

Interactive Presentation System

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In order of Intelligent Lectern Systems

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Interactive Presentation System
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Prologue:

At the University of Twente an internship is required at the end of the bachelor's program of Industrial Design. This internship is fulfilled by completing an assignment from a company to show all the subject-matter of the study is mastered.

This internship was performed by Intelligent Lectern Systems (ILS), a company specialized in the creation of intelligent lecterns. A lectern is the device a presenter stands behind during a presentation. Sometimes it is also called a podium. Its prime function is to give the presenter a place to put his notes and water. ILS creates intelligent versions of these lecterns with build-in touch screens and matching software to give the presenter the perfect environment and extra options for his presentation.

At this moment ILS has detected a growing popularity within presenters who likes to walk around during presentations, and not only giving the presentation, but also presenting themselves. Presenters are using more and more small clickers with a laser pointer to switch slides and to point out elements on the sheet. To secure the market in the future ILS wants to develop a new type of lectern with the same advanced options of the current lecterns from ILS, but without requiring the presenter to return to his screen whenever he wants to do something, a so called Interactive Presentation System.

Summary

To finish the bachelors program at the University of Twente an internship at Intelligent Lectern Systems (ILS) is fulfilled. ILS is specialized in the design of high end interactive lecterns. To secure their future market, they wanted to develop a new lectern which could be used without being an invasive statue on the podium.

A thorough market and user analysis is done to begin with. These analyses are used to determine what ILS actually needed, and what the user wanted. It appeared that ILS had a series of lecterns which were quite distinct from the competitors. It also appeared that ILS needs to innovate all the time to keep themselves distinctive from the competition, and that the idea of a lectern which can be used everywhere on the podium will be a very good product for future presenters.

From the analyses are a list of functions derived from which a set of ideas are generated. The key functionalities are: The presenter can view his current and upcoming slide without looking behind, he can draw on his slides and he can operate the presentation anywhere on the podium. These are unique selling points ILS either currently has, or want to create with the new lectern. The ideas are sorted within functions they fulfill. When the lectern can fulfill these functions, it is likely it has all the capabilities to handle all the functions derived from the analyses. The sorted ideas are put in a morphological table. With help of this table four concepts are designed.

The four concepts exist of a regular clicker with some advanced functions, two concepts with an interactive screen, one designed as a tablet pc, and one as a screen around the arm, and the last concept is a motion capture device. These concepts are tested with paper models and compared to each other with help of a program of requirements.

The motion capture device is chosen as the final product. A way to start the whole presentation is added with help of a wireless lectern. A screen is placed in front of the presenter to provide visual feedback about what he is doing. A new motion capture device, The Leap Motion, is used capture the gestures of the presenter. This device is hung around the neck of the presenter. This way he has always the same imaginary box in front of him where he can make gestures. These gestures will be translated to actual actions by The Leap. So the final product is a device which captures gestures made by the presenter and translate these gestures into operations for the presentation.

The advantage for a user to use this product over trying to make something himself is the point that the user gets a complete and integrated working product. He does not have to put any effort in trying to make a gesture unit work as ILS does this. The user buys a finished product which works together with sho-Q. ILS increases the value of the independent components by making them work together.

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1. About ILS

ILS is a small company focusing on the development of high-end lecterns. Their goal is to make sophisticated lecterns for professional presentations. They choose state of the art design and innovative ideas over cheap production. The company is located in Assen in the Netherlands where most of the assembly of the lecterns is done while most of the production is done in China. There are three important aspects the company uses to make money. A physical product, the matching software and as a side track they have developed a sound system. The combination of hardware and software is called the lectern. Otherwise it is a physical lectern or the software of the lectern. The sound system is more or less a stand-alone system, but is part of the lectern as ILS sells it.

1.1 Physical lectern

At first their physical lecterns: ILS has a variety of lecterns they sell all over the world. These products differ from a simple minimalistic plate to an all in one cabinet with touch screens, drawers sound, light and full control of the environment. Appendix A provides an overview of some typical physical lecterns ILS sells. Common for every lectern designed by ILS is the possibility to adjust the height of the lectern. Therefore a very wide range of users can, regardless of their length, use the lecterns of ILS. This functionality is something to keep in future lecterns. The touch screens used in the lecterns are from Wacom, with exception of the ILS-22 [figure 1.1]. The pillars and larger cabinets are designed in such a way it fits with the mounting of the screens. The 22 has a special designed touch screen ILS has developed. The screen is designed to include a keyboard, mouse pad and environment control. Environment control is limited to sound, light, and various options like control over the curtains. ILS prefers their smaller lecterns where the audience has a better look at the presenter. However there are still a lot of companies that like the bigger products where the presenter can hide behind. Although companies buy the bigger lecterns, more and more presenters like to walk over the podium without the need to return to the physical pillar for any actions. The presentations from Steve Jobs are a good example of this way of presenting. ILS feels the need to keep up with this way of presenting to secure the market in the future.



Figure 1.1 ILS-22 with the touchscreen developed by ILS itself.

Be able to use the lectern regardless of the height of the user.

Support the 'free moving' way of presenting.

1.2 Software

ILS includes software of their own design with their lecterns. This software, sho-Q, is designed to work with a touch screen and a beamer. Although it is still in beta testing, clients have already praised sho-Q for its usability and options for controlling a presentation. The software is designed to handle multiple presentations, during conventions for example. By opening sho-Q the user can load one or more presentations into the program. Then he can select the slide show of his liking for the actual presentation.

In the presentation he can see his notes, his current slide, the upcoming slide and the slide as it is projected by the beamer. [Figure 1.2]. Besides showing pages,

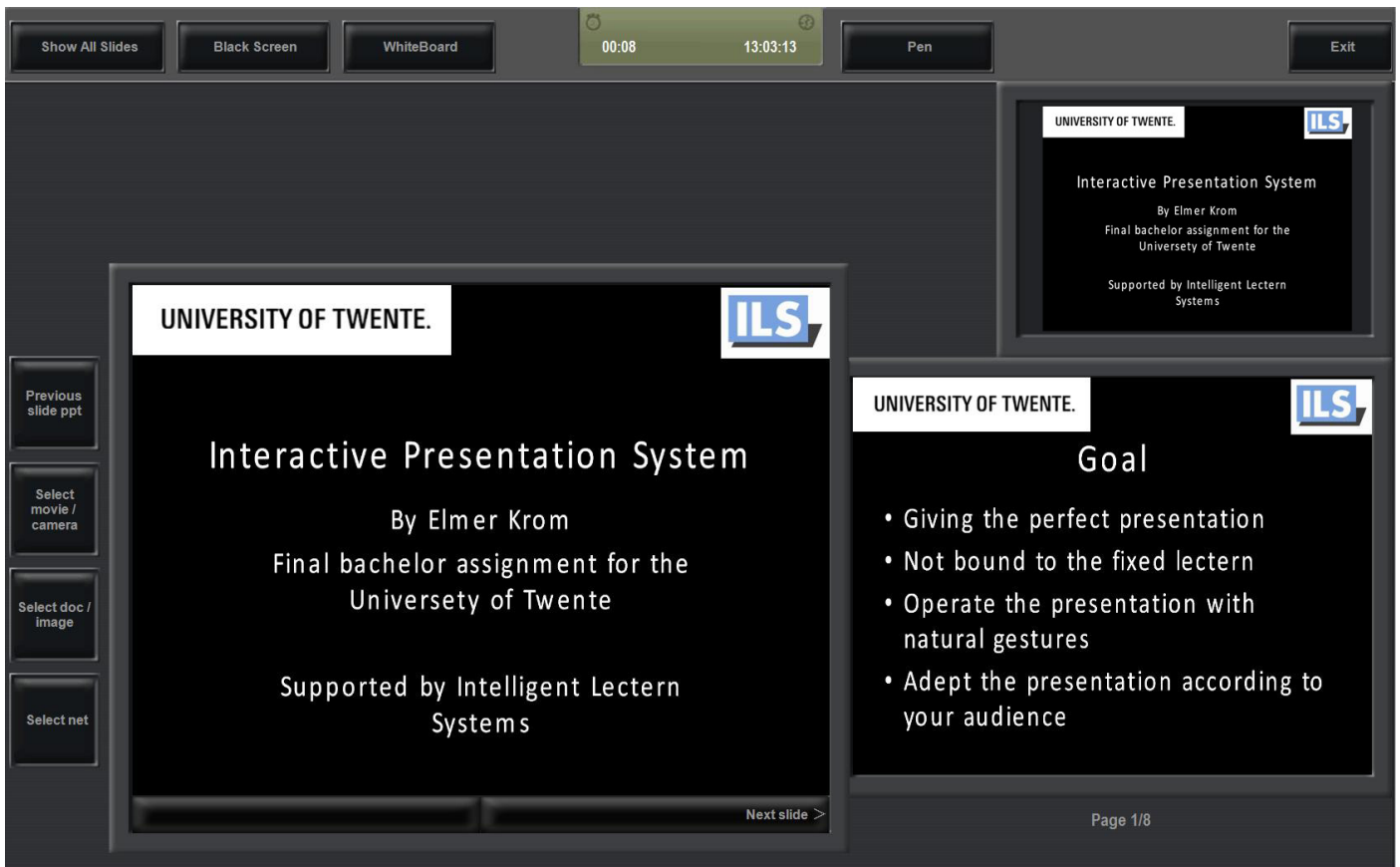


Figure 1.2 . The screen in sho-Q as the presenter sees during his presentation.

sho-Q also has the possibility to open images, movies and to go to the internet. The reason this can be done in sho-Q is so the presenter does not have to switch between different software programs. Also, by using sho-Q for this, the audience will not be distracted by the different folders of the presenter when he searches for the correct content to show, as sho-Q will show the last sheet until the presenter has found the file he was searching for. A second benefit for using sho-Q is that this program provides the possibility to draw on the images shown in all stages of the presentation, regardless of type of content shown. Drawing is possible on a web page, on a movie or simply on a sheet of the presentation. As ILS has put quite some effort in making sho-Q working, they would really like it when the new design of the lectern will be fully compatible with sho-Q. Appendix A contains more images of sho-Q.

1.3 Sound system

According to Henk from ILS research, has revealed that people learn and pay attention to the presentation up to three times more when they hear the presenter loud and clear, without the need to focus on what he says. To support the presenter ILS has a sound system which provides a clear sound for the audience. The speakers are very thin so they can easily be mounted on the wall. The whole speaker system is designed as a plug-and-play system. The user places the speakers, plugs in the power and he immediately can use the microphone for a good sound.

Because there is already a decent sound system, it is unnecessary to bring in the aspect of sound in the new lectern, as long as there is room for a microphone in some sort of way.

Have all the benefits from sho-Q

Be completely compatible with sho-Q

Not focusing on sound

Be compatible with the ILS sound system

1.4 Size of the company

The company is basically a one man company, founded and ruled by Henk de Groot. He is also the person who created the assignment for the new lectern. He hires students from the nearby academy for various projects like repairing and assembling lecterns or developing software for example. Larger and more expensive projects, like developing a new type of touch screen, is most of the time outsourced to other companies.

2. Target objective

Because during the internship a new lectern has to be designed, an objective is defined to test whether the target is reached or not. ILS wants to develop a new type of lectern. The main idea of this new lectern will be a presenter who is totally free of the fixed lectern. The presenter must be able to do anything on the podium he can do with the current lecterns of ILS anywhere. The objective of this assignment is to design a final concept and to create a presentation model for ILS which they can use for further development. Here a final concept is defined as the complete theoretical working of the product. A presentation model is a physical representation of the product which can be used by ILS to test and promote the lectern in its first steps.

Be able to perform the presentation, regardless of where the physical lectern is.

3. Research

To determine what the important aspects of the lectern are, a profound research is done. Several subjects are researched to get a grip on what to take into account by designing the Interactive Presentation System. Different stakeholders are reviewed to determine their wishes for the lectern. By analysing the market,

an image is created of what is currently available and what kind of techniques are required to create a new refreshing product.

3.1 Stakeholders

There are three different kinds of stakeholders identified who have to deal with the ILS lecterns, either because they use the lectern, or they buy the lectern or they have to clean the lectern.

The first and most important actors are those who actually use the lectern, the users. Some of the customers of ILS include for example:

- Managers
- Professors
- Military personnel

For this group it is important that they can give a presentation without any problems. The lectern must give them decent feedback and it must improve the quality of the presentation they give.

The second group of stakeholders are the clients of ILS, the companies who will buy the lectern.

- Cern, Esa estec
- Fortis, Price waterhouse Coopers
- Royal Airforce, Royal Navy (UK), Arméedeterre, Nato, Swiss Army
- Unil, Université de Lausanne
- Princess Noora University for women (Riyadh)
- CiT, College of information technology (Dubai)

Quality and status are important for these companies. The impression on others must be of high quality most of the time. This means they will prefer more expensive high quality products over the cheaper alternatives. An important note is that the Middle-East is currently also buying a lot of the lecterns from ILS. However they like the bigger bureau types. The expectation is therefore they will not buy a lot of Interactive Presentation Systems.

The third group of people involved are those who get indirectly in contact with the lectern. They produce and clean the lectern or are responsible for any regulations.

- Metalworking companies
- Transporter (UPS mostly)
- Cleaning personnel
- Government
- Disposal companies.

For these people regulations and easy access are important. Physically the lectern must not be too complicated.

The requirements needed according to these actors are: The Interactive Presentation System must give them feedback about the presentation, it must represent quality and the design must not be too big and complicated.

The lectern must provide decent feedback.

The lectern must be of high quality.

The lectern must not be complicated

3.2 Market analysis

There are two major competitors for ILS identified. Both are Korean companies specialized in the production of intelligent lecterns, just like ILS. The first company is AHA I&C, the second company is B&S. Although they both produce intelligent lecterns, these lecterns remain pretty big, unlike the lecterns from ILS.

A client can always buy a regular lectern when an intelligent lectern is too expensive. Therefore simpler lecterns were also added in the analysis. It appeared these simpler products are a lot easier to customize in colour and shape for the customer, which is their main feature is over intelligent lecterns besides lower costs. Appendix B contains the complete list of the reviewed lecterns.

3.3 Other technologies

After looking for these lecterns the realization struck that the new lectern will probably not be a box on the podium, but something much more discreet. Therefore different technologies for presentations and for computer interfaces were also researched.

At first are there different click devices for presentations compared. These devices are made to switch the slides remotely, and have the ability to point at elements with a laser pointer. On average, these devices have an operational range of 30 meter, red or green laser light

and some basic buttons like forward and backward. See appendix B for all the reviewed clickers.

3.4 Screens

If the lectern gets a screen, it will be of great influence what kind of screen it will be. There are four types of screens which can be useful for the lectern. The four screens are:

- A normal flat screen used for computers, this is most of the time a LCD screen and have touch screen capabilities.
- A beamer in front of the screen. This kind of screen is useful for big screens, but creates a shadow when the presenter walks in front of it.
- A beamer behind the screen. Does not creates a shadow, but the resolution is much lower and you need much more room behind the screen for placing the beamer.
- A holographic screen. This screen is a special glass plate where a beamer can project images on.
- A teleprompter, the kind of device used by newsreaders to read the news while looking in the camera. Also used by the holographic concert of Tupac last year. (11)

3.4.1 Normal screen

Regular screens can be used in variable ways, and can be acquired in a lot of different sizes. Strong points of a normal screen are the relative small space needed for the screen and the high resolution they provide. There are several touch options for normal screens, each with up and downsides. Nowadays a simple distinction between the touch screens are: single touch and multi touch, operation via stylus or finger. For now it will be enough to know what the different options for the touch screens are. Later if indeed a touch screen is used for the Interactive Presentation System the exact details of the touch screen can be determined.

3.4.2 A beamer in front of the screen

This is very often used when a large screen is needed, to display the slides for the audience for example. A beamer is a relative cheap way to cover a large area. Two major downsides are that regular beamers need to be placed a certain distance in front of the screen, making it necessary to calibrate the beamer for a clear picture, and beamers can make a lot of noise and heat

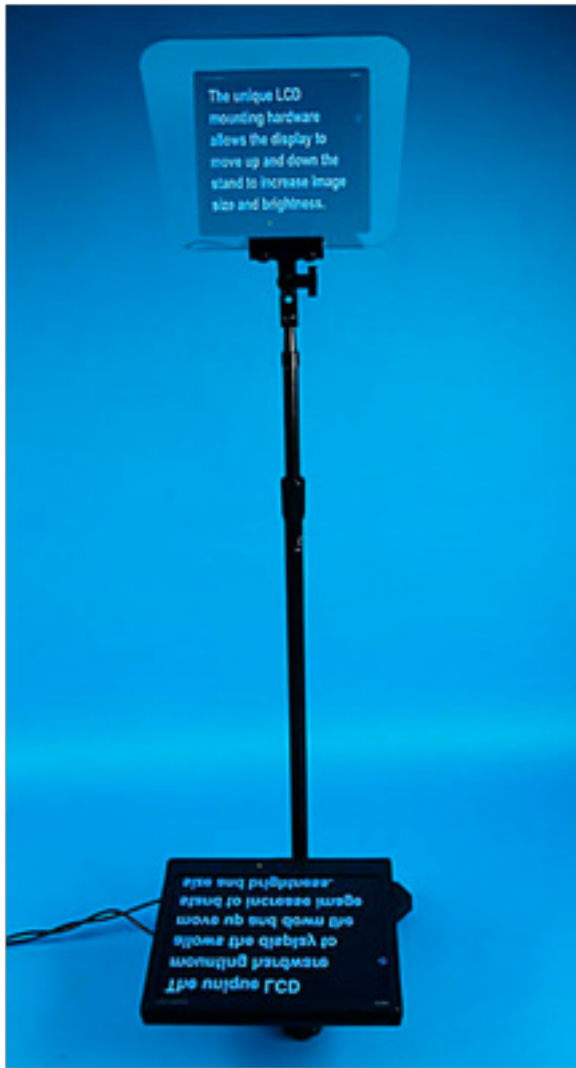


Figure 3.1. A teleprompter

which can be annoying for the audience and limit their use in close quarters.

