Wolters Kluwer

UNIVERSITY OF TWENTE.

BACHELOR THESIS

A pilot study on interactive decision trees

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Industrial Design

July
2016

Bachelor Thesis
A pilot study on interactive decision trees
University of Twente
Industrial Design

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7 July 2016

Pages
Report: 87
Appendix: 24

PREFACE

This bachelor thesis is written in collaboration with the University of Twente and the company Wolters Kluwer Nederland B.V.

In this preface I would like to thank Kluwer for allowing me to write my Bachelor Thesis in their environment, because a lot of learning opportunities were given to me. I learned a lot about the subject, but also about working in a professional environment, designing in an agile way and about presenting my work to colleagues and users. The help from all people I have spoken with in special the users, author, publisher and manager was very much appreciated and I hope you can profit in the future from this new functionality in the Navigator.

I would like to specifically thank Henriette, Anneke and Joy for supporting me in the process of this research. Your input and enthousiasm about the assignment kept me motivated. I would also like to thank the whole Navigator team for welcoming me with open arms and for always making me laugh during lunch breaks or randomly during the day.

I hope my enthousiasm about the assignment shines through in this report and you enjoy reading my bachelor thesis about interactive decision trees.

ABSTRACT

The Dutch share of the company, Wolters Kluwer Nederland B.V, makes use of an online information portal called Navigator to provide information and functionality to primarily law and tax professionals. The company is focussed on digitizing information and believes publishing a book online is not the same as being an online publisher. A new customer need was identified to provide users with practical content that helps the user get to the right information efficiently. The company's attention was drawn to a solution called interactive decision trees. A pilot study is performed to identify what is needed to incorporate interactive decision trees in the Navigator and how the decision trees can be visually presented to the user.

The identified customer needs include the ability to find the trees and favourite the trees in the Navigator. It should be possible to print the interactive decision tree and to save it to the computer. The user wants to be able to go back to previous answers and be able to change the answers. Design principles defined based on a broad analysis of interactive decision trees include guidelines about the overview, progress indication, consistency, scalability, accessible for everyone, flexibility and attention.

Ideas and concepts are generated and tested with users in a user test. The perspective of an author, publisher and manager is also gathered. The result of this test phase is recommendations for the final visual design of an interactive decision tree page in the Navigator based on the earlier defined design principles. The most important recommendations include show all the answers of previous questions, incorporate a categorisation of the questions, integrate the trees in the Navigator, add an elaborated explanation (in-text or in a separate window) and the recommended elements to include on the first page are a title, a short description and the first question.

The implementation plan is about aspects to think of when integrating interactive decision trees in the Navigator. First the real need of the customer need and the result of a decision tree should be defined. For the business perspective outsource options should be investigated and data control needs to be assigned. An input environment needs to be created for the author and a template for writing interactive decision trees is recommended. The authors need to be prepared for this different way of writing. Also important is the terminology used in both the title as the content of the decision tree. The new functionality 'decision trees' should be communicated to the user and it is important to make sure the user trusts the system.

The user is interested in this new functionality meaning further research and detailed plans, continuing on the information presented in this report, should be carried out to start the process of integrating interactive decision trees in the Navigator.

SAMENVATTING

Wolters Kluwer Nederland B.V. maakt gebruik van een online informatie portal genaamd de Navigator, om juristen en fiscalisten van informatie en functionaliteiten te voorzien. Het bedrijf is gefocust op het digitaliseren van informatie en is van mening dat een boek online uitbrengen niet hetzelfde betekent als je profileren als een online uitgever. Het bedrijf heeft een nieuwe behoefte bij de klant geïdentificeerd: het aanbieden van praktische content om informatie op een efficiënte manier te vinden. Het bedrijf ziet interactieve beslisbomen als een mogelijke oplossing. Een verkennend onderzoek is uitgevoerd om te ontdekken wat nodig is om deze beslisbomen te integreren in de Navigator en om uit te vinden hoe interactieve beslisbomen visueel kunnen worden weergegeven.

De gebruiker wil interactieve beslisbomen kunnen vinden en als favoriet kunnen markeren in de Navigator. De gebruiker wil beslisbomen kunnen printen en op kunnen slaan op de computer. Ook moet de gebruiker kunnen navigeren door vorige vragen en wil de gebruiker de antwoorden kunnen aanpassen. Uit een brede analyse zijn ontwerplichtlijnen opgesteld, bestaande uit de volgende aspecten: overzicht, voortgangsindicatie, consistentie, schaalbaarheid, toegankelijk voor iedereen, flexibiliteit en aandacht.

Ideeën zijn gegeneerd en concepten zijn ontwikkeld die getest zijn door middel van een gebruikerstest. Ook de mening van een auteur, uitgever en manager zijn opgenomen in de uiteindelijke aanbevelingen voor een visueel ontwerp van een interactieve beslisboompagina. Deze aanbevelingen zijn gebaseerd op de ontwerprichtlijnen. De belangrijkste aanbevelingen zijn dat gegeven antwoorden zichtbaar moeten blijven, een categorisatie van de vragen moet worden toegevoegd, de beslisbomen geïntegreerd moeten worden in de Navigator en een uitgebreide uitleg (in de tekst of in een apart venster) aan een vraag moet kunnen worden toegevoegd. De titel, een korte omschrijving en de eerste vraag zijn de voornaamste drie elementen die op de startpagina van een interactieve beslisboom aanwezig moeten zijn.

Het integratieplan beschrijft alle aspecten van de integratie van interactieve beslisbomen in de Navigator. Eerst moet de behoefte van de gebruiker in kaart worden gebracht en het resultaat van een beslisboom moet gedefinieerd worden. Vanuit een zakelijk oogpunt moeten de opties voor uitbesteding worden onderzocht en data verantwoordelijkheden moeten worden toegewezen. Een invoeromgeving voor de auteur moet ontworpen worden en een bestand met richtlijnen voor een auteur moet worden gedefinieerd. Auteurs moeten ook geschoold worden in een andere manier van schrijven. Terminologie in de titels, maar ook in de content is een belangrijk onderdeel van de integratie en de nieuwe functionaliteit moet gecommuniceerd worden naar de gebruikers. De gebruikers moeten vertrouwen hebben in de juistheid en compleetheid van een beslisboom.

De gebruiker is geïnteresseerd in interactieve beslisbomen. Verder onderzoek en gedetailleerde plannen, zoals beschreven in dit onderzoek, kunnen in werking worden gesteld om te beginnen met het integreren van beslisbomen in de Navigator.

TABLE OF CONTENTS

1 INTRODUCTION

The first chapter deals with introducing the assignment and getting acquainted with the content and relevant terms. The company Wolters Kluwer is introduced as a whole and the specific motive behind performing a pilot on interactive decision trees within the Navigator is described. Research questions are presented and the goal of the assignment is explained. This all will form a basis for the continuation of this report.

1.1 Background information

"Wolters Kluwer provides legal, business, tax, accounting, finance, audit, risk, compliance, and healthcare professionals the essential information, software, and services they need to make decisions with confidence." [1]

The company originally was founded in 1836. Due to a merger of the two publishers Kluwer and Wolters-Samsom the company in current form started in 1987. Products of Wolters Kluwer are designed for a big range of sectors and products are both services and books. Professionals in the above stated sectors make use of their services. An educative branch called Wolters-Noordhoff was part of the company for twenty years but was sold in 2007. Wolters Kluwer operates in over 180 countries and has around 19.000 employees all over the world. [2] The head-quarter is established in Alphen aan den Rijn. In 2015, approximately 83 percent of the company's revenue was gathered by digital products, software and services. The company is also listed as one of the 100 most sustainable corporations in the world. [3] The most important values of the company are 'Focus on customer success', 'Make it better' and 'Aim high and deliver'.

The Dutch share of the company, Wolters Kluwer Nederland B.V., makes use of an online information portal called Navigator to provide information and functionality to primarily law and tax professionals. In the online portal laws and regulations, jurisprudence, policies, literature and comments are accessible. Customers use the portal to gather information to support a lawsuit for example. A big part of the Navigator is the search engine where all the documents can be accessed.

The Navigator team is constantly working on improvements for and the maintenance of the portal. The developers of the Navigator are trained to work in a fast-paced and flexible environment. The design strategy agile working and fitting framework scrum are practiced, which means every three weeks a viable output should be delivered. The idea of implementing customer wishes within a small time limit is key.

1.2 Assignment

For a relevant result it is important to formulate the motive and goal of the assignment early in the process. All three parties, the University of Twente, Wolters Kluwer and I, need a clear description of the end result.

1.2.1 Motive

Wolters Kluwer wants to create the biggest possible added value for their customers. Therefore customer is key in all of their products. They present themselves as online knowledge supplier and are always looking for innovative ways to deliver information to their customers. A new customer need

was identified to provide information to professionals clearly and easily to enable them to give the best advice to their clients by offering interactive decision trees in the Navigator. In the current situation customers have to search for specific information in several regulations, laws and other documents. It can take a lot of time to find the right information, read it and interpret it. Customers also want to ensure that they have looked at a question from all possible angles, and are therefore both correct and complete in the answer they present to their internal or external customer. The input is a practical question and by asking the right follow-up question the output offers the user the right information to give the best advice to their client. The ultimate goal is to let the customer find practical information efficiently. Paper decision trees are already used by the customer, but these are not considered user-friendly because it takes a lot of time to complete them. This is due to the formatting. A future goal for interactive decision trees is the feedback from the service to the customer, instead of the other way around. This is easy to explain with an example. If a law changes, this has to be changed within the system. Every customer who ever included this law in their decision making process should be notified, so the advice (potentially) can be adjusted.

1.2.2 Goal

Wolters Kluwer wants to support their customers in the best way possible by offering interactive decision trees in the Navigator that enables them to find practical information easily and efficiently. The goal of this bachelor assignment is to perform a pilot study on these decision trees. Research has to be done where in the Navigator decision trees can be incorporated best and what is needed to implement this tool. It also consists of making prototypes that show the possible visual and substantive outcomes of the tree in the style of Wolters Kluwer. The focus of this assignment is on the navigation and the visual aspect of a specific part of the decision tree, where with help of literature the requirements for such a system will become clear. This is realised starting with gathering general information about interactive decision trees. Secondly, the customer is described and the Navigator is explored. Thirdly, possibilities for a suiting decision tree for Wolters Kluwer are explored and fourthly, a user test is carried out and adjustments are made to the concept. The customer is involved throughout the design process. A completely functioning system that is ready for integration in the Navigator is not part of the assignment. The entire assignment is completed within fourteen weeks.

1.2.3 Research questions

To reach the proposed goal research has to be done and questions have to be answered. In order to complete the assignment it is important to have knowledge about interactive decision trees itself, the competitors, the users and the design of the Navigator. The two main research question are:

"What is needed to incorporate interactive decision trees in the Navigator?"

and

"How can interactive decision trees be visually presented in the Navigator?"

1.3 Structure of the report

The following chapters of this report are dedicated to find the answer to the previous stated research questions. Several phases, analysis, ideas, concepts, test & development and final findings, lead to the conclusion. In the last chapter the research methods are evaluated.

The first chapter, analysis, explores several aspects of the assignment. First the term interactive decision tree is defined. The Navigator is elaborately explained and existing interactive decision trees are analysed. Existing practical content of Wolters Kluwer is investigated and the user of the Navigator is characterized. Customer needs are identified as well. Research on user interface guidelines is done in order to understand the challenges and to define design principles that are kept in mind through out the design of the final concept.

In the idea and concept chapters the creative process is described. First a visualisation of the concepts is presented because several elements need to be designed. The first ideas and paper drawings are presented. Several digital versions of two chosen paper ideas are designed. In the concept phase two chosen ideas are chosen and elaborated into mock-ups. This phase explains the concepts and reflects on the design principles.

The concepts are evaluated in a user test which is described in the test & development chapter. In this chapter the opinions of an author, a publisher and a manager about interactive decision trees are shared as well.

In the final findings chapter all previous research is put into work. An implementation plan describes the aspects that need to be taken into account when integrating interactive decision trees in the Navigator. Visual design recommendation are presented as well.

The conclusion summarizes and integrates the final findings to answer the research questions. The last chapter of this report disucces the presented work and evaluates the research methods.

2 ANALYSIS

In this chapter the analysis is addressed. In order to design an interactive decision tree research had to be done on several subject matters. Concluding this chapter requirements are formulated for integrating interactive decision trees in the Navigator, which is a starting point for the next phase: ideas and concepts. The analysis deals with defining an interactive decision tree, research on existing interactive decision trees, research on User Interface guidelines, in-depth research on the Navigator, analysing existing research of Wolters Kluwer, competing companies, the user of the Navigator and the user of the interactive decision trees specifically. Both from the above named research subjects and the input from the company itself, marginal and ideal requirements are formulated.

2.1 Defining an Interactive Decision Tree

This report describes the process of designing an interactive decision tree. A clear definition of what is understood by an interactive decision tree in this report is important. Interactive decision trees exist on several levels of complexity.

The idea of a decision tree is simple and one can draft a tree out of almost anything. Let's take a simple example: Should I wear shorts today? If one asks this question to a friend they first want to know the circumstances to answer the question correctly. A first question could be: Is the sun shining today? One answers with yes or no and based on this answer the friend tells you if you should wear shorts or not. If one writes this decision making process down in an efficient way it turns into a decision tree. Below a figure is shown of a simple decision tree drafted from the example.

Figure 1: *Definition of an Interactive Decision Tree*

As one can imagine, the answer to this question can be based on several conditions: the weather, planning of the day, clothes in your closet, etc. The more conditions the more complex the decision tree. Also a decision tree can consist of not just bilateral questions but questions with multiple answers, which increases the scale of the complete tree enormously. An interactive decision tree is a digitized version of the flat tree shown above and information is presented in a practical way. Due to the tree structure, the total amount of conditions to get to the final answer differs. If one enters one branch the decision tree could be done within one condition. One is simply not going to wear shorts if it is freezing outside. If one goes to another branch there could be a hundred other conditions to get to the right answer. If it is not freezing more questions need to be asked to know if one should wear shorts.

Basically a document is categorized as an interactive decision tree if it consists of a question or statement where conditions enables one to find the needed information.

2.2 Existing Decision Trees

In this sub-chapter several existing decision trees are analysed and customer needs are gathered. These gathered needs are based on the red marker notes in the figures and the finalized list can be found in section 1.2.8

KPN [4]

This is the home page of customer services of a phone company called KPN. The homepage has a very basic and simple decision tree used to indicate the subject of the problem and narrow down solutions quickly. With a move-over on the options, you know which subject you are going to choose if you click. After choosing in step 1 and step 2, you immediately are forwarded to the page dedicated to your subject. On the left all subjects are shown, these are the same as on the homepage for easy switching. Once you clicked on a subject the sections of the subjects are shown if you click on plus. However if you click on the name itself the site directs you to other places on the website and the whole decision tree disappears. On the right the actual information is shown, in this case including a roadmap. The website adapts when the size of the browser changes. The menu on the left disappears quite fast when minimizing the browser horizontally. The text is readable in every browser size. The website operates exactly the same in different internet browsers. The icons make the page interesting to look at. These also make the website more interactive.

Figure 2: *Annotations of User Interface KPN*

Riksjatravel [5]

This tool determines where you can go on holidays if you can't decide. All questions are closed and the maximum amount of options is four. There are two types of questions, one where you can click on the picture itself and one where you have to click on a number in the scale. You are always restricted by the given choices. Below the progress is shown and you can navigate to previous questions. You can't however click on the question you want to go back to. You can just navigate one question at the time.

Figure 3: *Annotations of User Interface Riksjatravel*

Figure 4: *Annotations of User Interface Rondreis*

Rondreis [6]

In this test you can also determine which country you want to travel to. It is a very easy decision tree, with always multiple options. I expect there are some countries behind it, who have all been assigned certain terms. For example, if you choose the option nature instead of culture only the countries with this term assigned to them will keep being an option. Then out of these residual countries, a certain amount of countries will be removed from the 'answer' list again and so on. This is also the reason you cannot write something yourself. The answers aren't very flexible. Above the picture the progress is shown. You can go back to any question you want. It is however not possible to skip a question, so you are not able to go to a future question. If you move over an option that option lights up. The picture size changes and the place where you have to choose the options moves with every question. Every question is shown on a new page. This tree is part of a bigger page, where more information is shown than just this test.

DSM-5® Differential Diagnosis App [7]

This app includes interactive decision trees. The app is developed to help clinicians diagnose their patients. Usually a number of questions is asked to discover the psychiatric illness and with this app you will not forget a step and discover illnesses you wouldn't immediately think of. You can select a symptom from the list and a decision tree starts. Every time you select an answer a new question appears. Below the tree information about the symptom is shown. After answering a certain amount of yes/no questions the app gives you the diagnoses, afterwards alternative diagnosis are shown to rule out all possibilities. This interactive decision tree is part of a bigger app and the trees are shown in a separate section. The app is specifically designed to use on smart phones or smart watches.

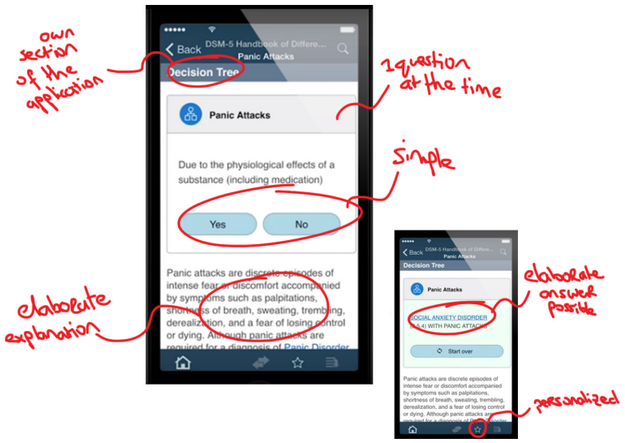


Figure 5: *Annotations of User Interface Diagnosis App*

Figure 6: *Annotations of User Interface Mag Ontslag*

Mag Ontslag [8]

On this website you can use several tools, where decision trees are used to gather information about resigning from your job. Above the homepage is shown, where you can choose several subjects for your tool. You are able to carry out a decision tree as an employer or as an employee. The different subjects are already clustered and it is a clear overview of all the content.

The goal of this tree is gathering information about a specific subject. It answers practical questions in an easy way. At the end you see an overview of all your answers and you get an answer on your question. These documents can be downloaded or emailed.

The way you run through the decision tree differs. Sometimes the questions are asked separately, one question per screen, sometimes the questions are asked all at once on the same screen. The questions also very between yes/no, multiple choice or open questions. Sometimes you are able to fill in something yourself, but mostly you are restricted to the offered options. An example of a starting point question could be if you are eligible for a certain compensation. The deliverable after some follow-up questions is a yes/no answer. Another decision tree makes you calculate the expected time for you to get a new job. This is done by filling in simple entry fields on the left side. On the right side the answer is shown, which consist of a table with multiple important numbers. This decision tree lets you stay at the same page. It is very clear what happens in the answer if you change one field. It might be useful to let this calculation be more interactive by immediately showing the change instead of having to click on the calculate button.

Belastingdienst [9]

On the website of the Dutch government a lot of information can be found about taxes and tax returns. This is both for the employee as well as for the business owner. On the latter's page a lot of questions are answered. In the bottom a quick menu is located where frequently asked questions can be accessed. At the top of the screen a few of these questions(that are most common) are highlighted. Both links bring you to the same page, which is the page shown on the right.

At the left side of the screen the subjects are shown. Sub-subjects are first hidden, but can be accessed by a roll-down menu which appears if you click on a certain subject. Once you've clicked on a subjects, the information is shown on the right. You can then click on a sub-subject and new information is shown on the right. This information is shown in text form including tables.

