MSc thesis in Information Management

The introduction of Canvas at Reykjavík University

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Abstract

The scope of implemented projects differs in size and impact, and this is especially true in new software implementation projects. In 2017 Reykjavík University implemented a new Learning management system (LMS) which replaced the LMS part of the older platform, Myschool. Like its predecessor system Myschool, the objective was to enhance the faculty, administration, and student experience and ensure that the system is accepted by all. The aim of this research is an examination of the process of system implementation at Reykjavík University and to provide lessons learned with the learning management system and its implementation to enhance change processes in the future. To evaluate the implementation, process the theoretical literature of change management combined with IT-related literature was compared to the implementation process as described by the implementation team and the users experience from teachers and students. Data was extracted using qualitative methods in form of nine interviews to examine how Reykjavík University conducted its implementation of Canvas. The main findings from the interviews were that the technological aspect of the implementation was a success. None of the users faulted the implementation team on their work, but two of the teachers did not like the selected system. The students did not miss the old system but complained about teachers not having the skills to fully utilize Canvas. It came as a surprise that the implementation team had a discussion regarding using change management tactics but decided there was not a need for it in this implementation. This research concludes that by not deliberately using change management tactics the implementation team missed opportunities in the form of less user acceptance. It can be argued that the consequence of this is that teachers are not fully utilizing Canvas, which is contrary to the implementation teams’ vision, for the future of teaching habits at Reykjavík University.

Keywords: Change management, Information technology, Implementation, User acceptance, Organizational transformation
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Declaration of Research Work Integrity

This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature of any degree. This thesis is the result of my own investigations, except where otherwise stated. Other sources are acknowledged by giving explicit references. A bibliography is appended.

By signing the present document, I confirm and agree that I have read RU's ethics code of conduct and fully understand the consequences of violating these rules in regards of my thesis.

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1 Introduction

The scope of implemented projects differs in size and impact, and this is especially true in new software implementation projects. New systems come along all the time, and it is the challenge of each project lead, to create a strategy for the installation and implementation of the system within the organization’s culture. For instance, questions that must be asked are, what are the reasons for the change\(^1\), should the software be created in-house\(^2\), should it be bought\(^3\), and should it then be customized\(^4\)? How will the organization encourage users to use the new software, and what are the measures of success\(^5\)?

But just as important as a technical installation is the user acceptance of the new software. If the users are not explicitly sold that the transformation which is at hand will be better, they are unlikely to embrace the change. This is where change management tactics play a crucial role. Many IT projects fail because not because of technical issues but because of a lack of consideration to social factors\(^6\).

In 2017 Reykjavík University (RU) implemented a new Learning management system (LMS) which replaced the LMS part of the older platform, Myschool. Like its predecessor system MySchool, the objective was to enhance the faculty, administration, and student experience and ensure that the system would be accepted by all.

RU is a new university and has been highly student focused. As part of its short history, it has experienced dramatic change over some 20 plus years. The changes included: rapid growth in offerings of programs, merging with a separate engineering school, rapid growth of students and faculty, building and relocating into a new school building as well as the dramatic adjustments required as a consequence of the events of 2008. As a result, of these dramatic and widespread changes it has a core value, change management, that is part of its DNA and is widely taught in the School of Business as a philosophy and a way of embracing change.

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1 (Myers and Young 1997)
2 (Boehm 1988)
3 (Parr and Shanks 2000)
4 (Brehm, Heinzl and Lynne 2001)
5 (Nah and Delgado 2006)
6 (Shah, o.fl. 2011)
The theme of this research is an examination of the process of system implementation and to provide lessons learned with the learning management system and its implementation to enhance change processes in the future.

RQ1: What were the objectives of the new learning system at RU?

RQ2: Were these objectives realized, and how does the implementation team know if those objectives were realized?

RQ3: What were the barriers to implementation?

RQ4: Did RU consciously follow a change management program with respect to all stakeholders?

RQ5: What are the lessons of this initiative for RU?

Today, software becomes obsolete just a few years after implementation. As the users become more aware of potential technological advantages possible with new and better systems, the pressure for change becomes more apparent. IT projects are complex, both technologically and culturally. The old system has often evolved over many years, and users become accustomed to certain features and look. Finding a new system that fits the criteria of the project and being able to sell to the users that the change will be for the better, is no easy task.

The end goal for any team as they finish implementing a new information system at an organization is the aspiration for improvement, in this case for the school, both the teachers and students. Create new opportunities in teaching tactics, creating an interactive platform for students and step a little bit further into the 21st century. But even though the system could be perfect, and the technological installation could be flawless, that would not matter if you don’t get the users on board. If users are not sold on the new system, they are unlikely to accept its new and exciting features. Perfect implementation can then be considered, an improved information system which the users accept as an improvement on the older one, and in the acceptance lies the key.

2 Theoretical chapter

The theoretical chapter is divided into three subchapters. The first chapter elaborates on change management tactics, the main focus of this chapter will be John Kotter’s (2012) eight steps for change, each step will be analyzed and elaborated on. Project management, the skills, and ability to gain the support of stakeholders and to lead the transformation is the most relevant critical
success factor of an IT implementation. For this reason, such a large portion of the theoretical chapter is devoted to change management. The second chapter revolves around the history and purpose of a learning management system. The third and final subchapter evolves around IT implementation in general, why organization starts an IT project, common hurdles, and best practices.

2.1 Change management

Most organizations change either to respond to an external threat or to take advantage of an external opportunity. If an organization fails in the response, it loses its competitive advantage. History is paved with failed companies that failed to see that their current path was wrong or failed to implement changes to correct that path.

There are many famous examples like Kodak, which did not respond to the digital transformation the photographic industry was moving into. Nokia which failed to arrive soon enough into the smartphone market. These are just two prominent examples, but history is paved with many more.

This subchapter will rely heavily on the work of John Kotter, and each subchapter is organized according to Kotter’s eight-step process toward change. Each step will be elaborated on from the viewpoint of implementing a new Information system. Additionally, the change management model ADKAR will be briefly covered as it became relevant to this paper during the research period.

2.1.1 Establish a sense of urgency

The first step in implementing change is to establish a sense of urgency. This is important because it’s unlikely that the people running the organization will feel the need for change unless they feel that without doing so, all will be lost. This is a motivational step which helps reinforce

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(Nah and Delgado 2006)  
(Kotter 2012)  
(Aaslaid 2018)  
(Hiatt 2006)
that the change needs to happen. An organization does not change just because an individual or a group of decision makers wants it to change, it requires cooperation\textsuperscript{11}.

One problem with establishing a sense of urgency is complacency. Employees don’t see the significant and visible threat in the internal or external environment, by not seeing the threat they see no need for change, they become complacent. This situation can be caused by many things, according to Kotter. For example, too much happy talk from senior management, lack of sufficient feedback from the external sources, and low overall performance standards, just to mention few. Though sometimes the crisis is of that magnitude that no employee can deny it, imminent bankruptcy, new government rules, etc.\textsuperscript{12}.

Creating a sense of urgency is especially vital in IT implementation projects, historically they have been plagued by failures. In a survey conducted in 2004 with a sample of 375 organizations located all over the world indicated that user resistance was the first ranked reason why information system (IS) implementation projects failed\textsuperscript{13}. Another survey conducted in 2016 by the Project Management Institute among 3234 projects managers, 200 senior executives and 510 project managers/directors, concluded that about 14\% of all IT projects were deemed in their companies as failures. This was considered a win as a year earlier the same survey indicated that 24\% of IT projects were failures\textsuperscript{14}.

Establishing a sense of urgency becomes problematic in cases where the stakeholders for the change see no need for it. The size and impact of the change are then considered unimportant by the stakeholders involved. Aiken and Keller (2009) argued that to overcome this challenge, you need to tell a compelling story and realize that what motivates one individual in an organization will not necessarily motivate another individual\textsuperscript{15}. Getting a company from being good to great, probably sounds like a good story for senior managers, but psychology research has shown that it isn’t necessarily likely to be a success story for the average employee. Lawson and Price (2009) argue that both managers and employees want to hear a story where the impact reaches certain aspects of their organization and their lives. In other words, the impact of the change must be told

\textsuperscript{11} (Kotter 2012)
\textsuperscript{12} (Kotter 2012)
\textsuperscript{13} (Kim and Kankanhalli 2009)
\textsuperscript{14} (RIQ News Desk n.d.)
\textsuperscript{15} (Aiken and Keller 2009)
in a way that individuals feel it has a direct impact on them. There have been identified five forms of these kinds of impacts where managers and employees agree on and have been showed to have a positive impact on the change process\textsuperscript{16}.

First, focus on the positive impact on society by building the community and stewarding resources. Second, is tell a story that emphasizes the positive impact on the customer, for an example creating superior service. Third, is tell a story about the positive impact on the company itself or stakeholders. These are changes that counteract the crisis the organization is currently facing. Fourth, is the impact on the team within the organization the change has the possibility to have, perhaps by creating a more creative and caring environment. Fifth, is the impact of change on the employee personally, for an example, his potential development as an employee, his paycheck, bonuses, etc.\textsuperscript{17}.

Another interesting result in behavioral science shows that these change stories are better off being written by the employees themselves. A story that comes from an individual seems to have much more impact. In a famous behavioral science research study, participants were split into two groups. One group were handed lottery tickets with random numbers, and the other group was asked to write down their own lottery numbers. Just before the draw of the winning number the researchers offered to buy the ticket from the individuals in different groups. The results were that no matter the geography, ethnicity, demographic or different environment, if the ticket belonged to an individual that wrote their own number the researchers would have to pay at least five-fold what a ticket belonging to the group which had assigned tickets. This supports that an idea which comes from the individual himself has up to five times more impact on him than an idea he is told, it can be assumed that the same goes for stories\textsuperscript{18}.

2.1.2 Create a guiding coalition

The second step in creating a successful transformation is creating a guiding coalition. Kotter emphasizes that in the past, organization have had strong trust in a single strong CEO forcing the change upon the organization. CEO use to have time to evaluate information and were able to make a decision at a slower pace than today. Another thing which perhaps worked in the past were

\textsuperscript{17} (Zohar 1997)
\textsuperscript{18} (Ross and Sicoly 1979)
weak low-level committees. This could work in the past because the changes in the environment were slower than they are now. Today where technological advances appear regularly, and the speed of the market is turning at an increased rate, there simply is no time for weak counterproductive committees, or a lone ranger style by the CEO, because no one person has all the information needed to make the right decision.\(^{19}\)

The first step in creating a guiding coalition is members’ selection. Kotter believes there are four key characteristics the team must have if they are to become successful. They need to be in a position of power, so the managers left out cannot easily block the whole progress. They need the have expertise which is relevant to the task at hand. It’s evident that a team with inadequate experience for the transformation will not make informed decisions in the change process. The team needs to have a good reputation, so other stakeholders in the organization will take them seriously. Last but not least, the team must include proven leaders that are able to drive the transformation process. Kotter argues that a team of managers will only produce potentially useful plans, but not a vision like a leader would do.

Kotter includes two types of individuals that should be avoided to all cost to incorporate in an implementation team. The first are individuals who have egos that fill up the room, which could cause other valuable members to withdraw from the transition. It is fine to have a healthy ego, but if it limits their ability to evaluate their own strengths and weaknesses in a realistic way and can appreciate complementary strengths of others, they have no business to take part in an organizational transformation. The second individual to avoid in a transformation is what Kotter refers to as a snake, which creates mistrust that kills teamwork, for apparent reason these kinds of individuals should be avoided in a guiding coalition.\(^{20}\)

Information technology theories and studies agree in large part with Kotter’s emphasis on creating a guiding coalition. In a study conducted in seven hospitals on what determines success in the implementation of IT system for patient care, the researchers interviewed 118 of the hospital's staff who were directly involved in patient care and use of a patient care system. The results were that for an implementation to be deemed a success, there were a couple of criteria that needed to be fulfilled. First, the change needs to have support from both leaders and staff. The development

\(^{19}\) (Kotter 2012)
\(^{20}\) (Kotter 2012)
of a gradual and flexible implementation approach. One of the most important results was how the implementation team planned for setback and drove the change process to achieve a successful transformation. The main reason for unsuccessful IT implementation at these seven hospitals was that problems that came up at the beginning of the projects were not dealt with. What tended to happen was that these small problems became persistent and more extensive. It was then up to the implementation team to create a plan of action to deal with those problems.

2.1.3 Develop a vision and strategy

The third step is developing a vision and strategy. Vision is defined as a picture of the future with some implicit or explicit commentary on why people should strive to create a better future. Kotter argues that without vision, the only alternative tactics for change is an authoritarian one or micromanagement, both are transformation styles that are likely to fail. If the changes are forced, stakeholders are likely to ignore your efforts, even undermine them. If micromanagement tactics are used, they could be helpful, but the amount of time required will almost never justify the end results.

In the first step, a sense of urgency was established, in step three, a vision of how the organization is going to respond to that threat is developed. The vision serves as a picture of the future to clarify the general direction the organization is set to aim at. After the desired picture of the future has been created, there comes a need for a strategy and plan how the organization is going to develop toward that aim.

Kotter stresses that creating and communicating the vision resolves hundreds of small and large problems in the transformation process. All around the organization, employees are making decisions that incrementally affect the organization, put together they can have a significant impact. If those employees are told a clear vision they can more easily see if the decision at hand has a positive impact on the organization journey towards the set aim.

The IT shared vision serves as the same as Kotter’s vision. It is vital to map out the IT solutions based on the current business processes to be able to create the vision for the future.

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21 (Spetz, Burgess and Phibbs 2012)  
22 (Kotter 2012)  
23 (Kotter 2012)  
24 (Kotter 2012)
business processes. Getting stakeholders to understand the shared IT vision will help them to see why the new system will help with attaining the goal the organization sets25.

Whatever the strategic goal the organization sets itself, if the vision is clear and compelling, it will influence the shared IT vision the organization adopts. Whether it is the IT investment priorities, funding, and finally, the willingness of shareholders to adopt the new IT system. If the vision is communicated correctly, and the system being implemented is seen to support the shared organization's vision and goal26.

2.1.4 Communicate the vision
Step four is communicating the vision. Vision is like a story if it’s not communicated it isn’t heard, which results in it not having an effect. Kotter believes this is when the real power of vision is unleashed, when all the stakeholders of the organization have a common understanding of the intended goals and direction. If this is achieved, it can help support the desired transformation27.

At this stage, it is essential for the change process that the organization has been successful in steps 1-3, created a sense urgency, created a guiding coalition which has credibility inside the organization and created a clear vision. If employees don’t feel the sense of urgency, it’s unlikely they will feel the need to hear information about the vision created. They are also unlikely to hear the vision unless it comes from a credible source28.

It is natural for people when they hear the intended vision communicated to ask themselves questions regarding how this changed vision for the organization will affect them and their coworkers. This is natural because accepting a vision for the future can be a challenge. What often happens here, Kotter argues, is that the coalition team spends hundreds of hours on asking themselves the relevant question, regarding if this is the right path for the organization. The teams become at peace with the vision and then assumes that the rest of the people in the organization will come to peace with the vision in a fraction of the time they spent. They communicate the vision through the routine communication lanes where it is quickly forgotten. As it is probably not an option to sit all employees through a time-consuming workshop on the vision, because of the fact

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25 (Sutanto , et al. 2008)  
26 (Sherer 2004)  
27 (Kotter 2012)  
28 (Kotter 2012)
it would simply cost too much, Kotter created a couple of guidelines regarding how to communicate the vision through the organization\textsuperscript{29}.

- **Simplicity**: All jargon and technobabble must be eliminated.
- **Metaphor, analogy, and example**: A verbal picture is worth a thousand words.
- **Multiple forums**: Big meetings and small, memos and newspapers, formal and informal interaction—all are effective for spreading the word.
- **Repetition**: Ideas sink in deeply only after they have been heard many times.
- **Leadership by example**: Behavior from important people that is inconsistent with the vision overwhelms other forms of communication.
- **Explanation of seeming inconsistencies**: Unaddressed inconsistencies undermine the credibility of all communication.
- **Give-and-take**: Two-way communication is always more powerful than one-way communication\textsuperscript{30}.

Effective communication is crucial, in all change management projects, IT projects are no different. Communicating the vision from top to bottom of the organization is necessary to ensure that the enthusiasm and momentum for the intended transformation, so it does not diminish over the extent of the project lifetime. Communication from the top management is in this extent seen as influential in gaining consensus of all stakeholders involved in the required IT system change\textsuperscript{31}.

