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**OPTIMISING STUDY COURSE IMPLEMENTATION AND
PLANNING**

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ABSTRACT

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<p>The thesis work was made for the Central Ostrobothnia Folk High School. The aim of the work was to help optimise the study course implementation and planning in such parts of the process where Information Technology based solutions could be useful.</p> <p>This thesis describes, how the work cases were chosen, how the project was planned, what tools were used for the project and how the work was implemented. The clients requirements and wishes were taken into consideration at every point of the work and are detailed accordingly.</p>		

Key words

Excel, macro, optimisation, spreadsheet, VBA

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1 INTRODUCTION

This project is commissioned by the Central Ostrobothnia Folk High School (Keski-Pohjanmaan kansanopisto in Finnish). The aim of the work is to help optimise the study course implementation process of the Folk High School. The Folk High School has been conducting an internal review of their work processes in accordance with principles of the Lean production method, which seeks to eliminate all waste from a process. During this review of their operations several bottlenecks could be found that contributed to a significant waste of resources. For this project only cases in the study course implementation process were looked at.

Cases that can be resolved with the help of information and communication technology are identified through discussions with personnel from the Folk High School. As resolving all cases thus identified is beyond the scope of this project, instances for which offering a solution were likely to result in the most benefits to the overall study course implementation process were chosen as the work cases for the project. This thesis project intended to find ways to resolve these work cases in ways that will work with the available resources and work processes of the Folk High School. As part of this thesis project the solutions were also implemented and introduced as part of the work process of the Folk High School.

The second chapter of this work offers a brief overview of the Folk High School. The third chapter goes into more detail about how the work cases for this project were chosen and what kind of solutions the client needed. The fourth chapter details the tools used for this project and the reasons why they were chosen, while the fifth chapter describes how the solutions were implemented.

2 FOLK HIGH SCHOOL

The folk high school in Finland falls under the purview of liberal adult education. According to the law of liberal adult education the purpose of such is to arrange education that furthers equality, the well-being of society and active citizenship in accordance with principles of lifelong learning. Folk high schools are boarding schools that offer full-time education, arrange self-motivated studies for both youth and adults, further the students' study preparedness and educate them as both individuals and as part of society. (Laki vapaasta sivistystyöstä 1998/632.)

The folk high school is a learning institution with a very diverse implementation. In Finland folk high schools offer general education, but also for example vocational education, open university courses, special education, short courses and education for immigrants. (Kansanopistoyhdistys.) In addition the Central Ostrobothnia Folk High School offers education for vocational and basic degrees, as well as fee-based services (Keski-Pohjanmaan kansanopisto 2016).

The Central Ostrobothnia Folk High School is a part of the Federation for Education in Central Ostrobothnia which includes seven vocational schools and one adult education establishment (Kpedu 2017; Kpedu). Folk High School studies are at least 12 weeks of full-time study and the amount of weekly lessons is at least 25. Such studies cover about 36% of Central Ostrobothnia Folk High School's overall study weeks. Courses, camps and vocational further education and training consist of at least 10 lessons. All education that last over 5 study weeks need a curriculum. At Central Ostrobothnia Folk high School courses cover about 4%, camps 10% and vocational further education 50% of the institutions overall study weeks. (Keski Pohjanmaan kansanopisto 2016.)