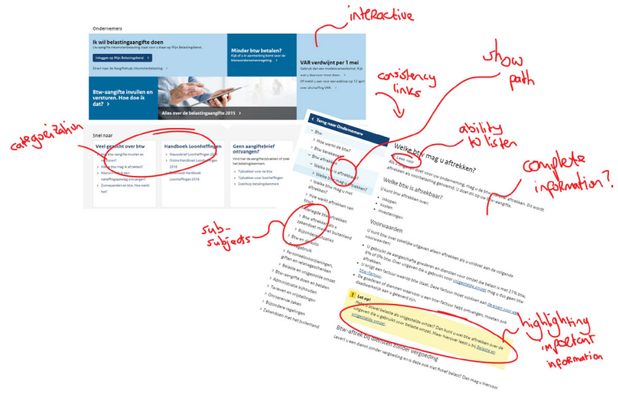


Figure 7: *Annotations of User Interface Belastingdienst*

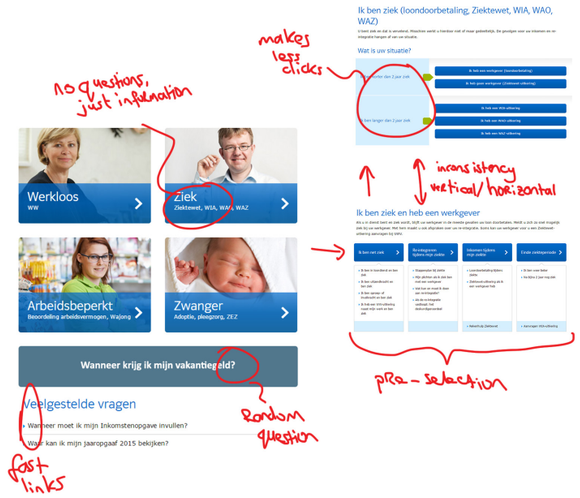


Figure 8: *Annotations of User Interface UWV*

UWV [10]

This informative website helps solving questions about employee insurances. At the homepage(figure 1) you can chose several subjects you want to get answers about. After you decided you come at a new page. In this page you have two options, that have several options in itself again. This saves an extra screen and the user isn't confused, because the decision flow is clear. Once you made a choice again, a new screen appears with several options again. This saves extra pages, but you have to search for the information yourself more. Besides the first choice is made vertically and the next page the first choice is made horizontally. Behind these choices the answers, which consist of for example a roadmap for an approach or information about the chosen subjects. This decision tree answers question but isn't stated in question/answer form. You just click on the subjects your question is about and the system serves you information.

2.3 The Navigator

The Navigator is a paid online information portal for legal and tax professionals. The users have to be aware of the latest law regulations, jurisdiction and literature relevant for their discipline to advise their customers in the best way possible. Because Wolters Kluwer is an (online) publisher not all documents are accessible to anyone. There are three subscriptions: Basic, Complete and Expert, which all include certain collections. Collections are clustered documents and publications aimed at certain disciplines and subjects, for example 'income tax'. Additional collections can be bought separately as well, depending on your subscription. The most important function are addressed below.

Homepage

If you navigate to www.navigator.nl you have to log in first. This is done using a log in which can be gathered by buying a subscription for Navigator. You are also able to log in using a student or employee account or with an 'Legal Intelligence' or 'Rechtsorde' account. On the homepage you have access to several different information sources. It is always accessible by clicking on the Navigator logo or the home button. Most important is the search engine located at the top of the page. Below the search field a few headings are visible. 'Favorieten' shows the documents and publications you've favourited. The fourth element is the 'Blijf op de hoogte' tab, where you see topical news about your area. At the top right you can sign in and out of the Navigator. You are also able to change your Navigator settings, for example your profession. Next to these buttons you can learn more about the Navigator with the 'Over Navigator' button. Next to these buttons are also the 'privacy' and 'suggestie?' buttons. At the top left of the screen you find the home button, but also short-cuts to search in the publications database and find 'Thema's'. The last button is the 'Mijn Navigator' button, where personal labels and notes can be accessed.

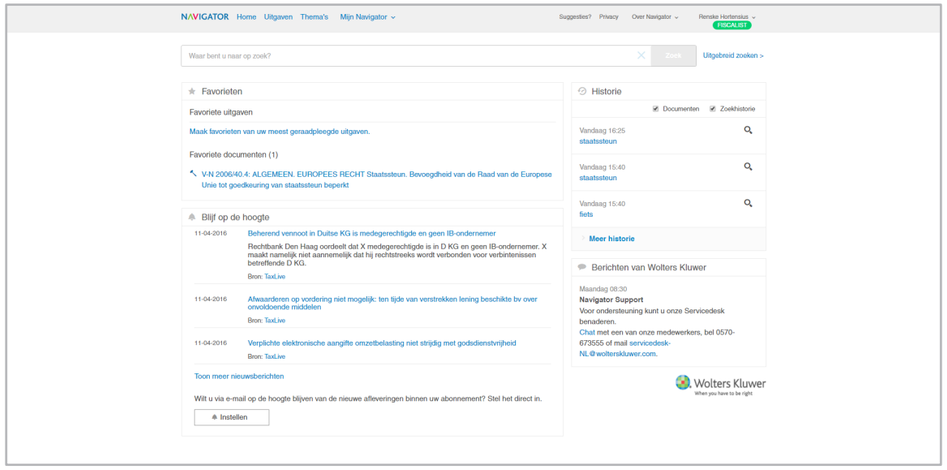


Figure 9: *Navigator Homepage*

Search Engine

In this part of the portal all information you have access to(due to subscriptions and individually bought collections) from the database. If you press enter or click the search button, the search engine will start generating results for you. You can add terms by typing and pressing enter again. It will show the two terms separately. By clicking the cross next to the term on the right you delete it. Once you've searched for a term, for example 'staatssteun' the results will show below the search engine on the right. At the left filters are shown. These are visible, but can be hidden if you want too. The filters can narrow the documents down for specific purposes.

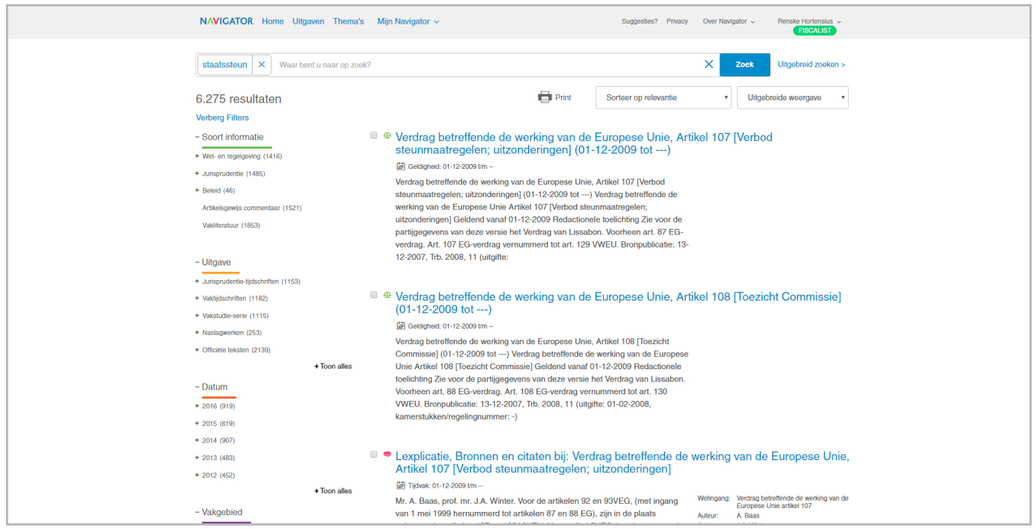


Figure 10: *Navigator Search Results*

While typing the first few letters a so-called word wheel is shown with suggestions. You can immediately see which documents exist with a name close to your search and search on that term instead. Besides filtering of information, you can print the document list or a specific document. You can also sort the documents differently, by default this sorting is by relevance. You can choose to sort by date(increasing) and date(decreasing). It is also possible to change the visual presentation of the documents from elaborate to concise. The filtered documents are shown and the title and meta data, on the right, are immediately visible. Below the title the validity date and concise content is shown.

In the elaborate search engine you can filter the results even more. This is done by entering the law name, article number, exact date or period, reference, ECLI, title, author and additional sub-filters to the filters previously mentioned. The results will be more suitable to your request. Once you've clicked on a filter the term shows up in the search engine so you always know which filters you used.

Document page

If you clicked on a document in the search engine you are immediately directed to the right document. At the top the title is shown. Below that the meta data is shown and this information can be hidden. This meta data contains editorial notes, source of publication, date of entry, source of publication of date of entry and disciplines. In this blue box you are also able to access different types of information: laws, comments, jurisdiction, literature and stated in. On the top right you can see if the law is valid or outdated and you can choose the law version you are searching for. In the text of the document the terms you searched for are highlighted. On the left the table of content can be accessed, printed and downloaded. In the menu on the right are all functions within a document accessible. You are able to search the current document with any search term. You are able to download the document in PDF or RTF format and you can choose to include document data. You are also able to print the document including or excluding document data. Below the E-mail button is located, where you can share (part of) the document immediately without leaving the Navigator. You can also get a link to share the document with others. You can add a label and favourite the document. It will show up in 'Mijn Navigator' or the homepage. Three font sizes are available.

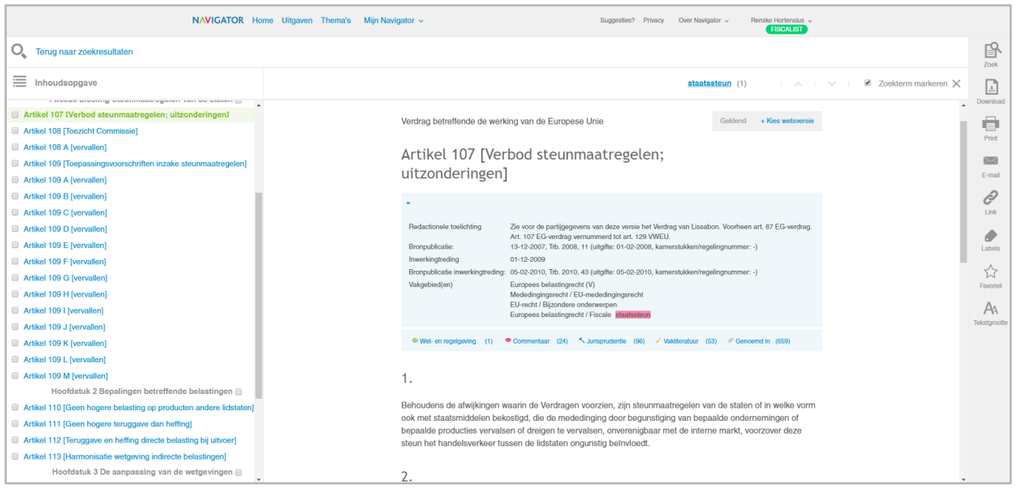


Figure 11: *Navigator Document and Table of Contents*

My Navigator

You can create and attach a label to a certain document. Once you've done this the label shows up in the 'My Navigator' tab where you can access all your labels. You can click on a label and it shows you all the documents you attached the same label to. This way you can make a categorization yourself. The same holds for the notes and remarks, which you can add in a document with the selection tool. You can find these personal notes on the separate 'My Navigator' notes and remarks tab. You can also search through these notes and labels with a specific search engine.

Themes

In themes matters are touched upon that are important in the legal and tax business at the moment. The author explains and elaborates on a certain subject and the theme contains links to relevant laws, jurisdiction and models. These are updated regularly.

2.4 Design Navigator

Below a figure of all existing buttons, text, logos, colours and other visual components is shown. These are all subtracted from the Navigator website and indicate which design choices need to be made for a fitting integration of decision trees.

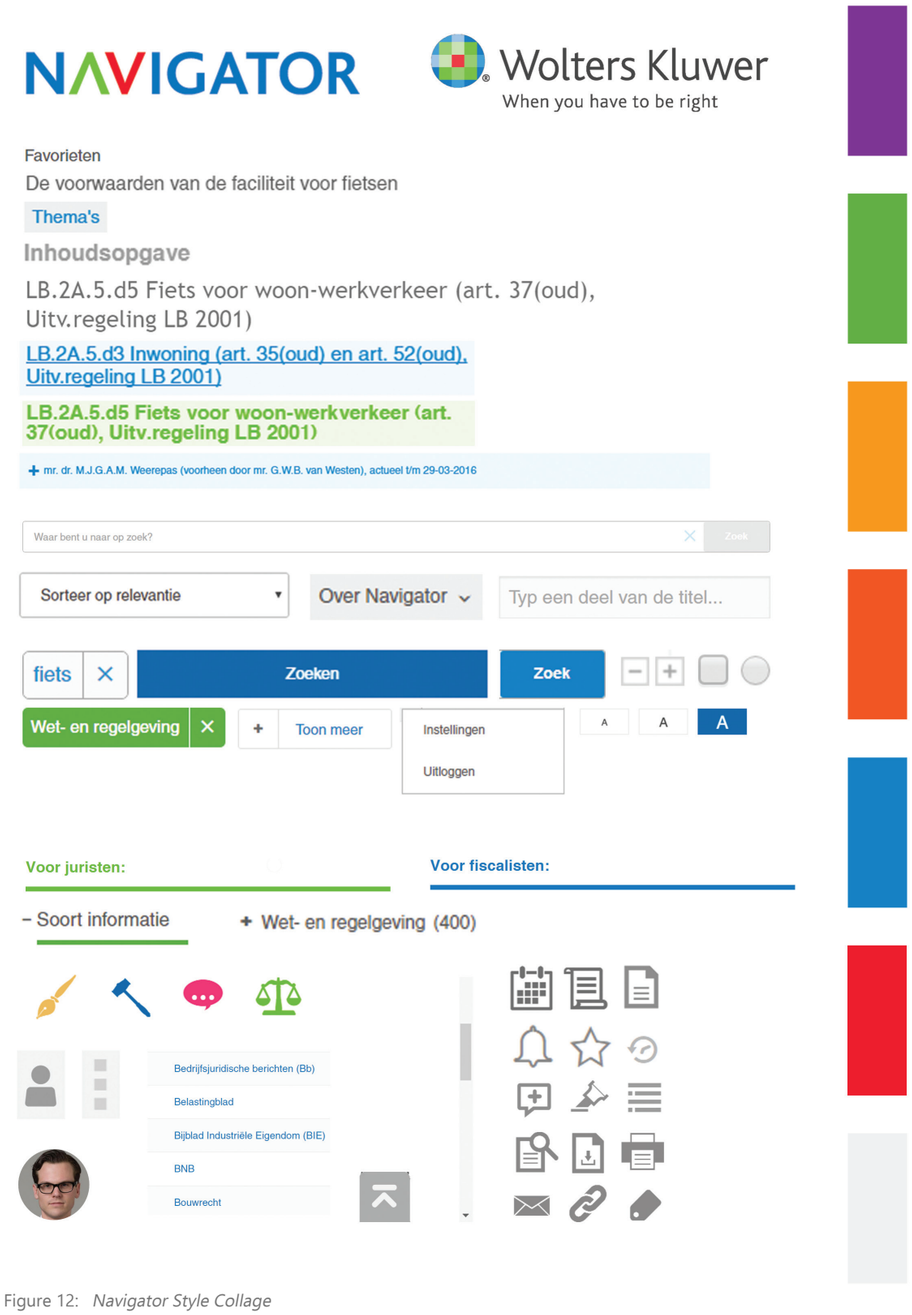


Figure 12: *Navigator Style Collage*

2.5 Existing Wolters Kluwer Tools

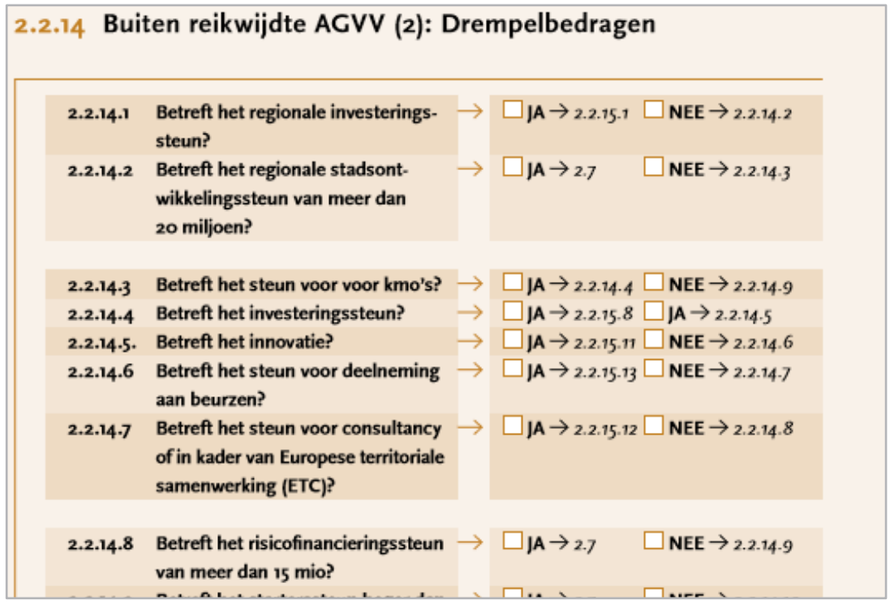
As said before, the company is busy trying to provide their customer with practical information. All throughout the company and in several departments and countries research has been done and concepts have been drafted and even implemented already. This part of the report will deal with the already drafted tools within the company to present information practically.

Models for legal practice

With these models several outputs can be generated, i.e. contracts or letters. These models make official requests, i.e. marriage registration, more efficient. You can download the model and a Word document will open. A document is shown where several spaces are kept blank. There is a number at each blank space that references to a number below the actual model. This reference explains the reason why the information needs to be incorporated in the letter and gives examples for the input. The word document doesn't include these elucidations while exporting. The Navigator contains hundreds of these models. However the design is not very intuitive and the Word document looks outdated.

Paper decision trees for civil matters

The company already has decision trees on paper that can be used to for example figure out if you are entitled to state aid. Although the content of the trees is correct, it is not efficient and you still have to search for the answer. The company is interested in charts like this and they can be very useful. They are however not digitized and can not be integrated in the Navigator yet.



2.2.14 Buiten reikwijdte AGVV (2): Drempelbedragen

2.2.14.1	Betreft het regionale investeringssteun?	→	☐ JA → 2.2.15.1 ☐ NEE → 2.2.14.2
2.2.14.2	Betreft het regionale stadsontwikkelingssteun van meer dan 20 miljoen?	→	☐ JA → 2.7 ☐ NEE → 2.2.14.3
2.2.14.3	Betreft het steun voor voor kmo's?	→	☐ JA → 2.2.14.4 ☐ NEE → 2.2.14.9
2.2.14.4	Betreft het investeringssteun?	→	☐ JA → 2.2.15.8 ☐ JA → 2.2.14.5
2.2.14.5.	Betreft het innovatie?	→	☐ JA → 2.2.15.11 ☐ NEE → 2.2.14.6
2.2.14.6	Betreft het steun voor deelneming aan beurzen?	→	☐ JA → 2.2.15.13 ☐ NEE → 2.2.14.7
2.2.14.7	Betreft het steun voor consultancy of in kader van Europese territoriale samenwerking (ETC)?	→	☐ JA → 2.2.15.12 ☐ NEE → 2.2.14.8
2.2.14.8	Betreft het risicofinancieringssteun van meer dan 15 mio?	→	☐ JA → 2.7 ☐ NEE → 2.2.14.9

Figure 13: *Paper decision tree about tresholds*

Decision tree from Navigator Poland

In the legal department of Wolters Kluwer an interactive decision tree is incorporated. On the right of the screen the structure in shown and all components are clickable. If you click on a node in the right window the left window will scroll to the matching elaboration with law references. The result will be a statement on the subject the tree is built for, i.e. the length of maternity leave.

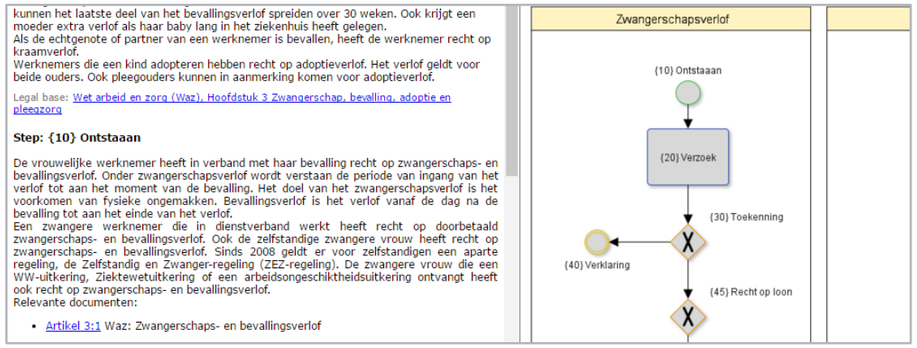


Figure 14: *Interactive decision tree about maternity leave from Wolters Kluwer Poland*

SmartDox

This is a software from Wolters Kluwer which can draft contracts easily. While filling in questions the program automatically generates a contract with all relevant articles. This document is available as download at the end of the session. The answers on the questions are also included in the end for reliability purposes and accuracy of the information.

