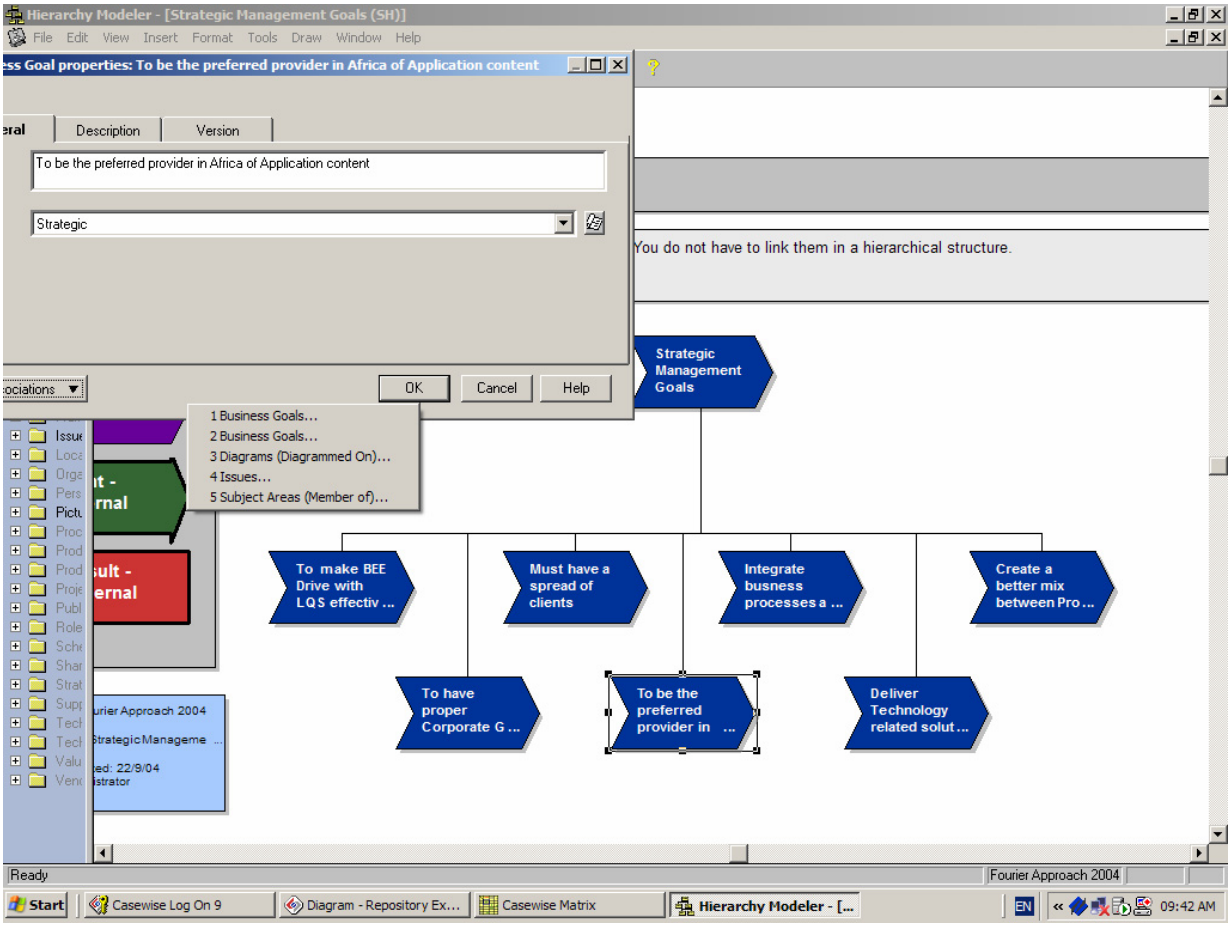


Figure 84. Definition of strategic goals

The next step for Fourier was to identify the organization and its external organizational context - see **Figure 85**. This organizational object in Casewise shows business entities that are relevant for the Fourier group. The entities in blue are entities in which Fourier Approach has shares. The other groupings of external entities represent the following:

- Suppliers of products that Fourier uses, or adds value to, in delivering services to its clients
- Strategic partners in business development and service delivery
- Suppliers of various support services
- Strategic partners that supply resource capacity

Figure 86 shows how the Fourier related enterprise group (the blue group in the previous figure) is broken down into individual entities on an exploded diagram. Each one of those entities can be exploded into lower level organizational structures up to the level of individual employees. Each exploded diagram forms an object on its own, and can be linked into various other hierarchies as depicted in **Figure 87**.

Each organizational object can also be associated with various other types of objects, for example the application software that is used by that unit. See **Figure 88** for an example.

