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Knowledge Management in Global Teams A Case Study at Volvo IT in Sweden and China

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Abstract

Volvo IT established a global delivery centre in Tianjin, China in 2009 which works closely with Gothenburg and other sites to develop and maintain IT-solutions that support vehicle sales in Volvo Group globally. Domain knowledge, the specific understanding about the processes and context where the software is used in Volvo Group, is an important asset for Volvo IT. Managing this knowledge in the unique Chinese context, with a young and mobile workforce and a young IT-industry is the challenge that this thesis aims to explain how Volvo IT has handled. The study has been qualitative action research in close cooperation with Volvo IT where the researchers have conducted interviews at the offices of Volvo IT in Gothenburg and Tianjin, and conducted a web-based survey with Volvo IT employees working in Swedish-Chinese teams.

The study finds that Volvo IT has managed to establish a similar workplace culture in Tianjin as in Gothenburg by focusing on working with training on culture, emphasising cultural fit when making recruitment decisions, sending Swedish expatriate managers to Tianjin and having close daily interaction with colleagues in Gothenburg. Overall the working style in Tianjin is somewhat more formal with more communication being done in writing and more organized study groups rather than informal discussions of the work at lunch and other breaks. Using a set of globally standardised professional roles and processes for personal development and promotion gives the organization a way to coordinate staffing while it gives the employees transparency and contributes to making growing individual domain knowledge part of growing professionally. The combination of the open Volvo culture and using structured ways to work with professional growth are important for attracting and retaining talented employees. In the future, increasing interaction with end-users and working with broader professional roles can contribute to building domain knowledge. There is also an opportunity for Volvo IT in Tianjin to become a pioneer in close university-industry cooperation and thus learn from academia and inspire students with its culture and opportunities for professional growth.

Keywords: Culture, global teams, human resources, knowledge creation, knowledge management, knowledge transfer, Swedish-Chinese cooperation, recruitment

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1. Introduction

In any organization, managing knowledge is major challenge that impacts how individuals can cooperate to make sure the organization can fulfil its objectives. For an organization expanding into several locales with different industrial maturity and different national cultures this can be a challenge that severely restricts how the organization can grow its capabilities. In the service-sector these problems can be expected to be magnified due to the intangible nature of services, and difficulty in measuring quality of what is delivered. The IT-sector can be expected to be especially challenging to work with as the service of developing and delivering software services is highly complex to supply and highly complex to be a buyer of and properly formulate demands. The problems of managing knowledge may be further increased by high staff turnover as an individual quitting leads to tacit knowledge disappearing from the organization together with personal relationships of that individual. All these challenging factors are present at Volvo IT in China which makes a case study of their knowledge management practices a promising area for research.

Volvo IT has recently expanded in China and is continuing to build capabilities in its global delivery centre in Tianjin. Volvo IT is part of Volvo Group and a large advantage compared to external IT-suppliers is that Volvo IT can build up extensive domain knowledge. Domain knowledge in the IT-industry is the understanding of the context that the software will be used in, in Volvo this means both an understanding of the automotive industry in general and specific understanding of how processes work at Volvo and its partners. The needs and conditions for managing knowledge and staff turnover are considerably different in Sweden and China. New approaches for knowledge management are needed to keep expanding the knowledge base, retain knowledge when staff move on to new positions and to make it easier to expand the number of employees. Volvo IT works extensively with partners and a large part of their staff in Tianjin are employed by partner companies which is both an opportunity to learn from other companies and a challenge to keep developing core capabilities in Volvo IT.

1.1 Purpose & objective

The purpose of this thesis is to explore how knowledge management practices can contribute to international cooperation, knowledge transfer and industrial development in IT service industry.

This is studied through a case study of how Volvo IT works and can work with managing domain and business knowledge in Sweden and China. The contribution of the thesis is an increased understanding of current practices for knowledge management, the effects of staff turn-over on accumulation of knowledge and insight in how knowledge can be managed in global teams. The thesis has been done in close cooperation with Volvo IT and has been designed as a case study of how their organization has dealt with the challenges of knowledge management, staff turnover and cooperation in Swedish-Chinese team. Our first research question deals with describing current practices at Volvo IT for knowledge management:

“How does a multinational organization in the IT-sector operating in both Sweden and China manage the creation, accumulation, transfer, and use of knowledge?”

Our second research question aims to describe how the organization is and can be affected by staff turnover, which is much lower in Sweden and China and may thus have different impact on building domain knowledge in the organization:

“How does and how can staff turnover affect IT-service delivery?”

Our third research question aims to describe how current practices at Volvo IT affect knowledge management, staff turnover and issues specific to global teams and to explore future possibilities for improvement in the practices of Volvo IT:

“How can company culture, processes and systems be used to mitigate problems related to cultural differences and staff turnover in an organization with global teams?”

From an academic perspective this thesis contributes to the understanding of how multinational IT-organizations working closely with clients in a complex industry can manage domain knowledge, educate new employees and reduce the negative effects of staff turnover. The results contribute to the academic body of knowledge about the challenges faced in managing complex international projects and transferring knowledge in large organizations with a mix of nationalities and experiences. The increased understanding of issues critical to the globalization of the service sector and development of the IT-industry in China can assist multinational companies and governments in making better decisions that will lead to increased development and international integration. As lean has been successfully used in the automotive industry for

improving manufacturing and creating learning, there is an interesting possibility to work more with it at an IT-organization specializing in software for the automotive industry. In our discussion frameworks from lean philosophy have been used together with concepts from knowledge management to analyse possibilities to improve the learning procedures in IT-industry and reduce the impact of staff turnover.

1.2 Scope & delimitations

The thesis will focus on the case of Volvo IT in Tianjin in relation to headquarters in Gothenburg, thus the conclusions will be especially applicable to other Swedish IT-companies entering China. The subject of the thesis is knowledge management in an existing business-to-business IT-service delivery organization. Since the study is designed as a case study of the current cooperation between Gothenburg and Tianjin, we will not investigate the general corporate strategy of Volvo IT or best practices in general for setting up new IT delivery centres. Even though the question of staff turnover is related to issues of optimizing the size or geographical deployment of workforce, these issues are influenced by too many factors related to overall corporate strategy and would stray too far from the theme of knowledge management. Since the aim of the study is to explore and describe the current efforts, it needs to make a broad description of different issues related to our theme and it is also out of the scope of this study to attempt to make detailed quantifications of costs or benefits related to knowledge management or to make detailed specifications of how new initiatives or IT-systems should be implemented.

2. Literature review

2.1 Knowledge

Here the concept of knowledge and the related concepts of domain knowledge are introduced.

2.1.1 The concept of knowledge

There is substantial literature on knowledge management and a fundamental issue is to actually define what knowledge is in order to understand how it can be managed. Alavi and Leidner (2001) define knowledge as “*knowledge is information possessed in the mind of individuals: it is personalized information (which may or may not be new, unique, useful, or accurate) related to facts, procedures, concepts, interpretations, ideas, observations, and judgments.*”. Different types of knowledge result in different processes of knowledge capturing and sharing (Davenport and Prusak, 1998) and different implications on management (Grant, 1996).

2.1.2 Tacit knowledge and explicit knowledge

Polanyi (1966) classifies knowledge into two levels: tacit knowledge and explicit knowledge. Explicit knowledge refers to the artificial knowledge which could be captured by say manuals, words in the paper and compiling data. Tacit knowledge is the individual skills and “know-how” which are formed by intuition, perspectives, beliefs, and values and are difficult to be shared (Hubert (1996), Ahmed, Lim and Zairi (1999)).

According to Hubert (1996), better tacit knowledge enables the organization managers to perceive the right place of the organization in the market and improve the ability of making decisions. Unified tacit knowledge helps the individuals in the organization to have effective communication, understand others’ perspectives, exchange explicit knowledge and cooperate to reach their common goals (Hubert, 1996).

2.1.3 Difference between data, information & knowledge

According to Gevorgyan and Ivanovski (2009), data, information and knowledge are often used interchangeably despite that they are distinct concepts. Fahey and Prusak (1998) assume that knowledge management would be meaningless if there is no difference between knowledge, data and information. Davenport and Prusak (1998) points out that it is important for the business

manager to identify the differences between the three concepts and make accurate decisions when in how to use the different entities.

Holmes (2004) defines data as “a representation of facts or ideas in a formalized manner, capable of being communicated or manipulated by some process”. Davenport and Prusak (1998) described data as “a collection of objective facts that is specific to some events” and the property of data is that it does not have any purpose when it is separated from the context. Information is defined as the “meaning that a human assigns to data by means of the known conventions used in its representation” (Homes 2004). The combination of data yields meaningful information (Ahmed, Lim and Zairi, 1999). The relationship between data and information is that data can be converted to information when the data is utilized for a specific purpose (Davenport and Prusak, 1998). Knowledge is personalized information possessed in the mind of individuals, which is related to cognition, analysing and judgments (Alavi and Leidner, 2001). Information exists at a lower order than knowledge (Ahmed, Lim and Zairi, 1999). Ahmed, Lim and Zairi (1999) explain the difference between information and knowledge by using dance as an example. The information of a dance is related to the step-movements during the dance. The dancing knowledge is held within a person perfecting the dancing skills (movements, balance and emotion) simultaneously. Based on the analysis of the relationship between data, information and knowledge, Gevorgyan and Ivanovski (2009) interpret the inter-relationship by a “knowledge circle” which is shown in Figure 1 and which shows the supporting relationships between the three entities.

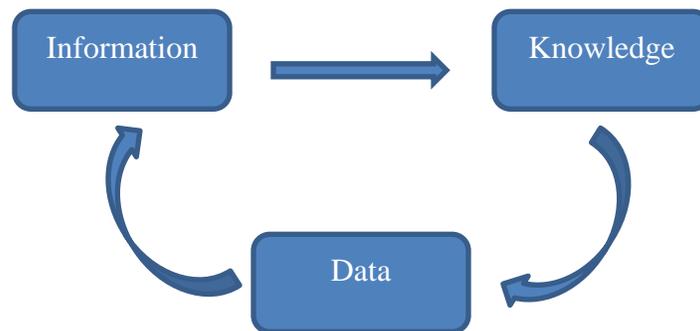


Figure 1: Knowledge circle (Gevorgyan and Ivanovski, 2009)

However, according to Alavi and Leidner (2001), information could become knowledge which is possessed in individual mind and knowledge could convert to information and be presented in readable form. In other words, the relationship between information and knowledge should be inter-conversion instead of monotonic conversion. As a result, the authors improved the knowledge circle to a new version which is shown in Figure 2. In the transmission process from highly explicit at the data level to highly tacit at the knowledge level, the depth of meaning and the difficulty of interpretation increases gradually and more resources are required for the interpretation of it.

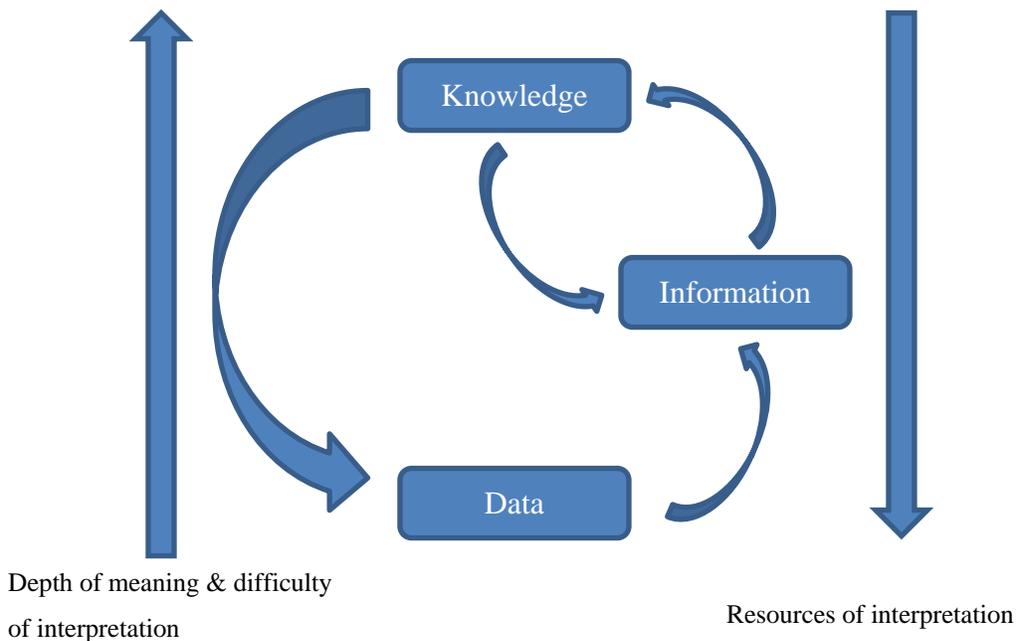


Figure 2: knowledge circle, authors' own interpretation of (Alavi and Leidner, 2001)

2.2 Knowledge management

In their review of literature on knowledge management Alavi and Leidner (2001) identify a number of different perspectives of knowledge and implications for the role of knowledge management(KM) such as: KM as giving users access to personalized information; KM as building and maintaining stocks of knowledge; KM as creating processes that enhances knowledge creation and sharing.

2.2.1 Components of knowledge management

According to Liebowitz (2012), knowledge management is combined by three components: people, process and technology. The “people” side is about how to create and nurture a knowledge sharing environment and culture in the company and the “process” side is about managing the knowledge management processes and aligning knowledge sharing with the daily work of the employees. “Technology” is about creating a unified platform for the employees to communicate and share knowledge.

2.2.2 Benefits of knowledge management

No matter which perspective is applied, the strategic management of knowledge is of great importance to the success of any company in a knowledge-intensive industry and Grant (1996) argues that knowledge is a resource whose special characteristics and needs for coordination is one of the main reasons firms exist at all. Nonaka (1991) argued that Japanese companies in automotive and electronics were successful largely due to managing to become *knowledge creating companies* where all levels of the company work together to create new tacit and explicit knowledge by gathering, combining and transforming existing tacit and explicit knowledge.

Schulz and Jobe (2001) argue that Multinational corporations enhance performance and gain competitive advantage by strategically managing the balance between keeping knowledge immobile (more tacit) to not let competitors make use of it and of making knowledge mobile (more codified or explicit) in order to facilitate use of the knowledge inside the organization. Based on surveying subunits, Schulz and Jobe (2001) further argue that companies do not benefit from just encoding more information in multiple forms, instead they should use a focused strategy of encoding the right pieces of knowledge in a single way that fits the information intensity and ambiguity of that information. Schulz and Jobe (2001) take a broad view of knowledge codification and divide it into 3 main categories: *numbers & code* (such as computer programs) are the most abstract way of codifying knowledge, *words and text* are less abstract and *people and objects* which is concrete prototypes or the uncoded knowledge of individual employees.

Mahnke et al. (2005) used the concept of *absorptive capacity* in performing a case study of how subsidiaries in a multinational company actually benefitted from knowledge management practices. The use of tools such as learning systems (directories of where to find information),

group benchmarking reports, knowledge teams and the corporate university was found to help integration of subsidiaries and have positive impact on economic performance and process efficiency (Mahnke et al., 2005).

Sveiby (1996) compares how knowledge is either transferred directly between individuals through face-to-face socialization or indirectly via a medium. Sveiby (1996) compares the concept of *Tradition* that deals with how tacit knowledge is transferred through interaction with the concept of *Information* that deals with how to encode understanding reality into a representation of reality that can be transferred without personal interaction. *Tradition* is a concept from the work of Michael Polanyi about how humans think and how the knowledge of societies grows as craftsmen and others who know pass on their tacit knowledge (Sveiby, 1996). The concept of *Information* may be used in a mathematical meaning in the field of *information theory* that deals with transmission of signals as in the seminal paper by Shannon (1948). Viewing information as something that can be embodied in symbols and processed fits well with a mechanistic view of the organization, with the organization being something that is formed in order to process information (Galbraith, 1974).

The knowledge management practices at Volvo Group has previously been investigated by Chen and Ghaedian (2012) who noted how the IT-focused efforts within the knowledge management tradition to codify and store knowledge may not be the most central processes in actually using the knowledge. Chen and Gaedian (2012) argue that the most important way that employees at Volvo actually find and create useful knowledge is by interaction with other employees, thus efforts to increase interaction and using technology to make the competence of competent individuals visible and searchable may have very positive effects and should be prioritized.

When employees are let go or choose to leave the firm, knowledge management practices have an important role to play in retain knowledge in the organizational memory, this retention is something which Schmitt et al (2012) argue is an insufficiently explored subject and that this leads to large losses of knowledge when downsizing. Understanding the effects of employee turnover is something this thesis aim to address, though in the context of an expansive company dealing with very different environments in China and Sweden. Lee (1999) agrees that foreign companies entering China need to adopt their organizational learning efforts at individual, team and corporate level to work well the legal and cultural environment.

2.2.3 Organizational knowledge management process

In this section, a systematic framework of knowledge management will be introduced to understand organizational knowledge systems. In this framework, organizational knowledge systems are divided into four sets of knowledge processes: creation, storage/retrieval, transfer and application (Holzner and Marx, 1979; Pentland, 1995; Alavi and Leidner, 2001).

Knowledge creation

Knowledge creation means new content development and the replacement of the existing content of organizational tacit and explicit knowledge. (Pentland, 1995; Alavi and Leidner, 2001).

Nonaka, Toyoma & Konno (2000) defines the knowledge conversion process of interaction between tacit knowledge and explicit knowledge as *the SECI process*. *SECI* is an abbreviation for the four conversion modes in the model: socialization, externalization, combination and internalization. Nissen (2002) also uses these four modes in his extended model of knowledge flow and represents it as knowledge flow in dimension of explicitness.

Socialization mode refers to the communication of tacit knowledge and experience sharing process between individuals through social interaction (e.g., apprenticeship and on-job training). In the socialization mode, effective plan and efforts are required to encourage individuals to involve in more communication and interaction (Curado and Bontis, 2001; Chen and Gaedian 2012). Externalization is defined as the articulating and knowledge crystallizing process from tacit knowledge to new explicit concepts (e.g., lessons learned). In the externalization mode, it enables the individual mindsets to be transformed into collective mindsets (Hubert, 1996).

Combination mode refers to the new explicit knowledge creation from the reconfiguration of the existing explicit knowledge (e.g., survey reports). The existing knowledge could be gathered from the inside or outside of the organization and the new explicit knowledge should be more complex and systematic (Nonaka, Toyoma & Konno, 2000). Internalization mode is exemplified by the creation of tacit knowledge from explicit knowledge and similar to traditional learning (e.g., the learning as a result of reading). Internalization mode could be considered as the knowledge transformation process from collective knowledge to individual knowledge (Chen and Ghaedian 2012).

As a result, the knowledge creation is a continuous interaction process between tacit knowledge and explicit knowledge. The SECI conversion process is interpreted in Figure 3.

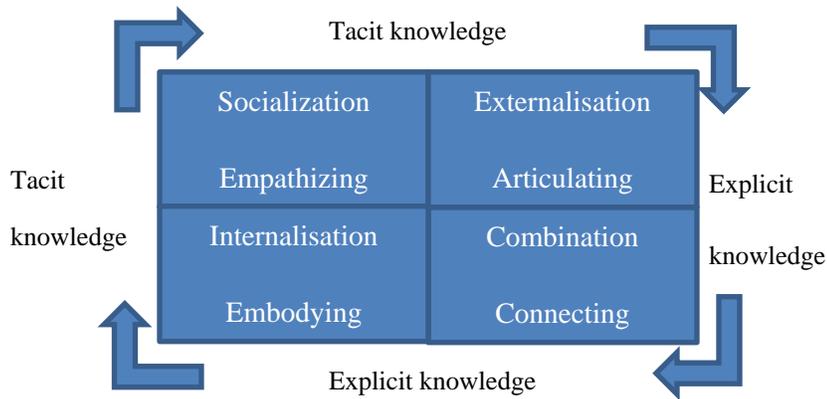


Figure 3: The SECI process (Nonaka, Toyama & Konno, 2000)

Knowledge storage/retrieval

Darr, Argote and Epple (1995) point out that the knowledge creation and learning process is accompanied with knowledge loss. It is important for the organization to store created knowledge for future retrieval and reuse (Gevorgyan and Ivanovski, 2009). The knowledge stored and available for retrieval in the organization is called organizational knowledge (Walsh and Ungson, 1991). The term organizational knowledge refers to all of the knowledge within the organization and could be stored in different forms, such as standardized working procedures, written documentation, structured information saved in databases, codified knowledge stored in the expert systems and tacit knowledge captured by individuals or individuals' network (Tan et al., 1998).

According to Stein (1995), an organization requires the capability to store and transmit the knowledge from the past to the future members in the social system; this capability is called the organization's memory. Stein and Zwass (1995) divided the memory into individual memory and organizational memory. Individual memory refers to the individual knowledge from personal observations, experiences and actions (Sanderlands and Stablein, 1987). Organizational memory refers to the knowledge that is accumulated in the past which impacts the present performance and activities (Stein and Zwass, 1995). According to Stein and Zwass (1995), organizational

memory could be divided into semantic and episodic. Semantic organizational memory refers to generalized, explicit and articulated knowledge (e.g., annual reports) and episodic organizational memory represents the situated and context specific knowledge (Gevorgyan and Ivanovski, 2009).

Memory has both positive and negative influence on the individual and organizational performance and activities (Alavi and Leidner, 2001). On the positive side, from the memory, stored workable solutions could be reused and reapplied to solve present problems and reduce the waste of organizational resources (Alavi and Leidner, 2001). The memory could also improve the implementation process of organizational changes (Wilkins and Bristow, 1987). On the negative side, outdated individual memories could lead to bias in the decision-making (Starbuck and Hedberg, 1977).

Knowledge transfer

After the knowledge creation and storage processes, it is important to transfer the knowledge to avoid situations operational skills and solutions for problems have to be reinvented (Schwartz, 2006). Knowledge transfer is a process to communicate and apply knowledge from one source to recipient (Darr & Kurtzberg, 2000) and mainly focuses on learning (Schwartz, 2006). The source and recipient could be separate or any kinds of combination of individuals, groups and organizations (Darr & Kurtzberg, 2000). Frequent interaction between the sender and recipient enables enhancing the flow of knowledge (Schwartz, 2006). Both tacit knowledge, explicit knowledge and the combination of the both could be transferred (Gevorgyan and Ivanovski, 2009). Knowledge transfer could be done more efficiently when the transferred knowledge is more explicit and less tacit (Schwartz, 2006).

Knowledge application

Knowledge application starts from the recipients using the learned and received knowledge (Gevorgyan and Ivanovski, 2009). During the knowledge application process of the recipients, the knowledge will be re-identified and applied and gradually converted to personalized and routinized knowledge (Szulanski, 1996).

To create and improve the organizational capability, Grant (1996) classifies the information integration into three mechanisms: directives, organizational routines, and self-contained task teams.

- Directives are the knowledge conversion from specific standards, procedures and requirements to explicit knowledge so as to enable the individuals to understand and learn the specific knowledge (e.g. work instructions) (Grant, 1996).
- Routines refer to integrating individuals' task performance and specific knowledge with the development of patterns, protocols and specifications so as to minimize the requirement of communication (Grant, 1996; Alavi and Leidner, 2001).
- Self-contained task teams refers to problem solving process for the teams of individuals by using their knowledge and personal ability when specification of directives and organizational routines are not applicable due to the uncertainty and complexity of the task (Grant, 1996; Alavi and Leidner, 2001).

2.2.4 Knowledge management measurement

To be a successful knowledge-based organisation in the era of knowledge economy, it is important for the organization to implement an effective and economical knowledge management strategy (Bose, 2004). However, with increasing investment on the implementation of knowledge management, the knowledge management practitioners are frequently requested to evaluate the contribution and benefits of knowledge management to the organization's performance. Positive benefits enable the practitioners to gain more investment and supports from decision makers on future improvements. Moreover, Bose (2004) presented the importance of measuring knowledge in order to enable managers and practitioners to analyze the knowledge management system and find bottlenecks. However, due to the inherent measurement difficulty of knowledge which is invisible, measurement is considered as the least developed aspect in KM (Bose, 2004). Moreover, all other influences from competitive environment and industry conditions, make it most difficult to measure the impact of organizational performance on knowledge management (Kim, 2006).

Ghalayini and Noble(1996) categorized the measurement development phases into: traditional management measures, non-traditional management measures and integrated measures. Traditional management measures, which were started in the 1980s, were based on the

management accounting systems and mainly focused on the financial performance and data (i.e. return on investment (ROI)). However, traditional management measures do not connect with the corporate strategy, contradict with continuous improvement and cost a lot during the measurement processes which limits their applicability. Non-traditional measures were related to the manufacturing strategy and operational measures which provide the necessary information to the decision maker and practitioners and help in achieving continuous improvements. In order to give a balanced view of both financial and operating measures, integrated measures were developed by the researchers and world-widely used in different firms and aspects. For example, strategic measurement analysis and reporting technique (SMART) system, balanced scorecard (BSC) and performance measurement questionnaire (PMQ) are included in the integrated measures.

Currently, there are no available standardized metrics for organizations to evaluate their knowledge management performance. According to Liebowitz (2012), knowledge management metrics can be divided into system measures, output measures, and outcome measures. Several concrete evaluation approaches will be introduced in the following sections.

Success case method

Employee training programmes plays a significant role in the learning perspective of knowledge management. Compared with spending money on external recruitment, training and developing the existing employees would increase the employees' satisfaction and motivation and be more beneficial for the company (Arellano, 2009). According to research on human resource development, on average only a 10% success rate is usually received from traditional training programs when success is defined as the training having contributed to improved individual and organizational performance (Tannenbaum & Yukl, 1992).

The success case method was developed as a way to work with continuous improvement and used in Japanese industry to describe and encourage quality improvements, Brinkerhoff (2003) developed a way to use the success case method to evaluate the return on the training investment in the human resource development perspective and the business effects of training. The success case method approach has two steps: 1) locating the potential success cases and individuals; 2) Identifying and documenting the success cases (Brinkerhoff, 2005). To locate the success cases

and individuals, a survey should be carried out where the key question is "To what extent have you used your recent training in a way that you believe has made a significant difference to the business?" Then the both successful and unsuccessful cases and individuals could be located. Besides survey, analysis of usage records or performance data also could be used to locate success. When the success cases are located, the interview method is implemented to identify, document and perfect the success in depth. Regarding the unsuccessful individuals and cases, the barriers to receive higher success rates can be identified and documented to improve the training.

Expertise locator system

It is difficult to locate the right advice and information from the right person at the right place in the right time, especially for the employees in a global company. However, in the organization, the individual expertise should be the most valuable resource to be managed (Mowbray, 2002). Expertise locator systems could be considered as the yellow pages of the expertise in the organization (Liebowitz, 2012). Liebowitz (2012) summaries 13 benefits of implementing expertise locator systems such as: rework and cycle-time reduction, financial savings, increasing service quality and customers' satisfaction, increase the employees' involvement and improve the decision making. Mowbray (2002) also lists three challenges of using expertise locator system: the quality of the content, collection of users' feedback and financial impact on organization.

2.3 Culture

The national culture is distinctly different from organizational culture and has implications the appropriateness of different management styles and practices, national culture was identified by Hofstede (1980) to be measurable along 4 different dimensions and later a fifth dimension was added. The original dimensions are (Hofstede, 1988):

Power distance index (PDI), the degree to which inequality between people is deemed acceptable, this may be inequality in prestige, wealth or in the relationship between superiors and subordinates.

Uncertainty avoidance index (UAI) measures how comfortable people are with situations that are new unfamiliar and ambiguous and how much a society is oriented towards using rules and rituals to avoid uncertainty and anxiety.

Individualism (IDV), which is the degree to which the individual is viewed as an independent unit mainly responsible for itself, which is contrasted to collectivism which in this context denotes a preference for viewing the individual as part of a larger group that cares for its members.

Masculinity (MAS), this dimension measures how much a society values competition and material achievement as opposed to traditionally feminine values such as caring for the weak, quality of life and harmony.

