Improve CMDB
NXP Interfacing

NXP Semiconductors Netherlands B.V.

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Author:	Henri den Hollander
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Education: Fontys Hogescholen

                    HBO-ICT ICT & Business

                    Rachelsmolen 1

                    5612 MA Eindhoven

Company: NXP Semiconductors

                    BP&A TA

                    High Tech Campus 60

                    5656 AG Eindhoven

Student: Henri den Hollander

Student number: 1339450

Company supervisor: Mr. M. Smit

Fontys supervisor: Mr. M. Dorenbos

Fontys supervisor 2: Mr. K. Vleugel

External expert: Mr. W. Knops

Preface

In the summer of 2009 I got permission to start the last phase of my part-time study ICT & Business at Fontys Hogescholen Eindhoven. While working as a consultant ICT for the company Ordina NV, I was contracted by NXP Semiconductors in the Application Integration Team of the IT department based in Eindhoven. NXP Semiconductors is a global semiconductors manufacturing company with their headquarters based in the Netherlands. NXP creates semiconductors like diodes, power management IC's, microcontrollers and chips for RF solutions. The IT department supports the business units and their factories by creating and supporting IT solutions. At the NXP Semiconductors IT department, BP&A TA, I was given the opportunity to work on my graduation. An improvement plan initiated by my own team seemed the perfect assignment.

Even though it was not clear what could be gained financially by executing an improvement project, I was allowed to start this project in September of 2009. The project delivered an automated solution for configuration management database to support the operational ITIL processes in the interfacing landscape of NXP, that can (and will) be easily reused for other processes in the future.
This thesis describes the assignment and the process to complete the project successfully.

I am proud of my achievements and of the products delivered by this project. People outside my team at NXP are enthusiastic about the new solution also, and it has been implemented already. The GUI delivered is reusable, and can support other applications as well.

This project would have never been completed, with such a great success, without the support of people from the NXP organization and Fontys Hogescholen.
I would like to thank NXP Semiconductors, and Marty Smit in particular, for the opportunity to graduate with the improvement project at NXP. It was very nice having Marty as my coach at NXP, to improve my project management skills. Many thanks as well to my colleagues in the team for their support and willingness to back me up in my work.
Furthermore I thank my thesis supervisor, Marco Dorenbos, from Fontys Hogescholen for his advice, guidance and motivation.
Last but not least, special thanks to Vivek Verma, a senior developer on my team BP&A TA AIT, for his great support in building the GUI. Without his effort it would have been very difficult to complete the project successfully.

Henri den Hollander
August 2010

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Summary

NXP Semiconductors is one of the leading semiconductors companies, with their headquarters based in the Netherlands. NXP is a company with factories and offices around the globe and it has a large and complex IT infrastructure. The support for the IT infrastructure is the responsibility of the IT department Business Processes & Applications (BP&A), which is located in Eindhoven on the High Tech Campus.

The IT landscape is a global network with many corporate applications and IT systems located in several data centers around the world. Numerous interfaces are implemented to connect the applications and support the exchange of information. With that many interfaces in the global infrastructure it is important that the availability is guaranteed. NXP uses the ITIL operational processes to support the IT landscape. These processes rely on a well maintained source of configuration data, a configuration management database (CMDB).

The current operating procedure for the CMDB is insufficient and configuration data is stored in several other places as well. The maintenance of the configuration data is a manual process and correctness or non-redundancy of the data is not enforced. To improve the CMDB, BP&A defined an improvement project. The objective was to create a CMDB in a database that would be the single source of configuration data for the interfacing landscape, and could be used by automated processes in the future as well. Besides that a GUI was built to view and update the configuration data.

The standard NXP project methodology, based on PRINCE2, was used to execute the project. All the phases of the methodology have been executed. The requirements gathering, design, development and implementation were all performed internally by the Application Integration Team (AIT), which is part of BP&A Technology Advancement.

The solution provided by this project consists of a database implementation based on a new standard format for configuration items (CI's) of the BP&A integration landscape. Currently 4500 documented configuration items are loaded in the database. It is capable of storing CI's outside the initial scope as well. A Graphical User Interface (GUI) has been delivered to maintain the configuration data in the database. The users of the application are all member of the BP&A support structure. They will benefit from this solution, since the operational ITIL processes are now supported by a consistent and reliable CMDB.

The project was completed successfully and well within budget. With the configuration data available in a database, other tools can make use of the data directly and the CMDB will be the sole source of truth. This new CMDB is the necessary foundation for further improvements on managing the integration landscape. The GUI is easy to use and highly configurable. The implemented solution can be used for new tools in the future and replace existing GUI's built for older tools.

1   Introduction

More than one million messages flow through the integration landscape of NXP Semiconductors a week. It has deployed almost 1200 components and over 850 message flows have been defined and developed between all corporate applications in more than 25 cities all over the world. Important information for the core business processes of NXP flow through these components, so the application can communicate with each other.

NXP Semiconductors is a leading semiconductors company with their headquarters based in the Netherlands. The IT department Business Processes & Applications (BP&A) where this assignment is executed is located in Eindhoven on the High Tech Campus. The support for the IT infrastructure and corporate applications is the responsibility of BP&A. With that many interfaces being part of the core business processes of NXP it is very important that the ITIL processes are under control. Incidents must be solved quickly and changes deployed smoothly. These processes rely on a well maintained source of configuration data, the configuration management database (CMDB).

Currently the CMDB for the interfaces of the BP&A IT landscape are maintained in an Excel sheet, which is difficult to manage. This Excel sheet can not be used by other processes, so configuration data is stored in other places as well. To improve the CMDB, BP&A Technology Advancement (solution team TA) defined an improvement project. The objective is to replace the Excel sheet with a CMDB in a database that can be used by automated processes as well. Besides that a GUI will be built to view and update the configuration data. The improved CMDB will enforce correct and reliable data and is the basis for other improvements within BP&A TA, such as version control linked to the CMDB and automated deployments of components in all environments.

For the approach of this project it is mandatory within NXP Semiconductors' IT department to use the NXP project methodology, which is based on PRINCE2. For this thesis all the phases of the methodology have been executed.

1.1   Scope

The scope of this thesis is within the NXP Semiconductors IT department BP&A (located in Eindhoven Headquarters). The project concerns an improved CMDB for the existing and future TIBCO interfaces for the integration of corporate applications. Within the solution team TA, the Application Integration Team (AIT) is responsible for these interfaces.

BP&A TA has defined a master plan for improvements, which will result in lower costs and better support for the business processes of NXP. Our team (AIT) also contributed to that master plan and has defined several improvements. This thesis is one of the improvements defined by AIT.

1.2   Document Structure

This document describes the thesis for the project "Improve CMDB" of NXP Semiconductors. In chapter 2 the company NXP and the department are described. The rest of this document is logically built following the stages of the project methodology executed for this assignment. Chapter 3 contains all information about the assignment and chapter 4 the methodology. The requirements are described in chapter 5, which are followed by the design in chapter 6. The results of the project are described in chapter 7. The final project phase can be found in chapter 8. Chapter 9 lists the conclusions and recommendations of the project and in chapter 10 the assignment is evaluated.

1.2.1 Audience

This document is intended for following readers:

Role	Name	Organization
Thesis Supervisor	M. Dorenbos	Fontys Hogescholen ICT
Secondary Supervisor	K. Vleugel	Fontys Hogescholen ICT
External Expert	W. Knops	External
Company Supervisor	M. Smit	NXP Semiconductors

This document is furthermore intended for all individuals interested in this project.

1.3 Related Documents

Knowledge of the following documents is required:

Document title	Author	Organization	Document ID	Version
Create_CMDB_NXP_interfacing _PID.doc	Henri den Hollander	NXP BP&A TA AIT	018399	1.0

1.4 References

This document uses the following reference documents:

Document title	Author	Organization	Document ID
Create_CMDB_NXP_interfacing_Process .doc	HdH	NXP BP&A TA AIT	PD_CMDB

1.5   Used terminology and abbreviations

The following definitions and abbreviations are used within this document:

Term	Description
AIT	Application Integration Team
BP&A	Business Processes & Applications
CI	Configuration Item
CMDB	Configuration Management DataBase
COBIT	Control Objectives for Information and related Technology
CSV	Comma-Separated Values
E2E	End-to-End monitoring tool
ESB	Enterprise Service Bus
FMO	Future Mode of Operation
GUI	Graphical User Interface
HTML	Hypertext Markup Language
HTTP	Hypertext Transfer Protocol
ITIL	Information Technology Infrastructure Library
J2EE	Java Enterprise edition
JAR	Java Archive
JDBC	Java Database Connectivity
JRE	Java Runtime Environment
JSP	Java Server Pages
PMO	Present Mode of Operation
RF	Radio Frequency
SIM	Service Integration Management (BP&A TA Operations)
SQL	Structured Query Language
TA	Technology Advancement (solution team within NXP BP&A)
TAM	Technical Application Management
TCS	Tata Consultancy Services (supplier)
TIBCO	The Information Bus Company (Supplier of Integration software)
XML	Extensible Markup Language

1.6   Document history

VERSION	DATE	DESCRIPTION	AUTHOR
0.1	2010-05-28	Initial layout	HdH
0.2	2010-06-07	Additions	HdH
0.3	2010-08-01	Additions (Last chapters, Conclusion)	HdH
0.4	2010-08-04	Proposal	HdH
1.0	2010-08-09	Final	HdH

2   **Organization**

NXP Semiconductors provides High Performance Mixed Signal and Standard Product solutions that leverage its leading RF, Analog, Power Management, Interface, Security and Digital Processing expertise. These innovations are used in a wide range of automotive, identification, wireless infrastructure, lighting, industrial, mobile, consumer and computing applications. Headquartered in Europe, the company has about 27,000 employees working in more than 25 countries and posted sales of USD 3.8 billion in 2009.

Locations around the world and in Europe are shown in figure 1 and 2.

Figure 1
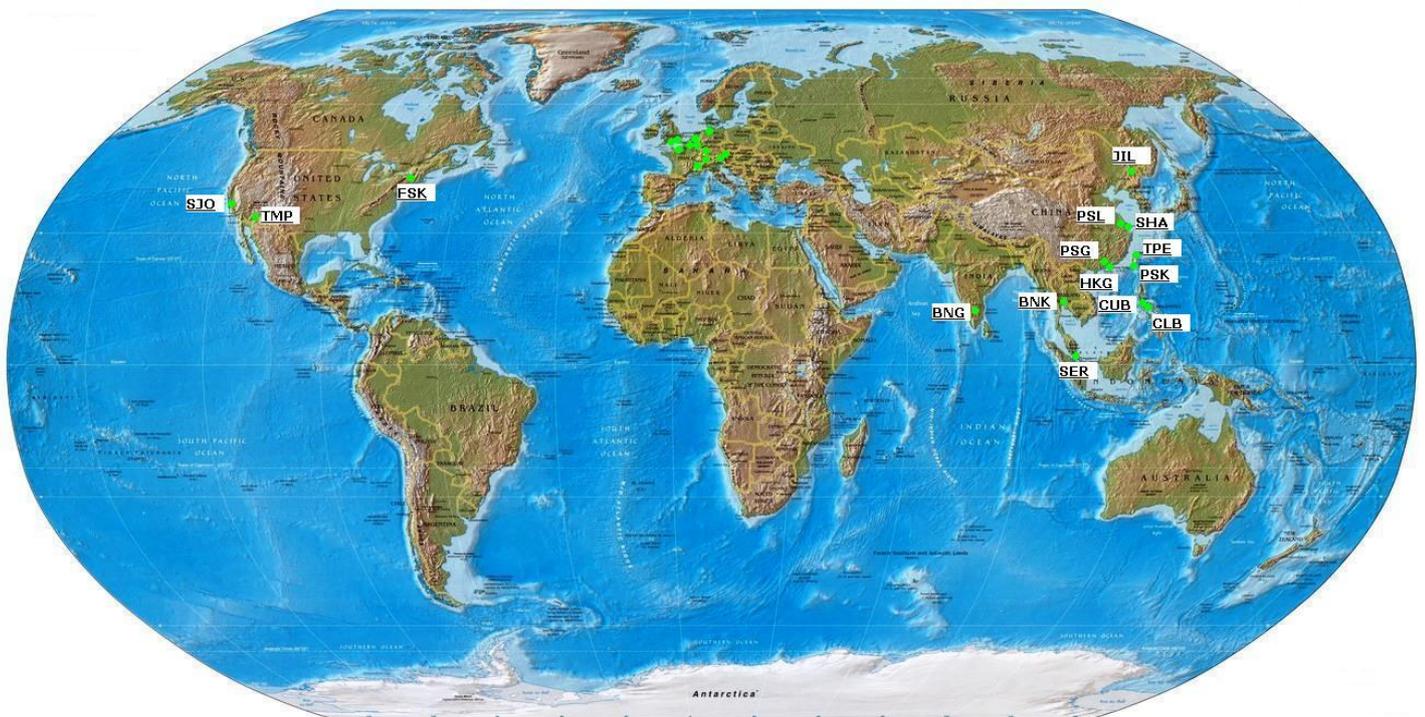
Figure 2
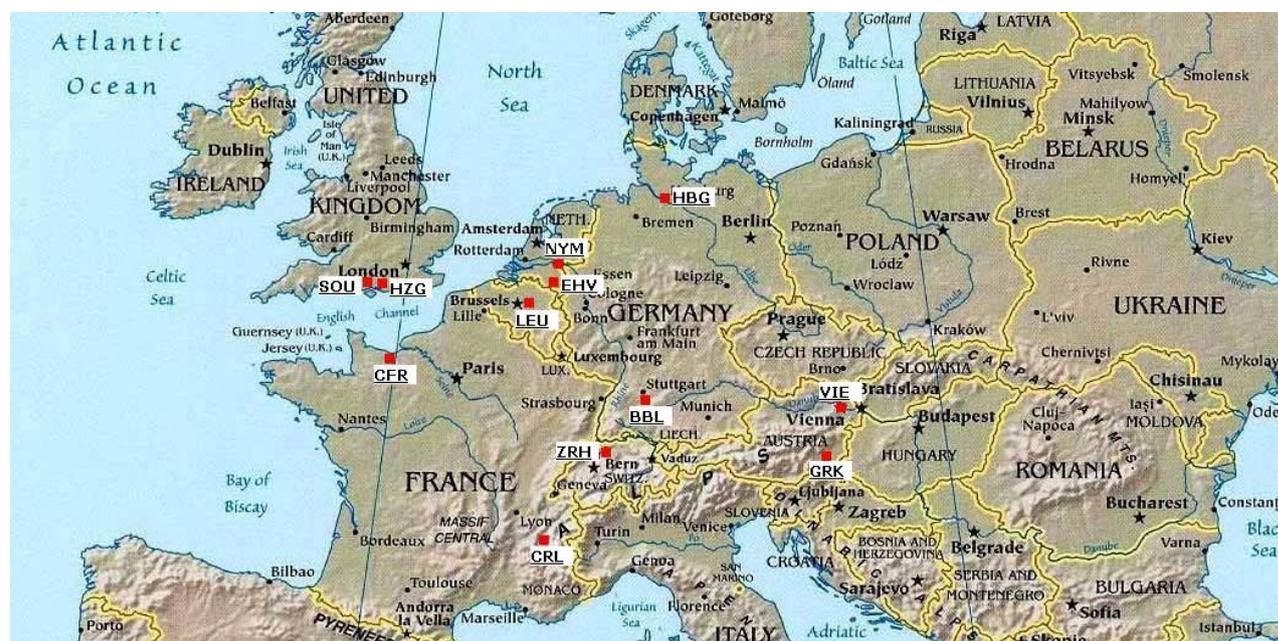
2.1 History

NXP Semiconductors was created on 29 September 2006 from Philips Semiconductors Product Division of the Royal Philips Group. It became a separate legal entity called NXP Semiconductors, and is owned by a consortium of private investment companies (Kohlberg Kravis Roberts and Co., Bain Capital, Silver Lake Management Company, Apax Partners Europe Managers, AlpInvest Partners, and other investors) and Royal Philips Electronics. Royal Philips Electronics retained a minority stake in NXP. NXP is one of the World's leading semiconductor suppliers. In 2008, NXP had sales of USD 5.4 billion (including the Mobile & Personal business), 30,000 employees, sales offices in 60 countries, and 13 manufacturing plants in Europe, the USA and Asia. The company is a leading supplier of application specific system solutions and components to the Home Consumer Electronics, Automotive, Identification and Multi Market Semiconductor device markets. Over 70% of the total sales is generated with the top 35+ accounts. NXP values its customers as partners and align roadmaps and future plans via strong key-account relationships. One of the most innovative product solutions is a highly integrated "system-on-chip" (SoC) platform designed to address the challenges of digital convergence through the implementation of advanced, flexible featuring.

2.2 Vision

NXP's vision is to create "A sustainable world where trusted NXP technology makes life safe, entertaining and convenient". Its vibrant media technologies make it easy to bring new product ideas to life, for example; creating better sensory experiences for consumers: brilliant images, crisp clear sound, and easy sharing of information in homes, cars, and mobile devices. All with exceptional effectiveness and efficiency. With NXP as a partner, customers will be more successful by bringing products to life that deliver better sensory experiences.

2.3 Mission NXP Semiconductors

1. NXP is a leader in semiconductor technologies that enable our customers to create products that deliver safety & security, promote sustainability and enable vibrant media experiences.
2. Become the market leader in Home, Automotive, ID and Multi-Market by delivering excellent, innovative semiconductor components and solutions, based on superior insights in value add for our customers.
3. Continue to be a large-scale, diversified portfolio company.

NXP Semiconductors' aspirations:
"We intend to expand on, or to achieve leading market shares in the mainstream markets for Home, Automotive, Identification and Multi Market Semiconductors. This will further improve our ability to shape the applications and markets in which we operate and will allow us to achieve the scale required to be able to fund the development of system solutions in advanced process nodes. Our leadership in system solutions for our target application markets is based on in-depth systems know-how obtained through our long-standing relationships with market shaping customers and through product performance and price leadership in selected application-specific components driving overall system performance. In addition, we seek to expand in our multi-market semiconductor business through both autonomous market share growth and acquisitions, because increased leverage of our existing asset base significantly drives profitability and cash flow. Our standard product families extend the useful life of our existing equipment and manufacturing facilities and bring scale benefits to our manufacturing infrastructure.
We aim to increase the competitiveness of our product roadmaps, deepen the penetration of our key accounts and further leverage distributors, independent design houses and software/service partners. In addition, we aim to penetrate selective, promising emerging countries and regions (e.g., Eastern Europe, India, Brazil) and application markets."

2.4   Organization structure

Since January 2009 Richard (Rick) Clemmer is the Chief Executive Officer of NXP Semiconductors. Mr Clemmer succeeded Peter van Houten. The company can be divided in three sections, as shown in the chart below (Figure 3). The sections Businesses and Core Processes are responsible for the main business processes of NXP. The third section holds all the support departments, of which the IT department is responsible for all business applications and other IT related systems.

Figure 3
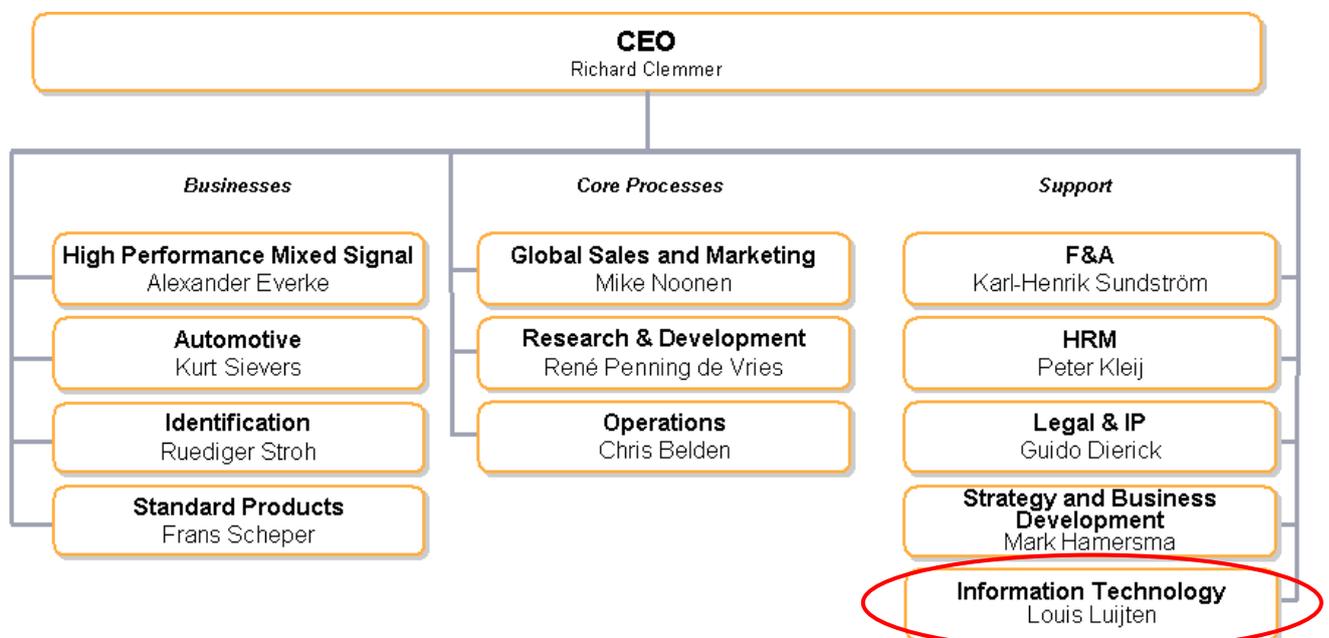
Within the department Information Technology (Figure 4) the support for the different sections is spread over four groups. The businesses are supported by Manufacturing IT, Research & Development is by Engineering IT. Generic IT is responsible for all shared services and the rest, like Sales & Marketing, F&A, HRM and the overall business applications are supported by BP&A (Business Processes & Applications). The project that is part of this thesis is executed within BP&A (Figure 5).

Figure 4
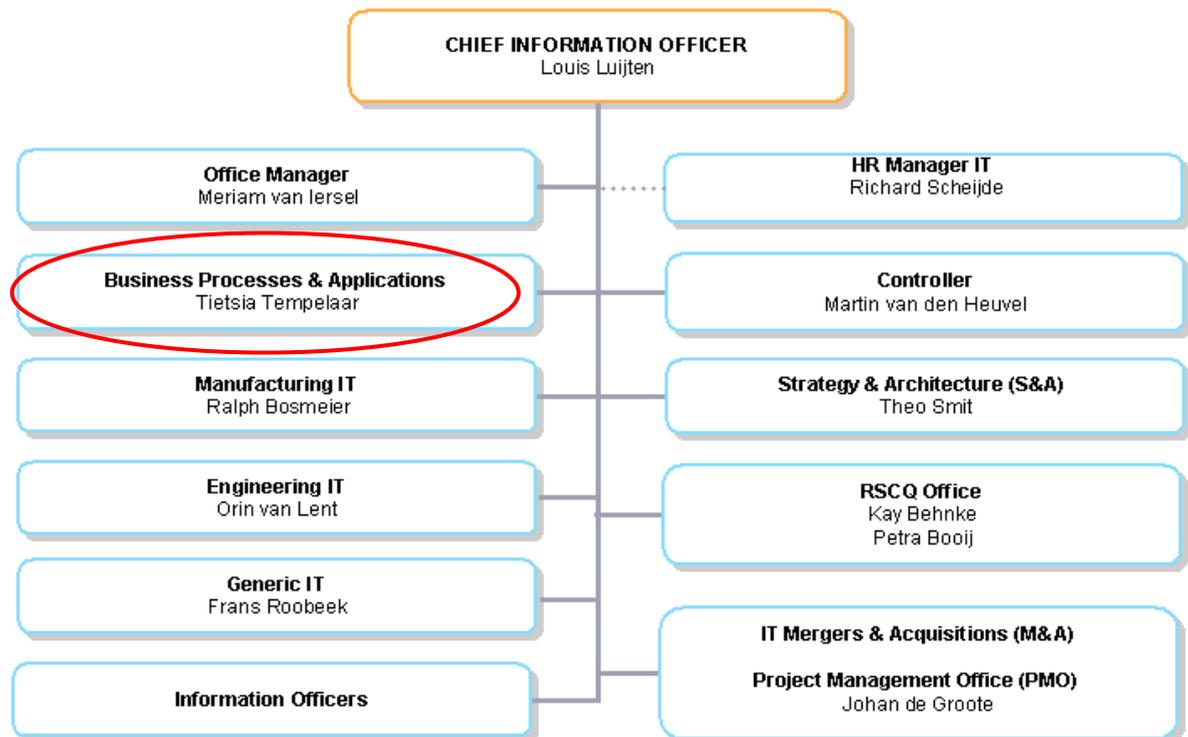
Figure 5
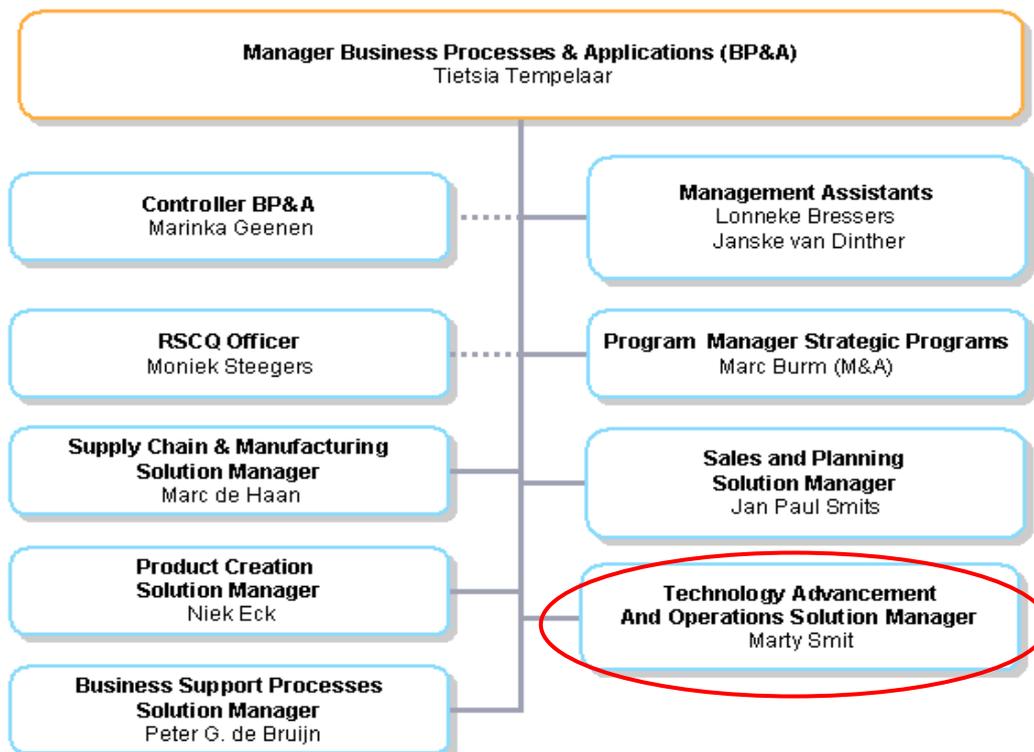
The department BP&A has five solution teams, each supporting different business processes. Four of these teams are functional oriented and Technology Advancement (TA) is the technical solution team. In TA the many specialties are divided over multiple teams. For example the infrastructure (data centres, machines and network) is managed in Technical Infrastructure Management (TIM), a team supporting SAP and the Application Integration Team (AIT) is responsible for all interfacing between the applications managed in BP&A. AIT is the driver for this project.