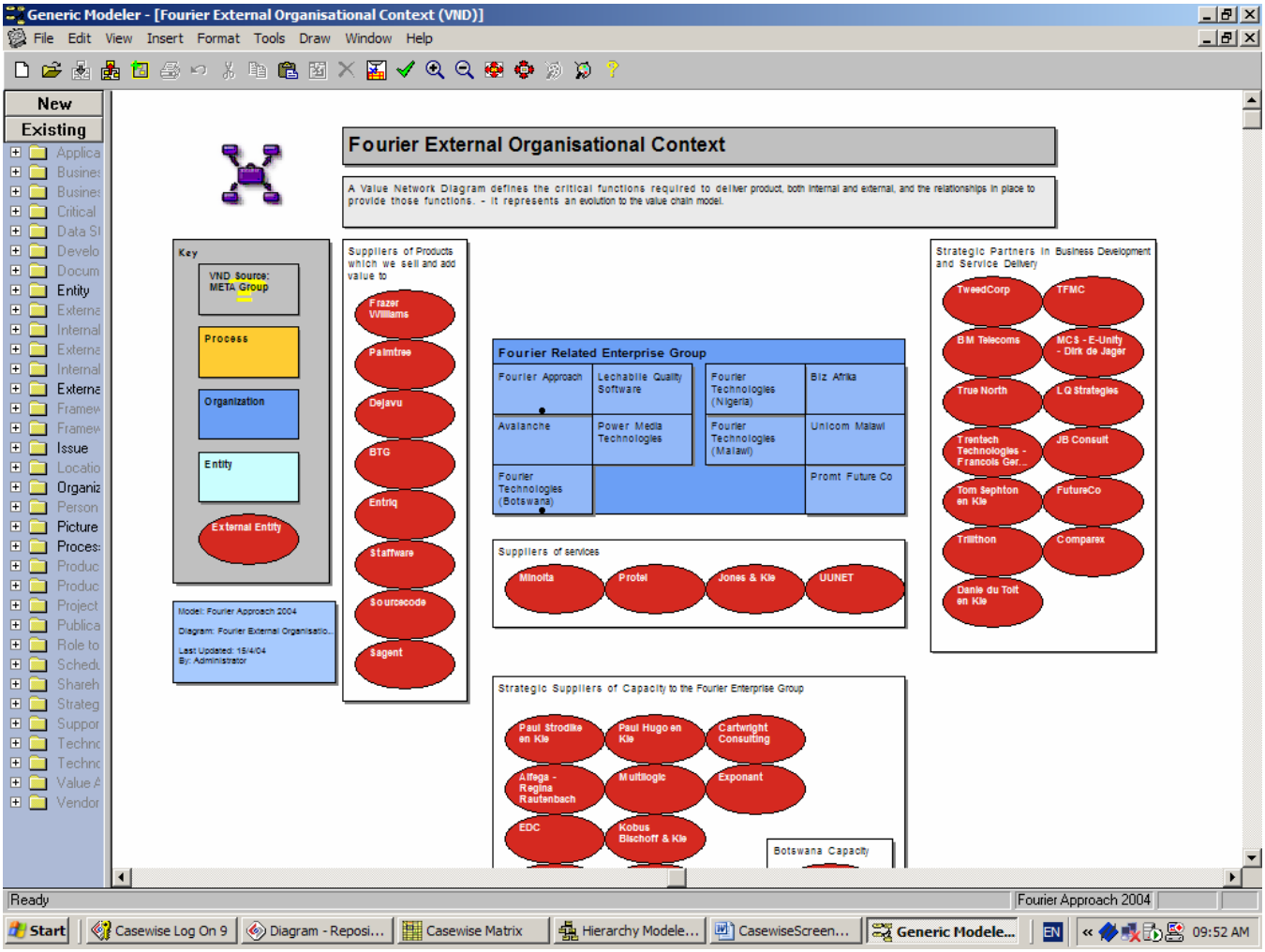


Figure 85. Fourier external organizational context

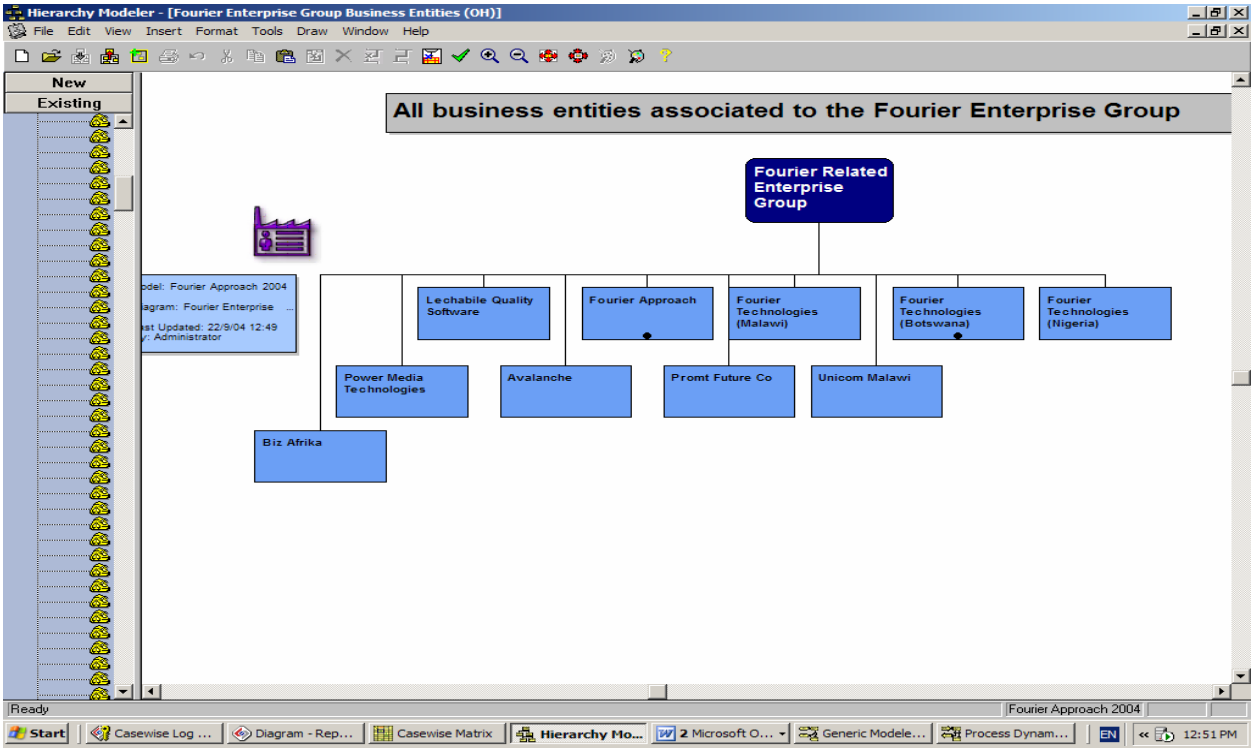


Figure 86. Breakdown of Fourier related enterprise group

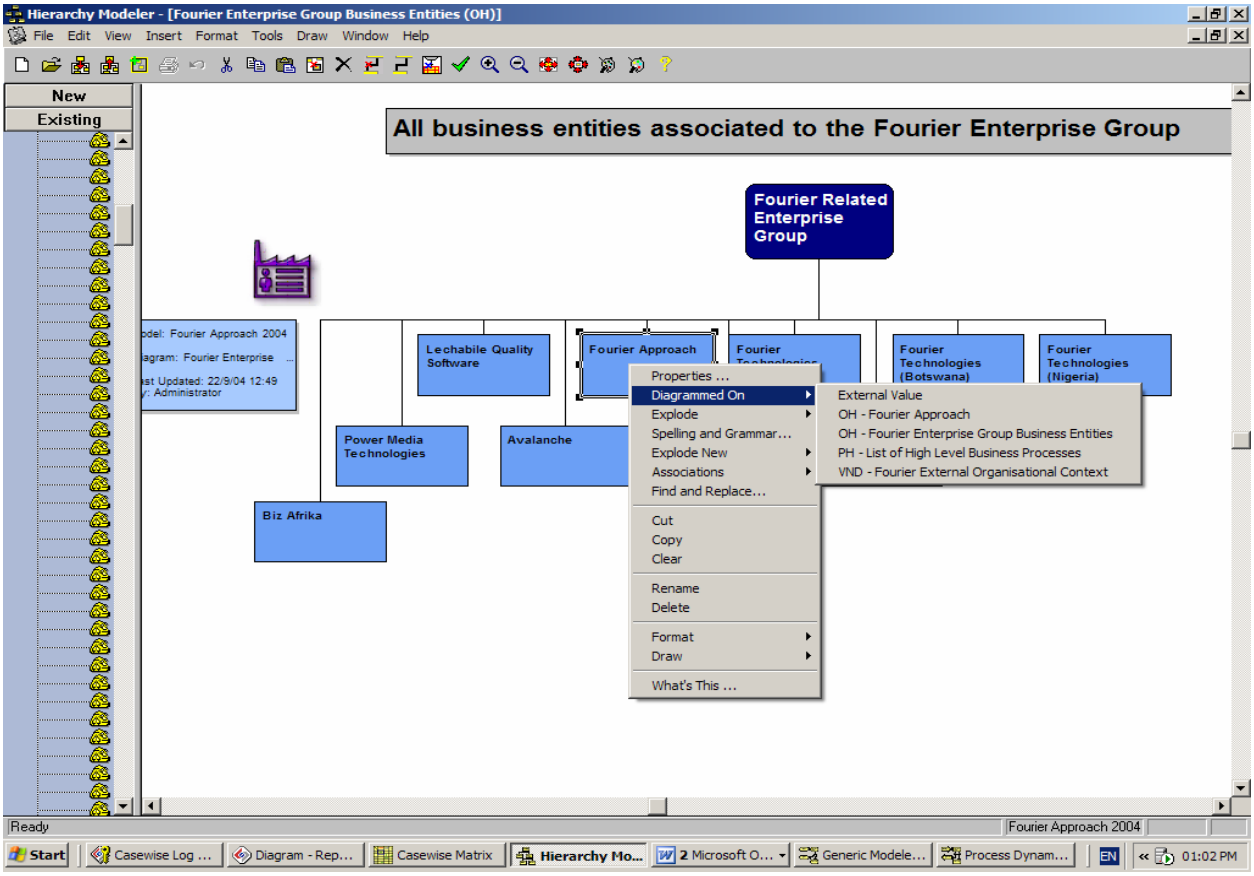


Figure 87. An object can be part of various hierarchies

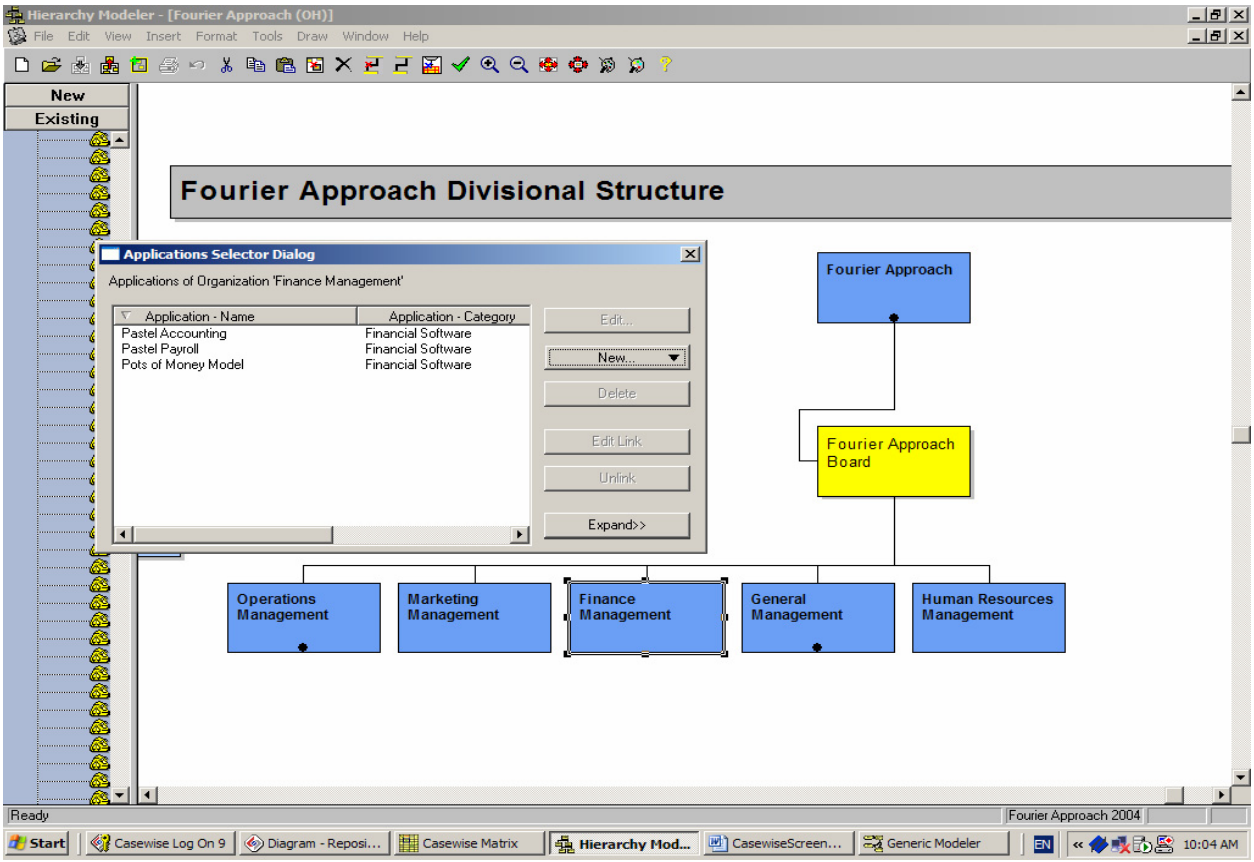


Figure 88. Application software associated with finance management

The definition of business processes for the organization was also done in a hierarchical manner. See **Figure 89** for the overall picture of the value chain, including the support functions like finance and purchasing.

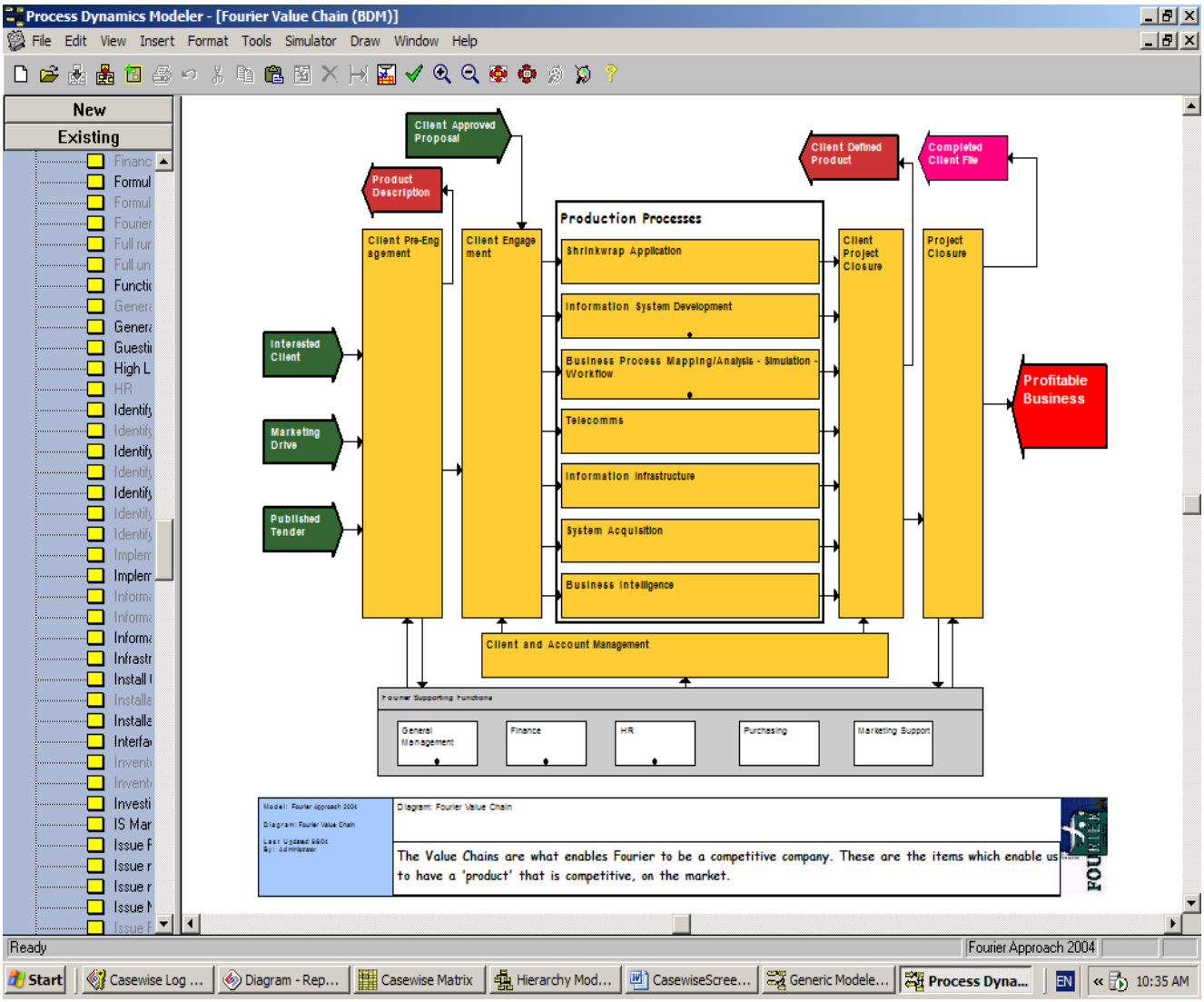


Figure 89. Value chain of Fourier Approach

Each one of the higher-level processes can be broken down into another hierarchy of processes - see **Figure 90** for the breakdown of financial processes. Eventually each process in the hierarchy can be described in terms of dynamic models with different levels of detail. Three types of dynamic models are pre-defined in *Casewise*, namely business dynamic model (BDM), system dynamic model (SDM) and a functional dynamic model (FDM). A dynamic model represents a process or business process that can be regarded as a single unit. It always starts with one or more events that are external to the process under consideration and ends with one or more results. Between the initiating events and concluding results, the other objects show the activities that take place. The FDM level is usually reserved for a detailed level necessary for the programming of a certain activity or process step.

See **Figure 91** and **Figure 92** for an example of the BDM and the SDM. It is good practice for complex processes to define the process steps in different exploded levels to prevent a single screen from becoming too busy.