3.4.3 A beamer behind the screen

Another way of lighting a screen is by placing the beamer behind the screen. This technique is used in the film industry in scenes with moving backgrounds. By placing the beamer behind the screen the people in front of the screen will create no shadows. This comes in handy if a screen lit by a beamer will be used for the interface of the lectern. A major downside of this way of projecting, besides the earlier stated needed extra space and heat production is that the resolution of the screen is rather low. Lower when the same beamer will be placed in front of the screen. This might be troublesome when the presenter has to read from the screen or must do other tasks which require a high

The lectern must not be excessively large



Figure 3.2. President Obama using a teleprompter

resolution screen.

3.4.4 Holographic screen

Instead of using a canvas for the screen, it is also possible to use a special kind of glass. This glass will spread the light from the beamer creating the projected image. With this technique the presenter will see the information in glass, while the audience sees mostly only a glass plate. Important with this holographic screen is that the beamer must not be placed directly behind the glass, but at an angle. Otherwise it will shine directly into the eyes of the presenter, which is very uncomfortable, and potentially dangerous to the eyes.

The holographic effect of the glass can be achieved by pasting a special plastic film over the glass. It is also possible to create a more 3D like image in the glass. In that case special glass must be used which bend the light in such a way it appears the image is in front of the glass. This is done by making a lot of tiny lenses in the glass. The effect is much more futuristic, than with the use of a plastic film, but this might work counterproductive as the presenter is awed by the screen while all he actually needed is a normal screen.

3.4.5 A teleprompter

The teleprompter is an excellent choice to provide the presenter with information only visible for him. The device, used by newsreaders on television, uses a reflection trick, also known as Pepper's Ghost. A semi-permeable mirror is placed in at an angle of



Figure 3.3. The Leap

45 degrees towards the person who needs to see the content on the screen. Under the mirror is the content projected [figure 3.11]. The image is reflected by the mirror for the presenter, but not for the audience. The president of the United States uses this system to read his speeches [figure 3.2]. He can look left and right as if he is looking into the audience, while he is actually reading his speech. Because the teleprompter is made of glass, it is a very discreet method as the audience barely sees it. When this device is placed left and right of the presenter, it will not be an obstacle. The presenter is even forced to look left and right and thus to let his eyes go all over the audience. This can be either a good or a bad thing, depending on the presenter. A skilled person can use this like the president of the United States does, to look left and right and give the illusion of looking at everybody in the audience. An unskilled nervous presenter however will probably just look at one screen all the time and in this way avoid contact with the audience.

The holographic screen is a great product for a discreet lectern. The presenter can for example just walk around using a regular clicker and when he needs the advanced options, like drawing, then he walks to the holographic screen. The audience will in that case only see a very small glass plate and a construction to keep the glass in place and not a whole lectern. To make it more attractive to walk around for the presenter, the construction can be placed not between the presenter and the audience, but in a small angle. So when the presenter stands straight behind the lectern, and looks forward, he will look toward the corner of the room, and not straight into the audience. This may however

also lead to a nervous presenter who is looking away from the audience. Also at the startup of the presentation, the presenter will look away from the audience. This is not a big issue, but it is less hospitable.

The owner of ILS was already fantasizing about using holograms as feedback and interface for the presenter. For holographic projections a screen with the beamer from behind, or the teleprompter is probably the best choice. The teleprompter takes up less space, but is probably more expensive. A glass screen with the beamer from behind is useful if the presenter wants to use the screen for interactions. However, the audience will be able to see the content on the glass screen and therefore it is not a useful device as a one-way hologram. It will be handy as a discreet normal screen with a futuristic appearance for the user.

The Audience may not be distracted by the feedback for the presenter.

3.5. Motion detection

Because a presenter uses a lot of gestures, it might be a good idea to use gestures to control the presentation. A presenter can let the presentation automatically go to the next slide by simply making a gesture. Gesture controlled interface does fits perfectly within the objective from ILS. It is new for presentations and it can provide an interface which can be used for the next generations.

3.5.1 Kinect

The most prominent and successful gesture interface of this moment is created by Microsoft, the Kinect. This device has three cameras which can detect three dimensional objects and movement within a room. The biggest downside of the Kinect is it is not yet very precise. The cameras have a resolution of 640x480 pixels. Although this is good for gaming and basic interfaces, it is rather restricted for more detailed applications. The user has to make rather big gestures for the Kinect to pick it up. But a presenter probably doesn't want to stand still and only wave his arms just to use some functions.

3.5.2 Leap Motion

A new technology that is scheduled for release in

January 2013 is Leap Motion [figure 3.3]. This is a small box with some sensors which detects finger movement in a certain area. This technology is precise enough to write with a pencil on a cubic centimeter or to detect the ten different fingertips. According to the creators is it possible to connect several sensor boxes and enlarge the covered area this way.

The major advancement of this device over the Kinect is its precision. A Kinect is great for body language, but lacks the precision needed to draw and write. Leap Motion can detect the ten different fingers, and can even detect it when an user holds a pencil. The area where Leap Motion works within is much smaller than that of the Kinect, but when this appears to be an issue, this can be solved by linking more boxes together. In this way a large imaginary box can be created in which the presenter can control the presentation with some hand gestures.

3.5.3 The use of Leap Motion

Because Leap Motion is not yet for sale, it is hard to find out what the specific workings are of the device. So it is not yet certain how well the system integrates within other devices and whether the device can scan hands while it moves.

Because the Microsoft Kinect currently has only a resolution of 640x480 it is likely the Kinect will improve its cameras within a short time. But this is merely speculation. In this way the Kinect might be more useful than Leap Motion. Calibrating the device will only be little effort, its working area will be a lot bigger and there is already software available to write your own applications. There are also other devices with a high accuracy in development, but these devices consume a lot of processing power, making the output not very responsive.

3.5.4 Leap Motion over Kinect

The expectation is that Leap Motion will have more potential in its use than the Kinect. The reason for this expectation is because Leap Motion has in all likelihood more to offer. With the Kinect solutions are still needed to surf on the internet and to use other programs with a non-linear interface. A non-linear interface is in this case an interface which cannot be used with a few buttons and therefore it is unpredictable how users will use it. For example a keyboard has too many buttons and therefore to many options to predict how a user will use it.

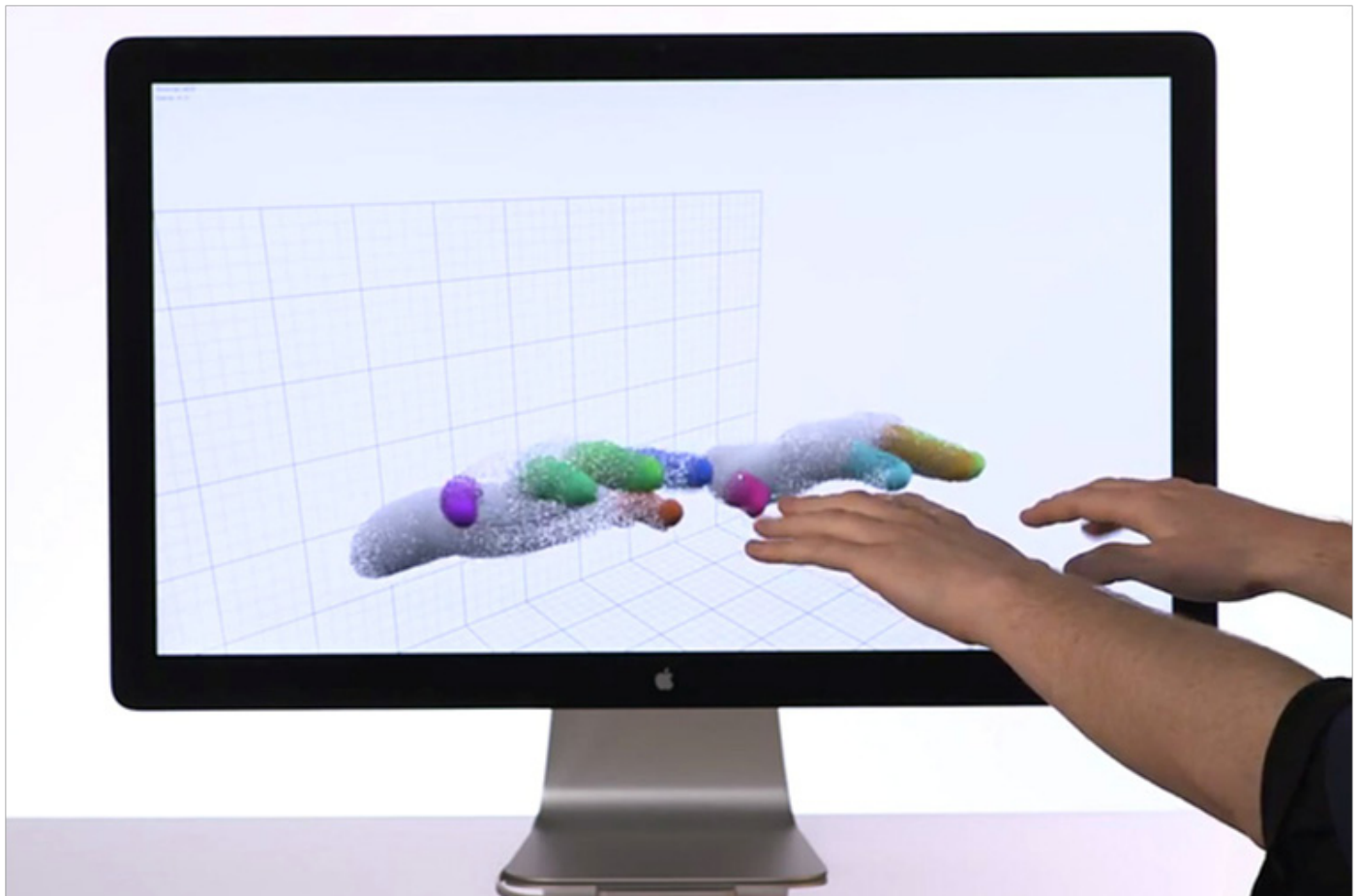


Figure 3.4. The leap can detect the ten different fingers, and show the hands on the screen with a minimal delay.

The expectation is that for the Leap these solutions are not necessary because by watching demos of the Kinect and Leap Motion, a major difference is the size of the gestures. For example, to zoom in by Kinect is most of the time a movement like swimming in the air or a gesture with stretched arms needed. While for Leap Motion are the same gestures operable as people are using on their Smartphone's. In this way a presenter does not have to stand in front of an audience of 300 men and act like a fish to go to the next slide.

A site that digs into the technology of the near future, extremetech.com, provided a pretty detailed description of the Leap Motion. The Leap Motion appears to use a special camera using infra red to measure the distance of objects towards the camera. In some way, the developers of The Leap have managed to create a very cheap high res camera. The site extremetech states: "However the Kinect is only accurate to less than a centimeter, while the Leap claims accuracy of 0.01mm, so it would have had to do a major leapfrog over the technology in Kinect." This even with just using 1% or 2% of a average laptop CPU, while with most devices for this high resolutions a much higher processing power is needed. An important note which has to be made is in demo's of The Leap the hands of the user are almost completely detected by the device, or so it seems. Because the device uses infra red camera's, it has not the option to see through the flesh of a user, so the back of the hands

in de demo clips are rendered by the software of the system to create a more realistic and better appealing image [figure 3.4].

3.6 Interactions

Because the Interactive Presentation System is a product specifically based on improving the user experience along with a presentation, it is of upmost importance to determine the interactions of the system. There are also different kinds of interactions. The user interacts with the physical presentation system, with the audience and with the software. All these interactions are studied to get the most out of them.

At first it is necessary to know what software is mostly used for presentations. Because the presentation system must support a good presentation, it automatically must support the presentation software.

Nowadays there are three kinds of software used for presentations, that works all three with the same basics.

- PowerPoint
- Prezi
- Keynote



Figure 3.5. Different poses are ranked from a closed appearance to an open appearance.

PowerPoint is the presentation system from Microsoft while Keynote is from Apple. Both programs are using slides you can switch in between. There is also free office software providing programs which works exactly the same. Prezi works slightly different. According to their site: “Prezi is a cloud-based presentation software that opens up a new world between whiteboards and slides. The zoomable canvas makes it fun to explore ideas and the connections between them. The result: visually captivating presentations that lead your audience down a path of discovery” [16]. Prezi uses a big canvas where the user can drop images and text. Next the user can select areas of the canvas as slides. When the user scrolls through the presentation, the program goes smoothly from one slide to the next slide over the canvas.

The three software programs are for the presentation itself quite similar. There is a linear timeline existing of pictures popping by one by one. The presenter controls when the next picture shows, and sometimes there are some special effects to make the presentation more fun to watch. Another set of programs which can be used, but is seldom done, are movie players. Movies can be very effective to make a point clear, and offer some special features compared to regular presentation software. Although movies also exist of a linear timeline, it is a lot harder to go forward and backward during the presentation. There are no actual key points the presenter can use to jump to, and the controls used by presentation software do not necessarily be the same controls used to control a movie.

A third party of used software in a presentation is an array of programs used for normal applications. It is quite common that programs, like SolidWorks and Maya, are used when someone tries to teach these kind of programs. As this kind of software requires full support of regular computer input, meaning keyboard and mouse, it will be too much to try to support this kind of software.

So summarized, the important interactions coming with the software is going forward, backward, pause, and switch between the software and a mouse operator.

Going forward in the presentation.

Going back in the presentation.

Operate with a mouse.

Operates several standard movie control functions.

Switch between software programs.

3.6.1 Interactions with the crowd

The next set of interactions are those between the presenter and the audience. The presenter wants to give a good presentation. To do so, the audience must be entertained in some way. Therefore it is really important for the presenter to use his body language in a positive manner. Needless to say, the Lecternless Lectern therefore must support the presenter in his positive appearance. So any postures considered negative should be avoided by the system.

It is common knowledge that an open posture is friendlier than a closed posture, and that it is considered kind when the presenter looks into the audience. For the audience it is important they can hear the presenter loud and clear. Most of the time a microphone will do the trick but in case there is no small microphone available, the presenter must rely on his own voice. When he is talking to the ground, or turned to the sheets, his voice will be difficult to hear for the audience.

To achieve a better understanding over the different kind of postures used during a presentation, a list is ordered in figure 3.5 from a ‘bad’ posture to a ‘good’ posture. An important note by this list is that it is all speculative. The order might differ from person to person, though the overall ranking will be the same.

Overall it can be said that the presenter must give a vivid presentation, it will be good when he is encouraged to walk around, look straight into the audience, use his hands and arms in a natural way and making natural gestures.

Give a vivid presentation

Have the hands free.

Use his body in a natural way.

Be able to make natural gestures.

3.7 Scenarios

With the help of the previous research, two scenarios are written. Both scenarios are about two common situations of users. These scenarios help to improve the understanding of what the user goes through while giving a presentation. The first scenario is about an experienced presenter who knows what to do and how to give a presentation. The second scenario is about a person who is not used to hold a presentation and is therefore quite nervous.

3.7.1 Scenario 1: Stan, the natural gifted and experienced presenter

Stan Anderson is known as a gifted presenter. He works for a company in modern technological gadgets. His job is to go around in the world and talk to people about the gadgets. He must make the costumers aware of the products his company sells and Stan needs to find out what the costumer likes to have. Stan loves his job very much, although his wife sometimes likes to see him more often. But that doesn't stop Stan from going around the world and give his presentations in conferences and symposia. This makes that he has seen a lot of different presentation systems and that he is quite experienced with these systems.

Even though others call him a natural speaker, he rehearses his presentations over and over and makes sure he knows exactly what he wants to say and what slide is up. This gives him the freedom to walk around during his presentations. That is why he likes to use a small device which he can use to switch sheets and point at aspects on the sheets. During the presentation he uses big gestures, pauses after important sentences and speaks clearly and with enthusiasm.

After his presentation, there is often some time left for questions. Answering the questions itself is no problem for Stan, he finds it really important that the audience go home satisfied and happy. Stan only finds

it annoying that for some questions previous slides are needed, and that he needs to scroll through his entire slide show to answer the question. It would be so much easier to just simply show the needed sheet instantly.

Sometimes Stan has a presentation where he wants to show a lot of things to the audience. A pointer is insufficient in these presentations so he uses his tablet laptop. There he can draw on his sheets and underline the important things. This restricts his movement options however as he needs to stay near his laptop. A few times he tried to use a tablet, like an Ipad for this. He could walk around again, but he was unable to make big gestures as he needs to hold his tablet. His solution for this problem was quite simple, but not ideal. Stan made a simple normal talk, and the tablet lay on a table. Every time he needed the tablet, he grabs the device and does whatever he needed to do with the tablet. Then he laid the tablet back on the table.

He is still dreaming of the day that he only has to point at the presentation and everything goes the way he wanted to.

3.7.2 Scenario 2: Gill Williams, the not so very gifted and experienced presenter

Gill is a member of a design team for modern gadgets. Her job in the team is to keep track of safety and customer issues. From time to time the results of the research need to be presented towards either members of the team or the board. Now she is asked to give a presentation about safety during a conference.

She does not really like to give the presentation but she sees the necessity of it. Gill likes to keep her presentations simple and to the point. But it won't prevent a lot of boring numbers and facts in her sheets.

Gill did rehearse her presentation a few times, but she was still glad she could look at the sheets to remember what she had to say. She knew there was a way to let some notes appear on her screen, and the real sheets on the big screen, but she had no idea how that works.

When she started she didn't expect there to be so many people in the audience. So she was really nervous and overwhelmed by the amount of eyes watching her. She was also unfamiliar with the presentation system so it took her quite a while until the presentation finally started correctly.

