Effects from Virtual Meetings on Individual Level

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Executive summary

This study seeks to develop a methodology to measure effects from virtual meetings (VMs) on the employees at Swedish public authorities as a part of the research project *"Resfria möten – vad blir effekterna och hur utvärderar man dem?" (Virtual Meetings: What are the Effects and How to Evaluate them?)*. Data has been collected via literature review of scientific publications and reports on the topic as well as via 27 in-depth interviews (10 structured and 17 semi-structured) with representatives from seven Swedish public authorities and five other organisations, which use VMs in their work routines. Data analysis departs from the proposed list of indicators by Arnflak (2012). In the course of the study 37 indicators of potential effects from VMs on the individual are developed. These indicators are structured in the following 10 categories:

- Work situation including negative stress (NS) and work/leisure time and life quality (WL);
- Social interaction (SI);
- Career and recruiting (CR);
- Performance, work productivity and quality (PPQ);
- Gender and social equity (GE);
- Personal safety and information security (PIS);
- Age (AG);
- Discipline and attention (DA);
- Potential to learn (LP);
- Meaning and significance (MS).

These categories were used to code the data gathered during literature review and interviews. Based on the inputs from literature and interviews all indicators in each category were assessed in terms of their importance/relevance to be measured and followed up as well as in terms of their measurability (i.e. how easy/difficult it is to measure each indicator). Results of the assessment are presented in the table form using a three colour coding system (Table A).

Table A. Colour coding for the indicator assessment

Colour code	Explanation
	not important/not relevant or difficult to measure/follow up
	relatively important/somewhat complicated to measure/follow up
	important/easy to measure/follow up

Results of the assessment are summarised in Table B. Only those indicators (18) that scored with three green boxes or two green and one yellow box have been selected for further evaluation. Nine indicators have been evaluated as important and easy to measure and follow up, four indicators – as important but somewhat complicated to measure and follow up, and five indicators – as important or relatively important and easy to measure and follow up.

Apart from these indicators, analysis has revealed that it would be important to collect data on several independent variables in order to study the relationships and possible correlations between these variables and the measured indicators. These include: age, gender, presence of children and small children, frequency of business travelling, frequency of VM use and experience (in time) of VM use.

In order to measure the 18 selected indicators a questionnaire is under development. Once finalised it will aim to collect both background data and indicator data, and can be used by Swedish public

authorities either as a separate online survey or as a part of existing employee surveys. The questionnaire is expected to be completed by those employees, who have some experience with VMs.

Table B. Indicators recommended to measure and follow up by Swedish public authorities

#	Indicator group	Code #	Indicator
IMPORTANT AND EASY TO MEASURE AND FOLLOW UP			
1a	Negative stress	NS 2	*Share of employees feeling that VMs reduce their stress at work*
		NS 3	*Share of employees feeling sure about the use of VM equipment*
1b	Work/leisure time and life quality	WL 1	*Share of employees feeling that they have more time to work on their tasks due to the increased use of VMs*
		WL 2	*Share of employees feeling that they have more free time for their private lives due to the increased use of VMs*
		WL 5	*Share of employees who feel good about avoiding business trips*
2	Social interaction	SI 4	*Share of employees who think that trust can be built via VMs but that it requires more time and more meetings*
		SI 7	*Distribution of employees who find VMs more/less/equally fun and stimulating as F2FMs*
3	Career and recruiting	CR 2	*Share of employees who think VMs represent a good substitution to a physical job interview*
5	Gender and social equity	GE 2	*Distribution of VM use between employees with small kids and without kids*
IMPORTANT BUT LESS EASY TO MEASURE AND FOLLOW UP			
4	Performance, productivity and quality	PPQ 1	*Share of employees who think their work efficiency has increased with the use of VMs*
5	Gender and social equity	GE 3	*Share of employees whose involvement in the meetings has increased with the introduction of VMs*
		GE 4	*Share of employees feeling their ability to express themselves during VMs is limited*
7	Discipline and attention	DA 2	*Factors that influence the ability to keep attention in VMs, and the share of employees that consider these factors relevant to their work routines*

#	Indicator group	Code #	Indicator
RELATIVELY IMPORTANT AND EASY TO MEASURE AND FOLLOW UP			
1a	Negative stress	NS 5	*Share of employees feeling more accessible with the use of VMs*
1b	Work/leisure time and life quality	WL 6	*Share of employees who think business travelling is stimulating and enriching*
		WL 7	*Share of employees who think business travel is an indication of higher social status*
7	Age	AG 1	*Distribution between age group and the rate of VM use*
10	Meaning and significance	MS 2	*Share of employees who feel that VMs are 'second class' compared to F2FMs*

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List of Abbreviations

AG – age

CMC – computer mediated communication

CR – career and recruiting

DA – discipline and attention

F2F – face-to-face

F2FM – face-to-face meeting

GE – gender and social equity

LP – potential to learn

MS – meaning and significance

NMI – nöjd medarbetare index (employee satisfaction index)

NS – negative stress

Pers. comm. – personal communication

PPQ – performance, productivity and quality

PS – personal security

SBTA - Swedish Business Travel Association

SI – social interaction

STS - science, technology and society

VM – virtual meeting

VT – virtual team

WL – work/leisure time and life quality

1 Introduction

This work is a part of the research project *"Resfria möten – vad blir effekterna och hur utvärderar man dem?" (Virtual Meetings: What are the Effects and How to Evaluate them?)*. The overall project goals are to:

- identify and develop a framework methodology and evaluation parameters for the assessment of impacts from virtual meetings (VMs) within each public authority;

- identify and develop indicators and generally applicable reporting routines for a continuous monitoring of VMs within each public authority;

- carry out an impact analysis based on the developed evaluation parameters and indicators;

- estimate the energy efficiency potential measured in kWh.

This report presents the results from literature review and empirical study (i.e. in-depth interviews with representatives from Swedish public authorities) carried out in June – September 2012. Its main focus is on the potential impacts from VMs on individuals – i.e. employees at Swedish public authorities, who apply VMs daily in their work routines.

This study departs from the working paper by Arnfalk (2012) on the proposed indicators to measure the effects from virtual meetings (VMs) in Swedish public authorities. Its aim is to assesses and review the proposed indicators at individual level. The study evaluates the indicators in terms of their relevancy for the public authorities in Sweden as well as their potential to be measured. It suggests a list of indicators together with related questions to be used in the survey on VM effects at individual level in Swedish public authorities during autumn 2012.

2 Methodology

2.1 Data collection

Data collection has been carried out via literature review and in-depth interviews with the representatives of public authorities and other organisations in Sweden. The literature covers the fields of social and business studies as well as science, technology and society (STS) approach, and includes both international and Swedish sources. The literature analysed comprises scientific articles and reports on the adoption and use of VMs; work and effectiveness of virtual teams (VTs) and related trust building issues; comparison between face-to-face meetings (F2FMs) and VMs; business travel and its implications for gender and family obligations, social status and career etc.; travel and meeting management; the role of VMs in the job search and recruiting process etc.

Empirical data collection includes 27 in-depth telephone interviews with the representatives of Swedish public authorities and other organizations in Sweden including If, Cisco, Swedish Business Travel Association (SBTA), Proffice Life Science (Table 1) and a big retailing company, whose name cannot be disclosed. 10 structured interviews have been carried by the author of this report, and 17 semi-structured interviews - by a colleague researcher Peter Lindeblad (marked in italics in Table 1). All interviews were carried out during summer 2012.

Table 1. List of interviewees and interview dates

#	Interview date, 2012	Name	Public authority	Position
1	5 June	Johan Banner	CISCO Webex	Sales Manager at Cisco Software Group – Norden
2 3	7 June 10 July	Ewa Fridén	Tullverket	Travel manager, REMM person
4 5	13 June 29 June	Ellen Brubråten	Trafikverket	Infrastructure manager, commissioner of IT/telecom services, REMM person
6 7	13 June 5 July	Bengt Littorin	Naturvårdsverket	Consultant in the area of media, web-conferences, web-cast etc.
8 9	14 June 5 July	Elizabeth Thoor	Domstolsverket	Internal consultant, Human Resources
10	14 June	Tobias Lund	Energimyndigheten	Project leader for VMs, REMM person
11	15 June	Ulf Stenvad	If	Business meeting manager
12 13	18 June 3 July	Catharina Ericsson	Trafikverket	Travel manager, Pesonalcenter
14	19 June	Urban Nordmarker	Tullverket	Training manager
15	19 June	Inga-Lill Backlund	Tullverket	Environmental manager, Administration Services
16	21 June	Anders Ekdahl[1]		Project manager
17	25 June	Birgitta Sjöstrand	Skatteverket	Travel manager
18	25 June	Hans Rönnegård	Trafikverket	IT-stategist, private consultant
19	28 June	Jan Ericsson	Tullverket	Architect for IT solutions, Head of the Unit, responsible for REMM project
20	28 June	Lena Håkansson	Trafikverket	Department manager for common infrastructure
21	28June	Lotten Fowler	SBTA	General manager

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[1] The name of the organisation is not disclosed in line with their request

#	Interview date, 2012	Name	Public authority	Position
22	3 July	Christer Göransson	Naturvårdsverket	Environmental manager, responsible for environmental monitoring, REMM person
23	4 July	Selene Samuelsson	Försäkringskassan	Environmental manager, Safety and Environment Department; REMM person
24	9 July	Mattias Strömberg	Trafikverket	Director, Human Resource Center / Staff Support
25	11 July	Claes Tidanå	Domstolsverket	Director, Finance Department
26	12 July	Ann Gannelind	Domstolsverket	Organisation developer, Human Resources
27	*14 August*	*Nina Holst*	*Proffice Life Science*	*Sales manager*

*Interviews marked in italics have been carried out by Peter Lindeblad

2.2 Data analysis

Data coding and analysis for this report have been performed using as its point of departure the analytical framework on proposed indicators to assess the impacts from VMs on individual level by Arnfalk (2012) (Fig. 1)[1].
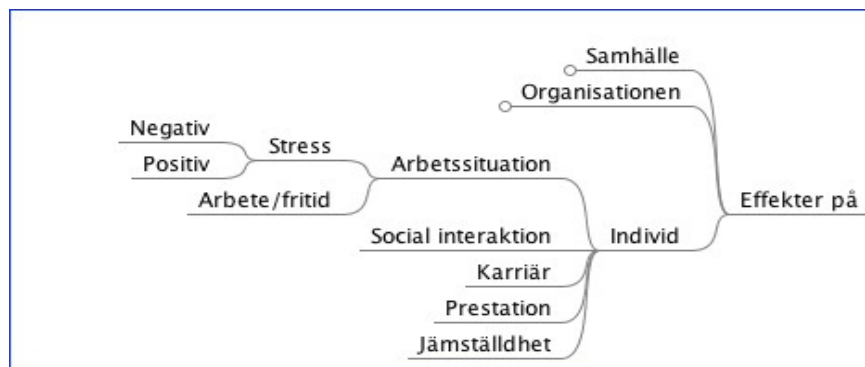
Figure 1. Potential effects at the individual level from the increased use of virtual meetings

Source: (Arnfalk 2012)

During the literature review and empirical data collection these indicators have been reviewed and several indicator groups have been added to this framework. Indicator groups will be described, analysed and discussed in Chapters 3 and 4 in detail, and include:

1. Work situation (1a - negative stress (NS); 1b - work/leisure time and life quality (WL);
2. Social interaction (SI);
3. Career and recruiting (CR);
4. Performance, work productivity and quality (PPQ);
5. Gender and social equity (GE);
6. Personal safety and information security (PIS);
7. Age (AG);
8. Discipline and attention (DA);
9. Potential to learn (LP);
10. Meaning and significance (MS).

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[1] Two other research sub-projects address the impacts of VMs on the organisation and society

3 Literature review and interview results

This chapter presents results on ten groups of indicators reflecting effects from VMs on the individual level. It compiles empirical findings from in-depth interviews with evidences found in the literature.

3.1 Work situation

This group of indicators is related to the degree of employee's satisfaction with his/her work in relation to the use of VMs in work routines. Many Swedish public authorities measure the employee satisfaction with their work situation by applying the so-called NMI-surveys (in Swedish 'nöjd medarbetare index' – satisfied employee index).[1] These surveys, however, do not include any questions on the use of VMs. Some interviewees perceive that NMI surveys can be supplemented with questions to evaluate individual perceptions and opinions on the use of VMs in the respected public authority[2] while others do not consider this to be possible or worth doing[3]. In addition, public authorities often use NMI questionnaires developed by private companies, which puts certain restrictions due to intellectual property rights and reduces the flexibility to modify the developed surveys.[4]

In general, VMs are found to influence the employee's work situation in two ways: through the change in personal stress levels experienced from the increased use of VMs, and through the contribution of VMs to the employees success in balancing their work and private life.

3.1.1 Negative stress

VMs have been found to influence stress levels of employees at Swedish public authorities in several ways. On the one hand, VMs have a potential to reduce personal stress and associated risks when they substitute a work-related travel (Gustafson 2012; Cisco 2008b). This involves both the stress related to the journey itself (travel planning hassle, tiredness from the journey, a need to leave home early and to come back home late[5], insecurity with traffic schedules[6] as well as stress accumulated from undone work tasks while being away on business.[7] All these factors have been also identified in previous research by others (c.f. Gustafson 2006; Räsänen et al. 2010; Arnfalk & Kogg 2003). The broader use of VMs is also reported to reduce employee stress by increasing their work flexibility,[8] as well as through shorter meeting times and higher efficiency of VMs as compared to F2FMs.[9]

On the other hand, VMs have a potential to increase employee stress related to the handling of technical equipment (e.g. equipment that is not functioning properly).[10] Some employees, however, have reported that they feel sure about VM equipment, and that it does not cause them any stress[11] while others try to choose equipment they are well-acquainted with when carrying out a VM.[12] Similar results have been reported in literature (Picha & Räsänen 2011; Räsänen et al. 2010; Räsänen 2006).

