IMMS final report to the Fund for Welfare Technology

Contents

Introduction

In the following, the Intelligent Materials Management (IMMS) project will be evaluated. The evaluation follows the evaluation concept provided by the Foundation for Welfare Technology - as far as this has been possible. In relation to the current evaluation concept, a change model is not included in the evaluation. A change model was not part of the project process as Intelligent Material Management applied for and was granted support from the then ABT fund. Due to the absence of a change model, in this evaluation we have sought to lean on the final application for funds for the ABT fund and the results obtained. The application includes a number of descriptions of primary and secondary objectives with the project - which is why these are the basis for this evaluation.

Summary

Intelligent Material Management (IMMS) is a newly developed logistics system implemented at the libraries in Aarhus and Copenhagen respectively during the winter of 2013-14. The objective of the system's introduction is to optimize the user experience at the libraries for both citizens and employees. The effect of the introduction is measured on a number of parameters that were partially

defined at the beginning of the project, and are very much related to the workflows of the staff and their distribution of tasks. Wrongly placed material, trimming of physical collections and other material handling has historically given rise to much work on the libraries, and it was judged that these work processes in particular could be optimized by implementing an intelligent logistics system that can guide via individually set parameters. Material handling is primarily 'backoffice work', which does not immediately provide visible value to citizens. At the same time, it accounted for about 1/3 of the libraries' consumed FTEs. Therefore, it was considered to be a value-creating area to streamline. In order to assess the effect of the system, a 0-point survey was carried out in 2011, and a comparable measurement in March 2014.

a. In the impact survey in March 2014, it appeared that, following the implementation of IMMS, labor saving was realized according to material handling, of 15.7% for Aarhus and 40.9% for Copenhagen, respectively. The projected savings of 15% are thus fully met. The significant difference between the two locations can probably be found in that, before the implementation of IMMS, Aarhus had already been transferred to a central sorting, whereas Copenhagen did so in connection with the implementation of IMMS. This reduction in material handling has altogether saved 21 FTEs between the two municipalities (16 in Copenhagen and 5 in Aarhus). The value of this is has been reinvested in the libraries operation and ensures that there is maintained high of service for citizens, also for the future. The efficiency improvement is realized primarily in functions with material handling and it is the employee groupings here that are affected. In short, it can be said that the workflows have been touched in such a way that the system assess whether submitted materials must be in library x or y and on shelf a or b, based on what stands on the shelves and on a set of variable parameters and staff will no longer have to make individual assessments and manual redeployments of bookshelves on the shelves to make room for submitted materials.

b. Furthermore, the implementation of IMMS creates value for both users and staff. The project results in a common material file between the libraries (in the respective municipalities), which is why new equipment can be purchased more efficiently, and this can be better distributed according to the needs and demand of the users. In the same way, citizens experience a more efficient user experience, as in searching for material, they now search all the municipal libraries, and not only in one's local library. As the functions of libraries are continuously developed according to the needs of the outside world, the reduction in material handling also increases the possibility of adapting to these. In connection with impact survey, the number of *'Failure-Demands'* - that is, the error requests for materials, was also measured. Typically, these will be caused by misplacements on shelves or mismanaged reservations. In this regard, the number of failure demands directly related to IMMS has decreased by 31%, and the number of inquiries regarding items not being where expected was reduced by as much as 71% [1] , probably also attributed to IMMS. Furthermore, due to an optimization of the amount of material on the shelves, it is no longer necessary for the staff shelving the books to move entire shelving unit to create

space for new materials. This was previously a hugely time-consuming activity. In addition, it was an activity that involved a lot of heavy lifting for the staff. These lifts are also not part of the activity further.

c.   As described above, some clear time-saving efficiency improvements have been achieved, which benefit both staff and users, and time has been released for other value-creating activities. The effect measurement has also been measured on employee satisfaction. In this respect, it was expressed that the workflows today are more appropriate than they were in 2011. Furthermore, it is clear that IMMS can in the long-term benefit both citizens and staff. This positive input is particularly noteworthy in view of how little time has passed since the implementation took place and the problems experienced with the new central sorting in Copenhagen. The staff is thus able to distinguish between the difficulties that arose in connection with the implementation of IMMS and IMMS's potential.

d.   As IMMS has passed from project form to full operation with the approval of the operational test in March 2014, IMMS is starting to become anchored in the respective municipalities, as well as in a cross-municipal cooperation to facilitate the continued development of IMMS. The basic premises for this development organization are described in Appendix 7 (6) of the Framework Agreement. Basically, an association is established that takes ownership of IMMS, and manages the funds allocated to the further development of IMMS. Currently, this association is made up of representatives from Aarhus and Copenhagen's libraries. A number of other libraries are on the way to acquiring the system. If and when several libraries choose to buy into the system, the payment sum will be placed in the development association, and thus finance the continued development of IMMS. New libraries also enter the association, and can thus also contribute with professional knowledge, and ideas for relevant further development of IMMS.

e.   The monetary gains realized by the project saving have been re-invested, in Copenhagen municipality the money has been given to the Library division where they will fund two projects: The Danish Digital Library and the Digitization Project as well as financing for the employees' competence development 2014 - 2017. [2] In Aarhus, the realized gain is used partly to finance IMMS operations and development, and to handle publicly directed services at the libraries in Aarhus commune.

Recommendations for implementation

In connection with the implementation, it became very clear that this is a process that must be handled with care. For Aarhus, the actual implementation progressed relatively painlessly. However, this was another matter for Copenhagen. November through January was characterized by major challenges with the central sorting. The Central Sorter itself could not keep up with the quantities of items that came in as a result of the transition to a common floating stock and central sorting. In Aarhus central sorting was implemented in 2006, so the load on the sorting plant did not come as a surprise here. The challenges experienced in Copenhagen meant that the following tests and tests of the system had to be postponed, as it was not possible to get a true and fair view of the system.

a. Making two such significant changes at the same time causes problems. IMMS works as it should, but like all other systems, it has a number of dependencies. It is therefore important that you are familiar with these before the implementation takes place. Central to IMMS is that sorting of materials takes place from a central point, which is why it must be ensured that the sorters that manages this sorting has the capacity to handle the quantities of items. This assessment should take place well in advance of the implementation of IMMS, so that the implementation process does not come to a complete standstill and there is time to make any necessary optimizations before implementation. The result of the impact survey shows that IMMS is certainly a success, according to the projected objectives. The efficiency improvement alone on material handling is hugely positive and in addition, both user and staff see improvement. For the users, the reduction in unnecessary inquiries (where is …) alone is a big positive, and it take a load off the staff. Likewise, the reduction in 'invisible work' is creating value as time can be spent on visible value-creating work for the benefit of both users and staff.

b. It is important to think about change management in a process like this. Implementing two big changes (IMMS and central sorting) at the same time puts a lot of pressure on the employees whose workflows are affected. Ultimately, IMMS only works if the staff uses it correctly, and too many major changes over a short period of time increase the risk of misunderstandings, resistance to the system and thus inappropriate use of the system.

c. the recommendation will thus be that a thorough risk analysis is carried out well in advance of the implementation, and that the result of this is addressed thoroughly until all potential show *stoppers* have been identified, clarified and planned handled:

d. The system parameters allow institutions to run with a trimmed material stock that provides clarity and a more efficient material handling, it must be ensured that space can be found for the materials that should not be on the generally accessible shelves. It is recommended that such a material hotel is ready for implementation of IMMS and that it is in close proximity to the central sorting for the sake of the logistical task there follows.

e. As the system relies on the devices used to scan materials, for reservation, for hotel, etc., can access the wifi network and synchronize with the central servers, it is recommended that a network analysis be made that ensures that there are no black holes 'in the network around the locations. If it is not possible to cover completely within the financial framework, in connection with the training of the staff, emphasis must be placed on how synchronization of IMMS takes place and how it will then be experienced if / when the staff work outside network coverage.

The trial project IMMS

As the IMMS project has been focused on development of completely new technology, the Intelligent Materials Management project can be regarded as a demonstration project. The starting point for the project was that huge amounts of working time were spent on material handling and misapplications from users in the libraries. The basic and conceptual consideration was that it might be possible to reduce the number of these 'unnecessary' and not visibly value-creating tasks by ensuring tighter control and handling of materials. Any savings could thus be transferred to visible value-creating activities for

the benefit of both users and staff. Since this is a demonstration project, the funding is divided between the two participating municipalities and the supplier, with the Foundation: "Fonden for velfærdsteknologi "as the primary contributor. The financing model also suggests that the technology should be disseminated to other libraries both nationally and internationally. The great interest from a number of libraries in Denmark and abroad indicates that this ambition can be achieved. Initially, the purpose of the project has been to result in savings on material handling for the library constellations involved. A realistic target of 15% was defined, based on experience from previous work on implementing IT - guided logistics. This objective has been met and surpassed. The IMMS system has many potentials and further development of the solution in collaboration and co-creation with other libraries. As there has currently been a focus on how a logistics system can help precisely the two library constellations involved, there can probably be other specifics with and goals for other constellations in the long term.

