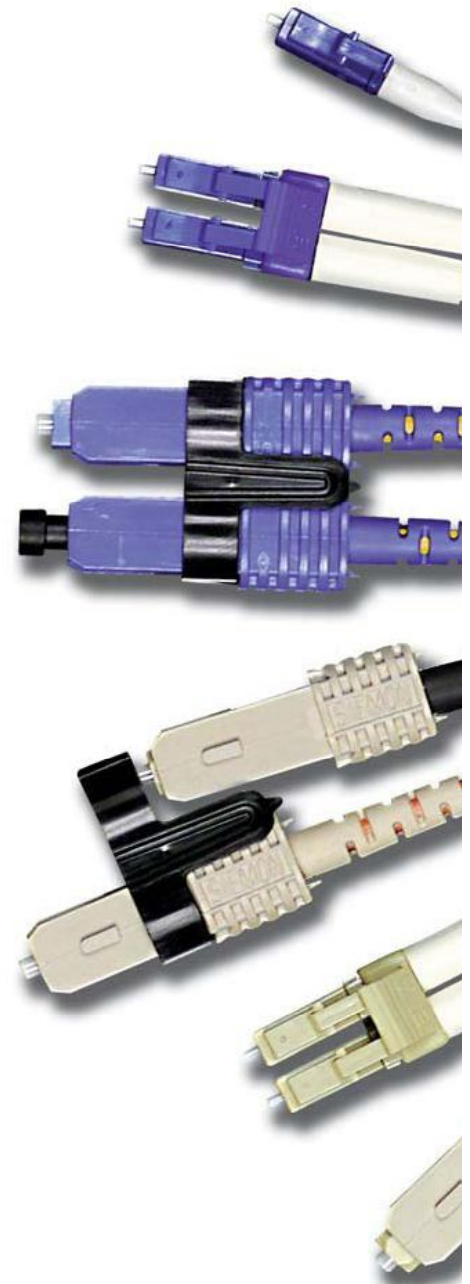
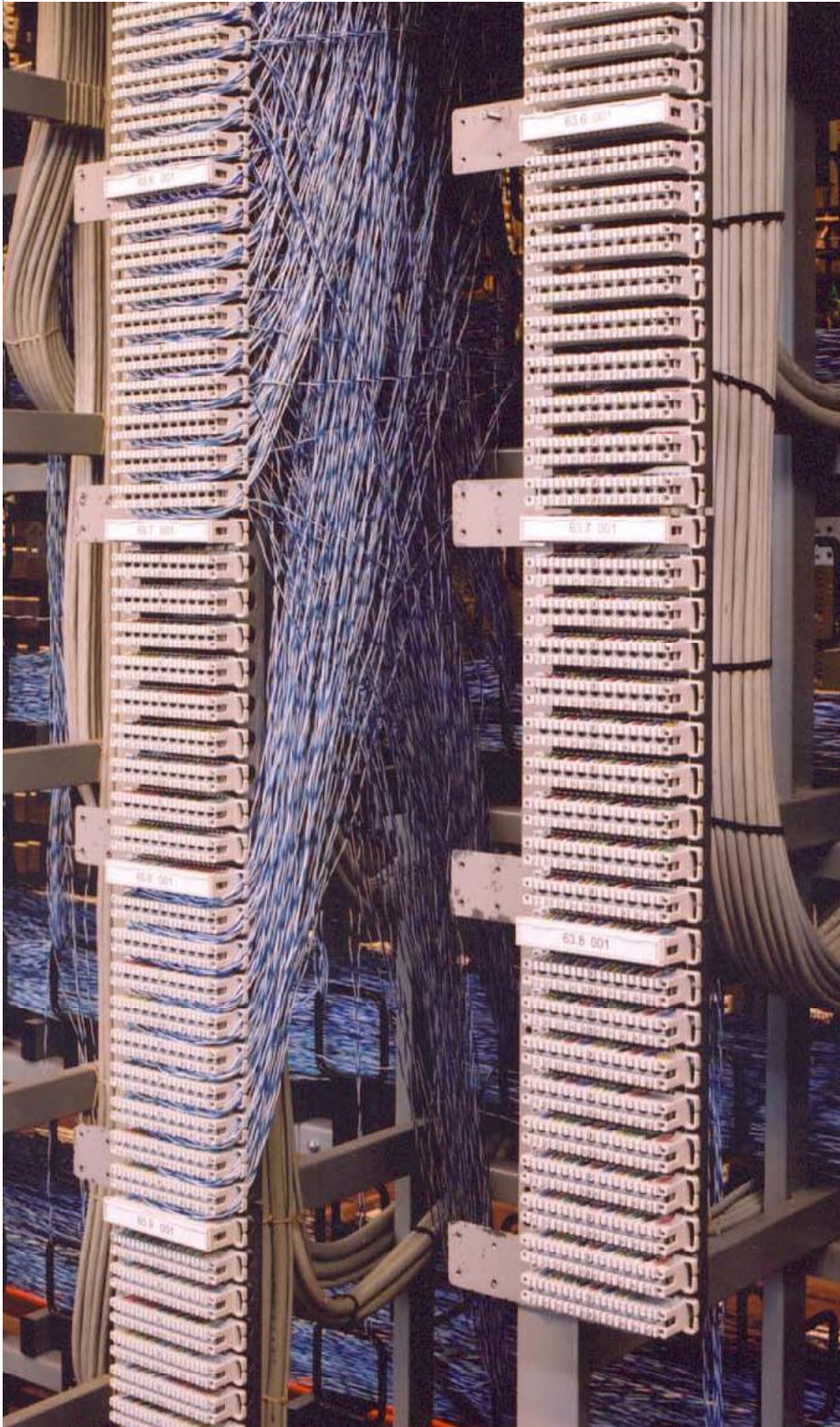


Performance Measurement for All IP



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February 2008, Den Haag

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Management Summary

In November 2005 KPN started the All IP Program, the migration from their copper network to a Next Generation Network based on fibre. This innovation was brought into action for three reasons: capacity expansion of the network, cost reduction and market share win-back. The nationwide migration to All IP is split up in local projects; from mid 2008 these local roll out projects will run at 20 to 30 locations simultaneously across the Netherlands.

KPN wanted an instrument for performance measurement developed to support a local roll out organisation in controlling the realisation stage, for communication on project performance to All IP Program Management in Den Haag and to support continuous improvement of the local roll out concept. The realisation stage comprehends all necessary activities from marketing and sales to in the end deliver and install a triple play (internet, television and voice) service at the customer. The objective of this research was formulated as follows:

*'The definition and implementation of key performance indicators
for the realisation stage of a local roll out project of the All IP Network'*

Since there was no clear insight into the coherence of processes of a local roll out project, this coherence was analysed at KPN Glasnet Enschede. The processes of marketing and sales, order registration, order processing and provisioning, the construction of infrastructure and installation are presented in cross-functional flow charts. These may serve as foundation for a manual for local roll out projects in the future.

The Balanced Scorecard by Kaplan and Norton [24] was selected as framework to define and implement performance measures. This framework was chosen since it is applicable at project level, clear guidelines and case studies for implementation are available, KPN is familiar with the concept and it is a useful tool in benchmarking (to support continuous improvement). The implementation roadmap by Assiri et al. [2] was used as guideline for development of the instrument for performance measurement.

Based on extensive interviews with All IP Program Management and studying relevant literature the strategy map was drawn up, the foundation of the Balanced Scorecard. The strategy map shows the objectives of All IP during the realisation stage of a local roll out project, through cause-and-effect linkages. The most important objectives are: reaching the financial targets stated in the business case, gaining market share, high customer satisfaction, first time right delivery and installation and excellent customer service. All IP Program Management strives for continuous improvement of the local roll out concept.

Based on the objectives defined in the strategy map the performance measures were defined. A total of 25 measures is defined covering the four perspectives of the Balanced Scorecard. They provide a complete overview of project performance during the realisation stage, presenting a complete mix of performance drivers and outcome measures. MS Excel was selected to implement the performance measures; for its flexibility, it enables fast implementation and is easy to understand. For the development a prototyping approach was used; an iterative process which led to a satisfactorily final version of the instrument through interaction with future users. Since the information systems which are going to be used during the nationwide migration were still being developed during this research, it was impossible to define the data sources. However, this did not jeopardise the research objective. The functioning of the instrument was proven by filling it with fictitious but representative data; this was confirmed by the future users.

By delivering the instrument for performance measurement during the realisation stage of a local roll out project the research objective is achieved. The instrument provides the necessary management information for controlling the realisation stage by a local roll out organisation regarding the objectives

stated in the business case and by All IP Program Management. It provides communication on project performance to All IP Program Management in Den Haag. The instrument allows for benchmarking local roll out projects through presenting the performance measures of several projects in one overview. Through analysing differences regarding performance it serves as foundation for continuous improvement of the local roll out concept.

The most important recommendations are:

- Weekly updating the Balanced Scorecard, except from financial figures being reported monthly. Make one person responsible to ensure completeness of BSC and define standard procedures for data gathering. The instrument must be accessible online, for example by MS Share Point.
- For using the instrument during the nationwide migration it is essential that data sources are identified within the new information systems. One database should be used in which all information on a customer is available (order data, customer service, progress of construction activities). Further research should be executed regarding improvement and further automation of supporting information systems during a local roll out project.
- To turn the All IP Program into a success it should be researched how to increase the flexibility of the delivery and installation process, but also how to improve the value proposition on the All IP Network for customers.

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List of Definitions

ARPU	Average Revenue Per User
Capex	Capital Expenditure
CO	Central Office
CSF	Critical Success Factor
xDSL	Variants of DSL – Digital Subscriber Line
DSLAM	Digital Subscriber Line Access Multiplexer
FttC	Fibre-to-the-Curb
FttH	Fibre-to-the-Home
FTR	First Time Right
FTU	Fibre Termination Unit
GSP	Green Service Provider
LSG	Local Support Group
HA	Homes Activated
HC	Homes Connected
HP	Homes Passed
IP	Internet Protocol
KPI	Key Performance Indicator
NGN	Next Generation Network
NT	Network Terminator
Opex	Operational Expenditure
QoS	Quality of Service
POC	Process Operations Centre
POTS	Plain Old Telephone System
RG	Residential Gateway
RSP	Red Service Provider
SC	Street Cabinet
SP	Service Provider
WBA	Wholesale Broadband Access
WDC	Wijk Distributie Centrum

Preface

This report is the result of the research executed to conclude the Master Industrial Engineering and Management at the School of Management and Governance, University of Twente. The research project was executed within the context of the All IP Program, at the department of Wholesale and Operations of KPN, Royal Dutch Telecom in Den Haag. The All IP Program comprehends the transformation of KPN's legacy copper network towards an IP based network on fibre. It has been interesting working in the dynamic environment of the All IP Program.

'Meten is weten!' an old Dutch expression used by carpenters. Word for word translated it means 'to measure is to know': very true when it comes to performance measurement. But measuring everything could lead to an information overload, it is impossible to manage projects based on too much information. Therefore it is very important to know with what objective to measure, what to measure and how to present the outcomes. Measuring performance is not the objective but the means to reach the objective! In this report the development of an instrument for performance measurement for a local roll out project of the All IP Network is described.

Hereby, I would like to thank my direct supervisor at KPN, Leo Helgers, for offering me the opportunity to execute my research at KPN and his guidance during the research. Second, the project manager of KPN Glasnet Enschede, Jan Willem ter Steege, and his team have been of great help in bringing this project to an end, thanks! Also I would like to thank my university supervisors, Koos Krabbendam and Christiaan Katsma.

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February 2008, Den Haag

1 Introduction

This first chapter comprises an introduction to the thesis. Section 1.1 describes the graduation organisation KPN, at which the master thesis was executed. In section 1.2 the reason for initiation of the All IP Program and the nationwide migration approach is explained. The research motivation and objective are defined in section 1.3. In the final section the research questions are elaborated.

1.1 KPN

In this section the organisation KPN is described: the profile, strategy and competition of KPN are explained. The information was acquired through interviews with KPN employees and studying the KPN annual report 2006 [30].

1.1.1 Profile

Since its privatisation in 1989 KPN has developed from a traditional telephone operator to the leading multimedia company of the Netherlands. The company provides consumers and consumer households with fixed and mobile telephony, internet and television services. To business customers, KPN delivers voice, internet and data services as well as fully managed outsourced ICT solutions. Besides that, KPN provides wholesale network services to third parties (including operators and service providers) nationally and internationally. At the German and Belgium market KPN provides mobile telephone services, serving multiple customer segments through a multi-brand strategy. In the Netherlands KPN serves 6.3 million fixed line voice subscribers, 8.6 million mobile customers, 2.1 million Internet customers and 300,000 TV-customers. In Germany and Belgium KPN serves another 15.0 million mobile customers.

KPN has a divisional structure to enable an integral customer approach, before the focus was on technology and the mobile and fixed telephone activities were separated. The divisions of KPN in the Netherlands are: consumer, business, wholesale & operations, IT Netherlands and Corporate Centre. The organisation structure is presented below.

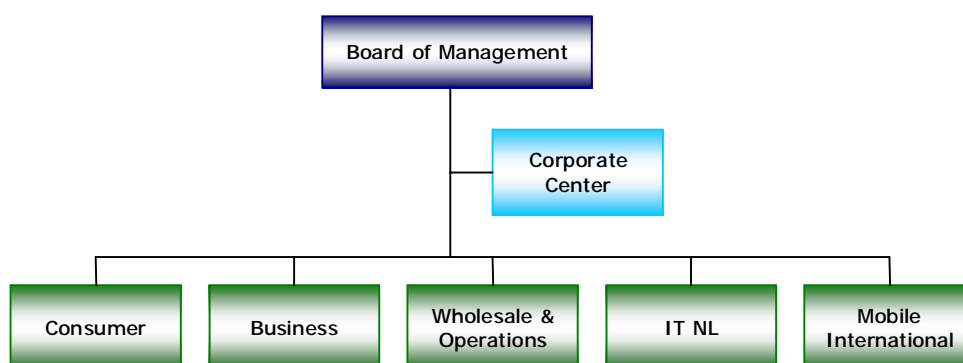


Figure 1 - Organisation structure KPN

1.1.2 Strategy

KPN is still developing from a traditional telephone operator, technology and product oriented, towards a multimedia company focused on the behaviour and needs of their customers. In March 2005 KPN introduced its new threefold strategy 'Attack, Defend and Exploit'.

- Attack - KPN wants to obtain a leading position on the market of new communication, information and amusement services, this will lead to attractive financial returns on the long term. To be able

to provide these services KPN migrates its network to a Next Generation Network based on IP (Internet Protocol), this development is called the All IP Program;

- Defend - KPN keeps defending its market share on traditional services, although this market size is decreasing. Where possible, KPN even tries to increase market share; also by providing wholesale services, in this case the economies of scale are of advantage;
- Exploit - KPN uses its leadership on the market of traditional and new services to develop a cost structure which is better than its competitors, this will give KPN a continuing lead.

KPN serves its market through a so-called multi-brand strategy; this means that the same product is marketed through several brands. This enables the customer to choose a brand that fits his needs and budget; ranging from the high-end KPN brand to for example Hi, a brand created specifically for young people.

1.1.3 Competition

KPN's most important market, the Dutch market, is one of the most competitive markets in Europe. KPN's fixed network is losing market share since the number of consumer households calling with an analogue fixed line is decreasing. This is due to an increase in consumer households using only mobile phones. Besides that, cable operators (e.g. UPC, Casema) nowadays offer internet and telephone services next to television; they have a 97% nationwide coverage. According to Banerjee & Sirbu [3] competition in the telecommunications services industry can be facilities based or non-facilities based.

- 1) Facilities based: each service provider serves the market using its own physical network;
- 2) Non-facilities based: each service provider shares the resources of a common network to provide service to its customers, two models are considered:
 - Unbundled Network Elements (UNE): the network owner rents out unbundled network elements (like a copper loop) to service providers.
 - Open Access: each service provider has to share the common data-link layer in order to provide voice, video or data services (e.g. ISPs providing internet over the same cable).

KPN experiences competition on all presented levels. The cable operators are an example of facilities based competition since they provide services via their own network. Due to the liberalisation of the telecom market in the mid-nineties non-facilities based competition (UNE) was born and Open Access competition exists since broadband providers deliver services to different service providers.

1.2 All IP Program

In this section the All IP Program is elaborated. The first part gives a general description of the program and the reason for initiation, the second part goes into the migration and roll out.

1.2.1 Description

KPN is convinced that IP (Internet Protocol) technology is the future basis for all communications; in November 2005 the All IP Program was launched through a press release¹. The program comprehends the migration of the legacy (current copper) network towards a Next Generation Network, a network based on IP and Ethernet, an infrastructure of fibre to 24.000 street cabinets. This innovation is brought into action for three reasons:

- Capacity expansion: the increasing need of customers for new IP-based, broadband services calls for more capacity (bandwidth) on the network.

¹ <http://www.kpn.com/kpn/show/id=796410/contentid=14254/sc=30171e>

- Cost reduction: the rationalisation of the network enables KPN to reduce its staff by around 8000 FTE's, the sale of real estate currently used for operating centres accounts for a large part of the costs of the All IP Program.
- Market share win-back: win-back of the lost market share in previous years.

The technical specifications of the legacy network and the All IP network, or Next Generation Network; and the evolution towards a Next Generation Network are explained in the appendix.

Currently KPN's network in the Netherlands consists of 1381 Central Offices, around 28.000 street cabinets and around 6 million customer connections. All intelligent network equipment is placed in the Central Offices; the only function of the street cabinets is cable distributor. The current situation is presented simplified in figure 2.

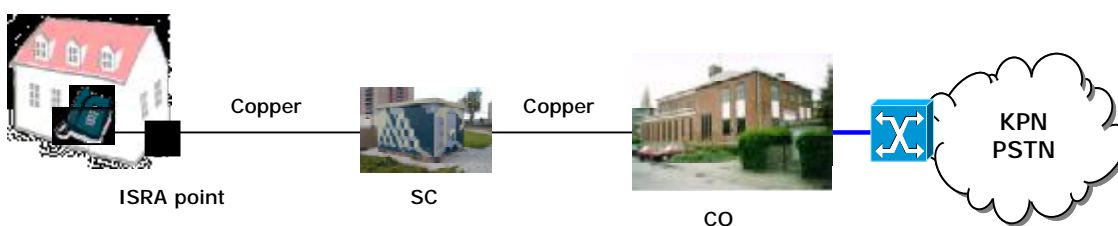


Figure 2 - Current network configuration

In the new situation of the All IP Network the intelligent network equipment is moved from the Central Offices to the street cabinets. Copper lines between the COs and street cabinets are replaced by fibre; the street cabinets are connected to a fibre ring. The copper connection between the street cabinets and the customer is also replaced by fibre, this new situation is presented simplified in figure 3, it is called Fibre-to-the-Home.

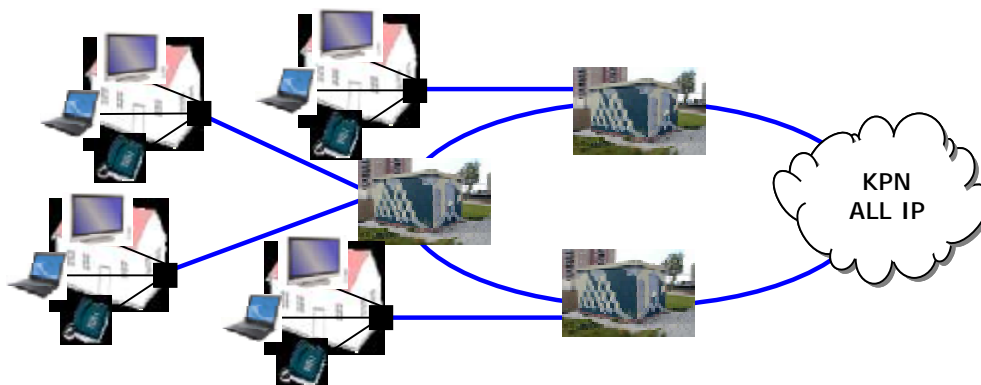


Figure 3 - FttH network configuration

Besides FttH there is also Fibre-to-the-Curb (FttC), in this network configuration the copper wireline between the customer and the street cabinet is preserved. VDSL technique is used for data transmission on the copper wireline between the end-user connection and the street cabinet. Since fibre is closer to the end-user connection in the new situation, the bandwidth of the network increases to a theoretical maximum of 50 Mbps. The bandwidth depends on the distance between customer and street cabinet and the quality of the copper line. Obviously this is a much cheaper option regarding the costs of rolling out the new network; for a FttH network digging is necessary to every customer.

The choice for rolling out FttC or FttH in a specified area falls outside the scope of this research. At this moment FttH is rolled out in new residential areas in any case and the first roll out project of All IP: KPN

Glasnet Enschede is a FttH roll out. Next to the wired variants of a Next Generation Network, there are also wireless solutions; then a wireless access point is placed at the Street Cabinet.

1.2.2 Migration & Roll Out

The migration towards the new network configuration is a radical operation for KPN. The All IP Program is one of the most radical transformations anywhere in the world being planned by a telecoms operator [8]. KPN has chosen a phased approach for the nationwide roll out of the All IP network through local roll out projects. A local roll out project comprehends the migration towards All IP for a city or part of a city during a predefined period of time.

Besides the physical network changing, there are also changes considering the services KPN offers its customers. Since the new network configuration is based on the Internet Protocol, only services that work IP-based can be offered. This means that some current services have to be phased out or there must be searched for an alternative, church telephony is an example (a service which enables people to listen to a church service at home based on analogue telephone technology). Changes to the services that KPN offers its customers fall outside the scope of this research.

The initial migration strategy towards All IP was technology driven. The goal was to first migrate customers to IP services on the current network, then roll out the All IP network and subsequently physically connect customers to the All IP network. This approach would require contact with customers on several points in time and too much service interruption, obviously not an approach that increases customer satisfaction. Since this approach does not fit KPN's new customer oriented strategy, it was decided to alter the migration strategy towards All IP.

KPN has chosen a local approach for the roll out, based on several successful local fibre initiatives which will be discussed in section 4.1. At the moment a city or neighbourhood is pointed out for migration a planning is designed to roll out the new network. During a predefined period of time a marketing campaign is active to persuade customers to register for connecting to the new network. Service employees of KPN take care of installation of the services at the customer. There is an ongoing discussion at KPN if customers that did not register and buy service on the All IP Network do get a new Network Terminator which makes it possible to connect to the All IP network in the future.

KPN headquarters in Den Haag decides when and where to start a local project to roll out the All IP Network; this is based on extensive cost analysis. Although the roll out on operational level is a complex process with a lot of dependencies, there is no instrument in place yet to measure the performance of the roll out on this level. Since millions of connections have to be migrated All IP management wants an instrument designed to measure the performance of the local roll out which supports the local roll out organisation. This instrument should also enable All IP Program Management in Den Haag to overlook the performance of the local roll out projects running at that time. This will be further explained in the next section.

1.3 Research Motivation and Objective

The nationwide migration towards All IP will be split up in local projects. At the moment this research started the first and only local roll out project, KPN Glasnet Enschede, was in its starting phase. From mid 2008 KPN plans to run local roll out projects at 20 to 30 locations in the Netherlands simultaneously. For a local roll out project a temporary organisation is created which is responsible for rolling out the All IP Network according to a specified business case. The business case is the financial justification of the project, e.g. it states the targets regarding market share to be gained to justify capital expenditure. A local roll out project consists of several activities, viz. the physical construction of the infrastructure, the marketing campaign and sales activities, and the activation and installation of services at customers. These activities are strongly related to one another, for example a customer can only be connected to the

new network when the construction activities are finished at that address and services are activated on the concerning line. This implicates that the planning of marketing activities must be linked to the planning of construction activities to ensure a limited period of time between the moment of sales and connection.

All IP Program Management wants an instrument based on performance measures designed which supports a local project team in managing and controlling the roll out project. This instrument should support the local project team during the realisation stage of the project. The realisation stage comprehends all necessary activities from sales and construction activities to in the end deliver up the service to the customer. The local project team must be provided with information on the performance of the roll out, information on which they can steer and control the project. The local roll out projects should be carried out according to the business case, strategy and objectives set by All IP Program Management; it is important to measure to what extent these objectives are reached.

The instrument should enable All IP Program Management in Den Haag to quickly overview the status of a local roll out project. Since from mid 2008 several roll out projects will be running simultaneously, the instrument must provide a way to benchmark local roll out projects. Daft [11] defines benchmarking as the continuous process of measuring products, services, and practices against major competitors or industry leaders. In this case benchmarking aims at the comparison of the performance of local roll out projects with each other to come to a best practice of managing the realisation stage of a local roll out project. Summarising, the instrument to be designed must fulfil the following conditions:

- Performance measurement to support a local project team in controlling the realisation stage of a local roll out project;
- Provide information communication on performance of a local roll out project to All IP Program Management in Den Haag;
- Support in continuous improvement of the realisation stage of the local roll out concept in general.

To be able to define and implement this instrument insights into the main processes and dependencies during the realisation stage of a local roll out project is inevitable. Since the nationwide roll out of the All IP network is planned to start mid 2008 the exact processes are not designed yet. However, in Enschede KPN rolls out KPN Glasnet, a first local roll out project which is part of the All IP Program. People get the opportunity to connect to the All IP Network through Fibre-to-the-Home. KPN Glasnet Enschede can be analysed to map the processes, record main activities, dependencies and cause-and-effect relationships during the realisation stage of a local roll out project.

Problem Definition:

*'The interdependencies of processes in a local roll out project are unclear.
This information is inevitable to be able to manage a local roll out project.'*

*'For the roll out of the All IP Network there is no instrument in place
to support a local project team in adequately managing the project;
key performance indicators must be defined an implemented.'*

First the main activities during the realisation stage of a local roll out project have to be mapped. This mapping serves as a basis for defining the appropriate performance indicators and developing the instrument. Second, the performance indicators must be defined and implemented in a management tool to support the local project organisation, provide communication of project performance between management levels and support in continuous improvement of the local roll out concept. Since process mapping is solely the means to the research objective it is not part of the objective.

Research Objective:

'The definition and implementation of key performance indicators for the realisation stage of a local roll out project of the All IP Network'

1.4 Research Questions

To reach the defined research objective the main research question is presented; this question must be answered by the research.

Main Research Question:

'What are key performance indicators for the realisation stage of a local roll out project of All IP; and how can these be implemented?'