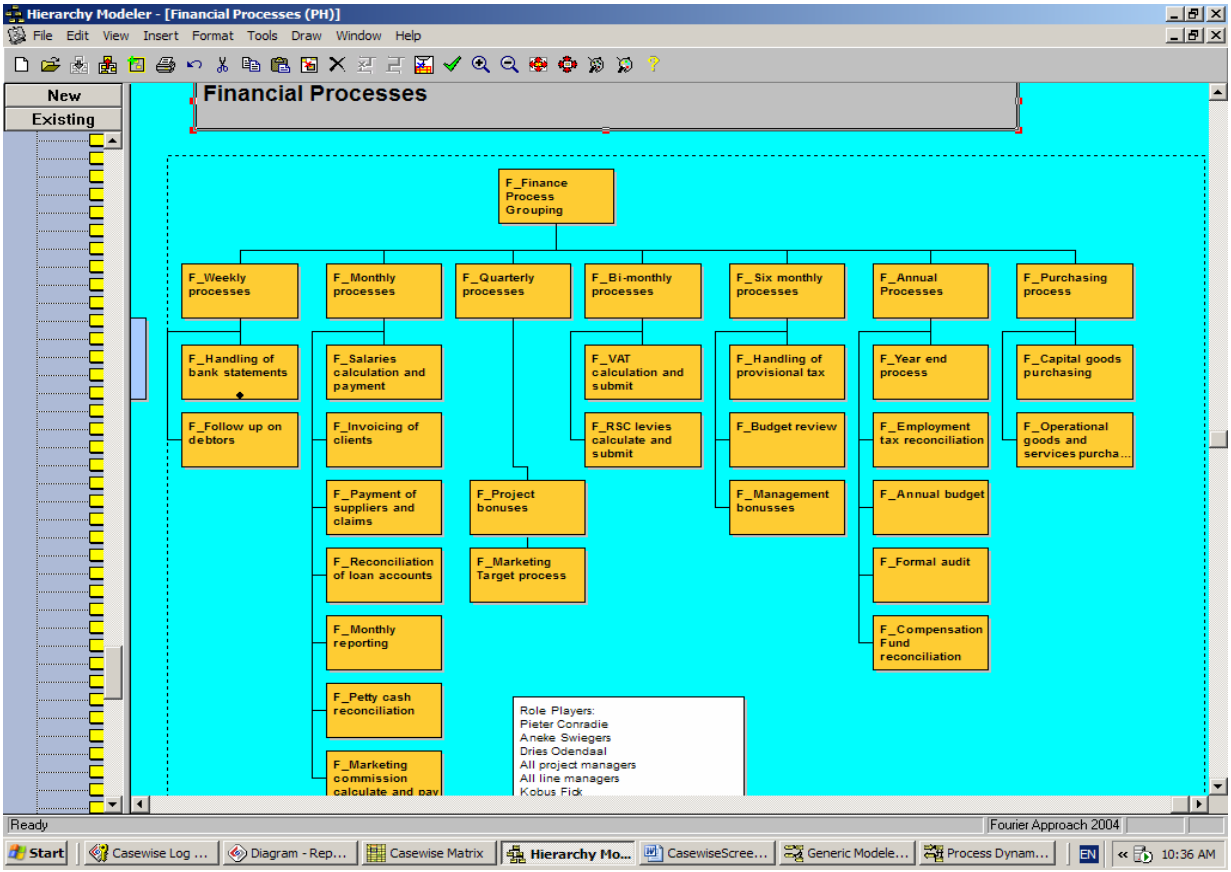


Figure 90. Hierarchy of financial processes

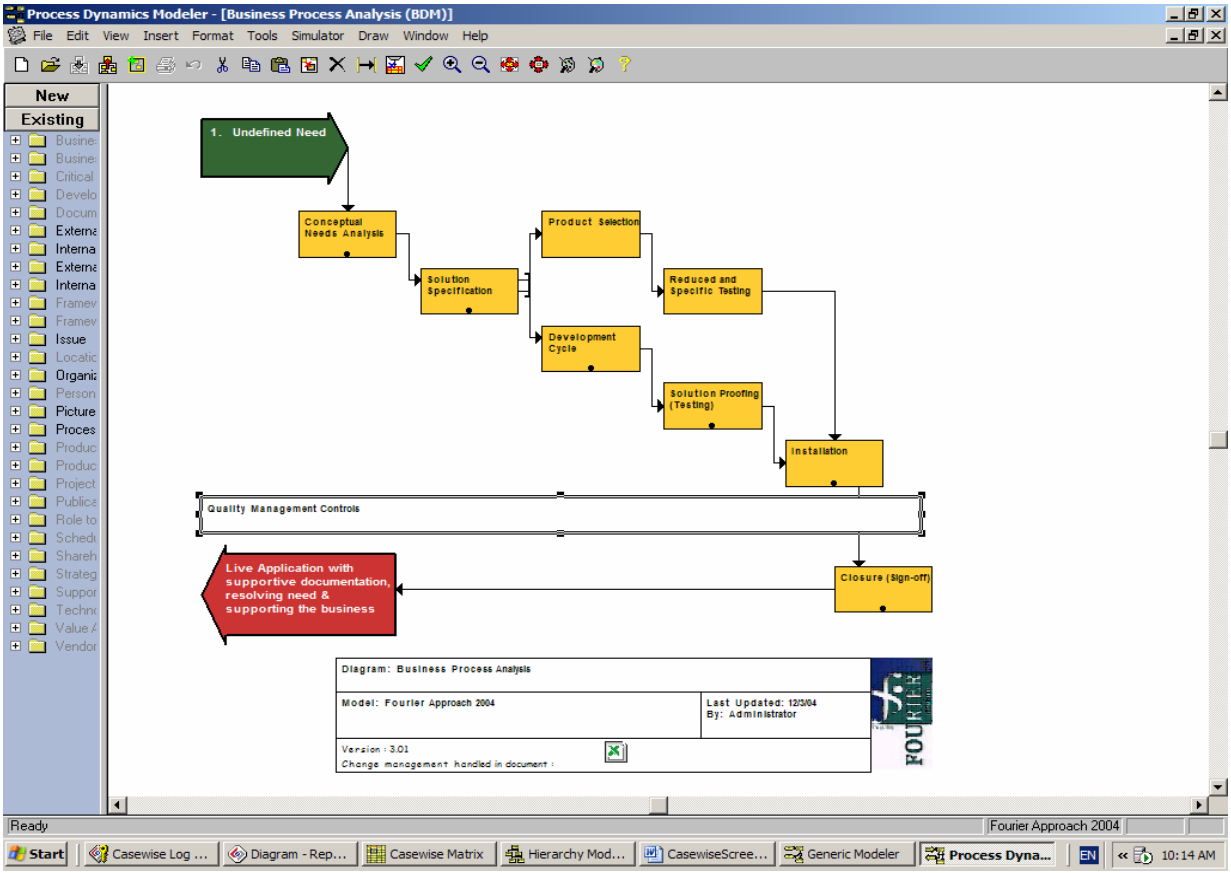


Figure 91. Example of a business dynamic model

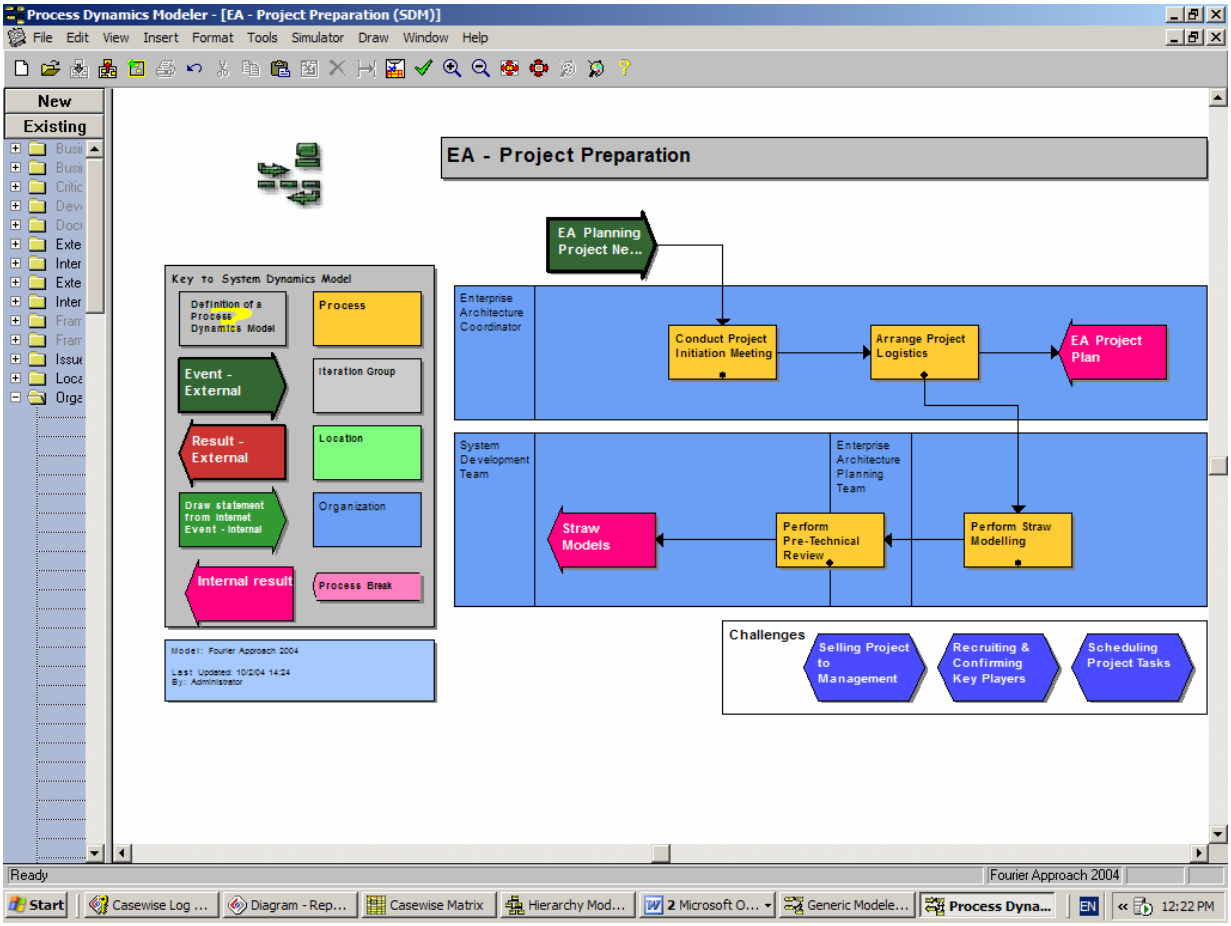


Figure 92. Example of a system dynamic model

Various other elements within the organization were also documented in the enterprise repository, such as products and services, locations and roles in the organization. By linking the elements with each other where relevant, useful association relationships are built, such as:

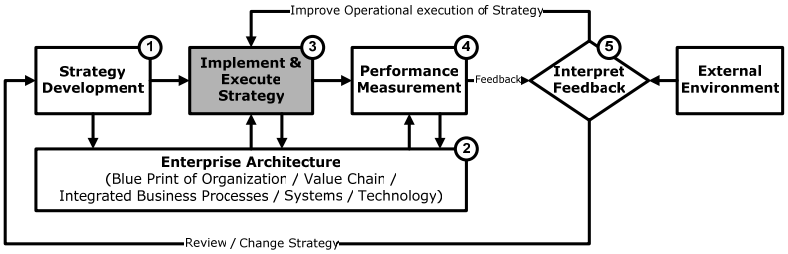
- Products associated with clients
- Business processes associated with organizational units
- Individuals associated with roles
- Individuals associated with clients
- Application software associated with business processes

These associations (with specified attributes of each type of object) can be exported to *MS Excel* through a user-friendly wizard process in *Casewise*. Obviously, these spreadsheets can be large and it is not practical to show a useful matrix in this document. An example is included on the CD ROM.

The whole repository (or specified parts thereof) can be published in various formats, including *MS Word* and HTML. In Fourier Approach it is published on the intranet in HTML format, where it is available to everybody in the company who has access to the network via normal browser software.

After the initial population of the repository it is not such a big task to maintain its data - it boils down to a disciplined approach by all responsible persons to add, amend and publish any changes.

4.5 Implement and execute strategy



Although part of the implementation process can be addressed by the Strategy Wheel and action list approaches suggested by Manning (which were demonstrated earlier), the Balanced Scorecard technique of Kaplan and Norton is much more focused. The strength of the approach is the logical cause-and-effect links that map out the strategy and the underlying hypothesis of the strategy in terms of the four perspectives (finance, customer, internal processes and learning and growth). If developed properly, these strategy maps can provide the alignment of activities that is needed for successful execution and measurement of the strategy.

Combined with the Balanced Scorecard approach, the Fourier Model (see **Figure 68**) was used to establish various technical wheels, which form the foundation or building blocks of any solution offered to customers.

Finally the Pots of Money Model was developed to communicate the application of funds to all stakeholders and to make sure that the budget supports the priorities in the strategy. (It is surprising how few people in an organization really know how money flows through the different "pots" in the organization!)

The application of these three methods to implement and execute the strategy in Fourier will be discussed briefly in this section.

4.5.1 Using the Balanced Scorecard

A three-step approach was followed to establish the first Balanced Scorecard for Fourier:

- Answer some pertinent questions on the four perspectives.
- Select objectives for each perspective.
- Select meaningful measurements for each perspective.

Firstly the question on financial goals was answered as follows:

- Increase revenue by 25% per year, without a significant increase in human resources.
- Change the mix in revenue streams between traditional (human intensive) projects, product sales and annuity income from 90:10:0 to 50:20:30 in five years.

Annuity income refers to fixed monthly or annual income based on maintenance fees for product sales and hosting or other services where very little human effort is required once the initial processes have been set up.

For the customer perspective the pertinent questions and answers were:

What market segments do we serve and what value proposition do we offer to each segment?

Here the parallel strategy clearly identified two market segments, namely:

- The RSA, where business-to-business (B2B) solutions are offered to medium-sized enterprises, including hosting of services or processes, integration of application software, enforcement of business processes through workflow, business intelligence services and "last mile" solutions through new telecommunication technology.
- The African market outside the RSA (Botswana, Nigeria and Malawi), where larger corporations are targeted for basic internet service provider (ISP) services, desk top support services and basic, shrink-wrap application software, such as Biogate II (a biometric access control system).