Another effect on the increase of personal stress levels from the use of VMs is noted due to the increased availability of employee.[13] However, some employees have reported that one's

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[1] Personal communications (pers.comm.) with Brubråten 2012; C. Ericsson 2012; Strömberg 2012; Göransson 2012; Samuelsson 2012; Thoor 2012; Fridén 2012; Sjöstrand 2012

[2] Pers. comm. with Strömberg 2012

[3] Pers. comm. with Thoor 2012; Göransson 2012

[4] Pers. comm. with Fridén 2012; C. Ericsson 2012

[5] Pers. comm. with Lund 2012; Thoor 2012; Samuelsson 2012; Fridén 2012; Tidanå 2012

[6] Pers. comm. with Brubråten 2012; Ganelind 2012

[7] Pers. comm. with Fridén 2012; Brubråten 2012; Tidanå 2012

[8] Pers. comm. with Nordmarker 2012; Banner 2012

[9] Pers. comm. with C. Ericsson 2012

[10] Pers. comm. with Fridén 2012; Brubråten 2012; C. Ericsson 2012; Tidanå 2012; Ganelind 2012; Holst 2012

[11] Pers. comm. with Strömberg 2012; Fridén 2012

[12] Pers. comm. with Thoor 2012

[13] Pers. comm. with Nordmarker 2012; Brubråten 2012; Ekdahl 2012

increased availability is under the control of each person and therefore each person can decide how they keep professional contracts, and in this way control related stress levels.[1] Others view enhanced possibility to hold professional contacts with the help of VMs as a positive factor in their work.[2]

It is worth mentioning that no implications of the so-called 'positive stress' (i.e. work stimulation, motivation or excitement) from VM use have been encountered in personal communications with employees at Swedish public authorities.

3.1.2   Work/leisure time and life quality

Another factor that may influence employee satisfaction with the work situation due to VMs is their ability to balance their professional and private life (Arnfalk 2012). By saving time, reducing stress linked to travelling (Denstadli et al. 2012; Cisco 2008b) and providing better flexibility to work routines (Räsänen 2006) VMs can contribute to the improved quality of life.

There was an overall agreement among respondents that one of the most important advantages of VMs for their participants is time saving,[3] which makes VMs more efficient than F2FMs.[4] This also means that VMs offer a potential to obtain more free time inside and outside work hours, which can be spent either as efficient work time[5] or as leisure time for private life[6] (e.g. to rest, be with families and children, do hobbies etc.). In this way VMs are found to contribute to work-life balance.[7]

Some respondents have indicated that VMs are shorter on average than F2FMs[8], which is another way of VMs' contribution to time saving. This has been also reflected in findings by others (Pate Dwyer 2007; Denstadli et al. 2012; Räsänen et al. 2010). Denstadli et al. (2012) have estimated that an average duration of F2FMs was five hours as compared to less than two hours for VMs. It has been also mentioned that F2FMs would be more suitable for longer meetings.[9]

The respondents have also reflected on advantages and drawbacks of spending time in transit while travelling to meetings with different transportation means. Overall many find it less efficient to work while travelling than in the office.[10] Six respondents agree that the train is the most efficient means in terms of available work time (e.g. one can work a few hours uninterrupted during the train journey, connect to the Internet, read work documents, write etc.)[11] while five find it difficult to work when travelling with plane, bus or car.[12] Employees at Swedish media companies in the research by Räsänen et al. (2010) have found working during a train journey as more continuous than during the flight, however, some have perceived air travel as faster, more efficient, comfortable and "nicer" way of making a journey. Time spent in transit either by airplane or train can as well be used as 'extra time' to do other things than work (e.g. to read a book or a newspaper, rest, sleep etc.).[13]

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[1] Pers. comm. with Littorin 2012; Strömberg 2012; Göransson 2012

[2] Pers. comm. with Fridén 2012; Tidanå 2012

[3] Pers. comm. with Fridén 2012; Nordmarker 2012; J. Ericsson 2012; C. Ericsson 2012; Strömberg 2012; Håkansson 2012; Thoor 2012; Tidanå 2012; Ganelind 2012; Littorin 2012; Göransson 2012; Samuelsson 2012; Fowler 2012

[4] Pers. comm. with C. Ericsson 2012; Strömberg 2012

[5] Pers. comm. with Fridén 2012; C. Ericsson 2012; Strömberg 2012; Tidanå 2012; Ganelind 2012; Littorin 2012; Göransson 2012

[6] Pers. comm. with Brubråten 2012; Strömberg 2012; Thoor 2012; C. Ericsson 2012; Fridén 2012; Ganelind 2012; Littorin 2012; Göransson 2012; Stenvad 2012; Ekdahl 2012; Samuelsson 2012

[7] Pers. comm. with Nordmarker 2012; Backlund 2012; C. Ericsson 2012; Håkansson 2012; Thoor 2012; Tidanå 2012; Stenvad 2012

[8] Pers. comm. with C. Ericsson 2012; J. Ericsson 2012; Thoor 2012

[9] Pers. comm. with Tidanå 2012

[10] Pers. comm. with C. Ericsson 2012; Strömberg 2012; Tidanå 2012; Samuelsson 2012

[11] Pers. comm. with Fridén 2012; Thoor 2012; Ganelind 2012; Littorin 2012; Göransson 2012; Samuelsson 2012

[12] Pers. comm. with Fridén 2012; C. Ericsson 2012; Thoor 2012; Littorin 2012; Samuelsson 2012

[13] Pers. comm. with Thoor 2012; Tidanå 2012; Göransson 2012

On the other hand, travel can be also perceived as "stimulating and enriching" and as "a source of variation and new experiences" (Gustafson 2006). During F2FMs people meet other people, which has a potential to contribute to the quality of life outside work life.[1] Some respondents in our study like travelling[2] or sometimes may associate it with status,[3] although others believe that the latter is already the issue of the past[4]. At the same time 50% of employees at Telia Research AB think that business travel is an indication of social status, and 70% enjoy getting out of the office (Arnfalk & Kogg 2003).

3.2 Social interaction

Literature demonstrates that F2FMs build and sustain personal relationships (Denstadli et al. 2012; Räsänen et al. 2010). It appears that "physical proximity promotes higher degrees of involvement and fosters psychological closeness and mutuality – a sense of connection, similarity, solidarity, openness, and understanding" (Guo et al. 2009).

Ten respondents in our study have pointed to the importance of physical meetings and the need to meet in person occasionally despite available technologies.[5] This is supported by the business management literature, which highlights the need for F2FMs between collaborating partners at least twice a year (Pate Dwyer 2007), since "to build relationships, there's no substitute for meeting face to face". It is also advised to use richer media during the initial stages of a project to speed up relationship building (Kandola 2006).

Six interviewees in our study have stressed that the first meeting is best to be carried out in person before the relationship could be moved to the virtual level.[6] This finding is supported with survey results by Denstadli *et al.* (2012), who studied the attitudes of business air passengers in Norway. VMs have been found unsuitable for the meetings with unknown people by 70% respondents of the survey while 56% considered it difficult to develop contacts with the help of VMs. At the same time, Guo *et al.* (2009) argue that virtual teams[7] (VTs) can still be as effective as face-to-face (F2F) teams "as long as they can share their values of effective communication and their frame of reference".

When asked specifically, 70% of our interviewees find it more difficult to develop mutual understanding and build trust during VMs compared to F2FMs[8]; 60% find it easier to have a VM with a person they have met physically before than with a person they have not met before.[9] Others believe that trust can be built gradually in VMs and can be enhanced by further and more frequent meetings, although it would require longer time to build a relationship than if the persons met in the real life.[10]

Trust has been identified as the key issue in understanding the effectiveness of VTs (Handy 1995). Previous research shows that richer media are generally better for trust building and maintenance (Bos et al. 2002; Kandola 2006) although F2F "is still a gold standard" (Bos et al. 2002). Therefore it can be more difficult to develop trust in an online setting compared to F2F (Bos et al. 2002; Rocco 1998; Wilson et al. 2006; Erasmus et al. 2010; Kandola 2006). This is also true for mutual understanding, which requires the presence of a shared context, and VTs typically experience difficulty to establish the latter (Kandola 2006).

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[1] Pers. comm. with Littorin 2012

[2] Pers. comm. with Thoor 2012

[3] Pers. comm. with Fridén 2012; J. Ericsson 2012

[4] Pers. comm. with Håkansson 2012

[5] Pers. comm. with Fridén 2012; Nordmarker 2012; J. Ericsson 2012; Brubråten 2012; C. Ericsson 2012; Håkansson 2012; Thoor 2012; Göransson 2012; Stenvad 2012; Ekdahl 2012

[6] Pers. comm. with Fridén 2012; Brubråten 2012; Håkansson 2012; Thoor 2012; Ganelind 2012; Göransson 2012

[7] Virtual team - any form of non co-located working, which includes virtual or remote team working, multiple site organisations, remote or home working, and geographically distributed or dispersed working (Kandola 2006)

[8] Pers. comm. with Brubråten 2012; C. Ericsson 2012; Strömberg 2012; Thoor 2012; Tidanå 2012; Ganelind 2012; Samuelsson 2012

[9] Pers. comm. with Fridén 2012; C. Ericsson 2012; Thoor 2012; Tidanå 2012; Göransson 2012; Samuelsson 2012

[10] Pers. comm. with Littorin 2012; Samuelsson 2012

Research by others (c.f. Pate Dwyer 2007; Guo et al. 2009; Kandola 2006) advocates that there is a need for additional efforts to facilitate trust building in VTs, e.g. by creating shared mental models with the help of dialogue technique (Guo et al. 2009), planning extra time for relationship building into the project that is carried out virtually (Kandola 2006), establishing a shared context through frequent and explicit communication (preferably through richer media) and spontaneous communication (Kandola 2006) etc. Over time - albeit with delays - trust levels in VTs (Wilson et al. 2006; Bos et al. 2002; Guo et al. 2009; Kandola 2006) as well as the quality of their meeting outcomes (Guo et al. 2009) have a potential to increase to the same levels as in F2FMs. It might take minimum two weeks for computer mediated communication (CMC) relationships become as socially grounded as F2F relationships (Kandola 2006), however, the ease and frequency of communication can reduce this time delay.

VMs are viewed by some respondents as lacking interactive participation (e.g. the participants are more quiet, do not ask questions as they arise, some are less engaged than others etc.)[1], and therefore being more suitable for the delivery of one way information. Some respondents suggest that seminars and workshops should be conducted F2F since it is easier to hold the discussion between the participants, and many participants can be more active than during VMs.[2] Others report that VMs can be more efficient than F2FMs as they offer broader possibilities to interact, particularly with the help of tools allowing several people to work on the same document simultaneously.[3]

Among other types of meetings that require physical presence the following were named: salary negotiations or other types of negotiations (Fridén 2012; Tidanå 2012; Göransson 2012; Samuelsson 2012); discussions on personal development, other private or sensitive issues and personal problems or conflicts (Fridén 2012; Ganelind 2012; Göransson 2012; Samuelsson 2012); job interviews (Thoor 2012; C. Ericsson 2012); creative meetings (J. Ericsson 2012); project kick-off meetings (Brubråten 2012; Rönnegård 2012; Samuelsson 2012); project closure and celebration of achievements (Göransson 2012); lectures when the respect and trust of the audience is crucial (Littorin 2012); allocation of tasks and duties, building of authority, delivering critique (Göransson 2012); environmental audit and monitoring (Samuelsson 2012). However, one respondent has indicated that there were no work-related questions that he would not feel comfortable or secure to discuss in VMs (Strömberg 2012).

Research on the perceptions of employees at four Swedish media companies confirms our results and emphasises that physical closeness is necessary to create (new) relationships, initiate a negotiation, discuss certain delicate matters and when meeting for more creative activities (Räsänen et al. 2010). Most managers prefer a richer media (e.g. a telephone over an e-mail) to hear about sensitive or complex issues to avoid misunderstandings (Pate Dwyer 2007). For complex social interaction and interpersonal communication that demand sharing of rich information (e.g. project start up and task allocation) media with "a higher degree of social presence" (e.g. F2F) is more suitable (Guo et al. 2009). The same applies to the instances when interactivity and reciprocity are needed in communication (Guo et al. 2009) (e.g. during seminars or workshops, group meetings (Räsänen 2006) etc.). A study by Arnfalk and Kogg (2003) on the perceptions of VMs by employees in a Swedish telecommunication company Telia Nära reveals that F2FMs are preferred in the beginning and the end of a project ('kick off' and 'kick out' meetings), while VMs are best suited for follow-up and information tasks or short and repetitive meetings. Research by Lu and Peeta (2009) on business air travel and VMs in Taiwan's technology industry concludes that F2FMs are required for business discussions, negotiations, marketing demonstrations, and even participation, while VMs are adequate for the information exchange, management meetings, training and consulting.

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[1] Pers. comm. with Fridén 2012; Ekdahl 2012
[2] Pers. comm. with Fridén 2012; C. Ericsson 2012; J. Ericsson 2012; Tidanå 2012
[3] Pers. comm. with Littorin 2012; Ganelind 2012

As one of the advantages of VMs Räsänen *et al.* (2010) identify the establishment and maintenance of long-term working relationships between geographically scattered groups of people or different departments in one organisation. When asked specifically, 80% of interviewees in this study have indicated that VMs increased the possibility to keep contacts in their professional network or develop more continuous work relations.[1] One respondent has indicated that such possibility decreases since people need to meet in order to keep in touch.[2] Nearly half of business air travellers in Norway think that VMs improve their contracts with collaborating partners (Denstadli et al. 2012).