In addition to the 4 dimensions identified by Hofstede (1980) in research from a western perspective, a fifth, independent dimension of culture was found and validated in large survey from a Chinese perspective (The Chinese Culture Connection, 1987). This fifth dimension was initially labelled *Confucian dynamism* and encompasses: thrift, persistence, respecting differences in relationships and having a sense of shame (The Chinese Culture Connection, 1987). A high score on this dimension was shown to be correlated with high economic growth and this cultural emphasis on values such as thrift (accumulating capital) and perseverance could be an important reason for the economic rise of East Asia (Hofstede & Bond, 1988). This dimension has later been used together with the original 4 dimensions and labelled *Long term orientation* (LTO). An interesting aspect of this dimension is that, despite being called *Confucian Dynamism*, this cultural dimension is negatively correlated with some values related to Confucian teachings, such the importance of protecting one’s “Face” and respect for tradition (Hofstede & Bond, 1988). As seen in Table 1, except for Individualism and Long term orientation, China and India get quite similar values in Hofstede’s dimensions of culture. Sweden differs more and scores much lower on Power distance and Masculinity, while scoring much higher on individualism.

| Dimension | Sweden | China | India |
|----------------------|---------------|--------------|--------------|
| PDI (Power distance) | 31 | 80 | 77 |

| | | | |
|-----------------------------|----|-----|----|
| UAI (Uncertainty avoidance) | 29 | 30 | 40 |
| IDV (Individualism) | 71 | 20 | 48 |
| MAS (Masculinity) | 5 | 66 | 56 |
| LTO (Long term orientation) | 20 | 118 | 61 |

Table 1: Comparison of national cultures (Hofstede, Hofstede & Minkov 2010)

2.4 Lean Philosophy

2.4.1 Introduction of Lean

Because of the intense competition in the Japanese market for automobiles, the original lean thinking was developed on the shop-floors in the Toyota Motor Corporation (Ohno, 1988). The concept “Lean production” was first introduced in the book “The Machine that Changed the World” in 1990 (Womack, Jones, and Roos, 2007). In the book, Womack, Jones, and Roos (1990) present five production principles: Specify value, identify value streams, create flow, create pull, and strive endlessly for perfection. The five lean principles were included in the 4P model (shown in Figure 4) by Liker (2004) which is widely used by the lean practitioners for the visualization management (Meiling, Backlund and Johnsson, 2012) and specified by 14 management principles (Liker, J.K, 2004).

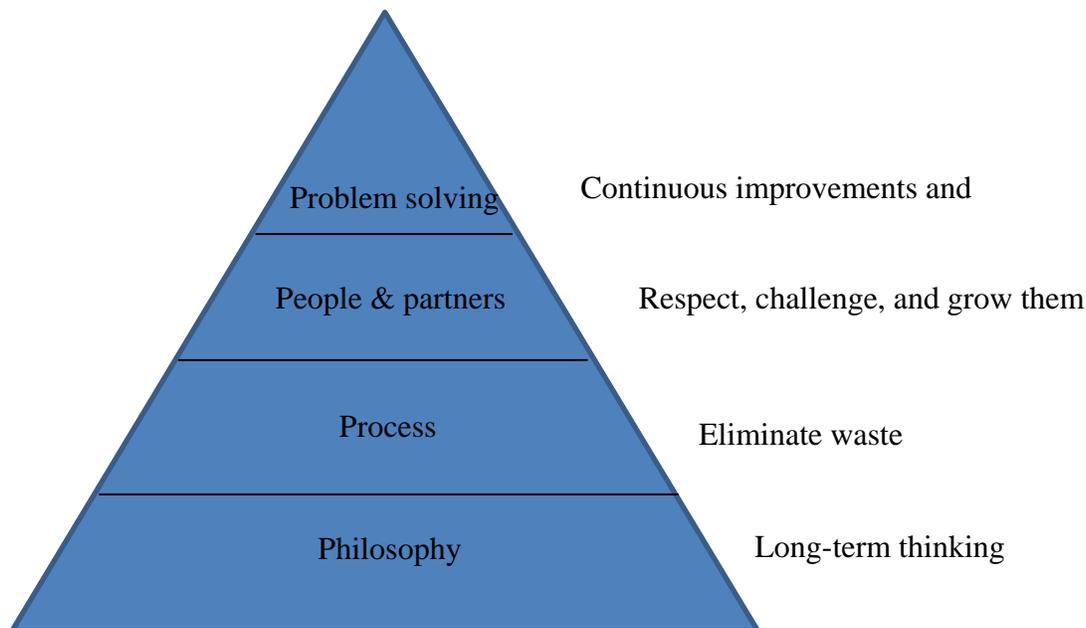


Figure 4: "4P" Model of Toyota Ways, (Liker, J.K. ,2004)

- Philosophy: Making the management decisions on the long term philosophy and commitments to long-term contribution to society and economic performance;
- Process: Focusing on lean methods and value stream to eliminate the waste in the process and using tested technology to develop excellent process;
- People and partners: Grow and develop leaders who live the philosophy; respect, develop and challenge the people in the organization and suppliers;

- Problem solving: Building a learning organization, go and see the problem by yourself and fact-based decisions.

Melton (2005) summarized the benefits of the lean to the organization to be: decreasing the lead time for customers, improving knowledge management and achieving robust processes. According to Melton (2005), lean thinking enables to wider knowledge sharing and gaining a well-managed knowledge base that can support sustainable change.

2.4.2 PDCA

PDCA (plan-do-check-act), shown in Figure 5, was made popular by Dr. W. Edwards Deming and is a four-step management method used in business to drive continuous improvement of processes and product (Tapping, D. 2008).

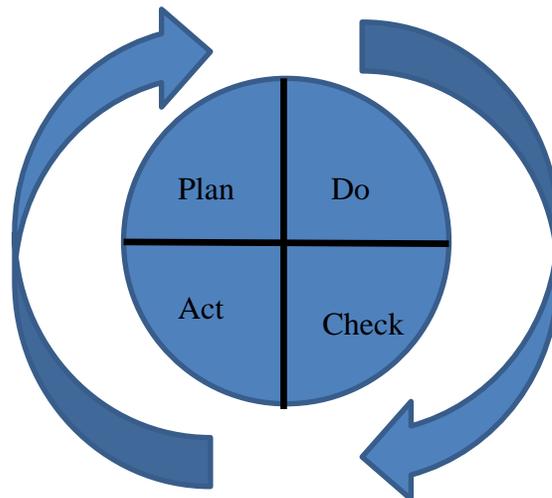


Figure 5: PDCA cycle (Tapping, 2008)

According to Tapping (2008), “Plan” is considered as the most important step in the PDCA cycle, it refers to identifying the problem, collecting the data and establishing the objectives and expected output (the target or goal). “Do” means the activity transformation from interim containment actions to permanent countermeasures including implementing and executing the plan, testing the actions and collecting the information for the following “check” and “act” steps. “Check” refers to studying the actual solutions from the “Do” step and compare with the expected effect to ascertain the differences. “Act” means evaluating the results from the previous

three steps to adopt and update the necessary standards and performance measurement or run the cycle again.

3. Method

This study has been done as a case study using action research where the researchers have collaborated closely with Volvo IT and spent a large part of the time working with the thesis at the office of Volvo IT in Tianjin. The main approach of the research is exploratory, descriptive and theory building using qualitative methods which are complemented by quantitative data from a survey.

A literature study has been performed on knowledge management and cross cultural management with a focus on Swedish and Chinese business culture. Using concepts from this literature study, more specific research questions have been formulated and qualitative data gathered from conducting 30 semi-structured interviews in Gothenburg and Tianjin. This has been complemented by a survey to gather quantitative data about behaviour and opinions of employees at Volvo. The results from the survey were then used as a basis for discussion in one seminar with line managers in Tianjin and two seminars with teams in Gothenburg which served to validate our analysis of the results and get new input on these subjects.

3.1 Semi structured interviews

A semi-structured interview is a qualitative interview where the interviewer will use an interview guide with a set of questions on some specific topics to be covered, but where the interviewee can answer quite freely and the interviewer is flexible to not follow the guide exactly (Bryman & Bell, 2011). The semi-structured interview has the advantage of letting the interviewer gain a broader understanding of the interviewees world view without influencing it by presuppositions to the same degree as a structured interview; compared with an unstructured interview the semi-structured interview has the advantage of being more focused and thus better for addressing specific research topics (Bryman & Bell, 2011). As the topic of the thesis was to explore three rather broad research questions and connected themes, it was natural to use semi-structured interviews as the main method to understand these themes and being able to go deeper into topics of interest that come up during interviews..

In total 30 semi-structured interviews were carried out. Each interview started with an introduction to the background and purpose of the master thesis project, it also included a description of how the answers would be used and that the answers would be anonymous, which hopefully made participants confident to contribute more of their views. Some interviewees requested to have the interview questions sent to them before the interview and were then sent the questions in advance. Most interviewees did not receive the full agenda questions in advance, but received a short introduction to the purpose of the project and the general topics we wished to discuss at the interview. This was due to that the researchers consciously chose to start each interview topic with more open-ended questions in order to get a broader view of the topic and respondents view before possibly influencing their answers with more specific questions about details. An example is that we would first ask a manager *“How do you work with developing domain knowledge of the group members?”* and *“What domain knowledge is important for new employees?”* in order to not limit the set of answers by our interpretation of what domain knowledge is and our notions of what initiatives can be done to work with it. Then after asking the open questions we would proceed to more specific questions such as *“How do you work with building communities that share domain knowledge?”* or *“How do you work with visits to Volvo dealers?”*. The interviews where the interviewees previewed the questions may have been influenced by this kind of effects, however, this does not present a major problem to our study as we are able to compare results with other interviews and as the focus of the study is not about interpretations about domain knowledge and other terms, but about how work in the organization is actually carried out and the results of that work.

All of the interviews except one were done with both researchers present in order to be able for one to focus on asking questions following the interview guide and one to be able to focus on taking notes and adding clarifying follow up-questions. The interviews were mainly done in English, with only short parts and explanations of unfamiliar words done in Swedish or Chinese. The fact that one of the interviewers is native Chinese and one native Swede has been helpful in reducing possible misunderstandings due to cultural differences and language barriers, though it may in some instances have influenced the responses of interviewees when discussing cultural differences and language barriers. This has however not been a major issue as interviewees have been open to discuss these issues anyhow and the picture from the interviews has been reinforced by the informal interactions in our native languages at breaks in the office which have given a

picture coherent with in the interviews. The interviews were carried out in meeting rooms, offices of the respondents and sometimes in empty canteens or lobby areas due to lack of space. All participants were, after the brief introduction, asked for permission to record the interview. All the interviews except three were recorded, the recordings were transcribed and analysed both soon after interview and reviewed in detail later.

Different interview guides were used with different individuals as they had different roles and were interviewed on different topics. To ensure comparability and validity of conclusions, the same formulations for questions were used in different interviews when asking on the same topic.

3.2 Documentation

Volvo documentation in the study has mainly been used by interviewees explaining processes, initiatives and organizational structures and in order to look up the meaning of abbreviations and terminology encountered in the interviews. As documentation has been supplied by interviewees and discussed with them, issues of misinterpretation of the documentation have been avoided.

3.3 Web-based survey

The survey included questions about: background of the respondent; interaction between Gothenburg and Tianjin, both in terms of frequency of communication and perceptions about the effectiveness of different communication methods and visits to the other site, there were also added questions about visiting the other site for those that had that experience; questions about experience and perceived benefits of visiting Volvo dealers; questions learning at work; questions about formal and informal knowledge sharing. Most questions were single choice questions, the only multiple choice question was about which methods and tools are used to find business knowledge. For hours spent in different kinds of meetings a normal week, the participants were asked to freely estimate a number of hours. Other questions about estimating frequencies or were asked as choosing an interval, such as “every day” or “every week”. For estimating “How many people do you know in Gothenburg/Tianjin”, intervals were also used and then some analysis was done by using the midpoint of each range, e.g. “51-100 persons” -> $(51+100)/2 = 75.5$, to calculate approximate averages. This was done in order to save time for the respondents and thus reduce the number of people not completing the survey, only the complete responses were used and it was not possible in the survey tool to keep track of

instances where the respondent abandoned the survey. In total the survey contained about 50 questions and took approximately 10 minutes to fill out when it was pre-tested with four employees at Volvo. Validity issues due to interpretation of the survey questions have been dealt with by having this pre-test with 4 team members and by also discussing the survey in detail with 3 Chinese line managers and 2 Swedish line managers.

The survey was distributed by a link in an email to a total of 107 employees of Volvo IT, after 5 days a reminder was sent out and then the survey was closed 5 days later. The survey was administered using a tool available in Volvo's intranet which the respondents were familiar with using. The participants were selected based on that they were working with applications that had geographically dispersed teams with some members in Gothenburg and some in Tianjin. As a large part of the survey questions explored interaction between Tianjin and Gothenburg, this was deemed to be an appropriate group to ask. For some questions it might have been possible to make interesting comparisons between the responses of employees who had regular contact with the other site and those who did not. This would however have made the survey less focused and would have meant that we would have introduced a possible selection bias. By limiting the target group to only include those individuals working in Gothenburg and Tianjin in delivery teams dispersed between the two sites, it was possible, with the help line managers in Tianjin and Gothenburg, to collect email addresses for everyone who worked in these delivery teams. Thus, the sampling frame was equal to the population of interest and selection bias was not an issue.

3.3.1 Non response bias

Non response bias is possibly an issue as 33 out of 107 who received the survey did respond. The response bias was dealt with primarily by taking it into consideration when analysing the survey question by question and by validating results in seminars with line managers who could provide context and alert us to instances of where the survey result may not be representative of the whole population. It was not deemed appropriate to sample non-respondents by complementary methods such as phone or face-to-face interviews as this would have made them feel that it was not voluntary to complete the survey and the different way of executing the survey would have raised validity concerns if results from interviews would be mixed with results from a web-based survey. As seen in Table 2, the response ratio was similar in both Gothenburg and Tianjin and

there is no reason to believe that there would be systematic variations in the non-response bias between the sites.

| Office of employment | Gothenburg | Tianjin |
|----------------------------|------------|---------|
| Number who received survey | 30 | 77 |
| Number who responded | 10 | 23 |
| Response ratio | 33% | 30% |

Table 2: Response rate to survey

A possible reason for concern could be different response rates between people in different roles and with different seniority which could give rise to a serious non-response bias. It was not possible for us to calculate response rates for different roles as the participants were asked about their primary role as part of the survey, thus the roles of the non-respondents are unknown. The respondents were asked about their role from an exhaustive list of roles present in the teams, the analysis was then done by categorizing the roles into three broader categories as seen in Table 3. This process ensured that participants did not have to interpret which category their role fell into, while also preserving anonymity and making it possible to discuss response in groups that had meaningful size. As seen in Table 4, each category of roles had similar numbers of respondents, though when breaking it down by site, some groups, such as technical roles in Gothenburg have very few respondents. This issue was dealt with in the analysis by ensuring the groups underlying averages were large enough to be meaningful. By having contextual understanding through the extensive interviews, it was possible to have hypotheses about the causal reasons for where there could be differences between groups. The framework for analysis of the survey results and segmentation of responses for different questions was produced before importing actual responses into the spread sheet used for analysis. This contributed to avoiding arriving at conclusions from random variation or by choice of how to segment the responses.

| Management role | Requirements analysis | Technical role |
|---|---|--------------------------------|
| Assignment leader Maintenance assignment lead Project manager Service delivery manager Line manager | Architect Business analyst System analyst | Developer Support Tester |

Table 3: Categorization of roles

| | Gothenburg | Tianjin | Grand Total |
|------------------------------|-------------------|----------------|--------------------|
| Management role | 4 | 9 | 13 |
| Requirements analysis | 4 | 4 | 8 |
| Technical role | 2 | 10 | 12 |
| Grand Total | 10 | 23 | 33 |

Table 4: Number of responses by categories of roles

3.3.2 Social desirability bias

Social desirability bias is respondents consciously or unconsciously responding in a way that is influenced by perceptions about what answer the survey organizer wants or what response is generally socially desirable. This could be an issue as many questions either concerned attitudes and perceptions or asked the respondent to estimate facts such as frequency of using different methods of gaining knowledge. The issue of social desirability bias was dealt with through taking care in wording the questions in a neutral way and avoiding value-laden formulations, discussing the questions and this issue with individuals at Volvo IT before finalizing the survey question and by ensuring anonymity to the participants.

Participants were assured anonymity in the cover message to the survey in order to avoid social desirability bias, elicit more informative responses and reduce possible stress for the respondents who may feel some implicit pressure to answer due to that a manager distributed the survey. Questions such as about suggesting areas of improvement for how to manage the cooperation

between the sites could be sensitive as responding to them could mean directly criticizing one's manager or company policy. Other questions, such as about how often you need to wait for responses from the other site may be sensitive if put into context, as one team member may be working with a single or just a few colleagues at the other site and could thus be perceived as criticizing their work performance. Other questions such as about participation in study groups or using e-learning may possibly be sensitive due to being linked to one's own performance, dedication to professional growth and thus prospects of being promoted. Anonymity was ensured by consistently aggregating the results into averages or counts of response categories and by analysing questions separately, thus not exposing patterns of how any single respondent answered. For free-text questions, the responses were not linked to particular roles or tasks and could thus be quoted or paraphrased into summaries without identifying individual respondents.

3.3.3 Seminars on survey results

The seminar in Tianjin was a meeting where results from the survey were presented in form of graphs, tables and text about our interpretations. Four line managers participated in the discussion and contributed with their views on the results and related issues. In Gothenburg a similar seminar was held with 9 team members and managers from the LDS-application group and with 15 team members and managers working with another application portfolio.

3.4 Validity and Reliability

In this section concerns of validity and reliability of the study are discussed.

External validity

External validity is a concept related to what degree the findings can be applied across social settings (Bryman & Bell, 2011). The study in its entirety has limited external validity as it is a case study based on a single company and concerns two of its offices. Some challenges and processes are quite specific to the IT-industry and to companies with offices in China, but many issues addressed in the thesis are more general and both the theory and discusses solutions can be widely applicable. Issues of knowledge management and retaining staff are to some extent present in all companies, and findings in this report should be most relevant for global organizations with a presence in China, global organizations setting up new sites in new markets and established companies doing knowledge work.

External reliability

External reliability is a concept related to the possibility for the study to be replicated (Bryman & Bell, 2011). It's inherent to the exploratory approach that has been used with semi-structured interviews, that it is hard to replicate this part of the study. The survey would however be easy to replicate at Volvo IT, in the same or other offices in Volvo IT and with only slight modifications it could also be used in other companies where global teams cooperate between two sites.

Internal validity and reliability

Internal validity and reliability concerns the soundness of findings regarding casual relationships between phenomena (Bryman & Bell, 2011). This has not been a primary concern as the study is mostly concerned with finding how things are done rather than to identify general casual relationships between different factors. The interviewees do however discuss casual relationships and exploring some casual relationships discussed in interviews was part of the design and analysis of the survey. The survey questions were validated by discussing the formulations in detail with Swedish and Chinese managers and by pre-testing the survey. Respondent validation of findings was made by discussing the survey results with Volvo employees and hearing their interpretation first, before discussing our own interpretations of the data and general conclusions, greater internal validity was established in interpretation of survey results. As interviews, a survey, study of documentation and informal interactions at the office all contribute to the results, it has been possible to achieve high internal validity and reliability through triangulation between results from these different methods.

4. Introduction of Volvo IT

In this chapter Volvo IT and the unit application delivery are introduced together with a description of how the work is organized according to professional roles in the company. Then the system LDS is described in detail as this is an interesting example of how global teams have been organized in practice between Gothenburg and Tianjin. The concept of domain knowledge and what benefits it gives in a Volvo IT context is also described.

4.1 Background of the company

In this section Volvo IT and the application delivery (AD) unit which this study focuses on are introduced.

4.1.1 Organization of Volvo IT and how it connects to Volvo group

Volvo IT is part of Volvo Group and works with providing IT-solutions for customers inside the Volvo Group and for customers external to Volvo Group. This thesis is entirely focused on providing IT-solutions for the Volvo Group as this is the focus of Volvo IT's efforts in China and as delivering solutions to Volvo Group is where Volvo IT has the most to gain from excellence in managing domain knowledge. Volvo group is a global manufacturer of trucks, buses, construction equipment and industrial engines. The group is headquartered in Gothenburg with 115 000 employees globally, has production facilities in 19 countries and is present in 190 countries. Volvo IT is also headquartered in Gothenburg, it employs 6000 people across 35 locations.

Volvo IT works with the whole chain of identifying needs for software, developing new software, maintaining software and hosting the software. To do this, Volvo IT is organized into three main groups of units on a global level. The customer relations and sales unit manages relationships with existing customers and sales to new customers. The solution units manage the interaction between business needs and IT-solutions, working with business requirements and new projects. The two delivery units are Infrastructure & Operations (I&O) and Application delivery (AD). I&O take care of physical infrastructure such as servers and delivers services that AD uses in order to deliver applications to customers. I&O does generally not interface directly with customers. This thesis focuses on Application delivery which does development of new software

solutions, implementation & localization to new locations and maintenance & support of the existing solutions.

4.1.2 The mega-processes of Volvo Group

In the whole Volvo group, there is an on-going focus on working in process-oriented way. On a very high level, the business of Volvo Group is viewed as mega-processes. The mega processes are: developing vehicles, marketing and selling them, producing the vehicles, aftermarket and service, and support functions. This is reflected in Volvo IT where the solution units and application delivery are organized according to these mega-processes.

4.1.3 Organization of Application delivery

The unit AD (Application delivery) has about 2800 employees and is organized globally as a matrix organization where there are eight geographical sites six functional areas. A site can consist of offices at several different locations or at a single location. As the office in Gothenburg is so large, it is a separate site from Site Sweden that contains the other locations of Volvo IT in Sweden. In this thesis the focus is cooperation between site Gothenburg and the office in Tianjin. The office in Tianjin is part of site APAC (Asia Pacific) east which contains offices in a number of locations in China, Korea and Japan.

From a functional perspective, the organization is divided into Application management (AM) which is responsible for delivering applications to customers and Consulting Services (CS) which provides people to work in Application Management for assignments of varying length. Consulting services is organized in general competence areas such as Project management, IT Architecture or Requirements management.

Application management

In application management the work is organized around the mega processes of Volvo Group from developing a vehicle to marketing it, producing it and providing aftermarket service for it. Some important reasons for organizing this way is that it aligns Volvo IT with the rest of the Volvo group, lets teams develop deep domain knowledge in part of the process and should make it easier to find synergies between applications that support related parts of the Volvo Group processes. In total there are hundreds of applications throughout Volvo and they are organized into portfolios, a portfolio may contain several applications or a single large application.

In Application management there is global functional management that decides the overall strategy for the different functional areas, strategic competence management and the strategy for where to locate different solutions. There is an overall strategy of growing capacity in the newer sites in BPIC (Brazil, Poland, India and China), both for cost reasons and to support the demands of Volvo group as it grows in new markets. Part of the way to achieve this growth is to work in global teams where part of the team is at a traditional site (such as in Gothenburg) and part of the team is in BPIC sites and where responsibilities are gradually increased at the new site. There are detailed plans and goals for how this shift should take place over time and part of this strategy is to concentrate certain technical competence and domain knowledge to certain sites. For China, the focus lies on working with solutions for sales and aftermarket processes which are both used by users inside Volvo Group and by dealers of Volvo vehicles. In Volvo, these mega processes are called MAS (Marketing and sales) and DCL (Delivering customer loyalty)

Consulting services

Consulting services is a part of application delivery where many with general competence as developers, tester, architects, database analysts or business analysts are employed. They are then working in the applications managed by the AM (application management) side of AD (application delivery) on long-term assignments. Those employed in consulting services will have a line manager from consulting services, but in the daily work they will primarily work with the application they are assigned to. Members of consulting services will have their performance evaluated in a slightly different way from those employed by AM. The members of consulting services will have an agreement with the service delivery manager they work with on the expectations on them and there will then be an assignment follow up yearly according to a standard template.

4.1.4 Application delivery in China

In China, Volvo IT has the head office in Beijing and offices in several other cities. Volvo IT had a presence in China since 2004 to support Volvo group, however this presence was in small offices together with other parts of Volvo Group and was in total only 30 persons in 2009. The office in Tianjin was established in a location separate from other Volvo offices in 2009 and has since then grown rapidly. The delivery of applications from China is concentrated to the office in Tianjin which is called a global delivery centre and employs about 300 people. Through building

up the office it has been important to have the presence of Swedish expatriates to work closely with Gothenburg and act as role models to align the workplace culture with Volvo culture, today there are three Swedish expatriates in Tianjin. For working with Volvo Culture, many of the early Chinese employees also went to Volvo IT culture training in Gothenburg and new managers do all attend global management introductions in Gothenburg for about 10 days.

In maintenance and development for several applications, employees in Tianjin work closely with colleagues in Gothenburg. One example of a large delivery with intense collaboration between Gothenburg and Tianjin is the maintenance and rollout of the LDS (lean dealer services) application which is described in detail in section 4.3.

4.2 Professional roles in Volvo IT

In Volvo IT, people are employed in professional roles that are standardized across the different locations globally. Some split their time between different roles, but generally one person is employed in a single role. These roles are used for strategic competence management to judge what needs there are for certain competencies globally and at each site. The roles are also used to standardize compensation and promotions in order to make this process fair and transparent to employees and avoiding having to negotiate individually with each employee. Within each role there is a progression with levels of qualification from A-E you can achieve in that role, though some roles are by definition more junior or senior and may not have all the levels from A-E. Each letter (A-E) level is associated with general keywords about the level of complexity, responsibility and autonomy in the role and then each role will have specific criteria for each level. These qualifications are stored globally for all employees in the qualification database (QDB). One notable example of what is not stored in the QDB is qualifications in particular technologies, such as Java or SQL server.

When a project manager needs to staff projects, the roles and levels will be used to find the right person and to decide the internal rate for how expensive it will be to use that person in the project. The QDB tool is also used to set personal development goals in the personal business plan that all employees will do yearly with their managers. Judging the qualifications is generally made by global qualification boards who judge if an employee has the qualifications for a new role or new level in the current role.

The roles are based on waterfall principles which are generally used in the development projects at Volvo IT (and at many other IT companies), though there are also efforts to complement waterfall methodology with practices from agile development methodologies. In waterfall methodology projects start with requirements analysis with the customer, and then proceed into selection of the solution to fulfil these requirements, the solution is then developed, tested and rolled out to the customer. After rollout, Volvo IT hosts the application, support is provided to the customer and the application is maintained by fixing bugs and by enhancing it with improved functionality and possibly customizing it for rollout to new customers (for example new geographical markets or other business areas of Volvo).

For the purposes of this thesis we have categorized the different roles of Volvo IT into three general groups: requirements analysis roles, technical roles and management roles.

4.2.1 Requirements analysis

The roles in requirements analysis all deal with translating customer needs into requirements for how the application should work, which people in the technical roles will then work to ensure that the application fulfils. A business consultant may advise the business on how to do business and will assist the customer in understanding what they can use IT for. A business analyst will then advice on how to achieve these business objective using IT. System analysts and architects will structure the solution, make sure the solution follows Volvo IT standards, decide how different parts of it should interact and how the solution should interact with solutions that already exist at the company.

4.2.2 Technical roles

Application developers will participate in working out the details of the solution and will then do the actual programming of the solution. Testers will then make sure that the solution works according to the specification and does not contain bugs.

4.2.3 Management roles

In order to manage an application, there will be a Service Delivery manager (SDM) with overall responsibility for delivery one or several applications. There will also be a line manager with responsibility for the people participating in the delivery and their professional development. The Service delivery manager will sometimes also have the role as line manager for part of the team

working on the delivery, but the roles are separate and people working in the delivery will thus usually have two managers. For a large application such as LDS there will be Maintenance assignment leaders (MALs) who report to the SDM and are responsible for parts of the maintenance process. In a geographically dispersed team such as LDS there will also be Assignment leaders (AL) who take care of leading the day to day work when the MAL is located in another office. For a delivery like the LDS which includes rollout projects, there will be a rollout manager who leads a team of project managers in managing projects to roll out the application to new markets.

4.3 The LDS delivery

The LDS application has a large team spread between Gothenburg and Tianjin and is a good example of how work can be done in global teams in Volvo IT. Below is an introduction to the application, its history and how the team works.

