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The changing roles of users

Cases of information systems design and use at the Refinery in Curaçao

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Enschede

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Summary

This master thesis is linked with a large project with the objective to document the historical development of information technology (IT) in Curaçao. The history of IT on Curaçao is up till now a Tabula Rasa ("blank slate"). The project "The Development of Information Technology in Curaçao" tries to fill up this gap in the general history of Curaçao by studying, analyzing and documenting the developments in the area of IT on Curaçao. For this project I did research on the history of IT at the Curaçao Oil Refinery. The two case-studies I conducted at the Refinery form the empirical basis of my master thesis.

This thesis focuses on the role of users and user departments in the introduction of new computer-based information systems (IS). How information systems are designed, used, accepted or changed is to a great extent determined by users and their departments. I will study the users in the context of their organization or department and in their interaction with information systems. Users have increased knowledge of the internal complexity of information systems, either because they have become more interested in information technology (IT) or because they are more and more confronted with information technologies in their everyday work. Because of this, users can act upon the (re-)design and use of information systems more actively.

To study the dynamics of the introduction of new information systems, two case studies have been conducted at the Oil Refinery in Curaçao. The Curaçao Oil Refinery has been for years one of the most important pillars of the economy of Curaçao, and also one of the biggest employers on the island. The Refinery – till 1985 a subsidiary of the Royal Dutch/Shell Group – introduced new information technology at a very early stage. Throughout its existence it kept making extensive use of IT, even after Shell left and the exploitation of the refinery was taken over by the Venezuelan state-owned company PDVSA. The first case study concerns the migration from mainframe computers to mini computers at the end of the seventies. This migration led to decentralization of computing at the Refinery. Users became more independent of the central IT department, and had also more responsibility concerning design and use of information systems. The second case study is about the implementation of SAP in the early nineties. SAP is a software package which integrates the data processing of almost all departments in a company. In 1993 the Refinery decided to adopt SAP as a long-term solution for its cost control and administration. Almost all the Refinery's legacy systems would be replaced by SAP modules. Together these two cases give a detailed impression of the dynamics of

several human actors in various departmental contexts interacting with each other (during design and/or use of new IS) and with new information systems.

The theoretical framework I adopted in this thesis is based on a theoretical model by Wanda J. Orlikowski, with which the interaction between technology and organizations can be examined. This model takes account of the structural environment in which the interaction between human actors and technology takes place. It offers furthermore a starting point to open up the 'black box' of technology. And furthermore the theory acknowledges the agency of technology designers as well as the agency of users in designing technologies.

Some interesting findings on the basis of the case studies include amongst other things: how users were enabled and constrained by institutional properties in their use of new information systems; how a new information system influenced the institutional properties of a department or the entire organization; how an information system was used quite differently than it was designed to; how systems analysts tried to stimulate and mould users in using a new technology; how users played a central role in the design stage of a new information system.

At the end of the seventies, parallel to the process of decentralization, the notion of involving users more in the development of information systems began to arise at the Refinery. The IT department started to see the users as a more and more independent entity, especially when for the first time they had computers physically installed in the user departments. The gap between systems analysts and users would become increasingly smaller over the years, and eventually symbolically bridged in the SAP project in the early nineties, where users and systems analysts worked together, full-time on the implementation of the software package SAP. On the basis of the two case studies it can be observed how the "hybrid user/designer" emerged. A user that links the context of design and the context of use, ergo ensuring better information systems and better use of those systems.

The theoretical framework primarily focuses on the internal organizational processes by which an information system got integrated in the operations of the Refinery through time. However, to fully understand those dynamics, attention had to be paid to social, political and cultural aspects of Curaçao too. The gaining of more control of the – mainly local - users and user departments in relation to the design and use of new IT in the organization is clearly influenced by the wider social-political processes of empowering the local Curaçao workers compared to foreign expatriates. This social-political dimension is not considered in Orlikowski's theoretical model.

Preface

This master thesis is the result of my education Philosophy of Science, Technology and Society at the University of Twente. At the basis of this thesis lies a lot of work, which I've done with much pleasure since the topic is very dear to me. The research that underlies this thesis was conducted at the Oil Refinery in Curaçao. Curaçao is part of The Netherlands Antilles which in turn forms part of the Kingdom of The Netherlands. However, these more 'tropical' parts of the Netherlands tend to be neglected almost entirely in Dutch historiography in general and in the Dutch history of (information) technology in particular. In this thesis I will show that Curaçao, although being a small island, was confronted in a very early stage with state-of-the-art information technology, through its refinery. The dynamics of shaping the technology will be put forward here, and also local developments that might have influenced the design of the technology will be mentioned. Hopefully this writing will do slight justice to the large omission of Curaçao in the Dutch historiography.

I thank the following for their constructive comments on several drafts of this thesis, and also for their patience and support during the more 'cloudy days' of my graduation period: Ellen, Adri and Fokko Jan. I also gratefully acknowledge the help of Jane, Vania, Lisa, Zina, Terrence, and my good old friend August with transcribing interviews. Special thanks to Roy Evers for making this possible in the first place. And to Roxanne: I don't think I would have made it without you!

Contents

Chapter 1

Introduction

1.1 Background of this thesis

This thesis contributed to a large project with the objective to document the historical development of information technology (IT) in Curaçao. The history of IT in Curaçao is up till now a Tabula Rasa ("blank slate"). By studying, analyzing and documenting the developments in the area of IT in Curaçao, the project "The Development of Information Technology in Curaçao" tries to fill up this gap in the written history of Curaçao. This thesis must accordingly be seen as an element of the project results.

My initial contact with the above-mentioned project was through a printed e-mail I received in my mailbox at the university. By this means the project initiator – Roy Evers – was looking for a graduate student who wanted to do research on the history of information technology at the oil refinery in Curaçao. The research could be done in the form of a case study, which the student would be free to fill in him- or herself; of course provided that the study would fit within the framework of the project. Seeing that Curaçao is my native country, and considering the fact that never before anything was written about the history of IT in Curaçao, I didn't hesitate to engage myself with this project.

The "Development of Information Technology in Curaçao" is a history project with educational, social and scientific ambitions. By carefully studying, analyzing and documenting the local developments in the area of information technology, the project aims to increase the overall knowledge of information technology in Curaçao. The expectation is that this will stimulate the growth of the IT sector in Curaçao, and accordingly facilitate the attraction of foreign investors. The project defines its specific objectives as follows:

– "To document the historical development of information technology in Curaçao for reference by students, teachers, managers and policy makers;

- To formulate critical success factors for the future development of information technology in Curaçao;
- To lay a foundation for further research in the area of information technology in Curaçao."[1]

The project focuses on several sectors which have made extensive use of IT, like the financial sector, the government, the refinery, and the IT industry itself. My contribution to the project would eventually consist of doing research on the history of information technology at the oil refinery in Curaçao. This was done in the form of in-depth case studies of two selected IT projects in the refinery. Except for the project, the case studies I carried out at the refinery resulted also in a report for the management of the refinery. In that report I presented my findings per case, and identified some critical factors the refinery could learn from in the future.[2]

The two in-depth case studies conducted at the refinery will also form the basis of this thesis. The first case concerns the implementation of mini computers at the refinery during the Shell period. In this case attention is paid to the design and use of IBM System/34 mini computers in two distinct departments of the refinery. The second case concerns the implementation of SAP R/3 at the refinery during the PDVSA period. This case focuses on the design and use of a number of SAP modules at the refinery.

The rest of this chapter is structured as follows: first I will give a description of the research site. This is followed by the formulation of the actual research question of this master thesis. And finally I will try to justify this thesis in terms of its social and scientific relevance.

1.2 Research site: the Curaçao Refinery

The history of the refinery[3] in Curaçao dates back to 1915, the year in which the Royal Dutch/Shell Group acquired a plot of land for the construction of the refinery. The first constructions were undertaken on 'Plantation Asiento' at the

[1] Evers, 2002, p. 2.

[2] Before handing out the report I gave a presentation for representatives of the refinery, including the Managing Director, the Human Resources manager, the Information Resources manager, an internal IT advisor, and a section head of the Information Resources department. From outside the refinery I invited two representatives of 'Refineria di Korsou' (RdK), and Roy Evers as the project initiator. These representatives were Henry Parisius, Director of RdK and Rudy Henriquez, the Human Resources manager. The reason I invited these representatives of RdK had to do with the fact that they had contributed financially with my research at the refinery.

[3] For a completer history of the refinery I refer the interested reader to Hartog (1961, 1968), van Soest (1977), Hendriks (1987), and van den Blink (1989).

Schottegat Bay on the peninsula of Asiento called 'Isla'.[4] Operations started in 1918, and heavy Venezuelan crude from Mene Grande, Lake of Maracaibo, was the basic crude slate for the refinery. From 1918 to 1923 the subsidiary of the Royal Dutch/Shell Group in Curaçao was called the Curaçao Petroleum Company (CPM). For fiscal benefits the company Curaçao Petroleum Industry Company (CPIM) was established in 1923 and all the rights of CPM were transferred to CPIM. In 1959 the name was changed into Shell Curaçao N.V. (SCNV).[5] SCNV continued operating the refinery till October 1985.

In July 1985 the Royal Dutch/Shell Group stopped its operations on Curaçao. In September of the same year, Shell Curaçao transferred the refinery installations to the Island Territory of Curaçao (this is how the insular government of Curaçao is named). The Island Territory established the limited liability company "Refineria Di Korsou" to manage on her behalf the refinery installations. On October 1st 1985 Petróleos de Venezuela S.A. (PDVSA), through its subsidiary Refineria Isla (Curazao) S.A., took over the operation of the refinery on basis of a lease agreement with the Island Territory of Curaçao. Early 1987 the lease agreement was prolonged for some years, while in 1994 a 20 years agreement was signed between the Government of the Netherlands Antilles, the Government of the Island Territory of Curaçao (as the owner of the facilities), Refineria Di Korsou and PDVSA.

The Island Territory of Curaçao owns thus the refinery installations and the Oil Terminal facilities at 'Bullenbaai'. Refineria Di Korsou, a mercantile company organized and functioning under the laws of the Netherlands Antilles, is legally authorized to represent the Island Territory of Curaçao as the owner of the refinery and the Bullenbaai facilities. The refinery is furthermore operated by PDVSA, an integrated oil company, wholly owned by the Republic of Venezuela. The policies and guidelines are set by the Venezuelan Ministry of Energy and Mines. PDVSA is constituted as a commercial corporation, whose structure, financial control, management style, personnel recruitment and development methods, they claim to be similar to those of most other leading international oil companies in the Western hemisphere. Before 1975, Venezuela knew several private oil companies. In 1975 PDVSA was incorporated and, after having acquired their assets, took possession of all the privately owned oil companies operating in Venezuela. Sine then PDVSA has grown to become a leading international oil company with a number two position in the international oil industry in 1996.[6]

The refinery is located on the outskirts of Curacao's capital, Willemstad. It occupies a large site, approximately 490 hectares around the north side of the harbor. In 1964

[4] The 'Isla' (literally: island) is the peninsula on which the oldest refinery installations were situated. 'Isla' was also the name of the refinery in popular speech. In 1985, this name was subsequently adopted by Petróleos de Venezuela S.A. for its Curaçao subsidiary.
[5] van Soest, 1977, p. 236.
[6] Folder: Refineria Isla (Curazao) S.A., 1991.

it was still the biggest refinery in the world[7]. The refinery has been furthermore one of the most important pillars of the economy of Curaçao for years, and also one of the biggest employers on the island.

The years immediately following the World War II brought economic prosperity to the Island of Curaçao; the demand for skilled labour exceeded the supply, attracting a stream of immigrants to the island. The population grew in a period of ten years from 75,176 (1944) to 114,683 souls (1954).[8]

The economy of Curaçao continued to depend heavily on oil, the refinery being the biggest employer. Employment reached its peak in 1952, comprising a total number of 12,631 persons employed at the refinery and its subsidiary, the 'Curaçaose Scheepvaart Maatschappij' (CSM), paying a total of 58 million Antillean guilders on wages, more than the total expenditure of the government.[9]

In 1954 there was a turning point when the refinery started with modernization of the plants and the automation of the production processes. The need to bring down operation costs to an economically justifiable level resulted in the reduction of the labor-force and eventually to mass lay-offs; in 1965 Shell Curaçao N.V. had 5,223 persons on the payroll, half of the number of 1954.[10] Against this context the revolt on labour relations on May 30 1969 has to be placed.[11]

The refinery is furthermore complex, and with many expensive installations. It is important to realize that all the work (at the refinery) is continuous. "The industry places a premium on uninterrupted operations, and on absolute understanding of what is happening at every stage of the process."[12] One of the means the industry has been employing to maintain and control such an ongoing process is the extensive use of information technology and information systems (IS). The refinery is thus an extensive user of IT. It is in fact one of the most extensive information technology users in Curaçao. This was the reason why the refinery was included as a special case to be investigated separately in the project "The Development of Information Technology in Curaçao", next to among other industries like the financial sector, the government, and the IT industry itself.

[7] NRC Handelsblad, 12-3-1996.
[8] Hartog, 1968, p. 414.
[9] Van Soest, 1977, p. 656 -657.
[10] Hartog, 1968, p. 319 and van Soest, 1977, p. 656.
[11] See 5.2.
[12] Cortada, 2002, p. 10.

1.3 Central research question

Both Royal Dutch/Shell Group and PDVSA are big, multinational companies, which operated (Shell) or still operate (PDVSA) a refinery on a small island. Considering this fact, my expectation was to come across a lot of expatriate employees during my research on Curaçao. I expected a predominance of expatriates working at the IT department and also occupying management positions. For a substantial part of the Shell period this expectation resulted justified. For the PDVSA period this was also the case in the beginning; it would last some years for the situation to change. Both in the Shell period and the PDVSA period the local employees voiced their dissatisfaction regarding their inferior positions (either outspoken and directly or subtle and indirectly). In the Shell period this discontent was not exclusively limited to within the refinery; it was part of broader social and political developments which took place in that time on Curaçao. In the Isla period the dissatisfaction was substantiated by an official survey which was conducted by the management of the refinery. The dynamics between local actors and expatriates, and the voicing of dissatisfaction by the locals may have influenced the design and use of IT and IS at the refinery.

Scholars in the field of Science and Technology Studies (STS) have been giving increasing attention to users in designing technologies. Oudshoorn and Pinch[13] for instance present users as active shapers of technology. They take the view that users and technology are "co-constructed"; they are two sides of the same problem. Oudshoorn and Pinch stress on two assumptions[14]: "there is no one way to use a technology" and users of new technologies have to be defined and, correlated with this, one needs to think about how new users will interact with a new technology. I find their notion that "there is no one way to use a technology" especially interesting. They claim that in fact technology and technological objects do not allow "one essential use". They acknowledge that there may be a dominant use of a technology or a prescribed use, though not an "essential use". This is especially true for information technologies, as we will see. Another notion that has my interest is that "one needs to work out how users will interact with a new technology". Since all innovators want their new technologies to be used eventually, it is convenient to have an impression of or anticipate on how users will appropriate new technologies. Oudshoorn and Pinch want to go beyond a technological determinist view which represents designers as active and users as passive agents in technological design.

Taking these insights into consideration led me to formulate the following research question:

How did users influence the design and use of new information systems at the refinery over time?

[13] Oudshoorn and Pinch, 2003.
[14] Ibid., p. 1 – 2.

1.4 Scientific and social relevance

Curaçao is part of The Netherlands Antilles which in turn forms part of the Kingdom of The Netherlands. Both in Curaçao and the Netherlands no attention has been paid so far to the historical development of information technology in Curaçao. In general, the Dutch historiography tends to neglect this part of the Netherlands almost completely. No attention is for example paid to IT in Curaçao in "De opkomst van de informatietechnologie in Nederland"[15], neither in the broader "Geschiedenis van de techniek in Nederland"[16] series.

The project "The Development of Information Technology in Curaçao" aims to fill up this gap. It will result in a book that will be published at the beginning of the year 2004. This book will be addressed to a wide audience ranging from students to policy makers to the IT sector in Curaçao and to potential investors in the area of e-business. The contents of this thesis will partially be used as input for the book. Both the scientific and the social relevance of this thesis can be extrapolated from this fact.

Firstly, by mapping a small part of the history of IT in Curaçao, this thesis contributes to the process of scientific knowledge production. Secondly, by showing that there are different groups of human agents influencing the design process of an information system, I illustrate that the design stage is not just a technical issue where an IS gets physically constructed, but that there are also relevant social aspects involved. Finally, the case studies I conducted at the refinery can be of value for the sub faculty Philosophy of Sciences and Technology, the faculty where I have graduated. Contribution to the research program of PST concerns the role of users in the dynamics of shaping new technology.