IntelliConnect

In the America's share of the company interactive decision trees are already incorporated in an online information portal. These trees are sold as an individual functionality or are included when buying a certain content package in their portal. Their decision trees exist of one questions per page and have several references per question. First an explanation is given and then a question is asked or a calculation tool is presented on the screen. They've experienced the user is likely to complete and print the tree.

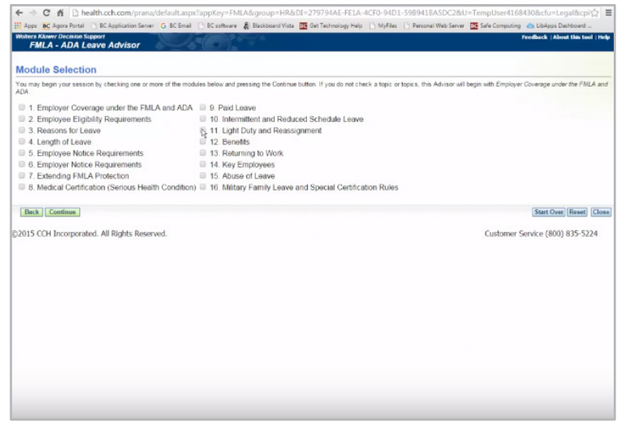


Figure 15: *Decision tree of IntelliConnect*

2.6 Competitors

A selection of general competitors of the Navigator and corporations that offer work flow tools that could be used for decision trees are displayed in this chapter.

2.6.1 General Competitors Navigator

Overheid.nl [11]

This website is an initiative from the government of the Netherlands. On this website a lot of information from different government organizations can be found and the website can be useful to general citizens, private business owners and entrepreneurs. On the tab government a search engine with all up-to-date laws and regulations can be consulted and filters are available for your search results. The results are shown clearly and the whole law can be accessed.

Figure 16: *Search results overheid.nl*

Fiscaal Totaal [12]

Fiscaal Totaal presents itself as online knowledge bank for relevant fiscal deepening. On this website all laws and jurisdiction can be found. You are able to search with a search engine and filter your results. They offer special tools and templates that supply practical information. Almanacs, tax guides and calculating tools are also included. Fiscaal Totaal for Financial is a program targeted to financial specialists.

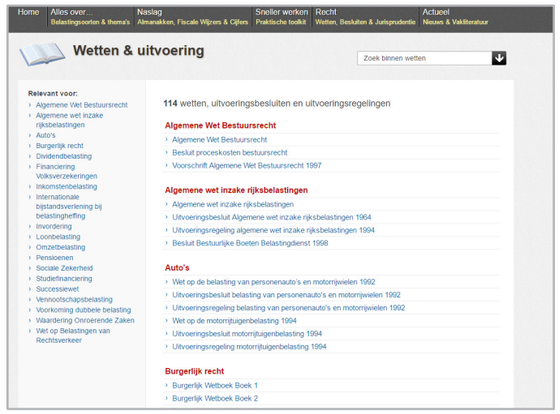


Figure 17: *Fiscaal Totaal law overview page*

Bloomsbury Professional (Tax Planner Interactive) [13]

Bloomsbury Professional is not a very important competitor to Wolters Kluwer because it is aimed at the UK market and Wolters Kluwer Navigator is specifically focused on the Netherlands. However, Bloomsbury does provide practical tax information and uses an interactive tool to present the information. In this tool the provided information is shown chopped into different market life cycle components. Once you've chosen your segment you can choose your goal and an interactive decision tree tool opens. You have to answer very practical yes/no questions about the situation and the end result is a gathering of the facts, a client summary letter, step-by-step guidance plan and more tips and tricks.

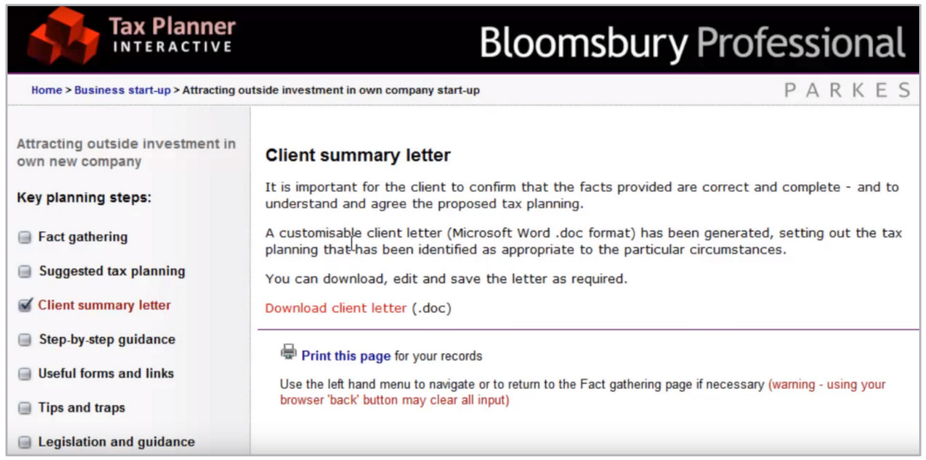


Figure 18: *Interactive decision tree from Bloomsbury Professional about investment*

LexisNexis[14]

LexisNexis pioneered in the 1970s with an online legal data system where documents were accessible digitally. [15] They currently have the world's biggest online database for legal related information and offer multiple solutions for several different market segments. Lexis Advance is an online legal research solution where jurisdiction and laws can be found and is part of Wolters Kluwer Poland. The Lawyer Overview Tool provides several calculation insights. LexisNexis Academic is aimed at students specifically and provides a legal related information database where articles and juridical publications can be accessed.

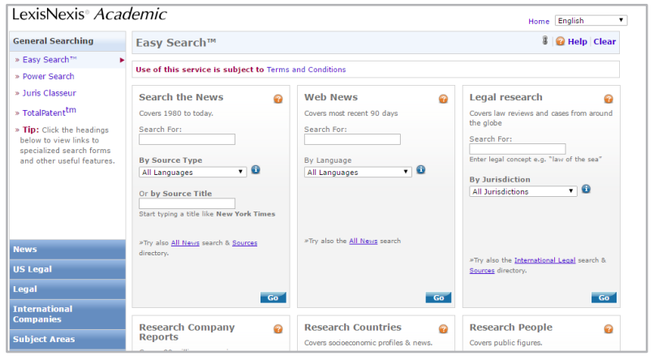


Figure 19: *Home page LexisNexis*

2.6.2 Decision Tree Tools Competitors

Berkeley Bridge [16]

This software is designed to create an interactive decision tree easily. After downloading the program an interface is shown with multiple windows. The middle window shows the structure of the tree which you can edit directly. You are able to add nodes and connect questions with answers to them. If you add a question a new window will appear where you are able to fill in the details. In the interface window you will directly see your changes. You are able to choose an answer kind, for example a check-box or a combo-box. The tree can be exported as an XML file.

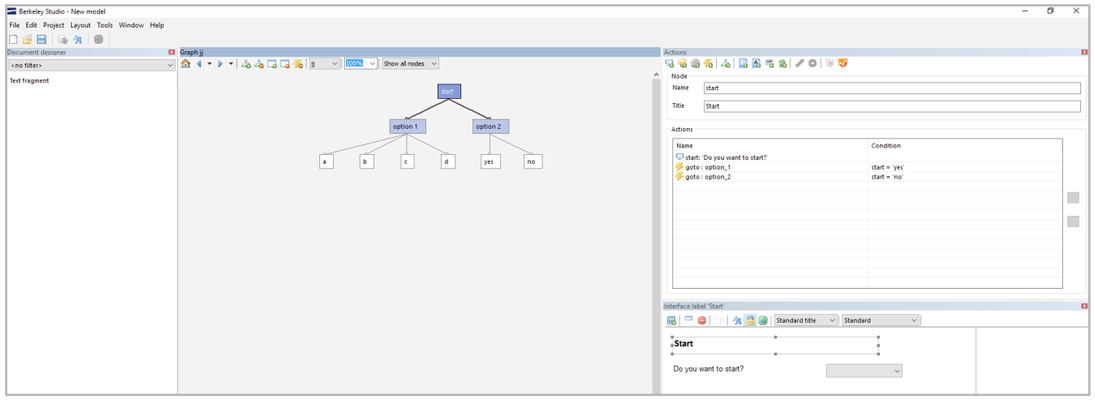


Figure 20: *Author input software from Berkeley Bridge*

Zingtree [17]

This website helps you create an interactive decision tree. When starting a new tree there are three choices in the way of creating: drawing, insert questions and the blank starter tree. It is also possible to choose between two lay-out options, buttons or panels. The node in the tree is also flexible, it can vary between a question(commonly-used) and linking to another tree. You can add a yes/no question and fill in the question and answers yourself and link these to the next question. The 'designer' lets you draw up the structure with the components you've made and make connections easily.

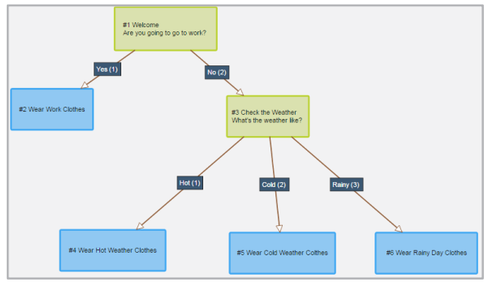


Figure 21: *Author input software from Zingtree*

Figure 22: *Interactive decision tree output from Zingtree*

Yonyx [18]

On this website you are able to create interactive decision trees. You have multiple editing options: map view and slide view. The map view shows the structure of the tree. The slide view looks more like how it's going to end up for the user. You are also able to see the end result any time you want. In the slide view you can add a follow-up question and structure the tree this way. It is also possible to give the questions a name and a description. In the editing views you are also able to see the cumulative traversal analytics.

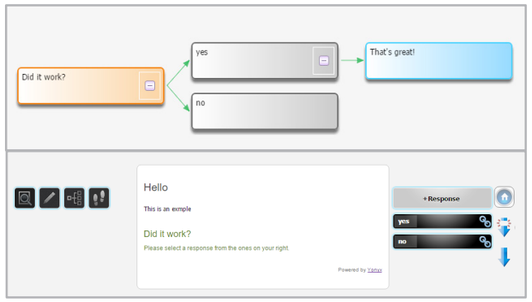


Figure 23: *Author input software from Yonyx*

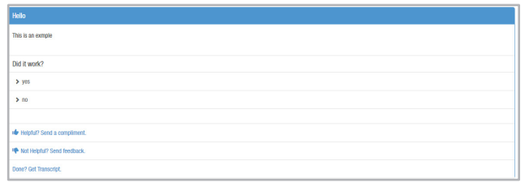


Figure 24: *Interactive decision tree output from Yonyx*

SmartDocuments [19]

This company is a specialist within the branch of customer communication and document creation. With their services it is possible to create a customized tool for document creation with a touch of your own company. They offer maintenance help and it is possible to link several application to a SmartDocuments tool. Their aim is offering customers the convenience of creating documents fast and with corporate identity. They realise this by offering templates and remembering information from all documents that can be reused afterwards.

Figure 25: *Logo from Smart Documents*

2.7 User

Fiscal and tax professionals, i.e. lawyers, jurists, payroll tax specialist or accountants, work in a fast-paced business and efficiency is important. The professionals(juniors and seniors) use the Navigator to find the complete law, jurisdiction, relevant news and publications. The use of this information varies a lot. Lawyers may use it to strengthen their case and fiscal advisors may use it to give a client advice for their company. The task of the users is therefore flexible but a few examples are: 'gather facts, draft contracts, litigate, research, give advice, calculate risks, transfer knowledge and mediating between two parties'. The database of the Navigator contains a lot of subject specific information and is therefore used by the professionals to find in-depth information. The seniors use latent knowledge and use the Navigator to find the exact document, the juniors are more likely to search for new information. The time they spend searching for information in the Navigator also varies. Some users may use it once every month and some users use it several times a day.

The online behaviour of the customer is wide in range. Some users identify as computer illiterate while others are information specialists and teach others how to manage technology. Most of the users are still working paper-heavily and prefer it this way. The younger users prefer everything digitally and do not appreciate the enormous paper database in their room. Less than five percent of the total amount of use is caused by users on a mobile phone. The average age of the user is approximately 43 years old, but also varies between users in their twenties and users in their sixties. The decision trees are being developed mostly for juniors, because specific needs based off customer experiences are: 'intuitive designs, print option, easy filtering, connection with social media, easy access to information'. Also seniors who wish to assist their client with a question outside of their specialisation will make use of the tool. The expertise of the user is not of the highly advanced level. However the Navigator provides in-depth research and therefore a certain amount of background knowledge of the research area is known by the user.

2.8 General User Interface Guidelines

The usability heuristics for user interface design defined by Jakob Nielsen [20] contain several principles which should be kept in mind while designing in an user centralized way. It states that a user should always be aware of the system status, providing feedback to the user within a certain time frame is essential for a user-friendly design. A relation between the system and the real world should be established to create recognition for the user and make the user interface intuitive. As a designer you should keep in mind the fact that users make mistakes and functions as undo and redo should therefore be supported. During the design process components with a high error risk should be avoided. If an error does occur clear indication and explanation of the solution is essential. Confusion should be avoided at all times and consistency is an important heuristic to makes users understand a system better. Also, users get accustomed with a system and the system should be designed to give the user the opportunity to increase their efficiency. Besides functional heuristics aesthetic design also plays a big role in a user-friendly interface design. Minimalistic design is preferred as every additional information component competes with the other components in the frame. A designer should not create distractions by adding unnecessary information making optimal use of the selective attention of the user. The user should not spend his time in a cluttered environment searching for the right information, the so-called visual search should be kept at minimum. Another way to decrease the visual search is providing the user the needed information in one screen taking account the human memory limitations. Ideally help concerning the use of a system is not necessary. However sometimes it is impossible to avoid and help should be offered focusing on the task of the user and offering specific solutions.

Action selection

When the user is subjected to a choice, no more than the essential options should be presented, particularly if time is critical. Many choices result in longer response time and more mistakes. Time required for a single high-complexity choice is higher than multiple low-complexity choices. A contradiction concerning this complexity of choice is: keep choices simple, but use a small number of complex choices. A single choice among a larger list is often better than multiple sequential choices among smaller lists. [21]

Human brain limitations

When designing an user interface the limitations of the human brain should be taken into account. Especially the attention, perception, interpretation, comprehension and cognition are important factors. Attention can be divided in three modes: selective, focused and divided attention.

Selective attention is influenced by a certain amount of factors. Some of these factors are: salient features, expectancy, value and effort. When designing a decision tree these factors should be kept in mind, because this supports for example highlighting important information or keeping information hidden to focus on the highly important information.

Focused attention is to maintain processing of the desired source and avoid

distractions. The decision tree should not contain visual so-called noise to improve the focused attention. Making information discriminable in a certain way will help the user distinguish information and keep focused and pay attention to the right thing. Making two components the same colour makes the user wonder if they are connected.

Divided attention is the ability to do certain tasks at the same time. Dual-task environments should be avoided in a design as it is an additional difficulty for the human brain and makes the design more complex. [21]

Visual perception

The Gestalt Principles [22] define several guidelines in terms of visual perception which can be applied to user interface design. These principles describe how the human brain groups images.

Similarity and Anomaly

Continuation

Closure

Proximity

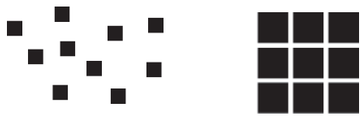


Figure & Ground

Figure 26: *Gestalt Principles visually explained [22]*

2.9 Guidelines and Needs

2.9.1 Design Principles

Mainly out of the analysis of existing decision trees(Chapter 2.2, denoted with a 2), the Navigator(Chapter 2.3, denoted with a 3), the user(Chapter 2.7, denoted with a 7) and the research on user interface guidelines(Chapter 2.8, denoted with an 8) design principles for the user interface for decision trees for the Navigator were gathered and clustered. The complete list is shown below.

Overview
- Minimize different pages (2)
- Input and Output generated on the same page (2)
- Subject categorization (2)
- Seeing response immediately when changing a field (2)
- Ability to go back to any question you want (2)
- Ability to return to decision tree, if linked to another page (3)
- Reduce fear of incomplete information (8)

Progress indication
- Indication of progress (8)
- Indication of chosen path (8)
- Show future questions (2)
- Show if a question is required (2)
- Clear boundaries where the decision tree ends (2)

Consistency
- Interface design fitting with Navigator (3)
- Same lay-out, same interaction (2)
- Consistent way of filling in the entry fields (8)
- Consistent direction of flow, i.e. scrolling down (2)
- Consistency in directory links (8)

Scalability
- Functionalities consistent when changing the page size (2)
- Compatible with different operating systems (3)
- Compatible with different browsers (3)
- Responsive design (on desktop, tablet or phone) (3)
- Adaptive to uncertain amount of questions (3)

Accessible for everyone
- Take into account colour blindness (7)
- Take into account dyslexia (7)

Flexibility
- Adaptive to different inputs (3)
- Adaptive to different outputs (3)
- Adaptive to elaborate explanation (2)
- Opportunity to grow in total size (3)
- Maintenance (3)
- Performance (3)

Attention
- Minimize visual searching time (8)
- Balance amount of questions on one page (8)
- Cluster information that belongs together (8)

2.9.2 Customer Needs

Wolters Kluwer wants to know how interactive decision trees could be integrated in the Navigator. Therefore it is important to prioritise functions and pinpoint which functions are necessary to gain profit from this new functionality of the Navigator. Together with the product owner and several influential people from the company this Minimal Viable Product (MVP) was drafted. An explanation from a marketing's point of view and measurable requirements are added to the most important customer needs as stated below.

As a user I want to...

... find interactive decision trees in the Navigator

Interactive decision trees as one may notice is written in plural form. Several subjects lend themselves for being put into a decision trees and with implementation a number of trees is going to be integrated at the same time. An overview page has to be designed, where all trees can be found. This also helps concerning the business strategy, promoting decision trees as a new concept, a new functionality, thus with a new page. Besides finding the trees on a separate page, integration with existing content and functionalities is also important to reinforce the use of the trees. It also makes the customer aware of the functionality 'decision trees'. Therefore trees will be found in the word wheel, search results, themes and relevant articles as well.

... Favorite interactive decision trees in the Navigator

An existing functionality of the Navigator, as stated in chapter 2.3, is the ability to mark a document as favourite. Someone using the decision tree and familiar with the Navigator will expect this functionality to be active and looking at the KANO model [23] this is a basic requirement. It is also easier for the user to find the decision tree, as the favourite documents are shown on the homepage.

... save the interactive decision tree to the computer

Once the user has found the decision tree and has used it in any way the result of the user's actions should be saved somewhere. Because technology and information systems are a big part of the society nowadays, a function like saving is also expected and will be very much missed.

... print the interactive decision tree

As much as Wolters Kluwer wants to digitize their products the industry is not ready for complete digital enclosure. Paper is still very much integrated in practice and books stand at the core of the law. It is therefore important to give a voice to this need. Besides the habit of using paper in the industry, people who are excited about digitization prefer a printing option as well, because reading for example is easier on paper than on screen.

... be able to go back to a previous question

The thinking track of users has to be changed in order for interactive decision trees to be successful. A risk with digitizing paper decision trees for example, is losing track of the complete picture. The human memory has trouble memorising big chunks of information as stated in chapter 2.8 and it is important to give the user the opportunity to see all the previous answered questions.

... be able to change my answers

As systems need to be adapted to the possibility of errors(Chapter 2.8) of humans, it is a logical step to include this error handling functionality in the decision trees. Besides error handling, it is necessary for the user to be able to explore several different answer paths to compare and come to the right answer and advise for their client.

As this pilot study can be categorised as an exploratory research, the focus lies on investigating the customer needs and gathering broad knowledge. Therefore the measurable requirements were not used often during the design process. The requirements however have been defined to anticipate on future restrictions and can be found in Appendix B. All wishes from the user are included in this document aswell.

3 IDEAS

In this chapter the beginning of the creative process of this assignment is touched upon. Small ideas, first visions and figments are all part of the process. As ideas can look great in your mind the thinking process really starts with drawing these out and discovering new ideas because of these visualisations. This chapter describes the thinking process and deals with premature ideas.

3.1 Concept Visualisation

As ideas are meant to lead to a concept eventually it is important to know the scope of the assignment and have a clear vision of the deliverables. Research on integrating interactive decision trees in the Navigator resulted in several minimal requirements as discussed in chapter 2.9.2. These requirements implicate several design components in order to complete the assignment as visualised below.