Data collection

Two major evaluations have been made in the project in documenting the results of the gains realized. This has been done in the form of an impact survey that compares the data from a 0-point measurement of 2011 and a 1-point measurement of 2014. For the preparation of frames and content for these measurements, we hired help from the consulting firm Valcon. This was the case for both the measurements in 2011 and 2014.

0- the point measurement was carried out on 6 libraries/library branches, 3 in Aarhus and 3 in Copenhagen. For Aarhus, there were: Aarhus Main Library, Lystrup Library and Risskov Library – For Copenhagen it was Copenhagen Main Library, Valby Library and Vesterbro Library.

1- point measurement was based on the 0-point measurement, since data should be comparable. This means that it has the same content and form, as it provides the best possible basis for comparison and thus the best possible clarification of effect. Furthermore, the same libraries were used for 1-point measurement.
Data was collected using three methods: Frequency measurement, *failure demand* measurement, and a questionnaire survey.

Frequency measurement indicating the distribution of tasks/working hours

The frequency measurement maps the time the staff in the 6 libraries apply to all different tasks and functions. The collection of data takes place with observers who, on charted routes around the workplace record what the employees they pass by are doing. The choice has fallen on this method because of its passively observing approach. The aim is that the libraries' reality should be described without this affected. The validity of the frequency analysis is based on the number of registrations. In 2011 appr. 8,000 registrations constituted a valid measurement. In 2011, 8,158 registrations were made, enough to constitute a valid measurement, and in 2014 a total of 11,091 registrations.

Failure demand indicating the number of error requests from patrons

Failure demand measurement consists of registrations of user inquiries due to error handling of tasks. It can be books not on the location where the library system thinks they should be. The registration of such inquiries took place by the desk staff registering each time such a "misapplication" found place.

Unfortunately, there is a little uncertainty about the methodological approach to this part of the measurement in 2011. In the impact measurement, we have assumed that this aspect of the 0-point measurement was made in the same days as the frequency measurement, and then corrected for the difference in number of days to get a comparable result. This gives rise to uncertainty, but with the assumption and result in mind the result seems true.

Questionnaire indicating the staff's experience of workflows etc.

The questionnaire survey took place by sending out questionnaires to 260 employees in the two municipalities. It was asked for an assessment of the employees' workflows and the future potential in IMMS. Since only a total response rate of 47 (50% for Copenhagen, and 41% for Aarhus) was obtained, no final conclusion can be reached on this part of the study. However, it is believed that the results thereof can be taken as an indication of the employees' view of the situation and system potential.

Evaluation Analysis

As mentioned under points earlier, no official evaluation model has ever been prepared for the project, we will seek to prepare this evaluation analysis without it. Instead, we will start with the initial project application and description. However, this means that a number of elements in the evaluation analysis are deleted.

a. As described above, the demonstration project Intelligent Material Management has demonstrated, an efficiency improvement and the following savings of 15.7% for Aarhus and 40.9% for Copenhagen respectively in relation to the proportion of time spent on material handling. This result settles all the objective about one reduction on 15% in relation to material handling. The total labor-saving potential was assessed at 15% or 21 FTE Aarhus and Copenhagen combined. This saving has been realized for the two municipalities, and the power measurement has confirmed the efficiency improvement.

b. In the original application to the then ABT Foundation, it was described how workflows would be improved for staff because of digitization of search and hold lists and 'smart' route planning around the libraries. In addition, the power measurement has shown a reduction in the number of *Failure Demands* by 31%. This is undoubtedly an indication of high quality and thus better service for citizens. At the same time, it must be assumed that it is also positively perceived, with fewer trips to be made in vain, and less disappointed customers.

c. The Intelligent Material Management project has been under way for some years, and has therefore been exposed to a number of changes in the central roles of the project. This, of course,

has given rise to noise and sometimes misunderstandings. However, the aspect of time has not been the biggest challenge we have encountered.

   d. The biggest challenge the project has encountered has been the problem of implementation and a simultaneous transition to the first central sorting in Copenhagen. When the system went live in November 2013, it quickly became clear that the new central sorting plant at Copenhagen's Main Library was not able to handle the extra amount of material. Intelligent Material Control requires that the materials can be sorted from the central point and the increased load on the yet uncalibrated central sorters was a barrier.

This meant that the takeover and operational tests was considerably delayed, since an approximate normal operation was necessary in order to create a true and fair view of the system for testing.

When the backlog was finally cleared, and the many thousands of items had been sorted and distributed according to the new rules for branches, status, demand, classification, etc., the possibilities with IMMS began to manifest more clearly. Six months followed with bug fixes and tests, and the system is now fully live

The project has taken the form of a cross-municipal collaboration between the municipalities of Aarhus and Copenhagen with a third party, the developer Lyngsoe Systems. This has worked well for most of the time. However, it can be difficult to work together on a shared system when one's starting points are very different. The fact that Aarhus did not experience the same problems as Copenhagen when the system went live, meant that perhaps the same understanding of complexity and coherence between systems and organizations may not have been between.

During the entire project process, Tårnby municipality's libraries have been represented and participated as a sparring partner on the sidelines. This has served to ensure that the smaller municipalities with different organizations and workflows have been kept in mind in development and adaptations. Since a long-term strategy with Intelligent Material Management has been widespread, this participation has been regarded as a channel for the rest of the libraries in Denmark.

Conclusion

Intelligent Material Control is now implemented and in full operation. The measurements have confirmed that the estimated efficiency improvement has been met. In this sense, the project and the newly developed system Intelligent Material Management are considered successful. The present project has therefore developed a new logistics tool that can be implemented as a standard solution for other libraries who may be interested in it. Furthermore, there are opportunities for further development of the technology so that it is adapted to needs and possibilities as these are exposed. It may turn out to be needs that are unique to smaller constellations of libraries than Aarhus and Copenhagen libraries. It is assumed that, just as there is a difference between how the system has led to

the two being more efficient, there will be differences on how other institutions receive IMMS. Intelligent Material Management is to a large extent a tool for logistics and control of the material stock.

INTELLIGENT MATERIAL

MANAGEMENT

IMPACT MEASUREMENT

11. APRIL 2014

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The IMMS project and Measurement of Impact

The project 'Intelligent Material Management' (IMMS) deals with the development and implementation of an IT-based library management system. The project was supported by the ABT Foundation and was launched in 2011 and will be completed in the spring of 2014. The primary purpose of IMMS is to reduce resource use in connection with material handling and thereby improve material utilization and service to the citizens.

The system itself was implemented in November 2013 at the libraries in Copenhagen and Aarhus. The project's impact, before and after the implementation of IMMS was measured (0-point measurement and efficiency measurement). This has been done at 3 libraries in Aarhus Municipality and 3 libraries in Copenhagen Municipality. By comparing the 0-point measurement and the efficiency measurement, the benefits of IMMS can be evaluated.

The purpose of this report is to uncover the effects that intelligent material management has had, including in particular on the proportion of time spent on material handling, misrepresentations by citizens and staff attitudes towards the libraries' workflows.

The 0-point survey in 2011

In 2011, a 0-point survey was carried out on 6 libraries, 3 in Aarhus and 3 in Copenhagen, respectively. The Copenhagen Central Library, Valby Library, Vesterbro Library, Aarhus Central Library, Lystrup Library and Risskov Library. The measurement consisted of three parts:
- A frequency measurement indicating the distribution of working time by respectively. material management and other tasks
- A failure demand measurement that indicated the proportion of so-called citizens' miscommunications
- A staff satisfaction survey indicating staff experience and assessment of workflows etc.

The starting point for the 0-point measurement was an ABC survey from the Copenhagen Libraries in 2006, which showed that approx. one third of library staff working time was spent on material management.

Impact measurement in 2014

The power measurement is basically a repetition of the 0-point measurement, ie. it contains the same three parts and is carried out using the same methods as the 0-point measurement. Thereby, the best possible basis for comparison is obtained to determine the effect of the introduction of IMMS.

The implementation of IMMS naturally causes changes in the workflow at the libraries, which affects the measurements. However, there are a number of factors that make direct comparison difficult. In addition, a number of other matters are important. This report identifies a number of factors relevant to the effects of IMMS. However, it is beyond the purpose of the report to analyze and assess each factor and its significance.

Assesment of Potential Gain

Based on the ABC survey in 2006 and the experience of similar projects, the project application to the ABT Fund assessed that the IMMS project could provide an efficiency gain of 15% (on the frequency measurement). In other words, after the introduction of IMMS, staff are expected to spend 15% less of their work time on material management. Overall, this corresponds to respectively 16 and 5 FTE's at the Copenhagen Libraries and Aarhus Libraries.

In the 0-point survey, the staff in Copenhagen and Aarhus spent 42.5% and 34.5% of the time on material management, respectively. With a 15% efficiency, the libraries are thus expected to spend 36.1% (Copenhagen) and 29.3% (Aarhus) of material management in Copenhagen and Aarhus respectively. The report on page 10 compares the potential calculation from 2011 with the power measurement.