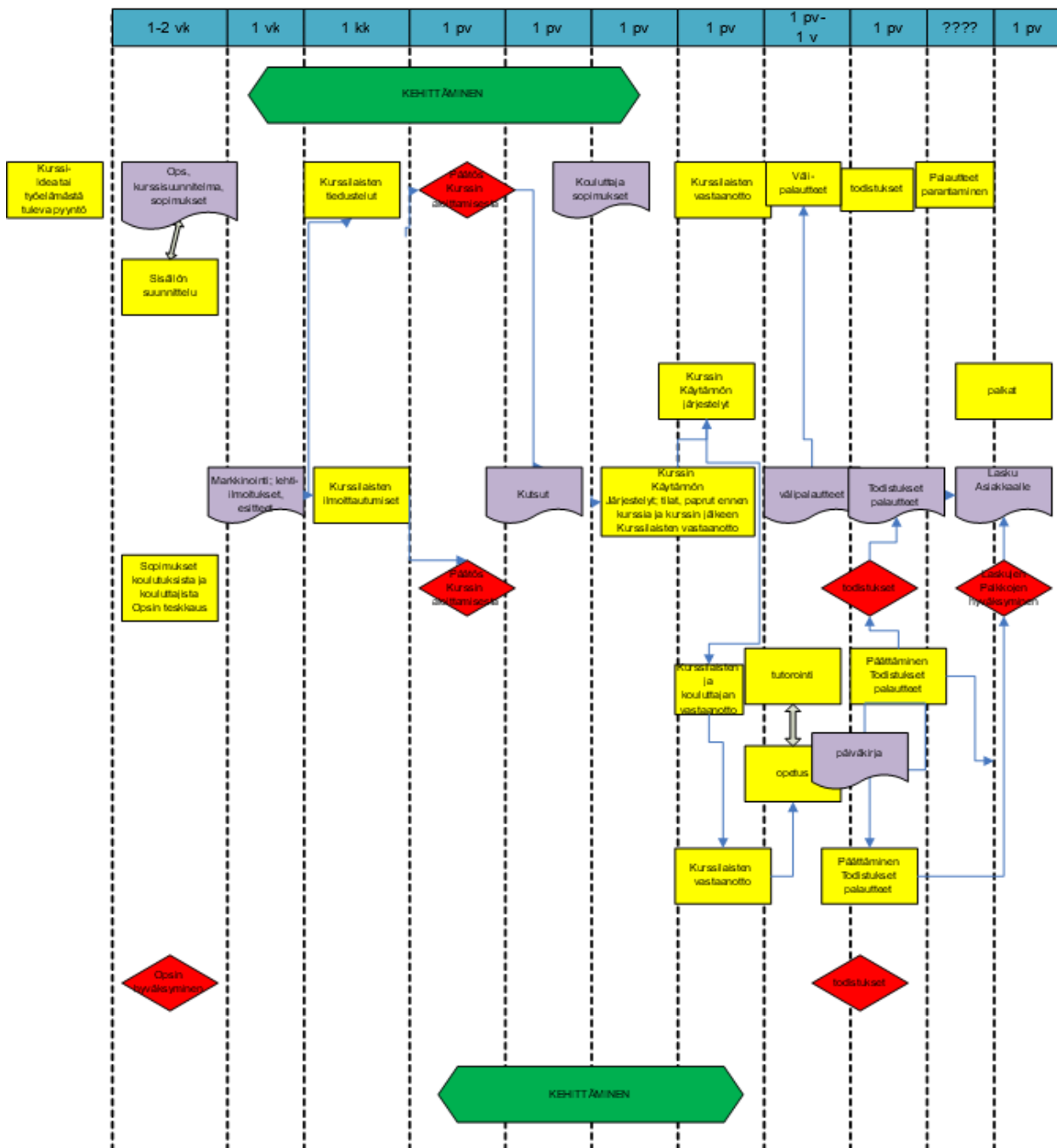
3 CHOOSING THE WORK CASES

This project was commissioned by Central Ostrobothnia Folk High School. The initial scope of the project was only loosely defined by the client. Initially the client was only clear on the fact that they wanted help in making their study course implementation process run smoother, but had no exact expectations on how this would happen. This meant that it was necessary to start the work on this project by together with the client and more specifically define what they wished the project to achieve. After the client's expectations were clarified and the scope of the project was more clear, it was possible to start planning on how to fulfill the goals set.

3.1 Defining the project

It was clear from the onset that the work would be restricted to the Folk High School's study course implementation process, which had been chosen as the relevant section to concentrate on by the client. The client had already identified several bottlenecks in the study course implementation process that were a clear waste of resources. The client did not, however, have a clear concept of how these bottlenecks could be solved, or which ones could be solved with the help of information and communication technology, and would thus be suitable work cases for this project.

The cases where the study course implementation process could be helped by implementing information technology based solutions were identified together with the client. The course implementation process involves several stages and requires participation from several people. As such it was necessary to first form a cursory familiarity with the overall structure and stages of the course implementation process in order to determine how and where information technology could be of benefit. The structure of the overall course implementation process can be seen in the study course implementation chart (GRAPH 1).



GRAPH 1. Study course implementation chart. (Keski-Pohjanmaan kansanopisto.)

The number of bottlenecks identified in the study course implementation process was greater than what the scope of this project would allow to be included. The particular cases to work on were therefore chosen through a series of discussions with the relevant personnel of the Folk High School. It was clear that there were several stages in the process where the manual work and working hours required could be significantly decreased with the help of information technology based solutions.

3.2 Project plan

According to the client's wishes it was decided to initially focus on the course development stage of the course implementation process, as it was the stage in the course implementation with the most easily identifiable problems. It was also determined that resolving bottlenecks in the development stage of the course implementation process would also potentially benefit a larger number of people at the Folk High School than working on any of the other stages of the course implementation process. This also meant that there were a larger number of people whose input needed to be heard in order to determine the client's specific needs for this work case. As such it seemed a suitable starting point as coordinating meeting times that would suit several people had already proved challenging and it was assumed that this had the potential to lengthen the time needed for the project.