4.3.1 Background of LDS

The LDS (lean dealer services) is one of several dealer management systems used throughout Volvo Group. The system supports dealers of Volvo trucks, Volvo buses and Volvo construction equipment in their aftermarket operations. It was originally developed in 2002 as a flexible system for use in emerging markets for large and small dealers, dealers also selling non-Volvo brands and in locations with poor internet connectivity. To deal with poor internet connectivity, the solution was made so that it is possible to either install it locally on a laptop or to install it at a central server in order to have better hosting and take advantage of coordination between dealers in different locations and other online-functionality. This original version of LDS was and is maintained in India where Volvo IT has had operations since 2004 and today employs more than a 1000 full time equivalents. In India the work was primarily carried out by a consultancy Volvo IT was partnering with.

Later it was decided that a new version was needed and the LDS NG (next generation) was developed, the original version is now known as LDS classic, while the new one is simply referred to as LDS. The development of the new LDS coincided with a shift in both the partner strategy and the site strategy of Volvo IT. Since the LDS application was judged to be of strategic importance to Volvo Group, management decided that Volvo at the time was too reliant on the partner company which at a time provided 80% of the staff working with LDS. In order to

keep key competence in Volvo Group, more key roles needed to be held by Volvo employees and the partner companies would mainly provide people with more general and less Volvo-specific technical competence.

At this time it was also decided to locate part of the team for maintaining the new LDS in the newly started delivery centre in Tianjin, an in-sourcing project was thus started for the new LDS application in the end of 2009. To do this, a comprehensive knowledge transfer from Sweden and India was needed to enable the team in Tianjin to thoroughly understand the application and gradually fully take over responsibility for it.

4.3.2 The transition of LDS from India to China

In the beginning of 2010 the move from India to China was started and at the time there were 20 employees from China involved. A seven-weeks training for the team in Tianjin was prepared, it contained training about the business of Volvo, technical training, training on work processes (such as Scrum and Kanban) and visits to Volvo dealers to understand the end users of the application. In the beginning some people spent as much as a month out with dealers and most spent at least a week at a dealership to understand how the application is used.

The knowledge transfer was done in a very structured way, where the team was tested on what they had learned and had to sign off each Friday that they had adequately understood the items scheduled for that week. One factor that significantly complicated the transition process was that the processes used to maintain LDS Classic were found to not be suitable for maintaining the LDS NG, so these processes were changed at the same time as the application was transferred to the new team in China.

Difficulties that arose during the transition

The greatest concern for the Swedish part of the team was the transfer of understanding how the application is used. While there was no concern about the technical skills of the Chinese team, there was concern about understanding of how the application is used as it was more specific to Volvo and more tacit, thus harder to teach in a short time. This turned out to work well with the structured transfer. The difficulties that did arise during and after the transition and actually did impact customer satisfaction had more to do with technology as there were some bugs and performance issues in the newly developed LDS NG.

Another area of concern was to motivate the people in Sweden and India who participated in the knowledge transfer. The people in China were very motivated to learn, but understandably it was harder to motivate the people in India who were working to hand over their jobs to people in China, however it was made easier by the fact that they were employed by a consultancy and would likely keep their jobs, but have new assignments after doing the knowledge transfer for LDS. An important concern to address was that the move was not about the quality of the work done in India, but that it was necessary due to Volvos long term strategy and ambition to grow in China. In Sweden there had years earlier been outsourcing activities were people had actually lost jobs, and it was important to address concerns about jobs moving to low-cost countries and emphasize that the build-up in China was not about moving jobs from Sweden to China, but about moving more jobs into Volvo and supporting future growth of Volvo.

4.3.3 Later ramp-up of team in China

During 2010 the team working with LDS increased to 30 persons, then to 50 in 2011 and now there are 60 persons in the team, 15 in Gothenburg and 45 in Tianjin. In the beginning many in the business were against the transfer to China, and during the first period it was very challenging for the team in China which was new to Volvo and worked with a not yet fully mature software. However this has worked out well, the technical problems have been fixed and the team in China has earned recognition of colleagues in Volvo IT and the customers in Volvo Group. In 2012 the LDS team was awarded by the global Volvo IT management team with a prestigious internal recognition, the Golden Touch award, for their achievement with improving quality and reaching high customer satisfaction. The team mentions working with clearly defined processes and investing heavily in the team's functional knowledge and business domain knowledge as the most important reasons for this achievement.

Now when the team is larger, taking in a new person requires less training and it generally takes three weeks of initial training to get an adequate understanding of the LDS and it is more self-study than it was in the beginning. This is both because it is easier to learn on the job when you become part of a larger and more experienced team and because in a larger team, it is less important for all team members to have deep knowledge as others in the team will know. In order to get deep understanding of the entire application, it's estimated by managers in LDS that it takes at least half a year of actually working with it. For those who become project managers

for the rollout of LDS to new markets, it's generally required that they should stay for two years as it may take a year for them to know the application and the processes it supports so well that they can discuss all the questions that may come up when talking to with the experts on the business side who work with these systems.

4.3.4 How the LDS works today

Today the LDS team has 15 persons in Sweden and 45 in Tianjin and the size of the team is quite stable and not set to change for the near future. In Sweden there are mainly management and requirements analysis roles and in Tianjin there are management, requirements analysis and technical roles. The Service delivery manager who is responsible overall for the application is a Swedish expatriate located in Tianjin. The team is divided into four different groups according to the sub-processes of maintaining the LDS application. Each group is headed by a maintenance assignment leader (MAL) ,currently the MAL for maintenance is located in Tianjin while all the other MALs are all located in Gothenburg. The four groups are: Rollout, enhancement, support and maintenance.

Enhancement

The enhancement group works with implementing change requests from the business to improve the application. The architects and other requirements analysis roles will be involved a lot in this process to specify requirements in detail while taking other parts of the application and integrations with other systems into consideration. The process for handling change requests is shown in Figure 6 and is similar for both the enhancement and the rollout team. A need will be discovered by someone in the customer organization, Volvo trucks, or by a dealership where there are end users of the LDS-system, there can also be a new need due to that the application is being rolled out to a new market which may have different legal demands. This needs may then be discussed with the LDS team before formally becoming a change request, as the LDS is a huge application, sometimes functionality requested or some very similar functionality may already be present in the code. When there is a formal change request, a steering committee in Volvo Trucks will approve it and prioritize when it should be done. Then work will commence in the LDS team to work out detailed requirements on what it should be done and how it should work from the user's perspective. When the requirements specification is finished and approved by the business side (Volvo trucks), then the architects will work together with developers to

work out the technical details in solution documents. In this process it also happens that there are some synergies from different change requests that can be merged and solved together. When there is an approved solution document, this will be developed and then tested by testers in Tianjin and by the architects. When this is done, the solution will be tested by business representatives in Gothenburg before being implemented in one market (usually one market is one country). When the solution has been proven to work well in that market, it will be included in updates to all markets. Throughout this process, documentation will be shared by email and folders on the intranet and the code together with some technical documentation will be handled using the specialized development tool Microsoft TFS (Team Foundation Server).

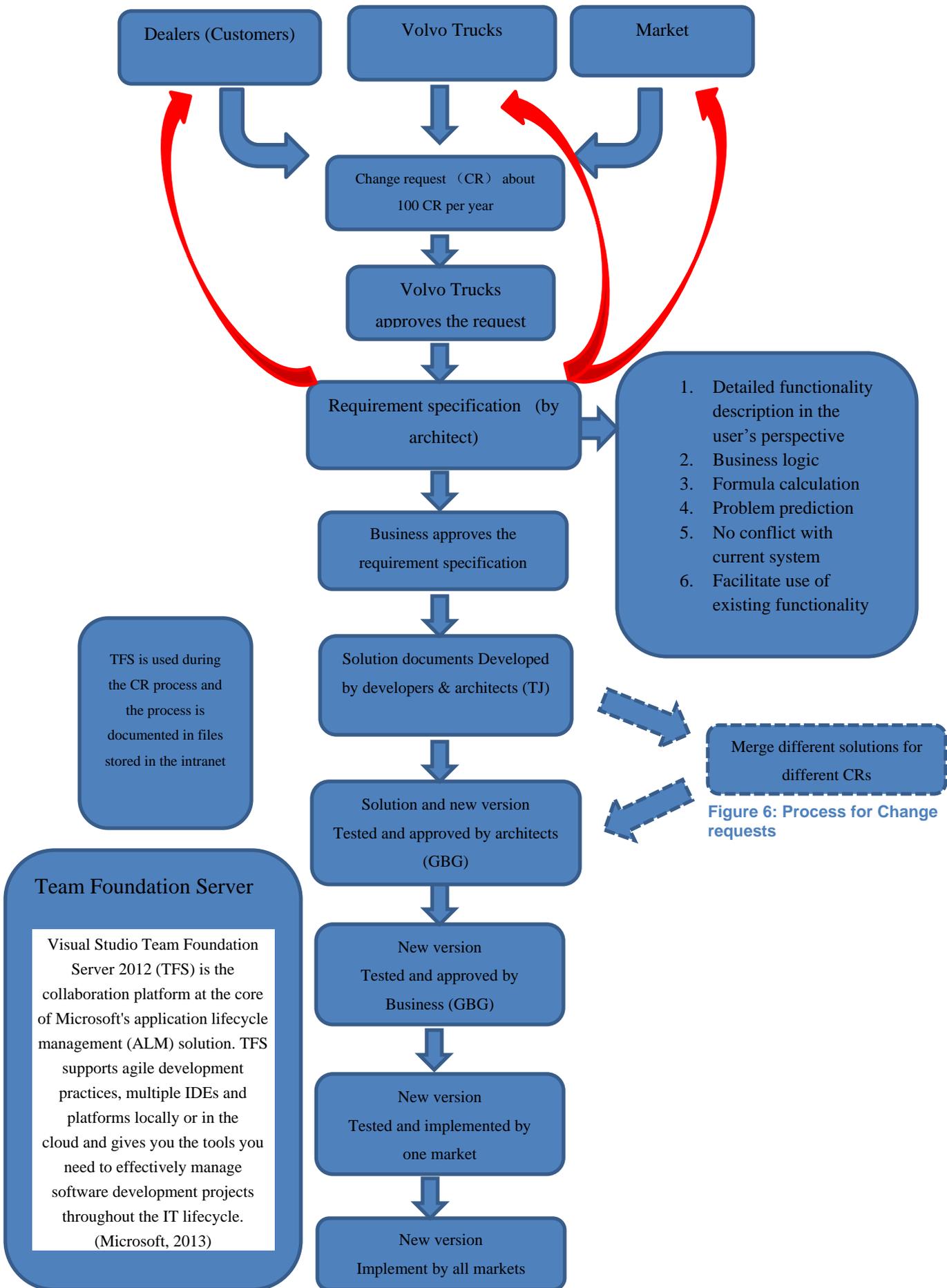


Figure 6: Process for Change requests

Maintenance

In maintenance, changes will also be made to the application, but the reason for the changes will be fixing bugs and making the application work as intended rather than increasing the functionality. The maintenance group may act as third line support when an issue is escalated by the support group which acts as second line support.

Rollout

The rollout team works with rolling out the LDS to new markets, sometimes to replace the LDS classic and sometimes to replace other solutions or introduce the system to a dealer in a market that already uses LDS. The rollout projects are quite large and follow the Volvo IT project model ISGDP4IT, in this model there are several gates which need to first be opened by IT before the business representatives from Volvo trucks can open a corresponding business gate in their project. For each of the gates there will be a detailed checklist (sometimes more than 100 items), these checklists are reviewed after each project and do thus become living documents that codify some of the lessons learned and make sure this is used in later similar projects. Each project is also documented and reviewed as part of closing the final gate, these documents are reviewed by the other project managers working in parallel rollout projects and are then saved in a folder in the intranet. The projects are primarily evaluated on time and cost, but customer satisfaction is also part of the evaluation.

A large part of the work in rollout is to handle changes to the system due to special local requirements, primarily due to differences in laws and standards. Another part of the projects is to migrate data from old systems. It is also important to have knowledgeable users in each market, called super users, who will have responsibility of educating others in that market, in order to become super-user, people will come to super-user trainings which are arranged by the LDS team two times per year, these trainings are covered further in section 5.1.

Support

The support team acts as second line support from the user perspective. The user will have a single point of contact for support and go to the Dealer Business Services (DBS) which is the first line support. There are a number of DBS teams spread out over the world to cover both

different time-zones and languages. The DBS will have knowledge about many different applications apart from the LDS and will be able to answer a large part of the issues raised by users, when they cannot solve it, they will have a list of which issues to escalate to which second-line support and will send some requests to the LDS support team. The LDS support team will be able to answer questions requiring expert knowledge of the LDS system and solve problems by making changes directly in the database used by LDS. For technical problems they do not manage to solve, for example that require changes in the code, they will generally escalate the issue to the maintenance group. Sometimes there will be possible to do a workaround so that the user can proceed working even if the root cause is not yet fixed.

The support issues are all tracked and classified by their type, impact (how many users are affected) and urgency (how urgent it is for the user reporting it). This is done and followed up using a Volvo tool which is currently being replaced by a third-party tool. Within the support group, some solutions will be saved in a knowledge base for re-use by the support team.

4.4 Domain knowledge in Volvo IT

4.4.1 What is domain knowledge in Volvo IT?

As a company specializing in industrial IT and mainly supporting Volvo Group, Volvo IT has a strong drive to develop and maintain knowledge about the business of developing, building and selling vehicles. This understanding of the contexts where the software will be used is known as domain knowledge and encompasses both understanding of the automotive industry and the specifics of how Volvo Group operates. Domain knowledge is an important differentiator for Volvo IT compared to external IT-companies as it makes it possible for Volvo IT to provide better solutions to Volvo Group at lower cost.

From a functional perspective, it is one focus area for the members of the global functional management to increase the domain knowledge globally in their functional area. Initiatives such as developing E-learnings about domain knowledge have come from the global functional management. For example, the global functional manager of marketing and sales led the initiative of developing an E-learning about the standardised Volvo truck sales process and how different applications support this process. Similarly, the global functional management of

aftermarket currently drives a project to produce a similar E-learning about the aftermarket process, and the applications supporting it. From the line managers' perspective, domain knowledge is part of developing the people on their team and enabling them to perform well. Another part of domain knowledge has more to do with the IT environment at Volvo IT, knowing how a particular application works or how it technically integrates with other applications, this is an area where some architects will specialize and where there is a central function, the integration office that governs how integrations are done.

4.4.2 What are the benefits of having domain knowledge?

Having deep domain knowledge is especially important for some who work in customer facing roles and work with requirements since their job revolves on translating customer needs into IT-solutions that fulfil those needs and enable the customer to be more efficient. In order to advance in some of these roles, such as business analyst or enterprise architect, there is a requirement to be experienced in more than one of the Volvo mega processes. The staff who does first line support in the DBS (dealer business services) need to be very familiar with how the end users work in order to be able to provide good service, and they spend several weeks every year at dealerships to get this knowledge.

For roles that do not regularly have contact with the customer or end users there are still large benefits of having business domain knowledge to complement the technical competency. One important benefit is that it will help in understanding what is important for the customer when developing or maintaining the solution. Even with detailed requirements, there will be issues where some things that are not in the requirements are very important to customer satisfaction. An example of this is to understand where performance and speed are important to focus on. An example situation can be that the workshop needs to print an invoice or a statement on what work has been done when the truck-driver comes in to pick up this truck. A developer or tester with good understanding of how the day-to-day operations of a dealership works will realize that this is a situation where it is crucial that printing this document goes very quickly in order to not keep the truck driver waiting. Using this knowledge, the developer can then prioritize to put extra effort into optimizing the code for speed and thus ensure that the staff at the dealership will have a smooth experience when they are using the system in front of their customers. Another example situation is when service is being done on a vehicle; the operator at the dealership will

need to input into the system what parts are being used. When servicing one vehicle, tens of parts may be used and each type of part is identified by a unique number, a skilled operator may have memorized these parts numbers and is able to very quickly enter them by just using the numeric keypad on the keyboard. Someone who doesn't know this may design an interface that relies on navigating lists by using the mouse or may not realize how fast the operator will be at keying in new information and the need for the system to react very quickly in order to not slow down the operator.

Some interviewees speculated that this kind of deep domain knowledge will be even more important in the future if smartphones or tablets were to be used together with the system. An example would be taking inventory of the parts stored at a dealership; today the process is done by walking around, taking notes on a paper and then going to a desktop computer to input this into the system. In the future this could be done more efficiently by using a mobile application to directly input the current inventory status when walking around in the inventory. This would place new demands on detailed understanding of how the dealership works as the application would then be used in a very different way from using a desktop computer, which is more similar to the way IT-professionals work in their offices.

Aside from specific understanding of Volvo, its dealers and how the products are sold, there is also other business domain knowledge that may be more related to general processes handled by enterprise resource planning and where experience from other industrial companies or consultancies may be transferable to quickly understand the processes of Volvo.

5. Knowledge management in Volvo IT

In this section, different aspects of how the units in Gothenburg and Tianjin work with knowledge management and staff turnover are described and discussed in relation to our research questions and literature review.

5.1 Contact with the business

Here some of the most important ways that the groups have contact with the customer, the business side of Volvo group are described.

5.1.1 Committees with the business

Application portfolios in Volvo IT are managed by a Service Delivery Manager (SDM) who will be responsible for much of the contact with the customer representatives, Business solution leaders (BSL) or Business solution managers, in Volvo Group. The SDMs are appointed by a Service delivery owner (SDO) in Volvo IT. The SDO will participate in some steering committees for the applications. For some application portfolios with several smaller applications, one SDM may have contact with several different BSLs on the customer side, which is some the organization tries to avoid as it complicates the work of the SDM. For deciding on things such as which change requests to prioritize working on there is a steering committee where the BSL from the business and the SDO from Volvo IT meet. They will both report to separate steering committees within the business and within Volvo IT. The customer owns the budget for the applications and will have an agreement with the SDM on what is expected, and then the SDM uses the budget to ensure to fulfil that agreement. One part of the agreement is service level agreement for KPIs such as uptime of the application or time to resolve support requests. There are also KPIs for customer satisfaction, which is measured twice per year in a survey.

5.1.2 Super-user trainings

The super user training is an extensive introduction to the LDS application which is normally runs 2 times per year for employees in Volvo Group who are appointed to become super users, now one of the trainings is held in Gothenburg and one in Asia. Each market should have one or two super users, and as LDS is rolled out to new markets and previous super users change jobs, there is a need to introduce new people to the application so that they can be the experts in that

market and support other users, new members of the LDS team will also participate if possible. Usually there will be about 20 participants who spend 5 full days in with instructors from the LDS team to go through the application and the Volvo processes it supports.

A problem before has been that it is hard to find people in Sweden with interest and time to deliver the super user trainings, and this year a very experienced person who had usually taken care of large parts of the super user training changed jobs. Because of this it was decided that one member of the Swedish team who recently started in the LDS team should do it together with two colleagues from China. This has the advantage of giving them a chance to interact with end-users and gain new understanding of the application when teaching others about it. As the training includes exercises for the users to navigate the application and the users will ask many questions, the instructors holding the training will have many opportunities for gaining insights. By the end of the training there will also be a reflection session and questionnaire.

There has been a discussion and on-going pre-study about changing the super-user training, possibly by shortening it and partially or even fully replacing it with an E-learning. This discussion is primarily due to the significant time it takes for the LDS team to arrange the trainings, time that could be spent on improving the application. It is also rather costly for the business to send users on a week of training, and sometimes it happens that those who take the training end up not using it because of changed roles or that those who would benefit from the training have to wait as the training is only done twice per year. With an E-learning, the cost would be much lower to teach new super users and they could do the training whenever it suits them. Another use of E-learnings considered is to use them to teach the basics about LDS, and by requiring that all participants at the super-user trainings have completed them as preparation for coming to the trainings, and then the trainings could have the same format with 5 days as today, but could go even deeper in the functionality. The super-users will often have to give trainings themselves quite often to new employees, especially in markets with high staff turnover, so for them it would also be a benefit if there was an e-learning so they didn't have to spend so much time on delivering trainings. As the materials (PowerPoint slide decks etc.) used for the super user training are also sometimes used for introducing new team members to the LDS team, an e-learning for super-users could also be useful within the LDS team. A further benefit of E-learnings is that they could include sections such as videos of how to use specific functionality

and thus be useful as a reference in the daily work and reduce the number of times users contact support for “how-to”-questions.

One reason that E-learning are not yet used for the super-user trainings is that, when the super-user trainings started 10 years ago, the technology and bandwidth to do good E-learning wasn't available, and the trainings have been continuing like at the start. Another reason that there is no e-learning yet, is that to do a good E-learning, external resources who are skilled pedagogues and expert in creating E-learning need to be involved and this means there needs to a budget allocated to the project.

Discontinuing the face-to-face trainings in the future is unlikely as they provide the important benefit of not only letting the LDS-team understanding more about the users, but also lets the users in different markets get to know each other and establish personal networks with others in the same role. This can both lead to them getting new ideas on use of the LDS and have benefits as they can exchange other ideas on how to improve their business.

5.1.3 Dealer visits

In general, there is a lot of interest in visiting Volvo dealers, as seen in Figure 7 it is perceived as important in the work to understand dealers and it is something many would like to learn more about. Dealer visits can be one cheap and efficient way of learning about the dealers and getting a better feel for the process in the business that the applications support. One important difference between Sweden and China is that in Sweden more people have a driver's licence and own a car. This gives an added understanding of how a car works, the issues the owner of a vehicle faces and how things work at a dealership where you sell and service vehicles, which is quite similar for private vehicles and commercial vehicles. This means that there may be more time needed for introduction to some domain knowledge in China and could also be part of the reason that managers generally experience great enthusiasm for domain knowledge in China as it is more new and that deep understanding of the automotive sector is more uncommon in China

and thus even more valuable to the individual obtaining it.

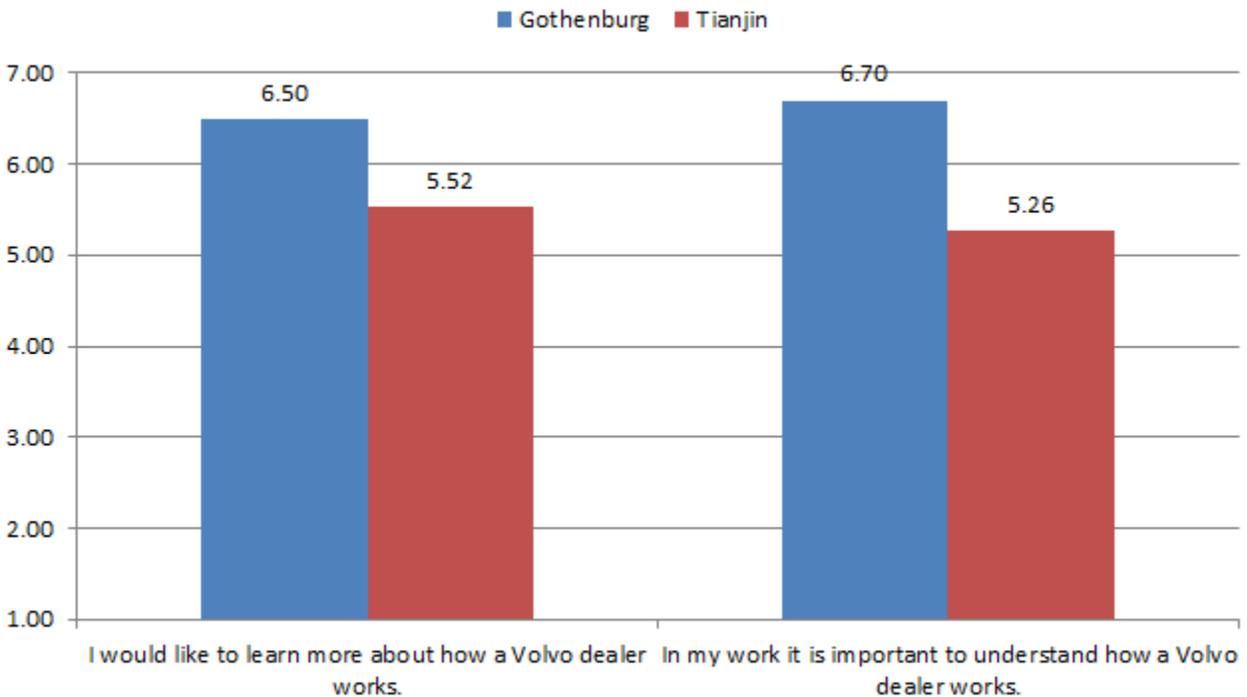


Figure 7: Visiting dealers. The scale is 1 to 7, where 1 represents “completely disagree” and 7 “completely agree”

However, only 14 out of 33 respondents had actually visited a Volvo dealer. A reason people in Gothenburg do not do so many dealer visits is that they do not find time to take from the daily work as they face many demands and are focused on delivering and fulfilling the agreements with the customers. Even if there is time allocated for training in development, it may still be hard to prioritize long term development against the more pressing day to day tasks and many in Sweden will not use all the hours allocated for training. Only the first line support (DBS) in Sweden does dealer visits in a really organized way as they have two weeks of working at a dealer every year as training.

In Tianjin it is in fact quite hard to arrange dealer visits as there are few dealers to visit near Tianjin and you have to limit the number of visitors to each dealer in order to not be a burden on them. Previously it has been possible to send some team members in Tianjin further away for dealer visits, for example to visit several dealers in Korea, but this year with travel restrictions for saving costs, that is not a viable option. In Gothenburg there are three different dealers, so it could be a good in the future to let people from Tianjin who go to Gothenburg stay some extra

day to visit a dealer there, even if they don't use exactly the same applications as in emerging markets, the basic process is the same. However there are many Volvo employees in Gothenburg, so there still needs to be coordination to avoid overwhelming these dealers. The dealers in China don't fully implement Volvo processes, partly due to the different setup where dealers buy via an importer and not directly from Volvo.

For this year it is a goal globally to increase the number of dealer visits and it will be tracked globally how many and what kind of visits have been done. In China there will also be an effort to gain even more from the dealer visits by requiring the participants to document the visits and present some of what they have learned to the others in their team. This sharing used to be more informal, but will now be tracked and noted in connection to the yearly goals in the personal business plan.

5.2. Training & learning

There are many efforts in Volvo It to work with continuous learning and setting goals for learning in personal development plans, as seen in Figure 8, most employees feel that they learn something new at least every week and in Gothenburg many even feel that they learn something new every day. This difference could possibly be because of different perceptions of what learning is or that the roles in Gothenburg are less technical and will require more frequent interaction with other parts of the organization.

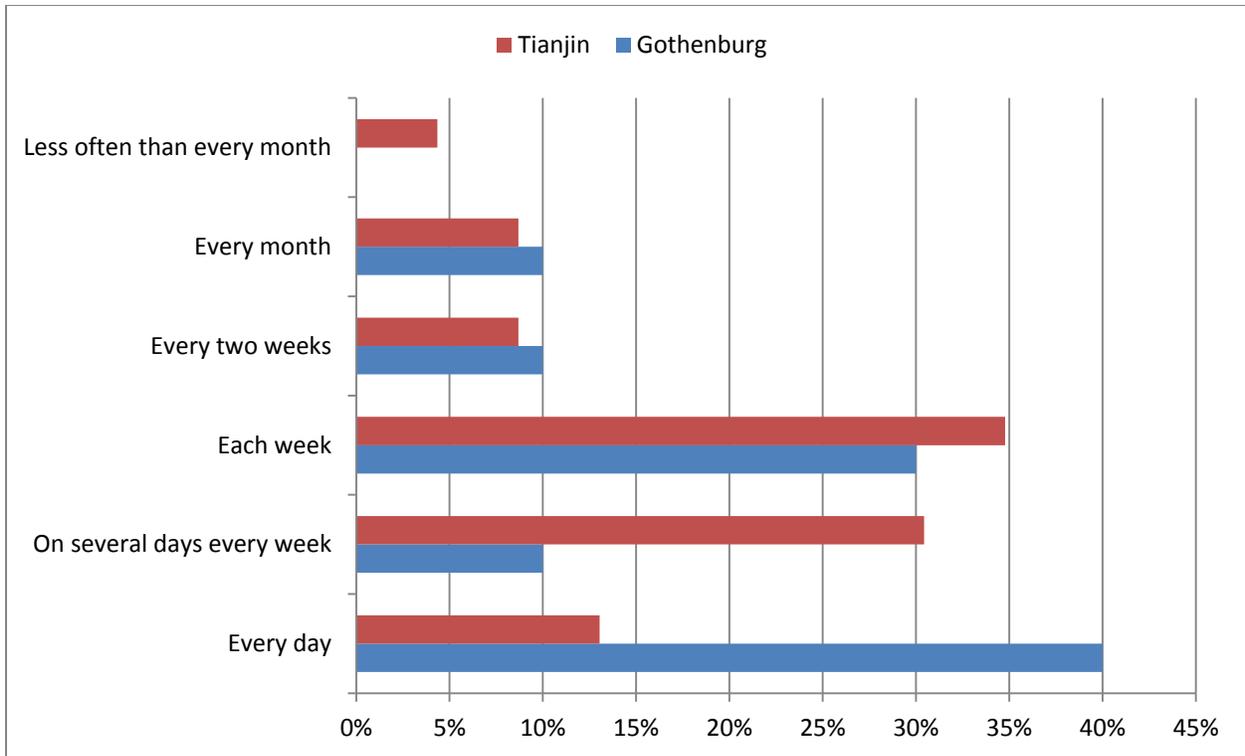


Figure 8: “I learn something new at work”

5.2.1 Introduction of new members

For new team members there will be an on-boarding package to read from HR about how to be a Volvo employee. There will also be a mentor or coach who together with the team leader points out what application specific documents on the intranet that the new employee should read. At the moment, this introduction period takes about 2 weeks for an experienced hire who starts to be a developer or tester in Tianjin, after those 2 weeks the person is expected to start delivering to the customer, though the customer is charged after one week, so there is an ambition to shortening the introduction period to one week. For some more senior roles, the knowledge transfer period will be longer, and even though an employee may start delivering to the employee soon after joining, it may take a long time before the employee has full understanding of a large and complex application.