The value propositions for the two segments are the following:

- For the RSA market - affordable, integrated solutions where the design is primarily based on business requirements (and not necessarily the latest technology flavour of the month)
- For the African market - affordable, basic and stable IT services and entry level transactional information systems

Identifying the key internal business processes that will help Fourier to deliver the value propositions to the market segments led to the following two value chains (see **Figure 93** which is a simplified version of the one shown in **Figure 89**):

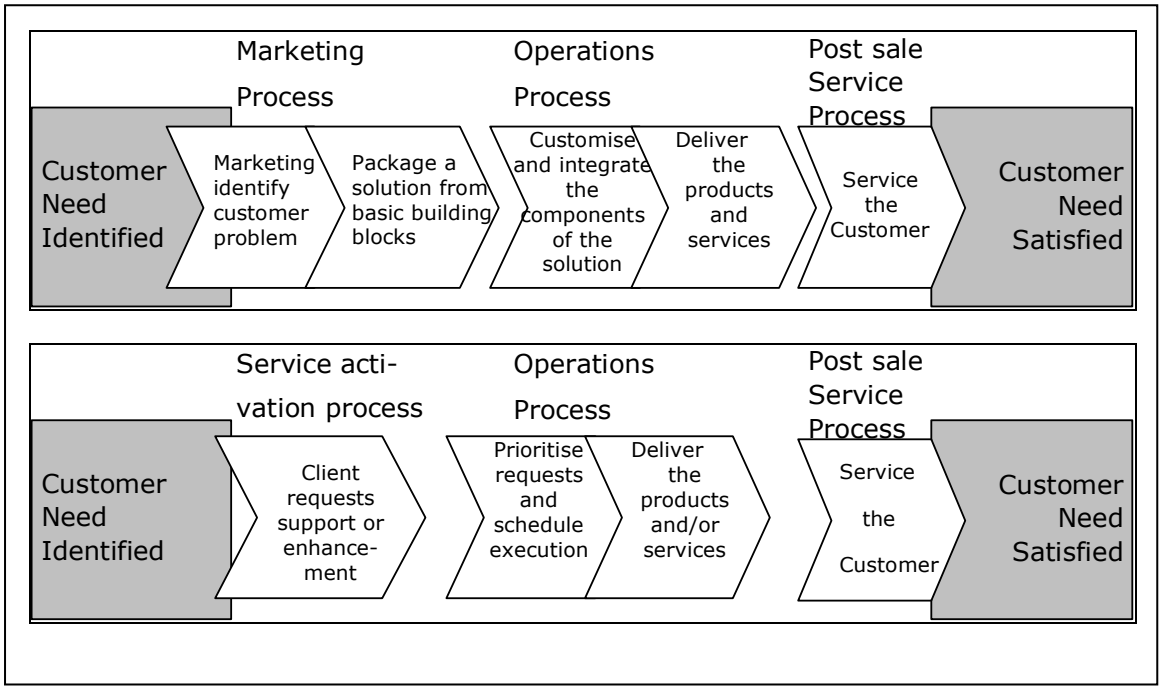


Figure 93. Simplified version of the value chains

Under learning and growth the question is "What skills and infrastructure are necessary for maintaining long-term growth?" In the case of Fourier the following items were identified:

- Scalable servers to provide hosting services
- Increase in project management skills in all resources
- Cross-training between business analysts (BAs) and systems analysts (SAs) to enable both groups to provide more effective services, especially in the workflow area

- Upskilling of certain infrastructure resources to provide telecommunication services as well

During step two of the process objectives were identified for the four perspectives and they were linked to each other as in **Figure 94**.

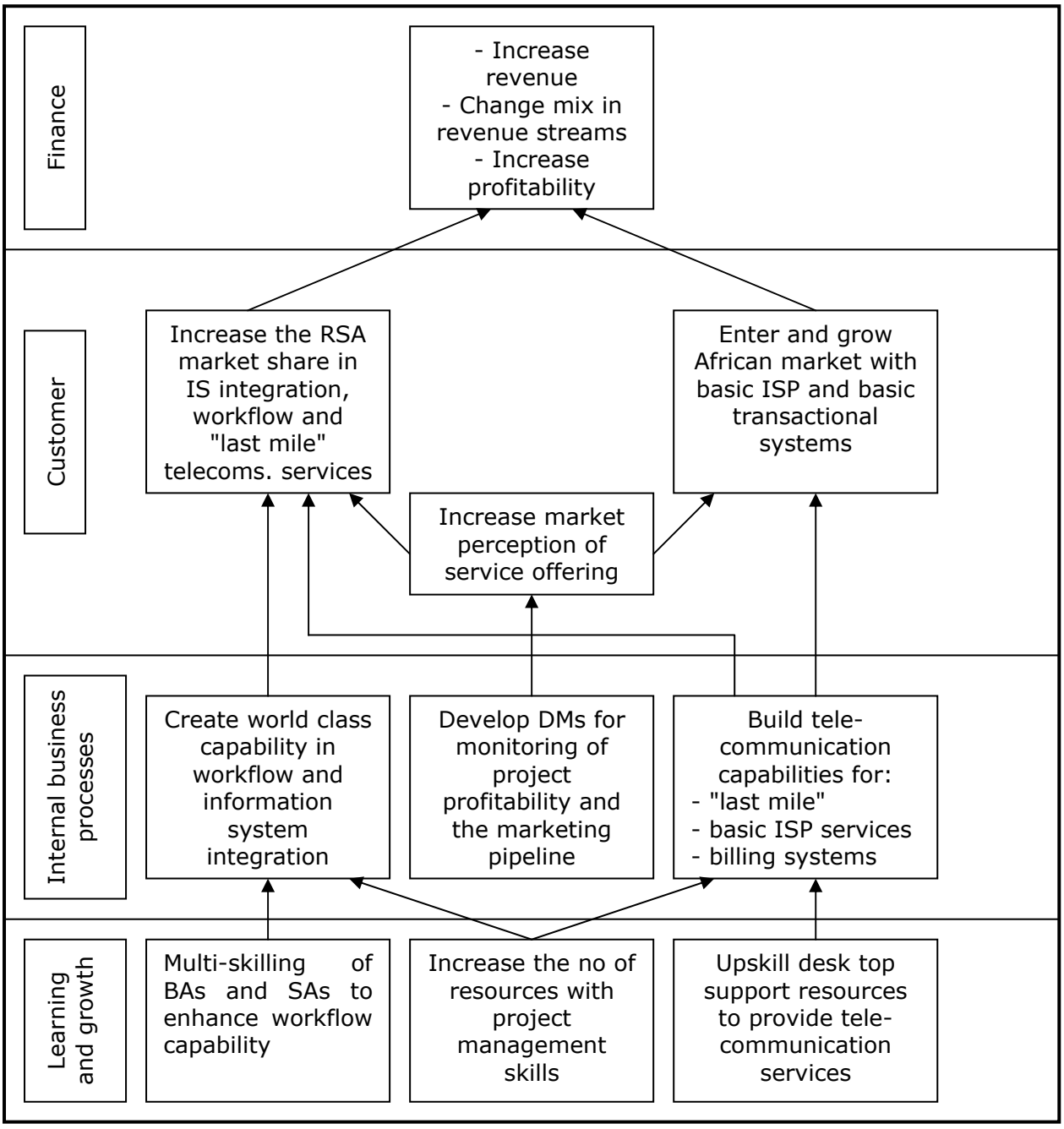


Figure 94. Strategy map for Fourier Approach

The last step in the Balanced Scorecard process requires the definition of meaningful measures. The following measures were identified for the different perspectives:

Learning and growth:

- Average skill level of workflow resources
- Average project management skill level
- Average skill level of telecommunication resources

Internal business processes:

- Maturity index of the technical wheels (see Fourier Model) with emphasis on the following functional areas - workflow, IS integration and telecommunication.
- Progress on the establishment of the data marts for
  - project profitability and
  - marketing pipeline.

Customer perspective:

- Customer satisfaction index - RSA
- Customer satisfaction index - Africa

Financial perspective:

- Monthly and year to date (YTD) revenue per category
- Project profitability

Even though not all measurements can be determined from the outset (e.g. customer satisfaction), the identification of these measures provides a roadmap of which systems need to be developed to provide the answers.

4.5.2 Using the Fourier Model

The conceptual Fourier Model consists of a number of concentric circles of which the inner two are referred to as the technical wheel (see **Figure 95**).

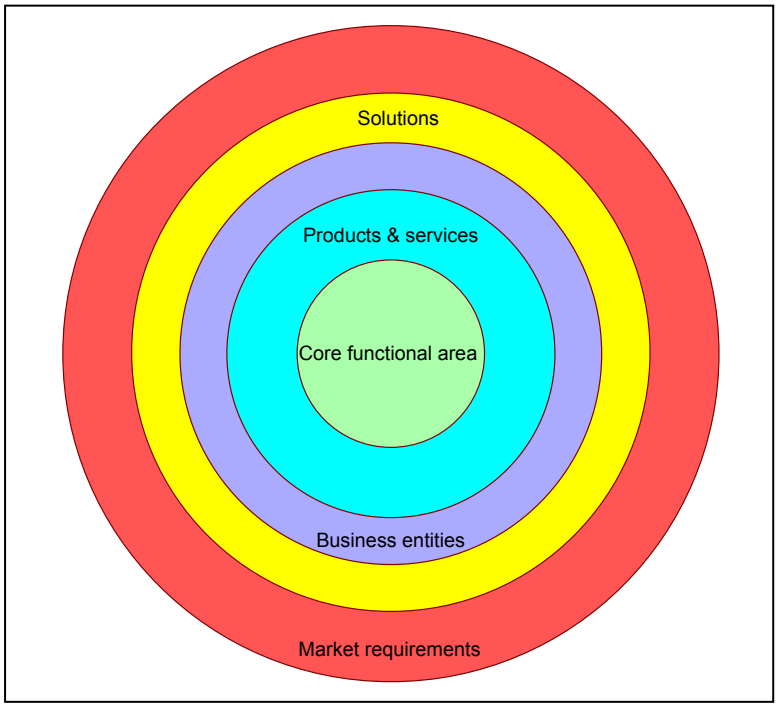


Figure 95. The Fourier Model

Each technical wheel contains elements of the following:

- Generic knowledge of the discipline
- Specific products related to the discipline
- Product knowledge to be able to implement, integrate, maintain or enhance the product

- Market information regarding the functional area (including competition, technical and marketing partners and movement in user requirements)

Over the years Fourier has invested in the development of various technical wheels - some are currently more mature than others. Since the technical wheels form the foundation or building blocks of every solution that is offered to clients, they need to be maintained. Based on the selected strategy they are prioritized in the following manner:

Primary focus:

- Workflow
- IS integration (and broader systems integration)
- Telecommunication

Secondary focus:

- Enterprise modelling (including business analysis and simulation modelling)
- IS development (mature)
- Business intelligence (mature)
- Biometrics (reasonably mature)

Tertiary focus:

- Information strategy
- Facility management solutions (mature)
- Project management support systems

An example of how the technical wheels are developed is given in an *MS Powerpoint* presentation on the CD ROM.

4.5.3 Using the Pots of Money Model

As pointed out earlier not all stakeholders understand how money flows through an organization. To implement a strategy successfully hard choices are sometimes made - also in terms of where money is spent. The aim of the Pots of Money Model is to illustrate to everybody how choices that are made in one area of the company influence choices in other areas. An overview of the model is given in **Figure 96**.

Pot 1 represents the money that is used for production activities. Income for this pot comes from money that is paid by customers for service fees, products, projects and cost recovery. The company itself can also put funds into this pot for investment projects by internal production resources, but that money comes from pot 4, which will be discussed soon. Although a pot can also be allocated to each project, it is seldom managed like that and normally the individual project pots all form part of pot 1, as defined in this model. The outflow from pot 1 rewards production resources and direct marketing cost (commission) and is called "Cost of sales" in financial circles. The result of pot 1 (inflows minus outflows) represents the gross profit.

Gross profit is normally the main inflow for pot 2, although other income such as interest received and dividends received may also add to the money in pot 2. Pot 2 rewards the support functions of the organization and the outflows are therefore indirect cost. These expenses may be fixed or discretionary and in some cases a combination. For example, the basic salaries of employees are fixed expenses, while management bonuses may be discretionary (depending on certain conditions). In some cases the formula of an expense is fixed, although the amount may differ depending on the formula - for example, regional levies. The result of pot 2 represents net profit before tax and

dividends.

The result of pot 2 is the only inflow for pot 3, which must reward the shareholders and the state through taxes and dividends. The formulae for company tax and secondary tax on companies (STC) are fixed. A dividend policy may be applicable in which case the formula is also fixed, but normally it is a discretionary outflow. The result from pot 3 is available as capital funds in pot 4.