In order to make the main research question more concrete it is split up in sub-questions:

- 1) What are the main processes during the realisation stage of a local roll out process?
 - a. What model available in literature can be used to bound the realisation stage within the scope of a project environment?
 - b. What are the main activities and dependencies during the realisation stage?
- 2) What steps must be undertaken to define key performance indicators for the realisation stage of a local roll out project?
 - a. What is performance measurement?
 - b. What models are available in literature for defining and implementing performance indicators?
 - c. What are KPN's strategy and objectives regarding a local roll out project of the All IP Network?
 - d. What are key performance indicators regarding the defined strategy and objectives?
- 3) What is an instrument to implement the defined performance indicators?
- 4) What recommendations can be made for using the developed instrument during the nationwide migration?

Answering the first question will bound the scope of the instrument to be developed and gain insight into the coherence of main processes of a local roll out project. Understanding this coherence of processes is necessary for the next steps in the research. The roll out project KPN Glasnet Enschede is analysed since the exact processes for the nationwide migration starting mid 2008 are not yet indisputably determined.

Answering question 2 will present the development of performance measurement in literature and give an overview of relevant frameworks from literature on performance measurement. A framework must be selected to be applied in this research. KPN's strategy and objectives regarding the local roll out of the All IP Network will be elaborated to define key performance indicators in coherence with this strategy. The third question will lead to an instrument to implement the defined performance indicators, this must be an information system which presents the performance indicators. The answer to the fourth and final question goes into the recommendations for use of the developed instrument during the nationwide roll out of the All IP Network. Together the answers to the questions above cover the research objective. In the next chapter the research approach and the structure of the research are explained.

2 Research Approach

In this chapter the research approach is explained. The research aims at designing an instrument for performance measurement for the realisation stage of a local roll out project. A structured research approach ensures the right results being delivered when the research is finished. It defines the approach per phase of the research and which sources of information are used. The research is divided into four phases, each of which is explained in a section below.

2.1 Literature study

Literature on performance measurement and project management is studied to build the theoretical foundation of the research. Project management literature is studied to understand and determine the scope of the instrument for performance measurement to be developed. The scope of this research is the realisation stage of a local roll out project. By explaining the phasing and activities within the phases of projects the purpose and application of the instrument is clarified.

Literature on performance measurement is studied to gain insight into the field of performance measurement. Performance measurement is defined and the development of performance measurement in literature is explained. Several frameworks are available to develop a performance measurement system, the application of those frameworks is elaborated. One framework is selected to serve as foundation to design the performance measurement instrument for the realisation stage of a local roll out project of All IP. This phase of the research aims at answering research questions 1a, 2a and 2b:

- 1a) What model available in literature can be used to bound the realisation stage within the scope of a project environment?
- 2a) What is performance measurement?
- 2b) What models are available in literature for defining and implementing performance indicators?

2.2 Process Analysis of a local roll out project

Since All IP Program Management has no clear insight into the coherence of processes during the realisation stage of a local roll out project, this coherence is analysed. The processes for the nationwide migration starting mid 2008 were not indisputably determined at the time this research started. Therefore KPN Glasnet Enschede, the first local roll out project of All IP, was analysed. The coherence and the content of processes is explained and visually supported by cross-functional flow charts. To acquire the necessary information, members of the local project team and members of All IP Program Management are interviewed. Also internal documents are studied and several weekly operational meetings of the project team are attended in Enschede. To be able to define key performance indicators knowledge of the processes on which the performance indicators report is inevitable. The drawn up flow charts may serve as foundation for creating a manual for local roll out projects of the All IP Network. This phase of the research aims at answering research question 1b:

- 1b) What are the main activities and dependencies during the realisation stage?

2.3 Defining performance measures

During the literature study the Balanced Scorecard of Kaplan and Norton [24] is selected to serve as framework for developing the performance measurement instrument. The first step in the development process is creating a strategy map. The strategy map offers the visual framework to integrate the objectives regarding the realisation stage of a local roll out project through cause-and-effect relationships. To define these objectives and arrange them in the strategy map several stakeholders are interviewed. Members of the All IP Program Management and the project manager of KPN Glasnet Enschede are

extensively consulted. It is important to involve the stakeholders in the process of developing the performance measurement instrument since they are the future users. The interview results are underpinned by internal documents about the All IP Program and relevant scientific literature about strategy, customer satisfaction and continuous improvement, all related to the defined objectives.

At the moment the stakeholders agree on the composition of the strategy map the performance measures can be defined. The performance measures present the performance of a local roll out project of All IP during the realisation stage, regarding the formulated objectives. Performance measures are selected in discussion with the people involved: members of the project team KPN Glasnet Enschede including the project manager and the customer processes manager of All IP Program Management. This phase of the research aims at answering research question 2c and 2d:

- 2c) What are KPN's strategy and objectives regarding a local roll out project of the All IP Network?
- 2d) What are key performance indicators regarding the defined strategy and objectives?

2.4 Implementation

After the complete set of performance measures is defined, the supporting software to develop the instrument is chosen. To design the instrument a prototyping approach [33] is used. A first relatively simple instrument is built aimed at short term fulfilment. Through interaction with the future users, members of the project team of KPN Glasnet including the project manager and the customer processes manager of All IP Program Management, the prototype is adjusted until the result is satisfactory. This is an iterative process, improvements to the instrument are made step by step. Since not all necessary data is yet available the instrument is filled with fictitious data aiming at a proof of concept.

Besides the development of the performance measurement instrument making recommendations for application of the instrument during the nationwide migration is also part of the implementation phase. Based on the objectives defined in the strategy map, during the phase defining performance measures, and relevant scientific literature recommendations are made regarding the frequency of reporting and continuous improvement of the local roll out concept. This phase of the research aims at answering research question 3 and 4:

- 3 What is an instrument to implement the defined performance indicators?
- 4 What recommendations can be made for using the developed instrument during the nationwide migration?

2.5 Structure

Based on Verschuren en Doorewaard [48] the research structure is presented in figure 4; the green circles identify the chapters in which the phases are elaborated.

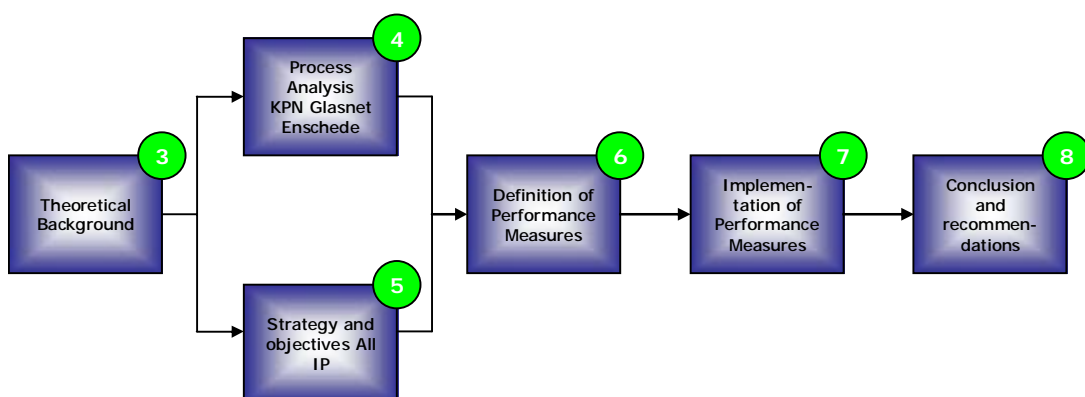


Figure 4 - Research Framework

Studying the literature on performance measurement and project management forms the theoretical background for this research in chapter 3. The processes of KPN Glasnet Enschede are subsequently analysed to map the coherence of processes during the realisation stage of a local roll out process of the All IP network in chapter 4. In chapter 5 the interview results are presented, founded on the interview results the objectives regarding the realisation stage are reflected in the strategy map. The performance measures are defined in chapter 6. Chapter 7 comprises the development of the instrument for performance measurement, also the application of the instrument is explained. Concluding the research the conclusion and recommendations are presented in chapter 8.

3 Theoretical Background

In this chapter the theoretical background for the research is presented. A local roll out project of the All IP Network is a project environment, therefore project management literature was studied. It helped to determine and understand the scope of the instrument to be developed within a project environment. The project management method PRINCE2 is discussed in the first section, the method is scalable and adjustable to specific circumstances of a project environment [22] and KPN project managers are familiar with the method.

The objective of the second part of this chapter is to gain insight into the field of performance measurement. A short introduction of the historical development is presented after which the definition, performance measurement systems and the development of these systems is explained. A framework for developing the instrument for performance measurement for the realisation stage of a local roll out project is selected from literature. The chapter is concluded with a roadmap for design and implementation of the performance measurement instrument.

3.1 Project Management

A project is a temporary management environment that is created for the purpose of delivering one or more business products according to a specified business case [41]. In case of a local roll out project of All IP the business products to be delivered are well functioning services (internet, telephone and/or television) at new customers over the All IP Network. The local roll out projects are part of the All IP Program, a program is defined as a set of projects and activities in a temporary organisation to realise one or more predefined strategic company objectives [22]. In case of the All IP Program the strategic company objective is to increase market share; KPN believes this will lead to attractive financial returns on the long term [30], this was explained in section 1.1.2 and 1.2.1.

The project management method that will be applied is PRINCE2. This method is chosen since it is useful for all kinds of projects; the method is scalable and adjustable to specific circumstances of a project environment [22]. Besides that, KPN project managers are familiar and educated in the PRINCE2 method. PRINCE2 distinguishes eight main processes based on the stages and responsibilities in a project, as can be seen in figure 5. The PRINCE2 process model shows four management levels:

- Corporate or program management, not part of project management, but it sets the business context for one or more projects;
- Project board, responsible for directing the project, this level is for key decision making and direction setting;
- Project Management, most effort goes into day-to-day planning and control;
- Managing project delivery is the lowest level, handled by team managers.

At KPN the role of program management and project board to some extent overlap, they are both executed by All IP Program Management in Den Haag. This implicates that program management, as defined by PRINCE2, actually is part of the project organisation. Project Management is the responsibility of the local project manager; and the lowest level is handled by members of the local project team, which PRINCE2 calls team managers.

The red dotted square in figure 5 outlines the scope of this research. The instrument to be developed must facilitate communication on project performance between the different management levels, mainly from lower levels up to program management; and support the local roll out organisation by providing information on project performance. It strongly aims at the execution phase of a project, the phase in which the business products to be delivered are actually realised.

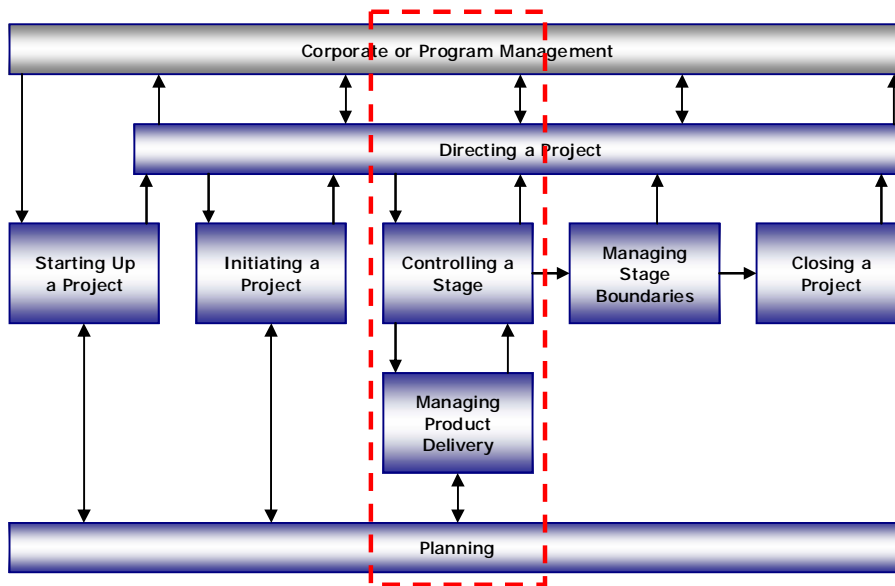


Figure 5 - PRINCE2 process model, adapted from [41]

The scope covers the following processes defined by PRINCE2 as outlined in figure 5:

- Directing a Project: this process aims at maximising the chance that the project is successful and delivering what the customer expects.
- Controlling a Stage: this process describes the day-to-day management of the project, the realisation phase. It aims at delivering the business product as agreed upon, it is essential for the success of the project.
- Managing Product Delivery: this process enables team managers to agree with the project manager on the work to be executed, planning the work and executing and delivering the work.
- Planning: this process supports several other processes, it is not only a time schedule but also describes when and by who a specified result must be delivered.

PRINCE2 presents a very detailed description of activities per process, it falls outside the scope of this research to focus on the activities at that detailed level. All IP Program Management is interested in performance measurement of a local roll out project during the realisations stage. This mainly considers the communication of project performance between the different management levels (indicated by the arrows in figure 5). The performance of the processes Controlling a Stage and Managing Product Delivery are of main interest. For the process controlling a stage PRINCE2 defines a control cycle presented in figure 6. This cycle is an ongoing process during the execution phase of a project.

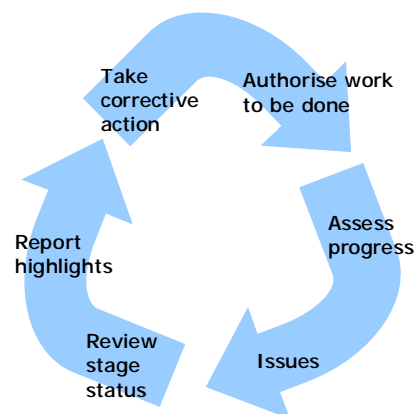


Figure 6 - control cycle, adapted from [41]

The process Controlling a Stage aims at executing the necessary activities in accordance with the defined quality and within the agreed costs, resources and time. The process Controlling a Stage drives the process Managing Product Delivery; the interfaces being the authorisation of work to be done, any specified reports, and the return confirmation that the work has

been completed satisfactorily [41]. Managing Product Delivery is the responsibility of team managers, in case of a local roll out organisation members of the project team.

In this research the processes Controlling a Stage and Managing Product Delivery are referred to as the execution phase of a project. Two stages are defined within the execution phase: the preparation stage and the realisation stage. The preparation stage aims at providing the necessary facilities such that the realisation stage can start. The realisation stage comprehends all activities from marketing and sales, construction of connections, to in the end deliver a well functioning service at the customer. This is further elaborated in section 4.3. The scope of the instrument for performance measurement to be developed is the realisation stage of a local roll out project. The instrument must measure performance regarding defined quality, costs, use of resources and time which supports a local roll out organisation in controlling the realisation stage.

3.2 Performance Measurement

Performance measurement is an important topic both in the operational research literature and the management accounting literature [33]; in broad outline two phases can be distinguished. During the first phase from 1880 till about 1980 performance measurement was primarily financially oriented. Solely financial performance measures like profit and revenue growth were used to measure the performance of an organisation based on management accounting. In the second phase starting in the late 1980s it became clear that the traditional financial performance measures had their limitations. There was a shift in focus towards quality, flexibility, lead time reduction; and new production management philosophies were introduced [20]. This was the start of treating financial measures as one among a broader set of measures [15]. Recent publications move towards performance management, a broader concept also related to process management [16]. This means not solely measuring the results of actions taken, but measuring the drivers of future success and management based on this information.

3.2.1 Definition

Neely et al. [38] describe performance measurement as the process of quantifying the efficiency and effectiveness of action. Effectiveness refers to the extent to which requirements are met, while efficiency is a measure of how economically the firm's resources are utilized when providing a given level of customer satisfaction. This definition takes in consideration the internal as well as the external aspect of performance measurement. An organisation might for instance increase its product reliability, a quality-related dimension of performance. This could lead to higher customer satisfaction (the effectiveness of action, an external measure) and lower the costs of warranty claims (the efficiency of action, an internal measure).

Nowadays there is a shift towards performance management. According to Lebas [31] performance is, especially in the case of management, not to much about past achievements; but about the future, about the capability of the unit being evaluated. The purpose of management is about creating and shaping the future of the organisation, as well as that of society. Regarding this definition performance management goes beyond performance measurement. Amaratunga and Baldry [1] define performance management as the use of performance measurement data to effect positive change in organisational systems, culture and processes. In this way performance measurement and performance management follow one another in an iterative process; management precedes and follows measurement, in a virtuous spiral and management creates the context for measurement.

Also Kaplan and Norton [26] recognize the shift from performance measurement towards management: 'measurement has consequences far beyond reporting on the past; measurement creates focus for the future.' Their Balanced Scorecard [24] nowadays is used as a management system, to link operational

performance to strategy. Companies use the balanced scorecard as the central, organizing framework for their management process [25]. This is presented in the figure below.

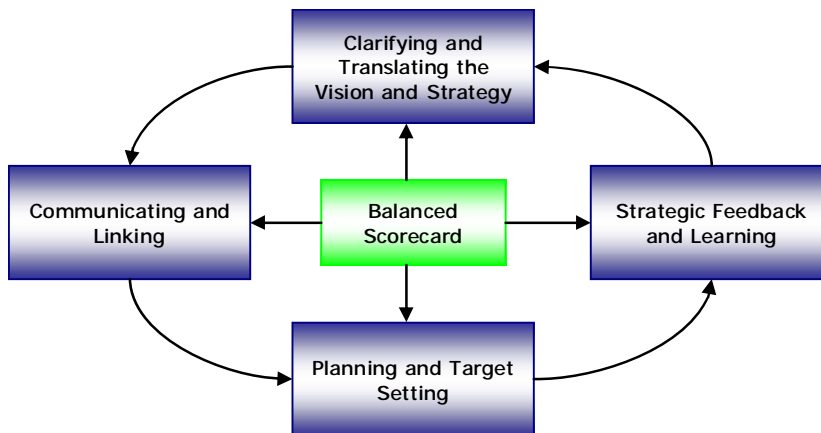


Figure 7 - Using the BSC as strategic framework for action, adapted from [26]

In the context of this research performance measurement must not solely measure the results of actions taken but also measure to what extent a local roll out organisation is able to deliver the desired results in the future. In this way All IP Program Management should be able to assess the impact of the chosen strategy on future performance of a local roll out project.

3.2.2 Performance Measurement Systems

A performance measurement system contains a set of individual performance measures, metrics to quantify the efficiency and/or effectiveness of action, as is presented in the figure below. In the figure the three levels of a performance measurement system are presented: the individual measures, the set of performance measures (the system as entity) and the relationship between the performance measurement system and the environment within which it operates [38].

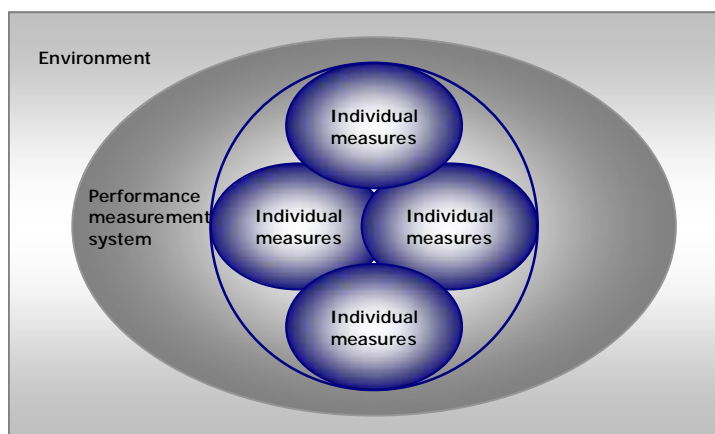


Figure 8 - Performance Measurement System [38]

Traditional performance measurement systems had a financial focus, but their deficiencies are widely recognized [44] [14] [15]. Financial measures aim on historical data and do for example not take customer's needs into account. Ghalayini and Noble [20] researched the differences between traditional (or financial) and non-traditional performance measures which are summarized in the table 1.

Traditional performance measures	Non-traditional performance measures
Based on outdated traditional accounting system	Based on company strategy
Mainly financial measures	Mainly non-financial measures
Intended for middle and high managers	Intended for all employees
Lagging metrics (weekly or monthly)	On-time metrics (hourly, or daily)
Difficult, confusing and misleading	Simple, accurate and easy to use
Lead to employee frustration	Lead to employee satisfaction
Neglected at the shop floor	Frequently used at the shop floor
Have a fixed format	Have no fixed format (depends on needs)
Do not vary between locations	Vary between locations
Do not change over time	Change over time as they need change
Intended mainly for monitoring performance	Intended to improve performance
Not applicable for JIT, TQM, CIM, FMS, RPR etc.	Applicable
Hinder continuous improvement	Help in achieving continuous improvement

Table 1 - Comparison between traditional and non-traditional performance measures [20]

Neely et al. [38] stress that the individual measures should be positioned in a strategic context, since they influence what people do. A company's strategy is the plan of action that prescribes resource allocation and other activities for dealing with the environment and helping the organisation attain its goals [11]. The objective of performance measurement is to stimulate action, to realise strategy; this can not be done based on solely financial measures. Performance measurement yields a fundamental type of management information needed for controlling operations, in this case the realisation stage of a local roll out project. It creates focus, triggers corrective action, is the basis for evaluating performance, and may help challenging and improving strategic choices [33]. This corresponds to the defined control cycle for the process Controlling a Stage in section 3.1.

3.2.3 Developing a performance measurement system

According to Bourne et al. [6] the development of a performance measurement system may conceptually be separated into stages of design, implementation and use. The design stage is about identifying key objectives and designing measures. In the implementation stage, systems and procedures are put in place to collect and process the data that enable measurements to be made regularly. In the use stage, managers review the measurement results to assess whether operations are efficient and effective, and the strategy is successfully implemented. Neely et al. [38] describe a typical development process of performance measurement systems; see table below.

Step	Action
1	Clearly define the firm's mission statement
2	Identify the firm's strategic objectives using the mission statement as a guide (profitability, market share, quality, cost, flexibility, dependability and innovation)
3	Develop an understanding of each functional area's role in achieving the various strategic objectives
4	For each functional area, develop global performance measures capable of defining the firm's overall competitive position to top management
5	Communicate strategic objectives and performance goals to lower levels in the organisation. Establish more specific performance criteria at each level.
6	Assure consistency with strategic objectives among the performance criteria used at each level

7	Assure the compatibility of performance measures used in all functional areas
8	Use the PMS
9	Periodically re-evaluate the appropriateness of the established PMS in view of the current competitive environment

Table 2 - Nine steps to develop a performance measurement system [38]

To make the mission and objective concrete they can be translated into critical success factors. Bullen and Rockart [7] describe CSFs as the limited number of areas in which satisfactory results will ensure successful competitive performance for the individual, department or organisation. CSFs are the few key areas where 'things must go right' for the business to flourish and for the manager's goals to be attained. CSFs help to define success, to understand the key areas in which to invest resources.

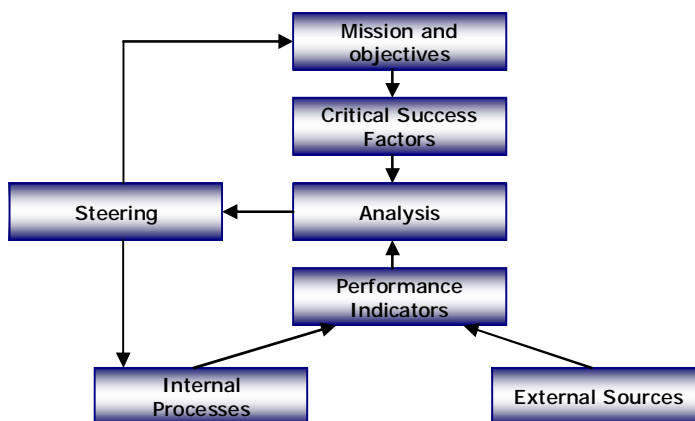


Figure 9 - Internal Reporting [46]

The difference between performance indicators and success factors is important, CSFs are largely qualitative identified, and they provide value through giving focus on critical areas. Performance indicators provide the necessary information to analyse the critical success factors, they present the performance of the organisation, related to the critical success factors and placed within the context of relevant information from the environment. This means the input for performance indicators is acquired by the execution of internal processes and information supplied by external sources. Analysis of the performance indicators within the framework of critical success factors may lead to the need to steer on internal processes or the mission and objectives. This coherence is presented in the model of internal reporting [46].

Neely et al. [39] reviewed the literature on performance measurement and came up with a list of 22 characteristics of performance measures. This was further reduced to the list below by Hudson, Smart and Bourne [23]. They propose the following set of critical characteristics of performance measures:

- Derived from strategy
- Clearly defined with an explicit purpose
- Relevant and easy to maintain
- Simple to understand and use
- Provide fast and accurate feedback
- Link operations to strategic goals
- Stimulate continuous improvement

Folan and Browne [16] distinguish procedural and structural frameworks. Procedural frameworks assists in developing a performance measurement system by outlining procedures, like the steps presented in table 2 by Neely [38] and the coherence of Stegwee [46]. However, we prefer a structural framework, which specifies a typology for performance measure management [16] since it offers more support in defining boundaries of the performance measurement system. In the next section several structural frameworks are presented of which one is selected to form the basis for a performance measurement instrument for the local roll out of the All IP Network.

3.3 Performance Measurement Frameworks

In this section the balanced scorecard and other performance measurement frameworks are elaborated. The section is concluded with the selection of a framework to be applied in this research.

3.3.1 The Balanced Scorecard

Probably the most well-known performance measurement model is the Balanced Scorecard, introduced in 1992 by Kaplan and Norton [24]. The balanced scorecard complements the financial measures which inform on the actions already taken, by operational measures on customer satisfaction, internal processes and the organisation's innovation and improvement activities. These operational measures are the drivers of future financial performance; the balanced scorecard puts strategy and vision, not control, at the centre [24]. The balanced scorecard is the key for driving performance in organisations; it transforms strategic management paradigms by placing the emphasis on enablers instead of on results [37].

The balanced scorecard is based on the principle that a performance measurement system should provide managers with sufficient information to address the following questions:

- How do we look to our shareholders (financial perspective)?
- What must we excel at (internal business perspective)?
- How do our customers see us (customer perspective)?
- How can we continue to improve and create value (learning and growth perspective)?

