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# What are the key enabling factors for a sustainable innovative environment in healthcare?

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# Abstract

**Title:** What are the key enabling factors for a sustainable innovative environment in healthcare?

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**Background:** The more varied and new challenges that the healthcare sector faces every day, calls for modernization and reorganization. However, the healthcare sector is commonly understood to be slow to adapt to change. It is therefore important to understand and identify the enabling factors for the implementation of innovation, by giving voice to healthcare practitioners concerns, considering their competence and position in the organisation, and the fact that they are the ones to benefit greatly from change.

**Aims:** We aim to investigate what are the enabling factors for sustainable innovation in healthcare, identified by healthcare professionals and if these differ across healthcare clinics.

**Methods:** An inductive approach was used, in a non-contrived setting. A sample of 5 health professionals from *Infektionskliniken* in Region Skåne in Lund and Malmö and another 5 from Sankt Lars primary healthcare center in Lund was investigated. Data was collected by using a survey with an open-ended question. Answers were analyzed with a text-analysis tool, Pertex. By applying hierarchical cluster analysis to the binary matrix of Orientation/Agent (O/A) derived from the text structure, cluster trees were originated with root concepts that define the underlying intent of the text.

**Results:** Ten root concepts were originated from each of the participants, to describe their perceptions of what are important factors to consider for fostering innovation in healthcare. From these, the following factors were extracted: autonomy, trust, competence, accountability, efficient planning and routines, flexibility, motivation and engagement, management and leadership, tailored change, feedback, teamwork and cooperation, time management, flat organisation, prestige-less work environment, and adequate resources. We were also able to establish temporal connections between these factors based on a hierarchical association denoted from the analysis of the results, which showed the complexity of how the concepts seem to be interlinked.

**Conclusion:** Innovation in healthcare is a complex phenomenon, and requires the consideration of the factors at the individual level, taking each professional group into account. It is a complex web of factors that determine and characterize an enabling environment, which should help decrease resistance to innovation.

Keywords: Inductive study; innovation in healthcare; enabling factors; Pertex

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# Table of contents

Abstract.....	1
Acknowledgements.....	2
List of tables.....	4
List of figures.....	4
<b>1. Introduction</b>	
1.1. The context for this project.....	5
1.3. Purpose and research questions.....	7
<b>2. Theory</b>	
2.1. Theories and concepts.....	8
2.2. Literature review.....	9
2.3. Limitations and the missing pieces.....	14
2.4. The frame of this project.....	14
<b>3. Methods</b>	
3.1. Research strategy and design.....	15
3.2. Study sample.....	15
3.3. Data collection.....	16
3.4. Data analysis.....	17
3.5. Discussion.....	19
3.5.1. Research choices.....	19
3.5.2. Pertex.....	20
<b>4. Data &amp; Analyses</b>	
4.1. Characteristics of the study participants.....	22
4.2. Results derived with Pertex.....	23
<b>5. Discussion</b>	
5.1. Main research question: what are the enabling factors for innovation in health care?.....	30
5.2. Discrepancies across different groups.....	34
5.3. Conclusion.....	35
5.4. Practical implications & further research.....	36
<b>References</b> .....	37
<b>Appendices</b> .....	41

# List of tables

Table 1 – Summary of facilitating factors for creating an innovative environment (adapted from Leue and Maximoff, 2017).....	10
Table 2 – Participants’ characteristics.....	22
Table 3 – Root concepts drawn from each individual answer using Pertex.....	23
Table 4 – Comparison of enabling factors derived from two sources: literature review by Leue & Maximoff, and results from the Pertex analysis.....	30

# List of figures

Figure 1 – Example of a binary matrix of Agents (A) and Orientations (O) (adapted from Mattsson et al. 2018).....	18
Figure 2 – Cluster tree of overall Orientation from the text of ID-3.....	24
Figure 3 – Further analysis of ID-3 text.....	25
Figure 4 – Depiction of mean AFFI values across different professional groups.....	28
Figure 5 – AFFI components: Fragmentation, Focus, and Integration of each individual text.....	29
Figure 6 – The complex web of associations between the key enabling factors for a sustainable innovative environment in healthcare.....	33

# 1. Introduction

## 1.1. The context for this project

When it comes to addressing today's needs and circumstances, efficient healthcare services are fundamental (Barnett et al. 2011). The dramatic changes the healthcare sector is facing calls for modernisation and reorganisation of current healthcare practices. Demographic development, in particular, a rising proportion of older population leads to a higher degree of hospital turnovers (i.e., increasing number of patients/time) (Barnett et al. 2011; Leue & Maximoff, 2017). More complex treatments, advanced medical solutions, and administrative processes are required due to new types of healthcare problems, which creates a gap between supply and demand in healthcare. The consequences are an increase in cost pressures (Bower, 2003; Jung & Padman, 2015). It is crucial to find new and efficient ways to reach a higher quality of healthcare (Kim et al. 2016). A driver for innovation in healthcare is the potential of information technologies, resulting in e-health or other digital solutions (Jung & Padman, 2015). There is a common opinion that healthcare is slower in innovation than other industries (Kim et al., 2016). Although, despite the recognized urgency, it remains difficult to implement innovations successfully in healthcare. Therefore, it is of importance to understand what are the enabling factors for creating a sustainable innovative environment in healthcare.

Different research approaches need to take place, to understand a complex phenomenon such as innovation. We have previously observed a literature review performed by Leue & Maximoff (2017), where the authors summarized the factors that are important to take into consideration when thinking of innovation in healthcare. They defined in their investigation all new, non-medical changes of an organisation as innovation, and so do we. In the present thesis, those factors identified included: flat organisational structure, networks, training, resources, innovation facilitating culture, dealing with diversity, overcoming professional status recognition, what and how to communicate, champions, leadership and management, middle management, relative advantage and complexity, compatibility and adaptability, and piloting, monitoring and feedback.

Leue and Maximoff (2017) used a deductive approach as they did a thorough literature review on facilitating factors for the implementation of organisational innovations in healthcare, followed by an empirical case study of Capio Group. The case study was conducted in order to validate the findings from the theory by interviewing healthcare professionals on their subjective perceptions, which enabled theoretical concepts to be specified for healthcare and further explored. To compare and complement the factors found by Leue and Maximoff (2017), we now propose an inductive approach to identify the factors that healthcare practitioners perceive as important for innovation. By using this approach, and unlike Leue and Maximoff's case study, we will identify factors stemming from healthcare practitioners' perceptions, and not look for the factors already described in the literature.

It is likely that not all factors derived from the literature are considered by the professionals on the day-to-day activities, and others might emerge. Furthermore, this project will use a text-

analysis tool (Pertex), which removes a great degree of subjectivity from text analysis. Pertex creates a binary matrix from the text and uses cluster analysis (Ward, 1963), based on Perspective Text Analysis. Unlike other text-analysis tools available, there is no influence from the researcher on the analysis of the respondent's text. That way, structure and intent of the text can be identified through a root concept originated from a cluster tree, that defines the overall Orientation of the text, allowing us to establish other types of connections between the factors.

This study will contribute to the understanding of the perceived key factors for innovation in the healthcare context, by adding another layer of perspective; objectively analyzing the perceptions of healthcare practitioners. Healthcare organisational structure is curious to a certain degree: the most knowledgeable people are the ones at the lower end of the hierarchy (i.e., practitioners working on the floor). It should, therefore, be of great value to pay attention to the professionals' perceptions, considering their competence and position in the organisation, and the fact that they are the ones to benefit greatly from change. By giving voice to their concerns, we hope to learn more about the perceived key factors for innovation, and foster professionals' engagement in innovation.

## 1.2. Purpose and research questions

The purpose of this project is to contribute towards a better (i.e., more comprehensive) understanding of the key factors (i.e., important) that enable a sustainable and innovative organisational environment in healthcare, by collecting healthcare professional's perceptions. Ultimately, the identified factors could be used by managers in healthcare in order to facilitate change that promotes the implementation of innovation.

The main research question that this project proposes to answer is:

“What are the enabling factors for sustainable innovation in healthcare, identified by healthcare professionals?”

Sub-questions:

- Do the identified factors differ across different healthcare clinics (*Infektionskliniken* in Lund and Malmö and a primary healthcare center in Lund)?
- How do the identified factors compare to those found in previous research?

## 2. Theory

### 2.1. Theories and concepts

It is particularly important to explain the terminology for innovation research as it is criticized for its ambiguous and arbitrary definitions. Consequently, it becomes difficult to compare different research and to develop argumentation that is consistent and theoretical. Studies involving predictors for innovation have conflicting and different views, even if a similar research interest is presented (Baunsgaard & Clegg, 2015). Implementation research is also challenged by different explanations and terms (Durlack & DuPre, 2008). In the following section, the terminology used in this study will be explained, having the previously presented challenges in mind.

#### Organisational Innovation

Innovation was defined in five different ways; new products, new sources of supply, new methods of production, new ways of organising business and the exploitation of new markets by Joseph Schumpeter (1934), one of the founding researchers of this subject. From this perspective, innovation is assumed to be derived from entrepreneurial activities and gives an implication of how innovation is defined in a macroeconomic perspective (Fagerberg, 2005). Organisational changes are also covered in the definitions of innovation, caused by the dynamics of internal and external factors in order to improve productivity and performance (Damanpour, 1991). Innovation means idea generation, but also the implementation of ideas that exist in an organisation (Damanpour & Wischnewsky, 2006). “At the organisational level, innovation is defined as the adoption of a new product, service, process, technology, policy structure or administrative system” (Damanpour & Schneider, 2006, p.216). This definition fits with the understanding of innovation within our study. The organisation that is implementing the innovation interpret the perspective of the concept “new” (Damanpour & Wischnewsky, 2006).

As in Leue & Maximoff (2017) study, we acknowledge all new, non-medical changes of an organisation as innovation. We frame innovation as organisational innovation, where an innovation exists if it is perceived as new to the organisation.

#### Organisational innovation in healthcare

“Innovation in healthcare is defined as those changes that help healthcare practitioners focus on the patient by helping healthcare professionals work smarter, faster, better and more cost-effectively” (Thakur et al. 2012, p.564). The scope of this study fits with this definition since innovation is narrowed down to, e.g., administrative procedures and internal workflows.

Organisational innovation in healthcare is defined as any non-medical product, technology, business model or administrative method in healthcare and aims to enhance the efficiency,

productivity, and improvement of healthcare quality for patients. As Leue & Maximoff (2017), we are focusing on frontline level innovation in this project.

## Implementation of innovation

The transition phase when putting an innovation into practice is called the implementation phase. In the literature, the innovation process is also often described as “adoption of innovation” (Damanpour, 1991; Wisdom et al. 2014). Two phases, the initiation phase, and the adoption phase precede the implementation phase and include pre-activities and the final organisational commitment (Damanpour, 1991).

The first utilization or launch is starting the implementation until the innovation is transferred into the routines of the organisation (Rogers, 1983). Continuous adaption of the innovation is essential in order to ensure alignment between the organisational setting and the innovation. The commitment of the organisation or the person using the innovation is crucial to its success (Damanpour, 1991).

Implementation of an innovation is when a developed innovation is integrated into the regular workflows, starting with the first application and ending with the innovation being a routine within the organisation (Leue & Maximoff, 2017).

## 2.2. Literature review

Innovation in healthcare is a key factor for sustainable development and improvement of healthcare practices. It is clearly a topic of interest for both political and economic reasons. However, innovation is not an easy and straightforward concept, and in order to understand a phenomenon, quantify it, improve it and replicate it, it is important to understand its foundations.

### Facilitating factors for organisational innovation in healthcare

The facilitating factors for the implementation of organisational innovation in healthcare have been studied in previous literature. Leue & Maximoff (2017) categorized their findings of facilitating factors (i.e., elements that foster or impair) when implementing organisational innovation in healthcare into five themes and fourteen theoretical concepts, which they grouped into three levels of analysis; Individual level, Organisational level, and Innovation level. On the organisational level, three themes were identified; Organisational structure, Organisational culture, and Communication. The individual level concerns the characteristics that are driving individuals. Relevant aspects of the innovation process itself and the innovations characteristics are themes found on the innovation level. From these five themes, fourteen theoretical concepts were identified which affect the implementation process of innovation (Leue & Maximoff 2017), and are described below in **Table 1**. Relevant references that were more closely related to the factors under study were selected from the literature review and investigated further.

**Table 1** – Summary of facilitating factors for creating an innovative environment (adapted from Leue and Maximoff, 2017)

<b>Level of analysis</b>	<b>Theme</b>	<b>Theoretical concepts</b>
<i>Organisational level</i>	Organisational structure	Flat organisational structure
		Networks
		Training
		Resources
	Organisational culture	Innovative facilitating culture
		Dealing with diversity
		Overcoming (professional) status recognition
Communications	What to communicate and How to communicate	
<i>Individual level</i>	Driving individuals	Champions
		Leadership and management
		Middle management
<i>Innovation level</i>	Innovation characteristics and processes	Relative advantage and complexity
		Compatibility and adaptability
		Piloting, monitoring, and feedback

## Organisational level

### Organisational structure

Several authors discuss the importance of integrating individuals that are affected by the innovation in the decision making. This encourages a *flatter organisational structure* in healthcare, which is a facilitating factor when introducing an innovation. In addition to joint decision making, variables such as collaboration across hierarchical levels, favorable communication flows, and shared planning should be addressed (Durlack & Dupre, 2008; Barnett et al. 2011; Leue & Maximoff, 2017).

Frontline healthcare staff and middle management are considered crucial stakeholders, who have to be integrated into the implementation process straight after the adoption decision. Implementation teams are important as they can act as supporting resources when putting the innovation into practice (Birken et al. 2013; Øvretveit et al. 2012). The importance of *networks* and close collaboration between different department and professions is highlighted. Due to complex treatments and an increase in the number of patients, having efficient workflows becomes important (Birken et al. 2013; Gray et al. 2016). Again, to enable collaboration between involved hierarchical levels, a flat organisational structure is required (Durlack & Dupre, 2008; Barnett et al. 2011; Leue & Maximoff, 2017). Other factors for a favorable innovation implementation are on-the-job *training* or educational programs to increase user-knowledge and general competencies, especially for physicians. Considering specific *resources*, access to financial resources, the amount of specifically assigned human workforce, and time for the users to get familiar with the innovation, strongly influence on the implementation process of an innovation (Barnett et al. 2011; Berard et al. 2015; Busari, 2012).