VMs are seen by our respondents as missing the social component (or "social agenda")[3] as compared to F2FMs in the form of informal talks and quick chats,[4] the potential to develop "we"-feeling,[5] the possibility to meet new people and socialize.[6] They lack the ability to see each other and read the body language,[7] see how the group reacts,[8] and understand the feelings and handle the reaction.[9] These observations can be supported by previous research (c.f. Räsänen 2006) and literature in the field, which highlights that CMC technologies restrict the transmission of non-verbal cues (tones, gestures, feelings etc.) (Guo et al. 2009; Kandola 2006), the ability to perceive individual differences and the physical presence of others (Guo et al. 2009). At the same time, 63% of F2F communication is non-verbal (Burgoon et al. 1996), which also demonstrates that when people have non-verbal cues at their disposal, they rely on them to a great extent (Kandola 2006). However, research also shows that people will deploy whatever communication cue systems they have at their disposal to form impression and develop relationships (Kandola 2006), and in the absence of non-verbal communication cues coordinate their actions and clarify the issues verbally (Hauber 2008; Räsänen 2006).

Respondents in our study have been asked to comment on their perceptions in terms of how fun and stimulating VMs are in comparison to F2FMs. While 60% of interviewees consider VMs as less fun and/or stimulating,[10] some note that VMs function well,[11] allow to avoid travel, which feels good,[12] and are more efficient.[13] The remaining 40% of interviewees find these two types of meetings "about the same",[14] and emphasise that these factors do not depend on the media of the meeting but rather on its topic.[15]

3.3 Career and recruiting

When asked specifically, 70% of respondents have not observed any influence from the use of VMs on their career development;[16] 20% have indicated that VMs had increased their chances to keep in touch with more people, however, they found it difficult to link any steps in their career development to the increased use of VMs.[17]

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[1] Pers. comm. with Fridén 2012; Tidanå 2012; Littorin 2012; Strömberg 2012; Samuelsson 2012; Göransson 2012; C. Ericsson 2012; Ganelind 2012

[2] Pers. comm. with Thoor 2012

[3] Pers. comm. with Littorin 2012; Rönnegård 2012; Stenvad 2012

[4] Pers. comm. with Fridén 2012; J. Ericsson 2012; Thoor 2012; Ganelind 2012; Ekdahl 2012; Sjöstrand 2012

[5] Pers. comm. with Nordmarker 2012

[6] Pers. comm. with Brubråten 2012; Rönnegård 2012

[7] Pers. comm. with Håkansson 2012; Tidanå 2012; Ganelind 2012; Littorin 2012; Ekdahl 2012

[8] Pers. comm. with Samuelsson 2012

[9] Pers. comm. with Littorin 2012; Göransson 2012

[10] Pers. comm. with Brubråten 2012; C. Ericsson 2012; Strömberg 2012; Tidanå 2012; Ganelind 2012; Littorin 2012

[11] Pers. comm. with Brubråten 2012

[12] Pers. comm. with C. Ericsson 2012

[13] Pers. comm. with Strömberg 2012

[14] Pers. comm. with Fridén 2012; Thoor 2012; Göransson 2012; Samuelsson 2012

[15] Pers. comm. with Thoor 2012; Göransson 2012

[16] Pers. comm. with Brubråten 2012; C. Ericsson 2012; Strömberg 2012; Thoor 2012; Ganelind 2012; Göransson 2012; Samuelsson 2012

[17] Pers. comm. with Fridén 2012; Strömberg 2012

Some interviewees see VMs as a potential motivation factor in the recruiting process for people who are looking for more flexibility at work (e.g. young families with children, those who would like to travel seldom etc.),[1] while others do not consider them as such[2] or assume that these factors will gradually gain meaning with the future development of VMs.[3]

Research by Räsänen et al. (2010) identifies the facilitation of employment interviews without travelling as one of the advantages of VMs. While some of our respondents would not carry out a job interview in a VM,[4] others see VMs - and especially videoconferencing - as a useful solution in addition to F2FMs in the recruiting process[5] since they expand geographical boundaries for employers and applicants,[6] can be adjusted easier to varied conditions[7] or help save time to interview more applicants.[8] Others differentiate the type of job that is applied for and the applicability of VMs for the job interview (e.g. VMs are more applicable, if a person is considered to be hired for routine or mechanical tasks such as typing).[9]

When asked specifically, 56% of respondents consider that it is more difficult to identify and evaluate whether a person is suitable for a certain job position, if they have met this person during a VM compared to a F2FM.[10]

3.4 Performance, work productivity and quality

Personal performance at work can be measured by the work productivity (efficiency) and the quality of delivered tasks. Nine respondents have agreed that their (or their colleagues') work efficiency had improved with the increased use of VMs due to time savings from avoided travel.[11] This has been also reported in the study on Swedish media companies by Räsänen *et al.* (2010), who interviewed employees on their perceptions about the use of VMs. It has been found that with the introduction of VMs the pace of work had increased (Räsänen et al. 2010). Research at Cisco has shown that by avoiding travel with the use of CMC technology Cisco employees gained productivity and improved their performance, and that for some employees time savings were 24 hours or more per trip (Cisco 2008a; Cisco 2008b). Ten respondents in our study have also reported that their work quality and/or efficiency had improved as they could perform their work tasks in less tight time frames and/or cope with more tasks as compared to when they would travel to the meetings.[12]

The literature points to the possibility of nearly instant information transfer between the meeting participants and "more rapid identification of problems and opportunities" as one of the key advantages of VMs compared to F2FMs (Erasmus et al. 2010). The work productivity and quality during VMs has been assessed by some respondents as similar to that of F2FMs[13] or that work quality could be improved during VMs (e.g. when sharing files, exchanging information etc.).[14] One respondent notes, however, that it is "very easy to be efficient during a VM" (e.g. due to the instant access to all required documents in the system,

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[1] Pers. comm. with C. Ericsson 2012; Thoor 2012; Ganelind 2012; Göransson 2012; Samuelsson 2012

[2] Pers. comm. with Backlund 2012; Strömberg 2012

[3] Pers. comm. with Littorin 2012; Fowler 2012

[4] Pers. comm. with Thoor 2012; C. Ericsson 2012; Samuelsson 2012

[5] Pers. comm. with Göransson 2012; Strömberg 2012; Littorin 2012

[6] Pers. comm. with Håkansson 2012; Littorin 2012

[7] Pers. comm. with Tidanå 2012

[8] Pers. comm. with Stenvad 2012

[9] Pers. comm. with Ganelind 2012

[10] Pers. comm. with Strömberg 2012; Thoor 2012; C. Ericsson 2012; Tidanå 2012; Ganelind 2012

[11] Pers. comm. with Fridén 2012; Backlund 2012; C. Ericsson 2012; Rönnegård 2012; Tidanå 2012; Littorin 2012; Stenvad 2012; Samuelsson 2012; Sjöstrand 2012

[12] Pers. comm. with Fridén 2012; Brubråten 2012; Nordmarker 2012; J. Ericsson 2012; Strömberg 2012; Lund 2012; Thoor 2012; Ganelind 2012; Ekdahl 2012; Samuelsson 2012

[13] Pers. comm. with Fridén 2012

[14] Pers. comm. with C. Ericsson 2012

possibility to find the needed information immediately etc.) and that the overall work quality can increase by 10% due to the learning potential of VMs, exchange of opinions etc.[1]

3.5 Gender and social equity

While some respondents considered gender equity as an important indicator to measure,[2] others found it not to be so relevant for the research on VMs.[3] Four respondents felt that men were travelling more than women in their work.[4] This perception can be supported by previous studies showing that work-related travel is "a predominantly male activity" (Bergman 2004; Presser & Hermsen 1996) regardless of the family situation (Gustafson 2006; Presser & Hermsen 1996).

VMs are perceived by 14 respondents in our study to provide the possibilities for people with small children to take care of their families without leaving their homes and still participate in the meeting.[5] The study by Arnfalk and Kogg (2003) has also shown that employees at the Swedish telecommunication company Telia who have small children were particularly reluctant to travel frequently to the meetings.

Previous international (Duncan et al. 2003) and Swedish (Gustafson 2006; Björnberg 2002) studies indicate that women are still expected to take the main responsibility for home and family. This has been also perceived by four respondents in this study.[6] The need to take care of the family might limit career development for many women, and therefore VMs might positively contribute to creating favourable conditions for more flexibility at work. This is also relevant for men, who have more opportunities to engage in family responsibilities (e.g. collect children from kindergarten) with the increased use of VMs,[7] and could be a more important factor in the changing world, where the 'adult worker family' model[8] becomes more and more common (Duncan et al. 2003; Gustafson 2006).

VMs were found to provide a meeting alternative for everyone (Räsänen et al. 2010). In their perceptions whether the increased use of VMs can improve equity between different (groups of) people, some respondents have referred to the increased flexibility at work[9] and the chance for everyone to access the meeting and/or related information.[10] In particular, positive implications of VM use have been stated for disabled people or those who have challenges to move[11] and for the participants from abroad who might need visa for travelling to a meeting.[12] Some found it, however, somewhat difficult to see any connection between the use of VMs and social equity.[13]

Negative implications for the equity between people who use VMs have been exemplified with "unfair" distribution of more and less advanced equipment between the meeting participants,[14] the privilege of using videoconferencing equipment, which is known to be expensive (Räsänen et al. 2010), not similar "presence" of those distantly and physically

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[1] Pers. comm. with Göransson 2012

[2] Pers. comm. with Fridén 2012; Brubråten 2012; Banner 2012; Ekdahl 2012

[3] Pers. comm. with Backlund 2012; Strömberg 2012; Thoor 2012; Ganelind 2012

[4] Pers. comm. with Fridén 2012; Brubråten 2012; Håkansson 2012; Samuelsson 2012

[5] Pers. comm. with Backlund 2012; Brubråten 2012; C. Ericsson 2012; Nordmarker 2012; C. Ericsson 2012; Håkansson 2012; Tidanå 2012; Göransson 2012; Sjöstrand 2012; Thoor 2012; Ganelind 2012; Littorin 2012; Samuelsson 2012; Holst 2012

[6] Pers. comm. with Nordmarker 2012; Thoor 2012; Tidanå 2012; Littorin 2012

[7] Pers. comm. with Stenvad 2012

[8] The 'adult worker family' model assumes full-time paid work by men and women and equal participation in household tasks

[9] Pers. comm. with J. Ericsson 2012; Rönnegård 2012; Thoor 2012; Tidanå 2012; Samuelsson 2012; Holst 2012

[10] Pers. comm. with Fridén 2012

[11] Pers. comm. with Ganelind 2012; Littorin 2012; Göransson 2012; Ekdahl 2012

[12] Pers. comm. with Ekdahl 2012

[13] Pers. comm. with C. Ericsson 2012; Strömberg 2012

[14] Pers. comm. with Brubråten 2012

present,[1] inadequate positioning of the picture and voice, which might create a feeling that some participants have more central role in the meeting than the others.[2]

3.6 Personal safety and information security

This indicator has been added after the literature review, which identified that the increased use of VMs could contribute to improved personal safety due to the eliminated need to travel and the associated reduction of journey related risks (e.g. vulnerability of air travel due to volcanic eruptions) (Denstadli et al. 2012). This implication has been confirmed by two respondents[3] while others elaborated on information security and privacy related to the use phase of VMs. In this regard, many interviewees do not see any problems in sharing and exchanging information virtually due to the high information security and available encryption technique.[4]

3.7 Age

Age has been included in the analysis as some of the respondents referred to the potential correlation between the use of VMs and age (e.g. younger generation is less afraid of using technology, is more interested and capable to use VMs etc.).[5] The responses have been, however, contradictory as some interviewees consider the rates of VM adoption and use to be individual and not age-dependent.[6] On the other hand, as described earlier in Sub-sections 3.3 and 3.5, the majority of respondents consider that young families with children may be more interested in the use of VMs as they allow them more flexibility.

3.8 Discipline and attention

VMs have been described as more concentrated (Pate Dwyer 2007; Räsänen 2006) and "to the point" than a meeting in person (Pate Dwyer 2007), and "efficient and focused" and therefore requiring discipline and attention from the participants (Picha & Räsänen 2011; Räsänen et al. 2010; Räsänen 2006). This study included a question to the users of VMs whether they felt it as more or less difficult to keep their attention during VMs as compared to F2FMs. Some respondents find VMs as more intensive, requiring more concentration than F2FMs, and therefore it might be easier for the participants to get tired, loose focus or attention.[7]

In addition, since VMs are often held at the regular workplaces of employees, some respondents found it easier to get distracted.[8] However, such distractions were reported to be minimal in the case of video-based VMs[9] or if the participants from the same place sit in the same room.[10]

One respondent claimed that she was equally concentrated in VMs and F2FMs.[11] For others their ability to keep attention depended on the length of the meeting.[12] There is also a perception that in case of a dialogue and the use of voice in a VM the ability to keep attention is quite high.[13]

Some respondents have also pointed to the fact that VMs require good structure,[14] prepared agenda[1] and well-maintained discipline[2] to be successful. The importance of effective

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[1] Pers. comm. with Rönnegård 2012; Holst 2012

[2] Pers.comm. with Littorin 2012

[3] Pers. comm. with Fridén 2012; Backlund 2012

[4] Pers. comm. with Fridén 2012; Littorin 2012; Banner 2012; Stenvad 2012; Sjöstrand 2012

[5] Pers. comm. with Fridén 2012; Brubråten 2012; Ekdahl 2012; Holst 2012

[6] Pers. comm. with Thoor 2012

[7] Pers. comm. with C. Ericsson 2012; Strömberg 2012; Thoor 2012

[8] Pers. comm. with Brubråten 2012; Ganelind 2012; Samuelsson 2012

[9] Pers. comm. with Brubråten 2012; Littorin 2012; Samuelsson 2012

[10] Pers. comm. with Göransson 2012

[11] Pers. comm. with Fridén 2012

[12] Pers. comm. with Tidanå 2012

[13] Pers. comm. with Littorin 2012

[14] Pers. comm. with J. Ericsson 2012; Thoor 2012; Samuelsson 2012

preparation and meeting management in a VM have been also identified in research by Arnfalk and Kogg (2003).