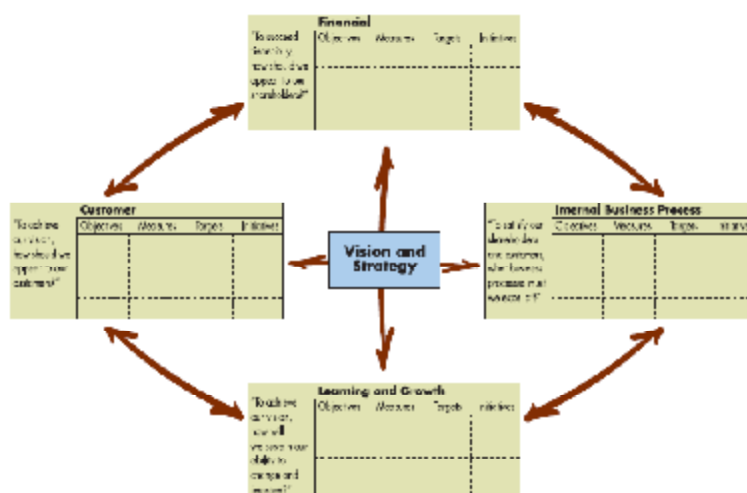


Figure 10 - The Balanced Scorecard [24]

The measures on a Balanced Scorecard are directed toward achieving an integrated strategy. As stated above these measures are grouped into four perspectives [25]:

- 1) Financial perspective - measures the economic consequences of actions already taken. For example: profitability, operating income.

- 2) Customer perspective - identifies the customer and market segments in which the organisation will compete and the measures of the organisation's performance in these targeted segments.
- 3) Internal-business-process perspective - identifies the critical internal processes in which the organisation must excel, the focus should be on the processes that will have the greatest impact on customer satisfaction and achieving the organisation's financial objectives.
- 4) Learning and Growth perspective - identifies the infrastructure that the organisation must build to create long term growth and improvement.

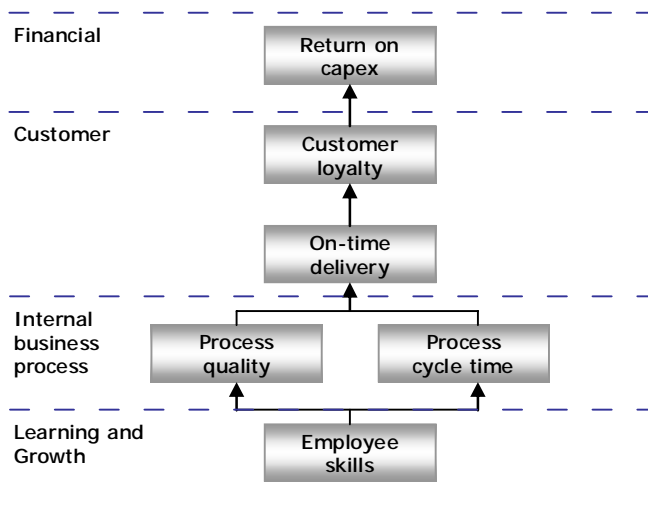


Figure 11 - Strategy Map [25]

The Balanced Scorecard is not just a collection of performance measures or critical success factors. The measures and objectives are linked through cause-and-effect relationships and mixtures of outcome measures and performance drivers [25], to create the trajectory of the strategy.

Daft defines a company's strategy as the plan of action that prescribes resource allocation and other activities for dealing with the environment and helping the organisation attain its goals [11]. Kaplan and Norton [25] translate strategy into a set of hypotheses about cause and effect. In a strategy map of which a simplified example is presented in figure 11, the strategy (chain of cause and effect) should cover the four perspectives of the Balanced Scorecard.

In the example the return on capital expenditure is used as measure in the financial perspective. The driver of this measure could be sales from existing customers, based on loyalty of customers. On-time delivery is in turn expected to be a driver for customer loyalty; both are incorporated in the customer perspective. Regarding the internal-business-process perspective process quality and process cycle time are presented as measures in the third perspective, both processes to excel at to realise on-time delivery. Finally, to improve the process quality and cycle time, the skills of operating employees should be trained; the objective in the learning and growth perspective. Obviously this is a simplified example of a strategy map.

A good Balanced Scorecard should have a mix of outcome measures and performance drivers [25]. Performance drivers indicate the way in which the outcomes should be achieved. Performance drivers are defined as lead indicators, drivers for future performance; outcome measures as lagging indicators, they reflect the results of actions taken. Lag indicators indicate the goals, for example market share or profitability; lead indicators reflect the uniqueness of the organisation, for example the market segment in which the organisation competes. In table 3 an example is presented for the four perspectives.

Objective	Measurement	
	Lag indicator	Lead indicator
Financial Reduce cost structure	Deposit service cost change	Revenue mix
Customer Increase customer satisfaction	Customer retention	Satisfaction survey
Internal Understand our customers	New product revenue	Product development cycle
Learning Develop strategic skills	Employee satisfaction	Strategic job coverage ratio

Table 3 - Lead and lag indicators

The Balanced Scorecard must retain a strong emphasis on outcomes, especially financial ones such as return on capital expenditure or economic value added. Ultimately, causal paths from all the measures on a scorecard should be linked to financial objectives [25].

Summarised: The Balanced Scorecard tells the knowledge, skills, and systems that the employees will need (their learning and growth) to innovate and build the right capabilities and efficiencies (the internal processes) that deliver specific value to the market (the customers), which will eventually lead to higher shareholder value (the financials).

3.3.2 Alternative performance measurement frameworks

In this subsection alternative structural frameworks to the Balanced Scorecard of Kaplan and Norton [24] are elaborated. Relevant alternatives are:

- The HR Balanced Scorecard by Maisel [34]
- The SMART system by Cross and Lynch [10]
- The Performance Prism by Neely, Adams and Kennerly [40]

HR Balanced Scorecard

Maisel [34] exchanged the learning and growth perspective from the Balanced Scorecard from Kaplan and Norton [24] for a human resource perspective.

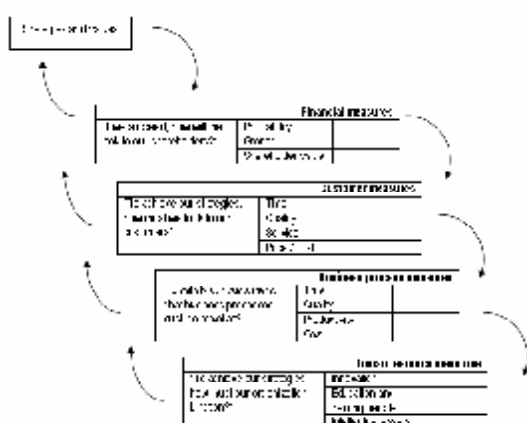


Figure 12 - HR Balanced Scorecard [34]

Instead of asking 'how can we continue to improve and create value (learning and growth perspective)?' the question 'to achieve our strategies, how must our organisation function?' is asked. In this new perspective the effectiveness of the organisation and its people should be measured. Besides the exchanged perspective the scorecard corresponds largely to the Balanced Scorecard by Kaplan and Norton.

SMART system

The strategic measurement analysis and reporting technique (SMART) system was developed by Wang Laboratories, Inc. since they were dissatisfied with traditional performance measures like utilization, efficiency, productivity and other financial variances [10]. The performance measures define and sustain success. The system can be visualized by a four-level pyramid of objectives and measures as presented below. The vision of the organisation is translated into performance measures through the organisation.



Figure 13 - the SMART system [10]

Performance Prism

Neely, Adams and Kennerly developed a three dimensional model called the Performance Prism [40]. The Performance Prism has five facets; the top and bottom are stakeholder satisfaction and stakeholder contribution, the three sides are strategies, processes and capabilities.

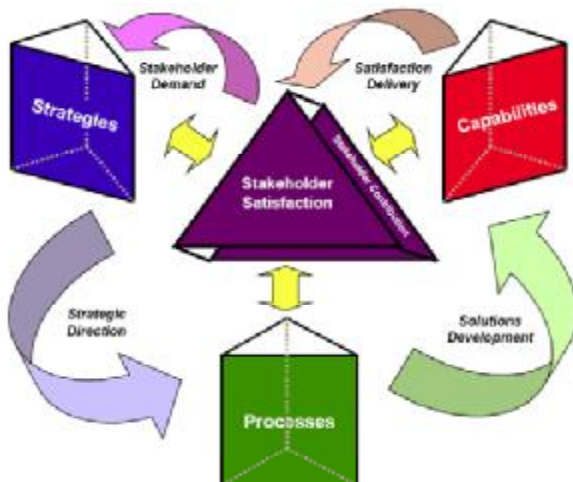


Figure 14 - the Performance Prism [40]

The writers identify five distinct perspectives on performance together with five key questions [40]:

- 1) Stakeholder satisfaction: who are the key stakeholders and what do they want and need?
- 2) Strategies: what strategies do we have to put in place to satisfy the wants and needs of these key stakeholders?
- 3) Processes: what critical processes do we require if we are to execute these strategies?
- 4) Capabilities: what capabilities do we need to operate and enhance these processes?
- 5) Stakeholder contribution: what contributions do we require from our stakeholders if we are to maintain and develop these capabilities?

3.3.3 Framework Selection

The four performance measurement frameworks treated in this section share the concept of defining performance measures covering several perspectives. The Balanced Scorecard by Kaplan and Norton, the Balanced Scorecard by Maisel, and the SMART system by Cross and Lynch define performance measures focusing on strategy of the organisation. The performance prism by Neely uses the stakeholder perspective as point of departure. Many case studies of the BSC by Kaplan and Norton can be found in literature; the framework receives much attention in professional as well as in academic literature. It is placed alongside approaches such as Activity Based Costing/Management and Total Quality Management in terms of industry and literary attention [37].

Kaplan and Norton provide a very useful way to make the strategy of an organisation concrete, the strategy map. The strategy map is a helpful tool in translating a chosen strategy into operational performance measures. In this way current actions are linked to goals of tomorrow. A clear roadmap for designing and implementing the Balanced Scorecard is available [2].

Regarding the Balanced Scorecard by Maisel, the SMART system and the Performance Prism, few implementation studies are known and no clear guidelines for design and implementation are presented. The Performance Prism is designed to support strategic management on the long term while the Balanced Scorecard by Kaplan and Norton can be applied at different levels: total organisation, strategic business unit, individual operational units or even to individuals [2], this makes the BSC better applicable for the realisation stage of a local roll out project.

All IP Program Management is familiar with the Balanced Scorecard concept which makes it easier to design and implement the instrument, since basic understanding of the framework is present. The Balanced Scorecard may very well be used as benchmarking tool; very useful in case of the local roll out concept since projects will be running simultaneously starting mid 2008.

The Balanced Scorecard by Kaplan and Norton is used as foundation to develop an instrument for performance measurement for the realisation stage of a local roll out project due to the following reasons:

- Many case studies and much attention in scientific & professional literature;
- Clear guidelines for design and implementation are available;
- Applicable at concerning organisational level;
- All IP Program Management is familiar with the concept;
- Useful tool in benchmarking local roll out projects.

3.4 Implementation Roadmap

Assiri et al. [2] propose an implementation roadmap for the Balanced Scorecard based on relevant literature, analysis of BSC case studies presented in literature and an exploratory global survey of 103 organisations in 25 countries that have already implemented or are in the process of implementing the Balanced Scorecard. The roadmap contains 27 critical success factors which influence the BSC implementation; these factors are divided in three levels: dominant, main and supporting factors. For all factors a detailed roadmap for implementation and a checklist is provided.

The dominant factors play a significant role in the implementation, without these factors the BSC can hardly be implemented. In the research of Assiri et al. [2] these factors represent a considerable level of criticality. The main factors are important in each step of a Balanced Scorecard project; they are subdivided into six categories: learning and innovation, planning, development, implementation, sustainability and benefits realisation. Supporting factors are less critical than dominant and main factors, but significant to support the development and implementation of the Balanced Scorecard.

The objective of the Balanced Scorecard that will be developed is to support a local project team during the realisation stage of a local roll out project of the All IP Network. Since this does not comprehend an implementation throughout the whole organisation, some critical success factors that fall outside the scope of this research can be left out. These success factors are:

- Training
- Cascading the Balanced Scorecard
- Communicate Balanced Scorecard
- Stimulate culture
- Rolling out implementation plan
- Self-assessment

The complete implementation roadmap developed by Assiri et al. can be found in the appendix. Below the critical success factors for defining and implementing the Balanced Scorecard for the realisation stage of a local roll out project are presented; a short description per factor is given.

Dominant Factors	
Identify BSC perspectives	Identifying adequate BSC perspectives is crucial for success of the implementation. Kaplan and Norton's four perspectives are appropriate for most companies and industries. Choose between 3-5 perspectives.
BSC Team	Create a team of which members have various skills, knowledge and are from different departments.
Executives' and senior managers' commitment	Managers should give necessary priority to BSC implementation to gain internal commitment during the full implementation of the BSC.

Table 4 - Dominant Factors

Main Factors - Development Stage	
Mission, values, vision, strategy	A clear mission, values, vision and strategy have to be in place and understood by the workforce.
Set objectives and measures	Identify key objectives derived from strategy. Between 3 and 5 measures per perspective and between 20-30 for the whole BSC.
KPIs	Establish the relative importance of KPIs, relative weights and balance among KPIs.
Cause-and-effect linkage	The chosen measures should be linked together in a chain of cause-end-effect relationships.
Main Factors - Sustainability Stage	
Automating BSC	BSC automation enables a quicker culture change, provides visibility to the process and facilitates participation by a wider audience.
Updating BSC with measures and Linking with rewards	Since the strategy might change, the performance measures have to be updated according to new circumstances. To strengthen the BSC implementation the reward of executives and managers has to be

	tied with the results of BSC measures.
Corporate alignment	Key strategic initiatives should be aligned with the strategic objectives of the organisation.
Benchmarking	Comparing performance with competitors leads to identifying best practices for improvements and opportunities.
Main Factors - Implementation Stage	
Information system design	Managers need to be able to access underlying data to explore the cause of any problem or analyse trend and correlations. The information system designs considerably affect the effectiveness of the Balanced Scorecard.
Main Factors - Benefits realisation Stage	
Regular reporting	The result of BSC measures should be incorporated into regular reporting system. Information must be delivered to top management and employees regularly.
Measurement assessment	Review measures frequently and identify the right combination of measures.
Problem solving and action planning	BSC measures can enhance problem-solving and team-communication processes in numerous ways.
Main Factors - Planning Stage	
Initial Plan	Create an initial plan for development and implementation of the BSC. Identify sources of performance data and critical processes.
Main Factors - Learning and innovation Stage	
Learning and innovation	Strategic feedback system in place. Performance appraisal system encourages learning and innovation. Existence of learning environment encourages people to innovate and share best practice and knowledge. Encouraging employees to voice opinions, criticisms and feedback on organisational functioning and performance.

Table 5 - Main Factors

Supporting Factors	
Integration	The BSC must be integrated in the management system, it can not stand alone.
Finalise measures	Review and finalise measures. Narrow the measures and choose those that may help the organisation to execute its strategy.
Fine tuning and refining	The BSC should be communicated to every level of the organisation and compares current performance with past results.
Finalise BSC plan	The BSC comprehensive plan has to be finalised by the top management and the BSC team to ensure that all BSC requirements exist in the plan.

Table 6 – Supporting Factors

3.5 Conclusion

In the first section the project management PRINCE2 was applied to a local roll out project, the scope of the instrument to be developed is the realisation stage of the project. This stage falls under the process of Controlling a Stage, the control cycle for this stage was presented. The instrument for performance measurement should support the local roll out organisation in controlling the realisation stage regarding

defined quality, costs, use of resources and time. This answers research question 1a) 'What model available in literature can be used to bound the realisation stage within the scope of a project environment?'

The second part of this chapter elaborated the field of performance measurement. The importance of a balanced set of measures is recognized in literature. Performance measurement in the context of this research aims at defining a balanced set of measures which not solely measure the results of actions taken but also measure to what extent a local roll out organisation is able to deliver the desired results in the future. This answers research question 2a) 'What is performance measurement?'

It was concluded that a structural framework should be selected to facilitate the definition and implementation of performance measures since it offers more support in defining boundaries of the instrument to be designed. The Balanced Scorecard by Kaplan and Norton [25] is chosen to serve as foundation for developing the instrument for performance measurement during the realisation stage. The BSC was selected since it is applicable at the organisational level, All IP Program Management is familiar with the concept, case studies and guidelines for definition and implementation are available and it is a useful tool in benchmarking the local roll out projects. The latter is important regarding continuous improvement of the local roll out concept. This covers research question 2b) 'What models are available in literature for defining and implementing performance indicators?'

In the final section the implementation roadmap for the Balanced Scorecard by Assiri et al. [2] was explained. This roadmap is used as guideline to develop and implement the Balanced Scorecard, at the end of each chapter the roadmap is evaluated.

4 Process Analysis - KPN Glasnet Enschede

The objective of this chapter is to gain insight into a local roll out project and its processes. The first local roll out project of All IP, KPN Glasnet Enschede, was studied. This chapter describes the KPN Glasnet Enschede organisation and its main processes; it presents insight into main activities and dependencies of a local roll out project of the All IP network. The information was acquired through interviews with members of the local project management team and All IP Program management; studying internal documents and attending several weekly operational meetings in Enschede.

The first section gives an introduction on KPN Glasnet and the project in Enschede; it describes the background, characteristics and objectives of the project. Section 4.2 treats the KPN Glasnet Enschede project organisation. In section 4.3 the relevant project processes as defined by the PRINCE2 project management method are applied to the roll out of KPN Glasnet, the main focus is on the realisation stage. During this stage the activities are executed from sales to in the end deliver the triple play service to the customer. Section 4.4 goes into the processes during the realisation stage of a local roll out project, the processes are presented in cross-functional flow charts and an explanation is given.

4.1 Introduction

KPN Glasnet is an important part of the All IP Program; it is the brand through which Fibre-to-the-Home and fibre only are marketed. KPN's vision for the future is that Glasnet enables an interactive and modern society. Because of the fibre network people can expect more interactive and better services. The Glasnet concept is based on several successful local fibre initiatives² with the following characteristics:

- Local visibility and approachability;
- Appealing to a feeling of solidarity through the local approach;
- Specific characteristics of fibre infrastructure, as described before.

KPN Glasnet Enschede is a cooperation of the municipality of Enschede, several housing associations and KPN; it has three important characteristics:

- Large capacity - enables new services;
- Open network - customer has freedom of choice;
- Future readiness - prepares the customer for the future at once.

KPN Glasnet will lead to a radical fusion of internet and (interactive) television. The open network model facilitates service providers to supply their services to customers. KPN supplies a WBA (Wholesale Broadband Access) service on which the service providers can supply their own services. KPN Glasnet can be seen as the highway where the service providers deliver the cars. Service providers next to KPN itself in Enschede are Solcon, Unet, Introweb and Hertzinger. The first three are triple play providers just like KPN, Hertzinger supplies analogue television on fibre.



Figure 15 - Enschede roll out area, autumn 2007

² E.g. OnsNet Nuenen, www.onsnetnuenen.nl

In June and July 2007 three test streets in Enschede were successfully connected to the All IP Network. In autumn 2007 another 8500 households in three neighbourhoods get the opportunity to connect to All IP through a Fibre-to-the-Home connection in the southern part of Enschede. The three neighbourhoods in Enschede: Stroinkslanden, Helmerhoek and Wesselerbrink are a representative reflection of the Dutch society. This makes KPN Glasnet Enschede a perfect test case for the nationwide roll out of All IP which is planned to start mid 2008. At the time this research started All IP Program Management had set the following objectives regarding KPN Glasnet Enschede:

- Prove that KPN is able to deliver reliable triple play services on a large scale on a Fibre-to-the-Home network (since it is the first roll out of FtTH on a large scale).
- The greater part of the households in Enschede should be connected to KPN Glasnet Enschede, of which a significant part with KPN as service provider to reach the financial objectives stated in the business case (exact figures are confidential).
- Before the end of 2007: 6000 customers in Enschede-south connected to All IP, of which 85% must be satisfied about the installation and functioning of the services.

4.2 KPN Glasnet Organisation

In figure 16 the KPN Glasnet Organisation is presented, the project team consists of six persons of which the executive is the responsible project manager. The project team is formed during the first project process identified by PRINCE2, Starting Up a Project.

The infrastructure manager is responsible for the physical construction of the infrastructure and planning of the construction. The marketing and sales manager is responsible for all marketing, communication and sales activities regarding KPN Glasnet. The installation manager is responsible for the final step of the realisation phase: delivering up the services at the customer. The street coordinators and service employees work under the leading of this manager. The operations manager is responsible for the registration processes, order processing and provisioning. Especially for KPN Glasnet Enschede this is a challenging function since IT processes have been almost completely rebuilt. The CRM (customer relationship management) manager is among others responsible for the customer service centre.

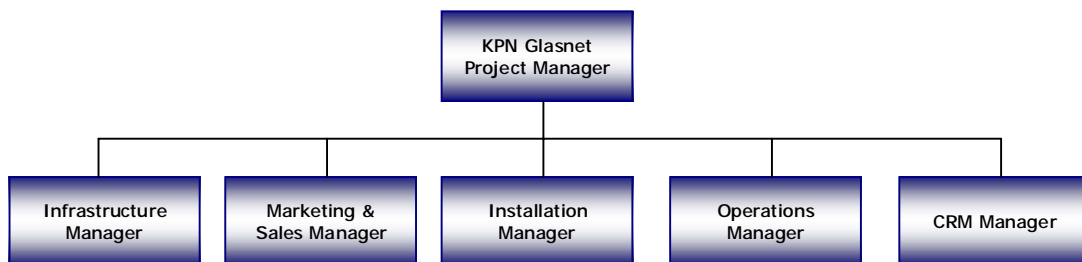


Figure 16 - KPN Glasnet Organisation

4.3 Project processes

In this section the relevant processes of the roll out of KPN Glasnet Enschede are elaborated, they are placed within the context of the PRINCE2 project management method as explained in section 3.1. Within the execution phase two stages are identified: the preparation stage and the realisation stage. The preparation stage is explained in short, the main focus is on the realisation stage of which the relevant planning activities are also explained.

4.3.1 Preparation Stage

The preparation stage aims at providing the necessary facilities such that the realisation stage can start. These facilities are inevitable for the functioning of the realisation stage. Below the necessary activities are briefly presented.

1) Personnel

The most important resource is personnel. It is assumed that the KPN Glasnet project team is already in place. The contractor responsible for construction activities must have sufficient capacity to be able to construct the infrastructure as planned; this is the responsibility of the infrastructure manager. The marketing and sales manager is responsible for recruiting and training of personnel for the service centre and customer service desk. Also KPN service employees have to be trained for installation activities; if additional service employees are needed they are recruited via an employment agency and trained by KPN, this is the installation manager's responsibility.

2) KPN Glasnet Service Centre

A local service point is opened where potential customers can obtain advice on KPN Glasnet and propositions of the service providers; in fact the service centre is a physical version of the website. Obviously the advantage of the service centre is the interaction with customers.

3) Customer service desk

A local customer contact centre is set up; it is approachable by a local phone number and email. People can contact customer service for questions and disturbances regarding KPN Glasnet during the presence of the local project organisation in the roll out area. After that period customers can contact regular KPN customer service.

4) Website

A website is launched: www.kpnglasnet.nl. People can obtain information on KPN Glasnet, the propositions of service providers and there is the possibility to register and place an order online. Through a check on zip code, customers are able to find out if they are eligible for KPN Glasnet.

5) Newsletter

A newsletter is sent out to all the addresses in the area pointed out for roll out to let people know KPN Glasnet is coming. The newsletter contains information on the KPN Glasnet concept, the advantages and characteristics.

6) Construction Sign Boards

After the decision to roll out construction sign boards are placed at strategic positions to let people know KPN Glasnet is coming, this activity is aimed at creating awareness. The marketing and sales manager is responsible for the service centre, the customer service desk, the website, the newsletter and the construction sign boards.

7) Licenses

The municipality of Enschede has to issue licenses to allow KPN to roll out KPN Glasnet in the appointed area. The licenses are time and location dependent, the infrastructure manager is responsible for acquiring the licenses.

4.3.2 Planning

The roll out of KPN Glasnet in the southern part of Enschede contains 6000 planned new connections to fibre out of 8500 households in total based on a phased approach. At the moment a certain area is pointed out for roll out, a street plan is designed by the contractor Nacap and KPN. Nacap engineers a network planning for the infrastructure and street cabinets. The street plan is made in Microsoft Excel and comprehends the following based on zip codes:

- Planning for phase Homes Passed, empty tubes in the streets (1);

- Time windows for phase Homes Passed++, branches to households (2);
- Time windows for phase Homes Connected and Activated (3), this phase is executed twice.

The CRM manager is responsible for drawing up the street plan. The street plan serves as input for the complete roll out since it states the moments in time when certain streets are planned to be connected to fibre. From the start it states the planning for phase 1, Homes Passed. Also it serves as input for the execution of phase 2 and scheduling the service employees in phase 3. The southern part of Enschede is split up in several street projects; a street project is a collection of addresses for which the phases as discussed above are executed during the same week. A street project has a unique identification number to assure unambiguous information exchange among the parties involved.

Zip Code	Phase 1	Phase 2	Phase 3	Phase 3 (2 nd time)
7588 AB	Wk 40	Wk 44	Wk 46	Wk 50
7588 AC	Wk 41	Wk 45	Wk 47	Wk 51
7588 AE	Wk 41	Wk 45	Wk 47	Wk 51
7588 AG	Wk 42	Wk 46	Wk 48	Wk 52

Table 7 - Example Street Plan

Based on the street plan a complete roll out planning is created, a simplified example is presented in table 5. The planning displays which activities are executed in which week on project level. In the example general communication on the roll out starts in week 36 and from week 43 communication of the service providers, the sales process and ordering starts. The planning states in which week which phase is executed for a street project. If we look at street project 2, the homes passed tube, the empty tube in the street, is constructed in week 41 (indicated by the red P1 cell in the planning). The orange P2 cell presents the week in which phase 2 is executed: the construction of homes passed++, the branches to households, executed in week 45. The final phase 3, indicated by the yellow P3 cell, is the week in which connections are delivered to customers, the homes are connected to the All IP Network and the services are activated. For street project 2 this can be done in week 47 and a second opportunity in week 51. The planning of phase 3 determines the deadline for ordering by the customers, three weeks earlier. For customers in street project 2 this implicates that they have to order before the end of week 44, or regarding the second opportunity before the end of week 48.

	September				October				November				December					
	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	
Communication	[Blue cells]																	
Communication SPs	[Blue cells]																	
Sales	[Blue cells]																	
Ordering	[Blue cells]																	
Street Project 1					P1					P2		P3				P3		
Street Project 2						P1					P2		P3				P3	
Street Project 3							P1					P2		P3				P3
Street Project 4								P1					P2		P3			

Table 8 - example planning

This planning on project level is created during the process Initiating a Project, defined by PRINCE2. During this process it is recorded what the objectives of the project are, in what way the results will be achieved and who is responsible for what. This planning is the foundation of the realisation stage explained in the next subsection.