### Organizational culture

Another essential theoretical concept identified is *an innovation facilitating culture*. The organisational culture is a necessary factor in healthcare organisations for innovation. A positive working environment, where the employees feel encouraged and committed to new working methods and ideas, makes the implementation process easier (Carlford & Festin, 2015; Weiner et al. 2011). There should also be a fit between organisational and personal values, which should be in line with the intended innovation (Wisdom et al. 2014). *Diversity* is a factor that is both fostering and challenging the implementation process of an innovation. Barrett et al. (2011) argue that it becomes harder to align priorities and beliefs with a more diverse group affected by the implementation. Contrarily, various authors argue that diverse backgrounds, knowledge, and expertise is essential for a successful implementation since many tasks are not related to medial functions, e.g., legal, administrative and workflow procedures (Schwamm, 2014; Wisdom et al. 2014). *Overcoming (professional) status recognition* is a rather difficult issue related to organisational culture, especially in healthcare environments. The traditional attitudes of “dominating” physicians, who are insisting on their decision-making power and independence over work processes and treatments is a barrier for the practical implementation of innovation and efficient collaboration (Anders & Cassidy 2014; Gray et al. 2016). This suggests that

cultural challenges are related to strict hierarchical organisation structure; "From formal authority comes status" (Mintzberg, 1999, p.168).

### Communication

Communication is another key theme, and the aim of effective communication is to make sure that everybody who is involved in the implementation process understands why there is a requirement for an innovation. They need to understand the consequences and changes concerning roles and tasks. It is important to reduce uncertainties regarding the intended outcome of the innovation since the satisfaction and habit with the status-quo are strong barriers against changes in organisations (Kash et al. 2014; Gagnon et al.2015).

The way of communicating should be clear, open, honest and inclusive. Misled communication can lead to misunderstandings, false interpretations and different opinions between departments, which are identified barriers to an implementation process. Therefore, it is appreciated with frequent feedback sessions, physical meetings and information sharing as a work routine (Anders & Cassidy, 2014; Kash et al. 2014, Weiner et al. 2011).

## Individual Level

### Driving individuals

Most researchers agree on the importance of driving individuals who influence the implementation process. So-called "*champions*" can foster innovation implementation by their engagement, motivating attitude and their ability to influence and convince peers. They also have the capability to increase commitment and tend to influence the diffusion of an innovation across and within departments due to their social status (Barnett et al. 2011; Cresswell & Sheikh, 2012; Leue & Maximoff, 2017).

Other theoretical concepts are *management and leadership*. Since inconsistent definitions are used for the terms leadership and management, we chose to use the most common definition by Kotter (2001). "Managing is about coping with complexity. Leadership, by contrast, is about coping with change" (Kotter, 2001, p. 4). Management is about organizing, staffing, delegating, controlling and creating structure, while leadership is about motivating, setting a direction, inspiring and aligning people (Kotter, 2001). The behavior of managers and leaders are an essential factor for the innovation implementation since they possess great administrative power and visibility in an organisation (Leue & Maximoff, 2017). Leaders in organizations need to be actively involved in the innovation process, and they foster a positive commitment to the innovation (Berwick, 2003; Wutzke et al. 2016). A successful leader in the innovation implementation process is tough and has a high awareness of risk. When acting as a motivator or initiator, status and work experience are of high importance. Management should formally communicate the aim and goals of an innovation. Other managerial tasks are to facilitate and initiate collaboration in order to develop trust among the different levels involved. To make

sure the frontline staff are incorporated into the change, managers should integrate the users in the planning process (Bérard et al. 2015; Bigelow & Arndt, 2005). *Middle managers* are positioned between the frontline level and the management level in the hierarchy of the organisation and act as mediators between those levels. Middle managers play a significant role in the practical implementation process of an innovation in healthcare (Birken et al. 2013; Birken et al. 2016).

## Innovation Level

### Innovation characteristics and processes

Except for the key players and organisation structure, the innovation itself and its characteristics influence the facilitation of the implementation. The process of implementation becomes easier if the intended innovation is perceived to have a *relative advantage*, to be more beneficial than the status-quo from the users' perspective. The perceived *complexity*, which is connected to the usability and ease of use of an innovation is a determining factor for the implementation (Jacobs et al. 2015; Øvretveit et al. 2012).

*Compatibility and adaptability* are two other dimensions besides complexity, where healthcare innovation can be analyzed. Compatibility describes to what extent an innovation as a whole fits settings and local contexts, such as organisational missions or current working procedures. More changes are required with low compatibility in an organization. On the other hand, fewer changes are needed to meet the benefits of an innovation with high compatibility. In contrast to compatibility, adaptability refers to the flexibility in adapting, refining and modifying an innovation to the needs of a local context. Various departments need to adapt differently to the same innovation to be able to exploit its full potential (Bérard et al. 2015; Øvretveit et al. 2012). The degree of compatibility and adaptability is essential to keep in mind in order to make the innovation fit its setting (Leue & Maximoff, 2017).

By creating possibilities for experimenting, experiencing and testing an innovation complexity can be reduced. Therefore, periods of *piloting* are valuable in order to understand the practical implications of an innovation (Barnett et al. 2011; Gagnon et al. 2015). A result of *monitoring measures*, a regular adaption of the innovation according to the expected outcome is recognised. Monitoring should also be supported by regular information sharing in order to update parties involved in the process (Staren, 2013; Wisdom et al. 2014). Measures of monitoring and *feedback* should be applied throughout the whole implementation process, to keep track of the innovation process (Leue & Maximoff, 2017).

## 2.3. Limitations and the missing pieces

Although the study of Leue and Maximoff (2017) has contributed with great value to our research, providing a great overview by being the only literature review in this field of research and summarizing the important factors in this field, we have some reserves pertaining to their method. Not all the inclusion and exclusion criteria were thoroughly described, making it difficult to reproduce their results. However, we based our frame of research in their study, taking the risk of trusting their results, as the literature found seemed to be accurate; we ran additional literature searches that lead us to most of the same references. This might also have limited our understanding of the field as we did not include more factors in our frame, as that were also not included in the review, such as political and economic. On the other hand, this would not limit our study to a certain extent, considering we used an inductive approach.

Leue and Maximoff's study is currently being used and build upon in a project between *Infektionskliniken* in Lund and Lund University School of Economics and Management, where the conceptual and theoretical findings from Leue and Maximoff (2017) are being translated to a more clinical and pragmatic language through different workshops. It is our hope to contribute in this direction as well.

## 2.4. The frame of this project

To understand a complex phenomenon, such as understanding innovation and how different factors might impact the ability of one organisation to be innovative, several approaches to measure the “reality” are needed. Previously, we have seen a thorough deductive effort to list the enabling factors for implementing innovation in healthcare, deriving from several peer-reviewed papers (Leue & Maximoff, 2017). To contrast this approach, the authors, Leue and Maximoff suggest that an inductive approach needs to take place to gain a comprehensive picture of this phenomenon; i.e., it is important to reach out to the healthcare practitioners. Many of the factors derived from the literature might not be observed, or even considered to be important, in the day-to-day activities.

In this project, we set out to investigate what are the key enabling and hindering factors that healthcare practitioners perceive to be important. For that, we took an inductive approach by asking a sample of healthcare practitioners in the Southern region of Sweden, Skåne to answer a survey. Data were analyzed with a novel tool that analyzed the structure and intent of the texts given by the participants, without much interference from the researchers. In turn, this allowed for the confirmation of some of the factors previously described but allowed us to understand what factors are perceived to be of higher or lower importance by healthcare practitioners.

## 3. Methods

### 3.1. Research strategy and design

This research project followed an inductive approach, i.e., using data to identify constructs that can be used in future theory building (Sekaran & Bougie, 2016). Innovation is an elusive phenomenon, and despite the fact that several enabling factors for innovation in health care have been described in the literature in recent years (Leue & Maximoff, 2017), it remains to understand which ones are perceived, or understood by health care professionals as the important ones. This study intended to take a “snapshot” of the phenomenon, and therefore used a cross-sectional design.

We took a survey strategy which included a questionnaire, to collect data that would help understand the phenomenon by generating factors grounded in the data, collected and comparing them to the ones identified through the literature.

Due to the non-contrived and correlational nature of this field study, i.e., with a goal to describe and delineate the relevant factors healthcare practitioners consider important in innovation in health care, the extent of the researchers’ interference with the study is considered minimal.

To answer our main research question, the primary level of analysis, or aggregation, was the individual. However, for the purpose of comparing the derived factors professional groups and the different clinics included to answer our sub-questions, the information was aggregated in the respective representative groups.

### 3.2. Study sample

In order to investigate our research questions in healthcare professionals (population) we focused our attention in the Swedish context, and 3 centers were identified (sampling unit); the “infectious diseases department” (*infektionskliniken* - IFKK) in Region Skåne University Hospital in Lund, and in Malmö, and at the Sankt Lars Primary Health Center, in Lund. Due to convenience (i.e., close contact between the center and Lund University School of Economics and Management), and because it has been indicated as one of the most innovative environments within Region Skåne, the first in Lund center was a natural selection. Malmö was included because both centers have the same manager, which would allow for close comparisons, and Sankt Lars was further included due to the connection with one of the authors of the present thesis.

The probability sampling process was designed to have a good spread of people, hopefully representing a good spread of ideas and constructs, and representing the categories that would be necessary to answer the different assumptions under investigation. For that, we aimed at including professionals from different levels: 1) management (yes/no), 2) medical doctors, 3)

nurses, and 4) social workers. In total there would be a minimum of circa 18 participants per each center, in a total of approximately 54 participants.

We had access to a list of employees in both Lund and Malmö's clinics in an Excel sheet; 121 in Lund, and 211 in Malmö. This list included a range of professions: medical doctors, nurses, social workers, physiotherapists, and assistant nurses. People were also at different levels within the organization; secretary, administrator, manager. Using the random function in Excel to perform an unrestricted probability sampling, a random number was attributed to each participant, and after sorting people according to their random number, a list of the first 60 was extracted. We would need around 20 participants per center, 40 in total, but decided to include 60 to account for a possible lower participation rate, assuming non-participation to be around 30%, due to the random nature of the sampling procedure.

The sampling strategy was altered to a non-probability purposive one, mid-way through our investigation: a key person from the IFKK in Lund provided a selected number of contacts (17) that would more likely take time to answer our survey, due to this key person's perception of their interest in the subject of innovation in the workplace. The probability sampling approach resulted in 4 answers, whereas from the non-probability one we got one answer.

In addition to this, Elin used her contacts at a primary healthcare center (Sankt Lars) and distributed the survey to everyone working at the center, 40 individuals with which she has a well-established rapport, with the same range of professions as in the IFKK. Out of these, 9 people answered, and 5 were selected to be included in our study based on the matching criterion of spread in professions to the 5 answers we got from the professionals at IFKK. Out of these, within the different professions, answers with a shorter text were excluded, because we wanted to ensure a meaningful analysis with the text-analysis software.

### 3.3. Data collection

We used one tool for the non-experimental approach to primary data collection in our study: a survey/questionnaire.

A short self-administered questionnaire was sent out via email to the 60 randomly selected people from the centers in Lund and Malmö, as well as the 17 from the purposive sample, and to 40 people at Sankt Lars (appendix A). In the first page, a short description of the intent of the research project, as well close-ended classification questions including age, gender, years of professional experience, etc., could be found. The name was asked for in the questionnaire to be able to connect answers to the random list created, but answers were numbered as soon as the matching process was completed.

In the second page of the questionnaire, we posed the main, open-ended, question of interest, with the goal of nudging the participants into writing a half-page text about the factors they consider relevant for innovation in their workplace. A short definition on organizational innovation was provided, to reduce possible confusion with medical innovation, but not detailed

enough to lead the participants in any specific direction, and a short paragraph with instructions, including the assurance that data would be treated with confidentiality could be found (appendix A). The wording of the main question was edited according to the input from several people, avoiding it to be leading or too negatively or positively worded. The question was tested informally to make sure it would approximate the level of understanding of the respondents.

### 3.4. Data analysis

The main unit of analysis in qualitative studies, such as this one, is words and not numbers, unlike quantitative research. There are three steps that qualitative data analyses go through 1) data reduction, through coding and categorization, 2) data display, and 3) drawing conclusions (Sekaran & Bougie, 2016).

The text derived from the data collection step, i.e., the questionnaire, was analyzed following the 3 steps, using a text analysis tool called Pertex (Helmersson, 1992, Helmersson 2001).

A few of the characteristics such as age, length of years of experience, AFFI values and its components, were analyzed quantitatively. For that, and due to the small sample size, non-parametric tests were used; Spearman's rho was used for correlation analyses, and histograms were used for the graphical representation of data. Analyses were carried out using the IBM Statistical Package for Social Sciences (IBM SPSS Statistics, version 22.0; IBM Corporation, Armonk, NY, USA) software for Windows.

#### The pertex software

The PC-system Pertex is a software designed to analyze text based on a Perspective Text Analysis (PTA) which has previously been validated (Mattsson, 2005). Text analysis has traditionally relied on either an intuitive approach, which depends on the researcher's worldview, or an approach based on the classification of words defined *a priori*, which limits the results to the predefined classification patterns, and this is the basis for many computer-based systems. Creators of Pertex argue that methodological limitations derived from previous approaches can be overcome by using the PTA approach (Bierschenk, 1991, Mattsson et al. 2018).

The main assumption of PTA is that spoken or written text produced by most humans is embedded by three basic functions: the intention (of the author when writing the text), action (mental or physical activity described) and orientation (awareness of the surrounding world). In a more practical sense, this triad could be translated to agent, verbs, and objects in sentences. The unique way each author expresses the configuration of agent, action, and orientation in the complete text, is then modelled by PTA.

A binary matrix of Orientation/Agent (O/A-matrix) is created by plotting the set of agents involved in the text, by sequence number, as column numbers (variables, in an SPSS datasheet)

against the set of different expressions for orientations in rows (cases), as shown in **Figure 1**. Every Orientation is only involved with one Agent, whereas one Agent can have several Orientations. The Agents govern the grouping into clusters of the Orientations, using a hierarchical cluster analysis by Ward’s method (Ward, 1963), culminating in displaying the data in a cluster tree.

	A1	A2
O1	1	0
O2	0	1
O3	0	1

**Figure 1** – Example of a binary matrix of Agents (A) and Orientations (O) (adapted from Mattsson et al. 2018).

It is the responsibility of the researcher to label the clusters’ fusions along the cluster tree, created automatically by the tool based on the expressions of Orientation that build each specific cluster. This labeling was done deductively, based on knowledge derived from the literature, but extra and new information was coded inductively, based on our perceptions and interpretations. The final fusion of clusters in the cluster tree is considered the “root concept” of the text, and since it is based on all expressions of Orientation in the text, it can be understood as an expression for the whole text.