The social relevance lies in the fact that other companies on Curaçao may learn from my views concerning the dynamics of design and use of information systems at the refinery.

1.5 Outline of the thesis

The outline of this thesis is as follows. Following this introductory chapter, I will give an outline of the theoretical perspective that guided my research. Then, in chapter 3, I will disclose the research method I applied during the empirical research underlying this thesis. Chapter 4 will report on the first case,

[15] Van Oost, 1998.
[16] Schot, 2003.

decentralization of computing at Shell. The second case, the implementation and use of SAP at Isla, will be presented in chapter 6. In chapter 5 I will interrupt my case reporting to present a context to link the two periods. This intermezzo will discuss the transition from Shell to Isla on Curaçao. And finally, in chapter 7 conclusions will be formulated to answer the research question.

Chapter 2

Theoretical framework and operationalization

As I already mentioned above I have carried out in-depth case studies of information systems' design and use at several departments, distributed over the two periods in the existence of the refinery. Those case studies were carried out on the basis of empirical material I had previously collected at the refinery. To interpret the collected data and structure my argumentation for this thesis I applied a theoretical model that was built on the basis of a conceptualization of technology in organizations. This "theoretical framework" of my thesis will be presented in this chapter.

Whichever theory I would adopt to conduct the research at the refinery in Curaçao, it had to comply with at least three conditions. For a start the theory had to take account of a structural environment in which the interaction between human actors and information systems takes place. In other words, the theory had to be on organization level, and not (just) on a societal (macro) level. In the second place, the theory had to offer me a starting point to open up the 'black box' of technology. In other words, I am interested in an information system's internal complexity and the way it interacts with human actors, and not just its inputs and outputs. And last but certainly not least, the theory had to acknowledge the agency of users as well as the agency of technology designers, and not just the agency of designers in designing technologies. I did find a theoretical model that integrated all these three prerequisites, and will present it in this chapter.

This chapter is subdivided as follows: in the first section I will present the theoretical framework of this thesis. In the second and last section I will make my research question operational on the basis of the theoretical framework.

2.1 Orlikowski's "Structurational Model of Technology"

The theory I adopted to frame my case studies refers to the theoretical conceptualization of technology in organizations, developed by Wanda J.

Orlikowski. In her article "The Duality of Technology: Rethinking the Concept of Technology in Organizations" Orlikowski develops a theoretical model with which to examine the interaction between technology and organizations[17]. In this article she distances herself from classic technology studies which consider technology to be an objective, external force that would have deterministic impacts on organizations. Orlikowski rejects thus the view of technology as being an autonomous, evolving force, which would drag along an organization in its development process. She also disclaims later developed social constructionist views that consider technology instead of being an autonomous force, as being exclusively the result of human action and therefore being infinitely plastic. These later researchers focused on the social construction of technology, seeing it as the outcome of strategic choice and social action. Orlikowski puts forward in her article that either view is incomplete, and proposes a re-conceptualization of technology that takes both perspectives into account.

The "Structurational Model of Technology" (SMT) shows us that technology, once designed doesn't have to become a 'black box' for its users (and even less for us, analysts of technology). Because human agents are highly "knowledgeable" and "reflexive" they can open the black box themselves[18]. When the black box is opened it will become clear to us (analysts of technology) that technology as a concept is indeed a social construction, in which structural or institutional properties of organizations, human agents, and technology itself have complicated relations with each other. Orlikowski hands me a "theoretical conceptualization of technology which underscores its socio-historical context and its dual nature as objective reality and as socially constructed product"[19]. Furthermore she conceptualizes, by drawing on Giddens' "Theory of Structuration", the ongoing interactions of human agents (agency) systematically in dualistic relation with the structural environment (technology/organization) in which human agents interact (structure)[20].

2.1.1 Components of the Structurational Model of Technology

The structurational model of technology comprises three components: human agents, technology, and institutional properties of organizations. *Human agents* refer to technology designers, users, and decision-makers (managers). Orlikowski's definition of *technology* is: material artifacts mediating task execution in the

[17] Orlikowski, 1992.
[18] Orlikowski draws these two terms from Giddens. Giddens in fact uses these terms as a central assumption in his book of 1984 titled "The Constitution of Society: Outline of the Theory of Structure". With the term "knowledgeable" Giddens refers to the fact that "All social actors, all human beings are highly 'learned' in respect of knowledge which they possess and apply, in the production and reproduction of day-to-day encounters." "Reflexivity" refers to the capacity of human beings to automatically and simultaneously observe and understand what they are doing.
[19] Orlikowski, 1992, p. 423.
[20] Orlikowski, 1992, p. 404 – 405.

workplace (for example a mainframe computer, mini computer, workstation, pc, or applications on a pc). And *institutional properties* refer to organizational dimensions such as structural arrangements, business strategies, ideology, culture, control mechanisms, standard operating procedures, division of labor, expertise, communication patterns, as well as environmental pressures such as government regulations, competitive forces, vendor strategies, professional norms, state of knowledge about technology, and socio-economic conditions[21].

All these components have relations with each other (see figure below). Human agents influence technology in the sense that "technology is an outcome of such human action as design, development, implementation, appropriation, and modification" (arrow a). Technology also influences human action in the sense that it facilitates and constrains human action through the reliance of human beings on technology to perform their job in an organization (arrow b). Humans in their interaction with technology are also influenced by institutional properties. They depend on the "intentions, professional norms, state of the art in materials and knowledge, design standards, and available resources (time, money, skills)" in an organization when they design and/or use a certain technology (arrow c). And finally the "interaction with technology influences the institutional properties of an organization, through reinforcing or transforming structures of signification, domination, and legitimation"[22] (arrow d)[23].

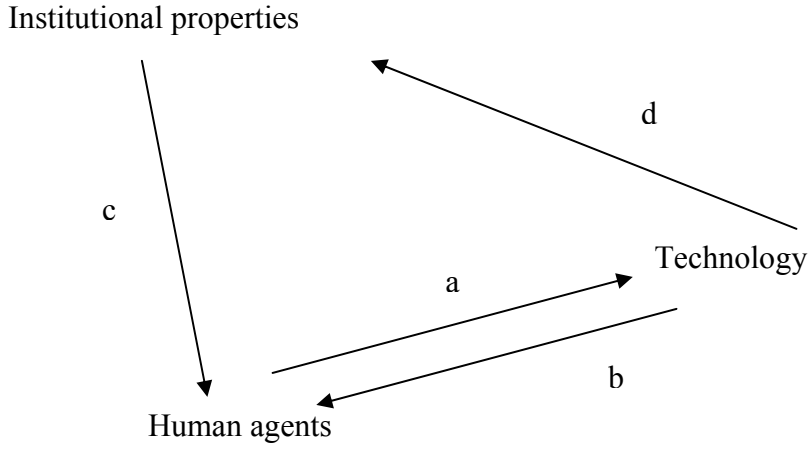

Figure 2.1.: Structurational Model of Technology

[21] Orlikowski, 1992, p. 409.
[22] These concepts will be discussed in the next section.
[23] Orlikowski, 1992, p. 410.

2.1.2 Relevant notions concerning the SMT

Orlikowski uses the term 'institutional properties of organizations' to refer to the patterns of interactions that through the regular actions of human actors become the common way of doing things in organizations. Orlikowski mentions examples like "ways of manufacturing a product, coordinating a meeting, or evaluating an employee". In course of time, these practices become institutionalized, comprising the structural properties of organizations. "These structural or institutionalized properties (structure) are drawn on by humans in their ongoing interactions (agency), even as such use, in turn, reinforces the institutionalized properties"[24]. Thus institutional properties of organizations are gradually realized through the regular actions of human actors. However, once institutionalized, we can see that these properties influence people in their interaction with technology.

In her theoretical conceptualization Orlikowski draws on several notions derived from Giddens' sociological method. One such a notion is the fact that when humans act in an organization they produce and reproduce three fundamental elements of social interaction: *meaning*, *power*, and *norms*[25]. To understand how these three elements are created and recreated in organizations, Giddens' notion of the 'duality of structure' is crucial[26]. By the duality of structure Giddens means that the structural properties of a social system are both the medium and the outcome of human action that constitutes that system. By acknowledging the duality of structure, Giddens actually attempts to overcome the dualism of structure versus agency. The basic problem is in fact how actions lead to structures, and how these structures enable and constrain human action. Applied to Orlikowski's Structurational Model of Technology *interpretive schemes or stocks of knowledge*, *organizational resources or facilities*, and *normative sanctions* are the 'bases' or 'vehicles' of successively communication of meaning, power and norms, comprising structures of signification, domination, and legitimation. Interpretive schemes, organizational resources and normative sanctions are drawn upon by the different social groups (comprising agency in the organization), and recreated through the duality of structure.

– From an agency viewpoint, human interaction is concerned with the "formation and communication of meaning". This is realized through 'interpretive schemes' or 'stocks of knowledge', which are drawn on by humans in their ongoing interactions within the organization. These stocks of knowledge become the heart of mutual knowledge within the organization, "whereby an accountable universe of meaning is sustained through and in processes of interaction". The interpretive schemes mediate hereby communication. From the point of view of institutional properties, interpretive schemes reflect organizational 'structures of signification'. These, symbolize the "organizational

[24] Orlikowski, 1992, p. 404.
[25] Ibid.
[26] Giddens, 1979, p. 69.

rules that inform and define interaction". Interpretive schemes are also consolidated or changed through social interaction, "as the organizational rules are reaffirmed or challenged through their use by human agents"[27].

- From an agency perspective, the element of 'power' becomes part of human interaction when organizational capabilities are provided to humans in order to accomplish outcomes. "Its use in organizations is mediated via the 'organizational resources' that participants bring to, and mobilize within, interaction". These resources are referred to as 'facilities' by Giddens. From the viewpoint of institutional properties, however, these facilities constitute 'structures of domination'. These, reflect the fact that all social systems are marked by an asymmetry of resources (for example, actors in an organization possess different degrees of authority, and have different amounts of financial resources at their disposal). Even so, human agents always retain the potentiality to act to change a particular structure of domination, "a potentiality referred to as the 'dialectic of control' by Giddens". When human actors, through their interactions, exploit a given asymmetry of resources the existing structure of domination will be reaffirmed. Should it happen that the existing asymmetry of resources is changed – either through an explicit effort or gradually and implicit –, then the existing structure of domination will also be modified or undermined[28].
- From an agency point of view, 'norms' "are organizational conventions or rules governing legitimate or appropriate conduct". Intra-organizational interaction is always "guided by the application of 'normative sanctions', expressed through the cultural norms prevailing in an organization". From the viewpoint of institutional properties, however, "norms constitute organizational 'structures of legitimation', whereby a moral order within an organization is articulated and sustained through rituals, socialization practices, and tradition"[29].

Structure	Signification	Domination	Legitimation
(Mediating modality)	Interpretive schemes	Organizational resources / Facilities	Normative sanctions
Agency (Interaction)	Communication of meaning	Power	Norms

[27] Orlikowski, 1992, p. 404.
[28] Orlikowski, 1992, p. 405.
[29] Ibid.

Figure 2.2.: three dimensions of structuration, adapted from Giddens (1979) and Orlikowski (1992).

Interpretive schemes are thus the means, through which meaning is communicated; organizational resources, the means through which power is exercised; and normative sanctions, the means through which norms are expressed. Considering that in Orlikowski's theoretical conceptualization of technology, technology is seen both as a product of human effort and as a medium of human action, I think I can rightly say that interpretive schemes, organizational resources, and norms become reified through the production and/or use of technology in organizations. These elements are built, designed into technology, and therefore influence the task execution of human agents.

2.2 Upon making the research question operational

Orlikowski illustrates her structurational model of technology by carrying out a research on the use of CASE tools within a large, multinational software consulting firm, and subsequently interpreting the results according to the model. For this empirical part she describes three stages of the technology's interaction with the organization, in which the specific relations of her model can be filled in more closely. These three phases will serve as a starting-point for my research too. The processes, by which the information systems got incorporated in the operations of the refinery through time, will be interpreted by a series of structurational models of technology corresponding with these stages. Departing from Orlikowski's model, my research domain (design and use of information systems) falls apart in the three stages she describes, which are: initial design, institutionalized use, and ongoing interaction with IT.

2.1.1 Stage 1: Initial Design/Development of an Information System

In this stage an information system is built. This is usually done by a group of IT experts, whereas users are consulted to supply information about organizational requirements. Because information systems have to meet organizational needs and goals this initial development stage has to take place in close cooperation with the organization or organizational department in question. The better a system meets user requirements, the better that system will be labelled. Managers are concerned with decision-making processes preceding this phase, and their strategies may have influence throughout this stage. The initial stage of IS development at the refinery can be analyzed with the help of the structurational model depicted below. This model depicts how an information system is in fact the product of human action, a directed effort of at least IT experts to construct an information system (arrow 1). During design and development of an IS the agency of these IT experts is

influenced (facilitated or constrained) by institutional properties of the organization (arrow 2).

Some points of attention in this stage are:
- The groups of actors involved and how they influence the design of an IS;
- The influence of the institutional properties of the refinery on the concerning groups of actors during design of the IS;
- The relation between the concerning groups of actors during design of an information systems.

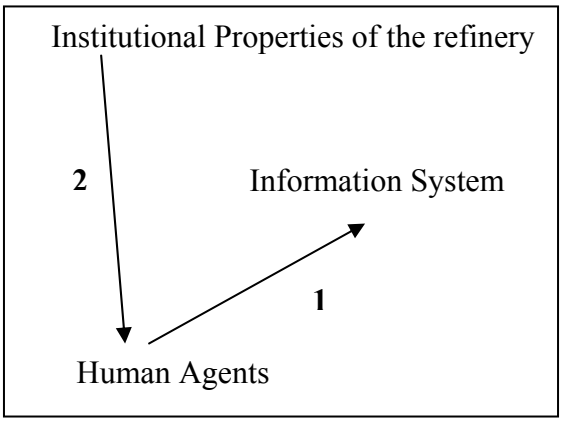

Figure 2.3.: Structurational Model of the refinery's Initial Design of IS

2.1.2 Stage 2: Institutionalized Use of an Information System

The institutionalized use stage of an IS within the refinery can be analyzed with the help of the structurational model depicted below. In this stage an information system first becomes operational. In the previous stage IT experts did make several design choices, which will have effects on users. These effects become visible through the fact that users are disciplined through their task execution (arrow 3), meaning that they can carry out their work only within the framework of a certain information system. The users are also limited to performing their work related activities within the framework of institutional properties of the refinery (arrow 4). Information systems within organizations become for their users in the course of time an obvious thing: they become institutionalized. Their use has influence on the institutional properties of the refinery (arrow 5), which subsequently may well influence other actors in a next stage (arrow 2 / 4).

The points of attention are:
- The groups of actors involved and the specific way in which an information system structures their task execution;
- The constraining or facilitating effect of the institutional properties on the involved actors during use of the IS;

- The influence of a newly implemented information system on the refinery's institutional properties.

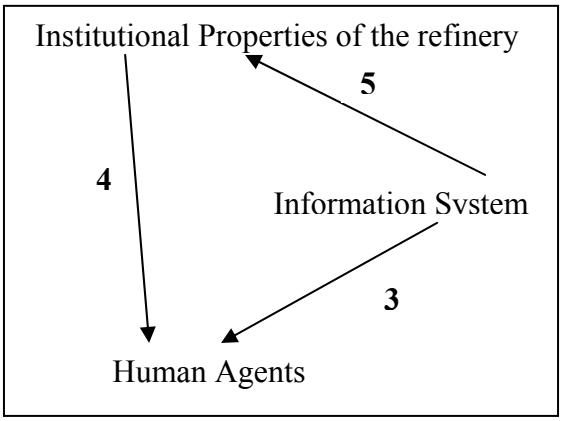

Figure 2.4.: Structurational Model of the refinery's Initial Use of IS

2.1.3 Stage 3: Ongoing Interaction with the Information System

At last the ongoing interactions of human beings with an information system within an organization can be analysed by means of the relations depicted in the structurational model below. Managers are the ones making decisions concerning the adoption, development or adaptation of information systems. The model below may well be used to analyse the decision-making processes and other strategies of managers through the ongoing interaction of an organization with IS. IT experts are assigned by managers to design an information system to support users in their daily activities within the organization (arrow 6). Managers adopt hereby strategies which are influenced by the institutional context of the refinery, and which also fit in that context (arrow 7). Once deployed, information systems within an organization tend to become institutionalized in the course of time, a development which in turn has influence on management strategies (arrow 8). The continuing use of institutionalized information systems by users performing their jobs, leads to a reaffirmation of the institutional properties of the refinery (arrow 9).