As a secondary goal to this project the cases from the rest of the course implementation process would also be looked into in order to determine if there were any cases that would be suitable for this project. While less time was spent focusing on the issues of the course implementation outside of the development stage, some issues could still be easily identified. The problem that seemed to take up the most unnecessary work hours was the need for one person to manually produce and print out each report card for certain courses after their completion. It was also clear that the solution for this would have to be based on information technology and this was a clear choice for one of the work cases for this project.

3.2.1 Course development

This stage is not described in any great detail in the course implementation chart which reflects the lack of a clear structure in practice. The largest complaint about this stage of the process is that most of the information that is required is scattered. The relevant course development data does generally find its way to the right member of personnel for documentation and can then be forwarded into the next stage of the course implementation process following the course implementation chart. This information, however, mostly arrives to the right person in bits and pieces, and with the possibility that important data is missing.

Further inquiries into the course development stage revealed parts that were not clear in the course development process chart. According to the chart some of these parts took place later in the process. However the relevant information could be more efficiently integrated into one step of the process at the development stage. Other parts of the process, such as a cost calculation for the course, did not appear in the chart at all. According to the personnel who participate in course development at the Folk High School these parts should ideally be included at the development stage as well.

It thus became evident that implementing clearer channels of electronic communication will greatly enhance the efficiency of the course development stage of the course implementation process. Often parts of the course development require communication with parties outside the Folk High School, as for example the educators for the courses are often contracted from outside the organization. It is not practical for this project to try to influence these paths of communication as they may vary greatly in both method and content depending on sources outside the organization. As such this work concentrates on the organization's internal communication at this stage of the course implementation process.

While the development process requires some flexibility, at some point it is necessary for all the relevant information to be collated so that the right member of personnel may then process the information as necessary and advance it to the next stage of the course implementation process. It is at this point of collation where the organization's internal communication somewhat breaks down, and places an unnecessary burden on the recipient of the information.

As a solution to this a clear list of necessary information to send forward will offer benefits to both the recipient and the sender. The initial course planner is thus provided with a clear list of items to include, and as such may use it as a reference point of what they need to do. The person who processes the information further for the next stage in the study course implementation process is provided with a clear and formalized set of information. Having a clear standard for where and how the information is sent forward also ensures that no unnecessary time is spent on trying to find the right information, and helps to ensure that no relevant information is lost in the confusion.

Part of the information needed at this stage in the course development process is a cost calculation for the courses. Course planners have thus far had to manually calculate the costs for the courses, or delegate it to someone else in case they are not knowledgeable enough in the relevant cost projection calculations. The cost projection should thus be made part of the list of necessary information for course planners to fill, and the need to do these calculations manually should be removed.

3.2.2 Report cards

As part of the Federation for Education in Central Ostrobothnia the client has access to certain software resources, among these Visma InSchool which includes Primus. Primus holds the data on students, teachers and staff as well as courses, grades, certificates and the like (Visma). Producing report cards for students from Primus is not a problem when it comes to regular and established degree programs. By its nature the Folk High School however offers a large number and variety of shorter courses that need different types of certificates and report cards. According to the client Primus does not easily lend itself to this purpose and they have found it necessary to manually produce these report cards and certificates for the students. This also gives them the freedom to design the report cards to the specifications of each course. The express wishes of the client in this case was to find a way to automate this to some degree so that they do not need to individually copy each students name to the report card as the report cards for a course are otherwise identical.

Primus does produce a list of students who have participated in a specific course. In this case then this list will have to be copied or exported to different software which can be used to print out report cards for the whole list of students without further manual work. Such a solution will however not entirely remove the need for manual work, as for example the design of the report card will still need some individualization so that it fits the purposes of a specific course. It is of course important that this individualization of reports according to course specifications is still possible as this is part of the reason why this task has been done manually thus far.

4 TECHNOLOGIES AND TOOLS

There are several implementation methods that could be chosen for the project. It would be possible to, for example, build a web application to make the cost projection calculation, or to fill in the information for the course plan, and then send that information to the right recipient. In case of the course development information it would also be possible to create some type of online survey for the course planners to fill in. However, the foremost criteria is that the end result should be easy to use by the relevant personnel at the Folk High School, and preferably make use of those tools that are already available to the client. Where possible any upkeep and updating should also be minimal on the client's part, as they do not have the necessary resources for personnel qualified for such a task.

Especially in case of the cost projection calculation it is vitally important that relevant sections can be updated by the client, as certain figures in the calculations change on a yearly basis. It is also preferable that updating the relevant figures in the cost projection calculation is as simple as possible, and does not require much specialised knowledge or training. In the case of automating the printing of the report cards it is not quite as important that the software chosen is familiar to the user. In that particular case there will only be one user, and it is viable to familiarize one person to the use of new software if it becomes necessary. However it is of course preferable that the user is already familiar with the software when possible.

