



## Towards balanced personalized client care:

*Human Resources Planning and Workforce (Re)scheduling in the Elderly care, Home care, and Maternity care*

		July 2004											
		1	2	3	4	5	6	7	8	9	10	11	12
		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mo
Gannaday, John	C2	D	D			E	E	E	E	E			N
Crockford, Warren	C4	D	Si	Si	Si	Si	Si	Si	D	D			D
Galloway, Andrew	C1	N	N			D	D	D	D	D			E
Kimball, Abraham	C3	E	E			N	N	N	N	N			D
McKenzie, Wayne	C1	N	N			D	D	D	D	D			E
Price, Jack	C4	D	D			D	D	D	V	V	V	V	V
		◀ M ▶ ◀ W ▶ ◀ D ▶ ◀ ▶ W ▶ M ▶											
Day Shift (all)		4	3	0	0	3	3	3	3	3	0	0	3
Evening Shift (all)		2	2	0	0	2	2	2	2	2	0	0	2
Night Shift (all)		2	2	0	0	2	2	2	2	2	0	0	2
1/1/2004 - 12/31/2004 (8 employees)													
Name	Group	Employee Num		Day Shift		Evening Shift		Night Shift					
McKenzie, Wayne	Crew 1	13		87		90		85					
Price, Jack	Crew 4	22		259		0		0					
Range, Dan	Crew 2	17		85		87		90					



# **Towards balanced personalized client care:**

*Human Resources Planning and Workforce (Re)scheduling in the Elderly care, Home care, and Maternity care*

Master thesis

Bo van Westerop  
Student Business Administration – Human Resource Management

Supervisors University of Twente:  
Dr. Ir. J. de Leede  
Prof. Dr. J.C. Looise

University of Twente  
Faculty of Management and Governance – OOHR

Enschede, February 2010

## Management summary

---

### Motive

A general research has been conducted on behalf of the social partners of the Elderly care, Home care, and Maternity care (EHM) organizations (SOVVT: ActiZ, ABVAKABO FNV, FBZ, NU'91, De Unie Zorg en Welzijn) about employment contracts and working hours. To cover the most important aspects of this broad topic, four specific research themes have been formulated, of which each of them forms the topic of a graduate student's master thesis: Human Capacity Management, Work-Life balance, Labour flexibility, and Care concepts. This thesis focuses on the Human Capacity Management theme of the general research. The main research question of this thesis is:

*“How is Human Capacity Management (i.e. Human Resources Planning, Workforce Scheduling, and Rescheduling) currently applied in Elderly care, Home care, and Maternity care (EHM) organizations and how could it be improved with a better balance between employees, operations management, and client care as a result?”*

Based on the theoretical background, five dimensions are formulated which appear to be of importance regarding Human Capacity Management:

- Human Capacity Management term: planning horizon, scheduling period, publication period;
- Human Capacity Management at centralized/decentralized level;
- Workforce schedule characteristics;
- Collective or individual workforce schedules: level of employee influence;
- Application of Workforce Scheduling ICT Tools.

### Research method

Regarding this research, a multiple-case study design is chosen consisting of multiple holistic cases. The cases were selected based on a list of 50 member organizations provided by employer's association ActiZ. The most important selection criteria were:

- *Size of the organization (FTE)*
- *Sector in which the organization operates (Elderly care, Home care, or Maternity care)*
- *The region in which the organization operates (urban or rural)*
- *Innovative behavior regarding at least one of the four research themes*

As a result, 9 organizations were selected to participate as the units of analysis (or 'cases') in the research. Data was collected by guided conversational interviews with different staff members, a distributed theme specific questionnaire to the contact persons and theme specific policy documents. Data was analyzed by use of the cross-case synthesis analytic technique. Based on this analysis, conclusions are drawn both on organizational 'case' level as well as sector level.

### Conclusions

- Little emphasis on Human Resources Planning, which results in difficulties regarding Workforce Scheduling and Rescheduling;
- Workforce Scheduling and Rescheduling often executed decentralized as additional function, large distances experienced by employees if a centralized scheduling department is applied;
- Longer scheduling- and publication periods maintained, certainty appreciated by employees;
- Provided influence to employees over their workforce schedules does not result in cyclic workforce schedules;
- ICT Tools generally underused in almost all organizations.

## Recommendations

- Professionalize Human Capacity Management in the organization:  
*Actual demand information should be registered and used as input for forecasting methods;*  
*Workforce schedules should be created by correct use of ICT Tools;*  
*All stakeholders involved in the Workforce Scheduling process should be offered sufficient knowledge to perform scheduling related tasks in an effective and efficient way.*
- Provide employees more influence on their workforce schedules:  
*Could contribute amongst other things to a better work-life balance, decreased employee absenteeism, and decreased employee turnover;*  
*Could be used as a recruitment instrument, given the shortage of personnel on the labour market;*  
*Could result in easier allocation of large employment contracts.*
- Organizational position of Human Capacity Management: centralized overview should be maintained:  
*Because of this, improvements of the allocation of flexible labour, improved Rescheduling of employees, and healthier workforce schedules (because of improved insights concerning possible violations of the collective labour agreement (CAO) and the labour law) should be accomplished.*
- Cooperation should be achieved among organizations regarding the computerization of Human Capacity Management:  
*Organizations should share their knowledge and experiences and translate them to their individual situation in order to bring their Human Resources Planning, Workforce Scheduling, and Rescheduling to a higher level: professional organization ActiZ could take the lead by bringing member organizations in touch with each other.*

## Motivation

All of the studied organizations must deal with the tight labour market and the increasing demand of work because of the ageing population. However, organizations do possess the capacity to organize their Human Capacity Management in a better way. Organizations and employees should cooperate together: a healthy balance should be found between the interests of both the organization and its employees. To achieve this, appropriate Human Resources Planning and Workforce Scheduling is needed, supported by ICT Tools, which allow employees to influence their workforce schedules within the limits stated by the organization.

## Consequences

- As demonstrated by earlier research, increased influence of employees on their workforce schedules could contribute amongst other things to a better work-life balance, decreased employee absenteeism, and decreased employee turnover. Paying increased attention to individual preferences of employees could also be used as a recruitment instrument. Because of this, EHM organizations must be able to handle the increasing future demand of work.
- If organizations share their knowledge and experiences regarding Human Capacity Management, it must be possible to bring their individual Human Capacity Management to a higher level. In addition, ICT Tools are expected to be better used as a result of knowledge sharing with more effective and efficient Human Resources Planning, Workforce Scheduling, and Rescheduling as a result.

## Preface

---

This master thesis is conducted in order to conclude my master track 'Human Resource Management' of the Master of Science programme Business Administration at the university of Twente. This track was chosen because I always have been interested in the 'human side' of business processes.

An interesting master assignment appeared about achieving a balance between operations management and employee interests regarding employment contracts and working hours in the Elderly care, Home care, and Maternity care (VVT: Verpleging, Verzorging, Thuiszorg en Kraamzorg), commissioned by employer's organization ActiZ. When the request was approved, I decided to join this research together with fellow student Lennart Homan. Due to the magnitude of the research, Kirsten Kupper and Erik-Jan Vlietman joined us not much later. From that moment, the general research could be divided into four specific research themes: Human Capacity Management, Work-Life balance, Labour flexibility, and Care concepts. The results of these theme specific master theses are included in the Final Report:

Plannen en roosteren in de VVT en kraamzorg

- Naar een productieve balans tussen werkgevers en werknemers in arbeidsduur en werktijden –

Dr. Ir. Jan de Leede and Prof. Dr. Jan Kees Looise acted as supervisors during this research and I would like to thank them for their feedback and the ideas they provided me. I also want to thank all the experts interviewed at the different case organizations and especially Drs. Stefan Wasser for his substantial contribution to the feedback sessions at the case-study organizations. Last but not least, I want to thank my family and girlfriend for their support.

Bo van Westerop

Enschede, February 2010

## Table of contents

---

Management summary .....	4
Preface .....	6
Table of contents .....	7
1 Introduction .....	9
1.1 Background of the Research .....	9
1.2 Research topic and connection with other general research themes .....	10
1.3 Background information of the EHM sectors .....	11
1.4 Research goal and central research question .....	13
1.5 Relevance .....	14
1.6 Structure of the report .....	14
2 Theoretical framework .....	15
2.1 Human Capacity Management: three different phases .....	15
2.2 Position of Human Capacity Management towards Human Resource Management .....	20
2.3 Employee influence on workforce scheduling .....	21
2.4 Demand patterns and workforce schedule characteristics .....	24
2.5 Human Capacity Management Outcomes .....	25
2.6 Use of ICT Tools .....	27
2.7 Research context .....	27
3 Research methodology .....	31
3.1 Type of research .....	31
3.2 Data collection .....	31
3.3 Data analysis .....	32
3.4 Operationalization .....	33
4 Results .....	37
4.1 Elderly care .....	37
4.2 Home care .....	46
4.3 Maternity care .....	51
4.4 Tabulation of case study data per research variable .....	54
5 Cross-case analysis .....	61
5.1 Elderly care .....	61
5.2 Home care .....	65
5.3 Maternity care .....	68
5.4 Linking the data to the propositions .....	72
6 Conclusions and recommendations .....	75
6.1 Conclusions .....	75
6.2 Recommendations .....	77
6.3 Discussion and recommendations for further research .....	78
References: .....	80
Appendices: .....	83
Appendix A: AWBZ-process flowchart .....	83
Appendix B: Different forms of scheduling at an individual basis .....	83
Appendix C: Phone call questionnaire .....	84
Appendix D: Questionnaire regarding HR Planning, Workforce Scheduling, and Rescheduling .....	85





# 1 Introduction

## 1.1 Background of the Research

The Dutch population, including the workforce of Elderly care, Home care, and Maternity care (EHM) organizations, is ageing. As a result, demand for care will increase, which is associated with an expected shortage of labour between 2.500 and 5.600 employees in Elderly care organizations in 2013, dependent on the applied scenario. On the contrary, an excess of labour between 1.200 and 100 employees is expected in 2013 regarding Home care organizations, including Maternity care (RegioMarge 2009, in Prismant, 2009). However, personnel shortages are still possible in certain geographical regions.

Because of these expected shortages of labour and the increase in the demand of work, research should be conducted to find solutions that are acceptable for both employees and employers in the EHM organizations. Concerning employment contracts and working hours, the University of Twente is approached by the social partners of the EHM organizations (SOVVT: ActiZ, ABVAKABO FNV, FBZ, NU'91, De Unie Zorg en Welzijn) to execute a research, in which the needs of both operational management and employees are balanced. This research is conducted on behalf of the SOVVT, as stated by the combined collective labour agreement of the EHM organizations (CAO VVT 2008-2010). According to this, the following central research question has been formulated:

*What are the possibilities in the Elderly care, Home care, and Maternity care sectors (EHM: VVT en Kraamzorg) to deal with the balance between operations management and employee interest regarding employment contracts and working hours in a social (innovative) manner, with attractive organizations in the EHM sectors for both current and new employees as a result?*

To answer this question, a general research model was prepared (Figure 1) by which insight and possibilities into the whole sector as represented by employer's association Actiz should be provided. Because of this, the research will distinguish between the different sectors, whenever is necessary:

- a) Elderly care (Intramural V&V)
- b) Home care (Extramural AWBZ)
- c) Maternity care
- d) Combinations of the mentioned forms above (integrated healthcare suppliers).

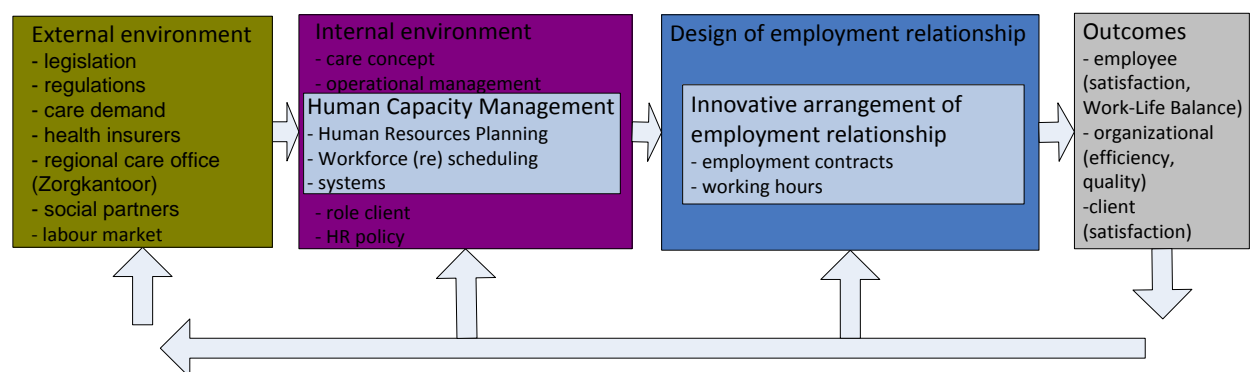


Figure1: General research model

The research model is translated into four specific research themes to cover the most important aspects of the main topic:

- Human Capacity Management
- Work-Life balance
- Labour flexibility
- Care concepts.

This thesis focuses on the Human Capacity Management theme of the general research. The remaining research themes form the topics of three other graduate student's master theses. The results of these four theme-specific master theses will be analyzed and combined into a final report. This report will be distributed to the SOVVT, and will be subject for the next collective labour agreement negotiations.

Parallel to this research, the Dutch institute for labour issues (IVA) conducted a study concerning employee experience in the EHM sectors. Their research is executed by both an online questionnaire for planners, as well as an online questionnaire for employees. In addition, IVA also implements a qualitative case study research at five EHM organizations. Because of the different goals, both researches will complement each other.

## 1.2 Research topic and connection with other general research themes

---

Based on the Human Capacity Management theme of the general research, this thesis concentrates on the fit between required human capacity and available human capacity in the Elderly care, Home care, and Maternity care sectors, given a certain demand of work.

Regarding Human Capacity Management, a further distinction will be made between the organizational level at which human capacity related decisions are made, the period covered by these decisions, and their appropriate level of detail. This will be done by using Human Resources Planning, Workforce Scheduling, and Rescheduling. *Human Resources Planning consists of the preparation, design and implementation of strategic policy regarding the flow of personnel in, through and out of organizations with an effective and functional allocation of labour as a result (Evers & Verhoeven, 1999).*

The actual allocation of labour is done by the process of Workforce Scheduling: the process of constructing work timetables for its staff, so that an organization can satisfy the demand for its goods or services (Ernst et al., 2004). As stated by the authors, the first part of the Workforce Scheduling process determines the number of staff, with particular skills, needed to meet the service demand. This part could be interpreted as being in accordance with Human Resources Planning. However, the second part of their definition complements the first part and will therefore be considered as Workforce Scheduling in this thesis:

*Workforce Scheduling concerns the allocation of individual staff members to shifts to meet the required staffing levels at different times and finally, duties are assigned to individuals for each shift.*

The purpose of Rescheduling is to *adjust the midterm workforce schedule on a shift-by-shift basis, which implies enactment throughout the day a few hours before the start of each work shift (Bard & Purnomo, 2005).*

Human Capacity Management, as stated above, is strongly connected with the other three general research themes. Ultimately, these themes are put into practice by Workforce Scheduling and because of that, Human Capacity Management takes care of the fit between these themes.

Work-Life Balance (WLB) is about people having a measure of control over when, where and how they work (Taylor, in Rose et al. (2007)). This is of direct influence on employment contracts and working hours, and because of that, on both Human Resources Planning (dependent on the availability and willingness of personnel regarding work) and Workforce Scheduling (workforce schedules must be in accordance with the desired WLB of personnel). In addition, workforce schedules are often used to shape specific terms of employment as a result of WLB agreements. On the contrary, workforce schedules could also influence the WLB of employees: working nonstandard shifts (nights, weekends, rotating) was amongst other things

associated with difficulties in scheduling family activities, less time spent in family roles and increasing the level of family-work conflict (Staines & Pleck in Tausig & Fenwick, 2001).

Labour flexibility could be distinguished into five forms: ad hoc flexibility, contract flexibility, working hours flexibility, functional flexibility, and location flexibility (De Leede et al., 2002). By using these forms of flexibility, measures could be taken regarding variety in both the demand of work and the supply of labour, which are the main variables of Human Capacity Management.

Care concepts could be interpreted as (innovative) ways to deliver care to customers and could be represented both by products as well as processes. Slack et al. (2007) make a distinction between professional services (specialized care, low level of standardization), service shops (intermediate), and mass services (high standardization level of care). Because of this, care concepts do influence the number of individualized staff members and the nature of duties that should be executed. As a result, care concepts affect the way by which Human Resources are planned and scheduled.

### 1.3 Background information of the EHM sectors

---

#### 1.3.1 General Law for Special Healthcare (AWBZ)

---

From January 1st, 2009 the general Law for special healthcare (AWBZ) has changed. The AWBZ (public insurance) covers serious health risks, which are not covered by the standard health insurance. The Dutch Government stated that the AWBZ is only available for people with moderate or serious limitations, who accordingly need health support for a long time, often lifelong. The reason for the change is twofold: the finance of the care arising from this law became too expensive (too many clients received AWBZ-financed treatment on an undeserved basis, as gathered by the Dutch Government [1.1]) and clients should have the opportunity to organize their health support by themselves, if they are able to do so. Other reasons for the change of the AWBZ Law regarding clients were to consolidate their position, provide them with more options, and more control related to healthcare.

Before this change, Elderly care organizations collected income based on capacity (number of clients), practically independent of differences in care demands between clients. As a result of the changed law, Elderly care organizations are financed based on clients' specific kind and level of needed care. Because of clients' freedom to choose their own Elderly care provider, Elderly care organizations should change their supply based operations management to an operations management based on clients' demand to attract their clients (and collect their income). As a result, healthcare suppliers compete with each other on the care market regarding the client, the labour market regarding the employees, and the care purchasing market regarding the healthcare insurers.

#### *The AWBZ process*

---

For the implementation of independent client assessment, an official body (Centrum Indicatiestelling Zorg (CIZ)) is established to indicate if a client needs care, which specific kind of care and the level of care (indicatiebesluit). The used standards are imposed by the Ministry of Health, Welfare and Sport (VWS). CIZ could provide healthcare with (intramural care) or without accommodation (extramural care). In both cases clients were granted one or some care functions (zorgfuncties) that contain AWBZ functions and their total quantity expressed in hours (hours or parts of the day per week concerning healthcare without accommodation).

In addition, a period (temporary or permanent) is also defined regarding healthcare without accommodation. Standard values (normbedragen) are linked with these care functions resulting in a client-based indicated budget. Since July 1st, 2007, Zorg Zwaarte Paketten (ZZP's) are provided as client-based budgets in case of requests for healthcare with accommodation in cure and care organizations. These ZZP's are formulated in table 1.

If a client-based indicated budget is allocated by the CIZ, the client requests for these specific care functions in kind at the regional care office (Zorgkantoor). These care offices represent all the health insurers in the specific region, but are affiliated to one (often the largest) health insurer in the region. The care office negotiates about agreements with the healthcare suppliers in a region on behalf of all the health insurers. These negotiations are executed within determined boundaries (contracteerruimte) and the agreements have a one-year duration. The boundaries are determined by the National Health Authority (NZa) on a national basis and allocated to the regional care offices (32 in total). A client is entitled to request for healthcare from a healthcare supplier located in a region other than the region of his/her domicile. The only requirement implies that the regional care office must have set up an agreement with the healthcare supplier preferred by the client. For both healthcare, with or without accommodation, a preferred healthcare provider could be suggested by the CIZ. Predominantly, the request will be granted and the healthcare will be provided by the specific healthcare supplier. The complete AWBZ process is summarized in a flowchart [Appendix A].

<b>Zorgzwaartepaketten (ZZP's) in cure and care organizations</b>
Package 1: Sheltered housing with some guidance
Package 2: Sheltered housing with guidance and care
Package 3: Sheltered housing with guidance and intensive care
Package 4: Sheltered housing with dementia care
Package 5: Protected housing with intensive dementia care
Package 6: Protected housing with intensive care and cure
Package 7: Protected housing with very intensive care with emphasis on accompaniment
Package 8: Protected housing with very intensive care with emphasis on care/cure
Package 9: Stay with recovery-oriented care and cure
Package 10: Protected stay with intensive palliative-terminal care

*Table 1: ZZP's in Elderly care organizations (intramurale zorg) [1.2].*

### *Home care*

Concerning healthcare without accommodation, the contract obligation of the regional care office (contracteerplicht) has been removed from the AWBZ since August 31, 2004. As a result, the regional care offices created a jointly formulated contract policy: providers of healthcare without accommodation are rated both on exclusion criteria, as well as evaluation criteria since 2006. Generally, regional care offices use public tender procedures to purchase this specific kind of healthcare. Regarding these tender procedures, appointments are made about quality and price of healthcare, which are supervised by the concerned regional care office. The resulting contracts between regional care offices and suppliers of healthcare without accommodation could be valid for one to several years and these suppliers are only allowed to charge the time they directly spend at a client's home. Because of this, the client-based indicated budget of the CIZ is expressed in a hourly rate.

### *Maternity care*

In addition to the AWBZ financed healthcare, Maternity care, midwifery by midwives, and the usual assistance by general practitioners (partusassistentie) are compensated by the standard package of essential healthcare of the basic health insurance (Basisverzekering). The basic health insurance is obligatory for all citizens of the Netherlands.

In September 2005, a national indication protocol for Maternity care was prepared (landelijk indicatieprotocol kraamzorg, LIP). This protocol provides the basis for the cooperation between Maternity care agencies, midwives, and healthcare insurers and contains a scheme with respect to the content of the usual birth assistance by general practitioners (partusassistentie). As stated by the LIP, the independent client assessment is implemented at two moments in time: during the pregnancy (first assessment) and in case of changes during

the childbed (the second or further assessment). A pregnant client could directly enroll at a specific Maternity care supplier or could submit a request for (a specific) Maternity care at their healthcare insurer. In the latter case, the healthcare insurer allocates the request to a related Maternity care supplier. This could be done by using an auction instrument, by which Maternity care suppliers can bid discounts on the statutory maximum rates for Maternity care, as stated by the NZa based on the Healthcare Development Act (Wet Marktontwikkeling Gezondheidszorg, WMG). In both cases, a client's request for a specific Maternity care supplier will be accepted in most cases.

Generally, the first assessment is implemented by a care adviser of a Maternity care agency in the seventh or eighth month of the pregnancy. Based on this assessment a number of Maternity care hours will be allocated to the client: 49 hours in the first 8 days after the delivery provided as a basis or 24 hours within this period as a minimum, as stated by the LIP. Concerning these hours, the hours used for usual birth assistance by general practitioners (partusassistentie) are not included. Additionally, a client could differ from the standard number of Maternity care hours as stated in the LIP by purchasing extra hours from the Maternity care provider or by demanding Maternity care different from the usual Maternity care working hours. These optional requests should be funded privately and will not be financed by insurance companies.

The second assessment is implemented directly after the delivery by a midwife or an independent operating physician, and a third assessment is implemented during the third day after the delivery. Based on this assessment, the initial number of Maternity care hours could be changed.

As stated above, Maternity care agencies are financed based on the charged number of standard Maternity care hours to the healthcare insurer and based on the extra hours they provide. In addition to this, the first assessment during the pregnancy and an enrolment fee are directly charged to the client and a connection fee for birth assistance by general practitioners and the actual hours spent regarding this task are also charged to the healthcare insurer.

#### 1.4 Research goal and central research question

---

The purpose of this research is to obtain insights in the design of Human Capacity Management in EHM organizations: insights in the fit between required human capacity and available human capacity given a certain demand of work. By concentrating on Human Resources Planning, Workforce Scheduling, and Rescheduling in EHM organizations, specific information about the current application by the organizations and in the different sectors should be obtained, as well as their effects. In addition to this, comparisons between the three sectors can be made. Subsequently, recommendations for change will be given based on a study of relevant literature and comparisons between the different sectors and organizations in these sectors.

To guide this research, a central research question has been formulated. Based on this research question, a theoretical framework will be developed as well as the research context of this thesis.

*How is Human Capacity Management (i.e. Human Resources Planning, Workforce Scheduling, and Rescheduling) currently applied in Elderly care, Home care, and Maternity care (EHM) organizations and how could it be improved with a better balance between employees, operations management, and client care as a result?*

## 1.5 Relevance

---

In the Netherlands, the National Institute for Public Health and the Environment (rivm) observes an increase regarding the life expectation of citizens (rivm, in Prismant, 2008). The number of citizens aged 70 and above will double between now and 2050. In addition to this, according to the Netherlands Bureau for Economic Policy Analysis (CPB, in Prismant, 2008) the increase of the working population (age 15-64) will be small until 2011 and decreasing in 2011. As a result of this ageing population, the demand for collective financed Elderly care is expected to increase with 29% between 2005 and 2030 (The Netherlands Institute for Social Research (SCP), in Prismant, 2008).

Regarding the different sectors in this research, both the increase in demand for care by the ageing population, the decrease of the working population because of the decrease of birth rates, and a decrease of the outflow of healthcare education programs result in a shortage of labour between 2.500 and 5.600 employees in Elderly care organizations in 2013, dependent on the applied scenario. An excess of labour between 1.200 and 100 employees is expected in 2013 regarding Home care organizations, including Maternity care (RegioMarge 2009, in Prismant, 2009). However, a clear subdivision of both sections has not been made. These expectations are formulated after the economic downturn started in 2008 and are, also due to expected governmental economy measures, lower compared to expectations published in 2008 regarding 2012: a shortage between 7.300 and 10.900 Elderly care employees, 0 and 4.700 Home care employees, and expected shortages of Maternity care employees (RegioMarge 2008, in Prismant, 2008). Regarding Maternity care employees, personnel shortages are expected because of a decreased outflow of Maternity care education programs, a higher personnel outflow compared to inflow in 2007, and the existence of a large number of vacant positions. In addition to this, the high personnel outflow because of the age distribution of the occupational group and a possible extension of the number of Maternity care hours will also attribute to a further unbalance between the demand for and supply of Maternity care (Wiegers, in Prismant, 2008). However, the introduction of an abridged Maternity care education program resulted in an inflow of 900 Maternity care nurses into the Maternity care sector in 2009 (Prismant, 2009).

Due to this expected shortage of appropriate staff in the near future, the expected growth of collective financed Elderly care, and because of the introduced market mechanism as stated earlier, efficient and effective planning and scheduling of the organizational workforce is required to survive. Also, distinctive and interesting planning and scheduling policies could contribute to the recruitment of new employees. From a scientific point of view, a lot of research has been conducted regarding planning and scheduling in the health sector, in particular in hospital departments. Regarding this thesis, research has been conducted at different non-hospital organizations in the health sector and will therefore contribute to the knowledge of planning and scheduling in the Elderly care, Home care, and Maternity care sectors and possible mutual differences.

## 1.6 Structure of the report

---

In the first part of this thesis the results of the literature review can be found. Section 1 provides the background, central research question, and research model of the broad research on employment contracts and labour hours in the EHM sectors. Regarding this theme specific research on Human Capacity Management, the research goal and relevance are given as well as the central research question to guide this research. Section 2 provides a theoretical framework on Human Capacity Management, which leads to the research context and specific sub questions to answer the central research question. Section 3 contains the research approach and elaborates on the data collection method, data analysis method, and data operationalization.

The results of this study can be found in the second part of this thesis. A general description of the studied EHM organizations is included in section 4, as well as the results found based on the collected case study information. Section 5 contains the data analysis and section 6, finally, includes the conclusions, recommendations, discussion, and recommendations for further research.

## 2 Theoretical framework

---

*This section provides an overview of scientific literature about Human Capacity Management by focusing on Human Resources Planning, Workforce Scheduling, and Rescheduling. This focus is clarified by four dimensions, based on the literature. We also pay attention to supposed external and internal (organizational) environmental factors of influence, as well as the supposed outcomes of Human Capacity Management. These presumptions are formulated as propositions at the end of this section. As a result, both the research context and the research questions for this thesis will be presented.*

### 2.1 Human Capacity Management: three different phases

---

For over 40 years, employee scheduling has been addressed by personnel managers, operations researchers, and computer scientists (Burke et al., 2004). A lot of research has been conducted, especially regarding nurse rostering: the scheduling of hospital personnel with different staffing needs on different days and shifts. Together with the ‘work around the clock’ characteristic of healthcare institutions, nurse rostering is considered as a very complex task. Because this research on Human Capacity Management is conducted in the Elderly care, Home care, and Maternity care (EHM) sectors, parallels with nurse rostering are assumed to exist: different staffing needs on different days, continuous occupation and work organized in shifts are also common in this sector. Because of this, many research on nurse rostering has been used: hospital wards should therefore be interpreted as departments in Elderly care organizations, ward managers as team managers, and nurses as personnel in the EHM sectors.