Methods

Frequency Analysis

The purpose of the frequency analysis is to map the proportions of time spent by the library staff at the 6 libraries on all tasks, especially those related to material management. The scope of records of all types of tasks corresponds to the total working time of the staff (including breaks).

The validity of the frequency analysis, which is sampled both in 2011 and 2014, depends on a large number of records of staff tasks [1](the more, the better). In this way, proportions of time spent on staff tasks with a certain statistical certainty can be generalized beyond the sample, ie. on the distribution of tasks generally in the libraries.

The procedure for frequency analysis has been the following (for both 0-point measurement and power measurement):

- Establishment of an activity list for material handling and all other tasks in the libraries. The 2011 activity list is qualified for the impact measurement, so it takes into account new / changed tasks after the implementation of IMMS and other changes in the past 3 years. Professionals at the libraries have assisted the qualification.
- Recruitment and training of registration resources.
- Choosing days for registration that is normal for libraries in relation to tasks and other activities.
- Scheduling routes at the individual libraries so that the registrants get around the entire library and register all staff during the time that staff is present [2].
- Implementation of the records during the sample period. The planned routes have taken about 10 minutes each and have been completed approx. 4 times an hour.
- Subsequent data collection and analysis.

Failure Demand

Failure demand can be termed a 'failure-demand', which is because something has not been done or has not been done right for the user. In contrast, value demand is where the user requests a service that can be met immediately. Failure demand, for example, may be a request from a user that a book is not on the shelf, even though it should, according to the system, be there.

The expectation is that IMMS will reduce the number of 'failure requests' expressed by failure demand. This includes because the physical materials should be easier to locate after the introduction of IMMS. The quality of the service that users use must therefore be supposed to improve. The power measurement shows what the possible reductions of error calls have been in relation to the 0-point measurement. In the report for the 0-point measurement, a number of concrete expectations have been formulated for reducing the different types of error requests. These relate to this report on pages 17-18.

The procedure has been as follows:

- Adjusting categories for registration.
- Execution of records at all counters at the 6 libraries (the counter staff records inquiries during the manned opening hours).
- Subsequent data collection and analysis.

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[1] In 2011, the assessment was that approx. 8,000 registrations would constitute a valid sample according to the scope of the study (registrations over a shorter period of 6 libraries).

[2] No self-service hours are registered (since the registration deals with the staff's time use). However, it is registered one hour before the manned opening hours, where staff is present.

Staff satisfaction Survey

Satisfaction among employees with the organization of workflows was examined in the 0-point survey to give an indication of which workflows contain the potential for better organization. In addition, the 0-point survey asked the employees general satisfaction with their work. In the power measurement, the survey is repeated. The question wordings have changed if they no longer make sense after the introduction of IMMS. The questions have also been extended to specific questions about IMMS, including specific questions regarding IMMS workflows.

It is expected that the work processes related to material management, which in 2011 were considered most inappropriate today, are considered more appropriate.

Distribution key for central material handling

In Aarhus, a central sorting of materials was introduced at the Central Library in 2006, and in Copenhagen at the Central Library in connection with the implementation of IMMS. The frequency measurement is used to record, among other things. monitoring the central sorting system at the main libraries. They sort materials for all libraries - both for the libraries that are included in the impact measurement and for other libraries. Registrations in relation to the sorting system are distributed among all the libraries to avoid distortion. This is done after a distribution key based on the libraries' lending figures in 2013.

Table 1. Distribution key for central material sorting based on loan figures

	Copenhagen (percent)	Aarhus (percent)
Copenhagen Central Library	17.5	-
Valby	5.9	-
Vesterbro	7.1	-
Aarhus Central Library	-	29.6
Lystrup	-	4.9
Risskov	-	15.0
Distributed to other libraries	69.5	50.5
Total	100.0	100.0

Copenhagen and Aarhus Central Libraries had 90 and 45 registrations, respectively, which are distributed according to the distribution key above. In addition, the Copenhagen Central Library has employees who take care of the central material handling at night and an employee who deals with the central material handling 37 hours a week. The Copenhagen Central Library thus deals with the central material sorting 81 hours a week. As it is assumed that the routes in the libraries are run four times per hour, this corresponds to 259.2 registrations, which are also distributed according to the distribution key above.

Representative Sample

The 2014 sample was conducted over a period that, with a few exceptions, can be considered normal for the libraries. For the Vesterbro Library, the lending figure for week 13, when the sample measurements were carried out, is less than an average week in 2013 (Table 2). Visiting figures for Aarhus Central Library and Risskov Library are slightly above average for weeks 1-13. This is because there are generally fewer visitors in the first months of the year. In relation to the library staff's tasks and activities / events at the libraries, the sample is average.

Table 2. Lending figures and visitor figures for the 2014 sample times

Library	Lending figures			Attendance		
	Avg. week in 2013	Loan figures week 13, 2014	Difference from average	Avg. week 1-13, 2014	Visiting number week 13, 2014	Difference from average
Copenhagen Central Library	13,177	11,686	-11.3	18,965	18,947	-0,1
Valby	4,456	4,178	-6.2	5,898	6,210	5,0
Vesterbro	5,375	5,378	0.1	6,002	6,357	5,6
Aarhus Central Library	12,815	11,865	-7.4	9,869	10,381	5,2
Lystrup	2,108	1,638	-22.3	2,081	2,002	-3,8
Risskov	6,511	5,675	-12.8	4,429	5,134	15,9

There is good agreement between the distribution of the number of registrations respectively. The Aarhus libraries and the Copenhagen libraries and their sizes measured on the distribution key based on loan figures and number of registrations (Table 3). The central libraries are generally slightly over-represented, while the other libraries are slightly under-represented. The Copenhagen Central Library had relatively few registrations in 2011, whereas there are a fair number of registrations in 2014.

Table 3. Number of registrations in relation to the size of the libraries measured by lending figures

Library	Share of registrations in 2014 in %	Library size in % compared to lending numbers *	Percentage of registrations by size (measured on registrations) in %	Converted difference ift. size in %
Copenhagen Central Library	69.2	17.5	21.1	3.6
Valby	14.4	5.9	4.4	-1.5
Vesterbro	16.4	7.1	5.0	-2.1
Other KK-branches	0.0	69.5	69.5	-
Aarhus Central Library	66.0	29.6	32.7	3.1
Lystrup	6.0	4.9	29.8	-1.9
Risskov	28.0	15.0	13.8	-1.2
Other Aarhus branches	0.0	50.5	23.7	-

* Lending figures for the whole of 2013 of all libraries in the municipalities of Copenhagen and Aarhus

The figure below shows that the more records that are in a measurement, the closer to the average (27%) the measurement is (see result, Table 4).

Figure 1. Material control in % per. measurement / day in number of registrations
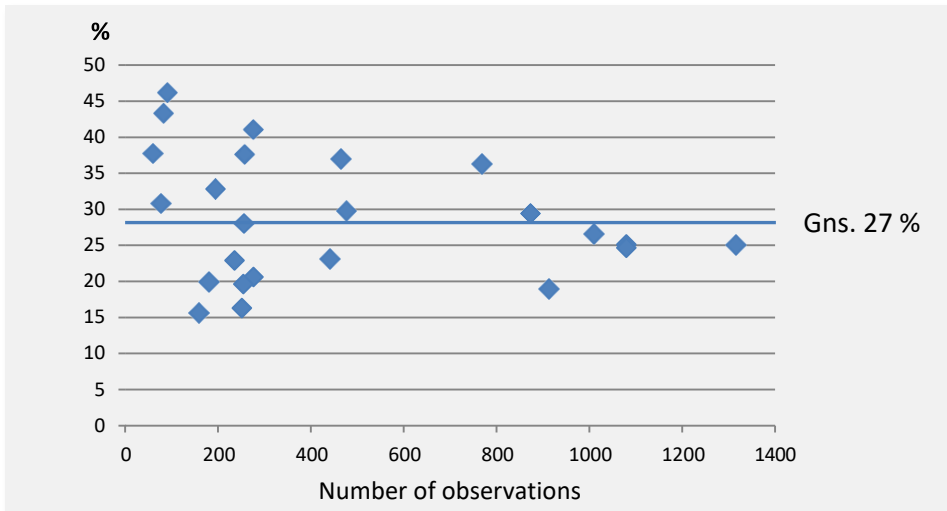
Thus, in the measurements with many records there is a relatively small degree of randomness. The same was true in the 0-point survey in 2011. The generally small deviation from emphasizes the validity of the samples.

Frequency Analysis

A total of 11,091 records were collected in the sample for 4 days in week 13, 2014 [3] (Table 4). This is just under 3,000 more registrations than in 2011 and an increase of 36%. Statistical certainty has thus increased considerably.