3.9 Potential to learn

The respondents have been asked to comment on their ability to learn during VMs as compared to F2FMs. 20% have found it easier to learn new things when they meet in person[3] while 40% underlined that their potential to learn depended on the situation and the type of information they acquired.[4] For example, VMs and F2FMs suit equally well for the one way communication or delivery of information[5] while when the employees need to learn about more complicated systems or relationships on particular subject, it is preferred to be done in person.[6]

At the same time VMs provide opportunities to use new tools that facilitate learning, interaction and information exchange: e.g. the possibility to share the screen, point at the same document or edit it simultaneously with other meeting participants.[7] Sometimes VMs can be even more interactive than F2FMs (e.g. webinars can be suitable for a continuous parallel dialogue with the presenter or colleagues while this is harder to achieve in large conference rooms during a F2FM).[8]

3.10 Meaning and significance

The question was posed whether the users of VMs perceive that VMs are more or less important than F2FMs. Some respondents do not perceive any difference between VMs and F2FMs in terms of their importance,[9] and have agreed that the significance of the meeting rather depends on its topic and content than the media that helps to carry it out[10]. Others perceived F2FMs as more important[11] due to time and resources spent in order to carry out the meeting.[12]

In research by Arnfalk and Kogg (2003) on employee perceptions of VMs and F2FMs in the largest Swedish telecommunication company Telia VMs have been generally perceived as "second class meetings" that are "less significant" while F2FMs have been reported to be of "higher interest, seriousness and respect". No such perceptions have been shared by the interviewees in this study.

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[1] Pers. comm. with Thoor 2012; Samuelsson 2012

[2] Pers. comm. with Brubråten 2012; Strömberg 2012; Thoor 2012; Littorin 2012

[3] Pers. comm. with Tidanå 2012; Göransson 2012

[4] Pers. comm. with Fridén 2012; Ganelind 2012; Littorin 2012; Samuelsson 2012

[5] Pers. comm. with Fridén 2012; C. Ericsson 2012

[6] Pers. comm. with Fridén 2012

[7] Pers. comm. with Ganelind 2012; Littorin 2012

[8] Pers. comm. with Littorin 2012

[9] Pers. comm. with Fridén 2012; C. Ericsson 2012; Ganelind 2012; Samuelsson 2012

[10] Pers. comm. with Tidanå 2012; Littorin 2012; Göransson 2012

[11] Pers. comm. with Brubråten 2012; Thoor 2012

[12] Pers. comm. with Thoor 2012

4 Analysis and selection of indicators

This chapter analyses and discusses the results of literature review and in-depth interviews, which were presented in Chapter 3. It develops a list of indicators to measure the effects from VMs on the individual level within each indicator group presented in Chapter 3. All indicators are assessed in terms of their importance to be measured and to be followed up by the authorities, as well as their practical measurability (Table 2 in Section 4.1). The detailed assessment and clarifications for each indicator are presented in the main text after Table 2 (Sections 4.2-4.11).

4.1 Indicators

Table 2 lists all indicators of VM effects on individual that were developed in this study and summarises their assessment. The assessment is performed to select the indicators to be recommended for the measurement by Swedish public authorities. It is based on the inputs from literature and interviews as well as simple logic. There are three criteria against which each indicator is assessed. These criteria include: 1) the importance to measure an indicator; 2) the possibility to measure it; and 3) the importance and possibility to follow up the measurement.

The assessment of indicators applies a three colour coding system:

■	not important/not relevant or difficult to measure/follow up
■	relatively important/somewhat complicated to measure/follow up
■	important/easy to measure/follow up

Table 2. Assessment of indicators to measure the effects from virtual meetings on individual level

#	Indicator group	Code #	Indicator	Importance to measure	Measurability	Possibility and importance to follow up
1a	**Negative stress**	NS 1	*Share of employees feeling that VMs contribute to their work flexibility*	Relatively important from research perspective; not much use for authorities	Easy	Not so important; provides data to advocate the case for VMs
		NS 2	*Share of employees feeling that VMs reduce their stress at work*	Important; correlations between VMs use and employee stress levels	Easy	Important; a support factor for VMs or a need to examine why VMs do not reduce stress
		NS 3	*Share of employees feeling sure about the use of VM equipment*	Important	Easy	Important; to identify if any awareness raising measures on VM use are needed
		NS 4	*Share of employees feeling stressed about the use of VM equipment*	Not so important, if NS 3 is measured	Easy	Not so important, if NS 3 is followed up. Choose either NS 3 or NS 4
		NS 5	*Share of employees feeling more accessible with the use of VMs*	Important; rather to identify VM impacts on the organization	Quite easy; individual perception of one's availability measured, not availability per se.	If the share is significant, important to measure the availability per se (e.g. extra hours with clients due to substituted travel)
		NS 6	*Share of employees feeling more stressed with the increased accessibility through VMs*	Not so important; one's availability can be controlled individually	Easy	Relatively important in case of increased stress for many employees
1b	**Work/leisure time and life quality**	WL 1	*Share of employees feeling that they have more time to work on their tasks due to the increased use of VMs*	Important; shows how the time saved from F2FMs is used	Easy	Important; if the share is significant – a support factor for VMs; if it is low, why? How is the saved time used?

1b	Work/leisure time and life quality	WL 2	*Share of employees feeling that they have more free time for their private lives due to the increased use of VMs*	Important; shows the real contribution to work-life balance from VMs	Easy	Important; if the share is big – support factor for VMs; if it is small, why? Are there any rebound effects?
		WL 3	*Share of employees feeling that VMs contribute to their work-life balance*	More important for research needs than for public authorities	Can be measured; unified definition of 'work-life' balance needed	Not important for a public authority, especially, if WL 1 and WL 2 are measured and followed up.
		WL 4	*Share of employees who think it is as efficient to work in transit as in the office*	Not important; probably the share will be low	Easy	Not important; if the share is low – indirect support of VMs. If it is high - respondents are likely to enjoy travelling (go to WL 6)
		WL 5	*Share of employees who feel good about avoiding business trips*	Important; an indication of the potential to introduce VMs	Easy	Important; if the share is low, behavioural change is needed to support VMs; otherwise - a good climate for VM proliferation
		WL 6	*Share of employees who think business travelling is stimulating and enriching*	Important; will show how much work is needed to influence the travel behaviour	Easy	Relatively important; it is important to see, what kind of trips are considered as stimulating and enriching.
		WL 7	*Share of employees who think business travel is an indication of higher social status*	Important; will show how relevant this barrier is for Swedish public authorities	Easy	Difficult to follow up, in case many think positively. Otherwise it is a good environment to limit travel
2	Social interaction	SI 1	*Share of employees who think it is important to meet despite the availability of VMs*	Not quite important; F2FMs are needed (our research and literature)	Easy	Not important
		SI 2	*Share of employees who think that VMs are unsuitable with unknown people*	Not so important; many think so (previous studies)	Easy	Not important (at least not for a public authority)

2	Social interaction	SI 3	*Share of employees who think VMs allow possibilities to build mutual understanding and trust between unacquainted people*	Not important, if SI 4 is measured	Might be difficult to measure in a survey	Not important, if SI 4 is measured and followed up
		SI 4	*Share of employees who think that trust can be built via VMs but that it requires more time and more meetings*	Important; will show, if employees are aware that special trust building techniques allow develop similar levels of trust in VMs as in F2FMs	Easy	Important; it will be clear, how to better employ trust building depending on the responses; how to make VMs more acceptable from the point of mutual trust
		SI 5	*Share of employees whose ability to keep contacts and/or develop more continuous work relations in the professional network has increased with VM use*	Not so important; probably the majority will answer positively (previous research)	Might be difficult to measure in a survey	Not important
		SI 6	*Share of employees whose abilities to create an impression and establish professional contacts is restricted by the use of VMs*	Probably important; will show if VMs restrict employees' abilities to develop relationships	Might be somewhat difficult to measure in a survey	Probably important; if the share is high, explorations on how to deal with the problem will be needed
		SI 7	*Distribution of employees who find VMs more/less/equally fun and stimulating as F2FMs meetings*	Important to measure; interesting both for public authorities and research	Easy	Important to follow up with identification of parameters that make VMs more or equally fun and stimulating
3	Career and recruiting	CR 1	*Share of employees who think that the presence of VMs in their organisation can be used as a motivation factor during recruiting*	Not very important; important to learn which social groups of potential employees are interested in VMs	Relatively easy; careful question formulation needed to avoid ambiguity in understanding	Not important; these are not the opinions of job applicants
		CR 2	*Share of employees who think VMs represent a good substitution to a physical job interview*	Important; crucial to add a question on why VMs are a bad/good solution; in which instances they are good/bad	Easy	Important; could help use VMs more often for recruitment but also be aware of their limitations

3	Career and recruiting	CR 3	*Distribution of employees who think it is more difficult/easy/the same to identify and evaluate whether a person is suitable for a certain job position, if they have met this person in a VM compared to a F2FM*	Not so important; the majority are likely to think it is more difficult (results from in-depth interviews)	Easy	Not so important; if it is more difficult, the reasons are found in literature and earlier in-depth interviews
4	Performance, productivity and quality	PPQ 1	*Share of employees who think their work efficiency has increased with the use of VMs*	Important; will show if VMs are good for individual work efficiency (will statistically prove preliminary results)	Easy to measure in a survey; "efficiency" should be defined	Important; if many think positively, would be interesting to measure the efficiency more objectively.
		PPQ 2	*Distribution of employees who think their work efficiency during VMs is higher/lower/the same as in F2FMs*	Relatively important; will provide understanding on (dis)advantages of VMs	Easy	Relatively important; identify why the work efficiency in VMs is higher/lower/the same
5	Gender and social equity	GE 1	*Distribution of VM use between male and female employees*	Relatively important for public authorities; interesting for research	Easy	Not so important for public authorities; interesting for research
		GE 2	*Distribution of VM use between employees with small kids and without kids*	Important; to support or decline previous results that VMs provide more flexibility. It will also show if flexible conditions for families with small children are created	Easy to measure in a survey	Important; if employees with kids use VMs more often - a proof for higher flexibility that VMs provide; an argument for public authorities to create more favourable work conditions
		GE 3	*Share of employees whose involvement in the meetings has increased with the introduction of VMs*	Important; will identify those groups who have more equal access to the meetings	Relatively easy to measure but important to get data on how and why the involvement increased	Important; to see which groups benefit from the use of VMs

5	Gender and social equity	GE 4	*Share of employees feeling their ability to express themselves during VMs is limited*	Important; will show, if some employees suffer from unequal treatment during VMs	Relatively easy to measure	Important, if the share is high, to understand what the problems are; if the share is low, not important
6	Personal safety and information security	PIS 1	*Share of employees feeling that their personal safety has been improved due to the increased use of VMs*	Relatively important; if many think positively – support for VMs	Relatively easy; personal security needs to be defined	Not so important
		PIS 2	*Share of employees who rely on VM technology in sharing and exchanging information*	Not so important; probably the share will be high (previous results)	Easy	Not so important; if many do rely – another argument to support VMs
7	Age	AG 1	*Distribution between different age groups and the rate of VM use*	Relatively important (controversial preliminary results)	Easy	Relatively important; if the older generation has more difficulties with VMs, additional support is needed
8	Discipline and attention	DA 1	*Share of employees who feel it is easier/more difficult/about the same to keep attention during a VM as compared to a F2FM*	Relatively important; a need to check preliminary results that it is more difficult to keep attention in a VM	Easy	Relatively important; identify what can be done to improve the levels of attention in VMs (if relevant)
		DA 2	*Factors that influence the ability to keep attention in VMs, and the share of employees that consider these factors relevant to their work routines*	Important; a need to check the importance of the factors from preliminary results	Might be somewhat difficult; important to leave for respondents an open alternative	Important; to identify factors that can be changed or enhanced to increase the attention in VMs
9	Potential to learn	LP 1	*Share of employees who find it easier/more difficult/about the same to learn new things in VMs as compared to F2FMs*	Not so important for public authorities	Can be quite ambiguous to measure	Relatively important to identify why and when the LP in VMs is high
10	Meaning and significance	MS 1	*Share of employees who feel that F2FMs are more serious and important than VMs*	Relatively important (opinions from in-depth interviews vary)	Easy	Relatively important, if any differences between VMs and F2FMs are found
		MS 2	*Share of employees who feel that VMs are 'second class' compared to F2FMs*	Relatively important; will show see, if this barrier exists in public authorities	Easy	Important; take measures to change the feeling changed, if it exists

4.2 Work situation

The impacts from the use of VMs on the work situation of employees at Swedish public authorities have been described in Chapter 3 (Section 3.1) in terms of the two indicator groups: negative stress and work/leisure time and life quality. Examples of employee surveys from the Swedish Environment Protection Agency (Naturvårdsverket) and the Authority for the Courts of Justice (Domstolsverket) include the questions on work-life balance of employees and their stress levels, which means that the data on similar indicators is being collected, however, not in relation to VMs.

4.2.1 Negative stress (NS)

Six indicators (Table 2) have been developed to measure the levels of negative stress (NS) to which the employees using VMs can be exposed to. The assessment of these indicators is discussed below.

- **NS 1: Share of employees feeling that VMs contribute to their work flexibility**

This indicator is easy to measure in a survey and it is relatively important to measure but mainly from the research perspective. Evaluation results are not likely to provide much input or use for Swedish public authorities and would be difficult to follow up. The results would rather provide statistical data to advocate the case for VMs, if many employees feel that VMs contribute to their flexibility, or vice versa.