Figure 6
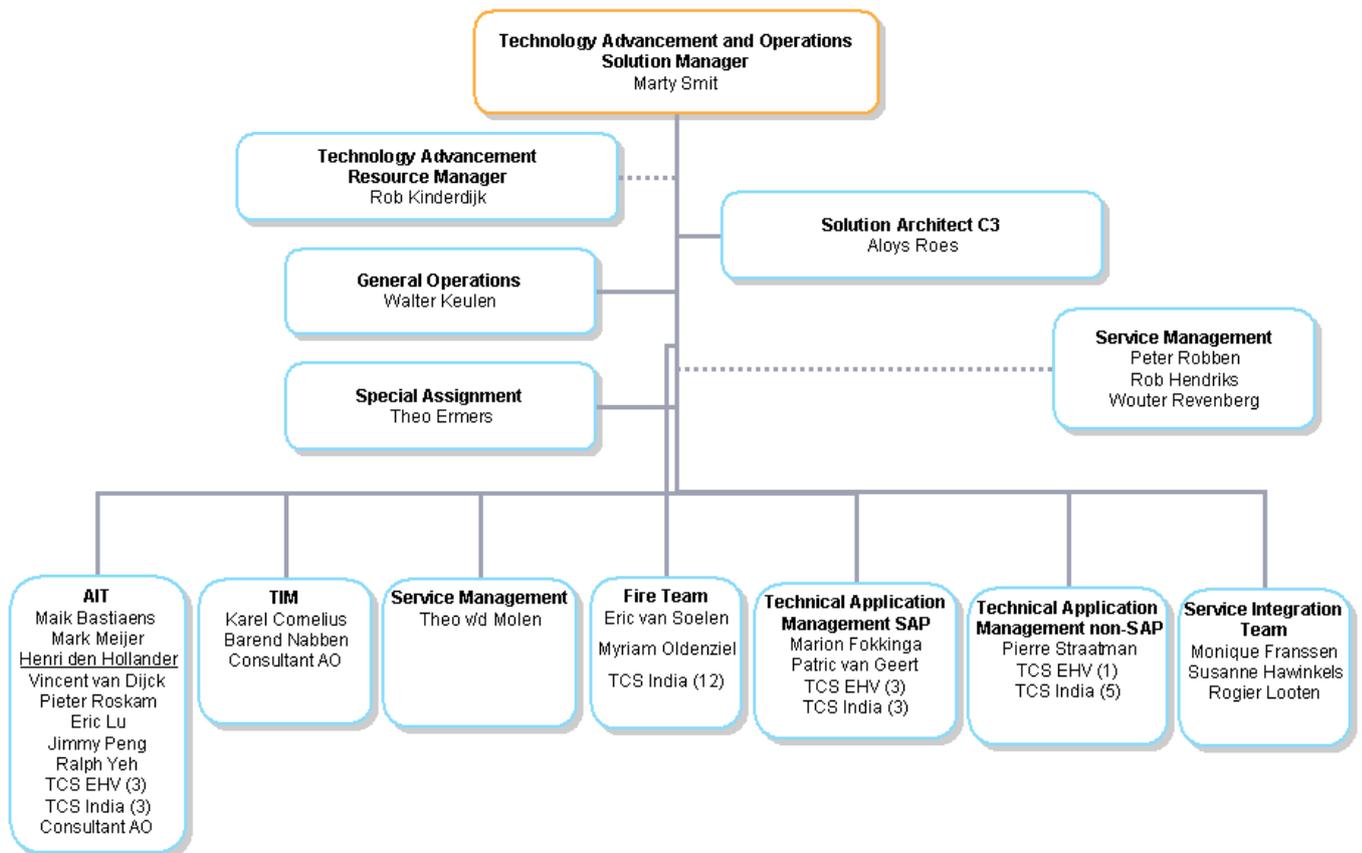
3   Assignment

3.1   Introduction

BP&A is part of NXP-IT and is responsible for Corporate IT business applications. BP&A facilitates the NXP business in executing and optimizing their processes by providing the IT applications and infrastructure. BP&A delivers the following IT services:

- Operate and maintain business applications at agreed service levels in an efficient and cost effective way;
- Harvest on existing applications by review and improvement cycles;
  - o Extend and improve usage and efficiency of existing solutions;
  - o Increase the IT benefits by better alignment of business processes and IT solutions.
- Configure or develop, and implement business applications;
  - o this often means purchase an application and integrate with help of the business;
  - o deliver fast, using standard functionality and improve in the "harvest on" phase.

The IT applications and infrastructure provided to the business side of NXP consists of many applications, resulting in a large and complex landscape. The infrastructure is spread across the satellite sites around the globe. All these applications are connected to exchange information and support the business processes. The exchange of information between applications is called an interface. Below in figure 7 a high level impression of the integration landscape is shown.

Figure 7
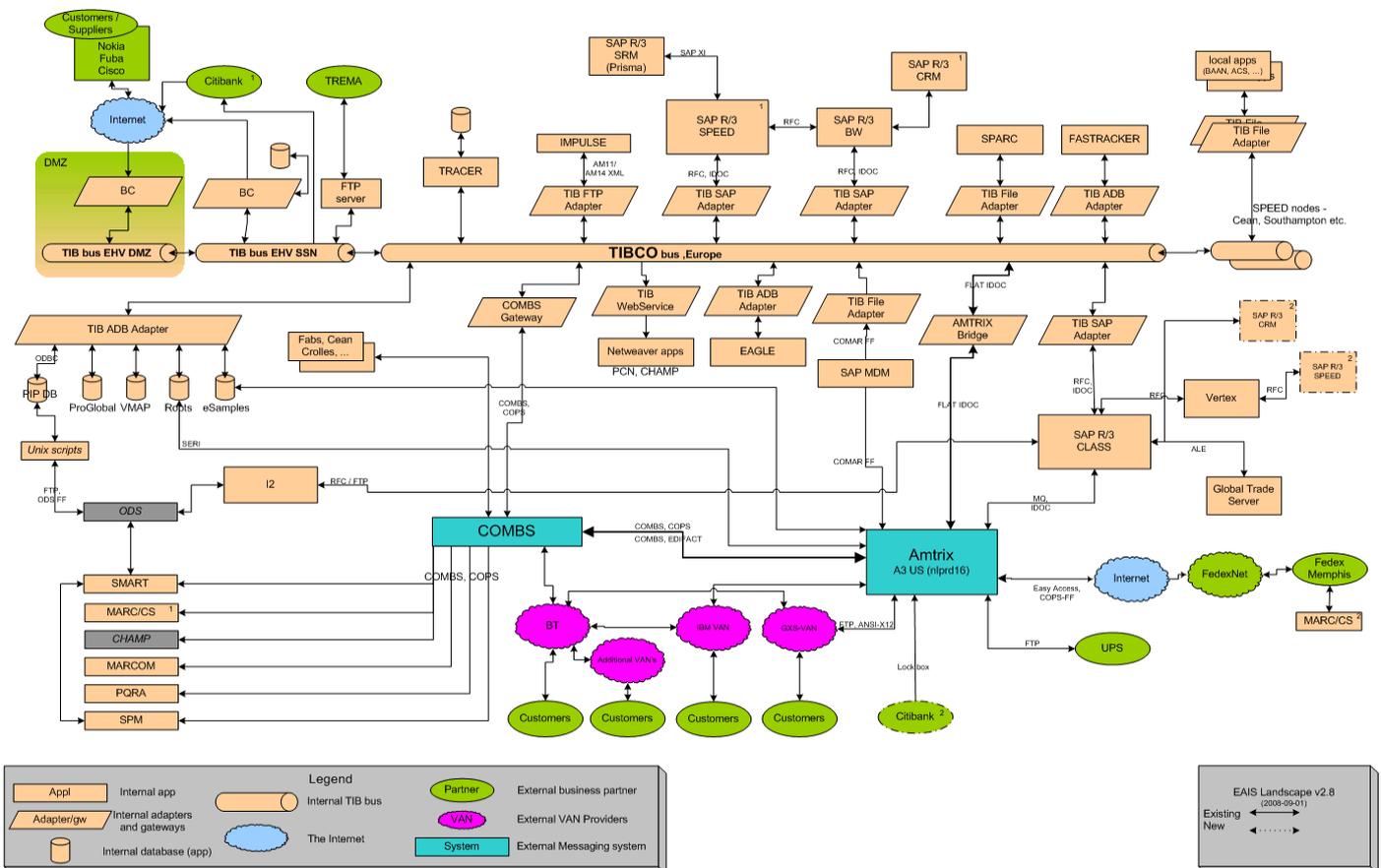
All the interfaces together form the integration bus, also called an Enterprise Service Bus (ESB). Within NXP-IT BP&A, the Application Integration Team of the solution team Technology Advancement is responsible for all interfaces. The interfaces are created in several products of integration software from TIBCO.

The information flowing through an interface is actually a message going from one application to another. The message passes through multiple components and operations are being performed on the message. Operations can be translations, routing logic, mappings or deliveries to an application. The operations are distributed over multiple components in the landscape.

These interfaces are developed in TA AIT according the reference architecture of NXP. Several standard solutions, integration patterns and a framework have been developed in the past.

Figure 8 shows an example of an interface pattern.

Figure 8
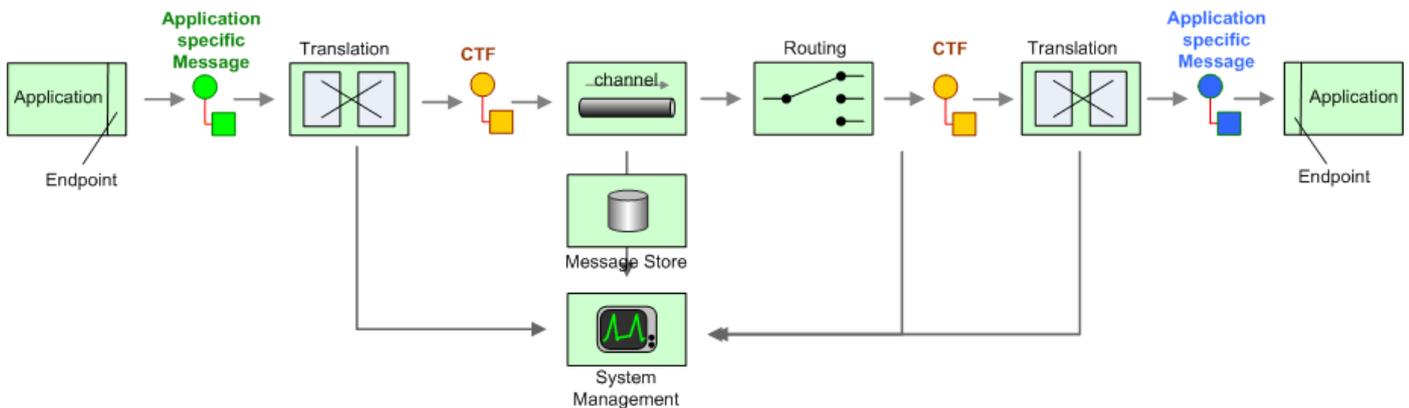
3.2   PMO

All the objects described in the previous paragraph need to be stored in the CMDB. Information about the interface that is stored is the Business process that flow belongs to and what applications it is connected to. Also parameters like complexity and criticality of the message flow are stored. Components executing operations on the messages need information about the location where they are running and on what machine. A component also belongs to a repository, which is a collection of processing logic. A selection of this logic is packaged and can be deployed into the landscape as a component.

The current Configuration Management Database (CMDB) is maintained in an Excel sheet and therefore not easy to use. Mistakes are easily made and overlooked, and for this reason it is not reliable. The CMDB contains all data of the message flows on the TIBCO infrastructure. This is used for the ITIL processes incident and change management.
The sheet is also very difficult to use in relation to other (automated) processes, like the new E2E (End-to-End) monitoring framework that needs the configuration items (CI's) for correct error handling and event handling. Currently the team lead of the TCS TAM TIBCO support organization is managing the additions, changes, and deletions manually in the Excel sheet. The team lead also extracts an overview of the operational message flows for sharing with NXP BP&A Operations and other suppliers of NXP. The CI's need to be shared since the interfaces connect applications supported by these other suppliers. Also in case of incidents, the correct CI needs to be communicated.

Figure 9 shows part of the exchanged list.

Figure 9

Status	InterfaceName	Complexity	Criticality	MsgFlowName	MsgType	Direction	Remarks	Application	Application Type	ApplicationInterfaces.Remarks
Operational	GENLDG_EMPEXP	Medium	Low	GENLDG_EMPEXP_HKG	I074	Inbound	Employee	SPEED	NONB2B	SEV1_NOTALLOWED-NL:8019916
Operational	GENLDG_EMPEXP	Medium	Low	GENLDG_EMPEXP_HZG	I074	Inbound	Employee	SPEED	NONB2B	SEV1_NOTALLOWED-NL:8019916
Operational	GENLDG_EMPEXP	Medium	Medium	GENLDG_EMPEXP_LEU	I074	Inbound	Employee	SPEED	NONB2B	SEV1_NOTALLOWED-UK:C617925
Operational	GENLDG_EMPEXP	Medium	Low	GENLDG_EMPEXP_PSK	I074	Inbound	Employee	SPEED	NONB2B	SEV1_NOTALLOWED-NL:8019916
Operational	GENLDG_EMPEXP	Medium	Low	GENLDG_EMPEXP_SHA	I074	Inbound	Employee	SPEED	NONB2B	SEV1_NOTALLOWED-NL:8019916
Operational	GENLDG_EXCRATES	Low	High	GENLDG_EXCRATES_EHV	I004	Inbound	Exchange	SPEED	NONB2B	SEV1_ALLOWED-NL:8019916
Operational	GENLDG_FINMTHEND	Low	High	GENLDG_FINMTHEND_EHV	I005	Outbound	Financial	SPEED	NONB2B	SEV1_ALLOWED-NL:8019916
Operational	GENLDG_GDSMVMT	Medium	High	GENLDG_GDSMVMT_BNK	I011	Inbound	Financial	SPEED	NONB2B	SEV1_ALLOWED-NL:8019916
Operational	GENLDG_GDSMVMT	Medium	High	GENLDG_GDSMVMT_CFR	I011	Inbound	Financial	SPEED	NONB2B	SEV1_ALLOWED-NL:8019916
Operational	GENLDG_GDSMVMT	Medium	High	GENLDG_GDSMVMT_CLB	I011	Inbound	Financial	SPEED	NONB2B	SEV1_ALLOWED-NL:8019916
Non-Operational	GENLDG_GDSMVMT	Medium	High	GENLDG_GDSMVMT_CRL	I011	Inbound	Financial	SPEED	NONB2B	SEV1_ALLOWED-NL:8019916
Operational	GENLDG_GDSMVMT	Medium	High	GENLDG_GDSMVMT_CUB	I011	Inbound	Financial	SPEED	NONB2B	SEV1_ALLOWED-NL:8019916
Operational	GENLDG_GDSMVMT	Medium	Low	GENLDG_GDSMVMT_GFR	LFI011	Inbound	Financial	CLASS	NONB2B	SEV1_NOTALLOWED-NL:8019916
Operational	GENLDG_GDSMVMT	Medium	High	GENLDG_GDSMVMT_HKG	I011	Inbound	Financial	SPEED	NONB2B	SEV1_ALLOWED-NL:8019916
Operational	GENLDG_GDSMVMT	Medium	High	GENLDG_GDSMVMT_NYM	I011	Inbound	Financial	SPEED	NONB2B	SEV1_ALLOWED-NL:8019916
Operational	GENLDG_GDSMVMT	Medium	High	GENLDG_GDSMVMT_PSG	I011	Inbound	Financial	SPEED	NONB2B	SEV1_ALLOWED-NL:8019916
Operational	GENLDG_GDSMVMT	Medium	High	GENLDG_GDSMVMT_PSK	I011	Inbound	"Financial	SPEED	NONB2B	SEV1_ALLOWED-NL:8019916
Operational	GENLDG_GDSMVMT	Medium	High	GENLDG_GDSMVMT_PSL	I011	Inbound	Financial	SPEED	NONB2B	SEV1_ALLOWED-NL:8019916
Operational	GENLDG_GDSMVMT	Medium	High	GENLDG_GDSMVMT_SER	I011	Inbound	Financial	SPEED	NONB2B	SEV1_ALLOWED-NL:8019916
Operational	GENLDG_GDSMVMT	Medium	High	GENLDG_GDSMVMT_VIE	I011	Inbound	"Financial	SPEED	NONB2B	SEV1_ALLOWED-UK:C516926
Operational	GENLDG_ICINVOICAR	High	High	GENLDG_ICINVOICAR_EHV	I056	Inbound	InterComp	SPEED	NONB2B	SEV1_ALLOWED-NL:8019916
Operational	GENLDG_INACCRECV	Medium	Medium	GENLDG_INACCRECV_CFR	I014	Inbound	Incoming	SPEED	NONB2B	SEV1_NOTALLOWED-UK:C511136
Non-Operational	GENLDG_INACCRECV	Medium	Medium	GENLDG_INACCRECV_CRL	I014	Inbound	Incoming	SPEED	NONB2B	SEV1_NOTALLOWED-UK:C511136
Operational	GENLDG_INACCRECV	Medium	Medium	GENLDG_INACCRECV_HKG	I014	Inbound	Incoming	SPEED	NONB2B	SEV1_NOTALLOWED-UK:C511136
Operational	GENLDG_INACCRECV	Medium	Medium	GENLDG_INACCRECV_PSG	I014	Inbound	Incoming	SPEED	NONB2B	SEV1_NOTALLOWED-UK:C511136
Operational	GENLDG_INACCRECV	Medium	Medium	GENLDG_INACCRECV_VIE	I014	Inbound	Incoming	SPEED	NONB2B	SEV1_NOTALLOWED-UK:C511136
Operational	GENLDG_LGLFINEMP	Medium	Low	GENLDG_LGLFINEMP_CFR	I053	Inbound	Legal Rep	SPEED	NONB2B	SEV1_NOTALLOWED-NL:8019916
Operational	GENLDG_LGLFINEMPAB	High	Medium	GENLDG_LGLFINEMPAB_CFR	I059	Outbound	Legal Rep	SPEED	NONB2B	SEV1_NOTALLOWED-UK:C511136
Non-Operational	GENLDG_LGLFINEMPAB	High	Medium	GENLDG_LGLFINEMPAB_CRL	I059	Outbound	Legal Rep	SPEED	NONB2B	SEV1_NOTALLOWED-UK:C511136
Operational	GENLDG_MTHTAXFRA	High	Medium	GENLDG_MTHTAXFRA_CFR	I027	Outbound	Monthly T	SPEED	NONB2B	SEV1_NOTALLOWED-UK:C511136
Operational	GENLDG_MULJOUFLOW	Medium	Medium	GENLDG_MULJOUFLOW_GUS	LFI071	Inbound	Multiple J	CLASS	NONB2B	SEV1_NOTALLOWED-UK:C511136

3.3   Scope

The scope of this project is within BP&A only and concerns the existing and to be developed TIBCO interfaces for the corporate applications. The existing interfaces connect to the following applications:

- SAP Commerce (CLASS) – Central ERP solution for commercial processes (Sales orders, Invoicing)
- SAP Manufacturing (SPEED) – Central ERP solution for manufacturing processes
- Insite – Shop Floor Control system used on the satellite sites
- I2 – Central planning application
- Adexa – Planning application on sites
- DIM3 – Planning application on sites
- SAP BW – Central Business Intelligence application
- Impulse – Central Product Master Data application
- EAGLE – Central Customer Relation Management application
- Extranet applications – Portal for the customers and distributors of NXP
- SNC – ServiceNow.com (SAAS provider for ITIL solutions)
- SPARC – Central project and resource management application
- SMS applications – Sales & marketing applications
- B2B gateways – Connectivity to the customers and distributors
- COMBS – Legacy messaging system

The data model of the new CMDB will have to support the requirements of the E2E monitoring framework for master data as well. This way the E2E reporting tool does not need to maintain its own configuration data of the operational landscape, but will be able to retrieve the information on the configuration items in the landscape from the database of the CMDB. The data model must support the extension of the scope to all interfaces in the BP&A domain next to the TIBCO interfaces as well.

3.4   FMO

The objective is to create a reliable CMDB that can be used by other (automated) processes. To achieve this we have to replace the current Excel sheet containing all message flows and interface components in the NXP integration landscape with a CMDB in a database. The operational ITIL processes that are used within NXP, like change management and problem management, will be much better supported by this new solution. Besides that the data in the CMDB must be made available for automated processes like the lifecycle tooling (scripting for deployments), version control system and the E2E reporting database. This way the single source of master data will enforce correct conventions and consistency through out the system landscape.

The handover processes for updates and maintenance on the CMDB will be done via a GUI (which will be built) on the CMDB for viewing and updating relevant data. With this GUI it will also be possible to generate an extract to provide to BP&A Operations as is done now monthly by the manual process.

3.4.1   Benefits

The following benefits will be realized:
- The CMDB will be used by TCS as well as NXP and can be easily shared with other suppliers
- Improved maintainability
- Improved consistency
- Non-redundant
- Improved change and problem management
- Can be used as master data by automated processes

3.4.2   Deliverables

According to the NXP project methodology, the required deliverables are listed below:
- Functional requirements specification
- Functional design of the data model
- Data dictionary for the data model
- Implementation model for the database
- Technical design for the GUI
- GUI for managing the data in the database
- Test documentation
- User guide

3.4.3   Costs

The cost for this project will only be labour of the resources in the AIT for developing the GUI and the hours spend on the project in NXP office hours.. No additional hardware or software is required, since it is already available. The database schema will be created in an existing database instance on the Oracle Grid.

The total amount of hours estimated for this project is 640 hours, out of which 200 are billable hours, since this project is the thesis of a part-time student as well. The total cost estimated is therefore $19.200,-.

The initial calculation of the @Investor ROI Calculation Form gives a ROI of 350%. This can be explained by the labour that does not have to be carried out by the AIT to support the processes of BP&A and the maintenance of the CI's in a central location.

4   Method

4.1   Introduction

NXP Semiconductors follows the COBIT framework, which states that a project methodology must be used in the company. For this assignment the standard NXP IT Project Management methodology has been applied also. It is based on the PRINCE2 project methodology. All the general and mandatory phases will be executed.

Furthermore the project will have the standard steps in the execution phase. After the initial design phase, an agile (iterative) approach for the design, development and implementation steps will be taken. This way more progress can be made in the beginning of the development within the Application Integration Team (AIT). This will not fit the NXP standard completely, since there is the possibility that the requirements are adjusted during the project. Those changes will have to be approved.

The solution will be developed in-house by the AIT and the new CMDB is part of the improvements defined within the team. The CMDB will be the basis for other improvements.

4.2   NXP IT Project Management methodology

4.2.1   Product Based Approach

The approach is product-based - all efforts are linked to the final "product" of the project. Every stage or phase has specific deliverables, which contributes to the final product of the project. Product-based planning should be used for all stages of planning required for the project, as it ensures that all breakdowns and activities add value and contribute to that final product.

4.2.2   Project Roles

The approach is also role-based. Within a project, people may operate in different roles. The most important roles are:
- Project Executive
- Senior User
- Senior Supplier
- Project Manager

These roles should be assigned to explicitly-named individuals. Within a project there can only be one named Executive and one named Project Manager. There may be several Senior Users and Senior Suppliers. Other roles, like Team Manager or reference team, may exist in a project, but these are not mandatory.

4.2.3   Governance

This methodology is based on "Management-by-exception." Although it is up to the Project Board to define when and how they want to be informed on the status, progress, and issues of a project, it is a basic rule for the Project Manager to inform the Board as soon as scope, budget or planning are outside of the agreed tolerance(s).

4.2.4   Project Flow

Within the NXP-IT project flow (Figure 10), you will recognize "Starting up a Project" (Project Preparation), "Initiating a Project" (Project Initiation), and "Closing a Project" (Project Closure) as PRINCE2 processes. "Directing a Project" and "Planning" are processes which are closely linked to the approvals and the role of the

Project Board. "Controlling a Stage," "Managing Product Delivery," and "Managing Stage Boundaries" are applicable on all execution stages.