### Data analysis with Pertex

The procedure to extract the underlying author’s intention was the following (Mattsson et al. 2015):

- 1 – Text from the answers was corrected for grammar mistakes and spelling errors
- 2 – The corrected text was then introduced in the Pertex software. Using a coding lexicon and a database of linguistic rules, actions, agents and orientations, these were identified by Pertex
- 3 – The researcher reviewed Pertex assumptions and corrected when necessary
- 4 – Each identified Agent is then assigned a column and each corresponding Orientation a row (as shown in **Figure 1**), thus creating the binary matrix of A/O, which represents the uniqueness of the text, with no layer of interpretation from the researchers
- 5 – Using Ward’s cluster analysis method (1963), clusters of orientation are created from the database consisting of the binary A/O matrix
- 6 – The number of significant clusters is decided by the researcher by looking at the ESS values (error sum of squares), and determining the ‘elbow’, when there is a bigger ‘jump’ in the values
- 7 – Significant clusters are then named by the researcher after analyzing all of the text associated with each cluster. This is successively done with the merging of clusters into new ones

8 – Results are then depicted in a cluster tree for Orientation. Depending on the text, there was also the possibility to dig deeper into the understanding of overall Orientation, and determine cluster trees for “figure” (or “gestalt”), “ground”, “means” and “goal” individually

9 – AFFI values were calculated, as an overall measure of text quality, together with its components: Fragmentation, Focus, and Integration

According to the creator of Pertex, AFFI values define the text quality and are based on the ESS (total) value, as it is calculated as  $AFFI = ESS(\text{total}) / (\text{number of agents})$ . AFFI stands for Agents’ Fragmentation Focus and Integration for the analyzed text (Helmersson and Mattson, 2012), elements that deepen the textual analysis with regards to quality. Looking at the binary A/O matrix, when there are different agents (A) associated with the same orientation (O), that indicates *Focus* (on that specific orientation). On the other hand, when the same agent (A) is associated with different orientations (O) (as visible in **Figure 1**, when A2 is connected with both O2 and O3), it indicates *Integration* - the underlying text is liking different objects together with the same agent, probably because they have something in common. Finally, when there is no overlap (i.e., each one object is connected with each one agent), this is an indication of *Fragmentation*. The expression of the component values in relative terms indicate how the information content of the underlying text can be separated into these components of quality (Helmersson and Mattson, 2012).

## 3.5. Discussion

### 3.5.1. Research choices

Our research choices restrict the possibility to draw conclusions from our results. For instance, we opted for an unrestricted sampling design at first, as this is the option with the least biased that offers most generalizability; i.e., results obtained from our study could be extrapolated to other locations in Sweden, for example. However, to ensure complete representativity of all the categories we wanted to analyze, a restricted sampling procedure (i.e., randomizing within strata) might have been preferable, and that way avoid inviting more people to answer a burdensome survey just to account for the foreseeable low response rate.

Nevertheless, as time went by and responses did not fall in our mailboxes, and we faced the likely reality of nonresponse error, the sampling strategy was altered to a non-probability one: a key person from the *infektionskliniken* in Lund provided a selected number of contacts (17) that would more likely take time to answer our survey, due to this key person’s perception of their interest in the subject of innovation in the workplace. In addition to this, and due to the fear of no-responses, Elin used her contacts at a primary healthcare center (Sankt Lars), and distributed the survey to 40 individuals with which she had a well-established rapport. These purposive sampling procedures severely limit our ability to generalize our results, but it was a necessary tradeoff for the sake of obtaining data.

Our survey included a short presentation of the research project, to establish a good rapport with the respondents. Taken together with the assurance of confidentiality, the credibility of the research was raised, and less biased answers were expected. The main open-ended question changed slightly in the versions sent out to a) the random sample, b) the purposeful sample, and c) the primary care center. These changes were based on the feedback received from the misunderstanding associated with the first version of the question (a) and with the hopes of improving our odds of receiving answers. However, even slight changes in the wording of the question might have resulted in different understandings of the phenomenon. The way the question is worded can nudge (i.e., push or direct) people into the not intended direction, which would put the validity of our study in jeopardy. By including a short description of what we defined as organisational innovation in our research we hoped to nudge participants into the same construct. Additionally, by avoiding the use of strong, positive or negative words in the question, we hoped to achieve a neutral tone and secure less biased answers. This fine balanced act between nudging participants into the construct we are trying to investigate without forcing them into a specific direction is a challenge. The fact that we had to slightly alter the first version of our question due to some confusion is a sign that we might have not totally succeeded with being clear enough at first, clearly challenging its reliability. However, it is hard to predict if we tipped the scale towards the other end (i.e., nudging into a specific direction) in the following versions of the question.

This study would have benefited from having carried out interviews on the same subjects, as originally intended, to further investigate the derived concepts in light of their results from the first survey. This would have enabled us to raise construct validation.

Finally, it should also be mentioned that this type of research and data collection relies on what people themselves think is important to report, what they say they do, think and feel. This is not to be confused with what the reality is, i.e., with this study setting we are capturing perceptions of the reality.

### 3.5.2. Pertex

Pertex is a text analysis tool that has previously generated both reliable and valid as well as relevant results, and in different contexts and settings (Mattsson et al. 2015). The tool has also proven to be able to deal with both large and small amounts of text, from groups of respondents or just a few. This indicates its usefulness and reliability to be used in this study.

As a tool that relies on the structure of the text rather than on the interpretation of the researcher, it is set out to be less subjective than others available. However, no formal comparison between the different text-analysis tools used on the same text has yet been made. We see this as a limitation. Furthermore, even though the clustering is done automatically, with no room for subjectivity, the labeling of the clusters is based on the researcher's frame of mind. There is a level of interpretation, analysis, and synthesis that needs to be done on the researcher's side to name the clusters, which might introduce some degree of subjectivity. We tried to minimize this by discussing the labeling of all the clusters among the two of us.

Finally, it is worth mentioning that Pertex can only analyze the text provided by the participants (i.e., what is written). It does not, however, measure other levels of the cognitive processes such as thoughts and motivations (i.e., how and why it was written).

## 4. Data & Analyses

### 4.1. Characteristics of the study participants

We received and analyzed a total of 10 answers to the survey (**Table 2**). The respondents were mostly women, either nurses, doctors or social workers, and with ages ranging from 23 to 63. Of these, only 2 had a management position. Length of years of experience varied from 0.5, of working at the clinic out of a total of 1 year of experience, to 14 years of working in the same workplace, out of 19 of experience, or to a total of 30 years of experience, and 9 years working at the same place.

**Table 2** – Participants’ characteristics

<b>ID</b>	<b>Place</b>	<b>Gender</b>	<b>Age</b>	<b>Profession</b>	<b>Length</b>	<b>Management</b>
1	IFKK L-1	F	25	Nurse	0.5/1	No
2	IFKK M-1	F	23	Nurse	1/1.5	No
3	IFKK M-1	F	32	Social worker – CBT	4/8	No
4	IFKK M-1	F	63	Nurse/chief of unit	4/27	Yes
5	IFKK L-2	M	29	Doctor	1/4	No
6	HC – 1.5	F	38	Doctor	9/13	No
7	HC – 1.5	F	50	Doctor	14/19	No
8	HC – 1.5	F	56	Nurse	9/30	No
9	HC – 1.5	F	34	Social worker	6/7	Yes
10	HC – 1.5	F	29	Social worker	3/5	No

IFKK, *infektionskliniken*; M, Malmö; L, Lund; 1, first version of the survey to a random sample, 2, second version of the survey to a purposeful sample, and another version with slight alterations (1.5) was sent to the primary health care center. CBT, specialization in cognitive behavioral therapy.

The number of total years of work experience was highly and positively correlated with age,  $r=0.96$ ,  $p<0.001$ , whereas it was significantly correlated but to a lesser degree with the years of working the in same unit,  $r=0.80$ ,  $p<0.01$ . Age or years of experience were not found to associate with holding a management position, which could be due to the very small sample of managers ( $n=2$ ).

## 4.2. Results derived from Pertex

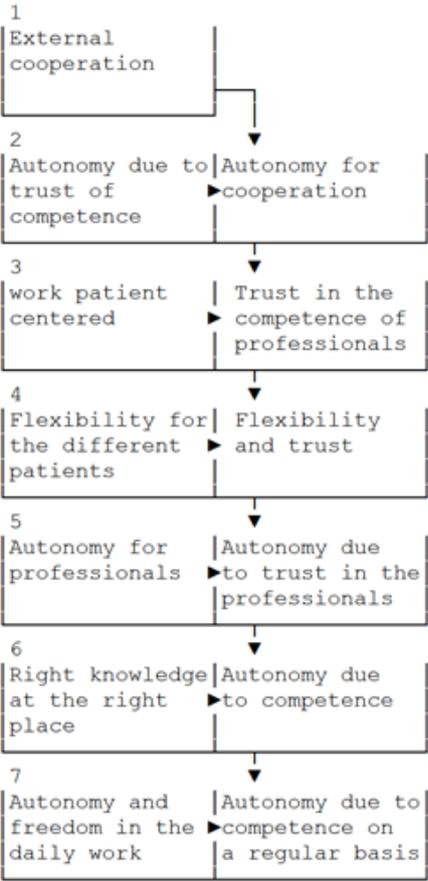
A cluster tree resulted from the analysis of each of the 10 respondents' text, which synthesized intention of each text in a root concept (**Table 3**). Each cluster tree (in Appendix B) is a representation of what employees perceive as important factors that need to be in place to facilitate innovation at their workplace. The results showed that the employees' needs were different depending on the center they worked in, and their profession. For example, everyone at Sankt Lars primary healthcare center mentioned the lack of time as a key factor for hindering innovation together with the need for a flatter organization, when that was barely mentioned by employees at the IFKK where autonomy and accountability seemed to be the recurrent themes. Nurses seemed to focus more on the need for teamwork and a supportive environment with good leadership, whereas doctors touched upon the need for a more flexible schedule with improved routines and improved accountability. Social workers recurrently mentioned trust as an important factor. Conclusive distinctions between Lund and Malmö IFKK, and between holding a management position or not, were not possible due to the very small sample for each of these groups.

**Table 3** – Root concepts drawn from each individual answer using Pertex

ID	Root concept
1	Sustainable and efficient work environment
2	Innovation must be tailored to each unit
3	Autonomy due to competence on a regular basis
4	Teamwork and competence fosters flexibility
5	Digitalization for improved accountability

6	Teamwork, routines and time for reflection and analysis enable development
7	Better time management results in more flexibility
8	Flat organization for efficiency
9	Trust, support and autonomy for efficient use of competence
10	Time for self-development and trust in competence

To better grasp how the root concepts were derived at, we present an example of one cluster tree (from ID-3) in **Figure 2**.

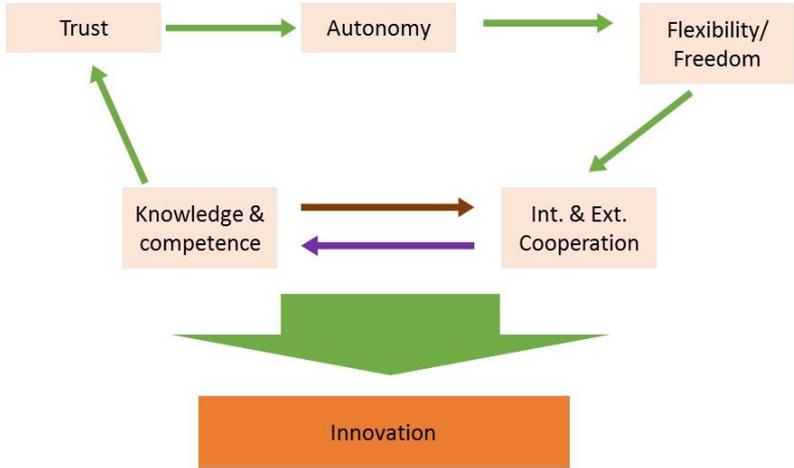


**Figure 2** – Cluster tree of overall Orientation from the text of ID-3

Seven significant clusters including expressions for Agent/Orientation were found. Those expressions were then synthesized into a short statement containing the concepts found in the expressions. Each cluster was then merged, automatically by Pertex; from the top and left, as

the arrows indicate, into a new and overarching cluster. This new cluster should contain the combined text contents from the previous two clusters, and consider that the one that is coming from the “left” modifies the one coming from the “top”. In the end, bottom right, we arrive at the root concept, which deems to synthesize the whole text intention.

In the case of individual ID-3, several factors were merged into the final root concept. She highlights the importance of autonomy in work based on trust, in competence and knowledge, provided by the management, to bring flexibility and freedom for cooperation. Interestingly, she points out that both internal and external cooperation are the key to widen competence, which she deems important for innovation (**Figure 3**).



**Figure 3** – Further analysis of ID=3 text

Arrows depict the directionality of the connections according to the text; green arrows can be found in the Orientation cluster tree (Figure 3), and the brown arrow represents the root concept of the “ground” concept whereas the purple arrow represents the root concept of the “figure” cluster.

The Orientation of the text could be further divided into a figure, ground, means and goal, provided that participants write words such as “on”, for ground, “via”, for means, and “for”, for the goal. Pertex then generates clusters for each of these dimensions, which provides further insight into the overall intention of the text. In the case of subject ID=3, besides managing to connect several concepts with directionality (i.e., some come before the others), and by investigating further into the “figure” concept of the text we understand that “competence is the basis for teamwork and network” (brown arrow), whereas the “ground” tells us that “cooperation widens competence” (purple arrow) (Appendix B, page 7).

## Main concepts extracted from the different centers (IFKK vs. Sankt Lars)

At the IFKK, there was a clear concern on **autonomy** based on the **trust** in **competence**. Several brought up the need to be more autonomous, considering the existing competences (Figures 3 and 4 illustrate these concepts). Also, better administration, improved by the use of digitalization, should make room for more **accountability** and transparency, leading to a healthcare that is more patient-focused and bearing patient safety in mind.

One professional (ID-5) brings up the importance of the development of digitalization and documentation in order for increased patient-safety: *“Many professionals feel that the administrative burden is increasing in healthcare. The systems we work with today are not experienced [by the professionals] to be effective. Double documentation is a problem, partly because some professionals document both in electronic journals as well as on paper. In addition, different professionals do not read what other professionals document. Much documentation is likely to take place just for the purpose to document, rather than improving patient care. A simple technical solution to address this would be to have available electronic documentation in each patient room” ....*” A problem experienced by the doctors is that the documentation on paper versus in the journal is not always coherent and one needs to look at several places to get the right information. *If all documentation was centralized, the patient safety would increase, as well as it would simplify the professionals work. It would probably facilitate everyone's daily work while providing better healthcare* ” (ID-5).

The improvements can also be physical; more **efficient** planning of the departments can lead to a better workflow. Different and more efficient **routines** should be implemented to facilitate **flexibility**.