- **NS 2: Share of employees feeling that VMs reduce their stress at work**

This indicator is easy to measure in a survey and is important to measure in order to assess the stress levels of the employees in the organisation. Evaluation results will allow identify correlations between the use of VMs and the stress levels of the employees. The results are important to follow up. If many employees feel that VMs reduce their stress level, survey results can support the promotion of VM use in the organization advocating the fact that VMs contribute positively to the work-life balance of an employee. If the results show the opposite trend (i.e. VMs do not reduce employee stress levels), there is a need to further explore the reasons behind it.

- **NS 3: Share of employees feeling sure about the use of equipment for VMs**

This indicator is easy to measure in a survey and is important to measure in order to evaluate the employees' knowledge on and habits in the use of VM equipment. Evaluation results will help to discover personal skills-related barriers to the broader adoption of VMs (if any). It is important to follow up these results to identify whether any further education or awareness raising measures on the use of VM equipment are needed in the organization.

- **NS 4: Share of employees feeling stressed about the use of equipment for VMs**

This indicator is easy to measure in a survey; however, it is not so important to measure NS 4 and to follow it up, if NS 3 is assessed. NS 3 is expected to provide a slightly broader perspective on employees' user skills of VM equipment apart from just measuring the individual stress levels. Moreover, if a person feels sure about the equipment use, it is highly unlikely that the person would feel any stress linked to it. In this way NS 3 and NS 4 are self-exclusive.

- **NS 5: Share of employees feeling more accessible for clients with the use of VMs**

This indicator is somewhat complicated to measure in a survey on the employee perceptions since the 'accessibility' is subjectively defined by each respondent and therefore it is the individual perception of one's accessibility that is measured, and not the accessibility per se (e.g. the accessibility for clients in terms of hours per day). NS 5 is important to measure rather from the perspective of VM effects on the organization than on each employee. In

case the evaluation results indicate a significant share of those feeling more accessible with the increased use of VMs, it is important to follow up with another study measuring the employee accessibility in more objective terms (e.g. extra hours spent with clients due to a substituted travel to a meeting).

- o **NS 6: Share of employees feeling more stressed with the increased accessibility through VMs**

This indicator is easy to measure in a survey. However, it is not particularly important to measure NS 6 since in the most cases individual accessibility (and linked to it possible associated stress levels) can be managed by each person. If NS 6 is measured, it is relatively important to follow up, if the increased stress for many employees is observed due to their higher accessibility. In that case the organization might need to plan discussions with employees, support them and provide psychological advice on how to reduce personal stress levels from higher accessibility, etc.

4.2.2 Work/leisure time and life quality (WL)

Seven indicators (Table 2) have been developed to measure work-life (WL) balance and life quality of the employees using VMs. Their assessment is discussed below.

- o **WL 1: Share of employees feeling that they have more time to work on their tasks due to the increased use of VMs**

This indicator is easy to measure in an employee survey, and is important to measure to discover how the saved time from F2FMs is actually used. Results on WL 1 are important to follow up in an organization. If the share of employees feeling they have more time to work on their work tasks due to the increased use of VMs is high, then survey results can support the further promotion of VMs in the organization. In the case of opposite results, the follow up is needed to identify where and how the saved time is used.

- o **WL 2: Share of employees feeling that they have more free time for their private lives due to the increased use of VMs**

This indicator is easy to measure in an employee survey, and is important to measure as it helps identify the direct contribution to work-life balance of employees in an organization from the increased use of VMs. Survey results are important to follow up. In case the share of employees feeling the positive contribution to their private lives from the increased use of VMs is significant, this can serve as one of the arguments for VMs. In the case of the opposite results, it is important to study the reasons behind (e.g. whether there are any rebound effects meaning that people tend to work more when they get some extra time).

- o **WL 3: Share of employees feeling that VMs contribute to their work-life balance**

This indicator can be measured in an employee survey, however, the results might be difficult to compare as different people may imply different things under the "work-life balance" when answering the question. Thus, if measured, the additional definition of "work-life balance" in the questionnaire will be needed. In this respect, indicators WL 1 and WL 2 are more concrete and essentially reflect the same type of issue, if measured together. WL 3 is perhaps more important to measure from a research perspective rather than from the perspective of Swedish public authorities as the assessment results would hardly entail any practical implications. For this reason it is not important to follow up by a public authority, and especially, if WL 1 and WL 2 are measured and followed up.

- o **WL 4: Share of employees who think it is as efficient to work in transit as in the office**

This indicator is easy to measure in a survey; however, not so important to measure. Most likely the share of those who think it is as efficient to work while in transit as it is in the office will be quite low since in-depth interviews and common logic point in the opposite

direction. WL 4 is not important to follow up either. If the share is low, it indirectly supports the idea of VMs, which happen in the office. If the share is high, then the respondents most likely enjoy travelling, which is more appropriately measured by WL 6.

- o **WL 5: Share of employees who feel good about avoiding business trips**

This indicator is easy to measure in an employee survey. It is important to measure since the results will indicate the potential to introduce VMs. WL 5 is important to follow up in an organization. In case the share is high, there is a favorable climate for the proliferation of VMs in the organization. In the case of opposite results, additional measures will be required for behavioural changes in order to support the introduction and/or expansion of VMs.

- o **WL 6: Share of employees who think business travelling is stimulating and enriching**

This indicator is easy to measure in an employee survey. It is important to measure as the evaluation results would indicate how much work needs to be done to influence the travel behaviour in an organisation. The assessment is also relatively important to be followed up in order to identify what kind of trips are considered as stimulating and enriching, and if there is any link between the individual frequency of travelling and WL 6. Such a follow up will help explore the solutions for a substitution of the mentioned travel advantages with non-travel alternatives and/or to establish a better balance between F2FMs and VMs in the organisation.

- o **WL 7: Share of employees who think business travel is an indication of higher social status**

This indicator is easy to measure in a survey. It is important to measure WL 7 since the evaluation results will help identify how relevant the barrier of 'higher social status' is and whether it is relevant for Swedish public authorities (since the opinions in in-depth interviews varied). It may be somewhat difficult to follow up, if the majority thinks business travel is the indication of higher social status. In this case the attitudes will need to be changed to create a more favourable climate for the proliferation of VMs, which might turn out as a long process unless the use of VMs is enabled and embedded in organizational routines. If not so many respondents in the organisation turn out to agree with the statement, then there is a good environment to limit travel and further introduce VMs.

4.3 Social interaction (SI)

Seven indicators (Table 2) have been developed to measure the effects on the social interaction (SI) of employees at Swedish public authorities, who use VMs. Their assessment is presented below.

- o **SI 1: Share of employees who think it is important to meet despite the availability of VMs**

This indicator is easy to measure in an employee survey. It is, however, not so important to measure as the evidence from in-depth interviews and previous research by others shows that nearly everyone is sure there is a need for personal meetings, which can be explained by the human nature. For the same reason SI 1 is not important to follow up.

- o **SI 2: Share of employees who think that VMs are unsuitable with unknown people**

This indicator is easy to measure in an employee survey. However, it is not so important to measure for the same reason as SI 1: most of people think VMs are not very suitable to have with people you have not met before in real life, which has been shown in our research and research by others. SI 2 is not important to follow up, at least not from the perspective of a Swedish public authority.

- o **SI 3: Share of employees who think VMs allow possibilities to build mutual understanding and trust between people who do not know each other**

This indicator might be somewhat difficult to measure in an employee survey as it might confuse the respondents because of its complexity and different aspects involved. It is not important to measure and follow up SI 3, if SI 4 is measured and followed up.

- o **SI 4: Share of employees who think that trust can be built via VMs but that it requires more time and more meetings**

This indicator is easy to measure in an employee survey, and is important to measure. Evaluation results will demonstrate whether employees are aware of the fact (or have a natural feeling for it) that there are trust building techniques allowing the meeting participants develop similar levels of trust in VMs as in F2FMs. It is important to follow up the survey results to identify how to act to make VMs more acceptable from the point of mutual trust building, how to better employ trust building techniques in an organisation depending on the responses, etc.

- o **SI 5: Share of employees whose ability to keep contacts and/or develop more continuous work relations in the professional network has increased with VM use**

This indicator might be somewhat complicated to measure as the challenge is in the formulation of the question(s) in such a way that is equally understood by the respondents. It is not so important to measure SI 5 as it is quite likely that the majority of respondents will admit that their ability to keep contacts and continuous work relations has increased with the use of VMs. This has been observed in most of in-depth interviews. SI 5 is not so important to follow up either. In case the measured share has increased, it is a good argument for the further expansion of VM use. Otherwise (meaning that the ability to keep contacts has not increased or has decreased) there is hardly anything to do about this on behalf of the organisation.

- o **SI 6: Share of employees whose abilities to create an impression and establish professional contacts is restricted by the use of VMs**

This indicator might be somewhat difficult to measure in an employee survey due to the complexity of the issue. The careful question formulation is important to make sure that the respondents get a similar understanding of the question and of its related implications. SI 6 is probably important to measure and to follow up. Evaluation results will demonstrate whether some employees feel that VMs restrict their abilities to establish professional contacts and create an impression. If the share of such responses is high, further explorations on how to deal with the issue will be needed (e.g. find a balanced number of F2FMs and VMs; find out which types of meetings contribute to relationship building and what the best ways to carry them out are).

- o **SI 7: Distribution of employees who find VMs more/less/equally fun and stimulating as F2FMs meetings**

This indicator is easy to measure in an employee survey. It is important to measure SI 7 as it would provide useful information both from the research perspective and from the perspective of Swedish public authorities. The assessment of SI 7 will help to understand which types of VMs are more stimulating than others. It is important to follow up the evaluation results with a study to identify which parameters of VMs make them more or equally fun and stimulating as F2FMs. Such parameters could help explore the facilitating factors to promote VMs in organizations.

4.4 Career and recruiting (CR)

Three indicators (Table 2) have been developed to measure the effects on the career of employees at Swedish public authorities, who use VMs, and recruiting possibilities in general. The assessment of these indicators is discussed below.

o **CR 1: Share of employees who think that the presence of VMs in their organisation can be used as a motivation factor during recruiting**

This indicator is relatively easy to measure in an employee survey as soon as the respondents get the same understanding of the question, i.e. what is implied under the 'motivation factor during recruiting'. CR 1 is, however, not so important to measure from the perspective of Swedish public authorities. It could be important to learn though which social groups or types of potential employees tend to be interested to use VMs more often. This is, however, a much broader issue that might require a survey with the participation of the broader society. If such survey is performed, the availability of VMs should be kept in mind as a factor to motivate these particular social groups to take/apply for a particular position. CR 1 is not important to follow up since the evaluation results would rather reflect the opinions of current employees, and not those of job applicants.

o **CR 2: Share of employees who think VMs represent a good substitution to a physical job interview**

This indicator is easy to measure in an employee survey; however, the questions should target those employees who are involved in the recruiting process in an organisation. It is important to measure CR 2 as well as it is important to add questions on the reasons why people think VMs are a bad or a good solution for a job interview, and in which instance they are good/bad. CR 2 is important to follow up to identify when VMs can be used for recruitment more often as well as to improve the understanding of their limitations in this area of applicability.

o **CR 3: Distribution of employees who think it is more difficult/easy/the same to identify and evaluate whether a person is suitable for a certain job position, if they have met this person in a VM compared to a F2FM**

This indicator is easy to measure in an employee survey. It applies, first of all, to persons in managing positions, who hire their co-workers. CR 3 is not so important to measure because it is quite likely that the majority of respondents would find it more difficult to identify and evaluate, if a person is suitable for a certain job position, if they have met this person in a VM. Most of respondents of in-depth interview have indicated so. CR 3 is not so important to follow up either: in case the respondents find it more difficult, the reasons for it are found in the literature and our earlier empirical research.

4.5 Performance, productivity and quality (PPQ)

Three indicators (Table 2) have been developed to measure the effects on the employee performance, work productivity and quality in response to the use of VMs. Their assessment is discussed below.

o **PPQ 1: Share of employees who think their work efficiency has increased with the use of VMs**

This indicator is relatively easy to measure in an employee survey, however, there is a risk of different understanding of "efficiency" by each employee. Therefore a clear definition needs to be included in the questionnaire. PPQ 1 is important to measure as the survey results will demonstrate whether VMs represent a good idea from the perspective of the individual work efficiency, and have a potential to statistically support earlier results from the literature and in-depth interviews. PPQ 1 is also important to follow up. If many employees think their work efficiency has increased with the increased use of VMs, it would be valuable to measure this efficiency in more objective terms (e.g. number of managed tasks by the employee) as well as to identify the overall effect on the efficiency of organization. Also if the share of employees who think their work efficiency has increased is high, it is a good supporting argument for the use of VMs.

- **PPQ 2: Distribution of employees who think their work efficiency during VMs is higher/lower/the same as in F2FMs**

This indicator is relatively easy to measure in an employee survey. It is also relatively important to measure as evaluation results will provide better understanding on the advantages and disadvantages of VMs. PPQ 3 is relatively important to follow up to identify the reasons why the work efficiency in VMs is higher/lower or similar to that in F2FMs. Such information will help better understand how VMs should be used to optimize the efficiency levels in an organization.

4.6 Gender and social equity (GE)

Four indicators (Table 2) have been developed to measure the implications for gender and social equity from the increased use of VMs by employees at Swedish public authorities. Their assessment is provided below.

- **GE 1: Distribution of VM use between male and female employees**

This is easy to measure in a survey as the data needs to be collected on the employee gender and his/her use patterns of VMs. GE 1 is interesting to study from the research perspective to explore whether VM use is gender related, since no previous studies have been found on this. It is somewhat important to measure GE 1 from the perspective of Swedish public authorities whose interest should be in the provision of equal employment opportunities for men and women. Since the data on VM use needs to be collected anyways, this indicator can be analysed by researchers for their purposes. There is no need to follow up, if there is no significant difference between men and women in their use patterns of VMs. In case such a difference exists, the follow up would be a research task rather than the one for public authorities.