Sometimes users may decide on their own to use an IS differently than its designers and managers had in mind (arrow 6). This undermines the embedded norms and intentions of the IS, and if it is sustained consequently and long enough, it can transform the institutional properties of the refinery by modifying aspects of the structures of domination, structures of meaning, and/or structures of legitimation (arrow 9). This may lead consequently to a change in management strategy (arrow 7), so that managers may authorize IT experts to modify the IS (arrow 6). However, once deployed, the IS would again become institutionalized and serve to discipline the work of users (arrow 8). This eventually leads to reproduction of the institutional system of the refinery (arrow 9). This cycle of relations and interactions between human agents, institutional properties of the refinery, and

information systems will continue over time for as long as the information system stays operational within the refinery.

Points of attention:
- Intended use (by designers, managers) versus actual use (by the users) of the information system;
- Transformation or consolidation of the institutional system of the refinery;
- Modifications to the information system.

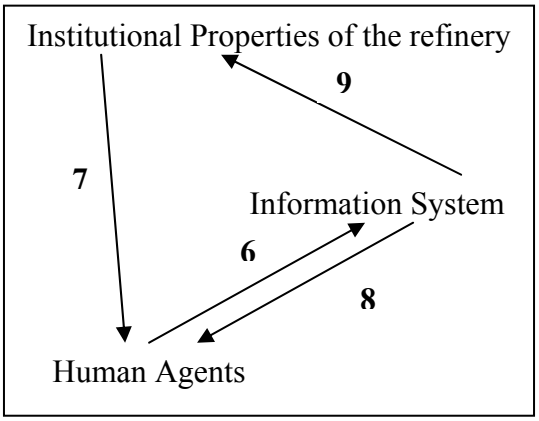

Figure 2.5.: Structurational Model of the refinery's Ongoing Interaction with IS

Chapter 3

Research method

In the preceding chapter I gave a description of the theoretical framework of this thesis. This will be the input for this chapter, in which I describe my research method. The aim of this research method is to answer my research question.

In section 3.1 I will mention the central research method applied through this study. This is followed in section 3.2 by my case selection and an introductory description of the cases. In section 3.3 the techniques I applied to generate empirical data will be discussed. In the last section I will elaborate on the approach that will be used to integrate theory and empirical data in order to answer the research question.

3.1 Main research method: case studies

My assignment for the project "The development of Information Technology in Curaçao" consisted in doing research on the history of IT at the refinery in Curaçao. The research findings would be published in a book resulting from the project. The purpose of my research at the refinery was to illustrate the broader development of IT in Curaçao. Based on the nature of the research, it seemed obvious to adopt the case study method as a main research method.

3.2 Case selection and a first introduction to the cases

The 'phenomenon' I will be focusing on, in my case studies concerns an information system's interaction with organizational departments. Consequently the interaction between a single information system and an organizational department is considered as a case. The interaction between an information system and an organizational department falls apart in both design (development) and use. So, the domain of study consists of an information system's design and use.

3.2.1 Decentralization of computing

The sixties marked the beginning of automation and the use of computers at the refinery. In 1968 Shell Curaçao acquired an IBM System / 360 model 40, which was a very powerful mainframe computer for those days.[30] In the second half of the seventies Shell Curaçao decided to migrate to IBM System/34 platforms – smaller and cheaper systems, hence the denomination mini computers – at some of its departments. This migration had a great impact on the organization of work at the refinery. The transition from mainframe computers to mini computers at the Shell constitutes the first case. Studying a transition situation, however, entails that both the preceding state and the new state have to be looked at. Success or failure in a new state of affairs cannot be entirely understood without paying proper attention to the preceding situation. In other words, to fully appreciate the dynamics of the design and use of the mini computer, some insights must be gained at least in the working of the mainframe computer. Only then the extensive impact of the transition on the organization can be fully comprehended. Still, while conducting an in-depth analysis of this case, the focus will be on the design and use of the mini computer. The design and use of the mini computer will be interpreted through the three stages[31] of the mini's interaction with organizational departments.

3.2.2 Implementation and use of SAP

Refineries have two kinds of processes: refinery processes, which constitute the core business and administrative and control processes, which support the core business. Automation of refinery processes is often referred to as process technology automation, while automation of administrative and control processes is referred to as data processing automation. In my research I limited myself to data processing systems. In 1992 Isla decided to acquire SAP, which is a software package that integrates the data processing of almost all departments in a company. The design and use of SAP at Isla forms the second case.

3.3 Data collection techniques

Within the case study approach, several techniques can be identified for collecting data. There is just one requirement: the data collected must be suitable for answering the research question. For my empirical research at the refinery I chose interviews as the dominant technique, and document analysis and archival research as additional techniques.

[30] Evers et al., forthcoming.
[31] See sections 2.2.1 through 2.2.3.

3.3.1 Interviews

To conduct my research at the refinery I've chosen interviews as the most dominant technique. I conducted unstructured and semi-structured interviews.

The first interviews I conducted were of an introductory kind, and therefore rather informal and unstructured. The purpose was to get acquainted with the people in the refinery, getting a global image of the organization, and getting sufficient information to decide which information systems to select as cases for further research. In this introductory phase I had conversations with a total amount of *fifteen* people: thirteen people who are currently employed at the refinery, one Shell pensioner, and one former employee of Shell Curaçao. Most of these conversations were conducted during an introductory round in the organization. The Shell pensioner and the former employee were referred to in these conversations for further information.

In the second phase of my research I conducted a total amount of *eighteen* formal, semi-structured interviews. The interviewees in this stage consisted of users, IT experts and managers. The interviews concerned the specific roles of these actors in the design and use stage of information systems in the refinery.

Shell period

For the Shell period I interviewed a total amount of *five* people, two of whom were still working at the refinery. These interviews were all semi-structured. The informants were people who had all worked for a lot of years at the refinery, occupying different positions, and consequently had a lot of knowledge concerning my domain of study. These informants provided me with valuable data, sometimes even including contextual information which gave me insight in the institutional properties of the refinery for the two distinct periods. The interviews were held with: a former user of the Finance department of S.N.A.V.[32] who would later become its manager, a former manager of the Laboratory department, a former section head Technical Support of ICS, a former systems analyst of ICS currently working as an EDP auditor at Isla, and a senior systems analyst of ICS. The selection of these informants was based on my informal, introductory conversations within the refinery. Talking to the refinery employees about my research topic lead to a list, with names of (former) employees that experienced the decentralization process (either through design, use or decision-making). This list was further complemented by a list of names, available in the project profile of "The Development of Information Technology in Curaçao". This list contained the names of some key figures in the historical development of IT at the refinery.

Throughout the collection of data I focused on three different perspectives: the users, the managers, and the designers (IT experts). I interviewed the former user of

[32] S.N.A.V. (Shell Nederlandse Antillen Verkoopmaatschappij) was a subsidiary of the Royal Dutch/Shell Group on Curaçao. See section 4.3 for a description of this company.

the Finance department of S.N.A.V. as both a user and a manager since he had occupied both functions. During the transition from mainframe to mini, he was a user; he experienced sitting behind a terminal importing data and receiving back output. It was until the early eighties that he promoted to Finance manager. The Lab manager I interviewed from a management perspective, and also as a representative of users. He didn't have physical experience using the mini (i.e. he didn't sit behind a terminal and import data), but he was closely involved in the innovation process, organizing it and stimulating his employees. The section head Technical Support I interviewed from a manager's perspective. He didn't experience the transition period himself, but he was well acquainted with the implications of the decentralization process for the organization. Finally, the two systems analysts I interviewed from an IT perspective.

Isla period

For the Isla period I interviewed *fifteen* people, including three of whom I had also interviewed about the Shell period. During my introductory round in the organization I had also informal conversations with some employees. These conversations resulted in a list with relevant actors to interview. I interviewed the former project manager of the SAP project, and a former section head Technical Support who experienced the decision-making process closely. I further interviewed a former systems analyst who is also a current consultant at KPMG. The current department head Information Resources was furthermore interviewed. The Human Resources manager and the Managing Director of Isla were interviewed about their (strategic) use of SAP. And eventually I interviewed, for each of the six SAP modules, former members of the implementation teams: one user and one systems analyst per module. For the FI and CO modules, the systems analyst who participated in the implementation was not accessible for an interview. And for the PM module the expert user who participated in the implementation could not be reached.

3.3.2 Document analysis and archival research

Besides the interviews as a dominant technique, I also used archival research and document analysis as additional techniques to gather and produce data. The interviews produced by far the most relevant data. But, also the archival research and document analysis produced some significant data.

Shell period

For data concerning the Shell I made use of the old ICS archive at Isla. This archive hasn't been administered for years, which explained for the neglected state it was in when I paid it a visit. The archive is now used as a junk room for dumping old computer components, office materials and documents. Nonetheless I found some useful documents, such as a decentralization proposal of ICS, a training manual for

IBM S /34 computer workstations, and several correspondence notes between ICS and its clients (i.e. user departments).

Isla period
For the Isla case I used documents that I obtained from current employees and former team members of the SAP project. I used documents such as management presentations of SAP implementation teams, minutes of meetings held by the implementation teams, and user manuals of SAP modules.

3.4 From theoretical framework towards methodological approach

In this section I will focus on the approach used within the case studies. I will elaborate upon how I intend to answer the research question, using the theory discussed in the previous chapter. My domain of study consists of an information system's design and use. This domain falls apart in some elements I have implicitly discussed in section 2.2. These elements correspond with the three stages of an information system's interaction with an organization[33]. The three stages can be furthermore described in terms of specific characteristics, which differ per case. The approach within my case studies consists of giving a detailed description of these variable characteristics. This description is relevant for answering my research questions.

But, first the variables have to be identified. This can be done on the basis of my theoretical framework.[34] Next, they have to be made operational, in the sense that they have to be translated in practical/manageable/useable pieces that can be used to generate relevant data. Indeed, this step constituted a direct input for my interview questions and served also as a guideline to collecting 'building blocks' from the archive or other documents.

3.4.1 Operationalization of variables

To collect data relevant for answering my research questions I turned to conducting interviews. From these interviews I could generate data to describe the variables. These descriptions would prove to be an effective foundation for answering my questions. All the variables could be extracted from the structurational models depicted in the sections 2.2.1 through 2.2.3. My interviews[35] were guided by the list of variables below. This table presents the variables, including their definitions and the way they were made operational. Thus summarizing, the interviews were a means for collecting data to describe the variables, and the description of these variables will provide a basis for answering my research question.

[33] See sections 2.2.1 through 2.2.3.
[34] See section 2.2.
[35] See the appendices for interview schedules.

Characteristics of the elements of the research domain (variables)	Further elaboration upon the variables	Operationalization of the variables
Stage I		
Participating actors	The groups of human actors involved in this stage	– IT experts (designers) – Users – Managers (decision-makers)
Influence of actors on design of IS	Description of how the different groups of human actors participated in the design stage	– Project management – Provide information – Mapping organizational requirements – Give advice – Implement IS
Influence of institutional properties on design of IS	Description of how the institutional structure constrains or facilitates human agents in designing an IS	– Available knowledge resources – Available organizational resources – General norms and rules concerning design
Relation of actors to each other	The ways in which the groups of human actors related to each other during this stage	– The level of authority of the different groups of human actors – The level of design related knowledge of the different groups of human actors
Stage II		
Participating actors	The groups of actors involved in this stage	– IT experts (designers) – Users – Managers (decision-makers)
Influence of IS on task execution	Description of how an IS can structure or discipline human agents in doing their job	– Restrictive features of IS – Enabling features of IS
Influence of institutional properties on use of IS	Description of how the institutional structure constrains or facilitates human agents in using an IS	– Available knowledge resources – Available organizational resources

		– General norms and rules concerning use
Influence of IS use on institutional properties	Description of how an IS through its use can influence the institutional structure of an organization	– Embedded knowledge in the IS (concepts, procedures, standards) – Embedded facilities in the IS (assumptions, features, standardized procedures) – Embedded norms and rules in the IS
Stage III		
Intended use of IS	Definition by designers of the use of a future IS; how designers picture users using the IS	– User guidelines – Organizational procedures
Actual use of IS	Factual use of the IS after it becomes operational	– User guidelines – Organizational procedures
Transformation of institutional system	The extent to which aspects of the institutional structure of the organization has been changed	– Changes in meaning – Changes in power relations – Changes in norms
Consolidation of institutional system	The extent to which aspects of the institutional structure of the organization has been reinforced	– Changes in meaning – Changes in power relations – Changes in norms
Modification of IS	The extent to which changes in the institutional properties of an organization or in the management strategy may trigger changes in the IS	– Essential changes – Gradual changes

Figure 3.1.: Definition and operationalization of variables

The last column in the table above formed the basis of my interview schedules. I have formulated questions around these variables and intensified these questions for the three groups of actors – IT experts, users and managers – I identified in my research. My interview schedules in fact developed through actually conducting the interviews. Since some of the concepts Orlikowski uses in her theoretical

conceptualization (and which I adopted in this thesis) are abstract and theoretical, the concretization of these concepts proved to be a rather difficult exercise. Learning by doing turned out to be an effective method to concretize some of these concepts. Sometimes informants provided certain information in interviews that clarified some abstract concepts of Orlikowski's theoretical model, which I would then use to 'sharpen' my interview schedules.

The data I gathered through my interviews were consequently interpreted in a heuristic way in order to tell 'stories' about the design, implementation and use of information systems at Shell (companies in) Curaçao.

Chapter 4

Decentralization of computing at Shell

4.1 Introduction

This first case concerns the transition from centralized mainframe platforms to decentralized mini platforms at Shell Curaçao.[36] I will discuss this transition for two Shell companies in Curaçao, namely Shell Nederlandse Antillen Verkoopmaatschappij (S.N.A.V.), and the Laboratory (Lab) department of Shell Curaçao N.V. (S.C.N.V.).

The structure of the remaining chapter is as follows. Section 4.2 starts with some background information about mainframe computers and mini computers at the refinery. Section 4.3 follows with a description of the organizational context of the decentralization process. A description of the processes by which the mini computers got incorporated in the operations of the two companies through time will follow in section 4.4. This description will be given in terms of the structurational models of technology and the theory underlying them, which was presented in section 2.2. In conclusion a reflection upon the relevant findings will be given.

4.2 Background information of computing at the refinery

The sixties marked the beginning of automation and the deployment of computers at Shell Curaçao N.V. The era of electronic data processing broke with the introduction of an IBM 1401 halfway through 1961.[37] This machine was operated by a controller, and only one program could be loaded and run at a time. Late 1962, the 1401 computer was replaced by a bigger 1410 IBM computer. But the first real

[36] Although Shell companies on Curaçao have own identities and even own names, sometimes for convenience I will use just 'Shell' as a general denomination to refer to subsidiaries of the Koninklijke/ Shell Group on Curaçao.
[37] Folder: "Shell op Curaçao", 1980, p. 5.

modern mainframe computer is considered the System 360 family of IBM. Shell Curaçao replaced its 1410 computer by a System 360 model 40 in 1968, which was a very powerful machine for those days.[38] In the second half of the seventies, Shell Curaçao decided to migrate to IBM System/34 workstations at some of its departments. These were smaller and cheaper systems, hence the denomination mini computers.

Mainframes are big, expensive computers that can process a great number of programs simultaneously. Mini computers are computers with a smaller capacity than mainframes, but with a much better price-performance ratio. The main differences between a mainframe computer and a mini computer lie in size, price and capacity. At Shell Curaçao mainframes were additionally characterized by batch processing.[39] Batch processing is a method of collecting and processing data, in which programs are accumulated and stored until it is efficient or necessary to process them as a group. Once a batch processing task begins, it continues until it is done (or until an error occurs). This implies that while a program is being executed there is *no interaction with a user*, though there is an operator who feeds a batch of programs in the mainframe. Users at Shell filled in forms, sent them to ICS (Information and Computing Services: the IT department of Shell Curaçao) for processing[40], where an operator – the human being operating the computer – would feed them in the mainframe.[41] After the jobs had been processed, the users received the results back from ICS[42] (a typical input/output procedure thus). An important notion is that prior to the introduction of mini computers at Shell Curaçao all computing was centralized. At the IT department of S.C.N.V., ICS, mainframe computers were installed in a central computer room, and these computers processed the jobs of all other departments and Shell companies on Curaçao.

Minis at Shell Curaçao were on the other hand characterized by on-line processing.[43] On-line processing is a type of computer processing that requires *interaction with a user*. It is often called interactive processing too, because applications on the computer *respond immediately to user requests*, there is an explicit dialogue between a user and the computer. After the introduction of minis at the Shell users could do more things themselves. They could e.g. do their own input, make backups, print reports out, read information online on the screen, etc[44].