2.1.5 Empower employees for broad-based action

Step five is empowering employees for broad-based action. Kotter argues that in step one to four, the defrosting of the current situation is put to action, now it’s time for the change themselves. Even though steps one to four does a great deal towards empowering people of the organization toward the set aim, there are a number of other obstacles that can hinder employees from taking action towards the set objective. Step five aspires to remove as many of those obstacles as possible. Kotter argues that there are four main obstacles that at this stage can hinder the change vision, structures, skills, system, and supervisors\textsuperscript{32}.

\textsuperscript{29} (Kotter 2012)
\textsuperscript{30} (Kotter 2012)
\textsuperscript{31} (Ziemba and Kolasa 2015)
\textsuperscript{32} (Kotter 2012)
Structure of the organization can be an obstacle for change. If the vision of the organization is to focus on the customer for an example, an organization which has fragmented resources and responsibilities will result in disempowering employees. To elaborate a little bit on that, if the product or service which the organization is providing is supplied from fragmented departments, it is unlikely that the vision of focusing on customers will be a successful one. Another typical structural problem is when the set vision is to give more responsibilities to employees, but the organization has many layers of middle managers, that constantly second guess their employees which result in them being disempowered. If the aim is to increase productivity, huge staff groups can be the structural problem, managing large groups is simply hard as employees get lost in the crowd. If the vision of the organization is to become a low-cost producer, an expensive headquarters is an obvious problem. Lastly, Kotter argues if the structure of the organization contains many independent silos which don’t communicate and with that slow everything down, a vision of speeding everything up is an unlikely success\(^{33}\).

If employees are still not accepting the IT-induced change some likely symptoms are, they might deny that the system is up and running. They may sabotage the system by distorting or altering inputs in the system. They might try to convince themselves and others that the new system should not or will not change the way they do their work. If the use of the implemented system is on a voluntary basis, they might refuse to use it. If this is the case, then the change process needs to be revisited. People that behave in this way, definitely do not see a sense of urgency nor are likely to accept a new vision on doing things\(^{34}\).

The second reason Kotter argues that can disempower employees is not having the right skills to achieve the set vision. Providing the needed training then becomes the key for the successful change. A common problem in this area is either that implementors underestimated the skills needed for the set change, or they calculate the training cost of all of the employees, become overwhelmed by the cost and try to skip corners. Both of the above scenarios will undoubtfully result in unskilled employees, serving to disempower them rather than empowering\(^{35}\).

\(^{33}\) (Kotter 2012)  
\(^{34}\) (Kotter 2012) (Pearlson and Saunders 2010)  
\(^{35}\) (Kotter 2012)
In a comparative study which analyzed risk factors in both indoor and outsourced software development projects concluded that staff training was one of the most significant risk factors. If the intended users of the software are not located inside the organization, the risk becomes even higher. In this study, the researcher’s stated that the training of these employees should even be considered a separate project with its own project manager. The researchers in this study emphasized that training was a critical risk factor that should not be ignored.36

The third reason that can disempower employees is not having the system within the organization supporting the set vision. Systems such as performance appraisals, bonus systems, promotional system, and recruiting and hiring system can inhibit successful implementation. Even though the implementation team has done all the groundwork of step one to four, if the core human resource system is not aligned with the set vision, the people in the organization are getting mixed signals. For example, if the vision is to provide superior service, and the performance appraisal does not measure and even reward service provided, then the employees are getting mixed signals.37

The fourth and final reason Kotter argues can have a crippling effect on empowering employees is when a supervisor that does not fall in line with the change strategy, even works against it. The solution to this problem is not an easy one. The implementation team needs to have an honest conversation with the supervisor. Kotter argues that with an honest conversation, it will become apparent early on if the supervisor needs to be replaced or some common ground can be found.38

2.1.6 Generate short-term wins
Step six is generating short-term wins for the people of the organization to see. Permanent transformations will take a lot of time and effort on behalf of all of the people inside the organization. It is unlikely that stakeholders are ready to wait for many years before yielding any positive results. Thus, creating short-term wins becomes of great importance, especially when the

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36 (Nakatsu and Iacovou 2009)
37 (Kotter 2012)
38 (Kotter 2012)
transformation is a long journey. By generating short-term wins, the transformation team is building up credibility for the stakeholders to sustain the efforts up ahead for the long journey\textsuperscript{39}.

Kotter believes that the nature and timing of the short-term wins are equally essential as generating them. A good short-term win has these characteristics; it is visible to a large group of people who see for themselves that this is a real win. It is unambiguous, and there can be little argument over it, and lastly, it’s clearly a result of the change effort\textsuperscript{40}.

Short term win provides evidence for all the stakeholders, whether it’s the board, managers, or employees that the sacrifice they are making is worth it. They reward the people responsible for the change with positive feedback. They provide proof that the change strategy is on the right track. They undermine people who are trying to thwart the transformation. Lastly, short term wins can build up momentum which the continued transformation progress can build on\textsuperscript{41}.

Generating short-term wins is a common practice in software development using the Agile process. The agile process demands that the project team generates short-term wins in the Agile theory, called milestones. Milestones are defined as a significant development stage where each project is divided up into packages, and each package has one milestone\textsuperscript{42}. This mindset of creating milestones has in the past decades been adapted to all kinds of projects including the implementation of a commercial software application and may be considered an industry standard when an organization tries to adopt an Agile mindset\textsuperscript{43}.

2.1.7 Consolidate gains and produce more change
The purpose of steps one to six is to build up a momentum to blast through the obstacles of the change. What comes in step seven is consolidating gains and producing more change. If the organization has been successful to this stage and has achieved small victories, a common mistake many organizations make is patting themselves too much on the back. They start to believe that the transformation efforts going forward will be an easy task. Celebrating short-term wins is important

\textsuperscript{39} (Kotter 2012)
\textsuperscript{40} (Kotter 2012)
\textsuperscript{41} (Kotter 2012)
\textsuperscript{42} (Kantar, et al. 2016)
\textsuperscript{43} (Power 2011)
to create momentum, but the celebrations of those wins can be bad for the organization if they result in the sense of urgency being lost\footnote{(Kotter 2012)}.

The mission of step seven is to appraise the short-term wins and use them to create more wins. Substantial transformation often needs many smaller change projects to become successful, and it’s unrealistic that the guiding coalition will be able to micromanage every one of those projects. Thus, in step seven, the coalition team uses the momentum to get other managers of the organization on board to manage different projects of the transformation. For the changes to be successful in juggling all of the projects at once, they need to fulfill two criteria. Senior executives must focus on the overall leadership task and delegate responsibilities for management and more detailed management as low as possible in the organization. If they are successful in this, there is not just a team of maybe ten people available to help on the projects, but a hundred, thousand or more, depending on the size of the organization\footnote{(Kotter 2012)}.

2.1.8 Anchor new approaches in the culture

The final and vital step in the transformation process is engraving the change in the organizational culture, or as Kotter puts it, anchor new approaches in the culture. Even if the implementation team is on top of things and nobody can deny that the transformation has had some positive impacts. The changes need to be engrained in the culture, otherwise there is a real danger the change will regress to old habits when the change program is put to a stop. This is a real danger if the changes have not been anchored in the culture of the organization.

Culture refers to values and behaviors that contribute to the unique social environment in an organization. Culture in an organization can contribute to how an organization conducts its business, how empowered employees are, how information flows in the hierarchy of the organization and how loyal employees are to the organization for an example. Culture is affecting all norms and behavior at the organization\footnote{(Business Dictionary n.d.)}.

If the culture is counter-intuitive to the desired transformation that is a big problem, if not solved, the intended changes will likely not have a permanent effect. Kotter argues that culture is powerful for three reasons. Firstly, because the culture is automatically introduced to new
employees by their coworkers. Secondly, because culture exerts itself through the actions of all employees. Thirdly, because all of this happens without a conscious intention. Because it is unconscious, it is complicated to discuss or challenge in any way.\footnote{Kotter 2012}

Knowledge transfer is an important topic in IT projects because often these projects require training for the employees, learning on new software, new processes, etc. It then becomes crucial that knowledgeable employees share their skills and information to their coworkers. The culture of the organization will shape assumptions about what knowledge is worth sharing and more importantly, culture often dictates how new knowledge is created, distributed, and legitimated inside the organization.\footnote{Karlsen and Gottschalk 2015}

Kotter argues that even though the culture change step comes last in the eight steps for leading change, the culture change starts earlier on. Steps 1-7 if successful, contribute to the cultural change in the organization. If the change organizers get the people to feel the sense of urgency, they are more likely to change their behavior, which in return eventually changes the culture. If the vision and steps that follow result in clear results and are considered by the people of the organization as superior to the old methods, anchoring the change in the culture will become more likely to succeed. If the implementor communicates the vision and smaller wins, reluctant people are more likely to validate the new practices. If there are still reluctant managers that do not fit with the improved vision, be ready to switch them out. Finally, Kotter argues that it’s crucial to make the right decision on succession. The promotional strategy must be compatible with the new practices, anything else would be counterintuitive.\footnote{Kotter 2012}

2.1.9 ADKAR change management model

Other models for managing transformation have been created since Kotters offered his eight-step for the change process. One of those models in the ADKAR model, which is an abbreviation for awareness, desire, knowledge, ability, and reinforcement. The model was first introduced in the book \textit{ADKAR: A Model for Change in Business, Government, and Our Community} by Jeffrey M. \footnote{Kotter 2012}
Hiatt. The author described it as a framework for change, which is instigated after the realization that change is needed\textsuperscript{50}.

The first step is creating awareness with the employees that the change is needed. Hiatt believes that no transformation will be successful unless people in the organization realize what are the external or internal drivers for change, as well as, they need to see what is in it for them. The amount of reasoning for the implementation team must be in consistent with the amount of control the organization has on the process being changed. In an organization where employees have liberty in how their work is performed, more awareness of the reason for the change has to be made\textsuperscript{51}. It can be argued that that this step resembles Kotter’s first step in creating a sense of urgency, so the employees see the reason for the change\textsuperscript{52}.

The next step in the ADKAR model is to create a desire for the change. Hiatt argues that our desire for change is influenced by four things. First, people seek to find out what is in it for them. Second, the organizational context the change is being made in, that is how successful past change has been and how adaptable the organization culture is for change. Third, Hiatt believes that the individual’s personal situation has a significant effect on how acceptable people are towards change. The fourth thing that influences people’s desire for change are their motivations. It is the change agent’s job to try to realize the change in a manner that in consistent with those motivations\textsuperscript{53}. The desire step resembles steps three and four of Kotter’s eight steps for change. There a vision is created which Kotter describes as a story where employees are motivated towards a set vision. In step four the implementors communicate the vision\textsuperscript{54}.

Knowledge is the third element of the ADKAR model. There change agents need to evaluate how much training and skills are needed for the desired change. Hiatt argues that when an employee has an awareness and desire to change this becomes the next a natural step, enabling the

\textsuperscript{50} (Hiatt 2006)  
\textsuperscript{51} (Hiatt 2006)  
\textsuperscript{52} (Kotter 2012)  
\textsuperscript{53} (Hiatt 2006)  
\textsuperscript{54} (Kotter 2012)
employee to realize the change. This is consistent with Kotter’s step five, where employees are empowered to take the necessary action, so the changes can be realized.

The fourth element in the ADKAR model is ability. It is Hiatt’s view though employees may have gone through extensive training seminars, it is unlikely they have gained the ability needed. He believes that only through experience ability can be gained and to do so, and the organization must provide resources and support.

The fifth and final element is reinforcement, that is reinforcement to sustain the changes, so they become permanent. This can be done through short-term wins, employee rewards for a job well done. Hiatt argues that the reinforcement can include any action or event that materializes the positive action that has taken place. Kotter’s steps 6-8 resembles the ADKAR model to a large extent. Creating short-term wins, consolidating gains and anchoring new approaches in the culture.

As discussed above, great similarities are between both models, where users are made aware of a urgency, vision is created to move forward, employees are empowered to have the skill needed to perform the change and an attempt are made to reinforce and sustain the change.

2.2 Learning management system

All educational institutions in our modern era need certain types of software applications to uphold the standards of the information age we are living in. Traditionally there are two types of systems in use, Student information system (SIS), which manages all relevant information regarding the student, and a learning management system. Not counting other systems an educational organization needs for an example payroll software and human resource management systems.

All information systems have a different purpose, whether it’s a word processor, customer relationship management, or learning management systems. LMS has been defined as software for

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55 (Hiatt 2006)
56 (Kotter 2012)
57 (Hiatt 2006)
58 (Hiatt 2006)
59 (Kotter 2012)
60 (Kotter 2012)
61 (Bharamagoudar1, B and Totad 2013)
administration, which helps them to document, administer, report, and deliver education to intended participants, usually students. LMS is not only used in schools but also in commercial organizations. LMS’s vary in size and scope, anything from a simple instructional video to a full-blown interactive media application where all the educational interaction goes through has in the past been defined as an LMS.\(^{62}\)

In a modern university, the LMS system has some common traits, it accommodates the learning registration, tracks the learning process, reports all interaction between the educator and student, records test scores and finally consolidates and manages all educational content, such as extra reading material, syllabus and etc.\(^{63}\) It has been argued that there are specific requirements for an LMS at a university level which the system must fulfill, which perhaps it does not need to fulfill at a commercial level. Course content management so that users can store private files, an option of sharing with other users and making the content reusable and public. Teaching evaluations where users can evaluate the course, both its content and the teacher. The LMS should support interactive communication between all users of the course. The system should offer progress monitoring accessible by both the relevant student and teacher. The system should support different roles for different users, such as teacher, student, and administrator. The LMS should also support third-party content, flash, MP3, as well as third-party hosted content, videos, etc. The user interface should be easy to use for all users and minimum training required and fully accessible through a website portal. The system should be modifiable through access to the source code or an access point integration (API). The setup of the system should be in a way that its ready to take on a heavy load and be able to handle large quantities of new users. The system needs to support interactive course content, which enhances the user's experience. Finally, the system should be built, so third-party integration is supported, such as Turnit\(^{64}\). To be able to support third-party integration, there has been developed a Learning tool interoperability standard (LTI) which allows easy and secure integration and connection between education tools like the ones mentions above.\(^{65}\)

Commonly, as mentioned above, there are three types of users who use the LMS. Students who view and enroll in courses, download resources, participate in group discussions, take quizzes,\(^{62}\) (David 2013)\(^{63}\) (David 2013)\(^{64}\) (Sharma and Vatta 2013)\(^{65}\) (IMS Global Learning Consortium n.d.)
do assignments, and evaluate the courses. Then there are the faculty members who adds or removes courses, uploads resources, create discussions in groups, posts quizzes, and assignments and grade individual users. Finally, there’s the administrator which is usually responsible for user account creation and maintenance of the LMS\textsuperscript{66}.

The evolution of LMS systems has been rapid in recent years, primarily due to the increased popularity of distance learning in higher education. Students have become accustomed to accessing all relevant course data in a structured way, accessible from every device\textsuperscript{67}.

The use of LMS generates data which is commonly stored in a database. In recent years researchers have come up with a systematic approach to use this data to predict student behavior and motivations regarding the courses they are enrolled in. It has been shown that there is a substantial correlation between student interaction with the LMS system and their motivation to finish the course in question\textsuperscript{68}. It has even been stipulated that Universities should analyze this data and create an algorithmic classifier which would automatically detect students who have a potential of dropping out of school. With this technology, universities could be able to intercept students and perhaps guide them to a more suited curriculum long before they ever decide to drop out\textsuperscript{69}.

Creators of content in an LMS are commonly teachers, as mentioned above, without the content from them the LMS is just an empty frame. A study conducted in California amongst teachers in 2008 concluded that there are certain motivational factors that can encourage teachers to successfully incorporate a Learning management system in their courses. In the study, the teachers were asked to rank certain motivational factors which would encourage them to use an LMS system, see table 1. The study concluded that even though it is the school policy to use the LMS it only ranked in fifth place in the motivational factors after other factors which had more to do with personal goals and responsibilities. Salary ranked on top of the list, where teacher’s felt they would be more keen to use a learning management system if the motivation to use it would be a monetary one \textsuperscript{70}.

\begin{table}[h]
\centering
\begin{tabular}{|l|l|}
\hline
Factor & Rank \\
\hline
Salary & 1 \\
Personal goals & 2 \\
Motivational factors & 3 \\
LMS system & 5 \\
Other factors & 4 \\
\hline
\end{tabular}
\caption{Motivational factors for using a Learning Management System.}
\end{table}

\textsuperscript{66} (Sharma and Vatta 2013)
\textsuperscript{67} (Sharma and Vatta 2013)
\textsuperscript{68} (Muñoz-Organero, Muñoz-Merino and Kloos 2010)
\textsuperscript{69} (Romero, Ventura and García 2008)
\textsuperscript{70} (Gautreau 2011)
The study also concluded that demographics, such as age, gender, and ethnicity, were not a decisive factor regarding if a teacher felt positive or negative toward LMS adoption. However, teachers who claimed to have technological experience were more likely to adopt the LMS system than other teachers\textsuperscript{71}.