The Folk High School makes use of Microsoft's cloud-based Office 365 services. A subscription of Office 365 services includes access to tools such as Word, Excel, Outlook and OneDrive (Microsoft b). It is preferable that the solutions that this project presents use resources available through Office 365, as the client already has use of such and the personnel of the Folk High School is already accustomed to the use of these tools.

4.1 Excel

Given that in all of the work cases it should be possible to implement solutions with the use of Excel, it becomes an obvious choice of software. Excel is part of the Microsoft Office Suite, and the most commonly used spreadsheet software in the world. While it is best known for use in numerical calculations, it can also be used for non-numeric applications. One of these applications is the use of the

Visual Basic for Applications (VBA) to automate certain tasks in Excel. (Walkenbach 2013b, 2-3, 825-828.)

4.1.1 Alternatives to Excel

There are several spreadsheet software alternatives, such as LibreOffice Calc and Apache OpenOffice Calc. Because the client already has access to Excel it seems the most fitting choice in this instance. However, other spreadsheet software were given due consideration in order to determine that Excel was in fact the best choice. Several of the available spreadsheet software are open sourced and free of cost. In this particular instance, however, the cost of Excel is not a significant consideration as the subscription of Office 365 is extant independently of the choice of software for this project. It is currently likely that the client's Office 365 subscription will continue for the foreseeable future.

Another consideration that makes Excel a preferable choice over some of the open source spreadsheet software is that the chance that Excel's software development will stop is very unlikely, whereas the possibility of orphaned software in open source projects is very real, though less likely in established projects such as LibreOffice or OpenOffice. Furthermore there is far more documentation available on the use of Excel than any other spreadsheet software. While much of the usability of Excel is reproduced in other spreadsheet software it does not mean that the documentation available about Excel is necessarily useful for use with other similar software.

4.1.2 Visual Basic for Applications

As the name suggests VBA is based on the Visual Basic language. VBA is Microsoft's common application scripting language and can be found in most modern Microsoft applications. (Walkenbach 2013c, 120.) In Excel VBA can be used to write procedures, usually called macros, to automate most actions that can be performed manually in Excel. With the use of different decision making structures and loops VBA macros can be used to automate tasks and enable them to be performed far faster than a human user would be able to. User interfaces for the code can be created with VBA, to display for example message boxes or user forms, which makes it easier to run the macros. (Mansfield 2013, 24.)

VBA code is written in a separate application called the Visual Basic Editor (VBE) that works with Excel (FIGURE 1). VBE cannot be run separately from Excel. For VBE to run Excel must be running simultaneously. (Walkenbach 2013c, 124.) Excel has a built in Macro Recorder tool, which when switched on will translate any actions done in Excel into VBA code, that can then be edited in VBE (FIGURE 1) (Mansfield 2013, 25). There are functions that cannot be recorded, such as looping or displaying custom dialog boxes, but the code for such functions can be written directly in VBE. (Walkenbach 2013b, 827-828.)