Instability brought by the constant change in the work environment, especially when it comes to performance measurements, seems to have a negative impact on **motivation and engagement**. The **management/leadership** team should take that into consideration, and help decrease people's resistance to change by leading them through the changes. A tool suggested to help in this case is to implement better **communication** systems, where information flows across professional categories, and clear priorities are set for change implementation. Additionally, it is important to **tailor change** and innovation to each unit, taking the employees into consideration, in order to reduce resistance. One professional (ID -2) highlights the importance to tailor change to the specific unit, depending on different conditions. *“In order for an innovation to be implemented in health care, it is first important to acknowledge that each clinic is unique and that units do not work in exactly the same way, partly because of the culture at the workplace, but also due to internal rules. It is therefore difficult to carry out an innovation that is general for a whole hospital. There are frequent changes in health care, which can lead to a new idea or innovation being addressed with criticism and poor interest by the employees. In order to get the employees involved, a clear plan should be in place together with planned follow-up. If the implementation of an innovation is not wholeheartedly initially, it will quickly be rejected and not done properly”* (ID-2).

Acknowledgement of the hard work with **feedback** is also important for engagement. Another professional (ID-10) brings up the importance on trust in the workers' competence, and acknowledgement of the hard work performed by the professionals: *"Another factor that I think is important for an innovative work environment relies on trust and confidence in the workers' resources, knowledge and experience. In healthcare, many incredibly competent people work, but due to, for example, lack of time and resource shortage, they experience that they cannot do the job they want. Furthermore, they usually hear [feedback] when they do something wrong or when they are not enough. They rarely hear much about what an amazing work they do. Confidence in and appreciation of the staff's work efforts is, therefore, a key to a creative work environment. Appreciation can be shown in many ways. If appreciation is shown, creativity and innovations can come as a result, which is why ideas and creativity need to be encouraged on a regular basis. Encouragement can be demonstrated by being more generous with further education and time for reflection and development"* (ID-10).

**Teamwork** (internal) and (external) **cooperation** are mentioned from two perspectives. On the one hand, more collaborations widen the existing knowledge and competence, which in turn fosters innovation and improves the quality of healthcare. On the other hand, more flexibility and freedom, as well as different competences, are needed in order to engage in better teamwork and cooperation (illustrated in **Figure 3**).

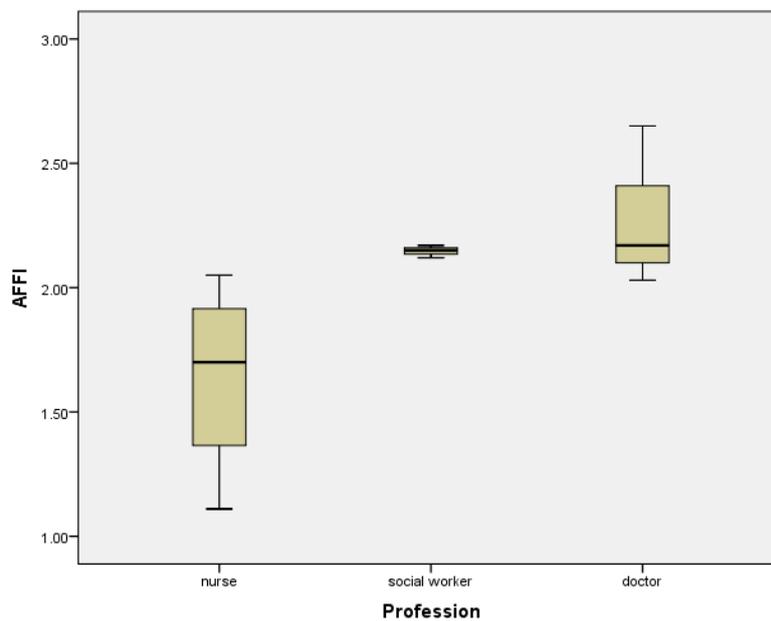
Part of the scenario repeats itself at Sankt Lars, especially when it comes to autonomy due to trust in competence, but other major concerns are brought to light. The main recurrent theme is **lack of time**, in several ways; a) rigid schedules do not allow for flexibility, b) no time for self-reflection and analysis, and c) no 'actual' time to cooperate. Employees attribute the power of time management to the management team, and a nurse (ID-8) believes that the doctors could make a more efficient use of their time in their meetings and help with some administrative work. Frustration is not only for the nurses, but also doctors feel that they need more time for reflection and analysis and that most discussions end with inaction and no visible results. Additionally, they feel disrupted continuously in their workflow, leaving no energy for changes and improvements. The second major theme is the need for a **flatter organization**, with a more open climate based on the trust in competence. A doctor (ID-6) is even the one to suggest that the overall **work environment** would improve and benefit from a **prestige-less** climate. The lack of **resources** is also pointed out as an important factor.

Additionally, another professional (ID-8), highlights the importance of cooperation, better routines for a better and more efficient work environment. *"It is important that someone daily checks that the healthcare center has emergency appointments to the doctors available. To make this possible, cooperation between the different professional is important to ensure that the unit is functioning. The doctors have a meeting almost every morning. During these meetings they would be able to check the schedule and, if necessary, insert more times in the schedule when the entire medical team is gathered. The difficulties with this may be that the medical team has too much to talk about in these meetings. Doctors do not have time for questions regarding the schedule, and there is a tradition that doctors should not have to spend their time on these issues. If this was implemented as a new routine, there would be more time for our acute sick patients and the nurses would not have to ask them to call back the next day*

*because of the absence of available times. A new routine like this would lead to more satisfied patients and a better work environment. We would become more efficient, save time and reduce the number of calls. Important for innovation to be possible in a workplace is an open climate, no hierarchy in discussions between staff, and a manager who encourages and allows this. Of course, it is also important with dedicated staff” (ID-8).*

## AFFI and its components: Fragmentation, Focus, and Integration

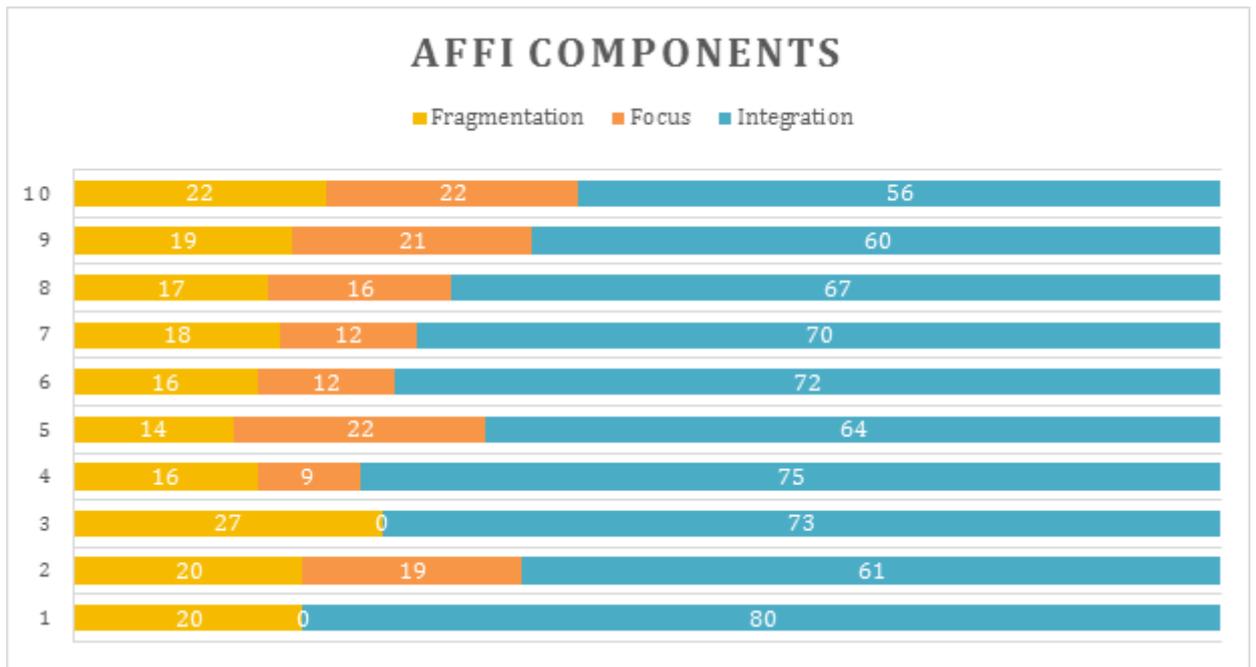
The profession seemed to be associated with AFFI values,  $r=0.73$ ,  $p<0.05$ , which required further analysis. When mean values for AFFI were plotted across the different professional groups (visible in histograms in **Figure 4**), it was clear that nurses had overall lower AFFI values, whereas doctors had overall higher values, and the social workers were in the middle.



**Figure 4** - Depiction of mean AFFI values across different professional groups

The horizontal lines represent the mean values whereas the size of the bar represents the variation of AFFI values within the same professional group. It should be noted that this is just a graphical representation of data, as no formal test to compare mean differences could be applied in such small sample.

By further dividing the AFFI values into its components, Fragmentation, Focus, and Integration, other patterns emerged. A complete Table (S.1) can be found in the supplementary material in Appendix C.



**Figure 5** – AFFI components: Fragmentation, Focus, and Integration of each text  
 Values are expressed as parts of a whole (in percentage).

Total AFFI values and components percentage did not vary across health care centers. However, as shown in **Figure 5** (and Appendix B for more details), the percentage of components seemed to vary across professional groups, with some variation within groups as well. Most of the social workers seemed to score higher in Focus (ID-9 and 10), whereas nurses scored the highest in Integration (ID-1 and 4), together with most of the doctors (ID-6 and 7).

## 5. Discussion

### 5.1. Main research question: what are the enabling factors for innovation in health care?

In the following table (**Table 4**), the factors that enable innovation in healthcare are described. This table is a comparative summary of those factors derived from the literature, and those derived from our study (survey answers analyzed with Pertex).

**Table 4** – Comparison of enabling factors derived from two sources: literature review by Leue & Maximoff, and results from the Pertex analysis

<b>Leue &amp; Maximoff</b>	<b>Pertex</b>
<i>Organisational level</i>	
Flat organizational structure (bottom-up)	Flat organization (equal stand for different professions)
Networks	Teamwork and cooperation
Training (reciprocal)	Training and education (for self- development)
Resources	Resources
Innovation facilitating culture (patient focus)	Patient focus (safety)
Dealing with diversity (international workforce)	
Overcoming (professional) status recognition	Prestige-less environment
What/how to communicate	Better communication systems
	Time management
	Efficient routines and unit planning
<i>Individual level</i>	
Champions	

Leadership and management	Leadership and management
Middle/first-line management	
	Motivation and engagement
	Feedback
	Autonomy
	Trust
	Competence
	Accountability
	Flexibility
<i>Innovation level</i>	
Relative advantage complexity	
Compatibility, Adaptability	Tailor change to specific units
Piloting, monitoring, feedback	

Our results overlap with the findings by the literature review provided by Leue & Maximoff. These findings might indicate that individuals can see and comprehend the same reality that surrounds them, even if they are not in management positions, as were the respondents from Leue & Maximoff study, which might be indicative of convergent construct validity. Probably also due to the lack of a good representation of managerial positions in our sample, most answers probed further at the individual level, lacking a certain level of oversight at the innovation level.

A few factors differed between the literature and the results derived from the participants in our study. **Time management** was one strong factor described several times by our sample. “There is no time or energy for flexibility and work with development. We just have time for the most important tasks” (ID-6). The lack of resources and a pressured organisation was a clear opinion presented by various of the professionals. There were many suggestions made for improvements on both a basic and more complex level. More efficient routines, unit planning, could

accomplish better time management; and innovation could be facilitated more efficiently if time was given for self-reflection, teamwork and cooperation and development by, e.g., continuous education. According to Crawhall (2013), time management is a success factor that is critical for most projects. It is essential to separate activities that are a part of the regular work and those parts that involve innovation. This distinction becomes vital to facilitate innovation in healthcare. Since the healthcare is a pressured organisation and the staff is perceived to have their hands full already, special teams should be created to enable innovation, who are given time to innovate outside of their regular duties.

Time management is closely related to **motivation and engagement**. It is difficult to become motivated to innovate if no time is given for it. Mattsson et al. (2015) found that motivation towards innovation depends of the lengths on tenure in an R&D department at Scania. However, a prevailing opinion among the groups involved in the research shared was that there is not enough time to become engaged in innovation activities.

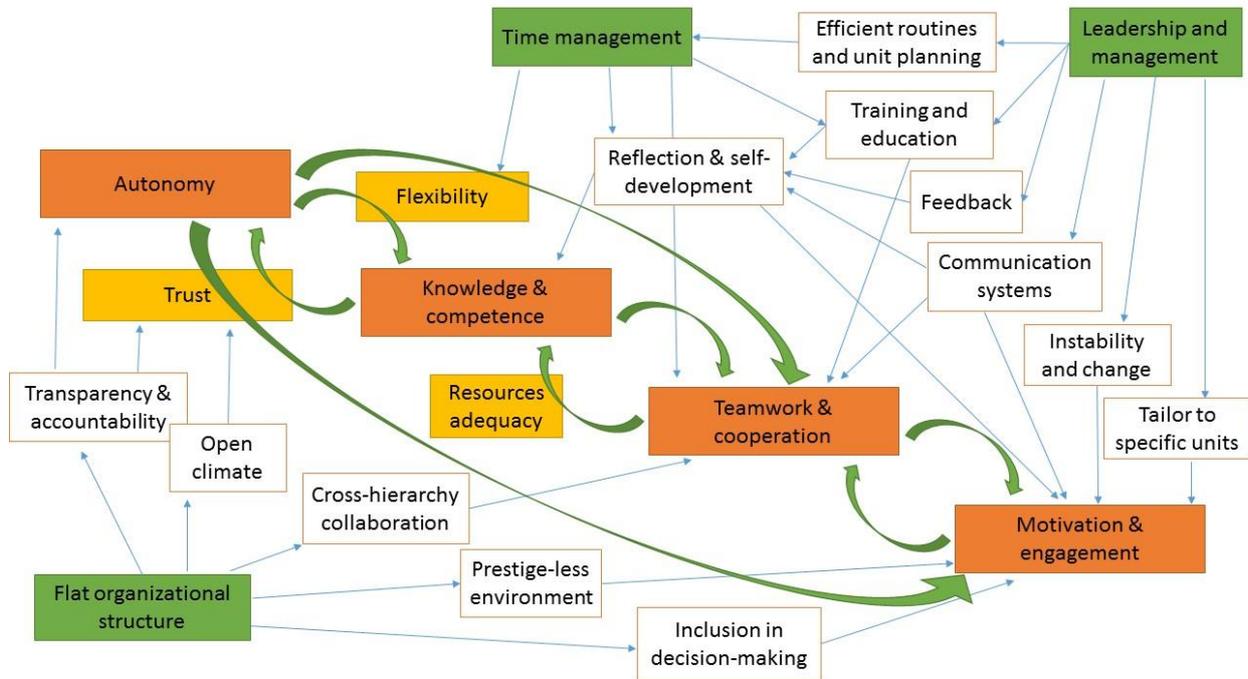
Many of the professionals also mentioned the importance of **encouragement** to feel motivated towards change. To feel appreciated, receive positive feedback and to be involved in decision making and the process towards change is important to facilitate innovation in healthcare. Further, it is essential to encourage the development of competence for the professionals. *“Encouragement can be demonstrated by being more generous with further education and time for reflection and development”* (ID-10). Similarly, Klein and Knight (2015) describe that the encouragement of employees’ continuous learning foster innovation.