Recent graduates who join Volvo IT will join a graduate trainee program in Tianjin, organized by consulting services. In this programme there will be training projects in order to get hands on experience and later they will shadow their mentors in their assignments. This program has been

judged as successful and the great majority of participants have smoothly been transitioned into regular assignments in projects.

For those being recruited to be managers in Volvo IT, the employment will start with going through responsibilities and usually have local knowledge transfers sessions daily over two weeks. There is also a general manager introduction for all new managers in Volvo which is arranged by Volvo several times per year where the new manager will meet other new managers from across the world. During two weeks, the new managers will be introduced to the Volvo way and meet representatives from different function of the Volvo group to get a holistic picture of the organization.

5.2.2 E-learning

The E-learning in Volvo are easily accessible in a single system on the intranet called learning management system (LMS), the same system is also used for signing up for physical courses. This system is also used to track the progress for each individual and gives line managers an easy way to follow up personal development goals they have set with their team. The system is also used for the global functional areas to set goals and track how the groups in that area use e-learning.

As seen in Figure 9, the typical employee in our survey uses an e-learning to learn more about the business of Volvo every three months. In Tianjin there are some who use the E-learning more frequently as they are new employees.

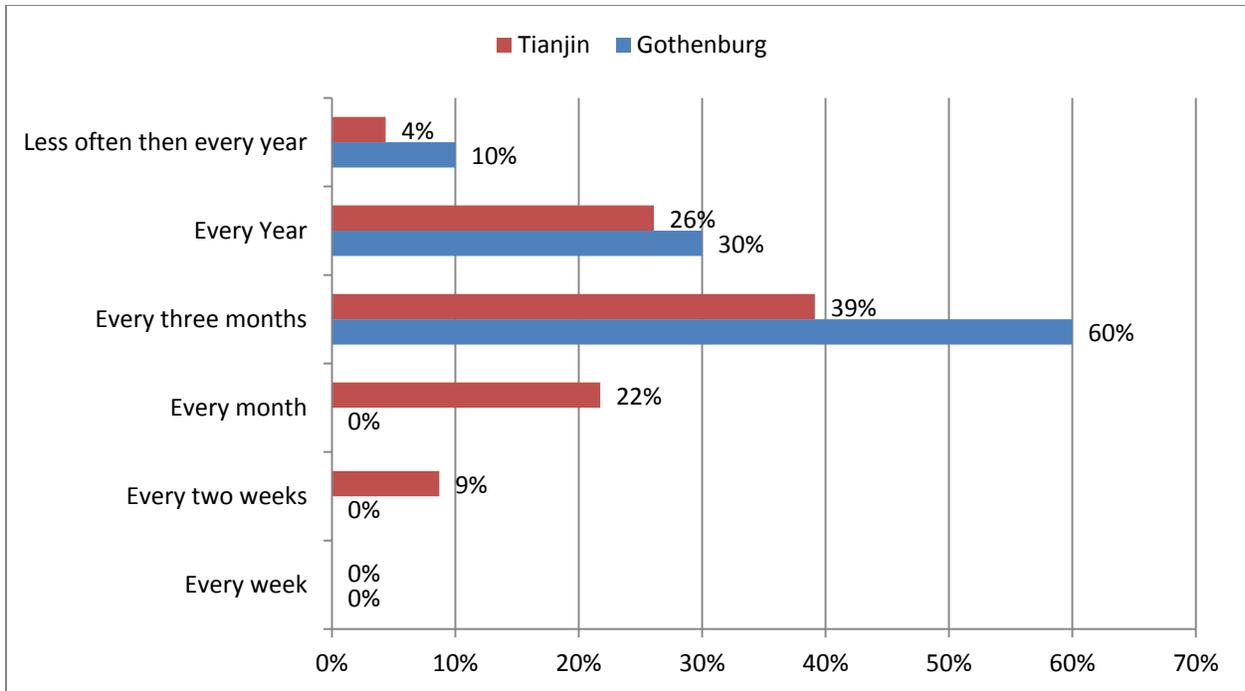


Figure 9: “I estimate that I use E-learnings to learn more about the business of Volvo”

The E-learnings about Volvo processes create user engagement by using video with dramatized sequences of the people involved in the processes and by using frequent knowledge tests throughout the e-learning, sometimes in the form of games. The E-learnings do both teach how the Volvo processes are set up and why they are set up this way, for example giving examples on how using a standard process in one department prevents problems from occurring in another department. These E-learnings are made by experts on education who will make story-boards together with the customer organization and conduct interviews about the processes with those most knowledgeable about them. As a basic introduction to the processes the E-learnings are perceived to work well as an efficient way of introducing the context Volvo IT works in, although several interviewees would have liked the E-learnings to be more extensive and go deeper into covering the details of the processes. An important benefit of the E-learnings has been to establish common vocabulary and context awareness, as some who are experienced in one area may not be familiar with what terminology is used to describe the overall processes.

5.2.3 The role of ADT & LMS in organizing trainings

ADT (application development techniques) is a part of Volvo IT that is responsible for supporting the delivery organization in a long term way to help it build capabilities, so the ADT is not supporting with resources for deliveries, but with advice and training. The people working in ADT are selected because of having expertise in some area and except for managers; the members of ADT will only have part of their time allocated to their assignment in ADT and keep working in their regular jobs in deliveries. Part of the role of ADT is to teach about Volvo processes and recommended ways of working, but it does this on request from the delivery organization and is not a governance function charged with enforcing any policies. The way ADT is involved in trainings is primarily by providing content. Some common formats can be a 1 hour presentation or a 2-4 hour seminar which goes deeper and includes more discussion. One role of the members of ADT is to have a network of people with certain competence and be able to find the right person for arranging a particular training and then also pay for the time that person allocates to preparing and delivering the training. The ADT can also provide coaching and have a longer engagement with some group in the delivery organization that wish to have some advice and an external discussion partner during a project. In order to give a single point of contact for the ADT, there is a common mailbox with administrators who make sure all requests to ADT are handled by the right manager.

LM (Learning management) manages the central IT-tool LMS (Learning management system) where much of the training in the organization is advertised and tracked. A part of the responsibility is to coordinate trainings and be gate-keepers, to keep trainings on the same subject the same across Volvo rather than using different external providers who may teach different variants of the same concepts. Part of this work is also to make internal trainings and purchasing of external trainings more efficient by ensuring that more participants participate at each session rather than arranging separate ones.

5.3. Sharing in formal and informal networks

In this section, how formal and informal networks facilitate knowledge sharing and how they are created is discussed.

5.3.1 Job rotation to Gothenburg

Since the LDS application is used both in Asia and in the European time-zones (which include many users in Africa), it is necessary to have support during business hours in these time-zones. Part of the strategy for LDS is to have support and maintenance in Tianjin, but this meant that someone there had to work afternoon until late night, which decreased the attractiveness of the job. As the team in Tianjin does the development and maintenance, they are the most suited to resolve complex support cases that the first-line-support in DBS is unable to solve. As the team in Gothenburg has most of the customer contact (with business representatives from other companies in Volvo group), it is also an added benefit that the team in Tianjin gets deeper understanding of end users by solving support cases.

Because of these factors it was decided to try having support and maintenance staff work in Gothenburg for short assignments. A first person was sent already in 2010, then later it was decided that it was better to send two people at a time to make the experience more enjoyable and since 2012 the current concept has been used. One person doing support and one doing maintenance is sent on a three month assignment to work in Gothenburg. By limiting the assignments to three months the visa procedures are simplified and more people are given the opportunity to go, a total of eight people every year out of the 15 who work with support and maintenance can go. The ones who go need to have enough experience to be able to work independently and some are not able or willing to go due to commitments outside work, still the interest is high, some who have gone want to go again and the issue has been to prioritize who should go first rather than having to persuade people to go. Some positive effects of the initiative that have been mentioned are: closer connection between the teams in Tianjin and Gothenburg, the team in Sweden getting closer to the technology underlying the application and the Chinese participants getting a better understanding of Volvo as a company and better specific domain knowledge of processes at dealerships outside Asia.

5.3.2 Networks in consulting services, communities of roles

One important role of consulting services is to make sure that the organization can quickly supply competence when projects demand it and shift resources when demand changes. Another important role is to ensure the build-up of competence in both technology and the business domain. By gathering people with similar roles in groups managed by the same line manager,

exchange of experience and ideas between can be facilitated between people who work in different projects.

There is also a global community concept in consulting services for how to work with creating communities; this concept defines three different levels for building communities. The first level is that of *competency areas*, which are global groups where mainly managers participate in order to coordinate efforts within a certain area. The second level is *competence communities*, global groups where those interested can join and regularly share insights from their work. Some line managers will also encourage their staff to join communities as part of their goals in the personal business plan, and then the participation will be evaluated at the end of the year. The competence communities will usually have an only meeting every month or every second and also post items of interest on a blog on the intranet. The third level in the concept is *study groups* which may be organized by a manager or spontaneously by those interested in an area, these may be more temporary, local and informal, some will have time allocated while others will meet during the lunch break.

In Sweden, it has been quite common for groups in consulting services who have the same line manager to, aside from having a monthly group meeting, have team-building activities and informally meeting up, such as going for dinner. There are also mailing lists for people in similar roles, an example is for people working as architects who may encounter issues when working in one application that are similar to what others have encountered. When sending an email to these mailing lists, you will generally get fast and accurate responses as those with expert knowledge like sharing it. The intranet is also occasionally used to share good solutions, but generally the issues discussed in the group are very specific so the solutions are not re-usable, for architects, the solutions that are re-usable tend to be so general that they are already on the public internet.

5.3.3 BA seminar

In China, one important initiative in consulting services is the BA seminar, where those who have the role of business analysts in all the offices in China will come together for two days to share domain knowledge. This seminar is held 3-4 times per year, and most of the 20 Business analysts in China will participate. Business analysts may often have expertise focused on one mega-process such as marketing and sales, and are generally eager to share that knowledge and learn from others who have focused on another mega-process in order to get a more holistic, end

to end view and broaden their professional network of fellow business analysts. It is also an important opportunity to discuss issues common to the role, for example by having a very experienced business analyst from Gothenburg come to China and lead a session about how to develop as a business analyst and procedures for assessing competence. Often there will also be representatives from the business coming to present about on-going projects of interest to business analysts, for example the on-going process of setting up a joint venture with Dongfeng Motor Corporation.

The event has been popular, and previously not only business analysts, but also many project managers attended, however that made the topic drift away from business domain knowledge into more of project management, thus it has been decided to focus on inviting business analysts now. The last part of each seminar is to evaluate it through a roundtable discussion to gather feedback, and so far the feedback has been very positive. After a seminar, the PowerPoint's used and summary notes from the discussions are gathered and shared on the intranet by the host of the seminar.

As seen in Figure 10, there seems to be some successes of these initiatives in consulting services in China as those in consulting services to a greater extent agree that they are “part of a community sharing knowledge” and to a lesser extent agree with “I would like to have more opportunities to share my knowledge with colleagues. Even though those not in consulting services are welcomed to participate in initiatives by consulting services, there may be an opportunity to increase promotion of the initiatives or to arrange more similar initiatives in the rest of the organisation in China. The same may be true in Sweden, though it cannot be shown in the survey due to too few respondents in Sweden who work in consulting services.

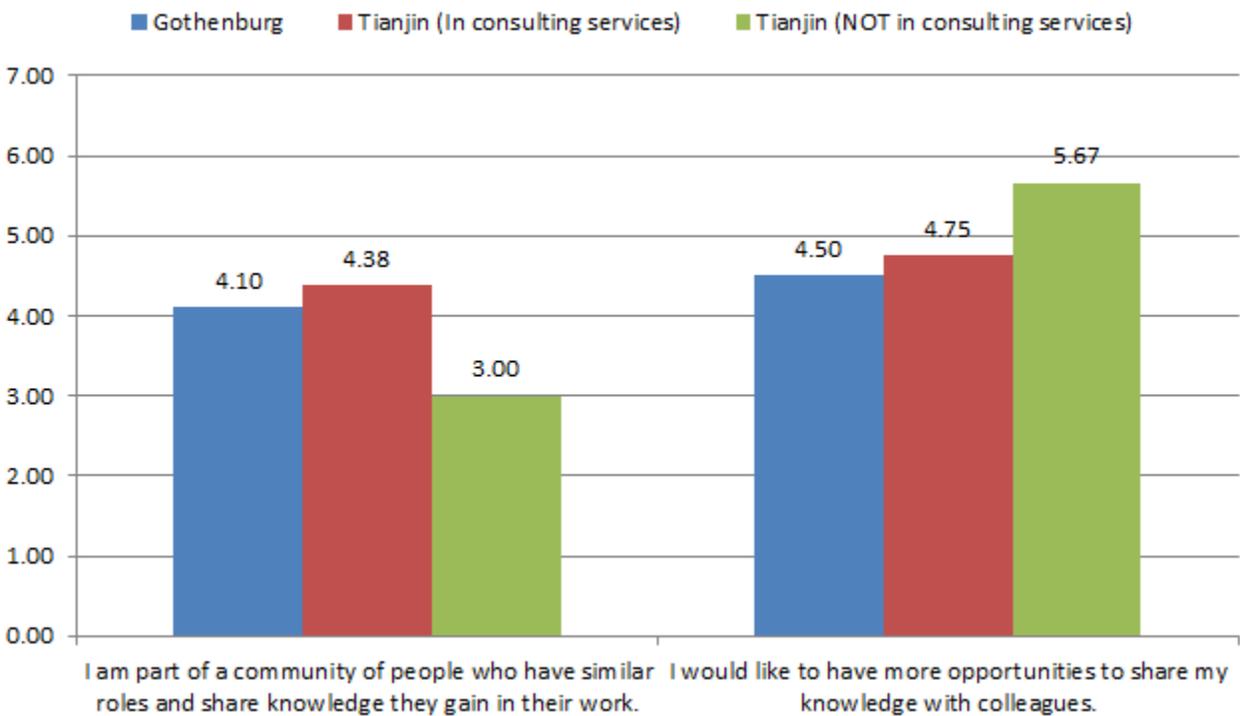


Figure 10: Survey results on Communities sharing knowledge. The scale is 1 to 7, 1 represents “completely disagree” and 7 “completely agree”

5.3.4 Discussing work on lunch time

In general, interviewees mention that they prefer to not talk about work during the lunchtime, though many in Gothenburg say that it still is quite common. This agrees with the survey results in Figure 11, where the respondents in Gothenburg to a greater extent agree to that they often discuss work on lunch and that there is nothing wrong about discussing work on lunch. One reason mentioned by interviewees in Gothenburg for discussing work on lunch was that lunch was one of the few chances to talk to your co-workers in your team for a longer time when both

have schedules filled with meetings. In Tianjin, more people work in technical roles who participate in less scheduled meetings and who may also deal with technical issues in their work which is hard to discuss in the canteen without showing the problem on a computer. A further reason may be that in Gothenburg, there is a large lunch room where people from many departments will mix when they heat their lunches while there are not many restaurants nearby. In the Tianjin office, there are several small lunch rooms and there is a greater selection of restaurants outside the office. This means both that employees in Tianjin may meet fewer colleagues from other teams on lunch and that they will often meet in places where non-Volvo-employees are present and were some work-related issues may be inappropriate to discuss when possibly being overheard.

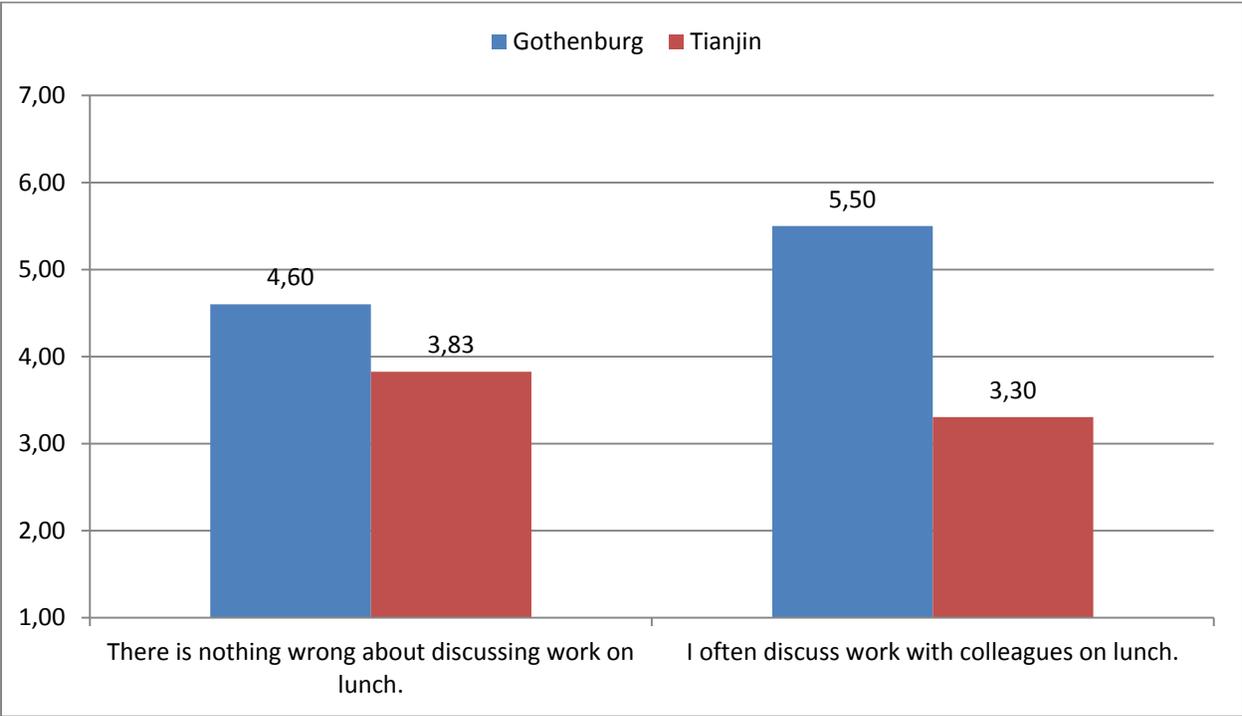


Figure 11: Discussing work on lunch (The scale is 1 to 7, 1 represents “completely disagree” and 7 “completely agree”)

Some will use the lunch time for informal, but organized sharing with others who have the same roles in different teams by deciding to regularly meet with others in the same roles. For employees who work in different teams and are not part of consulting services (where one line manager has responsibility for people of the same role working in different assignments), they may get to initially know these colleagues when attending trainings together or interacting when

integrations are made between the applications they work with. People in some roles have also on their own initiative organized study circles who meet on lunchtime to study some subject, often new technology or books in their field of interest. In Tianjin, some voluntary initiatives for improving English have also been organized by HR or managers on lunchtime in order to encourage improved English without cutting into the hours allocated to the deliveries to customers. There will also be some people meeting outside regular working hours, either on events arranged by Volvo IT or more spontaneously, but as seen in Figure 12, this does not seem like an important arena for discussing the work. It may however be an important way of staying in touch with colleagues and maintaining a social network that may be of help when problems are encountered in the work and you are familiar with people who you can contact. For some groups, such as in consulting services that are spread out in assignments and do not meet daily, meeting outside the office may be important for maintaining a group identity and network within the group.

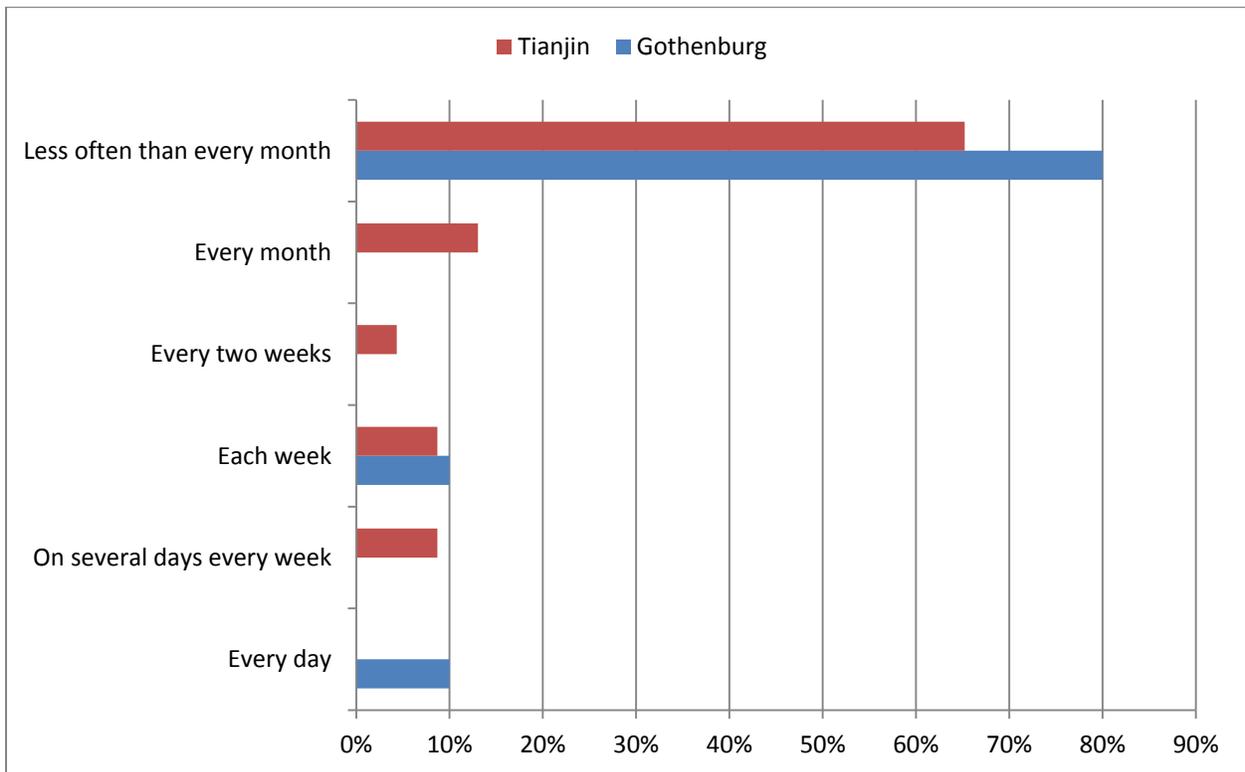


Figure 12: “I meet with my colleagues and discuss work outside the office”

5.4. Creation of documentation

The main place for gathering documentation for the teams in Volvo IT is the intranet file-sharing area called “team place”, here most presentations, spread sheets and documentation concerning the application are put and are available for the team. There are also some teams that use “file-areas” outside the web-based intranet to share files, instead having shared folders accessible through the regular file-browser. This is a legacy due to that the “team place” did not exist in its current form until quite recently, and this solution is disadvantageous from a backup-perspective and may create confusion about where to find documentation. A contributing factor in Tianjin for not phasing out this legacy solution may be that it is hosted locally in Tianjin and thus not vulnerable to sometimes slow internet connection.

When tasks are made as part of formal projects, there will be very structured documentation due to the standardised project management process with checklists for passing through gates in the project; this documentation will be gathered in team place. For tasks that are part of smaller projects, that do not employ the formal project management model or which are part of day-to-day run-time processes, documentation is done in different ways depending on the task.

For handling support cases, the individual cases are tracked using one system and some generally applicable solutions are, after review and approval, entered into a knowledge database in order to be re-used by others working with support. For handling change requests, much of the documentation is handled using the collaboration platform Microsoft Team Foundation server where code is stored together with logs of changes and the reasons for these changes.

Regarding documentation after meetings, the respondents in Gothenburg do receive meeting minutes less than in Tianjin, as seen in Figure 13. A possible reason for this could be that the average number of participants in meetings may be smaller in Gothenburg and that the meetings may be more frequent, thus reducing the need to use meeting minutes to avoid misunderstandings. Another reason could be that the content and type of the meetings in Gothenburg and Tianjin are different and thus have different need for documentation. A third reason for the difference could be cultural factors, where meeting minutes could be used in China to help in reaching a shared understanding of what was decided in the meeting, something that may go more smoothly in a less hierarchical culture as the Swedish where power distance is lower.

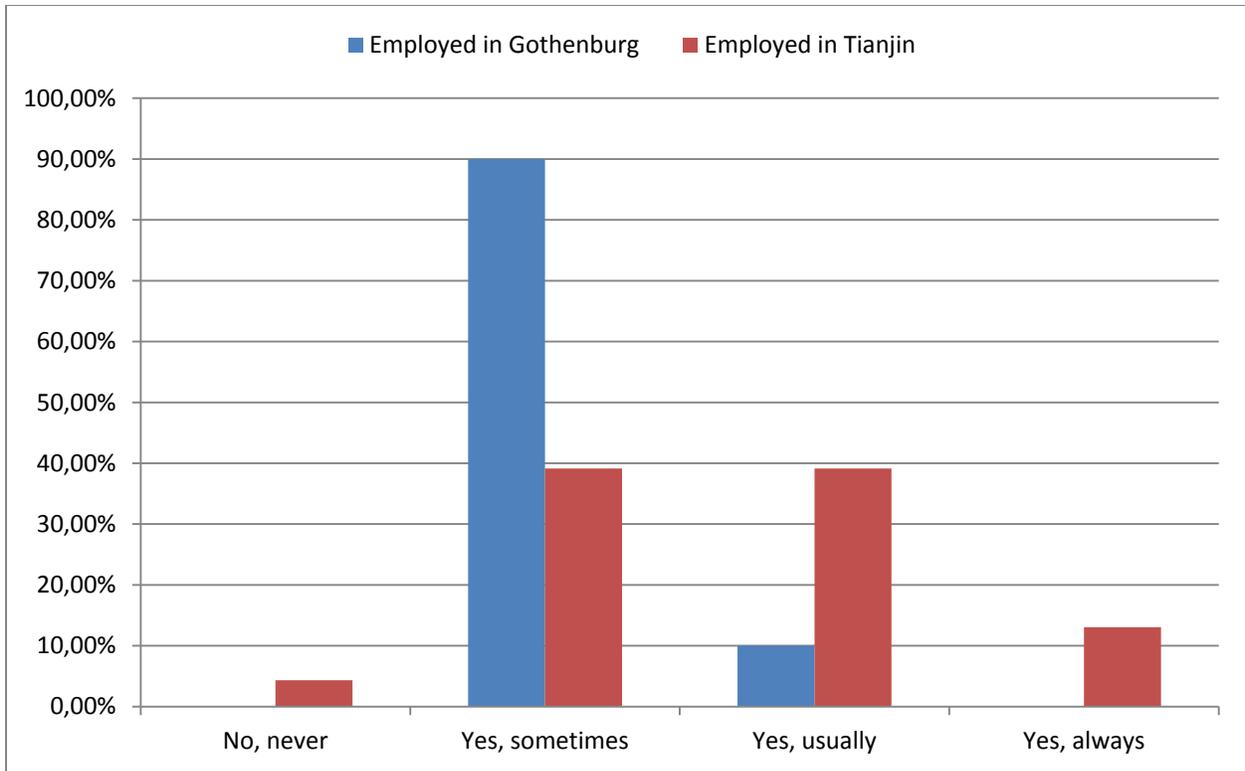


Figure 13: “After meetings I receive meeting notes”

Another possible explanation to why more meeting notes are sent out in Tianjin could be that the employees in Tianjin, as seen in Figure 14, find the meeting notes more useful than their colleagues in Gothenburg, and will thus have greater motivation to produce meeting notes.