Figure 10
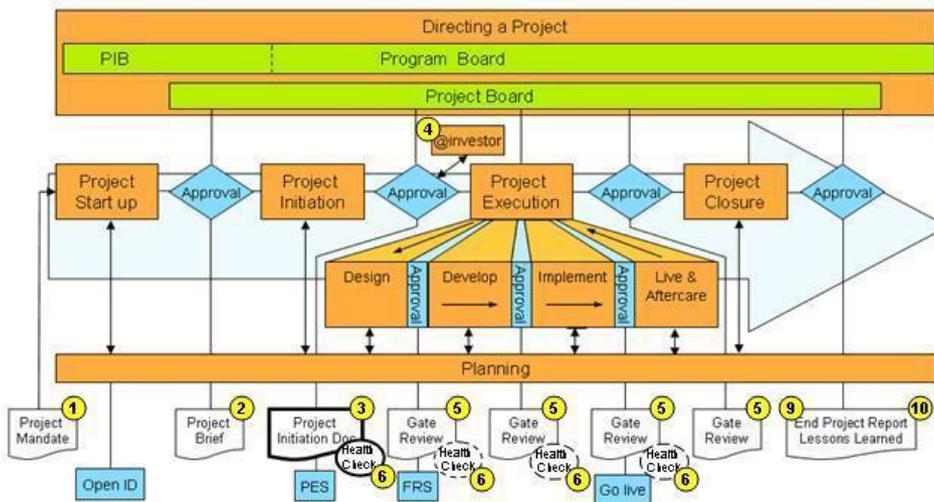
4.2.5 Business Case

The key philosophy in this methodology is that the Business Case must drive the project. If a satisfactory Business Case does not exist, a project should not be started. If a Business Case is valid at the start of a project, but this justification disappears once the project is under way, the project should be stopped. The focus of the Business Case should be on the totality of business change, not just one element of it. It is possible that a Business Case might generate several related projects - a program.
The Business Case is developed at the beginning of the program/project and maintained throughout the project with reviews by the Program / Project Board at each key decision point.

4.3 Quality

First of all the NXP project method requires the project manager to report the progress to the Project Management Office. In this case, monthly High Light Reports are required. The deliverables of the project will be reviewed by technical experts within BP&A TA before they are submitted for approval. This way the documents will be of higher quality and approved more easily.
Testing will be done with the help of test documentation in which the test cases are defined These test cases can be reused later if changes on the application are required.

4.4   Project team

The structure of the project team is shown below in figure 11. The project manager is responsible for the process, and the project members do the development and reviews of the documentation to guarantee quality.

Figure 11

Project Board		
Senior user	**Executive**	**Senior Supplier**

| Project Quality Assurance PSO | Project Manager | Support PSO |

Team
Developer 1
Developer 2
Quality
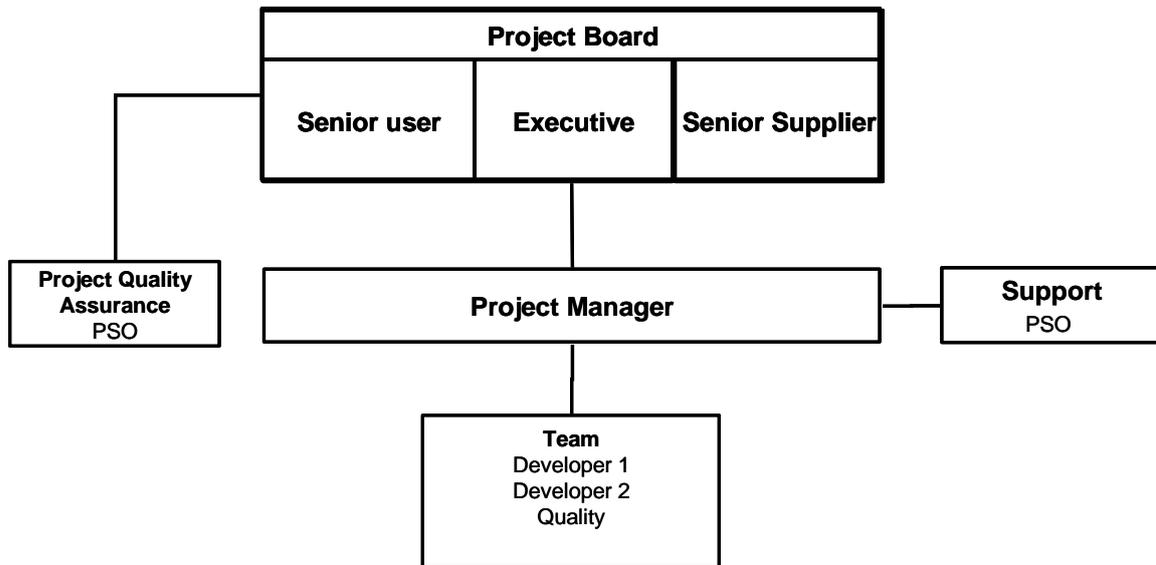
5 Requirements

5.1 Functional requirements

5.1.1 Processes supported by CMDB

Within NXP IT BP&A, the department Technology Advancement (TA) is responsible for the applications, support of the applications and technical infrastructure. The interfaces between all those applications are also the responsibility of BP&A, both functional as well as technical. The TIBCO interfaces connect local applications on the satellite sites all around the world with the central applications in the corporate data centre, the central applications to each other and the B2B (Business to Business) gateway. Every instance of an interface consists of several components and these components run at different locations on a number of hosts. The technical designs and implementations are taken care of by BP&A TA AIT, supporting the other BP&A teams in development of new interfacing solutions and changes on existing interfaces. Within the BP&A organization ITIL is used to support the IT systems. The CMDB (as part of the ITIL process configuration management) for the TIBCO interfaces is used by the ITIL support processes change management, release management, incident management and problem management.

Within BP&A TA AIT several detailed processes are defined for handling changes and releases together with the IT suppliers of NXP. The IT supplier TCS is responsible for MO (TCS TAM), and all incidents are handled by them. When something needs to be changed, the request comes to BP&A TA AIT and is executed. After the change is completed and tested, the new component is handed over to TCS TAM again, for release to Production.

See below the detailed process for the handling of changes with BP&A TA AIT.

Figure 12
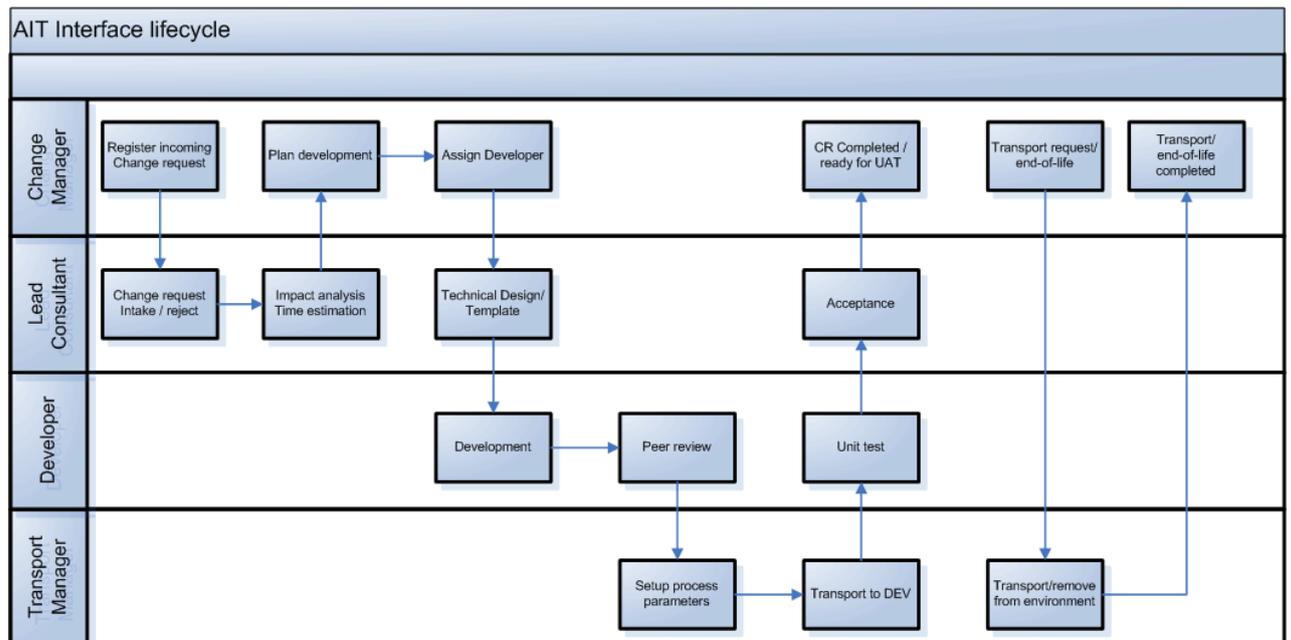
After completing a change, the component is handed over to MO for release in production. This procedure involves all new components, changed components or deleted components.. Below (Figure 13) the process for

handover from BP&A TA AIT to MO of TCS TAM is displayed. When the release to Production is executed by MO, the CMDB has to be updated.

Figure 13
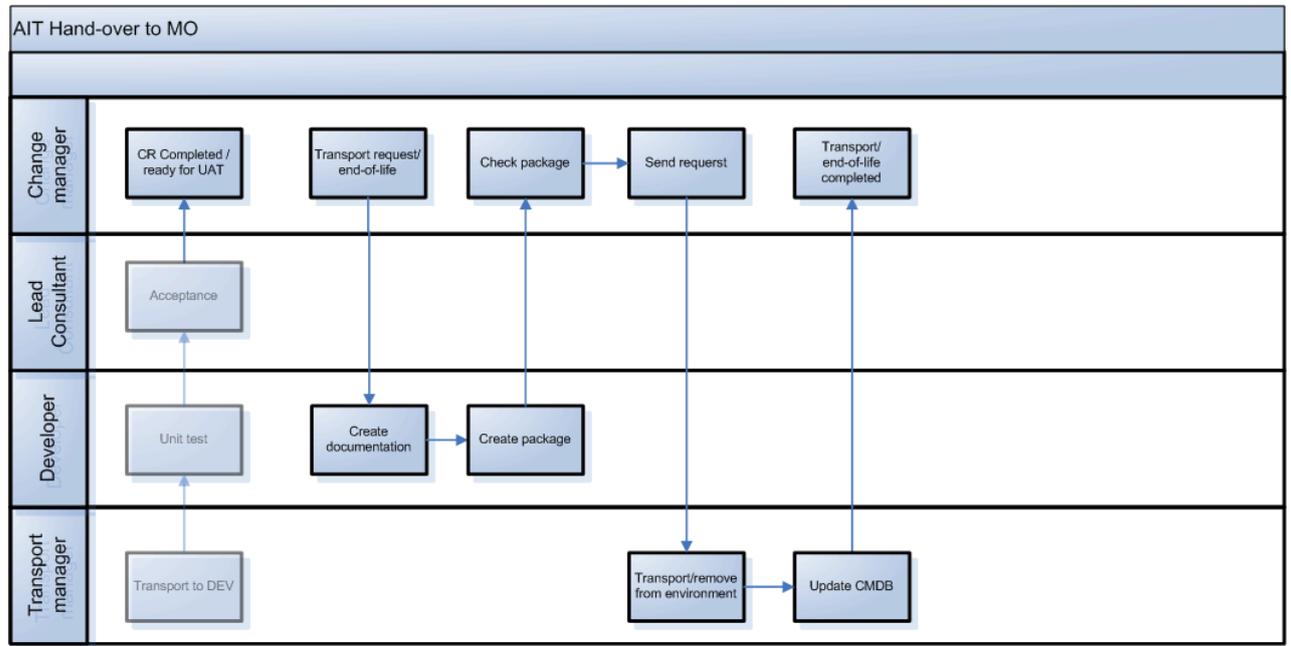
5.1.2 Function structure

The Function Hierarchy Diagram (FHD) contains all basic transactions that are needed to view and maintain the data of the CMDB. For the GUI the transactions are displayed in the FHD below.

Figure 14
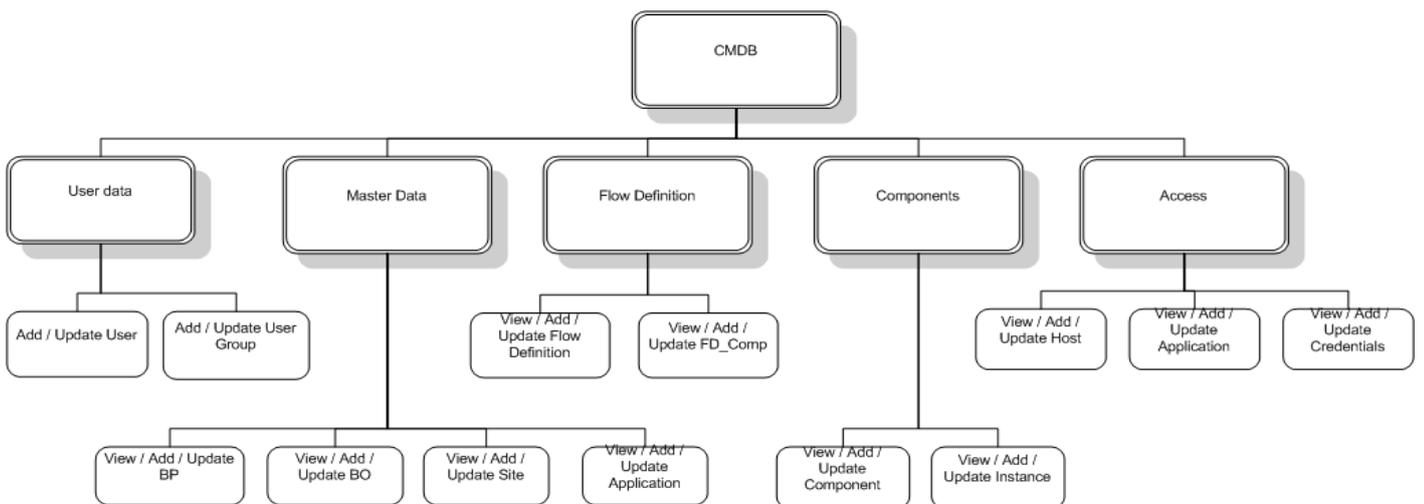
5.1.3 System context

Data Flow Diagrams are used to display how system interoperates at a very high level or how systems operate and interact logically. The system context diagram is a necessary tool in developing a baseline interaction between systems and actors; actors and system or systems and systems. Below two levels are displayed, a DFD level 0 (figure 15) and level 1 (figure 16).

Figure 15
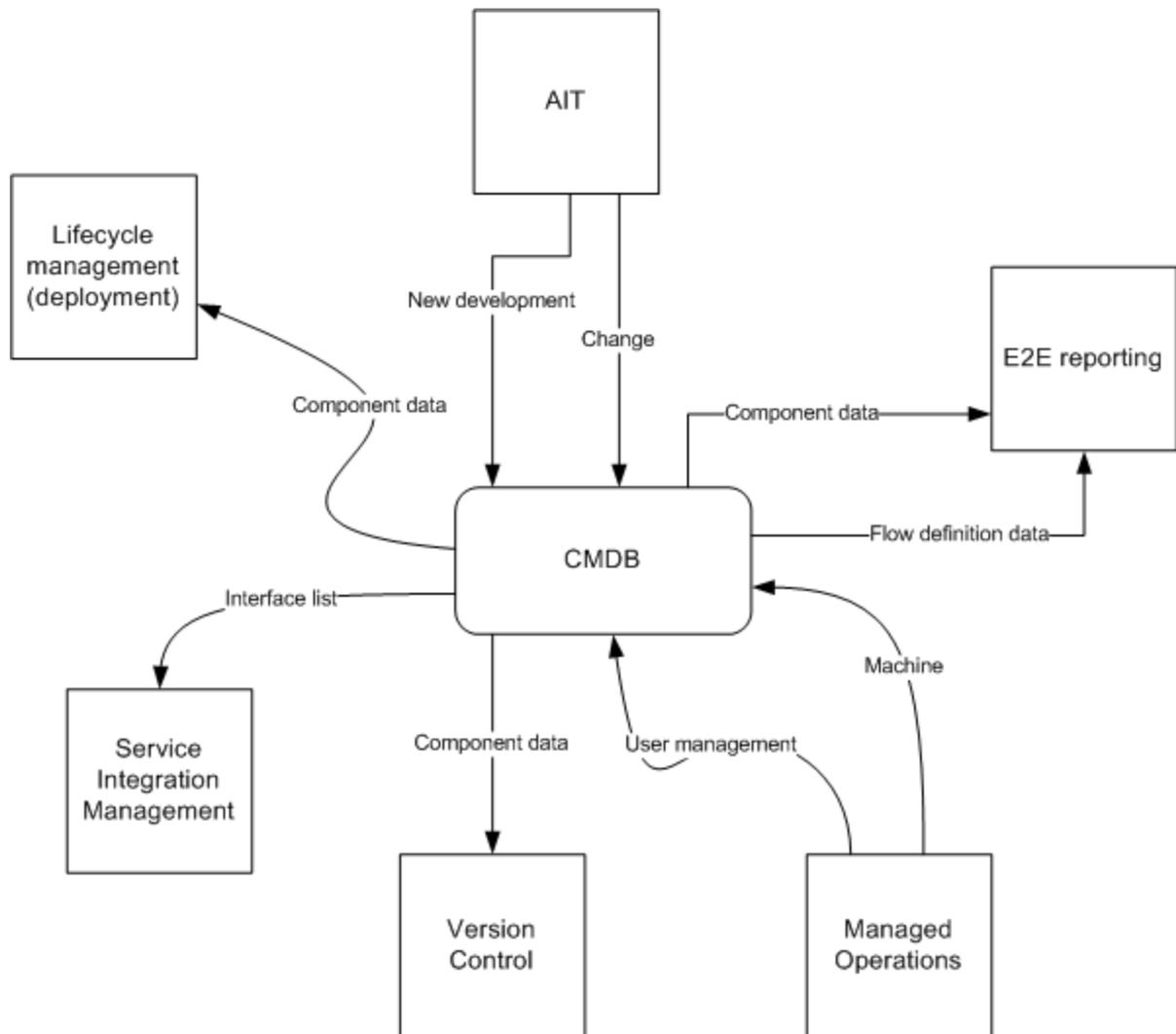
Figure 16
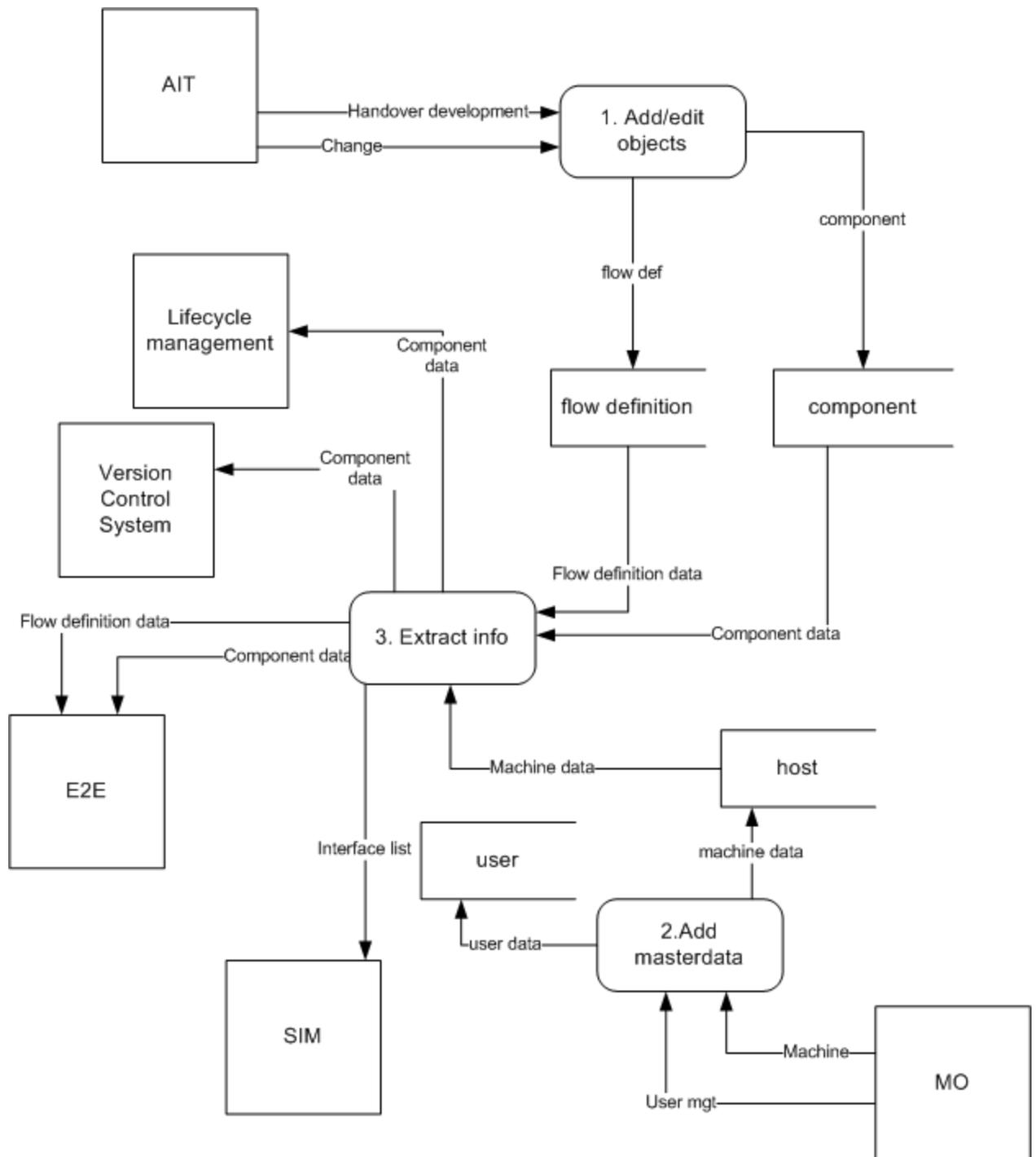
5.1.4 Actors

This paragraph describes all actors that will use the application.
An actor is someone or something outside the system that either acts on the system – a primary actor – or is acted on by the system – a secondary actor. An actor may be a person, device, another system or sub-system, or time.

Actor title	Activities
Administrator	User (group) creation, add /update credentials, add / update / delete master data, flow definition, component, host
Super user	View credentials, View / add / update master data, flow definition, component
User	View / add / update master data, flow definition, component
Viewer	View / extract interface list, component list
Reviewer	View data

5.2 Non-functional requirements

5.2.1 External interfaces/services

The application to control the CMDB will also have the possibility to export data. Currently the CMDB in the Excel sheet is also used to extract data which is relevant to share with other suppliers. It is called the interface list. Users that are member of the Operations team (viewers) must be able to export the interface list themselves, so it can be shared with the other suppliers and functional support groups.

The extract or export function must be able to create a file in CSV format as well as XML format. The CSV format can be used to load in the existing excel sheets (for example the sheet of the Operations team), so it can be sent by e-mail. The XML format will make sure it can be used by other applications in the future.

5.2.2 Sizing

The application is expected to store the following number of objects (records):

Object	# Object
Business Process (BP)	20
Business Object (BO)	120
Site	30
Application	50
Deployment	300
Flow Definition	1000
FD_COMP	1000
Component	1000
Instance	1350
Host	100
Credential	150
Total expected number of records	**5120**

The database will not contain dynamic data, but master data only. Therefore the size will not change dramatically in the future.

5.2.3 Usage matrix

Actor	# of users	Usage	Geographic
Administrator	4	weekly	Eindhoven
Superuser	5	daily	Eindhoven, Bangalore
User	8	weekly	Eindhoven, Taipei, Bangalore
Viewer	5-10	monthly	Eindhoven
Reviewer	2		Bangalore

5.2.4 Other non-functional requirements

This paragraph outlines all non-functional requirements stated for the desired solution. Non-functional requirements are requirements, which specify criteria that can be used to judge the operation of the system, rather than specific behaviors.

Network bandwidth may be a factor in the response time of the GUI, but with the current solution for TRAcER Tool the limits were never reached.
The availability of the GUI is not very critical. At the moment the users are also the people who support the solution. Therefore no dependencies on other parties are present. In the future the data in the database will be accessed by automated processes. The database used is part of the Oracle Grid solution that NXP currently has, which is high available.
Documentation must be made available to support the user with the GUI.
The GUI must be easily extendable, when the functionality is going to be extended to other processes like E2E reporting and the version control system.

6 Design

6.1 Platform

The diagram below shows the topology of the systems (Figure 17). The users are all inside the NXP network (for example on the High Tech Campus or in the Taipei office), and are able to connect to the webserver. The firewall is already configured correctly due to the use of the other tools on the same webserver.
The application on the webserver is connected to the database on the Oracle 10g Grid, which is hosted at the supplier AtosOrigin. This means the database is high available, because of the grid computing solution. The connection parameters from the other tools can be reused.