A significant factor being presented by most professionals included in our study was the need for **autonomy** and confidence in the competence of the professionals. To be given more autonomy at work considering the specific knowledge should be enabled by the management since the professionals are the specialists in healthcare. For autonomy to be possible, it is essential with trust based on transparency and accountability, which leads to more engagement. *“It is important to be able to be flexible at work and that managers give the staff autonomy and flexibility due to trust in the professionals’ competence”* (ID-3). Pettersson (2011) addresses trust-based or performance-based management as a topic of interest in healthcare with the importance for autonomy for the physicians. Socio-cultural elements should be recognized as mechanisms important for communication and coordination when managers are designing systems for management control.

None of the professionals included in our study brought up the importance of “champions” or individuals important to facilitate the process when implementing an innovation. People-based resources, like champions, is considered as an important and integral part to develop, establish and diffuse innovations. Both extra-organisational and intra-organisational influences are considered critical in the efforts of both impeding or facilitating innovators (Barnett et al. 2011). Our understanding of why the professionals did not mention the importance of “champions” could be closely related to the rigid and highly pressured environment in healthcare, where new ideas are considered as more work. Healthcare is also viewed as a traditional organization, influenced by hierarchy, which could result in professions being more resistant to influential

individuals with an innovative mindset. Older generations of healthcare professionals might have a fixed mindset and prefer to do their job as they have always been doing it.

Additionally, and with the analysis of the root concepts derived from Pertex, we were able to establish connections and temporality between different concepts (depicted in **Figure 6**).



**Figure 6** – The complex web of associations between the key enabling factors for a sustainable innovative environment in healthcare

**Figure 6** represents our understanding of the essential enabling factors for innovation to be implemented in health care, based on our results taken together with the literature. The four core concepts (represented in orange, like a staircase) stem from the root concepts that were described by our participants, and they feedback on each other (represented by the green arrows), meaning that they potentiate one another. Those core aspects are essential to have a facilitative environment for innovation; people need to feel engaged and motivated to participate in teamwork and cooperation, and at the same time feel enough autonomy to widen their knowledge and competence, which in turn helps foster teamwork and cooperation.

In yellow we can find the intermediary factors that are of great importance to achieve the main core factors. These factors could be considered catalyzers; i.e., in their presence, the process of obtaining the main core concepts and therefore enabling innovation, speeds up. In green, we highlight the concepts that are referring to an umbrella term, and in the middle we find other concepts that connect umbrella terms to the core concepts. These, in turn, could be processes, tools or situations one should take into account, and are suggested to influence the core concepts.

This overall picture should be representative of an environment fostering innovation. It should also be clear that some steps precede others, i.e., to achieve the core concepts, several

preparatory steps need to take place. For example, to foster and enable motivation and engagement of the staff in innovative tasks, there is a need for more inclusion in decision-making embedded in a prestige-less environment, signaling the need for flatter organization. It is also crucial to have management dealing with instability and change and tailoring change according to the specific characteristics of each unit. These could be considered direct steps. However, one can also look into the indirect steps that could be taken, for example, steps that foster teamwork and cooperation, will then contribute to motivation and engagement as well. We propose that this model can also be a tool used by future management to achieve their vision of encouraging an innovative environment in healthcare.

Other models have been proposed in the literature (Koomans and Hilders 2017). The authors described a toolkit consisting of 14 capabilities that define design-driven leadership necessary to move the healthcare system forward. According to the authors, the needed changes to improve the innovative value of healthcare ought to take place along the axis of leadership and design. Our model, on the other hand, not ignoring the importance of leadership and management, as it is, in fact, one of our umbrella terms, it emphasizes the importance of the core concepts (i.e., values) for the healthcare practitioners. We suggest that our results aid to the completion of a more comprehensive picture regarding this subject. Ultimately, an environment that is more favorable to innovations, is also more likely to be more focused on patient safety and satisfaction (Dobrzykowski, 2015).

## 5.2. Discrepancies across the different groups

Our results indicated that Focus values were higher among social workers, whereas nurses and doctors scored generally higher in Integration. This could be the result of their working context. It is possible that social workers can prioritize specific components better by expressing their Orientations with more Focus, possibly derived from the fact that they tend to focus on particular tasks or components on a daily basis. Social workers' root concepts summarize their focus in a conceptual characterization of the whole text: "trust, support and autonomy for efficient use of competence", "time for self-development and trust in competence", and "autonomy due to competence on a regular basis". On the other hand, possibly due to their training and tasks at work nurses and doctors might have a better understanding of the complex environment in healthcare, and the interaction between the different parts, as they show a better ability to Integrate the different Orientations, i.e., can see a more holistic view of what is needed. When looking into the root concepts that characterize their Orientations, it was more likely to find a reference to an umbrella term such as "better time management results in more flexibility", "flat organization for efficiency"; or processes leading to the core concepts: "teamwork, routines and time for reflection and analysis enable development", "teamwork and competence fosters flexibility".

Since we analyzed the answers at an individual level, and not at a group level, we could not derive AFFI values and its components for each of the centers. Not being able to use a more objective measure to identify differences between the different centers (IFKK and Sankt Lars),

we relied on the differences in the root concepts. Overall, employees at the IFKK showed a big concern for autonomy and trust in competence for more flexibility to enable teamwork and cooperation, whereas the major themes at the primary care center were time mismanagement and a need for a flatter organization. This could very well indicate the different nature of the jobs that healthcare professionals face in these different contexts. The fast pace at the primary care center, prompted by the high rotation of patients, (i.e., a high number of patients per hour), leaves no time for reflection, self-development, and cooperation. It ends up being a source of frustration for the professionals across all groups, together with the perceived heavy burden brought by inefficient bureaucracy and routines. In primary care, the professionals also seem to work more individually, and due to the time limit and the performance measurements there is not much space for cooperation, teamwork, and flexibility. In contrast, professionals in the hospital setting can focus on each patient as a team, and concerns with cooperation and teamwork are put in the context of being able to seamlessly make use of different existing competencies, which becomes crucial for patient safety in an environment perceived as more acute.

### 5.3. Conclusion

In our study we identified the key enabling factors for a sustainable innovative environment in healthcare, as perceived by healthcare professionals from two different contexts; from an infectious diseases department in Lund and Malmö Hospitals, and from a primary health center, Sankt Lars. Many of the factors found overlapped with those previously described in the literature, in addition to some extra factors. We were able to use Pertex, a text analysis tool to define intention of orientations and extract the root concepts of the interviewees' text, symbolizing intent. By combining our results with those of the literature, we were able to establish a model that can be used by management with the aim of enabling innovation at a specific healthcare unit.

In short, the core factors that need to be in place are autonomy, knowledge and competence, teamwork and cooperation, and motivation and engagement. These will feedback, positively or negatively, on each other. Other factors that help catalyze the increase of the core factors are trust, flexibility and adequate resources. Umbrella terms such as leadership and management, time management, and flat organisational structure seem to symbolize where individuals expect the intermediary factors to derive from; e.g., leadership and management should provide feedback to increase motivation and engagement. The intermediary factors found were: transparency and accountability, open climate, cross-hierarchy collaboration, prestige-less environment, inclusion in decision-making, efficient routines and unit planning, training and education, reflection and self-development, feedback, communication systems, instability and change and tailoring change to specific units.

All in all, innovation in healthcare is a complex phenomenon, and requires the consideration of the factors at the individual level, taking each professional group into account. It is a complex

web of factors that determine and characterize an enabling environment, which should help decrease resistance to innovation.

## 5.4. Practical implications & further research

Overall, our results should be looked upon from a practical point of view. We believe that the model created, even though it is an early version lacking validation, could already be a helpful tool for healthcare practitioners, especially in management positions. In a minimal approach, the model can be a means to understand what are the perceived main concerns of the healthcare practitioners that affect their ability to participate and contribute to innovations. In a broader approach, on the other hand, this can be seen as a tool that attempts to reduce the complexity of the literature in the field and helps translate theoretical concepts into an instrumental clinical language. The operationalization of the model is especially apparent when some of concepts/factors are preceded by others, i.e., there is a sequence of events that help arrive at the core concepts. This hierarchy display might help managers to identify the needs of their units and prioritize actions. Finally, it can also be used to track the progress of the implementation of change to achieve an innovation.

However, our project is not but a humble and small contribution in this field. We propose that more research with bigger sample size allowing for the possibility of comparing across different groups, early vs. late career, age groups, gender, with and without management position, and between private and public healthcare sectors is necessary to draw a more comprehensive picture. Only then will it be possible to design a model that takes the different individual characteristics and specific environmental aspects into consideration; leading to further engagement of the various professionals in change and innovation.

Ultimately, a nicely built model might be an interesting academic exercise, but completely useless if not applicable in reality. In the management field, there is a clear need for models that can help solve managerial problems. For that, we suggest that an experimental design should follow the previous suggestion; to investigate the feasibility and applicability of the complete model. With this design, the researcher can manipulate one or several of the components of the model in one group, and compare the outcome with a comparison group, to establish causality and the model's feasibility.

# References

- Anders, C. & Cassidy, A. (2014). Coevolution of Patients and Hospitals: How Changing Epidemiology and Technological Advances Create Challenges and Drive Organizational Innovation. *International Journal of Healthcare Management*, vol.7, no.2, June, pp.132-151.
- Barnett, J., Vasileiou, K., Djemil, F., Brooks, L. & Young, T. (2011). Understanding innovators' experience of barriers and facilitators in implementation and diffusion of healthcare service innovations: a qualitative study. *BMC Health Services Research*, vol.11, no.342, pp.1-12.
- Baunsgaard, V. & Clegg, S. (2015) Innovation: A Critical Assessment of the Concept and Scope of Literature, in Agarwal R., Selen, W., Roos, G. & Green, R. (Eds). *The Handbook of Service Design*, London: Springer, pp.5- 25.
- Bérard, E., Bonnier C., Saulpic O. & Zarlowski, P. (2015). Implementing managerial innovations: Lessons from two case studies. *British Journal of Healthcare Management*, vol.21, no.3, pp.125-129.
- Berwick, D., M. (2003). Disseminating Innovations in Health Care. *American Medical Association*, vol.289, no.15, pp.1969-1975.
- Bierschenk, B. (1991). The schema axiom as foundation of a theory for measurement and representation of consciousness. *Kognitionsvetenskaplig forskning*, No 38. Lund, Sweden: Lund University.
- Bigelow, B. & Arndt, M. (2005). Transformational Change in Health Care: Changing the Question. *Hospital Topics*, vol.83, no.2, pp.19-26.
- Birken, S., A., Lee, Shou-Yih D., Weiner, B., J., Chin, M., H. & Schaefer, C., T. (2013). Improving the Effectiveness of Health Care Innovation Implementation: Middle Managers as Change Agents. *Medical Care Research and Review*, vol.70, no.1, pp.29–45.
- Birken, S., Martino, L., Kirk, M., Lee, S., McChelland, M. & Albert, N. (2016). Elaborating on theory with middle managers' experience implementing healthcare innovations in practice. *Implementation Science*, vol.11, no.2, pp.1-5.
- Bower, D.J. (2003). Innovation in Healthcare Delivery in Tidd, J. & Hull, F., M. (Eds) *Service Innovation: Organizational Responses to Technological Opportunities & Market Imperatives Cover*, 9th edn, London: Imperial College Press, pp.211-230
- Busari, J. (2012). Management and leadership development in healthcare and the challenges physician managers in clinical practice facing. *International Journal of Clinical Leadership*, vol.17, no.211, pp.211-216.

Carlford, S. & Festin, K. (2015). Association between organizational climate and perceptions and use of an innovation in Swedish primary health care: a prospective study of an implementation. *BMC Health Service Research*, vol.15, no.364, pp.1-7.

Crawhall, R.J. (2013). Time to Innovate: Reflections and Recommendations on Time Management for Innovation Managers. *Technology Innovation Management*. September, pp 13-19.

Cresswell, K. & Sheikh, A. (2012). Organizational issues in the implementation and adoption of health information technology innovations: An interpretative review. *International Journal of Medical Informatics*, vol.82, pp. e73-e836.

Damanpour, F. (1991). Organizational Innovation: A meta-analysis of effects of determinants and moderators. *Academy of Management Journal*, vol.3, pp.555-590.

Damanpour, F. & Schneider, M. (2006). Phases of the Adoption of Innovation in Organizations: Effects of Environment, Organization and Top Managers. *British Journal of Management*, vol.17, pp.215-236.

Damanpour, F. & Wischnewsky, D. (2006). Research on innovation in organizations: Distinguishing innovation- generating from innovation-adopting organizations. *Journal of Engineering and Technology Management*, vol.23, pp.269-291.

Dobrzykowski, D, Callaway, S., Vonderembse, M. (2015). Examining Pathways from Innovation Orientation to Patient Satisfaction: A relational View of Healthcare Delivery. *Decision Sciences Institute*, October, vol. 46, no 5.

Durlak, J. & DuPre, E. (2008). Implementation Matters: A Review of Research on the Influences of Implementing on Program Outcomes and the Factors Affecting Implementation. *American Journal of Community Psychology*, vol.41, no.3/4, pp.327-350.

Fagerberg, J. (2005). Innovation: A Guide to the Literature in Fagerberg, J. Mowery, D.C., Nelson, R.R. (Eds). *The Oxford Handbook of Innovation*, New York: Oxford University Press Inc, pp.1-25

Gagnon, M.-P., Desmartis, M., Labrecque, M., Car, J., Pagliari, C., Pluye, P., Frémont, P., Gagnon, J., Tremblay, N. & Légaré, F. (2015). Systematic Review of Factors Influencing the Adoption of Information and Communication Technologies by Healthcare Professionals. *Journal of Medical Systems*, vol.36, pp.241-277.

Gray, C.P., Harrison, M., I. & Hung, D. (2016). Medical Assistants as Flow Managers in Primary Care: Challenges and Recommendations. *Journal of Healthcare Management*, May/June, vol. 61, no.3, pp.181-191.

Helmerson, H (1992). Main Principles for Perspective Text Analysis via the PC-System. PERTEX. Lund: *Lund University*.