Most universities have a policy nowadays to have an active LMS. As students seek almost all the information they need from the Internet, having an active LMS for all courses is a natural consequence\textsuperscript{72}. Even though a lot of time and energy has been put into the implementation of such a system, there has been some skepticism regarding the results of these projects. Putting a university course online will not automatically improve the educational outcome of the student attending. What is meant by that is that an application software like LMS is not a silver bullet but rather a tool which can be a useful and its success depends a great deal on support and the quality of content that is put into it\textsuperscript{73}. The success of any implementation and installation of an information system depends more on how the users use the system, how devoted they are, the quality and frequency of content creation and usage\textsuperscript{74}.

In a study conducted in 2010 involving 425 users of an LMS in Malaysia, researchers tried to evaluate what influenced users to adapt to an LMS system. To evaluate this, they create an Educational technology model (ETM) combining widely used technology acceptance model

\begin{table}
\centering
\begin{tabular}{|l|c|c|c|}
\hline
Ranked Order of Motivation Factors & Mean & Standard Deviation & N \\
\hline
Salary & 3.83 & 1.05 & 42 \\
Responsibility & 3.56 & 1.25 & 42 \\
Achievement & 3.44 & 1.05 & 42 \\
Advancement & 3.37 & 0.87 & 42 \\
Company Policy/Administration & 3.30 & 0.96 & 42 \\
Work Itself & 3.10 & 1.02 & 42 \\
Recognition & 3.07 & 1.07 & 42 \\
\hline
\end{tabular}
\caption{Motivation Factors, Mean Responses, and Standard Deviation (Gautreau 2011)}
\end{table}

\textsuperscript{71} (Gautreau 2011)
\textsuperscript{72} (Adzharuddin and Ling 2013)
\textsuperscript{73} (Schofield and Davidson 2002)
\textsuperscript{74} (Almarashdeh, et al. 2010)
(TAM) with an information system (IS) success model as a framework to evaluate the impact factors of three different dimension groups, see figure 2. Both TAM and IS success models have been used in the past, TAM to evaluate why users accept or reject new technology and IS success model in measuring successful implementation of the information system.  

The first dimension in the ETM evaluates the system design, that is, perceived system quality, service, information, usefulness, and ease of use. The second dimension evaluated was system usage, behavioral intentions to use the system, and the user’s satisfaction with the system. The final dimension was system outcome, that is perceived as the net benefit of the user with using the system. All participants in the study receive a questionnaire where each object of the ETM was illustrated as a statement, and the participants used a 5-point Likert scale ranging from strongly disagree to strongly agree. The results were then statistically verified using Cronbach’s alpha and analyzed using regression analysis evaluating how objects in each dimension affected one another. The results of the study concluded that system design has a significant effect on both intentions of the user to use the system and the user’s satisfaction with the system. All of the objects in the dimension group system design had a significant correlation. In the researcher’s opinion, this brings forward a problem regarding picking the right LMS for the institution. More elaboration of IS options and implementation will be elaborated on in the next chapter.

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75 (Almarashdeh, et al. 2010)
76 (Almarashdeh, et al. 2010)
2.3 Implementing an information system

Information technology has for the last decades been in the leading role in many organizations for creating a competitive advantage. But as commercial software evolves, smaller and medium-size organization gain the ability to have a competitive parity with larger competitors in an IT perspective. In the past organization needed to go on a costly journey to develop their own IS, this is still true in certain sectors, but to a large extent, commercial software can be bought for a variety of purposes.\(^{77}\)

Implementing a new Information System belongs in the theoretical framework of change management, but some researchers have made distinctions between types of information technology (IT) implementation. IT projects, which are a standard installation of a software application where the target objectives are technological advances like better hardware performance or more efficient cost of operations. Another type has been called Technochange, the word stands for technology-driven organizational change. There the target objective is to improve the organizational performance with a new software application followed by a complementary change of the organization. Organizational change programs often involve a collection of methodologies to effect for example attitudes and behaviors, human resource development, culture, reward systems, and job redesigns. The target outcomes are always improved organization performance or culture. Technochange can then be considered an IT project combined with organizational transformation where success is characterized by the completement of both tasks.\(^{78}\)

The organizational change part has been covered in the change management chapter above, implementing an IT project will be the subject of the rest of this chapter.

When an organization sets on the journey to implement a new software application, they commonly have three choices that are applicable. First, they can decide to buy a commercial product which fits their criteria and adopt the business processes to the new application.\(^{79}\) The second possibility is to buy a commercial product and customize it, so it adapts to the business process already in place at the organization.\(^{80}\) The third and final option is to develop from scratch.

\(^{77}\) (Xu and Lippert 2007)  
\(^{78}\) (Lynne 2004)  
\(^{79}\) (Parr and Shanks 2000)  
\(^{80}\) (Boehm 1988)
an application\textsuperscript{81}. These three options all have their pros and cons which will be elaborated on in the next three subchapters.

The decision regarding these issues often remains in the IT department of the organization. Commonly IT departments are responsible for making infrastructure decisions like those mentioned above, but also, what should be replaced, band-aided, what should be outsourced, etc. IT departments usually do not generate revenue, so they are often seen as a cost center, it then becomes troublesome to evaluate work done because the results don’t become immediately visible. Thus, it becomes problematic to measure the success level in the department\textsuperscript{82}. This would not be a problem if it were not for the fact, that when an organization implements a new information system, nearly always the productivity goes down, for a certain amount of time. It then becomes the project managers obligation to create critical success factors and measures of success of the implementation, which give stakeholders grounds to believe the productivity will go up again when the transformation has been accomplished\textsuperscript{83}.

2.3.1 Develop an information system

In the past organizations had no option but to develop their information systems in-house, as no commercial packages were available for many specific industries. The results of these development programs were varied in the degrees of success when evaluating both the end results and project budget. The methodologies used in these information system developments (ISD) have evolved through the last decades because of these minimal successes. There have been identified four eras in software development history\textsuperscript{84}.

First was the pre-methodology era, defined by the fact that early software development projects basically had no methodology. The needs of users were rarely established or met, which resulted in a software application which failed to do the job it was designed for. The focus was on getting the application to work, with limited computing power, what did not help is that the software developers often were not good communicators\textsuperscript{85}.

\textsuperscript{81} (Myers and Young 1997)
\textsuperscript{82} (Xu and Lippert 2007)
\textsuperscript{83} (Nah and Delgado 2006)
\textsuperscript{84} (Avison and Fitzgerald 2006)
\textsuperscript{85} (Avison and Fitzgerald 2006)
Second was the early methodology era, which was driven by the failed attempts of the pre-methodology era. Developers now found the need for a software analyst to find out the criteria from users. By this time organization were getting larger than ever before and the ISD needed to keep in mind that the information system being developed could not be isolated, it needed to connect to other information systems in the organization.86

This resulted in the development of the System development life cycle (SDLC), or sometimes referred to as the waterfall methodology. The methodology was mapped out from start to finish, emphasizing user involvement and setting critical success factors for the project, in the last step of the methodology the developer should have an end product, a complete information system.87 The early use of the waterfall methodology resulted in much better results than before, but still, there were some issues and limitations. The main critique on the methodology was its failure to meet the need of the managers because the team only focused on system development and not on the operational level of the organization. The focus in this era was on computerizing the existing system which often resulted in unambitious system designs. The system created was often unstable, because of the fact the testing was done near the end of the project in the waterfall methodology, see figure 3, resulting in an unreliable end product. Documentation was often inadequate, which resulted in user dissatisfaction. The project would often go over budget, in the effort to fix the problems that had come up at the launch of the software being developed. As a result of these problems there began a new era, a new methodology which tried to fix these problems.88

The third era has been identified as the methodology era. As the results of the problems with the waterfall methodology, multitudes of different methodologies were developed, which we're all trying to evolve the SDLC and fix the problems mentioned above. This evolution of the

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86 (Avison and Fitzgerald 2006)  
87 (Mishra og Dubey 2013)  
88 (Avison and Fitzgerald 2006)
SDLC is still going on. But although these improvements have been a success to some degree, many users argue that the inflexibility of the SDLC is the main problem\(^89\).

The fourth era is called the Post methodology era and it is the era of today, it is identified by the sense there is no silver bullet methodology that works perfectly. Of course, each era does not have a start date nor an end date, because organizations can still be found that uses no methodology, or waterfall techniques and etc. A relatively new development in this field is Agile methodology, which emphasizes the involvement of users and customers rather than emphasizing processes and tools, a working prototype early on rather than comprehensive documentation. They emphasize that a change decision is welcomed whenever in the development process. But perhaps because of the daunting task of software development more and more organization have moved from developing to buying a commercial package to solve their problem\(^90\).

Developing software in-house has some disadvantages and advantages. The developed software can undoubtedly have all the features needed, but in most cases, bought software will have more features. This is mostly because of budget concerns, as the IT team may not be able to implement all of the functions that the commercial product has. On the upside, modification of the developed system is much less costly than modifying a commercial system. But if the organization is modifying an old legacy system, odds are the people who originally developed the system are no longer around. This lack of personnel availability who designed and built the software becomes a problem when modifying the software, if the system has not been rigorously documented. What often becomes the case in this scenario is that over time features were added to the developed system and often the modification are not documented. The risk is that these modifications are creating interdependencies which will make future modification harder, because changing one part of the source code can have unforeseen consequences\(^91\).

2.3.2 Buy commercial software

The first step for a software consumer when deciding on the venture of buying and installing a commercial product is to do a system needs analysis. Such a step outlines the high-level functions needed, the critical features and the functions. The next step is to identify what software vendors

\(^89\) (Mishra og Dubey 2013)
\(^90\) (Avison and Fitzgerald 2006)
\(^91\) (Xu and Lippert 2007)
are offering and match that with the system analysis. Then the organization needs to do a gap-fit comparison between the different products and see which software fits best. After the selection, the organization starts the system installation phase where a detailed installation requirement analysis is performed, data structures and business rules are developed and decide on a configuration table setting for the software. The last phase is where many organizations have trouble with, they have to decide if they should change their business processes according to the industry standard, as designed in the commercial product or develop the commercial product so it fits the current business processes. The last step is to train the users on the new system and processes if they have been changed\textsuperscript{92}.

There are some definite positive points that certainly argue for the organization to buy commercial software. Usually, the solution is implemented quickly, off the shelf software usually has a variety of features designed for the sector the organization is in and lastly, the quality is usually better. One could even add that buying commercial software is usually a lot cheaper than developing it in-house\textsuperscript{93}.

On the other hand, there are certainly some negatives to buying commercial software. Although the cost of buying the software is relatively cheap when compared to developing it, the fact remains, most information systems require some kind of customization which is usually done by a costly specialist, this aspect often leads projects to go over budget. Additionally adding new features not supported by the software vendor can be very costly\textsuperscript{94}.

2.3.3 Customizing an information system

When buying off the shelf product there are always some need to set parameters, sometimes called configuration. This should not be confused with software code modification, which is usually discouraged by software vendors. Contrary to this fact, many organizations choose to go on this road of customization rather than adapting their business processes to the software\textsuperscript{95}. The processes might have developed over the years and are perhaps not industry standards. When buying off the shelf IS, it is doubtful that software will support the business processes in the organization. If the

\textsuperscript{92} (Sawyer 2001)
\textsuperscript{93} (Xu and Lippert 2007)
\textsuperscript{94} (Xu and Lippert 2007)
\textsuperscript{95} (Brehm, Heinzl and Lynne 2001)
organization decides to modify the software, it can become really costly and could prohibit the software for getting updates. To summarize, organizations should not customize commercial software products\textsuperscript{96}.

3 Methodology

This research will use qualitative methods to examine how Reykjavík University conducted its implementation of Canvas. Which is a learning management system like described in the theoretical chapter. Qualitative research aims to be a subjective and systematic approach to examine everyday life experiences and giving them proper meaning. There are several ways to do qualitative research, for example, participant observation, focus groups, and qualitative interviews\textsuperscript{97}. This research will follow the guidelines of verbal interviews as described by Robert K. Yin in his book, *Case Study Research*. The approach selected employed a semi-structured open-ended questionnaire as a framework for verbal interviews\textsuperscript{98}.

The use of qualitative research enables the researcher/s to examine the material through the eyes of different stakeholders. This was seen as crucial to be able to answer the research question this study states. The research questions demand that the researcher puts himself in the shoes of both implementation team for Canvas, at RU, as well as user— the teachers and the students\textsuperscript{99}.

3.1 Participants and Measurement

No estimation of sample size for the data collection was done prior to the start of this research. Rather the researcher focused on getting saturated when no new subsequent information emerged from the interviews\textsuperscript{100}. In total 9 participants were asked to participate in this research, three participants from the implementation team, three teachers from different departments of RU and three students from different departments of RU. A combination of snowball sampling and purposeful sampling was used to select participants.

It must be noted that most sampling in qualitative research entails some kind of purposive sampling, as the sampling strategy is always decided with the research goal at hand. Snowball

\textsuperscript{96} (Xu and Lippert 2007)
\textsuperscript{97} (Bryman and Bell 2015)
\textsuperscript{98} (Yin 2018)
\textsuperscript{99} (Bryman and Bell 2015)
\textsuperscript{100} (Trotter II 2012)
sampling refers to a sampling tactic where the researcher meets participants and they are then asked to refer other potential candidates for the research \(^\text{101}\). At first, the project manager of the implementation was contacted through email, she then referred two other members of the team and teachers which had been involved in the pilot testing of the LMS system. In every interview with the teacher, they were asked to refer a student. This ended up not to be the right tactic, as only one teacher was able to refer a student to this study. The other two were referred to after advertising on Facebook. To summarize seven participants were referred to this study by a participant, using snowball sampling. Two participants were selected with purposeful sampling.

The criteria for participating in this study were as follows. The members of the implementation team had to be vital members with decision making power in the implementation process. The teachers needed to be from different departments, to get a holistic view on the matter, and they had to be teaching at the time of the implementation to be able to evaluate the process. The students also needed to be from different departments and had to be attending the school during the implementation period. Three participants were women and six were men. All participants received an email invitation to participate in the study, see Appendix C and D, nine invitations were sent, all participants accepted. More detail on the participants can be found in table 3.

\footnotesize\textit{Table 2: List of participants}\normalsize

<table>
<thead>
<tr>
<th>User groups</th>
<th>Name</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation team</td>
<td>Rebekka Helga Aðalsteinsdóttir</td>
<td>Project Leader</td>
</tr>
<tr>
<td>Implementation team</td>
<td>Heiðar Jón Hannesson</td>
<td>Chief information officer</td>
</tr>
<tr>
<td>Implementation team</td>
<td>Einar Hreinson</td>
<td>Teaching administrator (now former)</td>
</tr>
<tr>
<td>User</td>
<td>Ásrún Matthíasdóttir</td>
<td>Assistant Professor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engineering department</td>
</tr>
<tr>
<td>User</td>
<td>Hannes Högni Vilhjálmsson</td>
<td>Associate Professor Computer Science</td>
</tr>
<tr>
<td>User</td>
<td>Ketill Berg Magnússon</td>
<td>Lecturer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Business Department</td>
</tr>
</tbody>
</table>

\(^{101}\) (Bryman and Bell 2015)
<table>
<thead>
<tr>
<th>User</th>
<th>Name</th>
<th>Student, Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>User</td>
<td>Ásrún Á Jónsdóttir</td>
<td>Psychology department</td>
</tr>
<tr>
<td>User</td>
<td>Einar Örn Bjarnason</td>
<td>Engineering department</td>
</tr>
<tr>
<td>User</td>
<td>Kristmundur Ágúst Jónsson</td>
<td>Computer Science department</td>
</tr>
</tbody>
</table>

Before the interviews were conducted, the question frame was created. One question frame for the user group and another for the implementation team, see Appendix A and Appendix B. The questions were open-ended in order to get more information from participants and were not necessary asked in numerical order, but more as a guideline for the interview.

### 3.2 Data Collection

All interviews were conducted between 23 May and 9 July. The longest interview was 73 minutes and the shortest interview was 17 minutes, which was by far the shortest interview. On average the interviews lasted 39 minutes. The students had the fewest things to say, ranging from 28 minutes to the lowest 17 minutes, this brings the average down considerably.