Table 4. Results of frequency measurement in 2011 and 2014: 'Material management' and 'Other tasks'

Frequency measurement 2011						
	Number			%		
library	Material-management	Other tasks	Total	Material-control in %	Other tasks in %	Total
Copenhagen Central Library	385	580	965	39.9	60.1	100.0
Valby Library	294	444	738	39.8	60.2	100.0
Vesterbro Library	390	422	812	48.0	52.0	100.0
Aarhus Central Library	1537	2849	4386	35.0	65.0	100.0
Lystrup Library	79	152	231	34.2	65.8	100.0
Risskov Library	330	696	1,026	32.2	67.8	100.0
Total	3015	5143	8158	37.0	63.0	100.0
Frequency Measurement 2014						
	Number			%		
library	Material-management	Other tasks	Total	Material-control in %	Other tasks in %	Total
Copenhagen Central Library	978	3107	4085	23.9	76.1	100.0
Valby Library	174	676	850	20.5	79.5	100.0
Vesterbro Library	328	637	965	34.0	66.0	100.0
Aarhus Central Library	1037	2390	3427	30.3	69.7	100.0
Lystrup Library	125	188	313	39.9	60.1	100.0
Risskov Library	351	1100	1451	24.2	75.8	100.0
Total	2993	8098	11091	27.0	73.0	100.0

As mentioned in the introduction, an ABC survey was carried out in 2006 at the Copenhagen Libraries, which showed that approx. one third of the staff's working time was spent on material management. This picture was confirmed by the 0-point measurement, which showed that 37% of the working time at the 6 libraries was spent on material management.

The power measurement shows that material management at the same libraries in 2014 takes up 27% of working time compared to the 0-point measurement. This represents a decrease of 27% in relation to the proportion of working time spent on material management in 2011. This corresponds to a decrease of 10 percentage points.

[3] Due to a weekly closing day, Lystrup Library only collected over 3 days. This has been corrected by adding one more day, calculated based on an average of the 3 days that measurements were taken. The registrations are divided into the current task categories.

Figure 2. Comparison of shares of tasks ('Material management' and 'Other tasks') in 2011 and 2014
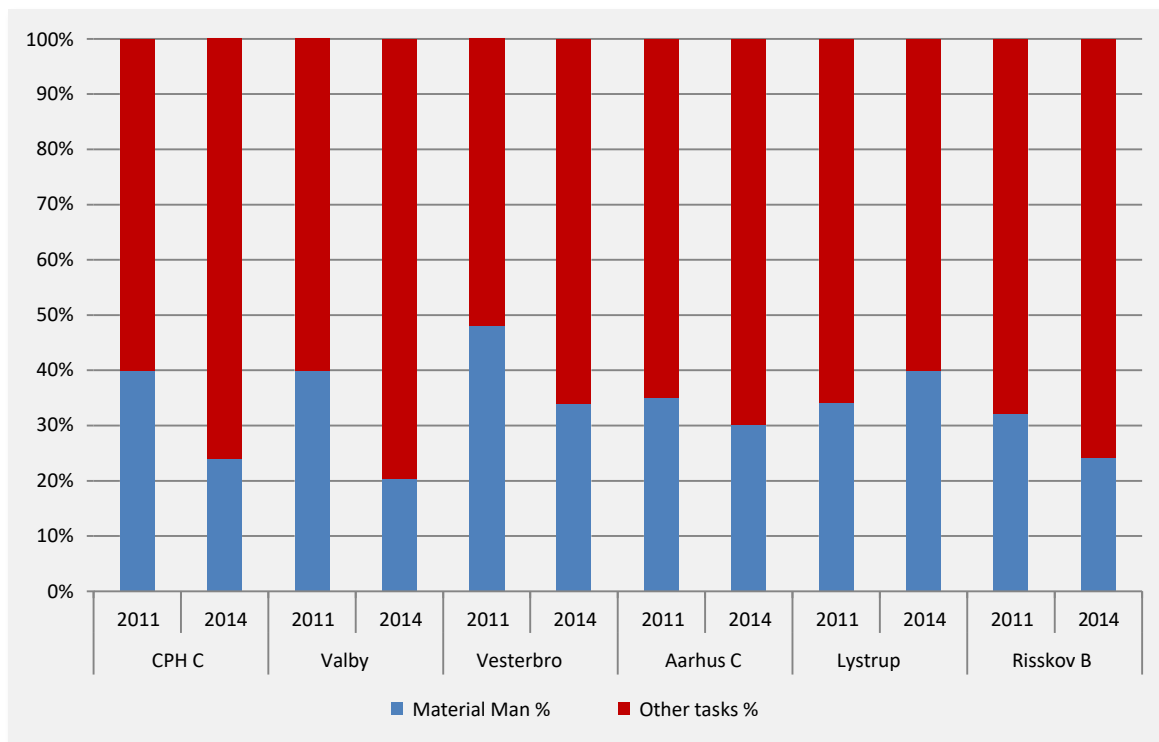
In five of the libraries, the proportion of working hours spent on material management has decreased. The largest drop was in the Copenhagen libraries, where the falls are 29% (Vesterbro), 40% (the Central Library) and 49% (Valby). At Lystrup Library, however, there has been an increase in the proportion of working time spent on material management. In 2011, 34.2% of employees' time was spent handling materials, which increased by 5.7 percentage points in 2014, so 39.9% of working time is now used to handle materials. This is also significantly above the average for all libraries in 2014. However, it should be noted that the staff at Lystrup Library due to the small size of the library have registered their activities themselves. The method deviation may be the reason why the library is slightly higher than the other libraries. As the number of registrations at Lystrup Library constitutes only 2.8% of all registrations at the six libraries (6% of the Aarhus libraries), the results there have only a very small impact on the overall results.

A central purpose of the power measurement is to show if less time is spent on material management today or on the other. the three Aarhus libraries and the three Copenhagen libraries. The result of a comparison of the 0-point measurement and the effect measurement is that in Aarhus, 15.7% less time is spent on material management compared to how much time was spent in 2011. In Copenhagen, 40.9% is used today. less time spent on material handling compared to 2011.

Table 5. Percentage of material management out of all tasks in 2011 and 2014 distributed in Aarhus and Copenhagen

	Material management in%, 2011	Expected material management in % at 15% savings	Material management in%, 2014	Percentage savings 2011-2014
Copenhagen	42.5	36.1	25.1	40.9
Aarhus	34.5	29.3	29.1	15.7

Compared to the potential calculation, where it was estimated that IMMS had a realistic efficiency gain of 15% of the time spent on material handling, the Aarhus libraries achieved 0.7 percentage points more than the assessment. The Copenhagen libraries have achieved 25.9 percentage points more than the assessment of 15%.

Material Management

Figure 3 shows exclusively material management tasks and the internal distribution of working hours between them. In all the libraries, material handling is the most time-consuming activity. In addition, there is a decrease in time spent on 'Retrieving Reserved' category in all 6 libraries. Library staff points out that it has become easier to find reserved materials with IMMS.

Figure 3. Percentages of material management tasks, 2011 and 2014
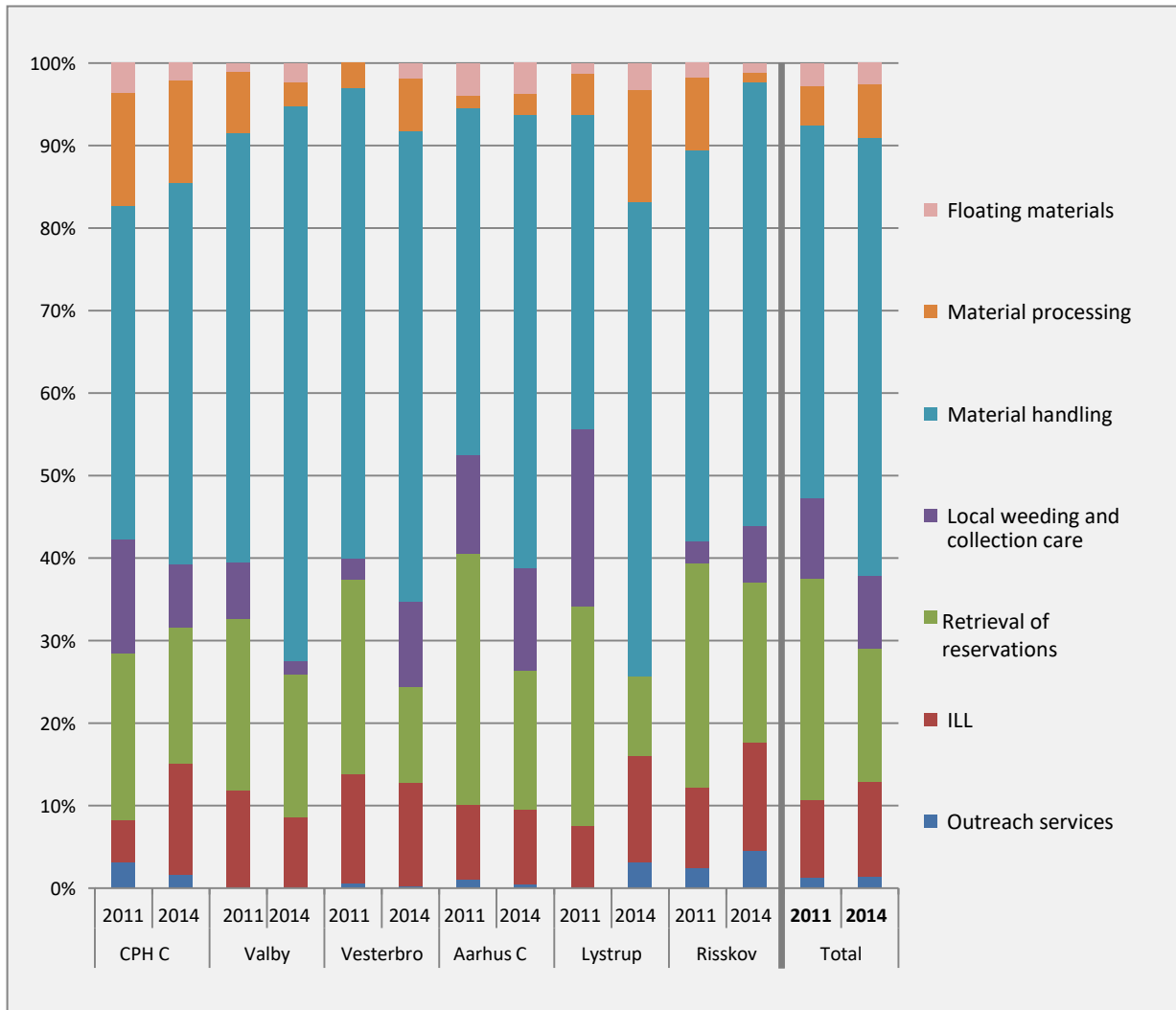
Looking at the totals for all the libraries, material handling and retrieval of reservations are the two most important categories of tasks, both in 2011 and in 2014. Where the proportion of retrieval of reservations has decreased by approx. 10 percentage points in the period, the proportion of material handling has increased by approx. 10 percentage points, so over 50% of the working time spent on material management today is spent on material handling.