- Helmersson, H and J Mattsson (2001). Demonstrating Pertex: A new method for improving text interpretation. *Field Methods*, 13(2), 115–136.
- Helmersson, H., Mattsson, J. (2012). Text-analytic measurement of effectuation and causation orientations among small and global business managers. *Springer Science + Business Media*, june, pp 3494-3507.
- Jacobs, S., Weiner, B., Reeve, B., Hofmann, D. & Weinberger, M. (2015). Determining the predictors of innovation implementation in healthcare: a quantitative analysis of implementation effectiveness. *Bio Med Central - BMC Health Research Science*.
- Jung, C. & Padman, R. (2015). Disruptive Digital Innovation in Healthcare Delivery: The Case for Patient Portals and Online Clinical Consultations, in Agarwal R., Selen, W., Roos, G. & Green, R. (Eds). *The Handbook of Service Design*, London: Springer, pp.298-318.
- Kash, B., Spaulding, A., Johnson, C. & Gamm, L. (2014). Success Factors for Strategic Change Initiatives: A Qualitative Study of Healthcare Administrators' Perspectives. *Journal of Healthcare Management*, January/February, vol. 59, no.1, pp. 65-81.
- Kim, R., Gaukler, G. & Won Lee, C. (2016). Improving healthcare quality: A technological and managerial innovation perspective. *Technological Forecasting & Social Change*, vol.113, pp.373-378.
- Klein, KJ and AP Knight (2005). Innovation implementation overcoming the challenge. *Current Directions in Psychological Science*, 14(5), 243–246.
- Koomans, M., Hilders, C. (2017). Design-driven Leadership for Value Innovation in Healthcare. *The design Management Institute*. pp 43-57.
- Kotter, J. (2011). What Leaders Really Do. *Harvard Business Review*, December, pp. 3-12.
- Leue, C. & Maximoff, K. (2017). Facilitating Factors for the Implementation of Organisational Innovations in Healthcare. An Empirical Case study of Capiro. *Department of Business Administration*.
- Mattsson, J and H Helmersson (2005). Internet banking: Modelling the e-competence of customers with a text-analytic CIT approach. *International Journal of Bank Marketing*, 23(6), pp. 470–483.
- Mattsson, J., Helmersson, H., Standing, C. (2018). The role of relationships in start-up development. *Journal Of Strategic Marketing*, Januari.
- Mattsson, J., Helmersson, H., Stetler, K. (2015). Motivation fatigue as a threat to innovation: bypassing the productivity dilemma in R&D by cyclic production. *International Journal of innovation management*, vol.20, no.1.

Mintzberg, H. (1999). The Manager's Job: Folklore or Fact. *Harvard Business Review*, March-April, pp.163-176

Øvretveit, J., Andreen-Sachs, M., Carlsson, J., Gustafsson, H., Hansson, J., Keller, C., Lofgren, S., Mozzocato, P., Tolf, S. & Brommel, M. (2012). Implementing organisation and management innovations in Swedish healthcare. *Journal of Health Organization and Management*, vol. 26, no. 2, pp.237–257.

Pettersen, IJ. (2011). Trust-based or performance-based management: a study of employment contracting in hospitals. *Internal Journal of Health Planning and Management*. Jan-Mar

Rogers, E.P. (1983). *Diffusion of Innovations*, 3rd edn, New York: The Free Press

Sekaran, U. & Bougie, R. (2016). *Research methods for business*, 7th edn. United Kingdom. John Wiley & Sons Ltd.

Schumpeter, J. A., Elliott, J. E. & Opie, R. (1983). *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle*: New Brunswick: Transaction Publishers, cop. 1983

Schwamm, L., H. (2014). Telehealth: Seven Strategies To Successfully Implement Disruptive Technology And Transform Health Care. *Health Affairs*, vol.33, no.2, pp.200-206.

Staren, E. & Eckes, C. (2013). Optimizing Organizational Change. *Physician Executive Journal*, May/June, pp.58-63.

Thakur, R., Hsu, S. & Fontenot, G. (2012). Innovation in healthcare: Issues and future trends. *Journal of Business Research*, vol.65, pp.562-569.

Ward, JH (1963). Hierarchical grouping to optimize an objective function. *Journal of the American Statistical Association*, 58(301), pp. 236–244.

Weiner, C., Belden, D., Bergmire & M., Johnston. (2011). The meaning and measurement of implementation climate. *Implementation Climate*, vol.6, no.78, pp.1-12.

Wisdom, J., P., Brian C., Ka Ho, H., Kimberly E. & Horwit, S., M. (2014). Innovation Adoption: A Review of Theories and Constructs. *Adm Policy Ment Health*, vol.41, pp.480-502.

Wutzke, S., Benton, B. & Verma, R. (2016). Towards the implementation of large scale innovations in complex health care systems. *Bio Med Central - BMC Research Notes*, vol.9, no.327, pp.1-5.

# Appendices

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Appendix A – Survey	1
Appendix B – Cluster trees from the 10 respondents	5
Appendix C – Table S.1, AFFI values and components	14

## Appendix A – Survey

**Forsknings projekt- Innovation inom hälso- och sjukvård/  
Research project - Innovation in healthcare**

By Elin Berggren ([ekh06ebe@student.lu.se](mailto:ekh06ebe@student.lu.se)) and Joana A. Dias ([jo8778al-s@student.lu.se](mailto:jo8778al-s@student.lu.se)), supervised by Stein Kleppestø

- Syftet med vår studie är att undersöka vilka faktorer som enligt sjukvårdspersonal är viktigast för en hållbart innovativ arbetsmiljö inom hälso- och sjukvård.
  - The purpose of our study is to investigate the key factors for a sustainable innovative work environment in healthcare, as identified by healthcare professionals.
- 

1) Namn/ Name: \_\_\_\_\_

2) Kön/ Gender:

Kvinna/ Female: \_\_\_\_\_

Man/ Male: \_\_\_\_\_

Annat/ Other: \_\_\_\_\_

3) Ålder/ Age: \_\_\_\_\_

4) Yrke/ Profession: \_\_\_\_\_

5) Har du en chefs-position?/ Do you have a management position? \_\_\_\_\_

6) År av erfarenhet( i detta yrke)/ Years of experience (in this profession): \_\_\_\_\_

7) År som yrkesverksam på infektionskliniken/ Years working at the Infection Clinic: \_\_\_\_\_

## Innovation/ "nytänk" inom vården

Nytänk inom vården är något som ofta diskuteras, tex hur ledningen och personalens insatser kan och bör utvecklas för att skapa trivsel och effektivitet i arbetet, vilket i sin tur främjar vårdtjänsterna.

Antag att du ingår i en grupp på din avdelning/klinik som har fått till uppgift att lägga fram förslag om införandet av nya rutiner, metoder, tekniska lösningar, administrativa metoder och hjälpmedel (Inte medicinska hjälpmedel). Dessa förslag ska alltså bidra till ökad trivsel och tillfredsställelse för personalen samt underlätta deras dagliga arbete.

Skriv ner dina tankar, förslag och visioner kring de faktorer som skulle kunna bidra till "nytänk" och förbättring inom verksamheten.

*Skriv ditt svar i normal löpande text, alltså inte enbart listade stolpar. Skriv så långt du tycker är lämpligt för att ge ett, enligt din uppfattning, uttömmande svar.*

*Svaret kommer att behandlas genom ett program som analyserar text och kommer att användas i forskningssyfte. Uppgifterna kommer att behandlas konfidentiellt.*

Vi ser fram emot din berättelse som blir ett viktigt bidrag för utvecklingen och innovation inom vården!

Definition av innovation ("nytänk") i vårt forskningsprojekt: Organisatorisk innovation inom hälso- och sjukvård är definierat som en icke-medicinsk produkt, teknik, administrativ metod eller affärsmodell inom hälso- och sjukvården och syftar till att förbättra produktiviteten, effektiviteten och vårdkvalitèn för patienter. I projektet fokuserar vi på patientnära innovationer.

Skicka era svar till: [ekh06ebe@student.lu.se](mailto:ekh06ebe@student.lu.se)

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## **Innovation/ "thinking outside of the box"**

**It is often discussed about innovation in healthcare, such as how the effort of the managers and staff can and should be developed to create well-being and efficiency at work, which promotes the healthcare services.**

**Suppose you are part of a group in your department / clinic that has been assigned the task of presenting new procedures, methods, technical solutions and tools (not medical devices). These proposals should contribute to the increased well-being and satisfaction of the staff and facilitate their daily work.**

**Write down your thoughts, suggestions and visions about the factors that could contribute to "innovation" and improvement in the organisation.**

*Write your answer in a normal and running text (not bullet points). Write as much as you think is appropriate to give an exhaustive answer to your opinion. The answer will be processed through a text analysis software and will be used for research purposes in a confidential manner.*

*We look forward to your story, which will be an important contribution to the development and innovation of health care!*

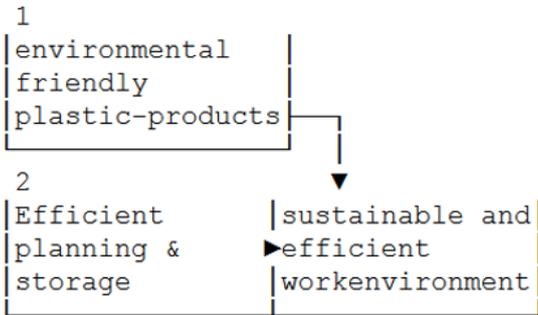
Definition of innovation in this research project: Organisational innovation in healthcare is defined as any non-medical product, process, technology, administrative method or business model in healthcare and aims to enhance the productivity, efficiency and improvement of care quality for patients. We are focusing on frontline level innovation in this project.

Send your answers to : [ekh06ebe@student.lu.se](mailto:ekh06ebe@student.lu.se)

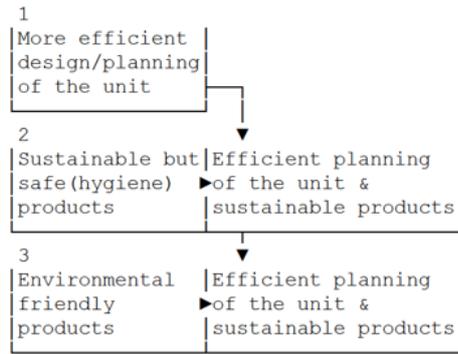
## Appendix B – Cluster trees from the 10 respondents

1

### Orientation

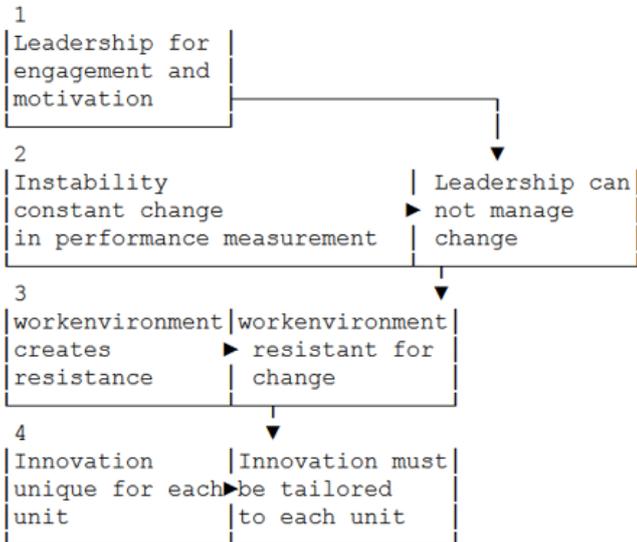


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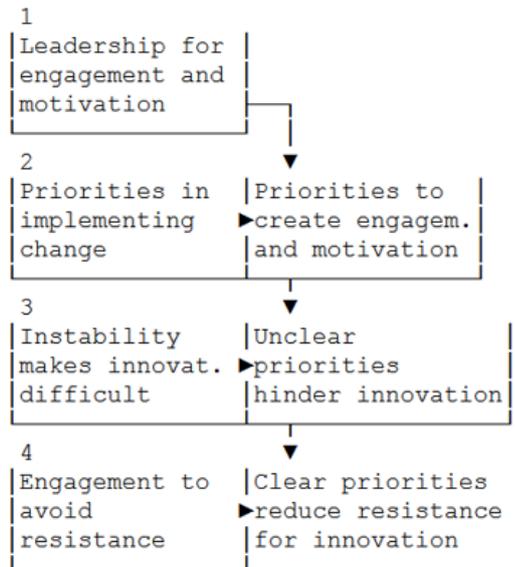


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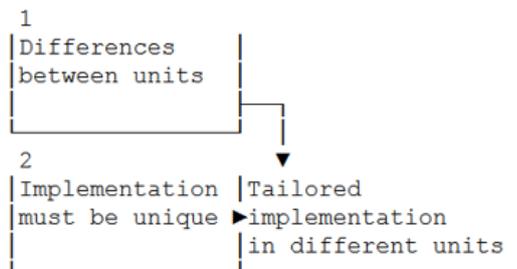
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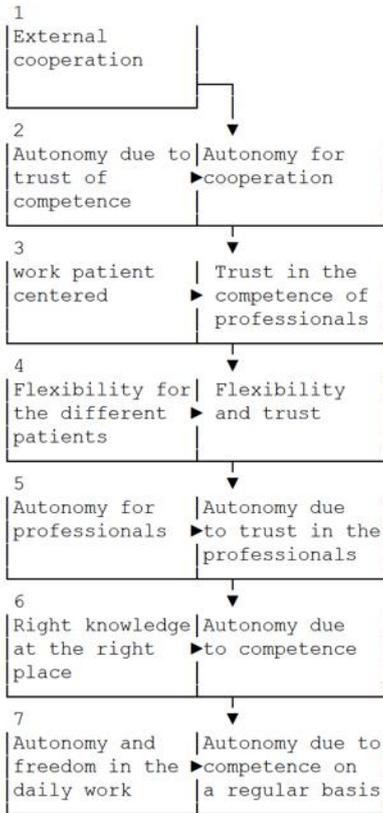


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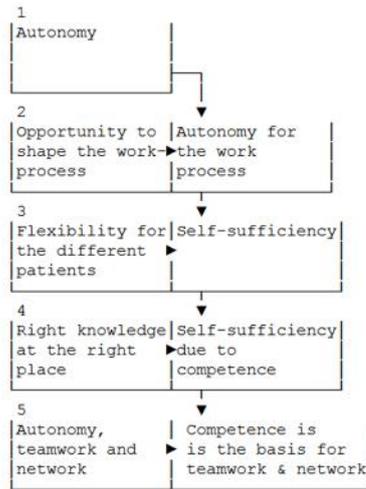