All the interviews were recorded using an iPad Pro and a backup recorder which was an iPhone SE. Verbal consent to record the participants was attained before the interviews. One participant requested that part of his interview would not be transcribed, material covered in that sector turned out not to be relevant to this research. Two participants also sent relevant documents in an email format. Rebekka sent the RU Information technology strategy which can be found in Appendix F, and a memo created by the implementation team regarding the selection process of the LMS system, see Appendix G. One participants from the user groups, Hannes Högni, sent a list of bugs in Canvas. The list was used more as a reference in future interviews but not directly reference in this thesis. The IT strategy and the memo from the implementation team, were considered relevant to this research project, other documents had a supporting role when writing the findings chapter, but they did not add new material.

The interview location was decided with the participant, to make him/her feel at ease. It is considered an important strategy when conducting interviews in qualitative research to make the
participant feel at ease, one aspect of that is to let them choose a location for the interview. Five out of nine interviews were conducted in a secluded meeting room at Reykjavík University. In one of the interviews the meeting room which had been booked had an overlapped booking. It was decided on the spot to conduct that interview near Te og Kaffi at RU. This was not a preferred location as the sound quality suffered for it. But not to the extent that the audio was usable. One of the part-time teachers preferred his workplace at Marel, one student wanted the interview to take place at his home and one student preferred to meet near his home in Hafnarfjörður, it was decided he would meet the researcher at his part-time job in a secluded meeting room at Allianz headquarters in Iceland. All the interview locations except one, described above, were quiet so no audio noise would interfere with the transcribing of the interviews.

3.3 Data analysis

After each meeting with participants, the researcher wrote down a short summary of that interview, just to see if there were some obvious themes that would emerge. When all the interviews had been conducted the next step was to transcribe them word by word.

This research uses grounded theory as the basis of the analysis. It involves the identification of categories of meaning from the data. The data was coded, and then themes emerged. Coding is considered a key process in grounded theory where the data is broken down into components or categories, which are given names.

The proposition of this research, of course, shapes the analysis in some way, the research strategy, research question, and question frame are all based on the research proposition. The interviews were also analyzed with Kotter’s 8 steps for change in mind, as the research questions revolve around change management tactics. This is commonly referred to as relying on a theoretical proposition.

The interviews were read repeatably applying the grounded theory approach, to be able to define common themes and category, both with the groups, users and implementation team. As all

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102 (Elwood 2000)
103 (Bryman and Bell 2015)
104 (Yin 2018)
the interviews were conducted in Icelandic the most relevant quotes were translated into English, the focus of the translation was to not miss the deeper meanings of the sentences in this process.

4 Findings

The findings are divided among common themes that occur in the interviews and were discovered in the coding process after the transcribing of interviews had been completed. The first chapter grants an overview of the process as seen by the implementation team. It was seen as helpful to get an overview of the process before diving into certain aspects of the change process. As the questions, see Appendix A and Appendix B, were created with Kotter steps for successful change in mind. The themes discovered and are discussed in the following subchapter have some resemblance to Kotter’s steps for change. This is followed by the user’s side of the change management process, each chapter has subchapter, the teacher’s side, and the student’s side. This was thought of as appropriate as these two groups points of view are quite different, as the creators of content versus the receivers of content.

4.1 Overview of the implementation process of a new LMS at RU

Heiðar Jón Hannesson was originally employed at Reykjavík University as an advisor and was assigned to create an IT strategy for the school. Which he did, and later was hired as the chief information organizer, where he is responsible to implement the IT strategy he helped create. According to Heiðar, the implementation of Canvas is one of the steps necessary to realize the IT strategy. The IT strategy can be found in Appendix F.

Heiðar stated that a university must have two unique applications to be considered operational. The university needs a student information system (SIS), which can be considered an enterprise resource planner (ERP) and a learning management system, which serves as a communication channel between students and teachers. On top of this the university needs an enrollment system and a graduation system. When Heiðar started reevaluating the IT structure at RU, these functions were all performed using Myschool. According to Heiðar this is not ideal, and not an industry standard to let one system serve both as a communication portal with the LMS, and a student information system. He described it the following way;

It is like having an ERP system and Facebook bundled together, it simply does not make sense
It was clear in Heiðar’s mind when he and his team reevaluated the IT infrastructure at RU that Myschool had to be replaced. Einar Hreinsson, the teaching administrator, made similar comments as Heiðar, that the student information system and a learning management system are not pedagogically compatible.

The first step in realizing the IT strategy was to create a data warehouse where all relevant student data was stored. They created a new graduation and enrollment system, which was more automated than before, in accordance with the IT strategy. The next step was to replace Myschool with a new LMS, Canvas, and a new SIS. This was supposed to happen simultaneously, but because of technical issues that have still not been resolved the SIS part of Myschool is still operational. Heiðar felt that the IT strategy created in 2012 would not be realized until a new SIS was operational.

Following the interview with the project manager, Rebekka Helga Aðalsteinsdóttir, she sent a link to a dedicated website which was created to inform user groups on the reasons and progress of the replacement of Myschool. According to an article on that site, the reasons RU stated for replacing the LMS systems were:

- To move away from a bespoke legacy system and into a widely used next-generation cloud system which uses industry standards for integration with other systems
- To ease integration with third-party systems which allows for more flexibility
- To make the move towards new technology such as mobile

4.1.1 LMS choosing process

When it became evident that RU needed a new LMS system an implementation team was created, on the team were the CIO, Heiðar Jón Hannesson, and head of teaching administration, Einar Hreinsson, two heads of departments and Rebekka Helga Aðalsteinsdóttir, the project leader.

The implementation team decided on choosing between three commercial LMS systems, they were Canvas, Brightspace, and Blackboard. According to Rebekka, the market ratio of these three systems is around 90%. It was considered important that the LMS selected would support the

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105 (Rebekka Helga Aðalsteinsdóttir 2016)
learning tool interoperability (LTI). LTI is a standard which most official learning assist applications support, which means future add-ons, which most support LTI, would be easy to integrate.

Later in the selection process, an LMS system created internally was introduced, called Centris. Two advisory groups were created to evaluate which one of these four systems suited RU best, they were not supposed to evaluate costs or network security issues. Members of group one had seven teachers from all departments, plus the chairman of the study committee and the teaching administrator, who also was a member of the implementation team. The other group involved three students who were chosen by the student committee. According to Rebekka, originally there were supposed to be more students in group number two, but the students selected, ended up having limited time, the committee then ended up involving only three students.

The groups tested the system and the results were for group one that Brightspace and Canvas should be viewed as options for a new LMS. Also, if it was the intention of RU to develop their own system, Centris should be considered. Group two, the students, decided to rank the system in the following order, highest to lowest, Centris, Canvas, Brightspace, Blackboard. The implementation team interpreted the results as unanimous, Blackboard was then no longer considered an option. Individuals involved in the three remaining systems were invited to do an open presentation of their learning management system which was held at RU.

The three remaining systems were then systematically compared, see table 3. The implementation team did not evaluate the individual functions of the system, rather evaluated the scalability and security concerns of the systems.

<table>
<thead>
<tr>
<th>Ready for use</th>
<th>Brightspace</th>
<th>Canvas</th>
<th>Centris</th>
</tr>
</thead>
<tbody>
<tr>
<td>LTI compatible</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Connection possibility to system</td>
<td>Yes</td>
<td>Yes</td>
<td>Limited</td>
</tr>
<tr>
<td>Open source</td>
<td>No</td>
<td>Yes</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

Table 3 Learning management systems compared

106 (Rebekka Helga Aðalsteinsdóttir 2016)
<table>
<thead>
<tr>
<th>Number of employees</th>
<th>800+</th>
<th>700+</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of customers</td>
<td>1100+</td>
<td>1700+</td>
<td>0</td>
</tr>
<tr>
<td>Number of users</td>
<td>15M+</td>
<td>16M+</td>
<td>0</td>
</tr>
<tr>
<td>User community</td>
<td>Good</td>
<td>Very good</td>
<td>None</td>
</tr>
</tbody>
</table>

It was the recommendation after comparing all three systems that RU should consider Canvas and Brightspace for the testing period, to make sure they fulfilled the requirements of the school and that the user experience was positive. The implementation team advised that Centris should be not be considered for this phase, mainly because of two reasons. The system was not, according to Einar Hreinsson, and Heiðar Jón ready by any means. As a consequence, they tried to calculate how many man-hours RU would be needed to develop Centris. The results showed them that it wasn’t a viable option. Secondly, choosing Centris would not be in sync., with the IT strategy which states that;

### 7.6 Information Systems

The information systems of RU shall be driven by the defined processes of the University, and the communication that needs to take place within it. In choosing solutions, the aim shall be to acquire solutions which are general and widespread if these are available. Otherwise, special solutions shall be developed for the University in collaboration with external parties.

According to Rebekka and Heiðar, the introduction of Centris to the selection of an LMS complicated things a little bit because now some employees and students had a more personal stake in which LMS should be picked. This was natural in their opinion, as both teachers and students from the Computer Science department had invested a lot of time and effort into developing Centris. In an interview with Ásrún, the teacher, had heard that the people responsible for the development of Centris felt as if they had not gotten an equal opportunity to showcase their LMS as the other platform’s got.

Hannes Högni, the teacher from the computer science department, felt the same way when asked about the system developed in his department. He thought it was the right decision, which the implementation team made, not to pursue an internally developed learning management system. His rationale was that RU had tried an internally developed system before with Myschool, that in
his opinion, had become in his words, a spaghetti monster of code with a lot of interdependencies. His fear was, if RU had decided to go with an internally developed LMS, this would happen again.

The two systems were then tested in two summer courses. According to Rebekka, this was just to get the user experience. To be able to evaluate the user experience Rebekka was in contact with both teachers and students involved in the test and at the end of the course a user survey was conducted, and in-depth interviews were conducted both with teachers and students in these two courses. The results were that both systems fulfilled academic requirements, but Canvas scored a little bit higher in user satisfaction. After evaluating the survey, cost analysis, seeking opinions from groups one and two, there was no relative difference between the two systems. According to Einar Hreinsson, there were two deciding factors, why the implementation team decided to pick Canvas. First, the Canvas team seemed to be able to support RU better in the implementation and second, how the Canvas market ratio was increasing in neighboring countries like Denmark, Sweden, Norway, and England. This would increase the likelihood that other Universities which RU collaborates could be using the same LMS system. This would mean for an example that some guest lecturers would be familiar with the LMS environment, if they picked Canvas rather than Brightspace.

The implementation team then advertised for teachers for the pilot test. These early adaptors tried the system in the spring semester 2017. Seven teachers were picked which in total involved 456 students from different departments. According to Rebekka these teachers varied in their use of the system for pilot semester, some used just the online exams, while others used all available features. Meanwhile, the implementation team coordinated the technical integration and implementation of the system.

According to Rebekka training seminars were held for the Canvas administrator, the Canvas support team and all teachers. The seminars for teachers were designed partly to sell them on the system by showing them fundamental functions in the system that were like their previous use of Myschool and then showing them added features of Canvas. They tried to make everything as simple as possible in the beginning, showcase-in how a teacher could set up his/her courses. In the weeks that followed, after the launch, teachers were invited to seminars where new features of Canvas were showcased. Tools, for example, speed grader, which enabled teachers to be quicker
in reviewing student assignments. According to Rebekka, the implementation team tried to get buy-in from users by advertising how these features would make their job easier and save a lot of time.

In the interview with Einar Hreinsson, he also talked about features of the system being used as a selling point for the system. Both features that were available and features that would be added in the future, which were now easily available because they had picked a commercial LMS which was easily adaptable to other teaching platforms like DigiExam and Turnitin.

After the pilot, technical integration and training seminars, Canvas was launched as the official LMS of RU in the fall semester 2017. At that time the implementation team removed the function from Myschool which enabled teacher to create new assignments. If teachers tried to create new assignments, they were met with a text message that said, you should be using Canvas.

4.1.2 Change management tactics

Heiðar talked about he wanted to use a change management model called ADKAR, (this model is covered to some extent in the theoretical chapter), but he argued that he did not get support for that idea from other members of the implementation team. He views his role as CIO as being responsible for technological results, that includes that technical support and installation are smooth. In hindsight, he felt he should have argued more for the use of change management tactics. He also described that a university is not a regular organization, from a change management perspective as its basically divided in two, one half is the administration part which resembles a regular organization and the other half is the academia, which he said was like the wild west. Teachers are used to being in charge, they are the teacher and they will do what they want.

Rebekka felt the implementation went well, regarding dissatisfaction she had this to say;

... Of course, you hear more about the things that go wrong, something that someone misses, or something people feels it should be different. We, of course, you try to listen to everybody, and the largest part is very happy. The unhappy ones are not unhappy because Myschool was better, but because when you put something like that in people's hands, they want something more, or different...

Rebekka admitted that there was one thing that is horrible in Canvas and was better in Myschool. That is how groups are assigned in Canvas. This is an issue which all of the teachers who participated in this research talked about. Rebekka elaborated, that this was a topic RU was most rigorous in their attempts to get Canvas to fix this issue.
When Einar Hreinsson was asked how he thought it had gone, pitching the new system to the faculty he responded that both the greatest thing about RU and one of the worst things about RU are the same, the departments are incredibly independent. That fact offers a lot of pros, but also a lot of cons, especially for managers in supporting departments. The responsibility of the quality of teaching lies with the head of the departments and if they are not interested in doing something new, then it basically does not happen. This means the only way to implement new things has to be with their blessing. Einar described that to counteract this departmental independence is that RU sets up rigorous official strategies for most things, which the department heads are obligated to follow. In the case of Canvas, the IT strategy needed to be realized as stated above. But even though they are obligated to follow the strategies RU sets, of course, there is a need for collaboration. According to Einar this collaboration was quite different between departments, as expected. Einar described the implementation process as a big bang implementation. All of a sudden, the whole school had a new system. But he was pleasantly surprised that most departments accepted the change and did a fantastic job. When Einar described the main problems, he said;

The wonderful thing about working in a university is that you are working full-time with incredibly gifted people who are absolutely brilliant and diligent in what they do. But it is perhaps also one of the main disadvantages, they may not realize that sometimes they transfer their expertise to things they have no expertise in.

Rebekka the project manager in the implementation team admitted that the team did not try to create a sense of urgency with the user group. Instead, they tried to sell to the teachers how their life would become easier after the installation. With better features and easy adaptation of tools from other vendors using the LTI standard, which was discussed above. The goal was to create something better for the teachers to conduct their courses and something more easily accessible for student, with the introduction of a smartphone application. Einar Helgi added to this that the introduction of Canvas the main goal was to offer students an LMS system that fulfills today's standards, to have a system that offers teachers a variety of teaching options, student evaluation, and third party connections. Einar Hreinsson remarked that the older system, Myschool, was basically a one-way system, it did not offer a variety of teaching options. Canvas, on the other hand, he described it as kind of a hub where all kinds of third-party application can be added with relative ease. RU is a school of about 500 teachers who teach in a variety of ways, with this new hub the school could for the first time offer them the correct tools for their work.
There were a couple of urgent issues that Canvas solved for the IT department, according to both Heiðar and Rebekka. Just by removing the LMS part from Myschool would release a lot of pressure on servers hosting the site. At the end of each semester, all students logged on to Myschool to prepare for examinations. This caused a fluctuation in server hosting Myschool, which resulted in the need for the system requiring constant care during the exam period. This problem ceased to exist when RU started using Canvas because the new system is a cloud-based service hosted by Canvas, which promises 99,99% uptime which results in RU no longer needing to have IT people on standby during examination periods.

It also became more manageable for the development team to create a new connection with Canvas than in Myschool, because of how good the API was. According to Hannes Högni, this had become problematic in Myschool and was resolved with the implementation of Canvas. With the new API and the LTI standard Canvas supports, it becomes easier to justify adopting third-party tools for a niche group at RU. In the older system it could not be justified to add a third-party tool because the adaptation needed to be coded by the software developers, which is hard to rationalize if just a small number of users need it. Rebekka elaborated that now it only takes about 15 to 30 minutes to set up, and the tool is ready for use.

Einar Hreinsson, the teaching administrator, had more things to add to the urgency. In 2012, the Quality Council of Icelandic universities (i. Gæðaráð Íslandska Háskóla) performed an extensive audit at RU, all universities in Iceland have to go through this audit every five years, according to Einar. The results from the 2012 audit were good for RU except there were two critical comments, one of them revolved around information technology, information technology flow and information management at RU. The results of these critical comments were the establishment of the IT strategy mentioned above, which Heiðar Jón took part in creating. The other critical comment was regarding student democracy, according to Einar this was resolved immediately.