Between 1978 and 1979 mini computers were implemented, first in the Lab department of Shell Curaçao, followed by its Finance department, and eventually at S.N.A.V. In this case study however, the focus will be on the implementation and

[38] Evers et al., forthcoming.
[39] Besides batch processing it is possible to process data interactively on a mainframe. At Shell however mainframes were exclusively used in batch mode.
[40] Interview: Haile, SG2, 20/6/03.
[41] Interview: Pandt, SP10, 4/7/03.
[42] Interview: Haile, SG2, 20/6/03.
[43] Ibid.
[44] Interview: Liong, SP3, 21/6/03.

use of mini computers at the Lab department and at S.N.A.V. The reason not to treat all three departments is that at S.N.A.V. the mini was implemented in the Finance department, just as at S.C.N.V. The use of the mini computer at the Finance departments of both Shell Curaçao and S.N.A.V. were nearly the same.

4.3 Organizational context of the decentralization process

Now that it's clear what mainframe, mini, batch processing, and on-line processing mean, I will proceed with an outline of the organizational context of the decentralization process. I will start by giving a brief description of the Lab department, followed by the same for S.N.A.V.

The Laboratory department

The Laboratory department was part of Shell Curaçao N.V. (S.C.N.V.). It consisted of four sections: 'Proeffabriek', 'Analytisch', 'Gas', and 'Controle'. The Lab department was mainly responsible for quality control: products were analysed during and at the end of the different stages of the refinery process, to check if they meet the specified requirements.[45] The Lab had different other departments of Shell Curaçao as their clients. These departments would send samples to Lab, which on its turn examined them. During the mainframe era the results of examinations of samples were sent as hard copies, or communicated by telephone. After the migration to minis, Lab's clients received a terminal in their department on which they could see the results on-line.[46] This was much faster and also less error-prone.

The S.N.A.V.

On the 31st of December 1960 The Shell Nederlandse Antillen Verkoopmaatschappij N.V. was founded. S.N.A.V. took over the sale of oil products in Curaçao, Aruba and Bonaire from Shell Curaçao N.V. on the 1st of January 1961.[47] Subsequently S.N.A.V became the company that took care of the sale of products on the local market. S.N.A.V as well as S.C.N.V. belong to the Royal Dutch/Shell Group, but operate in many aspects as self-reliant units. Independent of other Group companies these units pursue, according to own insights and within the own frame of possibilities, the best possible trading results.[48] On the 1st of November 1985 the name S.N.A.V. was changed – as a consequence of the arrival of PDVSA – into Curoil.

S.N.A.V. was an independent operating company in Curaçao, under the Royal Dutch/Shell Group. This can be illustrated by the fact that the company had its own board of directors. Regardless of this self-reliance, S.N.A.V. was still dependent of

[45] Folder: "Shell op Curaçao", 1980, p. 14, 15.
[46] Interview: Guiamo, SM4, 23/6/03.
[47] Folder: "Shell op Curaçao", 1980, p. 9.
[48] Folder: "Shell op Curaçao", 1980, p. 1.

Shell Curaçao on one point, namely for computer resources (the processing of all computer based jobs). All computing for the Shell companies on Curaçao was centralized in the IT department of S.C.N.V. It was only just after the introduction of the mini that S.N.A.V. became a 'truly' self-reliant, independent company.

4.4 Case description

In this section I will tell the story of the design, implementation and use of mini computers at Shell Curaçao in terms of the structurational models discussed in section 2.2, and guided by the variables presented in section 3.4.1. In this story the leading roles will be for Lab and S.N.A.V., with an important supportive role for ICS. I will tell a people centric story, in the sense that the activities of IT experts, users and managers will give content to this story. I will conduct my description by giving an account of the processes through which the mini computer got incorporated in the operations of Lab and S.N.A.V. These processes will be interpreted through the three stages[49] of an information system's interaction with an organization.

4.4.1 Stage I: Initial Design of the Mini

Halfway through the seventies ICS started experiencing increased workload. As I already mentioned, the computing for all the Shell departments was centralized in ICS. Due to increased processing jobs from the user departments, work pressure reached very high levels.[50] To solve this problem ICS started to consider decentralization of computing, i.e. letting the user departments do their own computing. This option would relieve the ICS personnel from their high workload, and would also release ICS from responsibility towards the systems. Approximately in 1978 the first mini computer, an IBM System/34, was installed at the Lab department of S.C.N.V. Shortly after that the Finance department followed, and a third Shell company that would follow was the S.N.A.V.

In 1977 IBM announced its System/34 mini computer as being "*a low-cost data processing system with multiple workstations, designed for both experienced and first-time data processing users.*"[51] The migration was, aside from being a relief for ICS, also a relief for users since they could do their own data processing from then on. This led accordingly to less dependence of ICS. The System/34 was a computer platform that was promoted (by IBM) for its ease of use, the system didn't require previous experience of users. This probably also influenced the decision to introduce System/34.

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[49] See sections 2.2.1 through 2.2.3.
[50] Informal conversation with Roy Evers, a former systems analyst at ICS.
[51] Source: online IBM Archives, http://www-1.ibm.com/ibm/history/history/year_1977.html

Once the mini was acquired, applications had to be developed to run on the systems. In order to develop applications, data concerning the business processes of the users had to be gathered. A former systems analyst explains how this was organized:

> "*In those days the analyst used to make a stack of files. All this was done manually. The analyst would go on research. The analyst was the one driving. A user would just drop by, and tell us (systems analyst of ICS) what application he or she wanted. But the user's input was not as strong as nowadays. Its input was minimal. It would not tell you: 'I want this particular system that will do such and such things.' One (a systems analyst) had to analyze, and consequently develop a system for the user. Thus, it was common that the (systems) analyst would steal the show, with the entire application."* [52]

Users were rather passively involved in the design of information systems in those days[53]. But, with the decentralization of computing at Shell a paradigmatic change occurred.

> *"(...) after some time a change of thought arose. As an analyst one had to give support to the user. The user is the one that has to know what it wants, he or she must know how the system has to function, and consequently he or she must help visualizing what it wants in order for us (systems analysts) to give technical assistance. A change originated thus in the mode of working.*"[54]

She continues telling that: "*in those days the consideration that the user must become part of the project began to arise.*"[55] In time, the notion of user involvement consolidated in ICS. User involvement became an explicit requirement to be included in proposals for information systems. In a 1983 proposal plan we can read the following requirement: "*For the successful implementation positive user-involvement is essential*"[56]. However, it was nowhere mentioned what "positive user-involvement" implied concretely.

Until the second half of the seventies there were no formal standards or guidelines by which systems analysts of ICS conducted their design practices. There were no formal systems development stages, no guidelines for estimating time and costs, no concrete milestones and no quality control. With the adoption of System/34 platforms this changed. A former systems analyst relates:

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[52] Interview: Pandt, SP10, 4/7/03.
[53] Here I am referring to the first half of the seventies.
[54] Interview: Pandt, SP10, 4/7/03.
[55] Ibid.
[56] Archival document: ICS note on Decentralization of refinery Data Input, April 28, 1983.

> "*(…) parallel to this (introduction of S/34) we started to think about introducing a methodology that would indicate stepwise how one should work. What should be the participation of the parties involved in the project? What should be the checkpoints? How should one control all this? (…) (Name of the methodology) prescribed to start a project with an identification study. After the identification study you had to contact the client. The client would tell you what it wanted, after which you started documenting that. We are not talking about programs yet, we're just talking about what the client wants. The result of the identification study was (input) for the identification report. An identification report would be written by an analyst and a senior analyst or also the project leader. Below the project leader one could find one or two analysts. And below the analyst there was a designer. And also programmers. Thus, this was how a project team was organized. The project leader would possibly write the identification report, and conduct the identification study. The identification report would be published subsequently. It would be approved, yes or no. When it was approved an identification stability study would follow. And every time you would make an estimate of your costs and your time. And as you proceeded further with your study, the estimates would change because you would become more and more accurate, more detailed, you would have more and more information. Then we would proceed with a feasibility study. The report would contain amongst other things details about how the application would be, and on which platform it would be developed. You would mention also which (programming) language would be used. Proper attention would be payed to the benefits of the project to be implemented, and what the pay out would be. Also the manpower savings, and what the consequences would be for the ones staying. Because sometimes people would have to be trained, since a new system would arrive with a new mode of working. All these things would be adressed in the feasibility report. And that would again go to the management – or others concerned. When everything was finished you would go to the analysis phase. About the analysis too we would write very fat reports. We had also reports on the results of the analysis. These would be used as input for the base of a design. In each stage the report would become more concrete and more detailed. Thus, when you would start programming, the chance of misinterpreting things would become less big.*"[57]

This account gives a detailed description of how the design process was rationalized, standardized and managed with the arrival of the minis. Until now I have told the decentralization story primarily from an ICS perspective. Did the user departments, Lab and S.N.A.V., in fact influence that process? In the rest of this section I will pay attention to the user's perspective.

[57] Interview: Pandt, SP10, 4/7/03.

The Lab department received thus the first System/34 machine. In the mainframe era, Lab used to send results of the examination of samples as printed hard copies or by telephone to its clients. The introduction of the S/34 would imply that the machine be physically installed in the department, with terminals in the clients' departments on which they could see the results on-line. The rationale of the mini was that "*all figures generated by the computer at Lab, should be seen immediately by our clients.*" [58]

The S/34 was an RPG (Report Program Generator) machine, i.e. it was best suitable for being programmed in the language RPG. A systems analyst who designed applications for the S/34 explained: "*We used to develop programs in RPG, because that programming language was easier to develop interactive systems with. Programming an interactive system in Cobol was more laborious.*"[59] Cobol (Common business oriented language) was the language most widespread and best known within ICS[60], albeit not suitable as a tool to develop on-line systems. Nonetheless, through my research I found out that the first information system implemented at Lab, the LIMS (Laboratorium Information Management System) was written in Cobol[61]. This was probably done out of convention: Cobol was the language known to the programmers and thus they used Cobol. With their creative force the ICS programmers managed to write an on-line system in Cobol. At S.N.A.V. on the other hand the applications were programmed in RPG, because they had more time to study that language.[62]

From S.N.A.V.'s point of view the implementation of mini computers was a policy decision coming from Shell Curaçao. With the decentralization process completed at Lab and Finance, S.N.A.V. was the third Shell unit to receive the S/34. With ICS having built enough experience in decentralizing it was easier to implement the minis. A former user at S.N.A.V. relates:

> "*In those days we were linked to Shell. The director then, wanted to become more independent. Besides that, Shell Curaçao – that gave support to C.O.T. (a subsidiary of the Royal Dutch/Shell Group on Curaçao) and S.N.A.V. – was then pursuing a policy oriented on making these companies less dependent.*"[63]

Although this account suggests that the implementation of mini computers was an external decision made by Shell Curaçao, a closer look at the developments reveals that there were internal voices – maybe not outspoken, but which nonetheless could

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[58] Interview: Guiamo, SM4, 23/6/03.
[59] Interview: Wanga, SP9, 26/6/03.
[60] Archival document: System Proposal Decentralization of Refinery Systems, September 1984, p. 14.
[61] Informal conversation with Roy Evers who in that time helped develop the system.
[62] Informal conversation with Roy Evers.
[63] Interview: Haile, SG2, 20/6/03.

have influence the decision to decentralize – which could have led to the introduction of the S/34. In the mainframe era, S.N.A.V. was confronted with an extremely inflexible batch system. Users filled in forms, sent them to ICS for calculation on the Mainframe, and received the results back from ICS (Input / Output). But the problem was that in those days Shell Curaçao applied very strict procedures for the monthly balancing of the different units (C.O.T., C.S.M.[64], S.N.A.V.). They had to do this since they had just one central mainframe machine for all units. A former user gives an impression of the rigidity of the batch procedures:

> "*The Shell could be characterized by a certain regime. For the department of Finance that regime was the fourth working day: on the fourth working day you had to hand in certain figures. No matter how, you'd better have those figures finished because the computer wouldn't wait for you. (...) The rigidity of the (batch) system at Shell led to a situation where one could not easily carry out a re-run. On the mainframe one couldn't carry out a re-run, especially because there was just one central mainframe available for the different companies of the Shell Group on Curaçao. Exclusively when a major error was made, an exception was made to perform a re-run.*"[65]

Moreover, Shell Curaçao gave priority to its own monthly balancing over that of S.N.A.V., which made the situation even more problematic. The introduction of S/34 would lead to more flexibility at S.N.A.V., since the machine would be placed physically in the department, and thus subsequently be officially under S.N.A.V.'s control. S.N.A.V. would also be able to perform its own re-runs. To perform a re-run means that in case of errors one can stop the processing, correct the errors and then re-start the processing. Considering this it would have been more than favorable to pursue an S/34.

4.4.2 Stage II: Institutionalized use of the Mini

The deployment of mini computers in the user departments had a great impact on the organization. For ICS the decentralization of computing led to, apart from an alleviation of the high work pressure, also to curtailing of their power. Before the mini era ICS was in a position where it was the one taking all decisions concerning computing. That it didn't fear losing some of its authority had to do with the fact that it had some kind of vision[66]. As noted in the previous section, the notion of involving users in the development of applications on the mini began to rise at the end of the seventies. ICS saw the users as a more and more independent entity in the future. Independence implied that the users would have to e.g. do their own

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[64] C.O.T. stands for Curaçao Oil Terminal N.V. and C.S.M. stands for Curaçaose Scheepvaart Maatschappij; they are both subsidiaries of the Royal Dutch/Shell Shell Group on Curaçao.

[65] Interview: Haile, SG2, 20/6/03.

[66] See section 4.4.2, where I consider the methodology ICS started adopting parallel to the deployment of the S/34's. This gives clear evidence of a certain vision.

computing, develop their own applications, i.e. decentralization. So, ICS did not fear decentralization, because they saw it as a logical part of their vision. The notion of more user involvement did in fact influence the decision to decentralize. How this 'user involvement' was organized is told by a former systems analyst of ICS:

> "*During this course, they would appoint a kind of 'focal thought' from the user's environment: someone who knew the environment well. He or she would become a spokesperson. That user might also receive assistants that would help him on the way. But this person had to be someone of a certain caliber, who knew the business area well, and could work with you. In order that the expert user, which would work on an application, would understand us well, we turned to signing him or her for n months in the ICS department. The person in question would go along with the project people. He would read, receive training in all the documentations in order to understand better what was expected from him or her. So that the team would perform better. I personally think that gave very good results, because you would clearly notice that the applications we implemented in the beginning were of a much better quality. Systems became much more effective and we also had systems that would cover a quite ample field.*"[67]

Indeed, it is widely acknowledged that user involvement is a "good thing", because it improves requirements, and consequently leads to better informion systems. And, if information systems meet user requirements better, they are also defined as better.[68] The 'work load issue' and the 'user involvement issue' constituted two completely distinct things, but nonetheless they reinforced each other leading to the decision to decentralise and from ICS's perspective to curtail of power.

The most important implication of the mini for the user departments was in fact that the entire S/34 platform was placed physically in the departments. This led to more possibilities for and more flexibility in the user departments. From then onwards users could do their own data-entry, perform re-runs, make backups, print out reports, and read information on-line from a terminal screen. At S.N.A.V. for example, deployment of the S/34 led to a situation where computer laymen – administrators working in the Finance department – developed themselves into computer experts. A user explains that this was a result of experimentation of users on the mini.[69] After working hours there were opportunities – for those who wanted – to work on the S/34 at S.N.A.V. "*By means of trial and error, laymen learnt to work on the computer*".[70] This was a development, which became possible by the implementation of an entire platform physically in the Finance department. As a

[67] Interview: Pandt, SP10, 4/7/03.
[68] See for instance: Mackay, 2000, p. 738.
[69] Interview: Haile, SG2, 20/6/03.
[70] Ibid.

user one did not previously have physical access to the mainframe. "*The mainframe was something for (operators), programmers and systems analysts.*"[71]

The transition from mainframe to mini was a transition from batch processing to on-line processing. This was a great innovation for S.N.A.V.:

> "*The ledger system was a mainframe application that could be downloaded on the mini. Sales Statistics was another program, which was specifically written for mainframe, but at S.N.A.V., a program was developed to downgrade Sales Statistics to System/34.*"[72]

Sales Statistics was a statistical program for management information. On the mainframe it had been a batch program: once a month it could be run at best. The advent of the mini made it possible to run this program anytime: it became an interactive program.