During her presentation there were quite a few questions, and every time she had to answer a question it took her some time to get back into her story. There was a big lectern on the podium where Gill had a steady grip to keep her nerves under control. This was reassuring for Gill, but it did not much good for her appearance and her presentation. As the audience didn't get a good look on her and she appeared quite unsure about herself.

Near the end of her presentation Gill had a video to show. However the clip didn't work in her presentation. She had to switch to her desktop to locate the movie over there and start it manually. Gladly she had foreseen that this problem would appear so she had acted accordingly to it by placing a copy of the clip on her desktop. She didn't even wanted to think about the shame she would have to endure if she needed to search all her computer to find the video clip.

At the end of the presentation there were still a lot of questions for Gill and she had to switch to a lot of different sheets in order to answer all of them. This was not a problem, but was kind of annoying.

4. List of Functions

- Be able to use the lectern regardless of the height of the user.
- Support the 'free moving' way of presenting.
- Have all the benefits from sho-Q.
- Be complete compatible with sho-Q.
- Be compatible with the ILS sound system.
- Be able to perform the presentation, regardless of where the physical lectern is.
- The lectern must provide decent feedback.
- The lectern must be of high quality.
- The lectern must not be complicated.
- The lectern must not be excessively large.
- The audience may not be distracted by the feedback for the presenter.
- Going forward in the presentation.
- Going back in the presentation.
- Operate with a mouse.
- Operates several standard movie control functions.
- Switch between software programs.
- Give a vivid presentation.
- Have the hands free.
- Use his body in a natural way.
- Be able to make natural gestures.

- Not focusing on sound.
- Not be excessively large.
- The Audience must be distracted by the feedback for the presenter.

5. Ideas

One of the first ideas was to use some sort of glasses for a screen. The presenter then always has all the information close by. Google is busy to set these kinds of glasses in the market (7), these glasses will be probably be available in 2014 for consumers. Other ideas where for example more advanced clickers for presentations or small portable screens.

For navigating in the presentation a set of small devices were designed. The idea was to have the opportunity for the presenter to control his sheet with something more discreet. With a few simple and small operations the presenter can do everything he needs for his presentation.

One less serious idea was to simply force the presenter to have a good posture. With a few handles he operates the software of the presentation while he is forced to make a confident posture. Of course this idea is more a fun idea than a realistic possibility for a product. However, the idea of forcing the user in better postures is not so bad at all. The main thing is the user must not have the feeling he is obligated to do things he does not want.

In these ideas three main categories were identified, stated as:

- Looking at the sheet
- Point out elements on sheet
- Switch slides

Besides these three points there is the option for different types of screens, and as a bonus, to let the presenter appear confident. For every category some more ideas were created to have variety of possible solutions.

The ideas are shown in figure 5.1. The rest of this chapter will be dedicated to explain the ideas in further detail.

5.1 Looking at the sheet

The first idea was the screen built in some glasses as described before. Other created ideas were to put a screen around the arm or hand. In this way the screen is still close by, but not directly in the visual field of the presenter.

Because the lectern had to be something new, an idea was to give the physical device a futuristic look. The device exists of several screens each with their own information and every screen could be moved separately. There are quite some possibilities with this device, but a major problem might be that the presenter is either too distracted by the device, or doesn't want to walk around with something so unfamiliar.

It might be possible to have a flexible screen. The presenter then has sort of a scroll in his hand, and when he has to look something up, he rolls the screen out. This idea however creates more steps for the presenter to follow then necessary, and it makes it nearly impossible to take a discreet look at the screen.

Instead of a portable screen, there are also a lot of options for fixed screens in the auditorium self. One of the first ideas was to put a screen behind the audience. The presenter then looks over the heads of the people to see his notes and sheets. But there are a set of major downsides making this idea little to not viable. At first the room has to be equipped with two beamers and screens. The screen for the presenter likely has to be from better quality then the screen the audience looks at, otherwise the presenter will likely not be able to read his notes. And this system cannot be used in a room with any kind of obstruction at the wall in the back, like doors, windows and pillars.

Instead of placing the screen behind the audience, the screen can be placed above the audience. This way the size of the screen can be considerably smaller, and there are a lot more auditoriums where this screen can be placed. The screen has to be placed in a small angle towards the podium where the presenter stands. This so the presenter has both a good look on the screen, and the audience won't be distracted by the screen on the ceiling. Furthermore the screen can be placed on the ground, in front of the presenter on the podium, or teleprompters can be used. The idea of placing the screen in the ground did pass, but there are too many downsides to a screen built in the floor.

Later is the idea generated to use some sort of small hand held device. The presenter does not have to roll out the screen, as is the case with the flexible screen, but can directly take a look. This device can both be operated with a stylus or with finger touch, depending on the used technology. This screen can also be equipped with a grip, so it is easier to get a hold on the screen. This grip can be added with some basic functions like switching slides.

Instead of developing a new screen, the presenter can use something like old lectern whenever he needs feedback. So when he wants to draw something or view his notes, he walks closer to the lectern. For navigating and other functions the presenter can use a handheld device. When this is not enough, this lectern can be placed on wheels and be equipped with some sensors. With the proper coding the lectern will be able to follow the presenter over the podium. So the presenter has literally every function of the lectern within his reach.

The presenter has to be comfortable with the Interactive Presentation System.

Simple to use.

May not hinder the presenter.

5.2 Point out elements on the sheet

Some of the ideas to look at a sheet are also useful to use as a navigation device. Basically all the ideas with a screen within reach of the presenter can be used to point out elements on the sheets. All that has to be done is to change the screen to a touch screen.

It is still the question if a flexible screen can be equipped with touch functions. If this will be possible within a few years, it is still likely that it will require a lot of research, which will be expensive. So the idea of a flexible touch screen is nice, but probably too expensive.

The presenter can use some sort of tablet pc as the interface for the lectern. This tablet might be a bit clumsy when the presenter only wants to read his notes,

but it provides all the necessary input possibilities for the presenter. It also would be rather cheap to develop, as the current hardware is already good enough for this use and the software only has to be adapted to fit on a tablet pc.

With help of gyroscopes and accelerometers it is possible to make a mouse work in thin air. The sensor detects changes in movement and orientation, which can be translated to a movement of the mouse pointer. In this way, the presenter can operate the mouse while walking around, like he does with a normal mouse. This sensor system can both be placed in a mouse, as in a device closer to a pointer or remote. The benefit of the mouse is: it is familiar for the user and offers a lot of room for buttons. With a pointer or remote the presenter can point with the device, which will probably feel more natural.

Instead of using a mouse or touch screen, there must be a possibility to use a small touch pad. This pad can be attached to the fingers of the presenter and works like the mouse pad most laptops have these days. It is simply smaller and therefore more discreet.

These days, laser pointers are commonly used by presenters. An idea is to use a sensor pick up this point and let the beamer project a line where the pointer was. This way, presenters can use the same devices they are used to, but are now able to do more with it.

May not be too expensive to develop

5.3 Switch slides

Again by providing all the screens from the previous ideas with a touch function, it can be used as an interface for switching slides, and controlling the presentation in general. Besides using touch screens, there are also other possibilities.

A friend showed a video of how a magnetic field was able to hold an iron sphere in mid air. By influencing the position of the sphere, a user could operate a mouse. Although the lectern does not have the space for such a magnetic field, an interface by influencing a sphere didn't sound bad. The presenter can hold a sphere, and by the way he holds and touches it, he might be able to perform several tasks needed to hold a presentation.

Since Apple did come with the click wheel on their Ipad, this interface concept has gained more and more ground within several user products. Such a click wheel will be a great way for a presenter to operate his presentation with sho-Q. With the wheel he can scroll through the different functions of sho-Q while with two simple buttons on the wheel he can switch the slides. The biggest problem of this concept is the patents Apple has on its products. So in order to be able to sell this product, sho-Q must likely re-invent the click wheel to get past the patent of Apple.

As presenters probably like small and discreet devices, it wouldn't be a bad idea to give him a small device to switch his slides. A bracelet can already do the trick. The presenter only has to press a button on the bracelet to switch the slide, and the audience will likely not even notice the device.

The natural position of the hand is slightly bent with the thumb close to the fingers. This position can be used for an interface which uses this natural position. Placing sensors on the finger tips can function as buttons. The index finger touching the thumb can count as next slide, while touching the middle finger can count as previous slide. Although this idea feels quite natural in its use, it must be comfortable. The assumption here is those presenters don't flock to attach all kind of sensors to their fingertips for a presentation, which causes some problems for this idea.

A less serious idea was to give the presenter some sort of belt with two cords. He must pull the cord to go to the next slide. This will force him into an open posture, but it is highly unlikely any presenter would like such a product.

The idea of the Interactive Presentation System is the presenter can walk around during his presentation. This idea of movement can be used to control the presentations. A button or sensor can detect the location of the presenter and execute a related function. So when the presenter walks to the left, the previous slide will show up, and when he walks to the right the next slide will show up.

As mentioned in the market analyses there are opportunities to use 3D motion detectors to control the presentation. The presenter can make a few gestures and the sensor translate these gestures into actions. This sensor might be located somewhere in

front of the presenter, or maybe when it is small, like it is the case with the Leap Motion, the presenter can hang it around his neck. In this way the sensor has constant area in where the presenter can make his gestures.

The lectern must be comfortable to use

5.4 Let the presenter appear confident

The first and simplest way to let the presenter take a confident stance is by using 3D motion detectors. The can be programmed in such a way that the presenter must stand straight with an open posture in order for the sensor to accept any commands.

The screen above the audience will also help the presenter, as he has to look up and thus straighten his back.

The gyroscopic mouse can be useful too, as this device can also be programmed to only accept certain commando's which encourage an open posture. Commando's like sweeping movements with the mouse. It also prevents the presenter putting two hands in his pockets. A device like the handheld mouse pad won't prevent this, as these can also be operated when the presenter holds both his hands in his pockets.

It is important to keep in mind that the actual posture will be from the presenter. When the presenter doesn't want to have a positive stance, he would probably ignore all the nudges provided by the lectern.

6. Program of requirements

When the project started, Henk had some requirements he wanted in his presentation. The bottom-line of these requirements were that the presenter had to be able to quickly start his presentation, and that the presenter had to be comfortable while using the lectern. The requirements given by Henk together

with the requirements followed out of the ideas are stated below.

6.1 Requirements

- Safe to use.
- System starts up within 1 minute.
- Handling presentation systems.
- Start the presentation.
- The presenter must be able to walk around freely.
- He must be able to operate the presentation from any point on the podium.
- Switching the slides.
- Visible notes for presenter.
- Visible current sheets for presenter.
- Able to point out elements at sheet.
- Able to switch between different media software.
- Appear familiar.
- Simple to use.
- The lectern must be comfortable to use.
- Must not hinder the presenter.
- Be suitable for audiences between 30 and 500 people.
- Support the ILS sound system.
- Support an external PC.
- Support external video.
- Immediate system shutdown.
- Must not be too expensive to develop.
- Make ILS a profit.

Wishes

- Visible previous sheets for presenter.
- Support the presenter in his appearance.

7. Concepts

Four concepts are developed with help of the generated ideas. From the morphological table, specific ideas are chosen to be molded into concepts. The selected ideas needed to be realistic and have to fulfil the program of requirements.

The first assembled concept used a click wheel for navigation, and a large screen on the podium to view the relevant data. The main idea of this concept was to keep the whole product familiar to the consumer, while it is still a new and user friendly product.

The second concept used a more common tablet around the neck, with teleprompters at the sides of the

podium. A small bracelet around the wrist gives the presenter easy access to the previous and next slide while the tablet can be used for complicated functions.

The third concept is quite similar to the second concept, but with the tablet screen reduced in size and strapped around the arm. The screens at the sides of the podium are removed. The screen at the lower arm can fulfill all of the functions the original ILS-lecterns have. However, to make it easier for the user, this concept can be combined with a normal clicker. In this way, the user does not have to use the screen around his arm every time he wants to switch a slide.

The fourth and last concept uses a gesture capture device, For example, the Leap Motion to allow the presenter to give a presentation by gestures only. The device is hung around the neck of the presenter, as is done nowadays with microphones, to make sure the presenter can always make the gestures in the same way.

7.1 Concept 1: The click wheel:

In general, people like it when something is familiar. So when a product uses the same principles and has the same functions as similar products the consumer likes to use, it will be more pleasant for the consumer to use it. The click wheel uses multiple of these familiar aspects. At first, most people already know the regular clicker for presentations. So when they are looking for a presentation device, they know what to expect from this concept. Second, people also already know the click wheel Apple used to make the ipod a great success. The greatest feature of the click wheel is its ability to control an interface with just the thumb, and use that single thumb to navigate through all the possible features. When a presenter uses a clicker for his presentation, all he has available is his thumb, and maybe one of his fingers, for buttons. So instead of filling up the clicker with all kinds of buttons, a simple click wheel will be sufficient enough for nearly all the navigational functions [figure 7.1].

All clicker devices are equipped with a laser pointer nowadays. The presenter uses this pointer to point out elements on the sheet. If the first concept will be equipped with a laser pointer, combined with the special sensor to track the laser point this laser can be used to draw directly on the sheet. This raises one problem, it appears to be incredible difficult to point directly where the user wants to point. If the sensor

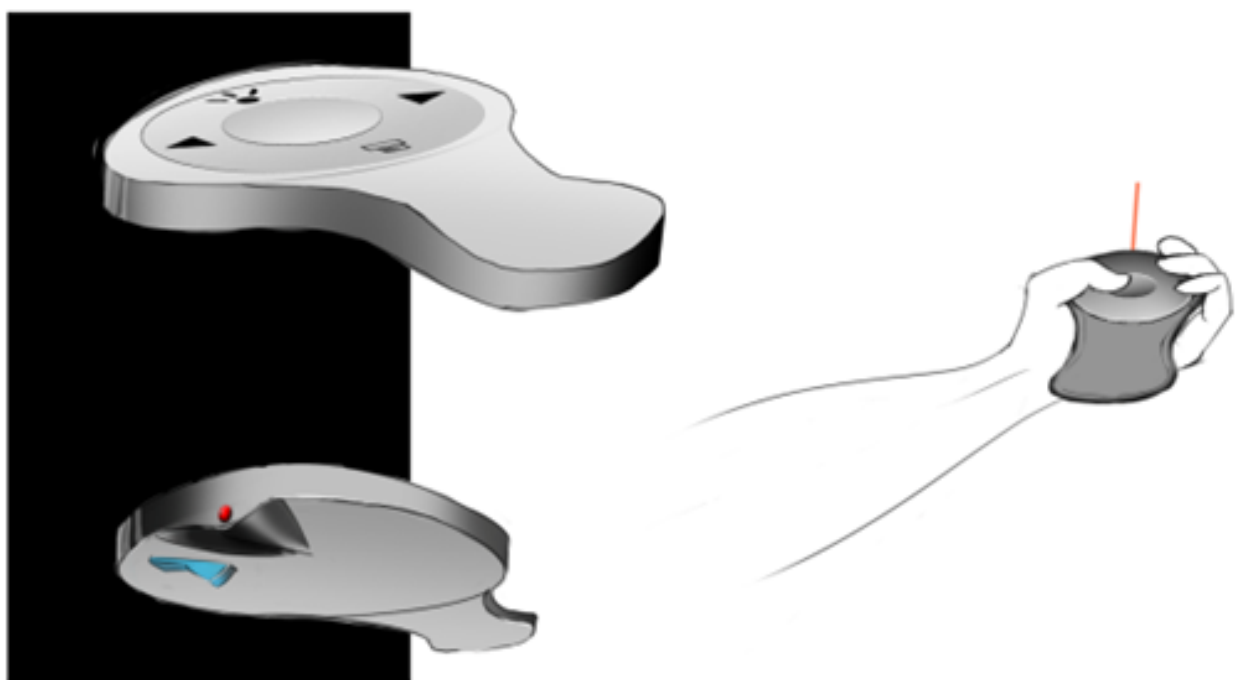
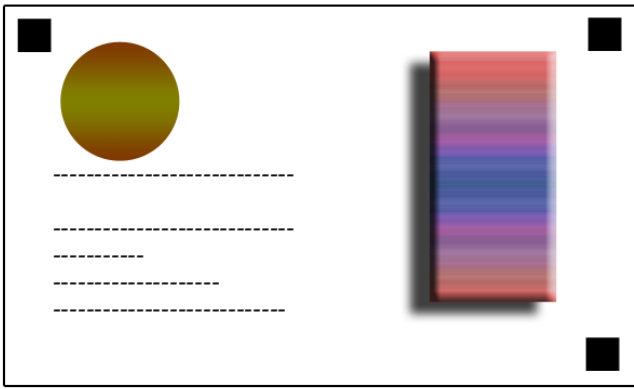
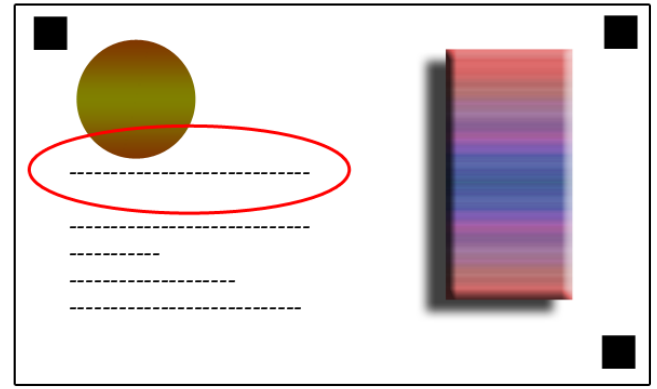


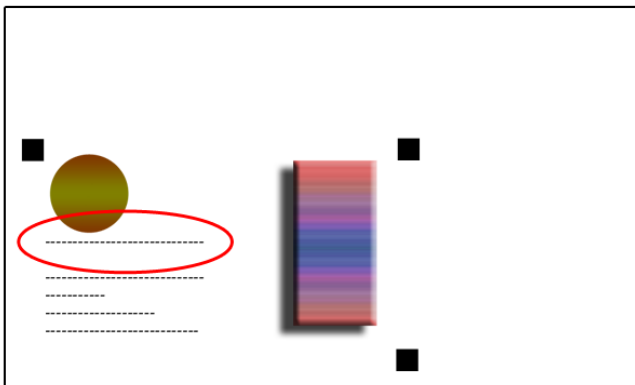
Figure 7.1. The click wheel



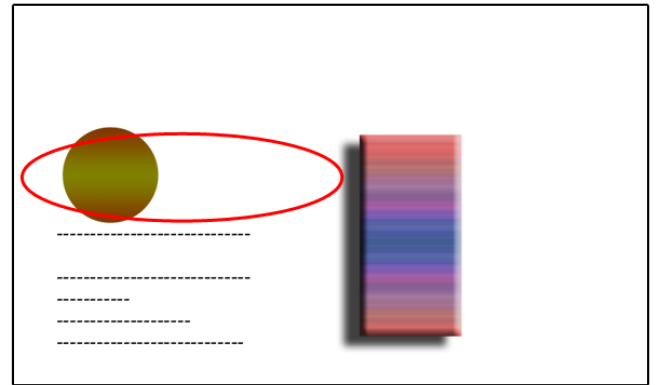
Every 25 frames, a calibration frame will be projected. The three black squares indicates the size, the orientation and the location of the sheet.