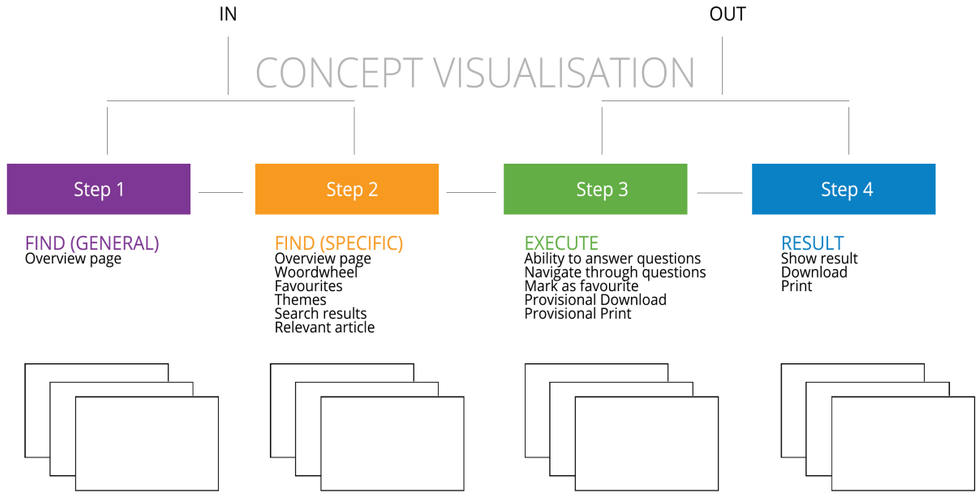


Figure 27: *Concept Visualisation of deliverables assignment*

If interactive decision trees are going to be integrated in the Navigator they need to be found in order for people to use them. A decision tree can be accessed, noted as IN in the concept visualisation, and exited, noted as OUT in the concept visualisation, in two type of ways.

3.2 Ideas Step 1

Step 1

FIND (GENERAL)
Overview page

All existing interactive decision trees can be found on the overview page. This step can be seen as finding the functionality in the Navigator and will exist as a button on the top menu (next to 'Uitgaven'). On the overview page the titles of all trees together with an explanation of the final result are presented. The trees will be categorised by job description : jurists, tax expert and government specialist and by discipline(if >16 trees).

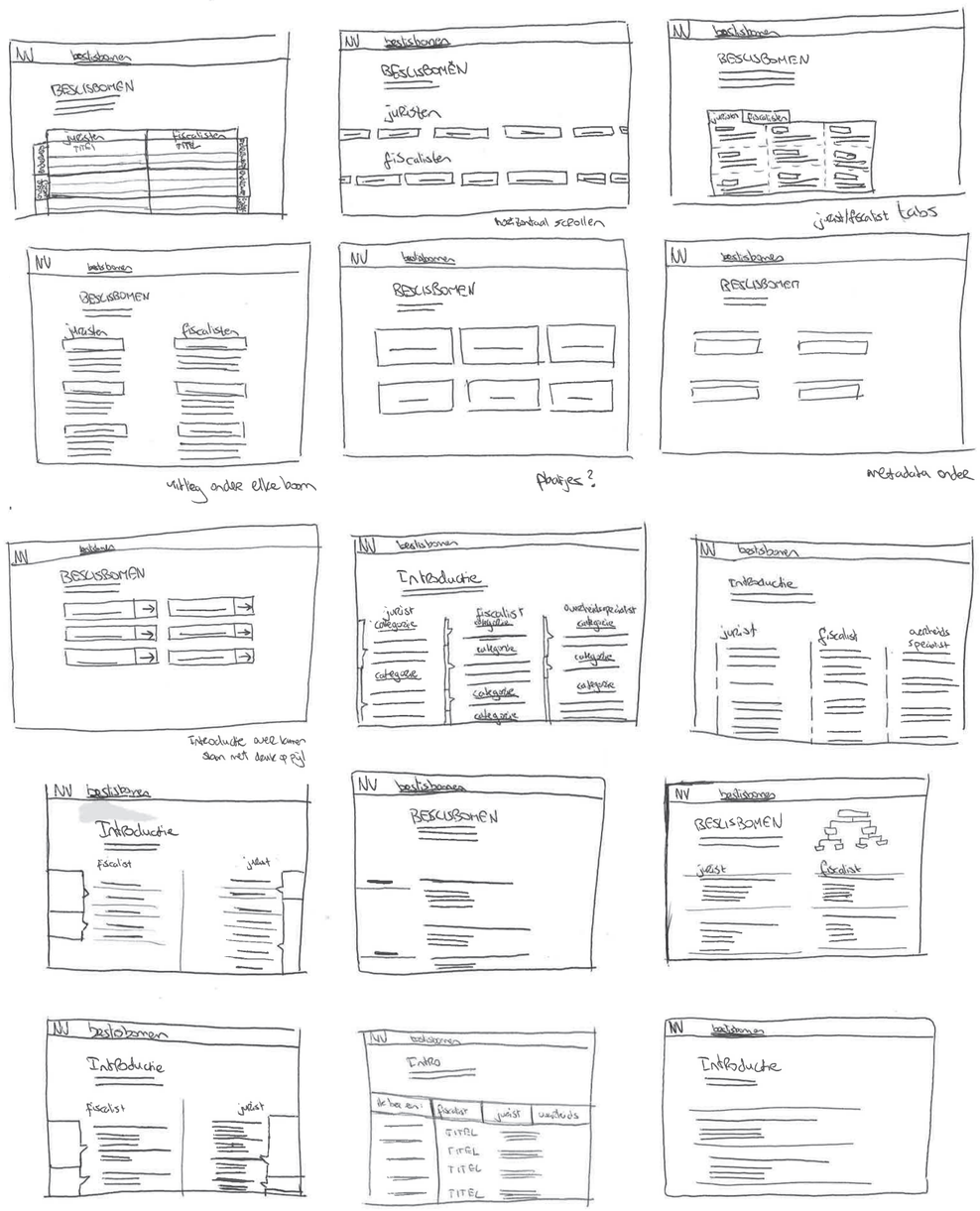


Figure 28: *Paper ideas interactive decision trees overview page*

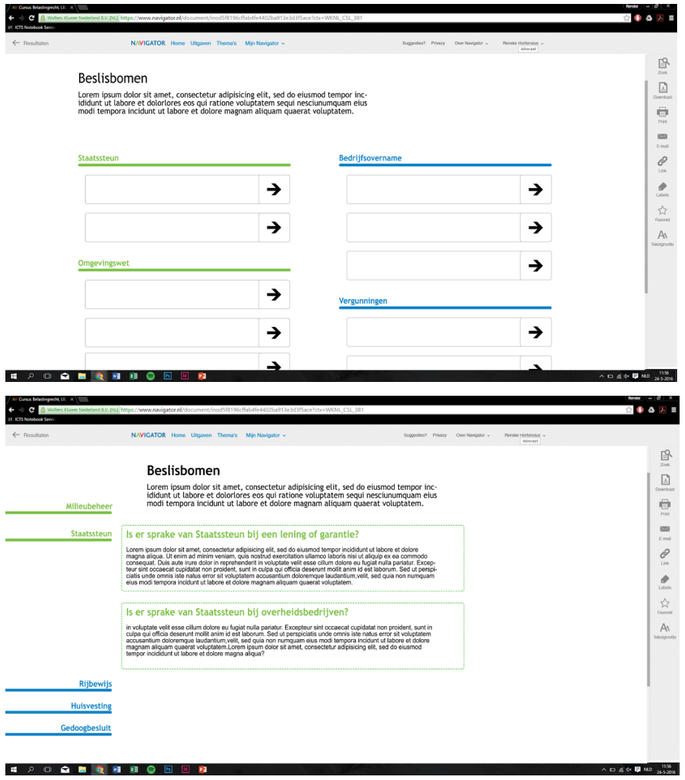


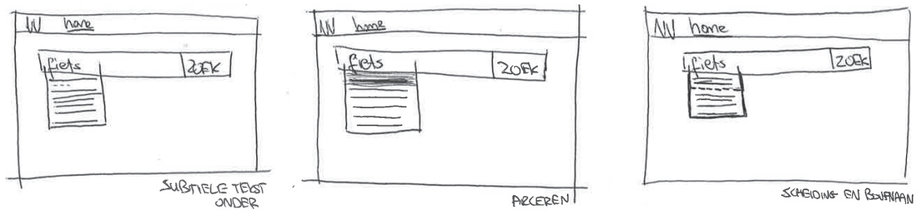
Figure 29: *Digital ideas interactive decision trees overview page*

3.3 Ideas Step 2

Step 2

FIND (SPECIFIC)
Overview page
Woordwheel
Favourites
Themes
Search results
Relevant article

Besides accessing a specific tree through the overview page, a tree is also visable in several other places. If searched for a specific term in the search engine the related decision tree will be shown in the woord wheel and search results. If the decision tree is favourited by the user it should show up in the 'Favorieten' window. As themes combine several information sources to one general topic, fitting decision trees will be added to this page as well. Trees will be shown at a relevant article page as well to create awareness for the functionality. The format of favourites and themes is set and decision trees can be added the exact same way. New designs are made for the Wordwheel.



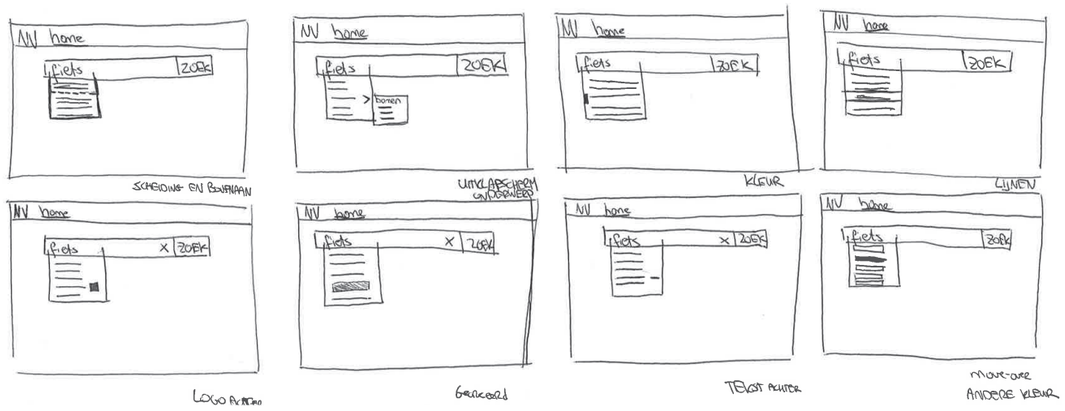


Figure 30: *Ideas current word wheel*

When decision trees are going to be integrated in the word wheel, a completely new design is preferred as the tool should be distinguished from regular documents. Below a few designs of new word wheel designs are shown where types of documents are in separate categories.

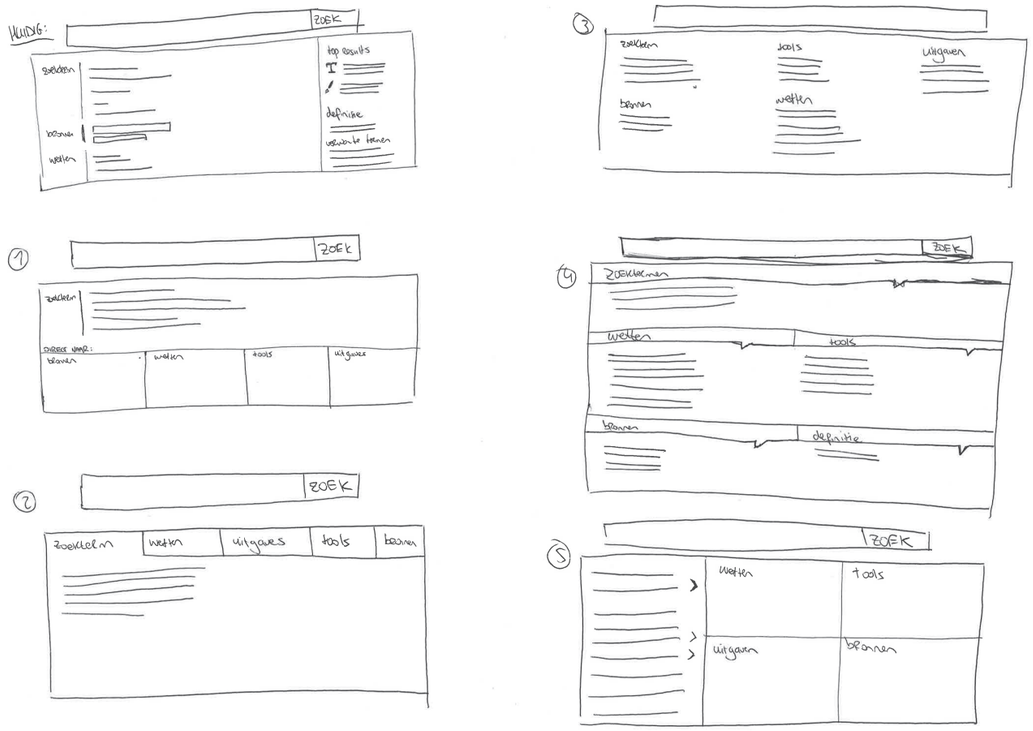


Figure 31: *Ideas new word wheel*

The previous designs were focused on the components and structure of the page. The few best designs were chosen to digitize and to elaborate the visualisation and are shown below. This selection was based on the findings from chapter 2.9 and the input from employees. The ideas for the current word wheel integration are shown below.

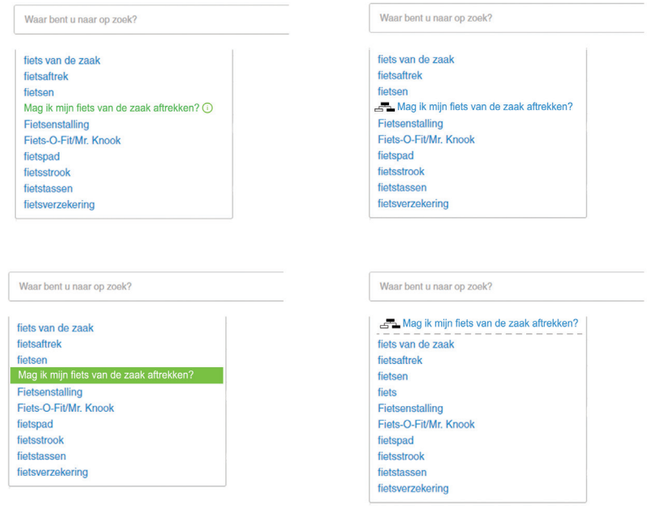


Figure 32: *Digital ideas current word wheel*

The designs for the new word wheel with more information:

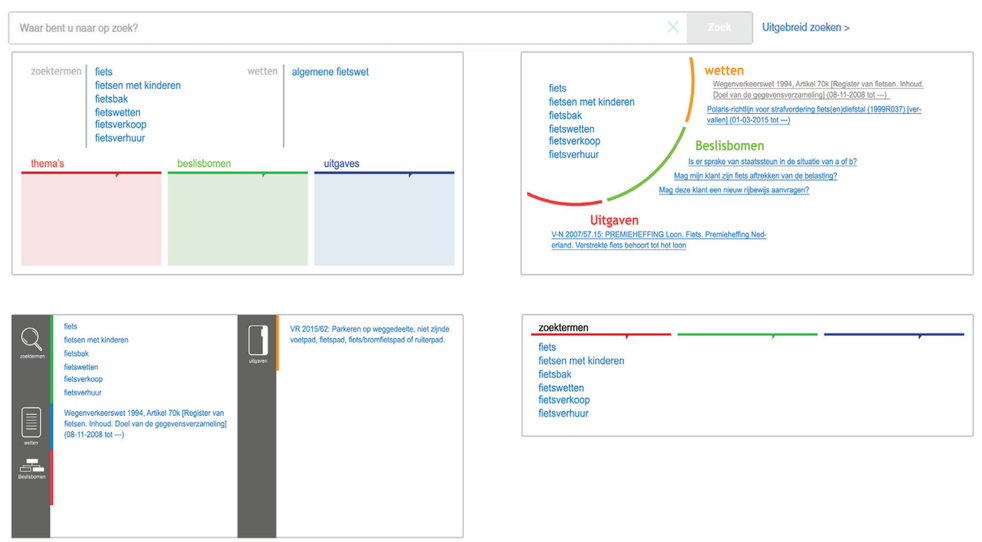


Figure 33: *Digital ideas new word wheel*

3.4 Ideas Step 3 and 4

Step 3

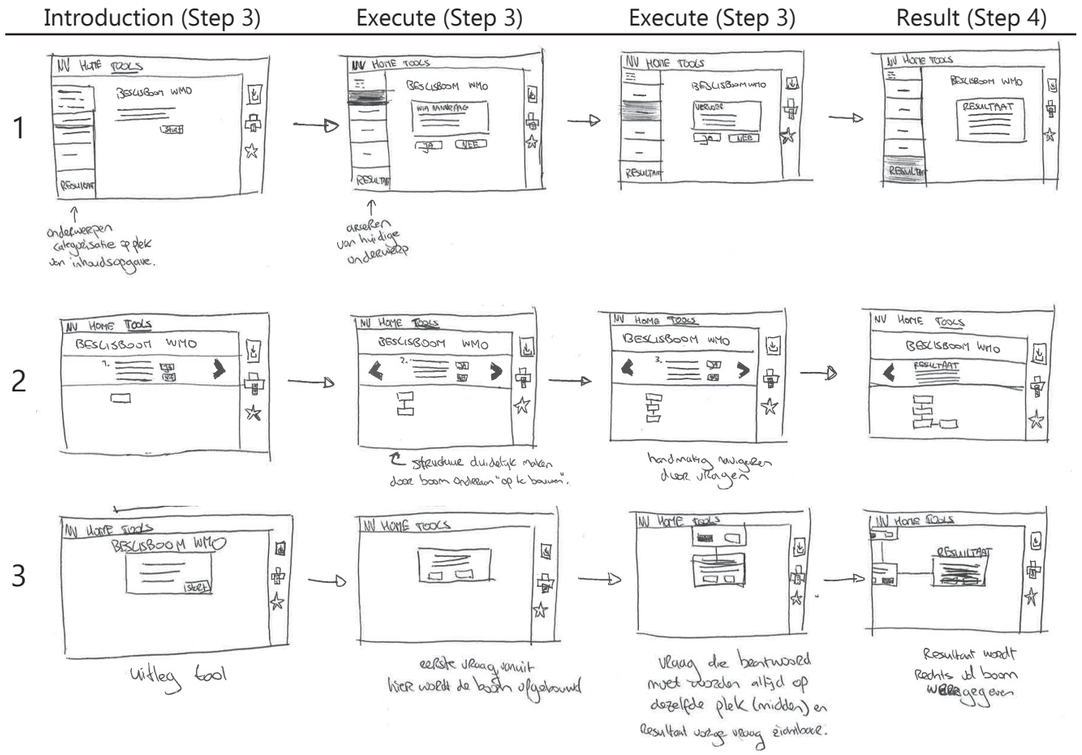
EXECUTE
Ability to answer questions
Navigate through questions
Mark as favourite
Provisional Download
Provisional Print

Once the tree is found and opened information needs to be provided and questions needs to be answered. The defined minimal functionalities as stated in Chapter 2.9.2 such as the ability to print a provisional tree need to be realised in this step. In the designs below the first three images from the left side are regarding this step.

Step 4

RESULT
Show result
Download
Print

This step is the final step in order to finish the decision tree. The result has to be represented and the functionalities download and print need to be realised. Once the result is showed and downloaded or printed the user has completed the interactive decision tree and will leave the page. Below all paper element designs are presented with the last image on the right representing step 4.