The transition to on-line processing at S.N.A.V. led however to additional work in the department. The department followed batch procedures before, where input was sent to ICS and output was received back. The processing between the input and the output was a 'black box'. With the introduction of System/34, one had to process forms oneself; more work thus. That was in fact caught well, because there originated a kind of "becoming conscious". People became aware of the fact that might they make errors during input, they would have to correct those errors themselves. People became also more "conscientious" regarding their jobs, since the mini brought "added value" to their input. On the mini one could determine ones output with ones input. Besides, you could apply changes yourself to the output.[73] This led to more accountability from the users' perspective: users became the only ones responsible for the output. Consequently it follows that ICS had less responsibilities towards S.N.A.V. (and also Lab).

Apart from these changes there was another, at the least as impacting change. After a while S.N.A.V. adopted a completely new general ledger system. This new ledger system was specifically designed for use on the mini (it couldn't run on the mainframe), and implied a new mode of book-keeping.[74] So, at S.N.A.V., a new technology (mini) led to entirely new applications (a new general ledger), and consequently to a completely new mode of working.

Lab's philosophy was that all figures generated by their computer, should be seen immediately by their clients. They experienced a lot of resistance in accomplishing this goal. A computer was then still seen as a 'black box', a machine only accessible to programmers and systems analysts:

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[71] Interview: Guiamo, SM4, 23/6/03.
[72] Interview: Haile, SG2, 20/6/03.
[73] Ibid.
[74] Interview: Haile, SG2, 20/6/03.

> "*Just 'normal' people who had their daily jobs didn't even talk about computers, not even the heads (of department). To change this we introduced a computer-training centre in our department.*"[75]

Lab organized on-the-job training programs to educate its employees in computer literacy. The 'fear' for computers was further fed by the belief most people had in those days that the introduction of computers implied sending home 'n amount' of employees, i.e. manpower reduction. At Lab this was emphatically not the case[76]. As a former manager emphasizes: "*The case was to acquire the correct figures faster!*" [77] Faster, because having minis installed in the department, Lab became able to generate figures anytime. The figures were also more accurate, since the mini led to "data control at the source."[78]

Notwithstanding Lab's philosophy (on-line availability of figures) they had to regularly make hard copies and send them to the concerning departments.

> "(…) b*ecause there were some departments and department heads that refused to learn anything about computers. Thus, in fact we had to work double: we had to make a hard copy, while the figures were also available on-line. And thus we had to ensure that they wouldn't ask anymore for hard copies, but go look immediately on-line.*"[79]

Since Lab (and this is also valid for S.N.A.V.) consequently became owner of the S/34 platform, they wanted to solve problems on the mini themselves. They had received support from ICS for a long period of time, but at a certain point the system came fully under their own control. Only when major errors or breakdowns occurred, they invoked the help of ICS. This was a major change in the organization. Personnel were trained to solve approximately 80 percent of the problems themselves. The remaining issues of a more technical nature were settled by ICS.[80] The tendency of users to become more independent and take more responsibility for information systems is illustrated by a 1980 document. In this document concerning the "long term responsibility" for a certain application, a user department lists potential disadvantages if it wouldn't take over responsibility for the application. It noted: "*Standard ICS procedures will have to be followed and response times may well be slow if ICS have other priority work.*"[81] The latter was

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[75] Interview: Guiamo, SM4, 23/6/03.
[76] Unlike some other departments. At ICS e.g. the deployment of minis led mainly to an alleviation of work pressure, but also to the disappearance of entire IT functions like the operator (Interview: Pandt, SP10, 4/7/03).
[77] Interview: Pandt, SP10, 4/7/03.
[78] Archival document: Long Term Responsibility for SCMS GAMMA-4 Programs, 23/1/80.
[79] Interview: Guiamo, SM4, 23/6/03.
[80] Ibid.
[81] Archival document: Long Term Responsibility for SCMS GAMMA-4 Programs, 23/1/80.

especially for S.N.A.V. a very unwanted option. This is exactly why they ensured to have the system in own control.

4.4.3 Stage III: Ongoing interaction with the Mini

The benefits of the deployment of the mini computer at S.N.A.V. were numerous: flexibility, independence, higher quality figures, correcting errors faster, etc. All these benefits had to do with the transition from batch processing to on-line processing. Thus one would think that S.N.A.V. made the most of the on-line processing capabilities of the mini. A closer look at the developments surrounding the use of the S/34 reveals that in fact the mini was not used at all interactively at S.N.A.V. As a former user recalls:

> "*The system stayed the same; the batch procedures stayed the same. The flexibility was new. On the mainframe one could re-run the output only once or twice. Striking is the fact that the mainframe way of thinking stayed the same. (…) The only difference was that we (S.N.A.V.) now had the system in our own control, and not Shell (Curaçao).*"[82]

At this department they were presumably so accustomed to the batch procedures that they maintained a batch system on the mini. They kept accumulating data, and imported them in the system as batch. So, the S/34 which possessed the potential to on-line processing was used as a batch system. The use of the S/34 at S.N.A.V. illustrates how users can change a technology's design through use; what was originally designed for interactive use, was re-designed or interpreted by users as a batch system. The mini was in fact used as a 'little mainframe'.

This factual use of the mini at S.N.A.V. leads to one possible conclusion: the S/34 was not introduced as a mere technical innovation – i.e. on-line computing – at S.N.A.V., but mainly for decentralization purposes. And indeed, Shell Curaçao N.V. in reality wanted to uncouple itself from S.N.A.V. and all other Shell companies.

At Lab however, the introduction of the mini was a great innovation. The System/34 there was designed to work on-line and real-time: as soon as a test was finished, it could be imported in the system so that a report would be presented. The Lab system (LIMS) was in fact the first potentially real-time system in the entire refinery. Potentially, because test results were still sometimes collected, and imported in the system as little batches. Furthermore people on the workplace – (chemical) analysts and semi- and unskilled lab technicians – didn't have any experience with computers. As a matter of fact, in those days Shell knew just batch systems.[83]

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[82] Interview: Haile, SG2, 20/6/03.
[83] Evers et al, forthcoming.

The interpreting of the S/34 as a batch system at S.N.A.V. had in fact much to do with the institutional structure of the organization. The institutional system of S.N.A.V. was characterized in the mainframe era by batch procedures. In the mini era the structures of signification, domination and legitimation would have to be characterized by on-line processing, but this was not entirely the case. Organizational rules informing and defining interaction with the S/34 were batch oriented. The interpretation of the mini (by S.N.A.V. users) sanctioned furthermore a specific mode of interaction with the S/34, namely a batch mode. This batch mode became consequently a legitimate way of data-processing.

On the other hand IT became much more "impregnated"[84] in the business processes, as a former manager described the consequence of the transition from mainframe to mini computers at Shell. Thus, there was much more use of IT after the introduction of the minis.

4.5 Relevant findings

This first case study showed how mini computers were introduced at two user departments of Shell in Curaçao. Before the introduction of mini computers users were rather passively involved in the design and use of information systems. But with the placement of mini computers physically in user departments a paradigmatic change occurred. It was for the first time users were confronted directly with computers in their department. Before the mini computers, user departments made use of computer services provided to them by ICS. Because ICS was suffering of increased work pressure, it considered decentralizing its computing responsibilities. The user departments were encouraged to adopt IBM S/34 platforms in their departments. ICS gave guidance and support, and helped developing applications for the users on the S/34. Users were also more and more involved in the development of applications for the mini. On the one hand, users wanted to do their own computing in order to become more independent, while on the other hand ICS wanted users to become as independent as possible in order to alleviate them from the high work pressure. A shift in agency from IT experts to users can be observed thus after the introduction of mini computers.

1. After the deployment of the mini, user departments were given enough space by ICS, to give an own interpretation to the newly adopted technology. ICS gave support to users and designed applications for them, but the appropriation of the mini computer was fully undertaken by the user departments.

2. The freedom users obtained to appropriate the newly adopted technology led accordingly to completely distinct uses of the mini at the two discussed

[84] Interview: Liong, SP3, 21/6/03.

departments. The Lab department could be characterized by an innovative use of the mini, while S.N.A.V. used the mini in a more traditional mode. The distinct use of the mini at the two organizational departments can be explained with the help of the Structurational Model of Technology. Lab and S.N.A.V. were characterized by different institutional contexts.

S.N.A.V. was characterized by many years of experience working with batch procedures. During the mainframe era, batch procedures were part of the structures of signification of S.N.A.V.: interaction with ICS was defined by batch procedures. Batch procedures were also part of the structures of legitimation: the accumulation of forms by S.N.A.V. (to be processed by ICS as batch) was part of the generally sanctioned mode of working. People were so accustomed to these batch procedures that when the mini arrived they kept a batch system on the mini, bypassing unconsciously the interactive potentiality of the mini. This accounts for the traditional use of the mini.

Lab on the other hand didn't have experience at all with computing before the mini computer. The S/34, which was a machine with on-line potentiality, was used accordingly by Lab. The users at Lab (consisting of mostly semi- and unskilled lab technicians) received a lot of training in their work environment, while working their shift. This way the daily work was disrupted minimally. Besides, the deputy head of Lab was someone who was very eager to apply computing in the laboratory department.[85] Because of this eagerness he fully supported and motivated the innovation process at Lab.

3. The users at Lab and S.N.A.V. as well as the IT experts of ICS consisted entirely of local employees.

[85] The deputy head was someone who had some foreign experience. He worked in Amsterdam at Shell's biggest research centre, and at the Shell Pernis Refinery in Rotterdam for two years altogether. There he got acquainted with computers and the application of computer control to refinery processes. One of the things that always intrigued him was, whether this knowledge could be applied in Curaçao. This is why he embraced the arrival of the mini and fully organized the innovation process at Lab. Source: interview with Raymi Guiamo, 23/6/03.

Chapter 5

Brief intermezzo

In this chapter the transition from Shell to Isla will be discussed. This description will serve as a background against which the next case can be placed. This context will help to link the two periods in the refinery's existence. The difference between the institutional setting of Shell and that of Isla will eventually become clear.

Most relevant data for this chapter came from interviews and informal conversations with (former) employees.

5.1 Characteristic differences between Shell culture and Isla culture

The Anglo-Dutch corporate culture at Shell was very different from the Venezuelan corporate culture of PDVSA. The Shell culture could be characterized as a "trust culture"[86]: trust in people doing their job was very high valued. Working at the Shell one could be certain of enough space and freedom to fill up a position, because one was trusted. PDVSA on the other hand was not familiar with a "trust culture"; one can even speak of a "culture of distrust". The people of PDVSA didn't trust each other, what in fact was understandable, because in that time many cases of embezzlement were known.[87] These acts of embezzlement led to a management style characterized by much control; there were many procedures, and these procedures often led to lengthy approval times. People became also afraid of taking responsibility for certain decisions; no one wanted to be accountable. Because PDVSA was a state-owned company criminal law was applicable and not private law. So, if you were found guilty of embezzlement, or something was not approved you would risk going to jail[88]. In the beginning when PDVSA took over the operation of the refinery facilities from Shell, it got itself confronted with an Anglo-Dutch culture; a situation that led to vehement clashes.

[86] Interview: Doest, SM1, 16/6/03.
[87] Ibid. Interview: Liong, SP3, 21/6/03.
[88] Interview: Liong, SP3, 21/6/03.

PDVSA knew also completely different power structures than Shell. "*When a Venezuelan boss gives an assignment to his subordinates, he expects them to obey and fulfill the assignment. If they come back with a question or suggestion, it will be interpreted as a challenge of authority. The local employee, (who was accustomed to the Shell culture), wouldn't have wanted to challenge any authority, but to contribute to better solutions: 'I want to do a better job'.*"[89] Shell's corporate culture could be characterized by more involvement of the employee; employees who opened their mouth and stood up for themselves were highly appreciated at Shell. PDVSA's corporate culture could be characterized as an authoritarian one; at PDVSA you had to do what you were told to do, period!

5.2 The changing role of locals

To understand the specific role and situation of local employees in the refinery it is necessary to consider the developments surrounding the revolt on labor relations on May 30 1969.

The years immediately following the World War II brought economic prosperity to the Island of Curaçao; the demand for skilled labor exceeded the supply, attracting a stream of immigrants to the island. The population grew in a period of ten years from 75,176 (1944) to 114,683 souls (1954).[90] The economy of Curaçao continued to depend heavily on oil, the oil refinery being the biggest employer. Employment reached its peak in 1952, comprising a total number of 12,631 persons employed at the refinery and its subsidiary, the 'Curaçaose Scheepvaart Maatschappij' (CSM), paying a total of 58 million Antillean guilders on wages, more than the total expenditure of the government.[91]

In 1954 there was a turning point when the refinery started with modernization of the production plants and automation of the control of processes. The need to bring down operation costs to an economically justifiable level resulted in the reduction of the labor-force and eventually to mass lay-offs; in 1965 Shell Curaçao N.V. had 5,223 persons on the payroll, half of the number of 1954.[92] Against this context the revolt on labor relations on May 30 1969 has to be seen. Under pressure of increasing prices of crude oil on the international market, operational costs were even more reduced by outsourcing non-core activities, like construction, maintenance and cleaning, to contracting firms.[93] One of those contracting firms was "Werkspoor Caribbean" – better known as "Wescar". Wescar benefited from

[89] Interview: Doest, SM1/IM1, 16/6/03.
[90] Hartog, 1968, p. 414.
[91] Van Soest, 1977, p. 656 -657.
[92] Hartog, 1968, p. 319 and van Soest, 1977, p. 656.
[93] Just consider these figures: in 1968 the Oil Industry employed 5,243 persons compared to the 12,631 persons one and a half decade earlier in 1952. Source: Evers, forthcoming.

the mass lay-offs at Shell in the sense that the ones who lost their jobs at the refinery were consequently hired at Wescar. They were subsequently rather forced to do the same work at the refinery, only now against a lower payment.[94]

On May 6, 1969, the day that the third Collective Labor Agreement at the contractor firm "Wescar" would become valid, the laborers went on strike. The core of their discontent was of course the difference in wage between them and their Shell colleagues doing the same job, but also the big discrepancies in wages between local laborers and foreigners in the same job. The strike lasted two days and was ended when the negotiations between the management of Wescar and the Labor Union, the Curaçao Federation of Laborers (CFW), were resumed.

On May 27, exactly three weeks after the first strike, a second strike broke out because to the opinion of the labor union the negotiations gave no results. Other labor unions showed solidarity with the Wescar strikers and eventually joined the strike, amongst which the powerful Petroleum Workers Federation Curaçao (PWFC) of the Shell Refinery. The Wescar strike blew out to a general strike and on May 30, 1969, it escalated in a (racial) riot and looting in downtown Willemstad. The strike had also political consequences; on June 6, the government of the Netherlands Antilles resigned and new elections were scheduled.[95]

The revolt on labour relations on May 30 1969 – "Trinta di mei" as it is popularly termed – entered the history as the most revolutionary event ever on Curaçao, causing major political, social and cultural changes. One important effect of "Trinta di mei" was the "Antilleanization"[96] of jobs that were previously predestined for expatriates. Also at Shell local employees were given more opportunities as from then, although the difference between an expatriate and a local employee always remained. Another effect of "Trinta di mei" was that PWFC, the labor union of the Shell Refinery became one of the most powerful labour unions of the region. They negotiated a collective labour agreement (CLA) with the refinery that was one of the most extensive and complicated CLA's of the region.[97]

The Shell companies on Curaçao were generally characterized by little confidence in local employees. Local employees were also given little recognition. The most important positions were held by expatriates. They held a policy that was based on the training of expatriates – the so called high potentials – on international experience. This policy was applied on all their international affiliates. These companies were used for the training and development of their own (Dutch and British) people.[98]

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[94] Römer, 2000, p. 56.
[95] Evers et al, forthcoming.
[96] A process where jobs are increasingly held by local people.
[97] Evers et al, forthcoming.
[98] (Unrecorded) Interview: Rudolph, 22/7/03.

Isla started off the same way as Shell. During the first operational years on Curaçao (approximately 1985 – 1996) their idea concerning change of culture consisted in imposing Isla's culture by employing a battalion of Venezuelan employees in the organization. It was a general manager named Javier Hernandez[99], who brought change in this situation. As from around 1996 / 1997 fewer expatriates were brought in from Venezuela, so that local workforces started to acquire more opportunities within the refinery. The reason for this was in fact lower costs, because a local employee is simply cheaper than an expatriate from Venezuela. But also the acknowledgement of the potential of the local employees played a significant role. Since Javier Hernandez had held several positions in the exterior – including Europe, North America, Latin America and the Caribbean – he could, on the basis of sheer comparison, assess the qualities of local workforces.[100] Javier Hernandez contributed to the process of rationalizing the 'policy' of enrolling new employees; a process that was previously unfavorable to local people. Thus, a mixture of cost aspects and more confidence in local people led to a more favorable situation of the local workforces at Isla.