4.3.3 Realisation stage

The realisation stage of a local roll out project aims at executing the necessary activities from marketing and sales to in the end deliver a well functioning triple play (television, internet and voice) service at the customer. In fact a small temporary enterprise is active during the realisation stage to execute the following processes: marketing & sales, registration, construction of infrastructure, order processing & provisioning and installation. Process mapping [47] is used to describe the processes; the objective is insight into the flow. As described in the appendix, the first step is creating a process relation chart; an overview of the processes at system level presented in figure 17. After drawing up the process relation chart the main processes presented in the outlined square are further analysed in cross-functional flow charts in section 4.4.

In the process relation chart the suppliers of KPN Glasnet Enschede are presented on the left. The contractor Nacap is responsible for constructing the physical infrastructure, the municipality of Enschede has to issue licenses to allow KPN to start with the roll out, the service providers supply triple play services over fibre and KPN Wholesale & Operations supplies the WBA (Wholesale Broadband Access) service, the activated line. In the outlined square the primary process is presented. The output of the marketing and sales process is a customer order. The order registration leads to information for the construction of infrastructure (where to construct branches to houses), an appointment for installation and information for the order processing & provisioning. The order has to be processed and the preparation for service activation has to be taken care of. The infrastructure is constructed and finally the installation leads to a WBA service for the service providers on which they can transport their services and the triple play services for the end user.

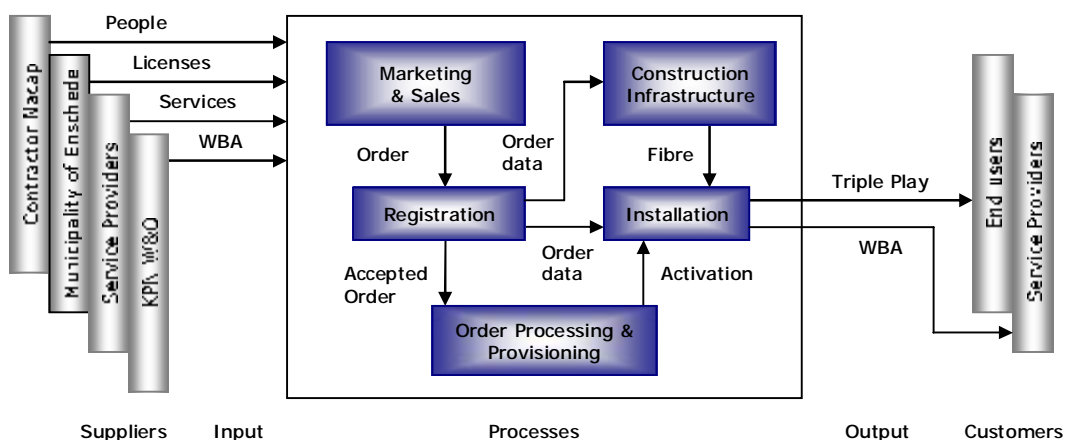


Figure 17 - Process relation chart

4.4 Process description

In the following subsections the processes in the outlined square in figure 17 are explained and presented in cross-functional flow charts. The meaning of the used symbols is explained in the appendix. Drawing up these flow charts may seem superfluous, but the information was simply not available at KPN when this research started. The flow charts may function as basis for a script or manual to set up other local roll out projects during the nationwide migration starting mid 2008.

4.4.1 Marketing & Sales

KPN fulfils two roles in the process of marketing and sales: as wholesale party by marketing KPN Glasnet Enschede in general and as service provider among the other service providers by marketing services which will be available on the network. To clarify this distinction the service providers are divided up into green and red service providers (GSP and RSP). For KPN Glasnet Enschede this means that KPN is a green service provider and Solcon, Unet and Intraweb are red service providers.

KPN Wholesale is responsible for marketing KPN Glasnet Enschede; as an impartial party they are responsible for all marketing and sales around KPN Glasnet. Several marketing and sales activities fall under the preparation stage of the project (i.e. construction sign boards, setting up the service centre) treated in section 4.3.1.

The marketing and sales activities during the realisation stage mainly consist of aimed activities in streets which are planned to be glazed on short term. Based on the street plan streets are pointed out where to start marketing and sales activities as can be seen in the cross-functional flow chart below. The service providers send out a direct mailing which contains their proposition, they also approach customers by outbound calling. Street actions are promotional teams (KPN Glasnet and service providers) that are brought into action to inform people and let them register, activities at sports clubs are sponsored and a promotional truck of KPN is placed in neighbourhoods to provide people with information. All this must lead to people visiting the local service centre and the website with the objective to let them register for KPN Glasnet and order services.

For people that did not register in time for the first possibility of connection (construction phase 3) a so-called tissue mailing is sent out, these people get a second opportunity to connect to KPN Glasnet. The expectation is that at the moment people experience the advantages of KPN Glasnet at their neighbours they want to register after all.

The service providers all offer their own package of triple play services, some even including a mobile phone subscription. The propositions vary in composition; price and configuration (i.e. speed of data traffic on the internet). For all service providers applies that analogue television (provided by Hertzinger) is an option.

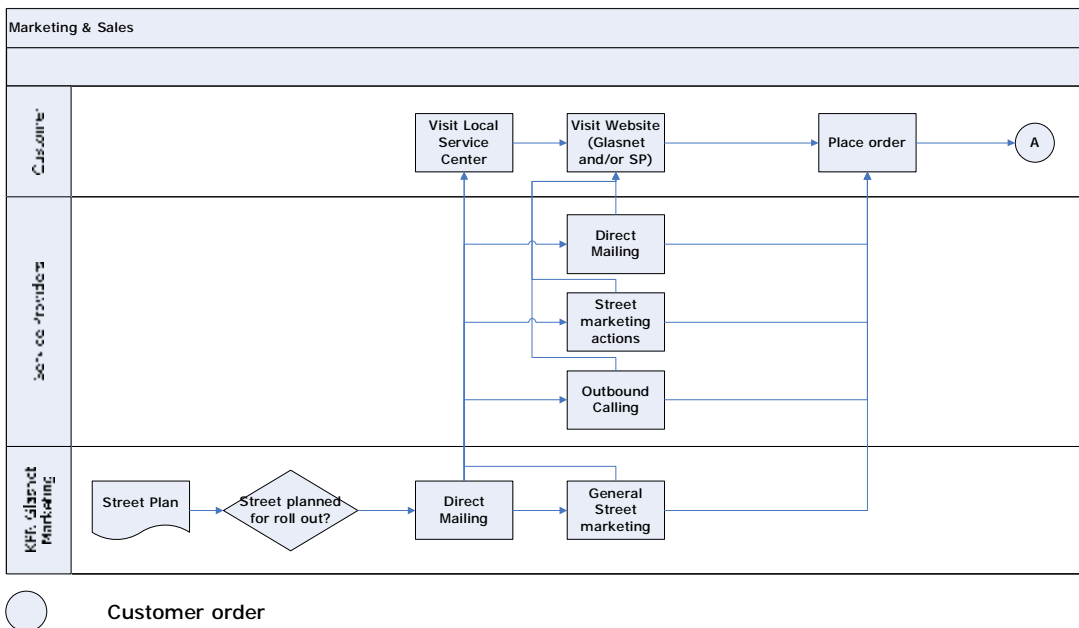


Figure 18 - Marketing & Sales

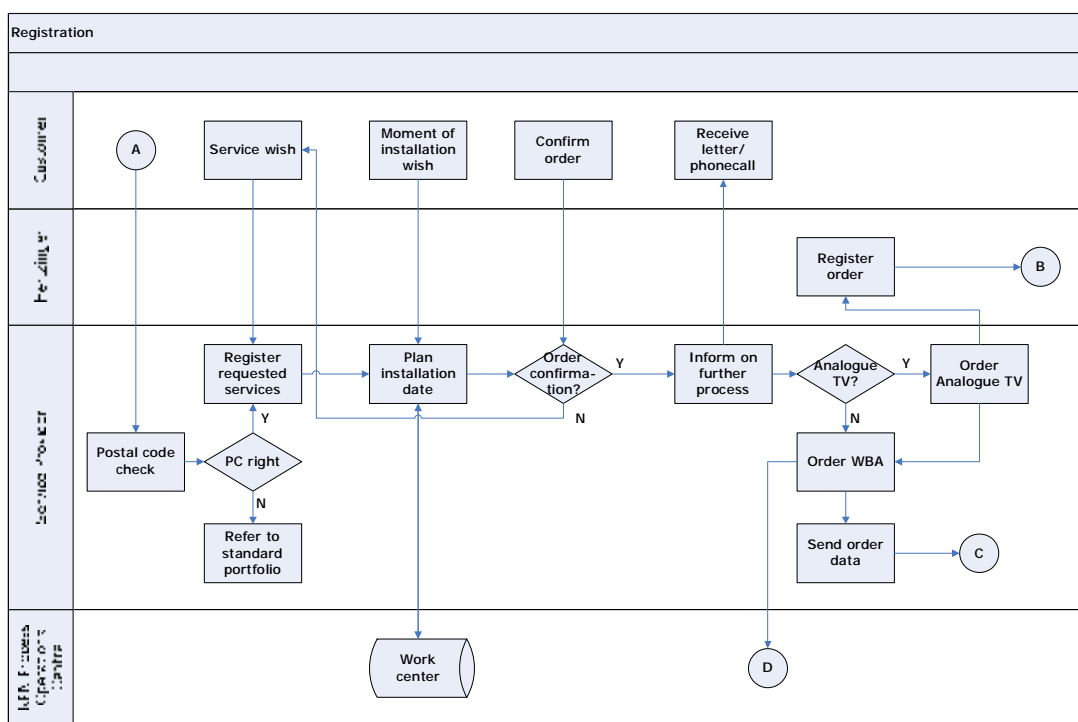
4.4.2 Registration

The registration period starts at a predefined moment in time. People have four options for registration:

- Website KPN Glasnet, the website contains the propositions of service providers
- KPN Glasnet service centre (also online), possible with help of an employee
- By phone, they call the concerning service provider
- By mail, sending in a reply card

A postal code check is executed to make sure the customer lives at an address within the area planned to be glazed. If a customer lives outside the appointed KPN Glasnet area he is referred to the standard portfolio of the service provider. The service wish of the customer is registered and the service provider makes an appointment in the predefined week for installation with the new customer.

Based on the street plan (which determines in which weeks activities can take place at a certain location) and the capacity of service employees of the contractor and KPN an appointment is made. The information needed to plan is available in Workcenter, an information system (Workcenter is accessible through an online application for the red service providers).



- (A) Customer order
- (B) Order data Hertzinger
- (C) Order data service provider
- (D) Order data WBA

Figure 19 – Registration

On the internet the customer can indicate a moment in time in a schedule himself, by phone the customer contact employee creates an appointment in consultation with the customer. The appointment is registered in Workcenter. After the customer confirms the order he is informed about the further way of business.

The customer receives a letter or phone call in which is told at what time phase 2, the construction of the branch to the household, of the construction of infrastructure is executed.

In case analogue television is ordered by the customer, the service provider orders at Hertzinger. The WBA order is sent to the KPN Process Operations Centre and the service order data is sent to the department of the service provider responsible for order processing and provisioning. The process is presented in the cross-functional flow chart in figure 19.

4.4.3 Construction of Infrastructure

The physical construction of the network covers the process of digging in an empty tube in the streets and creating branches for the addresses that registered for KPN Glasnet, only branches are constructed at the addresses that ordered. The physical construction process can be divided up in two sequential phases:

- 1) Homes passed (phase 1); all addresses are passed by an empty tube in the ground. This is done in all streets which are appointed for the roll out of KPN Glasnet. The Street Cabinets with Next Generation DSLAMs are put in place.

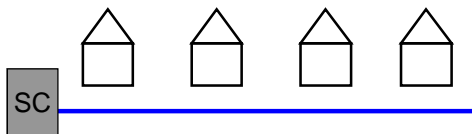


Figure 20 - Homes passed

- 2) Homes passed++ (phase 2); at the addresses that registered for KPN Glasnet an empty tube (branch) is dug in from the homes passed tube to the crawlspace of that address.

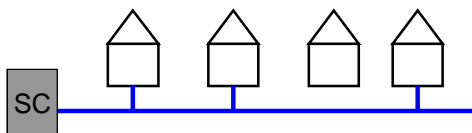
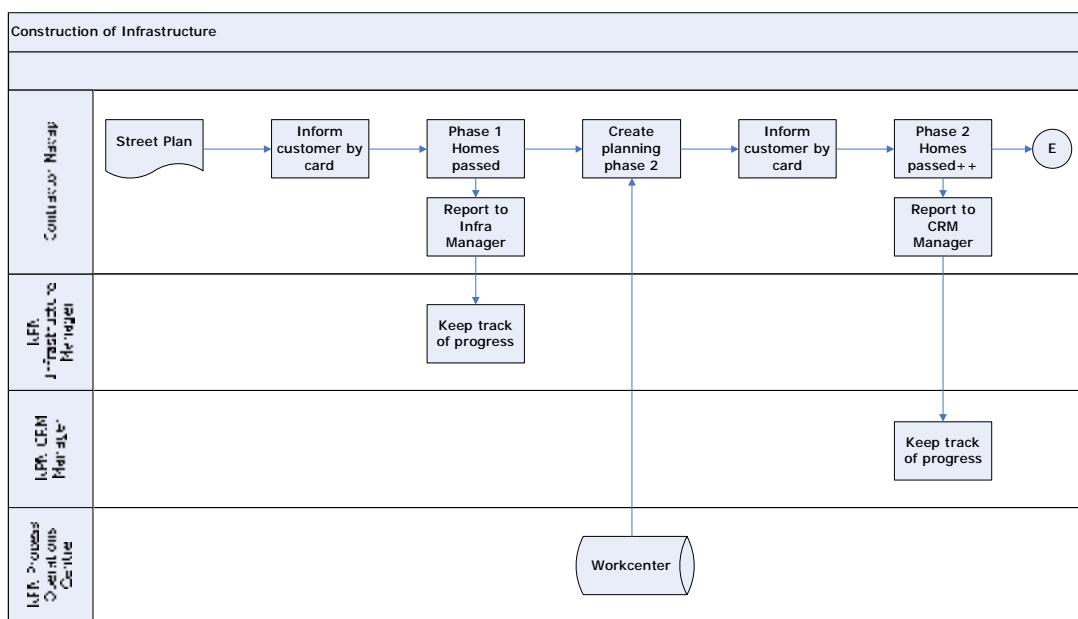


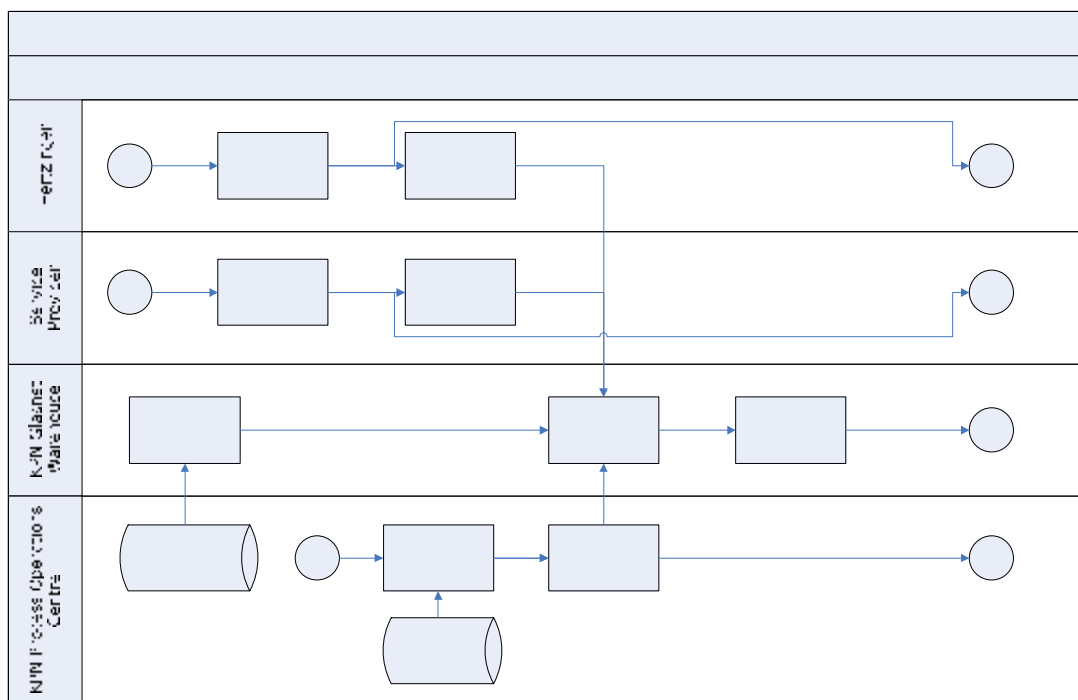
Figure 21 - Homes passed++

It is important to notice that the construction of phase 1 can be characterized as make-to-stock, phase 1 is executed anyhow. Phase 2 is order driven, or make-to-order; the branches are only constructed if a customer has registered for KPN Glasnet. The street plan serves as input for the construction of phase 1 - homes passed. Before Nacap starts working in a street, the people are informed about the activities by a card in their mailbox. The infrastructure manager is informed of the progress of phase 1. Based on the order data from Workcenter a planning is made for the construction of phase 2: homes passed++. Again the customers are informed about the activities in their street. After the branches to the addresses are constructed the CRM manager is informed about the proceedings. Phase 3, homes connected and activated falls under installation. In figure 22 the cross-functional flow chart for the construction of infrastructure is presented.



E Phase 1 and 2 of infrastructure are finished

Figure 22 - Construction of Infrastructure



- B** Order data Hertzinger
- C** Order data service provider
- D** Order data WBA

- (F) Preparation finished analogue TV
- (G) Preparation finished services
- (H) Preparation finished WBA service
- (I) Box with work instructions and necessary equipment for installation

Figure 23 - Order Processing & Provisioning

4.4.4 Order Processing and Provisioning

The input for this process is an accepted order from the registration process as can be seen in the process relation chart in figure 23. Order processing and provisioning comprehends the preparations for the week of installation. The order data for Hertzinger allows them to prepare the analogue television and supply equipment for the customer. The same holds for the service provider, the order data is used to prepare the activation of services and the necessary equipment is sent to the KPN Glasnet Warehouse. The KPN Process Operations Centre prepares the activation of the Wholesale Broadband Access (WBA) service. All the equipment is received at the KPN Glasnet Warehouse. Based on the Bill of Material boxes are put together per address, the Bill of Labour is added for the service employee that is responsible for installation. The Bill of Material and Bill of Labour are both generated in Workcenter at the KPN POC. The output of this process is depicted by (F) (G) (H) and (I) of which the meaning is presented below the flow chart.

4.4.5 Installation

This process comprises the connection of the fibre and activation of services at the customer. A street coordinator of KPN Glasnet is in charge of a team of service employees of the contractor and service employees of KPN. The service employees of the contractor blow the fibre through the tubes and place a Fibre Termination Unit (FTU) in the meter cupboard to finish the fibre optical cable. The service employees of KPN take care of installing all the equipment necessary to make services work and are responsible for activating the services. This also holds for the households that ordered services of red service providers. The first step, blowing fibre and placing the FTU is presented in figure 24, the activation of services is presented in figure 25.

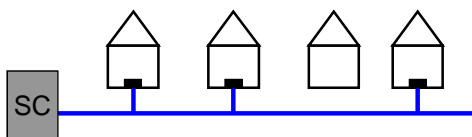


Figure 24 - Homes connected

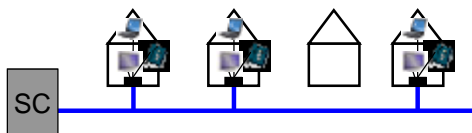
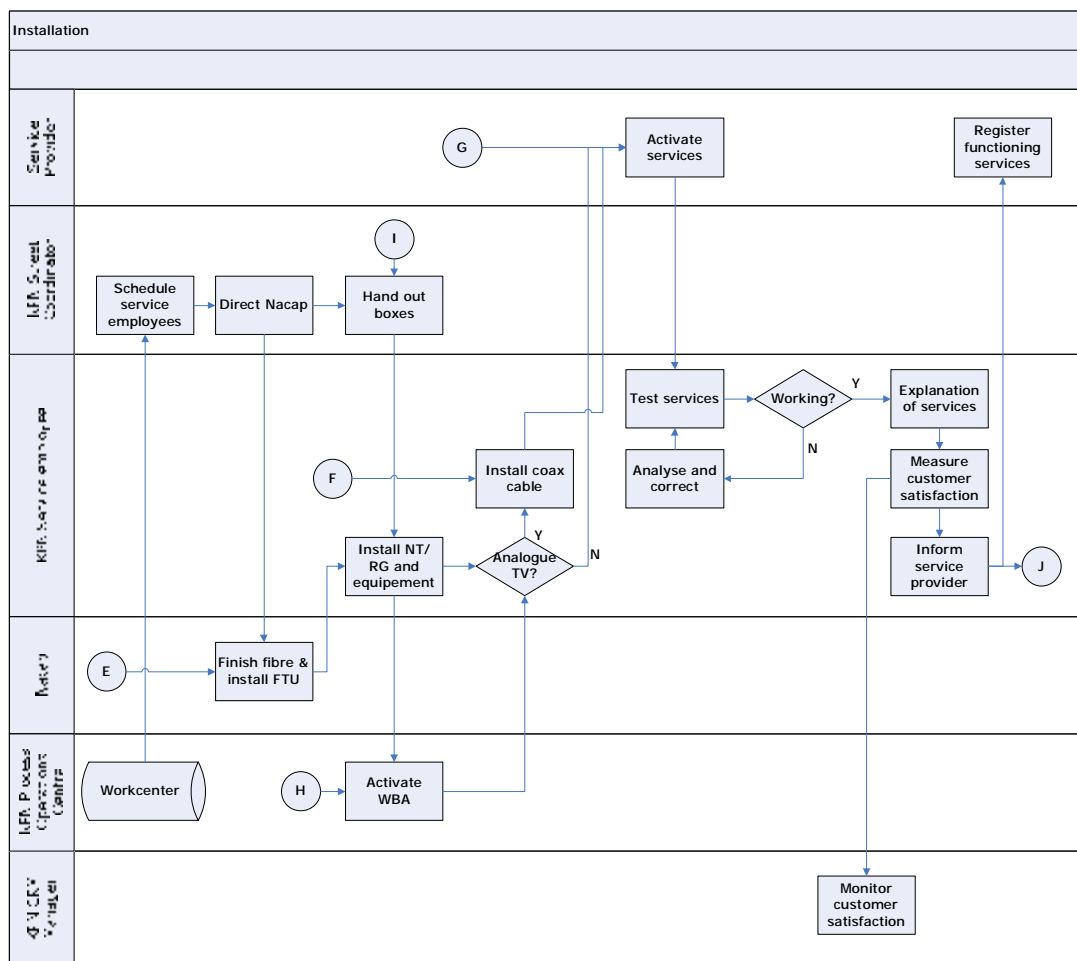


Figure 25 - Homes activated

The activities necessary for homes connected and homes activated are coupled in one phase such that the customers only have to be home for one morning or afternoon (there are four possible timeframes of which the customer can choose). The activities are presented in a cross-functional flow chart. The

information necessary for scheduling the service employees is available in Workcenter; the KPN street coordinator directs Nacap and the KPN service employees to which the boxes for installation are handed out. After blowing fibre and the installation of the FTU by Nacap, the KPN service employee places the NT and equipment and services can be activated. If the services are positively tested the working connection is finished. The KPN service employee explains the working of services to the customer and may help with installation of for example television channels. When the installation is finished the customer signs the protocol of delivery, this also contains a question on satisfaction about the installation. The protocols of delivery are sent to the CRM manager. The service provider is informed of the services delivered up.



- (E) Phase 1 and 2 of infrastructure are finished
- (F) Preparation finished analogue TV
- (G) Preparation finished services
- (H) Preparation finished WBA service
- (I) Box with work instructions and necessary equipment for installation
- (J) Activated services at end user

Figure 26 - Installation

4.5 Conclusion

This research focuses on the realisation stage of a roll out project; this comprehends the processes of marketing & sales, order registration, construction of infrastructure, order processing & provisioning and the final step of installation and activation of services at the customer. The process relation chart in figure 17 clearly shows how the processes relate to one another and the cross-functional flow charts provide a clear explanation of the processes. Since no clear manual was available when this research started, this step was inevitable for gaining insight into the coherence of processes in a local roll out project. The cross-functional flow charts presented in this chapter may function as foundation for a manual for local roll out projects in the future; and answer research question 1b) 'What are the main activities and dependencies during the realisation stage?'.

The process analysis of KPN Glasnet Enschede also emphasised the need for an instrument for performance measurement during the realisation stage. To enable installation of services at the customer as final step, construction activities have to be finished, a service employee must be scheduled, the preparations for service activation have to be finished, an order box with necessary equipment must be available. If one of these activities is not executed installation can not take place; this implicates that processes have to be monitored to in the end guarantee a successful installation at the customer.

In this chapter the processes of KPN Glasnet Enschede were analysed to gain insight into a local roll out project and its processes. The emphasis in this chapter was on the activities, for recommendations regarding a local roll out project one is referred to chapter 8.

In the next chapter the basis for an instrument for performance measurement is created by drawing up a strategy map, the foundation of the balanced scorecard.

5 Creating the Strategy Map

The objective of this chapter is to create the strategy map for a local roll out project of All IP; Kaplan and Norton state that defining the strategy map is the first step in the process of setting up a Balanced Scorecard [25]. The strategy map offers the visual framework to integrate the objectives of an organisation within the four perspectives of the Balanced Scorecard through cause-and-effect relationships as discussed in section 3.3.1. Guaranteeing a successful installation of services at the customer as explained in the previous chapter is very important, but not the ultimate objective of a local roll out project. It is one of the means for KPN to run a successful local roll out project; in this chapter the strategy and objectives of KPN regarding a local roll out project are presented. Again the focus is on the realisation stage of the project.

To define the strategy and objectives for a local roll out project several stakeholders were interviewed. In section 5.1 the interview results are presented - supported by information from relevant scientific literature and internal documents - which function as a basis to create the strategy map. Founded on the information in section 5.1 the strategy map is drawn up in section 5.2; this was done in extensive consultation with the project manager of KPN Glasnet Enschede and the manager customer processes of All IP Program Management. The cause-and-effect relationships are explained per perspective of the Balanced Scorecard.