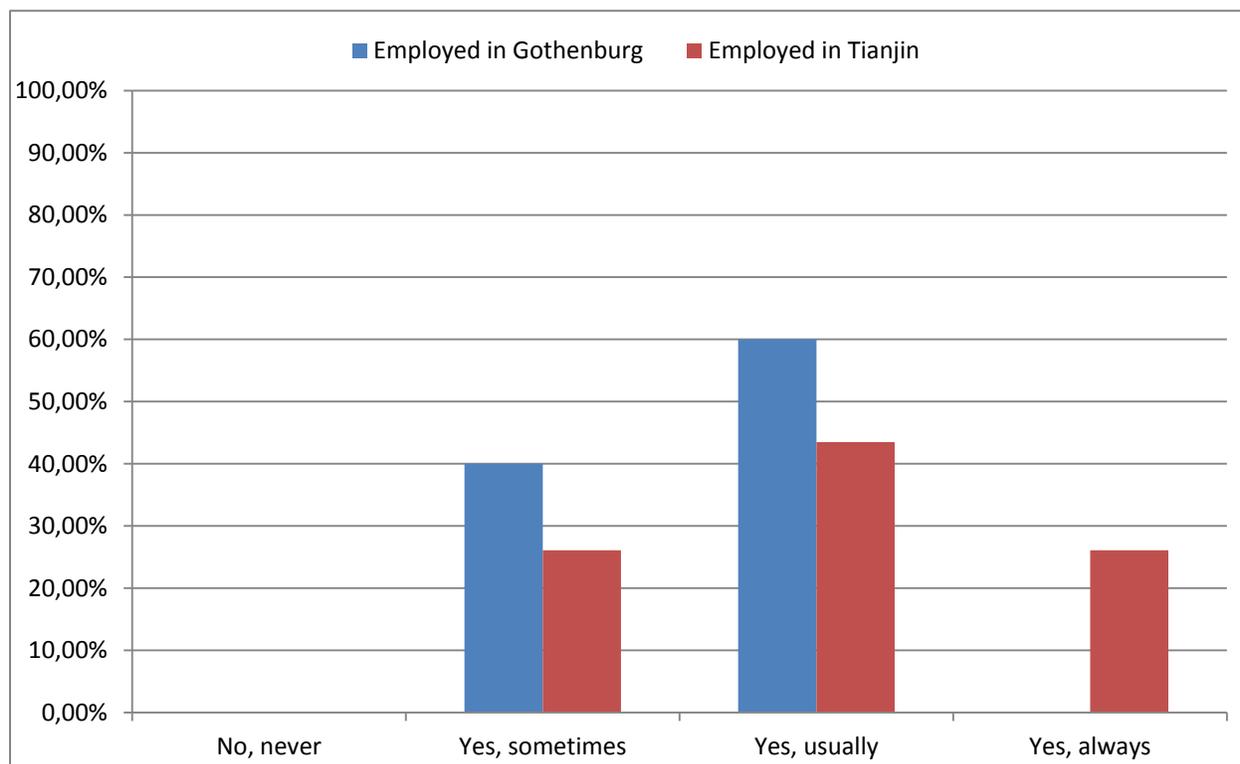


Figure 14: “I find the meeting notes useful in my work”

5.4.1 Initiatives in Consulting Services to gather codified domain knowledge

In Tianjin

From Consulting services there have been both global and local initiatives on gathering domain knowledge from different functional areas as its members work in different functional areas. In Tianjin there is a local initiative called Technical and domain competence committee where volunteers to spend some time on gathering existing materials such as PowerPoint presentations, about the different parts of Volvo processes. Over two months, the volunteer has gathered materials that anyone in Volvo IT is permitted to view and put these in a team place (a web-based solution for sharing files) where there is an illustration of the Volvo mega-processes and you can find the right materials by clicking on parts of the illustration. This repository is currently accessible to everyone, but its existence has not yet been widely advertised.

As part of the same initiative, the volunteer will also coordinate shorter training sessions on business domain knowledge or technical knowledge. These trainings will be on request of a team

member or line manager and usually consist of a 1-2 hour presentation where everyone in Tianjin is invited; the presenter may be a technical expert or business analyst who will have deep business domain knowledge. There is a standard format for the invitations and the presentations and those who want to participate can either attend in a meeting room or participate via speakerphone and the presenter sharing their laptop screen. After a presentation there will always be a questionnaire on email evaluating the presentation and the PowerPoint's will be shared on the intranet.

Another related initiative in Tianjin which only recently started, is to have volunteers gather profiles with details about the knowledge of team members and areas they would like to know more about. These profiles will then be used by managers both to find what trainings to arrange and to find people who may have competence to deliver trainings on specific issues.

Globally

Globally, there is an initiative similar to the local initiative to build a knowledge repository in Tianjin. Consulting services took the initiative in 2010 to gather domain knowledge in one place on the intranet for easy access. There was a global responsible for it and from China, a business analyst dedicated 1-2 hours each month to contribute to this project. Later the project was handed over to a group in application management.

5.5. How you find the right business knowledge

The most mentioned way for finding new business knowledge in the interviews were to ask colleagues in the team to explain or to refer you to the right person. E-learning is not used so much. A reason why so few answer that they ask their manager may be because of their interpretation of the word "manager", because of the matrix structure of Volvo IT, each employee has a line manager and a manager in the functional dimension, such as a Maintenance assignment leader or Service delivery manager. It's possible that with the flat culture promoted in Volvo IT, employees do only refer to their line manager as manager, while the functional manager may be seen primarily as a colleague.

| “When I need to know more about the business of Volvo I will:” | Percentage who ticked each alternative |
|--|--|
| Ask a colleague in my team to explain | 85% |
| Try to find documentation on team place (a part of the intranet where users can share files) | 76% |
| Try to find documentation on Violin (the intranet, not editable by most users) | 64% |
| Ask a colleague in another team in Volvo IT | 61% |
| Ask someone in the business directly | 58% |
| Try to find the right document on a shared file area we have in my team | 42% |
| Use a search engine(e.g. Google or Baidu) | 36% |
| Try to find the right document on my hard drive | 30% |
| Try to find an e-learning | 30% |
| Ask my manager to explain | 27% |

Table 5: “When I need to know more about the business of Volvo I will:”

As seen in Figure 15, In Tianjin, e-learnings are used more than in Gothenburg for finding out about the business of Volvo, which may be both due to people having less experience in Volvo and due to the fact that the business of Volvo is not as widely known in Tianjin as it is in Gothenburg where Volvo is among the largest employers and the production facilities are close to the Volvo IT office. In Tianjin, team place is also used more to find out about the business of Volvo, this could be for the same reasons as the employees in Gothenburg may already know much of the information that can be found on the team place.

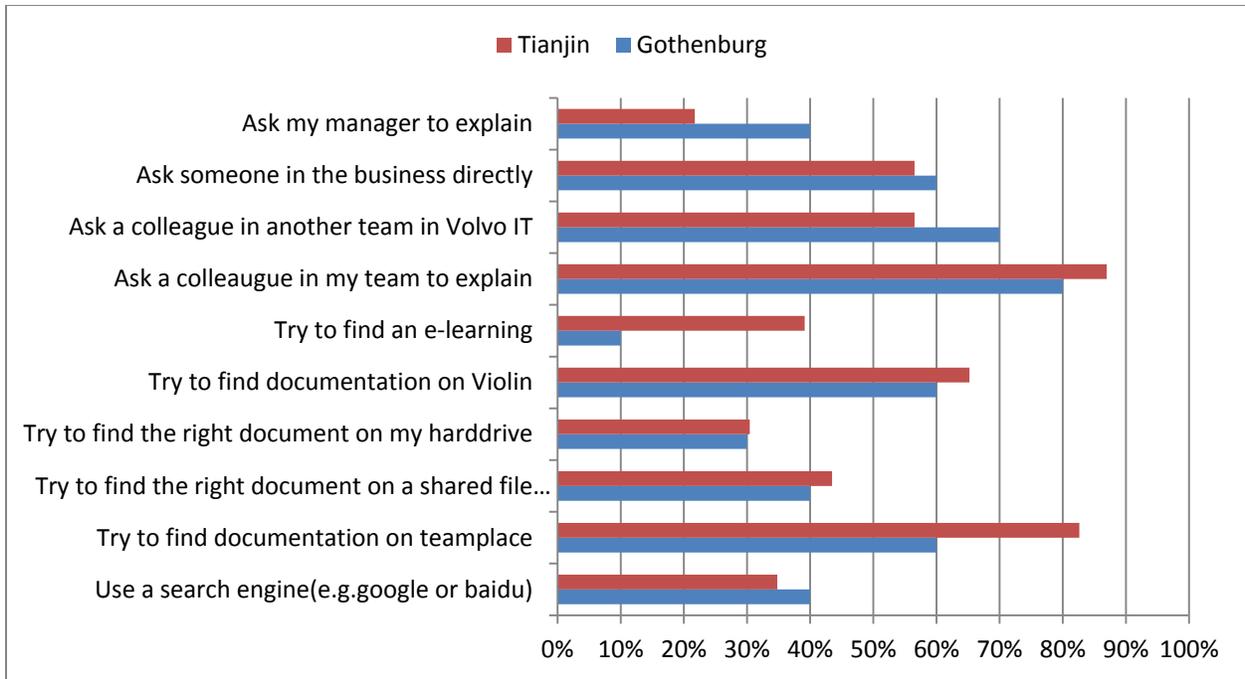


Figure 15: “When I need to know more about the business of Volvo I will:”

For finding the right people to ask outside the team, many interviewees mention the importance of having your own personal network or else asking around within your team to be referred to the right person. For some kinds of issues, where the team may need training or coaching on a subject for a longer time, the department ADT (Application delivery techniques) does have the role of facilitating this and will have their own groups of experts in different areas who in turn should have networks of others with special competence. There is also functionality on the intranet Violin for searching for people, where key words can be used for applications or areas of competence to search among their profiles. This functionality is quite new, and many people have not filled out their profiles, so the lack of use seen in Figure 16 may be mainly be due to lack of awareness as managers in Tianjin discussing the results agree that this functionality should be useful to many of their team members.

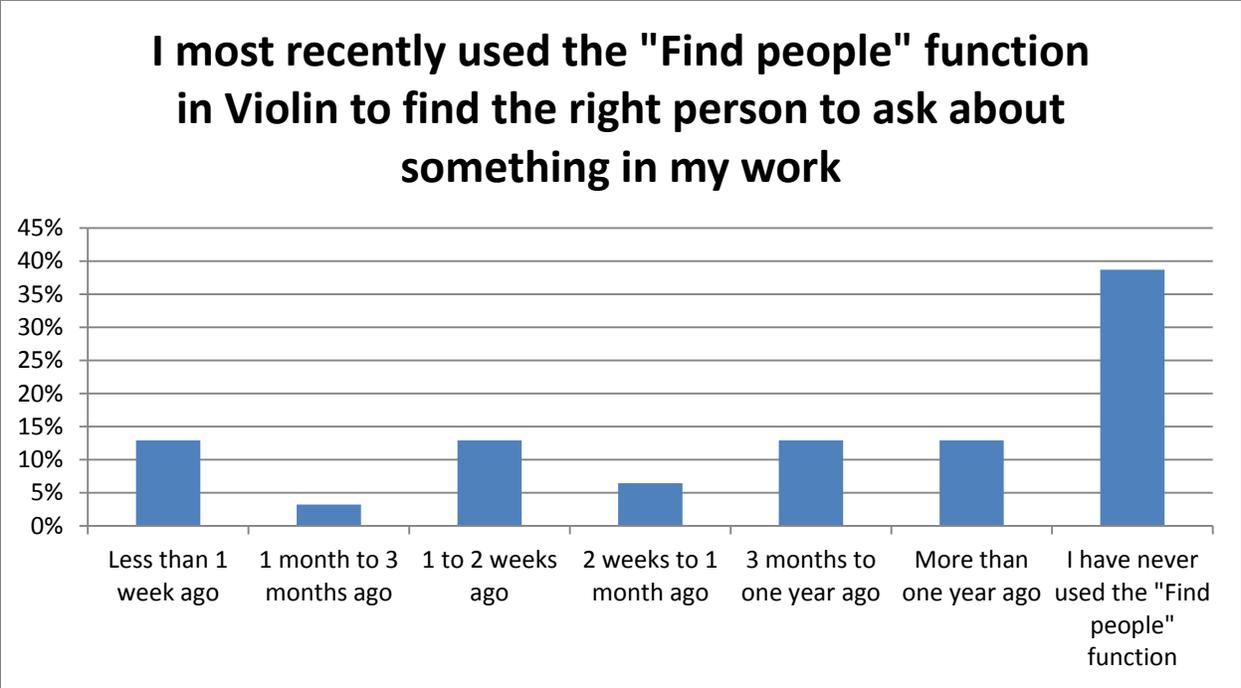


Figure 16: Searching for people with a profile on the intranet

5.6. Staff turnover

In Volvo IT Gothenburg, employees do generally stay a long time on their jobs. In Sweden the average age of employees is about 47 years and the turnover ratio is pretty low. Some of the employees have already worked at Volvo for 40 years.

In Volvo IT Tianjin, the average age of employees is about 26 years and most of the employees are new graduates and young professionals. There is a potential risk that the junior employees will seek for new career opportunities or be headhunted when they grow more experienced in the IT market. Currently, the turnover ratio of Volvo IT is low and less than half of the average turnover ratio in the Chinese IT-industry.

5.6.1 Recruitment

To attract candidates, Volvo has an advantage of its brand, being famous for cars and trucks with high safety and good quality. There may however be an issue of confusing Volvo Group with Volvo Car Corporation, and as Volvo Car Corporation is owned by Chinese auto maker Geely since 2010, this confusion may lead to the whole Volvo brand being perceived as more of a Chinese brand than a foreign, European or Swedish brand which could impact the employer branding. The international culture which includes the people care and respect is viewed as an

important factor in recruiting talent. Some of the multi-national companies in China did a conscious or unconscious choice to localize and make their Chinese organizations become more like other Chinese companies and less like their foreign parent organizations. However, Volvo IT keeps a highly global organization which enables the employees to have more international experience.

Compared with most other IT companies, a difference for Volvo IT is that they focus on serving the internal customers in Volvo Group. This lets employees build domain knowledge regarding the automotive industry, know more about Volvo and to work with more technically challenging tasks compared to some other IT-companies, which can be an advantage in recruiting. A candidate with a background in IT for automotive industry has some advantage, but it is not crucial as much experience from other industries can also be applied. For the positions related to working with business requirements, the automotive industry background is more important. As for hard skills, the candidates need to meet requirements of having good technical skills. What is even harder to find is the soft skills, where good English and an open-minded and team-oriented attitude is necessary for candidates to have a good cultural fit with the organization and the Volvo way.

For recruiting experienced candidates, recommendations by employees in Volvo or recommendations by external head-hunters are the main methods for Volvo IT to recruit. To attract more new graduates, Volvo IT focuses on the cooperation with the local universities to build the employer brand and find suitable candidates. In Gothenburg, Volvo has a close relationship with Chalmers University of Technology and offers opportunities for summer jobs, thesis work, internships and trainee programs for students. Volvo IT Tianjin, has long term cooperation plans with Nankai University, Tianjin University and Beijing Postal University which are all top universities in computer science and communication engineering.

5.6.2 Reasons to quit

In Volvo IT, the reasons for quitting from Volvo are mainly studying abroad for those 23-27 years old and going back to hometowns for starting a family for those who are older. Being recruited by other companies in Tianjin or other cities also happens.

Moving back to the hometown for family reasons is currently the most common reason for quitting. In Chinese culture, it is important for people to live close with their parents. A common career and life plan is to work and save money in the big cities and then use the savings and experience to start a better life and career in one's hometown. There is not the same problem in Sweden, few people come from far away and living close to relatives is regarded as less important than in Chinese culture, and as Sweden is relatively small, people's hometowns are never so far away unless they have immigrated to Sweden.

5.6.3 External consultants

One KPI in the strategy of Volvo IT is the ratio of consultants to employees, in order to balance the amount of regular employees and external consultants and ensure the flexibility of the company. In Volvo IT Tianjin, the cooperation with external consultancies is handled by an appointed partner manager and HR is not involved in the consultant recruitment process.

Volvo IT presently relies on three long term partnerships with consultancies that provide consultants. The original target of the ratio of employees in Volvo IT Tianjin is 30% of regular employee and 70% of external consultants. Now, due to the global development and challenges, the ratio has inverted to 70% of regular employee and 30% of external consultants. For the senior roles such as project managers, business analysts, architects and line manager, Volvo prefers to have regular employees instead of the external consultants. The rest of the roles are open to the partners.

During the daily work, external consultants are treated like regular employees and are involved in all activities, except for some training of technical skills which has a cost and which the partner companies are responsible for. In Gothenburg, the external consultants have better or equal salary as the regular employees and are generally satisfied with being consultants. However, in China, the partnering consultancies have a more flexible salary structure than Volvo IT and the external consultants will generally have less salary, benefits and training opportunities. As a result, most are eager to be converted to regular employees if given the opportunity.

5.6.4 Global resource pool

One of the challenges for the consulting services function in Volvo IT is keeping flexibility. The demands from the customers vary between periods and it is difficult to balance demand and

supply for competence. Consulting services needs to be able to ramp up project teams quickly to avoid resource issue and to ramp down quickly when demand is weak. Forecasting demand and cooperating with external resources is part of how to deal with this problem. Another method that has been implemented is using a global resource pool.

The initiative was started in 2012 when there were 16 employees in China involved in a global resource pool. The method is to gather resources from different sites of Volvo IT and match them to global requests from different countries. For example, when Gothenburg is short for resources and there are available resources from Tianjin in the pool, the resources from Tianjin will be assigned to work for the requests from Gothenburg. The resources could go abroad to work on-site or just work off-site in their home country based on the requirements of the request site. The benefit of the global resource pool is to use the resources efficiently, increase their abilities, have overseas working experience and control the cost of the project. The drawback is that the resources in the pool could not work on local assignments due to being held available for quickly responding to global requests. It means an increased labour cost when the resources don't have any assignment. Now, Volvo IT uses a mixed approach in global resource pool and the resources could work on local requests.

5.7. Knowledge transfer when people quit

As much knowledge will be carried in the heads of employees, it is inevitable that knowledge will be lost when people quit from the company. Although the turnover ratio in Volvo IT Tianjin is lower than other IT-companies in China, it is still important to transfer and store the knowledge when people quit in Volvo so as to maintain the competence of knowledge and reduce the reinvestment on the knowledge.

5.7.1 Process of knowledge transfer

The greatest difference between Gothenburg and Tianjin when people quit is the leaving announcement and handover time. The leaving announcement time in Gothenburg is generally about 3 months in advance which is much more than 1 month which is standard in Tianjin. During the handover period, the line managers would encourage the leaving people to create documentation which should be checked by the team leaders. Normally, a month is sufficient for knowledge transfer, however, quickly finding a replacement to transfer knowledge to causes problems.

In Volvo, there is no standard knowledge transfer process when quitting. Employees are encouraged to work together and share their knowledge to minimize the reliance on a single individual being the only one who knows a certain task. When people quit, line managers are responsible to find a backup in their team based on the retention plan where there will be at least a temporary replacement specified. When people quit from their position and there is no suitable permanent candidate for the position, the knowledge from the leaving person will be transferred to one or more regular employees who fill in for some time. Then the regular employee will transfer the knowledge to new employee when someone takes over the position. For different roles, they have different requirements on the knowledge that needs to be transferred between the knowledge sender and recipient. For example, knowledge regarding system functions and business logic is important for the knowledge transfer between developers. For the database architects, how the application works and is used in the daily work is key knowledge to be transferred. There will be several meetings for the knowledge transfer between knowledge sender and recipient and there is no standardized method to evaluate the quality of the knowledge transfer.

5.7.2 Problems caused by staff turnover

Every process is documented and there is a knowledge base in the daily work. Much essential knowledge will be documented somewhere, either in the system or in the team place. Retaining knowledge specific for projects is a responsibility of project managers. For some projects, a greater number of people are involved in and there is thus less impact of knowledge loss when somebody quits. For some smaller tasks, less people are involved in and the knowledge would lose more when someone quit. Based on the interviews in Volvo, both the HR and line managers are pretty confident with the knowledge transfer process in Volvo and believe that the knowledge loss when people quit is usually acceptable. However, some knowledge is difficult to transfer and there is a loss during the knowledge transfer.

Experience

Experience loss is the most frequent answer mentioned as response to interview questions regarding what knowledge is lost when people quit. Experience includes both tacit knowledge and explicit knowledge. Some of the explicit knowledge is introduced and documented in project reports and other documentation. However, most of experience is tacit knowledge which is

difficult to transfer since it just exists in the head of the owner. For instance, according to the system analysts, experience helps a lot for them to understand the request from the market and develop new functionality to reduce the requirement gap between Volvo and dealer and solve the problem. For some requests, the required functionality may already be developed for another market and needs to be introduced to the requested market instead of developing new functionality, but recognizing this kind of situation is hard without broad experience of working with that particular application. Much of this tacit knowledge regarding the business and the deliveries will be lost as it is difficult to be transferred between senders and recipients.

Personal network

Personal network is another aspect of knowledge loss during the knowledge transfer from a quitting employee. Relationships among people play a significant role of the employees to find the right person for both technical knowledge and business knowledge. During the knowledge transfer, some of the main collaborators will be introduced by the knowledge sender to the recipient. However, many other colleagues may not be included in the transfer, which can lead to difficulties later when the new employee will need to search in order to find a person to solve a perhaps important but infrequent task. As it requires lots of time investment to build a new relationship and trust, part of the problem of losing personal networks will not be solved by knowledge transfer, but may be mitigated by promoting an open culture and sense of community across the company. At present, there is no standard way to transfer the personal network when introducing a new employee, the new employee will be briefly introduced to the team in a team meeting and introductions to other colleagues may or may not be part of knowledge transfer sessions.

5.8. Influence of culture

5.8.1 Culture of Volvo

During the interviews with the people both in management roles and technical roles, everyone believes that the most attractive and competitive factor in Volvo is company culture – the Volvo way, which is explained in a book with the same name. Volvo way means the way that Volvo works together with energy, passion and respect for the individuals. It is recognized as the foundation and success recipe of Volvo group to develop into the world leading providers of

sustainable transport solutions. For the new employees, Volvo Way could be used as a good introduction about the company and a guideline to be a successful employee.

- Energy: Determination to meet and exceed the expectations of the customers and make improvements and innovation for the product, service and performance to add value to the customers;
- Passion: Determination to devote yourself to the work and becoming the best business partner for the customers; being proud of the excellent achievements of Volvo;
- Respect: Respect and encourage each other, support and learning from others are the foundation of all the relationships in the daily work and social life.

5.8.2 Volvo culture as a factor to attract and retain talent

According to the HR in Volvo IT Tianjin, Volvo culture plays a significant role in maintaining lower turnover rate when compared with the average turnover rate in the IT industry of China. Although the salary level of Volvo IT Tianjin is in the middle position of the IT job-market, the respected working environment and culture of a learning organization attract experts and young professionals to seek work in Volvo, which is proud of its culture and confident of it as a differentiating factor relative to other employers. Compared with the structure of Chinese and Japanese organizations, Volvo's organizational structure is more flat and less hierarchal which reduce the power distance in the organization and encourages individual initiatives of group members. According to some of the Chinese employees, they feel that Volvo way is more human-based and thus more attractive than more "mechanical" organizations. For example desserts, fruits and coffee are provided for free in the pantry and to desks and you are not expected to work overtime very often. If the employees are required to work overtime in the weekend or holiday, it is possible for them to have compensatory leave, which may not happen in the Japanese companies and some Chinese companies. In some of the Japanese and Chinese companies, the employees have to work overtime due to the manager not leaving and will not receive extra salary for that overtime.

5.8.3 Culture learning activities

Maintaining and developing the culture is considered as one of the key targets of Volvo. One of the responsibilities of the HR is to build the culture of the company and give culture training to the new employees and regular employees. Culture training includes the values of the company

and how to do the business with people from different countries. They also invite some external speakers to give some of the culture training and set up workshops. One successful case regarding how culture adds value is the culture volunteer team. The culture volunteer team was an initiative by two employees when Volvo IT Tianjin was set up in 2009. A volunteer group was established in 2010 which focused on running culture workshops and developing culture, communication and competence. In 2011, 50 new members joined in the volunteer group and corporate social responsibility was added to the scope of what the culture team does. Currently, one thing volunteers in the culture team do, is finding information, for example on personal development, on the internet and sharing this by email with all of the employees in Volvo IT Tianjin each Friday.

5.8.4 Culture ambassador program

The Culture ambassador program is a program within all of Volvo group. Any employee in Volvo can participate in the program and take courses, but for managers it is now mandatory. The network between the culture ambassadors supports employees in Volvo IT to involve in different initiatives to enhance communication, build trust, improve teamwork, extend interpersonal relations and respect diversity among customers and colleagues.

In China, employees who are interested in the culture work could work as ambassadors, participate in the culture committee and do some activities together, such as sharing materials in their functional mail box, arrange Friday Fikas (breaks with tea or coffee) and leisure activities such as “family day”. The members in the committee also interview with their business manager to ask how culture should support their business. For instance, in one project, they needed to have a deep understanding about Japanese culture and the members in the committee helped the project manager to hold the workshop, collect requirements from team members by survey, share the culture knowledge and support the project team. Some facts about other cultures are also shared on the announcement system on TVs in the lunchrooms by the communications team in Volvo IT.

5.8.5 Cultural differences between Sweden and China

Power distance index (PDI)

Normally, Swedish people have less sense of hierarchy than Chinese people. However, according to the observation and interviews, the power distance in Tianjin is quite low. Due to Volvo culture and organization structure, employees in Tianjin can communicate and discuss with their line managers freely in the working hours or after job. Based on the open discussion on personal development plan and personal business plan, solid trust and deeper understanding are built between the managers and employees and the power distance is reduced.

The standard promotion process also has a positive influence on reducing the power distance. In some of the traditional Chinese companies, the people with close personal relationships with managers are promoted instead of people with more solid technical knowledge and management skills. This situation results in a focus on hierarchies and leads people to mainly focus on personal relationship improvement in their daily work. Under the standard promotion process, employees can focus their efforts on the daily deliveries, improving their skills and be less concerned about the hierarchy at the workplace.

In the survey, there was a clear difference in how strongly the respondents in Sweden and China preferred to be introduced when contacting new colleagues. As seen in Figure 17, the respondents in Tianjin had a stronger preference for being introduced first, which could be related to the cultural differences in Hofstede's research, where there is a greater sense of hierarchy creating a barrier to contacting new people. The difference could also be related to greater individualism in Sweden, which may make it less important to have introductions by third person to establish mutual trust in a new relationship. An alternative explanation could be that as the respondents in Tianjin are significantly younger than their colleagues in Sweden, they are less experienced and thus feel more anxiety in contacting new people. It should however be noted that at both sites, the results indicate that the average respondents do not have a strong preference for being introduced first as the average answers are below 4 which is the midpoint of the scale. This could indicate that Volvo IT has been quite successful in efforts to promote an open and flat culture.