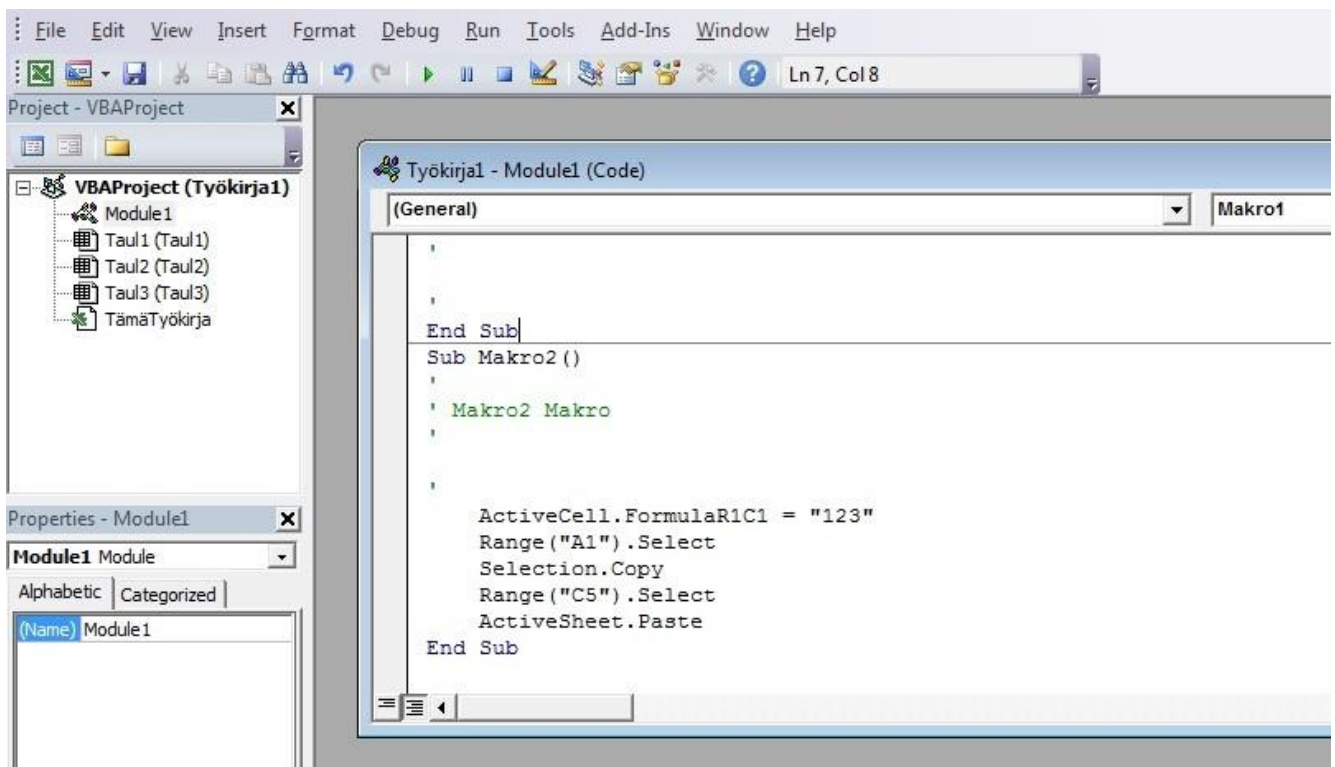


FIGURE 1. Example code in Visual Basic Editor.

There is an inherent security issue with the use of macros, as malicious macros may cause damage by for example erasing files or installing malware. For this reason Microsoft's applications disable all macros by default. The security settings in Excel for enabling or disabling macros can be changed, but it is recommended that macros be enabled only when the Excel workbook is received from a trusted source. (Walkenbach 2013b, 829-830.)

4.2 SharePoint

It is also necessary to make an easy path of communication for the course development chart and cost projection calculation to find the right recipient, both for use in planning the course and sending in the completed plan for further processing. As Office 365 is already in use by the client and Excel is a part of that package of tools it is the foremost choice for this project.

SharePoint is a tool for sharing files, data and resources, and collaborating within teams, both inside and outside an organization and is included in the Office 365 subscription (Microsoft a). It is therefore a good choice for sharing the course planning information, including the cost calculation. It can be used to share the result of this project concerning the course planning with the client, and also by the client to subsequently share the relevant course planning information to the right entity. Using SharePoint in this manner does not require significant work from this project and it is only necessary to instruct the client to create the necessary team in SharePoint and invite the relevant members.

5 IMPLEMENTATION

With a plan for how the cases chosen for this project can be solved, and the software to be used chosen the work to implement these solutions can be started. It is necessary to first make Excel worksheets for the course development information and the cost projection calculation. Once these are done to a satisfactory functionality and workability, they will be shared to the right group of people through Share-Point, which will also function as the way the filled Excel workbooks will be sent to the right person for further processing according to the course implementation chart.

Automating the printing of a batch of report cards for a specific course will also be done with Excel. This will require a specific macro to be written so that a list of names can be moved into a template for the report card and printed out.

5.1 Case: Course development

Previously a much of the information has been found in different places. For easy access for both course planners and the personnel that have to process the course plan further it will be easier to have all the course development information in one place. In accordance with this it is most efficient to combine the information for the course plan and the spreadsheet for the cost projection calculation into one Excel workbook. These two parts can be separated into different worksheets in the same workbook.

5.1.1 Course implementation spreadsheet

The information for the course development is a simple list of requested information for the course planner to fill in. Once the client made clear what information a course plan needed to include, it was relatively uncomplicated to add this list to a worksheet in the Excel workbook (FIGURE 2). However, some of the information requested in this spreadsheet does require quite lengthy pieces of text to be written down. Excel is not normally the first choice for long text entries, as the default formatting for such text entries is not ideal. In this particular case it is more expedient to adapt the Excel spreadsheet

to work for the needed purpose than it is to separate the rest of the course plan information from the cost projection calculation into different files.

KURSSISUUNNITELMA	
Kurssin tiedot	
Kurssin nimi	
Ajankohta ja kellonajat	
Lähiopetuksen tuntimäärä	
Etäopetuksen tuntimäärä	
Kurssin vastuuhenkilö	
Osallistujamäärä	
	min:
	max:
Paikka/Tilat	
Varusteet	
Missä ja kenelle markkinoidaan	
Koulutuksen kuvaus	
Kouluttajan tiedot	
(jos soten ulkopuolinen opettaja, niin kaikki kohdat täytetään)	
Nimi	
Titteli	

Täytettävät kentät (sarake C) laajenevat tekstin mukana. Tarvittaessa riviä voi vaihtaa kentän sisällä painamalla alt+enter.