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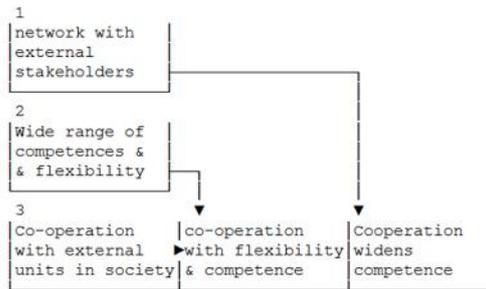
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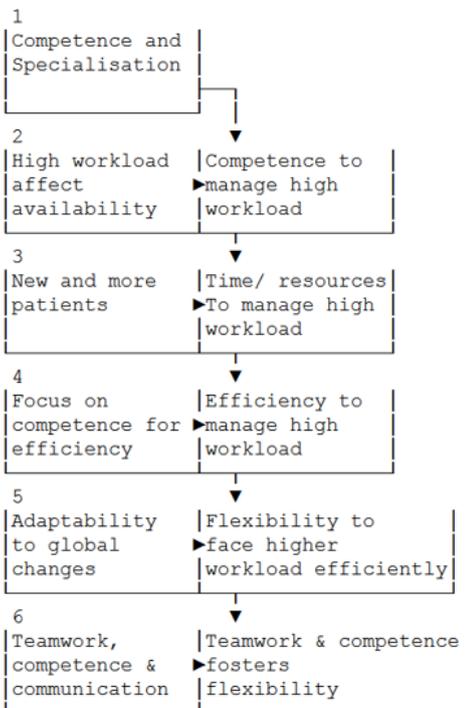


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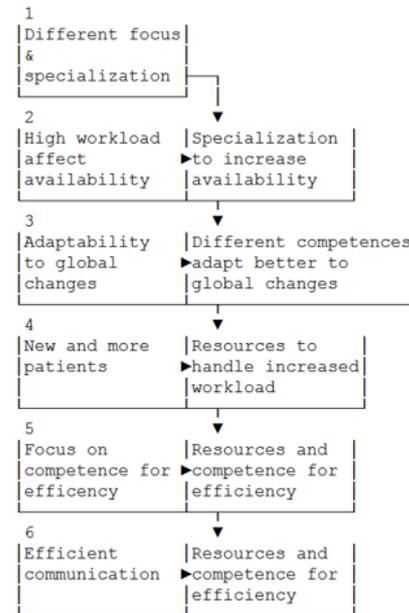


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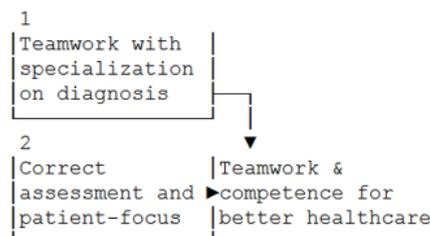
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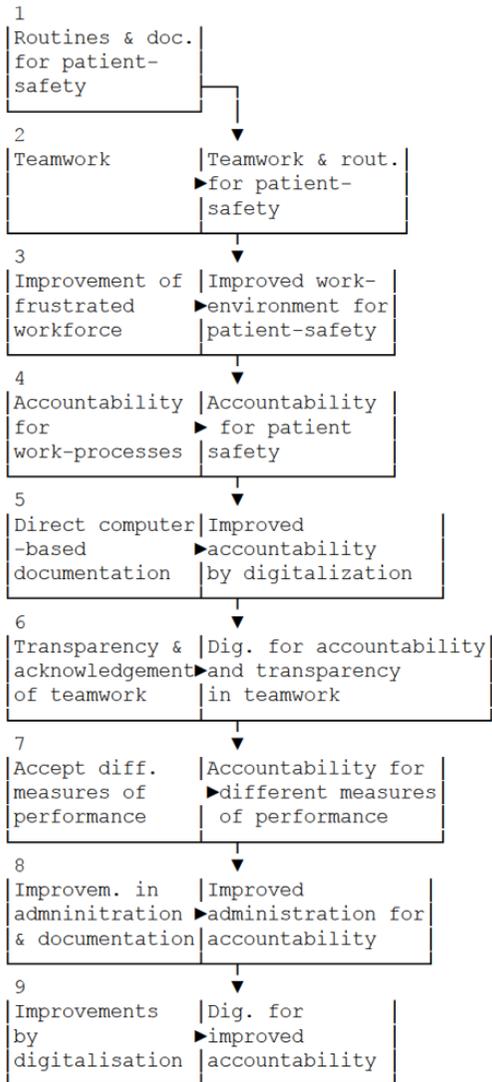
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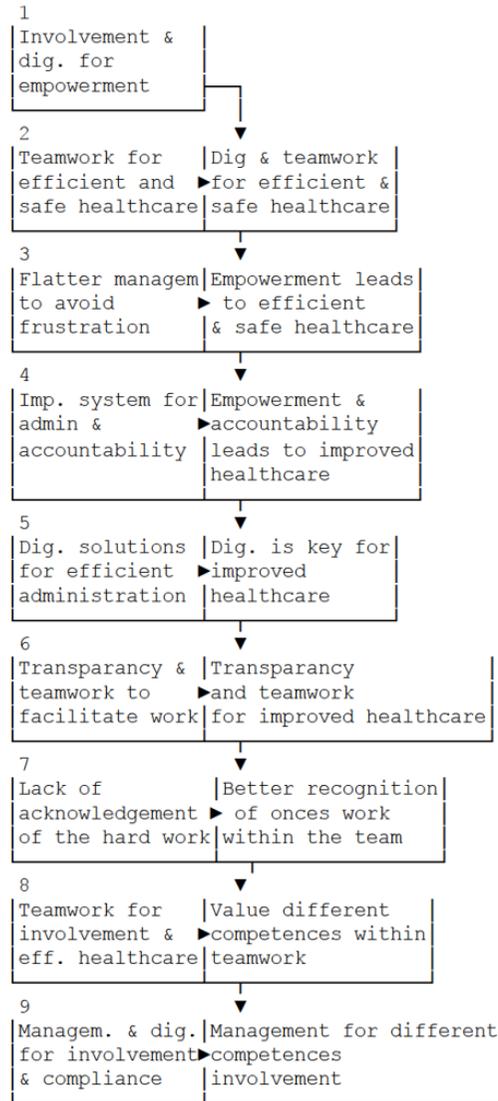
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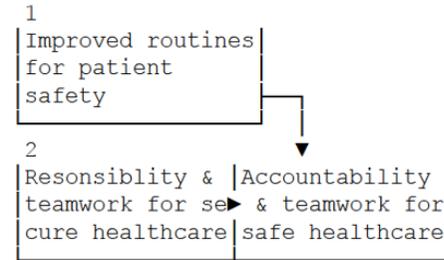
## 5 Orientation



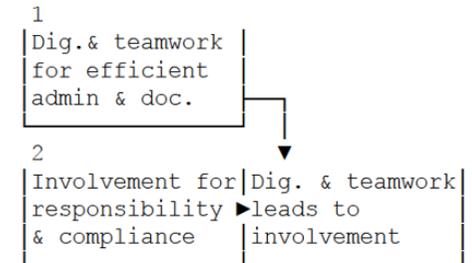
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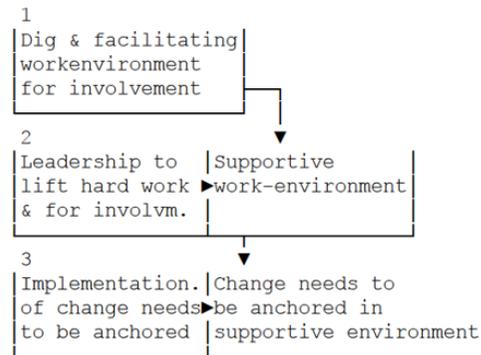
## Means



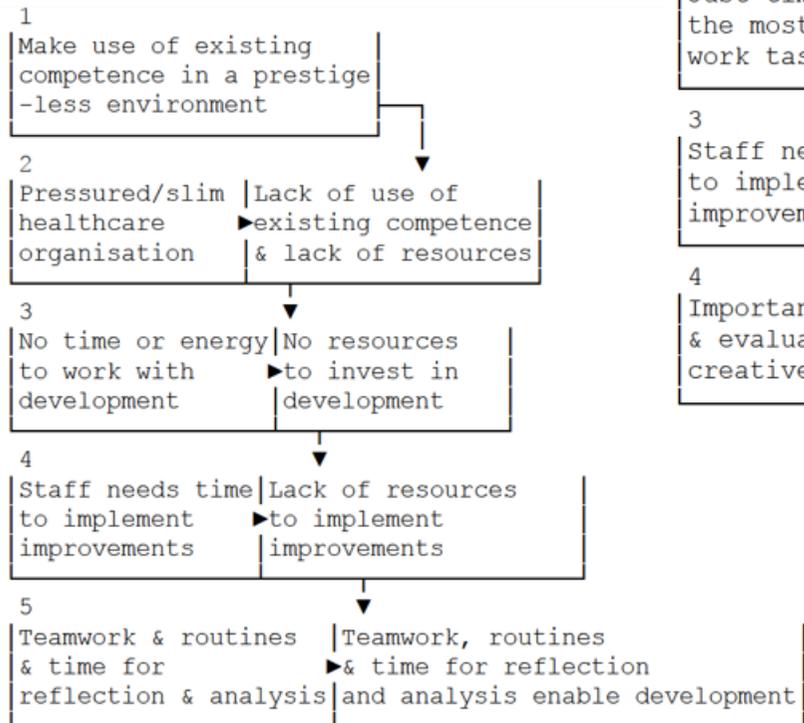
## Goal



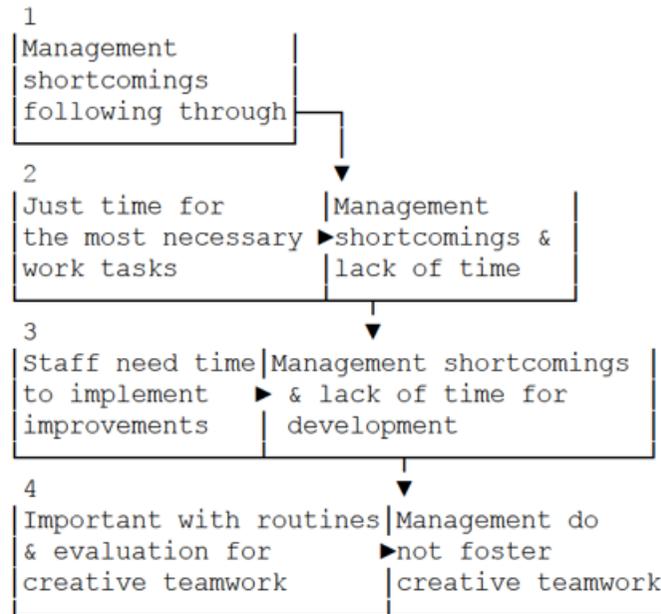
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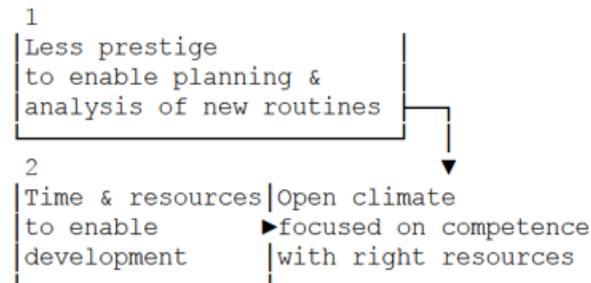
## Orientation