5.1 Interview results

The information presented in this section was acquired through interviewing members of All IP Program Management and the project manager of KPN Glasnet Enschede. The interviews aimed at bringing into focus the strategy and objectives of KPN during the realisation stage of a local roll out project within the context of the All IP Program. The interview results are supported by information from internal documents and relevant scientific literature. The information is divided up into six categories: mission & strategy, financial objectives, acquisition of customers, customer satisfaction, planning & execution and continuous improvement.

5.1.1 Mission & Strategy

A company's mission can be defined as its 'raison d'être', the mission describes the organisation's vision, its shared values and beliefs, and its reason for being [12]. KPN's corporate mission statement is defined as follows: *'Customers trust KPN to provide them with high-quality, reliable services to help them achieve their business and personal goals, and to enrich their work and leisure time. KPN believes that this approach leads to satisfied customers; creating a solid foundation for profitable growth and, as a result, creates value for their shareholders. KPN believes that their commitment to quality and customer satisfaction can be realized only if their employees are motivated to provide the best possible products and services.'* [30]

KPN is still developing from a traditional telephone operator, focused on technology and products, towards a customer-oriented organisation. In section 1.1.2 KPN's threefold 'Attack, Defend and Exploit' strategy was explained. The All IP Program falls under the attack strategy: KPN wants to obtain a leading position on the market of new communication, information and amusement services, this must lead to attractive financial returns on the long term. To be able to provide these services KPN migrates its current legacy network to a Next Generation Network, the All IP Network. The migration towards a nationwide All IP Network is split up in local roll out projects for which more concrete objectives are defined. These are elaborated in the next subsections.

5.1.2 Financial objectives

The corporate strategy states that obtaining a leading position on the market of new communication, information and amusement services will lead to attractive financial returns on the long term. In concrete terms for a local roll out project of All IP this means gaining market share by acquiring new customers (note: all new customers are qualified as new customers, also when they are already customers of KPN on the current legacy network). For KPN there are two kinds of customers: WBA customers and retail customers. WBA customers connect to the network through an external service provider (e.g. Introweb in case of KPN Glasnet Enschede); the external service provider pays KPN for the Wholesale Broadband Access (WBA) service. Retail customers of KPN are direct customers; they buy their services directly from KPN as service provider. That is, connecting people to the All IP Network effects revenue growth on the long term. For KPN Glasnet Enschede holds that the new customers connected to All IP are free of charge for the first three months. However, this does not mean a new customer does not generate revenue during the first three months. For internal bookkeeping purposes the customer generates revenue from the beginning, the free months are registered as discount and are reversed to the customer.

Regarding the current copper network KPN is obliged by law to allow external service providers on their network to provide voice services. Although this is not the case with the All IP Network, KPN has chosen to cooperate with small local service providers and let them offer their services over the All IP Network too. Through relatively small local service providers, KPN reaches customers they would not reach with their own portfolio of services. These service providers are too small to invest in their own network. The external service providers effect additional revenue growth by increasing market share.

The objectives regarding the investments of a local roll out project aim at minimising costs. The decision to invest in fibre is made with the decision to roll out the All IP Network in a certain area at a predefined moment in time. This decision is based on extensive analysis on:

- The type of customers in the area, the average revenue per user;
- The presence of cable operators and their market share;
- The value of real estate in which central offices are accommodated. For the All IP Network configuration central offices are superfluous since the active network equipment is moved to street cabinets. This implicates that the real estate can be sold.

Based on this data a prioritisation in time is made to invest in rolling out the All IP Network in outlined areas across the Netherlands. Further investments mainly depends on the efficiency of the execution of activities as the construction process, marketing activities, customer service and installation. Financial objectives are recorded in the business case which is created during the process Initiating a Project, targets are set for the monthly revenue and capex.

Besides the investments and increase of market share of a local roll out project, also the value of KPN on the stock exchange is of importance. Since KPN announced the start of the All IP Program in the end of 2005, they must prove that they are capable of rolling out the Next Generation Network for real. As far as that is concerned KPN Glasnet Enschede is the centre of attention, it is the first roll out of the All IP Network on a large scale. The potential increase or decrease of company value on the stock exchange through the performance of the All IP Program falls outside the scope of this research since this is influenced by many more factors.

5.1.3 Acquisition of customers

To realise the revenue growth through increasing market share, new customers have to be attracted based on the customer value proposition. The customer value proposition is the unique mix of product and service attributes, customer relations, and corporate image that a company offers; it defines how an organisation will differentiate itself from competitors [27]. KPN believes that IP technology is the basis for all future communication; therefore the Next Generation, or All IP, Network is built. The All IP Network

enables society to connect to the network of the future; in Enschede this is covered by the slogan '*KPN Glasnet maakt het mogelijk*'. The open network model enables society to choose from several service providers.

Through the use of fibre the network capacity increases considerably. The All IP Network provides a much higher bandwidth than cable or ADSL connections, the speed of internet can mount up to 50 Mbps in case of FttC (in case of FttH the capacity is much higher). The current average speed of internet in the Netherlands is between 1 and 3 Mbps. The general marketing campaign of All IP mainly emphasises the characteristics of the network and the service that is offered (in case of KPN Glasnet Enschede e.g. the first three months free of charge and the KPN service employee who takes care of the installation). KPN has chosen a local marketing approach in the roll out since this has proven successful in other local fibre initiatives as stated in section 4.1.

The local roll out organisation functions as a sort of intermediary; they fulfil an advisory roll between the customer and the service providers. Several marketing channels are opened to get people to connect to, and advise them about, the All IP Network. For example in Enschede the local service centre, the customer service desk and a promotion truck are neutral service points which can provide customers with information on the local roll out of KPN Glasnet and the different propositions of service providers.

Within the setting of the general marketing campaign, the service providers have their own marketing activities; only the activities of KPN retail will be discussed since there is limited information available on the activities of other service providers. Customers of KPN retail can choose among several combinations: internet only, IPB (InternetPlusBellen), internet and television or IPB and television. KPN retail approaches potential customers through different marketing channels: direct mailing, outbound calling, door to door actions and a riding stand. Besides that, customers can approach KPN in stores (Primafoon shops), by a phone number and on the internet (www.sluitjeaanopdetoekomst.nl). The differentiation from other service providers focuses, besides the advantages of a fibre network, on the reliability of the brand KPN, the price and the simplicity of buying television, internet and voice services at one provider.

Summarizing, the customer value proposition is based on the following product characteristics:

- Capacity of the network, which enables new services;
- Ready for the future;
- Open network model, customer can choose among service providers;
- Television, internet and voice service by one provider, one price (KPN retail);
- Reliability of KPN brand (KPN retail);

And on removing barriers (potential threats that could prevent people from ordering):

- Three month free trial period;
- Free installation by KPN service employee.

5.1.4 Customer satisfaction

Since KPN is changing from a technology and product oriented organisation towards a multimedia company focused on the behaviour and needs of their customers [30], customer satisfaction is considered extremely important. High customer satisfaction creates an emotional bond with the brand, which leads to customer loyalty [29]; customer satisfaction has a direct impact on the primary source of revenue streams for most companies [17]. According to Kotler [29] a highly satisfied customer:

- Stays loyal longer;
- Buys more as the company introduces new products and upgrades existing products;
- Talks favourably about the company and its products;
- Pays less attention to competing brands and advertising and is less sensitive to price;
- Offers product or service ideas to the company.

Especially for a local roll out project the third bullet point is interesting. Once a new customer is connected to the All IP Network and is highly satisfied about the installation and services, he will talk favourably about the product with neighbours and relatives. This in turn will lead to the acquisition of other new customers.

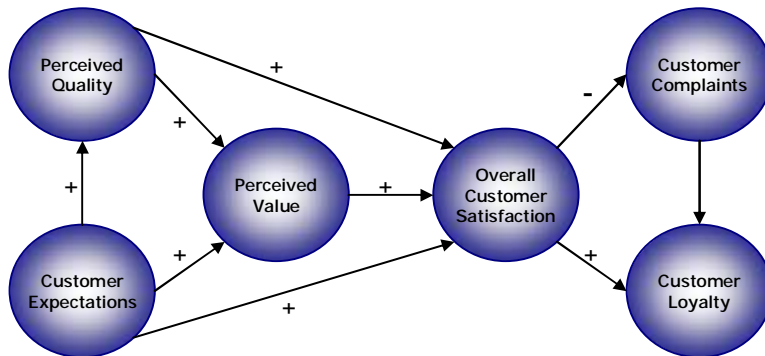


Figure 27 - American Customer Satisfaction Index (ACSI) Model [18]

In the figure above the American Customer Satisfaction Index Model is presented; according to Fornell et al. [18] overall customer satisfaction has three antecedents: perceived quality, perceived value and customer expectations. This model will be applied to the local roll out concept of All IP. According to literature [18] the perceived quality of performance can be operationalised by two primary components of the consumption experience: 1) customization and 2) reliability. Customization is the degree to which the organisation's offering is customized to meet heterogeneous customer needs; the reliability is the degree to which the organisation's offering is reliable, standardized and free from deficiencies. The second determinant, perceived value, is the perceived level of product quality relative to the price paid. The third determinant is customer's expectations. This determinant represents both the prior consumption experience with the organisation's offering (based on e.g. marketing and word of mouth) and a forecast of the supplier's ability to deliver quality in the future.

For perceived quality, there is positive association between perceived value increases and customer satisfaction. Customer expectations is a backward and forward looking determinant, the predictive role of expectations have a positive effect on overall customer satisfaction. In the right part of the model the consequences of overall customer satisfaction are presented. The immediate consequences of increased customer satisfaction are less customer complaints and an increase in customer loyalty. According to Reichheld and Sasser [43] customer loyalty is the ultimate dependent variable because of its value as a representative of (future) profitability, this corresponds to Kotler [29] as stated earlier in this section.

When applying this model to the realisation stage of a local roll out project only two determinants remain: perceived quality and customer expectations. Perceived value is left out since the installation by a KPN service employee is free of charge, the perceived quality related to the price paid therefore can not be included in the model. If KPN decides to charge a price for the installation in the future, the determinant perceived value should be included in the model.

For the local roll out the reliability and customization are for the greater part determined by the moment of installation. Reliability is defined by the first time right customer experience, this means that the KPN service employee arrives on time at the appointment and does not leave the customer before the services function properly. Reliability is also determined by customer service, customers' complaints or questions must be dealt with as fast as possible. Meeting the heterogeneous customer needs is defined by the installation by a service employee in general. The service employee must be capable of meeting the

customer needs regarding the installation; the situation he will find at the households will be different every time.

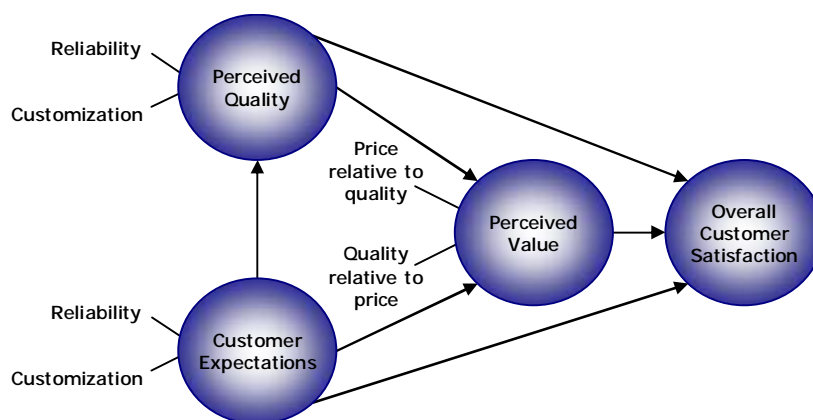


Figure 28 - Drivers for customer satisfaction, based on [18]

Customer expectations are determined by prior consumption experiences and the customer's forecast of the organisation's ability to delivery quality in the future. For a local roll out project this means that the most important determinant for customer expectations is the experience of customers already connected; this means the reliability and customization as explained before. Loyal customers that talk favourably about the installation create certain expectations by other potential customers. Also the impression that KPN makes on potential customers is important. Customer service deals with questions and complaints of customers. Obviously prior experience of customers with KPN exert influence, but this falls outside the research scope. This research focuses on the realisation stage of a local roll out project, therefore only the determinants that can be influenced by the local roll out organisation are defined.

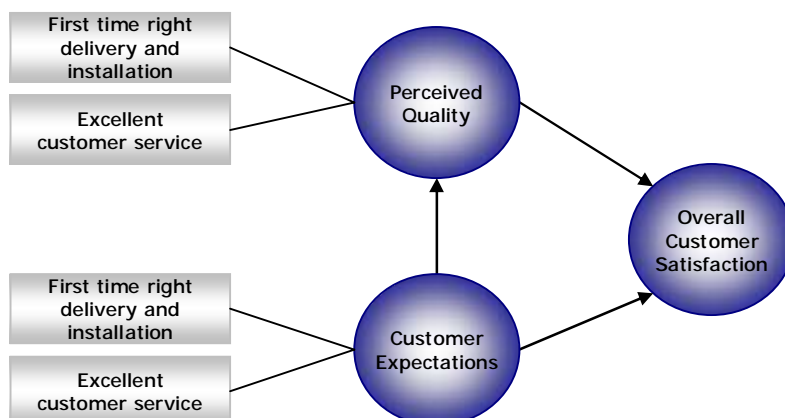


Figure 29 - Drivers for customer satisfaction during the realisation stage

5.1.5 Planning & Execution

As explained in section 4.3.2 during the process Initiating a Project, preceding the process Controlling a Stage, a planning on project level is created. This planning states what activities must be executed in what timeframe during the realisation stage, a simplified example of the planning was presented.

Obviously also more detailed plans are made for a local roll out project. For the construction of infrastructure a planning is made for the number of Homes Passed that must be delivered per week based

on postal codes; since other processes are dependent of the construction of infrastructure it is important to monitor the progress. The planning of order processing and provisioning, the construction of Homes Passed++ (branches to households) and the number of installations to be executed depends on the number of orders that come in, these processes are order driven. However, to guarantee a first time right delivery and installation it is of great importance to be able to monitor progress of these processes.

If a process deviates from the planning corrective actions must be taken by the local roll out organisation. This process was explained in section 3.1 where the control cycle of the PRINCE2 process Controlling a Stage was presented. However, for order driven activities this implicates that performance measures must be defined that indicate to what extent the local roll out organisation is able to execute certain activities in the future. An appointment for installation at the customer is known at least three weeks in advance. The Homes Passed++ tube should be finished one week before installation at the customer, the preparation of service activation must be finished, a FTU welder from the contractor to install the FTU and a KPN service employee to install services must be available for the final step of the delivering a well functioning service at the customer. These processes must be monitored to guarantee the first time right delivery and installation.

5.1.6 Continuous improvement

The All IP Program Management strives for continuous improvement regarding the local roll out of the All IP Network. Experience from local roll out projects must lead to a so-called 'best practice'. According to Daft [11] continuous improvement is the implementation of small, incremental improvements in all areas of the organisation on an ongoing basis. Continuous improvement is a significant element of total quality management (TQM). Total quality management focuses on managing the total organisation to deliver quality to customers [11]. According to Garvin [19] continuous improvement requires a commitment to learning, in the article 'building the learning organisation' Garvin defines a learning organisation as an organisation skilled at creating, acquiring, and transferring knowledge, and at modifying its behaviour to reflect new knowledge and insights. This definition boils down to creating the potential for improvement by generating ideas for change and applying these ideas to the way work gets done.

Since the local roll out concept of the All IP Network is going to be deployed all over the Netherlands starting mid 2008, it is essential to focus on areas in which improvement is possible. KPN Glasnet Enschede is the first project to test the strategies and objectives defined, therefore it is very important to learn from this experience and apply this knowledge to subsequent local roll out projects. Continuous improvement in the local roll out aims at improving the business processes and activities to deliver quality to the customer. This requires the active involvement of employees; through experiences from their day-to-day job they are the first to notice errors and room for improvement in processes and activities. For KPN Glasnet this means that employees but also the members of the project team are expected to contribute by initiating changes in their own jobs and activities.

The project management method PRINCE2 describes several management products; regarding continuous improvement the Issue Log and Lessons Learned Log are very useful. The Issue Log is a document in which project issues are recorded; they get an unique identification number, the type of issue is recorded and the status is presented [41]. Based on the Issue Log actions can be taken to resolve the issues. Recording the issues and the way they are resolved is of great value since other local roll out projects can be proactively managed to prevent the same issues from happening. The Lessons Learned Log is a repository of any lessons learned during the project that can be usefully applied to other projects [41]. At the end of a project a Lessons Learned Report is written based on the Lessons Learned Log.

5.1.7 Summary

In the preceding subsections the results from interviews with members of All IP Program Management and the project manager of KPN Glasnet were presented, supported by information from internal documents and relevant scientific literature. The interviews aimed at bringing into focus the strategy and objectives of KPN during the realisation stage of a local roll out project within the context of the All IP Program. Based on this information the strategy map can be created.

The objectives regarding the realisation stage of a local roll out project are summarised below.

- Reach the monthly financial objectives stated in the business case:
 - Maximise revenue (from new customers on the All IP Network)
 - Minimise investments to roll out the network
- Acquire new customers based on the customer value proposition to meet sales targets (gaining market share and creating revenue).
- High customer satisfaction through:
 - First time right delivery and installation
 - Excellent customer service
- Execute the activities as planned and monitor progress, also for order driven activities an indication of expected progress must be presented.
- Continuous improvement of the local roll out concept.

5.2 The Strategy Map

The strategy map is drawn up following the guidelines of Kaplan and Norton [25]. A first version of the strategy map was created based on the interview results elaborated in section 5.1. This first version was presented to the manager customer processes of All IP Program Management and the project manager of KPN Glasnet Enschede. Based on these meetings several adjustments were made which has led to the strategy map in figure 30.

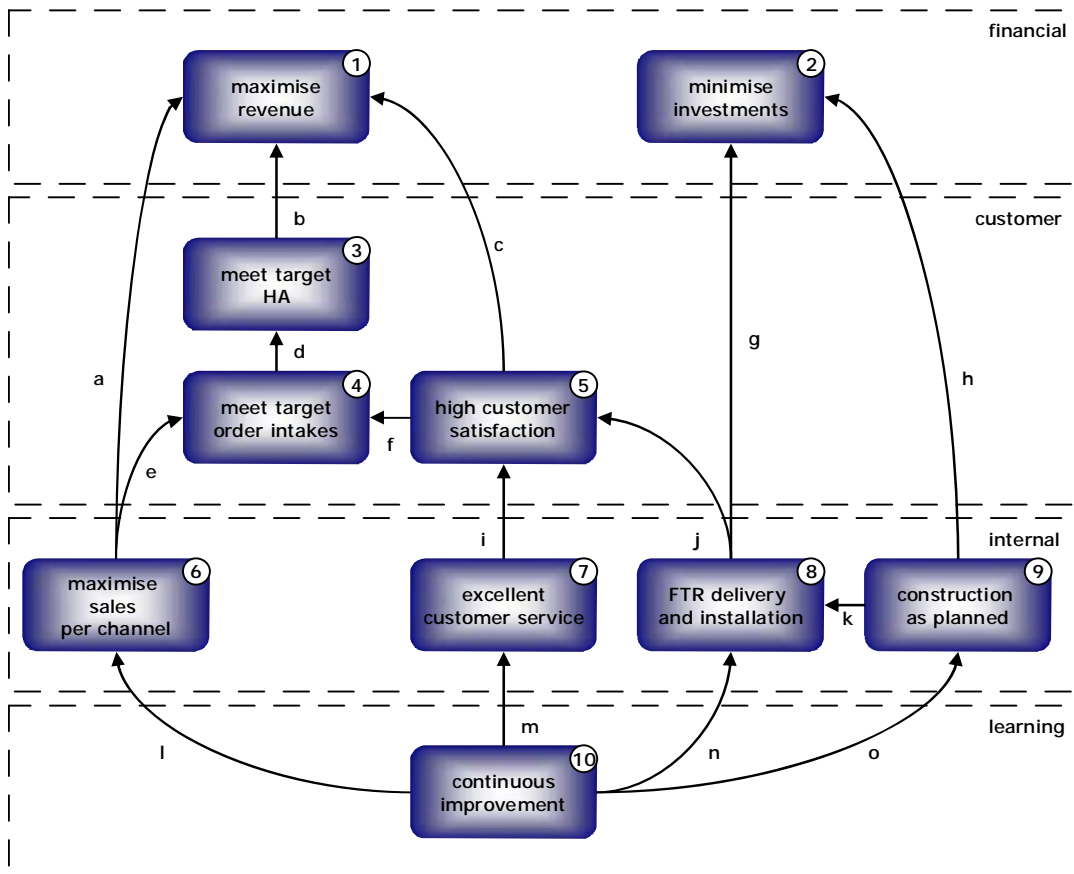


Figure 30 - Strategy Map

The strategy map shows KPN's objectives for a local roll out project of All IP linked through cause-and-effect relationships. The strategy map is developed from top-down, starting with the destination and then charting the routes that will lead there within the four perspectives of the Balanced Scorecard. In the following subsections the objectives presented in the strategy map are further explained. The objectives are numbered from 1 through 10, the cause-and-effect relationships in the strategy map are identified by the letters a through o.

5.2.1 Financial Perspective

The financial perspective contains the objectives and measures that reflect the economic consequences of actions already taken [25]. Two objectives are presented in the financial perspective: *maximise revenue* (1) and *minimise investments* (2). During the first process of a local roll out project, Initiating a Project, a business case is built to justify the investments; financial objectives are defined. The financial objectives in the balanced scorecard are derived from the business case. As explained in section 5.1 the impact of a

local roll out project (especially KPN Glasnet Enschede) on the value of KPN on the stock exchange is not included since this goes beyond the scope of this research.

The first objective in the financial perspective is *maximise revenue (1)*; the total revenue generated from new customers on the All IP Network is of great importance to the performance of a local roll out project. The objective *maximise revenue (1)* is determined by three antecedents; viz. the objective *maximise sales per channel (6)* from the internal business process perspective, the objective *meet target homes activated (3)* and the objective *high customer satisfaction (5)* both from the customer perspective. These relations are identified by respectively cause-and-effect relationships *(a)*, *(b)* and *(c)*.

The second objective defined in the financial perspective is *minimise investments (2)*. This objective focuses on minimising the investments made to roll out the All IP Network. Only the main determinants of the capital expenditure are identified: the objective *first time right delivery and installation (8)* and the objective *construction as planned (9)*, both from the internal business perspective. These two are the most important determinants regarding the costs of connecting a new customer to the All IP Network which are measurable. These relations are identified by cause-and-effect relationships *(g)* and *(h)*.

5.2.2 Customer Perspective

The customer perspective contains the objectives and measures that reflect the organisation's strategy regarding their customers [25]. These objectives are derived from the cause-and-effect relationships with objectives in the financial perspective.

The first objective, *meet target homes activated (3)* is connected to the objective *maximise revenue (1)* in the financial perspective with cause-and-effect relationship *(b)*. The number of activated connections influences the market share and is therefore a determinant for the revenue on the long term.

The objective *meet target of order intakes (4)* is connected to the objective *meet target homes activated (3)* through cause-and-effect relationship *(d)*, the number of confirmed orders determines the connections that have to be delivered. The number of orders is affected by the *sales per channel (6)* identified by cause-and-effect relationship *(e)*, but also by *high customer satisfaction (5)*.

Customer satisfaction is considered very important proven by the customer oriented strategy of KPN. The objective *high customer satisfaction (5)* effects the *meet target order intake (4)* identified by cause-and-effect relationship *(f)*. High customer satisfaction leads to loyal customers as was explained in section 5.1.4. During a local roll out project a highly satisfied customer will talk favourably about the installation of services and thereby influence relatives and neighbours to get connected. Also *high customer satisfaction (5)* will influence the objective *maximise revenue (1)*, since a highly satisfied customer buys more when an organisation introduces new products and upgrades existing products [29] (this will increase the average revenue per user). This can be explained by the American Customer Satisfaction Index model [18], clarified in section 5.1.4. This connection is identified by cause-and-effect relationship *(c)*.

5.2.3 Internal Business Process Perspective

The internal business process perspective identifies the objectives and measures of business processes in which the organisation must excel [25]. These objectives are derived from the cause-and-effect relationships with the financial perspective and customer perspective.

The objective *maximise the sales per channel (6)* effects the objective *maximise revenue (1)* in the financial perspective through cause-and-effect relationship *(a)*. Marketing success determines which services are sold and thereby influences the average revenue per user and thus the total revenue. Marketing success also determines the objective *meet target order intakes (4)* in the customer perspective; this is identified by cause-and-effect relationship *(e)*, because marketing is responsible for persuading new customers to register for All IP.

The objectives defined which determine the customer satisfaction for a local roll out project are *excellent customer service (7)* and *first time right delivery and installation (9)*. *Excellent customer service (7)* is a determinant of customer satisfaction, as identified by cause-and-effect relationships (*i*). Answering questions and dealing with customer complaints influences customer expectations and also influences the perceived quality; therefore it directly effects the overall customer satisfaction. This was explained by applying the American Customer Satisfaction Index in section 5.1.4.

First time right delivery and installation (8) is the third objective in the internal business process perspective. It is a determinant of customer satisfaction, this is identified by cause-and-effect relationship (*j*). First time right delivery and installation regards the reliability of KPN's offering and determines the perceived quality of the customer. It also influences the objective *minimise investments (2)*, at the moment a delivery and installation is not successful costs are made for corrective action. This connection is identified by cause-and-effect relationship (*g*).

The fourth and final objective in the internal business process perspective is *construction as planned (9)*. It is a determinant of *first time right delivery and installation (8)*, if construction is not executed as planned and the fibre branches to houses are not finished, installation can not take place. This relation is identified by cause-and-effect relationship (*k*). The objective *construction as planned (9)* also influences the objective *minimise investments (2)* in the financial perspective, identified by cause-and-effect relationship (*h*). If the construction is not carried out as planned and the project is delayed additional costs are made.

5.2.4 Learning and Growth Perspective

The learning and growth perspective identifies objectives and measures on which an organisation should focus to create long-term growth and success [25]. These objectives are derived from the internal business process perspective.

There is one objective presented in the learning and growth perspective: *continuous improvement (11)*. The concept of continuous improvement was explained in section 5.1.6; it aims at improving the processes to delivery quality to the customer on an ongoing basis. Continuous improvement however is not solely an internal objective within a local roll out project, it is used to find a so-called 'best practice' for the local roll out concept. The objective *continuous improvement (10)* affects the performance of the objectives presented in the internal business process perspective. It influences the objective *maximise sales per marketing channel (6)* identified by cause-and-effect relationship (*l*), the objective *excellent customer service (7)* presented by cause-and-effect relationship (*m*), the objective *first time right delivery and installation (8)* through cause-and-effect relationship (*r*) and at last the objective *construction as planned (9)* through cause-and-effect relationship (*o*).