Rönnerberg & Larsson (2009) state that the process of ensuring that there are enough nurses present at all times can naturally be divided in three planning phases: long term planning, mid term planning, and short term planning. This subdivision agrees with the distinction in three major areas of manpower decision research: staffing, scheduling, and reallocation of nurses (Wagner, in Burke et al., 2004). By describing the phases as stated by Rönnerberg & Larsson below, a clear enlightenment of Human Capacity Management will be given.

#### 2.1.1 Long term planning

---

According to Rönnerberg & Larsson (2009), the *long term planning* is part of the overall strategic planning of the ward: ward managers must estimate how many nurses with each of the necessary skills are needed during all possible time periods of the day to meet the demand of labour. Given this estimation, managers can determine how the days shall be divided into work shifts and the staffing demands for each of these shifts. This planning phase is considered to be equal to Human Resources Planning, as defined by Evers & Verhoeven (1999), and will be seen as the determination of the personnel formation in this thesis. Human Resources Planning is often made for a planning horizon of one fiscal year (Venkataraman & Brusco, 1996), defined by Evers & Verhoeven as operational planning. According to the authors, a planning horizon of 1 to 5 years is considered as the tactical planning and 5 years and beyond as the strategic planning. According to them, many Human Resources Planning applications are tactical and/or strategic by nature because of their long-acting effects. Human Resources Planning is produced for the first time when a new department (or ward) is opened and is, besides the regular update, also updated when major changes occur (Rönnerberg & Larsson, 2009).



### *Determining the personnel formation*

---

Capacity requirements, such as the size and the kind of labor to make available, are identified on the basis of forecasts of future demand (Reid & Sanders, 2005). Long-range forecasting is important to determining the capacity, tooling, and personnel requirements (Hopp & Spearman, 2000). Regarding service organizations, these forecasts need to be very specific because their intangible products cannot be produced ahead of time: clients are present during the creation of the service. According to Reid and Sanders, there are many types of forecasting models, which differ in their degree of complexity, the amount of data they use, and the way they generate the forecast. They classify forecasting methods into two groups: qualitative and quantitative. By using qualitative forecasting methods, the forecast is made subjectively by the forecaster and latest changes in the environment and “inside information” could be included, whereas quantitative forecasting methods are based on mathematical modeling by which a forecaster looks for patterns in the data and tries to obtain a forecast by projecting that pattern into the future. Both models have their individual strengths and weaknesses.

When demand of care is forecasted, the size of the workforce and their needed qualities should be determined, which is often done by using nurse-to-patient ratios. These ratios imply acceptable levels of patient care and nurse workload (Foffman et al. in Wright et al., 2006). By use of nurse-to-patient ratios several factors such as patient characteristics, required continuity and intensity of care, nurse availability, care coordination, and organizational support are taken into account (Ghosh & Cruz, 2005). Hopp & Spearman write about *standard hours of labour*, which are directly based on forecasted demand. According to the authors, the following issues should be involved to achieve a complete representation of workforce planning:

- Worker availability
- Workforce stability
- Employee training
- Short term flexibility
- Long-term agility
- Quality improvement

However, properly dimensioned staffing is no guarantee for good care but should nevertheless be considered one of the basic preconditions for good care of the patients (Fagerström and Bergbom Engberg, 1998). According to them, the staff’s level of knowledge, questions of caring ideology and the nurses’ attitudes to their patients are of decisive importance regarding how patients will benefit from staff resources. In addition to this, a caring culture that sees man in his whole complexity is probably still more important for the results of the care, as stated by the authors.

### *Creation of work shifts*

---

According to Rönnberg & Larsson (2009), both the determination how days shall be divided into work shifts and the determination of the staffing demand for each shift are part of the long term planning. Besides the demand, work shifts must also meet different rules and regulations (e.g. the presence of certain qualified nurses to fulfill specific actions). Shift work is considered as a common phenomenon in the round the clock operating hospitals and because of that no attention will be given to the decision *if* shift work should be applied. Shifts could be interpreted as hospital duties, which usually have a well-defined start and end time (Burke et al., 2004). Many nurse rostering problems are concerned with the three traditional shifts per day (or slight variants thereof): early (e.g. 7:00 – 15:00), late (15:00 -22:00), and night (22:00 – 7:00) (Burke et al., 2004; Moz & Vaz Pato, 2004). However, other shift configurations (e.g. 2 shifts of 12 hours a day) are also possible. Regarding the duration of shifts, Fitzpatrick et al. (1999) state that longer (12,5 hour) shifts are associated with less effective performance than shorter shifts and enhancement by effective management of nurses’ shift work is required concerning the well-being and effectiveness of the nursing workforce.



### 2.1.2 Mid term planning

---

Subsequently, *mid term planning* concentrates on the assignment of nurses to specific schedules specifying which shifts he/she should work within a chosen scheduling period (Rönnerberg & Larsson, 2009). Because of the involvement of individuals in this stage of Human Capacity Management, the process becomes more personal and specific. We consider workforce schedules to represent a composition of work shifts within a certain scheduling period and therefore Workforce Scheduling (as defined by Ernst et al., 2004) is considered to be similar to the mid term planning phase of Human Capacity Management. In addition to Rönnerberg & Larsson, the assignment of duties to individuals for each shift is also part of this planning phase (Ernst et al., 2004). Workforce Schedules could be draught for different scheduling periods, such as 1 to 4 weeks (Venkataraman & Brusco, 1996), 4 weeks (Burke et al., 2004), up to 6 weeks (Bard & Purnomo, 2005), 4 to 6 weeks (Silvestro & Silvestro, 2000), 2 to 8 weeks (Maier-Rothe & Wolfe, 1973) or 4 to 8 weeks (Rönnerberg & Larsson, 2009). According to the NCSI (2009), a shorter planning horizon is chosen as demand becomes more unpredictable, which results in workforce schedule related decisions that have to be made by employees on the short term. In addition, longer planning horizons could also be dissatisfying when employees can not denote their workforce scheduling related wishes a long time in advance: an appropriate balance between certainty and flexibility should be found.

#### *Workforce scheduling constraints*

---

After the days are divided into work shifts and the number of nurses and their necessary skills in these shifts are determined, individual staff members should be allocated to these shifts. Regarding this allocation process, both organizational and individual constraints (or scheduling rules) should be taken into account. Organizational constraints consist mainly of prevailing laws and regulations regarding staff scheduling (Rönnerberg & Larsson, 2009). The prohibition of a night shift followed by an early shift (L-E) in an individual's workforce schedule is an often used example. Constraints regarding individuals are about both their different skills and individual contracts (stating which shifts they can work and for how many hours per week they should work), as well as the fulfillment of some quality aspects regarding the acceptability of the schedule to nurses such as an even distribution of unpopular shifts (Rönnerberg & Larsson, 2009). Besides this, additional agreements made with individual staff members regarding work-related personal preferences should be considered. These arrangements could have been translated by hard- and soft constraints into the workforce scheduling process: hard constraints are those that must be satisfied at all costs while soft constraints are those that are desirable but which may need to be violated in order to generate a workable solution (Burke et al., 2004).

#### *Workforce schedule creation*

---

When all the constraints are indicated and the scheduling period is determined, the actual workforce schedule can be created. Rönnerberg & Larsson (2009) distinguish between two scheduling patterns as main approaches; the schedule can either be non-cyclic (unique) for each scheduling period or cyclic: the same schedule is used repeatedly, period after period. Regarding cyclic workforce schedules, Venkataraman & Brusco (1996) determine a rotating pattern for subsequent planning horizons and the absence of such a pattern regarding non-cyclic scheduling approaches. Ernst et al. (2004) add to the definition of cyclic rosters given above that in a cyclic roster, all employees of the same class perform exactly the same line of work, but with different starting times for the first shift or duty: this roster type is most applicable for situations with repeating demand patterns. Such a schedule, in which each worker would have completed each pattern exactly once at the end of the scheduling horizon, will tend to be perceived by all workers as unbiased (Millar & Kiragu, 1998). In addition to this, the authors state that cyclic schedules could be drawn much easier compared with non-cyclic schedules but their rigidity and inability to adapt to changes in scheduling demands could be considered as their main disadvantage. Regarding non-cyclic rosters (or acyclic rosters), Millar & Kiragu state that the lines of work in

these rosters are completely independent: this situation applies in cases where demand fluctuates with time and where shifts have different lengths and starting times. Non-cyclic rosters could also better cope with fluctuating supply of labour, such as sudden illness, emergency leave, or vacation on the part of one or more workers, which may cause major problems with the schedule. By using non-cyclic schedules the workforce is scheduled frequently and could therefore better cope with such influences (Millar & Kiragu, 1998).

As stated earlier, we consider workforce schedules to represent a composition of work shifts within a certain scheduling period. According to Ernst et al. (2004), workforce schedules exist of sequences of stints, where a stint is defined as a sequence of shifts: DDD used to refer to a stint with three consecutive day shifts and DND to a stint starting with a day shift followed by a night shift and finishing with another day shift. As a result, a workforce schedule consists of a sequence of stints spanning the scheduling period. According to the authors, stint based rostering is typical in nurse scheduling. Just as Workforce Scheduling patterns, stints could behave according to a rotating shift schedule (e.g. working day and night shifts on an irregular basis) or a fixed shift schedule (e.g. permanent nights) (Fitzpatrick et al., 1999).

### *Centralized and Decentralized Workforce Scheduling*

---

Workforce schedules could be draught both at centralized or decentralized levels in an organization. According to Daft (2005) centralization means that decision authority is located near the top of an organization, which is pushed downward to lower organizational levels regarding decentralization. Hayes et al. (2005) state that most companies operate in between these two extremes. A highly centralized approach can result both in standardization, which may improve communication and coordination across the network and in adoption of common ethical standards and business practices (Hayes et al., 2005). Efficiencies of scale could be obtained by using a centralized workforce scheduling department, as well as the development of certain expertise, but these departments need sufficient detailed working knowledge to be functional (Johnson et al., 2008). Regarding decentralization of the workforce scheduling process; workforce schedulers are able to adapt more easily and effectively to local operating conditions and constraints (Hayes et al., 2005). According to the authors, experimentation is also facilitated by decentralized processes, which can lead to superior performance. We assume Workforce Scheduling to be entirely centralized when both the creation, verification and closing of these activities are executed as the core duty of the responsible employee(s) and are executed at an higher organizational level than the level for which the workforce schedule is meant.

Silvestro & Silvestro (2000) define three rostering types on a continuum of high through to low empowerment of the individual employees: Self-rostering, Team rostering and Departmental rostering. Based on findings of Betts (in Silvestro & Silvestro, 2000), the authors state that the lack of consultation with staff is characteristic of departmental rostering: staff are allocated hours of duty, days off and even night duty according only to the needs of the hospital. The allocation is conducted by a single person. According to them, Departmental rostering could be interpreted as autocratic and therefore empowerment of individual staff, staff motivation, and roster effectiveness will be low as a result. We consider Departmental rostering, as mentioned by Silvestro & Silvestro, as a fully centralized approach which results in employer focused collective workforce schedules. Team rostering also involves one person assuming rostering responsibility for his/her team, but because fewer staff members are rostered simultaneously, the authors expect more consultation by the person planning the roster and more apparent consideration of staff requirements, resulting in a reduction of perceived autocracy. Because of this, Team rostering is placed mid-way on the continuum and we consider this approach to be both employer and employee focused: employees are given a predetermined amount of influence on the workforce schedule (for example by 'hard' and 'soft' constraints). Finally, by using Self-rostering the roster is prepared by the ward staff individually and therefore considered as the form with the lowest perceived autocracy and highest empowerment, staff motivation, and roster effectiveness. We consider Self-rostering, as stated by Silvestro & Silvestro, to be a fully decentralized approach with employee focused individual workforce schedules as a result.

According to their findings, one approach was not being shown to be 'better' than another: their research proposed that ward size and rostering system complexity are contingent factors regarding the choice of a rostering system. When ward size is over 70 and rostering problem complexity is high: departmental rostering should be applied, ward size between 35-70 and medium rostering problem complexity prefers the implementation of team rostering (departmental rostering also possible, but unpopular with staff), and ward size less than 35 and low rostering problem complexity are suitable terms for the implementation of self-rostering, as stated earlier.

On the contrary, the authors report that the time it takes to produce a roster is greatly reduced by implementation of departmental rostering, because one single person who makes the roster exercises control over the rostering process. This benefits the continuity of care. Involved managers in a department that applied departmental rostering, reported creation of more balanced rosters in less time. According to them, the reduced period of uncertainty associated with each new roster resulted in a more settled work environment (Silvestro & Silvestro, 2000). Because of the involvement of a single person by the creation of the rosters, the authors state that the quality of rostering is directly related to the management and planning skills of this person. In addition to this, the roster planner is situated between two parties: decisions which fail to take into account nurse requests for off-duty can make the planner notoriously unpopular with staff and at the same time, the need to run the ward cost effectively brings the roster planner under the scrutiny of senior managers.

### 2.1.3 Short term planning

---

The last planning phase, *short term planning*, is used whenever there is a shortage of nurses for a shift and consists of deciding whether to use overtime, to call in a nurse on her day off, to call in a substitute nurse (which could be both outside resources and pool nurses (Bard & Purnomo, 2005)), or to try to manage despite some shortage (Rönnerberg & Larsson, 2009; Bard & Purnomo, 2005). In hospitals the purpose of Rescheduling is to adjust the midterm schedule on a shift-by-shift basis, which implies enactment throughout the day a few hours before the start of each work shift (Bard & Purnomo, 2005). In line with our consideration of Human Resources Planning in the long term planning phase and Workforce Scheduling in the mid term planning phase, we will consider this short term planning phase as Rescheduling.

As stated above, calling in a substitute nurse is one of the measures that could be taken by Rescheduling. A substitute nurse could be assigned from a float pool, stated by Maier-Rothe & Wolfe (1973), as the only way to provide extra coverage without permanent overstaffing. In addition to this, also outside resources could be used as stated by Bard & Purnomo (2005). According to Maier-Rothe & Wolfe, individuals may be temporarily shifted from their usual workplace to another when peaks of patient care requirements do occur, which cannot be covered by use of the float pool.

Shortages of nurses for a shift may arise from daily fluctuations in the patient population and associated demand for nursing services, absenteeism (sick leave and personal days), and emergencies (Bard & Purnomo, 2005). Also, surpluses of nurses could exist when demand of labour drops (Bard & Purnomo, 2005). In such a situation, the current roster must be rebuilt into a new roster, which should in turn be as close as possible to the current one. By this approach, conflicts with family and/or social arrangements that nurses have already made should be minimized (Moz & Vaz Pato, 2004). This is analogous to Bard & Purnomo (2005), who state that the main goal of rescheduling is to reallocate the available resources in a way that minimizes the cost of the disruption.

Concerning personnel scheduling, Rescheduling in particular, there are several roles and responsibilities. In a hospital unit, this activity is often carried out by the nurse manager, clinical manager or nurse in charge (Bard & Purnomo, 2005). They state that in case of overstaffing in a particular shift, the relevant employee could request a reassignment to another unit. If the specific nurse is not willing to float and is not contractually obligated to do so, the nurse's shift is cancelled. According to them, nurses would generally rather be cancelled

than floated to another hospital unit although individual preferences may be overridden when the need is critical. When cancellation does occur; vacation, personal day, holiday, or unpaid leave could be used to compensate for the unpaid leave, each with different cost consequences.

## 2.2 Position of Human Capacity Management towards Human Resource Management

---

For a broader understanding of Human Capacity Management, information about its context must be obtained and the coherence with factors in this context. To achieve this, the position of Human Capacity Management towards Human Resource Management will be sought.

According to Beer et al. (1984), Human Resource Management involves all management decisions and actions that affect the nature of the relationship between the organization and employees – its human resources. As seen from this perspective, Human Capacity Management is supposed to fulfil an important role in Human Resources Management because it gives specific substance to the employment contracts of employees: their formal agreement with the organization.

As stated earlier, the first phase in Human Capacity Management is considered as Human Resources Planning: the preparation, design and implementation of strategic policy regarding the flow of personnel in, through, and out of organizations with an effective and functional allocation of labour as a result (Evers & Verhoeven, 1999). Given this definition, Human Resources Planning could be considered analogous with Human Resource Flow, one of the four major HRM policy areas as stated by Beer et al. (1984): Human Resource Flow has to do with the responsibility shared by all managers in an organization for managing the flow of people (at all levels) into, through, and out of the organization. According to Beer et al., an organization maintains an adequate number and types of employees by using a *flow planning process*. In this process the demand of labour and the organizational supply of labour are forecasted based on a prognosis of certain rates of turnover, transfers and promotions. Subsequently, recruiting, employee development, and/or outplacement need to be programmed to deal with anticipated shortages and surpluses. As a last step, the effectiveness of the used flow planning process needs to be evaluated and revised when necessary.

In *figure 2* the determinants and consequences of HRM policies are given by the HRM territory, Human Resource Flow being one of them. According to Beer et al. (1984) the *HRM policies* are influenced by both *situational factors* (forces that exist in the environment or inside the firm) and *stakeholder interests*. The relationship between situational factors and HRM policies could be seen as a mutual exchange: situational factors can act as constraints on the formation of HRM policies, but these factors could in turn also be influenced by these policies. Immediate *Human Resource outcomes* and resulting *long-term consequences* are also included in the HRM territory. As stated by the authors, striving to enhance the HR outcomes will lead to favourable long-term consequences. Finally, the long-term consequences do influence stakeholder interests and situational factors.

In addition to the central research question formulated in section 1.4, the map of the HRM Territory will be used to further guide this research by means of further developing and structure the theoretical framework by concentrating on the context of Human Capacity Management. As stated earlier, this should result in the contextual model for this research. Concerning *HRM policy choices*, Human resource flow is discussed in section 2.1 and section 2.3 will discuss *Employee influence* with relation to Human resource flow. The *Situational factors* of the HRM Territory will be represented by the introduction section of this thesis regarding Laws and the Labor market and in section 2.4 concerning workforce schedule characteristics. *Stakeholder interests* are also represented in section 2.4 by the demand of work. Demand of work is not included in the HRM Territory, but considered to be one of the *stakeholder interests* because a stakeholder is any group in or outside an organization that has a stake in the organization's performance (Daft, 2001). Because of this, clients of healthcare organizations are considered as stakeholders with a certain demand for care. Finally, Human

Capacity Management outcomes will be discussed in section 2.5 and are related to the *HR outcomes* of both *Human resource flow* and *Employee influence*.

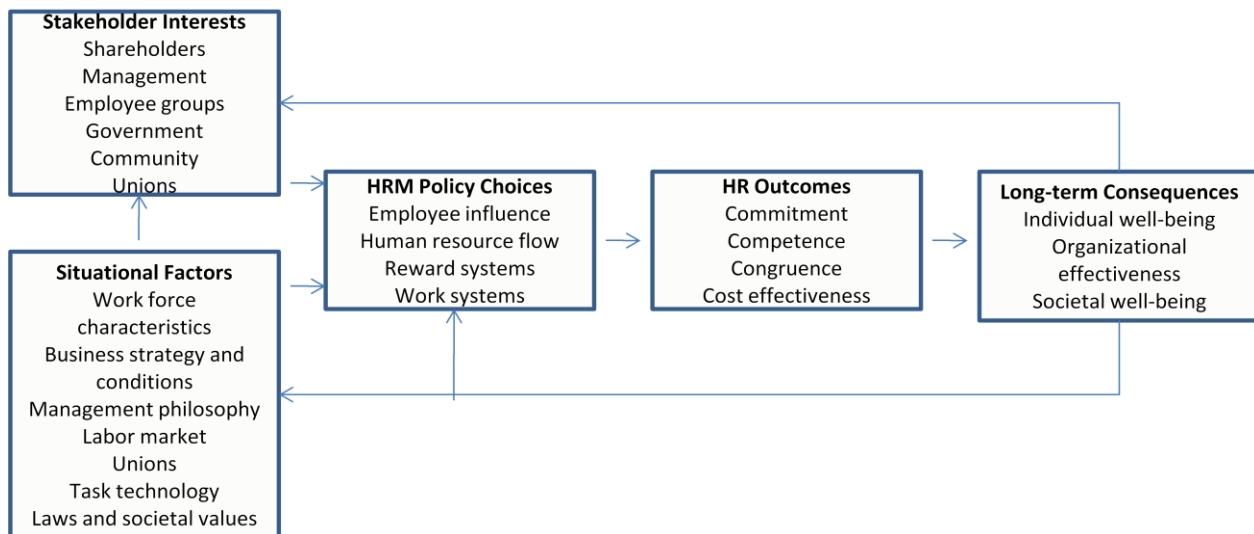


Figure 2: Map of the HRM Territory (Beer et al., 1984).

### 2.3 Employee influence on workforce scheduling

Employees could be given some level of influence on their workforce schedules and therefore on their working hours. One of the reasons why influence is provided to employees are the personnel shortages in the healthcare sector. Many hospitals have adopted scheduling policies that give increased weight to the preferences and requests of their nursing staff, often at a considerable cost (Bard & Purnomo, 2005). The authors argue that because of this a more attractive work environment and increased flexibility to deal with personal matters is expected with higher retention rates and lower overall costs as a result. Multiple appellations are used to indicate this influence, such as flexible work schedules (Pierce & Newstrom, 1983), employee driven work schedules (Kerin & Aguirre, 2004), worktime control (Ala-Mursala et al., 2002), flexible scheduling (Dalton & Mesch, 1990, Drouin & Potter, 2005), self-rostering (Silvestro & Silvestro, 2000), and preference scheduling (Rönnberg & Larsson, 2009).

#### Different levels of employee influence on workforce scheduling

In this thesis, we will use *flexible scheduling* to indicate the presence of some level of employee influence over their workforce schedules. Different levels of employee influence are defined by a paper of the NCSI (2009) about individual scheduling, which is defined as the level of control of (individual) employees on their working hours. The authors visualize individual scheduling by use of two dimensions [Appendix B]: the level of control of the individual employee, and the level of diversity in working hours (solutions). According to these dimensions, six different types of employee influence on working hours have been created by the authors, which are in an increasing order of both diversity in working hours and level of control of employees: Mutual exchange; Repetitive schedule; Preference schedule; Shift picking; Matching; and Self-scheduling. The authors state that these types of employee influence can be combined to form other types. These variances can be combined with other work concepts like self-planning (dividing the *content* of the work instead of the working hours or shifts) or an annual hours system (provides the number of hours that must be accomplished within a certain period). The six different types of employee influence on working hours are discussed below.

### Mutual exchange

Mutual exchange concerns the interchange of shifts between employees when the schedule is published. Concerning cyclic workforce schedules, the exchange process could be executed during the whole lifespan of the workforce schedule. In non-cyclic (unique) workforce schedules, the exchange of schedules often takes place immediately after the new schedule is published. Because of the mutual exchange of schedules, employees try to find a better balance between personal activities and work (NCSI, 2009).

### Repetitive schedule

A repetitive schedule comprises cyclic workforce schedules, but based on an individual level. This pattern includes a certain scheduling period after which the schedule repeats itself. Because of this, structural requirements of staff could be included in the roster. This process continues until another individual workforce schedule will be created. Regarding incidental requirements of an individual employee, mutual exchange could be used or another type of scheduling should be chosen (NCSI, 2009).

### Preference schedule

In a preference schedule, the person responsible for the schedules takes the individual preferences of staff into account as much as possible. Included in this, the individual could be allocated to a shift that fits best with the individual preferences (e.g. early morning shifts or late shifts). Generally, preference schedules have a finite scheduling period. Because of this, changes in individual requirements could be brought in when a new scheduling period arises (NCSI, 2009).

### Shift picking

Shift picking contains a set of work shifts of which employees have to choose, provided by the employer. If employees meet the prepared shift requirements, they are allowed to subscribe for a specific shift. The scheduling system or the person responsible for the schedule divides the available shifts among the subscribers. As a result, work schedules for each individual arise. Again, a certain scheduling period is applied which gives the opportunity to staff to modify their requirements each scheduling period (NCSI, 2009).

### Matching

Matching has similarities with shift picking. As a difference, the work shifts are not defined but staff requirements are published by the employer for every moment of a day within the planning horizon. In this case, staffing requirements regarding working hours are subscribed by staff and the scheduling system or the person responsible for the schedule tries to 'match' the staff subscriptions with the staffing requirements (NCSI, 2009).

### Self-rostering

Self-rostering means the determination of schedules by a team, department or individual staff within specified minimum and maximum staffing requirements and other constraints compiled by the employer.<sup>1</sup> Within every scheduling period, the schedules are created totally by agreements between employees and mostly supported by some form of ICT. Because this process is executed for a finite scheduling period, changing preferences and desires of employees could always be taken into account (NCSI, 2009).

<sup>1</sup> This difference indicates the extent at which self-rostering is applied and must therefore not be confused with the difference stated by Silvestro & Silvestro (2000), which refers to the organizational level at which rostering is applied.



### Further elaboration on self-rostering

---

Because of the shortage of nurses in many countries, the improvement of their working conditions is considered to be urgent regarding increasing the popularity of the profession. The introduction of better scheduling processes, especially with regards to flexibility and adaptation to personal requests, is considered as one possible manner to achieve this. As a result, nurses' influence on the scheduling has been increased, for example by a kind of self-scheduling which is common in the healthcare of Sweden (Rönnerberg & Larsson, 2009). According to the authors, the key characteristics of this process are:

- All nurses individually and independently propose their own schedules consistent with the scheduling rules, 6 to 8 weeks before the upcoming scheduling period begins.
- The independent schedules are compiled and compared with the staffing demand: shortages and excesses in shifts are identified.
- Nurses should trade shifts on their own initiative, in order to fulfill the staffing demand (typically made through informal negotiations during the coffee breaks).
- When the process of informal trading negotiations stagnates, the responsibility of making adjustments is handed over to a scheduling group consisting of nurses at the ward. These adjustments comprise the identification and correction of all violated significant scheduling rules and trying to eliminate the remaining staffing shortages and excesses.
- This should result in a usable schedule, which is presented to the head nurse who is ultimately responsible for the schedule. Violations of the scheduling rules and staffing shortages can be permitted by the head nurse to some extent, but should correct the unacceptable violations. The process ends with the head nurse approving the schedule.

This self-scheduling process as stated by Rönnerberg & Larsson could be compared with self-rostering at departmental level as stated by the NCSI (2009), because the self-scheduling process is executed in a hospital ward. It could also be compared with self-rostering as stated by Silvestro & Silvestro (2000), who define that the roster is prepared by the ward staff and a more senior manager will usually authorize the final roster.

Regarding the implementation of self-rostering, Hung (1992) refers to a suggested work out period of at least five months for hospital settings. According to him, it may take a while for employees (who are accustomed to receiving instructions) to adjust to the new environment in which they are given the freedom to choose. As stated by Bailyn et al. (2007), everyone must keep both sides (both the individual employee and the need of the unit) in mind continuously to succeed with self-scheduling: it is about bringing together the needs of the individual nurses with the needs of the unit to the benefit of both. Teahan (1998) concludes that self-rostering should not be imposed on an environment unless improvement is needed or a scheduling problem exists. According to the author, this should not be considered as a panacea.

Ward size and rostering system complexity form a big limitation on the implementation of self-rostering (Drouin & Potter, 2005). According to Silvestro & Silvestro (2000), ward size and rostering system complexity are contingent factors regarding the choice of a rostering system. According to the authors, ward size less than 35 and low rostering problem complexity are suitable terms for the implementation of self-rostering. Their main reason for this conclusion is that if ward size increases, so does the complexity of the rostering problem and the number of staff who do not fully appreciate the rostering problem. Because of this, the quality of rostering decision-making by use of self-rostering is likely being compromised when ward size increases: decisions are being made which do not take into account the full design ramifications.

## 2.4 Demand patterns and workforce schedule characteristics

---

Forecasting is used to determine the demand of work. Demand of work could be predictable, semi-predictable or non-predictable (Bicheno, 2008). Semi-predictable and non-predictable demands are subject to variability, stated by Hopp & Spearman (2000) as the quality of nonuniformity of a class of entities. Predictable demand is known in advance and therefore does not have to be forecasted. This demand could be constant within the planning horizon or changing according to a predictable pattern. Regarding semi-predictable demand, forecasting can be used as a determination technique. By using time series models, one of the quantitative methods, the obtained data could be plotted and the resulting graphs can be analyzed. This analysis implies looking for patterns in the data and by projecting this pattern into the future a forecast is tried to obtain. Four basic data patterns, or a combination of them, can be present in time series of data (Reid & Sanders, 2005):

- *Level or horizontal pattern*: Data follows a horizontal pattern around the mean.
- *Trend pattern*: Data is progressively increasing or decreasing.
- *Seasonal pattern*: Data exhibits a regularly repeating pattern.
- *Data increases or decreases over time*: It varies in length and magnitude and therefore is significantly more difficult to forecast than other patterns.