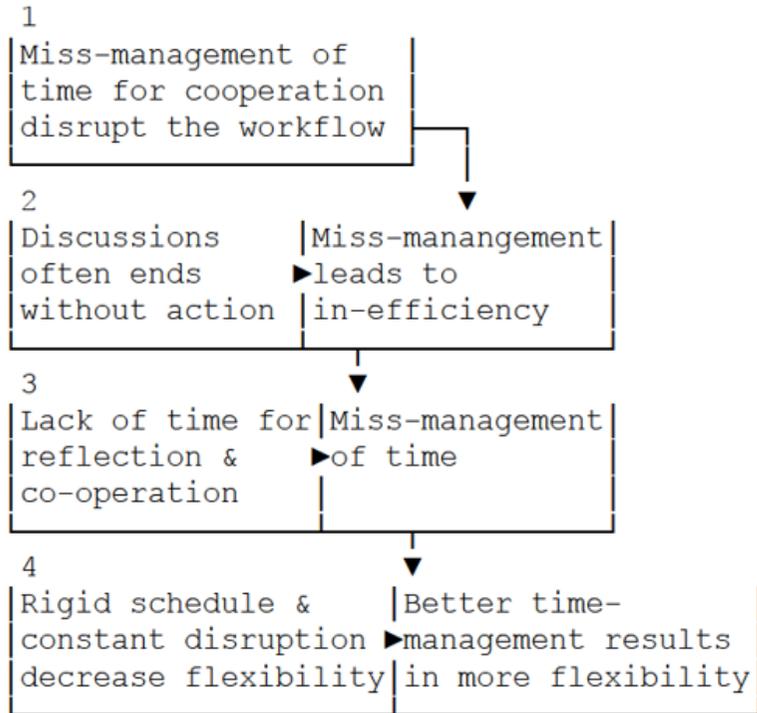
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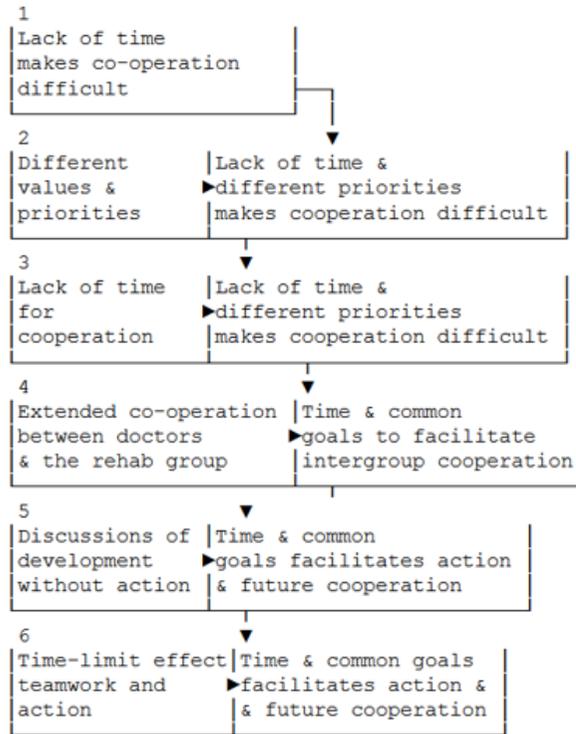
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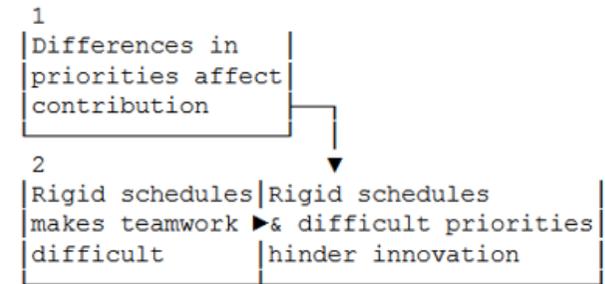
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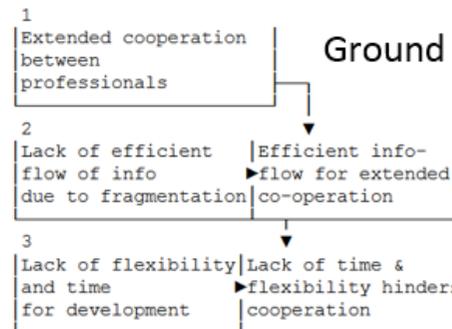
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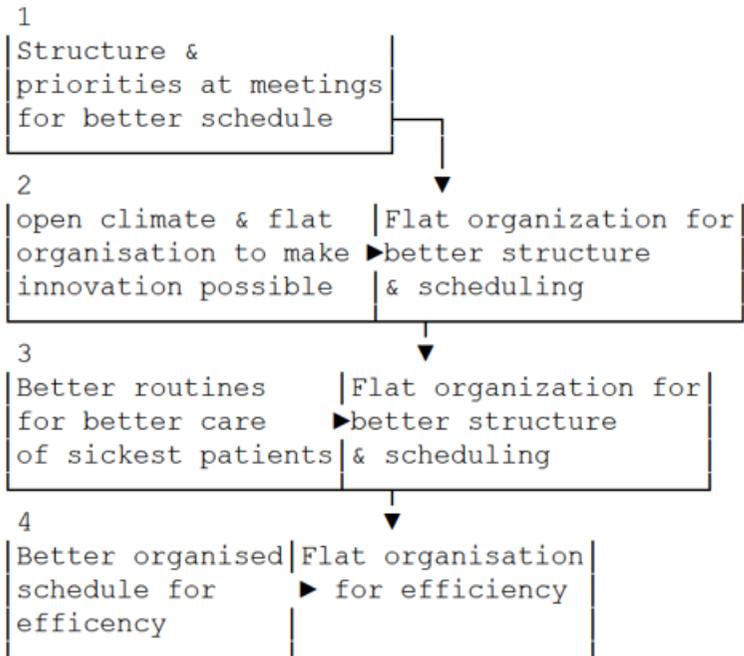
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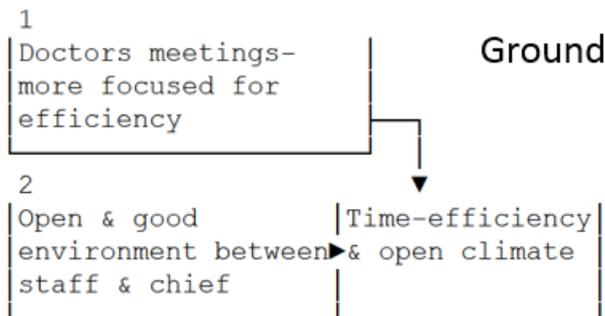
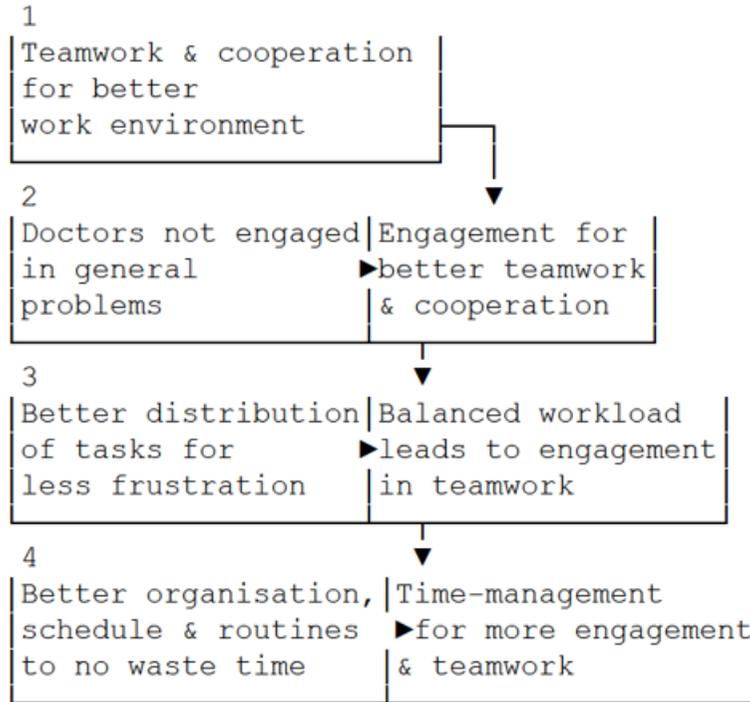
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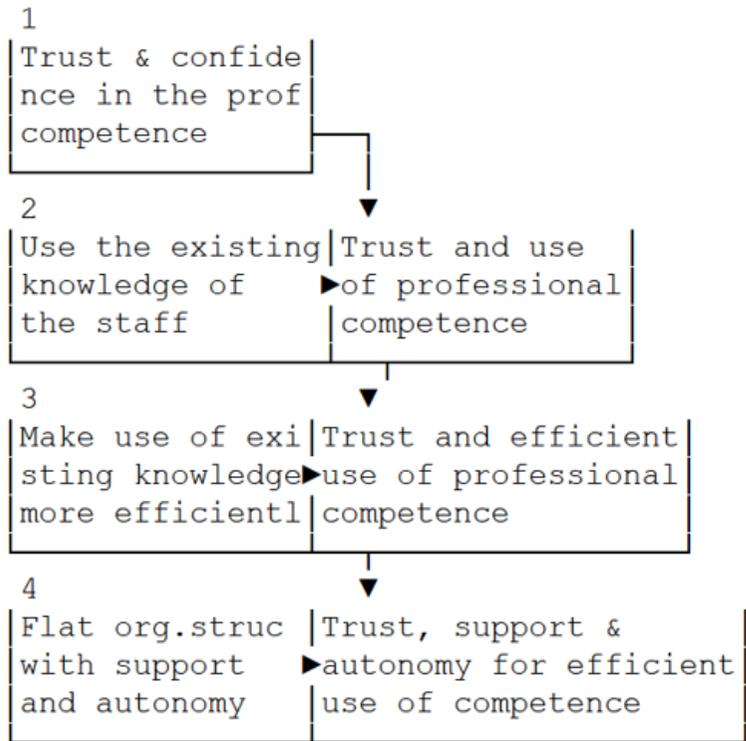
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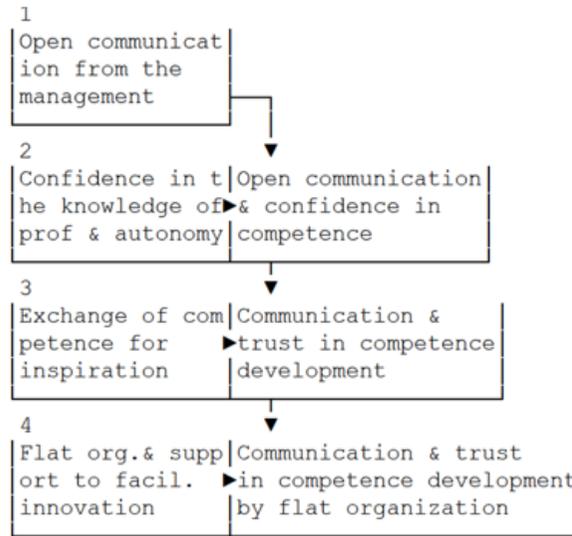
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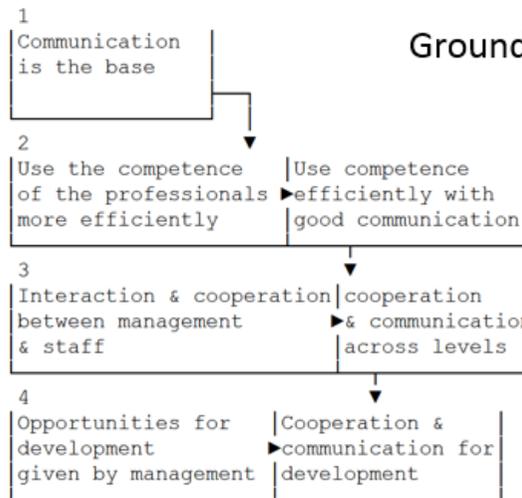
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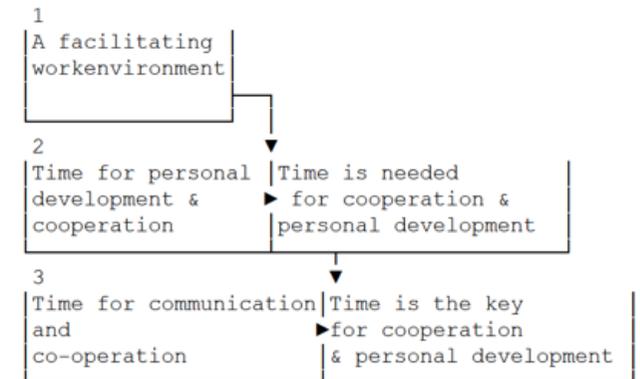
Figure



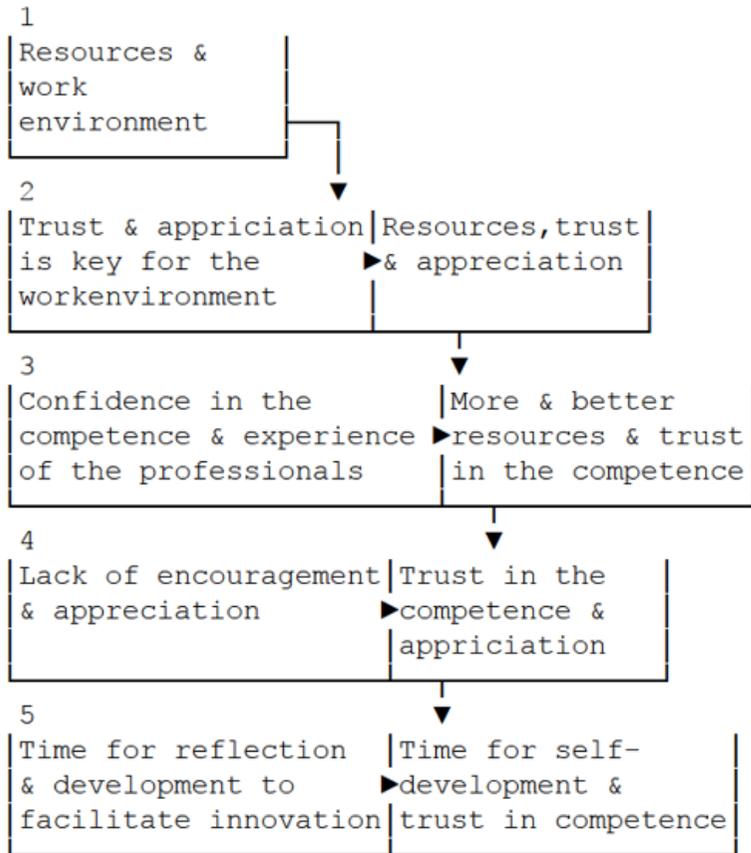
Ground



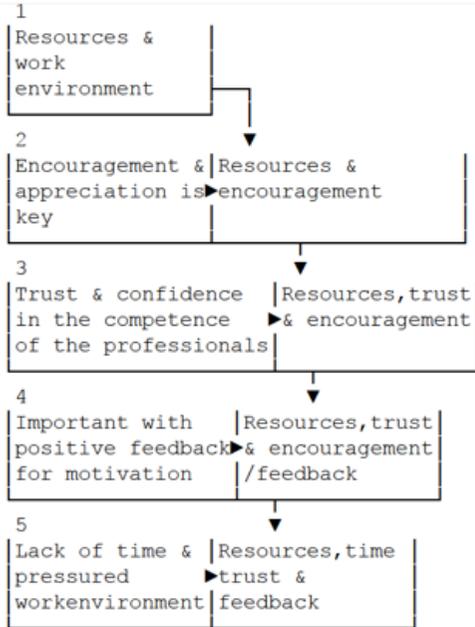
Goal



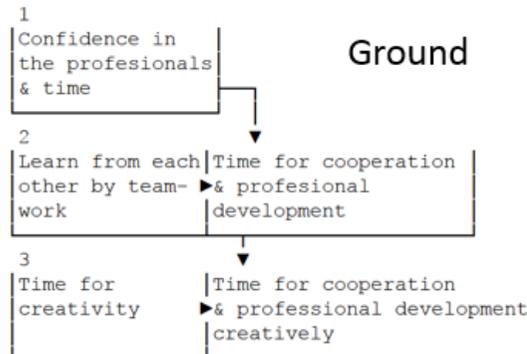
Orientation



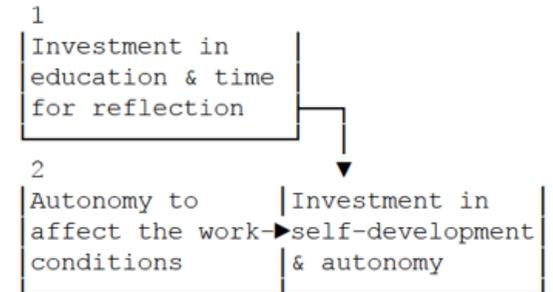
Figure



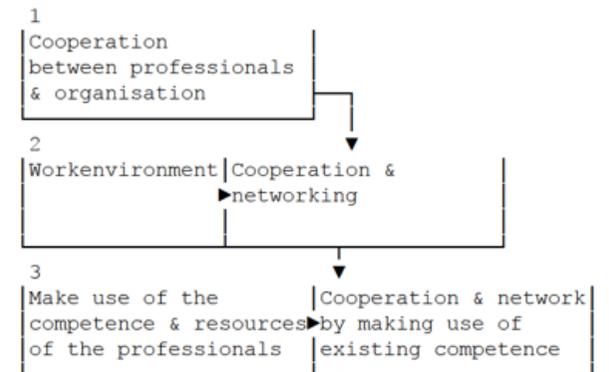
Ground



Means



Goal



## Appendix C – Table S.1, AFFI values and components

**Table S.1** – Text structure, AFFI values and components

<b>ID</b>	<b>Text size</b>	<b>Matrix size</b>	<b>AFFI</b>	<b>Fragmentation</b>	<b>Focus</b>	<b>Integration</b>
1	51	5/3	1.11 100%	0.22 20%	0.00 0%	0.89 80%
2	117	16/11	1.62 100%	0.33 20%	0.30 19%	0.99 61%
3	149	22/9	2.17 100%	0.59 27%	0.00 0%	1.58 73%
4	107	18/8	2.05 100%	0.33 16%	0.19 9%	1.53 75%
5	826	121/60	2.65 100%	0.38 14%	0.57 22%	1.7 64%
6	148	28/14	2.03 100%	0.33 16%	0.24 12%	1.46 72%
7	291	39/20	2.17 100%	0.38 18%	0.27 12%	1.52 70%
8	195	31/19	1.78 100%	0.30 17%	0.28 16%	1.20 67%
9	238	32/19	2.15 100%	0.40 19%	0.45 21%	1.30 60%
10	281	41/26	2.12 100%	0.48 22%	0.46 22%	1.18 56%

Text size, number of words in the text; Matrix size, number of objects\*number of agents