When a presenter draws a path on the sheet with his laser, here indicated by the red line, the sensor knows the path in comparison to the sheet.



If the sheet is different, in this case smaller, than normal, the line will still be correctly drawn, without the need of a new calibration.



Without the calibration dots, the drawn line can easily be out of place and shape. Because the optic sensor might not know where the sheet is in comparison to the drawn line.

Figure 7.2 The working of the automatic calibration.

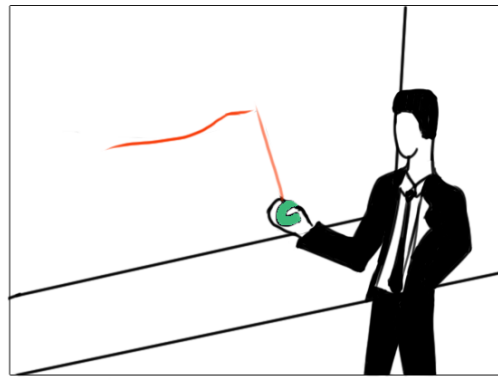
detects the laser and draws a line immediately, the presenter will draw lines he does not want, only because he first had to aim his laser at the right spot. Therefore a trigger button is added. The presenter can now press the 'laser button' to point at an element with the laser pointer, and when he wants to draw something, he pulls the trigger so the sensor remembers the path taken by the laser. The beamer then draws a line over this path.

During a brainstorm session with some of the students who work for ILS, a very useful came up helping with the projecting of the line. If a sensor would be used to track the laser pointer over the sheet, this sensor has to be calibrated in order to project the line in the correct position. A student in sensor technology came with an idea which would make the calibration unnecessary. When the sensor is aimed at the sheet, the beamer can project every once in a while a calibration sheet. The sensor can measure where the laser point is, compared

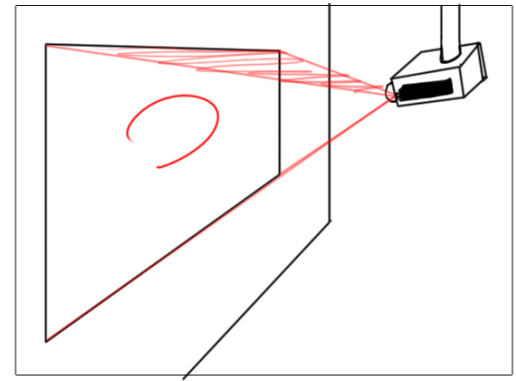
to the sheet, and use this measurement to display the drawn line in the correct position. This calibration is explained in figure 7.2.

Although it is not yet certain how the presenter is going to view the current and upcoming sheets, without to look behind, it is certain the presenter is going to use some sort of screen in front of him. This does open new uses of the beam too. There can also be a laser point detector be placed towards the screen in front of the presenter. Then he can use the laser to point at elements on his screen and click items. For example, he can click on the icon for images, and then open an image with his laser pointer.

Instead of using a camera for the detection of the laser on the screen, it might be possible to adjust a capacitive touch screen in such a way it will work for a laser beam. Now a capacitive screen works with

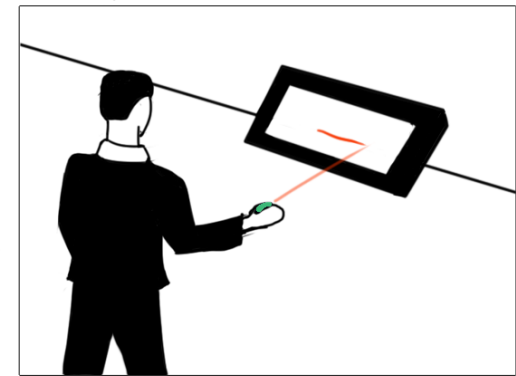


With a laser he can either draw a line directly on the sheet

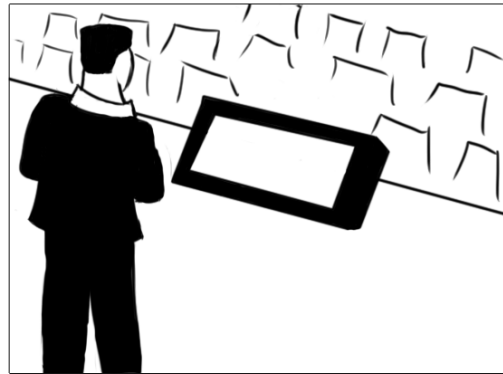


A sensor will detect the line and tells the beamer where to project this line.

Or he can draw a line on the screen which will be projected by the beamer.



With a small device has the presenter full control over his presentation



A screen on the floor shows the presenter some relevant data, like the upcoming sheet and his notes.

Figure 7.3. The use of the Click wheel concept.

small wires in the glass. When pressed the wires on the pressed location makes contact with each other. By measuring which wires do make contact, the computer determines where the user touches the screen. It might be possible to make these wires in such a way that they will expand when hit by the laser

beam. For example because the beam heats up the wires and the wires will expand as a result. This is for further exploration if this concept is chosen.

The final part that has to be chosen is the way how the presenter views the current and upcoming slide without looking behind. Although teleprompter screens do appear to be useful, there is one major issue why this is not a good idea. If the screen is used in combination with a detector to determine where the laser pointer is on the screen, the teleprompter will be dangerous for the audience. The laser pointer will shine right through the glass, and in a bad case

will shine into the eyes of the audience. A holographic screen on stage in front of the presenter might be better, but the same problem might occur. The safest way is just to use a big normal flat screen. This way the screen does have a good resolution and will simply block the laser beam [figure 7.3].

7.2 Concept 2: The touchpad:

The sho-Q, the software developed by ILS, is designed for a touch screen and a beamer. A solution is needed when a presenter walks around freely, but still have the opportunity to use all the functions sho-Q has to offer. One solution is to bring the touch screen along with the presenter. There are good quality touch pads available on the market. But only a touchpad with a cord around the neck will not do. The tablet has to hang around the neck because holding it during the entire presentation is not a viable option, not only is a tablet too heavy to carry, it is also a big negative impact on the freedom of movement of the presenter,

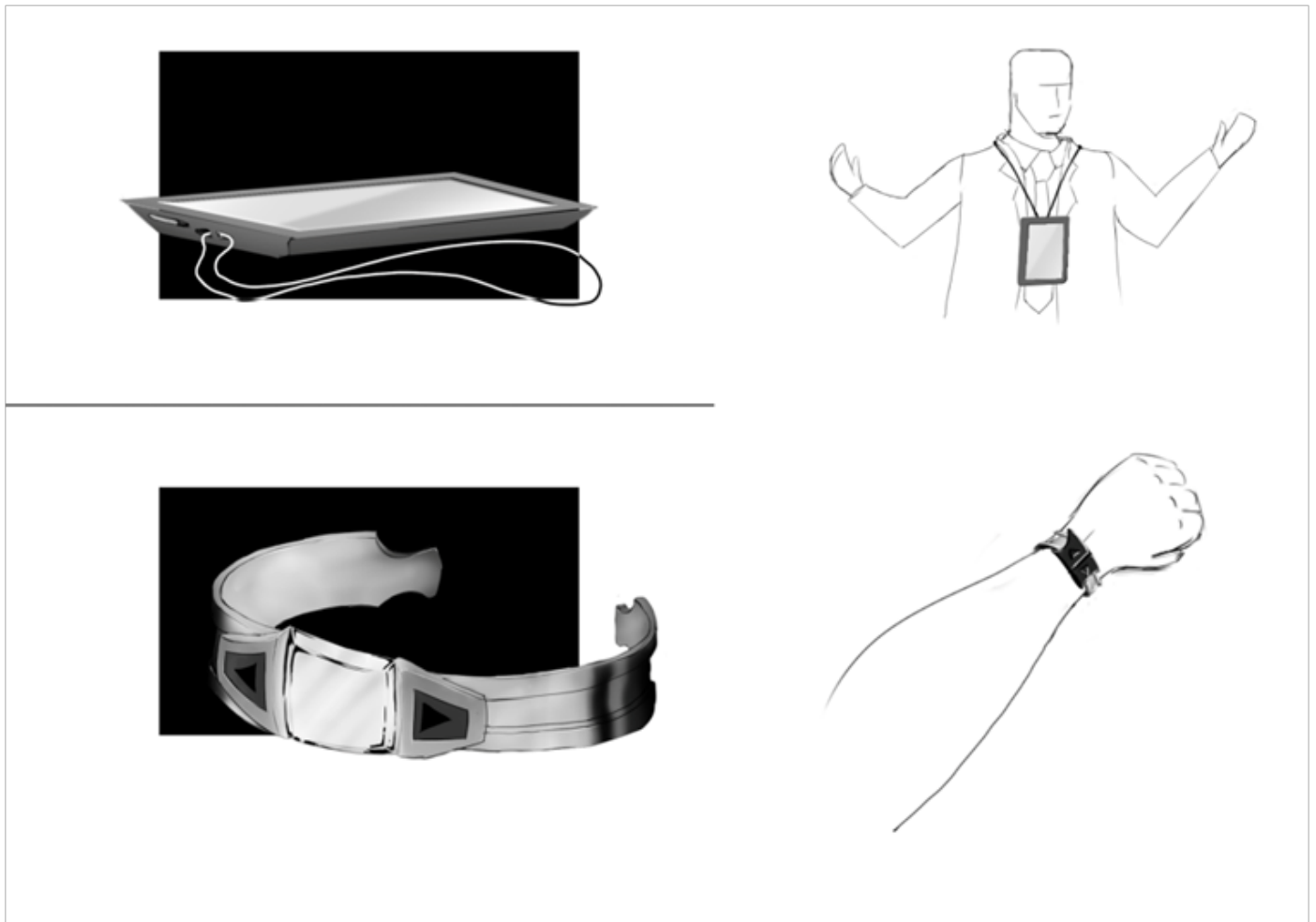
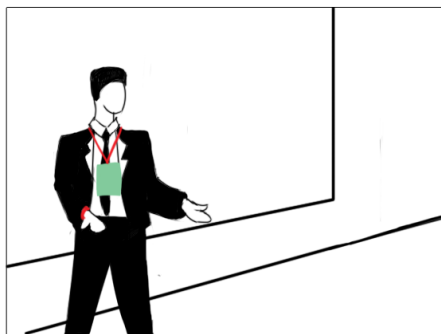
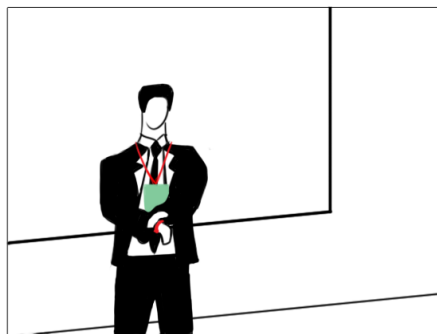


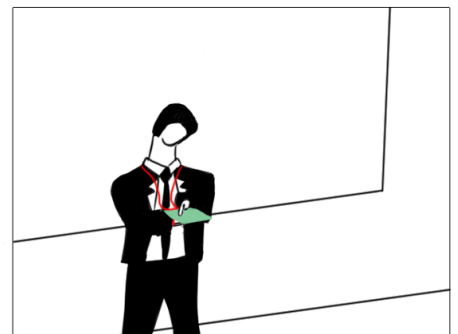
Figure 7.4. A tablet and a bracelet.



While giving his presentation, the hands of the presenter are totally free



When he wants to go to the next slide, all he needs to do is a simple touch on his special watch



Only for more advanced functions, like drawing or switching to other media, is the tablet required

Figure 7.5. The use of the tablet concept.

as he cannot use his arms in all possible ways anymore without having the fear of dropping the tablet. It will be incredible annoying for the presenter to have to swipe to the next sheet by using the pad all the time. A clicker to switch to the next slide will not do this time. A touch pad works best if the user has both of his hands free, one to grab the touch pad and one to tab on it [figure 7.4]. When he needs to hold a clicker, or a similar device, it will limit how well he can operate the pad. Although it is quite possible to touch the pad while holding something in the hand, it is far from relaxed to work this way [figure 7.5].

To solve this issue, the choice is made to add a bracelet to the design. This bracelet has two buttons, one for the next slide, and one for the previous slide. The presenter can go through his presentation by simply pushing the 'forward' button on the bracelet. And let the tablet for what it is when he does not need it. In this way, his hands are free when he needs to use the tablet.

And finally, there is the screen. A presenter might like to check his sheets on a regular basis. In such case it will be irritating when he needs to grab his tablet every time. Not only does this take more time than

necessary, it is also far from discreet. The flow of the presentation might get disrupted every time he grabs his tablet just to see what he needed to say. When there is a screen somewhere near, he can take a quick look on there while he looks around in the audience. For this concept the teleprompter is quite a sufficient design. There is no laser shining through the glass so that will be no problem, and these prompts are the closest things to a design were the presenter can look around in the audience but still be able to see his sheets.

7.3 Concept 3: The arm screen:

The previous concept existed of a lot of different gadgets. This might be annoying for the presenter as he has to grab more items then he might like. To take away all the different gadgets from the presenter, the touch screen from concept two is strapped around the arm in this concept. In this way the presenter only needs one hand to operate the product. The hand he would normally use to hold the tablet is now free.

To prevent the presenter from bringing his hand to the pad around his arm all the time he wants to go to

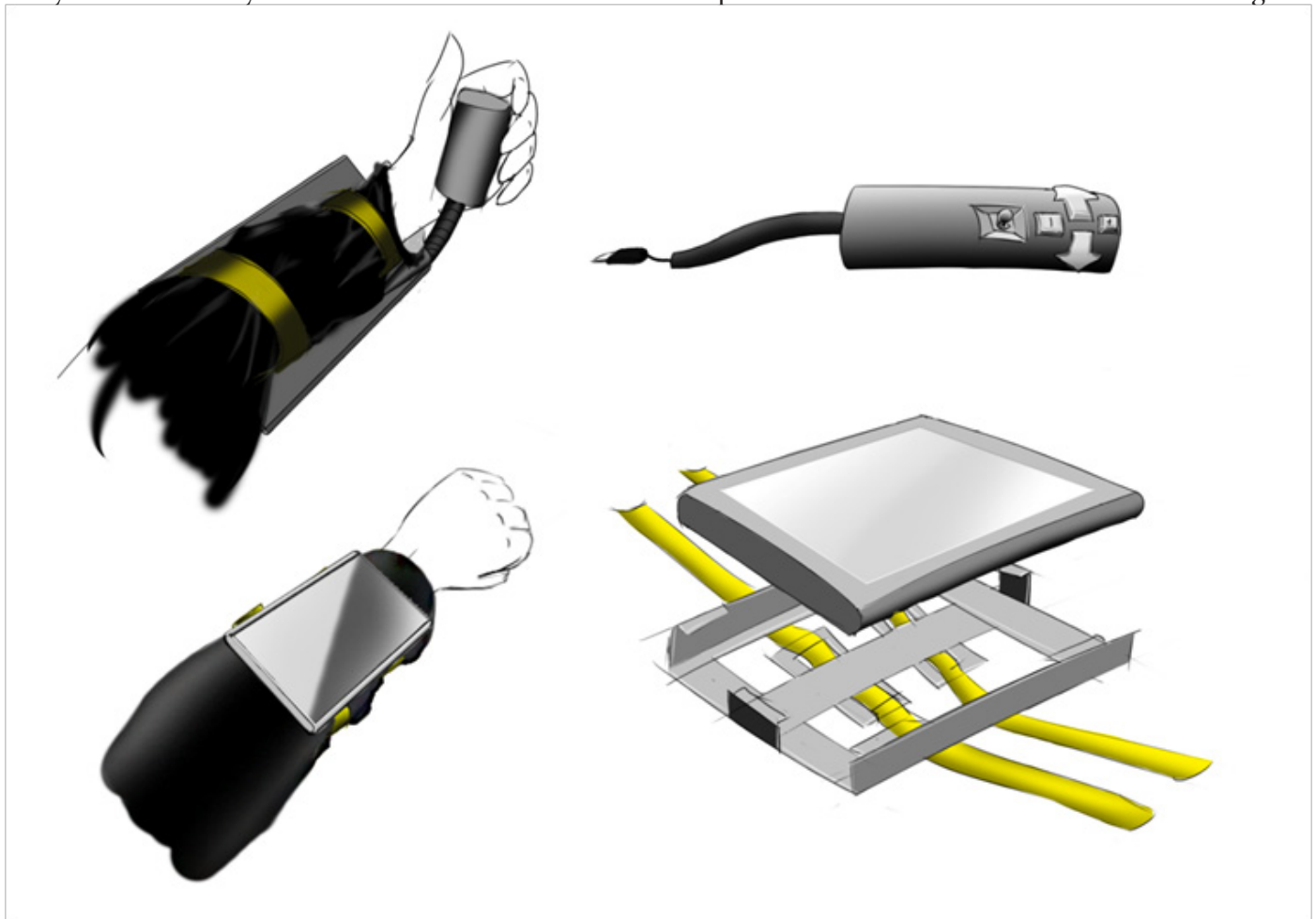
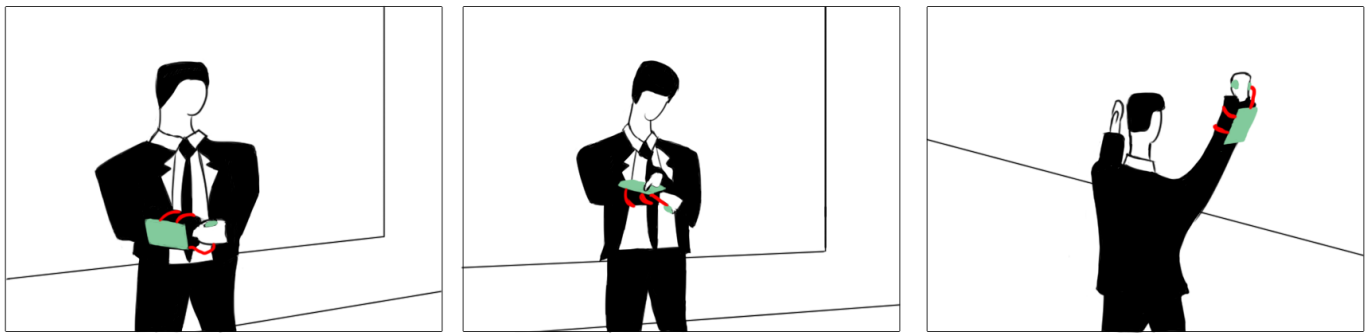


Figure 7.6. The arm screen.