5.3 Conclusion

In this chapter the strategy map for a local roll out project of the All IP Network was created to serve as foundation for the Balanced Scorecard. The information needed to build this strategy map was acquired through interviews with members of All IP Program Management and the project manager of KPN Glasnet Enschede, aiming at the strategy and objectives during the realisation stage of a local roll out project. The interview results were founded by information from internal documents and relevant scientific literature.

Based on this information and again consulting the customer processes manager from All IP Program Management and the project manager of KPN Glasnet Enschede, the strategy map was created. The strategy map shows KPN's objectives for a local roll out project of All IP linked through cause-and-effect relationships. The strategy map is developed from top-down, starting wit the destination and then charting the routes that will lead there within the four perspectives of the Balanced Scorecard. The information presented in this chapter answers research question 2c) 'What are KPN's strategy and objectives regarding

a local roll out project of the All IP Network?'. The objectives defined in the strategy map are the foundation to define performance measures in the next chapter.

In section 3.4 it was explained that the implementation roadmap by Assiri et al. [2] is used as foundation to define and implement the Balanced Scorecard for the local roll out of All IP. Below the relevant critical factors are evaluated.

Dominant Factors	
Identify BSC perspectives	The four perspectives of the Balanced Scorecard as presented by Kaplan and Norton [25] are used. Assiri et al. [2] state that these perspectives are found appropriate for most companies and industries.
BSC Team	The BSC team consists of the future users of the Balanced Scorecard. For this moment this means the project manager of KPN Glasnet Enschede and the customer processes manager from All IP Program Management form the BSC Team.
Executives' and senior managers' commitment	The initiative for performance measurement came from All IP Program Management; they are familiar with the BSC concept and are involved in defining the strategy, objectives and performance measures.
Main Factors - Development Stage	
Mission, values, vision, strategy	KPN's mission and strategy were elaborated in this chapter. The information was acquired through interviews and studying internal documentation.
Set objectives and measures	Within the four perspectives of the Balanced Scorecard the objectives for a local roll out project of All IP are defined through a top down approach starting with the financial perspective.
Cause-and-effect linkage	The objectives defined in the strategy map are linked through cause-and-effect relationships as prescribed by Kaplan and Norton [25], based on KPN's strategy and objectives regarding a local roll out project.

Table 9 - critical factor evaluation

6 Defining Performance Measures

In this chapter performance measures are defined for the objectives presented in the strategy map. According to Kaplan and Norton [25] a well built Balanced Scorecard includes an appropriate mix of performance drivers and outcome measures. Performance drivers indicate the way in which outcomes should be achieved, they are defined as lead indicators of performance. Outcome measures are defined as lag indicators; they reflect the results of actions taken. Performance drivers and outcome measures are linked through cause-and-effect relationships; as expressed in the strategy map in section 5.2.

The performance measures represent the performance of a local roll out project during the realisation stage. The information provided by the performance measures serves as support for a local roll out organisation in controlling the roll out project and to All IP Program Management in Den Haag as a status report of a local roll out project.

The performance measures were defined in consultation with the manager customer processes of All IP Program Management and members of the project team of KPN Glasnet Enschede. It is important to select performance measures through discussions with the people involved [21]. The performance measures are explained per perspective of the Balanced Scorecard. In section 6.5 the Balanced Scorecard for a local roll out project of All IP is presented.

6.1 Financial Perspective

The objectives defined in the financial perspective are *maximise revenue (1)* and *minimise investments (2)*. These objectives are lagging indicators; outcome measures that represent the financial results of actions taken in the past. The performance of the objective *maximise revenue (1)* is indicated by the total revenue gained from new customers on the All IP Network. Although customers on the new network are free of charge for the first three months (in case of KPN Glasnet Enschede) they generate revenue. The payment of the free months is reversed to the customer; for bookkeeping purposes revenue is gained. The total revenue per month is indicated by:

- Wholesale revenue: revenue gained from supplying the WBA (Wholesale Broadband Access) service, the activated line.
- Added revenue service provider: in case of KPN being the service provider, additional revenue is gained. KPN retail adds its margin to the WBA service.
- Added value analogue television: KPN Glasnet Enschede offers analogue television over fibre, the supplier of this service pays a fee to KPN wholesale for delivering its analogue television over the All IP Network.

Also the ARPU, average revenue per user, is of importance. This is divided into ARPU for wholesale (WBA) and ARPU retail; comparable to the figures of total revenue. WBA tariffs depend on the bandwidth (speed) of the activated line and the services provided on this line. The higher the bandwidth the higher the tariff, this also holds for the services: triple play (television, internet and voice services) is the most extensive and with that the most expensive package. This implicates that the ARPU WBA depends on the services that customers buy from their service provider. In case that service provider is KPN, there also is the ARPU retail. ARPU retail presents an indication of the services that customers buy from KPN as service provider.

Objective	Performance Measure
Maximise revenue	- Total revenue from customers on All IP (€/month) - ARPU WBA (€/month) - ARPU retail customers (€/month)

Table 10 - *maximise revenue*

The second objective in the financial perspective is *minimise investments (2)*. The performance measure for this objective is the total capital expenditure and operational expenditure per month. In the business case targets are defined for the monthly investment for rolling out the All IP Network. Due to accounting rules the investments are split up in capital and operational expenditure. All investments in the network up to and including the FTU are defined as capital expenditure, all investments from the FTU are defined as operational expenditure. The capital expenditure of rolling out the All IP Network during the realisation stage of the project is defined by:

- Investments in passive HP: passive network between WDC and estate separation.
- Investments in active HP (all investments in WDC)
- Investments in passive HC (passive network between estate separation and assembly in meter cupboard)
- Investments in active HA (costs of installation and FTU)

The operational expenditure of rolling out the All IP Network during the realisation stage of the project is defined by:

- Investments service provider (Residential Gateway)
- Investments roll out marketing
- Investments roll out services (service provider)

Objective	Performance Measure
Minimise investments	- Total capital expenditure (€/month)
	- Total operational expenditure (€/month)

Table 11 - minimise investments

The business case states monthly financial targets regarding the revenue and investments, general targets are defined for the ARPU WBA and ARPU retail. Since the targets for revenue and investments are defined per month, the financial performance measures should be reported monthly.

6.2 Customer Perspective

For the customer perspective three objectives are defined, *meet target of homes activated (3)*, *meet target of order intakes (4)* and *high customer satisfaction (5)*. The performance measures belonging to these objectives are defined in this section.

6.2.1 Meet target of homes activated

The performance measure for the objective *meet target of homes activated (4)* is the number of delivered connections, the number of installations for which the protocol of delivery is signed by the customer. At the moment the KPN service employee installed the services at the customer and it all works properly the signed protocol of delivery is sent to the team of the infrastructure manager. The concerning service provider and KPN Wholesale are informed about a successful installation. The number of delivered connections is a lead as well as a lag indicator. It is the result of a successful installation (an outcome measure), but it is also a lead indicator since it increases the revenue gained from customers on the All IP Network, defined in the financial perspective.

Objective	Performance Measure
Meet target of homes activated	- Total number of delivered connections

Table 12 - meet target of homes activated

6.2.2 Meet target of order intakes

The performance of the objective *meet target of order intakes (5)* is measured through the number of confirmed orders. Orders come in at the service providers, as explained in section 4.4.2. A confirmed order is an order for which an appointment for delivery and installation is made with the customer.

Two performance measures are defined since All IP Program Management has defined a target for the total number of orders as well as a target for the percentage of those orders that should be KPN retail orders (customers that order from KPN as service provider). These targets are derived from financial objectives. The total number of confirmed orders is a lag indicator since it is an outcome measure of the process of acquiring customers to connect to the All IP network. It is a lead indicator for the number of homes activated on the All IP Network, since orders lead to the delivery and installation of services at the customer.

Objective	Performance Measure
Meet target of order intakes	- Total number of confirmed orders - Percentage of KPN retail orders

Table 13 - meet target order intakes

6.2.3 High customer satisfaction

In section 5.1.4 the American Customer Satisfaction Index Model by Fornell et al. [18] was applied to the local roll out concept of All IP. It was determined which processes and activities affect customer satisfaction; excellent customer service and first time right delivery and installation, treated in the subsequent section. However, this focuses solely on internal processes; these are the performance drivers of customer satisfaction. It is important to measure customer satisfaction also from the customer perspective; the result of actions taken.

Two performance measures are defined to measure customer satisfaction. After the installation of services, the customer fills in a protocol of delivery. This protocol states all activities which must be executed by the KPN service employee and the question if the customer is satisfied about the installation. Summing up all activities executed by the service employee and letting the customer sign this aims at emphasizing the service offered by the local roll out organisation free of charge. The percentage of customers that answered the satisfaction question positively is defined as performance measure.

Besides the protocol of delivery as measure of customer satisfaction several other instruments can be brought into action to measure customer satisfaction. One can think of customer satisfaction surveys by phone or email; it falls outside the scope of this research to go into the content of those surveys. However, it is important that the outcome of those surveys is defined by a customer being satisfied or not. The outcome of those surveys is presented as performance measure, that is the percentage of satisfied customers of total customers examined.

Objective	Performance Measure
High customer satisfaction	- % of satisfied customers (protocol of delivery) - % of satisfied customers (survey)

Table 14 - high customer satisfaction

6.3 Internal Business Process Perspective

Within the internal business process perspective four objectives are defined, these are: *maximise sales per channel (6)*, *excellent customer service (7)*, *first time right delivery and installation (8)* and *construction as planned (9)*. In this section the performance measures for these objectives are explained.

6.3.1 Maximise the sales per marketing channel

The first objective within the internal business process perspective is *maximise the sales per marketing channel (6)*. The local roll out organisation is the facilitating party for service providers to propagate their propositions. Therefore, the performance on this objective is measured from the local roll out organisation's point of view. The local roll out organisation has limited influence on the marketing performance of the service providers, and since information on the performance per channel from service providers is mostly confidential the choice is made to solely measure the performance on this objective of the local roll out organisation. The performance on the target of KPN retail connections percentage of total All IP connections is covered by the performance measures of the objective *meet target of order intakes (4)* in the customer perspective (section 6.3.2).

To preserve focus only performance measures for the most important marketing channels are defined, these marketing channels are:

- Local service centre: the neutral shop where customers can acquire information on the proposition of service providers.
- Mobile sales: in Enschede a promotion truck was put into action to reach out to customers, in fact a mobile version of the service centre.
- Local activities: information meetings are organised at sports clubs and other local associations, people are informed about the roll out and can order.
- Door2door actions: promotional teams visit the streets and ring the doorbell at potential customers to inform them about All IP.

It is important to measure the performance of these channels to determine in what activities to invest. If for example the performance measures show that the sales from door2door actions are relatively high, the local roll out organisation could decide to execute more door2door actions. Since customers may not order immediately during a promotional activity it is important that the customers can indicate the reason for ordering when they order. A customer could after visiting the promotion truck decide to order online at home, also these indirect sales must be tracked.

These measures are leading as well as lagging indicators. The success of marketing and sales is a performance driver for the total number of order intakes and revenue gained from customers on the All IP Network; it is an outcome measure for the success of marketing and sales process by the local roll out organisation.

Objective	Performance Measure
Maximise sales per channel	<ul style="list-style-type: none"> - Sales local service point - Mobile sales (promotion truck) - Sales local activities (sport associations etc) - Sales door2door actions

Table 15 - maximise sales per channel

6.3.2 Excellent customer service

Excellent customer service (7) is the second objective defined in the customer perspective. This objective mainly concerns the performance of the local customer service desk, that is where all complaints and service interruptions are registered. All IP Program Management has set targets to settle customer problems within a predefined time period depending on the character of the problem. Problems are defined as service interruptions and complaints. The accompanying performance measure is the percentage of problems settled within the corresponding target. A second performance measure is defined to measure to what extent problems are resolved successfully: the percentage repeated problems (problems that have arisen before at the same customer) of problems registered.

The third performance measure defined regarding the objective excellent customer service is the percentage of problems related to the size of the installed base, that is the total number of customers on the All IP Network.

These performance measures are lag indicators for the performance of the local customer service desk and lead indicators, performance drivers for customer satisfaction. During the presence of the local roll out organisation, the organisation is responsible for solving problems of customers. After that period customers have to contact the regular national KPN customer service.

Objective	Performance Measure
Excellent customer service	- % problems settled within target - % of repeated problems - % of installed base

Table 16 - excellent customer service

6.3.3 First time right delivery and installation

The first time right delivery and installation is considered extremely important by All IP Program Management. They consider it to be the most important determinant of customer satisfaction. A first time right delivery and installation is defined by:

- The KPN service employee is in time on the appointed date;
- He is finished within the predefined time window (depending on the services to be installed);
- And the delivered services function properly.

The accompanying performance measure is the percentage of first time right delivery and installation of the total number of delivery and installations executed. This is a lag indicator, an outcome measure of the executed installations. It is a lead indicator for the objective high customer satisfaction in the customer perspective.

Besides the percentage of successful first time right delivery and installations All IP Program Management also wants to measure to what extent the local roll out organisation is able to guarantee a first time right delivery and installation in the future. Therefore several conditions have to be complied with:

- Construction activities have to be finished;
- A FTU welder from the contractor has to be available to install the Fibre Termination Unit;
- A KPN service employee is available to install the services;
- The preparations for service activation are finished (provisioning process);
- The order box with necessary equipment is available.

The first condition is accounted for in the objective *construction as planned (9)* explained in the next subsection. The remaining four conditions are combined into one performance measure to indicate the expected ability of the local roll out organisation to execute the necessary first time right delivery and installations for the next three weeks. The period of three weeks is chosen since the order deadline is three weeks before the moment of installation. Based on the number of installations to be executed in a week the necessary capacity of FTU welders and service employees, and the number of order boxes that must be available can be calculated. These values are compared with the planned capacity and order box availability for those weeks. Also the progress of the concerning orders through the provisioning process must be monitored. These values are combined into a percentage which indicates the ability for first time right delivery and installation per week. The first week accounts for 0.6, the second for 0.3 and the third for 0.1, the performance measure is expressed by a percentage. The calculation of this predicting performance measure is further explained in the next chapter on implementation.

Objective	Performance Measure
First time right delivery and installation	- % FTR delivery and installation - predicting measure First Time Right

Table 17 - first time right delivery and installation

6.3.4 Construction as planned

Since the construction process has to be finished before delivery and installation of services at a customer, it is very important to monitor the progress such that corrective action can be taken if necessary. The construction of infrastructure was explained in section 4.4.3, divided in two phases:

- Homes Passed: the empty tube in the streets
- Homes Passed++: branches to households provided with fibre

The execution of the phase Homes Passed is based on the street plan. The performance measure for Homes Passed is the percentage constructed Homes Passed of total planned Homes Passed. Besides measuring the progress an indication of future progress must be presented. For this expected progress the same period of subsequent three weeks is used as for the predicting measure of first time right delivery and installation. The average capacity of civil teams used is calculated over the preceding four weeks, based on these figures and the number of Homes Passed to be constructed the necessary capacity can be calculated for the subsequent three weeks. The values are compared with the planned capacity for the subsequent three weeks which leads to a percentage (planned/needed). It is important that the capacity for low-rise and high-rise buildings is calculated separately. The performance measure combines the values of the three weeks, the first week accounts for 0.6, the second week for 0.3 and the third week for 0.1. The performance measure is expressed by a percentage, it reflects the ability to deliver the necessary Homes Passed connections for the subsequent three weeks.

The construction of Homes Passed++ is order driven, only for households which ordered service on the All IP Network this phase is executed. Based on the number of orders and appointments for installation the number of Homes Passed++ to be constructed per week is known. The ambition is to finish the phase Homes Passed++ a week before installation at the households. The performance of executing this phase is defined by the percentage of Homes Passed++ delivered of total planned Homes Passed++. Also for the phase Homes Passed++ a predicting measure must be presented. As for the Homes Passed phase this predicting measure is also based on the capacity used in the preceding four weeks. For the phase Homes Passed++ the following capacity is needed:

- Constructors of Y-connectors: the connection between Homes Passed tube and tube to the households.
- Fibre constructors: the fibre is blown through the tubes under pressure.
- Welders: the fibre must be welded to the network.

The necessary capacity for the subsequent three weeks based on the number of Homes Passed++ to be constructed is compared to the planned capacity (planned/needed). In the same way as for Homes Passed one predicting measure is calculated to present the ability to deliver the necessary number of Homes Passed++ for the subsequent three weeks. It must be noticed that the predicting measures defined for Homes Passed and Homes Passed++ only present an indication of expected progress.

The performance measures regarding the planning of construction activities are lead indicators for the first time right delivery and installation since installation can only take place when the construction activities are finished. They are lag indicators for the construction process; they measure the results of construction activities regarding the planning.

Objective	Performance Measure
Construction as planned with minimal inconvenience	<ul style="list-style-type: none"> - % constructed of planned HP - % constructed of planned HP+ + - predicting measure Homes Passed - predicting measure Homes Passed + +

Table 18 - construction as planned

6.4 Learning and Growth Perspective

In the learning and growth perspective the objective *continuous improvement* (10) is defined. As explained in section 5.1.6 continuous improvement is the implementation of small, incremental improvements in processes and activities on an ongoing basis. It requires the active involvement of employees; they must contribute by initiating changes in their jobs and activities. An Issue Log must be kept up to date, issues can be put forward by everyone involved in the project and can concern every possible activity during the realisation stage. An issue can be a performance measure indicating that corrective action must be taken, but also a problem a team member experiences during his work or issues that came up during a customer survey. To measure the performance on the objective continuous improvement the percentage of resolved issues per week is defined as performance measure. This performance measure reflects the capability of a local roll out organisation to resolve reported issues and improve performance.

To measure if issues are resolved in the right way the current performance of the local roll out project must be compared to the performance of the local roll out project during the preceding period. Therefore the number of performance measures on target of the current period is compared to the number of performance measures on target of the preceding period, this reflects the improvement or deterioration of project performance. This process is visualised by Deming's Plan-Do-Check-Act cycle [13], applied to continuous improvement during the realisation stage:

Plan - decide what actions should be taken to resolve the issue

Do - carry out the planned actions

Check - check if the actions had the desired effect

Act - put learning into action, standardise on a permanent basis

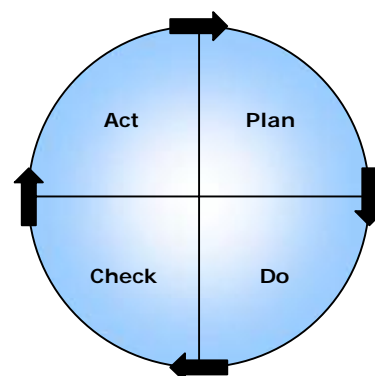


Figure 31 - PDCA cycle, based on [13]

Both these performance measures are leading indicators regarding the performance of internal business processes. The link between continuous improvement and the performance of internal business processes is presented in the strategy map in section 5.2.

Objective	Performance Measure
Continuous improvement	<ul style="list-style-type: none"> - % issues resolved - number of performance measures on target

Table 19 - continuous improvement

6.5 Balanced Scorecard

The Balanced Scorecard for the local roll out of All IP is put together by the performance measures defined for the four perspectives, it is presented below. The implementation of the performance measures is explained in the next chapter.

Balanced Scorecard All IP		
	Objective	Performance Measures
Financial	Maximise revenue	- Total revenue from customers on All IP - ARPU WBA customers - ARPU retail customers
	Minimise investments	- Total capital expenditure - Total operational expenditure
Customer	Meet target HA	- Total number of delivered connections
	Meet target order intakes	- Total number of confirmed orders - % of KPN retail orders
	High customer satisfaction	- % of satisfied customers (protocol of delivery) - % of satisfied customers (survey)
Internal	Maximise sales per channel	- Sales local service centre - Mobile sales (promotion truck) - Sales local activities (sport associations etc) - Sales door2door actions
	Excellent customer service	- % problems settled within target - % repeated problems - % problems of installed base
	Construction as planned	- % constructed of planned HP - % constructed of planned HP++ - predicting measure Homes Passed - predicting measure Homes Passed ++
	First time right delivery and installation	- % FTR delivery and installation - predicting measure FTR
	Learning	Continuous improvement

Table 20 - Balanced Scorecard All IP

6.6 Conclusion

Based on the strategy map defined in the previous chapter the performance measures for a local roll out project of All IP are defined. The Balanced Scorecard consists of 25 performance measures covering the four perspectives, presenting an appropriate mix of lead and lag indicators. The Balanced Scorecard provides a complete picture of the performance of a local roll out project which supports a local roll out organisation in controlling the project and decision making. Also for All IP Program Management the Balanced Scorecard is useful since it provides a quick status overview on the performance of a project. By defining the performance measures research question 2d) 'What are key performance indicators regarding the defined strategy and objectives?' was answered in this chapter.

In section 3.4 it was explained that the implementation roadmap by Assiri et al. [2] is used as foundation to define and implement the Balanced Scorecard for the local roll out of All IP. Below the relevant critical factors are evaluated.

Main Factors - Development Stage

Set objectives and measures	For the objectives defined in chapter five the accompanying performance measures are presented in this chapter covering the four perspectives of the Balanced Scorecard.
KPIs	The Balanced scorecard in section presents the performance measures (or Key Performance Indicators) during the realisation stage for a local roll out project of the All IP Network.

Supporting Factors

Finalise measures	Through interaction with future users the measures were finalised.
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Table 21 - critical factor evaluation

7 Implementation

The objective of this chapter is to develop an instrument to implement the set of performance measures defined in chapter six. In the first section the choice for using Microsoft Excel as supporting software is explained. To design the performance measurement tooling a prototyping approach [33] was used. This means that a prototype system was built and through interaction with the customer processes manager of All IP Program Management and the project manager of KPN Glasnet Enschede, the future users of the system, adjustments were made. This is an iterative process and ends at the moment a satisfactory result is achieved. Section 7.2 explains the developed instrument and the required data for calculating the performance measures presented on the Balanced Scorecard. Since the information systems that will be used during the nationwide migration were being developed during this research, it was impossible to define data sources. However, this does not jeopardise the objective of this research; it is aimed at a proof of concept. The functioning of the instrument is proven by filling it with fictitious, but representative data. Section 7.3 describes the application of the instrument, the way it should be applied during the realisation stage of a local roll out project. In section 7.4 it is explained how the instrument for performance measurement can be used to support continuous improvement of the local roll out concept.

7.1 Software

It is important to choose adequate software for the balanced scorecard implementation that meets the organisation's requirements [1]. The software should present the performance during the realisation stage of a local roll out project orderly such that it presents a quick overview of the status. Numerous software vendors have build software solutions to support a Balanced Scorecard implementation, there are over two-dozen application-providers to choose from [36]. Although there are disadvantages, today the most widely used software support is Microsoft Excel [35]. Microsoft Excel is a generally available spreadsheet tool; it is used as basis for presenting and calculating the performance measures of the balanced scorecard. MS Excel is chosen as supporting software for the following reasons:

- Fast implementation, the objectives of this research aim at implementation of a model for performance measurement in a relative short period of time.
- Flexible, the presented data in the model can easily be adjusted, calculations can be adjusted and additional data that should be measured in the future can be added. Since the local roll out of the All IP Network is a premature concept it is important that adjustments can be made easily in the reporting structure.
- Easy to understand, the local roll out organisation and All IP Program Management are familiar with MS Excel as reporting tool, it is widely used across the organisation.

7.2 Balanced Scorecard

Microsoft Excel is chosen to serve as supporting software for implementing the performance measures. The main sheet is the Balanced Scorecard, the performance measures are arranged as in the strategy map. This is done to emphasise the cause-and-effect relationships between the objectives and performance measures; the arrows are left out to keep the sheet orderly. However, the strategy map as presented in chapter five is depicted on a separate sheet for clarity's sake. A picture of the main sheet 'Balanced Scorecard' is presented in figure 32. The colours of the cells indicate the status of the performance measures, there are three options:

- Green: performance as or better than planned
- Orange: need for improvement, warning of potential future problems
- Red: corrective action must be taken

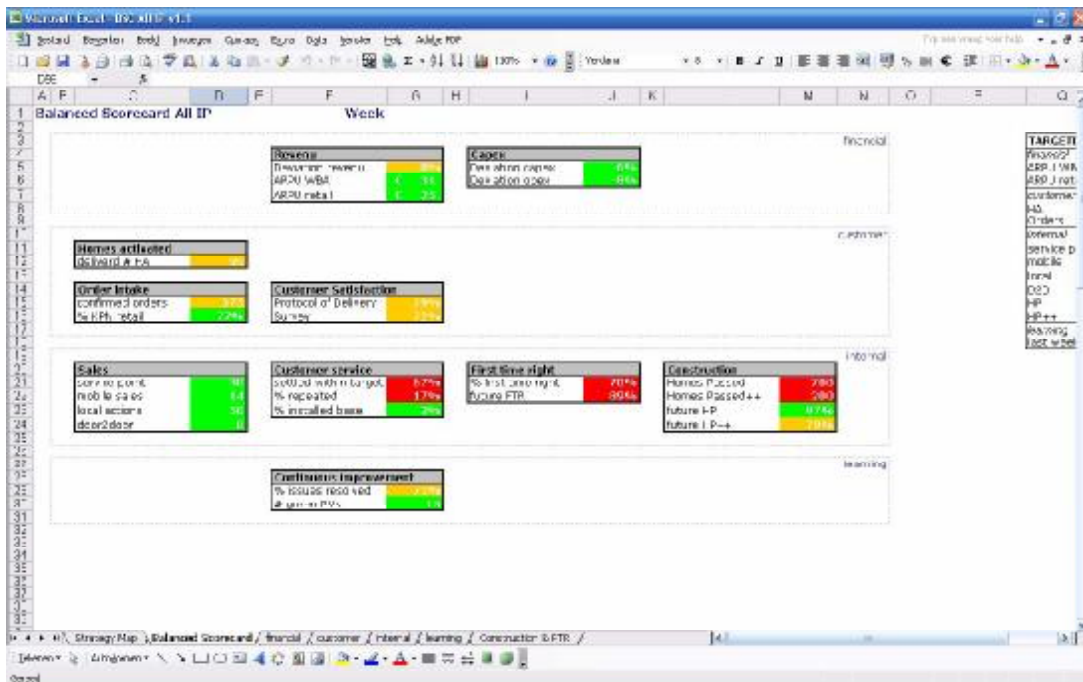


Figure 32 - BSC All IP

In the following subsections the implementation of performance measures is explained per perspective of the Balanced Scorecard. For each perspective a separate sheet in the performance measurement tooling is developed. Pictures of the sheets can be found in the appendix.