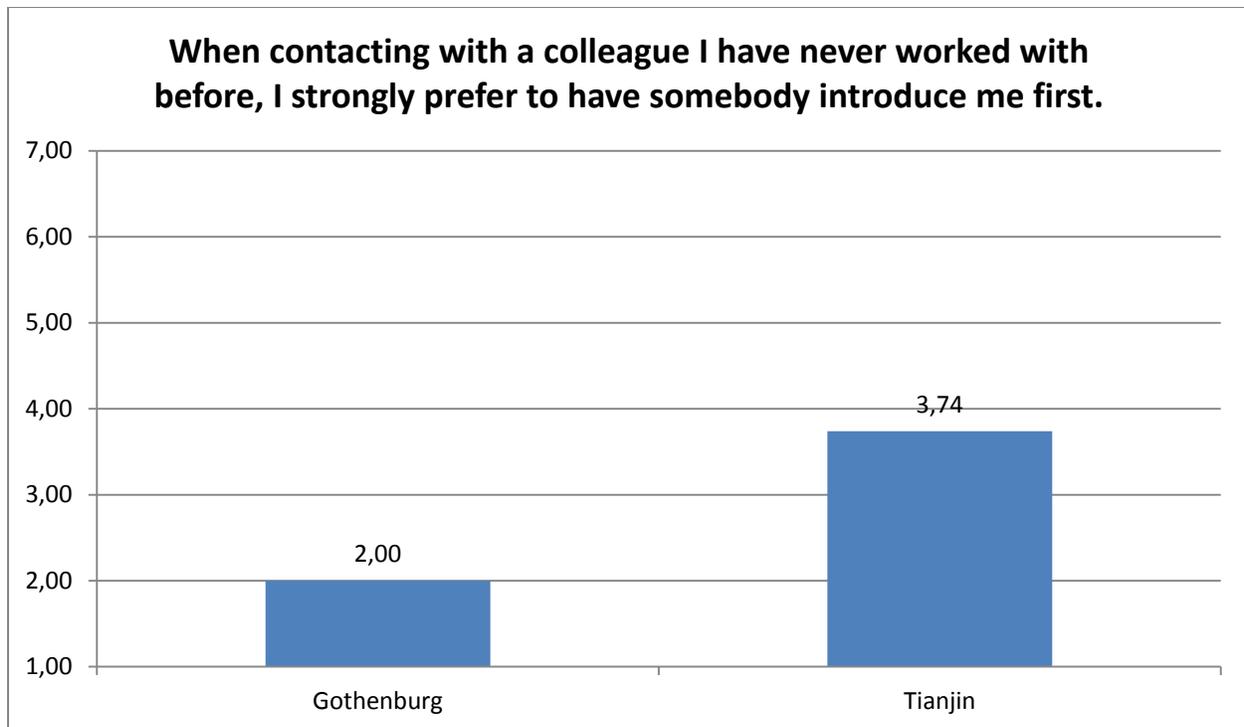


Figure 17: Introductions when contacting colleagues (The scale is 1 to 7, 1 represents “completely disagree” and 7 “completely agree”)

Masculinity (MAS)

In the dimension masculinity there is a large difference between the Chinese employees and the Swedish employees. In Volvo IT Tianjin, promotion and salary increases are considered as an important target of the employees in their career development. Employees are eager to be promoted when they meet the promotion requirements in QDB and some will often in ask their line managers about promotion opportunities. During the interview in Sweden, the employees seem less concerned with promotions and having rapid career development may be less important than enjoying the work you do.

According to the traditional thinking in China, being an external consultant is recognized as an unstable job which could be cut in the economic downturn. They do not have the same salary and bonus as for the regular employees in Volvo. As a result, the external consultants in China are more eager to convert and become regular employees of Volvo.

5.9. Standardized ways of working

5.9.1 Project model: IS-GDP4IT

IS-GDP (Information System Global Development Process) is an internal project steering model which is mandatory to be used for projects in all of the units in Volvo. IS-GDP4IT is the specific IS-GDP version used at Volvo IT. In IS-GDP4IT, project management and business needs are stated and it is described what should be done when in the project.

There are seven different phases in the IS-GDP which are pre-study phase, concept study phase, development phase, final development phase, industrialization phase, deployment phase and follow-up phase. The seven phases could also be classified into three periods: pre-study, project and follow-up. In IS-GDP4IT, the IT-side need to open gates before the business side can open the corresponding gates in the business side of the project model. Projects are reviewed in the end and a final report is done. The finalized project reports are stored locally on intranet (team place) and are both reviewed after completion and when starting similar projects. During weekly meetings recent final reports are discussed among PMs. Checklists are used during projects as part of the stage-gate and, for some series of similar projects such as roll-outs to new markets, they are living documents that are updated to reflect what is learned in projects.

5.9.2 Qualification database (QDB)

QBD (qualification database) is used as a standardized process to define the level of the employees in different roles and use as a guideline for promotion. Different requirements and conditions for different levels are clearly described in the QBD, such as the quantity of the projects, different trainings and working years in Volvo. Personal improvements of employee to meet the requirements of the next level are included in the personal business plan. Level changes in QBD is not defined as promotions, but may be followed by an increase in salary. This works the same globally and contributes to both transparency about promotion and makes internal staffing decisions and negotiations more smooth.

5.9.3 Personal business plans and development plans (PBP & PDP)

Personal business plans and personal development plans are the annual plans where employees define their personal goals for what to achieve in their work and how to proceed in developing their skills.

The personal business plan aims to give each employee an overall understanding of business objectives and relate them to how the individual will contribute to them. It is also used as a tool to evaluate employee performance. The plans start in the beginning of the year, then there is a mid-year review in June or July and an annual review and a new plan is done before March next year. Some common goals in the PBP are decided by the service delivery manager and assignment leader based on the assignments. If two team members are involved in the same assignment, they should have some common goals in their PBP. At least one improvement on soft skills should be included in the PBP. During the process, the managers communicate with the employee about their business and personal objectives. HR provides support to the manager about the communication skills, giving feedback and driving performance. HR also provides support to the employee about training, performance plan for low performing employees and development plans for the high performing employees.

The personal development plan is discussed at the same time with PBP. The purpose of the PDP is to enhance the competency of the employee in the long term. The employees will discuss their own personal development plan with their manager to decide what kinds of skills and abilities they want to focus on improving. The skills and abilities could connect with their daily work currently or have a positive influence on their future development.

5.9.4 Global attitude survey (VGAS)

VGAS (Volvo Global Attitude Survey) is an internal annual survey tool to evaluate employee satisfaction for all of the employees in Volvo group. Questions regarding culture and working climate are included in VGAS for the company to measure the performance and make future improvements. The response frequency was high and the average yearly index result for employee satisfaction is an important measure of the success of Volvo. A good score for a unit does not directly result in the managers being rewarded as ensuring employee satisfaction is a part of their job, but low scores may be a point of discussion in performance reviews of managers. Last year, the employee satisfaction and involvement in Tianjin was considerably higher than the average in Volvo Group in the VGAS survey.

5.10. Contact between the team in Gothenburg and Tianjin

In this section, patterns of daily communication and visits between the Gothenburg and Tianjin site are described.

5.10.1 Everyday contact between the teams

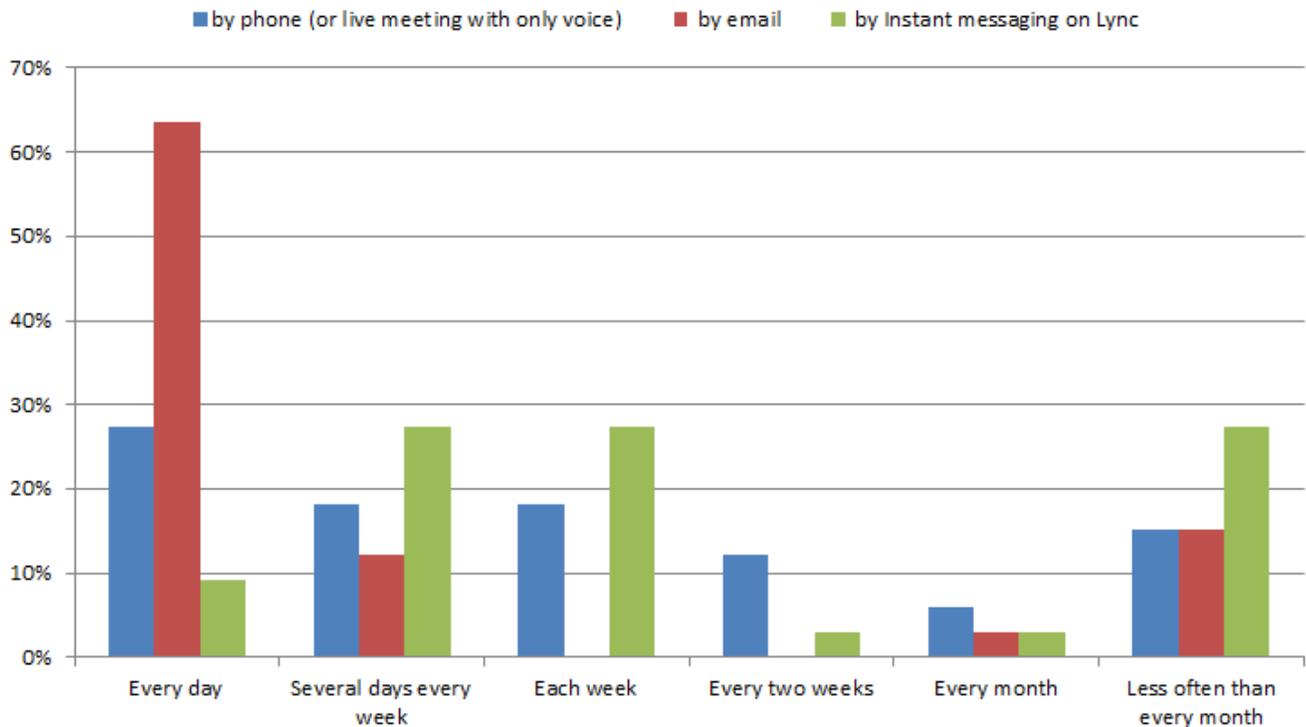


Figure 18: Contact between Gothenburg and Tianjin

As seen in Figure 18, Email is the most frequently used way of communicating. Instant messaging using the Lync platform is the least used, but most use it at least every week. The managers in Tianjin have been trying to encourage use of the phone in order to increase efficiency and were pleased to see that it is used quite frequently. One reason why email is used so much may be the time-zones, often a question may arise at a time when the colleague at the other site is not available to answer on phone or instant messaging. There have also been some technical issues with the instant messaging that may have discouraged use of it.

5.10.2 Visits between the sites

The benefit of having met face to face

Many mentioned in the interviews how important it was for them to have met the people they work with at least once as it made later communication and email much easier. Getting to know colleagues was by far the most common benefit mentioned in the survey when we asked a free

text question about the most important benefits of visiting the other site. As seen in Figure 19, when asked to rate the importance of having met face-to-face in order to work well together when working remotely, the respondents in Gothenburg rated this much higher than the respondents in Tianjin, this was true both when comparing to those in Tianjin who had travelled to Sweden and those who had not. A possible explanation could be that the people in Sweden have more other experiences within Volvo to compare with as most of them have worked a long time at Volvo IT. Another explanation could be differences in the national culture, in Hofstede’s framework, Sweden scores much higher on individualism than China, which could conceivably lead to Swedes feeling a greater need to personally connect with the people they work with, while the Chinese may be more content with being part of the same collective in order to feel comfortable working together. Another explanation could be that many of those in Sweden are responsible for leading work done in China and thus have a greater need for understanding the people they lead in order to give instructions, give feedback and interpret feedback in the right way.

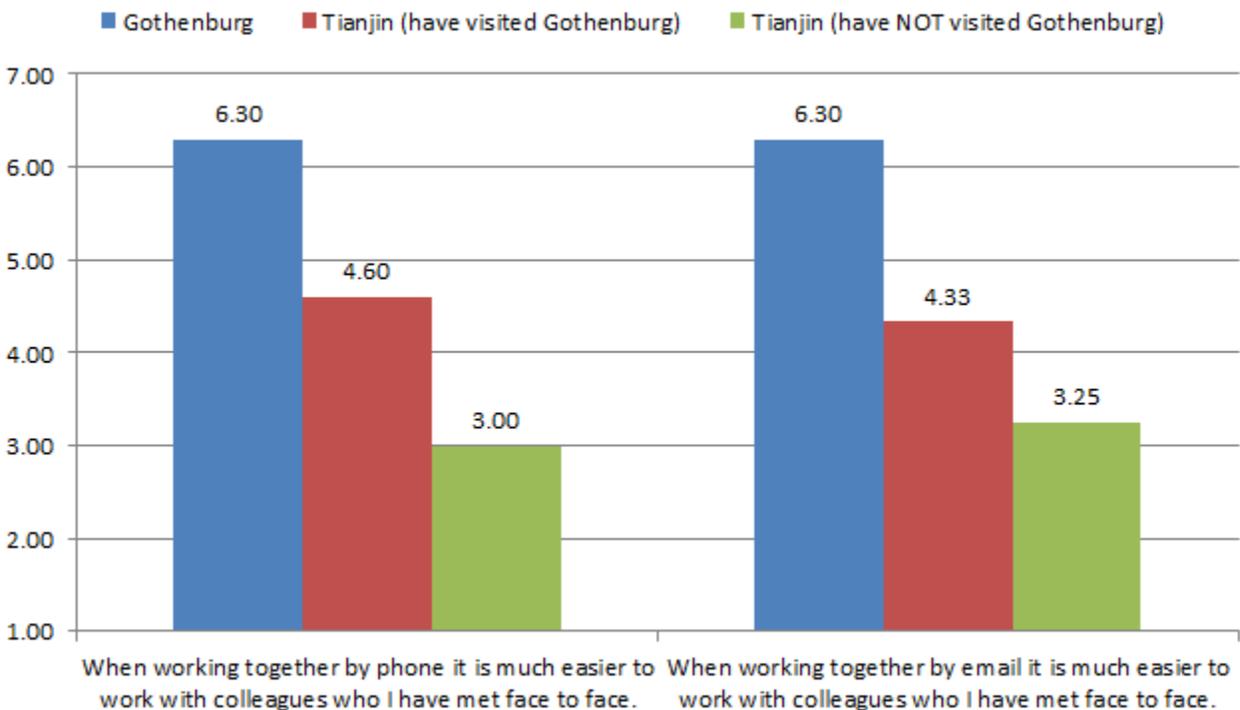


Figure 19: Importance of having met face to face with colleagues you work remotely with. (The scale is 1 to 7, where 1 represents “completely disagree” and 7 “completely agree”)

We also asked about how many persons the respondents know in Tianjin and in Gothenburg, and as seen in Table 6, the respondents in Tianjin answer that they know more people in total than

the respondents in Gothenburg. This is somewhat surprising as everyone but one person in Gothenburg has travelled to Tianjin, while only 15 out of 23 respondents in Tianjin have travelled to Gothenburg. Furthermore, the people in Gothenburg have on average worked longer at Volvo IT than those in Tianjin. A possible reason that was mentioned in discussion of the survey results for the difference between Gothenburg and Tianjin may be because of different perceptions of what it is to “know someone”. Another reason could be that people in Tianjin meet more outside work, for example on the shuttle buses to the office or at the gym near the office. In Gothenburg, as a traditional and large site, people may be more anonymous to each other than at a young and smaller site like Tianjin.

| | Respondent working in Gothenburg | Respondent working in Tianjin |
|---|---|--------------------------------------|
| Average of “how many persons do you know in Gothenburg” | 67 | 32 |
| Average of “how many persons do you know in Tianjin” | 18 | 98 |
| Sum | 83 | 130 |

Table 6: How many persons do you know in Gothenburg/Tianjin?

Generally, people from both sites are very interested in visiting their colleagues at the other site if there is an opportunity, and it's mainly the cost of travel that currently limits the amount of visits between the sites. When asked in the survey, all respondents would like to visit the other site. However, as seen in Figure 20, most of the respondents in Sweden would like to stay 2 weeks or less when visiting Tianjin, while the respondents in Tianjin would generally prefer to stay more than 2 weeks.

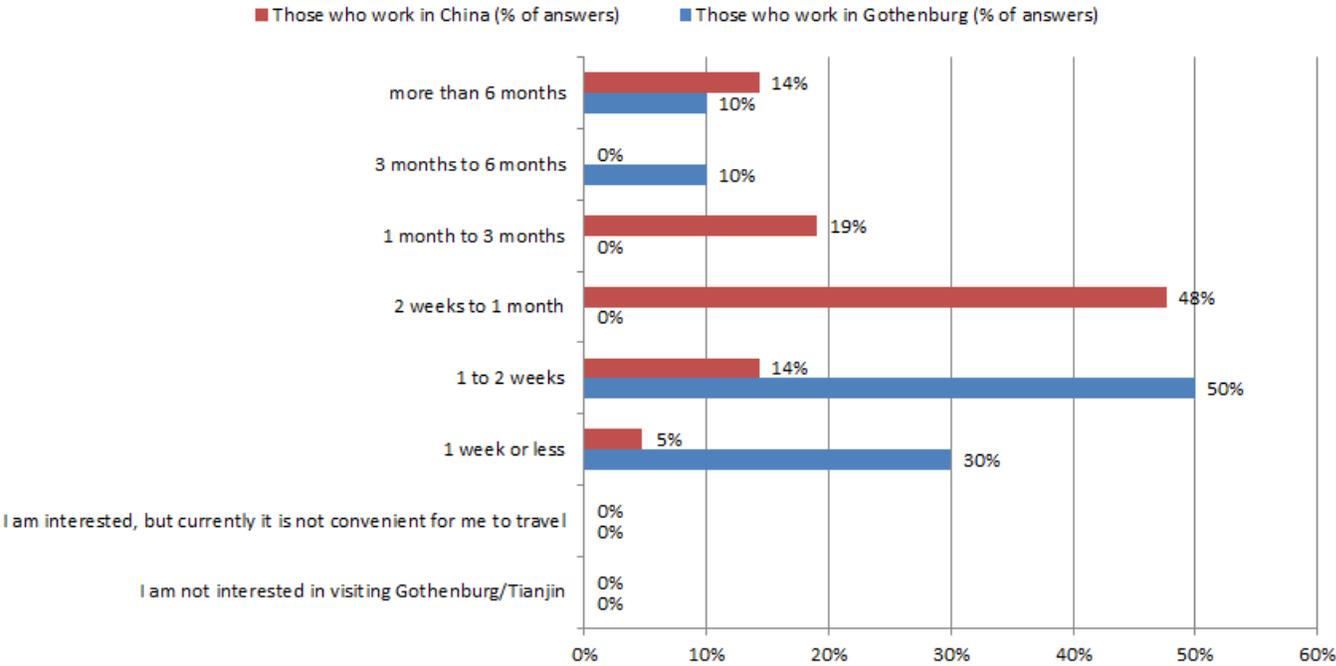


Figure 20: “If I have the opportunity to visit the other site in the future, I would prefer to stay ___”

Some general observations from the managers in Tianjin from their experience on this issue were that mostly younger and older people in Sweden are interested in going longer periods. One reason for this may be the family situation, for many in Sweden with kids and a spouse who works full time; it may be hard to be away for even one week. In China there is a greater proportion who are young and do not yet have kid and it's more common that grandparents help taking care of children. Another reason may be that as many in Sweden have management roles where it may be enough for them come one or two weeks for meetings, while for the more technical roles that most in China have, it may be necessary to stay longer to complete tasks which include periods of working on your own.

5.11. Issues when working remotely

An issue when working remotely can be to have to wait for replies to email from colleagues in order to be able to proceed with the work. For some of the roles in Sweden, an important task is to review work done in Tianjin, comment on proposed solutions and make design decisions, in this situation it can be both an advantage and disadvantage working remotely. An advantage can be that when the workday finishes in Tianjin, the people in Sweden have only been at work for 2-3 hours and have time left to review work that was done in China early morning Swedish time and to work with what was discussed on phone during the hours in which people in Sweden and China are both at the office. A problem can be that, sometimes when problems come up unexpectedly, the right person to talk to is not available to talk to due to the time difference, but usually there are tasks being done in parallel, so people are not idle when waiting for response. Another problem may be that even when it is known that feedback from Sweden will be required, the person there may occasionally get more requests than what are possible to handle during the working day, and may become a bottleneck if the colleague in Tianjin has counted on having feedback or a decision waiting on email when arriving the next day. An important way to mitigate this problem, suggested by managers in Tianjin, is for the teams to work with being pro-active, both in ensuring to have parallel work streams to avoid idleness and to dare to take more decisions independently and suggest proposals for solutions to the colleague in Gothenburg to choose among rather than asking for instructions. This can work well as the team in Tianjin is usually the most expert on the technical solutions, though it may have the drawback of sometimes having to discard or rework solutions if they do not fit with the overall structure of the application when evaluated in Gothenburg. In the survey, the frequency of having to wait for responses was similar in Gothenburg and Tianjin, and as seen in Figure 21,

most respondents experience this every week.

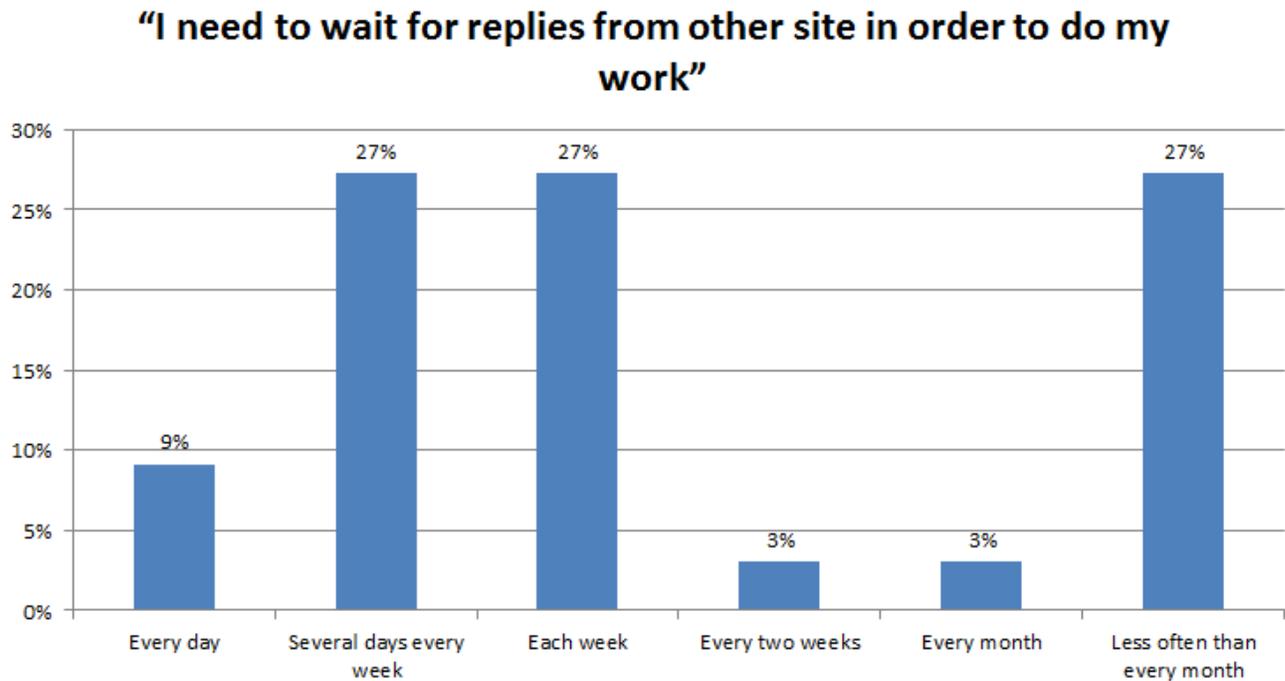


Figure 21: Frequency of having to wait for responses

A further problem, which may occur when working remotely outside the core team is that requests via email from someone you do not usually work with may be easier to not prioritize and may not be answered within reasonable time. One way to deal with this in the Chinese team is for managers to encourage their team members to send reminding emails or use the phone more, which is something many will hesitate to do in order to avoid offending the other party. Another way some will deal with the problem is to ask for help from a colleague they know well in Sweden who is familiar with the context of the application to walk over and on behalf of the colleague in China discuss the issue at the desk of the person not responding.

The impact of time-difference

Generally, the issue raised the most when discussing the impact of having part of a team in China and part of a team in Sweden was that of the time-difference limiting the time it is possible to communicate in real-time to just 2 or 3 hours per day. It is hard to work around for several reasons. In Sweden, few are willing or able start working earlier in the morning, especially for those that are parents and need to take kids to day-care, it would be very hard to start working before 8 AM. In Tianjin, with the location of the office outside the city-centre, most employees

take shuttle buses that leave at fixed times and may have a commuting times of over an hour each direction, which make it burdensome to change the time of working. One advantage of having the Tianjin office outside the city centre was actually mentioned to be that since you take shuttle buses, it limits the working hours for most who are not managers and gives better work-life balance as everyone will leave at 5pm. For some managers that need to take part in global meetings with more than two time zones, they will still call in to meetings from home in the evenings, but for most employees it is not expected and they are encouraged to say no to meetings at times that are not convenient.

6. Discussion

In this section we relate the findings to our original research questions and the literature and discuss the implications for Volvo IT.

6.1 “How does a multinational organization in the IT-sector operating in both Sweden and China manage the creation, accumulation, transfer, and use of knowledge?”

Volvo IT has chosen a global strategy for application delivery, with teams that are spread out globally and organized primarily by application portfolio rather than location. This reflects the global customer organization Volvo Group which Volvo IT delivers applications to. A different approach would have been to organize primarily by geography in order to have closer interaction with end users and less need for interaction globally. In the global strategy that application delivery has chosen, there is much interaction between the locations since the individuals in each location interact frequently with individuals in other locations, and thus there is less need for codifying knowledge to transfer it between locations. Due to the global strategy, team members in all roles need to have good English and communication skills to make the interaction and continuous transfer of knowledge work well. In a less global organization, it may be sufficient if some managers speak good English to take care of interacting with the other site and then distribute the work and do this in Swedish or Chinese. An advantage of the chosen strategy is that interaction between the teams does not have to pass through additional management layers, and it can truly be one team dispersed to two sites rather than two teams. Another advantage is that the frequent interaction makes it easier to transfer roles between the sites when opportunities occur, and employees can be part of a global resource pool. A disadvantage of this strategy is that the high requirements on English make the candidate pool smaller.

A prerequisite for this kind of strategy to work is to have a common culture in the teams, despite the wide differences in national culture. As Dutta & Fransson (2012) discuss in their study of how Volvo IT set up delivery centres in India and China, an important part of achieving a common work place culture has been to both maintain a strong corporate culture and to use fit with corporate culture as one of the most important criteria when recruiting new employees.

Volvo IT works with common culture by extensive programs for the employees and the recruiting processes in Tianjin contribute to making these efforts successful. By having some Swedish expatriate line managers in Tianjin, giving extensive training on Volvo culture to new managers and having a recruiting process which often involves a phone interview with a Service delivery manager in Sweden, Volvo IT manages to recruit people who fit well into the culture and communicate well in the global teams.

6.1.1 The knowledge cycle in Volvo IT

Different roles require different types of knowledge for their responsibilities in Volvo, such as domain knowledge, technical knowledge and knowledge for project management. The thesis mainly focuses on management of domain knowledge, as domain knowledge is what differentiates Volvo IT compared to other IT companies.

Knowledge creation

In this section, the creation of domain knowledge and the conversion between tacit knowledge and explicit knowledge concerning the business is discussed. According to Nonaka et al. (2000), the capability of the firm in knowledge creation is defined by how a firm continuously creates new knowledge by combining existing specific knowledge of the firm to define and solve problems. The term knowledge creation refers to the interactions between tacit knowledge and explicit knowledge (Alavi and Leidner, 2001). In the SECI model (Nonaka et al. 2000), the knowledge conversion process is divided into 4 continuous modes: socialization (from tacit knowledge to tacit knowledge), externalization (from tacit knowledge to explicit knowledge), combination (from explicit knowledge to explicit knowledge) and internalization (from explicit knowledge to tacit knowledge). The basic requirement for Volvo IT is to supply IT to the internal customers in Volvo Group, solve change requests from the customers efficiently and add value to the customers. Business decisions by the customers creating new need for software, the customers learning from using the software and interaction between Volvo IT and customers all play a significant role in creating new domain knowledge.