The presenter has one hand for the navigation device.

If he want to view his notes or draw at the sheet, he can use the tablet attached to his arm.

Some firm straps make sure the tablet is strongly secured to the arm, nevertheless the movements.

Figure 7.7. The use of the arm screen concept..

the next slide, his free hand can hold a regular clicker or a simple button to go to the next slide [figure 7.6].

To see his notes and slides, the arm screen would do. It is not as subtle as using teleprompters but it is way more discreet than grabbing the tablet. The presenter can look at the screen around his arm like he is taking a look at his watch.

[Figure 7.7].

7.4 Concept 4: The gesture unit:

Although the best tool to capture gestures, the Microsoft Kinect, was deemed not accurate enough, a concept based on gestures is still created. After seeing the future possibilities with Leap Motion it became clear that there will be a lot of new possibilities within the near future. The Leap uses a very small box, so it won't be that hard for the presenter to carry it around, as he is already used to wear a microphone. This similarity is used by combining the sensor box together with the microphone in one product which is put around the neck. So carries the presenter his sensor with him, and has the sensor a relative stable reference for checking the gestures.

The sensor, which will be likely the Leap Motion, will be intergrated with the microphone. When the presenter prepares for the presentation, he only has to equip the microphone-sensor device [figure 7.8]

A big issue of the gestures is when and when not to capture the gestures made by the presenter. To solve this problem, a pencil is added to the concept. This pencil has an activation button. As long the presenter

does not press this button, the sensor will ignore all gestures made by the presenter. To make things easy for the presenter, there is also a 'next slide' button added. A press on this button will let the presentation go to the next slide. This way the presenter does not have to make the same gesture over and over again during the presentation [figure 7.9].

There are a lot of possibilities when the gestures can be captured as accurate as the Leap can. The presenter must be able to even control a mouse with gestures. This makes that the screen for the presenter has to be at least big enough to show the mouse and corresponding functions. This means a bigger screen is required. The decision is made to lay a big screen on the podium, as is done with the first concept.

8. Paper prototypes

After creating different concepts it is necessary to make a choice what concept to use for the final Interactive Presentation System. To get a better feeling for the products, some models are created with carbon, and given some weight with iron. For concept one a regular is clicker used. With help of these models some ups and downs of each concept were discovered. These paper prototypes are used to test the concepts in terms of comfort in use. Also, they were used as an visual example to show to people so they could give their opinion.

8.1 Prototype concept one

The main reason for testing the clicker [figure 8.1] is

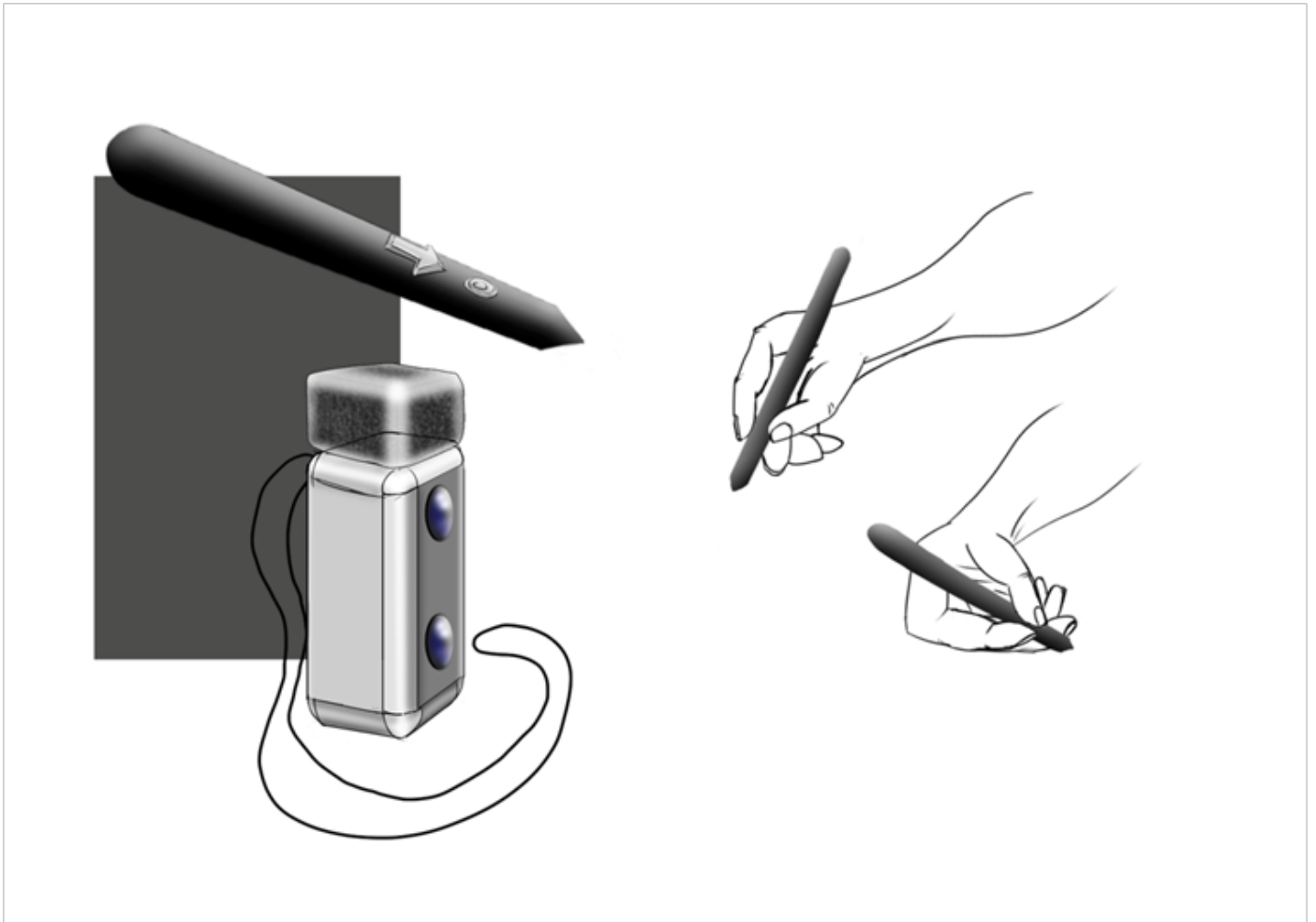
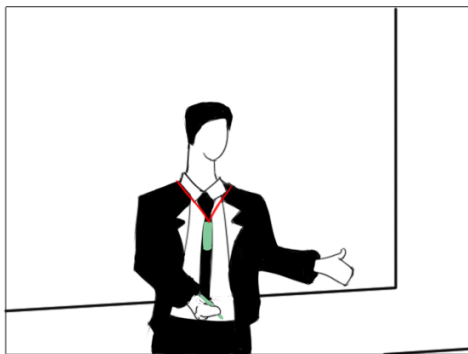
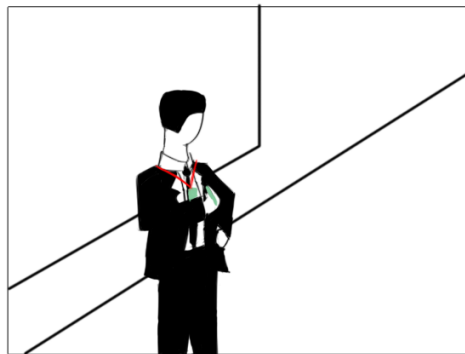


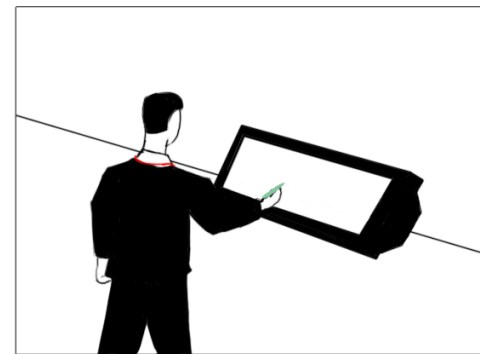
Figure 7.8. The sensor in the microphone detects the gestures made by the pencil.



The presenter has a pencil in his hand, and a motion detector around his neck.



When he wants to go to the next slide, he makes a small gesture with the pencil



For more complicated actions, the pen can serve as a mouse. The presenter sees what he does on a screen in front of him on the floor.

Figure 7.9. The use of the gesture concept.

to see how well it works to write with a laser pointer on the wall, or on a smaller screen. Also this model is quite sufficient to test whether the click wheel would work or not.

With some experimenting, it appears not to be too difficult to write with the laser pointer. A click wheel also did not show any inconveniences. But it is again confirmed that it is hard to point directly at the desired object. Only when the laser is activated will it be easy to bring it to the desired location. Therefore a special trigger for the writing option is indeed necessary.



Figure 8.1. For testing the clicker concept is a regular presentation clicker used.

8.2 Prototype concept two

The first thing almost all the people said about concept two, the tablet PC was that they did not like it. The tablet hanging around the neck is too uncomfortable in their opinion. The prototype of the tablet confirms these suspicions [figure 8.2]. The tablet is clumsy and it looks silly to walk around with such a device around the neck. It is also kind of rude to use the tablet every time the presenter wants to do something. Although it is probably not such a big issue, the tablet concept can be especially silly on users with obesity. The tablet then balances in front of the belly of the presenter while he tells his story. A typical aspect the people from an



Figure 8.2. A simple carbon plate with iron in it is used to simulate a tablet PC.



Figure 8.3. A tablet PC is big and clumsy, even when hung around the neck.

earlier generations, like Henk himself, brought up is that this prototype reminded them of the old signs with 'donkey' on it. Bad children had to wear these at school as a figure of shame [figure 8.3].

8.3 Prototype concept three

At first the expectation with concept 3, the arm screen, was that it might be unstable. The big screen around the arm could easily turn around the arm and will probably be uncomfortable to wear [figure 8.4]. However, the paper prototype shows that the screen can be quite comfortable. Even when some weights were added to make the carbon heavier and therefore more realistic [figure 8.5]. Still the screen moves more than it should, but a better design which fits better around the arm with straps which can be better fastened will most likely solve this problem. Another way to solve this is by making a cylindrical screen. The screen then fits better around the arm, has a bigger screen without extending in a clumsy way and it looks more modern.

Later the existence of a similar band type was noticed. The Iphone Armband is a gadget to hold your Iphone around the arm [figure 8.6]. It is designed as a gadget for during exercises, made of quality breathing materials [18]. This shows that it is indeed quite possible to mount a touch screen around the arm.

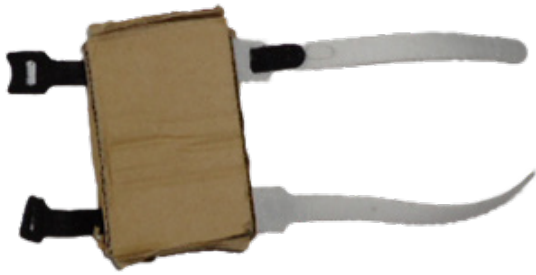


Figure 8.4. For the arm screen concept is also a carbon box filled with iron. Velcro tape is used to strap it around the arm.



Figure 8.5. A screen around the arm looks strange, but is very comfortable in its use.



Figure 8.7. A wacom pencil is used to test whether how well a pencil with buttons would work.



Figure 8.6. Apple already has designed something to strap an Iphone around the arm during running [19].



Figure 8.8. Because the detection box is way smaller than a tablet, it is much more comfortable in its use.

8.4 Prototype concept four

Concept 4, the gesture unit [figure 8.7, 8.8], has some interesting issues. One of these issues is that everybody sees other gestures fitting for the same functions. For example, one person sees a sweep to the right with the pencil as the gesture to go to the next slide, while the other sees a swipe to the left as the more logical gesture. One of the trainees in ILS had the idea of making a selection menu for the gestures. A presenter may there select the gestures he likes.

After a meeting with some students both the up and the downsides of this concept became clear. Because the user can use gestures, this concept has a lot of options and a great potential. However presenters are not yet used to gesture based designs as everything works with static lecterns and click systems. This might prove problematic as users might be unwilling to use a system they are not used to. As one of the students said: "I don't see myself waving around with my arms while giving a presentation, when I can do the same things with a simple clicker and a lectern."

8.5 Concept choice

To choose the best concept for further development, the concepts are rated according to the program of requirements. The concepts are given an amount of points for every requirement depending on how well the concept fulfilled the specific requirement. Out of this system, concept four, the gesture unit, came out as the best concept together the click wheel with a total of 50 points. The other two concepts both did earn 47 points. See appendix C for the complete ratings. It is no surprise the total score of the four concepts are pretty close to each other as they are all made as possible designs for ILS.

Because the product is going to be used by people, and the ratings of the concepts do not form a solid ground to make a decision, a wide variety of people are asked about their opinion over the different concepts. These opinions were used to reflect the results from the ratings.

These opinions came down to one point: both concepts with the screen are too invasive or uncomfortable for most users. Therefore concept one and four do have the best potentials for ILS. Concept 1 is familiar to what users know and gives more certainty. However there is also a lot more competition for this on the market, making the product less special. Concept 4 is

a lot harder to use, making it less useful for locations where people just come by and to a presentation only once. However the possibilities are much bigger and it can be a great tool for a natural presentation. The potential is thus bigger with concept 4, but so are the risks.

When looking into what the company represents and where its chances are, the final choice between concept 1 and 4 is chosen. ILS is a progressive company, using modern technology to create unique designs and therefore filling the niche of intelligent lecterns. A clicker for the presentation is a great product, but not very progressive anymore. Many companies already use this product. So it will be very difficult for ILS to get in this area of products. The market of gesture based products however is still very young, so now is a good time to step in and use the developed technologies for useful products. Therefore concept 4, the gesture unit, fits much better in what ILS represents: modern innovative products using technologies and techniques which are only used a little in the market.

9. Final product

To make the Interactive Presentation System working, it is created out of three main units: the portable device, the screen and the computer. The client is free to buy these devices any configuration he likes. When he already has a lectern, and does not want an extra screen, for example, he can simply order only the portable device.

9.1 The portable device

The portable device also exists of three separate elements: The Leap, a pencil and a microphone [figure 9.2]. It is really important that the pencil does not get lost, as the whole product will be unusable without the pencil. There are other products which also use a stylus to work, old digital agenda's for example, these products are used for inspiration to keep the pencil from getting lost. Digital agendas had a special storage compartment for the stylus so the user always had his pencil nearby and if he did put the pencil back every time it would not get lost.

This same storage system can be used for the portable

device. In the portable device a holder can be placed for the pencil. At the beginning of the presentation, the presenter can take the pencil out of the product and put it back at the end of the presentation. There are two kinds of situations which might occur with this idea, one where the presenter nicely put back the pen and nothing is wrong, and one where he does not. The main reason why a presenter does not put the pen back is because he simply forgets to do so. For example he puts the pen in his pocket or on a table. When he puts the pen in his pocket, it is likely he will find it, but will maybe find it too late to return it. When the pen is put on a table, it will likely be found and returned. It might be wise to provide a reserve pen with the lectern, or to make it easy to order a new pencil.

The current lecterns also need a pencil for its operation, the estimation is that with the Interactive Presentation System approximately an equal amount of pencils will get lost as with the current lecterns. According to ILS, up to now only one pencil went missing. From this can be concluded that the pencils will probably not disappear very often and thus it will not be necessary to provide a back up pencil with the Interactive Presentation System.

The best way of combining the Leap with the microphone will probably be by creating a cover for the Leap with a build-in microphone and a pen holder. This cover can also serve as an antenna. The antenna

built in the leap might be sufficient as well.

9.2 Batteries

The Leap is shown to be a wireless product. But to work, it must have a battery. The same goes for the microphone ILS now provides together with its sounds system. And the pencil also needs a battery to send its commands. It will be best for the user if he does not have to switch or charge all batteries separately. The microphone and the Leap are going to be integrated so they can also share the battery.

The pencil is stored in the main device, this can be used to build a charge station in the holder or the pencil. With this station the battery of the pencil will charge while it is not used. To charge the main device, the user can put it in a charge station while the unit is not in use. In this way the whole device is always charged the next day.