Figure 17
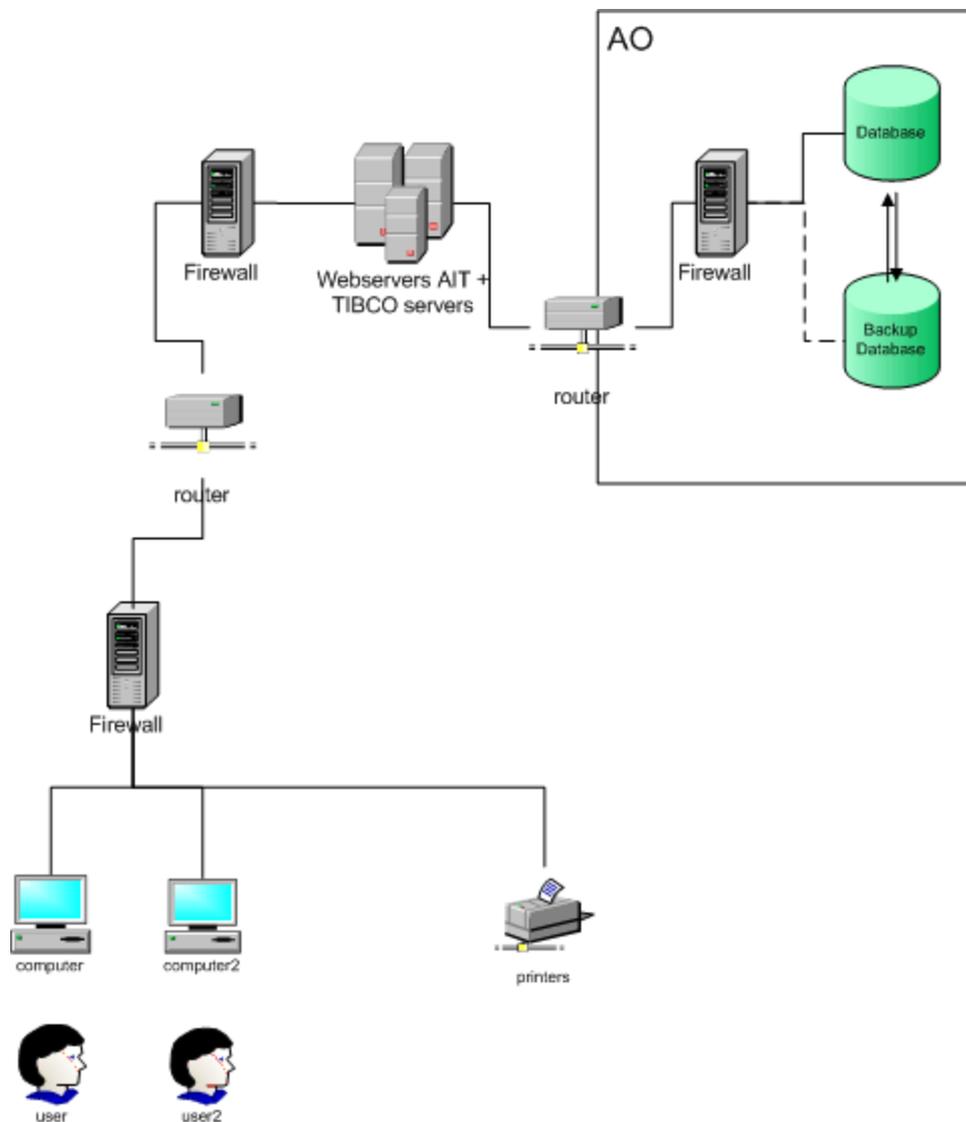
6.2 Data structure

6.2.1 Data model

Figure 18
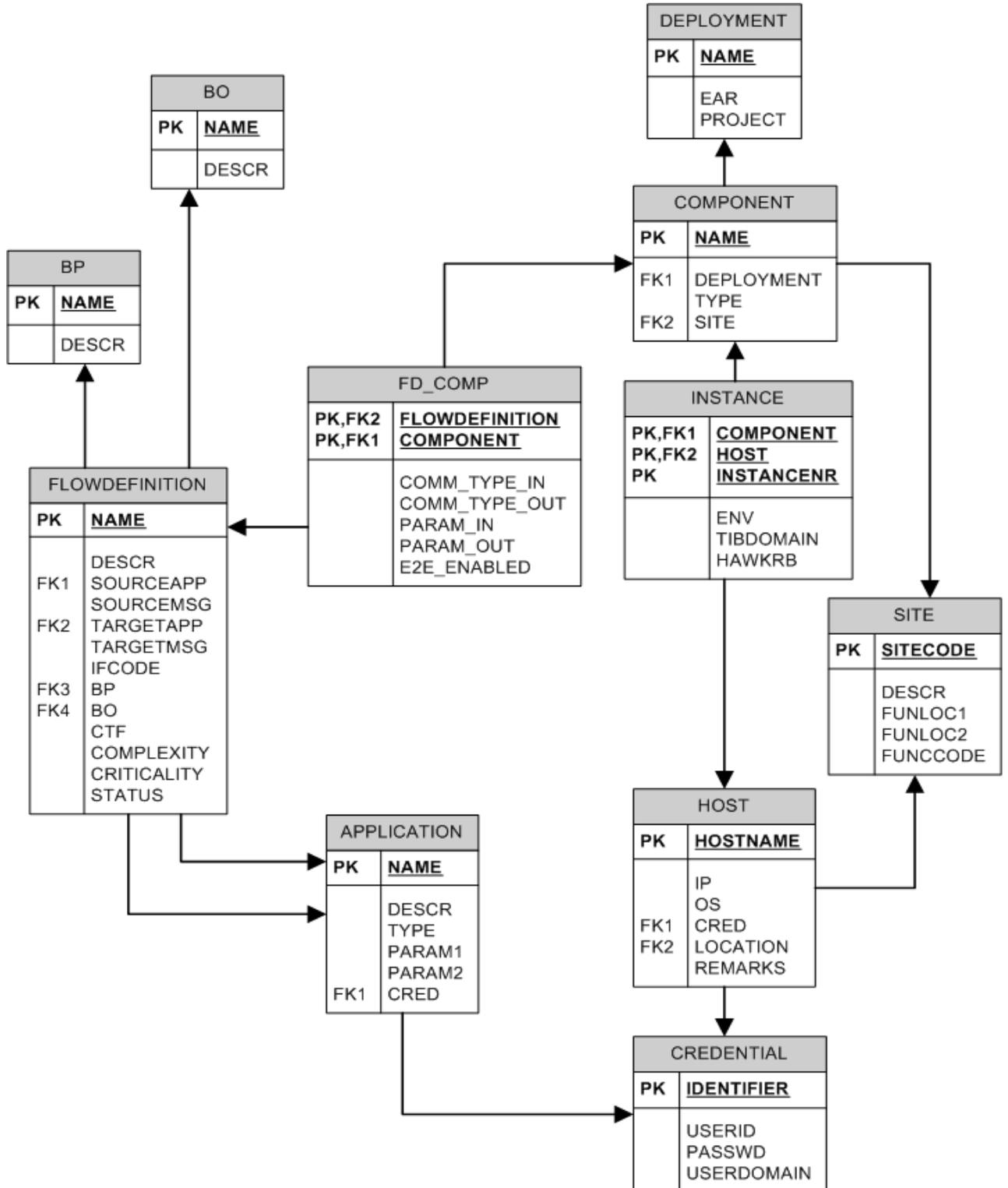
The data model for the CMDB is shown below. This model is the basis for the architecture of the GUI, since the database will enforce the constraints (e.g. foreign keys) of the model.

6.2.2 Data dictionary

A Data Dictionary is created for the detailed description of the elements of the data model. The description of the object "FLOWDEFINITION" is shown in Appendix III as an example.

FLOWDEFINITION						
Field	**Description**	**PK**	**Status**	**Type**	**Length**	**Comments**
NAME	FD name	Y	M	text	30	Unique name of the message flow
DESCR	Description		O	text	128	Full description of the flow
SOURCEAPP	Source application		R	text	16	Refers to NAME in table APPLICATION
SOURCEMSG	Source message format		R	text	64	Message format sent by application
TARGETAPP	Target application		R	text	16	Refers to NAME in table APPLICATION
TARGETMSG	Target message format		R	text	64	Message format received by application
IFCODE	Interface code		O	text	10	Short code used in SAP area
BP	Business process		A	text	15	Refers to NAME in table BP
BO	Business object		A	text	15	Refers to NAME in table BO
CTF	Common transformation format		O	text	64	Name of the CTF used by the flow definition
COMPLEXITY	Complexity		R	text	8	Low, Medium or High complexity
CRITICALITY	Criticality		R	text	8	Low, Medium or High criticality
STATUS	Status		R	text	32	Operational or Non-Operational

6.3 Processes

6.3.1 Adding new objects

The ITIL process release to Production is impacting the CMDB when new objects need to be registered. A new flow definition needs to be entered when a new development is ready. New components will be part of that. When a completely new application is added to the NXP IT environment, it needs to be added in the CMDB, as well as new machines in the datacenters.

Below in figure 19 the flowchart, which shows the overall sequence for adding completely new developments.

Figure 19
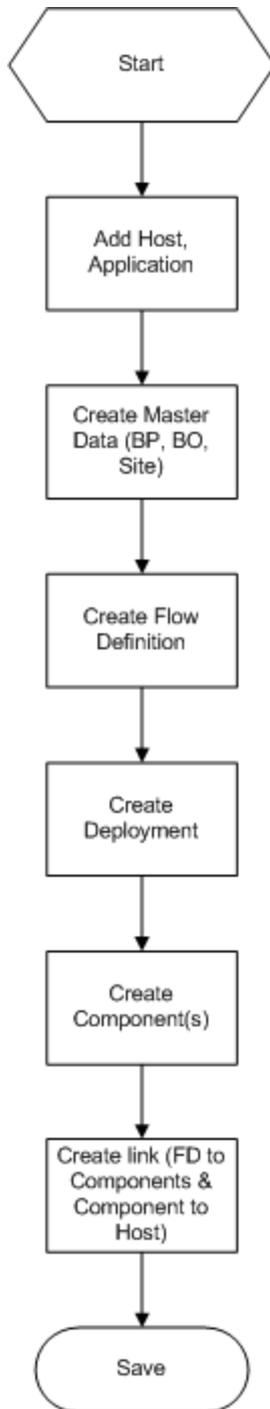
6.3.1.1 New flow definition

Figure 20
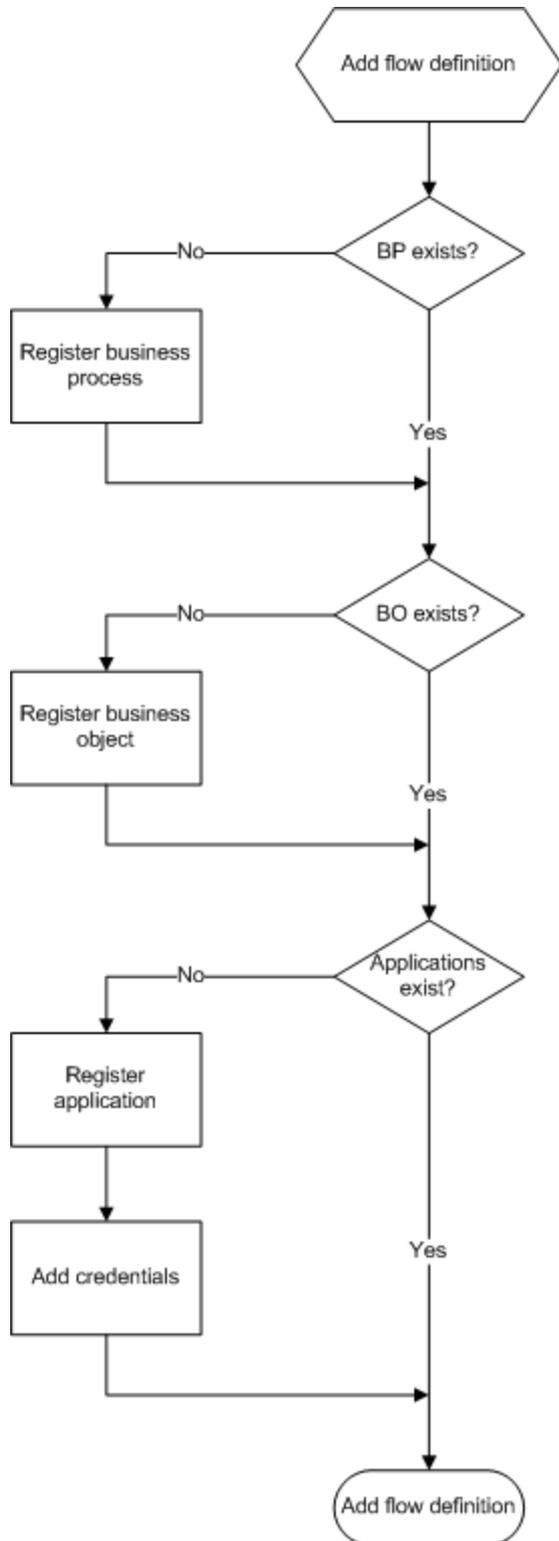
6.3.1.2 New component

Figure 21
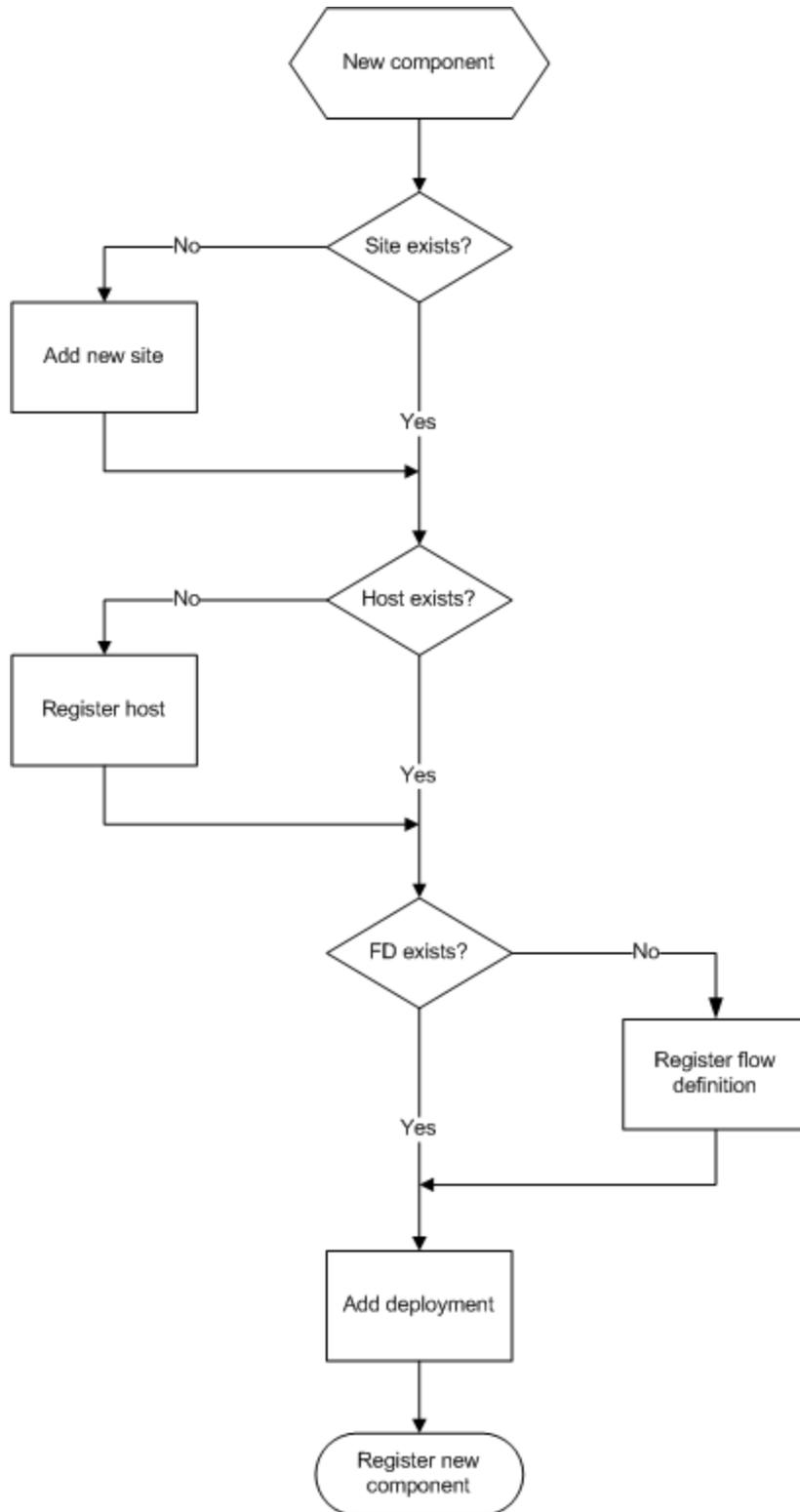
6.3.1.3 Link flow definition to component

When both the flow definition as well as the component are entered in the database, they need to be linked. A component can be part of more than one flow definition, since it is capable of running multiple processes at the same time. Besides that a flow definition makes use of more components in almost all cases.

6.3.1.4 New host

Figure 22
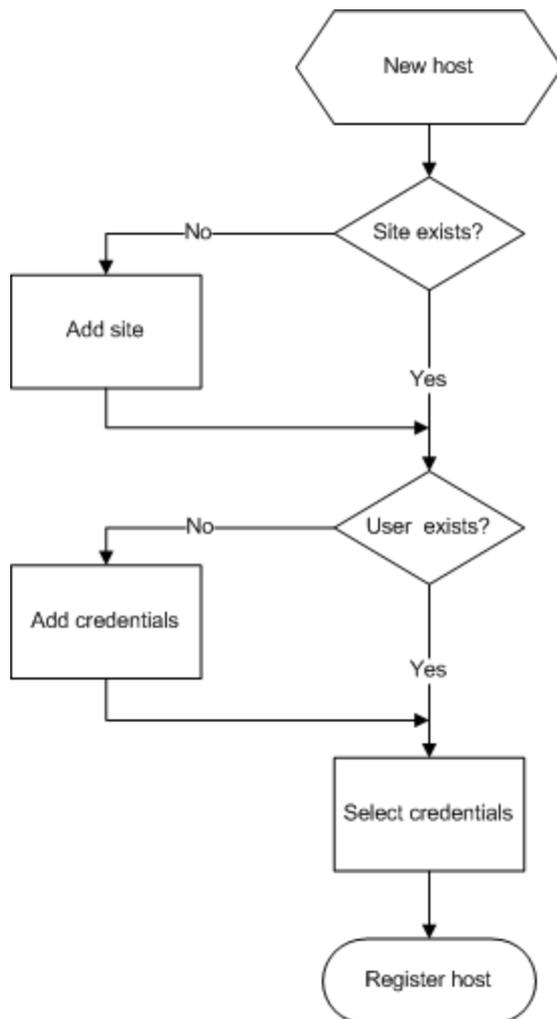
6.3.1.5 Link component to host

Components can be deployed multiple times. Therefore a component can be linked to more than one host. On a host, multiple components will be running.

6.3.1.6 New application

Figure 23
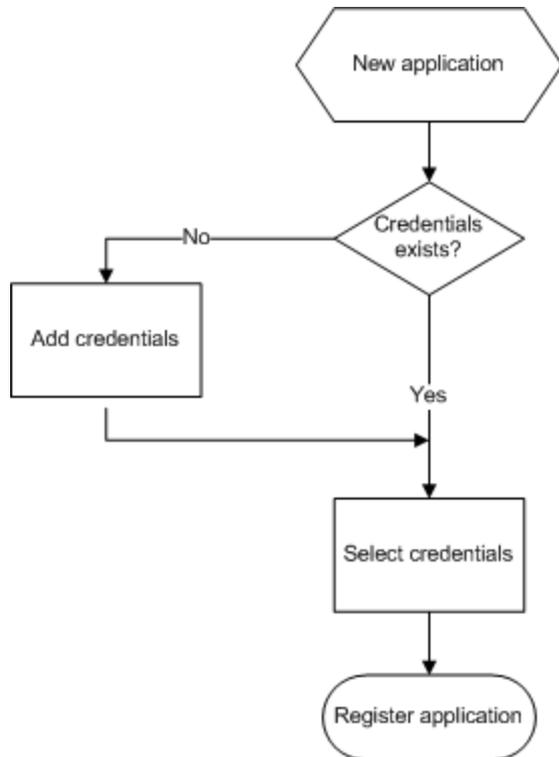
6.3.2 Transactions for changing objects

When changes are developed on existing components, it might be that an object in the CMDB will need to be changed as well.

6.3.2.1 Update component

Figure 24
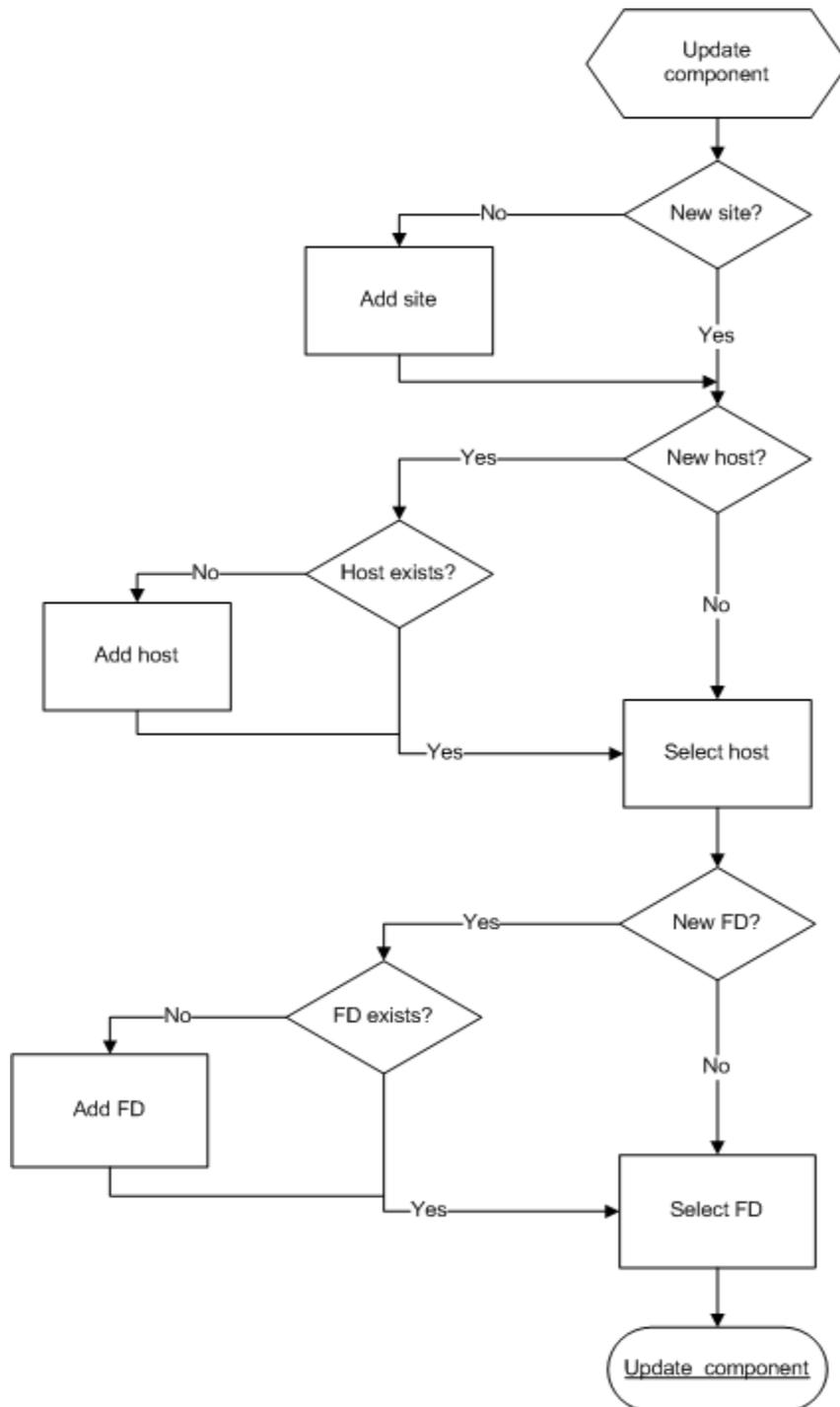
6.3.2.2   Update flow definition

Figure 25
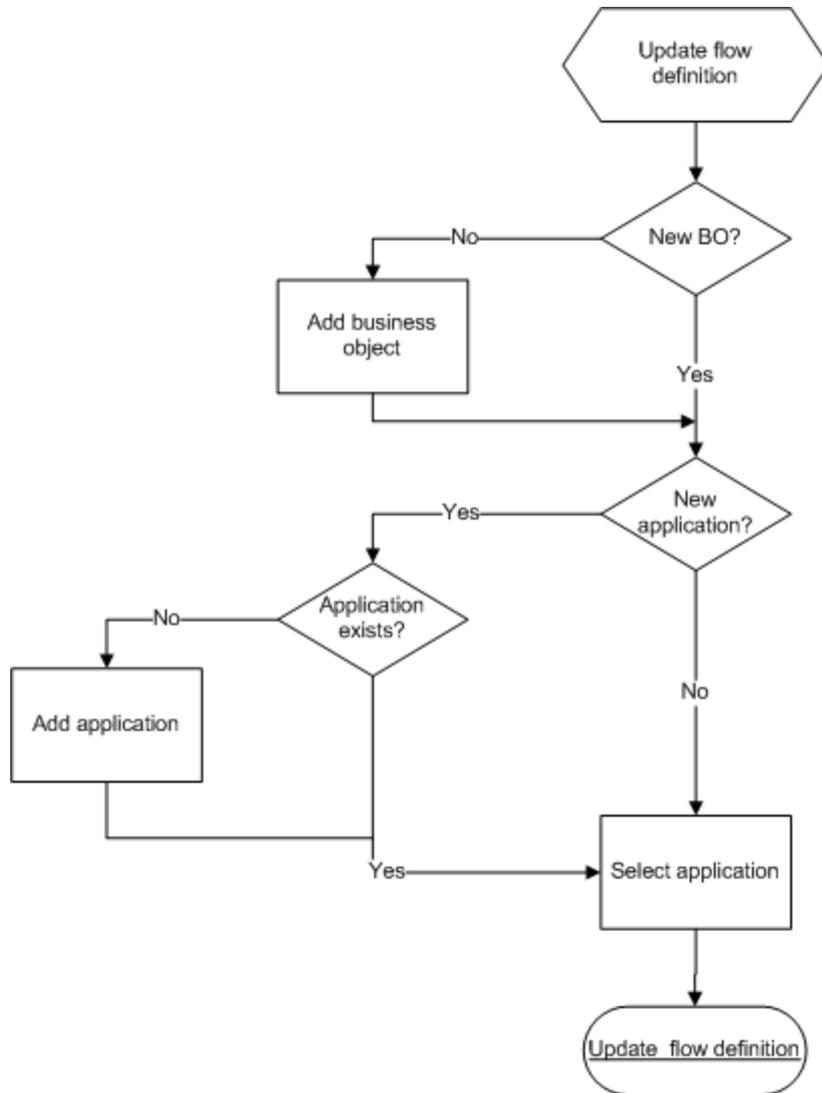
6.3.3 Transactions for viewing and extracting

As described in chapter 3, BP&A TA AIT have to share information with other teams and departments. Therefore it should be possible to view the data. Besides that, when members of the support organization need to access hosts in the environment to check the interfacing components or make changes, they need to be able to retrieve the credentials to login on the machines.