Forecasting techniques are not useful for non-predictable demand of work: no pattern could be found in the data because this type of demand behaves completely randomized.

To create a fit with the (forecasted) required human capacity, the available human capacity must be aligned by appropriate workforce scheduling. Regarding a predictable and constant demand of work, a constant level of labour has to be present to fulfill this demand. When the demand of work is changing according a predictable pattern within a planning horizon, the allocated labour should ideally follow this pattern to prevent over- and understaffing. Based on the stable demand and the low variability, fixed rostering could be used if sufficient workers can be recruited to staff the unpopular shifts (Hung, in Silvestro & Silvestro (2000)). Fixed rostering is where staff members are allocated a fixed shift pattern over a long or even indefinite time period (Silvestro & Silvestro, 2000) and could be defined as a cyclic schedule according to the definition of Rönnberg & Larsson (2009).

Regarding semi-predictable demand, variability is present that should be met. Because of this, each demand pattern within a planning horizon could be defined as unique. According to Silvestro & Silvestro (2000), flexible rostering should be applied: each rostering period is planned individually. According to the authors this personnel rostering type is, besides the presence of variability, also used because shifts are allocated based on anticipated demand patterns, as well as myriad other rostering parameters, including staff's preferences for off-duty. As stated by Rönnberg & Larsson, this rostering type could be defined as a non-cyclic (unique) workforce schedule.

Regarding unpredictable demand of work, needed capacity could be supplied in the following ways (combinations are also possible) (Reid & Sanders, 2005):

- Staffing for peak demand
- Floating Employees
- Employees on-call
- Temporary Employees
- Seasonal employees
- Part-time employees



Instead of adapting the supply of labour to satisfy the variability in semi-predictable and non-predictable demand of work, the demand of work could also possibly be adapted. This could be done by the concept of Heijunka: leveling out the work schedule (Liker, 2004). According to the author, two possible solutions are mentioned:

- Fit customer demand into a leveled schedule: because of this, the workload is leveled and a constant stream of income is achieved.
- Establish standard times for delivering different types of service: the duration of a certain procedure required by a client is diagnosed and scheduled accordingly.

In addition to the Heijunka concept, Reid & Sanders (2005) also mention four possibilities to influence the demand for services contrarily to the possibilities for adapting capacity to fulfill the variable demand. These possibilities are the use of *Appointments* (set a time for the customer to use the service), *Reservations* (enable the customer to take control or temporary possession of an item), *Posted Schedules* (post a schedule indicating when a service is available), and *Delayed Services or Backlogs* (use of queues to serve the customers in the order in which they arrive).

## 2.5 Human Capacity Management Outcomes

---

### *Workforce Scheduling outcomes*

---

Workforce Scheduling has great influence on organizational, employee, and client related outcomes. Because of this, workforce scheduling is an important organizational instrument. Poor Workforce Scheduling leads to negative outcomes, such as high employee turnover, absenteeism, resentment, poor job performance and unfit mental and physical conditions which translate to loss of productivity, quality and even safety (Hung, 1992). Drouin & Potter (2005) state that poor nurse scheduling can result in job stress and dissatisfaction, which in turn may be associated with absenteeism, tardiness, poorer patient care, more job injuries, and more mistakes. Silvestro & Silvestro (2000) note that a poorly designed roster can lead to over- or under-manning of a ward with critical implications for both quality of patient care, resource utilization and employee satisfaction. In addition to this, enhancing nurses well-being as well as improving care delivery can be achieved by the adjustment of work patterns to meet workers' needs (Bosch & Lange, in Fitzpatrick et al., 1999).

### *Outcomes of shiftwork*

---

Shiftwork, a common phenomenon in the healthcare sector and therefore part of Human Capacity Management, should be separately taken into account. Shiftwork could result in several negative outcomes, such as sleep disturbances, fatigue, digestive problems, emotional problems, and stress-related illnesses, as well as increases both in general morbidity and in sickness absence (Pilcher et al., in Bamba et al., 2008). These negative outcomes may be the result of disruption to physiologic, psychological, and social circadian rhythms (Akerstadt; Monk & Folkard, in Bamba et al., 2008). According to Monk & Folkard (in Bamba et al., 2008), shift work, particularly night work, disrupts the natural circadian rhythm. This disruption can subsequently lead to disharmony in the body, as some functions of the human body adapt more quickly than others. As a result, this leads to desynchronization, which itself can result in psychological malaise, fatigue, gastrointestinal problems (Monk & Folkard, in Bamba et al., 2008), and decrements in performance (Lanuza, in Fitzpatrick et al., 1999). Associations between long term exposure to shift work and health issues such as cardiovascular problems, pre-term births, or breast cancer have also been explored in previous studies (Swerdlow, in Bamba et al., 2008).

Regarding rotating shift schedules, switching from slow to fast rotation (change from more to less consecutive shifts) and changing from backward to forward rotation (change from night, afternoon, morning; to morning, afternoon, night) have beneficial effects on health and work-life balance of employees (Bamba et al., 2008).

### *Outcomes regarding flexible scheduling*

---

Allowing employees to have more influence over their workforce schedules besides their requests for off-duty is of great importance. When a roster does not take into account domestic and social needs of the staff, the roster is likely to give rise to considerable staff dissatisfaction (Silvestro & Silvestro, 2000) with a possible spiraling of costs through increased absenteeism and staff turnover as a result (Ovretveit, in Silvestro & Silvestro, 2000). Autonomy among nurses is promoted when staff has the possibility to make some choices regarding their roster (Drouin & Potter, 2005), which also accounts for staff nurses when self-scheduling is applied (Miller, in Silvestro & Silvestro, 2000). When employees are provided more flexibility regarding their workforce schedules, more involvement in decision-making and commitment to teamwork are likely to appear (Wortley & Grierson-Hill, in Drouin & Potter, 2005).

Besides the staff, managers are helped simultaneously to be involved in decision making by flexible-scheduling (Robb et al., in Drouin & Potter, 2005). Miller (in Silvestro & Silvestro, 2000) argues that flexible-scheduling becomes an effective tool in the retention and recruitment of staff nurses. Also, flexible-scheduling reduces time spent on scheduling by the head nurse (Miller, in Silvestro & Silvestro, 2000; Hung, 1992; Bailyn et al., 2007; Teahan, 1998). Hung (1992) concludes that employees feel more satisfied with the use of flexible-scheduling, tend to be more committed to a schedule developed with their peers, and communication and understanding among employees improves, resulting in a boost of team building. Bailyn et al. (2007) found both improved personal lives of nurses and improved patient care as a result of flexible-scheduling. Hung (1992) also reports the findings of an implementation of flexible-scheduling in a 62 bed-unit: a reduction in turnover rate (also found by Teahan, 1998), the elimination of the special request book for days off, increased awareness by the nursing staff of the unit's nursing care needs, enhancement of team spirit and improved relationships between nurses and administration. According to Hung (1992) nurses find their activity planning becoming easier because of flexible-scheduling and their pleasure to come to work increases. According to the author, nurses were also no longer preoccupied with the thought of unfairness in assignments. Stated by Silvestro & Silvestro (2000) both Hung and Miller argue that flexible-scheduling results in more effective roster designs. They noticed an improvement in staff's morale by the implementation of flexible-scheduling because of increased staff responsibility and perceived ability to integrate work patterns with home life. Elaborating on this, Bambra et al. (2008) found that self-scheduling of shifts has beneficial effects on health and work-life balance of employees.

In addition to enhancement of team spirit after the implementation of flexible scheduling as stated by Hung (1992), Silvestro & Silvestro found improved team spirit because of the need for staff to co-operate and negotiate shift allocations. As this team approach to matters became more apparent among the staff, the team members helped one another more on a work level and they switched days of work if it became necessary (Teahan, 1998). Subsequently, according to Teahan, staff became increasingly involved in problem solving that would have previously been directed to the manager. Partly because of this, Teahan states that staff, who actually make the roster, perceived the role of the manager different than before. Certain staff became less confrontational and more collaborative in their approach, with a more positive climate between management and staff as a result. In addition, these managers emphasized the importance of training the staff members to fully understand the rostering problem and the implications of their shift allocation decisions.

Flexible-scheduling also has some negative outcomes and restrictions. Street et al. (in Drouin & Potter, 2005) state that constant struggles between nurses and management could exist caused by introduction of a Self-scheduling system; nurses wanted more influence over their circumstances, and managers wanted more influence over their staffing needs. Teahan (1998) reported complaints of favouritism by the schedulers; demand for certain days off that could not always be met; pressure on the schedulers irrespective of their efforts, objectivity, and fairness; and frequent scrutinization by staff of colleagues' duty schedules as negative outcomes of Self-scheduling.

## 2.6 Use of ICT Tools

---

Optimal solutions regarding the planning and scheduling of staff members include cost minimization, meeting employee preferences, equally distribution of shifts among employees, and the satisfaction of all industrial regulations associated with the relevant workplace agreements, which makes this a highly constrained and complex problem (Ernst et. al, 2004). Nevertheless, this work is still carried out manually at many hospital wards, which is time-consuming and often results in schedules with undesired properties (Rönnberg & Larsson, 2009). According to the authors, the properties and structure of the workforce scheduling process makes it well suited for addressing with operations research methodology. Decision support tools are developed from appropriate mathematical models and algorithms and typically include spreadsheet and database tools and possibly rostering tools (Ernst et al., 2004). According to the authors, a particular roster could be developed based on the accomplishment of six modules: Demand modeling; Days off scheduling; Shift scheduling; Line of work construction; Task assignment; and Staff assignment. In the development of a roster, not necessarily all the modules are required and some modules may be combined into one procedure.

## 2.7 Research context

---

Based on the central research question in section 1.4, the HRM Territory of Beer et al. (1984) in section 2.2 and the theoretical framework, we consider relationships to exist between Human Capacity Management (HCM) in the Elderly care, Home care, and Maternity care (EHM) sectors and the external/internal environment that lead to certain outcomes. These expected relationships are formulated as theoretical propositions and visualized by arrows in the research context (*figure 3*). The theoretical propositions will be discussed in this research, and are formulated as follows:

Proposition 1, concerning the expected relationship between the external environment and HCM:

*The introduction of the client-based indicated budgets (ZZP's)/ national indication protocol for Maternity care (LIP) resulted in changed approaches of Human Resources Planning, Workforce Scheduling and Rescheduling.*

Proposition 2, concerning the expected relationship between the internal environment and HCM:

*The characteristic of the demand of work (predictable, semi-predictable or non-predictable) does affect the level of employee influence on their workforce schedules.*

Proposition 3, concerning the expected outcomes of HCM:

*More employee influence on workforce schedules leads to a decrease of employee turnover and absenteeism.*

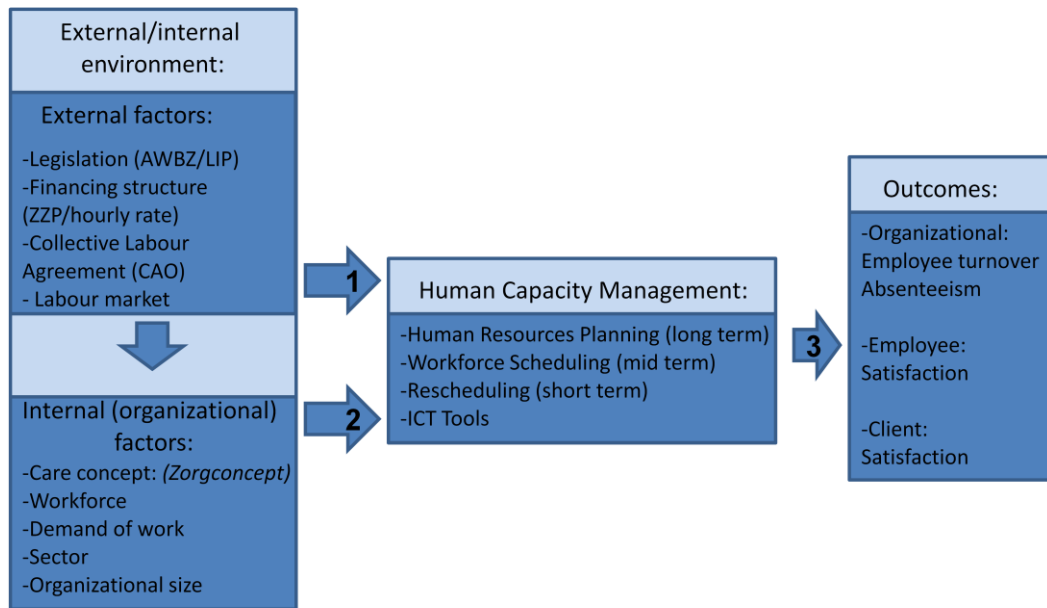


Figure 3: Research context

Regarding the external/internal environment, the changes in legislation (with a changed financing structure as a result), changes caused by the combined collective labour agreement, as well as the labour market, are supposed to be external factors of influence regarding Human Capacity Management. Concerning the internal (organizational) factors the organization's care concept, demand of work, sector, size, and the available workforce are supposed to be variables of influence. Outcomes, expected at organizational-, employee-, and client level, are indicated by employee turnover, employee absenteeism, employee satisfaction, and client satisfaction in the research context.

Because the focus of this research is on Human Capacity Management, most attention is given to Human Resources Planning (long term), Workforce Scheduling (mid term), Rescheduling (short term), and the use of ICT Tools to support these processes. Based on the theoretical background, five dimensions are formulated which appear to be of importance regarding Human Capacity Management. By using these dimensions as a guideline in the analysis section of this research, we can assure that these aspects are analyzed. These five dimensions are:

- Human Capacity Management term: planning horizon, scheduling period, publication period;
- Human Capacity Management at centralized/decentralized level;
- Workforce schedule characteristics;
- Collective or individual workforce schedules: level of employee influence;
- Application of Workforce Scheduling ICT Tools.

### Central research question and sub-questions

---

The central research question, which is also stated in section 1.4, reads:

*How is Human Capacity Management (i.e. Human Resources Planning, Workforce Scheduling, and Rescheduling) currently applied in Elderly care, Home care, and Maternity care (EHM) organizations and how could it be improved with a better balance between employees, operations management, and client care as a result?*

To answer the central research question, the following sub-questions are formulated:

- *How are Human Resources currently planned, scheduled, and rescheduled in the EHM organizations?*
  - *Which stakeholders are currently involved in the realization process of HR Planning, Workforce Scheduling, and Rescheduling, at what position in the organization and what is their relative share?*
  - *Within which specific time horizons are Human Resources currently planned and scheduled?*
  - *How are workforce schedules actually created: which ICT Tools are involved and how are they used?*
  - *What are specific differences per sector (EHM)?*
- *What are the outcomes of Human Capacity Management at organizational, employee, and client level in the EHM organizations?*
  - *What are specific differences per sector (EHM) towards organizational, employee, and client outcomes?*
- *What is the impact of external/internal environmental factors on Human Capacity Management in the different EHM organizations?*
  - *What are specific differences per sector (EHM)?*
- *What kind of HR Planning, Workforce Scheduling, and Rescheduling methods should be used given the specific organizational contexts in order to achieve the desired organizational, employee, and client outcomes?*



### 3 Research methodology

---

*This section represents the methodology used in this research. Sequentially the type of research, data collection method, the general analytic strategy, and the operationalization of the research variables in the research context will be discussed.*

#### 3.1 Type of research

---

In this research, a multiple-case study design is chosen consisting of multiple holistic cases. Compared with single-case designs, the evidence from multiple cases is often considered more compelling and because of that, the overall study is regarded as being more robust (Herriot & Firestone in Yin, 2009). Because of the focus on multiple sectors, this was considered more valuable than a single-case design, which allows more in-depth analysis and a higher level of detail.

According to Yin (2009), case study research is the preferred method of doing social science research when (a) “how” or “why” questions are being posted, (b) the investigator has little control over events, and (c) the focus is on a contemporary phenomenon in a real-life context. The holistic version of the design is chosen because this research concentrates on a single unit of analysis in multiple organizations.

A case study’s research design consists of five main components (Yin, 2009): The case study’s Questions, Propositions, Unit(s) of analysis, The logic linking the data to the propositions, and The criteria for interpreting the findings. These components will be used to describe how the case study method is applied in this research.

Both the case study’s questions and the theoretical propositions are formulated in section 2.7 and help to guide the entire case study by focusing on specific data. The unit of analysis determines what the ‘case’ is to be studied. In this research, the *organization* is the unit of analysis and therefore the ‘case’ in this multiple-case study. The fourth component: the logic linking the data to the propositions, is covered by the analysis phase of the case study research. In addition, the data collection method is also of great importance regarding this component, which will be described below. The last component, the criteria for interpreting the findings, is also included in the analysis phase.

#### 3.2 Data collection

---

To attract suitable cases for the general research, employer’s association ActiZ provided a list of 50 member organizations in the EHM sectors. We (the four graduate students together) mapped out these organizations by using a questionnaire [Appendix C], combined with a telephone interview and by visiting their websites. Based on the direct approach of a telephone call, some organizations stated directly not to be willing to cooperate with the research, other organizations refused further participation after the telephone call. When further participation was refused, the information they provided during to the telephone interview questionnaire was used as background information to familiarize ourselves with the topic.

The telephone interview questionnaire was also used as a selection instrument to qualify if the organizations that agreed further participation were appropriate for this case study research. According to this, the most important selection criteria were:

- *Size of the organization (FTE)*
- *Sector in which the organization operates (Elderly care, Home care, or Maternity care)*
- *The region in which the organization operates (urban or rural)*
- *Innovative behavior regarding at least one of the four research themes*

As a result, 9 organizations were selected to participate as the units of analysis (or ‘cases’) in the research: AxionContinu (Utrecht), Laurens (Rotterdam), DrieGasthuizenGroep (Arnhem), Beweging 3.0 (Amersfoort), Stichting Warande (Zeist), Zuidoostzorg (Drachten), Regionale Stichting Zorgcentra de Kempen (Bladel), Careyn Kraamzorg (Rijswijk), and Dé Provinciale Kraamzorg (Goes).

After the selection of the case study organizations, data needed to be collected for the general research. According to Yin (2009) three principles of data collection, when used properly, can deal with the problems of establishing the construct validity and reliability of the case study evidence.

The first data collection principle, *the use of multiple sources of evidence*, is considered as a major strength of case study data collection. Because of this, converging lines of inquiry are developed: a process of triangulation and corroboration of research data sources. Focused interviews were used as the primary data collection technique, guided by an interview protocol covering the four themes of the general research. Different stakeholders were interviewed for a short period of time: staff members of the scheduling department, care managers, region managers/ location managers, team leaders, care employees, and members of the Work Council (OR). The actual stream of questions in the applied interviews were fluid rather than rigid, and because of this the Focused interview technique could be interpreted as a guided conversation (Rubin & Rubin in Yin, 2009). In addition to these guided conversational interviews, we decided to distribute a questionnaire to the contact persons of the concerned case study organizations to obtain more detailed theme specific information regarding Human Resources Planning, Workforce Scheduling, and Rescheduling. If possible, this questionnaire was handed on and answered by the professional workforce scheduler. Besides the Focused interviews and the theme specific questionnaire, Human Resources Planning and Workforce Scheduling policy documents are also used.

The second data collection principle, *create a case study database*, increases the reliability of the entire case study. Because of this, other investigators can review the evidence directly and are not be limited to the written case study reports. We created a case study database both to increase the reliability and to provide all the obtained information to the involved graduate students.

The third data collection principle, *maintain a chain of evidence*, also increases the reliability of the information in a case study. The principle allows the reader of the case study to follow the derivation of any evidence from initial research questions to ultimate case study conclusions and the other way around.

### 3.3 Data analysis

---

A general analytic strategy was chosen to guide this multiple-case study research: *relying on theoretical propositions*. This strategy is considered to be the most preferred regarding case study research and the strategy’s aim is to follow the theoretical propositions (Yin, 2009), which are stated in section 2.7 of the theoretical framework. Regarding the analysis of the case study data, represented as case study results in section 4, the *cross-case synthesis analytic technique* was used. Based on this technique, word tables were created that display the obtained case study data according to the main blocks of the research context: Human Capacity Management, Outcomes, and External/internal environment. The data in the word tables was analyzed by comparing (linking) it with the initial theoretical propositions. By doing this, both the propositions and the research context are tested because the latter represents a visualization of the expected relations between the research variables. Based on this analysis, conclusions are drawn both on organizational ‘case’ level as well as sector level.



### 3.4 Operationalization

To test the supposed relationships between Human Capacity Management, the External/internal environment, and the Outcomes as stated by the propositions; operational definitions of the variables in the research context have to be developed. This will be realized by the operationalization process (Babbie, 2007). Both focused interviews and a theme specific questionnaire [appendix D] were used as instruments to gather information about the variables in the research context. The variables in the research context that have to be operationalized are:

Variable	Operational definition
<b>Human Capacity Management:</b>	
1. Human Resources Planning	1. The preparation, design and implementation of strategic policy regarding the flow of personnel in, through and out of organizations with an effective and functional allocation of labour as a result (Evers & Verhoeven, 1999).
2. Workforce Scheduling	2. The allocation of individual staff members to shifts to meet the required staffing levels at different times and the assignment of duties to individuals for each shift (Ernst et al., 2004).
3. Rescheduling	3. The adjustment of the workforce schedule on a shift-by-shift basis, which implies enactment throughout the day a few hours before the start of each work shift (Bard & Purnomo, 2005).
4. ICT Tools	4. The system used by an organization for Human Resources Planning and Workforce Scheduling.
<b>Outcomes:</b>	
1. Employee turnover	1. The inflow and outflow of salaried employment personnel at the case study organization in 2008, expressed in fte, numerical or as a percentage.
2. Absenteeism	2. The absenteeism of salaried employment personnel at the case study organization in 2008, expressed as a percentage.
3. Employee satisfaction	3. The overall satisfaction of employees with their employment in the organization (including with their workforce schedules).
4. Client satisfaction	4. The overall satisfaction of clients with the provided care.
<b>External/internal environment:</b>	
1. Legislation	1. The AWBZ (Elderly-/Home care) and LIP version 3, 2008 (Maternity care).
2. Financing structure	2. ZZP (Elderly care) and hourly rates (Home-/Maternity care) 2009
3. Collective Labour Agreement (CAO)	3. The CAO VVT 2008-2010.
4. Labour market	4. The availability of labour from the external environment.
5. Care concepts	5. (Innovative) ways to deliver care to customers, represented both by products as well as processes.
6. Workforce	6. The available Human Resource capacity in an organization.
7. Demand of work	7. The organization's clients, represented by personalized files.
8. Sector	8. The sector (Elderly-/Home-/Maternity care) in which the organization operates.
9. Organizational size	9. The size of the organization, expressed in fte.

#### Human Capacity Management

To explore how Human Resources were planned, specific questions regarding Human Resources Planning were asked during interviews with a care- or regional manager in the case study organizations.

Regarding both Workforce Scheduling and Rescheduling, an employee of the centralized workforce scheduling department was interviewed if an organization had such a department at its disposal. Team leaders were also interviewed regarding these topics, even if this process was executed completely centralized. In addition, research data was extracted from policy documents and data about the actual workforce schedules was also obtained from interviews with care employees.

Information about the available ICT systems was obtained from different stakeholders. Most times, if present, from an employee of the centralized workforce scheduling department and it was asked at the interviewed team leader too, if involved in the scheduling of the workforce.

Regarding all four variables, the contact (often the HR managers) answered questions from the distributed theme specific questionnaire and validated included information acquired earlier. The questions regarding this 'component' of the research context are:

- 7a, 7b, 8, 9, 10, 24 (Human Resources Planning);
- 11 up to and including 28 (Workforce Scheduling);
- 7c (Rescheduling)
- 4 and 25 (ICT Tools).

These questions represent the five dimensions stated in section 2.7 of the theoretical framework:

- Human Capacity Management term: planning horizon, scheduling period, publication period;
- Human Capacity Management at centralized/decentralized level;
- Workforce schedule characteristics;
- Collective or individual workforce schedules: level of employee influence;
- Application of Workforce Scheduling ICT Tools.

## Outcomes

---

To determine both employee turnover and absenteeism in organizations, the annual report is used. Simultaneously, questions regarding these subjects were also included in the telephone interview with (most of the times) the HR manager at the selection stage of this case study.

At employee level, data regarding employee satisfaction was obtained from interviews with employees (n=23). By employee satisfaction, overall satisfaction regarding their employment is meant, which also includes the satisfaction regarding the employment contract, working times and workforce schedules.

Information about client satisfaction was obtained from client satisfaction investigations or from interviewed stakeholders in the case study organizations.

*Question 30* was included in the theme specific questionnaire regarding this research context component and was answered by the contact.

## External/internal environment

---

Legislation, Financing structure, and the Collective Labour Agreement (CAO) do not have to be operationalized, because these variables are given and equal regarding all the involved case study organizations. However, they are included in the research context and included in the operationalization section for reasons of completeness and clarity.

Concerning the labour market, information from the national labour market regarding all EHM organizations is obtained from the research program of Prismant (Arbeid in Zorg en Welzijn 2008). Case study data about the regional labour market of case study organizations was acquired by interviews with the care- or regional manager, HR manager, team manager and representatives of the Works Council of the organizations. Besides the status of the regional labour market, questions regarding reactive measures taken were proposed during the interviews.

Information about the organization's care concept was gained from the contact person by both the telephone interview and the subsequent introductory meeting. In addition to this, organizational documents provided care concept related information and regarding the relationship between Human Capacity Management and the organizational care concept, *question 5* was included in the theme specific questionnaire.

The composition of the organizational workforce, the available Human Capacity, was again obtained from interviews with the care- or regional manager, HR manager, team manager, and representatives of the Works Council of the organizations. In addition, also Human Capacity Management policy documents were used. Data about the demand of work was obtained from interviews with the HR manager, care- or regional manager, team leader or an employee of the centralized workforce scheduling department (if present) of the organizations. *Questions 7a and 7b* were included in the theme specific questionnaire regarding this research variable.

Information about the organization's operational sector and organizational size were attracted from the telephone interview with the contact as well as from the organizational website and the annual report.



## 4 Results

*The results of the multiple case study are represented in this section, ranked by sector. Regarding all organizations, a general description is given. Subsequently, case study data are provided according to the three main components of the research context: Human Capacity Management, Outcomes, and External/internal environment. Finally, the obtained data of the case study organizations is tabulated per research variable and will be the starting point of the data analysis.*

### 4.1 Elderly care

#### 4.1.1 Regionale Stichting Zorgcentra de Kempen (RSZK)

RSZK	31-12-2008
Sector	Elderly care and Home care (VVT)
Region	Bladel
Size (FTE)	795,62
Number of locations	9
Absenteeism (company wide)	5,3%
Personnel turnover (company wide)	Unknown
Average age (company wide)	43

The current RSZK originates from three mergers of Elderly care organizations during 1997 until 2001. The organization is concentrated mainly on intramural Elderly care and contains also an upcoming wellness department and a housing corporation. The RSZK expects a change in demand for traditional intramural Elderly care towards small-scaled living facilities, accommodations suitable for 5 until 9 clients. Since 2008, two locations provide small-scaled living facilities to 87 clients in total. The main reasons for selecting this organization were the execution of a 'self-scheduling' pilot project in 2007 and the orientation towards both a new HR Planning/Workforce Scheduling ICT system and client administration software. We focused on intramural Elderly care, including the small-scaled living facilities.

#### *Human Capacity Management*

The horizon of the Human Resources Planning consists of 1 year. The planning is made for each regional business unit by the department of business economic affairs in cooperation with the responsible care managers. After approval, the care managers translate this annual financial personnel budget to departmental fte budgets. The total workforce in the primary process exists of approximately 500 fte/1200 employees. Around 75% of the workforce has a fixed employment contract, 25% consists of flexible labour contracts (15% min/max employment contracts; 10% on-call employees or employees from external sources). More min/max employment contracts of around 20/24 hours are preferred to fulfill the daily peaks in care demand.

Employees in intramural departments could choose between the 'self-scheduling' procedure and the conventional procedure: workforce schedules formulated by team managers. Besides one location, a centralized organizational scheduling department is not maintained. In practice, the conventional procedure is administered most of the times and when 'self-scheduling' is applied, mostly one employee creates the workforce schedule for the department completely by his/herself instead of the intended meetings at work by group members. This employee creates a monthly schedule for their department (with an usual size of 30 employees) during private time, which often takes 6 hours to complete.