Hinnan laskentataulukko on tämän työkirjan toisella välilehdellä. [Siirry laskentatulukkoon >>>](#)

FIGURE 2. Partial course development spreadsheet.

A cell in Excel can contain approximately 32 000 characters (Walkenbach 2013b, 32) which is more than enough to hold the amount of text that would conceivably be needed to be entered into a cell in the course development worksheet. A cell does not, however, display more characters than can fit into a column's current width unless the adjacent cells on the right hand side of the cell with the text are blank in which case the text spills over to cover these adjacent cells (Walkenbach 2013b, 32-33). Expanding the column with the user input cells enough to cover the conceivable text lengths needed in this case would make the table cumbersome to both look and use.

In order to accommodate the need for longer text fields the cells that the text will be input in need to expand according to the input length. Thus longer texts can be written into the input fields as necessary. It is possible to adjust the column width in Excel, either manually to the desired width or to automatically fit the widest entry in a column (Walkenbach 2013b, 67). However, adjusting the column width automatically works for existent entries, and in this case the column is meant for input by a user and is therefore initially empty. Furthermore, as previously stated, it would not be practical to have the column wide enough to encompass all the needed text. It is possible to wrap the text in a cell to use multiple lines (Walkenbach 2013b, 129), in which case the cell will expand as needed in height, but

not width. Formatting cells so that the text is wrapped can be done even though there is no existent entry in a cell after which any subsequent entries will be displayed in multiple lines as needed.

It is not readily visible in Excel that a cell has been formatted to expand according to input length and therefore an explanatory text for how the course plan spreadsheet works will be necessary to facilitate ease of use (FIGURE 2). The worksheet will be formatted for printing in such a way that the instructions do not get printed unnecessarily as it does not provide any useful information for the client to file and is a waste of printing paper.

Excel allows a spreadsheet to be protected which means that the content of locked cells cannot be modified. By default all cells in Excel are locked meaning that if the worksheet is protected with the default options chosen no content in the worksheet can be modified at all. It should be made sure that only those cells whose contents should not be modified will be locked prior to protecting the worksheet. It is possible to unprotect a worksheet to lock or unlock cells later. (Walkenbach 2013b, 644-648.) In this case the cells containing the list of required information will be locked and the worksheet protected. This ensures that no information will be lost due to accidental deletion of rows or cell contents. Thus the choice to leave fields empty will be a conscious one on the part of the course planner.

Once the initial version of the course plan worksheet was finished it could be sent to the client for testing. The feedback from the client prompted some minor changes, like added rows for additional required information and some small cosmetic changes for printing purposes. The overall structure of the course development worksheet did not however need to be changed.

5.1.2 Cost projection calculation spreadsheet

One of the main reasons for the cost projection calculation and the reason it is important at the development stage of the course implementation process is that it should arrive at a suitable fee that will be charged from the participants of the course. Before any sort of Excel spreadsheet for this can be made, it is necessary to ascertain how that figure can be arrived at and how much manual input the calculation will need. In order for this to happen the client provided a table where the projected costs and incomes for a specific course had been calculated. This table did not include explanations, and was nothing more than a simple list of figures for specific costs or incomes. In addition to this a specific

formula to calculate the state aid per student for a course was also provided by the client as this is a necessary part of the calculations and not readily apparent anywhere.

It soon became clear that the cost projection calculation would not work with the figures as initially provided by the client. Some of the costs were calculated as a percentage of the projected income of the course. The income for a course consists of the state aid and the student fees, the latter of which is what the cost projection calculation is meant to provide a figure for. As such it would be impossible to complete the calculation without modifying how these particular costs were calculated. The decision was made to calculate these costs as a percentage of the state aid only.

Once there was a clear picture of how the calculation could be performed and what figures would need to be provided by the course planner an Excel spreadsheet could be created that would perform the required calculations. The calculations required could all be performed with the standard formulas provided by Excel. The spreadsheet was designed so that it should in most cases visually fit onto the screen in its entirety, and thus be more easy to use (FIGURE 3).

	A	B	C	D	E	F	G	H	I
1									
2			syötettävät tiedot		TULOT				
3		Opiskelijamäärä			Opiskelija maksut	- €		valtionapu/opiskelija	163,00 €
4		Tuntimäärä			Valtionapu	- €		sos kulut %	22,00 %
5		Haluttu voitto €							
6					Tulot yhteensä	- €		kiinteistömenot % valtionavusta	23,0 %
7		KULUT						ruokahuoltomenot %	8,0 %
8		palkat (verokortilla)						hallintokulut %	25,0 %
9		sos kulut	- €						
10					Hinta/opiskelija	- €		Siirry kurssisuunitelmaan >>>	
11		Palveluiden ostot			Tulos	- €			
12		matkakulut							
13		opetuspalvelu ostot (ei verokortilla)							
14		kiinteistömenot	- €						
15		ruokahuolto	- €						
16		hallintokulut	- €						
17									
18		Vuokrat							
19		vuokrat							
20									
21		Muut kulut							
22		muut kulut							
23									
24		Kulut yhteensä	- €						

FIGURE 3. Cost projection calculation spreadsheet.