Pot 4 may also receive new capital from shareholders or money from loans (which will also cause an additional fixed outflow from pot 2 for interest on the loan). The outflows from pot 4 are normally capital items such as furniture, computers, machines and software, as well as investment projects (internally and externally). Furthermore, this pot will also weather the cash flow storms in terms of late (or no!) payments from debtors and will finance the odd staff loan. Any net result from pot 4 will form part of the reserve fund of the company.

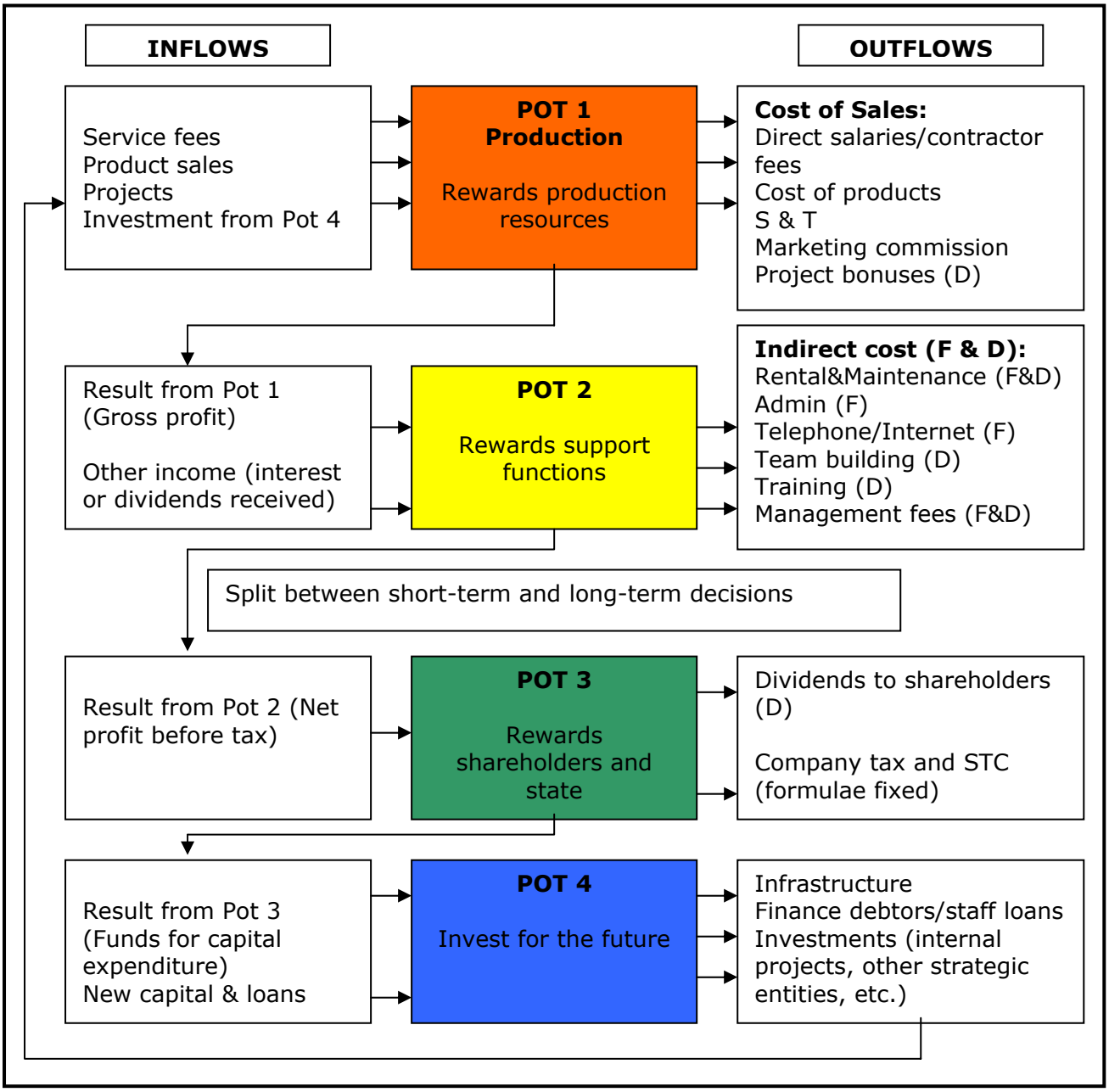


Figure 96. Overview of the Pots of Money Model

It may sound simplistic to explain the flow of money in these terms, but most people can understand and relate to it. A more detailed example in spreadsheet format is provided in **Figure 97**.

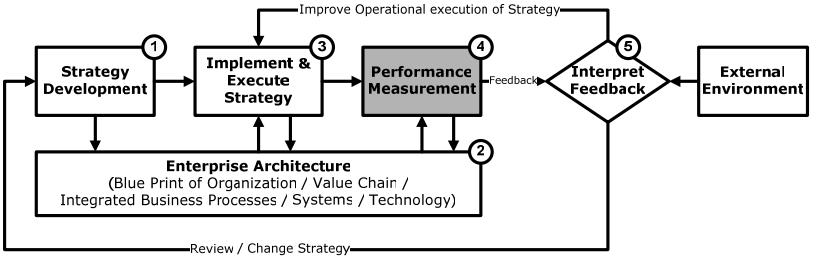
Pot 1 - Detailed view and impact on other Pots

Project Name	Client	Income (Turnover) from financial system	Human effort cost from time sheet system	Other expenses before project bonuses	Total Expenses	Gross Profit = Income- Total Expenses	GP %
Recoverable Projects:							
A	1	100000	56000	10000	66000	34000	34.00%
B	2	700000	660000	12000	672000	28000	4.00%
C	2	2000000	5500	700000	705500	1294500	64.73%
D	4	24000	24800	3000	27800	-3800	-15.83%
E	5	55000	40000	0	40000	15000	27.27%
F	1	3500000	2000000		2000000	1500000	42.86%
		6379000	**2786300**	**725000**	**3511300**	**2867700**	**44.96%**
Investment Projects: (Funded from Pot 4)							
G	FA	280000	200000	80000	280000	0	0.00%
H	FA	150000	100000	150000	250000	-100000	-66.67%
I	FA	30000	32000	0	32000	-2000	-6.67%
J	FA	50000	30000	15000	45000	5000	10.00%
		510000	**362000**	**245000**	**607000**	**-97000**	**-19.02%**
Total: (All Projects)		**6889000**	**3148300**	**970000**	**4118300**	**2770700**	**40.22%**
Project bonuses (a % of total gross profit guideline)				4.50%		124682	
Result from Pot 1						**2646019**	
Minimum required for Pot 2 (Fixed overhead obligations):						850000	
Additional Marketing effort						100000	
Additional Management bonuses						250000	
Other discretionary indirect cost						20000	
Deemed Net Profit: (Result from Pot 2)						**1426019**	
Minimum required for Pot 3 (30% of Net Profit):						427806	
Dividends & STC (a % of Net Profit after tax guideline)				50.00%		499106	
Result from Pot 3:						**926912**	
Minimum required for Pot 4 (Finance internal projects):						607000	
Other Capital Items						100000	
						707000	
Remaining as reserve (Result from Pot 4)						**-207894**	
(Any deficit in Pot 4 is funded by internal reserve funds, new capital from shareholders or external loans)							

Figure 97. Detailed example of Pots of Money Model

This concludes the examples on how strategy is implemented in Fourier, using some of the templates and approaches recommended in the Bigger Picture BI Context Model.

4.6 Performance measurement



This step in the process at Fourier is supported by a data warehouse approach. The Kimball methodology is followed by which the warehouse is built data mart by data mart. In this section the design of the project profitability data mart will be discussed to demonstrate the concept. The principle is that all performance measurements that are reliant on quantitive calculations will eventually be reported from the data warehouse.

According to the four step procedure the data mart was defined in the following terms:

Business process

This data mart supports the business process of project management and provides insight into the detailed income and expense transactions associated with any project. A data mart in the same group will carry project planning data and from the two data marts various relevant project management measures will be calculated, for example actual versus planned hours, cost, income and profitability.

The context of the different data marts that support project management are shown in **Figure 98**. The data mart marked in blue will be discussed further.

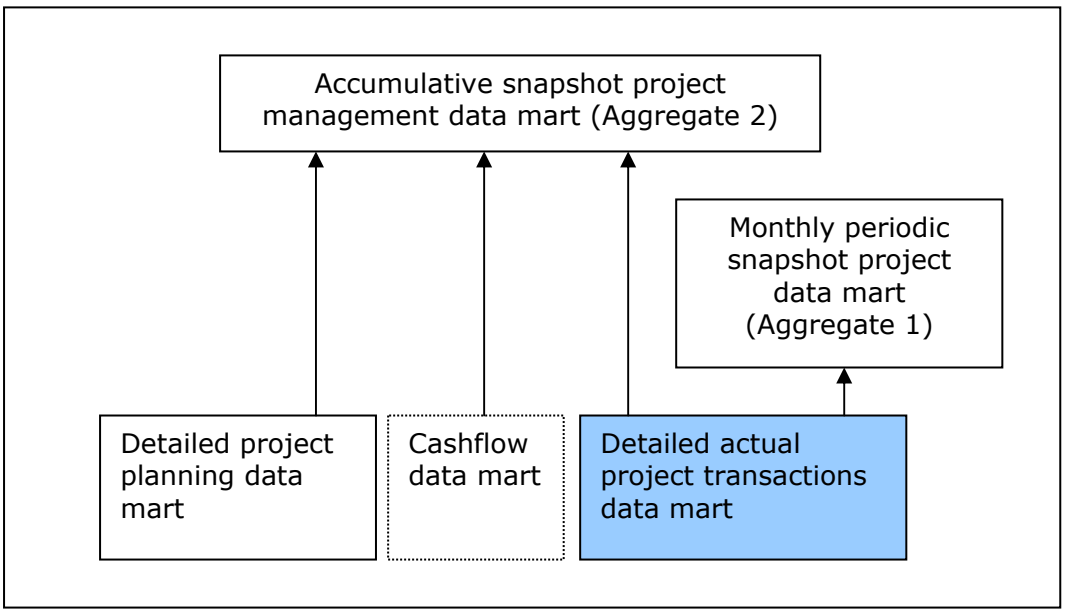


Figure 98. Context of the project management data marts

To ensure that all conformed dimensions (those shared by more than one data mart) are

identified, a Bus Matrix was established and an extract is shown in **Figure 99**.

Data marts	DATE_DIM	WBS_DIM	EMPL_DIM	CLIENT_DIM	SUPPLIER_DIM	TRANS_TYPE_DIM									
Actual project transactions	**X**	**X**	**X**	**X**	**X**	**X**									
Project planning	**X**	**X**	**X**	**X**		**X**									
Monthly actual project transactions	**X**	**X**		**X**											
Accumulative project management	**X**	**X**		**X**											
Cash flow	X	X		X	X	X									

Figure 99. Extract from Bus Matrix for Fourier data warehouse

Grain of the fact table

The grain of the fact table was defined as a financial transaction on any project. This includes invoices to the client, credit notes to the client, claims paid out on the project, purchases on the project and all time booked on the project which will be reflected as an expense calculated by the amount of hours multiplied by the internal tariff of the resource. It is therefore a transactional fact table, which will be appended every time transactions are added.

Dimensions

The following dimensions were identified and defined as in **Table 13**:

Table 13. Definition of dimensions

Dimension name	Dimension description
Date dimension	Details for each day of year for an amount of entries enable special groupings on date attributes like; "per month", "for all Mondays", "comparing the first financial quarter of every financial year"
WBS/Project dimension	Contains all hierarchical work breakdown structure attributes, as well as the de-normalized project attributes
Employee dimension	Details of all current and past employees (and contractors) in the total Fourier group.
Client dimension	Details of all current and past clients, as well as potential clients.
Supplier dimension	Details of all Fourier's current and past suppliers
Transaction type dimension	Description of all relevant transaction types, e.g. invoice, credit note, cash expense, human effort expense, credit purchase.

Facts

The following facts with their definitions were identified (see **Table 14**).

Table 14. Fact definitions for actual project transaction data mart

Fact name	Fact description	Default aggregation rule
Qty	Amount of hours booked by employee for human effort transactions. In most other transactions it will be 1.	Sum (Qty)
Tariff	Internal tariff 2 for all human effort transactions. In all other cases where the Qty was specified as 1, it will be the total amount excluding VAT.	Sum (Qty * Tariff)
Amount	Qty * Tariff which will give the total amount excluding VAT.	Sum (Amount)
Transaction description	Degenerate dimension (limited to 56 characters)	None
Transaction reference	Degenerate dimension	None

Negative values in most financial systems indicate credit amounts (income) and positive values indicate debit amounts (expenses). However, in the DW the standard is adjusted to show inflows as positive amounts and outflows as negative amounts. The sum of all transactions for a specific project is therefore positive if the income is more than the expenses.