Einar went on describing the LMS part of Myschool as an old tractor which was basically used as a torrent system. The teacher uploaded documents to Myschool during the semester, the students downloaded those documents and that’s it. In his mind, RU simply needed to step into the 21st century. He thought it was self-evident that the school needed another system, but he realized that not everybody thinks alike, especially on this topic. His view was in general people are positive towards change, if the transformation is not something that will cause them extra work. He said
that he was pleasantly surprised that there were people that he would not suspect to be positive towards the transformation, that in fact were positive. In his words;

I've been arguing here with 25 or 30 year old teachers who are entirely opposed to all of these changes and consider this to be just the devil's toolbox and on the other hand, I've had almost seventy years old professors who are positively bumbling with excitement and says, this looks really neat.

These were symptoms that have followed him in general with all change at RU as the Teaching administrator. Getting people to drop their habits is not an easy job in Einar’s opinion, you have to find the right angle. Einar admitted, of course, there was a need to get the faculty on-board, but his past experience has taught him that if you try to evoke any kind of change in teachers they start talking about academic freedom, although the change has nothing to do with that.

He elaborated that he always expects problems and opposition, and it was no different in the case of Canvas. Problems like the teachers not accepting the desired change and whole departments not complying with the schools changed policies. In his opinion this opposition is rooted in the fact that RU is a collection of independent departments, in Einar’s mind this was one of RU greatest traits but at the same time its most significant disadvantage because it also creates problems with compliancy of new policies and changes. He would not recommend changing the structure, academically this is works out really well for RU.

When Einar was asked about if the implementation used any deliberate change management tactics he said, yes and no. In one hand they sent out a clear message that no teachers could use the LMS part of Myschool and everybody was going to use Canvas. Einar described the rest of the change process as soft. First, they selected seven pilot teachers which Einar described as Trojan horses inside all departments at RU, they could spread the word. These pilot teachers also did open lectures for other teachers, where they shared their experience in working in Canvas. As this is not the first transformation the implementation team takes part in at RU, the team knew what key employees needed to be convinced, this was done prior to the launch.

52 seminars were held in 2017 in two languages, Icelandic and English, so in Einar’s words, nobody could have an excuse not to attend. All teachers needed to attend at least twice when Einar was asked if he experienced any resistance during these seminars he said;
There were a couple of people who did not come with a computer and just ate their sandwich, but it was a minority. Then we got the teachers who were in the pilot to come and share their experience. Especially, to show the neat functions

Einar said that in general it had been easy to convince the faculty at RU. Many teachers had been reluctant in the beginning in 2017, but just one year later the same teachers were seeking advice how to do more with the functions available in Canvas.

Accordingly, the implementation team tried to communicate the vision for the future, how Canvas would make their life easier. The communication of the vision was done through the training sessions, and other usually channels, email, one-on-one talks and public events. There was also a website set up, but the user groups were not interested in visiting the site, according to Rebekka, so after a couple of months they stopped updating it.

Einar Hreinsson, the teaching administrator, discussed in his interview that the prior semester that he was repeatedly getting Ari Kristinn, the Rector of RU, to talk that RU was getting a new and exciting LMS system next semester. Einar also talked with teachers and department heads he tried to sell them on a future vision that Canvas would enable.

4.1.3 Vision for the future

As discussed above, the implemenation team main selling point were new features of Canvas. One feature Einar Hreinsson was especially excited about was the use of analytical data which Canvas supports. According to Einar, one of the main problems of all universities is student dropout. Dropouts are socially inefficient phenomena because the Icelandic government pays each university a certain amount for each student they enroll. A dropout student is expensive both for the Icelandic government and also for universities. This is because in the fall semester specific numbers of students enroll in the university and all plans for resources are coordinated at that time. If there is a significant dropout of students during the fall semester the resource planning done earlier is suddenly inefficient, as fewer students are enrolled. Usually this dropout is not noticed until the end of the semester when the student does not show up for exams. With analytical data these students could be identified earlier in the process, perhaps he/she chose the wrong academic study area and could be helped by a student advisor, or perhaps there are other reasons. Whatever the case, perhaps the university could help in some way, by minimizing dropouts. In Einar’s words;
…We have a large number of students who quit their studies during the first two to three weeks of school in the fall semester. Many students quit because they encounter a hurdle that they do not get over, they do not seek help, we do not know about them, they do not quit their studies, they more drift out of their studies. So slowly they roll out of it… Canvas is a tool that offers information that we can put a system around which flags those students who are at risk of dropping out…

Einar wanted to be quoted that he wants to use Canvas like Mark Zuckerberg uses Facebook, except he doesn’t want to sell the information. If a student does not log into a course for a week or two the system flags him. What RU does then is a process that needs to be mapped out, but now, in Einar’s opinion, the school knows about it.

Einar Hreinsson had more ideas for the future, for instance, if all the course material is made available using Canvas, that is; videos, presentation and even the selected book for the course. It is possible for the teacher to monitor the students’ progress during the semester. All of the sudden the teacher can see which students came prepared for class. Also with this monitoring, the teacher can spot chapters in the selected book which are perhaps harder for his students, as they spend longer time on specific chapters. If he assigns students to watch a video before the lecture, he can see if all students completed the assignment. In Einar’s opinion the possibilities are basically endless.

4.1.4 Technically a successful implementation

According to all members of the implementation team the technical aspect of the installation of Canvas was a success. This was supported by all the teachers interviewed for this research project. In the interview with Heiðar Jón, he described the implementation of Canvas as a stepping-stone toward realizing the IT strategy which RU committed to in 2012, see Appendix F. Both Heiðar Jón and Rebekka elaborated on that the reason for the installation was such a success were twofold. First, because the implementation team had already gone through a database restructure. This was a big part of realizing the It Strategy. Secondly because of the fact that Canvas is a cloud-based service, there basically were no setup to go through, except to tailor the look to the RU styleguide. team. The installation itself took only half a day according to Rebekka. Of course, the integration took longer, but most of that was done during the pilot semester. Heiðar remarked that neither students nor teachers experienced downtime while the installation was completed. Heiðar’s opinion
was that this is something that people should not take for granted. His experience was that when this happens, it usually goes unnoticed.

It was decided in accordance with the IT strategy to do no customization on Canvas. This of course meant a more straightforward technical installation and that processes that teachers were perhaps accustomed to in the older system had to be changed. Rebekka’s opinion on this was that Myschool had been developed by large by RU, this meant that the system processes mimicked the processes that RU used at that time. The processes in Canvas where perhaps different then RU, but they were the results from millions of users.

A couple of participants mentioned the application programming interface (API) of Canvas was excellent, all the participants from the implementation team plus both teacher and student from the Computer Science department, made this point. According to Rebekka, this has meant that the developer team had a more manageable task of integrating the system with other systems like the student information system. Connections like the portal, which students and teachers see when they login to Canvas are all solutions created by the development team and made possible because of the API.

The launch went well according to the implementation team, the primary user problem were that the teachers forgot to publish the content they created for their course. This was one of the features that were new to the faculty, in Myschool you only needed to press save, but now you needed to press save and then publish. One of the teachers who participated in this research, Ketil Berg, commented on this feature. He liked it, just for the fact that now he could make everything ready for class weeks or even months before the course starts. Then when he is in the classroom with the students, he simply presses publish on the content he wants to make available on that date. This allowed him to be more prepared for class, and allows him to work on the content of his courses when it suited him.

During the first weeks of Canvas going live, the implementation team coordinated a rigorous support team, that in Rebekkas word, was ready for anything. The support team ended up getting just a couple of phone calls. In fact, two weeks after launch Rebekka decided to walk past classrooms just to see if the teacher were using Canvas. It turned out they were using the system, without significant problems.
A few weeks after the launch no problems occurred, Rebekka remarked that three weeks after the launch the executive council had two meetings, in none of them Canvas was discussed. In the third meeting after Canvas went live one of the executives raised concerns that nobody had still talked about Canvas. The fact was, according to Rebekka, nobody had any issue, it just went smoothly.

The implementation went so well in fact, according to Rebekka, the Canvas organization has the implementation of Canvas at RU as a reference on how to implement the LMS system. People involved in the implementation have regularly been invited to speak at a Canvas conference and describe the process they went through.

4.2 Users’ sense of urgency

4.2.1 Students

A common theme found with the students was that at the time of the change they found no real reason for implementing a new LMS system. All the students answered no, to the question if they felt the change was urgent. The students commonly describe the change as unnecessary and a nuisance at first, but because they were forced by the school to use a new system, they gradually learned how to perform actions in Canvas and were by the time of the interviews accustomed to Canvas. None of the students felt that RU had successfully communicated the reasoning for replacing the learning management system.

They all elaborated a little bit on their no, Einar Örn Bjarnason from the engineering department said that he saw no good reason for the change because Canvas had brought nothing new to the table, in his word;

...There was nothing I could pinpoint that was better here than in Myschool. For example, there was more connection with the RU environment in Myschool than in Canvas...

Ásrún Jónsdóttir had been at RU for the last seven years and also felt that the change was not needed, she said she would have been perfectly happy with continuing using Myschool. She felt Canvas had not added anything new to the user experience except bringing in a smartphone app. She described it as annoying at the time of change, but felt did not matter now, things were back to normal.
Kristmundur Jónsson, a recent graduate from the Computer Science department, both had experience as a student at RU and as an assistant teacher. When asked if the change was urgent his response was;

The first thing I want to say is it was not necessary, this was just something unnecessary for me to be forced into learning on a new system. But now two years later, there are clearly things in there that make work easier for both teachers and students...

He continued saying that at first when RU launched Canvas he remembered feeling really annoyed because there were a lot of features that he liked in Myschool which aren’t as good in Canvas. But in time, gradually he said when some teachers started to use the system as it was supposed to be used, he said he saw some real benefits in Canvas, especially the flow of information between the teachers and students.

4.2.2 Teachers

The three teachers interviewed for this research all agreed to some degree that a new LMS was needed. Hannes Högni Vilhjálmsson and Ketill Berg Magnús described themselves as very positive regarding the change. Ásrún Matthíasdóttir saw there was a need to change the LMS system and was the only teacher who had a clear-cut reasoning from RU why they were changing the system. As she understood it, the change was urgent because of potential security risk with the data stored in Myschool.

Hannes said the change was necessary, and everybody was getting really tired of Myschool, which he described as a coding spaghetti monster and a patchwork quilt which had to be replaced. Hannes described that he and his coworkers at the computer department were getting really tired of Myschool and were generally positive towards change but that positive feeling changed quickly as they started using the system, in his own words;

Yes, it is bizarre, but everyone loved to hate Myschool (laughter), you can quote this. A Year before the change everybody was like, ohhhh Myschool. But in the first, the first semester with Canvas, then you just started to hear, hear, this was so good in Myschool, why is it like this and not like this. You know, all of a sudden it had turned completely...

Ketil Berg has been a teacher at RU for approximately 20 years and he described himself as an early adoptor, in fact, the reason that he was in the pilot test group was that he approached
the implementation team and requested be a part of the pilot. Ketill is also a Human Resource manager at a large company in Iceland. For this reason, he has in the past been an instigator of change in his current job and others before it. The interview was, for this reason, a little bit colored by his prior knowledge on change management. In general, he was the most positive participant on the user's side of the implementation of Canvas. He felt as the change represented a lot of opportunities for RU to move ahead into the future. Ketill was enthusiastic to try new things and felt the implementation of Canvas was a successful implementation but also stated that the school could be doing more in regard of using technology to enhance the teaching habits at RU.

When Ketill was asked about his coworkers and his opinion of their enthusiasm to adopt a new system, Ketill described many of them being skeptical. Like any change there are some early adopters and laggards which join the change later in the process. He felt that RU had done an excellent job in this regard, eager early adopters could test the system and make sure that small problems with Canvas were dealt with before the full launch the following semester. He admitted that when the full launch happened in the fall of 2017, he was already using Canvas fulltime and did not bother getting acquainted with other teachers’ problems with Canvas in his department, he then had no real sense of how everything played out that semester.

Like stated above, Ásrún Matthíasdóttir was the only teacher able to give a clear and cut reason why the change was necessary from the point of view of the RU administration. She was positive towards possible new opportunities that the new system potentially had, but was worried that her coworkers were just using Canvas the same way as they had used Myschool. She had researched how teachers had used Myschool in their teaching ten years ago and the results were that most teachers were not using all the functions available such as online exams. They in fact were just using the system to upload content into it. She was worried that this was still the case and the implementation of Canvas would not enhance the student experience, except for the fact they now have a smartphone app. She was positive towards the intended change of the LMS system but was not thrilled by the selected platform, Canvas, in her words;

The first thing that came to my mind when I looked at the system was that it was not designed for teachers. That was the first thing that came to my mind. That is, you constantly must be clicking to do simple things. Or as one used to do with one or two clicks, you need a lot of clicks now. Like when you want an overview for the course, they used to show you more things, then they do now, all the names and all the grades and such. There were many things like that, which were
naturally just a habit. You felt as if it had not been teachers which designed it, because everything that you do most as a teacher was made more complicated. Just like creating a project, giving grades for a project, it's all kind of clumsy.

According to Rebekka the project manager for the implementation of Canvas, RU does view the logs, how teachers and students are using the system. She commented on having seen user logs from other schools that use Canvas. Her experience was that many schools envy RU at how much teachers use functionalities like online exams and other functions. This has been her experience when she has gone abroad to attend conferences with employees from other universities. She admitted though this could be because many teachers use quizzes in class as a part of the attendance grade students get. This could be the reason why users’ logs at RU show more usage of features than in other schools.

4.3 Creating an IT Vision and strategy, and communicating it

4.3.1 Students

As stated above, the students were all in agreement that they could not pinpoint the reason for the change nor had a clear and cut idea of how the new LMS would keep on evolving. They did, however, all have arguments they imagined the school had for the change.

Einar Örn Bjarnason was the only student which was enrolled in a course which was one of the pilot courses spring semesters 2017. He stated that in his first year enrolled at RU he had gotten an introduction that RU was intending to replace Myschool with a new student information system and a new learning management system, this was in the fall semester 2016. In his opinion, he and the people around him did not believe this was going to happen, in their opinion excellent RU had intended to replace Myschool for quite some time, and because it still had not happened, they did not believe it would happen in the two years he was enrolled. His understanding of the vision for the project was that the school was just trying to do something new. Implement a new system which would create more oppurtunities to enhance the learning experience for students. Myschool was an old system, which would be hard to develop feater, it needed to be replaced. He was though surprise to see Myschool still up and running in the year 2019. But as stated above, Myschool is still operational as a Student information system.

Ásrún Á Jónsdóttir did not remember getting an email or an introduction regarding the implementation of Canvas. She stated though, perhaps she just missed the email. All she
remembered was that RU announced that there was a new LMS system coming, which was going to replace Myschool the LMS part. In her opinion, she thought the argument for the replacement was that Myschool was an old system and needed to be exchanged. These are the same arguments Einar offered.

Kristmundur had heard that RU was replacing Myschool with a new system. He heard about it because some people at his department, the Computer Science department, had been in heated arguments with the school. Like described in the implementation process chapter above, a couple of teachers and students had for a couple of semester been developing their own LMS system Centris. They had been programming a new LMS for the school as a part of a course they were taking. They felt that their platform was overlooked in the selection phase of the implementation. Kristmundur did not remember getting an introduction in text form or vocally from the school. Kristmundur mentioned that perhaps he was just preoccupied with school to notice the messages RU perhaps was trying to communicate. Kristmundur had a computer science perspective on the replacement of Myschool. In his own words:

…It was my understanding that it's naturally incredibly difficult to maintain old systems, and if something comes up and something crashes in the servers, there always must be some kind of support team to do that. Then it becomes a question whether RU should have a person at work or people at work to maintain this system or not…

All of the students interviewed could imagine a vision the school had for implementating a new LMS system. Only Einar Örn Bjarnason could recall getting a formal introduction in his first day in at RU. They all admitted that it was interally possible that the RU administration did try to communicate messages to them, with posters, workshop and email. They all laughed a little bit when asked if they remembered about any communication, which can be interpreted that they felt as they were to busy at the time to notice any messages.

4.3.2 Teachers

When looking at the teachers as a user group and their experience, they had similar ideas regarding the goal of the project and felt that those goals had been reached at some degree.

Ketill felt like the vision that RU was trying to reach was in part fulfilled with the implementation of Canvas. He believed that the goal, in the beginning, had been twofold. One part had been to modernize the IT supporting communication between teachers and students at RU. The
other goal in his mind was to modernize IT supporting student information system at RU, that goal still had not been fulfilled, as Myschool was still up and running. In his opinion the technical installation of Canvas was a great success in a technical aspect, the system is usable. On the other hand, he felt the school had failed in supporting their teachers in using the system to enhance teaching at RU with new technology. This failure in his mind will be elaborated on in the next chapter, Users acceptance and training.