It might happen that the user forgets to put back the portable device in the battery station. This might result in that the device will not be charged the next day and will thus be unusable. To prevent this from happening, the charge station has to be a natural place to put the device. Also it will really help when the battery will last for a longer period of time, like two days. In this way it is not a real problem when the user forgets to charge the unit. However the duration of the battery is for a large part dependable on the power consumption of the Leap, which is yet unknown.

9.3 The computer

The lectern needs a computer to operate. This computer will also be the point where the presenter can plug in his USB stick with his presentation. Of course it would be a possibility to put a USB port in the portable device, but then, there must still be a place to start up the system and open sho-Q. As the screen is placed in front of the presenter, underneath this screen is some space left where a computer fits. There is already a screen the presenter can use so everything is there. However, with this setup, the presenter must crawl on the ground to plug in his presentation or computer and to start the presentation. This is something highly undesirable. The presenter must be in a comfortable position from start till the end of the presentation. In this case it is preferable if he can stand behind a computer to do the work necessary before the beginning of the presentation. This can be



Figure 9.2. A casing holds together the Leap, the pencil holder and the microphone.

done behind the curtains or on stage, depending on the client's preferences. Therefore it would be nice if there was a small lectern for the presenter where he can fulfill these functions. This lectern must be small, not attract the attention of the audience and with low cost appear stylish and professional.

At the moment, ILS is developing a complete wireless lectern, which is also planned to be the cheapest one in their current line of lecterns. The main feature of this lectern is its capability of being freely moved around over the podium. This is also useful for the Interactive Presentation System. The portable lectern can be available at the start of the presentation. During the presentation it can be moved out of the way and sight and at the end of the presentation it can be moved back to close all the applications. Although this move function might be more than necessary, it is important to offer the client a solution for the needed pc. When the client does not like the lectern offered by ILS, or already has their own computer, they are free to use the system they like and not order the lectern provided by ILS [figure 9.2].



Figure 9.3. The newest lectern from ILS can be moved around and is completely wireless

9.4 The screen

After a simple test the size of what a screen should be is determined. When the screens are placed left and right of the presenter, the maximal distance from the presenter to the screen is estimated at five meters. When the screen is placed before the presenter on the ground a distance of three meter will probably be the maximum distance from the presenter to the screen.

To test how big the screens has to be, the minimal readable font size of the notes is used for estimation. It appeared when the screens are placed at the sides of the podium, the screen has to be approximately 1,9m by 1,6m. When the screen is placed in front of the presenter on the podium, the screen must be approximately 1,4m by 0,8m.

From this simple test it appears a teleprompter would not be a good system to use. A screen of nearly two meters will be a problem to transport, especially when ILS wants to produce smaller and more easily transportable products. The size for the screen, needed over a distance of three meters, is still quite big, but in consultation with Henk of ILS it is just small enough for regular transportation.

Although a screen in front of the presenter is a much smaller and therefore much better size. It is still a pretty big screen making a teleprompter not very useful. This because the angle of the presenter may not vary too much in order to keep the content in the screen. Another reason is a teleprompter needs to have an equally sized or bigger screen which the glass plate mirrors. So when the screen is tilted backwards, towards the audience, the screen must be above the glass plate. Making it probably very distracting for the audience and more complicated than necessary [figure 9.4].

1. The beamer projects an image on a screen in the roof.
2. This image is reflected by the semi-permeable mirror.
3. The reflected image is caught by the eyes of the presenter, when he is in the correct position.

Of course a normal LCD or LED TV will also do, but then the issue of the price rises. The bigger the screen, the higher the price. A normal 60 to 64 inch screen, the size needed for the presenter to read his notes, is as expensive as an average lectern from ILS. A holographic film for a screen will probably cost

roughly around €150,- [18] Which is surprisingly cheap. However there is another problem with a holographic screen: ILS stated that on the ceiling of the auditorium there can be no beamer mounted. This is because the ceiling is either too high, or it is too expensive and time consuming.

9.5 Smart technologies

Smart technologies is a company that develops a system used to project and share information on a white board. To do this, they use a relative small beamer which projects the image via a mirror on the white board [image 9.5].

This system can also be used as a screen for the Interactive Presentation System. The beamer might be switched for a smaller beamer and any detection technologies can be removed. The main point of concern of this is that a smaller beamer might not have the qualities needed to compensate for the distortion of the image created by the angle of the projector. The features of this way of projecting are: the screen is easy to install in the auditorium, and its versatility regarding on size and location of the screen. Biggest downside of this way of projecting is this way of projecting might not be good enough on a holographic screen, making only a projector screen sufficient for this beamer. When placed on top of the screen it will be between the presenter and the audience, which is undesirable. By placing it on the floor, at the lower side of the screen, the projector will be out of sight of the audience. But it might block the view of the presenter on the screen. After a quick test with a normal beamer is it clear that the beamer will not block the screen for the presenter and forms no problem.

To determine how much the screen on the podium will block the view of the audience, its height is measured and it is tested what the audience will see. When placed in an angle, the height of the screen will be 45 to 50 cm. Or in terms of the view from the audience: in the worst case will the knees to the hip of the presenter be hidden behind the screen. When a lower podium is used, with the height of a table, and the presenter is relative small, a guest sitting right in front of the screen will not see the legs of the presenter. With a bigger podium the person right in front of the screen for the presenter might not see the presenter up to his hip, but these are worst case scenarios.

According to one of the employees of ILS, a 42 inch screen will do fine for reading over 5 meter distance.

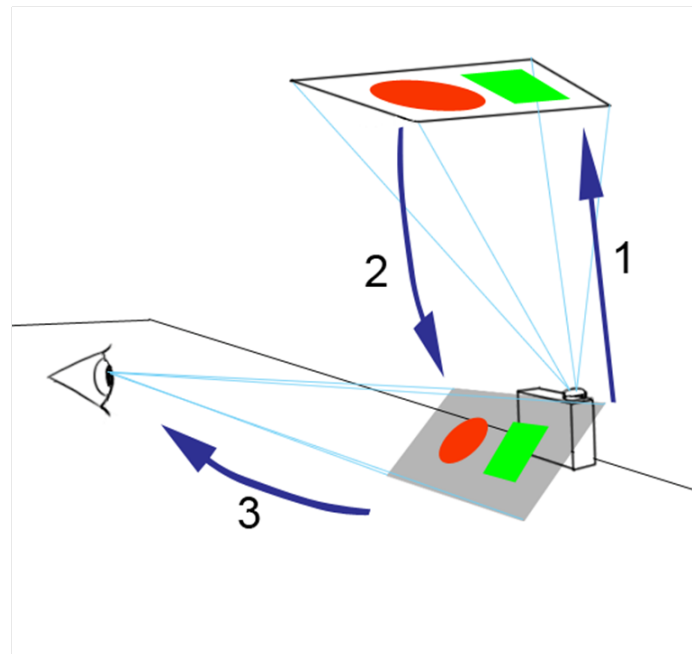


Figure 9.4. A teleprompter is not the best type of screen after all.

So reading over three meters will be no problem at all. Also a LED or LCD screen has a much better contrast and higher detail, making reading a lot easier. Sho-Q however has many items to show and uses a lot of buttons, it is nicer to click buttons when they are rather big, so the user does not have to do a lot of effort to precisely put the pointer on that button. Also a bigger screen gives clearer feedback, which helps the presenter to more accurately move his mouse pointer, to make a drawing for example. Therefore ILS can develop its own screen and when the customer does not like the screen he can always buy his own television.



Figure 9.5. A beamer can be placed very close on the screen, but still create a good image. [17].

computer.

Step two

The computer receives the information from the caption motion device. Here the computer translates the data from the microphone into sound and the data from The Leap into direct actions. So when the Leap detects the presenter swiping towards the next slide, the computer translates this data to an actual 'next slide' action. Also, the computer translates movements with the pencil into mouse movements.

Step three

Sho-Q receives information from the translation program and acts accordingly. The basic idea is that the software of sho-Q does not have to change, but that the program only inputs receives it already can handle. This might not be possible with gestures like 'selecting the pencil', and 'quit the image,' but at least the translation from gestures to mouse movements and button clicks should not be handled by sho-Q.

At the same time, the speakers receive the information from the microphone and transforms this back into

9.6 System integration

Now the separate functions of the system are known, the whole system needs to be integrated to one complete product. The computer, the gesture caption device, the beamer and the television screen each have their own inputs and outputs. In figure 9.1 is a schematic shown how the whole system should work.

1. The gesture caption unit with microphone.
2. The central computer, stationed in a wireless lectern.
3. Sho-Q and speakers.
4. The screen in front of the presenter to provide feedback.
5. The beamer that sows the slides for the audience.

Step One

The presenter has the motion capture device around his neck, creating an imaginary box in front of him where his gestures are detected. This device captures both the speech as the gestures of the presenter. The motion capture device sends this data to the central

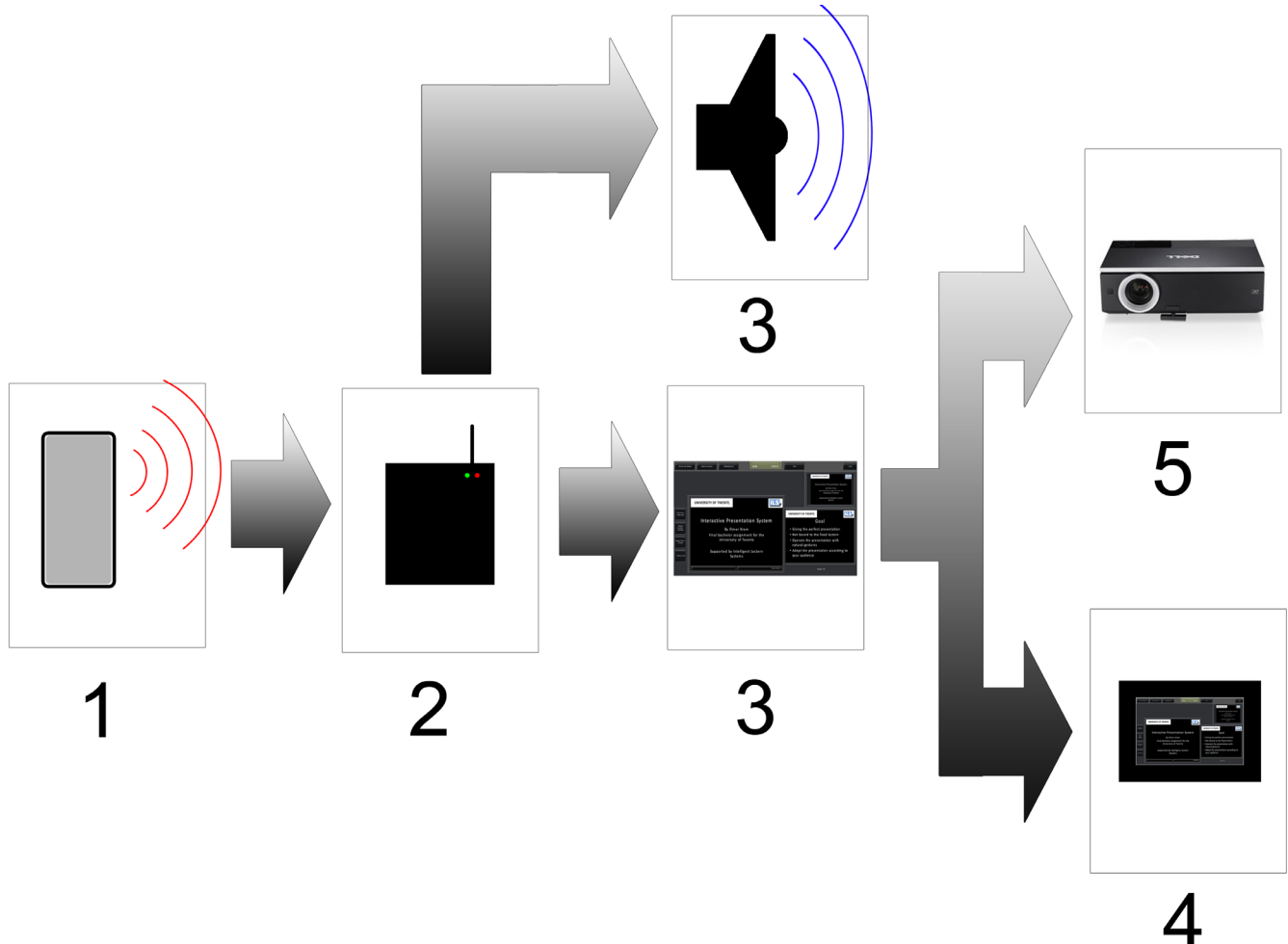


Figure 9.1 A schematic of how the different peices of the final product interacts.

sound.

Step four

The screen in front of the presenter receives updates from the central computer about what to show. This provides the presenter with the necessary feedback, when he moves the mouse for example. In general, the screen does not change compared to the screens used in the current lecterns of ILS.

Step five

The beamer that projects the sheets for the audience receives information from the central computer about what to project. This information is generated by sho-Q, as sho-Q updates the sheet itself when a presenter draws something. Just like the screen in front of the presenter, nothing actually changes compared to the current lecterns.

9.7 Gestures

Every person is different, and therefore everybody has a different idea of what a natural gesture looks like and what a logical way is to control a presentation with only gestures. Therefore during a meeting with a variety of employees of ILS are different kind of ideas discussed. The outcome was quite refreshing. At first everybody was shown the promotional video of the Leap, to give them an idea of the qualifications of this device. Then their opinion was asked what they would prefer if they stood in front of 500 people with this device. As a summary of the outcome of this meeting, the Leap is great with gesture recognition, and it would be great to use this feature as much as possible. But as soon the people get the pencil in their hands, the first thing they thought of was putting more buttons on it for more functions. When they were convinced to use gestures and only one button, the real ideas started to flow. One of the issues was: once the presenter had a function selected, the laser pointer for example, how to deselect this function.

The first idea was to make a special gesture. For example, the presenter presses the button and makes a cross. The point that this gesture would also create a cross drawn on the sheet and that the audience could see this was taken for granted. But then someone had the idea to make the function of the button time depending. With a short tap the current function will

be canceled, by holding the button pressed the actual gesture will be detected.

A second idea was to give the button a half pressed and a totally pressed option, like what is used in photo cameras to auto-focus. But this might prove problematic for users with poor finger control.

An idea already thought of before was to use the other side of the pencil, the user can use this side to draw, or to use as a mouse. There is no button required for this side because the Leap can detect which end is held and therefore it can see whether the user wants to draw or not. A similar principle is to hold the pencil like a pointer or like a pencil. As a pointer, the pencil does nothing in particular, but when held as a pencil, the presenter can write with it. However these two ideas will require the presenter to switch his grip on the pencil, which made it easier for the pencil to fall, especially when the presenter is a little bit older and does not have perfect hand coordination anymore. Also after some testing it became clear that writing in the air while holding the pen in a grip for normal writing does not necessarily write well.

9.7.1 Scenario: The use of sho-Q with the Interactive Presentation System:

To determine the needed gestures for the Interactive Presentation System, a simple scenario with all the steps a presenter goes through during his presentation is created.

To begin a presentation, the user has to plug his presentation in some way into the presentation system, for example by using a USB-stick. Then he must select his presentation while in sho-Q. When the presentation is loaded into sho-Q, it can be opened. Although half the times these steps will be executed by an employee, the other half the times the presenter still has to do it himself. After the presenter has opened his presentation, the real show can begin.

During the presentation, the presenter goes forward in his presentation. He probably wants to annotate something on his sheet sometimes. Sho-Q also presents the opportunity to zoom in on a sheet during a presentation, but the expectation is this feature will not be used that often. This is mostly because presenters are not quite used to this option and thus either forget they can do this, or make their presentations in such a way that zooming won't be needed.

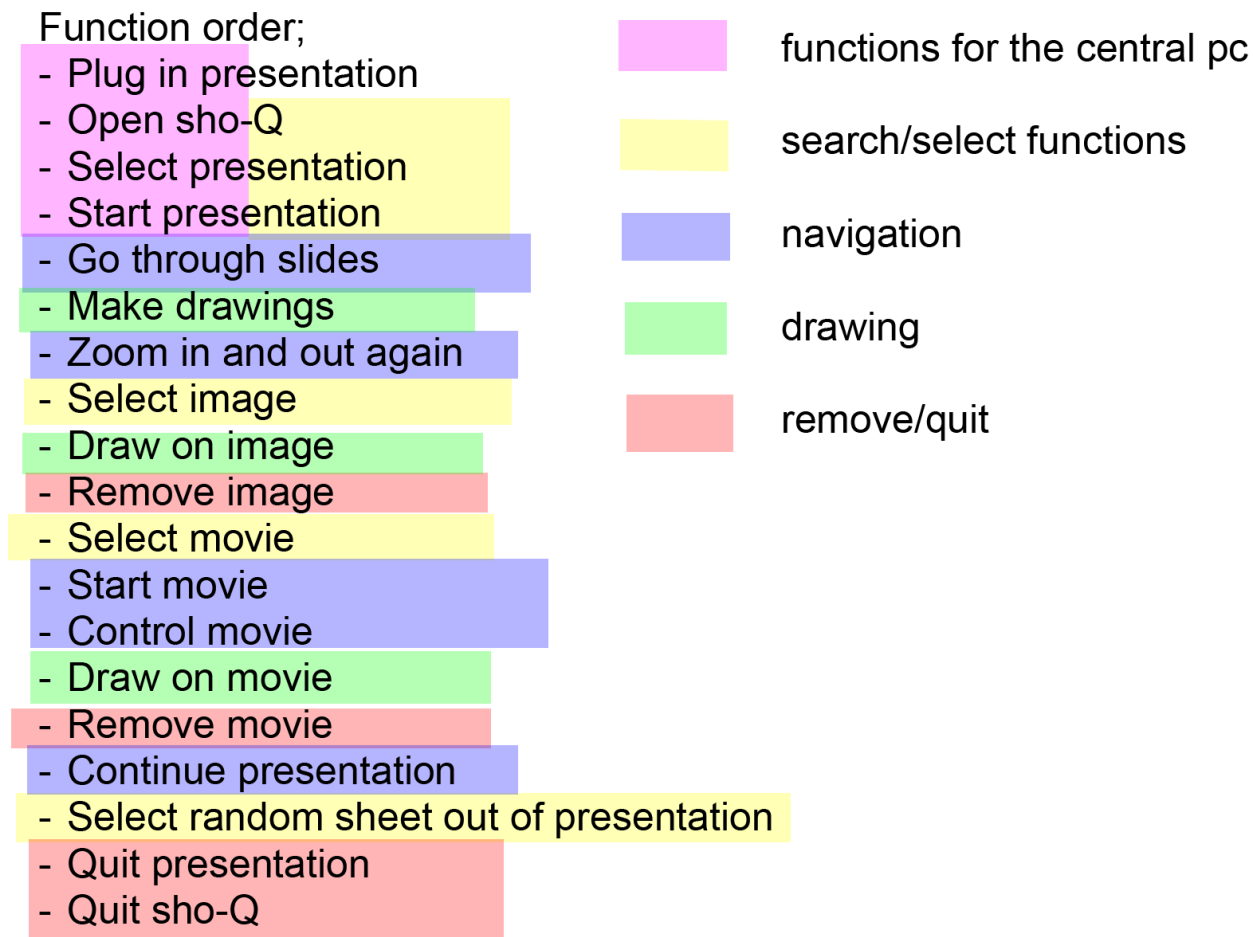


Figure 9.6. Similar types of gestures are ordered to determine what kind of gestures are needed.