5.3 The crisis in the beginning of the transition and its solution

During the operational takeover of the Shell Refinery on Curaçao by PDVSA, the Venezuelans saw themselves confronted with an institutional system that was quite different from theirs. Ignoring the differences during the first years led to vehement clashes between the local workforce and the expatriates from Venezuela. There is an official survey that was conducted around 1993 / 1994[101], that can confirm the role of expatriates in the dissatisfaction of local employees at Isla. Around that time the situation at Isla became so much unbearable, that management decided to conduct a survey under the local employees. The main three problems they indicated were:

- Bad communication;
- Distrust between local and Venezuelan employees;
- A desire for "Antilleanization"[102] by the personnel.

The problem of bad communication wasn't just the consequence of the differences mentioned above ("trust culture" versus "culture of distrust" and different power structures) between the ex-Shell employees and the PDVSA expatriates. It can also be explained by the fact that the PDVSA expatriates from Venezuela didn't have a common background.[103] They came from different affiliates of PDVSA, like

[99] Javier Hernandez is a born Venezuelan who has been living for many years on Curaçao. Before becoming Isla's General Manager he has also worked for Shell Curaçao. He was General Manager from 1993 to 2000.
[100] (Unrecorded) Interview: Rudolph, 22/7/03.
[101] (Unrecorded) Interview: Chaclin, 22/7/03.
[102] Empowerment of local employees; they wanted more say, more important positions, etc.
[103] Interview: Doest, SM1/IM1, 16/6/03.

Maraven, Lagoven and Pequiven. These companies were all international companies which were nationalized in 1975. Lagoven, for example, was a former Exxon company, and Maraven a former Shell company.[104] Thus, the PDVSA expatriates were in fact not a homogeneous group, but a heterogeneous group which had all enjoyed different training. The ones who came from Maraven had enjoyed a Shell-training; and the ones who came from Lagoven and Pequiven had followed an American training. The transition was thus characterized in the beginning by a mixture of people with completely different backgrounds (they were influenced by divergent institutional properties), who were supposed to work together. It is hardly surprising, that the local ex-Shell employees on Curaçao could communicate better with the employees from Maraven.

The bad communication, and distrust at the refinery had its roots in the onset of the transition period. In that period there was a great uncertainty with regard to the future of the refinery[105]. A former employee of the refinery that experienced the transition notes that "*it was an enormous, traumatic change for many people, a change which not everyone has been able to overcome*."[106] It was traumatic, because as from the end of 1984 it became uncertain whether the Shell would continue its operations on the island. Towards the end of 1984 Shell came with a total package of demands whit which the government of the Netherlands Antilles had to comply with.[107] All the conditions had to be satisfied. Negotiation about them Shell considered impossible. For the government of the Netherlands Antilles it would become a 'mission impossible' to meet all Shell's demands. Consequently the refinery closed its doors in October 1985. Many people lost their jobs, and the ones who stayed were not certain of their jobs on the long run. In the beginning there was a 'construction' where the refinery was rented by Venezuela by an initial period of three years. It was far from clear what would happen after that. At the start of the takeover by Venezuela, the employees experienced many changes.[108] They lost for instance many secondary conditions, and the pension scheme in the time of Shell disappeared. The employees saw themselves confronted with a new (Venezuelan) Executive Board no one knew.[109] All these developments led to a very uncertain, even "traumatic" period for the employees.

Killing two birds with one stone

Eventually, in 1996 /1997 Isla's General Manager took certain decisions to calm down the crisis. He made several arrangements to empower the local workforce, to "Antilleanize" the Isla personnel. In fact, with his strategy he killed two birds with one stone. In 1993 when he was appointed General Manager Isla was facing difficult times. Compared to most other refineries worldwide Isla had two

[104] NRC Handelsblad, May 25, 1991.
[105] Informal conversation with Eugene Rhuggenaath.
[106] Interview: Liong, SP3, 21/6/03.
[107] Hendriks, 1987, p. 153, 154.
[108] Interview: Liong, SP3, 21/6/03.
[109] Ibid.

problems: operational costs were too high, and the workforce was too extensive. To solve these problems Isla launched a "cost-cutting mode". As a consequence, many employees lost their jobs. The expensive employees – the Venezuelan ones – were transferred to Venezuelan subsidiaries, and the released functions were given to cheaper local employees. By taking these measures it seemed like Hernandez complied with the discontent of the local employees, while in reality he was cutting in the operational costs.

Chapter 6

Towards an integrated software solution

6.1 Introduction

This second case concerns the implementation and use of SAP at Refineria Isla (Curazao) S.A., popularly called Isla. I will discuss the implementation and use of SAP on the basis of two SAP implementation modules, namely SAP-FI, CO and SAP-Payroll, Time Management.

The structure of this chapter is as follows. Section 6.2 starts with some background information on the SAP project at Isla. Section 6.3 follows with a description of the organizational context of the SAP project. A description of the processes by which SAP got incorporated in the operations of the refinery through time will follow in section 6.4. This description will be given in terms of the structurational models of technology and the theory underlying them, which was presented in section 2.2. In conclusion a reflection upon the relevant findings will be given.

6.2 Background information about SAP at the refinery

At the beginning of the nineties Isla started to think about the acquisition of a software package solution to replace its financial applications. Isla's general policy was to acquire standard packages and adapt them to the particular needs in the refinery.[110] The refinery had thus a strong preference for the acquisition of standard packages over the development of in-house, tailor-made applications. Towards the second half of 1991 the SAP system was mentioned as a possibility, and in 1993 Isla decided to acquire SAP.[111] SAP stands for Systems, Applications, Products in Data Processing. It is a leading ERP (Enterprise Resource Planning) software package, which is used for administrative purposes. SAP integrates data processing

[110] Document: Norms for the use of Computer Resources (PC's, Servers, 'General' Software and 'Special' Software) and for the Protection of Information in Refineria Isla, sheet 6 of 15.
[111] A Maintenance manager named Carlos Guillamon introduced the idea of SAP at Isla.

of almost all departments in a company. The different modules of SAP can support almost all company functions and business processes.

The decision to acquire SAP was based on the fact that Isla was facing problems with its "cost control and administration".[112] Isla's Cost Reporting System was not adequate for proper cost control. Besides, managers complained about the completeness and timeliness of information (reports). A 1992 document states that the main problem with the cost reporting then was:

> "*With the information supplied by the current cost reports, the clients are not in a position to control their budget and take the proper managerial decisions, since it is unknown to them how much budget is still free to spend, because no commitments*[113] *and not all accruals*[114] *are reported.*"[115]

The refinery had three major groups of costs, namely: contracts, materials, and sundries (or other services). And thus contractors as well as material suppliers and other service suppliers were confronted with Isla's deficient cost reports. The timeliness problem of the reports was due to the fact that several reports (originating from several systems) had to be used simultaneously to exercise cost control, an operation that was experienced as being very tedious.[116] Integration of the systems, whereby the elements of costs (contracts, materials, and sundries) would be linked to the financial applications (e.g. budget reporting, commitment reporting, and accrual system), would solve this problem.[117]

Also the internal cost accounting of the refinery was deficient. An essential difference between Isla and its predecessor, Shell, is that the former is a "cost center", while the latter was a "profit center". A cost center means that the refinery provides exclusively processing and storage services to PDVSA. The products are made available to third parties by PDVSA, and marketed internationally through PDVSA. Isla as a company does not make any profit thus. It receives an annual budget from PDVSA with which all its refining operations has to be paid. Shell Curaçao was a profit center because besides processing crude into products, it also marketed those products internationally. Its main functions were accordingly purchasing, refining, trading and selling.

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[112] Document: Requirements definition report to improve cost control and administration, March 1992.
[113] Commitments are firm obligations made against the budget to account for the future expenses in connection with contracts, materials and other services. Source: see note 118.
[114] Accruals are provisions made in order to account for expenses incurred, related to work executed, services rendered and material purchased, but not yet paid. Source: see note 118.
[115] Document: Commitment & Accrual Handling, February 1992.
[116] Document: Requirements definition report to improve cost control and administration, March 1992.
[117] Document: Commitment & Accrual Handling, February 1992.

PDVSA had a very strict policy concerning Isla's budget: the budget amount was "sacred", it could not be exceeded. This strict policy created a "*cost consciousness at Isla. Waste was tackled, which was used amongst other things to lower the costs.*"[118] In a case study about the rejection of Shell Curaçao in 1985[119] Ywe de Jong points out that since the second half of the seventies Shell conducted an investment policy that had to end disastrously for the refinery. Shell totally neglected the refinery's maintenance: even the most essential investments in maintenance were not done. As a result, the waste at Shell was extremely high: in 1984 an amount of 40 million US dollars disappeared because of evaporation, burning off and company errors. Isla on the other hand couldn't take this liberty, and thus made significant investments to reduce waste, and accordingly to lower costs and increase efficiency. The acquisition of SAP as a solution for Isla's internal cost accounting fitted in the refinery's strategy of waste – and cost reduction.

Against this background Isla's decision to acquire SAP has to be seen: improvement of cost accounting and reporting. An additional problem Isla was facing was the fact that its systems were becoming obsolete. Due to that fact, special knowledge was required to maintain those systems, what made them extremely vulnerable. The maintenance of those systems was becoming increasingly expensive and time-consuming, what made Isla decide to replace them. SAP incorporates next to a Financial system, also fully integrated Materials, Production, Maintenance, Human Resources and some other applications. So, the acquisition of SAP would additionally provide an answer for the refinery's problem with its legacy systems.

Why SAP?

Isla had a general policy which concerned the use of standard, 'off the shelf' packages and adjustment of them to the particular needs in the refinery. SAP is a standard, integrated, enterprise wide software package. It is delivered to a customer with selected standard processes turned on, and many other optional processes and features turned off. SAP R/3 (which is the version Isla acquired) for instance contains about 10,000 tables which control the way the processes are executed.[120] It is up to the customer to customize these tables, i.e. to adjust the settings of these tables to get SAP to run the way one wants it. Acquiring SAP fits accordingly in Isla's policy. At the beginning of the nineties however, there were other ERP packages available on the market. According to the project manager, the choice for SAP among packages like Peoplesoft, Oracle, and Baan, was based on its solidness. "*Unlike other systems, SAP kept running, in spite of minor faults.*"[121]

[118] Interview: Liong, SP3, 21/6/03.
[119] Hendriks, 1987, p. 150-152.
[120] This information I have from the website: http://www.thespot4sap.com/Articles/TheBasics_1.htm
[121] Interview: Doest, IM1, 16/6/03.

6.3 Organizational context of the SAP project

In the time the decision was made to acquire SAP, there wasn't that much experience in the refinery sector with implementation of SAP. In fact Isla would become the first refinery in the world to adopt SAP R/3 for its administrative tasks. In spite of that Isla decided to implement SAP, with the consequence that almost all knowledge about the implementation had to be developed in-house. A former SAP project manager relates how difficult it was sometimes to find consultants sufficiently versed in some modules. The implementation team members had to specialize in SAP on their own, or else the project would get stranded.[122] Isla, however, did receive support from SAP consultants, but still the most substantial part of the implementation was done by Isla employees.

In this thesis I will discuss the following SAP modules[123]: SAP-FI, SAP- CO, SAP-Payroll and SAP-HR (Time Management). For every SAP module one implementation team was put together. The modules FI and CO were, however, implemented together by one implementation team. This was done, because although FI and CO are two distinct modules, they are closely interlinked. These modules constitute together the administrative heart of SAP: all the other modules are linked to these two. I selected FI and CO, because they were in fact the reason why Isla decided to acquire SAP in the first place: to improve its cost accounting and reporting.

The Payroll System was the very first application on the mainframe in 1968. It was in fact the first automated system at the refinery. After the revolt on labour relations on May 30 1969 the labor union of the refinery negotiated a Collective Labor Agreement (CLA) that would become one of the most extensive and complicated of the region. This CLA was consequently included in the Payroll system, what made the system very sensitive. With over 30 years of existence on the mainframe computer, the Payroll system is thus the oldest automated application in the refinery. Because of the dependence of Payroll on a complicated CLA and on country-specific laws regarding taxes and other deductions, the implementation process of SAP-Payroll was very laborious. For these reasons I choose to include Payroll in this discussion. The modules Payroll and Time Management were also

[122] Elize Krijt, who became the project manager after Richard Doest, tells me this.

[123] Isla possesses at this moment 11 modules of SAP spread over all its departments. In the fall of 1994 the first module of SAP was implemented at Isla. This module was SAP-HR: Organization Management. In January 1995 the second and the third modules were implemented, SAP-FI, CO: Financial & Cost Accounting, and SAP-MM: Materials Management. They followed in the second half of 1995 with SAP-HR: Mater Data, and in 1996 with SAP-HR: Personnel Development, Training & Event Management. In 1997 two modules were implemented, SAP-PM: Plant Maintenance and SAP-ESM: External Services. After two years, in 1999 the refinery possessed three brand new SAP modules, SAP-PS, IM: Project System & Investment Management, SAP-Payroll and SAP-HR: Time Management. In January 2001 the last module of SAP was implemented, namely SAP-HR: Compensation Management. Source: SAP Archiving presentation.

implemented together by one implementation module, since Time Management constitutes the input of time data for Payroll, and has thus a strong link with Payroll.

6.4 Case description

In this section I will give a description of the implementation and use of SAP at Isla. I will start by describing the processes through which SAP got integrated in the operations of Isla. These processes will then be interpreted through the three stages of an information system's interaction with an organization[124], which Orlikowski distinguishes and I adopted in this study. The operational variables established in section 3.4.1 will lead me through this process.

6.4.1 Stage I: Initial Design of SAP

For the SAP project an entirely separate organization was established. This was both physical and organizational. An empty shed next to the Lab was turned into (what they baptized as) the "SAP building". In this building everyone who was working on the SAP project sat together. Reorganization took place in the sense that all project members were removed from their departments and their daily workings, and assigned fulltime to the SAP project. The SAP implementation team had a lot of facilities at their disposal which other employees of the refinery didn't have.[125] These extra facilities were meant to guarantee high motivation of the project members. The SAP Team enjoyed also a certain social status: they traveled a lot, and threw parties on a regular basis. The SAP building was even given the nickname "Tajmahal".

In an interview with the former SAP project manager he explained the rationale for a separate 'workbuilding' from his perspective:

> "*Since the beginning of my professional career I follow a certain philosophy which assumes two types of people working in an organization, namely the 'campers' and the 'hunters'. The hunters are responsible for production; they take care of the inflow of money. A hunter will hunt outside the field. Campers are what we nowadays call the staff. They remain on the camp, and ensure for example that the fire keeps burning. There is always a fight going on between the hunters and the campers, because the campers know all too well that they have no right to exist without the hunters. But on the other hand they do not want the hunters taking over, because if they take over there will be changes. (...) Typical hunters are: Napoleon, Attila the*

[124] See sections 2.2.1 through 2.2.3.
[125] These facilities include amongst other things flexible working hours, a kitchen with a microwave oven, regular oven, refrigerator, etc.

> *Hun, but also Javier Hernandez[126]. I wanted to make of the implementation team a set of hunters.*"[127]

With his story about "campers" and "hunters", Richard Doest in fact wanted to illustrate how he tried to empower his people. The participants to the project had to produce, "*they had to become champs*", become leaders, as he explained further. Note that Doest is talking about the year 1994, just after Isla's management conducted a survey under its local employees. The results of that survey are known (see section 5.3.): people wanted to be empowered; they wanted more important positions, and above all they wanted the same recognition as expatriates. And with the SAP project they achieved all that: the project consisted entirely of local employees. Occasionally the help of external SAP consultants was called upon, but their contribution was mostly nonstructural and concerned specific technical assistance.

For every SAP module one implementation team was put together. The SAP project was conducted applying an implementation strategy where a conscious choice was made to closely involve users in the project. In every implementation team, a "key user" or "expert user"[128] was appointed as the team leader. A key user is someone who knows the process of his or her department well; he or she disposes of the greatest knowledge about the department. There is a clear analogy between the use of key users in the SAP project and the notion of an "ambassador user"[129] which Hugh Mackay uses. Mackay defines an ambassador user as "a representative of the entire community of users, not just its managers, and with the authority to make decisions and to guide the work of developers." An ambassador user is a user who is assigned the role of communicating in both directions between users and developers, representing the interests of the user group. An ambassador user is also an active member of the project team, and in that capacity has a commitment to the project and its success. So, an ambassador user has a dual loyalty[130], towards the user group and the project. This characterization of the ambassador user by Mackay corresponds to a large extent with how key users were seen at Isla during the SAP project.