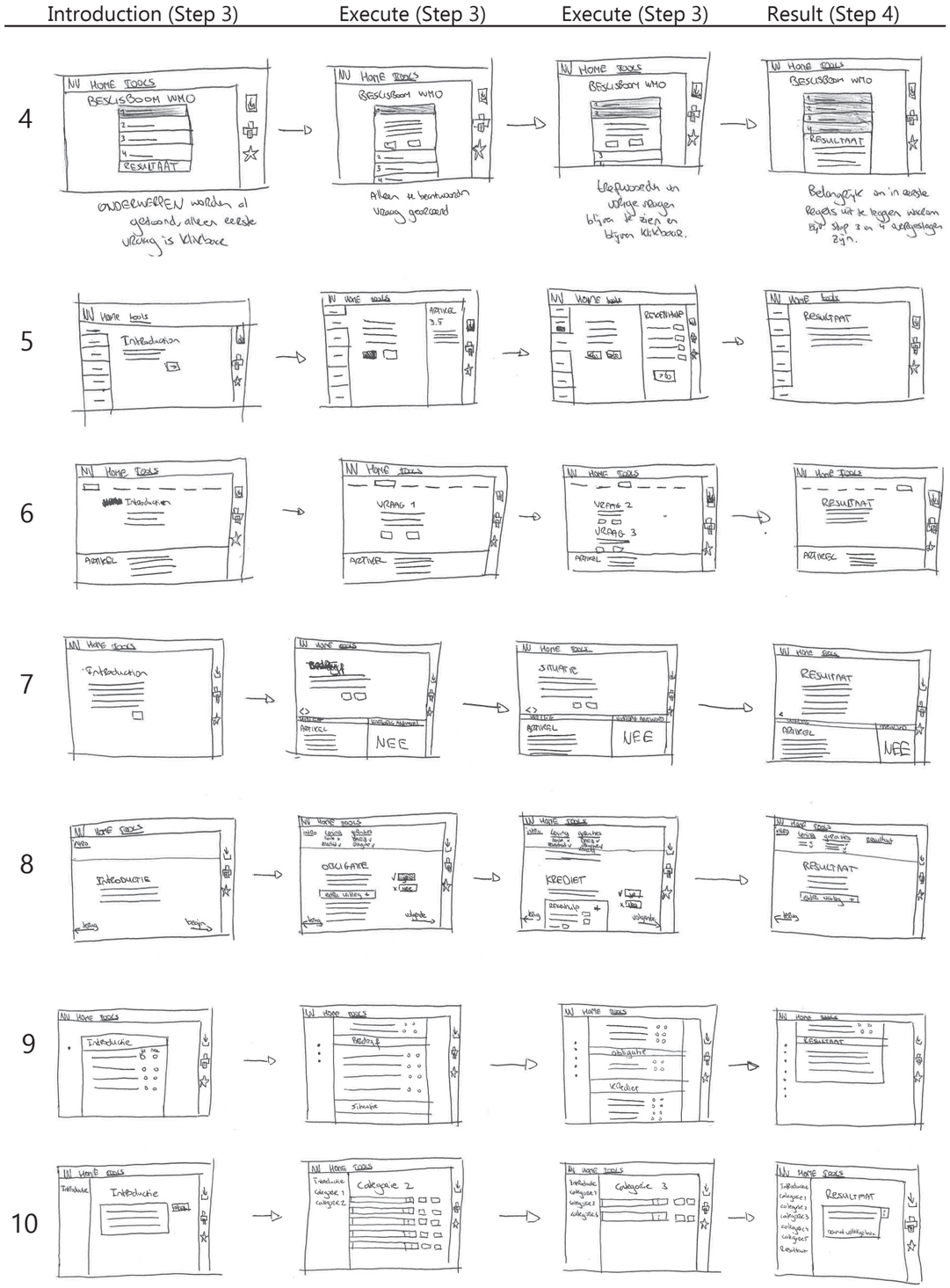


Figure 34: *Ideas interactive decision tree page*

Out of the paper designs with different elements two main directions were derived. The designs are on component and structural level. It is therefore important to realize that the focus is also based on these assets, meaning the actual visual appearance and the substantive content are still subject to change. All designs have one thing in common, which Is the framework they are in. The Navigator document screen as explained in the Navigator analysis (1.7??) already provides a print, download and favourite option. It is useful to keep these functionalities, because the decision trees are going to be integrated in the Navigator and it would save a lot of work in the development phase.

Looking at the customer needs, most designs would be a good fit and have the right components to satisfy the end user. However, it is not necessarily about the presence of the component but more about how well and in which way the requirement is realized. The next two concept foci are chosen based on the Design Principles (Chapter 2.9.1). Important to point out is the requirement of flexibility. Because it is not clear yet what the content, input and output, amount of questions and elaboration of the decision trees is going to be and probably options will be incorporated in the long-term, the ability to up- and downscale the design was important aspect in defining the directions.

3.4.1 Concept 1: All in one (Idea 9)

This design is focused on fast completion and more specifically towards simple questions. The design exists of one window where all the questions can be answered by scrolling down the page. The categorization is highlighted and when a category is completed a dot appears on the left. This makes it easy to scroll up to previous categories. When a reference is needed a link is in the text and a new internet browser tab will open with the relevant article or calculation or the explanation will be shown in-text.

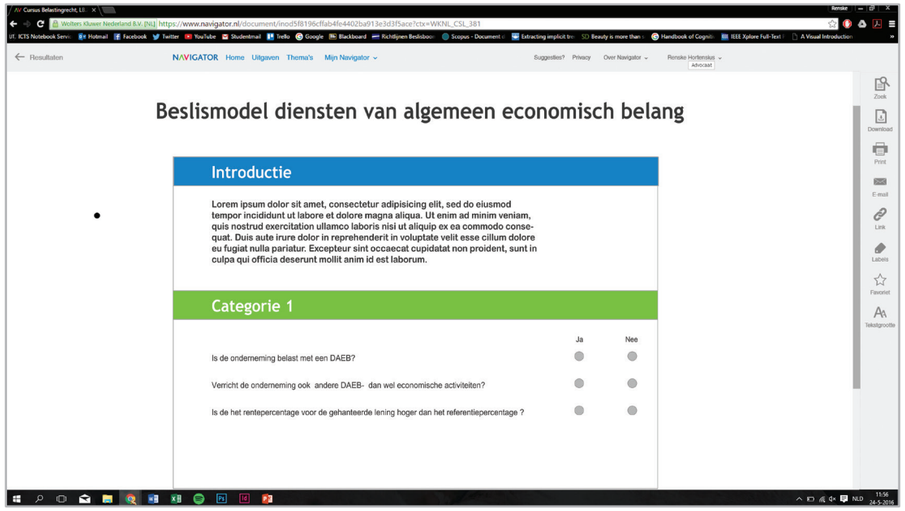


Figure 35: *All in one idea 1*

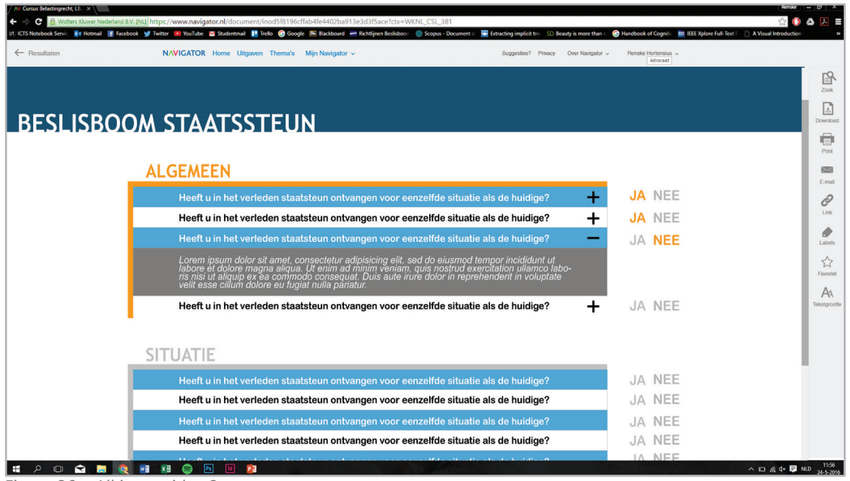


Figure 36: *All in one idea 2*

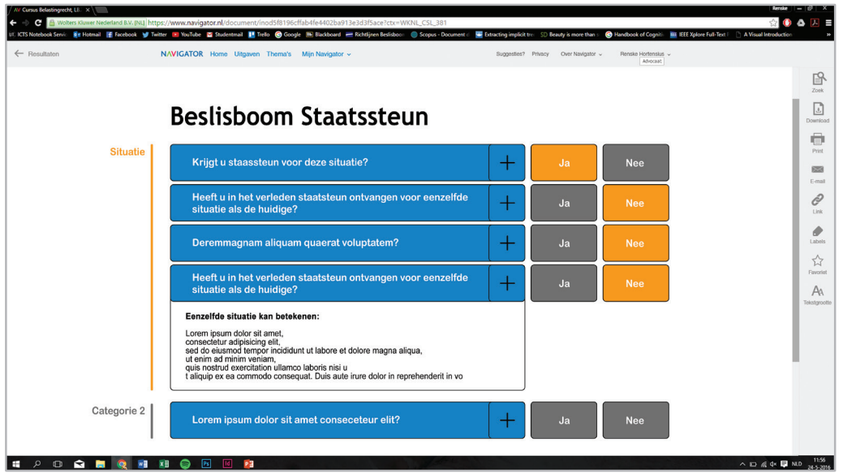


Figure 37: *All in one idea 3*

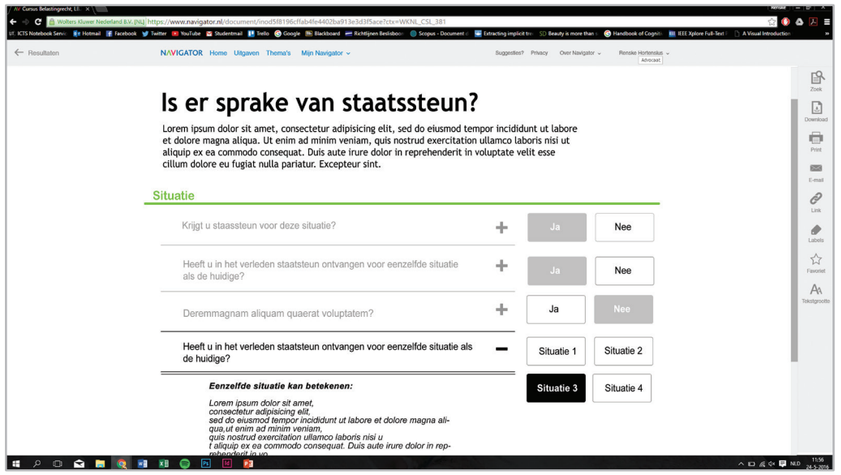


Figure 38: *All in one idea 4*

3.4.2 Concept 2 : Window Integration (Idea 5)

This design is focused on letting the user keep overview which is realized in two ways. On the left of the screen a subject subdivision is shown. Keeping in mind the assumption that every decision tree can be divided into categories in some sort of way. The user has a progress indicator, because the menu on the left drops one down when a new category is addressed. It is also possible to go back to a previous finished category. An elaborate explanation is hidden and can be excessed by means of an hyperlink or clicking 'more information'. The explanation is shown in a new window or in-text. This design is spacious meaning the length of the question can vary without causing trouble. The visual search is also minimised by adding category headers and the memory capacity is decreased as all given answered are still visible.

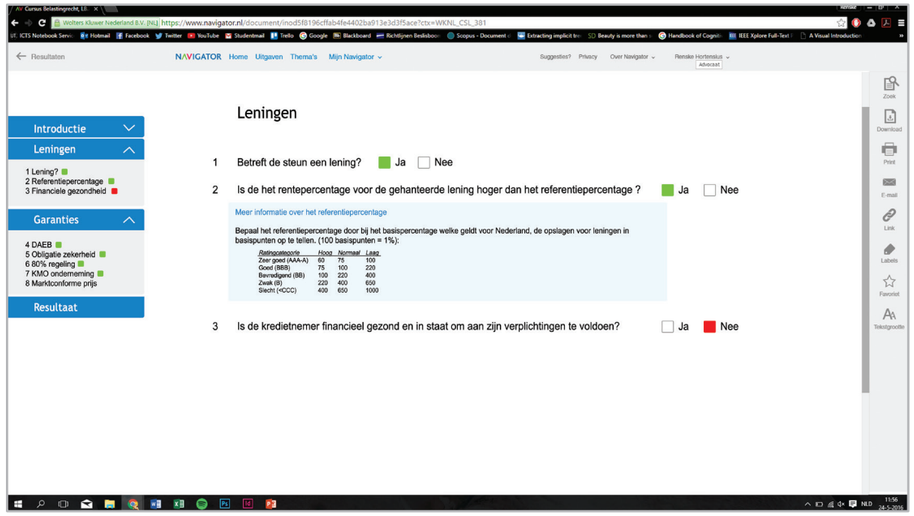


Figure 39: *Window integration idea 1*

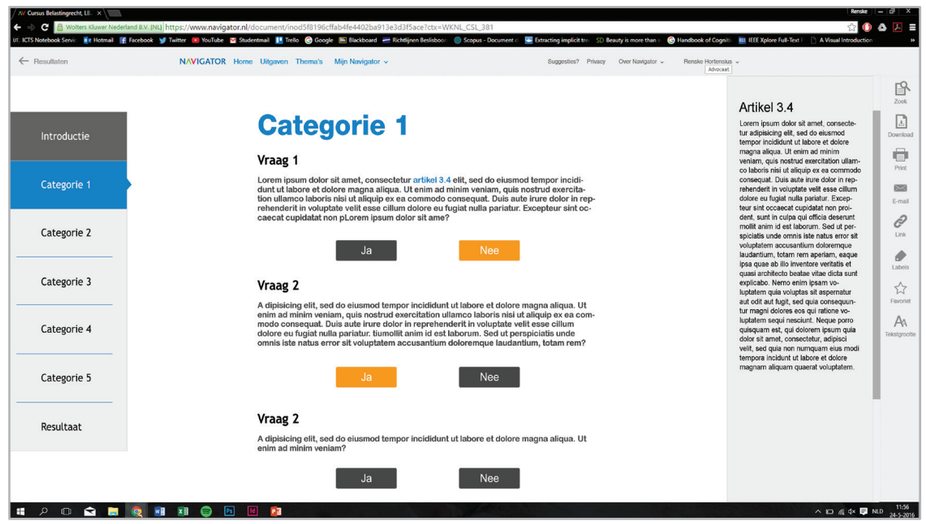


Figure 40: *Window integration idea 2*

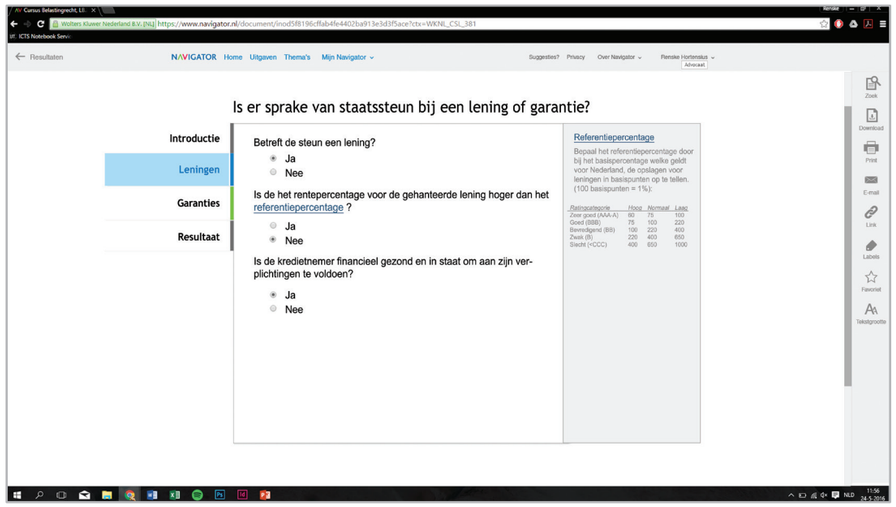


Figure 41: *Window integration idea 3*

4 CONCEPTS

The concept phase is where several concepts are defined out of the ideas from the previous chapter. The ideas are not just digitized, but adapted to the visual design of the Navigator and first problems are addressed and details are changed to make it suitable for computers. The end result of this phase is detailed concepts ready for use in the user test. The content used in these designs is from Allard Knook's book 'Handboek Staatssteun'.

4.1 Step 1

The second idea for the overview page is chosen for the final concept. At the top the title states 'Decision Trees' and a general description about the functionality is given. Below the list of interactive decision trees start and a categorisation is added on the left to make it easy to scroll through the titles. The subjects are closed at first and one subject at the time is open with the corresponding titles. An interactive decision tree is indicated by a specific title and a description where the goal of the tree is stated.

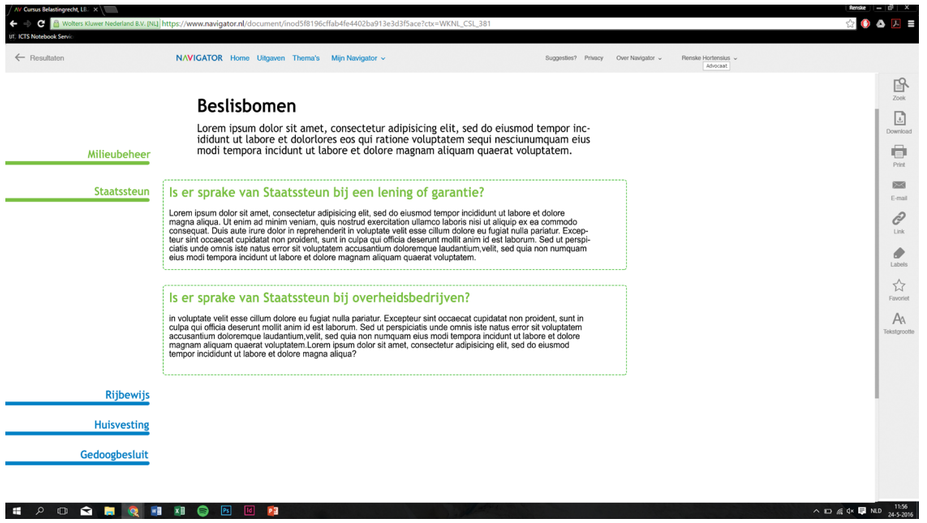


Figure 42: *Overview page*

4.2 Step 2

The chosen concepts for the word wheel are presented below. Decision trees are going to be limited, meaning that every time a decision is found through the word wheel it needs special attention. In the current word wheel the best way to get attention would be to put the decision tree at the top of the wheel with a logo to indicate the sort of document. With the new word wheel design where more information is incorporated the design is chosen with the most clear overview. Using the colors of the categories as also done with the themes page creates distuinguishment between the results and the icons make it easy for the user to recognize the type of document.

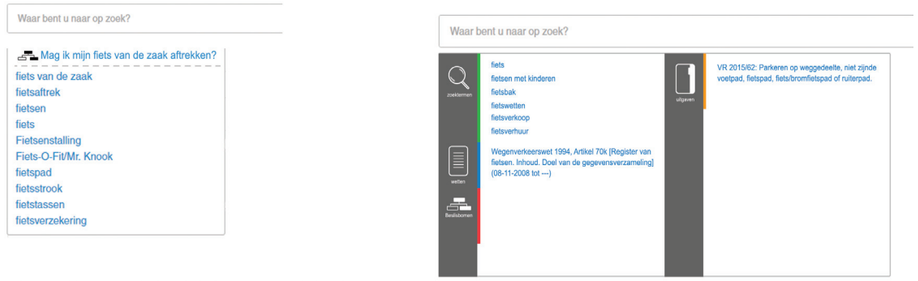


Figure 43: *Wordwheel (left: current; right: future)*

4.3 Step 3 and 4

In the concept phase the two interactive mock-ups for step 3 and 4 are presented and an elaborate explanation is given as to why certain choices were made. First of all, both concepts are integrated in the framework of the Navigator. The functionalities on the right menu, as described in chapter 2.3, can be re-used and the use of these functionalities is known to the user. Recognition was stated as one of the design principles in chapter 2.9.1. The 'Zoek', 'E-mail', 'Link', 'Labels', 'Favoriet' and 'Tekstgrootte' functionality are exactly the same.

