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.