A workforce schedule contains a scheduling period of three months and should be published one month before the start date. Periods of one month do exist by exception. Concerning Workforce Scheduling, the organization tries to admit every wish of an employer regarding their schedule if the possibility exists. 'Hard' requirements are formulated by the organization as moments at which an employee is unable to work. 'Soft' wishes are usually submitted by email to the team manager or 'self-scheduling' group respectively. After disclosure, roster

changes or mutual exchanges are informally executed: not always by notifying the responsible team manager, with possible violation of the CAO/ labour law or regulations concerning the standards of responsible care as a result. Rescheduling is executed by team managers, who approach employees when ad-hoc scheduling interferences do occur. Initially, on-call employees are approached to satisfy the first shift in case of sudden illness. Thereafter, regular employees should be contacted to fill in these gaps. Flex pools do not exist in the organization, but are considered as a future possibility. Because of this, a better usage of shortage hours is supposed to be achieved. However, employees in the same care location could be allocated to other departments when their support is needed.

ICT Tools are available in the organization, but not always used as they should be. When 'self-scheduling' is applied, employees create the schedules completely by heart, which results in schedules of low quality regarding excess-/shortage hour- and other balances. Elderly care departments are often scheduled first on plain paper, because of the experienced complexity of the DRP rostering system. Subsequently, the schedules are entered into this system and should often be changed because of identified violations of restrictions. Regarding small-scaled living, one employee schedules the complete team by direct use of the rostering system. Currently, the rostering system DRP (PinkRocade) is changed to Harmony (Ortec), principally because of the user-friendliness, the automatic planning tool (to introduce deployment proposals to fill in 'gaps' in the schedule), and the appropriate interface with other systems, such as the future real-time client administration.

In the intramural Elderly care, the workforce schedule is non-cyclic. One of the reasons for this, as given by the organization, contains flexible employees or employees on part-time basis who do not want to work structurally when full-time employees are entitled to some contiguous days off: they only want to work when they like. This forms a contrast to the rehabilitation departments, where employees generally adapt their schedules to the high variable demand: clients often need full-time care when they arrive and almost no care when they are recovered. If necessary, employees are even prepared to apply for leave. However, basis patterns in workforce schedules are supposed as a future possibility.

### Outcomes

---

Regarding small-scaled living, job satisfaction is high and after the introduction of 'self-scheduling', absenteeism and the number of mutual exchanges decreased compared with workforce scheduling by the departmental manager in the former situation. Regarding staff turnover, the organization realizes that it can ask less flexibility of their part-time employees than they would. Ideally, there should be a balance between the supply of labour from the employee and the demand of labour of the organization but if the organization asks too much (e.g. determine when an employee should work or at what location), some employees are expected to leave. Concerning client satisfaction: an intramural Elderly care location graded highest by Client and Quality Association in 2008. Positive reaction of both client's and relatives regarding small-scaled living.

### External/internal environment

---

The change of the general Law for special healthcare (AWBZ) and the changed *financing structure* as a result has led to a focus on demand based care. Measures are taken, integrated in the current restructuring of the organization. Possibilities for improvements become clear, as well as the importance of a real-time client administration, because the intramural Elderly care of the organization will be financed based on registered ZZP levels, which could change continuously. To operate at a break-even level or somewhat above, the bandwidth as provided by the ZZP is used but operating at minimum levels is currently subject of discussion.

The collective labour agreement (CAO) is considered as a prerequisite constraint, as well as the laws regarding labour hours. However, organizational rules, internal agreements, and workforce scheduling rules are considered to be tighter. According to the organization, the provided possibility for interrupted shifts should be implemented to satisfy the daily demand pattern for Elderly care with peaks during morning, afternoon and evening periods. In addition to this, better usage of the annual hours system provided by the CAO is considered

to be necessary: some employees who are responsible for the workforce schedule try to balance the excess-/shortage hours after each planning period (sometimes one month). Because of this, the usage of these hours regarding the holiday season is at risk.

The workforce of the organization is ageing and the labour market is considered to be tight. As a solution, new employees are attracted from the labour market by providing them larger than efficient employment contracts, in order to satisfy their demands. The changing financing structure in combination with the organizational restructuring leads to a change in the structure of the workforce: more tasks should be fulfilled by employees at educational level 2 instead of current educational level 3.

#### 4.1.2 AxionContinu

<b>AxionContinu</b>	<b>31-12-2008</b>
<b>Sector</b>	Elderly care and Home care (VVT)
<b>Region</b>	Utrecht
<b>Size (FTE)</b>	1100
<b>Number of locations</b>	12
<b>Absenteeism (company wide, salaried employment)</b>	5,7% (2007: 6,39%)
<b>Personnel turnover (company wide, salaried employment)</b>	22%
<b>Average age (company wide)</b>	Unknown

AxionContinu resulted from a merger between care organizations Axion and Continu in 2006. The organizational activities are divided by region, each with their own responsible regional director, and the organization does offer small-scaled living facilities. In 2008, the organization introduced the project 'Anders Werken', which included the design of a ZZP-tool to prescribe how the desires of clients must be indicated. Subsequently, a ZZP-proof instrument was introduced to allocate employees to departments. This instrument also takes employees' wishes (regarding content, procedure and working times) into account. Human Resources are planned and scheduled both on a decentralized as well as a centralized level and together with the project 'Anders Werken' the main reason for selecting the organization. The research concentrated on one Elderly care location.

#### Human Capacity Management

A five-year planning horizon is maintained at strategic organizational level, which consists of 1 year concerning the planning of Human Resources. This planning is draught according to the ZZP financing structure at regional level by the regional manager in cooperation with the departmental managers, who got allocated annual fte budgets. A workforce of approximately 815 fte is involved in the primary process. Approximately 75% of the workforce has a fixed employment contract between 6 and 36 hours with an average around 16 hours, 95% female. According to the organization, the number of full-time (36 hour) labor contracts should be decreased to obtain more labor flexibility. 25% of the workforce consists of on-call employees.

Workforce schedules are draught for the whole department, which could be done by the departmental managers alone, in cooperation with a head nurse or fully delegated to a head nurse (20% of the occasions). Some departmental managers often create the workforce schedules on plain paper first, which are entered into the DRP rostering system afterwards. This also occurs when schedules are created in cooperation with a head nurse. Weekly patterns, based on individual requirements and wishes, could be repeated by the rostering system to form an approximate annual workforce schedule. Incidental days off and holidays are requested by using a request list during the scheduling process. However, it is often possible to request for days off regarding the second or third month of the current schedule. The requests are taken into account directly by the departmental manager or the head nurse if scheduling tasks are delegated. Mutual exchanges are possible.

Regarding Rescheduling, some organizational locations do possess a flex pool, others do not. Because of this, the organization notices that some departments use on-call employees from external sources to satisfy ad-hoc scheduling interferences, even when labour is available in the organization. Excess-/shortage hours are used at quarterly basis to satisfy both ad-hoc interferences and the variable demand. However, some workforce schedulers balance these hours on a monthly basis. A shortage of location flexibility is noticed because employees attach to their own department. The organization investigates possibilities for flex pools, by which larger (organization- or region wide) employment contracts should become possible.

Generally, workforce schedules have a non-cyclic (unique) character because of the flexible demand of work. Cyclic workforce schedules are present by exception: these schedules could be assigned to employees by the organization based on serious personal circumstances or arise because of the mutual alignment of shifts between nurses who work during periods of stable demand (evening/night nurses for example).

The scheduling period of the workforce schedule is determined at 13 weeks and introduced also 13 weeks before the start date. The schedule should be apprised for the complete planning horizon and employees must possess the most recent schedule at least 14 days before the roster starts. In addition, workforce schedules with a planning horizon of one month are also provided in departments. Workforce schedules also contain an overview of the private hour balance.

In the past all workforce schedules of Axion were created at centralized level, but the distance between workforce schedulers and the employees was experienced as too large. This result did not change during a three-month scheduling pilot at Continu, where employees were scheduled at regional level. After the merger, AxionContinu decided to create schedules closer to the employees at departmental level and implement a centralized scheduling department to verify and close all organizational workforce schedules in dialogue with the departmental managers. In addition to this, the department takes care of both education regarding Workforce Scheduling and of the link with the salary records.

### *Outcomes*

---

Large differences between departments regarding absenteeism do exist. One departmental manager reported 30% absenteeism over 2008 (principally caused by prolonged absences), and another reported 3,71% over a two monthly period. According to the first departmental manager, broken shifts were not allocated, but late shifts succeeded by early shifts (L-E) are sometimes scheduled to fill gaps in the schedule (which could exist of 150 hours within a week). One head nurse, who often works (L-E) shifts, defines her workforce schedule as tough because of both these (L-E) shifts and structural overtime. As a result, her overall work-life balance is considered as pretty bad which ends in tiredness during off days, amongst other things. One head nurse, who draught the workforce schedule in cooperation with the departmental manager, did not want full responsibility over this process. She does not want to be blamed by colleagues when the schedule is not satisfying. According to a recent client monitor, client satisfaction was below national average and should improve by better communication with clients.

### *External/internal environment*

---

Because of the changing environment, the organization started to concentrate on the improvement of the supplied care. Client agendas were introduced to register the personalized agreements with patients regarding their supply of care. The bandwidth in the financing structure is used to maintain capacity for acute care demand and by using the bandwidth, every client contributes to the evening- and night shifts. At this moment, a lot more care is delivered by employees than will be compensated by the client-based indicated budgets (and could be alleviated by the bandwidth). This could be part of the commitment of employees to their clients, but also because of ignorance. Because of this, ZZP courses are provided to employees.



Regarding the collective labour agreement (CAO), the change of regulations concerning (paid) leave influences the scheduling of leave in the workforce schedule. Furthermore, organizational rules concerning excess-/shortage hours are considered to be tighter than stated by the CAO. Regarding the organizational workforce, the regional labour market is considered to be tight certainly regarding higher educated personnel. Because of this scarcity, the organization takes many wishes of new personnel into account, for example with respect to their preferred locations and working times. As a result, these wishes are translated to the workforce schedule.

The organizational care concept, which concentrates on providing care of good quality that meets the requirements of both clients (as stated by client agendas) and employees, is strongly related to Human Capacity Management and the demand of work of the organization. Extra care could be delivered in addition to the client-based indicated budget, but must be privately financed by the client. However, providing extra care may never be at the expense of regular care. Recently, the organization experiences demand for additional care.

#### 4.1.3 DrieGasthuizenGroep

<b>DrieGasthuizenGroep</b>	<b>31-12-2008</b>
<b>Sector</b>	Elderly care and Home care (VVT)
<b>Region</b>	Arnhem
<b>Size (FTE)</b>	310,9
<b>Number of Elderly care locations</b>	6
<b>Absenteeism (company wide, salaried employment)</b>	6,7%
<b>Personnel turnover (company wide, salaried employment)</b>	19,3%
<b>Average age (company wide)</b>	+/- 42

DrieGasthuizenGroep resulted from several mergers between Elderly care homes. Regarding Home care, the organization is also intending to improve their position. The organization switched from decentralized Workforce Scheduling at departmental level to centralized Workforce Scheduling for efficiency reasons, but the resulting workforce schedules turned out to be inappropriate. Workforce Scheduling at centralized level was the main reason for selecting this organization, as well as the small-scaled approach regarding the supply of care.

#### Human Capacity Management

The Human Resources Planning contains a horizon of 1 year, and is used for the formulation of the annual budgets of the different locations. These budgets consist of departmental fte budgets, which are formulated based on client indications by team managers and the responsible care manager. Budgets must be consistent with the organization-wide policy, which in turn contains the regulations regarding the minimum levels and qualifications of personnel regarding the kind of care. The majority of the labour contracts are part-time: approximately 247fte/425 employees are involved in the primary process. Min/max employment contracts are uncommon in the organization in contrast to employees on-call.

Workforce schedules are created for a planning horizon of 13 weeks and every four weeks, a new month is added to the current schedule. Because of this, a 4 week workforce schedule is known 13 weeks in advance which is considered by the organization to be sensitive to changes. This schedule is examined by the team manager, who is responsible for a schedule to work out as it should. When the monthly schedule is approved, the scheduling department should transfer this schedule into a daily version were factors such as short absenteeism are added. These daily schedules are used as basis for the salary records. The schedules are non-cyclic, because of the flexible characteristic of the demand for Elderly care. Employee influence is provided by one 'hard' requirement and the possibility to suggest 'soft' wishes by a web terminal. Cyclic workforce schedules are only maintained in case of serious personal circumstances. Mutual exchanges are also allowed, but are not executed in consultation with the team manager. As a result, additional departmental pressure is experienced when unequal exchanges do occur.

The scheduling of the workforce is executed at centralized level by the centralized scheduling department: schedulers (3 fte) create a one-month workforce schedule for all organizational teams in a time period of one month. This department also includes an organization-wide flex pool. The main goals of this approach were to relieve the team managers from scheduling activities, optimizing the scheduling process, better use of ICT solutions, and maintain a centralized overview by which employees could be deployed at a organization-wide level. The scheduling process at the Workforce Scheduling department is considered to be difficult, mainly because of the organizational shortage of employees with education level 3. Besides this, the organization experienced a large under-performance regarding the centralized scheduling department, which resulted in disturbances in the workforce schedules. A study was performed with the underutilization of the SP Expert (IT Systems) scheduling software by the schedulers deployed on re-integration basis and lack of knowledge of most workforce schedulers as main conclusions. Scheduling and rescheduling were executed on plain paper and by use of MS Excel. The scheduling software was only used as a registration instrument and because of this, the web terminal could not provide actual information.

Despite the presence of an organization-wide flex pool, ad-hoc disturbances are most of the times solved by team managers contacting the flexible employees. Their personal relationship with these employees is mentioned as the primary reason. The flex pool appears not to be able to provide flexible labour on an ad-hoc basis, both because of the absence of personal contact between the flex pool employees and the unwillingness of some employees to work at different locations. This constrains the location flexibility of organizational employees.

### *Outcomes*

---

Absenteeism differs between locations and departments. At one department, absenteeism decreased after competence development was offered and more individual wishes of employees were taken into account. Concerning the current workforce scheduling, (L-E) shifts are tried to prevent. According a member of the management team, the workforce schedule has direct influence on employee satisfaction and employee turnover. Regarding employee turnover, no records are maintained with reasons of employees who leave the company. Concerning older employees who leave the organization, the main reason of their departure is supposed to be the heavy physical work. Because of this, older employees should be indulged from heavy physical work regarding their health.

### *External/internal environment*

---

The actual examination of the fit between the provided care and a client's indication is delegated to head nurses. When a deviation occurs, a renewed indication is executed and the client's personal file is adapted. Finally, this should result hopefully in a renewed indication by the CIZ. To monitor clients for a renewed indication or to examine if the provided care agrees with the client-based indications present, the use of time studies is suggested by the organization. However, it is recognized that this could increase the administrative burden of employees, which, in worst-case scenario, could result in a higher outflow of personnel. According to the ZZP, the included bandwidth is used by the organization to maintain capacity for acute care demand and to moderate potentially provided extra care to prevent invoicing to clients.

Regarding the influence of the CAO on Human Capacity Management, the changed regulation of the leave allowance is mentioned. This changes the way of handling the scheduling of days off. The annual hours system is used to maintain enough labour capacity during the vacation period and shortage hours of employees should become available to the organization-wide flex pool according to the organization. The labour market is considered to be tight regarding higher educated nurses (level 3 and above). As a result, a shortage of head nurses is also experienced, because educational level 3 is required for this position in combination with certain abilities. The organization also notices that single wage earners are often interested in larger employment contracts. These contracts are not used as a recruitment instrument, because the organization experiences much scheduling difficulties with them and the organization questions if such schedules could be healthy.

Currently, clients are allocated to specific departments based on their individual care demand. Employees are allocated to a number of corridors in these departments, or to a care route regarding the client visits. When care routes are used, time related wishes of clients are taken into account as much as possible which is also common in Home care organizations.

#### 4.1.4 Warande

Warande	31-12-2008
Sector	Elderly care (V&V)
Region	Zeist
Size (FTE)	515
Number of locations	5
Absenteeism (company wide, salaried employment)	6,02%
Personnel turnover (company wide, salaried employment)	Inflow: 82,39 FTE, Outflow: 76,45 FTE
Average age (company wide)	Unknown

Warande differentiates itself from other Elderly care organizations by focusing on small-scaled living and a hotel approach in their Elderly care homes. Regarding this approach, the organization concentrates on clients with more financial strength who want to break into their capital to obtain more luxury customized care. These Elderly care homes are located in Bilthoven, Zeist (3 locations) and Houten. Besides this hotel approach, the organization was also selected because of their change in 2007 from decentralized to centralized workforce scheduling in one region to bring uniformity back into the workforce schedules.

#### Human Capacity Management

Human Resources are planned one year ahead. This is done by team managers at every department in cooperation with the specific location manager, by whom the planning must be approved. The planning is based on the individual care protocols of clients who are present in departments. From these individual care protocols, the needed number and quality of employees is derived.

Concerning the locations in the region Zeist, a centralized Flex/Plan department is responsible for the creation of appropriate workforce schedules based on the departmental Human Resources Planning. Annual departmental workforce schedules are created at this department by use of DRP software (PinkRoccade), taking into account the preferences of departmental employees known in advance. Based on these schedules, actual workforce schedules are created with a scheduling period of 12 weeks, consisting of 3 blocks of 4 weeks. Employees obtained 1 'hard' requirement and 1 'soft' wish, which are taken into account when the concept workforce schedule is created. The schedule is delivered to the team manager 12 weeks in advance, who examines the schedule. Subsequently, departmental employees are given the option for mutual exchange, which must be both in consultation with the team manager and should also be approved by the other employees in the specific shifts. Possible changes are added to the concept schedule, which is returned to the Flex/Plan bureau to draw up the final schedule, which is often published 10 weeks in advance. This schedule is non-cyclic and cyclic (repetitive) schedules occur by exception. Regarding the fixed employees, the organization tries to adopt a more cyclic workforce schedule, which should respond to changes in demand by using labour from the flex pool.

In addition to the current workforce scheduling process, the organization wants to concentrate on a certain level of individual scheduling at departmental level, which should result in a basis schedule. Employees have to observe constraints formulated by the organization, and this individual scheduling process should be supervised. According to the organization, large teams should be subdivided into smaller groups by function and educational level.

Besides the three locations in Zeist, the workforce is scheduled at a decentralized level by team managers in departments. Regarding Rescheduling, these managers solve ad-hoc disturbances in the workforce schedule by

themselves by use of excess-/shortage hours, on-call employees, or exchange of labour from other departments. The Flex/Plan department is established in 2007 to bring uniformity back into the workforce schedules: Workforce Scheduling at departmental levels resulted in qualitative different schedules. Despite of the accessibility of the Flex/Plan department and their helpdesk function for team managers and employees, the distance is considered to be too large by the employees.

### Outcomes

Regarding many organizational employees, work seems to be subordinate to private life. Attention must be given by workforce schedules to part-time employees with young children: working hours should be aligned with childcare hours. Bringing in work-life balance is considered to be the employees' own responsibility. At one location, 80% of the requests for days off are performed by 20% of the employees.

### External/internal environment

The organization investigates if the provided services are still cost effective, due to the changed financing structure. In the end, the organizational income is expected to increase with 2% because of this change. The collective labour agreement (CAO) primarily influences the workforce scheduling by the changed regulation concerning the leave allowance: holidays are scheduled in a different fashion and schedulers have to take this into account. The regional labour market is considered to be tight, especially regarding employees with educational level 3, of which an organizational shortage exists. Because of this, the organization takes personal requirements of recruits into account and invests in internal education. Requirements concerning working hours could be easier fulfilled when new recruits are allocated to the flex pool, because these employees are allocated to all three locations and could therefore be provided more options.

Warande concentrates on providing high quality care on a continuous basis to their clients, which is propagated through their care concept. Providing small-scaled living opportunities regarding Psycho Geriatric (PG) clients and the hotel approach for Somatic clients does affect the scheduling of personnel. This should be aligned with the care concept to satisfy demand.

#### 4.1.5 ZuidOostZorg

<b>Zuidoostzorg</b>	<b>31-12-2008</b>
<b>Sector</b>	Elderly care and Home care (VVT)
<b>Region</b>	Drachten
<b>Size (FTE)</b>	840
<b>Number of locations</b>	11
<b>Absenteeism (company wide, without pregnancies)</b>	6,47%
<b>Personnel turnover (company wide, salaried employment)</b>	Inflow: 234 employees, Outflow: 240
<b>Average age (company wide)</b>	45

This organization also concentrates on small-scaled living and maintains a hotel approach for Elderly care homes. Besides these innovative care concepts, the organization was also selected because of their approach regarding the introduction of the client-based indicated budget. Concerning this introduction, the organization introduced a study group to investigate the organizational personnel consequences.

### Human Capacity Management

The Human Resources Planning is currently executed for a planning horizon of one year and based on the financial annual budgets. These budgets, which are based on clients' ZZP's, are currently set up by the location managers and examined by the management board. Around 756 fte/1500 employees are present in the primary process. Approximately 70% of the labor contracts are fixed, mostly part-time and the remainder consists of flexible (0-hours) labor contracts. Employment contracts around 24 hours are preferred regarding scheduling purposes.

The scheduling period of the workforce schedule consists of 3 months, and every 4 weeks a new month is added to the schedule. According to the scheduling policy, the schedule must be presented regarding the complete planning horizon, at least 14 days before the start date. After each completed month, the actual workforce schedule has to be approved by the location manager. Employees could obtain 1 fixed day off as a 'hard' requirement and requests for days off must be presented by the request folder, which is often also taken into account regarding the current schedule. Regarding excess-/shortage hours, the organization uses the annual hours system to obtain flexibility in the core workforce. In addition, attention will be given to gross and net hours: absenteeism, days off, and educational leave will be inserted in the schedule. Mutual exchanges are allowed, in consultation with the workforce scheduler, and only between equal educational levels.

Actual Workforce Scheduling was executed decentralized at locations and executed by specific reintegrated workforce schedulers. The planning was executed primarily on ad-hoc basis: extra labour was not budgeted in case of absenteeism or educational leave, labour was often attracted from temporary agencies and personal wishes of employees were admitted too easily. Recently, team managers were made responsible for the workforce schedules at team level. Team managers could schedule their workforce by themselves or delegate this to an employee who is made responsible for the workforce schedules. Location managers have got freedom to choose the scheduling period and a scheduling method that fits with the location, which must be in accordance with the Works Council and regarding the organizational scheduling rules. This increase in team manager's responsibility is accompanied by a decrease in their span of control. No centralized Workforce Scheduling department is present at the organization.

Cura (Unit4Agresso) workforce scheduling software is used, but workforce schedules are often first created on plain paper and by use of MS Excel. These schedules are created for organizational departments, which currently exist of approximately 30 employees.

Rescheduling is executed decentralized by team managers by using shortage hours, min/max employment contracts, or employees on-call. These forms of flexible labour are currently organized per location. Employees from labour agencies are not used. The idea of a centralized flex pool in every region or an organization-wide flex pool to increase the flexible allocation of personnel has been forwarded. Both are considered to be difficult due to unwillingness of employees to work at other departments and the large geographical spread.

### Outcomes

---

The distance to the workforce schedulers in the past situation was experienced as large. Workforce Scheduling at team level is enlightening for the employees because they know who is responsible for their workforce schedules. According to several employees, the workforce schedule should be released earlier: three months before the start date. When this is done, private life could be adjusted to the schedule.

### External/internal environment

---

Based on the ZZP introduction, the organization inventoried their current workforce and the demand of work represented as client-based indicated budgets. As a result, too many employees with a higher level of education (level 3 or above) are present in the organization, compared to educational level 2 employees. Because of this, a mobility center will be established and function differentiation will be performed. In addition, the organization will use the natural wastage of employees and will not prolong temporary employment contracts. The change regarding the workforce is part of a reorganization process, which is initiated by the changed legislation. Responsibilities must be allocated to lower management levels, because more control could be executed at the source. Regarding the client-based indicated budgets, the organization will use the bandwidth mainly to finance the night shifts, which could be seen as a common service.

According to the collective labour agreement (CAO), the organization uses the annual hours system concerning excess-/shortage labour hours. Because of the freedom provided to team managers, this use of excess-/shortage hours differs between team managers. The labour market for Elderly care employees is not considered to be tight. Because of the internal restructuring, the organization focuses first on their internal labour market and tries to achieve more flexible employment in the regular formation.

The care concept of the organization concentrates on small-scaled living for Psycho Geriatric (PG) patients, a hotel approach with regard to both Somatic patients and patients after hospitalization, and the overall delivery of qualitative care. Concerning small-scaled living, both employees regarding housekeeping as well as Elderly care nurses must be scheduled, which results in Workforce Scheduling of higher complexity. A proper alignment between the changing demand for and the supply of care by rehabilitation clients also complicates the scheduling process. Qualitative care could also be achieved by offering extra services to clients, which could result in an increased demand of work. The demand for Elderly care is considered to be flexible. Because of this flexibility, workforce schedules must be adapted continuously, based on client-based indications.

## 4.2 Home care<sup>1</sup>

### 4.2.1 Laurens

<b>Laurens</b>	<b>31-12-2008</b>
<b>Sector</b>	Elderly care and Home care (VVT)
<b>Region</b>	Rotterdam
<b>Size (FTE)</b>	2410,2
<b>Number of locations</b>	35
<b>Absenteeism (company wide, salaried employment)</b>	7,52% (Zorg Compas: 6,97%)
<b>Personnel turnover (company wide, salaried employment)</b>	Unknown
<b>Average age (company wide)</b>	40-45

Since July 1st 2008 Laurens and Zorg Compas are merged administratively. Thereafter, the organizations will melt together, what should lead to a total merger on January 1st 2010. Regarding this research, we concentrate on both the Elderly care and the Home care activities of Laurens. The organization was selected because of their small-scaled approach towards the supply of care and because of the implementation of a new Human Capacity Management system as a result of the merger.

### Human Capacity Management

Regional managers prepare the financial budgets, based on client-based indicated budgets of the previous year, which are approved by the management board. Subsequently, these budgets are allocated to departmental managers who are both responsible for the planning of labour, as well as the match between the client-based indicated budgets and the actual provided care. Regarding the Human Resources Planning, a planning horizon of one year is maintained. The majority of the labor contracts is fixed and part-time. Concerning intramural care, employment contracts of 28 hours are preferred. Min/max labor contracts form a minority in the organization. With respect to Home care, employment contracts between 16 and 32 hours are common.

<sup>1</sup> Both Home care and Elderly care regarding Laurens

Regarding both intramural Elderly care and extramural Home care, workforce schedules are non-cyclic and have a length of 13 weeks. These schedules are presented at once, at least 14 days before their start date. In practice, the actual workforce schedules are often known for a length of 4 weeks. Despite the non-cyclic pattern of the workforce schedules, certain patterns could be defined as repetitive because of working hours regulations, a minimum number of night shifts during each 13 week scheduling horizon, and the wishes of certain employees to work together or because of the required quality levels concerning educational levels in shifts (authorized to deliver medication). In addition to this, certain patterns do exist due to the (upcoming) use of care routes at both intramural Elderly care and extramural Home care (AWBZ) and the attempt to minimize the allocation of different Home care nurses per client.

Employees are provided one 'hard' requirement: 1 fixed day a week at which employees do not want to be scheduled. Before the delivery of the workforce schedule, 'soft' wishes could be administered to the workforce scheduler. After the announcement of the schedule, mutual exchanges between employees of equal levels are allowed by involvement of the team manager. In some cases, structural exchanges between employees do occur (e.g. never work night shifts), tolerated by team managers. Wishes concerning the current workforce schedule must be stated to the team manager and could be approved by exception. At an extramural Home care division (consisting of 15 employees), nurses are given more influence over their workforce schedules by providing them a blank sheet of paper to indicate when they would like a day off or are willing to work between 7:30 and 22:30. To keep this process fair regarding all Home care nurses, the allocation of the preferences rotates among the nurses. After this scheduling procedure, the care coordinator draws the definitive schedule in cooperation with the scheduling department.

Workforce Scheduling is executed throughout the organization: every region contains a centralized scheduling department, where workforce schedules for both departmental intramural Elderly care employees and extramural Home care employees in the specific region could be created and verified. Departmental workforce schedules could also be created at intramural departments by a team manager or delegated to a nurse. The team manager is always responsible for the workforce schedule, regardless of the option chosen. Rescheduling is executed by team managers by using excess hours or allocation of employees with flexible employment contracts. These employees are concentrated in regional flex pools, which do not provide location flexibility: some of them prefer to execute only some specialism and others choose for a specific department.