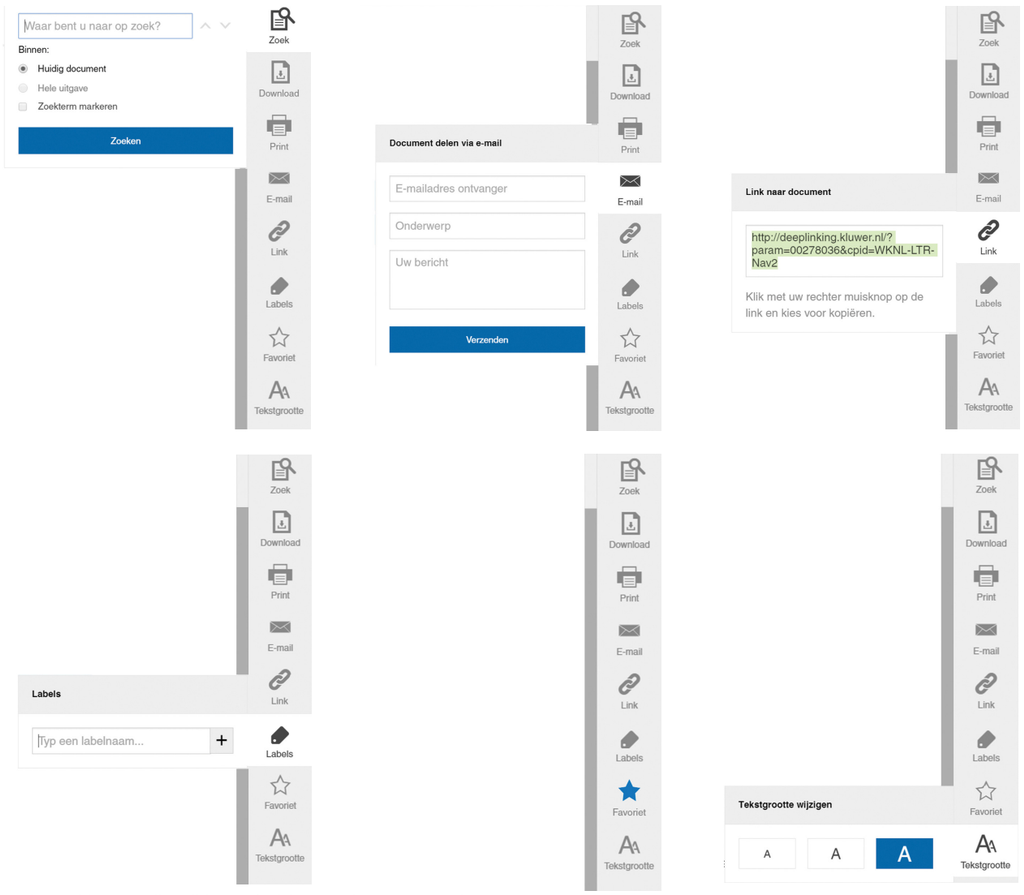


Figure 44: *Functiionalities at decision tree in current Navigator*

The functions that differ from the current Navigator functionalities are the print and download option. As shown below the special download and print functionality consists of three options, translated into 'Overview current subject', 'Complete provisional tree' and 'Result' with the options 'Including answer path' and 'Including reference articles'.

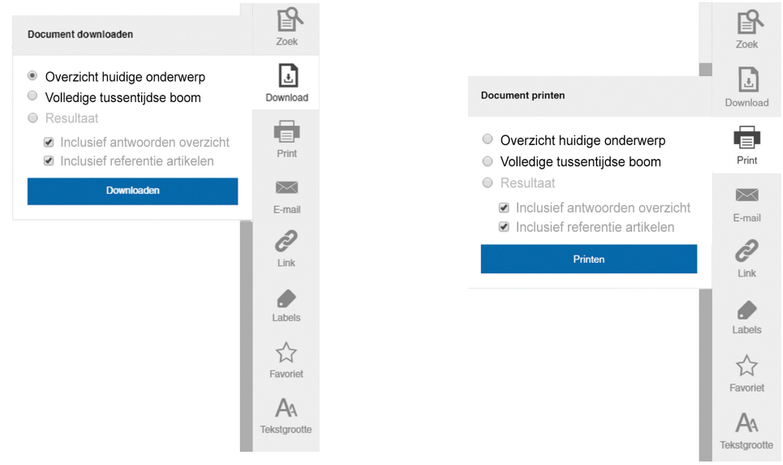


Figure 45: *Changed functionalities*

4.3.2 Concept 1: All in One

The main goal of this concept is to keep overview and to be able to change answers easily. The screen opens when a specific tree is chosen and the title is presented on top. The title consists of a general question. An introductory explanation is below which states the goal of the decision tree. The user can immediately start the decision tree with question 1. In green a categorisation is denoted to give the user something to hold on to and distinguish groups of questions. The answer buttons are big and therefore easy in use. This tree is optimized for bilateral questions, but several answer possibilities are also possible. The idea of this design is the user keeps seeing all information and this is presented without reloading several pages.

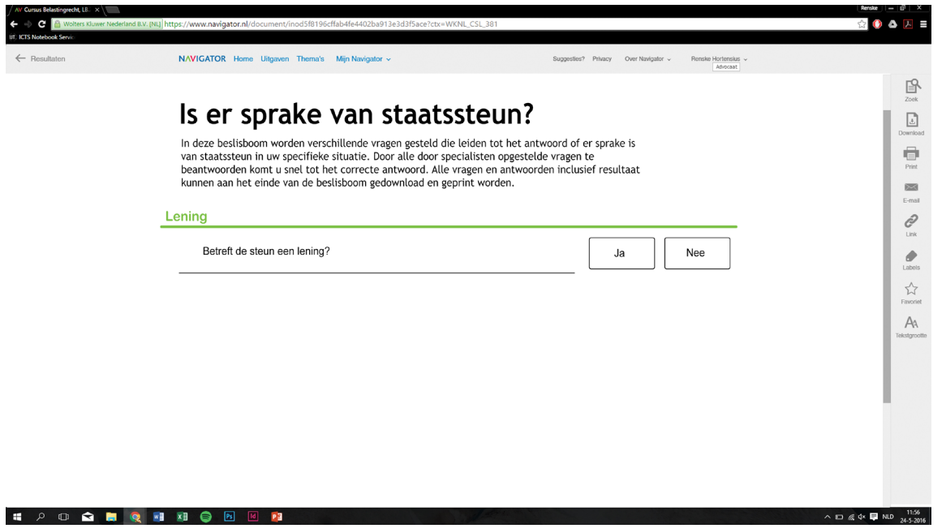


Figure 46: *Concept All in One: First page*

The image below shows the result of the subcategorisation. Several headers can appear with the title on the left to help the mind distinguishing certain groups of questions. The answers of the questions are highlighted and keep being visible throughout filling in the whole tree. This way the user can track the answer path and the overview is remained. The user can change an answer by clicking on an answer button and all questions after will be deleted.

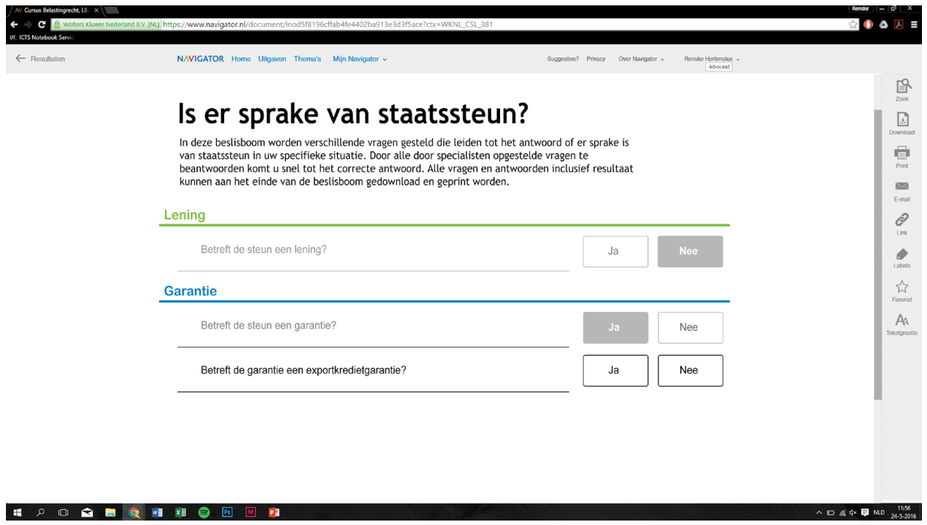


Figure 47: *Concept All in One: Categorisation*

The result is presented on the same page as well and a short answer is shown at first. By clicking a plus sign on the right of the question the elaborate explanation shows. This plus sign can be added to explain a question as well.

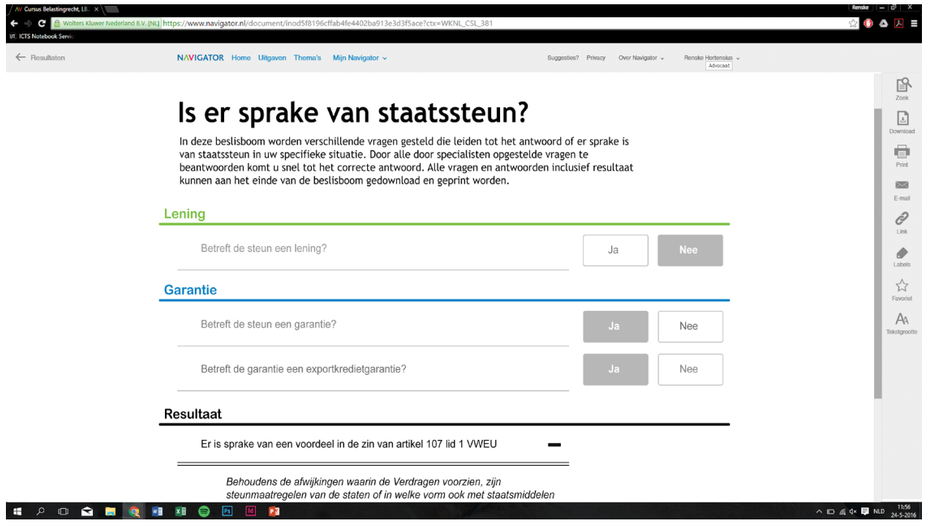


Figure 48: *Concept All in One: Result with elaboration*

4.3.1 Concept 2: Window Integration

The chosen concept is mainly focused on flexibility. The design consists of roughly four elements. The first element is the title. The title in this case is a question with two answer possibilities. The decision tree is specifically targeted at 'leningen en garanties'. The subcategorisation elements on the left indicates the progress and gives the user information about the rest of the tree. The shading will change to the subject shown on the middle window. The middle window shows the actual content and the first screen exists of an introduction. The user is able to start the tree. The grey window on the right is reserved for elaborate information. Colour blindness is taken into account as the use of colour together with shading is used. The user can distinguish the current category due to the shading.

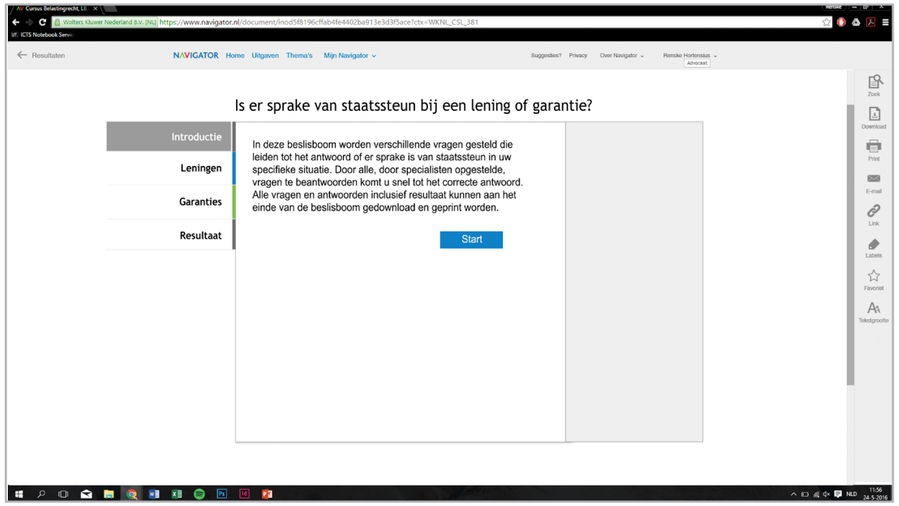


Figure 49: *Concept Window Integration: First page*

The screen on the next page is an example of how the executing of an interactive decision tree can be visually presented. As one can see the shading on the left is changed to 'leningen' and questions are asked in the middle window. The user is able to answer a question by clicking on a bullet point. The concept is designed spacious so there's a lot of room for flexibility. A question can be five words long, but also a question of five lines would fit in this design. Because the 'ja' and 'nee' bullet points are placed vertically there is also room for flexibility in the answers. A long answer or offering more answer possibilities is possible. The questions and answers within a certain category stay visible throughout the process, so the overview is kept. An answer can be changed by clicking on the bullet point of the question one wants to change and all answers will be deleted up to the question you clicked on. This is inevitable because the answer of every question defines the next (set of) questions.

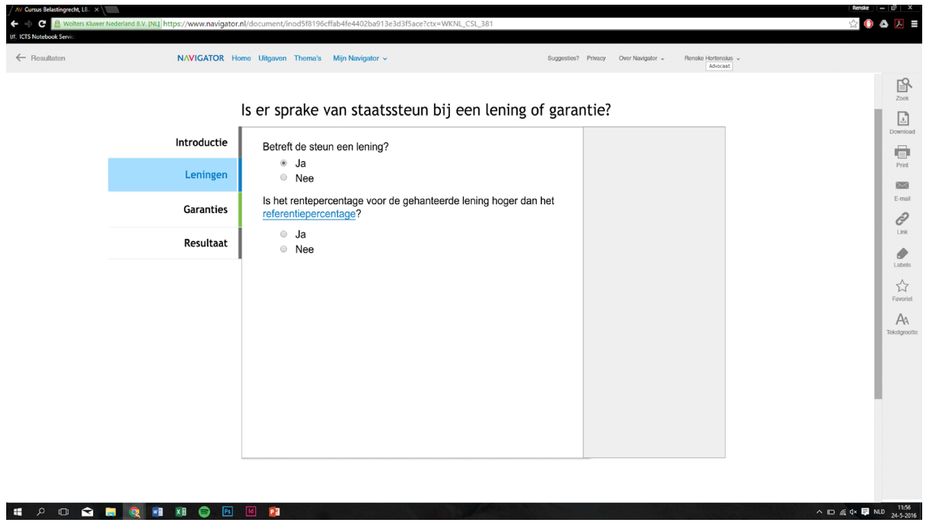


Figure 50: *Concept Window Integration: Precategorisation*

This concept idea arose while thinking about integrating relevant documents in the decision tree immediately. This design offers the most possibilities to integrate information and the separate window makes it easy to fill in the tree and see which changes a certain answer brings about while reading the elaborate information. The window on the right is suitable for both small and large texts fragments and is therefore fitting for a flexible design. The elaborate explanation can be accessed by clicking on the hyper link in the question. The explanation will stay visible until the next hyper link is clicked. The hyper link is always accessible.

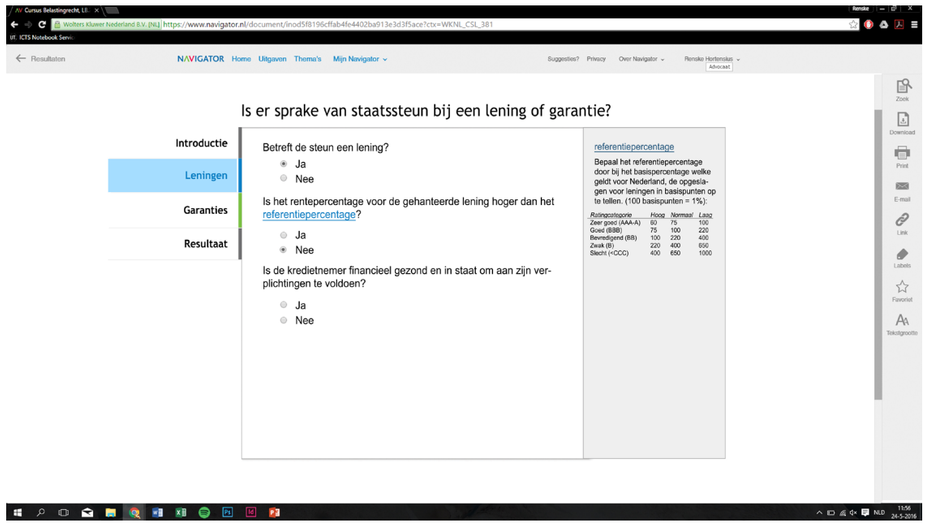


Figure 51: *Concept Window Integration: Elaborated explanation*

The results page is shown above and the answer is a short sentence with the opportunity to read the law article referenced in the question. The previous questions can be accessed by clicking on a title in the menu on the left and the given answers are shown. The user can see the whole process by clicking through all categories. The whole decision process including final answer and referenced articles can be downloaded or printed.

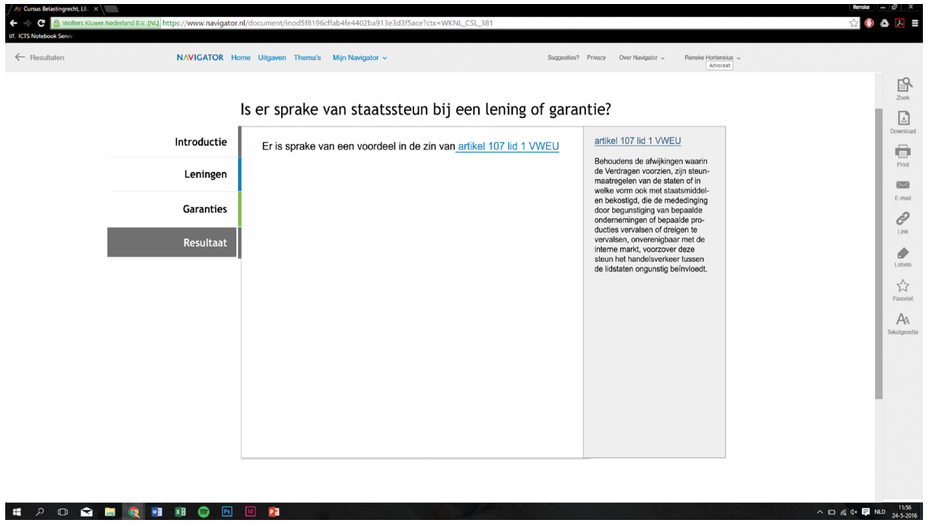


Figure 52: *Concept Window Integration: Result with elaborated explanation*

5 TEST & DEVELOPMENT

In the test phase several insights were gathered from people connected to the Navigator and/or decision trees. A user test has been carried out to show the interest of the customers in decision trees in the Navigator, an in-depth interview was carried out with an author and a publisher gave his opinion about the matter.

5.1 User Test

5.1.1 Structure

The main goal of the user test was to investigate the interest of integrating practical content in the Navigator. To give the users an idea how this is going to be realized an interactive mock-up has been presented and the opinion of the user was asked. The mock-up consisted of a clickable representation of step three of the concept visualisation, the page where the user executes the decision tree. The choice to test step three only was made based on the time frame of the user test in combination with the high complexity and innovative aspect of this step compared to the other steps. Two people were interviewed, the test lasted approximately an hour and took place in their own office. To gather consistent results an outline of the user test was created and this can be found in Appendix E. The outline of the user test consists of five divisions:

1 Pre-Test Interview

To gather the most useful feedback this part of the test is dedicated to making the user feel at ease. Questions about the user's function in the company and the user's knowledge of the Navigator were asked. The second goal of this first part of the user test is to gather insights about their way of working and their digital capabilities.

2 Interest for interactive decision trees

As Wolters Kluwer wants to make profit with this new functionality it is important to investigate the need for practical content. This part of the test deals with the user's knowledge about interactive decision trees and their expectations. The users are asked to illustrate a common case in their work area to help them connect to the concept and make it relatable. The goal is to uncover what users would seek in a decision tree and if they think it would fit in the Navigator.

3 Functionalities

In this part of the test the assumption is made that decision trees are going to be integrated in the Navigator. The goal is investigating needs and wishes of the customer regarding functionalities and to discuss where the user would expect to find a decision tree in the Navigator. As for the functionalities an open discussion is created where users are asked to name functionalities on the basis of a very simple decision tree. The image shown does not include substantive content, but helps the user imagine how a decision tree could look like. This image is integrated in the Navigator to help the user's imagination. The first question asked is 'What functions would you expect?' and 'What functions would you like to see?'. Once the discussion progresses more specific questions like 'What would like to print?', 'Would you like to share this information with colleagues?', 'Would you like to have an indication of progress?' and 'Would you like an elaborate explanation at each question?'

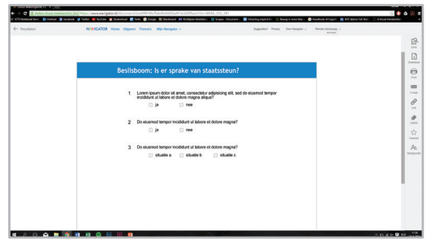


Figure 53: *Most simple design*

4 Usability
To provoke open answers and to avoid pushing users into a certain direction in the first parts of the user test no concepts were shown. In this part of the test the comprehensibility of the design concepts of step three is tested. The goal is to investigate if the visual representation is immediately understood. Two interactive concepts were presented and the user was asked to complete the decision tree. The user was asked to think out loud and to express every thought that came to mind. In the end the user was asked to summon positive and negative marks on both of the concepts.