Before implementing the Balanced Scorecard Assiri et al. [2] impose that the data sources to calculate the performance measures must be identified. The information systems which are going to be used during the nationwide migration were still being developed during this research, therefore it was impossible to define unambiguous data sources for applying the instrument during the nationwide migration. If possible the way of data gathering at KPN Glasnet Enschede is explained for the defined performance measures. This does not jeopardise the research objective since the required data is defined, the research aims at a proof of concept regarding the instrument. However, this implicates that before applying the instrument for local roll out projects starting mid 2008, the data sources that will be used have to be identified.

7.2.1 Financial Perspective

In this subsection the required information to present the performance measures in the financial perspective is elaborated. The information must be entered on the sheet 'financial'. Since the business case states monthly financial targets the performance measures are calculated per month. All information comes from financial information systems.

Revenue - required data

- Revenue wholesale
- Revenue SP (KPN)
- Revenue analogue television
- ARPU WBA
- ARPU retail

Table 22 - data revenue

The total revenue (sum of wholesale, SP and analogue television) is subtracted from the targeted revenue. This value is divided by the targeted revenue which leads to the percentage deviation. The percentage deviation is presented on the sheet Balanced Scorecard. For the ARPU WBA and ARPU retail holds that the actual value is presented on the sheet Balanced Scorecard. The colour of the cell reflects the performance in relation to the target.

Capex - required data

Capex Passive Homes Passed
 Capex Active Homes Passed
 Capex Passive Homes Connected
 Capex Active Homes Activated

Table 23 - data capex

The total capex (sum of the values in table 23) is subtracted from the targeted capex. This value is divided by the targeted capex which leads to the percentage deviation. The percentage deviation is presented on the sheet Balanced Scorecard.

Opex - required data

Investments marketing
 Investments marketing SP (KPN)
 Investments SP (residential gateway)

Table 24 - data opex

The total opex (sum of the values in table 24) is subtracted from the targeted operational expenditure. This value is divided by the targeted opex which leads to the percentage deviation. The percentage deviation is presented on the sheet Balanced Scorecard.

7.2.2 Customer Perspective

In this subsection the required information to present the performance measures in the customer perspective is elaborated. The information must be entered on the sheet 'customer'.

HA - required data

Number of homes activated

Table 25 - data HA

At KPN Glasnet Enschede the protocols of delivery are collected by the street coordinators and passed on to the CRM manager. The number of received protocols of delivery indicates the number of Homes Activated. The cumulative value of Homes Activated is presented on the sheet Balanced Scorecard. The colour of the cell reflects the performance in relation to the cumulative target.

Orders - required data

Number of orders
 % KPN retail

Table 26 - data orders

At KPN Glasnet Enschede Hi-Process is the information system in which all orders are registered. Through a web interface all service providers order directly in Hi-Process. The number of orders per week and the

percentage KPN retail orders of the total can be generated from this information system. The cumulative number of orders and the percentage KPN retail orders (of the cumulative number) are presented on the sheet Balanced Scorecard. The colour of the cells reflects the performance in relation to the targets.

Customer satisfaction - required data

- Number of satisfied customers PoD
 - # surveys executed
 - # satisfied customers
-

Table 27 - data customer satisfaction

The protocols of delivery are collected by the street coordinators and passed on to the CRM manager. The CRM managers keeps track of the number of customers that indicate to be satisfied with the installation. The percentage of satisfied customers is presented on the sheet Balanced Scorecard. When other customer satisfaction surveys are executed the CRM manager is informed on the results. The number of executed surveys and the number of satisfied customers must be entered. The percentage satisfied customers from satisfaction surveys is presented on the sheet Balanced Scorecard.

7.2.3 Internal Business Process Perspective

In this subsection the required information to present the performance measures in the internal business process perspective is elaborated. The information must be entered on the sheet 'internal'.

Sales - required data

- # sales service centre
 - # mobile sales
 - # sales from local actions
 - # sales from door2door actions
-

Table 28 - data sales

The marketing and sales manager keeps track of the sales resulting from marketing activities organised by the local roll out organisation and the sales in the service centre. The number of sales per week is presented on the sheet Balanced Scorecard. The colour of the cells reflects the performance in relation to the targets. For KPN Glasnet Enschede holds that indirect sales from marketing activities can not be tracked yet. The order information system (Hi-Process) must be altered in such a way that indicating the origin from the order at order entry is possible.

Customer service - required data

- New problems
 - Open problems
 - Settled problems
 - Settled within target
 - Repeated problems
-

Table 29 - data customer service

At KPN Glasnet Enschede an information system named Dbase is used to register the nature of incoming problems at the customer service desk. The required data presented in table 29 is available in this system. On the sheet Balanced Scorecard the following performance measures are presented: the percentage of

problems settled within target, the % problems of the installed base (Homes Activated) and the percentage repeated problems in relation to registered problems that came in during the week.

Construction - required data

- # Homes Passed constructed
- Predicting measures HP
 - low-rise HP
 - high-rise HP
 - capacity civil teams
- # Homes Passed++ constructed
- Predicting measure HP++
 - number of HP++
 - capacity constructor Y-connectors
 - capacity fibre constructors
 - capacity welders

Table 30 - data construction

The number of Homes Passed constructed as well as the number of Homes Passed++ constructed is monitored by the infrastructure manager. The cumulative number of Homes Passed and the cumulative number of Homes Passed++ are presented on the sheet Balanced Scorecard. The colour of the cells reflects the performance in relation to the targets.

On the sheet 'Construction & FTR' the predicting measures for HP and HP++ are calculated. For Homes Passed holds the following information must be entered regarding the preceding four weeks: the number of low-rise HP delivered, the number of high-rise HP delivered and the used capacity. For the subsequent three weeks the following information must be entered: number of low-rise HP to be delivered, number of high-rise HP to be delivered and the planned capacity. Based on these figures the predicting measure is calculated. For the predicting measure of HP++ the following information must be entered regarding the preceding four weeks: number of HP++ constructed and the used capacity of constructors of Y-connectors, fibre constructors and welders. For the subsequent three weeks the number of HP++ to be constructed and the planned capacity of construction employees must be entered. Based on these figures the predicting measure for HP++ is calculated. For the exact calculations one is referred to the MS Excel model. The predicting measures reflect the capability to deliver the targeted number of HP and HP++ for the next three weeks.

First time right - required data

- Number of FTR deliveries
- Number of planned HA
- Predicting measure FTR
 - number of HA
 - capacity FTU welders
 - capacity KPN service employees
 - available order boxes
 - order processing progress

Table 31 - data first time right

The following data on the installation is necessary to generate the information of the number of first time right deliveries from a database: the arrival time of the KPN service employee at the appointment with the

customer, the duration of the installation and the confirmation that services function properly. The number of FTR deliveries is divided by the number of planned appointments to determine the percentage first time right. The percentage FTR is presented on the sheet Balanced Scorecard.

The predicting measure FTR is calculated on the sheet 'Construction & FTR'. Regarding the preceding four weeks the following information must be entered: the number of Homes Activated and the used capacity of FTU welders and KPN service employees. For the subsequent three weeks the following information must be entered: number of Homes Activated to be delivered, the planned capacity of FTU welders and KPN service employees, the available order boxes and the progress of the provisioning process. Based on these figures the predicting measure FTR is calculated. For the exact calculations one is referred to the MS Excel model. The predicting measure reflects the capability to fulfil the first time right delivery and installations for the next three weeks.

7.2.4 Learning and Growth Perspective

In this subsection the required information to present the performance measures in the learning and growth perspective is elaborated. The information must be entered on the sheet 'learning'.

Continuous improvement - required data

New issues
 Resolved issues
 Performance measures on target

Table 32 - data continuous improvement

The number of new issues and the number of resolved issues from the Issue Log must be entered on the sheet 'learning'. The number of open issues is calculated by adding up the number of new issues and the number of new issues of the preceding week minus the number of resolved issues of the preceding week. Dividing the number of resolved issues by the number of open results in the percentage of resolved issues. The performance measure percentage of resolved issues is presented on the sheet Balanced Scorecard. The number of performance measures on target must be counted on the sheet Balanced Scorecard, identified by the green cells. Next to this performance measure there are 24 performance measures. The number of performance measures on target is presented on the sheet Balanced Scorecard. The colour of the cell reflects the performance in relation to the number of performance measures on target of the preceding week.

7.2.5 Required data

As explained in the introduction of this section it was impossible to define the data sources for measuring performance of the local roll out projects during the nationwide migration starting mid 2008. Advanced information systems were still being developed for the nationwide migration during the execution of this research. However, the data requirements defined in this section are sufficient to define a proof of concept. To prove the functioning of the instrument, it was filled with fictitious, but representative data. This was confirmed to be a satisfactory result by the future users of the instrument, the manager customer processes of All IP Program Management and the project manager of KPN Glasnet Enschede. However, this implicates that before KPN starts using the instrument during the nationwide migration, standards for data gathering and responsibilities must be defined.

7.3 Benefits realisation

Assiri et al. [2] state three critical success factors to effectively realise the benefits of a Balanced Scorecard. The factors below are elaborated in this section:

- Regular reporting;
- Measurements assessment;
- Problem solving and action planning.

For the realisation stage of a local roll out project the Balanced Scorecard should be updated weekly. Although with the exception of financial performance being reported monthly, since financial targets are set per month. At the end of each week there is an operational meeting for the project team of KPN Glasnet Enschede, in this meeting the progress of the project is discussed. It is recommended to maintain this principle for local roll out projects starting mid 2008. Weekly reporting means that the required data as discussed in the previous section must be gathered weekly. One person must be made responsible for ensuring the completeness of the weekly data, this could be the project secretary. Standard procedures must be defined regarding which team member is responsible for delivering what data. To facilitate the process of entering data the instrument should be accessible on the internet, e.g. by Microsoft Share Point. Accessibility of the instrument on the internet also provides communication to All IP Program Management. At the moment the Balanced Scorecard is updated All IP Program Management should be informed such that they can check the status of a local roll out project.

The developed instrument in MS Excel allows users of the Balanced Scorecard to access underlying data of the performance measures. Per perspective of the Balanced Scorecard a separate sheet is created in which the data is entered and stored, these allow users to explore the cause of any problem or analyse trends and correlations. The flexibility of MS Excel allows for adjustments in measures to be made easily.

The developed instrument for performance measurement presents a valuable supplement for the weekly meeting since it presents a complete overview of project performance during the realisation stage in relation to the business case and objectives stated by All IP Program Management. The Balanced Scorecard indicates if project performance is as desired. A performance measure below target implicates a warning for future performance or the necessity to take corrective action, depending on the value of the concerning performance measure. The cause of performance below target must be analysed, team members must be actively involved in this process. In this way the Balanced Scorecard serves as foundation for problem solving and action planning; this corresponds to the Plan-Do-Check-Act cycle presented in section 6.4.

Summarising, to fully reap the benefits of the developed instrument the following is of importance:

- Weekly updating of the Balanced Scorecard, with the exception of financial figures (being reported monthly);
- Define standard procedures for data gathering, who is responsible for delivering what data;
- To ensure the completeness of data one person must be made responsible, this could be the project secretary;
- The instrument must be accessible on the internet to facilitate the process of entering data and communication to All IP Program Management;
- Frequently assess the performance measures, if the right thing measured in the right way;
- The developed instrument serves as foundation for problem solving and action planning, a process in which team members of a local roll out organisation must be actively involved.

7.4 Continuous improvement

The All IP Program Management strives for continuous improvement regarding the local roll out of the All IP Network. Experience from local roll out projects must lead to a best practice. For internal continuous improvement of a local roll out project, performance measures are defined on the Balanced Scorecard based on the Issue Log in the learning and growth perspective; this was explained in section 6.4. However, to communicate information about improvements among local roll out organisations a Lessons Learned Log should be kept up to date for every local roll out project. Lessons learned must be handed over to the organisation responsible for initiating new projects [22], in this case All IP Program Management.

The Lessons Learned Log is a repository of any lessons learned during the project that can be usefully applied to other projects [41]. Although every project is unique, learning is certainly possible within and from local roll out projects. Lessons learned can originate from improvements made based on issues that appeared but also other improvements made regarding activities carried out by a local project organisation. The Lessons Learned Log must be kept up to date during the realisation stage of the project. At the end of the stage a Lessons Learned Report should be written based on the log.

The instrument developed for performance measurement is a useful tool in benchmarking local roll out projects. The performance of projects can be compared by presenting the Balanced Scorecards of different local roll out projects into one overview as presented in table 33. As on the Balanced Scorecard, the colour of the cell reflects the performance in relation to the targets. In the example solely performance measures for the financial and customer perspective are presented, it is filled with fictitious data. Based on this overview analysing why a certain roll out project performs better or worse on certain performance measures leads to possibilities for improvement. In this way the Balanced Scorecard serves as foundation for continuous improvement of the local roll out concept in general.

	Financial				Customer				
	Deviation revenue	ARPU WBA	ARPU Retail	Deviation Capex	Delivered # HA	Confirmed orders	% KPW Retail	% satisfied PoD	% satisfied surveys
Enschede	-8%	31	26	-4%	120	267	82%	86%	79%
Den Haag	2%	32	18	-4%	423	522	45%	72%	72%
Zevenaar	3%	31	25	-2%	267	364	59%	88%	82%
Zoetermeer	-17%	31	22	-9%	382	572	72%	88%	91%

Table 33 - benchmarking local roll out projects

7.5 Conclusion

In this chapter the instrument to implement the defined performance measures was developed. As supporting software Microsoft Excel was chosen for its flexibility, it enables fast implementation and it is easy to understand. A prototyping approach was used for the development, based on a prototype the final version of the instrument was designed through interaction with the future users. The required data that must be gathered to calculate the performance measures on the Balanced Scorecard was explained. The developed instrument presents a clear overview of project performance in relation to defined objectives during the realisation stage of a local roll out project. By developing the instrument and defining the required data to calculate performance measures research question 3) 'What is an instrument to

implement the defined performance indicators?’ was answered. It was impossible to define the data sources for the nationwide migration since the information systems which are going to be used were still being developed during this research. This implicates that before the instrument can be put into use for local roll out projects starting mid 2008, first the required data sources must be defined.

It is recommended that the instrument is used for reporting weekly; except from the financial performance measures, since financial targets are defined per month. The instrument must be accessible on the internet to facilitate the process of entering data by team members and communication of the Balanced Scorecard to All IP Program Management. To ensure completeness of the weekly Balanced Scorecard, standard procedures must be defined for gathering the data and one person of a local roll out organisation must be made responsible for delivering up the weekly report. The performance measures should be frequently assessed to ensure the right thing is measured in the right way. The developed instrument serves as foundation for problem solving and action planning, a process in which team members of a local roll out organisation must be actively involved.

The developed instrument can be used to support continuous improvement of the local roll out concept through benchmarking. The Balanced Scorecards of projects running can be presented in one overview as shown in table 33. Project performance can be compared and through analysing the causes of performance in relation to targets suggestions for improvement can be made. The recommendations for application and continuous improvement answer research question 4) ‘What recommendations can be done for using the developed instrument during the nationwide migration?’.

In section 3.4 it was explained that the implementation roadmap by Assiri et al. [2] is used as foundation to define and implement the Balanced Scorecard for the local roll out of All IP. Below the relevant critical factors are evaluated.

Main Factors - Sustainability Stage

Automating BSC	The degree of automation is limited to the performance measures being calculated automatically after entering the required data.
Updating BSC with measures and linking with rewards	The flexibility of the Excel model allows for changes being made when circumstances change. Linking project performance to rewards is a delicate subject which falls outside the research scope.
Corporate alignment	Presenting the performance measures as depicted in the strategy map ensures the overview of cause-and-effect linkages, the way performance on objectives influences one another.
Benchmarking	Based on the developed instrument benchmarking is possible among local roll out projects.

Main Factors - Implementation Stage

Information system design	The MS Excel model that is developed functions as information system. It should be accessible online (MS Share Point).
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Main Factors - Benefits realisation Stage

Regular reporting	The performance of a local roll out project must be reported weekly, except from the financial performance, being reported monthly.
Measurement assessment	The Excel model enables measurement assessment since the spreadsheets of BSC perspectives display the performance of the preceding period.
Problem solving and action planning	Based on performance displayed of the BSC issues can be reported which trigger corrective action.

Main Factors - Planning Stage

Initial Plan	Although the required data is defined, the data sources could not be defined as explained in the conclusion of this chapter.
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Main Factors - Learning and innovation Stage

Learning and innovation	In combination with the Issue Log and Lessons Learned Log the instrument serves as foundation for learning and innovation.
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Supporting Factors

Integration	The instrument should be accessible through MS Share Point to allow online access by the users.
Fine tuning and refining	Targets can be changed easily, the instrument allows for an overview of past performance.
Finalise BSC plan	The instrument was evaluated with the customer processes manager from All IP Program Management and the project manager of KPN Glasnet Enschede.

Table 34 - critical factor evaluation

8 Conclusion & Recommendations

The final chapter of this research goes into the conclusions that came to the fore during and at the end of this research. First the conclusions that can be drawn on the basis of this research are presented. Section 8.2 goes into recommendations as a result of this research.

8.1 Conclusion

This research aimed at developing an instrument for performance measurement for the realisation stage of a local roll out project during the nationwide migration of the All IP Network. The research objective was defined as follows:

*'The definition and implementation of key performance indicators
for the realisation stage of a local roll out project of the All IP Network'*

The first step in this research was creating the theoretical foundation to define and implement the performance measures. To determine and understand the scope of the instrument project management literature was studied, the project management method PRINCE2 was applied. PRINCE2 defines the process Controlling a Stage, the day-to-day management of activities within a stage. This process is presented by a control cycle (figure 6), in fact an extended version of Deming's plan-do-check-act cycle [13]. To support a local project organisation during this process the instrument to be developed must measure performance regarding defined quality, costs, use of resources and time as stated by the business case and objectives defined by All IP Program Management.

Performance measurement in the context of this research aims at defining a balanced set of measures which not solely measures the results of actions taken but also measures to what extent a local roll out organisation is able to deliver the desired results in the future. Kaplan and Norton's Balanced Scorecard [24] was selected as foundation for this research. The framework is applicable at project level, All IP Program Management is familiar with the concept and useful case studies and guidelines are available in scientific literature. Also a Balanced Scorecard is helpful in benchmarking local roll out projects; this is important since continuous improvement of the local roll out concept was desired. The implementation roadmap from Assiri et al. [2] was selected to function as guideline for developing the instrument for performance measurement.

There was no clear insight into the coherence of activities during the realisation stage of a local roll out project of the All IP Network. Therefore the processes at KPN Glasnet Enschede were analysed. The realisation stage comprehends the processes of marketing and sales, order registration, construction of infrastructure, order processing & provisioning and installation. The processes were explained with support of cross-functional flow charts, these may function as foundation for a manual for local roll out projects in the future. The results of the process analysis emphasised the need for an instrument for performance measurement since processes are strongly dependent on each other.

The foundation for the Balanced Scorecard was built through drawing up the strategy map; it shows the objectives of All IP Program Management during the realisation stage of a local roll out project through cause-and-effect relationships. The strategy map was created based on interviews with members of All IP Program Management and the project manager of KPN Glasnet Enschede, underpinned by scientific literature and internal documentation. The most important objectives are reaching the financial objectives of the business case (revenue and investments), gaining market share, high customer satisfaction through

first time right delivery and installation and excellent customer service. Activities must be executed as planned and for order driven activities an indication of expected progress must be presented. All IP Program Management strives for continuous improvement of the local roll out concept.

Based on the objectives defined in the strategy map the performance measures were defined. A total of 25 performance measures is defined covering the four perspectives of the Balanced Scorecard. It provides a complete overview of project performance presenting a complete mix of performance drivers and outcome measures, to support a local roll out organisation in controlling the realisation stage of a project. The performance measures are defined in extensive consultation with members of the project team of KPN Glasnet Enschede and the manager customer processes of All IP Program Management since it is important to involve future users in defining performance measures.

The implementation of the performance measures is done in Microsoft Excel. Excel was selected as supporting software for its flexibility, it enables fast implementation and is easy to understand. For the development a prototyping approach was used; an iterative process through interaction with the future users led to a satisfactorily final version. The main sheet of the instrument provides a clear overview of project performance in relation to the defined objectives arranged as the strategy map to emphasise the cause-and-effect relationships among performance measures. The required data for calculating the performance measures which must be entered in the Excel file is explained. Since the information systems which are going to be used during the nationwide migration were still being developed during this research, it was impossible to define the data sources. However, this did not jeopardise the research objective. The functioning of the instrument was proven by filling it with fictitious but representative data; this was confirmed by the future users.

By delivering the instrument for performance measurement during the realisation stage of a local roll out project the research objective is achieved. The instrument provides the necessary management information for controlling the realisation stage by a local roll out organisation regarding the objectives stated in the business case and by All IP Program Management. It provides a status overview of a local roll out project for All IP Program Management in Den Haag. Through benchmarking local roll out projects, by presenting project performance of several projects in one overview (table 33), it provides a foundation for continuous improvement of the local roll out concept in general.

8.2 Recommendations

It is recommended that the instrument is filled with necessary data to calculate the performance measures weekly. At the end of each week there is an operational meeting for the project team of KPN Glasnet Enschede, in this meeting the progress of the project is discussed. It is recommended to maintain this principle for local roll out projects starting mid 2008. Financial figures should be reported monthly since the business case states financial targets per month for the realisation stage of a local roll out project.

To ensure completeness of the Balanced Scorecard one person within the local project organisation must be made responsible for delivering up the weekly report; this might well be the project secretary. Standard procedures should be defined for gathering data to ensure that unambiguous information is presented on the Balanced Scorecard. To facilitate the process of filling the Excel model with data it should be accessible online; for this purpose Microsoft Share Point is a useful portal.

To start using the instrument during the nationwide migration starting mid 2008 it is essential that data sources to calculate the performance measures are identified. The information systems that were still being developed at the end of this research should enable generating the required data on project

performance. This would significantly relieve project team members of manually gathering data to present the balanced scorecard weekly. The required data was presented in chapter seven.

For example at KPN Glasnet Enschede the paper versions of the protocol of delivery must be collected by the CRM Manager; a laborious process. This paper version could be replaced by a digital one, a KPN service employee should be able to check off a delivery and installation online to ensure real-time status of the number of Homes Activated. For the status of an order in the order processing and provisioning process milestones should be defined, such that there is insight into the progress of orders during the process. This data is very valuable for calculating the ability of a local roll out organisation to deliver and install services at a customer in the upcoming weeks.

At KPN Glasnet Enschede, separate databases are used for progress on construction activities, customer order data and customer service. One central database should be used in which all information regarding a specific customer is accessible. This facilitates in ensuring a first time right delivery and installation, but also better customer service since a complete status overview is available per customer.

It is recommended that further research is executed regarding improvement and further automation of supporting information systems during a local roll out project.

The annual report [30] states that KPN wants to obtain a leading position on the market of new communication, information and amusement services, this should lead to attractive financial returns on the long term. This is one of the reasons for initiation of the All IP Program. However, a significant part of Dutch households must be convinced to change over to All IP to turn the All IP Program into a success. The value proposition KPN currently offers the customer is little distinguishing from for example the cable operators. Besides marketing the All IP Network as the network of the future, KPN should make this offer more concrete by supplying services of the future; one can think of services regarding healthcare.

Also the way of connecting customers to the network should be improved. By making the construction of branches to households an order driven activity, the process of delivery and installation is very inflexible. It could be that a customer that orders right now must wait about 10 weeks until the regarding street is planned for delivery and installation. KPN should design the construction process in such a way to ensure a more flexible delivery and installation.

To improve the customer value proposition and turn the All IP Program into a success it is recommended that further research is executed regarding the flexibility of the delivery and installation process and the services that KPN offers on the All IP Network.

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10 Appendix

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B) Networks

This section of the appendix goes into networks. KPN substitutes its legacy network by a Next Generation Network. In the first subsection the legacy network is shortly elaborated, followed by the Next Generation Network in the second subsection. This section is concluded with the evolution towards a Next Generation Network.

Legacy Network

The traditional copper telephone network is referred to as legacy network. The first technology to be used on this network was Public Switched Telephone Network (PSTN); this is the worldwide standard for telephony based on copper wireline. PSTN is also referred to as POTS – Plain Old Telephone System. The network is circuit-switched*; this means that first a connection has to be made between two nodes before communication can take place, the nodes then are occupied. The PSTN provides a very high quality of service (QoS) for large-scale voice services.

In the seventies ISDN was developed, it stands for Integrated Services Digital Network and allows for voice and data to be digitally transferred over a traditional copper network, the beginning of the internet. ISDN uses the same frequency as PSTN on the copper network and has a maximal bandwidth of 128 Kbps. Later on the DSL technology was developed, DSL stands for Digital Subscriber Line; it provides digital data transmission over the copper wires of a telephone network. The difference between DSL and ISDN is the frequency that is used and the speed of data transmission: ISDN comes instead of PSTN since it makes use of the same spectrum. DSL can be used next to PSTN and comes in several variants; the bandwidth varies from 256 Kbps (oldest variant) to the current theoretical maximum of 250 Mbps in case of VDSL2+.

* Packet-switched versus Circuit-switched

In packet-switching networks data is carried through the network in formatted units of information (packets). These packets are queued or buffered in the network nodes. The difference with circuit-switching is that circuit-switching sets up a constant bit-rate (data-stream) and constant delay, between the two nodes, through exclusive use. Nowadays it is possible to guarantee high levels of Quality of Service on packet-switched networks.

Next Generation Networks

The concept of Next Generation Networks (NGNs) appeared at the end of the twentieth century to face the emerging situation in telecommunications. This situation resulted from open competition between operators on a worldwide basis due to the total deregulation of the market, explosion of data traffic due to the general use of the Internet, strong demand from users for new multimedia services, and increasing demand from users for general mobility [9]. A Next Generation Network is a rather new type of communications network; it is a multimedia network that provides triple play services (voice, data and video) based on the Internet Protocol (IP). The Internet Protocol is a standard for communicating data on a packet-switched network. In general NGNs are built around the Internet Protocol (IP); therefore the term All-IP is sometimes used to describe the transformation process from a legacy network towards a Next Generation Network.