The workforce schedules are created by using Plan4W (Advimedin), but will be replaced by Monaco (I.C. systems) due to organizational growth. The last software supplier was already implemented by ZorgCompas and is considered to be more able to guarantee the continuity of the scheduling software.

### Outcomes

---

Work pressure is considered to be high regarding large employment contracts. To reduce negative outcomes, working hours could be varied regarding each different shift. Because of this, mothers with school going children are allowed to work 'mother shifts': they start work after their children are brought to school. The influence given to Home care employees on their workforce schedules is considered to strengthen the bond between team members. These members brainstorm about possible constraints and work together to come up with solutions. One Home care employee stated that her work-life-balance increased because of more influence on the workforce schedule. Since the implementation of this system, her number of late shifts (which she dislikes) decreased. The introduction of care routes regarding intramural care are supposed to increase client satisfaction, because the provided care is more predictable and recognizable to clients. In addition, the bond between clients and employees is expected to increase and renewed indications could be done easier and faster by using client contact persons. This is also supposed to be regarding the Home care: because of the low numbers of different Home care employees per client, the bond between them is improved.



### External/internal environment

The organization concludes that at 'higher' ZZZP-levels (ZZP 6 till 10) more care hours are contracted to clients (for example physiotherapy, speech therapy, ergo therapy or hired doctors) than actually compensated based on their client-based indicated budgets. In addition to this, the organization states that nurses on the whole deliver all the care that clients demand. As a result, nurses are instructed by team managers about ZZZP financing. However, the organization realizes that some clients are used to a certain level of care. This level of care will be maintained by the organization, with a financial loss regarding those clients as a result.

Concerning the collective labour agreement (CAO) the changed regulation concerning the leave allowance was mentioned. This influences the way by which days off are scheduled and registered. The annual labour hours system is partly used: labour hours should be balanced at the end of each planning period. However, some employees responsible for Workforce Scheduling do balance these hours at a weekly basis. The regional labour market of intramural Elderly care employees is considered to be tight, especially as compared to the past. A shortage exists regarding employees with educational level 3 and above, what results in more pressure on Workforce Scheduling and administrative processes. Regarding the Home care division, no shortage of nurses (mainly with educational level 3) seems to exist.

The care concept of the organization concentrates on the supply of a proper amount of qualitative care, provided by a minimum level of different employees per client. As a result, employees are deployed on a broad basis and the organization recruits rather new employees on a higher care-related educational level and also rather generalists than specialists. As a result, the level of task differentiation is tried to be held low.

The demand of work is characterized by an unpredictable behaviour, due to the alternation between clients with low and higher ZZZP-levels in the Elderly care organizational function. The demand for Home care (AWBZ) could be considered as semi-predictable, because demand for care in extramural routes is more stable. Regarding the demand for Home care at night, cooperation exists between intramural Elderly care departments and the Home care divisions: intramural Elderly care personnel is deployed to extramural (AWBZ) clients when care is necessary during nighttime.

#### 4.2.2 Beweging 3.0

<b>Beweging 3.0</b>	<b>31-12-2008</b>
<b>Sector</b>	Elderly care and Home care (VVT)
<b>Region</b>	Amersfoort
<b>Size (FTE)</b>	2050 (Home care: 296.38 FTE)
<b>Number of locations</b>	13 (without extramural care)
<b>Absenteeism (company wide, salaried employment)</b>	5,95% (Home care: 7%)
<b>Personnel turnover (company wide, salaried employment)</b>	Inflow: 332 FTE (Home care 33,38 FTE), Outflow: 287 FTE (Home care 36,89 FTE)
<b>Average age (company wide)</b>	+/- 41

Regarding Beweging 3.0, the research concentrates on the Home care division. Home care is delivered in the municipalities Amersfoort, Baarn, Barneveld, Bunschoten/Spakenburg, Eemnes, Ermelo, Leusden, Nijkerk, Scherpenzeel, Soest, Voorthuizen and Woudenberg. Home care is organized by regional offices where a team leader, planner, and two client assistants are present. The main reason for selecting this organization was the presence of a large Home care division, which operates in both urban and rural districts.



### Human Capacity Management

---

The long-term organizational planning concentrates more on the development of care packages and on the ongoing competition between Home care suppliers than client- and employee numbers. Because of this, Human Resources Planning could be considered to focus on the short term: the current size of the workforce in relation to the current demand. Regarding the entire organization, 80% of the labor contracts contains a fixed number of hours and the remaining 20% are considered to be flexible on-call labor contracts. Regarding the Home care sector, min (16 hours)/max(24 hours) employment contracts are preferred, because allocation of full-time (36 hour) employment contracts to care routes is considered to be difficult.

Scheduling periods differ between 4 or 8 weeks, because some Home care teams publish one period and other teams publish two periods at once. These schedules do exist of care routes in the specific region and are published 2 weeks in advance. This publication period is shorter compared to the intramural care departments, mostly because of fallouts of employees (short absenteeism) instead of the also changing demand of work. A publication period of 10 days instead of two weeks is proposed at the Works Council, which has the same length as the publication period in the Maternity care sector as stated by the CAO. The organization tries to work with a cyclic basis pattern, but this is dependent on the degree of turnover in the client-based indicated budgets. The schedules within a scheduling period are available on the PDA (personal digital assistant) of the Home care nurses, whereby they are able to start at home instead of the regional Home care office, which saves time. The PDA is also used for their hour registration. Employees are given one 'hard' constraint and have the possibility to propose soft wishes by their team manager in written form, both before and after the determination of the workforce schedule. In addition to this, mutual exchange of both shifts (days) and care routes (on a day) between employees is possible when the quality of care is guaranteed.

Workforce schedules are created at centralized regional level: by a planner in a regional Home care team. Scheduling software of Monaco (I.C. Systems) is used to schedule the approximately 15 employees of a Home care team. This is a different system compared to the intramural Elderly care organizations, where different systems are used including Caress (PinkRocade). Planners work at part-time basis: 12 planners (9 fte) are involved to schedule all Home care employees (296.38 fte). In the past, Workforce Scheduling was executed centralized at the organization, but resulted in poor contacts with decentralized Home care teams. If new requests for Home care are received by a client contact person, the planner is consulted regarding whether or not the request fits into a route. The planner executes also the requests for mutual exchanges between employees. At a regional Home care office, the team manager is responsible for the workforce schedules and for the audit of the invoiced hours by the employees.

Concerning Rescheduling, the planner tries to fill the 'gaps' in the workforce schedule by contacting Home care nurses associated with the Home care office. Parallel to this, the organizational flex department could be involved to contact on-call employees. Currently, the organization concentrates on possibilities to outsource the flex department to an external partner, which is already present regarding ad-hoc personnel solutions during weekends.

### Outcomes

---

Relative high absenteeism (7% - 10% (2008); annual average 2008: 6,4%) is present in the organization, mainly caused by prolonged absences. According to a representative of the Works Council, proper insights regarding the personal hour balance should be offered to employees. (L-E) shifts are tried to prevent by the organization. However, as stated by some employees, (L-E) shifts are not concerned to be problematic because it provides certain benefits regarding their private life. Some clients complain about the number of different Home care nurses that visit clients. Because of this, increased work pressure is experienced, also because of the limited time per client: there is no time for such discussions.

### *External/internal environment*

---

Regarding Home care financed by the AWBZ, no major changes have occurred since the introduction of the contract policy by regional care offices in 2006. However, client-based budgets expressed in hourly rates have been declined during the past years, as stated by the organization. This is of great influence on Human Capacity Management, because the provided hourly rate is based on the prescribed level of care and contains a quality element. Regarding organizational cost effectiveness, nurses should ideally only be allocated to tasks at their specific quality level and perform those tasks according to organizational quality standards.

Concerning the collective labour agreement (CAO), the changed regulations regarding employees aged 55 or above is considered to be of influence on Human Capacity Management: these employees could be mandated to work overtime or during inconvenient hours (except between 23:00 and 7:00), which could be refused according to the previous CAO (2006-2008). Because of this change, it is stated that Workforce Scheduling became easier but caused much unrest in the workforce. The labour market for Home care nurses is considered to be tight. Because of this, individual wishes of new recruits are taken into account in order to attract them.

An increased use of the annual hours system is desired by the organization. Excess-/shortage hours are currently balanced after each 4 weekly scheduling period, which should be lengthened to 12 weeks to enable more flexibility regarding the allocation of resources. Besides this, the organization also wishes to shorten the workforce schedule publication period from 14 days to 10 days (such as in the Maternity care) because of the variability in demand.

The care concept concentrates on the supply of personalized Home care that satisfies high quality standards. This is partly expressed by the presence of a 24/7 ambulatory team and specialized nurses with a high level of expertise. The demand of work consists mainly of elderly clients, but also of younger patients who need additional care after being discharged from hospital. Some clients need special treatments at specific times (such as diabetic clients who need care and clients who are picked up for daycare activities at a specific time). These clients take precedence over other clients, and this must be translated into the workforce schedule. Because of the growth in demand and to satisfy the time related wishes of clients as much as possible, Home care is also provided after school, which was most unusual in the past according to the organization.

### 4.3 Maternity care

#### 4.3.1 Dé Provinciale Kraamzorg

Dé Provinciale Kraamzorg	31-12-2008
Sector	Maternity care
Region	Goes
Size (absolute)	161 (without stand-by employees (27))
Number of locations	1; also 'maternity suites' in Terneuzen
Absenteeism (company wide, salaried employment)	5,3%
Personnel turnover (company wide, salaried employment)	8,7%
Average age (company wide)	45
Provided care (hours)	110.085
Number of care treatments	2.518

Dé Provinciale Kraamzorg concentrates totally on Maternity care, which is one of the reasons why this organization is selected for the research. Other reasons were the establishment of seven maternity suites in hospital De Honte Terneuzen, further extension plans towards other regions and the introduction of an abridged educational program to develop Maternity care nurses. All of these reasons are direct effects of the hourly-based financing structure and the national shortage of Maternity care nurses.

#### *Human Capacity Management*

The emphasis of Human Capacity Management in this organization lies on Workforce Scheduling, the actual allocation of Maternity care nurses to their clients. This because of both the high level of unpredictability regarding the demand of Maternity care and the shortage of Maternity care personnel on the labour market. Besides these restrictions, Human Resources Planning is executed by the Maternity care manager, concerning a planning horizon of one year. In this planning, trends and forecasts regarding the labour market and demand of Maternity care (based on birth rates) are taken into account. Between 80-85% of the labor contracts contain a fixed number of hours, almost all part-time. The remaining labour contracts are flexible: on-call contracts and temporary vacation contracts. Only a small number of employees has a full-time employment contract, because these contracts are very difficult to schedule based on the prescribed 49 hours of Maternity care per client.

Workforce schedules consist of a scheduling period of one month and are introduced around 10 days before their start date. These schedules comprise shifts of 8 contiguous days, and are allocated to all Maternity care nurses regardless the type of employment contract. Both during the scheduling of the workforce and the introduction of the schedule, nurses have the ability to present individual changes directly to the centralized scheduling department or the Maternity care head nurses. In addition, personal restrictions (such as allergies) of employees are taken into account. Besides these possibilities of influence, the Works Council states that the total amount of influence is low because of the uncertainty in demand, which results in non-cyclic workforce schedules.

Workforce Scheduling is executed by both a planner at the centralized scheduling department in the organization and assisted by four Maternity care head nurses. These head nurses are responsible for the contact with Maternity care nurses and their wishes regarding the workforce schedule. Because of this, their tasks regarding Workforce Scheduling are executed at decentralized levels but by using the same ICT planning and scheduling tool as at the centralized scheduling department: Informatie Systeem Kraamzorg (ISK, Facet). Insights regarding the personal hour balance are provided by the salary slip, but these insights are supposed to be insufficient by Maternity care nurses. Maternity care head nurses are also involved in Rescheduling: employees are contacted to work additional hours or on-call employees are contacted. If these two options do not solve the ad-hoc personnel shortage, labour agencies are contacted. As provided by the CAO regarding Maternity care organizations, guard duties are allocated when no demand is present at the beginning of a shift. Because these duties adjust the initial workforce schedule, these are interpreted as Rescheduling activity.

### *Outcomes*

---

Older employees expect guard duties to have a larger impact on the private life of younger colleagues than the impact of these duties on their own private lives. This is due to their broad experience with the sector (they got used to it) and also because younger colleagues with children experience many difficulties regarding their work-life balance. If a last minute workforce scheduling change is administered (for example a sudden cancellation of a guard duty), a completely different workforce schedule is the result. However, employees are generally satisfied with the current workforce scheduling procedure. The overall absenteeism of 5,3% in 2008 could be considered as low compared to the national average of 7,13% regarding Maternity care organizations.

### *External/internal environment*

---

Unlike the recent changes regarding the financing structure of Elderly care organizations, very less changes have occurred in the Maternity care since the introduction of the LIP in 2006. The biggest change since the introduction of the LIP was the increase of the number of Maternity care hours compensated by the basic health insurance in 2008: from 44 hours to 49 hours. The collective labour agreement (CAO) influences the Workforce Scheduling process because of two main changes: regarding employees aged 55 or above and the realization of employment contracts at annual basis. Regarding the latter, the previous CAO (2006-2008) stated that excess-/shortage hours are cleared after each quarter and a maximum amount of +20/-20 hours could be transferred to the next quarter at maximum. The organization uses the annual hours system, which could result in a largely varying employee deployment per month.

Regarding the labour market, a demand for larger employment contracts by applicants is found by the organization. Based on the maximum number of Maternity care hours as stated by the LIP, and the policy of the organization to allocate 1 Maternity care nurse to 2 clients at maximum, employment contracts of 70% minimum to 90% maximum are provided to new employees. This makes it very difficult to attract new Maternity care nurses.

The care concept of the organization primarily reacts on the nationwide trend concerning the decrease in the number of home births by introducing the 'transferred home birth'. Because of this expansion of the provided services, the number of possible shifts in the workforce schedule is influenced. Besides this, the number of available care hours is also influenced because of reduced travelling time when employees work at maternity suites or hospitals instead of assisting home births. Regarding the demand of work, guard duties are used in the workforce schedules to prepare for variability of demand: seven or eight Maternity care nurses are always on guard duty at the beginning of a day because hospitals usually report their discharges in the morning. As stated by employees, more information regarding demand patterns should be provided by the organization for a better preparation of employees on possible calls for work.

## 4.3.2 Careyn Kraamzorg

<b>Careyn Kraamzorg</b>	<b>31-12-2008</b>
<b>Sector</b>	Maternity care
<b>Region</b>	Rijswijk
<b>Size (FTE)</b>	245
<b>Number of locations</b>	3
<b>Absenteeism (company wide, salaried employment)</b>	7,46%
<b>Personnel turnover (company wide, salaried employment)</b>	+/-10%
<b>Average age (company wide)</b>	45
<b>Provided care (hours)</b>	197.200
<b>Number of care treatments</b>	5.221

Careyn Kraamzorg, part of the Careyn foundation, delivers both Maternity care at client's homes and in the HaGa 'birth hotel' in The Hague. It contains of the regions Rijswijk, Vlaardingen and Breda. The opening of their own birth center inside a hospital in another region is planned at the beginning of 2010. Provision of Maternity care, trying to determine the size of the workforce based on birth rates, extending the organization by providing Maternity care in a hospital (polyclinic births) and the development of an intelligent planning tool were the most important criteria regarding the involvement of the organization in this research.

*Human Capacity Management*

Human Resources Planning is used to determine the number of core and peripheral employees within a planning horizon of one year, which is executed at centralized organizational level by the Home care manager. Regarding this determination, the annually published LIP, trends and forecasts regarding the labour market, and Maternity care demand (based on birth rates and the number of client intakes during the planning period) are taken into account. Core employees have a fixed employment contract (10% - 89% of full-time or full-time) and are called 'on roster' because only these employees are scheduled in advance. Peripheral employees could also possess fixed employment contracts, but are not scheduled ('on roster'). 83% of the total workforce belongs to one of these categories; 40% 'on-roster' and 60% employed on an annual basis. 17% of the total workforce consists of on-call employees.

Based on the Human Resources Planning, an annual schedule is draught containing all factors known in advance. Subsequently, workforce schedules with a scheduling period of 13 weeks are created only for core employees. These schedules are introduced one month before the beginning of the scheduling period. After this introduction, Maternity care nurses still got the possibility to bring in requests at the scheduling department. This workforce schedule comprises shifts, which exist of start dates of clusters containing 8 contiguous days. Maternity care nurses 'on roster' start with a guard-duty when there is no demand for Maternity care. Because of the great flexibility and uncertainty regarding the demand of work, workforce schedules are non-cyclic, but the organization tries to create more cyclic (repetitive) schedules.

The workforce schedules are draught at the centralized scheduling departments in each region. Besides the 200 Maternity care nurses in the associated region, also the schedules for the Maternity care nurses deployed at the HaGa 'birth hotel' are created by six workforce schedulers at the scheduling department in Rijswijk. ISK (Facet) scheduling software is used and the organization currently develops an intelligent scheduling tool with roster generator in cooperation with the independent research organization TNO. Because Maternity care nurses work in different situations every time, the scheduling department takes many restrictions of employees into account, which leads to many scheduling constraints. These restrictions must be approved by the team manager and could consist of allergies to not willing to travel large distances when roads are slippery.

Nurses 'on roster' are phoned by the centralized scheduling department when demand does occur and have to be present within one hour. 'Flexible' Maternity care nurses are called by a scheduling department or call this department themselves to ask for work. Regarding labour hours, the organization is bound to the CAO regarding balancing the excess-/shortage hours at annual basis. In addition to this, the organization introduced an internal rule for employees 'on roster': when no demand occurs during guard duties, shortage hours are created. When demand does occur, excess hours are provided. By using this rule, the organization tries to handle the large amount of excess-/shortage hours that seems to be common in the Maternity care sector because of the high flexible demand. Rescheduling is also executed by the centralized scheduling departments. Employees 'on roster' of 'flexible' Maternity care nurses could be contacted, as well as on-call employees or labour from external sources when ad-hoc disturbances do occur. Most times, these employees are often committed to a certain region, which makes it a difficult activity. Guard duties are used regarding employees 'on roster' when no demand of work is present at the beginning of a shift.

### *Outcomes*

---

A member of the Works Council noticed that the changed regulation for employees aged 55 and above has a negative effect on absenteeism. The charge of shortage hours when no demand occurred during guard duties is considered to be very unfair by the Maternity care nurses, which could negatively influence the satisfaction regarding the profession. One employee was involved in a pilot by which clients were helped by the same Maternity care nurse. After the provided daily care hours, the nurses' working day ends. Because of this, the work became stable what resulted in more satisfaction regarding her work-life balance. These hours were compensated by the number of days off between shifts. However, according to the organization, this pilot is just a marketing instrument regarding clients and could not be further applied because of the shortage of personnel. The organization tries to allocate two different Maternity care nurses per client at most.

### *External/ internal environment*

---

As stated by the current CAO (2008-2010), employees aged 55 or above are less protected regarding working times compared with the former Home care CAO (2006-2008). Careyn Kraamzorg differs from this change by an organizational rule: by using a checklist and the advice of a Health and Safety executive (arbo-arts), the organization identifies at which level these employees could be employed (regarding overtime and inconvenient hours). In addition to this and different from the CAO, these employees are not allocated to night shifts at all. Regarding the labour market, the organization faces difficulties to attract Maternity care nurses. Because of this, requirements of new employees are often met including the demand for larger employment contracts.

The demand of work is considered to be very flexible and unpredictable. In the organization, the demand is divided into three patterns: a constant demand pattern, a variable pattern, and on top of this unpredictable 'peaks' in demand. The constant demand pattern should be satisfied by the core employees 'on roster', the variable pattern by peripheral employees, and the demand peaks by on-call employees. In addition to this, the demand of work is changing because of the decrease in the number of home births. By developing a birth center and providing birth assistance by general practitioners, the organization tries to satisfy demand and make more efficient use of their Human Resources. This is in line with the organizational care concept, which concentrates on the supply of high quality Maternity care.

## **4.4 Tabulation of case study data per research variable**

---

The previous results of the case study analysis are tabulated per variable of the research context. These variables are clustered by the main blocks of the research context: Human Capacity Management, Outcomes, and External/internal environment. The case study organizations are arranged by sector: Elderly care, Home care, and Maternity care.

## Human Capacity Management

Organization	HR Planning	Workforce Scheduling	Rescheduling	ICT Tools
<b>The RSZK</b>	1 year HR Planning horizon for each business unit based on clients' individual care protocols and translated into departmental fte budgets.	Decentralized at departmental level. Scheduling period of three months, published one month before start date (monthly schedules by exception). Non-cyclic character, but basis pattern considered as a future possibility. 'Self-scheduling' at departmental level possible: in practice executed by one responsible person at home. 'Hard' requirements/ 'soft' wishes used. Mutual exchanges are informally executed.	Min/max employment contracts, on-call employees, and employees from external sources (together 25% of the workforce) used, as well as overtime. No flex pool, considered as a future possibility. More min/max employment contracts preferred. Excess-/shortage hours used.	DRP (PinkRoccade) regarding workforce scheduling, replaced by Harmony (Ortec). Often first scheduled on plain paper and subsequently entered into the system.
<b>AxionContinu</b>	1 year HR Planning horizon, based on clients' individual care protocols and part of a five year planning horizon at strategic level. Fte budgets allocated to departmental managers.	Decentralized at departmental level by departmental manager, head nurse or both. Centralized scheduling department verifies and closes schedules. Scheduling period of 13 weeks, published 13 weeks before start date (monthly schedules do occur). Scheduling at collective basis, exceptions (created by a group of nurses) do occur. Mutual exchanges allowed. Non-cyclic character, cyclic schedules by exception at individual basis. 'Hard' requirements/'soft' wishes used.	Overtime, on-call employees (25% of the workforce). Flex pool present at some locations, possibilities for centralized/ regional flex pools investigated to improve location flexibility and possibility for large employment contracts. Excess-/shortage hours used.	DRP (PinkRoccade) regarding workforce scheduling. Often first scheduled on plain paper (by head nurse) and subsequently entered in to the system by the departmental manager.
<b>DrieGasthuizenGroep</b>	1 year HR Planning horizon, used for formulating annual budgets of the different locations.	Centralized by scheduling department, combined with organization-wide flex pool. Scheduling period of 13 weeks, new month added every four weeks. Non-cyclic character, cyclic schedules by exception at individual basis. Mutual exchanges allowed. 'Hard' requirements/'soft' wishes used.	Overtime, on-call employees. Despite centralized flex pool, Rescheduling often applied at departmental level. Employees' shortage hours should become available for the organization-wide flex pool. Excess-/shortage hours used	SP Expert (IT Systems), underutilization of this system by workforce schedulers concluded.
<b>Warande</b>	1 year HR Planning horizon, formulated by location managers in cooperation with team managers at every department.	Centralized scheduling department in one region, combined with flex pool. In other two regions at departmental level. Annual departmental workforce schedules created based on employee preferences. Scheduling period of 12 weeks, published 10 weeks in advance. Non-cyclic character, cyclic schedules by exception at individual basis. Cyclic schedules by individual scheduling considered as future possibility. Mutual exchanges allowed. 'Hard' requirements/'soft' wishes used.	Overtime, on-call employees, exchange of labour from other departments, or by use of Flex/plan department. Excess-/shortage hours used.	DRP (PinkRoccade).
<b>ZuidOostZorg</b>	1 year HR Planning horizon, based on clients' individual care protocols and translated into departmental fte budgets. May become financial budgets in the future.	Decentralized, by team managers themselves or delegated to an employee. Scheduling period of 3 months, new month added every four weeks. Presented at least 14 days before the start date. Actual workforce schedules must be approved by location manager. Non-cyclic character, but basis pattern considered as a future possibility. Intends to concentrate on gross and net hours. Mutual exchanges allowed. 'Hard' requirements/'soft' wishes used.	Overtime, min/max employment contracts and on- call employees used. No flex pool, Rescheduling applied at locations. Centralized/ decentralized (regional) flex pool investigated. Excess-/ shortage hours used.	Cura (Unit4Agresso) regarding workforce scheduling. Often first scheduled on plain paper (by head nurse) and by use of MS excel.

Organization	HR Planning	Workforce Scheduling	Rescheduling	ICT Tools
<b>Laurens</b>	1 year HR Planning horizon. Based on clients' individual care protocols and translated into departmental fte budgets.	Centralized per region regarding Home care. Centralized per location regarding Elderly care if chosen by departmental manager, who is also able to schedule the team by itself or delegate this to an employee. Non-cyclic character, cyclic patterns recognized. Basis pattern regarding large employment contracts considered as a future possibility. Scheduling period of 13 weeks, introduced at least 14 days in advance (exceptions do occur). Mutual exchanges allowed. Announcement of employee wishes by using plain paper (preference scheduling) implemented by Home care department. 'Hard' requirements/'soft' wishes taken into account.	Overtime, min/max employment contracts. Excess-/shortage hours used. No centralized flex pool.	Plan4W (Advimedien), replaced by Monaco (I.C. systems) due to organizational growth.
<b>Beweging 3.0</b>	Because of the high variable demand, HR planning is concentrated on the short term: the current size of the workforce in relation to the current demand.	Decentralized by a planner in a regional Home care team. Schedules contain 1 or two periods (4 or 8 weeks), dependent on the Home care team. Publication period of 14 days, proposed to change to 10 days as in Maternity care. Schedules contain a number of routes in the region of a specific team and are available on PDA. Cyclic basis pattern tried, dependent on degree of turnover of the client-based indicated budgets. 'Hard' requirements/'soft' wishes used.	Overtime, Excess-/shortage hours , min/max employment contracts , and on-call employees used. Centralized flex pool present.	Monaco (I.C. systems) regarding Workforce Scheduling.
<b>De Provinciale Kraamzorg</b>	1 year HR Planning horizon, which takes trends and forecasts regarding both labor market and Maternity care demand into account.	Centralized by planner, assisted by 4 head nurses. Scheduling period of 1 month, introduced around 10 days before start date. Schedules comprise start dates for shifts of 8 contiguous days, working times not scheduled in advance. Non-cyclic character, wishes could be introduced to the centralized planner or a head nurse.	Guard duties, on-call employees, temporary vacation contracts (together 15-20% of the workforce), excess-/shortage hours.	ISK (Facet) regarding Workforce Scheduling.
<b>Careyn Kraamzorg</b>	1 year HR Planning horizon, which takes trends and forecasts regarding both labor market and Maternity care demand into account.	Centralized at regional level. Annual schedule draught, which contains all factors known in advance. Scheduling period of 13 weeks, only created for core employees 'on roster', introduced 1 month in advance. Comprises shifts, which exist of start dates of clusters containing 8 contiguous days. Non-cyclic character, more cyclic patterns tried to create. Employee restrictions taken into account, possibility to bring in additional requests at the scheduling department.	Guard duties, overtime, on-call employees, excess-/shortage hours, and peripheral Home care nurses also used regarding Rescheduling.	ISK (Facet) regarding Workforce Scheduling. Developing new tool in cooperation with TNO.