In the project management processes and change requests processes, the business requirements originate from the customers' experience of using the application and the forecasting of the future requirements. Some of the requirements are tacit, based on customers' experience and perceptions, but the customers may be unaware of these requirements or not reflect on that they

are not obvious to staff at Volvo IT. The customers will discuss their problems and requirements and share their experience with the business consultants in Gothenburg. After that, in the organization, the business consultants advise the business on how to do business. The responsibilities of business analysts, database architects and system analysts are to assist in specifying the customers' requirements and provide the requirements specifications including detailed functionality and system requirements. The composition of the requirement specification is a combination of the external requirements from the customers and the internal knowledge about business logics and system requirements. It results in knowledge converting from the tacit knowledge to explicit knowledge which is readable for the developers and architects in Tianjin. The solution documents will be developed by the maintenance team, approved by the customer and then implemented and used in the market. During the problem solving, Volvo IT not only defines the problems and implements new solutions, but also develops new knowledge and understanding of the business which can be used in the future application improvements and solution developments.

In Figure 22, the SECI model is used to illustrate how the change request process in Volvo IT leads to knowledge creation by articulating from primarily tacit requirements into more explicit requirements that are then refined into a software solution that is used by users who then gain new tacit knowledge. Dealer visits are another important way to learn domain knowledge by going and learning tacit knowledge directly from end users by the employees and converting that knowledge into new tacit knowledge (Socialization) and saved as documentation (Externalization). The explicit knowledge in E-learning plays a significant role for new employees learning business knowledge (Internalization).

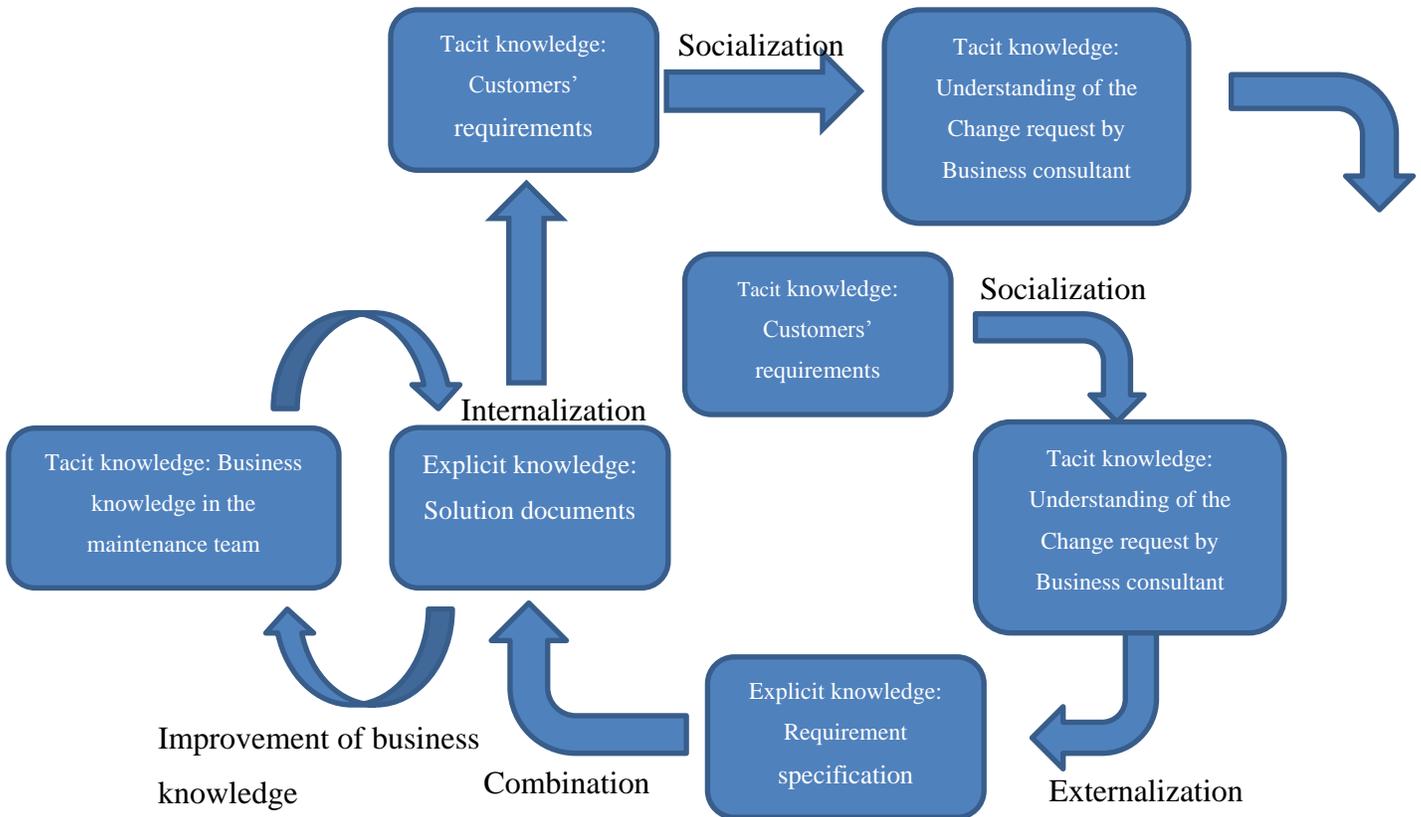


Figure 22: The change request process in Volvo IT viewed as knowledge creation using the SECI model

Knowledge storage

Organizations can improve knowledge storage in order to maintain strategic direction, reduce repetitive work, facilitate organizational learning and make locating expertise easier (Stein, 1995). In Volvo IT, the organizational memory regarding the domain is well stored in E-learning, documentation on the team place and on team foundation server. Some of these memories can be reused and updated for future application while some documentation may not be used again. In Gothenburg, most of the employees have worked for many years and have lots of individual memory which is important but tacit and difficult to make explicit and store. Reflections in the ISGDP4IT process are one form of useful and important documentations for future reference in similar projects. Some of the individual knowledge is saved in emails and meeting notes which are unsearchable for the others. For the tacit individual knowledge which is stored in the head of the owner, knowledge sharing sessions could be a way to transmit and store the knowledge to the others, though much of the sharing is best done by learning through participating in regular meetings and understanding how that person reasons and makes decisions.

Making more meeting minutes would be a significant way to store both the organizational and individual knowledge together from brainstorming, knowledge sharing and knowledge transfer meetings. It would be useful for Volvo to use a standardized way to collect feedbacks and compile meeting minutes so as to store the knowledge efficiently and comprehensively.

Knowledge transfer and sharing

In Volvo IT, there is a lack of standardized processes to transfer knowledge. The knowledge transfer could be divided into knowledge transfer due to turnover and knowledge transfer from business.

Knowledge transfer due to turnover is the knowledge transfer from the people leaving their jobs to the new people who take the vacant position when they leave. The leaving announcement time in Gothenburg is normally 3 months which is longer than Tianjin where it is 1 month. However, during the interview, some of employees in Gothenburg said that normally one month is enough for the knowledge transfer when the new person is experienced, and if the new person comes from within Volvo IT, there is already some personal network and tacit background knowledge which can be used in the new role. As Schwartz (2006) mentions, explicit knowledge is more efficient to transfer than tacit knowledge. Knowledge saved in the documentation can more easily be transferred, shared and updated. Tacit knowledge regarding understanding of the business requests and the sense of decision making is more difficult to be transferred and normally be lost during knowledge transfer.

Knowledge transfer can also be the continuous knowledge sharing and learning among the employees and between Volvo and its customers and partners. In Gothenburg, employees do spend lots of time on meetings and discussions. As seen in the survey result in figure 12, more people from Gothenburg discuss work with colleagues on lunch, which some mention is due to that they have less time to meet in the working hours. Employees from Tianjin have less discussion with their colleagues during lunch, but they have more initiatives to share knowledge and prefer to have more opportunities to involve in the communities to share with others. Both of the findings indicate that Volvo IT has a good knowledge sharing culture which enables the people to share knowledge and build network.

Ghaedian and Chen (2012) find that employees often don't initiate sharing their knowledge unless the knowledge is requested, which to some extent could explain why people in Tianjin have more organized initiatives to share knowledge than their Swedish colleagues.

Another reason for the many organized sharing initiatives in Volvo IT Tianjin is a young company for Volvo IT with more young talents than the other sites. The young talents normally have good learning agility, willingness to learn and ambitious to develop themselves. In Tianjin, different initiatives are formulated by the manager or volunteers to motivate the knowledge sharing and more formal meetings are held within the teams and whole organization to have more face to face discussion and knowledge sharing, such as QDS and TCC.

In the knowledge sharing and reusing process, using one's personal network is the most commonly used way for the employees to find the right person for the required knowledge. Face to face meetings are an important way to build trust and personal relationship between people, eliminate the misunderstanding and share the knowledge especially for getting tacit knowledge.

Many interviewees mentioned the importance of the face to face meeting and business visit to get understanding of another culture and improve the cooperation. However, the Chinese participants in our survey placed much less importance on having met face-to-face in order to cooperate efficiently using email or phone compared to their Swedish colleagues. One reason for this difference may be that since considerations of face (mianzi, 面子) makes Chinese participants prefer to not discuss sensitive issues or raising new ideas in meetings, especially unprepared. They are much more used to using written communication or discussing in a formal way in meetings, while Swedes may prefer more informal discussions. In a study by Dickmark & Stoij (2011), Chinese participants perceived e-mail as a good medium for both discussing technical issues and for giving feedback, while their Swedish colleagues emphasised the importance of that people meet and thought email was not very suitable for feedback about the daily work. To build network and search competence, Violin is implemented recently but less people have the awareness for the new functionality. Violin could be considered as the expertise locator system in Volvo type.

Both of the sites believe that network plays a significant role in knowledge sharing. However, according to the survey results in figure 16, there are some differences for the Chinese and

Swedish people to use their network. In Tianjin, employees prefer to find the business knowledge by themselves from the existing documentations and E-learning instead of asking the colleagues in other team or business. Less people in Tianjin prefer to ask the manager to explain the business knowledge because some of them think the manager doesn't have the knowledge either and some of them are hesitate to let the manager know that they don't know. In Sweden there is a greater preference for finding knowledge by talking to your colleagues and as seen in Figure 17, the Swedes are very open to reach out and contact new people without being introduced by a mutual contact.

Knowledge application

In Volvo IT, knowledge application is under a knowledge pull system which means knowledge is used when it is required. Knowledge application and integration means different activities for different roles. Such as, business analysts are more related to self-contained task teams to identify customers' problem and supply reliable solutions and people in maintenance teams more rely on routines to solve the support problems in short time. Knowledge application is a part of domain knowledge creation and update to improve the user's understanding.

6.1.2 Lean perspective on knowledge management in Volvo IT

In the following section, the practices of Volvo IT are compared with Lean principles of working by applying the 4P model described in the literature review.

Philosophy

China has a quickly developing market and Volvo IT needs to make strategic decisions based on long term philosophy to keep its business competence. However, most of requirement analysis roles and main customers are located in Gothenburg and other traditional sites. Volvo IT in Tianjin wants to have more responsible roles transferred from Gothenburg. Volvo Group is currently working on a joint venture with the Chinese truck maker Dongfeng. In the following years, if Dongfeng implements Volvo process in the company, it will be very important for Volvo IT to have strong competence in China to support this. Capacity growth in Tianjin is dependent on global demand which needs to be there in order to expand and managers in Tianjin and in the Global functional management work on convincing the rest of the organization to transfer more roles and responsibilities. This requires trust between Tianjin and

the traditional sites, which makes it very important to maintain a good reputation in order for other sites to be confident in shifting more responsibility to Tianjin. To build and keep its business competence, actions to build business domain knowledge are set as goals in the personal business plans and personal development plans.

Process

There are various standard management working processes in Volvo. The standard working processes are the foundation of Volvo IT's effort to manage knowledge, build competitive advantage and being an efficient global organization.

ISGDP4IT is widely be used in internal projects. All of the required documentations in each phases and personal reflections after the project are well documented in the folders at team place. The documentations at team place are important resources for the project managers to review and launch similar projects. The checklists and requirements in the ISGDP4IT model are also continuously improved based on the reflections from the project members, something that can also improve the involvement and empowerment of the employees. QDB is a standard working process for working with competence management and lets the employee have a transparent personal improvement and promotion path. Under QBD, employees can focus on their own personal capacities and it reduces the potential risk of conflicts and perceptions of unfair treatment.

All of the deliveries from Volvo IT are based on the customers' requirement which is a typical pull system to reduce the overproduction. It gives Volvo a specific guideline to balance the resources and cooperate with partners effectively.

There is however no standard process for knowledge management and introduction of new team members, but usually Volvo IT manages it quite well as responsibilities are clearly described and employees are engaged in their work.

People and partners

In the culture of Volvo, respect means respecting and encouraging each other and supporting and learning from the others. As a flat and less hierarchal organization, it is easier for Volvo to fulfil

the requirements regarding “respect”. A respectful working environment can be a foundation for employees to build trust, communicate openly and have the will to share their knowledge.

Personal business plans gives the employees to have a clear description about their responsibilities in the following year. The employees are also encouraged to involve in different knowledge sharing groups and committees to share and learn knowledge so as to improve their work performance and build good network with other colleagues.

The development of employees’ abilities is based on the personal development plan. In the plan, employees will have clear targets for their personal career and decide what abilities that they want to improve based on their own interests. Line managers can thus offer more opportunities for employees to improve their abilities and personal competence. When there is an available position in Volvo, employees who grow with Volvo culture will be promoted internally based on the requirements in QBD.

For Volvo IT, the resources from the partners are referred to as external consultants, but in the knowledge sharing perspective, there is no difference in what knowledge is shared with regular employees. External consultants are also involved in dealer visits and in China the external consultants will have personal business plans, personal development plans and soft skills training. The only difference between external consultants and regular employees is that the external consultants will not join in training of technical skills that costs money as this is the responsibility of their employer.

Problem solving

All of the decisions are made based on improving customers’ satisfaction. For the internal stakeholders, they are satisfied with the quality of the delivery of Tianjin and short delivery time and the LDS team won the internal Golden touch award last year based on the positive feedbacks from the customers.

Conducting dealer visits is one important way for Volvo IT to work as a learning organization by seeing the problems by themselves. Having domain knowledge is the most competitive advantage of Volvo IT for its customers. Better connection with customers and deeper

understandings to the business from the dealer visit are benefit and valuable for the employees to understand the business process, customers' demands and dealers' daily operation.

In the system support perspective, all support requests are classified and tracked. The benefit from the time zone is that the support hours are extended from 8 hours to 14 hours in summer time or 15hours in winter time which shorten the deliver time of the supports and deliveries.

However, there are still some imperfect factors in the problem solving process. Firstly, the negative influence from the time zone is that the communication between Gothenburg and Tianjin is short and they need to wait for longer time for the non-response mails. Secondly, there are some misunderstanding on problem solving between Gothenburg and Tianjin. Gothenburg side is the site that gives orders and specific requirements to Tianjin. Tianjin is the site that develops the deliveries based on the requirements from Gothenburg. Sometimes, when Gothenburg site meets some tough problems, longer decision making time is required to make the decision considerably which results delayed response and stop work in Tianjin. Tianjin site would complain about the stop work and delayed decisions from Gothenburg. However, the Gothenburg hope the Tianjin site could give them some possible solutions to be evaluated so as to shorten the decision making time and waiting time.

6.2 “How does and how can staff turnover affect IT-service delivery?”

The staff turnover at Volvo IT in China today is significantly lower than the average in the Chinese industry, which is thought to be because Volvo IT provides an attractive workplace culture, international experience and opportunities for professional growth. This agrees with earlier research on what makes international companies attractive to Chinese graduates, in a study by Dickmark and Stojj (2011), students mentioned having a clear promotion path in a company with a vision, learning by doing interesting tasks and having a clear promotion path based on merits as some important factors, though material incentives such as salary and housing benefits were the most important. The experience of Volvo IT in setting up business process outsourcing in India suggests that Volvo may be able to retain a relatively low attrition rate in the future as the site in India managed to keep a very low attrition rate, despite the more mature Indian IT-service industry normally having a high rate of staff turnover (Dutta & Fransson, 2012). So far, the primary reason for quitting has been that people who originally come from another part of China wish to move back there when getting married and having children. In

anticipation of future problems with staff turnover, HR and line managers have done extensive analyses of the risk of each individual employee quitting and planned for how to reduce the risk or limiting the impact. Having consulting services and the external partners as primary sources of finding new people for assignments is a setup made for quickly finding new people to fill vacancies, but due to the cost of keeping people idle and the specialization of some roles, it is tricky to manage the balance between cost of having a vacancy and the cost of being able to fill it fast.

Since the knowledge management in Volvo IT does not rely so much on creating documentation it means that a lot of knowledge will only be kept in the heads of employees and introducing new employees becomes more costly, especially for some more senior and specialized roles this is problematic as there may only be a single person who fully knows how to perform a certain role for a certain application. According to Stein (2005), the leaving of the experts results greater cost to the organization due to the long-term education, training and experience.

In Sweden, employees often stay long at Volvo IT in the same roles and thus accumulate much tacit knowledge, but this does not cause so much problems when they quit Volvo IT as they will usually have a long period of knowledge transfer before quitting and will sometimes even gradually reduce the working hours in order to give the successor a good start. In Sweden it is not uncommon for employees who quit announcing it 6 months prior to the last day of employment and the managers will then have a long time to find a successor and to smoothly plan and execute knowledge transfer.

In China, employees who quit will generally announce this only one month before, which will create a problem as it is very short time to find a permanent replacement and do any extensive knowledge transfer. This means that it is unusual for someone who is leaving to directly train the successor, the person leaving will instead have to do knowledge transfer with someone else. The main effect of the staff turnover in China and the short notice of quitting is that it increases long term cost and decreases the output for the organization as the recruitment and knowledge transfer to a new person takes much time for managers and the colleagues who fill in for that person when waiting for a replacement. The new person will then need to undergo training and self-study for one or several weeks before being expected to contribute to the delivery. The problem

of staff turnover is partly mitigated by the line managers and HR who do succession planning for all employees and by the existence of consulting services as a pool of qualified resources.

6.3 “How can company culture, processes and systems be used to mitigate problems related to cultural differences and staff turnover in an organization with global teams?”

In this section we discuss some of the factors mitigating problems related to cultural differences and staff turnover and we also propose some possible ways to further work with these issues.

6.3.1 Dividing roles differently to reduce vulnerability to staff turnover

A possible way to adapt to the Chinese context and reduce the impact of someone in a key role quitting would be for individuals to specialize less in China than at sites where people stay longer. This approach to dealing with demand variability and unforeseen events is known as multiskilling and has been shown to be associated with increased firm productivity in empirical studies covering a broad range of industries (Yong-min & Park, 2003).

This could be implemented by having employees specialize in the standard roles from QDB, but to a greater extent work with several application portfolios and splitting responsibilities with others in the same role. For example, instead of having one architect work on Application A and one with Application B, the two architects could each spend 50% of their time on application A and 50% on application B and share responsibilities. Aside from reducing the risk of losing knowledge when somebody quits, some added benefits could be more interchange of insights between different teams, more commonality in the details of how work is carried out across applications and some productivity gains as two people working closely together may motivate each other and arrive faster at better solutions. Shared responsibilities would also lead to more personal connections being made and make it easier to preserve personal networks if someone quits as the one who had shared responsibilities would also have acquired a similar and overlapping personal network.

A study by Cockburn & Williams (2000) compared pair-programming practices with programmers working alone and found that two persons can complete the tasks faster and with fewer errors than a single programmer, and even if the ratio code/man-hour falls slightly, the reduction in errors make it more economical to use pair-programming. Aside from greater

economic value, in the study by Cockburn & Williams (2000) there was also increased learning in the teams, better team dynamics and employee satisfaction rose. It is however not certain that the same productivity benefits could be realized if attempting to use methods similar to pair-programming for tasks that are not programming, but about requirements analysis and more high level architectural decisions. Some clear disadvantages would be that the division of responsibilities would be more complicated and that each individual would have to learn more in order to become an expert at two applications instead of one.

A second way of reducing the specialization and the risk posed by staff turnover would be to have more people split their time between different roles while working with the same application. For example, instead of application A having a full time architect and a full time system analyst, the two employees could each work 50% as architect and 50% as system analyst on application A. A variant of this strategy would be for someone already in one senior role to take on an additional senior role, while making time for the secondary role by shifting some responsibilities to a more junior team member. This would have the added benefit of offering career progression and learning to both the more senior and more junior employee, but be a smaller step than promotion to an entirely new role.

A possible way of implementing any of these two strategies to prevent knowledge loss would be to organize it as shadowing assignments and set aside some time each week for an individual to be introduced to a “secondary role” or “secondary assignment” and then gradually take on more responsibilities in the new application or the new professional role. An overall risk of this kind of strategies would be to create confusion by deviating from standard ways of working and the standard roles. To reduce confusion, it would be important to have clear individual responsibilities, while at the same time ensuring that there are enough shared responsibilities to ensure a smooth transition in case a person quits.

Some risks in the implementation is that productivity may suffer during the introduction period or that high demands in one of the part-time responsibilities will make the employee prioritize that one and not make time for the secondary one. There is also the risk that there will be permanently lower productivity as the strategy makes the responsibilities of the employees more complex, though this could be outweighed by the benefit of having a well prepared successor ready whenever a person in a senior role decides to quit.

6.3.2 Increase cooperation with universities in Tianjin

One difference between Sweden and China in the education is that most of the new students in Sweden already have working experience before they start studying at universities, while this is rare in China. In Sweden, half of the new students at Swedish universities are older than 22 years (Saco, 2011). However, the average age of the new students at Chinese universities is 18 years, and youngest is 16 years old (Cai, 2007). While Swedish students choose their course of study based on experience and interest, for Chinese the decision of choosing university and program is influenced more by their parents. The Chinese students know less of the real work connected to their program of study until they graduate from university and start working. As a result, close cooperation with universities in Tianjin is good for Volvo to improve students' understanding of the practical work, share the culture of Volvo, attract more talents and enhance Volvo's employer branding.

There has been some good cooperation with two universities in Tianjin with holding competitions on technical problem solving, arranging visits to the office and some students being offered internships. Increasing this cooperation and having deeper long-term relations with the universities could increase awareness and interest in Volvo IT as an employer for graduates in Tianjin. In a recent report on University-industry cooperation, Chalmers University of technology in Gothenburg was among the world leaders in university-industry cooperation with 18.4% of research publications in mathematics and computer science being done in cooperation with industry, for the universities in Tianjin the ratio was much lower with 0.4 % for Nankai university and 5% at Tianjin University (University-Industry Research Connections 2013, Leiden University), though it should be noted Tianjin University has a relatively high ratio compared to other universities in China.

There could be an opportunity to adapt practices from Volvos cooperation with universities in Sweden and partner with universities in Tianjin to develop their cooperation with industry in doing research. In Volvo there is a large example of such successful collaboration where Volvo has formed long-term cooperation called a *learning alliance* with the division of quality sciences at Chalmers University of Technology to develop and implement the concept robust design in product development (Mashhadi et al., 2013). By allocating time for engineers to interact with master's students instead of professional consultants, Volvo 3P has achieved success in

increasing learning and changing their processes while also contributing to creating scientific knowledge and giving the students valuable experience (Mashhadi et al., 2013). The collaboration has been running since 2006 and has so far involved 22 students, there had been failed attempts to introduce robust design by hiring external consultants before, but by having students work with these issues in master's thesis projects it was possible to create more involvement, adapt practices to local needs and avoid resistance to change that professional consultants may encounter (Mashhadi et al.,2013). Similar approaches could be used for collaboration between universities and companies in China too, a successful example of this is a project where Chalmers university and Volvo Car Corporation initiated cooperation with University of Electronic Science and Technology of China (UESTC) to have a team of Swedish and Chinese students work together to investigate cross-cultural teams at Volvo Car Corporation's new plant in Chengdu (Alänge and Scheinberg, 2012).

One way to start could be to explore opportunities for Volvo employees to do guest lectures in university courses. Another way to involve more with students would be to help with career planning by organizing mentorship programmes or presenting success stories of employees in Volvo IT who have fulfilled their ambitions and have taken on new and exciting roles in Volvo IT or in other Volvo Group companies. Presenting how you can make a career at Volvo IT and giving a practical understanding for how different roles can work in an international software company would help students form their ambitions and dreams for what they want to do after their studies and provide value to both the university and Volvo IT. As seen in the comparison of cultural values in Table 1, there is an extremely strong long term orientation in Chinese culture, and if Volvo IT can use its vision, culture and broad international opportunities to inspire students to envision a long-term career in the Volvo Group, then it can have a great advantage in attracting talent in China.

6.3.3 Support settling in Tianjin

Since an important reason for staff turnover is that people move in order to start families, focusing on making it attractive to stay in Tianjin for those who start families could be a good way to attract and retain staff. One possibility could be to take advantage of having an office location outside the city centre by supporting families who wish to move to this area, for example by being proactive in offering shuttle-bus service to the office from areas with larger

apartments more suited for families than smaller apartments inside the city centre. Another way would be to support those who want to buy a home in the area, which could possibly be done without spending if a bank could be convinced that Volvo IT employees are low-risk customers and that it is a good idea to offer discounted mortgages to them.

When discussing the root cause of why people quit, an important explanation is housing prices. China has more than 5000 years' history and there is a long tradition emphasizing the importance of owning your house. According to the *Hanshu*, the first history book which narrates Chinese history, houses are considered as the foundation for people to settle down and prosper and as the foundation for a king to solidify his control of the country. Having a house is the most important marker of wealth and social status, and grants the owner both a sense of security and of having come somewhere in life.

However, house prices are very high in large cities in comparison to the average income. In April of 2013, the average monthly salary of Tianjin and Beijing is 3520 RMB and 4672 RMB, but the average house price per square meter is 13723 RMB and 34977 RMB (The national real estate data center, 2013). Moreover, under the leasehold system in Chinese law, the buyers can only have 70 years' ownership of the apartment. From 2006, the phrase *mortgage slave* (房奴), popped up to describe people who spend more than 50% of their income on their mortgage. In 2006, 31.8% of the people who took on new mortgages fell under this definition (Xinhuanet, 2006). Having a house also has a direct influence on the prospects of getting married. According to a report on national health and family planning laws of the People's Republic of China (2013) the average wedding age for Chinese men is 26.7 and for women 24.9 years. 52% of women think that having a house is a necessity for marriage, which makes men have more pressure to quickly be able to afford a house and may thus make short term decisions based on quick gains in income instead of long term professional development. As a result, for people who don't come from Tianjin, a settling program could be important to strengthen the employer brand, increase the satisfaction of employees and reduce the staff turnover, possibly in a more cost-effective way than increasing salaries to attract and retain staff.

6.3.4 Focus on excellence in remote working

In order to support the global customer organization, there is a strong case for Volvo IT to focus on excellence in working remotely, both in what tools are used and how the working procedures

are set up to support cooperation in geographically dispersed teams. With the current setup of teams that work globally in application delivery there is already a strong foundation of experience in working together across countries and time-zones. If the capabilities to work efficiently remotely are increased it would mean that Volvo IT can achieve more with existing resources and take greater advantage of being a global organization both in staffing projects and in building and using domain knowledge. Within in China, it could be beneficial to be prepared to work remotely more in order to remain flexible to changing business needs and also be able to draw on a larger labour pool in the future. For example, the smaller Volvo IT offices could recruit local talent and provide them with office space while having them work remotely in a team in Tianjin.

At present there is some lack of video-conferencing facilities in Gothenburg, while in Tianjin this does not seem to be an issue. With the recent upgrades in the messaging software used, it may be possible to use webcams more without overloading the network and the LDS team is considering using them more. The ADT has some initiatives going on with piloting new solutions for working remotely, and the Tianjin office could be a good place to pioneer new solutions as it is a quite new office with intense collaboration with Sweden.

Another initiative that could be considered is working more with the culture and processes surrounding meetings. As the time-zone difference limiting time to discuss between the Gothenburg and Tianjin is the most mentioned downside of having global teams, it is important to make sure that the limited time it is possible to communicate does not become a bottleneck. For management roles at both sites, it was not uncommon to spend more than half of the workweek in meetings, and in Gothenburg several interviewees pointed out that it was problematic to not have time for other tasks. A culture where much work is done in meetings may be an obstacle to successfully moving more senior roles to China, as remote meetings will not be the same as face-to-face meetings and the time-zone-difference will cause long working days.