The high-level star scheme design of the data mart is shown in **Figure 100**.

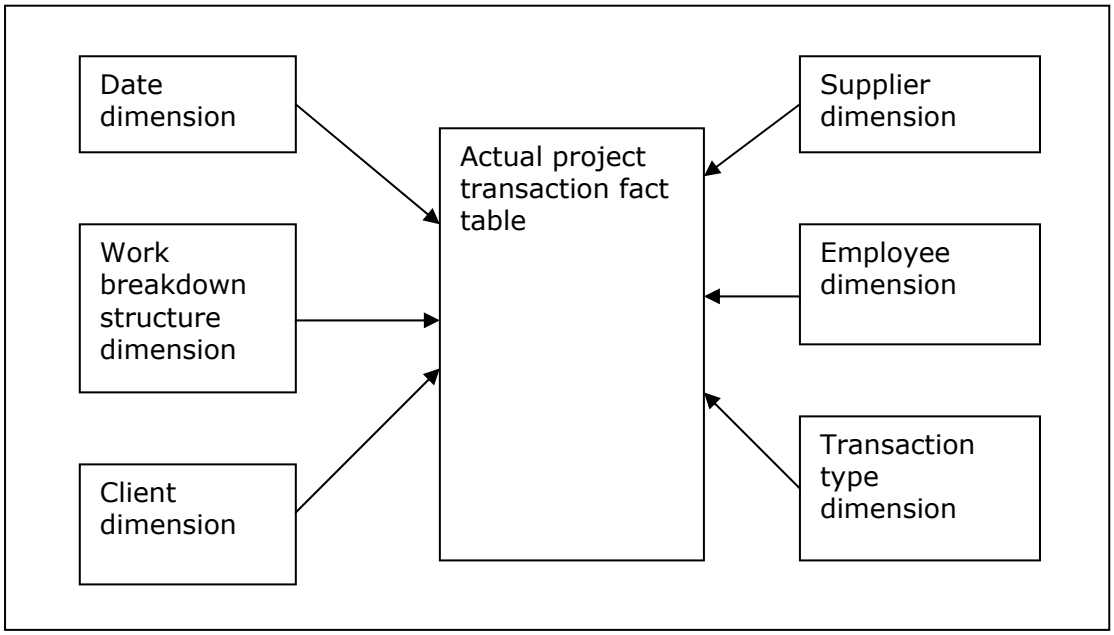


Figure 100. Star scheme of the actual project transaction mart

Each dimension is defined in much more detail. This means that each attribute in the table is defined in terms of an attribute name, description, type of update and sample values. The type of update refers to the update types identified by Kimball where, for example, Type 1 indicates that the value will be overwritten when it changes and Type 2 implies that a new record will be added to the dimension table when the value changes. An example of the detail specification of the client dimension is shown in **Table 15**.

Some of the dimensions (e.g. supplier and employee) have a special "Not applicable" record that are used to link to transactions in the fact table where it is not possible to identify a relevant record in the dimension. For example: a time booked transaction will not be linked to a valid supplier and therefore the "Not applicable" record will be used.

Table 15. Detailed specification of the client dimension

Attribute name	Attribute description	Update type	Sample values
Key	Unique surrogate key	2	105, 106
Extract date	Date that record was extracted from TPS	1	2003/5/1
Load date	Date that record was loaded into dimension	1	2003/5/2
Current indicator	Go-No go indicator to indicate if the record is the current active record in the dimension.	2	Y, N
Client code	Client code in Pastel or master file	2	C001, C002
Client name	Client name in Pastel or master file	2	TFMC, Nedcor
Client contact person	Client contact person	2	John Dow
Suburb	Suburb	2	Eastville
Town/City	Town/City	2	Johannesburg
Postal code	Postal code	2	0101
Client category	Client category ito marketing life cycle	2	Suspect, prospect, ordering, paying
Current client status	Current client status ito activity (marketing or project activity)	2	Active, Inactive

Various ETL (extraction, transformation and loading) plans were developed in *Sagent* to update the various dimension and fact tables. In this case two source systems are used:

- The *Time sheet system* is used as source for the employee dimension and work breakdown/project dimension, as well as the transactional records of hours booked per person.
- *Pastel Accounting* is used as source for the supplier dimension, client dimension and all other financial transactions that are linked to a project.

The date dimension and the transaction type dimension are created and maintained in the data warehouse database.

Figure 101 gives an example of a typical data flow or ETL plan in *Sagent*. It was found that having a two-phase approach to the data warehouse update process is actually smart. The first ETL plan will only extract the data from the source system and dump it in a flat file (actually just extracting and loading). The second ETL plan will extract data from the flat file, compare it with data in the existing dimension table and (depending on the update type for a dimension) will overwrite some records, append new records where applicable and transform certain values. The different ETL plans are linked together in an automation process within *Sagent* to ensure that the ETL plans are executed in the right sequence. First all dimensions are updated, then the detailed transactional fact tables are updated and after that relevant aggregation fact tables are updated from the newly updated transactional fact tables.

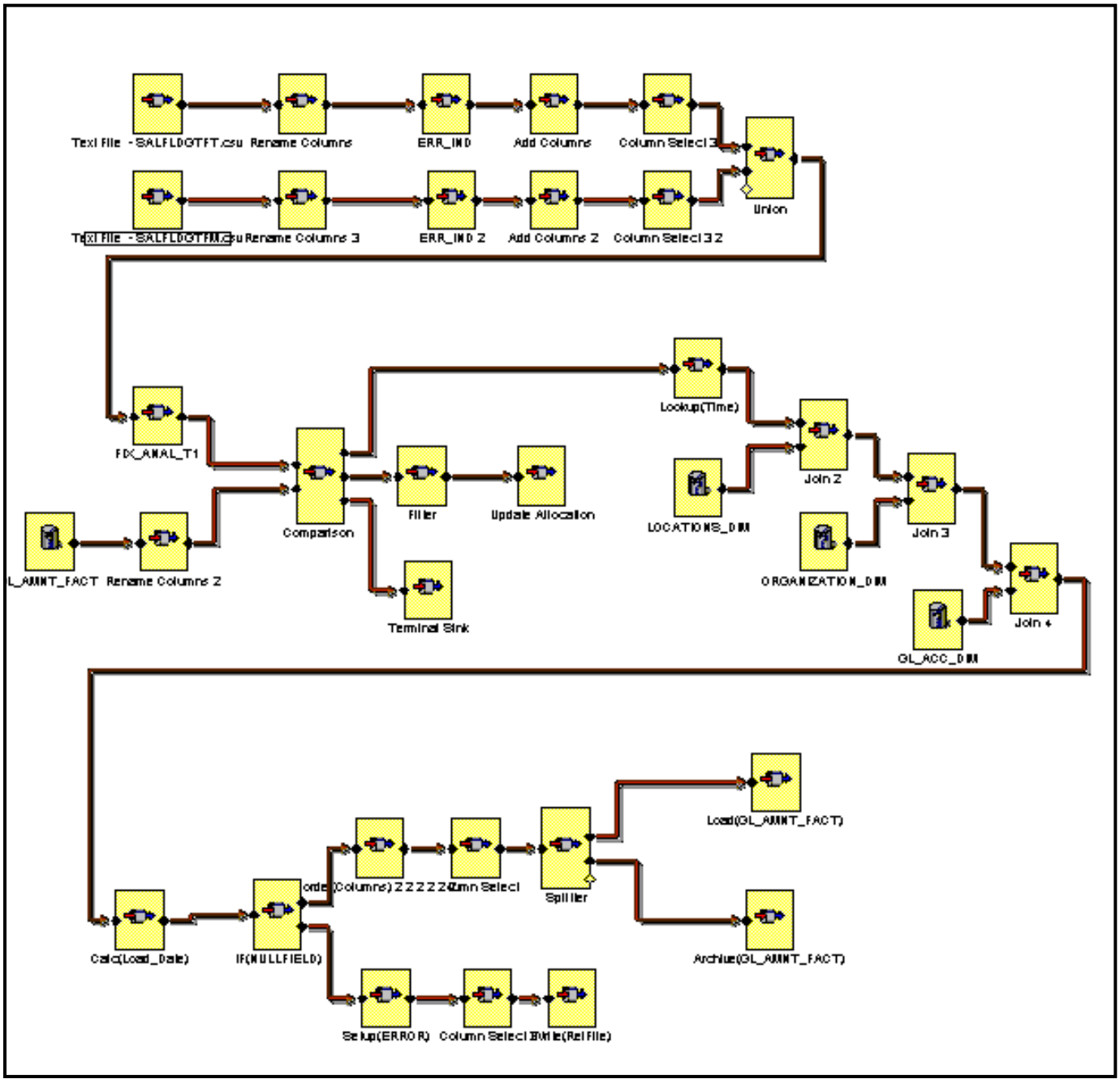
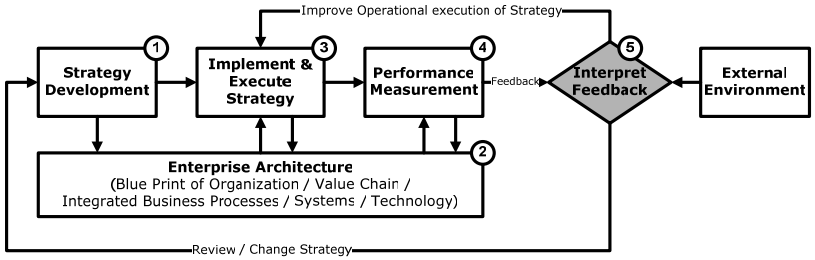


Figure 101. An example of a typical *Sagent* ETL plan

With the data in a star scheme format, it is easy to compile various queries from the meta view in *Sagent.* However, some of the standard reports are exported to *MS Excel* where people without access to *Sagent* can interrogate the data further using the powerful pivot table capabilities. An example of the data in *MS Excel* format is included on the CD ROM.

As always the most time consuming part of the data warehousing process is to ensure data quality. Various business process changes were made to ensure that the data is captured more accurately. For example, the claim form format was changed to ensure that the correct cost code was identified to link the transaction to the correct project.

4.7 Interpret feedback



As mentioned in the general discussion of the model, this step in the process requires human judgement and cannot be automated. Even though not all measurements are yet in place at Fourier Approach to support all the selected measures of the Balanced Scorecard, a number of conclusions were drawn from those that are in place. Some of them led to improvements in business processes, others to refinement of the measuring method. Changes in the external environment such as the relaxation of the monopoly that Telkom had with regard to internet services led to the strategy to provide billing system services - not only in other African countries, but also in the RSA. A few examples of how the interpretation of measurements in context with the current strategy and changes in the external environment led to changes in the organization are listed in this section.

- After discovering that not all project expense claims were allocated to the correct project in Pastel, distorting the project profitability figures, the business process for handling of claims was changed, as well as the claim form format. No change in strategy, but improvement of business process.

- The marketing pipeline showed a growing potential requirement for workflow resources. This trend influenced the strategy to launch a multi-skilling training exercise for business and systems analysts and to prioritise the workflow technical wheel in the primary focus group.

- The changes regarding Telkom (input from the external environment) justified the emphasis on the development of the telecommunication technical wheel and the upskilling of current desktop support resources. It also influenced a decision to become a value adding reseller of an American billing system with the necessary investment that goes along with that decision.

- The drop in market tariffs for desktop support services in the RSA (also an external environment input) was also reflected in the profitability of this type of project. This influenced the decision to move out of this market in the RSA.

- A need for improvement in project management skills was highlighted when it was discovered that basic causes were responsible for low project profitability - things like uncontrolled scope creep, spending of additional hours by resources to refine solutions because they were not allocated to other projects in time, informal handling of change requests and inadequate testing procedures. This directly led to the learning and growth objective to increase the project management skills of all relevant resources.

- From the project profitability measures it was also discovered that certain projects were less profitable than planned, even though the amount of hours spent were within budget. The cause of the problem was allocation of more senior (and

expensive) resources to certain tasks, without changing the allocated amount of hours. It also pointed to lack of business sensitivity on the side of the responsible project manager - further justifying the strategic objective to increase project management skills. It also highlighted the importance of having a good mix of junior and senior resources and this insight influenced the business process of recruiting employees.

- The Pots of Money Model clearly pointed out that internal investment projects (even though the company is the sponsor/client in these cases) should be managed like all other projects, because an overspent project could reduce the total project bonus amount.