## Outcomes

Organization	Organizational level	Employee Level	Client level
The RSZK	After introduction of 'self-scheduling' in small-scaled living departments, both absenteeism and the number of mutual exchanges decreased compared with traditional scheduling by departmental manager. Employee turnover supposed to increase if employees are obliged to be more flexible (e.g. determine when an employee should work or at what location).	High job satisfaction in small-scaled living departments.	Clients very satisfied about intramural Elderly care location: highest graded by the Client and Quality Association in 2008.
AxionContinu	Large differences between departments regarding absenteeism: 30% reported at one intramural Elderly care department (resulting in 150 'gap' hours to fill in within a week) compared to 3,71% over a two monthly period in another. Turnover supposed to increase if employees are obliged to be more flexible.	One spoken head nurse works often (L-E: Late-Early) shifts and structural overtime and defines her workforce schedule as tough: considered her work-life balance as pretty bad and experiences tiredness during off days.	Organizational wide, client satisfaction was below national average.
DrieGasthuizenGroep	Absenteeism differs between locations and departments. Absenteeism decreased in one department, where competence development was offered and individual wishes of employees were taken into account. Heavy physical work expected to be the main reason of employee turnover.	According to a member of the management team, the workforce schedule has direct influence on employee satisfaction and employee turnover. Also because of this, (L-E) shifts are tried to prevent.	-
Warande	The company's personnel turnover in 2008 could be expected as high (Inflow: 82,39 FTE, Outflow: 76,45 FTE), but is improved as compared with the figures of 2007.	In departments, the overall interaction between employees is considered to be fine. The organization tries to align workforce schedules of part-time employees with childcare hours which increases job satisfaction.	-
ZuidOostZorg	Personnel turnover decreased from 6,47% in 2008 to 5,08% (September 2009).	Direct contact with workforce scheduler appreciated by employees, even as early publication.	-

Organization	Organizational level	Employee Level	Client level
Laurens	Decreased absenteeism in 2009 compared with 2008.	Strengthened bond between team members and increased work-life balance experienced as a result of preference scheduling at Home care team. The organization tries to align workforce schedules of part-time employees with childcare hours which increases job satisfaction.	Low numbers of different Home-/Elderly care employees per client are supposed to improve the client-employee relationship. Introduction of intramural care routes supposed to increase client satisfaction, because care becomes more predictable and recognizable to clients.
Beweging 3.0	Relative high absenteeism (7% in the first half of 2009, annual average 2008: 6,4%), mainly caused by prolonged absences. The personnel turnover in 2008 does not contribute to a desired increase (both quantitative as well as qualitative) of the Home care workforce.	Increased work pressure experienced because of the limited nursing time per client. Work is considered to be very individualistic.	Complaints about the high number of different Home care nurses per client.
De Provinciale Kraamzorg	The overall absenteeism in 2008 (5,3%) could be considered as low compared to the national average (7,13%). The personnel outflow in 2008 was relatively low.	Older employees expect guard duties to have a larger impact on the private life of younger colleagues than on their own. Generally, employees are satisfied with the current workforce scheduling procedure.	Maternity care graded with 8.7 in 2008: best organization of their region.
Careyn Kraamzorg	Changed CAO regulation regarding employees aged 55 and above is supposed to have a negative effect on absenteeism, stated by Works Council representative.	Employee satisfaction could be negatively affected by the organizational rule to charge shortage hours when no demand occurs during guard duties. One nurse experienced increased job satisfaction as a result of a pilot concerning the only accompaniment of one family per day. Work is considered to be very individualistic.	Regarding client satisfaction, the organization tries to allocate two different Maternity care nurses per client at most.

## External/internal environment

Organization	Legislation/Financing	CAO	Labour market	Care Concept	Workforce	Demand of work	Sector /Size
<b>The RSZK</b>	Changed AWBZ resulted in demand based care. Bandwidth provided by ZZP used, operating at minimum levels subject of discussion. Possibilities for improvements become clear.	Considered as prerequisite constraint. However, organizational rules considered to be tighter.	Considered to be tight. Larger than efficient employment contracts used as a recruitment instrument.	Small-scaled living provided as well as personalized (wellness) care. Demand expected to change from traditional intramural Elderly care towards small-scaled living.	Ageing. More tasks should be fulfilled by educational level 2 employees instead of educational level 3.	Represented by client agenda, should be monitored real-time. Peaks during morning, afternoon and evening.	VVT, 795,6 fte.
<b>AxionContinu</b>	ZZP-tool/ZZP-proof instrument developed. Focus on demand based care. Bandwidth provided by ZZP used.	Changed (paid) leave regulations influence workforce scheduling. Organizational rules considered to be tighter.	Considered to be tight, especially regarding higher educated personnel (3 and above). Many wishes are taken into account.	Providing care of good quality that meets the requirements of both clients and employees.	ZZP courses are provided. Shortage of higher educated personnel (level 3 and above).	Represented by client agenda. Currently more care delivered than compensated by ZZP. Recently, demand for additional care.	VVT, 1100 fte.
<b>DrieGasthuizen Groep</b>	Client-based indications closely monitored. Deviations from provided care are adapted directly. Bandwidth provided by ZZP used.	Changed regulation of leave hours mentioned: changes the way days off are scheduled.	Considered to be tight regarding higher educated personnel (3 and above). Employment contracts not used as a recruitment instrument because of scheduling difficulties.	Preparations regarding small scaled living. Elderly care could be provided by care routes instead of delivering care based on corridors.	Shortage of higher educated personnel (level 3 and above) experienced. Wonders if large employment contracts could be healthy. Large amount of task differentiation.	Represented by client agenda. Task differentiation considered unavoidable because shortage of higher educated personnel and changed financing structure.	VVT, 310,9 fte.
<b>Warande</b>	Expects 2% increase in income because of changed financing structure. Investigates if provided services are still cost effective.	Changed regulation of leave hours mentioned: changes the way days off are scheduled and registered.	Considered to be tight, especially regarding educational level 3. Both employee wishes are taken into account as well as educational requests.	Concentrates on high quality care on a continuous basis. Small-scaled living concerning PG clients and a hotel approach for Somatic clients.	Current shortage regarding higher educated personnel (level 3 and above).	Considered to become more personalized: clients with more financial strength are prepared to pay for additional services.	V&V, 515 fte.
<b>ZuidOostZorg</b>	Focus on demand based care. Bandwidth in ZZP mainly used to finance the night shifts which are stated as a common service.	Annual hours system used as stated by CAO.	Not considered to be tight. Focuses on internal labour market.	Concentrates on delivering qualitative care. Small-scaled living concerning PG clients and a hotel approach with regard to patients after hospitalization.	Too many higher educated (level 3) employees compared with levels 2 and 4.	Considered to be flexible regarding Elderly care. Workforce schedules should be continuously adapted to changing demand.	VVT, 840 fte.

Organization	Legislation/Financing	CAO	Labour market	Care Concept	Workforce	Demand of work	Sector/Size
<b>Laurens</b>	Generally, regarding higher ZP levels (6 till 10) more care hours are offered compared with client-based indicated budgets. Home care financed by hourly rates.	Changed leave allowance regulation mentioned: changes the way days off are scheduled and registered.	Considered to be tight, especially regarding educational level 3 and considered to be tighter compared to the past.	Delivery of care of high quality, by a minimum of different nurses per client. As a result, level of task differentiation is tried to keep low.	Current shortage of higher educated intramural personnel (level 3 and above). Limited shortages in Home care.	Home care demand is considered to be more stable than Elderly care demand. Less fluctuations in client-based indicated budgets.	VVT, 2410,2 fte.
<b>Beweging 3.0</b>	Home care financed by hourly rates. Decline of compensation noticed by the organization. Cost effective allocation taken into account.	Regulations concerning employees aged 55 and above influence Human Capacity Management.	Considered to be tight. Many wishes are taken into account in order to attract new recruits. High degree of competition.	Supply of personalized Home care that satisfies high quality standards. Also 24/7 ambulatory team and specialized nurses.	Both qualitative and quantitative shortage of personnel, primarily caused by high degree of competition.	Considered to be variable because of short term cancellations and registrations. Existing of both elderly clients and younger patients discharged from hospital, some demand met at specific time.	VVT, 2050 fte.
<b>De Provinciale Kraamzorg</b>	Dependent on LIP and statutory maximum rates by WMG. Most recent change concerns the increase from 44 to 49 hours, as compensated by the basic health insurance in 2008. Works with Maternity care auction instrument.	Regulations concerning employees aged 55 and above and the realization of employment contracts at annual basis.	Considered to be tight. Demand for larger employment contracts found. Min (70%) and max (90%) labor contracts are supposed to be optimal, which makes recruitment very difficult.	Introduction of the 'transferred home birth' as a reaction to the decrease of the number of home births.	Shortage of personnel. Cooperation with educational institution to strengthen the workforce.	Considered to be very flexible and unpredictable.	Maternity care, 161 empl.
<b>Careyn Kraamzorg</b>	Dependent on LIP and statutory maximum rates by WMG. Most recent change concerns the increase from 44 to 49 hours, as compensated by the basic health insurance in 2008. Works with Maternity care auction instrument.	Organizational rule instead of CAO maintained concerning employees aged 55 and above: in any case released from night shifts. Realization of employment contracts at annual basis.	Considered to be tight. Many wishes are taken into account, including the wishes for larger employment contracts.	Concentrates on supply of high quality Maternity care: at home, in hospitals (maternity suites) or in their own birth center.	Shortage of personnel.	Considered to be very flexible and unpredictable. Three patterns discriminated: constant, variable and unpredictable 'peaks'. Employees 'on roster' should satisfy the constant demand.	Maternity care, 245 fte.

## 5 Cross-case analysis

---

*The performed cross-case analysis will be described in this section, in which the case study data is analyzed per sector. The five research dimensions will be used as a guideline. This approach is chosen because of the differences found per sector regarding the demand of work and the different Human Capacity Management approaches to meet this demand. In addition, the propositions stated in the theoretical background will be discussed.*

### 5.1 Elderly care

---

#### Human Capacity Management term: planning horizon, scheduling-, and publication period

---

All of the six Elderly care organizations plan their Human Resources one year ahead, which is in accordance with the theory found. Their Human Resources Planning is based on client-based indicated budgets of which most organizations really became aware during 2008, after the introduction in July 2007. Regarding all organizations, the year 2009 was used to determine whether or not the organizational workforce (both quantitative and qualitative) was sufficient to meet the demand of work. Because of this, we conclude that Elderly care organizations understand the importance of a sufficient and effective workforce based on the demand of work. Human Resources Planning often results in a non-financial fte budget, which becomes the responsibility of the team/departmental managers who manage their own employees. Regarding Laurens, departmental managers are made responsible for financial budgets, which is also planned by ZuidOostZorg in line with their policy to put more responsibilities at lower organizational levels.

Most of the times workforce schedules comprise a scheduling period of 13 weeks (or 3 months), which is longer than the periods stated in the theoretical background section but considerably shorter than the Human Resources Planning horizon. The length of this period is sometimes chosen because of practical reasons (quarter) or because of regulations concerning 13 weekly periods, such as the maximum amount of night shifts stated by the collective labour agreement (CAO). Usage of excess-/shortage hours balanced at the end of each quarter was another reason found. In addition to this, both the employer and employees are provided with certainty over a longer period. Workforce Scheduling such a long time in advance is possible because of the relatively stable demand, especially regarding the 'higher' ZZP levels 5 to 8. Demand of Psycho Geriatric clients (PG, often dementia) is also relatively stable. According to the organizations, most flexibility is present at the 'lower' ZZP levels 1 to 4. However, because ZZP levels up to 4 or 5 could be maintained in regular care departments, these changes do not affect workforce schedules immediately. Rehabilitation departments could be interpreted as an exception: ZZP levels of clients are high (ZZP 9) when they arrive and decrease during time. However, organizations take this into account with regard to the scheduling of these departments.

DrieGasthuizenGroep, ZuidOostZorg, and Warande 'unroll' the workforce schedule every 4 weeks with one month. As a result, a workforce schedule with a 13-week duration is present during all times in the organization and the scheduling process is more evenly divided. At Laurens, the complete workforce schedule should be provided at once, 13 weeks in advance, but certainty is often provided per month. The RSZK should provide the complete 13 weekly workforce schedule one month in advance, which often turns out to be a monthly workforce schedule provided at least 14 days in advance.

## Human Capacity Management at centralized/decentralized level

---

We observe Human Resources Planning to be executed at decentralized level in the Elderly care organizations: it is conducted per region by a regional manager in combination with the departmental managers. Regarding all organizations, regional managers have financial responsibility over the Elderly care homes in their region. Subsequently, the financial (HR) planning is approved at strategic organizational level.

Workforce Scheduling is executed entirely centralized at two of the six Elderly care organizations (DrieGasthuizenGroep and Warande (in one region)). At two organizations (Laurens and ZuidOostZorg) Workforce Scheduling is executed decentralized by professionals at departmental level. At AxionContinu, a combination of both centralized and decentralized Workforce Scheduling is maintained: workforce schedules are created at departmental level and all departmental schedules are verified and closed at one centralized scheduling department. This department also provides scheduling courses to employees responsible for departmental Workforce Scheduling and offers a helpdesk function, to guarantee the quality of the initial workforce schedules. Regarding Laurens, team managers in Elderly care departments have a choice: they could execute the scheduling of their employees by themselves (or delegate this to a head nurse) or have the possibility to outsource this process to the regional scheduling department. If scheduling is outsourced, workforce schedules are both created, verified and closed afterwards at the regional scheduling department. However, team managers remain responsible.

The main reasons for a centralized approach are to relieve managers from scheduling activities, to improve the quality and equality of schedules, optimize the scheduling process, better use of ICT solutions, and to maintain an overview for organization/regional wide personnel deployment. Some organizations implemented a centralized scheduling department in the past but cancelled this decision chiefly because of the large distance experienced by the employees and departmental managers. This could be interpreted as low expected consultation of the workforce scheduler according to the theory. Regarding all organizations, the team-/departmental manager is always responsible for the created schedules and should take the lead when Rescheduling has to be applied. Because of the experienced lack of location flexibility in the organizations, team members (certainly regarding small-scaled living teams) often have to work extra shifts when absenteeism occurs among colleagues.

## Workforce schedule characteristics

---

Demand of work (represented by client-based indications) is considered to be subject to a certain level of variability, especially regarding longer time horizons. This also holds for the supply of work by the workforce; because of variables such as absenteeism, provided leave, education (possibly because of employee turnover), and work meetings. According to the organizations, absenteeism is considered to be of most influence on variability in the supply of work. After the introduction of the client-based financing structure, all organizations concentrated on the actual fit between the demand of work and the available quantity and quality of employees. The demand of work is predictable to a certain degree regarding the short term and could vary according to changes in the number and/or composition of client-based indications on a longer term. To maintain an appropriate fit, all six Elderly care organizations work with client contact persons to achieve renewed indications easier and faster when necessary.

On a daily basis, demand patterns are based on activities, which are included in a client's individual care protocol. These activities are planned within certain time slots and the needed capacity to fulfill them could be planned in advance. Besides these fixed patterns in the demand of work, rules and regulations concerning the standards of responsible care do also provide some certainty in advance regarding the needed labor capacity, such as continuous monitoring of Psycho Geriatric (PG) clients or the presence/accessibility of a higher educated nurse or physician within a specific time period, 24 hours a day.

Figure 4 illustrates an estimation of the daily demand pattern of an Elderly care department. The number of employees is fictitious, because this depends on the number and kind of clients in a department, the proportions of the different time slots are based on information obtained from the Elderly care organizations. The pattern is supposed to be equal regarding both Somatic clients and Psycho Geriatric (PG) clients. PG clients are often served in smaller groups because of the achieved mental rest (small-scaled living facilities). As a result, the needed number of employees to be present is smaller: often one permanent employee with educational level 3 and one employee with a lower educational level, mostly educational level two. As a result of this combination, the higher educated employee could concentrate on administrative or scheduling tasks during time slots with less demand for care. Because of this, the estimation shown in Figure 4 could be interpreted as a daily demand pattern of a Somatic client department because of the larger (fictitious) number of employees.

As illustrated, demand is stated to be highest during the morning ((1), around 8-11 am). During this period, clients have to be taken out of bed and provided with breakfast. In addition, medicine rounds have to be carried out as well as activities stated by a client's care protocol which should be fulfilled during this period. Besides this activities with time agreements within this period, time agreements could also be made because of practical reasons: to spread the activities over the day. The latter could be interpreted as Heijunka, because the workload is leveled by fitting the demand into a leveled schedule. The activities during 'peak 1' are provided by (full-time) employees during the morning shift. Given the large demand of work, these employees are often assisted by employees with part-time employment contracts who ideally leave around 11 am. During the afternoon ((2), around 12-14 am) a small increase in demand is included because of the providing of lunch which is still satisfied by the morning shift employees, sometimes assisted by relatives (mantelzorg). At the beginning of the evening ((3), around 5-8 pm), the morning shift is followed by the evening shift: dinner is served and clients are put to bed. The evening shift often starts around 3-4 pm. To finish these activities within a certain period of time, additional labor is needed by part-time employees, sometimes again combined with relatives. Later in the evening ((4), around 8-10:30 pm) clients are still put to bed, and after this period ((5), 10:30 pm – 8 am) the night shift takes over in accordance with the standards of responsible care.

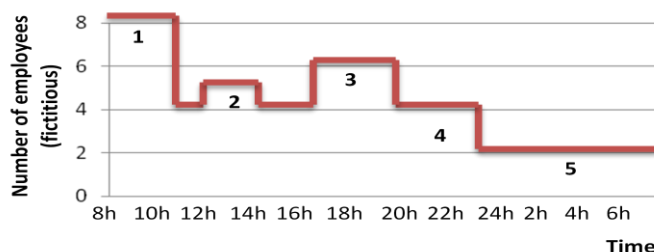


Figure 4: Estimation of a daily demand pattern of an Elderly care department.

Creating a proper fit between the varying demand of work and the deployment of staff results in complex Workforce Scheduling in Elderly care organizations. Primarily because of the demand of (recently graduated) employees to earn a certain income, larger employment contracts are desired. All of the six organizations, except DrieGasthuizenGroep and ZuidOostZorg, provide these larger employment contracts and take many personal wishes into account in order to attract new employees from the tight labour market. These contracts, which comprise at most 36 hours per week and are often achieved by shifts with a duration of 7,5 hours, do not match with the 'peaks' in demand as illustrated by figure 4. These 'peaks' last around 2 to 3 hours, which could be only fulfilled by large employment contracts in an efficient way when broken shifts are applied. Broken shifts are allowed by the collective labour agreement (CAO) in the intramural Elderly care when an interval of at least three hours is taken into account. However, it is unwanted by employees and therefore mostly prohibited by organizational rules. Because of this, employees with large employment contracts are deployed by use of uninterrupted shifts, which results in less deployment options towards employees with smaller (part-time) employment contracts.

If part-time employees put their private life in the first place and do not respect the contiguous days off concerning full-time employees as stated by the CAO, Workforce Scheduling becomes even more difficult. Because of this, basis scheduling patterns could not be implemented which results in (often undesired) non-cyclic workforce schedules regarding all employees. To overcome these difficulties, all organizations prefer smaller employment contracts because of the associated flexibility. To satisfy the current demand for larger employment contracts, organizations think about part-time allocations to a flex pool, which assures a certain amount of labor hours but does not have to state the location at which these labor hours should be fulfilled. Because of this, location flexibility is created. However, most employees are currently not willing to work at another department than their own, not to think of another location or region.

There is a strong decrease of available labour during the holiday season. Many women are employed in the sector, often with school going children. These employees want to go on vacation for three consecutive weeks including the weekends before and after, as stated by the CAO, during school holidays. A minimum amount of employees must be employed and because of this, all organizations pay much attention to the scheduling of the vacation period including mutual alignment between nurses if necessary. All six organizations use the annual hours system provided by the CAO to compensate the shortage of personnel during the holiday season. The first months of the year are used to build shortage hours, which are compensated in the holiday season. However, these excess-/shortage hours of employees are often balanced at the end of each week, month or quartile, dependent on the scheduler and the scheduling period chosen, with limited flexible employment of fixed employees as a result. Employees responsible for workforce schedules often think that shortage hours are wrong by definition and should be solved. All organizations intended to use the annual hours system as stated by the CAO, by which flexible measures could be obtained.

#### Collective or individual workforce schedules: level of employee influence

---

Workforce schedules in the intramural Elderly care are composed of a combination of both full-time and part-time employment contracts and could also include additional labour from other sources. Because workforce schedules are created mainly by the organization for all members of a team or organizational department at once, scheduling is performed at collective basis. Exceptions do exist, such as a group of night shift nurses at AxionContinu who create their own workforce schedules, independent of the collective departmental schedule. Workforce schedules at an individual basis occur by exception in all Elderly care organizations, often because of serious personal circumstances. These schedules are often cyclic (repetitive) by nature, to provide certainty on the long run. 'Self-scheduling' at the RSZK should also be noticed as Workforce Scheduling at collective basis because the schedule is created by one employee for the whole team. If 'Self scheduling' is applied according to the theory, all employees are actively involved in Workforce Scheduling activities, which makes the scheduling process more individualized.

All of the six Elderly care organizations offer some kind of influence to employees over their workforce schedules: 'hard' requirements and 'soft' wishes are provided to all employees in the organizations. Regarding the different levels of employee influence on working hours as defined by the NCSI (2009), *mutual exchange* of shifts is possible in all Elderly care organizations, provided that the minimum levels of quality and quantity are maintained. However, exchanges do not always occur in consultation with the scheduler or team manager, often with violations of the CAO/labour law or regulations concerning standards of responsible care as a result. Regarding the possible violations, the negative effects of poor sequences of shifts on work-wife balance and health are mentioned by some employees, which is in accordance with the theory.

As stated above, *repetitive schedules* are used by exception at individual basis because the variability in demand prevents the creation of cyclic schedules at collective basis. *Preference schedules* are not officially maintained by the organizations, but some scheduling procedures could be interpreted as such: In some organizations, employees responsible for the workforce schedules (or official workforce schedulers) state that they do know the employees they schedule personally, as well as their preferences. Because of this, 'self-



scheduling' applied at the RSZK could be interpreted as preference scheduling. However, preference scheduling is not always possible because of regulations, such as the obligatory phase out of employees mainly employed at night shifts because of health risks, as stated by the CAO. *Shift picking* and *Matching* are not applied in Elderly care organizations which also applies to *Self-scheduling* as defined by the NCSI.

#### Application of Workforce Scheduling ICT Tools

---

All Elderly care organizations do possess ICT Tools to assist employees involved in Workforce Scheduling with this complex task. However, the scheduling of the workforce is often carried out manually in the first place and scheduling software is only used as an administration instrument. This is in accordance with the theory found regarding hospital nurses. Badly organized (or used) scheduling software (inability to reproduce a complete work week on the computer screen) or the habit to create schedules manually are often heard. Scheduling on plain paper is a time consuming task, which is often performed by team-/departmental managers or scheduling employees. After scheduling on plain paper, concept schedules are presented to employees by use of MS Excel. After a certain period, the schedule is entered in the scheduling system with noticed violations of constraints as a common result. These violations could have been noticed in the first place, when the schedule was created by direct use of the system. In addition, mutations are often only implemented to plain paper schedules, with obsolete digital schedules provided to employees as a result. Requests for days off are usually introduced verbal or by a request list and if a web terminal is used, these requests are often processed manually in the plain paper schedules. Only in a few cases, including small-scaled living teams, a scheduling tool was used directly. As an example of the achieved efficiency, team managers at AxionContinu, who schedule their team by direct use of the scheduling tool, can take immediate action when violations of constraints do occur. This results in more qualitative workforce schedules in the first place and because of this, only two employees are needed at the centralized scheduling department to revise and close the more than 50 different workforce schedules of the whole organization. By doing this, the same Workforce Scheduling system is used as the systems at departmental levels.

## 5.2 Home care

---

### Human Capacity Management term: planning horizon, scheduling-, and publication period

---

The Home care department of Laurens uses a planning horizon of one year to estimate the size of the workforce, which is in accordance with the theory. This estimation is based on the number and types of hourly rates within the obtained client-based indicated budgets of the previous year. Beweging 3.0 focuses on the short term regarding their Human Resources Planning: the current size of the workforce in relation to the current demand. The reason for this short term focus is because of the tight labour market and the heavy competence: concentration on the development of care packages and the ongoing competition is supposed to be more valuable by the organization than focusing on a desired state that could not be achieved.

The maintained scheduling period of Laurens comprises 13 weeks, the same length regarding the intramural care departments. This scheduling length provides a lot of security on the long run, regarding the days at which employees should work. The actual allocation of Home care nurses to care routes is made on the short term, because of changes in the composition of the client population and the associated demand of work. Because of this, Beweging 3.0 prefers to shorten the publication period to 10 days, which is allowed in the Maternity care. Beweging 3.0 schedules their personnel for one or two periods at once (4 to 8 weeks), dependent on the Home care team. Regarding both organizations, structural requirements are taken into account and cyclical patterns are maintained as much as possible which result in predictable schedules to some extent.

#### Human Capacity Management at centralized/decentralized level

---

Concerning both Home care organizations, Human Resources Planning is executed at decentralized level: it is conducted per region at Laurens by a regional manager and by the Home care managers at Beweging 3.0. Subsequently, the HR planning has to be approved at the highest organizational level.

Workforce Scheduling is performed centralized at regional level: by the centralized scheduling department of the relevant region concerning Laurens and by planners of the regional Home care teams regarding Beweging 3.0. In the past, this decentralized Workforce Scheduling approach at regional level at Beweging 3.0 was changed into an organization-wide centralized approach by the introduction of a centralized workforce scheduling department. The gained efficiency improvements of this homogeneous scheduling approach did not outweigh the lack of communication that arose between team leaders, Home care nurses and client contact persons. Because of these poor results, the organization changed back into decentralized Workforce Scheduling. Because of the current decentralized approach at Home care teams, the planner could be directly consulted when new requests for Home care are received to check if these requests fit into the existing care routes. Concerning both organizations, because of the relatively small size of a Home care team, the planner and the Home care nurses know each other personally which results in better (ad hoc) scheduling solutions.

Due to this approach, Workforce Scheduling is both considered to be a primary activity and is executed in consultation with Home care nurses whenever necessary. As a result, team managers are relieved from scheduling activities, except from the final responsibility. However, centralized overview is not present in both organizations, which hinders (besides the lack of location flexibility) the exchange of Home care nurses between regions.

#### Workforce schedule characteristics

---

The demand for Home care on a daily basis is considered to behave according to a predictable pattern. Fixed shift patterns could be introduced resulting in cyclic workforce schedules for individual Home care employees, which is in accordance with the theory. However, the demand for Home care is largely influenced by both long- and short term variability. Regarding the short term, cancellations of Home care appointments (often because of hospital visits of client's, reported one day in advance) are common, as well as requests for Home care after hospitalization, which should often be directly fulfilled. Concerning the longer term, admittance of clients to Elderly care organizations, clients who pass away, new requests for Home care or requests for more extensive Home care influences the care routes of organizational care regions and the workforce schedules as a result. Because of this variability and because of the individualist performance of the job, employees are considered to adopt a flexible attitude towards the organization. Variability is also present in the supply of care and employee absenteeism is stated as the primary reason.

*Figure 5* illustrates an estimation of the daily demand of a regional Home care department. Again, the number of employees is fictitious because this depends of the number and kind of clients in a specific region. The proportions of the different time slots are based on information obtained.

During the first part of the morning ((1, around 7:30-10am) Home care is provided to clients based on fixed time agreements. These clients have to be prepared in time regarding their transport to daycare activities or because of in time supply of medicine. Clients with less important care needs are served later in this time slot or afterwards ((2), around 10-12am): mostly in order of registration.

During the afternoon ((3), around 12am-5pm) tasks could be spread more evenly compared with the first part of the morning (1), which results in a decrease of the needed number of employees. Besides providing care, lunch is provided whenever necessary.

At the beginning of the evening ((4), around 5-8pm), the evening shift arrives which replaces the large employment contracts in the morning shift. During this period, clients return from daycare, are provided with dinner, and are put to bed whenever needed.

During the evening ((5), around 8-10:30pm), the last regular Home care activities are provided.

Later in the evening and during nighttime ((6), around 10:30pm-7:30 am) both previously planned Home care (terminal care, for example) and requests by emergency calls are provided (dotted line). In case of Beweging 3.0, an ambulatory team of Home care nurses is present during this period and Laurens provides Home care during this time slot by intramural Elderly care personnel present in the Home care region.

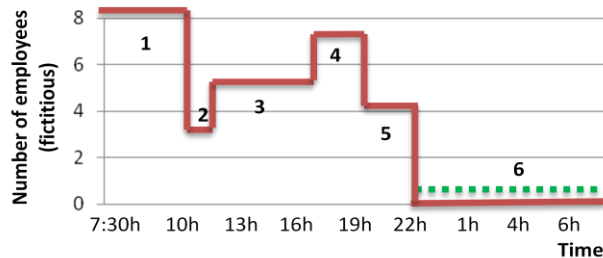


Figure 5: Daily demand at Home care region

Because of the 'peaks' in the daily Home care demand, the short term variability (such as cancellations/entries known one day in advance), the quality standards to keep the number of different Home care nurses per client as small as possible, the financing structure 'behind the front door', the execution at individual level, and the geographical spread of regions, Workforce Scheduling in Home care divisions may be considered to be of higher complexity compared with intramural Elderly care. This complexity results in non-cyclic workforce schedules. Given the 'peaks' in demand, small employment contracts between 16 and 24 hours are desired by both organizations. However, even as the intramural Elderly care, larger employment contracts are used to attract new Home care employees from the tight labour market. These contracts do often contain a fixed amount of non-care related hours during periods of less Home care demand, such as coaching and administrative responsibilities. Broken shifts (one 'fraction' per day) could be imposed by Home care organizations according to the CAO, but are not applied by both organizations due to unwillingness of employees. Concerning both the short term variability in Home care demand and the vacation period, excess-/shortage hours are used more and more to achieve more flexibility. Sometimes, the flexible attitude of employees (such as the use of leave hours) is appealed. However, the lack of location flexibility and the experienced difficulties with the exchange of intramural and extramural personnel result in even larger Workforce Scheduling complexity.