The spreadsheet was designed so that all data input by the user would go into one column. This can be seen in the above figure in column C (FIGURE 3), where the cells that require user input are shaded distinctly from the rest of the cells. There are cells in the same column that do not take user input, and are therefore protected from use and shaded a different colour to avoid confusion.

The data in column I are figures that are used in the cost calculation (FIGURE 3, FIGURE 4). These figures may need revision on a yearly basis. They are therefore left visible and modifiable to the user. In this way the client will not need to change any of the formulas in the calculation, and the spreadsheet will remain viable for use in the future without requiring deeper knowledge of how Excel works.

	B	C	D	E	F	G	H	I
1								
2		syötettävät tiedot		TULOT				
3	Opiskelijamäärä			Opiskelija maksut	=C5+C24-F4		valtionapu/opiskelija	163
4	Tuntimäärä			Valtionapu	=(C4/5)*(C3/5)*13		sos kulut %	0,22
5	Haluttu voitto €							
6				Tulot yhteensä	=SUMMA(F3:F5)		kiinteistömenot % valtionavusta	0,23
7	KULUT						ruokahuoltomenot %	0,08
8	palkat (verokortilla)						hallintokulut %	0,25
9	sos kulut	=C8*14						
10				Hinta/opiskelija	=IOS(0>=F3;0;F3/C3)		Siirry kurssisuunitelmaan >>>	
11	Palveluiden ostot			Tulos	=F6-C24			
12	matkakulut							
13	opetuspalvelu ostot (ei verokortilla)							
14	kiinteistömenot	=F4*16						
15	ruokahuolto	=F4*17						
16	hallintokulut	=F4*18						
17								
18	Vuokrat							
19	vuokrat							
20								
21	Muut kulut							
22	muut kulut							
23								
24	Kulut yhteensä	=SUMMA(C7:C23)						

FIGURE 4. Cost calculation spreadsheet with formulas.

Once the first version of the cost projection calculation spreadsheet was finished it could be sent to the client for testing for usability and to see if the projected figures coincided with the client's usual manual calculations. The overall usability of the cost projection table was found to be quite good, but there was some minor adjustments needed to the choice of figures the user would have to input. The cost projections proved accurate to similar manual calculations and did not need further modification.

The feedback provided from the client also made it clear that the Excel spreadsheet would be printed out and filed in paper format. It thus became necessary to format the worksheet in such a way that only the relevant sections would be printed out in an easily readable format. Once these modifications were done the result was shared with the client and approved for practical use by the client.

5.2 Case: Printing report cards

In order to facilitate the printing of identical report cards for several people, a list of names should be copied to Excel and a macro written that will automate the task of copying each name in the list to a

report card template and print out the template. The use of macros limits the usability of the Excel workbook as macros cannot be used in Excel Online (Microsoft c). In this specific case the Excel workbook will only be used to print out report cards at the Folk High School's premises by one user, and as such its lack of usability online should not be an issue. In case access to the offline version of Excel becomes an issue, the Excel workbook is also tested so that it works with similar open sourced and free of cost spreadsheet software alternatives, such as for example LibreOffice Calc.

5.2.1 Excel layout

Since the list of names and social security numbers, the required personal information of the student in the report card, is generated by Primus, the first step is to find out in what form the list appears and how it can be exported to Excel. The most easiest way to move the data is to copy and paste into the relevant Excel worksheet. The result of this, however, is that while the information does get separated into multiple lines at each line break in the original list the name and social security number will be copied into the same cell.

It is possible to import text files into a worksheet range and it may thus be possible to separate the names and social security numbers into different columns (Walkenbach 2013a, 188-189). This would, however, require several more steps from the user. The goal of this implementation is to automate as much of the report card printing process as possible, and minimize the work needed to do by the user. As such copying the information from Primus and pasting into the Excel worksheet is the best option available (FIGURE 5).

	A	B	C	D	E	F	G
1	Aklsfksls Marjukka 010101-0101			Liitä nimilista A sarakkeeseen			
2	Luuu Jenna 20.10.1987			Tulosta			
3							
4	Mkjskjlkfjsldj Sanna Hannele 010101A0101						
5	Meee Timea 010101-0101						
6	Moooo Johanna Kaisa-Maija 010101A0101						
7							
8							

FIGURE 5. Print report cards - worksheet.