Figure 4. Percentages of sub-tasks in the 'Material Handling' category, 2011 and 2014
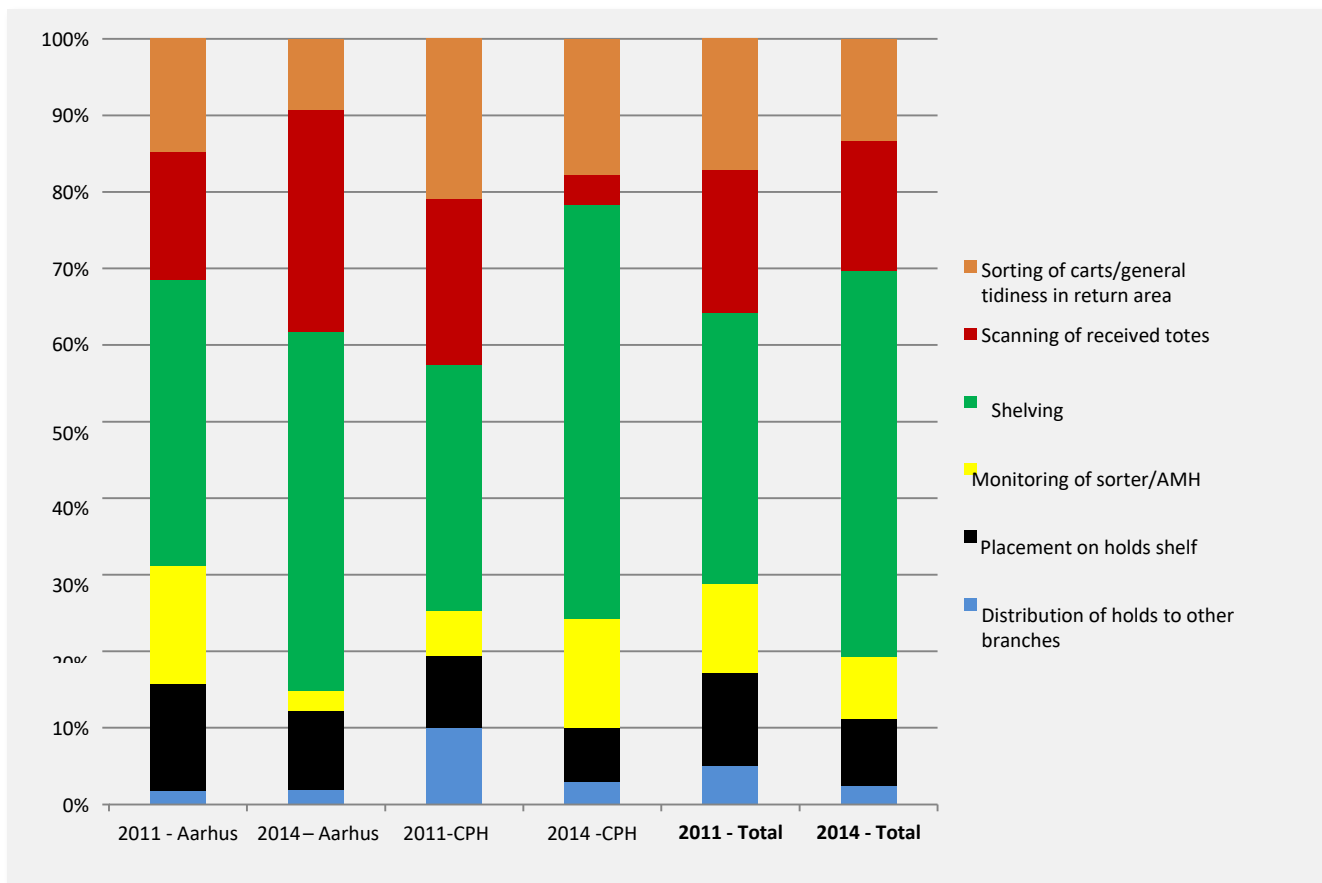
Shelving is still the most time-consuming task. But very essentially, IMMS has a positive effect on the shelving of materials, as items are only sent to shelves if there is space on the shelf, making it easier to put materials into place. In Aarhus, the proportion of time spent on shelving has increased by approx. 10 percentage points and in Copenhagen with approx. 22 percentage points.

Interestingly, in Aarhus and Copenhagen, there are two opposite movements regarding scanning of incoming boxes. In Aarhus, the proportion of time spent on this task has increased by approx. 12 percentage points, whereas in Copenhagen there is a decrease of approx. 18 percentage points.

There is also an opposite movement in relation to monitoring of central sorting. In Aarhus, there has been a decrease in the proportion of time spent on this task of approx. 13 percentage points, while in Copenhagen an increase of approx. 8 percentage points. The introduction of central sorting at the same time as IMMS in Copenhagen explains the increase there. In Aarhus, one possible explanation is that the monitoring procedures have been trimmed and more efficient.

Multiple factors

There are many factors that can contribute to these savings in the proportion of time spent on material management. In other words, it is unclear (and based on the data collected, it is not possible to calculate) what proportion of the savings is 'pure' effect of IMMS and what proportion of the savings are due to other factors. In the following, several factors highlighted by professionals in the libraries are factors that have an impact on the effects of IMMS. The intention is not to provide an exhaustive analysis of each factor, but merely to emphasize that there are factors that are not part of the IMMS, but which can nevertheless be of significance. Besides the factors mentioned, there are of course several other factors that are important.

Central Sorting

A large part of the explanation that the saving is greatest in Copenhagen compared to Aarhus is probably to be found in that Copenhagen first introduced central material sorting after the 0-point measurement, while Aarhus had introduced central material sorting in 2006, before the 0-point measurement. Thus, Aarhus had already streamlined the gain of a common material sorting before the 0-point measurement. A large part of the savings of 15.7% of the time spent on material handling in Aarhus can probably be attributed to IMMS. The marked difference between the savings in Copenhagen and Aarhus indicates that central sorting has a great impact on intelligent material management and savings in the use of time spent on material management.

Changes in task distribution and staff composition

In the libraries, there have been some changes in recent years in terms of tasks, distribution of tasks and composition of staff in professional groups. For example, at the Copenhagen Central Library there was not a Library Development Department at the time of the 0-point measurement, but in the effect measurement. The employees in the Library Development Department do not work with material management, and therefore have an impact on the proportion of time spent on 'Other tasks', which may explain some of the decrease in the proportion of time spent on material management. However, the staff composition and assignment of tasks is a complex size, which depends on several conditions that are outside the IMMS project. Therefore, it cannot be excluded that a changed staff composition from 2011-2014 has had an impact on the effects of IMMS - however, it is not possible to assess the extent of this importance.

Citizen Service

On April 1, 2011, Citizens Service was introduced at selected libraries in Aarhus and Copenhagen (Risskov, Lystrup, Valby and the Copenhagen Central Library in this study). Citizen Service does not have a particularly significant impact on the proportions of time spent on material management. As seen in Figure 5, the difference is only 1-2 percentage points.