The list could be extended, but it is believed that the reader can get a feeling of the importance of this step in the Bigger Picture BI Context Model from the examples above. The value of this step lies in the **action** that is taken when confronted with information that the business intelligence tools so handsomely present, as well as monitoring whether the action that was taken had the expected or desired effect.

4.8 Discussion of other case studies

This section briefly discusses some other experiences that the author had where the suggested Bigger Picture BI Context Model had not been used yet. The one example is based on a data warehouse exercise at a facilities management organization and the other explores the use of the model in a typical academic environment.

4.8.1 Data warehousing in a facility management environment

Although this client had a well thought-out business intelligence strategy based on the incremental approach of Kimball, business users became impatient and a project was launched to deliver a robot system for performance management. Much emphasis was put on the delivery side of the process and a very sophisticated robot application was specified and developed. Since the data warehouse was not fully developed at that stage, it was agreed that the robot application would be driven from so-called delivery tables. Eventually these delivery tables would be populated via ETL plans that would use the data warehouse as a source, but until that stage any method would be used to put data into the delivery tables.

The robot application was fairly complex, with different levels of detail, weighted index figures for each set of KPIs, actual figures for the current monthly period, year to date figures, rate of improvement and so forth. Limited development resources were available due to budget restrictions and eventually more time went into the development of the delivery mechanism than into the development of the underlying foundation - the data warehouse. See **Figure 102**, **Figure 103** and **Figure 104** for typical screens related to the robot application, showing the different levels of detail.

Each parameter has upper and lower limits that determine whether the KPI is green (above the upper limit), red (below the lower limit) or yellow (between the limits). Each robot could have any number of KPIs and the formula (the underlying SQL statement) for the same KPI could differ depending on which robot it appears. For example, the number of on-time delivered work orders for the organization as a whole would include all work orders in all regions, while the same KPI on regional level would only include work orders relevant to that region.

It soon became clear that a separate application would be needed to manage the definition of robots and individual KPIs, as well as the targets (upper and lower limits) for each parameter. A meta data application was developed to document all this

information and to maintain the definitions of the KPIs, because a business definition in English had to be translated into an SQL statement that accurately reflected what the business person wanted. See **Figure 105** for the main screen of the meta data application and **Figure 106** for an enlargement of what is meant by the translation from English to SQL statement. The meta data application also has a simple workflow facility whereby the developers can document any issues and e-mail any questions regarding the KPI.