The SAP project was a 'high priority' project[131] at Isla: it just had to succeed. Because of this only the best employees were appointed on the project. For the user departments this meant that they saw their best users leave to work full-time on the SAP project. These key users in the project often used to fulfill the role of "user custodian" in their department. User custodians are users who have full

[126] Managing Director of Isla from 1993 to 2000.
[127] Interview: Doest, IM1, 16/6/03.
[128] At Isla these terms are used indiscriminately.
[129] Mackay, 2000, p.738, 748, 749. The ambassador user is originally a user role which the Dynamic Systems Development Method (DSDM) Consortium for Rapid Application Development (RAD) distinguishes.
[130] Mackay, 2000, p. 748, 749.
[131] Interview: Doest, IM1, 16/6/03.

responsibility for a certain business process or organizational procedure. They know the process very well and constitute a first contact point in case of problems or questions concerning that process. These user custodians were appointed in the SAP implementation teams as representatives of their user group ***and*** as team leaders. Accordingly these users became ambassador users in the SAP project.

An implementation team consisted furthermore of one or more systems analyst from Isla's IT department[132]. Systems analysts and users worked full time on the project, while occasionally the help of external consultants was called upon. The latter was a more nonstructural activity; only when they couldn't resolve problems themselves consultants were called in.

The SAP project was thus structured as follows: one implementation team for every SAP module; each implementation team consisting of at least one user (key user) and systems analyst, sometimes complemented by an external consultant. The last element in the structure was the project manager. A former manager of the Operations department was assigned as the SAP project manager.[133] He was someone who emphasized teambuilding, training and education of his project members. He also invested much time and effort in getting acquainted with the project participants. He was a man of authority who could drill through the bureaucracy of an organization, and hence could have things done faster. He did open doors for his project people, which were closed before. His people could as a result make direct contact with their bosses, so that decisions could be taken faster. This is still in accordance with the time they were in, namely 1994, a time when people wanted to become empowered.

Implementation of FI/CO and Payroll/Time Management

FI and CO are, together with the Materials Management module, the first modules which were implemented at Isla. The implementation process had lasted approximately one and a half years when on January 1 1995 it went live. Implementation of the Payroll module started in July 1998 and lasted more than a year. SAP-Payroll went live on September 1 1999.[134]

A "Big Bang" implementation approach was applied for the SAP project as a key user noted: "*(...) we didn't run parallel, but switched directly. On December 31, 1994 the legacy systems were loaded in the new systems, FI, CO and MM.*"[135] A "Big Bang" implementation approach refers to the fact that before implementing the new systems, the legacy systems are turned off. Once implemented, only minor changes can be made to the new systems. It's a risky strategy in the sense that there is no fallback on the legacy systems if things don't go well. This approach doesn't

[132] Under Isla the IT department was named TSI (Technical Services Information Resources).
[133] This manager was Richard Doest.
[134] Interview: Scheidelaar/Anthonia, IG7/IG8, 25-6-03.
[135] Interview: Schotborg, IG6, 25-6-03.

allow an organization to run the legacy systems at the same time as the new systems in order to check the results first.

The Payroll module is divided into gross accounting and net accounting. Gross accounting is largely international in nature, whereas net accounting depends on country-specific laws regarding taxes and other deductions.[136] Net accounting for Netherlands Antilles is not SAP standard. It was fully developed in-house in 12 months. Gross Payroll was on the other hand customized from Payroll USA.[137] The Payroll module was implemented together with the Time Management module. Together these two modules form a whole. Like FI and CO, these two modules are very interlinked. In Time Management one collects in fact all the input for Payroll; all time data, like overtime and absence, is delivered through Time Management.[138]

The FI, CO implementation team consisted of three users, one systems analyst, and one external consultant. The tasks of the systems analyst included, amongst other things, indicating what the technical possibilities were. The final decisions were made by the key users, while the systems analyst assisted with possible solutions. The users were for instance told by management that all functionalities of the old system had to be found in the new system.[139] And thus the expert users transferred data from the old system to the new one. This was done in close cooperation with the systems analyst. They downloaded data from the legacy system to for instance Microsoft Excel, while the systems analyst converted this data to SAP. Users characterized their cooperation with systems analyst as pleasant.[140] There was much interaction between the two groups, because users had specialized knowledge on the area of finance and no knowledge on the area of IT, while systems analyst on the other hand had knowledge of IT and no knowledge of finance.

The Payroll and Time Management team consisted of two systems analysts (one for the Payroll module and one for the Time Management module); three users (two for Payroll and one for Time Management, one of the Payroll users being the team leader); and one external consultant. The principal role of the systems analysts in this initial design stage was to analyze and write programs to download information from the legacy systems, and consequently create programs to upload legacy data in SAP. For Payroll the legacy data was partially on the mainframe and partially on the S/36.[141] The role of the users included amongst other things to give explanation about the processes, test results and give user trainings.[142] The external consultant contributed to the project with specific programming activities. The users selected to work on the implementation of Payroll were among the most experienced users

[136] Document: Training material for HR/Payroll personnel, August 1999.
[137] Document: Corporate Presentation of SAP Payroll and Time Management, December 1999. SAP Payroll comes in several country specific versions, of which Payroll USA is one.
[138] Interview: Demei, IP5, 23-6-03.
[139] Interview: Imperator, 7-7-03.
[140] Ibid.
[141] The S/36 is the successor of the IBM S/34 discussed in chapter 4.
[142] Interview: Demei, IP5, 23-6-03.

in the Payroll department. The team leader was working in the Payroll department since 1981, while the other user was working there since 1991. They were both working for a long period of time for the refinery: the team leader has been in employment since 1969, while the other user has been in contract since 1976. They both had also managerial experiences within the refinery. In brief, they were among the very best Payroll users at the refinery.

During the implementation of Payroll all the team members received training from the external consultant. These trainings concerned mainly information about the implementation (for the systems analysts) and about the processes (for the users).[143]

The refinery's labor union – since the revolt on labor relations of May 30 1969, a powerful union – turned out to be a significant party involved in the implementation of SAP. In the beginning, they offered substantial resistance to the implementation of the Payroll module. A considerable amount of effort was made by the expert users to convince the labor union of the importance of implementing the new Payroll module.

6.4.2 Stage II: Institutionalized use of SAP

The deployment of SAP had a great impact on the organization. SAP made the entire data administration easier, because it was integrated. Before SAP, Isla knew for example several systems for processing Payroll. They had 'Time Recording', 'Payment Deduction', 'Tax' and 'Payroll'. These systems were spread on a PC, an S/36 mini computer and a central mainframe. Time Recording contained all time data (absence, overtime, etc). All time data went from Time Recording to Payment Deduction for calculation. After that followed tax calculations. These two calculations went subsequently to the mainframe where some additional calculations were made. The mainframe would finally produce the payslips, which together with some statements and a disk went to the bank.[144] This was a very laborious procedure. With the introduction of SAP-Payroll which was linked to SAP-Time Management, the Payroll process became much easier. The SAP-Payroll module made it also possible to execute the entire process, unlike the legacy system, where for instance an operator printed the payslips.

SAP-Payroll was also much more flexible than Payroll on the legacy system. Payroll on the legacy system was characterized by batch input. "*In the legacy system, the input could be done just one time, batch, on a fixed day. Now, test data can be generated anytime.*"[145] The on-line capability of SAP-Payroll made it more pleasant to work with. An additional advantage of SAP, especially for management, was the fact that it made possible to get information fast and without human

[143] Interview: Scheidelaar/Anthonia, IG7/IG8, 25-6-03
[144] Interview: Demei, IP5, 23-6-03, informal conversation: Rich Wanga, 29-4-2003.
[145] Interview: Demei, IP5, 23-6-03.

intervention. The integrated character of SAP implied that information could not be 'manipulated' anymore. Information would flow from Time Data directly to Payroll without the possibility to change the data. Managers at Isla praised thus the "timeliness" and the "quality" of information that SAP made possible.[146]

One important benefit for the FI, Co users was the fact that they could see the costs anytime and generate their reports themselves. In the time of legacy systems all the different departments received results (in the form of reports) of the previous month from the IT department on the tenth day of the month. Moreover, the old financial system used to be on the mainframe. Users didn't have access to the legacy system thus. They filled in forms and sent those forms to the IT department to process. With SAP on the other hand they could do their own processing. The cost accounting became also much more extensive and complete under SAP.

While in the past ensuring user commitment was a problem, the implementation strategy of SAP where users were highly involved in the project (users were team leaders of the implementation teams), led to a high commitment of the user and the user departments. The key users felt a very great responsibility for the modules. Since they led the implementation process, they knew the modules well and therefore felt responsible for them. In an interview with the two Payroll users they noted that:

> "*A*[147]*: I don't think the system itself played a significant role in our motivation. I think rather the function on itself, which enclosed a lot of responsibility.*
> *S*[148]*: yeah! I think the responsibility we had caused our motivation to be top.*"

Systems analysts praised the implementation strategy for the same reason, they just did this from their perspective. One systems analyst who participated in the SAP-PM module implementation team noted for instance:

> "*E: my experience with users is that they love blaming the system. If the system fails to serve the department's needs, we (TSI, the IT department) are blamed; if problems occur we are blamed again. Now they won't be able to blame the system anymore.*
> *A: do you mean they're part of the system now?*
> *E: yeah! They participated in the project, they were even leading the implementation teams. So, they're in part accountable for the final system.*"[149]

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[146] (Unrecorded) interview: Norbert Chaclin, (unrecorded) interview: Romeo Rudolph.
[147] Interview: Scheidelaar/Anthonia, IG7/IG8, 25-6-03. Stella Anthonia reacts on my question how motivated she was to work with SAP.
[148] Interview: Scheidelaar/Anthonia, IG7/IG8, 25-6-03. Enid Scheidelaar reacts on the same question.

This systems analyst also acknowledged the higher accountability and commitment of the users; he just interpreted it as an advantage for himself and his department. It is, however, remarkable how this systems analyst enjoyed the fact that the implementation strategy led to his becoming less accountable for the system, while the Payroll users praised their increased responsibility. This development indicates a shift in responsibility from the IT department to user departments.

In this use stage users experienced a very high workload. The Payroll users had to give user training, especially to the Time Management users. The Payroll module has two end-users; the same two key users who participated in the implementation project operate the module. But for Time Management this was different. The users didn't participate in the project, and thus didn't know how to work with the module or even with SAP. They received training during the implementation of the module, but also after the implementation. Next to give training, the Payroll users had to also give support, since they were focal points[150] for the Time Management module. In this stage they were often called by Time Management users[151] for support. Not only the training and support the Payroll users had to give led to a high workload. Also the fact that at the Payroll department the manpower was reduced by two full-time employees played a significant role in the heavy workload. At the Finance department, manpower was even more reduced as a consequence of the FI, CO module. A key user relates that:

> "*It was well known that the FI, CO module would eliminate certain positions (at the Finance department). The reduction of the workforce would eventually consist of n amount of employees in several areas. (…) Of the 38 people who started using the FI, CO module at Finance, just 16 would eventually remain.*"[152]

Also the key users of the FI, CO implementation team gave training to other users during and after the implementation. The FI, CO module had several users on the plant. After these modules were implemented, also workers on the plant had to do some input. While these workers filled in forms in the past and sent them to Finance for further transaction, with the deployment of SAP they had to import data in the system themselves. Many of these workers didn't have any knowledge of computers, and thus had to be trained. They received computer training, SAP training, and furthermore had to become used to importing data in SAP. Users, whose core business was constituted by work on the plant, were confronted with computers from then on.

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[149] Interview: Suiters, IP14, 11-7-03.
[150] A focal point is a first contact point that should be consulted in case of problems and/or questions about an IS.
[151] Among these users there were many supervisors on the plant, who had no experience with SAP.
[152] Interview: Schotborg, IG6, 25-6-03.

The users who participated in the SAP project were appointed as focal points of the concerned module. A focal point is a first contact point for users in case of problems and/or questions about a SAP module. These focal points gave support to the users. A consequence of the establishment of focal points was that the responsibility of the IT department diminished and users on the other hand became much more accountable. The IT department was called upon only in case of major (technical) problems or when the focal point couldn't manage a certain problem itself.

6.4.3 Stage III: Ongoing interaction with SAP

Orlikowski proved in her article that "technology cannot be conceived as a fixed object at any time during its deployment".[153] If acknowledged, the "interpretive flexibility" of technology – meaning that technology can be given different meanings by different groups of human agents – may induce users to modify their interpretation and use of a certain technology. In order for this to happen, users have to acknowledge technology's "constructed nature".

At Isla, the use of the different SAP modules was not modified significantly. This is subsequently quite understandable. At Isla, users designed their own technology. Participating in the implementation process of SAP, they actively shaped the SAP modules as they desired. The key users represented their department and designed the modules according to the department's wishes. This strategy helped diminishing the "interpretive flexibility" of SAP, as far as it is anyway possible to interpret SAP differently.

The deployment of SAP led to a modification of Isla's institutional context. SAP, by being an integrated system provides a single source of information for management monitoring and reporting. Managers get their information faster and 'cleaner' (because there is no human intervention). Deployment of SAP thus, consolidated management control at Isla. SAP also standardized work at Isla: from then on users could follow standard procedures and make standard reports.

Payroll, however, is a dynamic system. Continually, changes have to be brought to it. Curacao laws regarding taxes and an extensive Collective Labor Agreement are incorporated in the Payroll module at the refinery. Because these things tend to change continuously, the Payroll module has to be accordingly adapted frequently. To maintain a Payroll module is in fact an ongoing process, and because of that the decision was made to place a systems analyst (the same that participated in the implementation project) permanently in the Payroll department, next to the users.

[153] Orlikowski, 1992, p. 419.

6.5 Relevant findings

In this second case study the implementation of SAP as an administrative system at Isla was discussed. In this case it came out that SAP was implemented mainly to replace Isla's deficient cost accounting and reporting system. A general description was furthermore given of the organization of the project. And finally a more detailed descriptive analysis was given of the design and use of SAP on the basis of the modules FI/CO and Payroll/Time Management. The following concerns a selection of findings that will lead the way to answering the research question.

1. The implementation of SAP was user driven. The idea to introduce SAP came from a user, a Maintenance manager named Carlos Guillamon. The project manager appointed to the project came also from a user department, a former Operations manager named Richard Doest lead the project.

2. Users had a central role in the SAP project. Every concerned manager committed itself to appoint at least one user of its department to the project. Managers appointed their best users to the project. These "key users" didn't just participate to the project; they led the different implementation teams. These implementation "team leaders" were assisted by systems analysts. Thus, there was a reversal of roles. Before the SAP project, it was the users who assisted the IT experts by providing their requirements to them. The IT experts were drivers of IT projects. In the SAP project, the users were responsible for the automation of their process, while IT experts assisted them with technical solutions. In this project, users were the drivers.

3. The SAP project consisted entirely of internal, local employees of the refinery. Occasionally the help of external SAP consultants was called upon for providing specific technical assistance. This was, however, mostly nonstructural.

Chapter 7

Discussion and conclusion

7.1 Discussion

This thesis has explored the implementation and use of two distinct information systems at the refinery in Curaçao, spread over two periods in the existence of the refinery. Special attention has been drawn on the role of (mostly local) users in this process. Drawing on Orlikowski's theoretical conceptualization of technology it was shown how deployment of an IS in different institutional contexts might have different effects on the interpretation and use of that IS. It was further shown how there is flexibility in how people design, interpret and use an IS. This flexibility is, however, constrained by the kind of information system (the mini computer is more interpretive flexible than SAP), the institutional context in which the information system is designed and used (at S.N.A.V. the mini was used more flexible than at Lab), and the beliefs, knowledge and power of human actors. There are, however, two subjects that qualify for a short discussion. These are subjects that have emerged as a consequence of my research at the refinery, but which are not or not explicitly addressed by Orlikowski's theoretical conceptualization of technology.

In the first place it came to light that social, political and cultural aspects of Curaçao had influence on in any case local employees, and perhaps even on their design, interpretation and use of information systems. The "Trinta di mei" revolt on labor relations in 1969 had as a consequence the "Antilleanization" of jobs that were previously predestined for expatriates. This "Antilleanization" or empowerment of local employees meant that the locals obtained more opportunities, better positions, etc. in the refinery. The middle management of the refinery that consisted before the revolt entirely of expatriates was replaced by local staff. More local employees would participate in the design and use of information systems from then on. This empowerment process might reflect also the will of the user departments to decouple from ICS and accordingly the deployment of mini computers in the user departments. The above-mentioned is a social-political dimension which is not included in Orlikowski's theoretical conceptualization of technology. Her conceptualization focuses primarily on the internal organizational processes by which an information system becomes integrated in the operations of an organization through time. In this case, however, to fully understand these dynamics, attention has to be paid to social, political and cultural aspects of

Curaçao too. This is further confirmed by the crisis which arose after the transition from Shell to Isla. One of the results of a survey conducted under local staff workers in 1993 was the desire for "Antilleanization" by the Isla personnel. In this case there is a direct link between this desire and the organization of the SAP project later on. This project was a high priority project with all corresponding facilities and resources, and it consisted also entirely of local employees. This empowering of local employees led to a specific organization of the SAP project, which Orlikowski's theory doesn't consider (at least explicitly).