Figure 5. Citizen service significance in frequency measurement
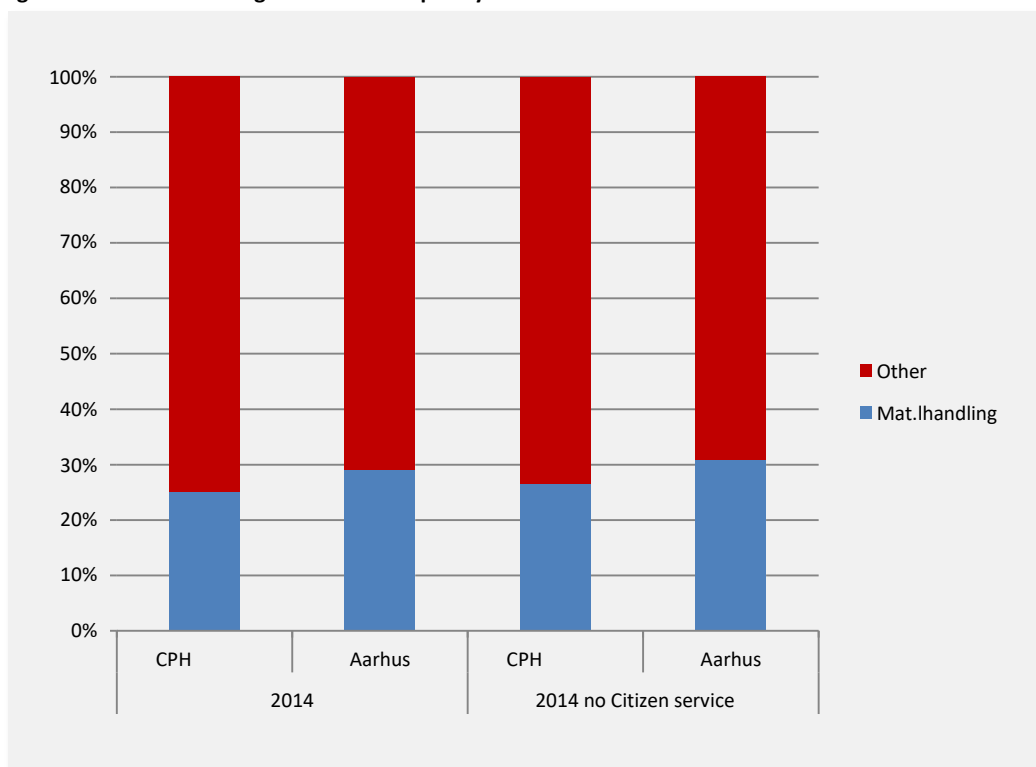
This was an operating situation in week 13, when data was collected. However, there were reports of local implementation problems and operational disruptions by library staff, and the staff were not completely familiar with the new workflows - which must be assumed to be natural. change. This is also evident from the satisfaction survey, see pages 18-20. Thus, the effects could possibly have been greater if the power measurement had been made at a later date.

Changes in lending figures and visitor figures

There has been a change in visitor and lending figures between 2011 and 2014. Table 6 shows that lending has generally declined, while visitor numbers have increased in most places. The falling lending rate means that less time is spent handling materials, for example sorting and placing of materials.

Table 6. Changes in lending figures and visitor numbers 2011-2014 (for the 6 participating libraries)

	Circulation figures			Attendance		
Library	Week 11, 2011	Week 13, 2014	Difference i %	Week 11, 2011	Week 13, 2014	Difference in%
Copenhagen Central Library	18,638	11,686	-37.3	14,776	18,947	28.2
Valby	* 5,240	4,178	-20.3	4,954	6,210	25.4
Vesterbro	7,072	5,378	-24.0	4,152	6,357	53.1
Aarhus Central Library	18,861	11,865	-37.1	12,921	10,381	-19.7
Lystrup	2,,110	1,638	-22.4	1,441	2,002	38.9
Risskov	7074	5,675	-19.8	5,334	5,134	-3.7

* Average week in 2011

The increasing number of visitors (except for the Aarhus library and Risskov library) compared with the decreasing circulation rate, indicates that the libraries are now used to a greater extent for purposes other than (what may be called) traditional core tasks such as lending books. The fall in circulation obviously affects the proportion of time spent on material handling less in 2014 compared to 2011.

Failure Demand

The distribution of failure demand inquiries in the power measurement was examined in the same way as in the 0-point measurement. Inquiries have been registered in the following categories.

Table 7. Categories for inquiries in 2011 and 2014, failure demand

	Categories
Failure-demand communications	**Borrower cannot find material on shelf ***
	Material cannot be found, although it should be found in the library *
	Borrower cannot find reserved material on pickup shelf *
	Reserved material not available on pickup shelf * / **
	Borrower inquire about reserved material that has not yet been fulfilled, despite having been "available" according to the ILS for a long time *
	Collection of books in magazine on request of borrower
	Borrower is referred elsewhere in the library for assistance
	Help for self-service machines
	* Direct relevance to IMMS (IMMS-related failure demand)
	Inquiry regarding PRINT **

Other tasks	Inquiry regarding COPY**
	Inquiry regarding BOOK PC / Short Term PC **
	Citizen Service (Copenhagen) **
	Citizen Service (Aarhus) **
	All other inquiries
	** Categories included in the 2014 survey only

The reason that the category "Reserved material does not exist on collection shelf" is included is that according to the library managers it is relevant to distinguish whether the borrower is unable to find the material or whether there was an error and the material is not on shelf.

The Citizen Service category has been added since it was introduced in 2011.

Results

The result of the failure demand survey shows that in 2014, 5,291 measurements were recorded at the six libraries. This is remarkable as 7,761 inquiries were recorded in 2011. This is even though Valby failed to collect failure demand registrations in 2011 and that there were more visitors in 2014 compared to 2011.

-

Unfortunately, it is unclear how many days the failure demand measurement was made in 2011. The frequency measurement was carried out over a total of 28 days (total number of libraries days). In comparison, a total of 23 days was measured in 2014. Assuming that, the frequency measurement and failure demand measurement were carried out over the same number of days in 2011, the number of inquiries in the failure demand measurement can be corrected, so the number of inquiries also corresponds to 23 days in 2011.

Table 8. Number of inquiries in failure demand measurements 2011 and 2014

	2011	2011 corrected	2014	Percentage difference between 2014 and 2011, corrected
Number of inquiries	7761	6375	5291	-17.0

When corrected for the different implementation periods of the samples, there remains a difference in the number of inquiries. IMMS influences this difference, i.e. that there are fewer failure demand requests after IMMS was introduced. As can be seen in Figure 6, the proportion of failure demand inquiries has fallen between the 0-point measurement and the power measurement. In 2011, failure demand accounted for 27% of all inquiries, while in 2014 it accounted for 23% of all inquiries. Thus, there is only a small decrease of 4 percentage points in the proportion of failure demand inquiries.

Figur 6. Failure demand i 2011 og 2014
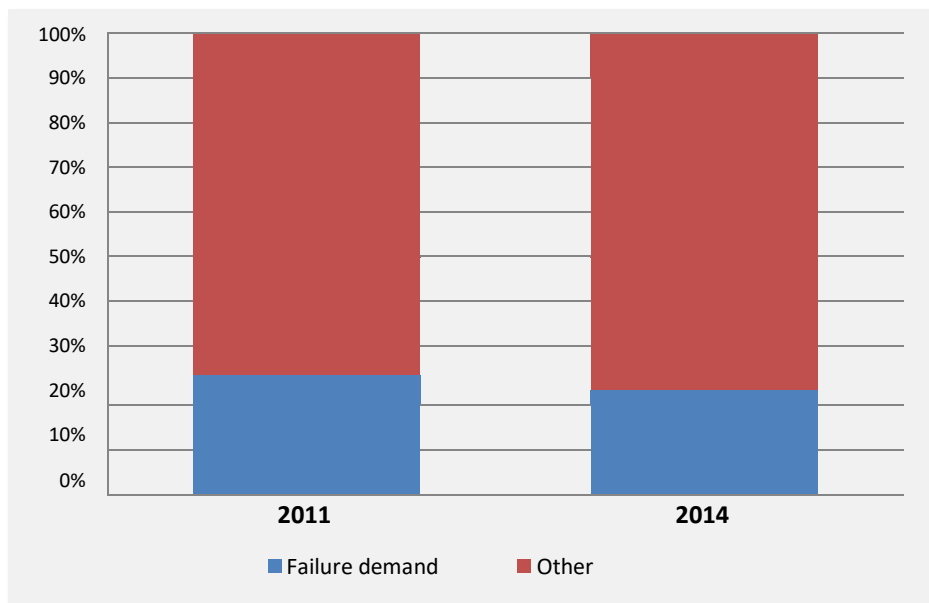
If you look at the inquiries registered by type, in the effect measurement a picture similar to the measurement in 2011 is drawn:

Table 9. Failure demand measurements, number of inquiries by type, 2011 and 2014

Query please type	2011	2011 corrected	2014	Percentage difference ml. 2014 and 2011 corrected
Borrower cannot find material on shelf	340	279	166	-40.6
Material cannot be found, although it should be found on the base the library	218	179	52	-71.0
Borrower cannot find reserved material on pickup shelf	179	147	130	-11.6
Borrower inquires about reserved material that has not yet been fulfilled despite being in the base for a long time	30	25	24	-2.6
Collection of books in magazine on request of borrower	301	247	167	-32.5
Borrower is referred elsewhere in the library for assistance	602	495	318	-35.7
Help for self-service machines	405	333	315	-5.3
Reserved material is not available on pickup shelf	-	-	61	-
Inquiry regarding PRINT	-	-	415	-
Inquiry regarding COPY	-	-	142	-
Inquiry regarding BOOK PC / Short Term PC	-	-	163	-
Citizen Service	-	-	322	-
All other inquiries	5686	4671	3016	-35.4
Total	7761	6375	5291	-17.0

It can be seen from Table 9 that inquiries that either show borrowers to another location in the library for help or help with self-service machines are the two most common types of inquiries in both 2011 and 2014.