Ásrún believed, as stated above the goal for the implementation had been installing a new and secure system. A new system would bring about a lot of opportunities by connecting different media platform inside the LMS to enhance teaching. She worried though that teachers were just using Canvas precisely the same way as Myschool, and thereby missing out on opportunities. She was not sure if the school intentions were just to install a new system or something more significant, like enhancing the teaching methods.

Hannes had a computer science perspective on the vision for the project. In his opinion, Myschool was not built with representation of courses for students in mind. He referred to Myschool more as a content management system, missing all the features that students seek today. Another goal in his mind was that the system would be mobile friendly. In his word;

...This was really just, you could say, the goal was to come somewhere, ... maybe to connect to a user group that they didn't attend until that time, the students and maybe, on the other hand, to simply upgrade the interface to adapt to new technologies that had come. And there was really no way to do it with Myschool...

In Hannes’ opinion some of the goals were realized with the implementation of Canvas, especially in regard of servicing students, they got a mobile app that works really well and is probably used a lot, this would not have been possible with the old system.

In general the teachers understood that Myschool was not a perfect system and understood the vision for the future, as communicated by the RU administration. When the interviews with teachers turned negative it was regarding Canvas itself as a system, not a disagreance with the IT vision ore strategy. They all felt the implementation team did a splendid job in many was and all agreed that Myschool needed to be replaced. Hannes and Ásrún were not fans of the system picked and perhaps felt the implementation team had overpromised and under delivered.
4.4 Users’ acceptance and training

4.4.1 Students

A common theme that came up in nearly all the interviews was an inconsistent representation of course material and variation of the teacher’s ability to operate Canvas.

Einar Órn described the pilot semester as a disaster, the teacher in the course had no idea what to do, material for the course was not made available for weeks and finally they even decided to put all the courses material on Google Drive. When asked if this was still his experience in the following launch semester, he answered no. But there were still some problems, which were still problems when he graduates, for example, sometimes he didn’t receive grades, especially in group projects. When asked if this experience was different between teachers, his answer was;

Yes, very much (big emphasis on words), we had the gurus in technology that came in, and then just someone who was working as a manager in on corporate boards and knew nothing about such things, they even asked the student for help to navigate through this.

Ásrún also talked about that representation of course material and the teacher’s usage of the system differed a lot between teachers. She liked Canvas and stated that it would be great if all teachers would bother to learn how to operate the system and its functionalities. When asked if there was a difference between guest lecturers and local teachers, she said it there was some difference in skill level, but not much. She talked about it as a local joke, when guest lecturers came to teach a course the first fifteen minutes goes into the teacher trying to log in and publish the course material.

Another problem was the introduction of Digiexam, which is an added function in Canvas which makes it possible for teachers to have all their examinations on computers. According to Einar Hreinsson, the teaching administrator, this was something RU was making mandatory next semester, no examinations should be taken on paper in the fall semester of 2019. Ásrún, the student, had some experience with Digiexam and described the process as painful for some teachers, she said that some teachers were just unable to operate the function. She described the system just as good as how the teachers used it. If a teacher is active in putting up material and communicating through the system it’s great, but if teachers are not active, then Canvas is no better
than Myschool. When asked to elaborate on this, if this solely lies with the teacher, her remark was;

Definitely, if the teachers are not using the system, this is completely pointless. There they can install the modules stuff. They can put in a complete plan, this is what you should read and here is a quiz there and there, so you can see exactly how the plan is. It's very convenient, so they put in the lectures and they just open when you show up in the lectures.

In the computer science department, Kristmundur described the course layout and material became somehow more transparent in Canvas, teachers now had the opportunity to lay out their courses in a better way. At the same time, he stated that teachers in his department varied a lot in their usage of Canvas. Some used features like sending messages from the LMS, online examinations and video lectures while others just used the system the same way as the used Myschool before.

All of the students agreed that the system would never be better than the teacher using the system. All of the students described having had teacher that really used the system, and where constantly trying to find new ways to communicate their material, while others still used Canvas like they had previously used Myschool.

Heiðar Jón also mentioned this as a top concern today. Each year there is a service survey conducted at RU, and one question evolves around Canvas. This is a open ended question which basically asks what students feel about the LMS. Heiðar elaborated on that consistently for the past two year students have complained about their teachers not being skillful enough on Canvas. Remarks like, please teach the teachers how to operate Canvas are pretty common, according to Heiðar. He felt that this was one of the things the implementation team could have done better. They did conduct seminar, like described earlier, but Heiðar felt that perhaps there was a need to hire additional two employees to solely focus on being experts in the system. Those employees could then spread their knowledge and know how to the teachers. Also, the implementation team would have been able to be more proactive in there approach teaching on the system. They would have known the potential problems better, and could have counteracted them.

4.4.2 Teachers
All of the teachers agreed that students that had used Myschool before were more prone to complain than students enrolled in RU in the last two years and who were accustomed to Canvas. They
believed that most complaints were just because these students were accustomed to certain things in Myschool which are now different in Canvas.

All the teachers were asked if the introduction of Canvas had in some way improved teaching at RU, for example, communication between teachers and student, the structure of courses or something else. They all agreed that Canvas had the potential to improve communication between students and teachers and because it is a commercial application a lot of features can be added from other providers. This is something that Myschool could never offer them, except with a lot of coding work.

Ketill applauded the communication portal in Canvas but thought the implementation of this communication channel was lacking. Students were not accustomed to using such a system. In his opinion having all the communication in Canvas is better because it directly connects the messages he gets with the relevant courses he is teaching. Even though Ketill has asked his students to use this portal, they almost always use email instead. Ketill thought it was important for RU to have a communication strategy between teachers and students. It is important in his opinion because teachers are obliged to answer messages within 24-hour response time receiving a message from students. If students are using random communication channels to deliver their messages, it makes it even harder to meet the 24-hour response marker. Ketill came up with an example of this. Last semester a student came up to him and was really frustrated that Ketill had not answered him. Ketill did not receive an email at his RU email, or his personal email and not in the Canvas inbox. The message had been sent as a response to an assignment grade and Ketill had failed to turn on notification for responses to the assignment. The student’s perception was of course, in Ketil’s view, that he was not getting serviced. This is a problem, in Ketil’s opinion, which could perhaps be avoided if RU had an official policy for communication between teacher and student.

Ketill also felt that RU could be doing more to push the envelope in regard of using new technologies to enhance the students and teachers experience. He elaborated on this that he would have like if the implementation team would have to put more focus on enhancing the tutoring experience, not just installing a new system. He like the new system, of course there are some bugs, but in general he felt the system was good. Einar Hreinsson referenced Ketill in his interview as the teacher that probably tried out every feature of Canvas.
Ketill did not believe that Canvas by itself had made something in the courses better, of course, the system had the potential evolve how the tutoring is done. His thoughts were that while RU was still using Myschool other technological breakthrough’s happened like smartphones and social media. Teachers and student had then long before Canvas started, created chat groups on social media, and created YouTube lectures. What Canvas did was create a single platform for all of that.

Ásrún Matthíasdóttir felt that Canvas by itself did not bring anything new to the table, its main advantage was the potential connection Canvas could make with other teaching assist platforms. Ásrún describes her coworkers as negative toward the change in the beginning but as they were forced to move their courses to Canvas, gradually that frustration went away as teachers started to learn on the new system. She thought now would be a good time to start making teachers try some features out in the new system. Ásrún’s feeling was that the only change that really happened was that they replace the older system with a new one. Teachers were still using it in the exact same manner as they used Myschool before. Ásrún described that this has been done to some extent, but she wanted more.

When Hannes was asked if the replacement of Myschool with Canvas had added something to his teaching he said yes, to some extent. He described how grading assignments and giving comments on assignments was a breakthrough from Myschool but then continued describing a lot of bugs in the system. He had documented those bugs and sent them to the support team but raised concerns that he had not gotten any feedback if those bugs had been resolved or not.

Hannes described himself as being optimistic when the pilot for Canvas started and a new LMS was coming. He felt as the implementation team had done many positive things in the process, which he liked, creating the pilot, being proactive in getting feedback from the pilot. But he felt there were some crucial bugs that he was surprised a commercial system like this had. Problems that could not be resolved unless the organization coding Canvas would do it. Hannes’ feeling, straight from the pilot was that getting things fixed, which he thought of as bugs, would not be easy as RU is just a small user group compared to the thousands of schools that use the system. In Hannes’ words;

Actually, it was kind of an experience like that, the things that come up are not things we can do right now, fix. It's not that flexible that you can just, one, two
and three and react. Instead, you were promised we could put any comments we had on the system, into a voting mechanism where, if there are enough people behind it, this could become a reality, if there are enough people. But I never saw that list, I don’t really know what happened to any of these items we sent.

First off, Hannes has had problems where students do not receive feedback from assignments, even though he has explicitly given that feedback. This was just a problem from him in the beginning, apparently, there’s a checkbox that a lot of teachers missed, if you don’t check it, students don’t receive the response. Hannes worried that not all teachers know about this. Another problem was grades given on assignments in Canvas are not exported to Myschool in the correct way. It seems that Myschool has one way of calculating the grades while Canvas has another. This was a problem Ketill had also encountered. Apparently, the grade book has to be set up in the right way. Hannes raised concerns regarding this, perhaps not all teachers at RU knew about this and hundreds of students had received a lower grade in Myschool than they should have.

Hannes also had more expectations toward Canvas in regard to being able to import content from a Wiki site he had been running ever since he started teaching at RU. As a computer science teacher, he must be able to showcase code snippets for his students, this was not a function Myschool supported and he was explicitly told that Canvas had this feature. It turned out it did not support this, he ended up pasting the content of the site as an HTML code inside Canvas. This is an ok solution in his opinion for a one-time article. But if you need to update the article this becomes a problem. Because the code basically becomes unreadable after it has been imported into Canvas. The result of this in his words;

Now we just have the problem that we have a whole bunch of stuff in there that just isn't readable! I'm getting an assistant teacher to update the projects and they just need to sink themselves into a nightmare, looking at the code behind the pages.

Both Hannes and Ásrún had big problems with how groups were organized in Canvas. Their opinion was that they had more control over groups in Myschool and did not like how things were done in Canvas. Like stated before, tis was something that Rebekka the project leader also talked about this, and explicitly sad that this was the first priority of RU in the voting mechanism the Canvas corporation has for added features.
5 Discussion

It was thought as appropriate to organize the following chapter in synchronization with the theoretical chapter. First, subchapter elaborates on RU’s approach to the change management aspect of the implementation. Subchapter two will seek to evaluate the technical aspect of the implementation.

5.1 Change management

Like stated in the findings chapter, the implementation team did not follow any official change management tactics to try to influence the faculty or students regarding the implementation of Canvas. That being said, the implementation team did a lot of things Kotter recommends in his 8 steps for change. In the following subsection it will be discussed what the implementation team did and did not do in regard to change management tactics as described by Kotter.

5.1.1 Sense of urgency

Kotter believes that selling the urgency for change is a fundamental step which all future steps in the transformation will depend upon, if the employee does not see a sense of urgency they are unlikely to be a part of the change, they simply will not see the need for change\textsuperscript{107}.

The participants from the implementation team admitted that they did not specifically try to get users to see the sense of urgency, but instead tried to sell the system itself. By that, they tried to get users to see that they could do the same things in Canvas as they did in Myschool, plus additional features. Although the implementation team did not sell an urgency for the change, there were abundance of reason why the replacement was needed.

It is evident judging by the interviews with the participants from the implementation team that they had a clear sense of urgency regarding the need to replace Myschool. First, because the IT strategy was created as a response to the audit by the Quality Council of Icelandic universities, which specifically commented on the IT environment at RU. Getting comments on the audit and not responding could reflect poorly on RU.

The second reason was regarding Myschool, it was clearly becoming problematic to develop the system because of independencies in that were not mapped out. Independencies that

\textsuperscript{107} (Kotter 2012)
have evolved throughout the 20 years Myschool has been in development. This fact would have made it much harder to add new features. Features which some have the potential to become an industry standard, like online examinations which RU has now implemented. That means no examinations will be done on paper. If RU would have continued to develop Myschool it is not unlikely they would not be able to add new functions and add-ons as easily as with Canvas. That could have had the repercussions eventually that RU would lose the competitive parity or even advantage to other universities in Iceland.

Third reason, for the implementation team was the fact that during examination periods Myschool uptime could not be trusted. This was because during examinations students would all login to their assigned courses to start going over the course material, which caused a lot of extra traffic which Myschool could not handle. In today’s world this is something that cannot be tolerated, especially in a school that seems really concerned with supplying students with a good learning facilities and utilities.

The users’ group were split in two regarding their view of the urgency to replace the LMS system. The student participants saw no need to replace the system and saw it just as a hassle for them. The teachers interviewed all saw a clear need to replace the LMS, but only one teacher remembered getting an official statement from the school with reasons why they needed to change the system, Ásrún remembered getting some information regarding that security issues existed within Myschool. Noticeably this was not part of the reasons the participants of the implementation team communicated.

But when discussing how the faculty responded to the replacement of Myschool with Einar Hreinsson, he admitted that of course there were some teachers who did not like the replacement. He also stated that his general experience regarding any change at RU was that many teachers did not like changes which they felt were forced upon them, then they started to talk about their academic freedom, as Einar put it. These are perhaps teachers who have become complacent, as Kotter would put it, and see no need for change. The reasons for these symptoms, Kotter believes, can be the results of many things for example, too much happy talk from senior management, lack of sufficient feedback from the external sources and low overall performance standards. It is
important to note that some external or internal threats are of the magnitude that even complacent employees cannot deny them, the replacement of Canvas can hardly be considered one of those\textsuperscript{108}.

Instead of creating a sense of urgency the implementation team tried to expect resistance and counteract it with selling the features of the systems. Additionally, they wanted to counteract problems that would come up with having good internal support for Canvas. Although it is considered good practice and even a necessity that the new system brings something new to the table and it to have good support. That by itself is not a good replacement for selling the sense of urgency. Especially considering that research has shown that user resistance is the top reason why information system projects fail\textsuperscript{109}.

That being said, one of the teachers who participated, Hannes Högni, talked about that there was a consensus with the teachers at RU, that everybody loved to hate Myschool. It can then be argued it could have been easy for the implementation team to sell the urgency if everybody loved to hate Myschool. That combined with the fact the implementation team had abundance of reasons for replacing Myschool, reasons which are mentioned above.

5.1.2 Guiding coalition

According to Kotter, to have a successful transformation there is a need for a strong coalition team which guides the transformation. He elaborates that the team's selection needs to follow four criteria: they need to be in a position of power, have expertise which is relevant to the task at hand, a good reputation and the team must include proven leaders that are able to drive the transformation process\textsuperscript{110}.

First, the implementation team had authority to establish the change, both from the executive board, approval from the rector of RU, Ari Kristinn Jónsson and the approved IT strategy of RU. Members of the implementation team included the Chief information officer, Heiðar Jón Hannesson, who is responsible for all IT-related decisions and the Teaching administrator, Einar Hreinsson, who is responsible for the quality of teaching at RU. Additionally, two department heads were on the team, from the engineering department and computer science department. Finally, the implementation team had a project manager, Rebekka Helga Aðalsteinsdóttir, who was

\textsuperscript{108} (Kotter 2012)  
\textsuperscript{109} (Kim and Kankanhalli 2009)  
\textsuperscript{110} (Kotter 2012)
responsible for the coordination of the projects. In the interviews Einar did raise concerns regarding that each department was independent. This sometimes creates problems when a support department, like he is in, tries to invoke change. This could undermine the position of power the coalition needs to have to successfully be able to guide the transformation. Einar did elaborate that this is not a problem if the change is rooted in an official policy change of RU. Which was the case in this project, so perhaps this is not a concern. If all things are considered, it can be said with some certainty that the implementation team would pass on Kotter’s criteria regarding being in position of power.

In Heiðar’s mind he was responsible for the technical aspect of the projects, for which he has expertise. Einar was responsible for the people’s aspects of the projects, which he has expertise in. Rebekka has a degree in project management. The team had two presidents of two relatively large departments on the team, it can then be argued that they have expertise, at least how teaching affairs are conducted in their department. It suffices to say that the team can be considered having expertise in the relevant field for the implementation.

Unfortunately, no direct comments were made which support or deny the implementation team’s reputation. That being said there were nearly no complaints regarding how the system was implemented, its selection process or the onsite support the team created for Canvas. Quite the opposite, Ketill Berg applauded the support and the IT department as a whole, in his opinion the IT support at RU is far superior to other organization he has worked in. Although no real claims can be made that the team had a good reputation, the evidence does aim that way.