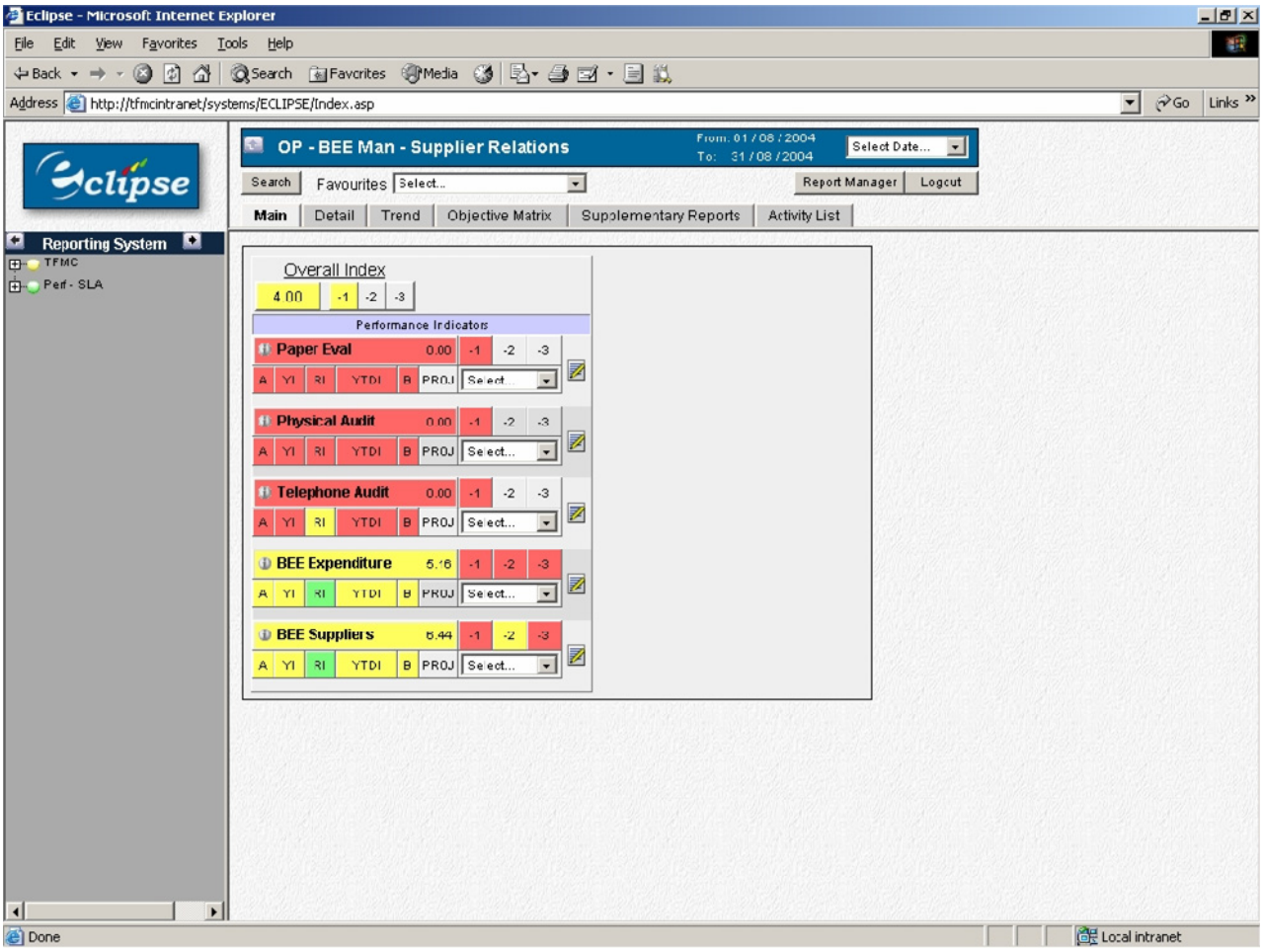


Figure 102. Typical overall robot screen

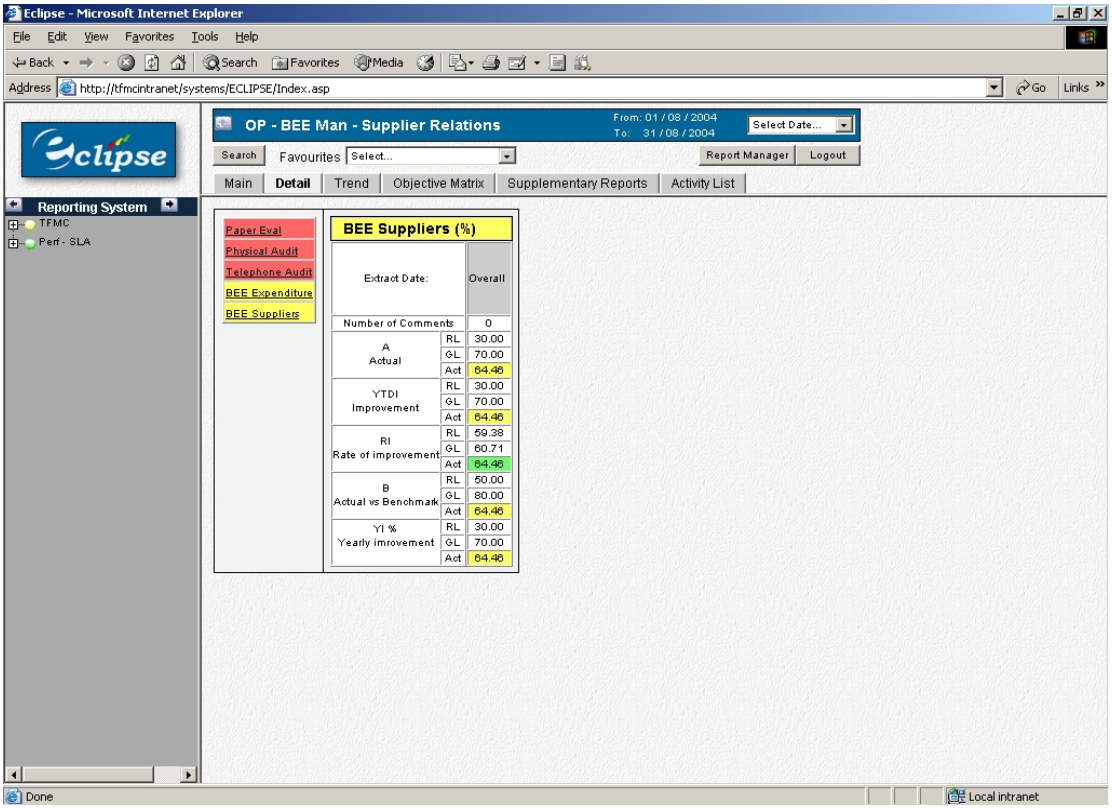


Figure 103. Detail figures for a specific KPI

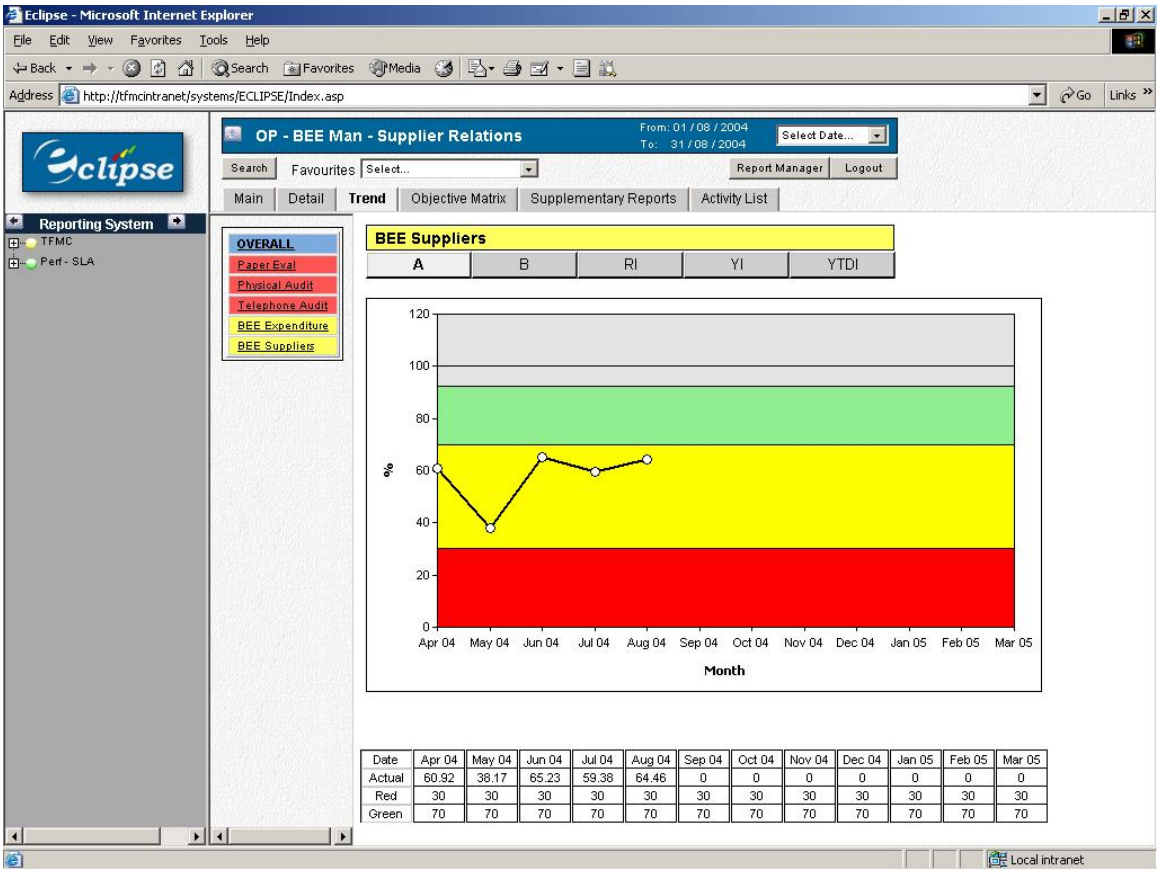


Figure 104. Typical trend report for a specific KPI

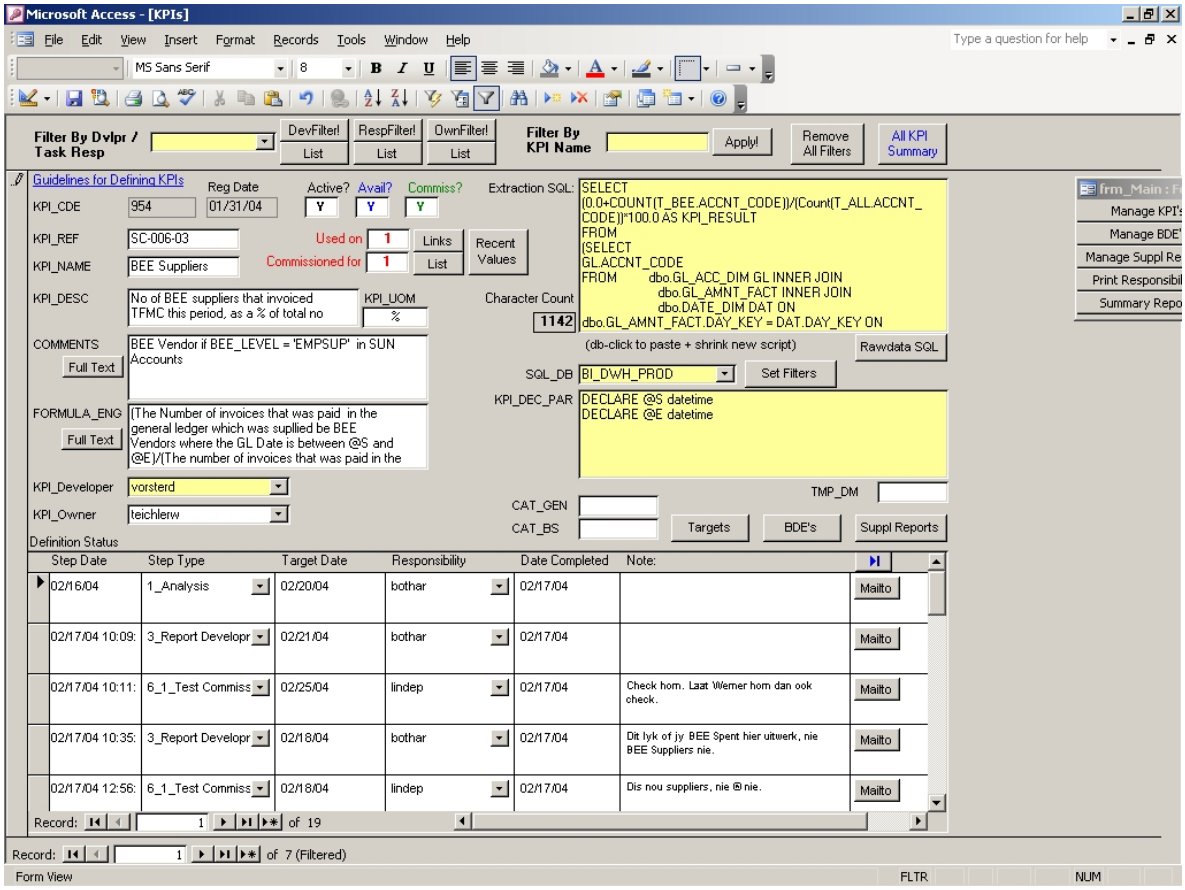


Figure 105. KPI definition and management application

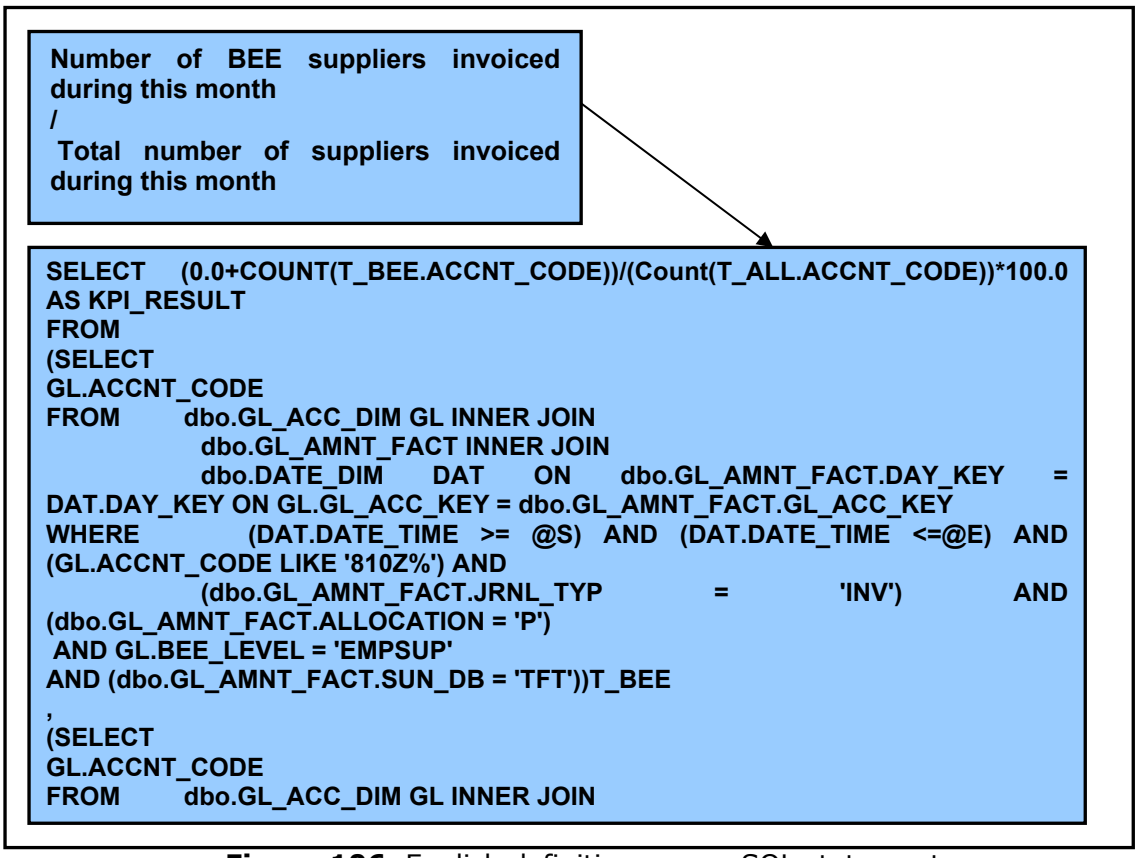


Figure 106. English definition versus SQL statement

Another difficulty that arose was the fact that business users also had access to an ODS (operational data store), which was a simple (daily) copy of the transactional databases. Some reports were drawn from that data source and when the answers did not match with the answers from the robot system, the suspicion normally pointed to the data warehouse team. Meanwhile the definition and rules that were defined by business and implemented in the data warehouse, were not necessarily applied when reports were drawn from the ODS. Naturally the timing of the reports and the refresh rate of the robot also played a role in the discrepancies.

At some stage more than 500 KPIs were reported. One colleague commented: "There is something wrong with this statement. How can there be 500 **key** performance indicators?" That was probably the main reason why progress was slow - the pure volume and the lack of prioritization. Had the Balanced Scorecard methodology been followed only a manageable amount of measurements would have been identified (let us estimate 20 or 30 real critical measurements).

Lastly, user expectations were based on the generic potential of the robot application specification. It was promoted to the business that any robot could be defined with various KPIs from various subject areas - see **Table 16**. This implied that all the data marts for all the subject areas had to be in place before the robot could be delivered - or that data for those KPIs that were not supported by data marts yet, should be sourced from a temporary area. The client opted for this temporary source, which further diluted the effort that went into the development of the real data warehouse. The quality of this data could not be guaranteed and if errors were pointed out on one of the KPIs of a robot, the integrity of the whole robot was questioned. The solution for data quality problems usually lies in changes to the ways in which the transactional data is captured in the first place - something that is also not achieved overnight for a nationally distributed organization!

Table 16. Expectations of KPIs from various subject areas

Report 1	Subject 1	Subject 2	Subject 3	Subject 4	Subject 5	Subject 6
KPI 1				X		
KPI 2						X
KPI 3		X				
KPI 4		X				
KPI 5			X			
KPI 6	X					
KPI 7	X				X	
KPI 8			X			
KPI 9	X					
KPI 10		X				

Many lessons were learned during the process, even though some of the most powerful tools (e.g. the meta data application and the robot application) were developed during the time. In retrospect, however, most of the frustrations experienced during the project can be traced back to the fact that the basic and proven methodology of evolutionary development of the data warehouse was not followed. Furthermore, too much emphasis was placed on the delivery mechanism before the foundation for such a delivery tool (the data warehouse) was mature enough - thus creating unrealistic user expectations.

4.8.2 Applying BI in a typical academic environment

Until now most of the discussion and examples were based on business or commercial scenarios. The author is of the opinion that the principles can also be applied to many other situations such as schools, churches, sport organizations and political parties. The use of the model in an academic environment is debated briefly in the following paragraphs.

Most tertiary academic institutions such as universities have strategic goals - to do research, to transfer knowledge to students and to do community service. These goals differenciate them from normal businesses, but they have many issues in common with businesses. They also struggle with BEE questions; they have challenges to ensure that their income is enough to cover all their expenses; that their product offering (content of their academic courses) stays aligned with the expectations of their clients (students and businesses in the economy); they have to do benchmarking against international standards; they must ensure that their pricing models are acceptable and sustainable; they need to ensure personal growth for their employees and have to maintain facilities.

Naturally it would be better to apply the model to a university as a whole, but for the purposes of this discussion it will be applied to an academic department such as industrial engineering. The strategy development part will be derived to a large extent from the strategy of the university. The strategy implementation and execution part may however be adapted for the situation of the department. For example, the university may have a research objective of one publication on average per academic staff member per year in order to compare favourably with international standards. From a department with 12 staff members the university would expect 12 publications in a year. The department may structure its activities in such a way that three or four staff members with pertinent research activities during a certain period will produce the required quota of publications. In turn the other staff members will have to take over some of the lecturing responsibilities to provide the research group with enough time to prepare their publications. (This is just an example of how the implementation of strategy at a departmental level may be different for individual departments, while the higher-level objective can still be achieved.)

The Fourier Model can be used to identify, prioritize and develop various technical wheels that are important for the department at a certain time. A functional subject area such as supply chain management or a vertically integrated market segment such as the one for the automotive industry may be examples.

The Balanced Scorecard approach may also be used to identify objectives related to the four different perspectives and to build the cause-and-effect relationships to establish a strategy map. Since the university is not a profit-making organization, it might be that the ultimate objective in the cause-and-effect map would end up in the customer perspective (while most commercial strategy maps end with the financial perspective). The map will clarify and communicate the strategy to various stakeholders.

To measure progress in terms of the execution of the strategy a data warehouse approach may be followed. Typical subject areas for data marts may include undergraduate and post graduate student performance, research activities of lecturers (wider than just a count of publications!), industry involvement of lecturers, skills and qualifications of lecturers and the tracking of former students.

Some of these marts may be used to analyze data with the objective to influence future strategy. A colleague at the department is currently analyzing student performance during their total involvement with the university to try and identify preventive measures (e.g. additional prerequisite subjects or alternative routes) that can be used to prevent

students from failing certain courses. The typical star scheme for such an analysis environment would be a student performance fact table with semester, examination and final marks for a course as the facts. The fact table is surrounded by the following dimensions:

- Student (with attributes such as matric marks for certain key subjects)
- Course
- Date (with attributes to indicate first and second semesters)
- Department that is responsible for the course
- Lecturer who presents the course

Some of the transactional sources for the data marts suggested above already exist (for example a student administration system), but others may require that a transactional system be developed to capture the data.

This brief discussion on the application of the BI model in an academic environment may have triggered more questions than answers, but the author is convinced that it can add value if the process is completed in the structured manner that the model suggests and if the relevant elements (such as goals, business processes, systems, courses and organization) are properly documented and linked in an enterprise modelling repository.

4.9 Conclusion

The purpose of this chapter was to demonstrate how the Bigger Picture BI Context Model that was developed in the previous chapter is applied in practice. Most of the methodologies and templates that were described as components of the model were applied to a typical consulting firm. The consulting firm acted as an experimental environment where many of the concepts were tested and refined.

Another practical data warehousing environment was discussed where the sequential flow of activities as suggested by the Bigger Picture BI Context Model was not followed. Various consequences of this approach were pointed out. The message from that exercise was not that BI could not be applied any other way than the "Bigger Picture BI" way - only that a lot of frustration could have been prevented and progress could have been faster if the suggested model had been followed.

Finally the author debated on a high level the value that could be added if the model would be applied in an academic environment - just to show that the model is generic and not only applicable to commercial business environments.