Citizen Service was not introduced to the libraries at the time of the 0-point measurement. If the 322 citations related to citizen service are excluded, 25% of the requests for failure in 2014 are about a difference of 2 percentage points compared to 2011.

In the 0-point survey, the categorization of failure demand was unclear in relation to inquiries that IMMS had a real opportunity to change. That patrons need help to retrieve a book in a magazine, that a borrower is referred to another place in the library for help, and that a borrower needs help with self-service machines is not something that is affected by IMMS.

Therefore, the development of the IMMS-related failure demand is also investigated (see categories for this in Table 7).

Figure 7 shows the proportion of IMMS-related failure demand. In 2011, there were 9.9% IMMS-related failure demand inquiries, while in 2014 there was 8.2% IMMS-related failure demand. This represents a decrease of 1.7 percentage points. Excluding citizen service from the survey in 2014, the picture is largely unchanged, with here 8.7% of inquiries pertaining to IMMS-related failure demand.

Figure 7. Overview of IMMS-related failure demand with and without citizen service
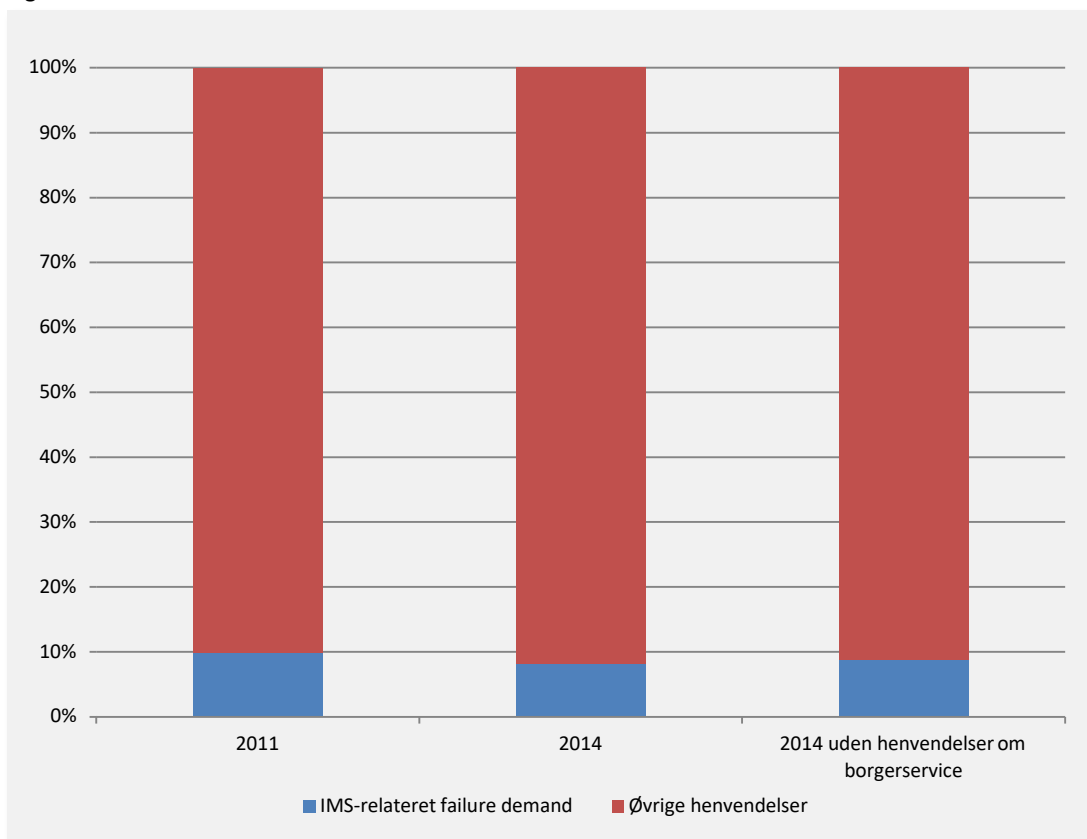
There were 767 inquiries regarding IMMS related failure demand in 2011 and 433 inquiries regarding IMMS-related failure demand inquiries in 2014. Table 10 shows proportions of IMMS-related failure demand in 2011 and 2014.

Table 10. Potential for full or partial removal of failure demand from 2011 to 2014

	Number of inquiries is in 2011	Number of Inquiries in 2011, corrected	Streamlining efficiency potential	Expected number of inquiries in 2014 (Corrected number of inquiries for 2011)	Number of inquiries in 2014	% deviation between 2014 and 2011 (Corrected)
Borrower cannot find material on shelf and items cannot be found, despite according to the ILS it should be on the library	558	458	50%	229	218	-52.4
Borrower cannot find reserved material on pickup shelf [4]	179	147	33%	99	191	29.9
Borrower inquires about reserved material that has not yet been fulfilled despite status "available" in ILS	30	25	100%	0	24	-2.6
Collection of books in magazine on request of borrows request	301	247	33%	166	167	-32.5
Total	**1068**	**877**		**493**	**600**	**-31.6**

The 0-point measurement describes what the efficiency potentials are for a complete or partial removal of failure demand.

Table 10 shows the number of inquiries in 2011 corrected for the 28 days measured in 2011, while in the 23 libraries in 2014 the 23 days were measured.

- ***Total savings***
  Table 10 shows that, overall, there are 31.6% fewer failure demand inquiries by the categories included in the potential calculations. Looking only at the IMMS-related failure demand inquiries, there are 31% fewer inquiries in 2014 compared to 2011.

- ***Borrower cannot find material on shelf and item cannot be found, despite ILS status "available"***
  In 2011, the expectation was an overall efficiency potential of 50% on inquiries regarding patrons who cannot find material on the shelf and material that cannot be found, despite status "available" in ILS. In the power measurement, there are 52.4% fewer inquiries compared to the corrected number for 2011, i.e. the potential is met.

- ***Borrower cannot find reserved material on pickup shelf***
  In 2011, an efficiency potential of 1/3 fewer inquiries was expected from borrowers who cannot find reserved material on the pickup shelf. Inquiries in the category 'Reserved material are available not on pickup shelf 'from the 2014 survey is included in this figure. From 2011 to 2014, there is an increase of 29.9%, which therefore does not live up to the expected potential.

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[4] Inquiries in the category 'Reserved material not found on collection shelf' from the 2014 survey are included in this figure.

The fact that the potential has not been fulfilled may be since, in connection with the implementation of IMMS, the libraries in Copenhagen have been given a new system for collection of reservations. Thus, users have had to get to know this new system, which may have prompted more questions. The libraries in Aarhus continued using a system implemented long before IMMS

- ***Borrower inquiries about reserved material that has not yet been fulfilled despite status "available" in ILS***

The expectation in 2011 was that there would no longer be inquiries from patrons who could not get a reservation fulfilled even though the material has been "*available*" for a long time. There were 25 inquiries in 2011 (corrected number) and 24 inquiries in 2014. Thus, the target is not met - but , as in 2011, the scope of inquiries is very limited (this corresponds to less than 1 inquiry per library per day

- ***Collection of books in magazine on request of borrower***

In 2011, a reduction of 1/3 of inquiries was expected. picking up books in magazine. This objective has been met.

Staff satisfaction Survey

The satisfaction survey was sent to 260 employees (167 in Copenhagen and 93 in Aarhus) who, as in the 0-point survey, responded to how well they assess the workflows regarding a number of material handling workflows. 122 employees answered the questionnaire (38 in Aarhus and 84 in Copenhagen) giving a total response rate of 47% (Copenhagen = 50% and Aarhus = 41%). The results of the satisfaction survey must be read with a caveat, since the relatively few answers cause some methodical uncertainty. For the same reason, the results are not divided into respectively Aarhus and Copenhagen.
(Note that the results of the satisfaction survey can also be found in an independent appendix to this report.)

The table below shows the workflows that were considered least appropriate in 2011 and the corresponding value for 2014.