5 Wrap-Up
A few concluding questions are asked about the general impression on decision trees and if this new functionality would be an improvement for the Navigator. The user is given space to reflect on the user test and is thanked for their participation.

5.1.2 Results
To guarantee the privacy of the interviewed users they will be referred to as user 1 and user 2.

1 Pre-Test Interview
User 1 is working as a strategic juridical adviser in the department spatial planning. This user supports the company with legal issues and executes objections and appeals and uses the Navigator to support his cases. The average time spent on the online database is twice or thrice a week for approximately one to two hours.

User 2 is a tax advisor in an accountancy agency. The user searches for information on the Navigator a few times a week and usually searches for applications for law articles.

2 Interest for interactive decision trees
User 1 is aware of the digitization of society and refers to his own discipline of the law as a suitable candidate. The user is familiar with the term 'interactive decision trees' and has a paper decision tree in use. He foresees a problem with bilateral questions because cases are often not black and white. However he can imagine several cases that are crystal clear, because an enormous amount of jurisdiction is written about it. The user has most interest for decision trees regarding calculation or search help. If the goal of the tree will be the provision of information, the user would use the tool as an automatically generated second opinion. The user expects the success of this new functionality to strongly depend on the author who develops the questions and the knowledge of the person who fills in the decision tree.

User 2 is also interested in a decision tree that helps narrowing down search results, because in her opinion the search engine generates too much search results that are irrelevant. The user's interest is awakened learning about using decision trees as information provision. The user suggest a business transfer as a suiting case, because of the standardised method with reoccurring elements. The to-be run through aspects are predefined and consist of for example income tax and transfer tax. This user is anxious of loosing sight of the complete picture. The user feels like the questions push her into a certain direction, while in her discipline an answer can be found in an unexpected corner of the law. It is therefore important for this user to see relevant documents. The user would expect the interactive decision tree to deliver a bilateral answer in the end. However, ifs and buts are part of the job and the expected answer would be along the lines of 'yes, but only if….'. An explanation of the answer is always necessary.

3 Functionalities
User 1 expects to find interactive decision trees in a button on the top menu next to 'Uitgaven' with an overview of all trees. The user also expects a link to decision trees on the homepage. A special filter for interactive decision trees and including them in the search results would also be a good idea. In the search results he would expect a tree to come up when searching for the term 'beslisboom' and when searching for a term in the title. If he searches for a specific article and this article is used in a decision tree the user expects the decision tree to come in the results as well.

User 2 expects to find interactive decision trees on the homepage, presented as a link to an overview page. If that functionality is realised a button on the top menu would be unnecessary. A special filter would not be useful to this user, but the trees should show up in the search results with a short and pithy title. It should show up when searched for the term 'beslisboom' and if the search term is in the title. The user does not want to see a tree in the results when searching for a specific article, because then the final destination is known. The lay-out of the decision tree in the search results should be different from the normal article or jurisdiction document, so it is recognizable in one instance.

User 1 and User 2 about specific functionalities:
Print
Both users want to print the whole process with questions and answers and the end result. User 1 imagines clicking the wrong button on accident. User 2 wants to compare scenarios to see what the impact of a question is on the end result. User 2 would also like to print a certain selection of the questions.

Save
The tree should automatically save the answers in the decision tree thus in the Navigator according to user 1. If this user opens the tree in the Navigator at a later moment the user wants to continue with the tree immediately, for example through the link in the already existing history window. User 2 also would also appreciate an automatic save functionality. The finished product should be saved as well in case the client disagrees with a question. This should be saved for a long period of time, at least half a year. This could also be beneficial for efficiency because you could open a completed tree and make a copy of it. You could then re-use information and start the tree again from the question the situation is different. User 2 wants to delete answers herself and the Navigator should not be allowed to delete content.

Share
User 1 would appreciate a functionality to e-mail the result (in PDF) to a colleague directly form the decision tree page. Sharing the decision tree page link so a colleague can fill in the same tree would be useful as well. A function to be able to give another user permission to add and change annotations in the document would not be useful to this user. User 2 would not use an e-mail option, this user would print the document and walk over to the office of a colleague.

References
User 1 believes additional and elaborate information is necessary and should be integrated in the decision tree, switching between windows is not user friendly. User 2 also would find it useful if this information would be integrated in the decision tree.

Labels
The user makes use of the labels functionality a lot and would expect this function to be accessible with decision trees as well.

Notes
User 1 and User 2 both would not make use of this function.

Overview
User 1 would like to go through the whole tree without answering questions to know what to expect. A percentage of progress indication would be helpful. User 2 would not find a percentage helpful, because it is different than a survey for example. In this case you are searching for an answer and the task is part of the job. The user would not care about a percentage and also would not care about the time completing a decision tree takes.

Responsive
Both users never look at the Navigator on a smartphone, because it is not something you would look at in the train. User 2 does use Navigator on a tablet and would want to use decision trees on the tablet as well.

Notification
User 2 would like to be notified if a decision tree has changed because of a law or jurisdiction adjustment. This notification should be shown when a previously used decision tree is opened. A notification about a change in an already completed decision is not necessary, because advice is not retroactive.

4 Usability

Concept 1 : All in One

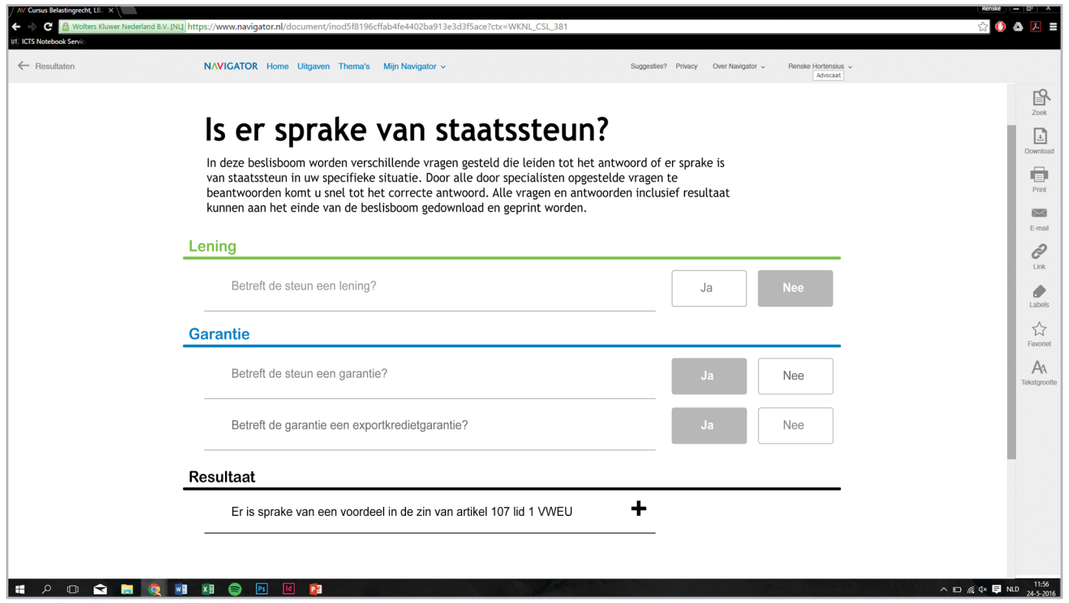


Figure 54: *Concept 1: All in One*

User 1
+ Lay-Out
+ Overview
+ Efficient
+ Easy to change answers
+ Colourful subcategorization
+ Integrated explanation
- Access to explanation

User 2
+ Structure
+ Functions in the right menu
+ Clear how it works
+ Overview
+ Efficient
+ Easy to change answers
+ Integrated explanation
- Access to explanation
- Explanation in-text
- Access to previous questions

User 1 starts commenting on the lay-out and is positive about the font and the overall clearness of the screen. The user starts exploring the prototype and finds it efficient the next question is immediately shown when pressing an answer button. The user notices the difficulty of content in the decision tree and comments that he does not know exactly what some terms mean. The user at first is not aware of the plus sign, but clicks on it accidentally because the user thought it had a different meaning. At the next question with an elaborate explanation the user again does not make use of the opportunity to show more information. In the end it turns out the user was not aware of this possibility. Suggestion of the user is referring at the term itself instead of connecting it to the whole sentence. Going back and changing an answer is easy and the user is positive about the colourful subcategorization: lening, garantie, resultaat.

User 2 believes the structure with title, short description and the first question is very clear and you can start immediately. The functions on the right side of the screen are noticed by this user and the user expects the same functionalities as by a regular document in the Navigator. The plus sign was not noticed by this user running through the tree the first time. The second time around the user notices the plus and finds the functionality useful. However, this user foresees problems with long texts, because reading a long text will distract the user from completing the tree. Overview is clear in this concept and the user is positive about immediately showing the next question by clicking on an answer button. When asked to change an answer the user clicks on the question itself to try to go back.

Concept 2 : Window Integration

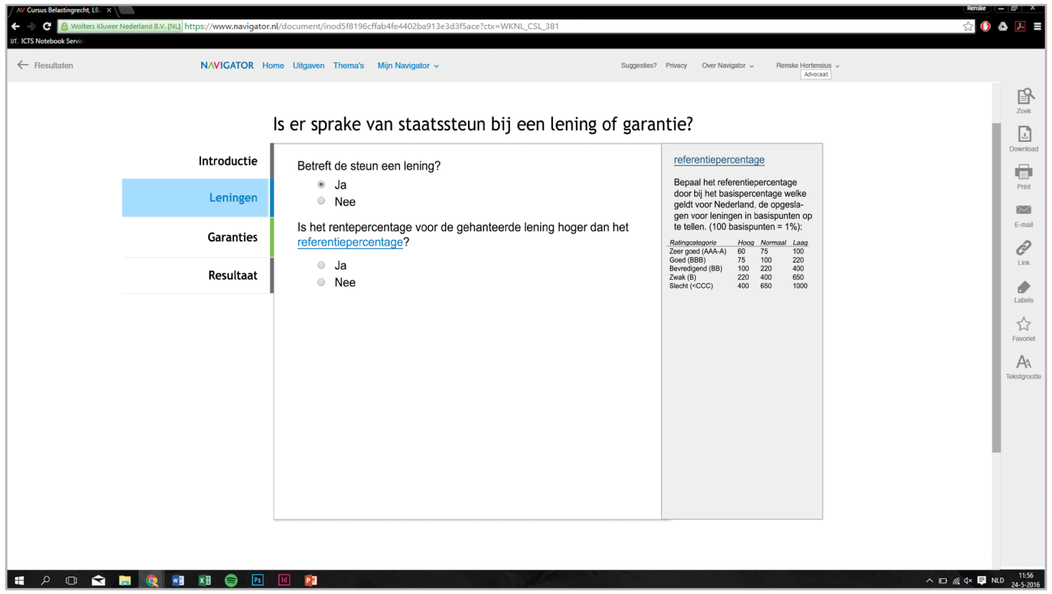


Figure 55: *Concept 2: Window Integration*

User 1		*User 2*	
+	Specific question	+	Integrate explanation
+	Integrated explanation	+	Hyperlink
+	Hyperlink	+	Explanation in separated window
-	Lay-Out	+	Pre categorisation if long tree
-	Pre categorisation on the left	-	Pre categorisation if short tree
		-	Function pre categorisation
		-	Lay-Out

User 1 notices the question asked is more specified than in concept 1. The user tries to click on 'Garanties', because the user thinks you can either go to 'Leningen' or 'Garanties' and not run through both. The hyperlink in question two is immediately clear and the user is enthusiastic about the pop-up information on the right side. The user believes an extra 'i' at the hyperlink is not necessary,

User 2 interprets the menu on the left as a way to skip questions. The first impression is more negative than concept 1. If the whole tree has to be finished the pre categorisation is not necessary. The user can imagine the categorisation is useful if the tree is longer. Due to this design the user comes with the idea to decrease the amount of questions by first asking which categories should be touched upon in the specific case. The hyperlink is more clear than the plus in concept 1. A long explanatory text could be incorporated in this concept, because the text is not in-text and the overview remains.

5 Wrap-Up

User 1 is positive about both concepts and grades them both 7.5 out of 10. The explanation window on the right is the reason this user has a slight preference for concept two. The Navigator would improve if decision trees are going to be integrated. The user finds the trees most useful for a second opinion. The user would use interactive decision trees, but the success of the system really depends of the expertise of the author and the knowledge of the user.

User 2 has a slight preference for concept one, because the categorisation builds itself with the questions. With concept one it is clear the questions will continue, this is unclear in concept two. The clearness of the hyperlink makes concept two better in the elaborate explanation usability. The user answers yes to the questions if interactive decision trees would contribute to a better Navigator.

5.2 Author's Perspective

As authors will create content for the interactive decision trees it is important to know their needs. A jurist who is the author of the 'Handboek Staatssteun' was willing to share his opinion. In his book decision models are set as guidelines throughout each chapter. The first chapter includes a general decision model which guides the user to the relevant chapter. In this chapter several other decision models are used where the complexity increases to seven levels of content which means criteria on criteria times seven.

The author believes the market is getting ready for practical content and competition of Wolters Kluwer in America already forefront in offering the user this kind of assistance. In the publisher's world offering the user a digital platform is essential and the demand for checklists and short to-the-point content is increasing rapidly.

It is a challenge for authors to change lengthy texts into short questions, but this author believes relatively young (<40 years old) authors including him would be willing to take on this challenge. To make interactive decision trees a success a few ringleaders need to be approached. These authors should have a modern mindset which means the authors should think about providing information efficiently instead of writing a certain amount of words.

The decision models in his book are bilateral and the author explains the juridical discipline can be very unambiguous. However, an author has to make certain decisions, i.e. which question leads to which aspect of the law. An author is usually an expert in his or her discipline and this author believes the author is allowed to make this decision and people should trust the expert's opinion. An explanation at certain question is clarifying and the author suggests publishing a book in the Navigator and deep-link information from the decision tree to this document to provide the additional information. Also references to other decision trees are necessary to improve efficiency over time. This provides the opportunity to start a decision tree in a more specific branch and potentially be linked back to a more general topic if necessary. All results of the decision models have less than four final results and exist of a yes/no answer with a few criteria.

5.3 Publisher's Perspective

A publisher of tools in the company of Wolters Kluwer has already experimented with interactive decision trees. These trees are very elaborate and the amount of questions can increase to 900. The goal of these decision trees is the provide the user with all the necessary documents in a certain situation, i.e. a merger of two companies. This decision tree was produced in collaboration with Blueriq (Everest), but the product was not successful for unknown reasons.
An important aspect when integrating interactive decision trees is data control and responsibility. The data control can be assigned to:

1) Navigator. In this first case the Navigator gives a command to the tool. The decision tree tool executes the task without processing data and sends the information back to the Navigator who in turn decides to show it to the user. The document can be stored in the memory of the Navigator.

2) Interactive Decision Tree. In this second case the tool is in control where the Navigator only knows that a decision tree is started. The tool processes the data and decides to show it to the user directly. It is possible for the user to save the document in the tool and send it back. In the Navigator a link to the saved tool can be accessed.

3) User. In this third case the user is in control. The user decides to activate a decision tree in the Navigator, the decision tree tool executes the task and does not process it completely. The information is presented to the user who can download it. Once downloaded the user can decide to save it in the Navigator, but the data cannot be changed anymore.

5.4 Manager's Perspective

A manager who is familiar with integrating interactive decision trees in a company shared his opinion about the matter. The challenge of this manager was letting the authors and specialist work together with the information managers in an efficient way. A few difficulties ensued because the information should be provided at the right time at the right place in a digital environment and authors were not used to this way of thinking. For authors it was difficult to write in question-form instead of writing long pages of text. The solution of this manager was found in training the specialist in information management. Changing the mind-set of the author costed a lot of effort and time (approx. three months), but this sharing of knowledge made decision trees successful in the end for this company.

Decision Trees have been evaluated from different perspectives. The conclusions drawn from this test phase are presented in the chapter final findings. Findings about integrating decision trees in the Navigator and other business-related aspects can be found in the implementation plan in chapter 6.1. Recommendations for the visual design of an interactive decision tree page can be found in chapter 6.2.

6 FINAL FINDINGS

This chapter presents the findings of all previous chapters in an implementation plan and a recommendation list for the final visual design. The two main research questions of this research are answered and all findings result in a conclusion.

6.1 Implementation Plan

The main research question was defining criteria for integrating interactive decision trees in the Navigator. This implementation plan is the final product of all findings gathered in the research. The aspects in this plan are all subtracted from specific research elements and the source of each element is below the paragraph. One term is not referred to earlier in this report and is called 'Workshop Decision Trees 1, 2, or 3' and is explained in Appendix C. These meetings, together with all other research provided information that resulted in this implementation plan for interactive decision trees in the Navigator. The elements are categorised in types of actions : "To decide" or "To do". Whereas by 'To decide' several possibilities have been explored and a decision needs to be taken and 'To do' consists of performing a task. The structure of each element is first stated the title, then an explanation and at each "To decide" element a recommendation for the decision is provided.

6.1.1 To decide

Goal of decision trees

Decision Tree is an ambiguous term, because the purpose, content and scale can vary tremendously. This pilot study has to be elaborated in order to discover the real need of the customer, as only two customers were interviewed in this research. These users found interactive decision trees useful in several situations. The goal of integrating decision trees could be to provide:

- a search help
- a calculation tool
- new information
- an automatically generated second opinion
- relevant documents

Recommendation: Seconnd Opinion: Let the user complete a decision tree to check if their opinion is right, because that is more efficient than asking a colleague.

Source: User Test

Save Personal Information

In the scope of this research the question regarding saving personal information kept arising. The system could include information about the company, finances, etc. This information could be saved in the Navigator with the main reason to give the user the ability to re-use information and work more efficiently. This research resulted the following advantages and disadvantages for including or excluding personal data:

Advantages:

- Prevent the loss of information if the user did not finish the tree
- Users are able to back-up information online
- Ability to re-use information for the users which results in more efficiency
- Gathering more insights about the users

Disadvantages:

- An overview of finished/on-going trees needs to be created
- Several new functionalities need to be created i.e. importing informa-

tion
- Privacy issues for the user
- More advanced security is needed

Recommendation: Due to the amount of questions (based on a decision tree written by an author of Wolters Kluwer of 80 questions) an interim saving option is necessary. A suggestion is to realize this functionality at the decision tree itself i.e. several previous versions can be accessed. If a decision tree is cut off before finishing, the information should be saved in the Navigator and should be shown the next time the tree is opened. A pop-up should ask if the user wants to continue, save or delete the answers. Import information is a functionality to be incorporated in the long-term if the tool is a success.

Source: Workshop Decision Trees 1,2 and 3; User test

Number and Length of Decision Trees

The exact and suitable number of trees is hard to estimate, because the amount of suiting subjects is unknown. However, there should be a balance between the amount of titles and the categorization of the overview page. This is mainly because of usability purposes. The length of the decision tree is strongly connected to the total amount of trees on the overview page.

An interactive decision tree can be entered at several levels. The most general topic related to the content of the Navigator is state aid. A decision tree with the title 'state aid' could start asking questions about the situation of the person involved. However, the decision tree can be entered on a more specific level like 'state aid for loans with a high reference percentage'. The latter tree consists of less questions, but more titles are needed for the overview page to contain the same amount of information.

Recommendation: More specific trees that are related to a general topic. This should also be shown on the overview page. The ability should exist to step in anywhere and be referenced back to the general topic, i.e. 'Have you thought about this subject?' If not, go back to the tree about ....

Source: Publisher's perspective

Title of Decision Tree

One of the most important aspects influencing the amount of use and findability is the title of the decision tree. If the title is not clearly defined, the user will most likely not make use of the decision tree. A few titles are possible, but a text specialist should decide which is the best choice. Possible title forms:
- Question
- Short and general
- Long and specific
- 'Decision tree about ...'

Recommendation: if <5 trees a short term would be best, else the recommendation would be to have a long specific term as title. However, the lay-out of the trees should be distinguishable from a regular document.

Source: User test

Decision Trees in search results

As taken from the result of the user test the decision trees should be found through the search engine and should be listed as a result. Tags should be attached to every decision tree to make them visible in the results and these should be incorporated in the algorithm for the search results. There are several tags possible, i.e.:
- Key words in the title
- Key words in the whole decision tree
- The words 'Decision Tree'
- The word 'tool'
- The words 'yes' and 'no'
- Key words from the title of documents that are referred to in the decision tree
- Key words form the documents that are referred to in the decision tree.

There is also the option to show the decision trees on top of the results, because the assumption can be made that a decision tree is relevant as it will not show up as as a result that often. Some users might experience this as disturbing.