6.3.3.1 View host with credentials

Figure 26
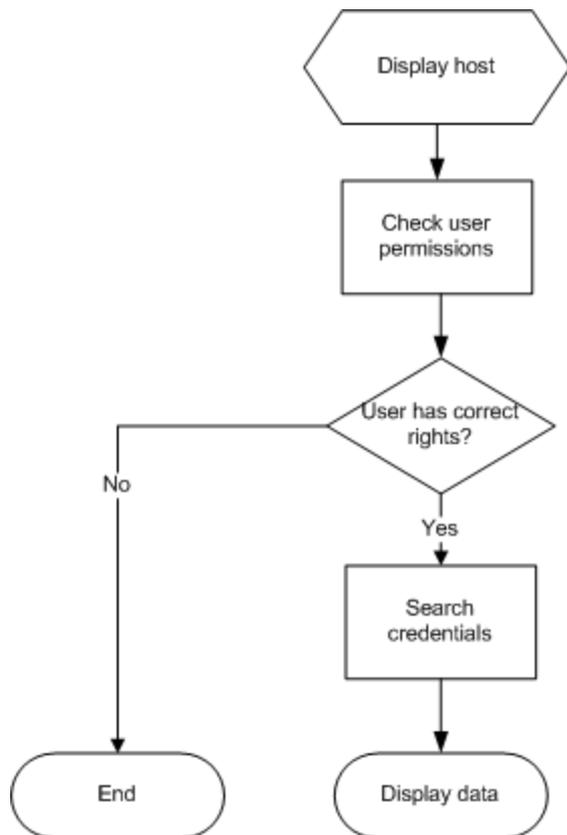
6.3.3.2 View info on interfaces

Figure 27
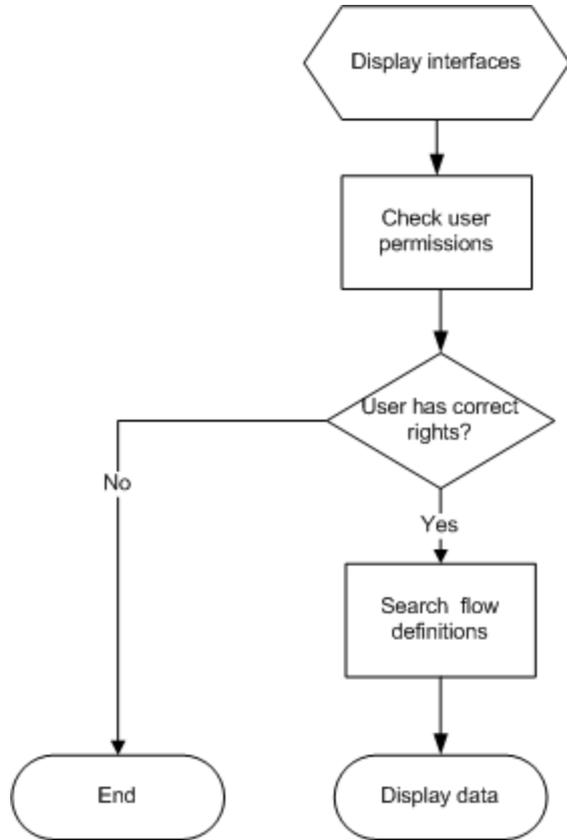
6.3.3.3 View & extract interface (criticality) list

Figure 28
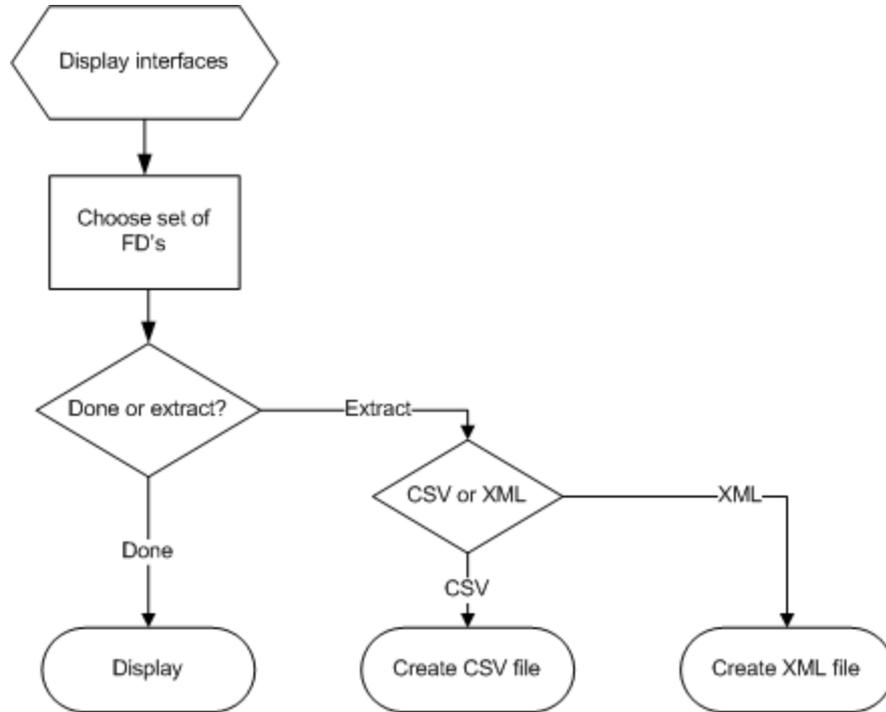
6.3.3.4 View & extract components list

Figure 29
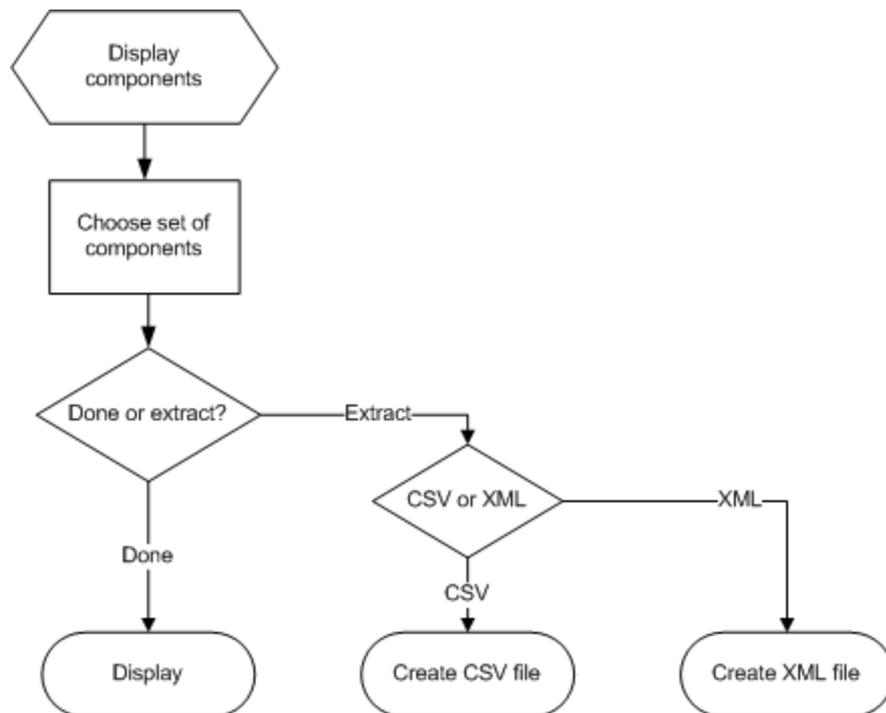
6.4   Interfaces

6.4.1   Graphical User Interface

The GUI is built according to the MVC architecture.
The MVC (Model-View-Controller) architecture is a way of decomposing an application into three parts: the model, the view and the controller. It was originally applied in the graphical user interaction model of input, processing and output.

Model
A model represents an application's data and contains the logic for accessing and manipulating that data. Any data that is part of the persistent state of the application should reside in the model objects. The services that a model exposes must be generic enough to support a variety of clients. By glancing at the model's public method list, it should be easy to understand how to control the model's behaviour. A model groups related data and operations for providing a specific service; these group of operations wrap and abstract the functionality of the business process being modelled. A model's interface exposes methods for accessing and updating the state of the model and for executing complex processes encapsulated inside the model. Model services are accessed by the controller for either querying or effecting a change in the model state. The model notifies the view when a state change occurs in the model.

View
The view is responsible for rendering the state of the model. The presentation semantics are encapsulated within the view, therefore model data can be adapted for several different kinds of clients. The view modifies itself when a change in the model is communicated to the view. A view forwards user input to the controller.

Figure 30
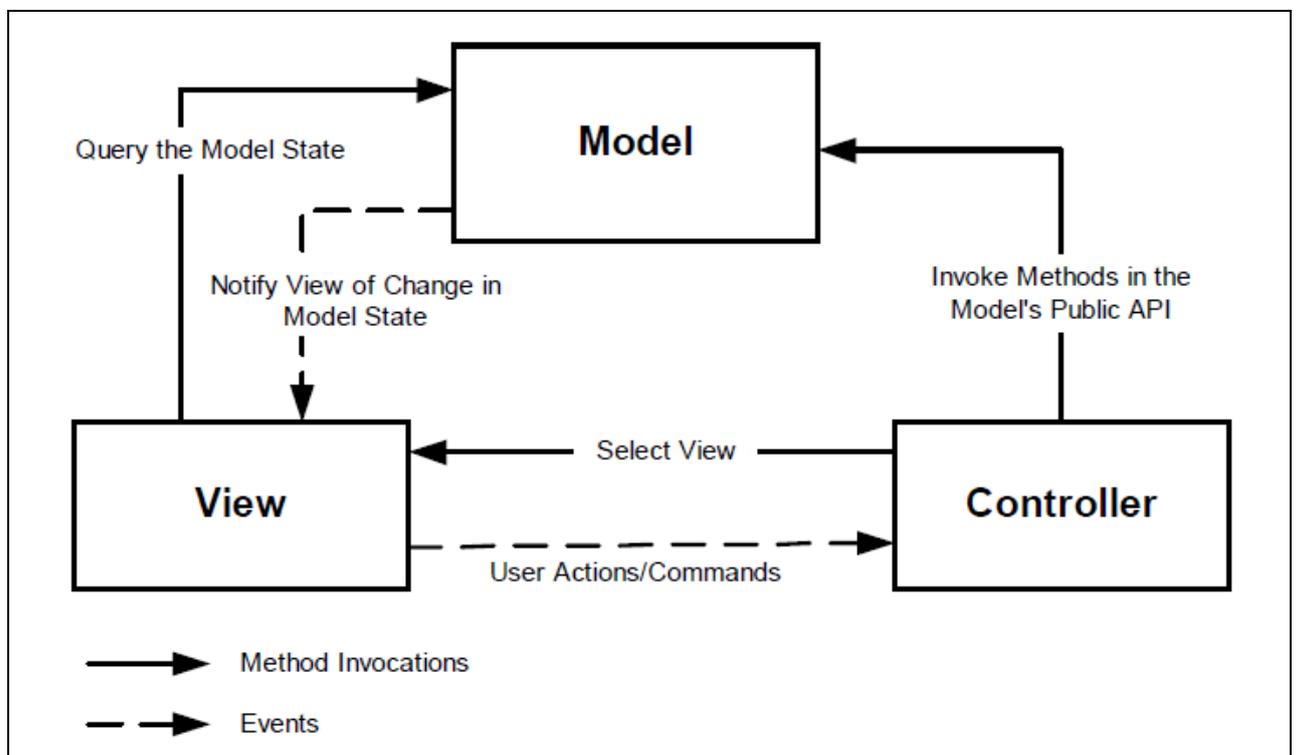
Controller
The controller is responsible for intercepting and translating user input into actions to be performed by the model. The controller is responsible for selecting the next view based on user input and the outcome of model operations.

In a J2EE based application, MVC architecture is used for separating business layer functionality represented by JavaBeans or EJBs (the model) from the presentation layer functionality represented by JSPs (the view) using an intermediate servlet based controller. However, a controller design must accommodate input from various types of clients including HTTP requests from web clients, WML from wireless clients, and XML-based documents from suppliers and business partners. For HTTP Request/Response paradigm, incoming HTTP requests are routed to a central controller, which in turn interprets and delegates the request to the appropriate request handlers. This is also referred to as MVC Type-II (Model 2) Architecture. Request handlers are hooks into the framework provided to the developers for implementing request specific logic that interacts with the model. Depending on the outcome of this interaction, the controller can decide the next view for generating the correct response.

6.4.2 Extracts

The possibility to create extracts from the database of the data in the CMDB will be available. The extracts are used to share the information with other suppliers who do not have access to the NXP network and AIT webserver. The extracts can be saved to the computer of a user. The information needed is divided over multiple tables in the database. Therefore Oracle views will be created, so queries can be developed on these views to retrieve data for the user. Bisides that extra information is provided in the list to the users which can be derived from the actual data in the database. To achieve this PL/SQL functions will be created in the Oracle database. The views and functions can be found in Appendix IV.

6.4.3 Database connection

The GUI web application connects to the database with JDBC. The same protocol can be used in the future by other tooling to access and retrieve data from the CMDB tables.

7   Realization

7.1   Delivery

The test system is delivered in the QA (Quality) environment after the development phase. The tests on the GUI and the integration with the back-end are performed in this environment as well.

The application is built according to the standards defined within TA and has the same look and feel as the other tools in use. Below a screen for an administrator is shown.

Figure 31

The screens for a user with less rights looks different, since only the objects that are in the configuration of the user group for the user are shown. See figure 32.

Figure 32
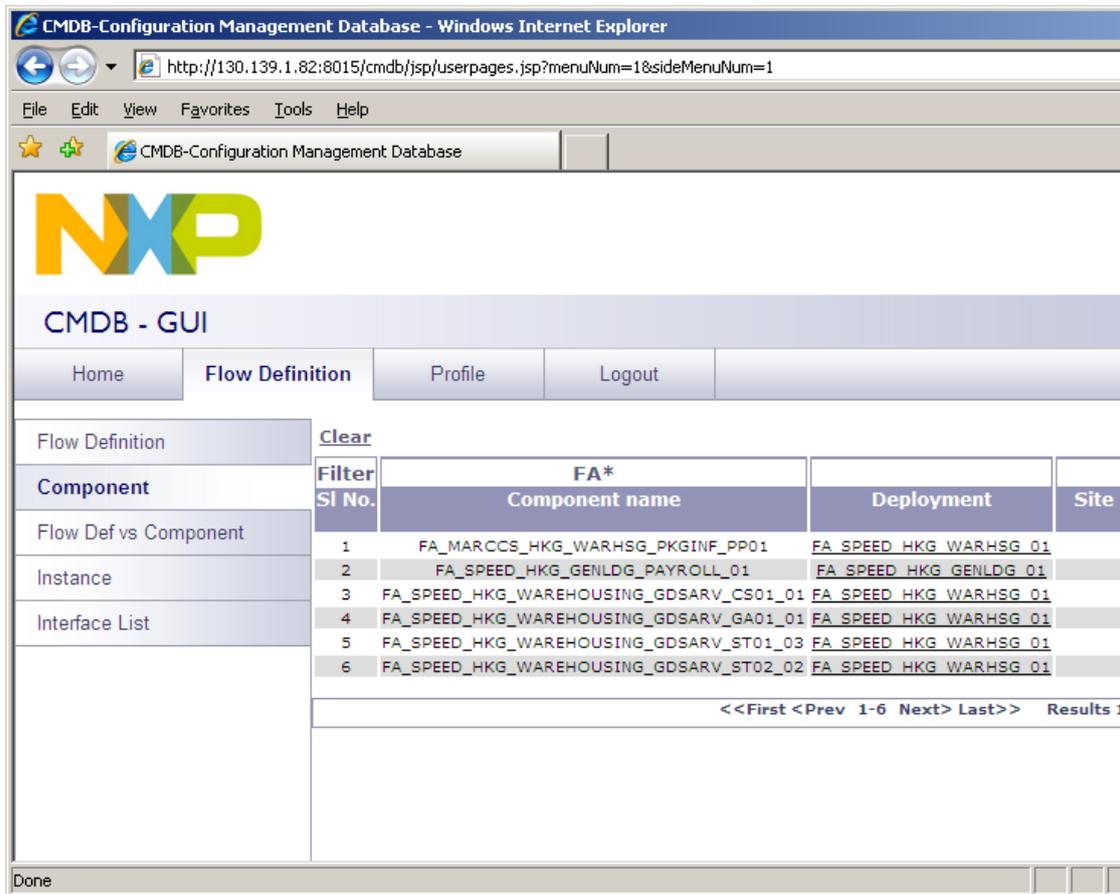
The interface list for sharing looks as in the figure below:

Figure 33
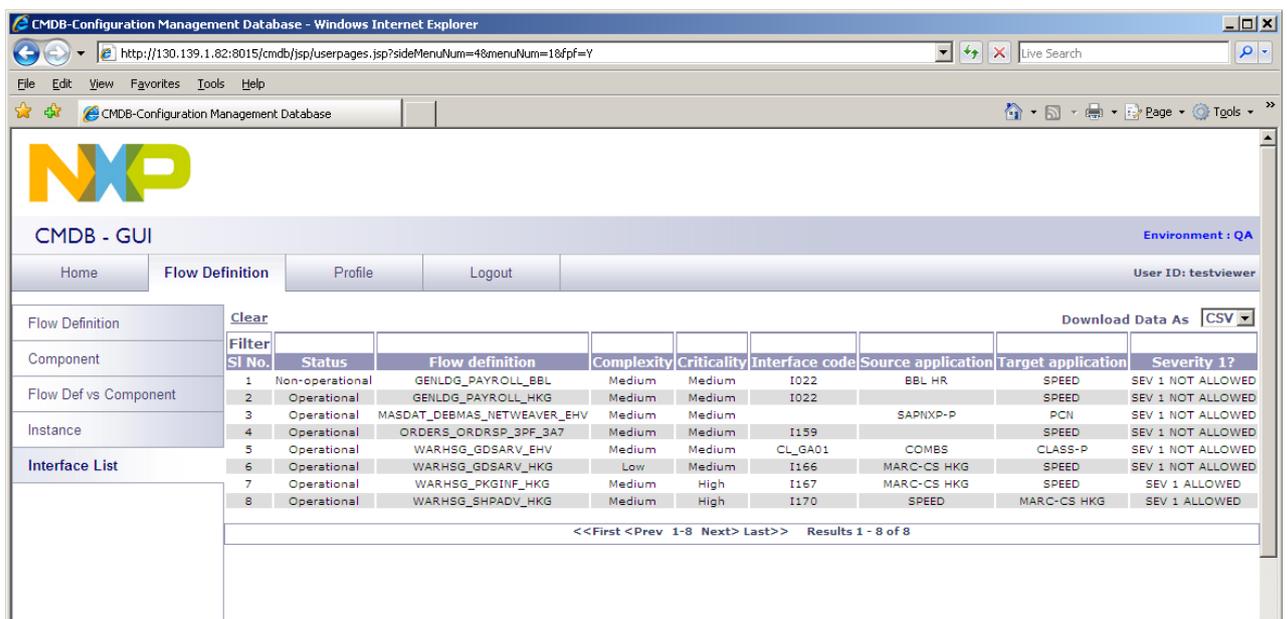
The data can be exported as CSV or XML, so it can be shared with the suppliers. Click "download" and following screen appears. Here the user can pick a location to save the file.

Figure 34

```
File Download                                              [X]

Do you want to open or save this file?

         Name:  INTERFACELIST.csv
         Type:  Microsoft Excel Comma Separated Values File, 842 ...
         From:  130.139.1.82

                   [  Open  ]   [  Save  ]   [  Cancel  ]

         While files from the Internet can be useful, some files can potentially
         harm your computer. If you do not trust the source, do not open or
         save this file. What's the risk?
```
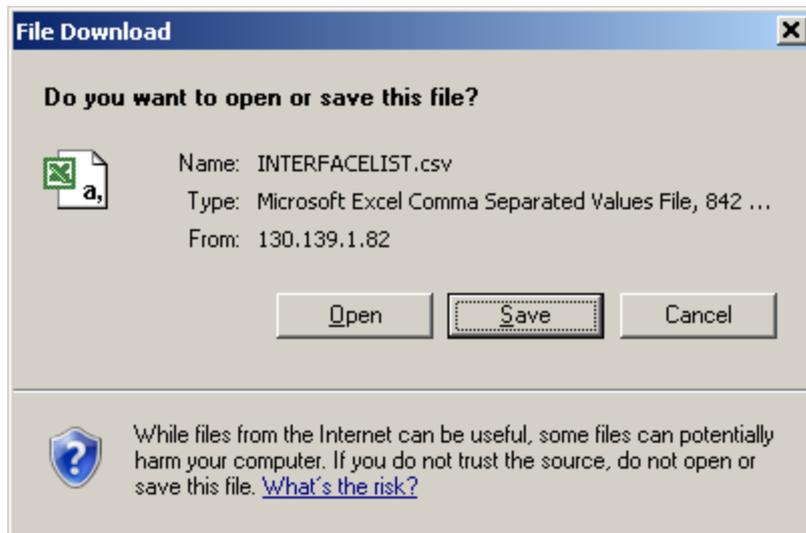
The output generated is shown in figure 35 (XML) and figure 36 (CSV)

Figure 35

```xml
<?xml version="1.0" encoding="UTF-8" ?>
- <INTERFACELIST>
  - <row>
      <STATUS>Non-operational</STATUS>
      <NAME>GENLDG_PAYROLL_BBL</NAME>
      <COMPLEXITY>Medium</COMPLEXITY>
      <CRITICALITY>Medium</CRITICALITY>
      <IFCODE>I022</IFCODE>
      <SOURCEAPP>BBL HR</SOURCEAPP>
      <TARGETAPP>SPEED</TARGETAPP>
      <SEVERITY>SEV 1 NOT ALLOWED</SEVERITY>
    </row>
  - <row>
      <STATUS>Operational</STATUS>
      <NAME>GENLDG_PAYROLL_HKG</NAME>
      <COMPLEXITY>Medium</COMPLEXITY>
      <CRITICALITY>Medium</CRITICALITY>
      <IFCODE>I022</IFCODE>
      <SOURCEAPP />
      <TARGETAPP>SPEED</TARGETAPP>
      <SEVERITY>SEV 1 NOT ALLOWED</SEVERITY>
    </row>
  - <row>
      <STATUS>Operational</STATUS>
      <NAME>MASDAT_DEBMAS_NETWEAVER_EHV</NAME>
      <COMPLEXITY>Medium</COMPLEXITY>
      <CRITICALITY>Medium</CRITICALITY>
```

Figure 36

7.2 Testing

The development is performed locally on the PC of the developer in the tool Eclipse. The code is stored in the version control system CVS (a version control system). The database schema was created in the development database, tables could be created for the unit tests. The GUI could be tested with these tables on the PC of the developer.

In the QA environment the integration testing with the backend systems as well as user acceptance tests are performed. Many test cases were defined and an example of the test case template is shown in Appendix V.

The database solution (Oracle Grid) was tested thoroughly before it became a part of the NXP system landscape. Therefore no test cases for the Grid were created.

The test cases with the results can be found in Appendix VI.

7.3 Training

During the user acceptance test, training was provided. The concept of the training is "train the trainer." In this way the testers can train the other members on their team. An extensive user guide is implemented in the GUI for online help.

7.4 Implementation

The transition to production is relatively easy, since the variables for the environment are defined in the properties file of the GUI application. The following steps have to be performed to move the new solution to the production environment.

- Deploy the database schema in the production database
- Create the placeholder in the Tomcat webserver of production
- Deploy the web application into the Tomcat webserver of production
- Set the environment variable for production in the properties file
- Start the context in the Tomcat webserver of production

8   Aftercare

8.1   Documentation

8.1.1   System documentation

The code is very well documented according to the standard. With the code as the basis, the program "javadoc.exe" generated the system documentation. The output of the program is html based documentation and can be put locally on a PC, but can be uploaded to the webserver as well.

Below an impression of the system documentation.