The second point of attention is the fact that, despite the suggestion of her theoretical conceptualization that several human actors (including users) may influence the design of technology, in her illustration of the structurational model of technology she doesn't include users in the design stage. My second case study displayed the leading role of users as designers of technology in the design stage.

7.2 In conclusion

The case studies discussed in this thesis showed in general how users have evolved from rather passive actors in the design and use of information technology at the refinery to more active actors. On the basis of these two case studies I will draw two conclusions in relation to the topic of my research, namely the role of users and user departments in the introduction of new computer-based information systems.

The first conclusion concerns the influence of an institutional context on the interpretation and use of a new information system. Issues like how much experience an organization or organizational department has with IT and IS design and/or use influences the interpretation and appropriation of newly implemented systems by users; also custom and tradition might influence technology interpretation and use. This accounts for the distinct use of the mini computer at Lab (progressive, innovative use) and S.N.A.V. (conservative, traditional use).

The second conclusion has to do with the evolving of users from passive, powerless actors in IS design to drivers, team leaders of IT projects. This latter is what Mackay calls the evolving of a user in a "hybrid user/designer".[154] By becoming the ones responsible for an IT project, users gain more accountability during design, use, and maintenance of information system. This accountability is also translated to the ensuring of commitment from the user departments, something IT experts used to be responsible for. Another effect of the enrollment of the "hybrid user/designer" is that it functions as an "ambassador" of the user department in the project. A lot of attention is paid to wishes of the departments and user requirements in designing new systems, leading to better information systems and also to a better (and less interpretive flexible) use of new systems.

[154] Mackay, 2000, p. 749

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List of informants

Formal interviewees

1. Anthonia, Stella: former user participant in the SAP/Payroll Implementation team, and current Payroll Analyst at Isla. Code: IG8. Datum: 250603.

2. Chaclin, Norbert: Managing Director of Isla (unrecorded)

3. Demei, Nelly: former Systems Analyst in the SAP/Payroll Implementation team, and current business analyst at Isla. Code: IP5. Datum: 230603.

4. Doest, Richard: former Operations Manager at Shell, and Project Manager SAP at Isla. Code: SM1/IM1. Datum: 160603.

5. Guiamo, Raymi: former Lab Manager Shell. Code: SM/IM4. Datum: 230603.

6. Haile, Anthony: former User and Finance Manager S.N.A.V. Code: SG2/SM2. Datum: 200603.

7. Imperator, Shirley: former Team Leader in the SAP/CO Implementation team, and current Department Head Treasury at Isla. Code: SG11/IG11. Datum: 070703.

8. Inesia, Angeline: former Team Leader in the SAP/ESM Implementation team, and current Department Head Budget & Contracting Out at Isla. Code: IG12. Datum: 080703.

9. Liong, Eric: former Section Head Technical Support ICS at Shell. Code: SP3/IM3. Datum: 210603.

10. Meulens, Cedric: former System Analyst in the SAP/ESM Implementation team, and current Quality Analyst at Isla. Code: IP13. Datum: 090703.

11. Pandt, Edith: former Section Head Systems Development ICS at Shell, and current EDP Auditor at Isla reporting directly to PDVSA Auditing Organization in Caracas. Code: SP10. Datum: 040703.

12. Paz, Douglas: Department Head Information Resources at Isla. Code: IM16. Datum: 220703.

13. Quilot, Giovanny: former System Analyst in the SAP/MM and SAP/PM Implementation team, and current Senior Manager, Information Risk Management at KPMG Business Advisory Services. Code: IP15. Datum: 210703.

14. Rudolph, Romeo: Human Resources and Services Manager of Isla (unrecorded)

15. Scheidelaar, Enid: former Team Leader in the SAP/Payroll Implementation team, and current Section Head Payroll at Isla. Code: IG7. Datum: 250603.

16. Schotborg, Monique: former Team Leader in the SAP/FI Implementation team, and current Department Head Accounting at Isla. Code: IG6. Datum: 250603.

17. Suiters, Eugenio: former System Analyst in the SAP/PM Implementation team, and current Section Head Administration & Operation Information Systems (TSIS) at Isla. Code: IP14. Datum: 110703.

18. Wanga, Rich: former Programmer and Program Designer at Shell, and current senior Business Analyst at Isla. Code: SP9. Datum: 260603.

Informal conversations

19. Crestian, Eddie: Section Head Computer Operation (TSIO) at Isla

20. Elizabeth, Oswin: former Employee Finance Department at Isla

21. Evers, Roy: Director of Curises, independent consultant, project "The Development of Information Technology in Curaçao" initiator

22. Geferts, Joyce: Business Analyst at Isla

23. Hu-A-Ng, Ramon: Information Technology Advisor at Isla

24. Loefstop, John: LAN Engineer at Isla

25. Nunes, Humberto: Section Head Technical Services Administration, Long Term Planning & Budget (TSPL) at Isla

26. Römer, Marlon: Systems Engineer at Isla

27. Wiel, Boeis: pensioner of Shell

28. York, Owen: LAN Engineer at Isla

Appendix I: interview schedule

The interview schedule below is an example. It concerns an interview schedule which was used to interview actors who were involved with the SAP project.

Afstudeeronderzoek WWTS
Interview project SAP, Isla respondentcode .....

Naam interviewer(s) _____

Datum interview _____Tijdstip aanvang _____

Plaats _____

Voor mijn afstudeerscriptie ga ik twee casussen uitwerken waarin ik onderzoek doe naar succesvolle implementatie en gebruik van informatietechnologie in een organisatie. Daarbij gaat mijn aandacht in het bijzonder naar de speciale rol van mensen in dit proces. In de eerste casus ga ik onderzoek doen naar de implementatie en gebruik van de SAP bij de "Refineria Isla (Curazao) S.A.". Als theoretische kader daarvoor maak ik gebruik van het theoretische model van Wanda J. Orlikowski die met haar "Structurational Model of Technology" een concept heeft ontwikkeld waarmee technologie onderzocht kan worden vanaf de ontwikkeling tot en met het operationele gebruik ervan. De eerste SAP module werd geïmplementeerd in november 1994, en de laatste in januari 2001. In totaal zijn er 11 verschillende modules in gebruik bij de Isla. Van die 11 modules ga ik er 4 betrekken in mijn onderzoek. De respondenten die deel gaan nemen aan dit onderzoek kunnen gecategoriseerd worden als: managers, IT professionals, of gebruikers. De respondenten zullen gecodeerd worden met behulp van de volgende lettertekens: I verwijst naar een Isla medewerker, M verwijst naar een Managementfunctie, P verwijst naar een IT professional, en G verwijst naar een gebruiker. De nummers 1, 2, 3, ... , n zullen gebruikt worden om te verwijzen naar de volgorde waarin de respondenten geïnterviewd zijn. Dus, IM1 verwijst naar een manager van de Isla die als eerste geïnterviewd is.

Instructies

1. Vóór interview respondentnummer (en eventueel om wat voor soort actor het gaat) op het formulier en op het cassette-etiket invullen (zie boven).

2. Rest van de gegevens boven op het formulier invullen (datum, naam interviewer, plaats van interview, tijdstip, etc.).
3. Pas bij de eerste vraag bandrecorder aanzetten.

Gespreksintroductie

Doel van het interview
Gegevens verzamelen over de implementatie en/of gebruik van SAP ten behoeve van mijn onderzoek naar de voorwaarden voor succes bij implementatie en gebruik van IT bij de olieraffinaderij op Curaçao.

Verantwoordelijke instanties
- Voor mijn scriptie: vakgroep Filosofie van Wetenschap en Technologie van de faculteit Bedrijf, Bestuur en Technologie van de Universiteit Twente.
- Voor de case: Curaçao Institute for Social & Economic Studies (CURISES), een wetenschappelijke stichting verbonden aan de Universiteit van de Nederlandse Antillen (zij zijn de opdrachtgever van het project "The development of Information Technology in Curaçao", waaronder deze case valt).

Reden voor keuze respondent
Omdat de betreffende persoon een relevante functie heeft vervuld in het SAP project; omdat hij of zij in aanraking is gekomen met SAP door middel van aanschaf, implementatie, gebruik of besluitvorming erover.

Gebruik bandopname
Zodat ik naderhand het gesprek rustig kan gaan verwerken, onvolledigheden kan invullen, en zodoende betrouwbare interviewresultaten kan genereren. Het gaat mij tevens minder tijd kosten bij de notering van antwoorden, en de verwerking van resultaten.

Rapportage interviewresultaten
- De interviewresultaten zullen verwerkt worden in een hoofdstuk van de publicatie "The development of Information Technology in Curaçao".
- Tevens zal ik de interviewresultaten voor mijn eindscriptie WWTS gebruiken.

Te verwachten vragen
De vragen zullen voornamelijk gaan over de implementatie van SAP, het operationele gebruik ervan, de institutionele invloeden van de Isla op de implementatie en het gebruik van de SAP modules. De geïnterviewden zullen ook expliciet gevraagd worden naar hun rol in bovenstaande zaken.

Anonimiteit
De interviewresultaten zullen anoniem verwerkt worden (dus uitspraken van geïnterviewden kunnen zonodig aangehaald worden, zonder dat daarbij de naam

van de respondent vermeld wordt). Het gaat mij namelijk niet om de persoon, maar om de verschafte informatie.

Duur interview
Circa 1 uur.

De vragen

1. **Bent u een man of een vrouw?**
   □ **Man**
   □ **Vrouw**

2. **Wat is uw leeftijd?**

3. **Geef een beschrijving van uw functie(s) bij de olieraffinaderij.**
   (Probeer de respondent een zo uitgebreid mogelijk functieomschrijving te laten geven. Laat hem desnoods een werkweek beschrijven, of een werkdag. Wat doet u zoal op een dag hier? En in een week? Laat hem of haar alle vervulde functies bij de olieraffinaderij opsommen)

4. **Hoe lang hebt u gewerkt bij de olieraffinaderij?**
   (Noteer hoe lang de respondent heeft gewerkt bij de olieraffinaderij. Deze vraag stel ik om de antwoorden van de respondent te kunnen interpreteren overeenkomstig de context van de tijd waarin hij gewerkt heeft voor de olieraffinaderij.

   4.1. **En, onder de huidige functie?**
   (Noteer hoe lang de respondent als leidinggevende gewerkt heeft bij de olieraffinaderij)

5. **Was u tevreden met uw functie bij de olieraffinaderij?**
   (Laat de respondent vertellen wat hem of haar wel beviel aan de functie en wat niet. Deze vraag laat mij wellicht meer inzicht krijgen in de werkhouding van de respondent ten opzicht van de organisatie)

   □ Ja, omdat ……...

□ Nee, omdat ……

6. **Welke opleiding(en) hebt u gevolgd en afgerond?**

   □ **Lager onderwijs / Lager beroepsonderwijs**
   □ **MAVO, MULO**
   □ **HAVO, HBS**
   □ **VWO, Atheneum, Gymnasium**
   □ **Middelbaar Beroepsonderwijs (MTS/MEAO)**
   □ **Hoger Beroepsonderwijs (HTS/HEAO)**
   □ **Universiteit, Technische Hogeschool (TH)**

7. **Heeft de moedermaatschappij van de Isla, PDVSA, een rol gespeeld bij de implementatie van de SAP?**
   (Deze vraag biedt mij inzicht in de invloed van externe factoren op de implementatie van SAP)

   7.1. Een rol wat betreft keuze van de SAP?

   7.2. Wat betreft het implementatieproces zelf?

   7.3. Wat betreft de besluitvorming omtrent de implementatie?

8. **Wat voor strategie is er gevolgd bij de implementatie van de betreffende SAP module?**
   (Hier vraag ik naar de gehanteerde implementatiestrategie bij de implementatie van de betreffende SAP module).

   8.1. Wat waren de implementatiefasen?

   8.2. In hoeverre participeerden gebruikers in het implementatieproces?

8.3. Wat voor rol hadden degenen die deel uitmaakten van de implementatieteam?

8.4. Waar (uit de organisatie) kwamen deze mensen vandaan?

9. Ik noem een aantal categorieën op, en u geeft aan of u denkt dat ze het implementatieproces beïnvloed hebben, en zo ja, hoe?

9.1. Change management
(Hoe men is omgegaan met verandering in de organisatie)

9.2. Projectmanagement stijl
(Hoe het project geleid is)

9.3. Leiderschapsstijl

9.4. Kennismanagement
(In hoeverre was kennis beschikbaar voor de betrokkenen, hoe waren de kennisbronnen?)

9.5. People management
(Motivatie en ontwikkeling van personeel, training, teamwork, discipline van de betrokkenen)

9.6. Controle
(Doet iedereen wat zij geacht worden te doen?)

10. In hoeverre was er, wat betreft IT professionals, sprake van:

10.1. Kennisoverdracht tussen de IT professionals

10.2. Participatie aan het besluitvormingsproces

10.3. mogelijkheid om advies te geven over de implementatie

10.4. Goede kwaliteit van de communicatie tussen IT professionals tijdens de implementatie

11. Hoe zat het met de motivatie en de discipline van de IT professionals tijdens de implementatie van de betreffende SAP module?

12. In hoeverre was er, wat betreft de gebruikers, sprake van:

12.1. Participatie aan informatieverschaffing

12.2. Participatie aan het besluitvormingsproces

12.3. Mogelijkheid om advies te geven over de implementatie

12.4. Goede kwaliteit van de communicatie tussen gebruikers en IT professionals tijdens de implementatie

13. Hoe zat het met de motivatie en de werkdiscipline van de gebruikers?

13.1. Vóór de implementatie van SAP

13.2. Tijdens de implementatie van SAP

13.3. Na de implementatie van SAP

14. Toen het besluit werd genomen om SAP te implementeren, was men (gebruikers) enthousiast?

15. In hoeverre hebben de gebruikers zich aangepast na de implementatie van SAP?

16. Vonden er reorganisaties plaats tijdens de implementatie van de SAP
(Deze veranderingen kunnen misschien invloed hebben uitgeoefend op de implementatie van SAP)

16.1. Van fysieke afdelingen

16.2. Van de samenstelling van bepaalde groepen

16.3. Van bepaalde functies

17. Was het voor de gebruikers duidelijk waarom de SAP eigenlijk geïmplementeerd moest worden?
(Uit deze vraag kan wellicht gedestilleerd worden waarom een IT project geaccepteerd wordt of juist niet)

17.1. Was de gebruiker ook tevreden met deze redenen voor implementatie?

18. In hoeverre waren de doelen van het nieuwe informatiesysteem duidelijk?
(Idem, zie boven)

19. Is de betreffende SAP module ingewikkeld om mee te werken?
(Uit deze vraag kan wellicht gedestilleerd worden waarom een informatiesysteem na implementatie geaccepteerd wordt of juist niet)

20. Was de werking van de betreffende SAP module in het begin wel begrijpelijk?
(Idem)

21. Maakt de betreffende SAP module veel dingen mogelijk die daarvoor niet mogelijk waren?
(Idem; dingen wat betreft de taakuitvoering uiteraard)

22. Brengt de betreffende SAP module ook veel beperkingen met zich mee?
(Idem; dingen die niet meer gedaan kunnen worden)

23. Is er een groot verschil tussen wat de IT professionals in het begin voor ogen hadden, en wat er uiteindelijk lag?
(Idem)

24. Is er een groot verschil tussen het beoogd gebruik van de betreffende SAP module, en het feitelijk gebruik ervan?

25. Is de betreffende SAP module prettig om mee te werken?

26. Bestaat tussen de gebruikers consistentie in het gebruik van de betreffende SAP module?

27. Is men tevreden met de trainingen die aan de gebruikers gegeven worden?

28. Is de gebruiker tevreden met de manier waarop de implementatie is verlopen?

29. Is de gebruiker tevreden met de duur van de implementatie?

30. Is de IT professional tevreden met de manier waarop de implementatie is verlopen?

31. Is de IT professional tevreden met de duur van de implementatie?

32. Is de manager tevreden met de manier waarop de implementatie is verlopen?

33. Is de manager tevreden met de duur van de implementatie?

34. Is de gebruiker tevreden met de ondersteuning vanuit de organisatie wanneer er problemen optreden met een SAP module?

- ✓ **Afsluiting**
- ✓ **Dankwoordje**
- ✓ **Vragen of er nog opmerkingen zijn**