The International Telecommunications Union (ITU), the global standard organisation in telecommunication area, part of the United Nations, defined the NGN as follows: *A packet-based network able to provide services including Telecommunication Services and able to make use of multiple broadband, QoS-enabled transport technologies and in which service-related functions are independent from underlying transport-related technologies. It enables unfettered access for users to networks and to competing service*

providers and/or services of their choice. It supports generalized mobility which will allow consistent and ubiquitous provision of services to users.³

This definition basically states that packet-switching is used for data transmission in a Next Generation Network; it uses broadband technologies to do so and guarantees a high Quality of Service (QoS). The main difference between a legacy network and a NGN is the shift from separate vertically integrated application-specific networks to a single network capable of carrying any and all services [28]. This means a shift towards a horizontally integrated network, the service and transport layer are separated as can be seen in the architecture overview below.

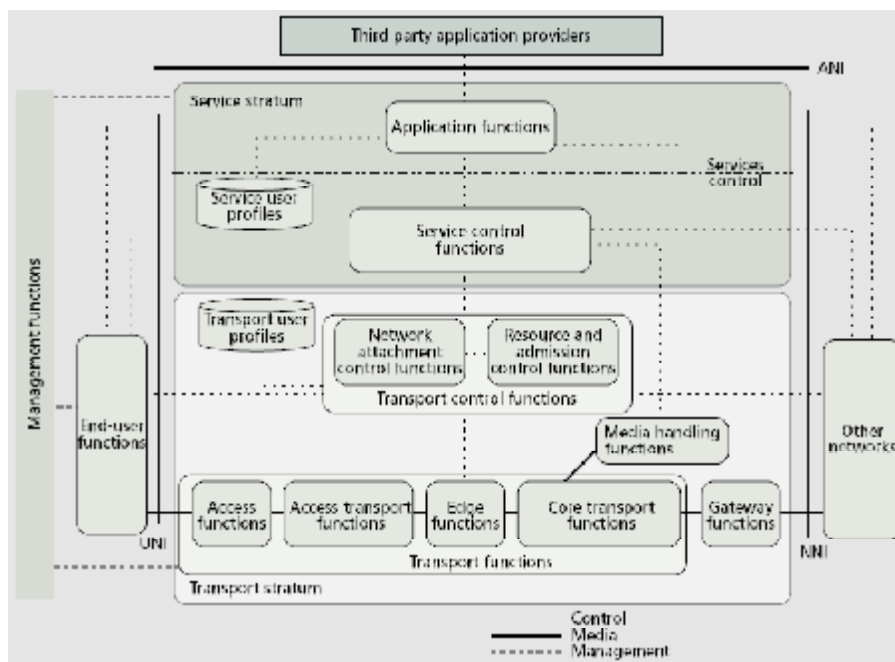


Figure 33 - NGN architecture overview [28]

Several technologies can be used to function as access network to a NGN, wireline as well as wireless.

Examples of wireline access technologies are:

- Variants of DSL (ADSL, VDSL) transported on copper lines;
- Synchronous Digital Hierarchy (SDH), an optical technology based on fibre;
- Cable networks.

Examples of wireless access technologies are:

- IEEE 802.X Wireless networks (e.g. WLAN or Broadband Wireless Access - BWA);
- 3GPP Packet Switched Domain.

Evolution towards NGN

The use of IP technology makes it possible to deliver different services (voice, data, and video) over any type of network (e.g. cable, DSL, mobile): this development is called convergence [4]. This convergence towards one Next Generation Network is visualized in figure 6.

³ http://www.itu.int/ITU-T/studygroups/com13/ngn2004/working_definition.html

PSTN/ISDN networks are considered the prime candidate for evolution towards NGNs; a step-by-step approach should be used since it is an evolutionary process. According to Lee and Morita [32] the evolution towards a NGN should consider the following objectives:

- Separation of transport, control, management and service functions
- Reduction of cost for the network infrastructure and its maintenance
- Maximum reuse of the existing resources
- Achieving comparable QoS level as provided in the existing network
- Optimum use of the new technologies
- Rapid implementation of new services and technologies enabling introduction of new applications
- Provision of mechanisms enabling user's full utilization of the applications and network resources

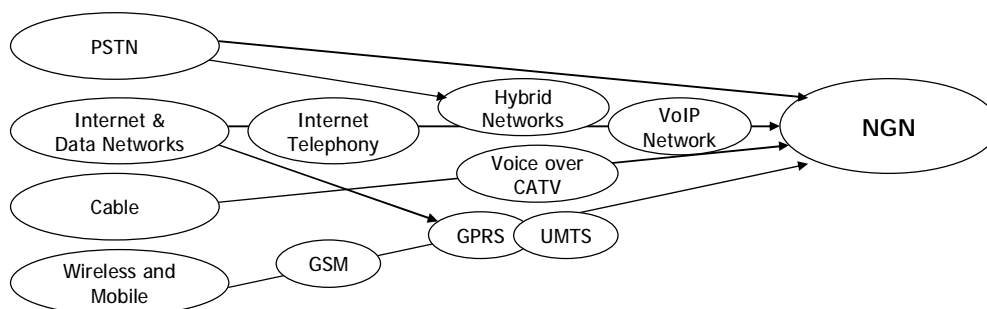


Figure 34 - Convergence towards NGN [42]

C) Process Mapping

A useful tool in finding bottlenecks and critical points in business processes is process mapping. It allows for a graphical representation of business processes. This method maps the relations and process steps, decision points and the flow of the process through the several organisational functions, which leads to an overall view of the processes and relations. To be able to define key performance indicators, one has to know what to measure; the business processes should be clear. Process mapping is very useful technique to get insight into business processes. By means of process mapping it is possible to identify and make business processes accessible.

Process mapping starts with a process relation chart; this is a complete overview of the main processes (primary process) that an organisation uses to deliver its products and services to the customer. The process relation chart shows at system level what the organisation produces, which actors are involved and, through input and output, how processes influence other processes. The creation of a process relation chart facilitates in clarifying objectives for improving and reengineering of the processes. Below a general example of a process relation chart is presented. The main processes (A, B, C and D) can later be elaborated in cross-functional flow charts. The use of cross-functional flow charts is explained in the appendix.

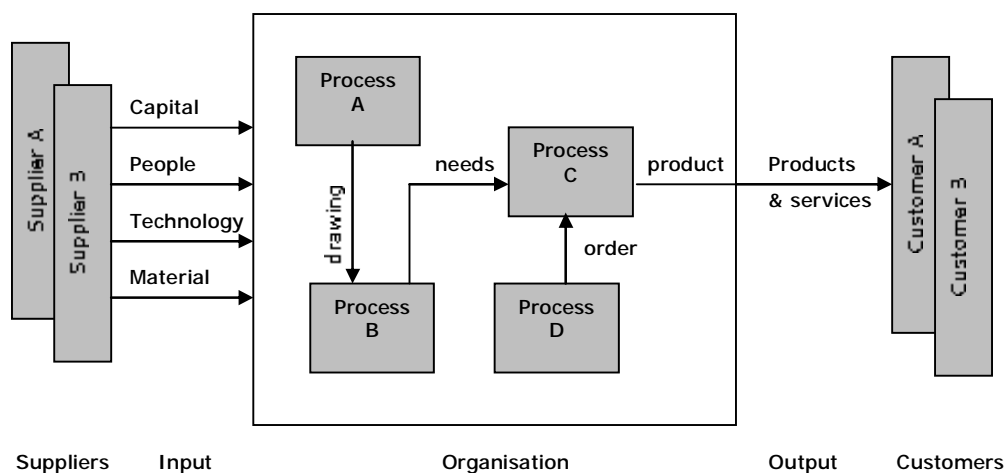


Figure 35 - Process relation chart [47]

A tool for representation of business processes is the cross-functional flowchart; it presents business processes across the borders of organisational units, identifies delays, repeating steps, potential risks and can be provided with a time line. An example of a cross-functional flowchart is given below.

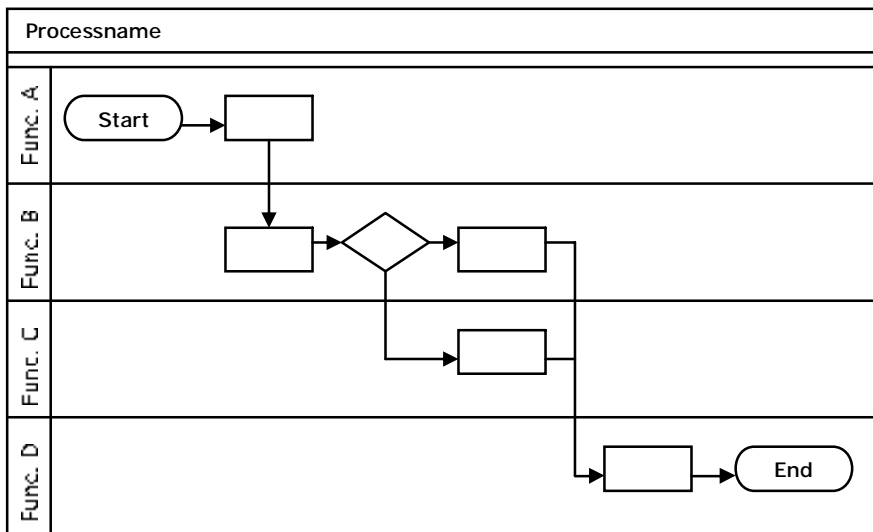


Figure 36 - Cross-functional flow chart [47]

Besides the cross-functional flowchart there is also a linear flowchart; it shows the input, activities, decisions and output of a process without the different functions within an organisation. The linear flowchart is only useful in case of non-functional-crossing processes within an organisation [47].

Several symbols are used in a flowchart. The most common symbols used in a flowchart are:



Start/stop

Identifies the beginning or end of a process.



Activity

Identifies a activity or task in the process which changes the input. In the symbol the activity should be shortly described.



Decision

Identifies a decision in the process. Mostly these are yes/no decisions after which the process continues along two ways.



Document

Identifies the output of a process step when it is a document.



Connector

Identifies the output of a flowchart which is the input for another flowchart. The number of letter indicates the document which further describes the process



Vector

Represents input and output, the material or information that is input for the next step in direction of the flow.

Table 35 – flowchart symbols

D) Roadmap BSC implementation

Below the critical success factors and checklist are presented based on Assiri et al. [2], divided into dominant, main and supporting factors. The main factors are subdivided into six categories: learning and innovation, planning, development, implementation, sustainability and benefits realisation.

Dominant Factors	
Identify BSC perspectives	Choosing perspectives that suit the organisation's requirements, strategy, and objectives. BSC perspectives adequately capture focus of organisation's strategy and provide balance between financial and non-financial measures. Between 3 and 5 perspectives. BSC perspectives cover all aspects and activities of the organisation.
BSC Team	Executives and senior managers assume active responsibility for BSC implementation. Visibility of executives' and senior managers' commitment to BSC activities. Executives and senior managers allocate adequate resources and time for BSC project. Involvement of top and middle level managers in BSC development. Top management discuss many BSC issues during their meetings.
Executives' and senior managers' commitment	Special team has approved for the BSC project BSC team members have various skills, knowledge and are from different departments. BSC team visible and has access to top management. Training for BSC team in BSC implementation and performance measurement. Frequent and regular meetings for team to discuss BSC issues. Team member has a very detail understanding of functional area. Team member can gather and analyse detail data for clear communication to others. Team member can comprehend strategic issues and connect issue to his/her job.

Main Factors - Development Stage	
Mission, values, vision, strategy	Organisation has a clear mission, values, vision and strategy. Entire workforce understands and is committed to mission, vision, values, and strategy. Organisation's BSC supports vision statement BSC communicated strategy throughout organisation. Organisation clarifies and translates vision and strategy in operational terms. Strategy aligned to, and driven by CSFs and balanced set of performance measures.
Training	Emphasis placed on skills development and training in organisation. Knowledge and skills developed, consistently, to meet changing needs of BSC implementation, teams and individuals. Linking Education and Training of employees to organisation long-term plans and strategies. Top management arranges adequate resources for employee education and training. Training for BSC team and employees in performance measurement and BSC implementation and other technical skills.
Set objectives	Before implementing BSC key objectives have to be identified. Initiatives and measures derived form strategy. Each department has to create own performance objectives and measures. Between 3 and 5 measures for each BSC perspectives. Between 20 and 30 measures for whole BSC. Well-balanced set of financial, non-financial, lagging and leading measures representing all parts of organisation. BSC

	measures are regularly discussed in management meetings. Written documented definitions for BSC measures.
KPIs	Establishing relative importance of KPIs before implementing BSC. Relative weights and appropriate “balance” among KPIs determined before implementing the BSC.
Cause-end-effect linkage	Establishing relationships and linkages between KPIs. BSC support relationship definition to provide cause and effect modelling. Cause and effect relationships between data elements are looked into to ensure resources are being correctly allocated.

Main Factors – Sustainability Stage	
Automating BSC	Choosing adequate software for BSC implementation that achieves organisation requirements. All the results automatically sent to right employees at right time and in right frame. BSC software integrated with other software. Regular maintenance and updating for BSC software.
Updating BSC measures and linking with rewards	Measures re-visited and re-defined on regular basis. Measures re-visited to confirm continued relevance. Updating BSC measures at least once a year. Linking compensation and rewards to BSC measures results.
Corporate alignment	Identifying key strategic initiatives to achieve objectives, and allocating resources appropriately. Alignment of tangible and intangible assets with strategy. BSC measures works in congruence with organisation's strategic objectives.
Benchmarking	Benchmarking made against primary competitors. Informal benchmarking and other forms of information sharing with organisations in different sectors and industries to identify best practices for improvements and opportunities. Targets stretched according to external benchmarking.

Main Factors - Implementation Stage	
Rolling out implementation plan	Developing comprehensive implementation plan for BSC. BSC comprehensive implementation plan divided into subgroups. Leader for each subgroup appointed, and responsibilities assigned. Using the top-down approach. Developing clear communication between top-level and shop floor.
Cascading BSC	Using top-down approach. Linking objectives from executive level down to lower business level, ensuring everyone working towards common goals. Communicating BSC to every level of organisation and comparing current performance with past results.
Information system design	Information system communicating BSC requirements and best practice indicators. Technology is strategy planned and utilised to improve communication and access to services for customers and Stakeholders. BSC team actively gathers, integrates, and communicates information critical to implementation and practice of BSC.

Main Factors - Benefits Realisation Stage	
Regular reporting	BSC deliver to top management and employees on regular base. Information of BSC reaches right people, in right format, at the right time and in right quantity. Result of BSC measures incorporated into regular reporting system. Using BSC feedback to adjust strategic plan during operating period.
Measurement assessment	Measures assessed according to BSC results. Reviewing measures frequently and identifying right combination of measures.
Problem solving and action planning	Problem solving and continuous improvement processes, based on BSC results, facts and systematic analysis. Team approach in problem-solving and continuous improvement. Employees empowered to resolve problems and improve processes. Encouraging culture of teamwork and problem solving. Action taken as a result of measurement activities. Measurement results used to drive decision making throughout organisation. Management regularly checks that actions related to achievement of BSC targets are taken.

Main Factors - Planning Stage	
Communicate BSC	BSC is communicated throughout organisation from top to low level. Providing commentary and written guidelines for users of scorecard. Employees well-informed about BSC development continuously. Strong communication system between departments. Using various communication devices is begin BSC project, such as executive announcements, videos, town meetings, brochures, and newsletters.
Initial Plan	Prepare initial plan for BSC development and implementation. Identification of sources of performance data before implementation. Identification of critical processes that should be excelled at in order to meet objectives of shareholders and of targeted customer segments.
Stimulate culture	Stimulating employees' culture for BSC implementation by increasing education in performance measurements. Shifting managers' efforts from single-minded focus on growth/financial figures to broader set of objectives that encompass profitability and non-financial performance. Convince employees that BSC measures exist to evaluate and improve their performance, not to blame them.

Main Factors - Learning and innovation stage	
Learning and innovation	Strategic feedback system in place. Performance appraisal system encourages learning and innovation. Existence of learning environment encourages people to innovate and share best practice and knowledge. Encouraging employees to voice opinions, criticisms and feedback on organisational functioning and performance.

Supporting Factors	
Integration	BSC integrated into strategic management system. Integration of BSC automation software with internet and email to share analysis and results. Process of goal deployment and performance improvement linked to performance appraisal as integrated system.

Self-assessment	Implementing self-assessment frequently. Use of self-assessment tools and other mechanisms to track and improve performance gaps in implementation and effectiveness of systems, processes and practices. Recognising weakness in activities and improving it.
Finalise measures	Before implementing BSC, measures reviewed and finalised. Customers involved in establishing objectives and measures for customer perspective. Organisation selects correct performance measures for assessing desired performance.
Fine tuning and refining	BSC communicated to every level of organisation and compares current performance with past results. Organisation's measures have been refined according to BSC reporting results. Results of organisation measures reflect understandable causal relationship between performance effort and performance result.
Finalise BSC plan	Measures have direct link to strategy. Organisation calculates costs and benefits of its measures collection. BSC team or employees are able to explain both operational and strategic significance of every measure. Measures accurately depict the process or objectives it is attempting to evaluate. Organisation specifies precise meaning of its performance measures and ensures that it has agreement with BSC team.

E) Performance Measurement Instrument

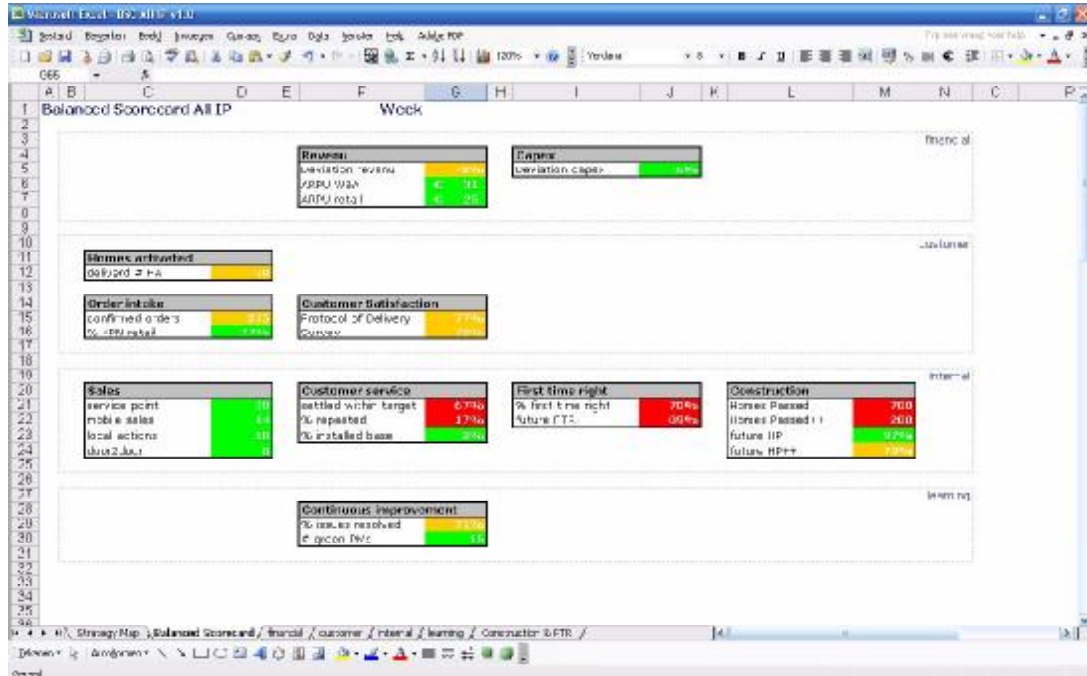


Figure 37 - sheet Balanced Scorecard

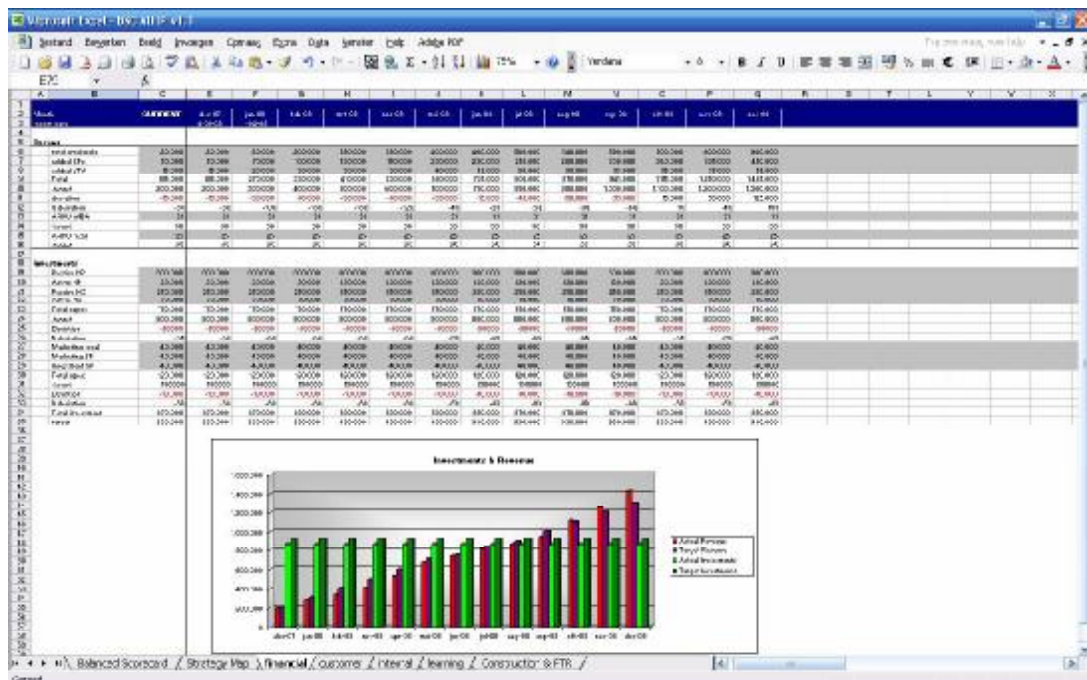


Figure 38 - sheet financial perspective

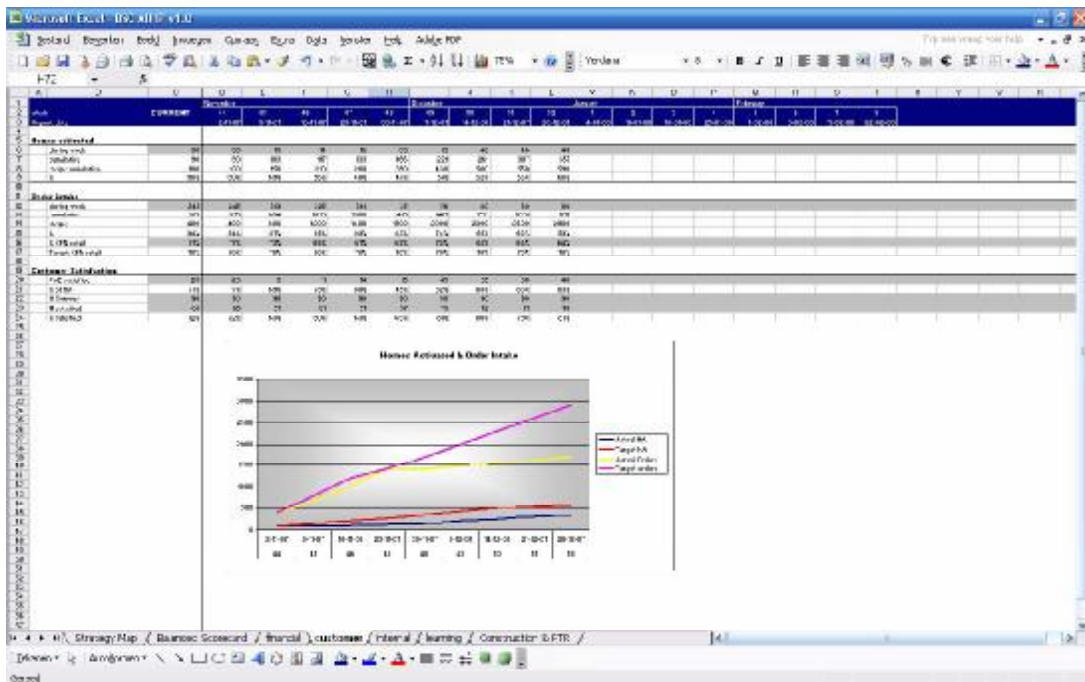


Figure 39 - sheet customer perspective

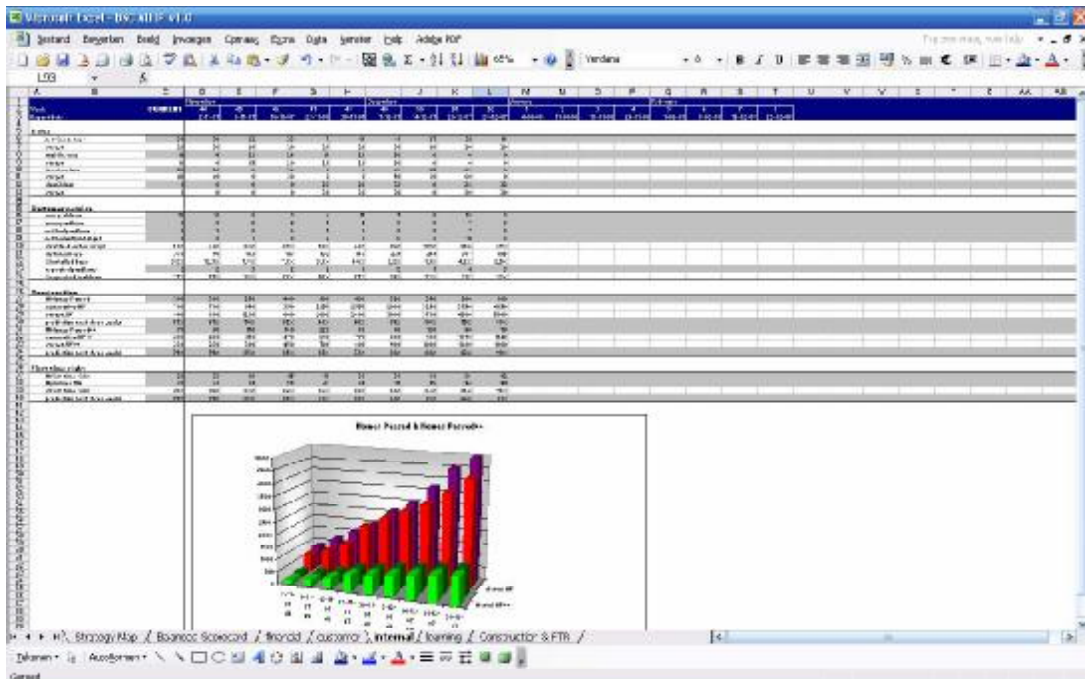


Figure 40 - sheet internal perspective