Figure 37
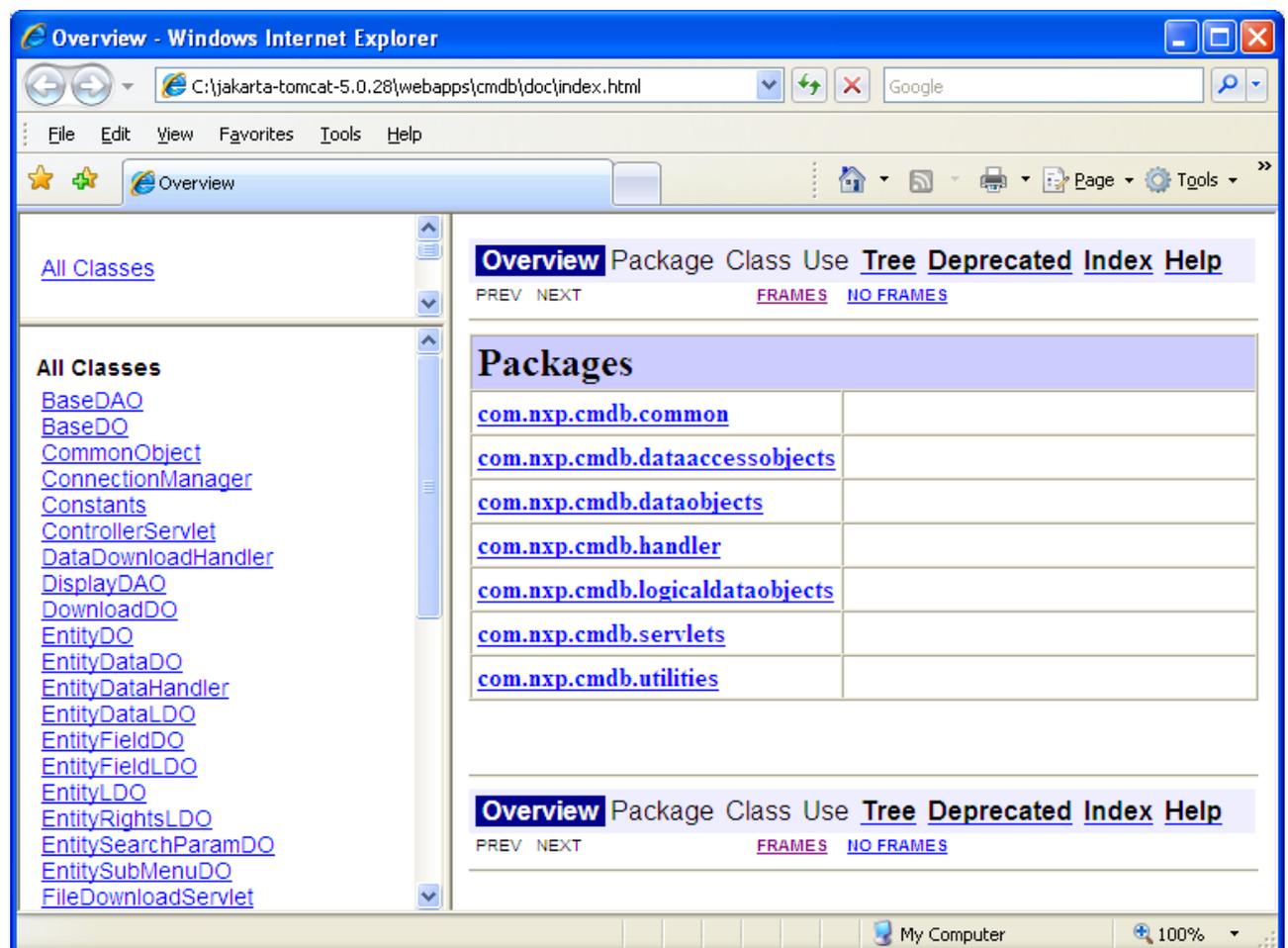
8.1.2   User documentation

The user documentation is available online in the homepage of the users. It is a step by step description of the various screens and options in the GUI.

An impression below in figure 38.

Figure 38
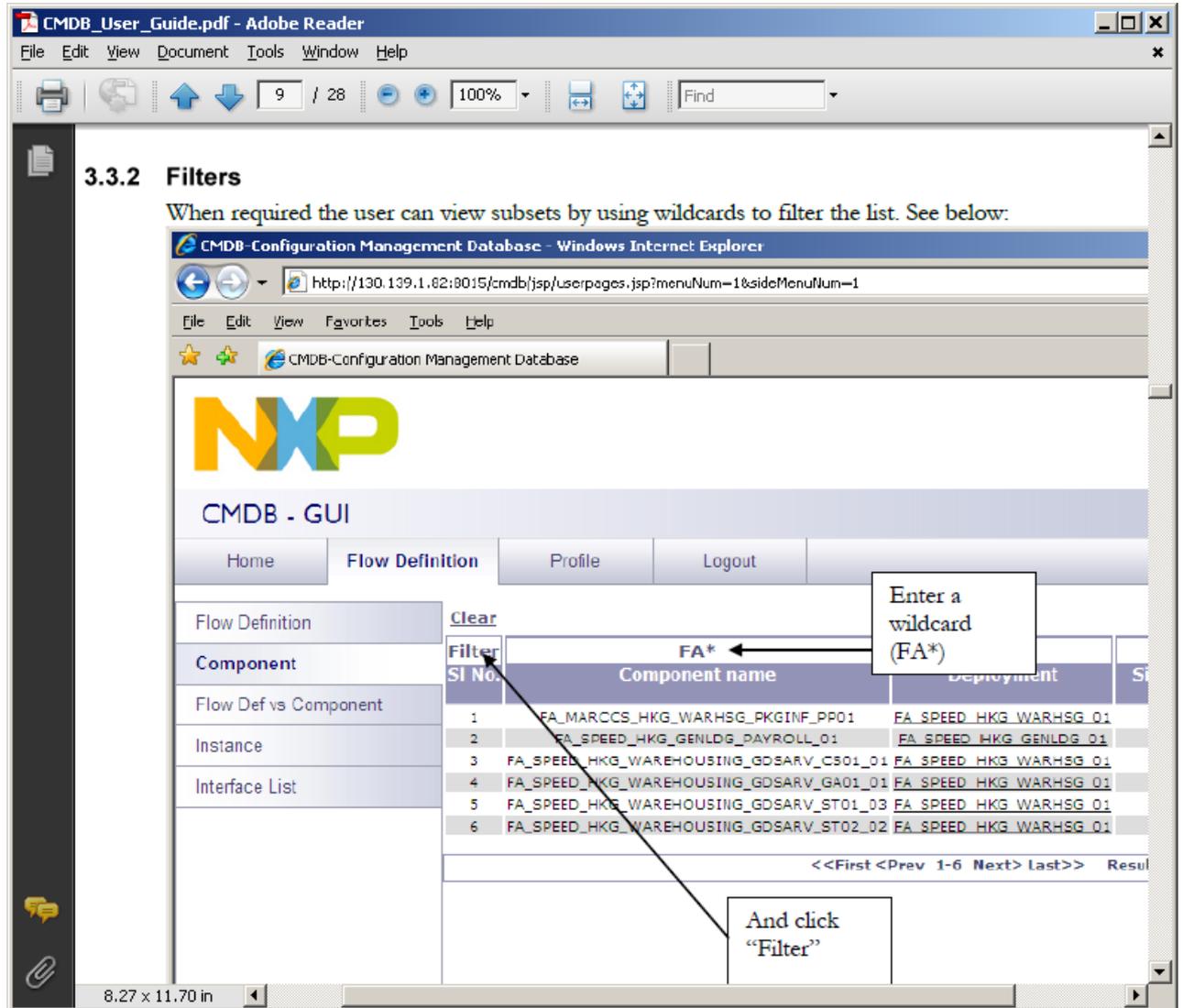
8.2 Support

Support has been arranged in the same way as for other tools, which are built by TA AIT. The GUI for the new CMDB is supported in TA AIT itself and the TCS TAM TIBCO group is also familiar with the webserver in production. Changes will be handled by TA AIT and its developers. Incidents will be addressed by the support people in TCS TAM TIBCO and if help is needed, TA AIT is there to assist.

Change requests from outside the team can only be raised by the team leads of the users.

8.3 Project closure

In the aftercare phase issues can still be solved by TA AIT. When the application is running in the production environment for a month the project will be closed officially following the NXP project management methodology.

9 Conclusions and recommendations

9.1 Conclusions

A new application was created and implemented successfully. The new GUI for CMDB is running in production and the old situation does not longer exist. All users will work with the new solution.
The project did not run according to the initial planning, due to other projects within NXP Semiconductors with a higher priority. This risk was defined at the start of this project as medium and came through.
The costs of this assignment were well within budget, even with the possible issue solving and minor improvements needed in the aftercare phase.

Before the project was initiated the problem description already existed, since master data was stored in all the other tools. After the improvement was initiated the gathering of the requirements started. It took several weeks before it was clear what was needed, but then the design phase started. With the design ready, the development of the GUI could start and was taken care of in the Application Integration Team (AIT) itself, since the knowledge is available within the team. All issues could be handled internally and were fixed very quickly, so the implementation was very smooth. No major issues were discovered in testing and the new solution was ready to go-live. All documentation has been delivered, so the project is ready for closure.

This new CMDB means there will be a single source of configuration data for the complete NXP interfacing landscape. A GUI is delivered for managing the configuration data, which is easy to use for the people in the MO organisation (TCS TAM TIBCO), who are responsible for the interfaces. Searching for information as well as extracting data for reporting to other teams will be easier. This is a good step towards proper master data management.

The GUI is highly configurable and therefore easily extensible. It can adapt new objects in the future without programming. This GUI can also be used for other tools as well, since it only requires a data model and the configuration of the objects in the database. The GUI is the basis for further improvements as well.

With the configuration data now available in a database the E2E monitoring tool can link to the database schema. It will be able to use the configuration items (CI's) internally with the processing of events in the landscape and display the message status information related to the correct CI's as stored in the CMDB.

9.2 Recommendations

The delivered solution is a excellent basis for further improvements in the interfacing landscape. The redundant data will make it easier to start working on more automated solutions to manage the interfacing landscape. The next logical step would be to connect the version control system to the new CMDB.

Another recommendation is to add a view in the GUI for the administrator to check the audit data and even restore changes made by users with a click on a button. The information is already available for such an addition. The creation of a management view for reporting could be an option as well. Old tools could be upgraded by implementing this version of the GUI for those tools.

To improve the reporting on the data of the CMDB, some additions to the data model could be made. For example the addition of sequence numbers to the components that belong to a flow definition can be used to determine the order in which the messages pass through the components. This information can also be used in the future to create documentation automatically. More calculated fields (with database functions) can enrich the data also. Information about the versions of the installed software can be an improvement on the information on machines in the landscape.

10   Evaluation

It was a really valuable experience to execute and manage a project from beginning to end all by myself. Most of the time I am solely involved in feasibility studies for a project or involved in the design phase. An initial challenge was to set the scope for my thesis and define clear bounderies, so the assignment would not become too extensive. When the project initiation document was ready and approved, I already felt better about the assignment and the future of the project.

During the assignment of my thesis I learned to use the PRINCE2 method of NXP, which is an essential addition to my project management skills. I already had some experience, but with this project all phases were executed completely. Although this project is not that big compared to the large IT projects in NXP, this experience will help me manage projects more easily in the future.

The successful completion of this project is very important for NXP BP&A TA and also for my team. This project is part of an improvement roadmap, and will save costs on operational activities in the future. Although the initial time frame was not met, due to my involvement in other projects with higher priority, I am very satisfied with the results. All the objectives stated in the initiation document are met.

With this project finished other improvement initiatives can be started. I also kept the costs well within budget, and in the aftercare period we will be able to solve small issues without having to request extra funding.

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Appendices

I. Process Initiation Document

Project name:	Improve CMDB
Program:	(TA Improvements)
Executive:	Marty Smit
Clarity ID:	18399
Project Manager (author):	Henri den Hollander
Project Budget:	Total budget K€: 19
Project charges to cost center	231087
Version :	0.2

Approval		
Name	Function	Date
Marty Smit	Manager BP&A TA	

Copy	
Name	Function
Tietsia Tempelaar	Manager BP&A
Marty Smit	Manager BP&A TA
Herwig Wens	Team lead BP&A TA AIT
Roel van Rijn	PM / Resource planning BP&A TA AIT
Shuguang Shi	Process and Excellence Manager, BP&A Operations
Marco Dorenbos	Thesis supervisor Fontys

Content

1   Background/Context

Within NXP Semiconductors the standard chosen for interfacing the applications in scope of the IT department Business Processes & Application (BP&A) is TIBCO. The TIBCO interfaces connect local applications on the satellite sites with the central applications in the corporate data centre, the central applications to each other and the B2B (Business to Business) gateway. Every instance of an interface consists of several components and these components run in different locations on a number of hosts. This results in a

lot of configuration data, since the TIBCO infrastructure supports over 800 interfaces, which has to be maintained.

The TIBCO interfaces were previously supported by AtosOrigin, but was handed over to TCS at the end of 2008 when the contract ended with AtosOrigin for the support. The current Configuration Management Database (CMDB) is maintained in an Excel sheet and not easy to use. For that reason it is not fully reliable, because mistakes are easily made and overseen.
The CMDB must contain all relevant data of the message flows on the TIBCO infrastructure. This will ensure proper incident and change management. The new CMDB should enforce the correct conventions and consistency.

Now that the interfaces are in support with TCS (Tata Consultancy Services), and due to several improvements that have been carried out, the data (model) needs to be updated and put in a database schema. The sheet is very difficult to use in relation to other (automated) processes, like the new E2E (End-to-End) monitoring framework that needs the configuration items (CI's) for correct error handling and event handling. The CMDB will be used by the lifecycle tooling for deployments of components in the various environments. Another improvement that is coming up is better version control, which will use the CMDB for correct naming.

2 Project definition

2.1 Project objectives

The main objective is to create a CMDB that can be used by more (automated) processes. To achieve this we have to replace the current Excel sheet containing all message flows and interface components in the NXP integration landscape with a CMDB in a database.
Next to that the CMDB must be made available via an interface for these automated processes like the lifecycle tooling (scripting for deployments), version control system and the E2E reporting database. Handover processes for updates and maintenance on the CMDB will be defined and a GUI on the CMDB for viewing and updating will be created. With this GUI it will also be possible to generate an extract to provide to BP&A Operations as is done now monthly by a manual process.

2.2 Project Approach

The standard NXP IT Project Management methodology (See document "NXP IT Project Pocket.doc") will be applied. All the general and mandatory phases will be executed.
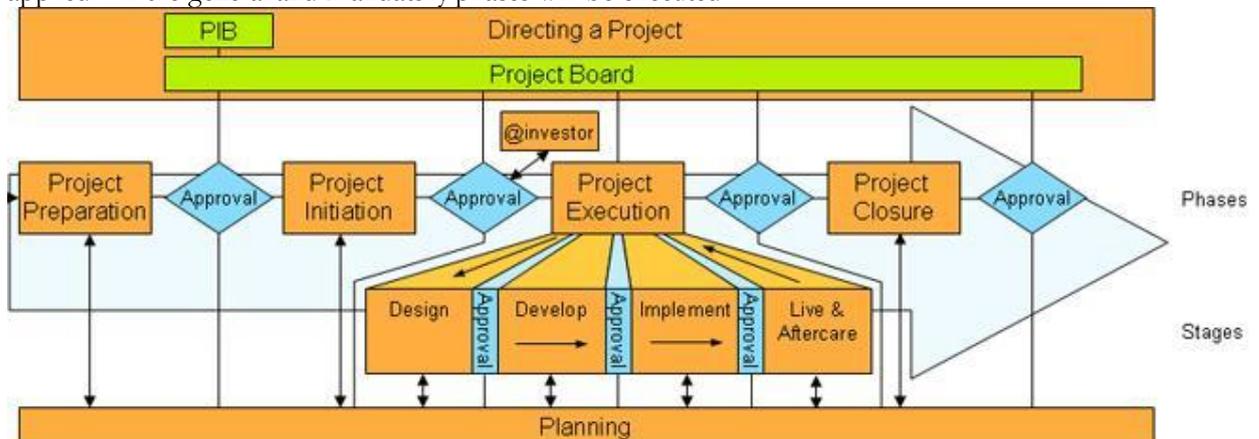
Furthermore the project will have the standard steps in the execution phase. After the initial design phase, an agile (iterative) approach will be taken for the design, development and implementation steps will be taken, since more progress can be made in the beginning within the Application Integration Team (AIT) this way. This

won't fit the NXP standard completely, since there is the possibility that the requirements are adjusted during the project. Those changes will have to be approved.

The solution will be developed in-house by the AIT and the new CMDB is part of the improvements defined within the team. The CMDB will be the basis for other improvements.
The project organisation is described in chapter 4.

2.3   Project scope

(Company wide, multiple or single departments, regional, etc)
The scope of this project is within BP&A only and concerns the existing and to be developed TIBCO interfaces for the corporate applications. The existing interfaces connect to the following applications:

- SAP Commerce (CLASS)
- SAP Manufacturing (SPEED)
- SFC systems
- I2
- Adexa
- DIM3
- SAP BW
- Impulse
- CRM
- Extranet applications
- PALLAS
- SPARC
- SMS applications
- B2B gateways
- COMBS

The data model will have to support the requirements of the E2E monitoring framework for master data as well. In that manner the E2E reporting tool does not need to maintain its own configuration data of the operational landscape.

The data model supports the extension of the scope to all interfaces in the BP&A domain next to the TIBCO interfaces.

2.4   Project deliverables/outcomes

The following deliverables have been defined for the project:
- A functional specification of the data model to be used by the CMDB. This will be an ERD (Entity Relationship Diagram) with a data dictionary.
- A technical design and implementation of the data model of the CMDB in the existing Oracle infrastructure. A physical schema in the Oracle database will be created.
- A migration of the configuration data into the new CMDB.
- A process description for manipulating and viewing data for processes like handover of new CI's and maintenance.
- A GUI for the data manipulation and for viewing.
- An interface description of the CMDB for automating processes.

2.5 Exclusions

Interfaces and message flows that are not built on the standard TIBCO solution will not be included in this project. The creation of standard naming conventions is also excluded, but the existing conventions will be followed.

Interfaces outside the responsibility of BP&A TA AIT, like AMTRIX, Synchrony B2BiOD or local interfacing solutions are also out of scope.

2.6 Constraints

The new CMDB must be still capable of loading the expected and correct data to the suppliers that are supporting the NXP system landscape. The suppliers get an extract of the current CMDB delivered by BP&A Operations in an overview is called the "Critical CIs across suppliers.xls" and is distributed once a month. (See Appendix A)

This project is the thesis of Henri den Hollander. Any delay in the project will result in missing the thesis date in January 2010.

2.7 Assumptions

Until now no assumptions are made. The Application Integration Team (AIT) is fully aware of the current situation.

2.8 Dependencies

There is a dependency on the data model of the E2E framework, which is being implemented for end-to-end monitoring of the TIBCO interfaces.

Since this project will be the thesis of Henri den Hollander for the final part of the study "Business Informatics", the project will be dependent on the timelines of the thesis.

2.9 Compliancy

2.9.1 Organisational compliancy

There will be no impact on the current organisational structure of NXP. See appendix B for organisation chart.

Current manual process of maintaining the data will be replaced. In that way, the existing process within BP&A operations of delivering an extract of the current CMDB in the Excel sheet for sharing with the other suppliers will be still supported. This can be replaced in the future with automated distributions to the suppliers like TCS, CIBER and AtosOrigin when the CMDB is available in a database.

2.9.2 SOx Compliancy (approved by IT Compliance Team)

In Appendix C the standard questions regarding Sox compliancy are answered. In general all can be answered with "No."

The CMDB will have Application Controls which will be standard Oracle. The GUI for updating and viewing the data in the CMDB will have a login page.

2.9.3 Information Security

The PID has been discussed with the NXP Information Security (Mario de Boer). It became clear the access control and encryption of data in the database should be defined clearly in the design phase. In that way the NXP Information Security can check if all security related aspects have been addressed.

2.9.4 Architectural Assessment

The architectural assessment has been completed and discussed with Herwig Wens. It can be found on the NXP WIKI: http://nww.wiki.nxp.com//x/YwCFFw.
Also see Appendix D.

2.9.5 Assessment on the Functional Application landscape

The project was discussed with the Process and Excellence Manager of BP&A Operations, Shuguang Shi. The link with the HEROS program has been mentioned and the CMDB possibilities of SNC must be checked. Also a meeting will be held with the process manager of TCS, Shreepad Mahavadi will be planned, since TCS is supporting the TIBCO environment. TCS uses Remedy as a service desk tool, which also has CMDB capabilities.

2.9.6 Project Health check Assessment

A Project Health Check assessment has been performed to assure a proper start of the execution phases. The outcome of the Health Check is **Optimize**. See Appendix E.

3 Business Case

3.1 Alternatives Considered

The alternatives next to a detailed CMDB in a Oracle database are listed below.

Do nothing and keep the Excel sheet will result in creating the master data of the configuration items anyway. The data will be scattered around over various implementations, like the E2E reporting database and the version control system. The question is then if it is possible to maintain the data correctly and keep it consistent.

Use the CMDB of SNC. The level of detail required by the TIBCO infrastructure (E2E framework reporting, version control) goes much further than the level required in a ticketing system. Currently, the HPOV system does not even contain the data. If the data would be maintained in that CMDB of SNC, which is outside the NXP domain and infrastructure, a real time connection between SNC and the E2E reporting database will be needed. This will add much more complexity than having the CI's in the same database as the event data generated by the E2E framework.

Use the CMDB of Remedy. Like SNC, Remedy is also not in the IT domain of NXP, but in the domain of TCS in a different data centre. Remedy is also not only used for NXP and more data of other customers of TCS is in that CMDB.

3.2 Benefits Expected

(Describe Benefits or IT Cost Savings in measurable terms .The Business must be consulted in case of Business benefits/cost savings)

CMDB data maintained in a central place down to the level required by the E2E framework. The version control system and lifecycle tooling for automated deployments will make use of the same data.
Extracts of the CMDB can be made and provided to the TCS ticketing system and for sharing with the other suppliers. Also the CMDB of SNC can be populated when required.

3.3 Cost

The cost for this project will only be labour of the resources in the AIT. No hardware or software is required, since it is already available. The database schema will be created in a existing database instance on the Oracle Grid.
The total amount of hours for this project is 640 hours, out of which 200 are billable. The total cost estimated is therefore $19.200,-.
The initial calculation of the @Investor ROI Calculation Form gives a ROI of 350%. This can be explained by the labour that does not have to be carried out by the AIT to support the processes of BP&A and the maintenance of the CI's in a central location.

4 Project Organisational Structure

4.1 Project Management Team Structure

Project Board
    Executive: **Marty Smit** (Manager BP&A TA)
    Senior User(s): **Maurice Arntz** (Manager BP&A Operations)
    Senior Supplier(s): **Marty Smit** (Manager BP&A TA)

Project Manager: **Henri den Hollander** (Architect BP&A TA AIT)
Project Support/Assurance: **PSO**
Project Member(s): **Henri den Hollander, Vincent van Dijck, Nilesh Tiwari**

Project Organisation Structure
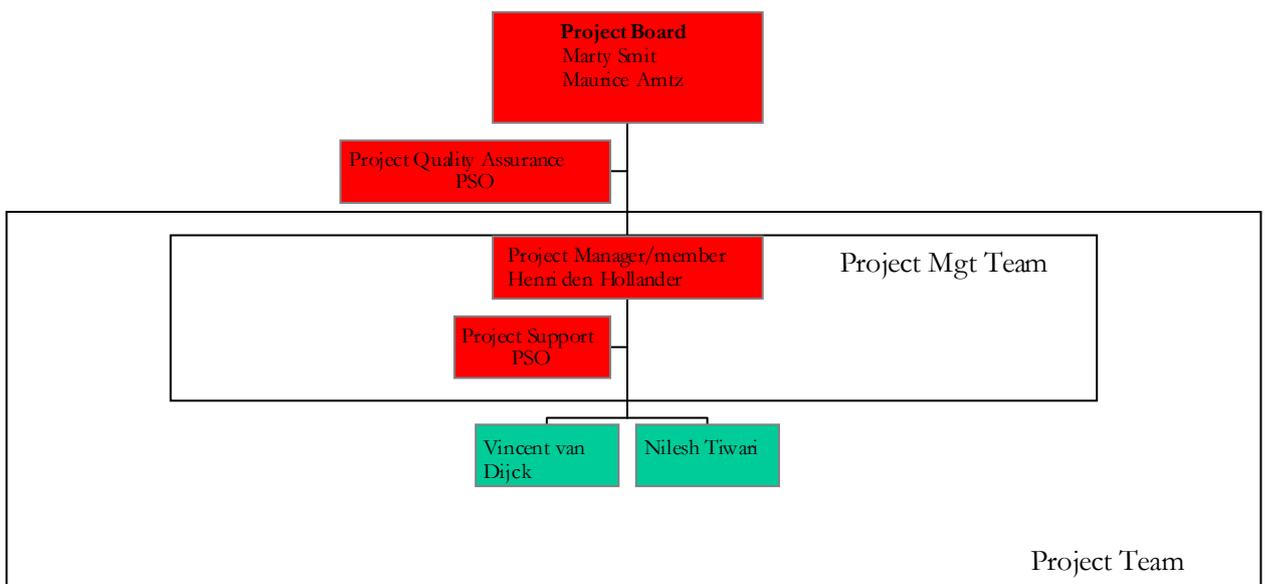
4.2 Job Descriptions & Responsibilities

In the project board the Executive role and Senior supplier role will both be fulfilled by the manager BP&A TA, since this is an improvement project. The senior user is not from the business, but the manager of BP&A Operations is responsible for supporting the ongoing business. The products of the project can be used by BP&A Operations.

Project management will be part time, since the project manager will also participate as a project member and the team manager.

See the Responsibilities table below:

Roles ->	PMO	Team members	Project Manager	Project Board
Responsibilities				
Project Budget	I	-	R	A
Project Organization	I	I	R	A
Change Requests	I	C	R	A
Project Issues	I	C	R	A
Project Risks	I	C	R	A
Project Progress	I	R	R	A
Project QA	R	C	C	A

Roles & Responsibilities table
R=Responsible, A=Accountable, C=Consulted, I=Informed

5 Project Quality Plan

5.1 Customer's Quality Expectations

The project results will be handed over to Operations (TCS TAM TIBCO) and will replace the current Excel sheet holding the configuration data of the TIBCO components in the landscape. All the existing data must be migrated into the database and can be checked if required.

The current (manual) processes must be supported still after the implementation, so that the data is available for BP&A Operations.