- **GE 2: Distribution of VM use between employees with small kids and without kids**

This indicator is easy to measure in an employee survey, and is important to measure. It has been mentioned during in-depth interviews in our research and in the literature that VMs have implications for families with children providing them with higher flexibility. Measuring GE 2 will show how the situation looks like in reality and whether the respected organization is able to create such flexible conditions for the families with small children. GE 2 is important to follow up. If there is a statistically significant difference between the two groups of employees (i.e. employees with kids use VMs more often), than it is an evidence of the higher flexibility that VMs provide, which is a useful argument in research. For public authorities the expanded use of VMs can be applied as an argument to create more favourable conditions for the employees.

- **GE 3: Share of employees whose involvement in the meetings has increased with the introduction of VMs**

It is relatively easy to measure this indicator in an employee survey. However, to reflect the issue of social equity, it is important to get the comments on how one's involvement has increased and why the respected employees have been restricted to participate in some meetings before the introduction of VMs in their organization. GE 3 is important to measure since, if measured adequately, it is supposed to help identify those social groups that have more equal access to the meetings. GE 3 is important to follow up to identify which groups benefit from the use of VMs and in which instances.

- **GE 4: Share of employees feeling their ability to express themselves during VMs is limited**

This indicator is relatively easy to measure in an employee survey. The challenges can be linked to the difficulty for the respondents to remember the instances of not having been able to express themselves in a VM unless it has been something significant or that they would not want to point out other individuals who treated them somewhat unequally in a

VM. GE 4 is important to measure to identify whether some employees suffer from unequal treatment during VMs – an important ethical factor influencing the reputation of an organization. In case the share of employees who have experienced unequal treatment in VMs is high, it is important to follow this up to explore the problems and look for the ways to solve them. In case the share is low there is no need to follow up.

4.7 Personal safety and information security (PIS)

Two indicators (Table 2) have been developed to measure the implications for personal safety and information security from the increased use of VMs by employees at Swedish public authorities. Their assessment is provided below.

> o **PIS 1: Share of employees feeling that their personal safety has been improved due to increased use of VMs**

This indicator is relatively easy to measure in an employee survey. However, the questions need to be carefully formulated to ensure that respondents understand them similarly (e.g. it will be helpful to include the clarification of "personal safety" in the survey). PS 1 is relatively important to measure. In case many respondents think their personal safety has increased due to the increased use of VMs, the results provide a support argument for VMs. PS 1 is not so important to follow up.

> o **PIS 2: Share of employees who rely on VM technology in sharing and exchanging information**

This indicator is easy to measure in an employee survey. It is, however, not so important to measure since it is highly likely that most employees using VMs do rely on technology – otherwise they would probably not be using VMs. In addition, the results of in-depth interviews have not pointed to any serious problems with information security for those using VMs in their work. PS 2 is not so important to follow up. In case many employees do rely on VMs, it is just another argument for VM support.

4.8 Age (AG)

One indicator has been developed to measure the age implications for the use of VMs by employees at Swedish public authorities. Its assessment is discussed below.

> o **AG 1: Distribution between different age groups and the rate of VM use**

This indicator is very easy to measure in an employee survey by adding age boxes on the questionnaire and the question on the frequency of VM use. AG 1 is relatively important to measure since there have been controversial views during in-depth interviews on whether VM use is age dependent or not. No indications in the literature have been found on this matter. Another reason to measure this indicator is to explore any possible instances of age discrimination. AG 1 is relatively important to follow up. If it is the older generation that has more difficulties with the use of VM (i.e. there is a statistically significant difference between young and old), then additional support for this category will be needed to speed up the adoption of VMs in their work routines.

Another type of relationship that is interesting to study from the research perspective is the one between the age and the frequency to travel for work. This is easy to analyse statistically once the data on age and travel behaviour is collected in the surveys.

4.9 Discipline and attention (DA)

Two indicators (Table 2) have been developed to measure the effects on the employee's levels of attention during VMs as compared to F2FMs. Their assessment is presented below.

> o **DA 1: Share of employees who feel it is easier/more difficult/about the same to keep attention during a VM as compared to a F2FM**

This indicator is easy to measure in an employee survey. DA 1 is relatively important to measure. Many respondents during in-depth interviews have mentioned that it was more

difficult to keep focus and attention in a VM. It would be useful to check this statement statistically. DA 1 is relatively important to follow up to see what can be done to improve the levels of attention in VMs (if relevant).

- o **DA 2: Factors that influence the ability to keep attention in VMs, and the share of employees that consider these factors relevant to their work routines**

Examples of factors that might influence the ability to keep attention in VMs include sound and picture quality, possibility to make oral or written contributions by meeting participants, length and location of the meeting etc. DA 2 might be slightly difficult to measure in an employee survey, if a selection list of predefined factors is offered to respondents. There is a risk that some factors will be missing from such a list. Therefore it is important to include the option for the employees to suggest their own factors, which are not on the list. DA 2 is important to measure. From the point of view of the public authority, DA 2 is important as it is linked to the employee efficiency. From the research perspective it is interesting to check how important the factors derived from in-depth interviews are in reality. It is important to follow up this evaluation to identify which factors need to be changed/enhanced to support the employees and help them have higher attention levels in VMs.

4.10 Potential to learn (LP)

One indicator (Table 2) has been developed to measure the effects on the employee's potential to learn (LP) during VMs as compared to F2FMs. Its assessment is discussed below.

- o **LP 1: Share of employees who find it easier/more difficult/about the same to learn new things in VMs as compared to F2FMs**

This indicator can be somewhat ambiguous to measure as different people imply different things under their learning potential as well as different ways of learning. Perhaps, if measured, specific examples should be provided to guide the respondents. LP 1 is not so important to measure from the point of view of public authorities, at least not in the instances directly linked to the employee education. If LP 1 is measured, it is important to follow up the results to identify the reasons and instances about the learning potential in VMs.

4.11 Meaning and significance (MS)

Two indicators (Table 2) have been developed to measure the perceptions of employees at Swedish public authorities of VM importance as compared to that of F2FMs. Their assessment is discussed below.

- o **MS 1: Share of employees who feel that F2FMs are more serious and important than VMs**

This indicator is easy to measure in an employee survey. It is relatively important to measure since the opinions on this matter from in-depth interviews vary. MS 1 is relatively important to follow up, in case any statistically significant differences are discovered in this respect between F2FMs and VMs. Then the reasons behind such phenomenon need to be studied and the solutions to make F2FMs and VMs more equal are important to be sought.

- o **MS 2: Share of employees who feel that VMs are 'second class' compared to F2FMs**

This indicator is easy to measure in an employee survey. MS 2 is relatively important to measure to see whether this perception barrier still exists in the context of Swedish public authorities. If measured, MS 2 is important to follow up in order to seek solutions to change the employee perceptions of inequality between F2FMs and VMs (if relevant).

4.12 Summary of results: What to measure?

Overall 37 indicators structured in 10 groups have been assessed in this chapter. Only those indicators that scored with three green boxes or two green and one yellow box have been

selected for further evaluation. Overall 18 indicators have been selected. Nine of them were identified as important to measure and follow up in Swedish public authorities to assess the effects of VMs on the individual level as well as easy to measure in an employee survey; four indicators have been labelled as "important to measure and follow up", although some additional precautions need to be taken when formulating the questions for the survey; and five indicators have been identified from "important" to "relatively important" to measure and/or to follow up, which are also easy to measure in a survey (Table 3).

Table 3. Indicators recommended to measure and follow up by Swedish public authorities

#	Indicator group	Code #	Indicator
IMPORTANT AND EASY TO MEASURE AND FOLLOW UP			
1a	**Negative stress**	NS 2	*Share of employees feeling that VMs reduce their stress at work*
		NS 3	*Share of employees feeling sure about the use of VM equipment*
1b	**Work/leisure time and life quality**	WL 1	*Share of employees feeling that they have more time to work on their tasks due to the increased use of VMs*
		WL 2	*Share of employees feeling that they have more free time for their private lives due to the increased use of VMs*
		WL 5	*Share of employees who feel good about avoiding business trips*
2	**Social interaction**	SI 4	*Share of employees who think that trust can be built via VMs but that it requires more time and more meetings*
		SI 7	*Distribution of employees who find VMs more/less/equally fun and stimulating as F2FMs*
3	**Career and recruiting**	CR 2	*Share of employees who think VMs represent a good substitution to a physical job interview*
5	**Gender and social equity**	GE 2	*Distribution of VM use between employees with small kids and without kids*
IMPORTANT BUT LESS EASY TO MEASURE AND FOLLOW UP			
4	**Performance, productivity and quality**	PPQ 1	*Share of employees who think their work efficiency has increased with the use of VMs*
5	**Gender and social equity**	GE 3	*Share of employees whose involvement in the meetings has increased with the introduction of VMs*
		GE 4	*Share of employees feeling their ability to express themselves during VMs is limited*
7	**Discipline and attention**	DA 2	*Factors that influence the ability to keep attention in VMs, and the share of employees that consider these factors relevant to their work routines*

#	Indicator group	Code #	Indicator
RELATIVELY IMPORTANT AND EASY TO MEASURE AND FOLLOW UP			
1a	**Negative stress**	**NS 5**	*Share of employees feeling more accessible with the use of VMs*
1b	**Work/leisure time and life quality**	**WL 6**	*Share of employees who think business travelling is stimulating and enriching*
		WL 7	*Share of employees who think business travel is an indication of higher social status*
7	**Age**	**AG 1**	*Distribution between different age groups and the rate of VM use*
10	**Meaning and significance**	**MS 2**	*Share of employees who feel that VMs are 'second class' compared to F2FMs*

In order to be able to study various relationships and explore correlations between the variables, it is deemed important from research perspective to include the following variables in the survey: age; gender and presence of children; frequency of travelling; frequency of VM use; and experience in using VMs.

It will be important to analyse whether the following indicators are **age**-dependent:

- o confidence about the use of VM equipment (NS 3);
- o increased ability to participate in the meetings due to VM use (GE 3);
- o increased accessibility of employees due to VM use (NS 5);
- o employees feeling their ability to express themselves during VMs is limited (GE 4);
- o employees who find VMs fun and stimulating (SI 7);
- o positive/negative feelings about travelling for business (WL 6/WL 5);
- o employees who think business travel is an indication of higher social status (WL 7).

It will be also valuable to study whether the following indicators are **gender**-related:

- o confidence about the use of VM equipment (NS 3);
- o positive/negative feelings about travelling for business (WL 6/WL 5);
- o increased ability to participate in the meetings due to VM use (GE 3);
- o employees who find VMs fun and stimulating (SI 7);
- o increased availability of employees due to VM use (NS 5);
- o employees feeling their ability to express themselves during VMs is limited (GE 4).

Relationship between the presence of **children** as well as **small children** (below 7 years old) and the following variables are important to be analysed:

- o increased free time for private life due to VM use (WL 2);
- o positive/negative feelings about travelling for business (WL 6/WL 5);
- o increased ability to participate in the meetings due to VM use (GE 3);
- o increased availability of employees due to VM use (NS 5).

It will be important to study whether any correlations can be observed between the **frequency of business travelling** and the following indicators:

- o reduced stress at work due to VM use (NS 2);

- increased time for work tasks due to VM use (WL 1);
- increased free time for private life due to VM use (WL 2);
- positive/negative feelings about travelling for business (WL 6/WL 5);
- increased work efficiency due to VM use (PPQ 1);
- increased availability of employees due to VM use (NS 5);
- employees who think business travel is an indication of higher social status (WL 7);
- employees feeling that VMs are 'second class' compared to F2FMs (MS 2).

Relationships between the **frequency of VM use** in the work routines of employees and the following indicators are deemed important to be explored:

- reduced stress at work due to VM use (NS 2);
- confidence about the use of VM equipment (NS 3);
- increased time for work tasks due to VM use (WL 1);
- increased free time for private life due to VM use (WL 2);
- employees thinking that trust can be built in VMs but requires more time and more frequent meetings (SI 4);
- employees who find VMs fun and stimulating (SI 7);
- increased work efficiency due to VM use (PPQ 1);
- increased availability of employees due to VM use (NS 5).

It is deemed valuable to analyse whether any correlations between the **experience** of VM use (i.e. how long the employees have been using VMs in their work routines) and the following indicators exist:

- confidence about the use of VM equipment (NS 3);
- positive/negative feelings about travelling for business (WL 6/WL 5);
- employees thinking that trust can be built in VMs but requires more time and more frequent meetings (SI 4);
- employees who find VMs fun and stimulating (SI 7);
- employees thinking that VMs represent a good solution for a job interview (CR 2);
- employees feeling that VMs are 'second class' compared to F2FMs (MS 2).

5 Discussion and future work

This study has collected and analysed individual perceptions, opinions and experiences about the use of VMs by employees at Swedish public authorities and several other companies, who apply VMs in their work routines. Different issues around VMs use have received a number of comments from the respondents. In some cases their opinions were similar, and sometimes they varied. Discussion in this Chapter is structured in line with the degree of the respondent opinion divergence on various aspects of VMs (Sections 5.1 and 5.2). Directions for future work and suggested pathways for the follow up of this study are then presented in Section 5.3.

5.1 Similar opinions on virtual meetings

All respondents agree that the major advantages of VMs include time and cost savings, which have been reported in previous studies and is broadly described in the literature. There is also a general agreement on the fact that travelling to meetings causes stress or pressure in the one way or another.

The majority agrees that working in office is more efficient than while in transit to a meeting, and that it is more efficient to work, if one travels by train than by airplane or car. These are common sense statements, especially considering the fact that trains in Sweden are well-equipped with power supply for computers and have possibilities for the Internet connection. Most of the interviewees also agree that VMs improve personal work efficiency due to time savings from the avoided travel to and from meetings.