The second worksheet in the Excel workbook is used for the template of the report card. Before printing the template should be modified by the user to fulfil the needs of the course in question, so that only the name and social security number of the student need be inserted. Since the report cards may need to hold a range of information about the course, the initial template will only be an outline for how the report card should look and the worksheet containing the report card template is left open to modification by the user (FIGURE 6). Since copies of the Excel workbook can be easily saved, the user can create report cards for specific courses and save them for later use if needed so that the same work does not need to be repeated later.

A	B	C	D	E	F	G	H	I	
				 KESKI-POHJANMAAN KANSANOPISTO					
			TODISTUS						
			<i>Opiskelijan nimi</i>						
			Syntymäaika						
			on suorittanut 2.12.2017 – 12.4.2018						
			KURSSI						
			5 op						

FIGURE 6. Partial report card template.

5.2.2 Excel macro

The macro that automates the task of printing the report cards will be run by clicking on the "Tulosta" button as seen in Figure 5, after which the user will be prompted by a Yes/No Message Box whether they want the students' social security numbers to be printed in the report card, or if they should be replaced by birthdates (FIGURE 7). The only input the Yes/No Message Box has are the two respec-

tive buttons, and the return value indicates to the VBA procedure which button the user clicked (MSDN).

```
'ask how to display social security nمبر/birthdate
Question = "Tulostetaanko henkilötunnus (jos ei niin syntymäaika tulostuu sen tilalle)?"
Answer = MsgBox(Question, vbQuestion + vbYesNo, "???)")
```

FIGURE 7. VBA code snippet – Yes/No Message Box

The macro loops through the filled rows in column A using a For Each...Next loop, which repeats the statement inside the loop for each cell in the collection (FIGURE 8) (Microsoft Visual Basic Guide). The range for the collection is set from the first cell of column A to the last filled cell of the same column, so that the VBA procedure does not unnecessarily check through all the cells in column A. The macro then moves the name and social security number into specific cells in the worksheet containing the report card template (FIGURE 6), and then prints the report card worksheet.

```
'Iterate through each populated row in column A
Dim rng As Range
Set rng = sheet.Range(sheet.Cells(1, 1), sheet.Cells(lastRow, 1))

For Each c In rng
...
Next
```

FIGURE 8. VBA code snippet – For Each...Next -loop.

As all the data on a person is contained in one cell, the VBA procedure needs to split the text string into pieces in order to reorganise it properly into the report card template. In case the birthdate should be used instead of the social security number this conversion also needs to be done. The decision for this is made with an If...Then...Else -statement (FIGURE 9), according to the answer the user indicated when prompted with a Message Box dialog.

```
If InStr(ddate, ".") Then
ElseIf Answer = vbNo Then
    'change birthdate format
    ddate = FullDate(ddate)
End If
```

FIGURE 9. VBA code snippet – If...Then...Else -statement.

The user is asked to do as little as possible in order to minimize the opportunities for mistakes to appear. While the user still has to manually modify the report card template with the pertinent information for a particular course, this macro makes it possible for the user to then print out individual report cards for each student by copying the list of course participants into the Excel table (FIGURE 5) and clicking a button.

6 CONCLUSIONS

This thesis aimed to reduce waste from the Folk High School's course development implementation process. Due to the limitations in scope for this thesis, it was necessary to choose a limited number of cases from the entire process to focus on. The choices were made based on what would most benefit the overall process and where information technology could be of most use. The structure of the chosen work cases was clarified and the manual work needed removed where possible. The software chosen for this project was made both due to the suitability for the project and the availability to the Folk High School.

A great deal of the work for this project went into communicating with the client. There was of course a need to find out what the client expected and wanted out of the project, which involved learning quite a bit about the overall structure of their course implementation. Furthermore once the specific cases to work on had been chosen together with the client, there was still a need to learn more about those parts of the course implementation in order to be able to offer any kind of solutions to the actual problems. During the course of the project this meant having meetings with the Folk High School's personnel. It was at times challenging to arrange times that would be suitable for everyone involved. Of course electronic communication was available, but it is often easier and faster to get results in an in person meeting, especially when the participation of several people is needed.

What was not known at the beginning of this project was that in all cases the solutions for the bottlenecks that the client had identified turned out to be relatively simple to implement. It would have been possible to implement solutions that would have required more complex work, and would perhaps have better showcased the author's knowledge. However choosing such implementations would have been to the detriment of the client in the long run, as the client does not have the resources for updating or maintaining any extra software applications. One of the most important reason for the client to commission this project was to eliminate unnecessary use of resources in their internal processes and therefore implementing solutions that would have proved more intricate would have been against the clients specific wishes. There are still bottlenecks in the client's operations that were beyond the scope of this project where information and communication technology based solutions would be of benefit and could reduce the amount of manual work done.

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