5.2 Acceptance Criteria

Deliverable	Acceptance criteria (measurable)	Measured by
Functional specification data model	Requirements of E2E covered in data model	AIT
Technical implementation in Oracle	Complete schema in Oracle	AIT
Process description for maintaining the data	All processes in scope defined	TCS (TAM TIBCO)
GUI for data manipulation	Working GUI on the current web server of TRAcER	AIT
Interface description of the CMDB	Oracle schema accessible and XML output available	AIT

5.3 Quality Responsibilities

AIT (Project team member Vincent van Dijck) will be responsible for the quality aspect in relation to the usability of the CMDB by the E2E framework and the future improvement for version control and lifecycle tooling. TCS TAM TIBCO (Project team member Nilesh Tiwari) will be responsible for assuring the current processes will be still supported by the new CMDB.

5.4 Applicable Standards

The CMDB will be created in an existing Oracle database instance on the Oracle Grid, which is managed and supported by AtosOrigin.
All the interfaces in scope are running on the standard TIBCO infrastructure.

5.5 Quality Control and Audit Processes

The standard NXP Project Health check is and will be used.
See Create_CMDB_NXP_interfacing_Health_Check.xls

5.6 Specialist Work Quality Control and Audit Processes

Not applicable.

5.7 Change Management Procedures

Any change to the specification or scope will be carefully controlled and logged in the standard NXP Project Log. The impact of potential changes, their importance, their cost will be assessed. Then a and a judgmental decision can be made by management on whether to include them or not. Any approved change must be reflected in any necessary corresponding change to schedule and budget.

5.8 Configuration Management Plan

All the documents produced by this project will have version management. The documents will be stored in a central location, accessible by the team. The location is G:\EAIs\30 Projects\Improvement Initiatives\. Next to that the project documentation will be send to the PSO as well.

The products delivered, like the code to create the tables in Oracle and the code of the GUI will be stored in a version control system. Currently within TA AIT XMLCanon is used for storing code, but an improvement will be started up soon, to move away from XMLCanon since it is not supported anymore by Tibco. Therefore the TA standard, CVS, will be used to store the code for this project. A separate branch for AIT is already available.

5.9 Quality Tools

No specific tools will be used, except the NXP IT project lifecycle with its gate reviews. The product will be presented for review and comments from reviewers (as stated in paragraph 5.3) are discussed during a structured meeting. Any required changes to the product are agreed and a complete list of required actions is taken.

6 Project Controls

The standard NXP project controls will be followed as described below.

All project issues will be registered in a central issue log, managed at the project level. Anyone from the project team can enter a project issue in project log. Team members will report open issues for urgent issues directly, or for other issues in the checkpoint reports. If the team can resolve the issue internally and remain within team plan tolerances, the team will do so; if not, team members will escalate to project manager, who can reassign resources or re-plan, as long as he remains within stage tolerances.

Project Management will monitor open issues as frequently as needed, perform impact analysis and evaluate against the set tolerance levels. If the project manager foresees that corrective action will not be sufficient and stage tolerance is in jeopardy he will immediately escalate a project issue or create an xception report and submit per e-mail – to the first responsible from project board. Escalated Issues (NB: only if out of tolerances) will be handled according to below decision tree:

Impact	Tolerance	First responsible(s) from Project Board	Actions
Time	80 hrs	Executive & Senior Supplier	Call project board meeting
Money	2 K €	Executive	Call project board meeting, if needed invoke NXP Management
Risk	Above Medium	Executive & Senior Supplier	Discuss & decide, if needed call project board meeting
Quality	If not met	Senior Supplier	Take internal supplier action, if needed call project board meeting
Scope	Extending outside BP&A	Senior User	If additional scope has no consequences on other parameters (time / money) decide, else call project board meeting
Benefits	Other systems will use product	Executive / Senior User	Take organizational change management action, if needed call project board meeting

First responsible or his appointed replacement will react within 24 hours and decide on the issue or will call a Project Board meeting. If issue impact is severe, Project Management will take direct (phone) contact with Business executive and decide on further action.

7   Communications Plan

Communication Item	Stakeholder	Purpose / Objective	Content Owner	Frequency of communication	Channel	Sender	Feedback
Highlight Report	Project Board	Project Progress / Status Reporting	Project Manager	Bi-Weekly	PowerPoint presentation sent via e-mail	Project Manager	Collated by PM. Action depends on feedback
Project Progress	Program Board/Fun	Project Progress /	Project Manager	Monthly	PowerPoint presentation	Project Manager	Collated by PM. Action depends

Communica tion Item	Stakeholde r	Purpose / Objective	Content Owner	Frequency of communic ation	Channel	Sender	Feedback
Report	ctional Board	Status Reporting			sent via e-mail		on feedback

Contact information			
Name	**Role**	**Telephone number**	**Email address**
Marty Smit	**Project executive**	**+31402729252**	**Marty.Smit@nxp.com**
Maurice Arntz	**Senior user**	**+31402729425**	**Maurice.Arntz@nxp.com**
Henri den Hollander	**Project manager**	**+31402725746**	**Henri.den.Hollander@nxp.com**
Vincent van Dijck	**Project member**	**+31402725746**	**Vincent.van.Dijck@nxp.com**
Nilesh Tiwari	**Project member**	**+31402728801**	**Nilesh.Tiwari@nxp.com**
Marco Dorenbos	**Thesis supervisor**	**+31877871195**	**M.Dorenbos@fontys.nl**

8   Initial Project Plan

Agreed with Board at end of Phase / stage: ->	Design		Develop		Implementation		Live & Aftercare		
	Target	Tolerance	Target	Tolerance	Target	Tolerance	Target	Tolerance	**Actual**
End date Design Stage (= SCORE FRS Approved Milestone)									**<date>**
End date Develop Stage	2009-10-07	2 wks							**<date>**
End date Implementation Stage			2009-11-01	1 wks					**<date>**
End date Live & Aftercare Stage (=SCORE Go-Live milestone)					2009-12-01	2 wks			**<date>**
End date Project Closure Phase							2009-12-15	2 wks	**<date>**
Agreed with Board at end of Phase / stage: ->	Target K€	Tolerance	Target K€	Tolerance	Target K€	Tolerance	Target K€	Tolerance	
Cost Design Stage									…K€
Cost Develop Stage	11 K€	**10%**							…K€
Cost Implementation Stage			5 K€	**10%**					…K€
Cost Live & Aftercare Stage					1 K€	**10%**			…K€
Cost Project Closure Phase							1 K€	**10%**	…K€
Total project costs	**11 K€**	**10%**	**5 K€**	**10%**	**1 K€**	**10%**	**1 K€**	**10%**	**… K€**

For a more detailed planning see Appendix F.

9   Initial risk log

The standard NXP Project Risk log is used. Initially the following risks can be determined. Other improvement projects of BP&A TA are dependent on this new CMDB. The implementation of the new E2E framework is ongoing and needs the master data of the CI's for the correct processing of events generated through out the landscape. Currently temporary tables are used in the E2E reporting database with limited data for the processing.
The other improvements for version control and lifecycle tooling need to be started still. Therefore changing requirements for the data model can also be a risk, but the data model will be set up with the complete landscape in scope.
Another risk for this project is the current workload of the AIT. Good planning of the team is a must to complete all the running projects. The SAPNXP functional merge project, SPEED roll outs and cost savings

projects have higher priority, but according the current planning there is room for this improvement. Also the other projects will benefit from a good CMDB and version control.

See Appendix G for detailed risk matrix.

10   **Glossary**

AIT – Application Integration Team (of BP&A TA)
BP&A – Business Processes & Applications
C3 – Standard collaboration tools within NXP
CI – Configuration Item
CMDB – Configuration Management DataBase
CVS – Open source version control system
E2E framework – End-to-End framework for generating events throughout the integration landscape
E2E reporting – The reporting tool for End-to-End monitoring in C3 tool JasperServer
HPOV – HP OpenView
PSO – Project Support Office
SNC – Service-now .com
TA – Technology Advancement
TCS – Tata Consultancy Services
TIBCO – TIBCO Software Inc. (The Information Bus Company)
TRAcER – Current message flow control for tracking and tracing
XMLCanon – Version control system from TIBCO

11 Appendices

Appendix A Interface list

Status	InterfaceName	Complexity	Criticality	MsgFlowName	MsgType	Direction	Remarks	Application	Application Type	ApplicationInterfaces.Remarks
Operational	GENLDG_EMPEXP	Medium	Low	GENLDG_EMPEXP_HKG	I074	Inbound	Employee	SPEED	NONB2B	SEV1_NOTALLOWED-NL:8019916
Operational	GENLDG_EMPEXP	Medium	Low	GENLDG_EMPEXP_HZG	I074	Inbound	Employee	SPEED	NONB2B	SEV1_NOTALLOWED-NL:8019916
Operational	GENLDG_EMPEXP	Medium	Medium	GENLDG_EMPEXP_LEU	I074	Inbound	Employee	SPEED	NONB2B	SEV1_NOTALLOWED-UK:C617925
Operational	GENLDG_EMPEXP	Medium	Low	GENLDG_EMPEXP_PSK	I074	Inbound	Employee	SPEED	NONB2B	SEV1_NOTALLOWED-NL:8019916
Operational	GENLDG_EMPEXP	Medium	Low	GENLDG_EMPEXP_SHA	I074	Inbound	Employee	SPEED	NONB2B	SEV1_NOTALLOWED-NL:8019916
Operational	GENLDG_EXCRATES	Low	High	GENLDG_EXCRATES_EHV	I004	Inbound	Exchange	SPEED	NONB2B	SEV1_ALLOWED-NL:8019916
Operational	GENLDG_FINMTHEND	Low	High	GENLDG_FINMTHEND_EHV	I005	Outbound	Financial	SPEED	NONB2B	SEV1_ALLOWED-NL:8019916
Operational	GENLDG_GDSMVMT	Medium	High	GENLDG_GDSMVMT_BNK	I011	Inbound	Financial	SPEED	NONB2B	SEV1_ALLOWED-NL:8019916
Operational	GENLDG_GDSMVMT	Medium	High	GENLDG_GDSMVMT_CFR	I011	Inbound	Financial	SPEED	NONB2B	SEV1_ALLOWED-NL:8019916
Operational	GENLDG_GDSMVMT	Medium	High	GENLDG_GDSMVMT_CLB	I011	Inbound	Financial	SPEED	NONB2B	SEV1_ALLOWED-NL:8019916
Non-Operational	GENLDG_GDSMVMT	Medium	High	GENLDG_GDSMVMT_CRL	I011	Inbound	Financial	SPEED	NONB2B	SEV1_ALLOWED-NL:8019916
Operational	GENLDG_GDSMVMT	Medium	High	GENLDG_GDSMVMT_CUB	I011	Inbound	Financial	SPEED	NONB2B	SEV1_ALLOWED-NL:8019916
Operational	GENLDG_GDSMVMT	Medium	Low	GENLDG_GDSMVMT_GFR	LFI011	Inbound	Financial	CLASS	NONB2B	SEV1_NOTALLOWED-NL:8019916
Operational	GENLDG_GDSMVMT	Medium	High	GENLDG_GDSMVMT_HKG	I011	Inbound	Financial	SPEED	NONB2B	SEV1_ALLOWED-NL:8019916
Operational	GENLDG_GDSMVMT	Medium	High	GENLDG_GDSMVMT_NYM	I011	Inbound	Financial	SPEED	NONB2B	SEV1_ALLOWED-NL:8019916
Operational	GENLDG_GDSMVMT	Medium	High	GENLDG_GDSMVMT_PSG	I011	Inbound	Financial	SPEED	NONB2B	SEV1_ALLOWED-NL:8019916
Operational	GENLDG_GDSMVMT	Medium	High	GENLDG_GDSMVMT_PSK	I011	Inbound	"Financial	SPEED	NONB2B	SEV1_ALLOWED-NL:8019916
Operational	GENLDG_GDSMVMT	Medium	High	GENLDG_GDSMVMT_PSL	I011	Inbound	Financial	SPEED	NONB2B	SEV1_ALLOWED-NL:8019916
Operational	GENLDG_GDSMVMT	Medium	High	GENLDG_GDSMVMT_SER	I011	Inbound	Financial	SPEED	NONB2B	SEV1_ALLOWED-NL:8019916
Operational	GENLDG_GDSMVMT	Medium	High	GENLDG_GDSMVMT_VIE	I011	Inbound	Financial	SPEED	NONB2B	SEV1_ALLOWED-UK:C516926
Operational	GENLDG_ICINVOICAR	High	High	GENLDG_ICINVOICAR_EHV	I056	Inbound	InterCom	SPEED	NONB2B	SEV1_ALLOWED-NL:8019916
Operational	GENLDG_INACCRECV	Medium	Medium	GENLDG_INACCRECV_CFR	I014	Inbound	Incoming	SPEED	NONB2B	SEV1_NOTALLOWED-UK:C511136
Non-Operational	GENLDG_INACCRECV	Medium	Medium	GENLDG_INACCRECV_CRL	I014	Inbound	Incoming	SPEED	NONB2B	SEV1_NOTALLOWED-UK:C511136
Operational	GENLDG_INACCRECV	Medium	Medium	GENLDG_INACCRECV_HKG	I014	Inbound	Incoming	SPEED	NONB2B	SEV1_NOTALLOWED-UK:C511136
Operational	GENLDG_INACCRECV	Medium	Medium	GENLDG_INACCRECV_PSG	I014	Inbound	Incoming	SPEED	NONB2B	SEV1_NOTALLOWED-UK:C511136
Operational	GENLDG_INACCRECV	Medium	Medium	GENLDG_INACCRECV_VIE	I014	Inbound	Incoming	SPEED	NONB2B	SEV1_NOTALLOWED-UK:C511136
Operational	GENLDG_LGLFINEMP	Medium	Low	GENLDG_LGLFINEMP_CFR	I053	Inbound	Legal Rep	SPEED	NONB2B	SEV1_NOTALLOWED-NL:8019916
Operational	GENLDG_LGLFINEMPAB	High	Medium	GENLDG_LGLFINEMPAB_CFR	I059	Outbound	Legal Rep	SPEED	NONB2B	SEV1_NOTALLOWED-UK:C511136
Non-Operational	GENLDG_LGLFINEMPAB	High	Medium	GENLDG_LGLFINEMPAB_CRL	I059	Outbound	Legal Rep	SPEED	NONB2B	SEV1_NOTALLOWED-UK:C511136
Operational	GENLDG_MTHTAXFRA	High	Medium	GENLDG_MTHTAXFRA_CFR	I027	Outbound	Monthly T	SPEED	NONB2B	SEV1_NOTALLOWED-UK:C511136
Operational	GENLDG_MULJOUFLOW	Medium	Medium	GENLDG_MULJOUFLOW_GUS	LFI071	Inbound	Multiple J	CLASS	NONB2B	SEV1_NOTALLOWED-UK:C511136

Appendix B Organisation
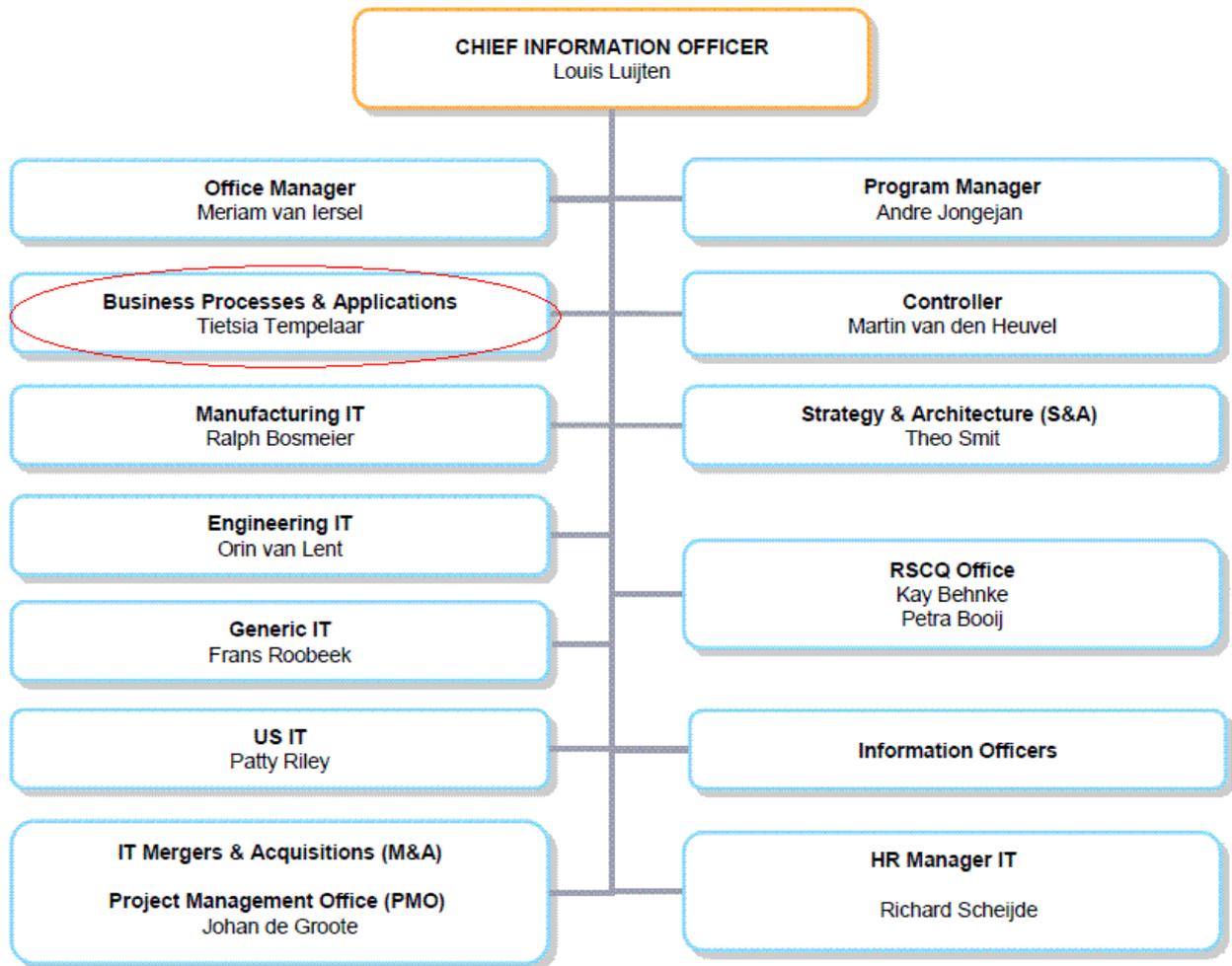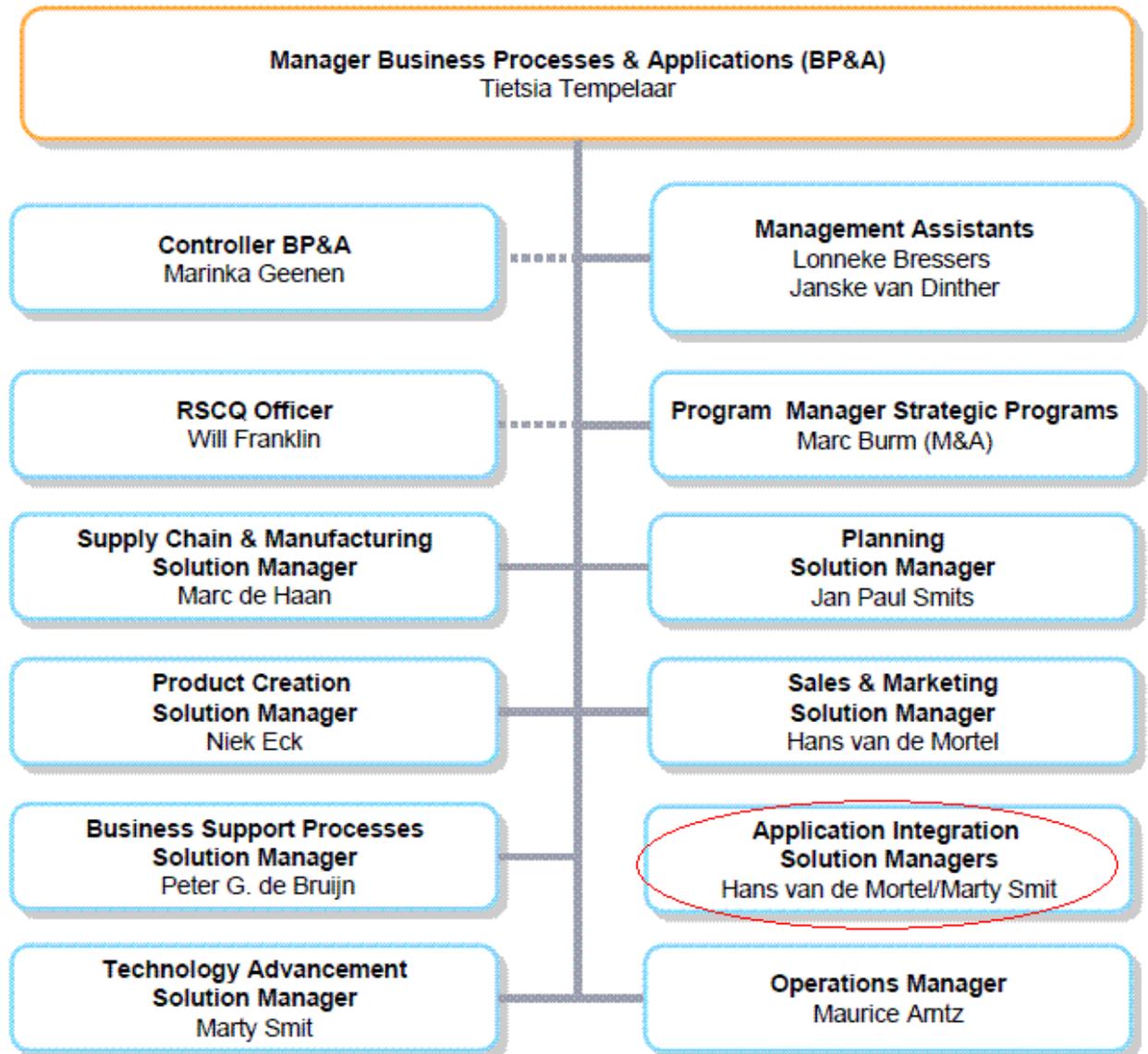
Appendix C Sox Compliancy

Answer the three questions below. If the answer is yes on one or more of the questions then the deliverable "SDLC-SOX compliancy check for projects" is mandatory in the design phase.

a. Is the product that is being created/modified/deleted in scope for SOx in this year? **No**
   -<Does the product contains, changes or presents any financial data with applications? **No**
   -<Is the application already in SOx scope for the present year? **No**
   - If uncertain, please check with the IT Compliance Team for the latest details on what applications are in scope >

 b. Will the product be in scope for next year (does the process/application have a significant impact on, the creation of and the content, of the Yearly Financial Statement)? **No**
   <See same questions as under question a. Only answer these questions for next year/coming year for the application.>

c. Are there Business Controls, IT Application Controls or IT Dependent Manual controls defined for the product/application/system?
The CMDB will have Application Controls which will be standard Oracle. The GUI for updating and viewing the data in the CMDB will have a login page.

Appendix D Initial Architecture Impact Assessment

Project Cost Center	231087
Project Name	Improve CMDB (018399)
Are you going to introduce any new applications? If yes, which?	Yes, GUI on CMDB
Will there be a change to the existing business processes? If yes, which?	No
Are you planning to deploy an application to a new or extended user group? If yes, which?	No
Are you planning to introduce new information objects? If yes, which?	No
Are you planning to exchange information with other systems? If yes, which?	No, but is possible
Are you planning to exchange information with external parties? If yes, which?	Yes, CI's are also now being exchanged with suppliers by Excel sheet. Export will be provided to support current process
Do you expect custom development?	Yes
Do you expect to run this application on existing infrastructure?	Yes
Will this be a SaaS (Software as a Service) project? If yes, which?	No
What is the life expectancy of this application? (<1, 1..3 or >3 year)	>3 years, as long as there is TIBCO. Data will be used by E2E framework also.
Can other applications re-use parts and/or services from this application? If yes, which?	Yes, other CMDB's from suppliers
Is new technology involved, never before used by the organization? If yes, which?	No
Will there be a need to modify established identity and access management information, for example, new roles, new approvals, and so on? If yes, which?	No

Appendix E Project Health Check

For the health check all the nine area's must be filled. This results in the graph below.
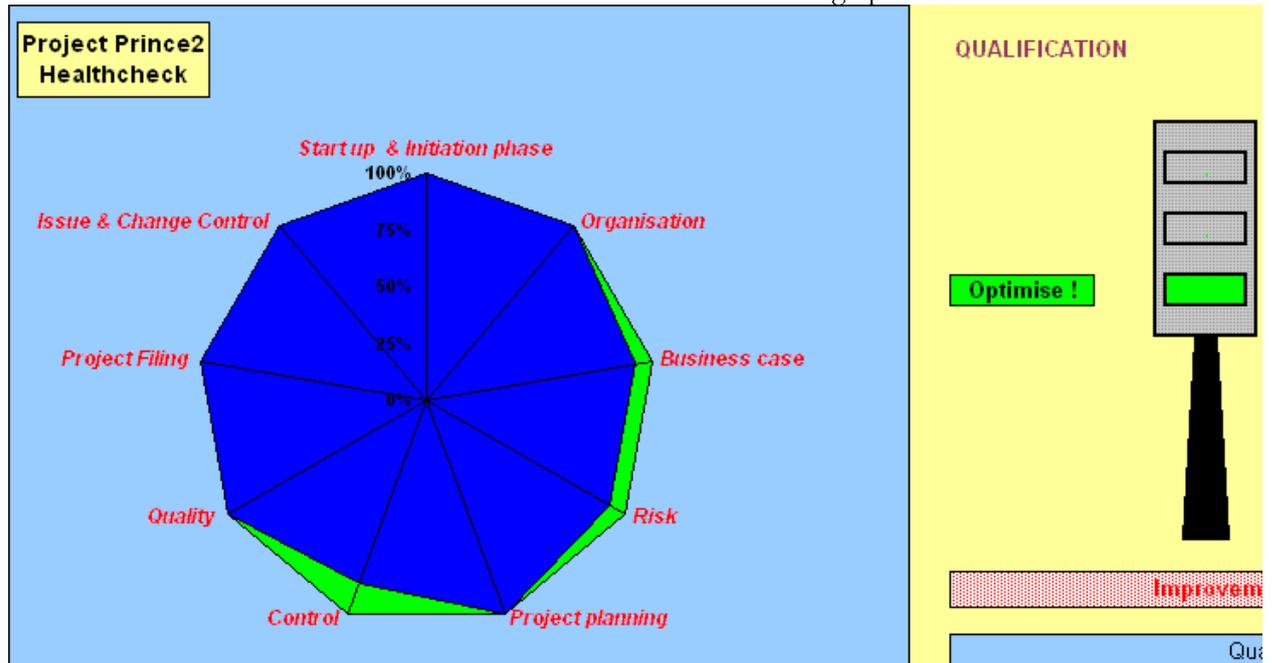
Appendix F Project planning

Deliverables	2009																					
	Aug				Sep					Oct				Nov				Dec				
	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	1
PID			done	done	done																	
Meeting NXP proc mgr			done																			
Planning						done	plan															
Meeting TCS proc mgr																						
Approval PID							◆															
ERD					done	done	plan	plan	plan													
Data dictionary								plan	plan													
Request db schema							plan															
Process definitions								plan	plan													
Review data model									plan													
Review processes									plan													
Gate 1 FRS approval										◆												
Code GUI										plan	plan	plan	plan									
Develop output formats													plan	plan								
Gate 2 Code approval														◆								
Data migration															plan							
Deploy GUI															plan	plan						
Output channels																plan						
Gate 3 Impl (test compl)																	◆					
Go-Live																		◆				
Aftercare																		plan		◆		
Project Closure																			plan		◆	

actual plan ▮ done ▮

Appendix G Risk Matrix

Risk No.	Description	Date Logged (dd-mm-yy)	Risk Status	Impact of risk	Probability of risk	Risk Level
R-001	Other improvements depend on this project	31-08-2009	Open	Low	Medium	Low
R-002	Current workload of AIT	31-08-2009	Open	Low	High	Medium
R-003	Changing requirements E2E	03-09-2009	Open	Low	Low	Low

The input:

The tool generates the graph below based on the input.