Both Einar and Heiðar have been working at RU for a couple of years and have already implemented other changes at RU. They can then be considered proven leaders. The guiding coalition, as Kotter puts it, passes all of his criteria to become successful.

5.1.3 Creating a Vision and communicating it

As stated above, the implementation team tried to sell features as the main vision for the project. Einar Hreinsson was the participant from the implementation team that referenced this often during the interview. They were implementing a system that did all the things Myschool had done and a lot more. This seems not have been the main goal thou for the implementation as no analysis was
done prior or after the implementation as to how teachers were using these features, it was just emphasized to them.

This is consistent with the opinions of both, the teachers and students when asked what they thought have been the reasoning for change. That being said, one teacher and all students raised concerns regarding that many teachers were not using features that were available. There are basically two reasons why this could be. This can be because they simply do not know how to operate them, or simply do not have interest in using them. As all teachers have support available, both in form of literature from Canvas and a support team which was applauded throughout the interviews it stands to reason that the teachers do not have interest in using these features. It can then be argued that perhaps this is a result of the implementation team not strategizing how the vision should be materialized or the teachers simply do not see the urgency of evolving their teaching habits.

It can be argued that by not selling the urgency for the replacement the implementation team made the change process harder. According to Kotter if people do not see a reason for the change, they do not care for a vision for the future, they simply do not see the need. The response of the students on how most teachers are using Canvas the same way as they used Myschool across different departments lays ground for this assumption.

Another argument that can be made is that the implementation team did not communicate the vision sufficiently. That is an unlikely assumption as all teachers and students shared the same reasoning for change. In their opinion RU was replacing a legacy system with a new commercial one which would bring about a lot of new features.

5.1.4 Enabling employees for broad based actions
Both Kotter’s model for change and ADKAR model, reference the need to enable employees to have the structure, knowledge, and skill to take actions to materialize the transformation. Kotter argues there are four things that can stop the transformation at this stage, structure, skills, system, and supervisors.

111 (Kotter 2012)
112 (Kotter 2012) (Hiatt 2006)
There is evidence from the interviews, especially with Einar Hreinsson, that RU organizational structure is assembled by independent silos. This is an identity according to Einar, that RU would not see gone. But as each student usually only seeks service from one department at a time, this cannot be considered a hindrance for change.

One study conducted that the greatest risk factor in implementing new software at an organization was employee training, this was especially true if a large part of the employees is outsourced\textsuperscript{113}. This was also a concern for the implementation team as RU has many guest lecturers. The problem with having a large number of external teachers is coordinating seminars and support for those teachers as well as regular teachers at RU. The implementation team held 52 seminars, two a week in Icelandic and English, prior to and during the implementation phase in the year 2017. Teachers were obliged to attend at least two seminars. On top of that during the first weeks of the implementation the support team was on standby to help faculty with their problems with Canvas. There is also an abundance of material available in English from official Canvas support site. It suffices to say if the teacher saw a need for the new skill, there were an abundance of opportunities available.

The research conducted for this paper did not disclose any system or supervisor problems that could hinder the transformation. With system, Kotter means processes or a bonus system for example that have a counteracting effect on desired change\textsuperscript{114}. Regarding the supervisors that could perhaps hinder the change, the implementation team did not foreclose any dealings with supervisors who deliberately tried to sabotage the change process.

5.1.5 Moving forward
It was the consensus of both Einar Hreinsson, the teaching administrator, students and faculty that the implementation was not over. More features would be added gradually to Canvas as faculty demands them. According to Rebekka, this will be an easy task as Canvas supports the LTI standard, which means adding new features becomes cost-effective.

Kotter emphasizes that creating short term wins is essential in long term projects as this implementation seems to be, at least according to Einar Hreinsson. He said after the user groups

\textsuperscript{113} (Nakatsu and Iacovou 2009)
\textsuperscript{114} (Kotter 2012)
have now become accustomed to Canvas the next phase is to implement phase two, starting to use analytical data to enhance services to students\textsuperscript{115}.

Kotter describes a good short-term win in the following way, it is visible to a large group of people who see for themselves that this is a real win. It is unambiguous, and there can be little argument over it, and lastly, it’s clearly a result of the change effort\textsuperscript{116}. One teacher who participated in this research, Ketill Berg, was by all account one of the teachers that were the most enthusiastic to try new features. In his opinion the implementation of Canvas was a success, how smoothly it went was could certainly be considered a win. The other two teachers, Hannes and Ásrún, felt the same way about the implementation team itself, applauded their approach to the implementation but were not fans of the system selected. Hannes Högni, for example, felt as if the implementation team had overpromised features that the system really did not support. Features like being able to show code snippets, exporting content from one media two another. Hannes was surprised at how raw he felt the system was. He also did not like that he got little to no responses to bugs he reported to the support room, he was also worried that not all teachers were aware of these bugs, as he just stumbled upon them by accident but he knew that some of them had not been resolved.

Adding new features like Digiexam, which was introduced recently, can perhaps be considered a short-term win. By Kotter's standards, it is definitely visible to a large group of people who see for themselves that this is a win generated by the replacement of Myschool. If RU keeps on this track, introducing features which make faculties life easier, they will undoubtfully gradually win more and more teacher over. As this continues more and more teachers will become accustomed to being introduced to new exciting things, which in return could gradually change the culture. But as the teacher, Ásrún, described it, teachers ten years ago were not even using the limited features Myschool offered. She worried that this was also the case with Canvas. None of the participants interviewed in this research had any knowledge of or if the utilization of Canvas was more extensive than in Myschool. The student’s impression was that the same teachers who used features in Myschool were now doing it in Canvas with success, but the ones not using any features continued doing so in Canvas. In the student’s opinion no system is better than the content

\textsuperscript{115} (Kotter 2012)  
\textsuperscript{116} (Kotter 2012)
that is created for it. If teachers are not using the features of Canvas, and are just using it like they used Myschool, why bother changing the system.

It can then be criticized that although the goal of the implementation team was to give teachers something new and better, that it hasn’t been deliberately analyzed. Canvas offers some kind of dashboard feature where administrators of the system get some information, according to Rebekka. She commented that other universities abroad were envious towards RU because of the high usage of online examinations. This statistical anomaly is according to Rebekka mostly because teachers at RU use online multiple-choice exams as a measure of student attendance. No efforts were made to measure before and after usage of Myschool or Canvas, according to the implementation team.

Incentives play a vital part in motivating teachers to use LMS systems according to research. Of those incentives’ salary, gained responsibilities and gained achievements play a vital role\textsuperscript{117}. None of the incentives above were introduced in the implementation process. According to research age, gender or ethnicity plays no role in teachers’ acceptance towards an LMS system\textsuperscript{118}. This is contrary to one student’s beliefs who thought her older teachers would not be able to adapt to new technologies. Einar Hreinsson, however, supports this claim, where he has had heated arguments with young teachers, where they thought that Canvas was the root of all evil, at the same time many older teachers have embraced the new system, according to Einar.

To conclude the change management chapter, it is useful to visit again the definition between Technochange and IT projects introduced in the theoretical chapter. Technochange is considered an IT project where organizational change is needed, the target is then to perform IT change followed by a complimentary change of the organization. IT projects, however, are usually standard installation of a software application where the objective is technological advances, this can be, for example, better hardware performance, better support mechanism or more efficient cost of operations\textsuperscript{119}.

It can be argued that this implementation was not thought of as a technochange, but rather an IT project. Rebekka and Heiðar both talked extensively about the IT side of the projects. Heiðar

\textsuperscript{117} (Gautreau 2011)
\textsuperscript{118} (Gautreau 2011)
\textsuperscript{119} (Lynne 2004)
acknowledges that the use of change management tactics would have been preferable. Einar Hreinsson, however, believed that faculty would gradually become accustomed to Canvas and then their attitudes would change. In his experience as instigator of prior change at RU, changes are always hard at RU, especially when you have to deal with teachers.

5.2 LMS and technical implementation process

If the implementation is purely considered an IT project as described in the theoretical chapter it is to be considered nothing else than a success. RU was stuck in an old legacy system and the implementation team decided early on to adopt a commercial system. According to research referenced in the theoretical chapter this is consistent with industry standards today. The solution is implemented quickly, off the shelf software usually has a variety of features designed for the sector the organization is in and lastly, the quality is usually better. One could even add that buying commercial software is usually a lot cheaper than developing it in-house120.

According to Rebekka it was decided early on that the selected LMS system would be selected based on systems design, they wanted basic features that Myschool had and lastly it should be industry-standard using the LTI standard. According to the literature this is in line with the industry-standard today when selecting an LMS system. There are basic functionalities that all commercial LMS’s support. According to Rebekka the largest organization providing LMS systems were evaluated and three systems selected for testing and evaluating. The problem the implementation team faced early on in selection phase was the introduction of Centris to the selection process. Centris was an inhouse developed software. According to Heiðar and Einar, Centris would have needed hundreds of hours in development before it would be considered operational. According to research, developed software can undoubtedly have all the features needed, but in most cases, bought software will have more features. The reason for this are usually because of budget concerns. More features requires more time, which costs money, this means the IT team may not be able to implement all of the functions that the commercial product would have.121 It can because of this be easily argued that the decision the implementation team made to exclude Centris as an option should be considered the right one. Early on more LMS were excluded from the process, the remaining two were then piloted.

120 (Xu and Lippert 2007)
121 (Xu and Lippert 2007)
The LMS system was piloted in two seminars and relatively extensive qualitative and quantitative researched was conducted to find out users’ views of the two systems. This is consistent with user acceptance research of LMS system reference in the theoretical chapter. There it is concluded that system design has the most significant effect on both intentions of users to use a system and user satisfaction with the system\(^{122}\). Where the implementation team can perhaps be faulted is not getting more teachers to evaluate the two systems. As teachers are the creators of content there is a certain need for them to like the system design. Rather than asking two teachers and a lot of students, perhaps it would have been wise to incorporate more teachers in the selection pilot. The students will use the system no matter what, if the teachers present material there which they need to learn. That being said, there was a selection committee with teachers in it early on in the selection process, these teachers just tried the system. Perhaps it would have been wise to get those teachers to evaluate the system during a course, that way they would have been able to make a more informed decision.

The installation of Canvas went flawlessly as any commercially bought software should according to research. No customization was conducted, which means more simplified installation. This is in accordance with industry-standard as customizing the software is both costly and limits future updates\(^{123}\).

It was interesting to hear Heiðar talk about the installation, he remarked that neither students nor teachers experienced downtime while the installation was completed. Heiðar’s opinion was that this is not something that people should take for granted. His experience was that when this happens, it usually goes unnoticed.

If the objective the implementation stated in just a few months before the launch of Canvas are revisited it becomes obvious that all goals referenced here have been realized;

- To move away from a bespoke legacy system and into a widely used next-generation cloud system which uses industry standards for integration with other systems
- To ease integration with third-party systems which allows for more flexibility

\(^{122}\) (Almarshdeh, et al. 2010)  
\(^{123}\) (Xu and Lippert 2007)
To make the move towards new technology such as mobile

When evaluating the goals it also becomes evident that the implementation was thought of as an IT project rather than a technochange, and a successful one at that.

6 Conclusion

This research paper aimed at evaluating the implementation of Canvas at Reykjavík University, both with a technological perspective as well as in change management perspective. To evaluate the process five research questions where created. The following chapter will elaborate on these questions, which were;

RQ1: What were the objectives of the new learning system at RU?

RQ2: Were these objectives realized, and how does the implementation team know if those objectives were realized?

RQ3: What were the barriers to implementation?

RQ4: Did RU consciously follow a change management program with respect to all stakeholders?

RQ5: What are the lessons of this initiative for RU?

It is unlikely that there is a so-called perfect implementation. When the work of people is evaluated in accordance with a strict academic approach it is unlikely that anyone could come from that evaluation unscathed. This is also the case when evaluating the implementation of Canvas at RU.

The advertised objectives of the new learning management system was to move away from a legacy system which was starting to be problematic for RU to service and develop. Second, there was also a common understanding that Myschool would not serve as a hub connecting much needed third-party tools. Tools that are by today’s teaching standard have become essential. Third, the school had pressure from student to have a mobile application.

If the project is to be considered an IT project, as defined in this research. Where the goal is a standard installation of a software application and where the objective is technological advances, like the goals stated above give indication of. Then it can be said that these objectives were realized with the implementation of Canvas at RU. If the measures of success are that the
teachers and students are using the software, then that objective is also realized. The implementation team did a superb job in many perspectives. They tried to involved the users as much as possible, performed an extensive platform selection process, they were applauded for good support from all teachers interviewed and they executed a smooth technological transition from Myschool to Canvas with little or none downtime.

But during the examination of data extracted from the interviews, both students and some teachers expected something more than was delivered. The students expected new features being used, that their teachers were up for the task. Now two years after Canvas was first introduced students that were interviewed still complained that many teachers were not using the system the way they knew it could be used. Using online material, videos, communication and other neat features that the students have gotten to know in few courses. The same goes for the two teachers interviewed during this research. Ásrún thought that the features introduced by Canvas where not being utilized, for example, many teachers around her still use multiple-answer examinations on paper rather than using online exam features. Ketill believed that the RU did a fantastic job at implementing Canvas. The only thing he did not applaud the them for was the failure to develop an IT teaching strategy at the same time.

IT was apparent when interviewing the members of the implementations team, especially the Teaching administrator, that the vision which was connected to the replacement of Canvas, was to enhance the teaching utilities. RU was introducing a new system to be able to add new features. One must though ask themselves what good are new features if they are not being used?

It is understandable that users, in this case, teachers, become complacent in a system that has been around for roughly 20 years, Myschool. Of course, user acceptance is not given and according to literature it must be earned, and it is the results of this paper that perhaps the implementation team treated this transformation as an IT project rather than a technochange, as defined in this paper. By doing so it is the conclusion of this research that they missed a lot of opportunities and even made the replacement of Myschool harder than it needed to be. If RU wanted to enhance their teaching ability with technological advances this implementation was a perfect opportunity to do so. They could have performed an organizational transformation simultaneity as the technological installation was being planned and executed. There are things in an IT project that need to be done no matter what. Things like gaining user acceptance, validating
the selection of a commercial platform, select early adopters and conduct training sessions. All things that can be considered a part of classical change management tactics. All of these things were executed very well by the implementation team but change management tactics demand a little bit more.

The first and obvious problem with the transformation was that they did not sell a sense of urgency. The consequence of that is perhaps that user acceptance was not as much as it could have been. People, who do not see the need for change will resist it, according to Kotter and the ADKAR model. By failing to sell the urgency it can be assumed that the implementation team made the transformation process even harder than it needed to be. Presumably, this could have been a pretty easy sell, if everybody loved to hate Myschool, as Hannes Högni put it, companied with the really urgent problems RU was facing. The implementation team should have been able with relative ease to get users at RU to understand the urgency at hand.

The team had a vision where all teachers would have an abundance of features available for them but seem to have failed in delivering a strategy that would realize that vision. With more user acceptance, people would have perhaps embraced Canvas and by doing so started to develop new teaching habits. The proposition that the implementation team seem to have setup for the teachers, is that there would be options available for them. But it was up to them to decide if they would choose to implement them in their course material or not. This is perhaps a reasonable proposition considering Einar Hreinsson’s words regarding how hard it is to implement changes at RU. As he explained, when implementing change at RU that involve teachers they start talking about their academic freedom. But this known fact should have push the implementation team even further on using change management tactics.