Depending on the type of presentation, the presenter probably has to open a movie or two, and maybe a picture. At the end of the presentation it is not hard to imagine he must go through his presentation to find a particular sheet to answer a question.

During a movie, the presenter needs to be able to control this movie. So he must apply all the basic commands like start, pause, stop, fast forward and rewind.

Finally, at the end of the presentation all the software has to be closed and the PC shut down.

9.7.2 Gesture functions

From the scenario is a list of functions derived which the presenter should fulfill with the Interactive Presentation System. See figure 9.6.

Similar functions are shaded with the same colour. In this way it is clear what kind of gestures there are needed, and it is easier to keep the gestures with the same kind of functions the same. For the user it will not be hard to learn to use the product, and the

product will feel more natural.

These function types are put in a new table, and for every function several possible gestures are drawn. In the end are all the functions be treated separately again and with help of the brainstorm are the final gestures chosen [figure 9.7]. To get a better idea how the gestures have to work a video is made where the a example presentation is given with the gestures.

To start a presentation, the presenter needs mouse control. This is needed for opening sho-Q and for selecting his presentation. Although it is logical to expect that sho-Q is already opened when the presenter enters the podium, it cannot hurt to make sure that the presenter can start all the way from the beginning. This means that as long the presentation itself hasn't started yet, the 3D sensor is allowed to detect and process all the movements of the presenter. The user can click by 'tapping' the object. The demo clips of Leap Motion show that this small gesture can be detected, and this appears to be a very natural gesture for clicking.

For navigating through the slides everybody does agree with a gesture to the left or right. However, the

- Plug in presentation	
- Open sho-Q	⊗
- Select presentation	⊗
- Start presentation	⊗
- Go through slides	↔
- Make drawings	↓
- Zoom in and out again	↖ ↗
- Select image	⊗
- Draw on image	↓
- Remove image	⊗
- Select movie	⊗
- Start movie	>
- Control movie	↑ ↓ ← →
- Draw on movie	↓
- Remove movie	⊗
- Continue presentation	←
- Select random sheet	⊙ → ⊗
- Quit presentation	↶
- Quit sho-Q	↶

Figure 9.7. A graphical representation of the gestures.

final interpretation does prove to be problematic. Some might say that a gesture to the right compares to the right arrow key, while others believe a gesture to the right is the same as swiping and thus going to the left, or back, in the slides. This issue can be solved in two ways. The first solution is to implement both gestures at the same time in the device. A short move to the left is then translated into the left arrow key. A swipe gesture to the left translate into a swipe, making the slides go to the right. This way of implementing can only be done when the programmer can make the Leap see the difference, and when the user makes distinctive enough gestures. The second solution is to

have only one method active at the time and the user can select his preferred gesture in the selection menu.

Sho-Q has the function to zoom in on the slides. There already exists a common gesture to zoom in and out: Moving two fingers towards or away from each other. It will be very hard to make this gesture with only one hand when this hand already needs to hold the pen. Therefore this is the only gesture where the presenter needs two hands to execute. One hand for using the pencil and the other for the index finger to make a 'regular' zoom gesture. This won't be a problem probably, as the zoom function will likely barely be used. And only be used by people who are aware of the existence of the function.

Although it is tried to let the gesture commands be natural, it is hard to prevent signs, like letters, for

commands. Therefore the signs are tried to keep as familiar as possible, and only for the more advanced functions. Sho-Q has the feature to be able to draw on every stage of the presentation, and to quit the drawing with the cross button in the top right corner. In fact, every function will be deleted with the cross in the corner. To match this form, the user can delete any function opened by making a cross. However, as sho-Q does not use that distinctive delete function or button to quit the presentation, the gesture should be different as well. It is really bad if the presenter quits his presentation while he simply wanted to delete a drawing. Chances of this to happen are quite slim, but the point is to prevent too many functions under one gesture, where the presenter then has to make that gesture and just hope the correct function will pop up. Quitting a presentation is like going back to the selection screen. Therefore a 'going back' gesture will be fitting. This gesture can be used for all the places where the presenter likes to go back in a menu, or a level higher in the menu.

The circle with the cross is a move 'into the paper', meaning it is for the presenter a small tab in the air on an imaginable paper. The 'select random sheet' gesture, is a large sweep from the presenter towards the imaginary paper in the air. With this move the presenter opens the table with all his sheets. This also brings up the mouse. With a 'tab' he then opens the selected slide.

Because the option to go to the next slide is the most important function for a lectern, this function will get, as the only function, a special button. When in a presentation, the presenter can always go to the next sheet with this button. Without having to make extra gestures or repeat the same gesture over and over the presenter can always bring up the next clean slide.

9.8 The benefits for the customer

Most functions of the lectern are actually untouched. The Leap does nothing more than moving the touch screen away from the screen, to an imaginary box of roughly eight cubic feet in front of the presenter. This way, the presenter can move away from the screen but still has the power to operate sho-Q. He just operates the mouse in the air instead on top of a screen. This also adds a few extra possibilities for the presenter in the form of the applied gestures.

The added value of this product over the homemade system created by hobbyists is that the Interactive

Presentation System will be a complete and fully integrated product within the presentation environment. A customer does not have to think self of a motion capture device and create the proper software. The Interactive Presentation System is everything put together by ILS, and ready for the customer as one product.

The customer then has the choice to order the complete set with computer, motion capture device speakers and TV screen, or he can order parts of it, like only the motion capture device with the speakers.

The total cost of the entire Interactive Presentation System will probably be around €2500,- for the customer. This price is around the same prices ILS has for their current products. The 3D motion capture device will probably be around €400,- inclusive the needed software to translate gestures into actions. In appendix E are the costs further explained.

Conclusion

The chosen concept does have a lot of potential for ILS. But there at this moment it relies heavily on the Leap. When this device does not deliver up to its promises, most of the designed product will be a lot harder to develop. The created product does also make it necessary for ILS to develop new software, to translate the gestures into actual actions. At the other hand however, the idea is compatible with sho-Q, provided the presenter has a decent screen.

In the end the only thing not done was the creation of a physical presentation model. Although one can wonder how big the use of a model is with a product based on the creation of gestures. But besides the portable device, it would have been nice to have created a screen and computer just to test the entire concept in a real auditorium, just to see if the tests done in the office resemble the real world.

The way the computer is connected with the lectern, with the movable catheter, does not feel satisfying, but sadly no better options were found. It is likely that customers will only buy the gesture unit anyway. It would be best when every customer is evaluated individually to determine what the best computer system will be for the customer.

In the end ILS does have received something they wanted: a small portable device the presenter can use to give presentations while walking over the podium.

Recommendations

The success of the concept depends on how well ILS can program the Leap, given that the Leap will work as expected. Gesture motion capture and other devices to capture 3D movements are a hot topic, so there is a lot of development in this area. When the Leap is useless after all, there will be other technologies possible in all likelihood. Maybe two or three sensors that detects the pencil might be enough.

If for some reason the chosen gestures either don't work or a lot of people prefer other gestures, ILS must not hesitate to implement any changes deemed necessary. But as already became clear during the concept creation, it is really easy to think of more buttons on the pencil, while this might make the product only more complicated in its use. Therefore it is recommended to be very careful with adding options to the pencil, instead of adding gestures. Another thing is: most people probably only want to give a simple presentation, while other people want to get the best out of their performances. Therefore it might be a good idea to give the Interactive Presentation System a basic option and an advanced option. So people who will use the device will not be bothered with long manuals they don't want to read, or be restricted with only a few options while there is so much more possible.

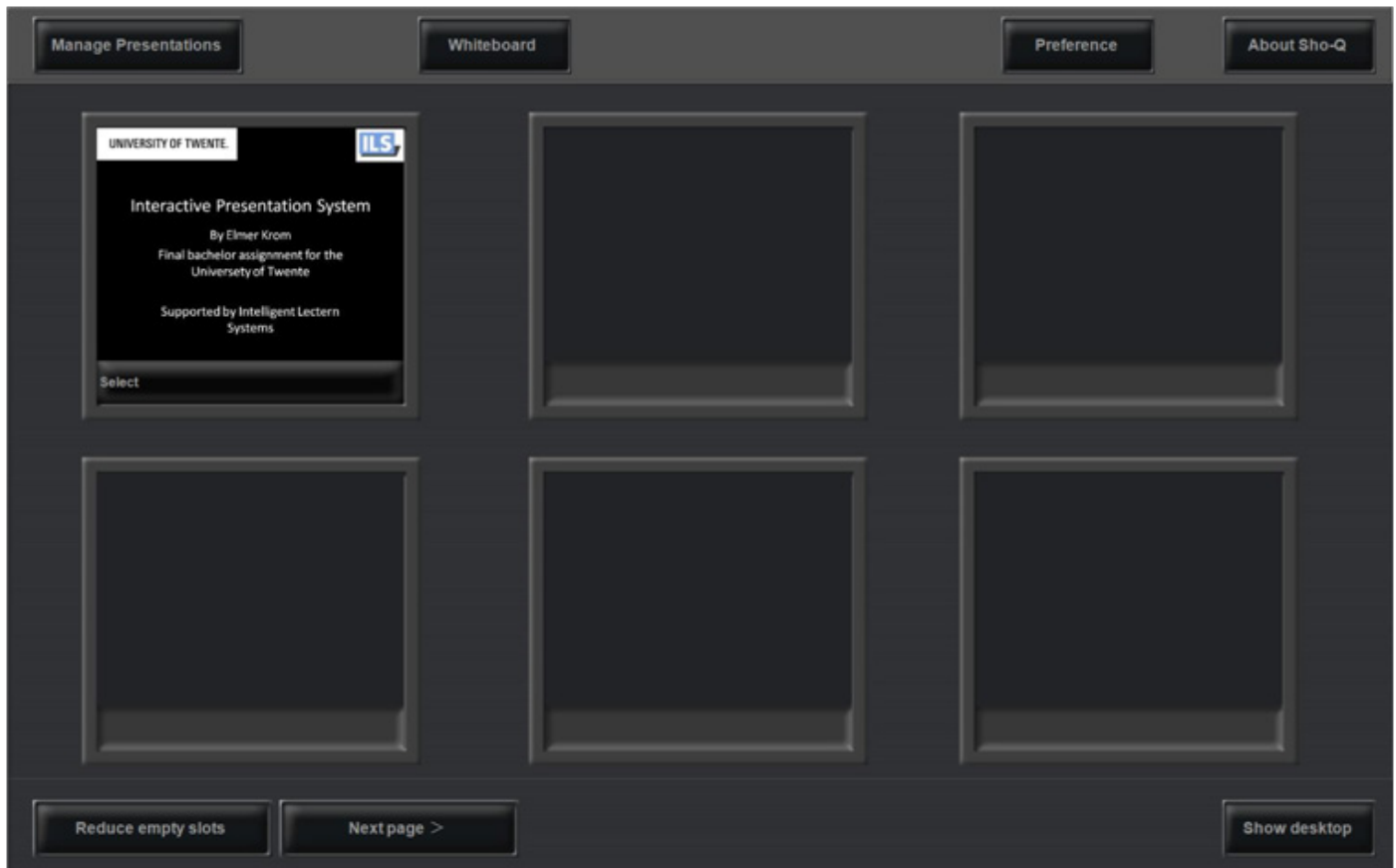
The main selling point of the gesture unit is its small size, and a lot of possible options. Presenters can have a decent choice between regular clickers and this, more sophisticated, gesture detector. When the gesture unit will be available as a standalone product, it will be accessible to a much wider range of potential buyers and thus much higher potential sales.

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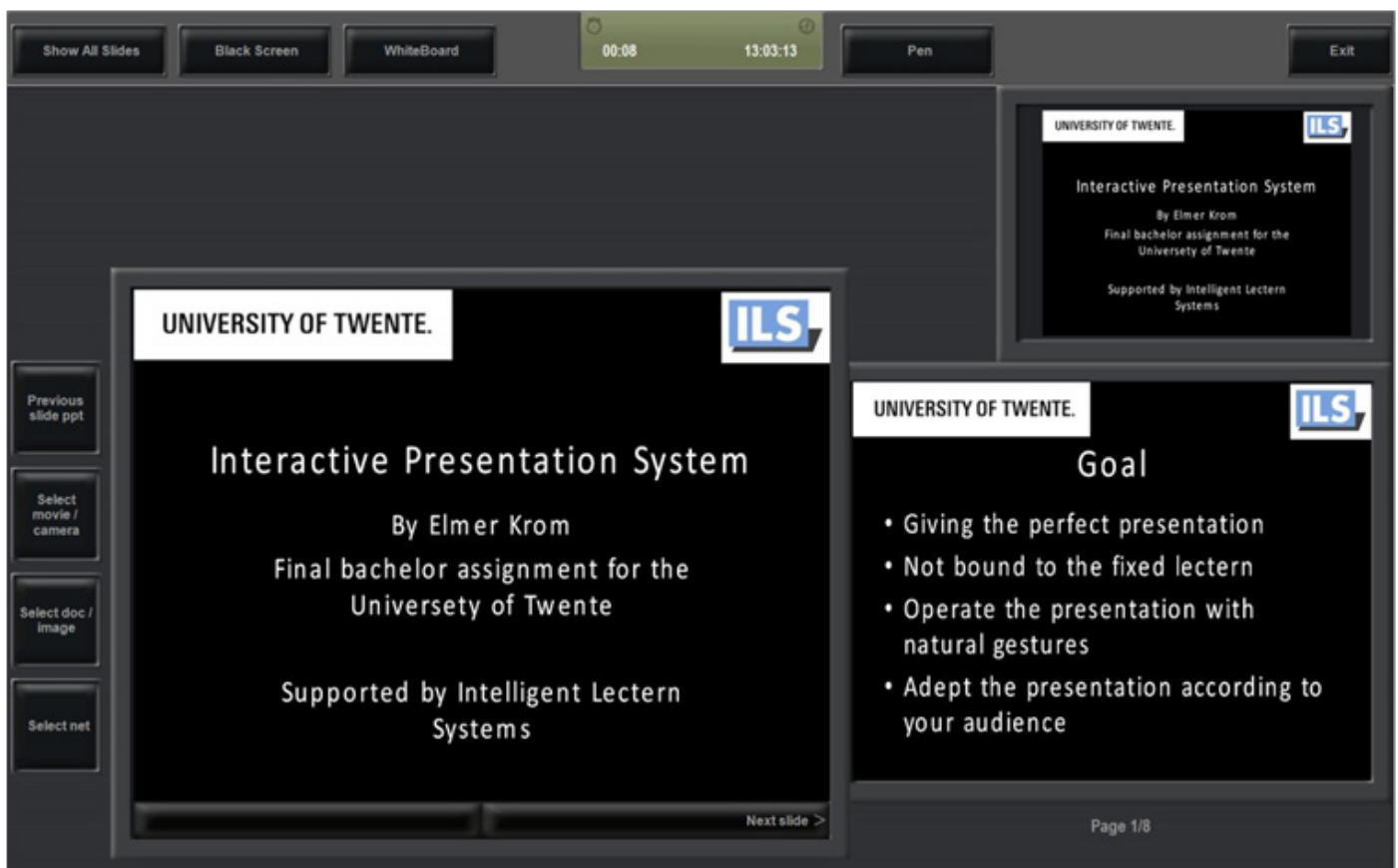
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Appendix A: Sho-Q