Nearly all respondents mention the importance of physical meetings and the need to meet in person at least occasionally despite available technologies. The same opinion is voiced with regards to the importance of the first meeting to be carried out in person. All interviewees point to the fact that VMs miss the social agenda as compared to F2FMs, which is revealed in one way or another. This is understandable since all VMs represent less rich media than F2FMs: the latter open room for various kinds of social interaction including the body language, chatting at coffee breaks, having lunch with meeting partners, socializing after the meeting etc.

Most of respondents have not observed any influence from the use of VMs on their career development. This can be linked to the fact that these people do not work with CMC technologies or VMs directly but use them as tools in their work. Therefore it is difficult for people to link the use of VMs to their career advancement, and at times it can be challenging to remember such occasions (if any) instantly, unless they have made a really significant impact.

The majority of respondents find it more difficult to identify and evaluate whether a person is suitable for a certain job position, if they have met this person during a VM compared to a F2FM. This is highly likely to be linked to the human nature and habits as well as the desire to use as many senses as possible at a time once an important evaluation needs to be done. F2FMs represent rich media, which allows for the use of all human senses.

Nearly all respondents have referred to the fact that VMs provide more opportunities for the parents of small children, whose participation in F2FMs can sometimes be restricted (e.g. because they need to stay home with sick children, leave them at or collect from the kindergarten etc.).

None of the interviewees has indicated any problems linked to the sharing of information in VMs or that he/she was concerned about the information security. This is also probably due to the fact that people interviewed represent current users of VMs, who should have had a certain degree of trust with regards to the safety of technology before adopting it in their work routines.

5.2 Diverging opinions on virtual meetings

Despite many similarities in the responses, many opinions and perceptions about VM use have diverged between different respondents in our study. Those employees who felt sure about the use of VM equipment have not experienced any stress related to the equipment handling, while those less skilful in this area experienced more stress.

The opinions of respondents on whether travel is the indication of higher social status have diverged. While some interviewees consider that travel has no connection to the status, others feel these two variables are closely linked (i.e. the higher one's status is, the more one travels). This finding is somewhat difficult to explain before any statistical results have been received. The latter will help to explore among other things, if such opinions have any correlation with age, e.g. if the younger generation tends to perceive travel less as the indication of high status or VMs less as "second class" meetings compared to F2FMs. Also it might be true that such opinions would vary between public and private sectors (there seem to be sharper associations with the travel as the indication of higher social status in business) or between Sweden and other countries or cultures (Swedish culture has a low level of hierarchy, where issues like social status bear less cultural value than in high hierarchy cultures). Another context specific factor is the high level of environmental awareness in Scandinavia, which may contribute to the lower value allocated to personal trips in human perceptions. These aspects need to be explored in detail and are subjects for future research.

The majority of respondents in this study find that it is more difficult to build trust in VMs as compared to F2FMs. However, two respondents have indicated it could be possible to build trust gradually with more frequent VMs, which is also reflected in scientific research on VTs. This difference in opinions is likely to be linked to the different levels of skills and expertise in relation to VMs since one of these two respondents is an IT and VM expert while another one seems to be fond of technology and IT tools.

Many respondents suggest that seminars and workshops, which normally require much interaction between their participants, are not suitable to be conducted virtually, which has been also proven in previous studies on the matter. However, this seems to be context and situation dependent, since some interviewees still report about the advantages of VMs in offering interactive techniques such as document sharing. Perhaps these differences point to the divergence in individual preferences as well as depend on the number of factors such as the nature of task, number of participants in a meeting, tools available in a VM, suitability of these tools for the task, skills to operate the tools efficiently by the meeting participants, etc.

Most of the respondents except for one agree that VMs have increased their possibility to keep professional contacts or develop more continuous work relations while one respondent has indicated the opposite. This respondent thinks that people need to meet in order to keep in touch, which can probably be linked to the individual preferences of keeping in touch.

There have been diverging opinions on how fun and stimulating VMs are in comparison to F2FMs. Many find that VMs underscore on this scale while a number of opinions supported the fact that the form of the meeting does not define how fun and stimulating the meeting is. Such divergence is most likely linked to personal preferences and comfort with using new forms of meeting instead of well-established and old fashioned F2FMs.

Diverging opinions have also been observed on whether the presence of VMs in an organization can be used as a motivation factor in the recruitment process or not. This trend is difficult to explain without the examination of more detailed reasons behind such thoughts. Probably this is related to whether a person is actively recruiting people him/herself and therefore is knowledgeable about existing and evolving trends in the preferences and the needs of job applicants. This issue might require further exploration with a quantitative study in the society, as it indicated in previous chapter.

While some respondents would not carry out a job interview with the help of a VM, others find it as a useful tool at least during certain stages in the selection of candidates for a certain

job position. Such varied opinions are likely to be linked to the routines established in the organization, which the respondents represent (e.g. some organisations conduct video or telephone interviews to pre-select the candidates before they invite them for a personal interview, others are more keen on getting a broader selection of candidates from different regions in Sweden etc.). This is, however, just the author's assumption, and only a quantitative study can prove whether any statistical difference exists. The diverging opinions on this matter can also be linked to the ways one feels more comfortable of getting to know a job applicant and form a personal opinion about him/her; or whether an employer has long experience of job interviews or not; or how easy it is for the employer to define during a personal interview whether the applicant is suitable for a certain job position or not etc.

Diverging opinions of respondents in this study have also been observed on whether gender equity is an important indicator group to measure in its relation to VMs. First, this can be linked to the fact that some interviewees are more than others interested in gender issues and equality (primarily, women). Second, some respondents experienced difficulty to identify the relationship between VMs and gender without additional streaming questions/clarifications, which have not been used in this study not to provoke any presupposed answers.

While many interviewees noted there were certain implications from the use of VMs for social equity some have not been able to identify any such connection. However, as in the case with gender equity, the question has been formulated in a way that tried to avoid any presupposed answers. This has apparently complicated the situation for the respondents to not only come up with any examples of such a connection but also to realise whether any link between VMs and social equity exists. One respondent noted that VMs may be favourable for the meeting participants from other countries for the reasons of diplomatic nature (e.g. in case they need a visa to travel to a meeting). However, it should be noted that this is unlikely to be relevant for the majority of meetings at Swedish public authorities since they would rarely engage participants from other countries (unless in special occasions when the meeting is linked to some international project).

Contradictory opinions have been received on whether the use of VMs and technology is age dependent or not. Since no studies have been found on the matter, it would be worth to check the existence of such relationship statistically.

Different perceptions have been reported on the comparison of the respondent's ability to keep attention in a VM and a F2FM. While many felt it was more difficult to keep their focus in VMs, a number of factors seem to be embedded here, and the issue is not that straightforward. In many cases this ability can be context dependent (e.g. whether a meeting involves video, whether a participant seats in his/her own office, what kind of meeting it is, how important and how long the meeting is, how well-prepared and structured it is, etc.). Therefore a more detailed study on this group of indicators is deemed important to fill in the outlined knowledge gaps.

A similar divergence of opinions is observed when it applies to the learning potential during VMs and F2FMs. While some respondents indicate that it is easier to learn F2F, others point to equal or even better learning opportunities that VMs can provide in comparison to a personal meeting. This is linked, first, to the context and the nature of the problem/subject to be studied, and, second, to the level of knowledge and skills about the opportunities that virtual tools can provide. To some respondents it may be difficult to answer this question, if they have not been involved in any learning or education with the use of CMC technologies.

Different opinions have been received when comparing the importance and meaning of VMs as compared to F2FMs. There is a need to check statistically whether this difference is significant, and if so, what the reasons behind the differentiating opinions are. Sometimes the respondents consider that to organize a F2FM costs more than a VM, and therefore perceive the F2FM as more important. As it has been mentioned earlier, there is also a need to check whether the perception of VMs as "second class" meetings is relevant for Swedish public authorities.

5.3 Directions for future work and follow up

Section 4.12 suggested a list of indicators to be measured in an employee survey by Swedish public authorities. Sections 5.1 and 5.2 highlighted a number of points that would require quantitative studies and further research to discover the relationships between variables as well as to explain the nature and mechanisms of these relationships.

While the practicalities about carrying out the survey will be provided in Chapter 6, this Section discusses the follow up implications of 18 indicators suggested for the measurement. Among other things, it is believed that the measurement of these indicators and the follow up of its results will throw some light on the current trends and issues surrounding VMs. One of the interesting aspects to analyse will be the evolution of these trends and individual perceptions over the last years (as compared to previous research in the field) with the advancement of VM technology.

5.3.1 NS 2: Share of employees feeling that VMs reduce their stress at work

If this share is high, the follow up research can study how exactly VMs reduce the employee stress. As it was mentioned in Section 4.2, such survey results can as well be used to support the promotion of VMs and advocate that VMs in the organization contribute to the improved work-life balance of its employees.

In case this share is low, there is a need for the follow up study to discover what the reasons behind this phenomenon are. The relationships between this indicator, the travel frequency of an employee and his/her frequency of participation in VMs need to be checked for any possible correlations.

5.3.2 NS 3: Share of employees feeling sure about the use of VM equipment

If many employees feel sure about the use of VM equipment, then the organization has been quite advanced in this area and there is no need for the follow up. In the case of opposite results, a follow up will be needed in the form of awareness raising and education events including workshops and test sessions, dissemination of detailed instructions and guidelines to employees on how to use VM technology, creation of VM support units with experts who can answer the questions and help the users etc.

5.3.3 WL 1: Share of employees feeling that they have more time to work on their tasks due to the increased use of VMs

If this share is high, the follow up can be done to assess the work efficiency related to the introduction of VMs in more objective terms (e.g. number of extra hours used for work tasks due to time savings from the avoidance of travelling to a business meeting). Such survey results can also support further promotion of VMs in the organisation.

In case of the opposite results, there will be a need to follow up with the study to identify how and where the saved time is used, if the employees do not dedicate it to work.

5.3.4 WL 2: Share of employees feeling that they have more free time for their private lives due to the increased use of VMs

If this share is high, it is the evidence that VMs contribute positively to the one's work-life balance and the survey results can be used in the organization to promote further implementation of VMs. The follow up can be made to estimate the amount of private time saved from reduced travelling, however, such a study is rather interesting from the researcher perspective rather than from the perspective of a Swedish public authority.

In case this share is low, the follow up study needs to be performed to find out the reasons why many employees do not receive additional time for their private lives from the time saved with VMs. In case the saved private time is used for work tasks, it is a rebound effect that VMs deliver, and in this case they can hardly be claimed to contribute positively to the work-life balance of employees.

5.3.5 *WL 5: Share of employees who feel good about avoiding business trips*

If this share is high, there is a good potential for the further introduction of VMs in the organization. Apparently such employees are likely to appreciate meeting at a distance from their home places. It would be also interesting to discover whether any correlations exist between the travel preferences and if the employees have (small) children or not.

If this share is low, there is a need for a follow up study to find out why the employees are not that interested in avoiding business trips, what kind of benefits they think such trips deliver to them etc. as well as whether there is any relationship between the age of an employee and his/her preference for travelling. Such a follow up study would help discover instances where extra efforts need to be performed in order to make those who like to travel interested in substituting (some of) their business trips with VMs.

5.3.6 *SI 4: Share of employees who think that trust can be built via VMs but that it requires more time and more meetings*

If this share is high, it is a good climate in the organization to further promote the use of VMs. It maybe nevertheless worth to raise the employee awareness of existing trust building techniques for VMs and support those interested in deploying these techniques in their VTs.

If this share is low, there is an obvious need to follow up with the education of employees on the possibilities to build trust in VTs faster as well as launch workshops, guidelines, brochures etc. to the users to support and accelerate their trust building abilities.

5.3.7 *SI 7: Distribution of employees who find VMs more/less/equally fun and stimulating as F2FMs*

In case of any distribution obtained, a follow up study is important to discover the instances when and how VMs can be fun and stimulating, what the determining factors in this relation are as well as what potential VMs have in terms of their ability to enthral the participants. Outputs from such study can help discover pathways for the increased use of VMs in organisations while keeping their participants more engaged and interested.

5.3.8 *CR 2: Share of employees who think VMs represent a good substitution to a physical job interview*

If this share is high, the follow up is needed to study how VMs can be used more often for job interviews (e.g. in which departments, for which positions, in which virtual forms etc.) in the respective organisation.

If this share is low, the follow up might be interesting to find out the reasons why VMs are not perceived as good solutions for job interviews, what their deficiencies are as compared to personal interviews, how these deficiencies can be overcome and in which instances (if any) VMs can still be appropriate as job interview tools.

5.3.9 *GE 2: Distribution of VM use between employees with small kids and without kids*

The follow up on this indicator is the exploration of any relationships/correlations between GE 2 and other indicators measured in the organization. Examples include the potential relationships between GE 2 and the share of employees feeling that they have more free time for their private lives due to the increased use of VMs (WL 2); GE 2 and the share of employees who feel good about avoiding business trips (WL 5); GE 2 and the share of employees whose ability to participate in the meetings has increased with the introduction of VMs (GE 3); GE 2 and the share of employees feeling more available with the use of VMs (NS 5).

5.3.10 *PPQ 1: Share of employees who think their work efficiency has increased with the use of VMs*

If this share is high, there is a need for the follow up study to evaluate the efficiency contributions in more objective terms than just the employee perceptions on their own efficiency (see also Sub-section 5.3.3). That study would, however, deliver the results of VM effects rather on the organisation than on the individual.

If this share is low, there is a need for the follow up to identify the reasons why this share is low and whether there is any correlation between the perception of the one's change in one's work efficiency and the rate of VM use by employees.