By using change management tactics, selling a sense of urgency, creating a vision to move forward and communicating that vision, they could have perhaps gotten more people onboard and increased user acceptance. With that they could have realized the vision of enhancing tutoring at RU with the help of technology. The fact that the team thought about using change management tactics in the implementation but deliberately decided not to do it was a surprise. The choice not to adopt change management tactics is especially a short fall as RU teaches change management approaches which are common practices in today’s world.
There are some limits to this research. For instance, this research conducted nine qualitative interviews, it would have been preferable to do a quantitative research also. For instance, using the technology acceptance model, elaborated on in the theoretical chapter. This would have given a clearer view of the teacher and students acceptance towards Canvas, with that giving a measure to the success the implementation team had with convincing their user groups. Additionally, it would have also been helpful to get user logs from the Canvas system. That way it could have been to analytically evaluate if the student complains in this research, on their teachers tutoring methods are in consistent with reality.
7  Bibliography


Appendix A – Questionframe for the implementation team

- Could you start by introducing yourself and what was your approach to implementing Canvas?
- Could you describe the precursor of implementing a new LMS system?
- What were the main objectives of the project, what problems were being solved?
- How long did the process take / or is it still going on?
- How did you and your team evaluate systematic options for:
  - Buy, customize, create
  - How were these options evaluated?
- Could you tell me about the team you managed and different roles in the team?
- Could you describe how the installation was performed on the system?
- How has the response staff and students been to?
  - Were the reactions measured?
- Do you think you managed to get the teacher and students on board in the implementation?
- Do you feel that the system, as-is is solving the primary objectives that were set up in the beginning?
• Could you start by introducing yourself and what was your involvement to the implementation of Canvas?
• When and did first begin to hear that there was a new LMS system being implemented?
• What was your opinion of the new system at first?
• Did you feel that the change was necessary?
• How did you like working in Myschool?
• Do you have any experience outside RU working with an LMS?
• In your mind, what were the main objectives of the project, what problem was being solved and do you feel like those problems are solved?
• Do you feel the main objectives were solved?
• Could you describe for me how the pilot period and launch period went?
• Can you describe for me the training you received during the implementation period?
• In your opinion was that training sufficient?
• How would you describe how other students or teachers in your surrounding reacted to the new system?
• Do you think that Canvas has improved teaching practices?
  o How courses are setup
  o Communication
  o Etc.
• How do you think it went, getting the students and staff onboard with this change?
• Do you feel that the system as is, or will be, will solved the primary objective that were set up in the beginning?
• In your opinion, is the implementation completed?
Sæl / Sæll Viðtakandi

Ragnar heiti ég og er meistanemi við viðskiptarfæðideild RU með áherslu á upplýsingastjórnun (Information mangament).

Ég er um þessar mundir að skrifa meistararitgerðina mína og er að skoða innleiðinguna á Canvas.

(Millímálsgrein breytileg eftir viðtakanda)

Ritgerðin er bara á fyrstu stigum hjá mér, þar sem ég er að skrifa á sumarönn en ég þarf eiginlega að lenda hlaupandi úr síðustu önn til að ná fólki fyrir sumarfrí, mér þætti því afar vænt um ef þú sæir af smá tíma fyrir mig.

Með bestu kveðju

Ragnar Aðalsteinn
Dear Recipient

My name is Ragnar and I am a Master's student at the RU School of Business, with an emphasis on information management.
I am currently writing my master's thesis and am looking at the introduction of Canvas.

(paragraph varies between recipient)

The essay is just in the early stages, and since I am writing in the summer semester, I must land running from the last semester and book all my interviews before people go on summer holidays, I would really appreciate it if you would be able to meet me.

With best regards
Ragnar Áðalsteinn
12 Appendix F – Information technology strategy for Reykjavík University

Approved by RU Executive Committee 2012-06-12

1. General – Introduction
Use of information and communication technology in the work of RU is one of the keys to the University’s success.
Here, an information technology strategy is presented which describes the intent and emphasis of RU to make use of information and communication technology.
A distinction is not made between information technology and communication technology in this document. Both are referred to as information technology and abbreviated as IT. The corresponding strategy is referred to as information technology strategy.

2. IT Mission
The IT mission is to support the strategy of Reykjavik University to be a strong teaching and research university with an emphasis on technology, business, and law.

3. Vision
RU will be a show case for professional IT governance where efficiency in operations, education, and innovation are guiding principles.

4. Objective of RU in Utilizing IT
The objectives of RU utilizing IT are many-faceted:
1. To ensure suitable quality and security in information processing within the University.
2. To accomplish streamlining in as many areas as possible in the University’s operations.
   a. With automation of processes as much as possible
   b. With self-service where possible
   c. With re-engineering of processes if necessary
3. To create a work environment for students and employees enabling them to be successful in their work.
   a. With better access to appropriate information
   b. With increased knowledge and skill in IT and its effective use
   c. With more effective group work and external collaboration
4. To be a model to RU students which they carry with them as they pursue other endeavors.
5. To provide users with services through known avenues in defined areas and of defined quality.
   a. A service desk available during business hours
   b. A web with information/instructions for self-help available on the University web site
   c. Services based on service requests which have different guarantees based on defined importance
   d. Clear protocols for users to report service issues and other urgent matters

5. Three Roles of Information Technology
It is presumed here that IT has, in effect, three kinds of roles, each of which calls for a different approach by the University.
These roles are:
   1) Function IT: Tools to solve specific projects
   2) Network IT: Communication tools which enable employees and students to communicate between themselves in various ways
   3) Enterprise IT: Support for processes
The IT Department (ITD) plays a key role in the University’s IT matters, but the different roles of IT do call for varied involvement by the Department.
Here, a description will be given of how RU will organise its work so that IT will be as effective as possible in these three roles.

5.1 Function IT
IT tools are either general or specialized tools.
General tools are the responsibility of ITD which handles their selection, implementation, and maintenance (upgrades).
Specialised tools, on the other hand, are the responsibility of the departments or employees in question and they provide a point of contact for these specialised tools. In choosing specialised tools, though, it must be ensured that such solutions conform to the underlying operating environment, and advice should be sought from ITD if necessary.
No direct service is provided by ITD regarding IT tools. It is assumed that users are self-supporting in their use and will attend seminars if necessary.

5.2 Network IT
IT as a communication tool is the responsibility of ITD which handles the selection of such solutions and their implementation, operation, maintenance, and development.
Assistance is provided in the case of incidents and problems which occur.
Use of Network IT is the responsibility of employees who have the freedom to form data as they choose.
Users have the option of attending seminars to increase their skill in using such solutions.

5.3 Enterprise IT
IT as support for the University’s processes is entirely the responsibility of ITD.
ITD is responsible for selecting and implementing such solutions, as well as their entire development.
Formal and documented processes shall form the basis of this work. ITD defines the processes in question in collaboration with the departments concerned. Departments are responsible for the correct description of processes. Processes are divided into three main categories; teaching and learning, research and innovation, and administration.
Changes to processes can lead to changes in the IT systems which support them. IT systems which support processes will not be changed unless updated descriptions of processes are in place first.
Users can contact ITD concerning any problems which arise in the use of IT which supports the University’s processes.
Use is the responsibility of employees who shall form data in accordance with defined requirements of RU.
RU organises seminars for users so that they can make use of such solutions.

6 Threefold Support for IT
The involvement of ITD employees in the IT matters of the University can be divided into three categories.
Firstly, occasional services for users, facilities, and events. Secondly, organised operation of infrastructure and systems which IT processing is based on. Thirdly, formal and organised development of the IT matters of the University.

6.1 Services
IT services are reactive operations, and it is therefore difficult to predict the service need from day to day.
Due to need for future planning, detailed statistics including kinds of services and response times will be kept. These statistics will be reviewed annually.
ITD services shall be based on processes according to ITIL v3 which addresses availability management, capacity management, event management, incident management, and problem management.
Service processes shall be supported with IT as much as possible.

6.2 Operations
The operation of IT is at its core a proactive activity but also a reactive activity in connection with incidents.
The organisation of operations shall be based on ITIL v3 and ISO27001, which consists in event management, incident management, problem management, and change management.

6.3 Development
Development of IT is a proactive activity. It can be incremental in the case of IT solutions which are in operation or complete from scratch.
Development of solutions which are in operation shall be based on ITIL v3 and ISO27001, which consists in formal change management and project management if necessary.
ITD is responsible for the development and deployment of IT solutions which are or are supposed to go into wide-scale operation at RU.

7 Technological Architecture
7.1 Information Security
Information security within RU shall be developed in accordance with guidelines in ISO27001/ISO27002 and ITIL.
The aim shall be for RU to be in position to receive ISO27001 certification in the beginning of 2015.
7.2 Data Architecture
Data is divided into primary data and secondary data. Secondary data has its origin in primary data and changes if the primary data changes.
Primary data which is created within RU shall be stored and maintained in one place.
Primary data which originates outside RU is categorised as secondary data and is maintained by retrieving the primary data when needed from its place of origin.
Data communication between IT systems at RU shall take place in the following manner:
1)The first option is that real-time processing is based on real-time communication between IT systems (API or direct database access).
   2)The second option is that real-time processing is based on very recent secondary data, for example, data which is retrieved once a day.
Real-time processing and batch processing shall be separated as much as possible. Batch processing, such as report preparation, shall be performed on secondary data in the data warehouse but not on primary data which is used in real-time processing.
All data kept by the University shall have a defined level of security which determines its handling and distribution.
7.3 Access Controls
Access controls shall be based on the roles of users within the University.
The roles of users shall be defined in primary data on users.
Primary data on users shall be used in all access controls within the University.
7.4 Infrastructure
Infrastructure of information processing consists of a network, servers, and data storage
The IT infrastructure is entirely the responsibility of ITD.
Normal information processing is ensured sufficient capacity, such as bandwidth, computing power, and data storage. Capacity management shall be performed to ensure that this is the case.
Occasional information processing is ensured capacity depending on circumstances at each time. This applies to any sort of research and development work.
Network architecture shall be based on requirements for information security and academic needs within the University. Network traffic shall be prioritised if necessary. Users shall receive access to the intranet in accordance with their role within the University.
7.5 User Work Stations
Work stations of users are categorised as Functional IT, and users are therefore free to determine their setup.
RU provides employees with standardised solutions and services those solutions. Employees who choose other types of setup do so at their own responsibility.
Students have access to standardised work stations in the computer rooms of the University.
Work stations owned by students are not the responsibility of RU and may be denied access to the network if unsafe practices are detected.
7.6 Information Systems
The information systems of RU shall be driven by the defined processes of the University, and the communication that needs to take place within it.
In choosing solutions, the aim shall be to acquire solutions which are general and widespread if these are available. Otherwise, special solutions shall be developed for the University in collaboration with external parties.
Solutions shall be modular, and it should be possible to develop each module independently.
Handling of data shall be in accordance with the strategy of RU, that is, data architecture and information security.
Information systems shall be subject to version control, mandatory testing, and deployment scheduling if it may result in service outages.

7.7 Knowledge of Employees
RU places an emphasis on employees having sufficient knowledge of the core operations of the department so that the operational security of IT is ensured. Either employees have that knowledge themselves or it is accessible at external parties.
RU will contribute to the increased skill of general employees to make use of IT within the University.

7.8 Infrastructure for IT Research
Infrastructure occasionally needed for IT research and development shall be set up in collaboration with ITD.
ITD shall ensure that such infrastructure is accessible to the parties concerned, and that the infrastructure does not disrupt normal information processing within the University. Setup of any type of system software which is connected to such infrastructure is not the responsibility of ITD.

7.9 Data Administration
RU preserves all data of importance in the operations of the University in accordance with laws and regulations.
RU operates Data Warehouse and Fileserver resources for protection, archiving and sharing of all academic and research data.
13 Appendix G – Memo from the implementation team

20.4.2016 HÁSKÓLINN í REYKJAVÍK

Minnisblað

Til: Framkvæmdastjórnar
Frá: Verkefnastjórn um innleiðingu LMS og SIS
Efni: Val á kennslukerfum (LMS) fyrir Háskólann í Reykjavík (DRÖG)

Inngangur


Er þetta í samræmi við upplysingastefnun skólans þar sem markmiðum með hagnýtingu UT er skipt í eftirfarandi þætti:

1. 1) Að tryggja viðeigandi gæði og órýggi í upplysingavinslu innan skólans.
2. 2) Að ná fram hagráði á sem flestum sviðum í rekstri skólans.
3. 3) Að skapa nemendum og starfsmönnum vinnumhverfi sem auðveldar þeim að ná árangri í störfum sínun.
4. 4) Að vera nemendum HR fyrrirmýnd sem þeir fara með sem veganaði til annarra starfa.
5. 5) Að veita notendum þjónustu eftir þekktum leiðum og á skilgreindum sviðum og gæðum.

Í lok árs 2015 var skipuð verkefnastjórn um innleiðingu nýs nemendabókhlúskefis (e. Student information system) og nýs kennslukerfis (e. Learning management system). Verkefnastjórnin var skipuð þannig;

Einar Hreinsson, forstöðumaður kennslusviðs
Guðrún Arnbjörg Sævarsdóttir, forseti verkfræðideildar Heiðar Jón Hannesson, framkvæmdastjóri upplysingatæknis Yngvi Björnsson, forseti tölvunarfræðideildar

Rebekka Helga Aðalsteinsdóttir, verkefnastjóri innleiðingar, var ritari hópsins.

Þegar hefur verið valin lausn fyrir nemendabókhlóð skólans, Unit4 Student Management sem er samhæfð lausn við fjárhaugs- og viðskiptahugbúnað skólans.

Unit4 Student Management er einnig samhæft LTI (Learning Tools Interoperability), sem er staðall um samvirkni kerfa sem ætluð er til kennslu eða náms, þróaður af IMS Global Learning Consortium. Með notkun staðalsins er samhæfni og samtenging kerfa einfölduð verulega.
Verkefnastjórnin tók ákvörðun um að mikilvægt væri að það kennslukerfi sem yrði fyrir valinu nýtt í þennan staðal enda einfaldi það gagnaflutning, heilindi gagna og útskiptingu kerfa í framtiðinni.

Ferlið


Hópunum var ætlað að meta stuttlega þau fjögur kerfi sem um ræðir og bera þau saman á grundvelli vikni þeirra í dag. Hópunum var ekki ætlað að meta aðra þætti svo sem kostnað og öryggi.


Hópurnir mátu kerfin og var niðurstaðan eftirfarandi:

Mat kennara

Hópurinn leggur til að Brightspace og Canvas verði skoðuð nánar, en Blackboard ekki. Ef verkefnisstjórnin telur að sérsmiðað kerfi komi til greina, þá leggur hópurinn til að Centris verði einnig sett upp og skoðað nánar.

Mat nemenda

Einungis tveir nemendum af þremur skiluðu niðurstoðu. Þar var kerfunum raðað í eftirfarandi röð:

1) Centris
2) Canvas
3) Brightspace 4) Blackboard

Það er því ljóst að Blackboard var útilokað af þáum hópunum.

Val á kerfum

Ekki var farið í að bera kerfin saman með tilliti til einstakrar virkni. Brightspace og Canvas þykja með mjög sambærilega virkni. Þess í stað var horft á aðra þætti er snúa að öryggi og skalanleika kerfanna sem eru listaðir í töflunni hér að neðan:

Samanburður kerfa
<table>
<thead>
<tr>
<th></th>
<th>Brightspace</th>
<th>Canvas</th>
<th>Centris</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tilbúið til notkunar</td>
<td></td>
<td>Já</td>
<td>Nei</td>
</tr>
<tr>
<td>Samhæft LTI</td>
<td></td>
<td>Já</td>
<td>Já</td>
</tr>
<tr>
<td>Möguleiki á ýtri viðbótum</td>
<td></td>
<td>Já</td>
<td>Já</td>
</tr>
<tr>
<td>Open Source</td>
<td>Nei</td>
<td>Já</td>
<td>Öbekkt</td>
</tr>
<tr>
<td>Fjöldi starfsmanna</td>
<td>800+</td>
<td>700+</td>
<td>0</td>
</tr>
<tr>
<td>Fjöldi viðskiptavina</td>
<td>1100+</td>
<td>1700+</td>
<td>0</td>
</tr>
<tr>
<td>Fjöldi notenda</td>
<td>15M+</td>
<td>16M+</td>
<td>0</td>
</tr>
<tr>
<td>Notendasamfélag</td>
<td>Gott</td>
<td>Mjög gott</td>
<td>Ekkert</td>
</tr>
<tr>
<td>Val kennara</td>
<td>1</td>
<td>1</td>
<td>2¹</td>
</tr>
<tr>
<td>Val nemenda</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

¹ Kennarar lögðu til að ef að sérsmiðað kerfi kæmi til greina þá yrði Centris skoðað nánar

**Kostnaður**

Ekki eru komin endanleg verðtilboð frá neinum framleiðanda kerfanna. Visbindingar eru um að verðmunur á Brightspace og Canvas sé överulegur. Centris er frábrugðið að því leiti að kerfið útheimtir vinna frekar en notendagjöld. Ekki er talið að Centris verði hagkvæmara fyrir háskólann í rekstri.

**Prófanir**

Verkefnastjórnin lagði til að Canvas og Brightspace yrðu prófuð frekar enda sé það stefna skólans að nota meginstraumslaúsni og kostnaður er sambærilugur milli kerfa.

Prófunin var fyrst og fremst ætluð til þess að ganga úr skugga um að kerfin uppfylltu allar þarfir háskólags og væru notendavæn. Eftir prófanirnar voru lagðar stuttar spurningakannanir fyrir nemendur í áföngunum.

Næstu skref

Ekkert kom upp í prófununum sem bendir til þess að annaðhvort kerfið uppfylli ekki þarfir Háskóla. Allir kennararnir voru sáttir við það kerfi sem þeir unnu með.

Unnið er að gerð verðkönnunar og er gert ráð fyrir að niðurstaða hennar liggi fyrir í október 2016.