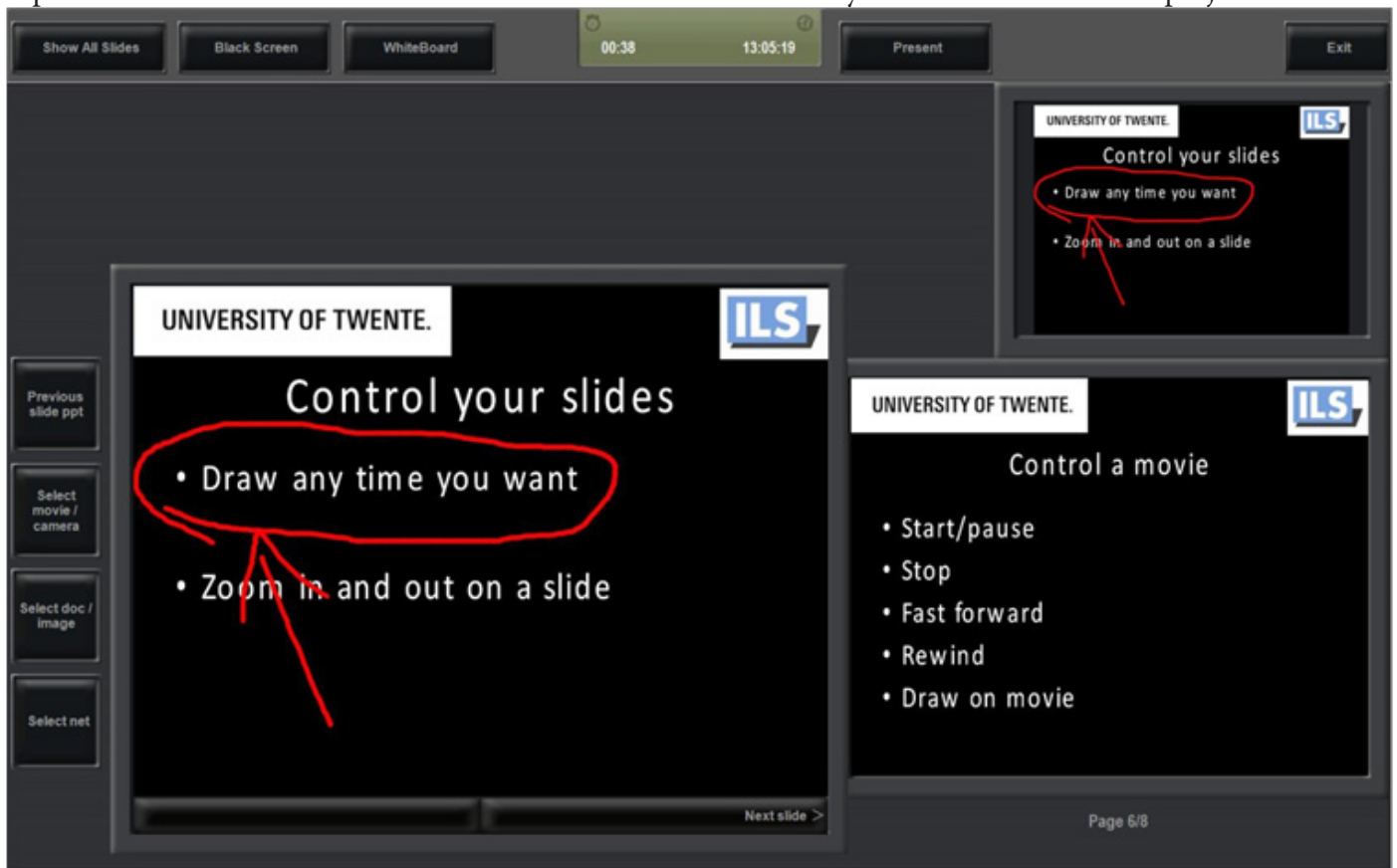
Multiple presentations can be loaded in sho-Q at the same time. This way, people can more easily open their presentation when there are multiple presentations in a row.



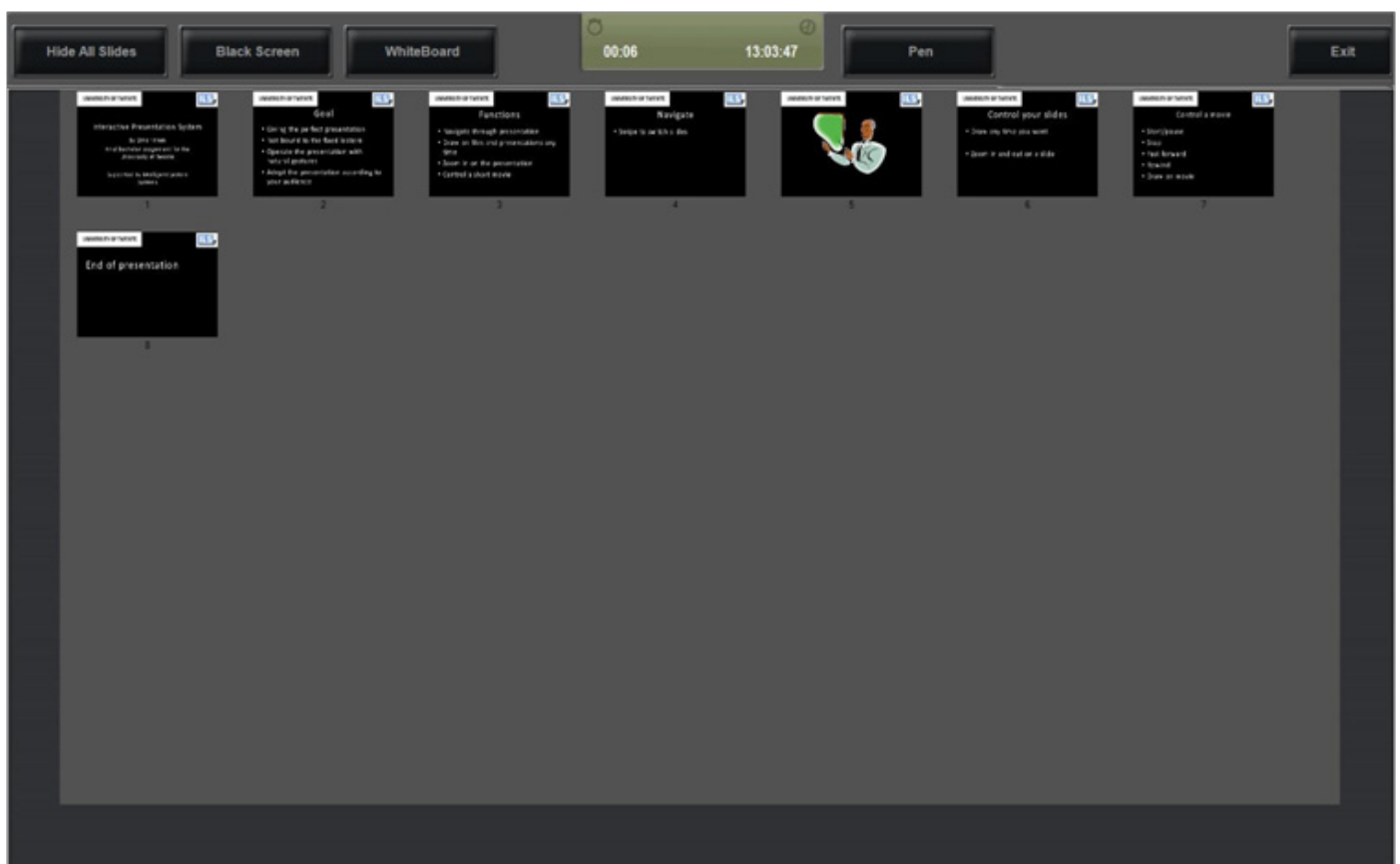
This is the main screen during a presentation. The big window is the working area of the presenter, the smaller window on the right shows the next slide and the small window in the upper right corner shows how the beamer projects the sheet.



A presenter can draw on the sheet. The small window automatically shows how the beamer projects this.



If the presenter needs to go to a slide, he can use the slide overview to directly open the desired slide. This way he does not have to scroll through the entire presentation.



Appendix B: Product analysis.

Some typical products ILS sell are:



From left top right, top to bottom:

ILS24H

A state of the art compact design of an all in one lectern. The big screen is electrical in height adjustable, a small touch screen on the side can be turned. So people in wheelchairs are also able to look at the screen. And all the unneeded elements can be inserted.

ILS11A

This is a simple lectern, special for low budgets. With only an adjustable height and a connection for the notebook as special features.

ILS3

This lectern was special designed for teachers in Saudi Arabia. The design is modular so it can be adjusted to the costumers' wishes.

ILS16H

This design was developed for educational and training purposes. The panels can all be inserted if they are unneeded

ILS21HL

This lectern provides a smooth and comfortable space for the presentation. It features an adjustable floor stand, high resolution 22" touch screen, microphone mount and reading light.

1. Competitors analysis.

To know what ILS can add to the current range of presentation systems, it is important to know what the market has to offer in return. Therefore an analysis is made about the current competitors of ILS and new possible competitors of the Lecternless Lectern. At this moment ILS recognize two real competitors who design intelligent lecterns.

The first competitor is AHA I&C.

AHA I&C is a Korean company who present themselves as the 'World First company developed 19" LCD Tablet monitor'. The Korean Ministry of Education selected AHA as "The Best E-Learning & U-Learning Solution Company" according to their website [13].



There are four lecterns they produce which can be considered as a counterpart of the ILS lecterns. From left to right:

Smart Podium ELF

The world's first dual monitor lectern system. It has a built-in RFID system for automatic control and security features. Furthermore, it is a simple and elegant design.

Digital Podium Maestro

This lectern is designed to show the authority of the teacher.

Digital Podium DPL

It is a stylish design to elevate the presenter and his presentation.

Digital Podium SIMPO

This is product of AHA I&C is the closest one to the main presentation lecterns ILS develops. But it looks way more static.

The second great Competitor of ILS is B&S.

B&S media provides several electronic products for auditoriums like camera's who automatically track the presenter, interactive whiteboards and of course, Lecterns.

B&S sells three kinds of intelligent lecterns:

e-STATION S



e-STATION Z



e-STATION T



Although the designs differ from each other, the e-STATION S and Z are basically the same. They are computers with all the necessary equipment. Mouse, keyboard, slide-away work top and environment controller.

The e-STATION T is more a desk from where a teacher can do his lecture, than a professional lectern for auditoriums. It has a build in computer, environment control and several drawers and cabinets.

Other Lecterns

Of course a company is not obligated to buy an intelligent lectern. Simpler lecterns are much cheaper and still appealing to the eye, so it can be a good alternative. Following is a list of a few normal lecterns which might be good alternatives for intelligent lecterns.

BlueGumjoinery:

BlueGumjoinery is an Australian company: "Specialising in the design and manufacture of joinery specifically related to audio-visual equipment and related components."

BlueGumjoinery produces good looking basic lecterns. Most of their products are made of wood. They have basically two kinds of lecterns they produce. Solid cupboard lecterns, and standard post lecterns. Most of their products are individually customizable if required.





ArchiExpo

According to ArchiExpo, an on-line architecture exhibition, there are 50 companies who produce lecterns [14]. ILS is the only one who produces intelligent lecterns who is affiliated with the site. One other company, VersaTables, produces a lectern which comes close to a intelligent lectern.

VersaTables, American Made Computer Furniture. Offers a lectern with a build in screen, invisible for the audience. A slide-out tray provides a keyboard and mouse for easy control of the system.



Presentation pointers

Because the idea of the Lecternless Lectern is to move the presentation functions away of the lectern, a list of pointer devices is searched. Such devices are commonly used nowadays and pretty much allow the presenter to walk around freely. These pointers are quite sufficient for presentations, but do not support all the features of an ILS lectern. Like drawing and viewing the notes, so there is still a lot of room for improvements.

Targus

Targus pioneered carrying cases for notebooks. They like to shape the market for mobile computing cases and accessories. Some of their products are the presentation pointer:

AMP13EU

Features buttons making it easy to give a presentation. Approximately 15m wireless distance. And a built in laser pointer to highlight elements at the sheet.



AMP20EU

“let you control your pc as if you are using a mouse.” Green laser pointer, 15m wireless distance. Features like cursor and volume control.

Kensington

Kensington's three key points are Smart, Safe and simple. They innovate their products with the user in mind, produce risk free products which are easy and intuitive to use.



Wireless Presenter Pro With Green Laser Pointer

The green laser is ten times brighter than standard red lasers. 45m wireless distance and a four button design. Wireless presenter 4 button control. Comfortable design. 20m wireless distance. Plug and play design.

Logitech

Logitech is a company who focus on improving the experience of users with their computers. With every single product of their wide arrangement they study how the user will use it. And use this research to improve the quality of the product and to make them more delightful.

Logitech Professional Presenter R800

Intuitive powerpoint control, green laser and a range up to 30m.

Logitech Cube

Can be switched between pointer and mouse. When you lay it down it acts like a mouse. When you pick it up it acts like a presentation device. On/off button, smooth scrolling and designed to bring it with you.



Appendix C: Concept choice.

To test what concept would be the best choice to continue further development, the concepts are tested to the program of requirements. For every requirement is an amount of zero up to three points awarded. Three points if the concept excels at the specific function, zero points if the concept cannot fulfill the requirement in its current state. Not all of the requirements are certain whether they are or are not being fulfilled by the concept. In such case it is given a one.

Concept 1: The Click wheel

Requirements Score

- Safe to use. 2
- System start up within 1 minute. 3
- Handling presentation systems. 2
- Start the presentation. 1
- The presenter must be able to walk around freely. 2
- He must be able to operate the presentation from any point on the podium.3
- Switching the slides 3
- Visible notes for presenter. 2
- Visible current sheets for presenter. 2
- Able to point out elements at sheet. 2
- Able to switch between different media software. 1
- Appear familiar. 3
- Simple to use. 3
- Comfortable to use. 3
- Not hinder the presenter. 3
- Be suitable for audiences between 30 and 500 people. 3
- Support the ILS sound system. 2
- Support an external pc. 1
- Support external video. 1
- Immediate system shutdown. 2
- May not be too expensive to develop. 2
- Make ILS a profit. 1

Wishes

- Visible previous sheets for presenter. 2
- Support the presenter in his appearance. 1

Total Score 50

Concept 2: the touchpad

Requirements Score

- Safe to use. 2
- System start up within 1 minute. 2
- Handling presentation systems. 2
- Start the presentation. 3
- The presenter must be able to walk around freely. 3
- He must be able to operate the presentation from any point on the podium.3
- Switching the slides 3
- Visible notes for presenter. 2
- Visible current sheets for presenter. 2

- Able to point out elements at sheet. 3
- Able to switch between different media software. 3
- Appear familiar. 2
- Simple to use. 2
- Comfortable to use. 1
- Not hinder the presenter. 1
- Be suitable for audiences between 30 and 500 people. 2
- Support the ILS sound system. 2
- Support an external pc. 1
- Support external video. 1
- Immediate system shutdown. 2
- May not be too expensive to develop. 2
- Make ILS a profit. 1

Wishes

- Visible previous sheets for presenter. 2
- Support the presenter in his appearance. 1

Total Score 47

Concept 3: the arm screen

Requirements Score

- Safe to use. 2
- System start up within 1 minute. 2
- Handling presentation systems. 3
- Start the presentation. 2
- The presenter must be able to walk around freely. 3
- He must be able to operate the presentation from any point on the podium. 3
- Switching the slides 3
- Visible notes for presenter. 1
- Visible current sheets for presenter. 1
- Able to point out elements at sheet. 2
- Able to switch between different media software. 2
- Appear familiar. 2
- Simple to use. 2
- Comfortable to use. 2
- Not hinder the presenter. 2
- Be suitable for audiences between 30 and 500 people. 2
- Support the ILS sound system. 2
- Support an external pc. 1
- Support external video. 1
- Immediate system shutdown. 2
- May not be too expensive to develop. 3
- Make ILS a profit. 1

Wishes

- Visible previous sheets for presenter. 2
- Support the presenter in his appearance. 1

Total Score 47

Concept 4: the gesture unit

Requirements Score

- Safe to use. 2
- System start up within 1 minute. 2
- Handling presentation systems. 2
- Start the presentation. 2
- The presenter must be able to walk around freely. 3
- He must be able to operate the presentation from any point on the podium. 2
- Switching the slides 3
- Visible notes for presenter. 2
- Visible current sheets for presenter. 2
- Able to point out elements at sheet. 2
- Able to switch between different media software. 2
- Appear familiar. 2
- Simple to use. 2
- Comfortable to use. 3
- Not hinder the presenter. 2
- Be suitable for audiences between 30 and 500 people. 3
- Support the ILS sound system. 3
- Support an external pc. 1
- Support external video. 1
- Immediate system shutdown. 2
- May not be too expensive to develop. 1
- Make ILS a profit. 2

Wishes

- Visible previous sheets for presenter. 2
- Support the presenter in his appearance. 2

Total Score 50

Appendix D: Size of the screen

Over a distance of one meter was a font size of 12 sufficient to read. Over a distance of three meter was a font 36 needed and over a distance of five meter, a font size of 72 was reading fine. This data is used to determine what the magnification factor is for the font sizes over the given distances. These factors are then generalized to the entire screen, because when the characters are bigger, the screen must become at least equally bigger to let all the functions of sho-Q be visible on the screen. The results are a rough estimation of how big the screen has to be to give the presenter a comfortable size of visual feedback.

Distance	Old font	New font	Magnification factor	Size old screen(cm)	Size new
3	12	36	3	47.5x27	140x80
5	12	72	6	47.5x27	190x160

Although the testing method was really basic and does not provide very accurate data, it is enough to indicate that the screens left and right of the presenter will drop out of the possibilities for a display. In special occasions is this kind of screen not useless, like when the presenter is always standing left or right of the screen causing the maximal distance between him and the screen to become much less. However these circumstances differ too much to provide a solid basis for a product. It is also possible to account for smaller rooms, and make only a special screen when a client has a very big auditorium. But this limits the possibilities of where the product can be used to much especially when the company wants to standardize more of its product.

Appendix E: The cost of the final product

Motion Capture device	Costs
The Leap	€70,-
Microphone	€15,-
Pencil	€10,-
Assembly	€30,-
Translation program	€300,-
Sub total	€425,-
Computer system	
Wireless Lectern including sho-Q.	€1200,-
TV screen	
Beamer	€300,-
Screen	€50,-
Sound	
ILS RedCat sound system	€200,-
Loan	
Development costs	€100,-
Profit for ILS	€200,-
Total	€2475,-

The prices are all rough estimations based on current prices of several products. So the microphone, the pencil, the beamer and the screen are all roughly estimations based on prices of similar products with good performances. At this moment it is unclear how difficult it will be to create a program that translates gestures into actions for sho-Q.