Table 11: Procedures rated as least appropriate in 2011 compared to 2014. (1 = Not appropriate, 10 = Very appropriate)

workflow	2011	2014
Handling of under float / handling of empty shelves	4.33	6.19
Handling of over float / handling of empty shelves	4.38	6.19
Reservation list / List 2 [5]	4.68	Copenhagen: 5.60 (holds work in general) Aarhus: 7.75 (locating materials on open shelves) Aarhus: 8.30 (locating materials in media hotel)
revision	5.27	5.56
Weeding (material can be discarded when returned)	5.56	6.08
Follow-up List /list 3	5.63	-
Weeding according to lists	5.70	6.15
Managing uncollected reservations	6.33	6.18
Reservation list / List 1	6.82	-

[5] As Lists 1, 2 and 3 are no longer distinguished, the question wording used in the power measurement is written in the column during 2014.

The table shows that the workflows that were considered least appropriate in 2011 are assessed as more appropriate in 2014. With the exception of "Handling of uncollected reservations", the satisfaction with the mentioned workflows has thus increased.

The following tables show the work processes that are considered the least and the most appropriate in 2014, respectively:

Table 12. Procedures rated as least appropriate in 2014. (1 = Not appropriate, 10 = Very appropriate.)

workflow	Average
revision	5.56
Work on reservations (Copenhagen)	5.60
Processing of books	6.04
Processing of newspapers	6.05
Processing of journals	6.06

Table 13. Procedures rated as most appropriate in 2014. (1 = Not appropriate, 10 = Very appropriate.)

workflow	Average
Retrieval items at media hotel (Aarhus)	8.30
Retrieval of items open shelves (Aarhus)	7.75
Shelving of items	7.20
Distribution of materials to other libraries	7.08
Scanning reservations for other libraries	7.02

First, it is worth noting that overall satisfaction with workflows is higher in 2014 compared to 2011. In 2011, there were 7 questions where satisfaction was less than 6, while the same is true only for two questions in the impact measurement.

It is interesting that the work on reservations in Copenhagen is at 5.60, while in Aarhus it is estimated at an average of 8.30 and 7.75. This indicates that employees are more satisfied with this workflow in Aarhus than in Copenhagen.

In the questionnaire, we also examined employee well-being at work using five questions. It can be seen from the table below that overall well-being is lower in 2014 compared to 2011:

Table 14. Average well-being questions in 2011 and 2014. (1 = Not at all, 10 = Very much)

job satisfaction review	2011	2014
I can recommend my workplace to others	7.17	6.71
I find that my work is meaningful	8.19	7.45
My pace of work is appropriate	6.76	6.64
I can do my job satisfactorily	7.24	6.98
All in all, my physical working environment is fine	6.24	6.15

The question with the biggest difference is "I feel that my work is meaningful", which has dropped from 8.19 in 2011 to 7.45 in 2014. This is considered natural due to the extent of changes in workflows that IMMS has caused. One possible 'stress factor', especially for Copenhagen, has been that the flow of materials to the local libraries from the central sorting at the Central Library has at times been very unstable. However, well-being is generally above average on all issues.

In general, respondents were positive about finding and shelving materials using the IMMS Android app, both of which averaged 7.02 on a scale of 1-10. And, to a lesser extent, staff find it easier to find materials after the introduction of IMMS. The staff also experiences less futile material searches after the introduction of IMMS.

In addition, respondents were asked to comment on some statements about IMMS that they could agree or disagree on a scale of 1-5. The responses were characterized by the fact that the majority of respondents place themselves in the middle category 'Do not agree or disagree' and in the category 'Do not know'. It is interesting, however, that there are three questions the employees most agree on:

- In the long run, I think IMMS will benefit the staff (3.80)
- It is clear to me what IMMS can be used for (3.71)
- In the long run, I believe IMMS will benefit citizens (3.70)

This indicates that employees are aware of what IMMS can be used for, but also that the librarians can see the potential of IMMS, despite the operational problems and implementation difficulties.

For example, several respondents mention that IMMS may be vulnerable to incorrect scans and errors or because the IMMS mobile app is not reliable enough. For example, an employee describes: *"Work is somewhat easier. However, it can be very frustrating when the IMMS mobile phones are not working. If the technology is running, IMMS is absolutely fantastic."*

Many of the employees indicate that there were problems during the implementation phase. However, it is remarkable (in a positive sense) that the majority of employees can see the potential of IMMS in the long term - both for themselves and for the citizens.

The power measurement is concluded on basis of three sub-surveys, the frequency measurement, the failure demand measurement and the satisfaction survey, respectively.

Frequency Analysis

The impact measurement shows that staff spend a lesser amount of time handling materials compared to the 0-point measurement in 2011. At the Copenhagen libraries, 40.9% less time is spent on material management compared to 2011. Today, Aarhus 15 , 7% less time spent on material management compared to 2011. The assessment of an efficiency gain of 15% less time spent on material management is thus met in both places.

An important explanation for the difference in the saving between Copenhagen and Aarhus is that before 0-point measurement, Aarhus had a central material sorting, while Copenhagen got this in connection with the implementation of IMMS. Thus, Aarhus had already reaped the benefits of central material handling.

Failure Demand

In general, there were fewer failure demand inquiries in 2014 compared to 2011. The number of fail-safe inquiries directly related to IMMS decreased by 31% from 2011 to 2014. The proportion of inquiries related to materials that cannot be found even though, according to the library base, they should be in the library, have fallen by 71%. This type of inquiry is directly influenced by IMMS, which is why IMMS is probably the cause of the decline.

Staff satisfaction Survey

In general, employees rate workflows as more appropriate in 2014 compared to 2011. The workflows that were considered least appropriate in 2011 are considered (except for one) as more appropriate in 2014.

In the satisfaction survey, employees also had the opportunity to comment on the questions. Some express operational and scanning problems and the IMMS mobile. This is considered implementation difficulties, as employees generally believe that IMMS can benefit both citizens and staff in the long term. The employees thus distinguish between implementation difficulties and the perspectives and potentials that IMMS holds.

Professional evalution

Overall, the Effect Measurement Report provides a good overview of the first phase of the implementation of IMMS.

A comparison between the years 2011 and 2014 of the library's tasks will show that in many areas there has been a change in the libraries' focus areas and work organization.

The power measurement report has included factors that can play into the results of the IMMS and the full gain.

It is important to maintain the main trend as the report points out that IMMS has had a positive effect on the libraries' work organization and time consumption for material handling and that the staff are satisfied with the new workflows.

The service improvement can also be documented, with the most durable part result from the Failure Demand survey being a drop in inquiries of 52.4% for material that has status "available" but can not be found on the shelf.

Copenhagen's task of introducing central sorting in a temporary location has obviously had a negative effect on the implementation of IMMS itself.

Despite this and the saving of 16 full-time equivalent salaries by 1.1. 2014, the staff indicated that the new workflows were satisfactory

In the long term, IMMS will be a significantly greater gain when the new sorter in Copenhagen is in place by August 1, 2014 and IMMS can be used fully to better adapt to the location of the materials and give more emphasis on the information improving citizen service

/ Pia Schack, BFA Copenhagen

Shelving of materials

Aarhus feels that shelving has become easier after the introduction of IMMS, as the shelvers do not have to spend time shuffling items on shelves. The benefit is achieved by IMMS always ensuring that there is space on the shelves before directing items there.

The effect of central sorting

Prior to commissioning IMMS, Aarhus introduced central sorting. The efficiency of the introduction of central sorting has been significant.

Reserved material does not exist on the reservation shelf

Aarhus has not changed the handling of its hold shelves after the introduction of IMMS. Materials still do not always exist on the reservation shelf and no difference is noticed after the introduction of IMMS in this area.

/ AAKB

Appendix A.1

Frequency measurement: Categories used for registration

Material handling & related tasks	
Material Processing	
Ordering	
Processing of books	
Processing of newspapers	
Processing of journals	
Material Handling	
Retrieval items at media hotel (Aarhus)	
Retrieval of items at open shelves (Aarhus)	
Shelving of items	
Distribution of materials to other libraries	
Scanning reservations for other libraries	
Scanning transport crates	
Distribution of reservations to other libraries	
Sorting of book carts / general tidiness in return area	
Finding Reservations	
Reservation list / List 1 (Copenhagen)	
Locating materials in Media hotel (Aarhus)	
Locating materials on open shelves (Aarhus)	
Managing uncollected reservations	
Floating collections	
Floating collection local maintenance	
Circulating materials to the responsible library	
Receiving materials from the responsible library	
Outreach services	
Packing and sending of materials to outreach services	
Receiving and unpacking materials from outreach services	
Inter Library Loans	
Receive and prepare materials for ILL	
Delivery and return to the lending library	
Handling BOB orders	
Orders in Net Point	
Search for ILL loans	
Renewal of ILL	
Processing messages from other libraries	
Local weeding and maintenance of material collection	
Weeding	
By shelf	
By list	
Disposal upon delivery of, for example, damaged material	
Inventory	

Other tasks	
Other tasks	
Help for Search and ordering	
Recommendation of books / inspiration etc.	
Location of materials on open shelves and closed stacks	
Case Management	
Citizen Service	
All tasks other than those mentioned in the schedule.	