#### Collective or individual workforce schedules: level of employee influence

Because of the large amount of Rescheduling in the Home care sector, sufficient overview is required to accomplish an appropriate fit between the variable demand and the available resources. To achieve this, collective workforce schedules are created by planners in Home care regions, which could be compared with Team rostering as stated by Silvestro & Silvestro (2000). Employees exercise influence over their workforce schedules by 1 'hard' requirement and additional 'soft' wishes. This influence was increased by Laurens, where employees were given a blank sheet of paper to indicate when they would like a day off and when and at what time they are willing to work. This could be seen as preference scheduling (NCSI, 2009). The experienced decrease in the number of unpopular shifts by these employees indicates the possibility to improve the initial alignment between the available labour and the required capacity, with a decrease in mutual exchanges afterwards as a result. Given the already tolerated possibility of structural mutual exchanges at Laurens, the increased influence resulted in better workforce schedules in less time.

## Application of Workforce Scheduling ICT Tools

---

Because Home care nurses are allocated to clients instead of duty codes (as used at intramural Elderly care schedules), up to date workforce schedules are very important. As a result, Home care nurses are allocated to care routes consisting of clients by direct use of the Workforce Scheduling ICT system at both organizations. Regarding Beweging 3.0, 9 fte planning capacity is used to schedule all Home care nurses (296.38 fte) and review their registered hours. At Laurens, this system is the same as the system used for intramural Elderly care scheduling, which makes interchanges of nurses between these divisions easier to administer. Beweging 3.0 uses different scheduling systems, but also plans to integrate them to achieve a better exchange between intramural and extramural employees. However, we have to keep in mind that Home care requires employees who are able to operate independently and because of this, mutual alignment of ICT systems only is not enough.

Home care nurses at Beweging 3.0 are equipped with PDA's: by using this system, the provided nursing time could be registered, the client agenda could be consulted, and Workforce Schedules could be retrieved. Because workforce schedules could change as a result of client turnover, Home care nurses always know where to go and what to do. In combination with an extramural system for client's front door keys, Home care nurses are able to start working directly from home instead of the previous morning meetings at the Home care department, which is common at Laurens. This approach saves Beweging 3.0 around 300.000 euro salary costs at annual basis. Regarding Laurens, nursing time is registered at clients' homes.

### 5.3 Maternity care

---

#### Human Capacity Management: planning horizon, scheduling- and publication period

---

Regarding both Maternity care organizations, the Human Resources Planning comprises a planning horizon of 1 year. This length is chosen because it is based on the annually publicized LIP and annual birth rates, and is therefore updated annually. In addition, the number of client intakes during the planning period is also taken into account. The scheduling period of Careyn Kraamzorg consists of 13 weeks (quarter) and has a publication period of one month. Scheduling 13 weeks in advance given a largely unpredictable demand is possible because only the employees employed 'on roster' are scheduled in advance. These employees are considered to fulfill the minimum demand level for Maternity care, which is supposed to be constant. Because of this, employees 'on roster' are provided some certainty on the long run about when they are supposed to work and when they have their days off. Certainty regarding the actual work days could not be given because these depend on the Maternity care demand: only the start date for a working period (often consisting of eight contiguous days) and an indication of the number of hours could be given. Dé Provinciale Kraamzorg implemented a scheduling period of one month, introduced around 10 days before the schedule's start date, as stated by the CAO. Compared with Careyn Kraamzorg, the organization maintains these short scheduling and implementation periods because all employees with an employment contract are allocated to the workforce schedule. To match supply of labour with actual Maternity care demand as good as possible, short horizons are used. In addition, days off, holidays, vacation, and other factors known in advance are scheduled on the long term.

## Human Capacity Management at centralized/decentralized level

Human Resources Planning and Workforce Scheduling are executed at centralized level at both organizations: centralized at regional level concerning Careyn and centralized at organizational level regarding Dé Provinciale Kraamzorg. Because of the high variability of Home care demand, many scheduling expertise is needed, which is present in the centralized departments. According to Dé Provinciale Kraamzorg, workforce schedules have to be created in a short period of time, which is possible by a centralized Workforce Scheduling approach (Silvestro & Silvestro, 2000). By using a centralized regional approach by Careyn and four Maternity care head nurses to assist the centralized scheduling department at Dé Provinciale Kraamzorg, workforce schedulers are better accessible by Maternity care nurses and should be able to adapt more easily and effectively to local constraints. Because Maternity care nurses exert their profession mainly autonomous and start working from home, good contact with the planner is important especially for motivating flexible employees to work a couple of hours or getting things done by employees in busy times despite of certain personal constraints.

### Workforce schedule characteristics

Workforce Scheduling is considered to be a very complex activity because of both variability in the start date of a Maternity care period and its duration: between 24 hours at minimum and 80 hours at maximum could be delivered by a Maternity care organization during a contiguous period of 8 till 10 days. These hours are compensated by the basic health insurance as stated by the LIP. A common Maternity care period consist of 49 care hours when breast-feeding is provided and 45 hours if not, which is indicated during the first assessment and provided in eight contiguous days. However, the number of days does decrease when hospitalization occurs (both before or after the delivery) and could also change as a result of the second or third assessment: the number of hours could be decreased or increased according to the current circumstances. Because of this, an average duration of Maternity care could not be calculated. As stated by the Maternity care director of Careyn Kraamzorg: *“the average does not exist”*.

The distribution of the allocated hours over the contiguous days is not stated by the LIP: this must be at least three hours per day, during a period of eight contiguous days (seven when the delivery was not during regular labour hours during the first day: the Maternity care starts at the second day). Concerning most Maternity care organizations, the number of provided hours per day is phased out during the Maternity care period. However, other organizations divide the allocated hours equally over the days. This always is in consideration with the client, but in practice the most intensive Maternity care is needed during the first five days after the delivery. Careyn Kraamzorg provides the Maternity care according to the first option, which is illustrated by an estimated demand pattern in *Figure 6*: a common Maternity care period of 49 hours under standard circumstances.

During the first 5 days (1) Maternity care concentrates on care and monitoring of both mother and child. During these and the subsequent days (2,3) other tasks such as education and instruction and ensuring an appropriate amount of hygiene are executed. The intensity of the Maternity care is phased out as time progresses. When extra hours are allocated based on the second or third assessment, these hours are provided during some extra days (4). Other allocations of hours over the contiguous days are possible, certainly when extra hours are provided: the number of hours during the eight contiguous days could be phased out to a less extent when intensive Maternity care is still needed.

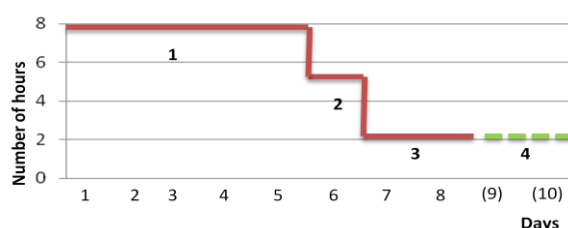


Figure 6: Maternity care demand in common situation

Despite the large amount of variability in Maternity care demand, certain patterns could be distinguished. Maternity care organizations are obliged to provide Maternity care to the clients they take in. Based on these intakes, an estimation of demand can be made, which includes clients' delivery day estimations. To satisfy this obligation for Maternity care and birth assistance by general practitioners, guard duties are commonly used. Based on the client intakes, forecasts and past experiences, a certain minimum level of demand could be draught, which could be indicated as predictable. The structural higher demand for Maternity care during the summer, 'geboortepiek': +10% during the summer of 2008, (ActiZ, BTN, ZN, NBvK and Sting, 2008) could be defined as a seasonal data pattern and is therefore also considered as semi-predictable. During the year, unpredictable demand does also occur. These data patterns are illustrated in *Figure 7*, where the Maternity care demand is fictitious because this depends on the growth of the organization and the number of births in a specific region. (1) indicates the minimum level of demand outside the summer period, (2) indicates the higher demand during the summer period ('geboortepiek') and (3) indicates the unpredictable demand pattern which could be satisfied by using overtime or other flexible labour solutions.

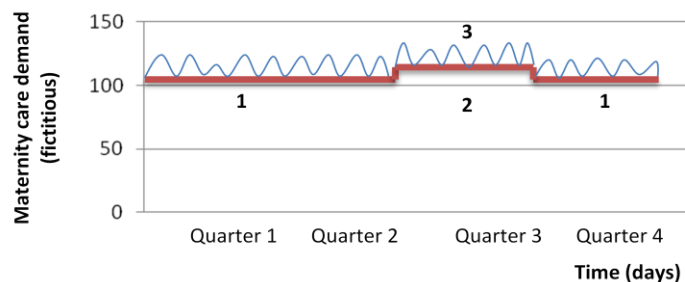


Figure 7: Annual Maternity care demand data pattern.

Like the Elderly- and Home care sectors, larger employment contracts are preferred by (recently graduated) employees, mostly to earn a certain income. However, full-time employment contracts (36 hours on a weekly basis) could not be offered because of the maximized number of Maternity care hours per client (decrease of the average Maternity care duration), as regulated by the LIP and the decreasing trend regarding the number of births (decrease of the Maternity care volume). In addition to this, a decreasing trend is noticed regarding the number of home births: clients prefer to give birth in another environment than their home situation. Because this trend influences both the number of performed usual assistance by general practitioners and the number of Maternity care hours by clients at home, Maternity care organizations already allocate nurses to both birth centers and maternity suites (in hospitals) which could be seen as a possible solution regarding the demand for larger employment contracts. As a result of all these developments, employment contracts of 24 hours are average in the Maternity care sector (Nivel, 2008).

As stated earlier, Careyn Kraamzorg only schedules a certain amount of their core employees for a period of eight contiguous days. Regarding Dé Provinciale Kraamzorg, all employees with an employment contract are included in the workforce schedule and allocated to such a period. After this period, a contiguous period of rest of at least 60 hours (interpreted as three days by both organizations) must be allocated according to the CAO. Concerning a common Maternity care period of 49 hours within 8 contiguous days, the employment contract consists of around 31 hours per week when a Maternity care nurse is able to provide all Maternity care to one client within a period. Careyn Kraamzorg commonly provides 89% of full-time employment contracts, which is between 70% and 90% of full-time at Dé Provinciale Kraamzorg. Full-time employment contracts (36 hours per week) are present at Careyn Kraamzorg, but exist of Maternity care hours supplemented with intake- and educational activities. Possibilities to enlarge the employment contracts are provided by the CAO, but could be partly counteracted by both organizational agreements and the demand for Maternity care. At Careyn Kraamzorg, for example, shifts are performed during regular working hours: between 8:00 and 16:00 and nurses could be maximally allocated eight hours per day according to organizational agreements. To meet an employment contract of 36 hours at a weekly basis within a working period of 8 contiguous days as maintained by both organizations, around 57 hours should be worked because of the subsequent obligatory rest period.

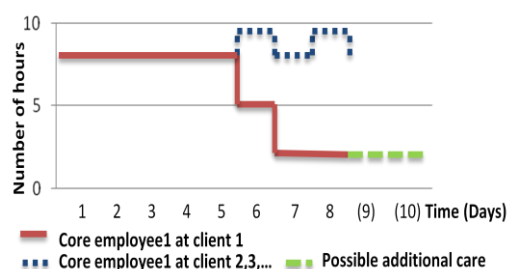
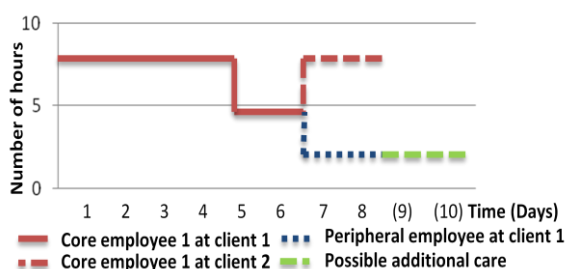
A schedule, that phases out during the number of provided Maternity care hours during the Maternity care period, could be an appropriate starting point for larger employment contracts. We provide two possible options (*illustrated by figures 8 and 9*):

- Large employment contracts (core employees) are allocated only to a initial client ('client 1') during the first couple of days ('large hours'). After this period, these core employees should be allocated to another client's ('client 2') intensive Maternity care days regarding the remainder of their working period and a 'small' employment contract (peripheral employee) should fulfill the remaining hours of the initial client ('client 1').
- Core employees are allocated to one client ('client 1') regarding all hours during the Maternity care period and fill up their daily hours worked during the last couple of days at other client(s) ('client 2,3,...').

Regarding the first option, a Maternity care period could not be accompanied completely by the same Maternity care nurse (Maternity care at 1:1 basis), which is the case regarding the initial client of the second option. According to the currently applied working period of 8 contiguous days, however, a complete accompaniment of a client is not possible if the first day of a maternity period does not match the start date of a core employee's schedule. This could be solved by using the CAO possibility to work 11 contiguous days followed by an obligatory rest period of at least 72 hours (three days) instead of the current 8-day shifts. Increased travel time should also be mentioned concerning the second option, which could be a reason to prolong the number of hours during a working day. According to the CAO, at most ten hours could be allocated during a working day, which can result in more effective nursing time when the time needed to travel between different clients is taken into account.

However, choices have to be made between the size of employment contracts, the level of security (when to work) provided by workforce schedules and the priority given to the delivery of Maternity care by a minimum amount of different nurses. When the organization prefers to keep this amount low, Maternity care nurses could be asked to work more than 8 contiguous days to finish the Maternity care period at one client or work more hours during a day. Because of the resulting variable shift length, nurses 'on roster' cannot be provided the certainty in advance when to work and for what period anymore. When enlarged shifts are administered, they should also be used as an instrument to balance the number of excess-/shortage hours, which are common in the Maternity care sector. Shortage hours will increase rapidly regarding employees with large employment contracts if these employees could not be allocated to Maternity care demand. In the end, shortage hours are costs for the organization.

Besides scheduling complexity caused by the variable demand, complexity is increased by recognizing personal constraints of Maternity care nurses. Constraints such as allergies and maximum travel distances are often recognized at Careyn Kraamzorg, and this organization also uses them regarding the recruitment of new employees. To achieve a workable situation, a balance should be found between the employer and the employees. If Maternity care employees are provided larger employment contracts, more travel time, more visits to different clients, and broken periods of care regarding clients should be taken into account. In addition to this, longer (consecutive) workdays should eventually be taken for granted.





### Collective or individual workforce schedules: level of employee influence

---

The scheduling approach at both organizations could be interpreted as collective: workforce schedules are heavily focused on the high variable demand. Because of that, schedules of eight contiguous days are created in which guard duties and excess-/shortage hours are common phenomena. As a result of this approach, structural requirements (besides personal restrictions) cannot be taken into account. Influence can be practiced only regarding incidental occasions by introducing requests for holidays and incidental days off before, or requests for days off during the current schedule. Mutual exchange after the introduction of or during a workforce schedule is not a conventional procedure, but possible. Because of this, the scheduling characteristic in Maternity care operations could be defined as the departmental rostering approach as stated by Silvestro & Silvestro (2000). At Careyn Kraamzorg, flexible (peripheral) employees have more influence over their 'workforce schedule' because these employees are not scheduled in advance. These employees are allowed to reject requests for work, provided that they satisfy their obligations as stated by the employment contract.

### Application of Workforce Scheduling ICT Tools

---

Workforce Schedules are created by direct use of the scheduling tools at both organizations. Because Maternity care demand is highly variable and demand for birth assistance could emerge at all times during a day, up to date workforce schedules are very important. At Careyn Kraamzorg, 200 Maternity care nurses are scheduled by six professional workforce schedulers. On the short term, Maternity care nurses are contacted by planners when demand occurs, and Maternity care nurses contact the planners when their daily client hours are finished to ask if they are needed elsewhere. Because of this, Workforce Scheduling is a continuous process. The effectiveness of the schedules (their ability to cope with the high complexity) is largely dependent on the qualities of the workforce schedulers. To decrease this dependence, Careyn Kraamzorg develops an intelligent planning tool which must be able to provide a number of different deployment options with their effects, such as the influence on excess-/shortage hours or the number of different Maternity care nurses allocated to a client. Because of this, more efficient workforce schedules are expected to be obtained by the organization.

## 5.4 Linking the data to the propositions

---

Based on the collected case study evidence shown in the results section, the theoretical propositions will be discussed. A proposition will become plausible when collected case study data is consistent with its underlying relationship and objectionable if not. When consistent case study evidence is not found, the underlying relationship in the research context should be changed.

### Proposition 1:

---

*The introduction of the client-based indicated budgets (ZZP's)/ national indication protocol for Maternity care (LIP) resulted in changed approaches of Human Resources Planning, Workforce Scheduling, and Rescheduling.*

After the introduction of the changed legislation and associated financing structure, both Elderly care and Maternity care organizations began to realize that appropriate Human Capacity Management is of great importance regarding the financial position of the organization. This also applies for Home care organizations, which are financed based on hourly rates for still a long time. Regarding Human Resources Planning, all organizations revised their workforce both quantitatively and qualitatively based on client indications, and clients' individual preferences are more and more taken into account. Workforce Scheduling changed because of the increased importance of the alignment between demand of work and supply of labour. Rescheduling also changed, because of the changed ways by which labour flexibility is (or will be) realized.



In addition, the changed CAO legislation (especially regarding leave hours and extended deployment possibilities of employees aged 55 and above) also influences both Human Resources Planning and Workforce Scheduling of EHM organizations. Besides this, the understanding arose that Human Capacity Management could be used as an instrument to cope with shortages on the labour market. Based on these findings, proposition 1 is supposed to be plausible. However, it should be extended because of the relationships found between Human Capacity Management and the changed Collective Labour Agreement (CAO) and the (tight) labour market.

#### Proposition 2:

*The characteristic of the demand of work (predictable, semi-predictable, or non-predictable) does affect the level of employee influence on workforce schedules.*

In both Elderly care and Home care organizations, the integral demand pattern could be defined as being relatively predictable over a longer period. Employees are allocated to clients regarding Home care organizations, allocated to days concerning Maternity care organizations, and allocated to duty codes in Elderly care organizations. Because of the certain level of predictability, 'hard' requirements and 'soft' wishes of employees could be taken into account by both Elderly care and Home care organizations, even as requests for mutual exchanges. Examples found of higher administered levels of employee influence are 'self-scheduling' as provided by the RSZK and preference scheduling in a Home care department at Laurens. Regarding the Maternity care organizations, only 'soft' wishes of employees could be taken into account as a result of the maintained scheduling period of 8 contiguous days.

In addition to the characteristic of the demand of work in the different organizational sectors, the care concept and the composition of the workforce also seems to affect the level of employee influence on their workforce schedules. At the RSZK, scheduling in small-scaled living teams could be defined as team-rostering stated by Silvestro & Silvestro (2000) or preference scheduling as stated by the NCSI (2009), with certain employee influence as a result. In addition, Maternity care nurses are often able to influence their schedules when 1:1 supply of Maternity care is applied: because of the bond between the nurse and the client, working times could be adapted in favor of the former. The broad representation of woman in the workforce also influences the workforce schedules, because employers have to take wishes regarding employees' private lives into account, which are often based on the age of their children. Based on the case study evidence found, proposition 2 seems to be plausible. The care concept and the workforce seem also to be of influence.

#### Proposition 3:

*More employee influence on workforce schedules leads to a decrease of employee turnover and absenteeism.*

One of the results of a two-year 'self-scheduling' pilot at several departments of the RSZK (n=315, response rate: 56%) during 2007-2009, was a decrease in employee absenteeism compared with departmental rostering in the former situation. In addition to this, the number of mutual exchanges after the introduction of the workforce schedule also decreased. It is believed by the organization that employee turnover will increase if too much (location)flexibility is mandated to employees. Due to this reason, employee turnover is expected to decrease if employee influence on workforce schedules increases. As stated by a Works Council representative of Careyn Kraamzorg, the changed CAO regulation (increased organizational opportunities) regarding the employment of employees aged 55 and above is considered to be of influence on employee absenteeism. As a result of the changed regulation, 55+ employees are provided less influence on their workforce schedule. Preference scheduling, as applied at a Home care department of Laurens, resulted in a better work-life balance according to an involved employee. According to Bambra et al. (2007) this could be a positive effect of the implemented self-scheduling method as well as beneficial effects on health which could result in turn in a decrease in employee absenteeism. Because of these findings, proposition 3 seems to be plausible.



## 6 Conclusions and recommendations

---

The central research question was stated as follows: *“How is Human Capacity Management (i.e. Human Resources Planning, Workforce Scheduling, and Rescheduling) currently applied in Elderly care, Home care, and Maternity care (EHM) organizations and how could it be improved with a better balance between employees, operations management, and client care as a result?”* In order to answer this question, a literature study on the subject was conducted and practical data from the case study organizations was obtained. The answer to the central research question will be formulated by the conclusions and recommendations.

### 6.1 Conclusions

---

#### *Little emphasis on Human Resources Planning, which results in difficulties regarding Workforce (Re)scheduling*

---

Regarding Human Resources Planning, all organizations maintain a planning horizon of one year, which is combined with the determination of the annual financial budgets. Because of the changed general Law for special healthcare (AWBZ), client-based indicated budgets are particularly used for the determination of the size of the departmental workforce (fte budgets), and proper determinations of the composition of the workforce are not being made. In addition to this, larger (up to full-time: 36 hour) employment contracts are often used as a recruitment instrument, which complicates the Workforce Scheduling process because of an experienced lack of flexible attitude among employees. As a result, difficulties are experienced regarding Workforce Scheduling: large employment contracts are scheduled first, resulting in little possibilities for smaller employment contracts. This also leads to difficulties with Rescheduling: large employment contracts are difficult to replace and less flexible labour is available given current workforce compositions. Currently, some organizations (at least intend to) concentrate on the composition of the workforce in relation to client-based indicated budgets.

#### *Workforce Scheduling and Rescheduling often executed decentralized as additional function, large distances experienced by employees if centralized scheduling department is applied*

---

At five of the six Elderly care organizations, Workforce Scheduling is executed decentralized per department (by the team manager or delegated to an employee, as additional function) or location (by workforce schedulers). One Elderly care organization implemented an organization-wide scheduling department existing of workforce schedulers, and another Elderly care organization implemented a centralized scheduling department in one of the three regions. The objective of both organizations is to increase the effectiveness and efficiency of the workforce scheduling process, to relieve team managers from scheduling tasks and to improve the quality of workforce schedules. However, large distances are experienced between employees and the centralized Workforce Scheduling department, which often leads to difficulties regarding contacting flexible labour by use of centralized flex pools in case of Rescheduling. The two Home care organizations use centralized scheduling departments per region, which also counts for one of the two Maternity care organizations. Regarding the second Maternity care organization, centralized scheduling is applied because of its single location. Regarding both Home- and Maternity care organizations, Workforce Scheduling is executed by workforce schedulers and no distances are experienced by employees. However, one Home care organization once centralized their workforce schedulers, with experienced distances by employees as a result. Because of this, the organization decided to return to the scheduling of their Home care teams at decentralized level.

#### *Longer scheduling-, and publication periods maintained, appreciated by employees*

---

Six of the nine organizations maintain a scheduling period of 13 weeks: an annual quarter. Within this period, organizations try to use the excess-/shortage hours as stated by the CAO to obtain more flexibility regarding the allocation of employees: to 'save' labour capacity during 'quiet' periods to solve both 'peaks' in demand, and to achieve the minimum requirements with less personnel during the vacation period or in case of Rescheduling. In addition to this, quarterly workforce schedules are also aligned to some CAO regulations, for example the maximum number of night shifts during this period. Four organizations 'unroll' their workforce schedules monthly with one month, other organizations introduce the complete length of a workforce schedule at once. Longer scheduling- and publication periods are appreciated by employees because they provide certainty a long time in advance, and over a long period when to work: appointments can be made regarding their private life. However, most recent updates of workforce schedules are often provided by organizations around 14 or 10 days before their start date. This is in accordance with the CAO and because of short term changes in demand or unfilled 'gaps' in the schedule.

#### *Provided influence to employees over their workforce schedules does not result in cyclic schedules*

---

All organizations provide a considerable amount of voice to their employees regarding their workforce schedules. Concerning all Elderly- and Home care organizations, at least one 'hard' requirement is allowed which is defined as a (part of the) day at which an employee structurally does not want to work. In addition to this, 'soft' wishes could be communicated (during both the conceptual stage of a workforce schedule or after the start date) to the team manager, employee, or scheduler responsible for the workforce schedules. Generally, 'soft' wishes are accepted, as long as the possibility exists. Regarding Maternity care organizations, employees only have the possibility to communicate 'soft' wishes, both before and after the introduction of the workforce schedule because of the shifts of 8 contiguous days. Except at Maternity care organizations, mutual exchanges of shifts among equal levels are possible by approval of the team manager, provided that the standards of responsible care are guaranteed.

Because of the understood benefits by both employer and employees, cyclic workforce schedules composed of basis patterns are desired by all organizations. However, none of the organizations achieved to implement these schedules at collective basis: the high variability in demand and experienced difficulties regarding the alignment of workforce schedules of core and peripheral (flexible) employees are stated as main barriers. Only some patterns do appear in workforce schedules, but not that structural to form cyclic workforce schedules. These schedules are only present by exception at individual level, often because of personal circumstances.

#### *ICT Tools generally underused in almost all organizations*

---

The last couple of years, Elderly care, Home care, and Maternity care organizations invested in ICT Tools in order to achieve efficient scheduling of their scarce Human Resources. However, inefficient scheduling practices have been found regarding scheduling team managers/employees at Elderly care organizations and even at a centralized scheduling department consisting of rehabilitated employees: workforce schedules are often created manually, because direct use of the ICT Tools is considered to be difficult. It often turns out that restrictions are violated and that excess-/shortage hours of employees are not taken into account or are not used effectively. Regarding the Home- and Maternity care organizations in this research, workforce schedules are created by schedulers by direct use of the ICT Tools available. Concerning Elderly care organizations, decentralized Workforce Scheduling tools do not interact with each other or with intramural scheduling systems regarding Home care divisions, which results in the underuse of the (allocation of) the workforce. However, the changed Law for special healthcare (AWBZ) concerning both Elderly- and Home care organizations and the introduction of the LIP regarding Maternity care organizations have provided understandings regarding the necessity of appropriate Human Capacity Management achieved by direct use of ICT Tools.

## 6.2 Recommendations

### *Professionalize Human Capacity Management in the organization*

Given the shortages on the labour market and the ageing population, organizations must invest in more effective and efficient use of their resources. The obtained insights by the changed financing structures should be used to improve Human Capacity Management. Regarding Human Resources Planning, client-based indicated budgets present should be used to draw up the composition of the desired workforce (concerning both employment contracts and educational levels). Subsequently, plans should be made regarding the achievement of the desired situation. To assure an appropriate composition of the future workforce, actual demand information should be registered (which could be done by the implementation of a real-time electronic client file) and used as input for forecasting methods. Subsequently, workforce schedules should be created by correct use of the already present ICT Tools. All stakeholders involved in the Workforce Scheduling process (including employees) should be offered sufficient knowledge to perform scheduling related tasks in an effective and efficient way. Dependent on their specific tasks, sufficient knowledge of both ICT Tools and the relevant regulations such as the collective labour agreement (CAO) and the labour law could be of influence. Because of this, all stakeholders involved should understand the consequences of their influence on the workforce schedules which should finally result in more effective and efficient schedules. In addition, workforce schedules could also be consulted by employees by use of a computer interface.

### *Provide employees more influence on their workforce schedules*

Because of the high work pressure experienced by employees, the irregular working times, and the shortage of personnel on the labour market, EHM organizations should provide employees more influence on their workforce schedules. As demonstrated by earlier research, increased influence could contribute amongst other things to a better work-life balance, decreased employee absenteeism, and decreased employee turnover. By using a computer interface, provided influence is directly supported by a computerized system, which makes all activities easier and less time consuming for all stakeholders involved. Paying increased attention to the individual preferences of employees could also be used as a recruitment instrument, instead of the current offerings of larger employment contracts with less labour flexibility of employees in return. However, a healthy balance should be found between the interests of both the organization and its employees. The organization must pay attention to the interests of employees in order to maintain a pleasant employment relationship. On the other hand, employees must pay attention to the organization's staffing requirements and other constraints and should adopt a certain flexible attitude given the nature of the job. Because of this, flexibility measures stated by the collective labour agreement (CAO) should be possibly adopted to a reasonable extent, which could improve the current experienced difficulties regarding the allocation of large employment contracts into basis schedules and the use of flexible employment contracts to complete the workforce schedules. As a result, additional large employment contracts could become possible.