6.3.5 Utilizing existing tools to make it easier to network

At present there are several different ways that competency and professional interests are tracked, there was also recently new functionality introduced on the intranet to search for people where everyone can have a rather detailed profile containing interests and expertise. If this new

functionality becomes widely used, it may be possible for managers and committees to spend less time on gathering information and spend more time on taking action based on this information. For the individual team member, having good profiles of colleagues on the intranet can mean saving time when having to find people to ask in the daily work and it would make it a bit easier to know who to ask when coming into a new role in a new team. The use of profiles on the intranet could also make it easier to work with introductions of new team members in a more structured way than today, for example assigning the new team members to solve tasks that benefit the team and which require the new team member to interact with others and form a personal network.

A way to start working with this would be for line managers who hold regular face-to-face meetings to in some of these meetings discuss what competencies and interests a team member could add to their profile on the intranet. If line managers use the intranet profiles to plan competence development activities for their teams, this would create initial engagement and put useful data into the intranet profiles which would enable ADT, global communities and management committees to understand more about the competency of the organization globally and reach out to the right people when introducing new trainings, E-learnings or other initiatives.

6.3.6 Find new ways of training and interacting with end-users

At the moment, interaction between the development team and end-users is usually either indirect, through discussions and the change request process with the internal customer in Volvo Group, or direct through the technical support in response to specific and urgent issues. The dealer visits and training sessions are the forums where there is an opportunity to have direct contact and where the team at Volvo IT can develop deeper tacit understanding of the end-users needs and discover opportunities for improvements.

The application-specific training sessions are a forum that could be used to both build domain knowledge and develop ideas for future improvement. In the case of LDS, an important benefit of the super user trainings, from a customer perspective is that it gives new super users a chance to not only learn about the application but to also get a network of others in the same role. For the team maintaining LDS, an important benefit is that by observing users using the application and by hearing their questions, they get a better understanding of the context of the application which is useful for future development. However the spontaneous insights from super user

trainings are not systematically saved and only occasionally, there will be some larger insight which find its way into the change request process. If more of the basics about the application are taught using an e-learning in the future and the pace of new rollouts becomes slower as more markets introduce LDS, then it could make sense to change the super-user training into being less oriented towards training. Instead it could be transformed into having only some training and being more of a seminar for gathering user insights and understanding promising areas of improvements, thus giving the maintenance team more direct contact with users. This would keep the benefits of a face-to-face meeting where super-users can network, while also giving the maintenance team greater domain knowledge and giving the business representatives who decide on budget and prioritization of change requests new insight in the potential gains from new or changed functionality in the application. One way to make this kind of seminar less costly could be to coordinate it between related applications, for example having super users of LDS and GDS meet during the same week, with some courses separate for each application. A different way of getting some benefits similar to a seminar would be to hold online meetings.

A completely different approach to improving understanding of usage (and in some instances substitute for domain knowledge) would be to introduce software for recording screenshots of how users solve different tasks inside the application and possibly software for doing detailed analytics on usage of the applications in Volvo IT, for example identifying menu items that take a long time for users to find or instances where usage patterns differs between markets.

6.3.7 Coordinate dealer-visits, increase two-way interaction on visits and reward dealers

At present there are efforts to track the number of dealer visits globally and to work in a more structured way with the participants documenting and presenting what they learn. A next step could be to coordinate dealer visits more across different teams in Volvo IT and other parts of Volvo group, to make sure that more people get the opportunity to do visits. Then visits could then be concentrated to fewer days, preferably on days when the dealership expects to be less busy with their customers. Another next step in working with the dealer visits could be to globally document insights from dealer visits and regularly discuss these with the business side of Volvo, this could enable the visits to result in more improvements to the software which would add value to Volvo and make dealers feel more involved in the IT. Another benefit would

be that it would create documentation that could be a complement to actually performing dealer visits, even if there is much tacit knowledge from visits that could not be substituted by more documentation

In order to track dealer visits in more detail, be able to coordinate more across teams and give the dealership added understanding of the benefits of the visit, it could be good to define standard formats and goals for the visits, for example: “hands-on introduction to how service of a truck is done”, “practical understanding of the sales process”. By defining the scope of visits, the impact of the visit to the operations at the dealership could be clearly defined and the employees at the dealerships could prepare and improve how they introduce different topics to Volvo employees. To inspire employees to actively acquire and use domain knowledge and inspire dealers to participate, Brinkerhoff’s (2005) success case method (further described in section 2.2.4) could be used to find examples of successful use of domain knowledge and tell the stories of how it has improved the IT-solutions.

As there are a few dealers close to Volvo IT sites and Volvo group offices, the relationships with these dealers are very important for enabling Volvo group and Volvo IT to educate its employees and ultimately sell more vehicles more efficiently. Thus it could be motivated to recognize the contribution of these dealers who receive many visitors by awarding them monetary or in other ways. One way could be to let the dealers formally become providers of education services and pay them for “courses”, thus giving new Volvo employees an efficient way of getting practical insight in how the dealers work. Another way of rewarding these dealers could be to formally recognize them as “*pioneer dealers*” or “*IT-partners*” and work together closely with them to develop new services and ways of working, in effect rewarding them with early access to new technology and management consulting services by some expert Volvo employees.

7. Conclusions & further research

7.1 Conclusions

The focus of this thesis is how Volvo IT organizes global teams between Sweden and China, how it manages domain knowledge and how staff turnover impacts domain knowledge.

7.1.1 Interaction and culture

There are some differences in the culture of Sweden and China which do impact how managers receive feedback, how individuals perceive knowledge and how knowledge is shared. But overall, national cultural differences do not seem to play a major role as the organizational culture of Volvo is similar in both Tianjin and Gothenburg and makes it easier to synchronise the daily work and build domain knowledge. The factor that influences the work the most is the time-difference which limits the time the team has together to 2-3 hours per day, but which also means that support is available longer time globally and that some work can be handed over to the other site at the end of the day and thus be completed faster.

The workplace culture at Volvo IT in Sweden emphasises face-to-face meetings as arenas for giving feedback, getting to know each other and solve problems. For those in Gothenburg who work with Tianjin and coordinate work done in Tianjin, it has been important to visit their colleagues in Tianjin in order to get to know them better and the visits to Tianjin were perceived to be a significant boost in already good working relationships. Employees in Tianjin place less importance on face-to-face meetings in order to cooperate well on email and phone with their colleagues abroad, this difference to Gothenburg may be due to that the employees in Gothenburg have more coordinating roles and place importance on knowing the people they coordinate. However, there is great enthusiasm to visit Gothenburg and most would like to stay two weeks or more, both to get to know their colleagues better and to learn more about the business of Volvo.

In Tianjin, the work is more formalized than in Gothenburg. Examples of this is that meeting minutes are used more in Tianjin than in Gothenburg and that employees in Gothenburg are more frequently interrupted in their work by colleagues asking questions and that there are more organized groups for knowledge sharing in Tianjin, while employees in Tianjin tend to discuss work less on lunch breaks than the colleagues in Sweden.

Volvo IT has managed to promote their global corporate culture in Tianjin by emphasising cultural fit and English skill in recruitment, sending Swedish expat managers, working daily with the culture and by having close contact with colleagues at other sites in the daily work. It seems that this has worked well in creating an open climate as respondents in Tianjin are open to seek out the most knowledgeable persons in a field they have questions about, even if they are not familiar with that person and do not have a common connection to introduce them to each other. The estimates of how many people you know in Volvo are higher in Tianjin than in Gothenburg, something that can possibly be explained by people being less anonymous to each other at a smaller site and to Chinese culture requiring less familiarity with someone before you say that you know that person.

7.1.2 Finding and developing domain knowledge

The most important way of finding domain knowledge is to ask colleagues to either explain or to refer you to a person who can explain. There are systems on the intranet to find people with specific competence, which are not used much today but were thought to have great potential to assist employees in Tianjin in finding the right person, in Gothenburg the potential of these systems was thought to be smaller as the employees are more senior and often have issues that are too specific to be for it to be useful to look at user profiles.

There are projects in Tianjin and globally to gather documented domain knowledge in one place on the intranet, but at the moment it is not widely used. Much learning of domain knowledge takes place in the learning management system of Volvo where progress is often connected to the personal development plans employees set annually with their managers. E-learning is used more in Tianjin than in Gothenburg and are perceived as a good way to learn basic knowledge about Volvo business processes and what applications support these processes. There is however much understanding of how users use the application that is more tacit which can be used to better understand customer requirements and make small but important choices in the development which improve usability, one important way of gaining this understanding is by arranging visits to dealerships. The visits to dealers are mainly limited in order to not overwhelm the dealers with visitors, in Tianjin there are few dealerships nearby and even though there are three dealerships in Gothenburg, there are many Volvo employees in Gothenburg and many visits. Another reason that limits dealer visits is that employees do not find time due to the daily

workload. Dealer visits are perceived as important for the future and since this year the numbers of visits are being tracked globally, and in Tianjin those who do dealer visits share their insights with their teams in a structured way.

7.1.3 Staff turnover

The average staff turnover in Chinese IT industry is high, but Volvo IT has managed to keep their staff turnover in Tianjin rate much lower than the industry average. The main reason so far for people leaving has been that they wish to return to their hometowns when getting married and having children. Line managers and Human resources work proactively with decreasing the risk of people quitting and to have plans in case they do quit. In Sweden staff turnover is lower and people tend to announce that they quit well in advance, letting a knowledge transfer to a new person take place, in China there will be one month's notice, which will be too short to find a replacement and do knowledge transfer for senior roles.

The culture of Volvo is an important factor reducing the staff turnover in China. Managers care about the development of the employees and provide training to employees based on the employees' expectations and clearly defined career paths within the standardized framework of professional roles in Volvo IT. Another factor reducing staff turnover may be that Volvo IT keeps the organization global, gives opportunities for international travel and maintains intense interaction with foreign colleagues, contrary to some other foreign IT firms which may have their Chinese offices act in a localized way much like a domestic Chinese company.

7.1.4 Possible future actions

In order to continue developing the cooperation and move more responsibilities to Tianjin, some actions that could be considered are:

- Have senior employees in Tianjin taking on “secondary roles” or “secondary assignments” and work more in pairs or small groups of specialists in order to reduce the impact of staff turnover by spreading domain knowledge across more persons, increase knowledge creation by having more interaction between individuals and reduce the impact of time-zones by having more parallel work streams.

- Evaluate opportunities to support new and current employees in settling in Tianjin, such as by being proactive with offering transportation from new housing developments and providing benefits related to buying a home and raising children.
- Work on common practices for working remotely, taking advantage of new technology and reducing the time that needs to be spent in meetings. There may be opportunities to increase the use of webcams and video-conferencing to cooperate efficiently and build familiarity with less travel. Increased capabilities in working remotely could both increase efficiency globally and make it easier to draw on a larger labour pool in China by finding some resources in other cities than Tianjin and having them work remotely with the team in Tianjin.
- Line managers could, when formulating personal development plans with their team members, use the functionality in the intranet to let the team member express strengths and areas of interest in their public personal profiles. This practice would contribute to increasing the amount of data available for the organization to use for understanding its overall competence, planning education and finding talent internally. For some employees it would be helpful to be able to search for individuals to ask on specific issues and this would somewhat reduce the problem of new employees not having a network in the company.
- Find new ways to work with super-users by involving them before and after super-user trainings. Work with E-learning to teach how to use the applications and make sure super-users are familiar with it before arriving at a super-user training. Transform super-user training into being more oriented towards being seminars for understanding end user needs and letting end users network among each other. Consider making trainings less application specific and coordinating some of the activities so they are the same, thus reducing cost and increasing exchange of ideas between users of different applications.
- Coordinate dealer visits across teams to give more people opportunities to visit dealers, without increasing the number of visits and overwhelming dealerships near the Volvo offices. Consider formalizing more dealer visits into standard formats with clear goals, thus enabling the dealership to give deeper insight in specific areas while assigning fewer dealership-employees to take care of each visit. Evaluate ways of rewarding dealerships who receive many visitors, such as monetary compensation for “educational visits” or

creating partnerships where these dealers get more involvement and benefits in their operations by working closely with new IT and experts from Volvo.

- Increase cooperation with universities in Tianjin to build the employer brand and attract local talents who are more likely to stay long at Volvo IT. Adapt practices from the extensive cooperation Volvo has with universities in Gothenburg and pioneer these in China where such cooperation is less common. Use guest lectures in university courses as an initial step to establish contact with students and faculty. Inspire students to pursue their dreams by telling success stories of Volvo employees and offering advice at career planning sessions or mentorship programs for students.

7.2 Further research

Some topics out of the scope of this thesis that could be promising to research further would be:

- How does Volvo IT attract talent in China and other markets, what aspects of Volvo culture appeal to potential candidates, how do candidates evaluate these benefits compared to what other employers offer, how is and can the Volvo brand be used in future recruiting efforts?
- How can efficiency be increased in working remotely and how does difference in time-zones impact the organization and results in IT-delivery?
- How does knowledge management in IT-delivery efforts differ between Sweden-China compared to other combinations of countries?
- How are knowledge management efforts organized in other organizations with a similar setup as Volvo IT?
- How do knowledge management efforts work in domestic Chinese IT companies?

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Appendix I - Interview questions

We are two master's student at Chalmers who are doing a thesis during this spring on how Volvo IT works with knowledge management in Sweden and China. Our purpose is to understand how knowledge is created, stored, transferred and used within Volvo IT and especially how these processes work in Swedish-Chinese teams.

We are interested to know more about what your department aims to achieve, how you organize the work, how you measure results and what challenges you face. We are especially interested in how you solve problems that arise in the work, how you document solutions and how you find people with necessary knowledge. We are also interested in how you work with company culture, training and recruiting the right team members for your projects.

Personal background and role

1. Could you describe your role in Volvo IT?
2. What are your main responsibilities?
3. How long have you worked in this role and how long in Volvo IT?
4. What previous roles did you have at Volvo and other companies?
5. Could you describe what knowledge transfer took place when you changed roles?

Group background and role

1. Could you briefly introduce your group?
2. How many people are there in your group?
3. What roles do they have?
4. What backgrounds do your staffs have (age, education, work experience)?
5. How many of the persons are consultants from your partners?
6. What are the most important strategic goals of Volvo IT and how do they relate to your group?
7. What challenges does your team face in the future?
8. What challenges does Volvo IT face in the future?
9. What are the outputs from your team?
10. What are the most important performance measures for your team and what you deliver?

11. Who will judge the quality of the deliveries and how is this done?

Work and communication in the group

1. How do you spend a typical work week?
2. How often do you discuss the work with your group members?
3. About how many hours per week do you meet with your group members?
4. Do you feel that you have enough time to discuss with your group members?
5. Do you feel that the meetings you have with your colleagues in Sweden are enough to handle the issues you need to discuss?
6. How often do you contact with colleagues in Sweden?
7. How do you contact with your colleagues in Sweden?
8. Have you visited Gothenburg, if so how many times?
9. What kinds of problems or misunderstandings have occurred when you and your group have been working with Swedish colleagues?
10. How have you solved these problems or misunderstandings?
11. How do you work to minimize problems from working in English?
12. Do you sometimes record meetings or phone conversations?

Knowledge management - Tasks and problem solving

1. When starting a new project or task, how do you prepare for it?
2. How do you document during and after projects?
3. Are the project documents searchable and who can view them?
4. Have you participated in any Volvo trainings about project management, if so what did you learn?
5. How do you receive feedback and suggestions from your group members?
6. Do you document tasks that are not part of a project?
7. Do you usually document the results from meetings, if so, how?
8. Do you feel that you spend more or less time in meetings now compared to one year ago?

9. Could you tell us about some time you encountered a problem in your work which you needed additional knowledge to solve?
10. Which way do you prefer to use in the daily work when you need new Knowledge? (for example: white books, asking colleagues, using a directory to find experts, solutions database(KMS), external sources on the internet)
11. When you are not sure who to ask about something, how do you find the right person?
12. How do your team members find the right person to ask?
13. Could you describe a situation where you helped a colleague solve a problem?
14. Do people usually discuss problems in your work during lunch or other breaks?
15. When people need to discuss an issue with a colleague, do you think it is preferable that they just go to that person's desk or should they book a meeting with that colleague?

Knowledge management - Managing group members

1. How do you introduce new employees to the work?
2. How do you work to develop the skills of your group members?
3. What are some common goals for people in these years' personal business plans?
4. How do you introduce employees to how your application is used by end users?
5. What domain knowledge is important for new employees to understand?
6. How do you work with E-learnings about domain knowledge?
7. How do you share knowledge with consultants from your partners?
8. Is there some knowledge you do not share with consultants?
9. How do you work to retain knowledge when people quit the job or move to a new role?
10. How do you encourage people to share their knowledge with others?
11. We plan to make a web-based survey soon with employees in AD China and colleagues in Sweden. Is there something you would like to know that could be answered by a questionnaire?

Could you recommend some people you work with who we could interview about their view on these issues?

Are there any issues you think we should focus on discussing during interviews with them?

Appendix II - Survey questions

Section 1 Background

| | |
|-------------------------------|--|
| I'm employed in | Beijing Gothenburg Tianjin Other (please specify) |
| I primarily work as a | Architect Assignment leader Business analyst Developer Line manager Maintenance assignment lead Project manager System Analyst Support Tester Other: FREE TEXT |
| I work in Consulting services | Yes No |

| | |
|---|---|
| Age: | <p>21-25 years old</p> <p>26-30 years old</p> <p>31-35 years old</p> <p>36-40 years old</p> <p>41-45 years old</p> <p>46-50 years old</p> <p>51-55 years old</p> <p>56-60 years old</p> <p>61-65 years old</p> <p>66 years or older</p> |
| I have worked in Volvo IT | <p>Less than 6 months</p> <p>6 months to 1 year</p> <p>1 to 2 years</p> <p>2 to 3 years</p> <p>3 to 5 years</p> <p>5 to 10 years</p> <p>more than 10 years</p> |
| Before working in Volvo IT I worked in other IT companies for | <p>I have not worked in any IT company before joining Volvo IT</p> <p>Less than 6 months</p> <p>6 months to 1 year</p> |

| | |
|---|---|
| | <p>1 to 2 years</p> <p>2 to 3 years</p> <p>3 to 5 years</p> <p>5 to 10 years</p> <p>more than 10 years</p> |
| My native language is: | <p>Chinese</p> <p>Swedish</p> <p>Other</p> |
| In Volvo IT - Beijing I estimate that I know | <p>Nobody</p> <p>1 person</p> <p>2 or 5 persons</p> <p>6 to 10 persons</p> <p>11-20 persons</p> <p>21 - 50 persons</p> <p>51-100 persons</p> <p>more than 100 persons</p> |
| In Volvo IT - Gothenburg I estimate that I know | <p>Nobody</p> <p>1 person</p> <p>2 or 5 persons</p> |

| | |
|---|--|
| | <p>6 to 10 persons</p> <p>11-20 persons</p> <p>21 - 50 persons</p> <p>51-100 persons</p> <p>more than 100 persons</p> |
| <p>In Volvo IT - Tianjin I estimate that I know</p> | <p>Nobody</p> <p>1 person</p> <p>2 or 5 persons</p> <p>6 to 10 persons</p> <p>11-20 persons</p> <p>21 - 50 persons</p> <p>51-100 persons</p> <p>more than 100 persons</p> |
| <p>I have experience of visiting Volvo IT sites outside of the country where I primarily work</p> | <p>-Yes. I've previously visited other sites and I'm currently working at my home site</p> <p>-Yes, and I'm currently working at another site then where I'm primarily employed</p> <p>-No</p> |

Condition: Go to Section 2A if you answered yes to last question, else to Section 2B. (Tianjin/Gothenburg changed depending on where you currently work (Gothenburg if working in Tianjin or Beijing)).

Section 2A Visits to another site

| | |
|--|--|
| In my work I regularly have contact with colleagues in Gothenburg/Tianjin | yes no |
| I have visited Tianjin/Gothenburg | __ times |
| I have totally spent | __ weeks in Gothenburg/ Tianjin |
| What was the purpose of your visit(s) (check all that apply) | job rotation receiving training meeting colleagues in my team meeting with colleagues outside my team Other (please specify) |
| The most important benefit(s) I received from visiting Gothenburg/Tianjin was: | FREE TEXT ANSWER |
| I will need to go to Gothenburg/Tianjin during this year because of the tasks in my role | yes no I don't know |
| I would like to go to Gothenburg/Tianjin | yes |

| | |
|-------|----|
| again | no |
|-------|----|

Section 2B Visits to another site

| | |
|---|---|
| In my work I regularly have contact with colleagues in Gothenburg/Tianjin | yes no |
| If I had the opportunity to visit Gothenburg/Tianjin, I would prefer to visit Gothenburg/Tianjin for: | - I am not interested in visiting Gothenburg/Tianjin - I am interested, but currently it is not convenient for me to travel - 1 week or less - 1 to 2 weeks - 2 weeks to 1 month - 1 month to 3 months - 3 months to 6 months - more than 6 months |
| If I have the opportunity to visit Gothenburg/Tianjin I think the most important benefit(s) would be: | FREE TEXT ANSWER |
| I will need to go to Gothenburg/Tianjin during this year because of the tasks in my role | yes no |

| | |
|--|--------------|
| | I don't know |
|--|--------------|

Condition: If regular contact with Gothenburg/ TJ go to Section 3 ELSE go directly to Section 4

Section 3 Questions on interaction with Tianjin/ Gothenburg

| | |
|---|--|
| I have contact by phone with colleagues in Tianjin/Gothenburg | Every day Several days every week Each week Every two weeks Every month Less often than every month |
| I have contact by email with colleagues in Tianjin/Gothenburg | Every day Several days every week Each week Every two weeks Every month Less often than every month |
| I have contact by instant messaging on communicator with colleagues in Tianjin/Gothenburg | Every day Several days every week Each week |

| | |
|---|---|
| | <p>Every two weeks</p> <p>Every month</p> <p>Less often than every month</p> |
| <p>I participate in video-meetings with colleagues in Tianjin/Gothenburg</p> | <p>Every day</p> <p>Several days every week</p> <p>Each week</p> <p>Every two weeks</p> <p>Every month</p> <p>Less often than every month</p> |
| <p>I need to wait for replies from Tianjin/Gothenburg in order to be able to do my work</p> | <p>Every day</p> <p>Several days every week</p> <p>Each week</p> <p>Every two weeks</p> <p>Every month</p> <p>Less often than every month</p> |
| <p>If I would suggest my colleagues in Tianjin/Gothenburg to change something about the way they work, I would suggest:</p> | <p>FREE TEXT ANSWER</p> |

Section 4 Questions about training/interaction at the site where I work

| | |
|--|---|
| In an average week I spend approximately | __ hours in scheduled face to face meetings |
| In an average week I spend approximately | __ hours in scheduled phone meetings |
| In an average week I spend approximately | __ hours in unscheduled discussions with colleagues |
| In the meetings I participate in, minutes from the meeting are distributed to all participants | No, never Yes, sometimes Yes, always |
| I find the meeting minutes I receive useful in my work | No, never Yes, sometimes Yes, always |
| I most recently used an E-learning to learn more about the business of Volvo | Less than 1 week ago 1 to 2 weeks ago 2 weeks to 1 month ago 1 month to 3 months ago 3 months to one year ago |
| I estimate that I use E-learnings to understand more about the business of Volvo | Every week Every two weeks |

| | |
|--|---|
| | <p>Every month</p> <p>Every three months</p> <p>Every Year</p> <p>I never use E-learnings to learn more about the business of Volvo</p> |
| <p>If I had an hour every week to work on improving my knowledge and skills, I would spend it on</p> | <ul style="list-style-type: none"> - Increasing my technical skills - Increasing my knowledge about the business of Volvo that the application(s) I work with supports - Increasing my knowledge about business of Volvo that I do not work with daily. -Increasing my communication skills -Increase my project management skills |
| <p>When I need to know more about a subject I will first ask</p> | <ul style="list-style-type: none"> - The person I'm most familiar with even if I think others may know even more - The person I think has the most knowledge on the subject |
| <p>When I need to know more about the business of Volvo I will (Check all that apply)</p> | <ul style="list-style-type: none"> - Use a search engine(e.g. Google or baidu) - Try to find documentation on team-place - Try to find the right document on a shared file area we have in my team - Try to find the right document on my hard |

| | |
|--------------------------------------|--|
| | <p>drive</p> <ul style="list-style-type: none"> - Try to find documentation on Violin - Try to find an e-learning - Ask a colleague in my team to explain - Ask a colleague in another team - Ask my manager to explain - Other: |
| <p>I learn something new at work</p> | <p>Every day</p> <p>On several days every week</p> <p>Each week</p> <p>Every two weeks</p> <p>Every month</p> <p>Less often than every month</p> |
| <p>I create new knowledge</p> | <p>Every day</p> <p>On several days every week</p> <p>Each week</p> <p>Every two weeks</p> <p>Every month</p> <p>Less often than every month</p> |

| | |
|---|--|
| I share knowledge with my colleagues | <p>Every day</p> <p>On several days every week</p> <p>Each week</p> <p>Every two weeks</p> <p>Every month</p> <p>Less often than every month</p> |
| I meet with my colleagues and discuss work outside the office | <p>Every day</p> <p>On several days every week</p> <p>Each week</p> <p>Every two weeks</p> <p>Every month</p> <p>Less often than every month</p> |
| I participate in study groups in Volvo IT | <p>Every day</p> <p>On several days every week</p> <p>Each week</p> <p>Every two weeks</p> <p>Every month</p> <p>Less often than every month</p> |
| I participate in the following study groups: | FREE TEXT ANSWER |

| | |
|---|---|
| | |
| I am part of a community of people who have similar roles and share knowledge they gain in their work | <p>Completely disagree</p> <p>Somewhat disagree</p> <p>Neither agree nor disagree</p> <p>Somewhat agree</p> <p>Completely agree</p> |
| I would like to have more opportunities to share my knowledge with colleagues | <p>Completely disagree</p> <p>Somewhat disagree</p> <p>Neither agree nor disagree</p> <p>Somewhat agree</p> <p>Completely agree</p> |
| I regularly write down new things that I learn | <p>Completely disagree</p> <p>Somewhat disagree</p> <p>Neither agree nor disagree</p> <p>Somewhat agree</p> <p>Completely agree</p> |
| I am often interrupted in my work by colleagues who ask me questions | <p>Completely disagree</p> <p>Somewhat disagree</p> |

| | |
|--|---|
| | <p>Neither agree nor disagree</p> <p>Somewhat agree</p> <p>Completely agree</p> |
| <p>When contacting with a colleague I have never worked with before, I strongly prefer to have somebody introduce me first</p> | <p>Completely disagree</p> <p>Somewhat disagree</p> <p>Neither agree nor disagree</p> <p>Somewhat agree</p> <p>Completely agree</p> |
| <p>When working together by email it is much easier to work with colleagues who I have met face to face</p> | <p>Completely disagree</p> <p>Somewhat disagree</p> <p>Neither agree nor disagree</p> <p>Somewhat agree</p> <p>Completely agree</p> |
| <p>When working together by phone it is much easier to work with colleagues who I have met face to face</p> | <p>Completely disagree</p> <p>Somewhat disagree</p> <p>Neither agree nor disagree</p> <p>Somewhat agree</p> <p>Completely agree</p> |
| <p>I often discuss work with colleagues on lunch</p> | <p>Completely disagree</p> |

| | |
|---|---|
| | <p>Somewhat disagree</p> <p>Neither agree nor disagree</p> <p>Somewhat agree</p> <p>Completely agree</p> |
| There is nothing wrong about discussing work on lunch | <p>Completely disagree</p> <p>Somewhat disagree</p> <p>Neither agree nor disagree</p> <p>Somewhat agree</p> <p>Completely agree</p> |
| In my work it is important to understand how a Volvo dealer works | <p>Completely disagree</p> <p>Somewhat disagree</p> <p>Neither agree nor disagree</p> <p>Somewhat agree</p> <p>Completely agree</p> |
| I would like to learn more about how a Volvo dealer works | <p>Completely disagree</p> <p>Somewhat disagree</p> <p>Neither agree nor disagree</p> <p>Somewhat agree</p> <p>Completely agree</p> |

| | |
|---|---|
| I have visited a Volvo Dealer | never one time two times more than two times |
| I think the most important benefits of visiting a Volvo dealer are: | FREE TEXT ANSWER |