Project risk level

risks per category : Only open risks considered

	Low	Medium	High
High	Medium 0	High 0	Very High 0
Medium	Low 0	Medium 0	High 0
Low	Very Low 1	Low 1	Medium 1

Impact of Risk (vertical axis)

Probability of Risk to occur (horizontal axis)
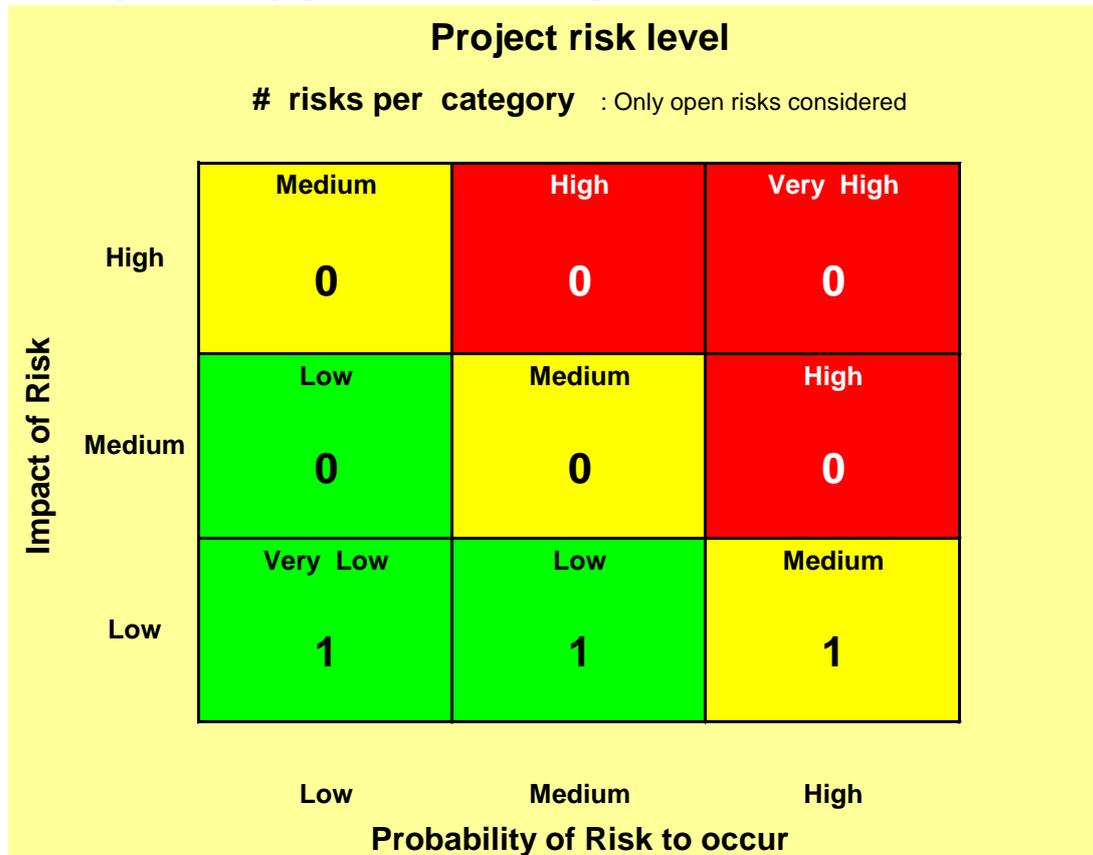
NXP Semiconductors Netherlands B.V.

High Tech Campus 60, 5656 AG Eindhov en

II. Thesis process document

Improve CMDB
Process Report

Fontys Hogeschool ICT & Business

Category:	Process Documentation
Author:	Henri den Hollander
Date:	8/6/2010
Version:	1.0
Status:	Final
Reference:	018399

Table of contents

1   Introduction

1.1   Purpose

The purpose of this document is to describe the process of the project for my thesis. Over the course of time, when the project was executed, changes in planning were done, which will be explained. Next to that a personal evaluation about the period of the project and my learning curve is added.

1.2   Scope

The scope of my thesis is within the NXP Semiconductors IT department BP&A (located in Eindhoven Headquarters). The project concerns an improved CMDB for the existing and to be developed TIBCO interfaces for the integration of corporate applications. Within BP&A, I work for the solution team TA AIT, which is responsible for these interfaces.
BP&A TA has defined a master plan for improvements, which will result in lower costs and better support for the business processes of NXP. Our team (AIT) also contributed to that master plan and has defined several improvements. My thesis is one of the improvements defined by AIT.

1.2.1   Audience

This document is intended for following readers:

Role	Name	Organization
Thesis Supervisor	Marco Dorenbos	Fontys Hogescholen ICT
Secondary Supervisor	Ko Vleugel	Fontys Hogescholen ICT
External Expert	W. Knops	External

1.3   Related Documents

Knowledge of the following documents is required:

Document title	Author	Organization	Document ID	Version
Create_CMDB_NXP_interfacing_ Thesis.doc	HdH	BP&A TA AIT	-	1.0

1.4   Used terminology and abbreviations

The following definitions and abbreviations are used within this document:

Term	Description
AIT	Application Integration Team
BP&A	Business Processes & Applications
CMDB	Configuration Management DataBase
ERD	Entity Relation Diagram
FRS	Functional Requirements Specification
GUI	Graphical User Interface
HTML	HyperText Markup Language
PHP	**P**HP: **H**ypertext **P**reprocessor
PID	Project Initiation Document
SOx	Sarbanes-Oxley
TA	Technology Advancement

1.5   Document history

VERSION	DATE	DESCRIPTION	AUTHOR
0.1	2010-07-02	Initial layout	HdH
1.0	2010-07-29	Final	HdH

2 Assignment

2.1 Organisation

NXP Semiconductors BP&A has chosen TIBCO software as the standard for interfacing the corporate applications. The TIBCO interfaces are the responsibility of AIT in BP&A TA and I am the senior architect in that team. My main focus is the architecture of the interfacing landscape and the responsibility for future proof and reusable solutions.

For this assignment, to improve the CMDB (my thesis), I am the project manager as well as the designer and developer. Next to that my colleagues will review the products and help me with the development.

2.2 Current solution

The TIBCO interfaces were previously supported by AtosOrigin, but were handed over to TCS at the end of 2008 when the contract ended with AtosOrigin for the support. The current Configuration Management Database (CMDB) is maintained in an Excel sheet and not easy to use. For that reason it is not fully reliable, because mistakes are easily made and overseen.

The CMDB must contain all relevant data of the message flows on the TIBCO infrastructure. This will ensure proper incident and change management. The new CMDB should enforce the correct conventions and consistency.

2.3 Desired solution

The main objective is to create a CMDB that can be used by more (automated) processes. To achieve this we have to replace the current Excel sheet containing all message flows and interface components in the NXP integration landscape with a CMDB in a database.

Next to that the CMDB must be made available via an interface for these automated processes like the lifecycle tooling (scripting for deployments), version control system and the E2E reporting database.

Handover processes for updates and maintenance on the CMDB will be defined and a GUI on the CMDB for viewing and updating will be created. With this GUI it will also be possible to generate an extract to provide to BP&A Operations, which is now done manually every month.

3 Planning & Execution

3.1 Initial planning

The approval of the assignment at NXP was end of July 2009 and the project initiation document delivered beginning of August 2009. Everything started fine and the goal was to finish the project in December 2009 and graduate January 2010. At that moment it seemed feasible, since I had over seven years of experience in the area and really looked forward to improve the CMDB. No assumptions had to be made and I knew what we needed.

The initial planning:

	2009																				
	Aug				Sep				Oct				Nov				Dec				
Deliverables	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	1
PID			▨	▨	▨																	
Meeting NXP proc mgr			▨																			
Planning					▨	■																
Meeting TCS proc mgr							■															
Approval PID							◆															
ERD					▨	▨	■	■														
Data dictionary							■	■														
Request db schema							■															
Process definitions								■	■													
Review data model																						
Review processes																						
Gate 1 FRS approval									◆													
Code GUI										■	■	■	■									
Develop output formats												■										
Gate 2 Code approval													◆									
Data migration														■								
Deploy GUI														■	■	■						
Output channels															■							
Gate 3 Impl (test compl)																◆						
Go-Live																	◆					
Aftercare																		■	◆			
Project Closure																		■	■	◆		

actual plan ■   done ▨

3.2 Changes and actual planning

In September 2009, I was asked by the management team to join a project initiation meeting. The board of NXP had decided to start a "carve-out" project for a part of NXP. The project (called "Greece") had to move out the products of the NXP BU Home towards the company Trident. The project board decided they needed me because of my extensive experience and know-how in the interfacing within NXP. This project consumed most of my time from November 2009 until April 2010. The Greece project had the highest priority for NXP IT and the aftercare phase started in May 2010. As a result of this project, senior management decided that we have to cut costs in our department since the IT budget is too high in relation to the overall revenue of NXP. In April, May and June I was part of the core team to investigate the possibilities to lower the costs for the IT contracts we have with our suppliers. This activity has second highest priority (SOx compliancy has highest, since NXP will be part of the NASDAQ in 2011) and consumed 40% of my time until the end of June when we had to deliver a set of alternatives.

This resulted in a big delay of the improvement projects, like the improvement of the CMDB. After the Greece project I adjusted the planning to aim for the graduation in August.

The actual planning:

Deliverables	2009										2010																	
	Aug				Sep					Oct	Apr		May				Jun				Jul				Aug			
	32	33	34	35	36	37	38	39	40	41	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
PID			░	░																								
Meeting NXP proc mgr			░																									
Planning						░																						
Meeting TCS proc mgr									░																			
Approval PID							◆																					
ERD					░	░	░																					
Data dictionary								░	░																			
Request db schema							░																					
Process definitions									░																			
Review data model									░																			
Review processes																	░											
Gate 1 FRS approval														◆														
Code GUI										░					░	░	░											
Develop output formats																			░	░								
Gate 2 Code approval																				◆								
Data migration																					░	▓						
Deploy GUI																			░	░	▓							
Output channels																				░	▓							
Gate 3 Impl (test compl)																						◆						
Go-Live																									◆	▓		
Atercare																										▓	◆	
Project Closure																											▓	◆

actual plan ▓   done ░

3.3   Execution

Due to the fact that I was contracted by NXP (Philips Semiconductors at that time) as a Ordina consultant since 2002 and saw and was part of the extension of the interfacing landscape of NXP, I did not need any introduction. When I started the assignment in 2002 the integration landscape had a scope of just one satellite site connecting to a central application and around 20 interfaces between the central applications in Eindhoven. Now the total setup has over 20 satellite sites connecting to Eindhoven and in total there are over 800 interfaces in the global interfacing landscape.

After the PID I had to create a functional requirements specification (FRS) according to the PRINCE2 method. This enforces the project manager to make sure the project covers all needs. An ERD was created to describe the data model. The data model for the improved CMDB is created around a flow definition and a component operating on that flow. A flow definition describes (the purpose of) an interface between a source and a target application for a particular site. An example of such a flow is employee expense information sent from the local application in Bangkok to the central SAP application in Eindhoven.
Although everybody within BP&A is familiar with the terms message flow and component it seemed needed at that point to create a data dictionary. With a data dictionary it is clearly described what the meaning and purpose of every object is.
Based on the ERD, the database was created in Oracle. For the creation of the database, SQL scripts were used. To access the database after it is created, we use a database management tool called TOAD.

The new GUI was built with the style sheets we already have for other tools in our organisation, so it has the same look and feel. It is also built in a way, that when extension of the functionality is needed, it can be done without programming. The objects in the GUI are displayed dynamically based on the user profile.

Output of the CMDB for further use in the organisation can be retrieved also depending on the authorisations of the user. Different formats will be available for extraction and in the future grants (rights to read data in a database table) can be set on database level for automated processes.

4 Personal evaluation

4.1 Introduction

Due to my position in the team as the senior architect of the team, I am involved in all projects AIT contributes to. We are involved in as many as 30 projects at the same time, since we support all business processes, which the functional teams are responsible for. I am also responsible for the quality of the developments delivered by AIT. This makes it difficult for me to focus on one thing.

As a parttime student you can expect that, since day-to-day business has to go on as well. But in my case it caused a delay of more than 4 months, since priorities were changed by management. Later, after talking to Marco Dorenbos, my thesis supervisor, I realised I should have changed my assignment. My thesis could have been part of the other projects with higher priority.

It was a really valuable experience to execute and manage a project from beginning to end all by myself. Most of the time I am involved in feasibility studies for a project or I am involved in the design phase. Although it is not the first time, in this case the full method, PRINCE2, was used, and I had to follow the NXP standard (financial) reporting. Normally as an expert, you focus on tecnology and solutions and not that much on the marginal events, as planning and control costs.

Since this improvement project is my thesis, the costs for NXP reduced as well, because I invested a lot of private time. It was not possible to execute everything during office hours.

The transition of the new CMDB and the GUI went very smooth. Everybody in the team is eager to use it and because the look and feel is the same as the other tools, it is easy to use.

I have to thank the supervisor at NXP, Marty Smit, for giving me the opportunity to do my thesis at NXP, when I am actually an employee of Ordina hired by NXP. Also many thanks to Vivek Verma, one of the developers in my team, who helped me a great deal with the coding of the GUI.

I also would like to thank Fontys Hogescholen in the person of Marco Dorenbos, since the change of plans was no issue at all, and I got all support to keep motivated to finish the project.

4.2 Growth

During the assignment of my thesis I learned to use the PRINCE2 method of NXP, which is an addition to my project management skills. I already had some experience because of all the training we had in the courses at Fontys with ISA, VSO and WEBD, but with this project the complete method is actually executed through all phases. Everything was reported to the NXP project management office as well, to make it official.

Although this project is not that big compared to the large IT projects in NXP, I will understand the execution of projects better in the future. This experience will also help me to manage projects more easily. For all other improvements we have defined, project mandates are created already. This makes it easier to prioritise and initiate the other initiatives.

At Fontys (WEBD) we learned how to build web interfaces with HTML, java script and PHP. In this project the GUI was developed in JAVA (jsp), which was new to me, but already common practice in the team. With help of the developers in my team, I learned a bit to program jsp's in J2EE. Creating a data model and data dictionary was not new to me, since we created ERD's several times with the courses at Fontys. Also the course DBS and VSO provided me with the correct basis to create the specifications for the database.

The ITIL processes were introduced at the course HDM in the first year at Fontys. Now my knowledge of the ITIL processes is also refreshed.

5   Conclusion

In the end the project was a success. Although it took longer than expected the outcome is as desired and within budget. It is very nice to see that the team and the people working in Operations are very enthusiastic about the solution provided.

The new CMDB is ready to be used by automated processes that will help to improve the quality of the solutions built and delivered by BP&A TA AIT. The other improvements for version control and automated deployments are initiated already and are awaiting approval, so they can be executed in the second half of 2010. The tool for monitoring the message flows in the NXP production environment can be connected to the new CMDB as well. The CMDB will act as a single master data source for the configuration data.

The new CMDB will also help to get the configuration data redundant, which makes the ITIL processes, like release to production and change management, easier to manage.

Because all relevant personnel that have to work with the new CMDB are very enthusiastic, one might conclude my performance and the cooperation within the team has been very good. Another successful project has ended within AIT.

III. Example from Data Dictionary

The flow definition describes how one source document moves from the source application – through intermediate operations, in the form of messages – to the target application.

FLOWDEFINITION						
Field	Description	PK	Status	Type	Length	Comments
NAME	FD name	Y	M	text	30	Unique name of the message flow
DESCR	Description		O	text	128	Full description of the flow
SOURCEAPP	Source application		R	text	16	Refers to NAME in table APPLICATION
SOURCEMSG	Source message format		R	text	64	Message format sent by application
TARGETAPP	Target application		R	text	16	Refers to NAME in table APPLICATION
TARGETMSG	Target message format		R	text	64	Message format received by application
IFCODE	Interface code		O	text	10	Short code used in SAP area
BP	Business process		A	text	15	Refers to NAME in table BP
BO	Business object		A	text	15	Refers to NAME in table BO
CTF	Common transformation format		O	text	64	Name of the CTF used by the flow definition
COMPLEXITY	Complexity		R	text	8	Low, Medium or High complexity
CRITICALITY	Criticality		R	text	8	Low, Medium or High criticality
STATUS	Status		R	text	32	Operational or Non-Operational

IV. Oracle views and functions

View for Interface List
select STATUS, NAME, COMPLEXITY, CRITICALITY, IFCODE, SOURCEAPP, TARGETAPP,
SEV1(CRITICALITY) SEVERITY
from FLOWDEFINITION

View for Components List PROD
select STATUS, TIBDOMAIN, BP, BO, FLOWDEFINITION.NAME FLOW, COMPLEXITY,
CRITICALITY, IFCODE, FLOWDEFINITION.DESCR, COMPONENT.NAME COMPONENT, TYPE,
SITE, HOST, SOURCEAPP, TARGETAPP, SEV1(CRITICALITY) SEVERITY
from FLOWDEFINITION, FD_COMP, COMPONENT, INSTANCE
where FLOWDEFINITION.NAME = FD_COMP.FLOWDEFINITION
and COMPONENT.NAME = FD_COMP.COMPONENT
and COMPONENT.NAME = INSTANCE.COMPONENT
and INSTANCE.ENV = 'PROD'
order by BP, FLOWDEFINITION.NAME

View for Components List QA
select STATUS, TIBDOMAIN, BP, BO, FLOWDEFINITION.NAME FLOW, COMPLEXITY,
CRITICALITY, IFCODE, FLOWDEFINITION.DESCR, COMPONENT.NAME COMPONENT, TYPE,
SITE, HOST, SOURCEAPP, TARGETAPP, SEV1(CRITICALITY) SEVERITY
from FLOWDEFINITION, FD_COMP, COMPONENT, INSTANCE
where FLOWDEFINITION.NAME = FD_COMP.FLOWDEFINITION
and COMPONENT.NAME = FD_COMP.COMPONENT
and COMPONENT.NAME = INSTANCE.COMPONENT
and INSTANCE.ENV = 'QA'
order by BP, FLOWDEFINITION.NAME

Function to determine if SEV1 is allowed for the Flow Definition

```sql
CREATE OR REPLACE FUNCTION TIBCMDB.SEV1(CRIT in VARCHAR2) RETURN VARCHAR2 IS
tmpVar VARCHAR2(32);

BEGIN
   IF CRIT = 'High'
   THEN
      tmpVar := 'SEV 1 ALLOWED';
   ELSE
      tmpVar := 'SEV 1 NOT ALLOWED';
   END IF;
   RETURN tmpVar;
   EXCEPTION
     WHEN NO_DATA_FOUND THEN
       NULL;
     WHEN OTHERS THEN
       -- Consider logging the error and then re-raise
       RAISE;
END SEV1;
```

V. Test case template

Test Case Details							
Serial Number	1						
Name							
Configuration Item							
Description							
Input							
Expected Output							
Steps	1. 2.						
Actual Output							
Result							
Remarks							
Personnel Information							
Author	**Date/Time (dd-MM-yy hh:mm)**	**Approver**	**Date/Time (dd-MM-yy hh:mm)**	**Tester**	**Date/Time (dd-MM-yy hh:mm)**	**Reviewer**	**Date/Time (dd-MM-yy hh:mm)**
Author of the test-case	Date and Time of authoring the test case	Approver of the test case	Date and Time of approval of the test case	Tester (tested by) the test case	Date and time of testing of the test case	Reviewer of the test case	Date and time of review of the test case

VI. Test results

Module	Sl.No	Test Case		Expected Ouput	Actual Output
Login Page	1	Valid User id and Password entered	Click Login	Goto Home page	As expected
	2	User id and Password fields are empty		Pop up message to prompt for input	As expected
	3	Only user id field empty		Pop up message to prompt for user id	As expected
	4	Only password field empty		Pop up message to prompt for password	As expected
	5	Invalid user id		Error message displayed (Invalid user id/password)	As expected
	6	Invalid password		Error message displayed (Invalid user id/password)	As expected
	7	Enter user id and password	Click Reset	User id and password fields reset to blank	As expected
Home Page	1	Home Page display		Display the entities as configured for user group	As expected
	2	Click on link User guide		Pdf file opens	As expected
Change Profile	1	Click Change Profile from home page		Change Profile page displayed	As expected
				Data corresponding to user must be displayed	As expected
				Field user id must be non-editable	As expected
				Rest of the fields must be editable	As expected
	2	Empty password		Pop up does not allow OK	As expected
	3	Empty Name	Click Update	Error shown	As expected
	4	Enter Name		More than 35 characters must not be accepted	Not executed yet
	5	Enter password / confirm password		More than 40 characters must not be accepted	Not executed yet
	6	Enter all valid data	Click Update	Data must be successfully updated in DB	As expected
	7	Data in password pop-up not matching		OK button will not become active	As expected
	8	Numbers in Name field			Not executed yet
	9	Alphabets in Phone number field			Not executed yet
	10	Reset		All fields must be set to initial values	As expected
Flow Definition		**Flow Definition**			
	1	Click Flow Definition in menu	Click menu	Flow Definition page must be displayed	As expected
	2	Viewer gets table view		Table with first 20 flows	As expected
	3	Admin get input fields and table	Click a record	Corresponding records must be displayed	As expected
	4	Add wildcard in desired column	Click Filter	Subset must be displayed	As expected
	5	Select CSV or XML	Click Download	Pop-up must appear to Open or Save	As expected
	6	Admin: fill fields	Click Insert	Data must be successfully inserted in DB	As expected
	7	Cases with no/errornous data	Click Insert	Error shown	Not executed yet
		Components			
	1	Click Components tab		Components page displayed	As expected
	2	Repeat cases as above			As expected
		Deployment		Only for ADMIN/USER groups	
	1	Click current tab		Deployment page displayed	As expected
	2	Repeat cases as above			As expected
		Flow Def vs Component			
	1	Click current tab		Flow Def vs Component page displayed	As expected
	2	Viewer gets table view		Table with first 20 flows	As expected
	3	Select Flow Def	Click edit	Pop-up must appear with FD's	As expected
	4	Select Component	Click edit	Pop-up must appear with Components	As expected
	5	Cases with no/errornous data	Click Insert	Error shown	Java null pointer!!
		Instance			
	1	Click current tab		Instance page displayed	As expected
	2	Viewer gets table view		Table with first 20 flows	As expected
	3	Select Component	Click edit	Pop-up must appear with Components	As expected
	4	Select Host	Click dropbox	List must appear with hosts	As expected
		Componentlist PROD			
	1	Click current tab		Component list displayed	As expected
	2	Select CSV or XML	Click Download	Pop-up must appear to Open or Save	As expected
		Componentlist QA			
	1	Click current tab		Component list displayed	As expected
	2	Select CSV or XML	Click Download	Pop-up must appear to Open or Save	As expected
		Interfacelist			
	1	Click current tab		Interface list displayed	As expected
	2	Select CSV or XML	Click Download	Pop-up must appear to Open or Save	As expected
Configuration		**User**			
	1	Click Configuration in menu	Click menu	User page must be displayed	As expected
	2	Role dropbox	Click	Roles must be listed	As expected
	3	Group dropbox	Click	Groups must be listed	As expected
	4	Click password field	Click	Pop-up for validating password	As expected
	5	Cases with no/errornous data	Click Create	Error shown	Not executed yet
		User group			
	1	Click User group tab		User group page displayed	As expected
	2	Select existing group for update	Click	Groups must be listed	As expected
	3	Retrieve entities	Click	Entities are displayed in tables	As expected