### *Organizational position of Human Capacity Management: centralized overview should be maintained*

When employees are provided more influence over their workforce schedules, organizations must think about ways to organize this. In this research, different workforce scheduling approaches have been found: fully centralized (by organization-wide centralized scheduling department), centralized at regional level, decentralized at departmental level with centralized verification, and fully decentralized at departmental level without centralized verification. Independent of the approach chosen, centralized overview should be maintained. This overview could be achieved by an organization-wide, centralized scheduling department or by exchanges of data between ICT Tools applied decentralized in the organization. However, it should always be combined with the presence of Workforce Scheduling professionals. Overview is needed regarding the allocation of flexible labour. Besides this, it should result in more efficient Rescheduling of labour and in healthier workforce schedules because of insights concerning possible violations of the CAO and the labour law. In addition, regulations concerning standards of responsible care could be better fulfilled because of insights in the consequences of mutual exchanges, amongst other things.

*Cooperation should be achieved among organizations regarding the computerization of Human Capacity Management*

---

All Elderly care, Home care, and Maternity care organizations are dealing with changing circumstances and have gained both knowledge and experiences regarding Human Capacity Management individually. Despite the differences in nature between the sectors, organizations should share their knowledge and experiences and translate them to their own individual situation in order to bring their Human Resources Planning, Workforce Scheduling, and Rescheduling to a higher level. Professional organization ActiZ could take the lead by bringing member organizations in touch with each other. Placed in a broader context, knowledge could be shared with other organizations, such as hospitals or cleaning companies regarding extramural services.

### 6.3 Discussion and recommendations for further research

---

By implementing a multiple-case study design, consisting of multiple organizations per sector, both comparisons could be made between sectors and between organizations active in a specific sector. This is often considered more compelling and it improves the generalizability compared with a single-case study design. However, higher levels of detail should have been possible by implementation of a single-case study design.

However, the external validity of the research data must be questioned because of several reasons. This research is commissioned by employer's association ActiZ and therefore conducted among its members. In addition to this, the selection of participants was biased because nonprobability sampling was applied only among 50 members provided by ActiZ, and subsequently only among members interested to participate in the research. Because of a limited amount of resources, purposive sampling was used to secure the representation of different company sizes, sectors, regions and innovative behaviors. This resulted in the admission of nine organizations to represent the three sectors: Elderly care, Home care and Maternity care. Because of this, generalizability per sector is very questionable: Elderly care is only represented by six organizations, and both Home care and Maternity care sectors by only two organizations each. Despite of this, much similarities between organizations in a specific sector and between the different sectors have been found which provide some stronger generalization of the case study results.

Concerning the collection of the data, difficulties did arise. To obtain information from several disciplines in the organization and regarding the reliability of the obtained evidence, several stakeholders at different organizational levels were interviewed. Because of the broad character of the general research and the involvement of four students, the interviews were evenly divided. Focused interviews were conducted in pairs of two students and had a guided conversational nature. However, the limited amounts of time, the limited experience of the students as interviewer, and the theme specific specialization of each of the four students resulted in differences in the obtained information compared with the set questions derived from the case study protocol. This often resulted in (an) inadequate (amount of) information concerning some of the themes of the general research. Regarding this theme specific research, we decided to distribute an additional questionnaire to the contact persons of the concerned case study organizations to obtain missing information and to validate the already obtained information. Looking back on this, interviews with stakeholders expected to be relevant regarding one of the four specific research themes should have been conducted by the student responsible for this theme. Probably, the needs of the line of inquiry could have been better satisfied.

Because of the determined importance of effective and efficient Human Capacity Management in both Elderly care, Home care, and Maternity care organizations because of the changed financing structure, the current and expected shortages on the labour market, and the ageing of the population, further research should be applied. Regarding the generalizability of the findings, further research should be extended to a complete sector. If organizations are willing to change their Human Capacity Management, pre- and posttests could be applied to measure the influence of these changes on certain outcomes.

As stated by this research, limited emphasis is placed by EHM organizations on Human Resources Planning. Because this long term planning phase concentrates on the composition of the workforce, a combination with research on labour flexibility is supposed to be of great relevance regarding the improvement of this long term planning phase in organizations. Research could be conducted to explore the relationship between the applied level of labour flexibility concerning Human Resources Planning and the experienced level of difficulties regarding the scheduling and rescheduling of the workforce.

Regarding the computerization of Human Capacity Management in Elderly care, Home care, and Maternity care organizations, earlier research at hospitals should be extended. Constructive research should be applied to develop a sector-specific mathematical model based on operations research methodology, which takes into account all relevant constraints and possible influences of employees. As a result, more effective and efficient Human Capacity Management specified for EHM organizations should arise.

Finally, a longitudinal research could be conducted to find out if Human Capacity Management of organizations improves after the introduction of (already existing) Human Capacity Management ICT Tools (in combination with the Electronic Client File and Personnel Registration System). Because of the involvement of several stakeholders regarding Human Capacity Management, outcomes at both organizational-, employee-, and client levels should be observed.

## References:

---

- [1.1] Internetsite min vws, geraadpleegd: 5-06-2009
- [1.2] Adviesaanvraag AWBZ 18 april 2008 Langdurige zorg verzekerd: Over de toekomst van de AWBZ (website SER, geraadpleegd: 12-6-2009).
- [1.3] Landelijk indicatieprotocol kraamzorg (LIP) 2009
- ActiZ, BTN, ZN, NBvK and Sting (2008). *Plan van aanpak 2008-2010 arbeidscapaciteit kraamzorg*.
- Ala-Mursala, L., Vahtera, J., Kivimäki, M., Kevin, M.V. & Pentti, J. (2002). *Employee control over working times: associations with subjective health and sickness absences*, J Epidemiol Community Health, Vol. 56, 272-278
- Bailyn, L., Collins, R., Song, Y. (2007). *Self-scheduling for hospital nurses: an attempt and its difficulties*, Journal of Nursing Management, Vol. 15, 72-77
- Bambra, C.L., Whitehead, M.M, Sowden, A.J., Akers, J. & Petticrew, M.P. (2008). *Shifting Schedules: The health Effects of Reorganizing Shift Work*, Am J Prev Med, Vol. 34(5), 427-434
- Bard, J.F. & Purnomo, H.W. (2005). *Hospital-wide reactive scheduling of nurses with preference considerations*, IIE Transactions, Vol. 37, 589-608
- Beer M., Lawrence, P.R., Mills, D.Q., Spector, B. & Walton, R.E. (1984). *Managing Human Assets*. New York: The Free Press
- Bicheno, J. (2008). *The Lean Toolbox for Service Systems*. Buckingham: Picsie Books
- Burke, E.K., De Causmaecker, P., Vanden Berghe, G. & Van Landeghem, H. (2004). *The state of the art of nurse rostering*, Journal of scheduling, No. 7, 441-499
- Cheang, B., Li, H., Lim, A. & Rodrigues, B. (2003). *Nurse rostering problems – a bibliographic survey*, European Journal of Operational Research, Vol. 151, 447-460
- Daft, R.L. (2001). *Organization Theory and Design*, Thomson Learning South-Western
- Dalton, D.R. & Mesch, D.J. (1990). *The Impact of Flexible Scheduling on Employee Attendance and Turnover*, Administrative Science Quarterly, Vol. 35, 370-387
- De Leede, J., Cox-Woudstra, E., Goudswaard, A., Van Rhijn, G., Van Schie, J., Tuinzaad, B., Van Veldhuizen, A. (2002). *Flexibele inzet van personeel in productiebedrijven Praktijkvoorbeelden Trends Effecten Instrumenten*. TNO Arbeid, TNO Industrie, Hoofddorp.
- Drouin, R. & Potter, M. (2005). *Flexible scheduling: exploring the benefits and the limitations*, AJN November 2005, Vol. 105(11), 72E-72-F
- Ernst, A.T., Jiang, H., Krishnamoorthy, M. (2004). *Staff scheduling and rostering: A review of applications, methods and models*, European journal of operational research, 153, 3-27
- Evers, G.H.M. & Verhoeven, C.J. *Human Resources Planning. Een integrale benadering van personeelsplanning*. Deventer. Kluwer, 1999.
- Fagerström, L. & Bergbom Engberg, I. (1998). *Measuring the unmeasurable: a caring science perspective on patient classification*, Journal of Nursing Management, Vol. 6, 165-172
- Fitzpatrick, J.M., While, A.E. & Roberts, J.D. (1999). *Shift work and its impact upon nurse performance: current knowledge and research issues*, Journal of Advanced Nursing, Vol. 29(1), 18-27



- Ghosh, B., Cruz, G. (2005). *Nurse requirement planning: a computer-based model*, Journal of Nursing Management, Vol. 13, 363-371
- Goudswaard, A., De Leede, J., Van Hooff, M., Brugman, T., Klein Hesselink, J., De Leeuw, M., van Rhijn, G., Gruyters, R. (2007). *De toekomst van flexibele arbeid*. TNO, Hoofddorp.
- Hung, R. (1992). *Improving productivity and quality through workforce scheduling*, IM, November/December
- Hayes, R., Pisano, G., Upton, D., Wheelwright, S. (2005). *Operations, Strategy, And Technology Pursuing The Competitive Edge*, John Wiley & Sons.
- Hopp, W.J., & Spearman, L. (2000). *Factory Physics: Foundations Of Manufacturing Management*, McGraw-Hill.
- Johnson, G., Scholes, K., Whittington. (2008). *Exploring Corporate Strategy*, Pearson Education Limited.
- Kerin, A. & Aguirre, A. (2005). *Improving Health, Safety, and Profits in Extended Hours Operations (Shiftwork)*, Industrial Health, Vol. 43, 201-208
- Liker, J.K. (2004). *The Toyota Way*. New York: McGraw-Hill.
- Maier-Rothe, C. & Wolfe, H.B. (1973). *Cyclical scheduling and allocation of nursing staff*. Socio-Economic Planning Sciences, Vol. 7, 471-487
- Millar, H.H. & Kiragu, M. (1998). *Theory and Methodology. Cyclic and non-cyclic scheduling of 12 h shift nurses by network programming*, European Journal of Operational Research, 104, 582-592
- Moz, M. & Vaz Pato, M. (2004). *Solving the Problem of Rerostering Nurse Schedules with Hard Constraints: New Multicommodity Flow Models*, Annals of Operations Research, Vol. 128, 179-197
- NCSI (2009). *Individueel roosteren: kansen voor werkgevers en werknemers*.
- Nivel (2008). *Monitoring Kraamzorg III; Ontwikkelingen in het aanbod aan kraamverzorgenden: in- en uitstroom bij opleiding en beroep*, T.A. Wiegers.
- Pierce, J.L. & Newstrom, J.W. (1983). *The design of flexible work schedules and employee responses: relationships and process*, Journal of occupational behaviour, Vol. 4, 247-262
- Prismant (2008/2009). *Arbeid in Zorg en Welzijn*, Prismant, Utrecht.
- Reid, R.D. & Saunders, N.R. (2005). *Operations Management An Integrated Approach*, John Wiley & Sons.
- Rönnberg, E. & Larsson, T. (2009). *Automating the self-scheduling process of nurses in Swedish healthcare: a pilot study*, Health Care Management Science, DOI 10.1007/s10729-009-9107-x
- Rose, S., Hunt, T., Ayers, B., *Adjust the Balance: Literature Review Life Cycles and Work Life Balance*. Centre of health Psychology Staffordshire University Stoke on Trent, 2007.
- Silvestro, R. & Silvestro, C. (2000). *An evaluation of nurse rostering practices in the National Health Service*, Journal of Advanced Nursing, Vol. 32, No. 3, 525-535
- Slack, N., Chambers, S., Johnston, R. (2007). *Operations Management And Quantitative Analysis In Operations Management*, Pearson Education.
- Tausig, M., Fenwick, R., *Unbinding time: Alternate Work Schedules And Work-Life Balance*. Journal of Family and Economic Issues, vol 22 (2), Summer 2001

Teahan, B. (1998). *Implementation of a self-scheduling system: a solution to more than just schedules!*, Journal of Nursing Management, Vol. 6, 361-368

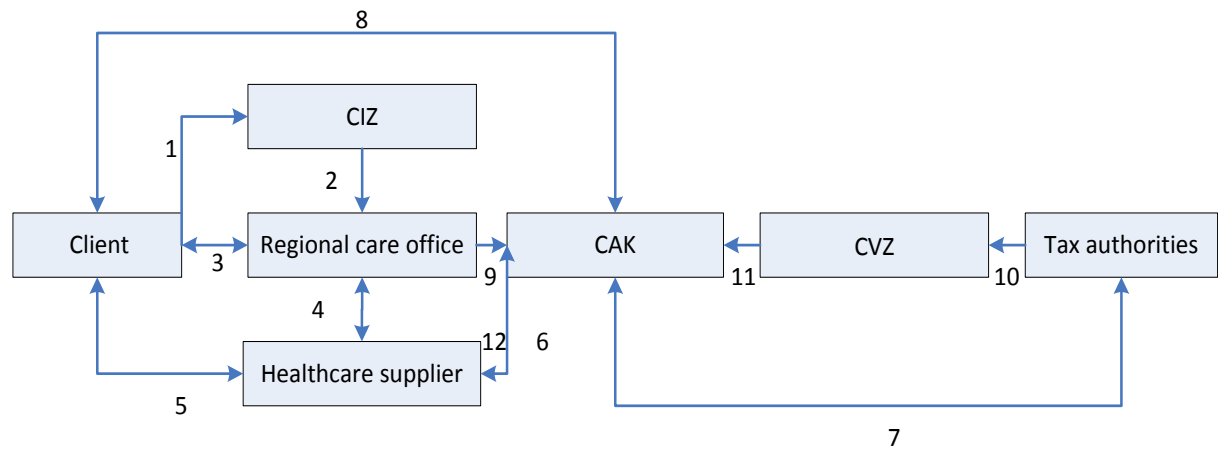
Venkataraman, R. & Brusco, M.J. (1996). *An Integrated Analysis of Nurse Staffing and Scheduling Policies*, International Journal of Management Science, No. 1, 57-71

Wright, D.P., Bretthauer, K.M., Coté, M.J. (2006). *Reexamining the Nurse Scheduling Problem: Staffing Ratios and Nursing Shortages*, Decision Sciences Institute, Vol. 37, No. 1, 39 – 70, February 2006

Yin, R.K. (2009). *Case Study Research: Design and methods*, Sage Ltd.

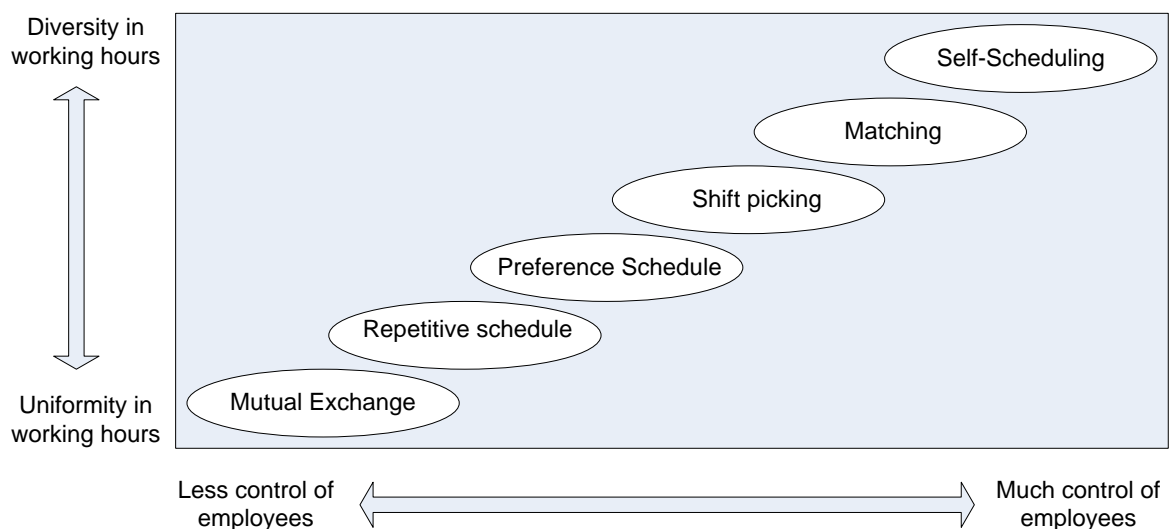
## Appendices:

### Appendix A: AWBZ-process flowchart [based on 1.2]



1. Client contacts CIZ for a client-based indicated budget.
2. If approved, CIZ draws up the indicated budget and sends it to the regional care office.
3. In consultation with the client the regional care office arranges a place at a suitable healthcare supplier.
4. The regional healthcare office sends the indicated budget to the specific healthcare supplier.
5. The healthcare supplier contacts the client and the specific care can be provided.
6. The healthcare supplier contacts the CAK for the calculation of the clients' obligatory financial contribution.
7. CAK retrieves the clients' income from the tax authorities.
8. CAK charges this contribution from the client.
9. The regional care office instructs the CAK to transfer AWBZ public money to the healthcare supplier, based on the negotiated agreements.
10. CVZ acquires the AWBZ public money from the tax authorities.
11. CAK acquires this money from the CVZ.
12. CAK transfers the AWBZ public money to the healthcare supplier.

### Appendix B: Different forms of scheduling at an individual basis (based on NCSI (2009))



## Appendix C: Phone call questionnaire

---

### 1. Introductie

Goedemorgen/middag, u spreekt met ... en ik ben student Bedrijfswetenschappen aan de Universiteit Twente. Zoals u wellicht weet, voeren wij in opdracht van sociale partners VVT een onderzoek uit naar de inrichting van de arbeidsduur en werktijden binnen de VVT-sector en de kraamzorg.

Wij willen graag weten hoe uw instelling omgaat met arbeidsduur en werktijden en ook of uw instelling bereid is om als case study te fungeren. Komt dat op dit moment gelegen (duurt ongeveer 15 minuten)?

*Zo nee: Direct proberen een terugbelafspraak te maken.*

*Zo ja: Verdergaan met het stellen van de onderstaande vragen.*

### 2. Algemene vragen

Binnen welke sector zijn uw werknemers werkzaam? ... (VVT of kraamzorg – enkelvoudig of samengesteld)

Uit hoeveel fte's (totaal aantal) bestaat uw instelling? ...

Uit hoeveel fte's bestaat de door uw instelling verleende zorg (VVT of kraamzorg)? ...

Hoeveel medewerkers binnen het primaire proces werken er binnen uw instelling in de VVT of kraamzorg?

Wat is de gemiddelde leeftijd van het personeelsbestand van de medewerkers? ...

Wat is het ziekteverzuim voor de zorgverleners binnen uw instelling in 2008? ...%

Is deze trend stijgend of dalend?

### 3. Specifieke vragen arbeidsduur en arbeidstijd

Wat is de gemiddelde arbeidsduur voor de zorgverleners binnen uw instelling? ... Welke contractvormen komen er binnen de instelling voor? En in welke verhoudingen? ... onbepaalde tijd - bepaalde tijd – extern (niet in loondienst) – oproepkrachten – jaarurencontracten – min/ max contracten.

Kan de organisatie met dit soort contracten het werkaanbod aan?

Zijn er knelpunten?: Overwerk, onregelmatige diensten, gebroken diensten, onregelmatige werktijden

Zijn er knelpunten die u binnen uw instelling constateert, betreft de arbeidstijd/ arbeidsduur en werkdruk?

Hoe wordt hier mee omgegaan binnen uw instelling? ...

### 4. Planning

Zorgen deze medewerkers voor een juiste 'dekkingsgraad' (capaciteitsplanning) voor de te bieden zorg? ...

Hoe wordt er gepland: (centraal/decentraal, collectief of individueel)

Is er sprake van verstoringen in het rooster? (structureel of uitzonderlijk).

Indien ja: hoe worden deze opgelost?

Hoe ver van te voren staat het rooster vast? Is de medewerker er dan ook van op de hoogte?

Hebben medewerkers inspraak bij de totstandkoming van het rooster?

Is men op de hoogte van de voorkeur van de medewerkers?

Hoe gaat u instelling om met vakantietijd? ... Ziet de planning er anders uit? ...

Zijn er recente ontwikkelingen betreft de planning van de medewerkers binnen uw instelling (Zorgconcepten, bedrijfsconcepten en/of technologie)? ...

Zijn er zaken die u als bijzonder classificeert betreft de planning binnen uw instelling? ...

Is er een OR of een zeggenschap comité (actieve werkgroep) binnen uw instelling? (Agendapunten, werkdruk?)

### 5. Zorgconcept

Hoe is het takenpakket van uw medewerkers ingericht? Hebben ze kennisspecifieke taken of zijn er met name algemene taken die door uw medewerkers verricht worden? (Takenpakket van de zorgmedewerker, worden ze met name ingezet als *specialist* of als *generalist*)

Hoe worden taken onder de medewerkers verdeeld? (Individueel/ teamverband, Generalist/ specialist)

Zijn er gegevens bekend over uw cliënttevredenheid? (wat is de trend?)

Zijn er in uw visie mogelijke aanpassingen van arbeidsvoorwaarden die de kwaliteit van de arbeid kunnen stimuleren? ...

### 6. Afronden

Bij deze wil ik u hartelijk bedanken voor uw tijd en moeite. Aan de hand van de verkregen informatie uit de belronde zullen wij een korte reportage maken over alle 40 benaderde instellingen. Op basis van deze informatie zullen een 9-tal instellingen als case geselecteerd worden, dit in samenspraak met de sociale partners. Bent u bereid om met uw instellingen als case te fungeren?

## Appendix D: Questionnaire regarding HR Planning, Workforce Scheduling, and Rescheduling

### Aanvullende interviewvragen mbt plannen/roosteren

#### Externe factoren:

**[1]** Oefent de wijziging van de AWBZ / invoering van zorgwaartefinanciering/ wijziging financieringsstructuur een merkbare invloed uit op de lange termijn personeelsplanning en het opstellen van dienstroosters? Wat is deze invloed en welke veranderingen heeft het tot gevolg?

**[2]** Zijn veranderingen in de samengestelde CAO 2008-2010 ten opzichte van de vorige CAO binnen uw instelling van invloed op de lange termijn personeelsplanning en het opstellen van dienstroosters? Hoe is deze invloed merkbaar?

**[3]** Wat voor relatie bestaat er tussen de regionale arbeidsmarkt waar uw instelling afhankelijk van is en de lange termijn personeelsplanning en het opstellen van dienstroosters? Wordt er expliciet rekening gehouden met bepaalde wensen van nieuwe medewerkers?

**[4]** Welk criterium heeft destijds de doorslag gegeven voor de keuze van het huidige gehanteerde ICT-planningspakket?

#### Organisationele factoren:

**[5]** Op welke wijze bieden de lange termijn personeelsplanning en het opstellen van dienstroosters ondersteuning aan het zorgconcept van de instelling?

**[6]** Welke strategische keuzes binnen de bedrijfsvoering van de organisatie zijn direct merkbaar in de wijze waarop er gepland en geroosterd wordt?

**[7]** In hoeverre oefent de *vraag naar zorg* invloed uit op de manier van planning en roostering:

- [7a] wat is de invloed van de vraag op de termijn waarvoor de strategische personeelsplanning wordt opgesteld? Wat is deze termijn?
- [7b] Is er sprake van een 'vast en vlak rooster' (een rooster waarbij de inzet van personeel vastgesteld op een vlak niveau is vastgesteld) een 'variabel rooster' (een dienstrooster dat wel inspeelt op variatie in vraagzorg m.b.t. de inzet van personeel), of een 'flexibel rooster' (een dienstrooster dat inspeelt op een aan variatie onderhevig zijnde vraagzorg, die in dit geval onregelmatig verloopt)
- [7c] hoe wordt de flexibiliteit opgevangen met bepaalde ingebouwde flexibiliteitsvormen?  
Is er sprake van verschillen tussen organisatieonderdelen / regio's?  
Wat zijn deze verschillen?

#### Human capacity management:

##### Human Resources Planning:

**[8]** Welke stakeholders op welke niveaus zijn er bij het opstellen van de strategische personeelsplanning betrokken en wat is hun aandeel in dit proces/verantwoordelijkheid?

**[9]** Vindt het opstellen van de lange termijn personeelsplanning centraal binnen de organisatie plaats, of gebeurt dit decentraal en zoja op welk niveau?

**[10]** Door wie wordt de *vraag naar zorg* vervolgens omgezet naar concrete shifts (/diensten) en op welk niveau/ binnen welke afdeling gebeurt dit binnen de organisatie?

### *Workforce Scheduling:*

**[11]** Voor welke planningshorizon (cycluslengte) worden dienstroosters opgesteld? Is er sprake van verschillen tussen organisatieonderdelen?

**[12]** Is er sprake van een repeterend dienstrooster (dat zich herhaalt na een verstreken cycluslengte) of wordt er na elke cycluslengte een nieuw uniek dienstrooster opgesteld? Komen hier binnen de instelling verschillen in voor (regio's, bedrijfsonderdelen, vestigingen, afdelingen?)

**[13]** Wat zijn deze verschillen?

**[14]** Vinden repeterende of unieke patronen in dienstroosters collectief plaats of kunnen deze patronen toegewezen worden aan elke medewerker als individu?

**[15]** Hoeveel tijd van tevoren worden de opgestelde dienstroosters bekendgemaakt aan de medewerkers? Wordt op dit tijdstip het rooster bekendgemaakt voor de volledige gehanteerde planningshorizon? Bestaan er na dit moment van bekendmaking nog mogelijkheden voor medewerkers om wijzigingen aan te brengen, zoals door onderlinge ruil?

**[16]** Hoe hebben medewerkers inspraak in het dienstrooster? (door een 'harde eis', een 'zachte wens', of kunnen zij tijdens de opstelfase van het dienstrooster tevens aanvullende wensen kenbaar maken). Zijn er hierbij verschillen tussen organisatieonderdelen en regio's? Wat zijn de verschillen?

**[17]** Hoe kunnen de medewerkers hun eisen kenbaar maken?

**[18]** Is het voor medewerkers mogelijk om deze roosterwensen ná het vaststellen van het dienstrooster door te geven: wensen voor het huidige rooster doorgeven gedurende de looptijd van dit rooster?

**[19]** Op welke manier vindt 'ruilen' plaats?

**[20a]** Vindt het opstellen van de dienstroosters centraal plaats voor de gehele organisatie, of gebeurt dit decentraal?

**[20b]** Zitten hier verschillen in tussen organisatieonderdelen (wat zijn deze verschillen)? **[20c]** Welke stakeholders zijn hierbij betrokken en wat is ieders verantwoordelijkheid?

**[20d]** Als er sprake is van een centrale planning en roostering: welke aspecten vinden centraal plaats en welke decentraal? (zoals bijvoorbeeld totaaloverzicht over decentraal opgestelde roosters)?

**[21]** Door wie en op welk niveau wordt het roosterbeleid opgesteld?

**[22]** Zijn er mogelijkheden om het (decentraal) opstellen van dienstroosters uit te besteden?

**[23a]** Is er sprake van een bepaald basisrooster dat opgevuld wordt door gebruikmaking van arbeidsflexibiliteit?

**[23b]** Gebeurt dit op eenzelfde wijze binnen de gehele instelling? Zonee: wat zijn de verschillen?

**[24]** Wordt er gebruikgemaakt van 'reservefactoren' binnen de strategische personeelsplanning: zoals rekening houden met uitval door ziekte en opname van verlof? → Een hoger aantal FTE begroten (per arbeidsplaats).

**[25]** Van welke systemen wordt gebruikgemaakt voor de personeelsplanning en het roosteren en wat is hun relatie met de salarisadministratie, cliëntregistratie en personeel informatie systeem (verwerking van persoonlijke saldi)?

**[26a]** Hoe worden dienstroosters in de praktijk opgesteld? Verschilt dit per locatie/verantwoordelijke?

**[26b]** Hoe zouden deze in theorie opgesteld moeten worden?

**[27]** Hoe zijn persoonlijke saldi (voor medewerkers) inzichtelijk/opvraagbaar?

#### Excess-/shortage hours:

**[28]** Hoe luidt het beleid omtrent +/- uren?

**[29]** Hoe gaat men binnen de instelling met de vakantieplanning om: welke rol speelt de opbouw van +/- uren hierin?

#### Outcomes:

**[30]** Zijn er resultaten bekend van de wijze van plannen en roosteren met betrekking tot de organisatie als geheel, de werknemer en de cliënt?