5.3.11 GE 3: Share of employees whose involvement in the meetings has increased with the introduction of VMs

If this share is high, there is a need for a follow up study to identify which groups of employees are benefiting from the participation in VMs first of all. The results of the follow up can be used to target these particular groups of employees while promoting further introduction of VMs in the organization. The reference to the fact that VMs positively contribute to the social equity (if this is the finding of the survey) is a favorable factor for the image of the organization and its attractiveness as a work place for all.

If this share is low, there is a need to find out whether all employees in the organisation have equal access to VM technology as well as knowledge and support on how to use it.

5.3.12 GE 4: Share of employees feeling their ability to express themselves during VMs is limited

In case this share is high, there is a need to follow up with a study exploring why this is the case, what the problems are and how these problems can be solved to create a better environment during VMs where all employees are treated equally.

In case this share is low, there is no need to follow up. It is a good image factor for the organisation, however.

5.3.13 DA 2: Factors that influence the ability to keep attention in VMs, and the share of employees that consider these factors relevant to their work routines

The follow up study is needed to explore which factors need to be changed or enhanced in order to support the employees and create more favourable conditions so that it would be easier for them to keep their focus and attention.

5.3.14 NS 5: Share of employees feeling more accessible with the use of VMs

If this share is high, there is a need to follow up with another study to measure the change in the employee availability in more objective terms (e.g. number of extra hours spent with clients due to a substituted travel to a business meeting).

If this share is low, there is a need to find out the reasons why it is low and whether there is any evidence that VMs generate more F2FMs (i.e. cause rebound effects on the meeting culture in the organization).

5.3.15 WL 6: Share of employees who think business travelling is stimulating and enriching

If this share is high, it is important to follow up with a study that would identify the reasons why business travelling is considered stimulating and enriching and in which instances or for which purposes it is considered to be such. This study will also help explore pathways and opportunities to make VMs more stimulating and enriching.

If this share is low, then it may mean that there are favorable conditions for further promotion of VMs in an organisation.

5.3.16 WL 7: Share of employees who think business travel is an indication of higher social status

If this share is high, there is an obvious need to follow up with a deeper study to understand why such perceptions in an organisation exist. In some cases the actions will need to be taken by top management to demonstrate the personnel that VMs are actively used by them in addition or as a substitution to business travel.

If this share is low, there is a favorable environment for further promotion of VMs in an organisation.

5.3.17 AG 1: Distribution between age group and the rate of VM use

It will be important to study whether there is any statistically significant difference between older and younger people on how often they use VMs. In case older people appeared to use VMs less often than younger people, this would fill the research gap not covered in literature before. In addition, it would prove the need to provide more targeted help for older people to teach and train them in how to use VMs.

If there is no statistically significant difference between different age groups and the frequency of VMs use, no follow up study is needed. However, such finding will also contribute to knowledge and close the existing research gaps.

5.3.18 MS 2: Share of employees who feel that VMs are 'second class' compared to F2FMs

If this share is high, there is a need for a follow up study to identify the reasons why VMs are perceived as 'second class' meetings as well as whether such a perception differs with the employee position in the organization, age and VM experience. Pathways to change such perceptions need to be explored. For researchers it would also be interesting to compare whether the results vary between different organizations, and whether such perceptions can be attributed to a specific corporate culture.

If this share is low, the organization can be characterized by favourable environment for further introduction and promotion of VMs.

6 Survey proposal

Since the purpose of this study in the research project *"Resfria möten – Vad blir effekterna och hur utvärderar man dem?"* is to evaluate the effects from VMs on the individual level (i.e. employees at Swedish public authorities, who use VMs) and to study employee opinions and perceptions of VMs, the best method to measure such impacts is with the help of a survey. Suggested survey questions are provided as a separate document, and the survey practicalities are described below. Each Swedish public authority is free to choose its own way to use the suggested questions either as a part of their employee survey or as a separate questionnaire.

6.1 Survey format and outset

The survey is recommended to be implemented as an online questionnaire. A link to the questionnaire should be sent via e-mail to its potential respondents by the person responsible for REMM project in the respected public authority. Brief description of the survey purpose will be provided at the outset of the survey text.

6.2 Survey timeline

The survey is recommended to be left open for responses during five weeks (25 working days). Three reminders should be sent to survey respondents in the beginning of the third, forth and fifth working weeks (i.e. on 11th, 16th and 21st working days) with the remark to those who have already filled out the survey to disregard the reminder.

In the case of a low response rate (less than 50%), the open time for the survey should be prolonged to additional 1-2 weeks and further reminders should be sent.

6.3 Target authorities and potential respondents

It is recommended (but not limited to) to apply this questionnaire to measure the effects from VMs on the individual level in the following authorities:

- o Trafikverket;
- o Tullverket;
- o Naturvårdsverket;
- o Skatteverket;
- o Försäkringskassan;
- o Energimyndigheten.

These authorities are selected for the first evaluation as they have advanced with the implementation of VMs, and a number of their employees have been using VMs in their work routines. Therefore there is a greater chance that these employees would provide valuable inputs to the study by indicating their opinions, perceptions and experiences on the use of VMs.

The selection of survey respondents is the responsibility of each REMM-project representative in the respected public authority. The survey can be either sent to all employees at the public authority with the indication to be filled out by those acquainted with VM technology (i.e. those who have used each form of VMs - video-, web- and teleconferences – at least two times in their work) or the REMM-project representative is free to choose those departments at their authority, which he/she considers are most experienced in the use of VMs, with the request to engage as many employees in the survey as possible.

The questionnaire can as well be applied by other Swedish public authorities than listed above - primarily those who would like to evaluate the effects of VMs on their employees, and who consider they have a reasonable number of employees (at least 50) with minor experience of VM technology (i.e. have used each form of VMs - video-, web- and teleconferences – at least two times in their work).

6.4 Survey content

They are expected to measure indicators suggested in Section 4.12 including the following:
1) important indicators: NS 2, NS 3, WL 1, WL 2, WL 5, SI 4; SI 7; CR 2; GE 2;
2) important but somewhat challenging to measure indicators: PPQ 1, GE 3, GE 4; DA 2;
3) relatively important indicators NS 5, WL 6; WL 7; AG 1; MS 2.

7 Conclusions

Methodology to measure effects from VMs on individual employees at Swedish public authorities has been developed in this work. It is proposed that the measurement is carried out with the help of an anonymous online survey, which can be used either as a separate questionnaire or as a part of employee surveys circulated at Swedish public authorities.

The questions should be posed to those employees, who have some experience with VMs, i.e. have used each of the VM forms (video-, web- and teleconference) at least two times in their work routines. The following indicators are proposed to be measured with the help of the questionnaire:

- o Share of employees feeling that VMs reduce their stress at work (NS 2);
- o Share of employees feeling sure about the use of VM equipment (NS 3);
- o Share of employees feeling that they have more time to work on their tasks due to the increased use of VMs (WL 1);
- o Share of employees feeling that they have more free time for their private lives due to the increased use of VMs (WL 2);
- o Share of employees who feel good about avoiding business trips (WL 5);
- o Share of employees who think that trust can be built via VMs but that it requires more time and more meetings (SI 4);
- o Share of employees who find VMs more/less/equally fun and stimulating as F2FMs (SI 7);
- o Share of employees who think VMs represent a good substitution to a physical job interview (CR 2);
- o Distribution of VM use between employees with small kids and without kids (GE 2);
- o Share of employees who think their work efficiency has increased with the use of VMs (PPQ 1);
- o Share of employees whose involvement in the meetings has increased with the introduction of VMs (GE 3);
- o Share of employees feeling they are not being treated equally to their colleagues during VMs (GE 4);
- o Factors that influence the ability to keep attention in VMs, and the share of employees that consider these factors relevant to their work routines (DA 2);
- o Share of employees feeling more accessible with the use of VMs (NS 5);
- o Share of employees who think business travelling is stimulating and enriching (WL 6);
- o Share of employees who think business travel is an indication of higher social status (WL 7);
- o Distribution between age group and the rate of VM use (AG 1);
- o Share of employees who feel that VMs are 'second class' compared to F2FMs (MS 2).

Possible relationships between these indicators and six independent variables are important to be analysed after the survey data is collected. These variables include the employee's age, gender, frequency of business travel, frequency of VM use, experience of VMs use, and whether the employee has (small) children.

The questionnaire contains 22 questions, and is assumed to take 20 minutes to be completed.

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Annex I – Sample interview questions

I Information om intervjuade

1. Framför allt kan Du säga några ord om Din roll i er Organisation, dvs vad Du ansvarar för samt vad Du arbetar med?

II Befintliga datainsamlingsmetoder i organisationen och andra rutiner

2. Finns det redan idag något sätt att samla in information om resfria möten (RM) i er organisation, och i så fall vilket?

3. Finns det idag något sätt att följa upp effekter av RM i er organisation, och i så fall vilket? Vore det möjligt för oss att få mer information om detta?

4. Finns det något sätt att mäta den anställdes individuella nöjdhet med den egna arbetssituationen i er organisation? Om det finns sådan mätning, vilka metoder använder ni? Vilka parametrar mäter ni?

5. Mäter ni den anställdes yrkesmässiga prestation i er organisation? Om så är fallet, vilka metoder använder ni? (I fall det finns enkäter som rör detta, skulle det vara möjligt att ta del av dem?)

6. Har ni någon reseadministratör i er organisation?

7. Vilken typ av utrustning / RM-lösning använder ni vanligtvis i er organisation? Arbetar de anställda på egna datorer under ett RM, med hjälp av någon annan utrustning, eller både och?

8. Var håller ni RM: på era vanliga kontor eller någon annanstans? Om det senare är fallet, hur långt behöver ni ta er, och vilket transportmedel använder ni?

9. Finns det något bokningssystem för RM i er organisation? I så fall, hur fungerar det? Är det kopplat till er möte eller resepolicy (om sådan finns)?

10. Hur många deltagare brukar ni vara i RM i er organisation, och hur bestäms detta antal? Vilket är det maximala antalet deltagare som er organisation har engagerat i ett RM?

11. Finns det resepolicy i er organisation? Innehåller resepolicyn något stöd för användningen av RM i er organisation? Vem äger detta dokument? Skulle vi kunna få ta del av resepolicyn?

III Individuella reserutiner, uppfattningar och åsikter om RM och fysiska möten (FM)

1. Hur många gånger per månad reser Du i Ditt arbete? Hur mycket tid tar Din genomsnittliga tjänsteresa? Skulle Du föredra att minska, öka eller behålla denna resefrekvens? Varför (inte)?

2. När Du planerar och genomför ett RM, känner Du Dig säker på utrustningen (dvs. på att Du ska kunna hantera den, och att den inte ska krångla), eller orsakar utrustningen Dig någon stress?

3. Vilka fördelar anser Du att FM har jämfört med RM?

4. Vilka fördelar anser Du att RM har jämfört med FM?

5. Vilka typer av affärsmöten, om några, skulle Du inte genomföra som ett RM? Vilka typer av möten, om några, (med anknytning till Naturvårdsverkets verksamhet), kräver enligt Dig fysisk närvaro?

6. Uppfattar Du det som att det är svårare, lättare, eller lika lätt/svårt att utveckla ömsesidig förståelse och förtroende under ett RM i jämförelse med ett FM?

7. Hur skulle Du jämföra Dina möjligheter att lära Dig saker i ett FM jämfört med i ett RM?

8. Finns det någon typ av arbetsrelaterade frågor som Du inte skulle känna Dig bekväm med att diskutera med hjälp av IKT (intellektuella kommunikationssystem)? Om ja, vilken typ av frågor skulle detta gälla?

9. Om Du sparar tid genom att ersätta en affärsresa med ett RM, hur tillbringar Du denna besparade tid?

10. Hur påverkar RM relationen mellan ditt arbete och fritid?

11. Hur påverkar (dvs ökar/minskar) RM Din möjlighet att bibehålla kontakten, eller att hålla tätare kontakt, i yrkesmässiga nätverk? Om möjligheten ökar, hur upplever Du detta?

12. Upplever Du RM som mer eller mindre roliga och stimulerande än motsvarande FM?

13. Har RM påverkat Dina karriärmöjligheter på något sätt, och i så fall hur?

14. Vilken betydelse har RM för rekrytering?

15. Är det lättare eller svårare att identifiera och utvärdera om en person är lämplig för en viss position om Du har träffat denna person i ett RM, jämfört med i ett FM?

16. Hur skulle Du jämföra Din möjlighet att behålla uppmärksamhet under RM respektive FM?

17. Uppfattar Du att virtuellt samarbete bidrar till kvaliteten på Ditt liv utanför arbetslivet? I så fall, hur?

18. Vilka är för- respektive nackdelarna med att vara i transit när man resar i arbetet, enligt Dig?

19. Känner Du någon skillnad när Du har ett RM med personer Du träffat fysiskt tidigare, jämfört med när Du har ett RM med människor som Du inte träffat tidigare? I så fall, hur är det annorlunda?

20. Påverkar Ditt deltagande i RM Din arbetsproduktivitet och kvalitet: 1) positivt; 2) negativt; 3) inte alls?

21. Uppfattar Du någon skillnad mellan RM och FM när det gäller hur viktiga de är? I så fall, hur?

22. Tror Du att för- och nackdelar med RM respektive FM skiljer sig åt mellan kvinnor och män? I så fall, hur?

23. Tror Du att RM påverkar jämlikhet (t.ex. rörelsehindrade, mötesdeltagare från utomlands osv) och i så fall hur?

III Slutfrågor

24. Vilka personer i er organisation, som använder RM regelbundet i sina arbetsrutiner, skulle Du rekommendera att vi intervjuar om deras egna åsikter och uppfattningar om RM, i jämförelse med FM (2-3 personer)?

25. Skulle vi kunna följa upp detta samtal senare med fler frågor, i fall de uppstår?