Recommendation: The tags should include key words from the title, key words from the whole decision tree and "Decision tree' should also lead the user to decision trees in the results list. The tree should be shown on top of the search results.

Source: User test

Outsource

The opportunity to outsource the development and maintenance of the tool 'Decision Trees' arises because of the systems already on the market. These companies have experience and the possibilities for a co-operation should be investigated. Kluwer Law International, a company branch focused on international law, also owns an online platform to provide customers with information and they started a pilot on interactive decision trees with the help of the company Be Informed. They were very content with the collaboration, because a lot was possible and they were more affordable than Berkely Bridge. (In the end the whole project was cancelled because the customers were not satisfied with the content. The users also were not ready to change their way of thinking, which was necessary to work with the question/answer structure.) The main arguments for and against outsourcing are:

Advantages:
- Experienced developers in the area
- Maintenance is taken care of
- Fast on the market

Disadvantages:
- Less flexible
- Difficult to integrate with existing Navigator functions
- Lose control of information

Recommendation: Develop it within the company. There are advantages to outsourcing, but mainly because of the agile way of working within Wolters Kluwer it would be better to keep in control of the development process. If a company is capable and willing to keep up with the fast changes in maintenance this would be the better option, as the Navigator team can focus on new functionalities instead of the maintenance of decision trees.

Source: Competitor analysis; Ewa Cairns-Szkatuła(KLI)

Data Control

When designing an information system with user input it is important to touch upon data responsibility and control. Data needs to be stored, accessed and even retrieved and the question is: 'Where is the best place to do so?'. According to the publisher's perspective (Chapter 5.3) there are three possibilities. The data control can be assigned to the Navigator, the decision tree tool or the user. *Recommendation: Assign the control to the Navigator for retrieving purposes.*

Source: Publisher's perspective

Terminology of Categorization

As the users were positive about a categorisation of the questions in a long tree a decision should be made on the terminology. The two main options are informative or overview terms. An informative term refers to terms directly connected to the content of the questions i.e. 'DAEB'or 'reference percentage'. An overview term refers to terms connected to the structure of the tree, i.e. 'general information' and 'finances'. The latter is more general and can create consistency as terms can be re-used in all trees (with small differences), whereas the informative term is more flexible and creates relevant and specific information to the user. *Recommendation: Use general terms, as the user needs recognition to improve efficiency.*

Source: User test

6.1.2 To do

Draft Business Model

To gain profit from the new functionality 'Decision Trees' a business plan needs to be drafted. The functionality could be sold as a whole, per category or separately. This depends on the scale and the goal of decision trees. If only two really big decision trees exist, it seems logical to sell them as a functionality. However, if decision trees are a successful tool and more subjects turn out to be suitable for the concept it is more likely to be sold per category or discipline. Because a decision tree is a practical functionality and also has the goal of digitizing information the business model of themes could function as a directive.

Source: Workshop Decision Trees 1

Find suiting subjects – Define criteria for suiting subject

Research has to be done which subjects are suitable to put into a decision tree. As one can believe the opinion of the interviewed author, a lot of subjects are fitting. A research has to be done to draft criteria that subjects have to fulfil in order to be profitable to turn it into a decision tree. Aside from this practical side the business side is also important and therefore research has to be done which documents or categories are used regularly and are the most valuable to the user.

Source: Author's perspective

Create Input Environment for Authors

This research mainly focused on the output from the user's point of view, i.e. the functionality needs of the user and how a decision tree can be user-friendly represented in the Navigator. A decision tree is a tool and requires a different approach of input. What is meant by that is that the author needs to understand the structure of a decision tree and should be able to draft this in an online environment. The making of such an environment should not be underestimated and there are several ways to visualize and build the structure. Examples of how such an environment could look like is shown in the figures below.

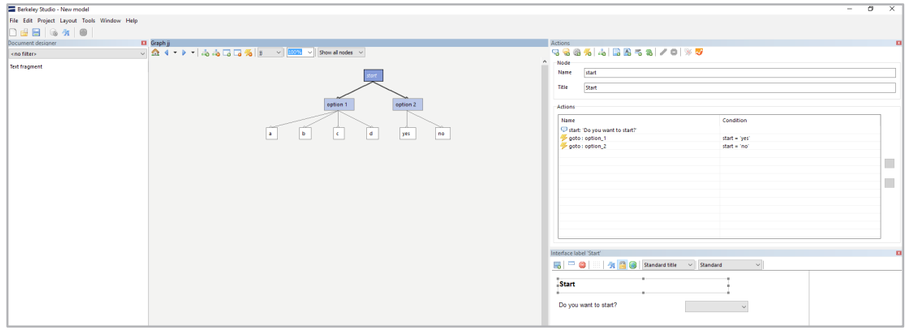


Figure 56: *Input environment Berkely Bridge*

Figure 57: *Input environment Yonyx*

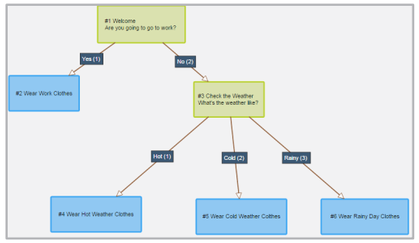


Figure 58: *Input environment Zingtree*

Research has to be done to investigate which visualization way is most effective for authors of Wolters Kluwer. This could be one of the already existing environments, but it could also be a new system which anticipates on the way authors think.

It is also important to include an user-friendly 'edit' functionality, as the law and tax industry is subjected to many changes. It should be easy for the author to change the structure of a tree and create new questions within an existing interactive decision tree.

Source: Competitor analysis

Template for Author

If different authors are going to produce decision trees for the Navigator it is important to use a template. The goal of these guidelines is creating consistency for the user. Especially if the amount of trees increases it is important for the user to recognize a pattern. If decision trees are drafted the same way, it is easier for developers too. In this template several criteria and restrictions should be stated, examples are:

- Restriction for categorization headings
- Sort information to include
- Word count restriction of one question

- Restrictions for incorporating elaborate explanation
- Language restrictions regarding jargon
- Restrictions for amount of possible outcomes

Source: Manager's perspective

Communicating the new functionality to the user

The Navigator is an online portal where users are searching for relevant information, therefore users are not necessarily interested in new functionalities and mostly just want to get the information they need. However, if time, effort and money is put into developing this new functionality and the trees will improve the efficiency of the user it is important to approach users in the right way and inform them about the functionality. One way to do so is informing users by showing a pop-up the first time they open the Navigator when the decision tree is integrated. A guide should be developed to let the users understand all functionalities clearly. This guide should not be mandatory. On the website of Wolters Kluwer the functionality should be communicated.

Source: User test

Data Analytics

A functionality (for the company) already integrated in the Navigator is the ability to gather information about user's behaviour using Google Analytics. In order to get a grip on the success, the findability and the usability these data measurements should be possible for the decision trees as well.

Source: Workshop Decision Trees 2

Result Document

Once a user has finished a decision tree an answer is given. This answer is short with a few criteria or an explanation. The user test concluded that users want to download and print the whole decision making process meaning all questions and answers leading to the final result. When the user clicks on the 'Download' button a document(PDF) has to appear with all this information. The document should contain at least:

- Title
- Answered questions
- Answers
- Result
- Meta data (date, URL)

This information should be visualized in a clear and user-friendly way and there should be enough space to make notes on paper.

Source: User test; Workshop Decision Trees 2

Preparing Authors

When decision trees are going to be integrated the mind-set of authors needs to be changed. Most authors are used to write in text form and are used to work with a (often big) given number of words. When developing a decision tree the challenge for the writer is to write information in short chunks, but still capture all information. The order of the questions is essential too. Authors need to understand the way of thinking of the reader. It is also necessary to let the author and the information specialist understand each other to make the cooperation successful. This change of mind-set and understanding each other should not be underestimated and can take a lot of effort and time. To make the tool successful it is necessary to gather a group of enthusiastic, younger (<40 years old) and modern-thinking authors to act as head men. A training should be organised informing the authors about formulating questions concisely

Source: Manger's perspective; Author's perspective

Cost estimation

A cost estimation needs to be carried out in order to examine the scale and deciding about functionalities in balance with expenditures.

Source: Workshop decision trees 2

Create trust for Interactive Decision Trees

For the user it is important that decision trees are trustworthy. Especially since a big group of the users is still working paper-heavy and might not be that welcoming to new digital functionalities. Not only should Wolters Kluwer be absolutely certain there are no mistakes, content and spelling wise, the tree should also always be up-to-date. The company should communicate this trustworthiness to the users. An example to realize this is showing the author at the screen. This way users can do research and discover the tree has been drafted by an experienced author. This also gains publicity for the author. A sleek and professional visual design also contributes to convince users of the trustworthiness of the system. Possibilities to communicate trust for this tool need to be investigated.

Source: User test; Workshop Decision Trees 2

Incorporate information from user test evaluation

In the user test specific functionalities and usability (of step 3) aspects of the decision tree are evaluated. Recommendations are written in chapter 6.2 and it is important to include this feedback in the final design. This feedback regards i.e. the integrated explanation window, deleting user input and sending a notification if the tree changes.

Source: User test

6.2 Visual Design Recommendations

Ideas and concepts have been created and a user test has been carried out for two chosen concepts. In this user test several opinions were shared and misunderstandings of the mock-ups were gathered. In chapter 5.1.2 the results of the user test are presented in a descriptive manner meaning the opinion of the user was captured separately. In this chapter recommendations based on the insights from both users and insights gathered during the evaluation of the concepts, are presented to provide a clear image of which visual design aspects were received positively and which aspects need to be changed in order to increase user-friendliness. These recommendations are based on the design principles presented in chapter 2.9.1.

Overview and accessible for everyone
While clicking through the mock-up both users did not find any difficulties in understanding the way of interaction, as they both clicked the 'Ja' or 'Nee' button to answer the question. They were not surprised about the fact that the next question popped up immediately and a recommendation would be to let the question appear when the previous question is answered. What is meant by that is there should not be an extra button of 'next question' added, as this decreases efficiency. There is a possibility the user would not like this immediate response as the question would be gone too fast and the user could not check his answer. Because the questions and answers are still visible in both designs, this is not a problem. The way of changing answers was clear to one user, the other user kept clicking on the question itself instead of the answer buttons. This is a logical act and clicking on the question to change an answer would be a recommendation for the next design as well.

Concept one is specifically focused on decreasing the amount of different pages and keeping the overview. All information including the result is shown on the page itself. Concept two hides questions of a different subject. As user two stated the categorisation is useful with a long tree and for overview reasons it might be better to not show all questions if there are more than 60 questions. A recommendation would be to hide the answers in tabs as in concept two or to add the ability to fold in a specific subject in concept 1. This could be done automatically when a subject is finished but more research on this subjects needs to be done.

Both users also mentioned the page of concept 1 gave a clear overview of the interactive decision tree. This could be devoted to the big answer buttons, which also show the given answer by staying shaded. The overview could also be enhanced by the colourful subject title. It is recommended to use sleek and big answer buttons and incorporate colours. Keeping in mind colour usage is not enough, because colour-blindness should be taken into account.

Progress Indication
Both concepts contain a categorisation to offer the user support for not losing the overview and show the user an indication of progress. These categorisations are different in such a way that in concept 2 the categorisation is static and in concept 1 dynamic. In concept 2 the user gets an idea of the future subjects and the length of tree and this idea had a divergent response. It gave the user structure but on the other hand created confusion. The users did not see the list on the left in concept 2 as the steps to take in the process but as a categorisation to choose from. The lay-out with tabs might suggest an optional categorisation. A recommendation for this design could be to add numbers to the subjects to let the user know all subjects need to be run through. In the first concept the categorisation is built up and flexible which gives the user a clear overview of the given answers, however an indication of progress and an insight about future questions is not provided and the question is how necessary this indication is as the users shared a conflicting opinion about this matter.

Consistency
Both concepts were integrated in the Navigator meaning the print and download functionalities were kept in the same place and all other Navigator functionalities are available. The users would expect the functionalities in that specific place and the recognizable design increases the recognition. The recommendation therefore is to keep the functionalities as they are presented at a document in the Navigator. Both concepts were designed to create consistency as the lay-out of the concepts stays the same throughout the whole filling in process.

Scalability
When designing both concepts the frame of the website on a desktop and tablet is taken into account as room is left over at the left and right of the questions. The usability of decision trees on smartphones is not taken into account in the concepts as such a small percentage of the users uses this opportunity. However, both concepts were not tested on a tablet nor smartphone and while there is thought of the tablet view while designing the desktop versions does not mean the design is immediately fitting. An elaborate look needs to be given to use interactive decision trees on a tablet. The compatibility with different operating systems or internet browsers is not taken into account as well. The designs are adaptive to the amount of questions as the categorisation could be elaborated to keep the overview, but also a mock-up with a lot of questions needs to be drafted to test the overview with i.e. 200 questions.

Flexibility
A visual design aspect that was not received positively was the plus sign, directing the user to the elaborate explanation. Although the functionality was received very positively the implementation needs some adjustments. The plus was not noticed by one of the two users at all. The other user clicked on the plus because he was curious, but expected a different functionality behind the button, i.e. an enumeration. Although once a user has noticed the plus it might be clear from then on, the risk users will not ever notice the plus is too big. While evaluating the concepts another hurdle was discovered as the plus refers to the whole questions and sometimes only one term is explained. Also, what happens if several terms need explanation? It is recommended to discard the plus and find a new solution to give the user access to the elaborate explanation, the hyperlink of concept two could be a good alternative as this was received positively by the user.

Another visual aspect to keep in mind regarding the explanation is the usability of an in-text explanation as this is subjected to the length of a text. If one term is shortly explained an in-text reference is a good solution, if a page-long explanation of a certain aspect of the question is necessary, the in-text reference might decrease the user's overview. The explanation window in the second concept is a more flexible solution, as longer text can be incorporated. The explanation also does not change the user's overview as it is a separate window. However, the readability of a longer article in this window is questionable. The recommendation is to incorporate term references but deep-link long text information back to the document in the Navigator.

Attention

A remark regarding the first concept (All in One) is that both users took the time to read the introduction and were positive about the clearness of the screen more than in concept 2 (Window Integration). An explanation for this clearness could be that there is only one new 'clickable' component on the page aside from the functionalities the user is familiar with. The introduction and title are organised the same way the theme page is designed, and the user's focus is aimed at the first question also because the question is located at the middle of the screen. With the second concept the first question was hidden behind the 'start' button and the page could be perceived as less clear because of the amount of components. In concept 2 it is for example not immediately clear what the function of the grey window on the right is. A page without any distractions, which draws the focus of the user immediately to the first question is recommended. The structure of showing the title, introduction (including the goal of the decision tree) and the first question is a good approach to keep the page simple.

7 CONCLUSION

This chapter answers the research questions intertwining all information gathered throughout the assignment. Final recommendation are included as well.

The Dutch share of the company, Wolters Kluwer Nederland B.V, makes use of an online information portal called Navigator to provide information and functionality to primarily law and tax professionals. The company identified a new customer need defined as the need to find practical information in an efficient way. This need fits within the digital era and mindset of modern society. People are exposed to a lot of information on a day and filtering this information is essential. To anticipate on this trend interactive decision trees could be incorporated in the Navigator. These decision trees present information in chunks, in clearly defined questions, which results in helping the user focus and filter information. This report and this chapter specifically presents the outcomes of performing a pilot study on interactive decision trees for the Navigator.

Looking at the research questions:

"What is needed to incorporate interactive decision trees in the Navigator?"
and
"How can interactive decision trees be visually presented in the Navigator?"

it is save to conclude the answers to these questions deal with two different aspects of the research, but are closely intertwined as well. One can image if a user demands a certain functionality (question 1) a different visual design is necessary as this functionality should be visible on the webpage (questions 2). A practical example is the functionality to have an explanation at the question. This need was identified and immediately changed the visual design as a solution for this need had to be present. In the concepts this was realised by adding an explanation window or to hide the information behind a plus.

What is needed to incorporate interactive decision trees in the Navigator?

The implementation plan discusses all aspects of implementing interactive decision trees in the Navigator. This plan contains two separate lists called 'To Do' and 'To Decide'. In these lists different aspects of the implementation of interactive decision trees are stated, looking at the implementation from different points of views.

If interactive decision trees are going to be integrated in the Navigator one of the most important aspects is to investigate the real need of the user, the goal of decision trees. The final result needs to be visualised in for example a PDF document and the elements included in this document, i.e. date or URL, should be defined. Also criteria should be defined for subjects that are suitable to translate into an interactive decision tree.

From the business perspective it is important to decide if the product decision trees is going to be outsourced or made by the company itself. Also a business model and cost estimation need to be drafted. A choice regarding data control and data responsibility has to be made and data analytics need to be incorporated in the final design to get an idea of the success of the tool.

The author needs to be able to give the system input and a new input

environment should be developed. Authors need to be informed and prepared to provide content to the reader in a question-answer structure. A template to give authors guidelines and create consistency for the user is also highly recommended.

An important aspect of incorporating interactive decision trees in the Navigator is the use of appropriate terminology. Especially the title should give a clear indication what the decision tree is about. The title also represents the level of complexity and defines the length of a decision tree, which is connected to the total amount of decision trees. A choice needs to be made if informative or overview terms are going to be used for the subject categorisation. The decision trees should also be found in the search results, so the terms which let the decision trees be shown in the results need to be defined also.

When interactive decision trees are going to be a part of the Navigator, the new functionality should be communicated to the user. The user should have trust in the new tool and should have trust that personal information is kept private. Especially if the functionality of saving information in the Navigator will be realised. The best way to create this trust needs to be investigated.

If all these decisions are made and all items on the list are executed a visual design needs to be designed. In the next paragraph recommendation regarding this visual design are presented.

How can interactive decision trees be visually presented in the Navigator?

Design principles were defined at the end of the analysis phase and were used throughout the report. The principles were kept in mind during the concept generation and the end concepts were tested on the aspect as well based on the user test. The aspects are: overview, progress indication, consistency, scalability, accessible for everyone, flexibility and attention.

To maintain overview, it is recommended to keep all answers and questions visible during the process and minimalize the amount of pages. Big answer buttons contribute to the overview positively too. A relative progress indication is useful with long (>20 questions) decision trees and the subject categorisation should include numbers to make sure the user understands all subjects need to be run through. Incorporating the decision tree page in the Navigator with the same functionalities as at a regular document is recommended to increase consistency in the Navigator itself. Flexibility is an important aspect of designing an interactive decision tree as the questions can vary in length and the answers can vary from a yes/no question to a situation description. The elaborated information should not be assigned to the question as a whole, but to certain terms in the question. If texts are long (> half A4) they should not be included in the decision tree but a deep link to the document in the Navigator should be added. The page should be kept sleek and simple, i.e. showing the title, introduction and first question only when opening a tree and the attention of the user should be focused on answering the first question.

In this pilot study the interest for interactive decision trees of the users has been investigated as well. Both interviewed users were positive when asked if interactive decision trees would improve the Navigator. The user is interested in this new functionality meaning further research and detailed plans, continuing on the information presented in this report, should be carried out to start the process of integrating interactive decision trees in the Navigator.

Recommendations

Further research should be done on the production method, as this was not discussed in depth in this report. A trade-off should be made while making the decisions stated in the implementation plan, between better functionality and production time/costs.

A usability test should be carried out with more users to really understand the difficulties and to be able to draw conclusions regarding the whole user group. Especially the amount of questions in the mock-up should be increased to test the overview and also the flexibility of the concept.

An elaborated look needs to be given to IntelliConnect from America, because their interactive decision trees are a great success. The questions of the decision trees have a different structure than the decision tree used in this report(more elaborate) and a different build up of the questions, thus a change in the author's writing style might be necessary in order for the interactive decision trees to be succesful.

This research can be elaborated to a general integration plan suitable for every company. This plan is specifically focused on implementing interactive decision trees in the Navigator, but the report can be useful for a lot of other people if recommendations are generalised.

8 DISCUSSION

Now that all research content has been presented and a conclusion is drawn it is important to reflect, evaluate and discuss. the overall quality of the work. The set-up of the evaluation follows the structure of the report.

Analysis

Starting with the analysis phase the first note to make is the choice was made to have a very broad knowledge gathering. The subject was investigated from different aspects, which resulted in a relatively small knowledge of a lot of viewpoints. This approach was chosen because in a pilot study it is important to do a broad investigation to oversee the whole picture. However, a disadvantage is the sometimes insufficient knowledge i.e. about the general user interface guidelines. An enormous amount of information is published on this specific subject and it would probably have made a better design at the end if more research was done. The information about designing an user interface in an user-friendly way might have been too little in this report.

Looking back at the interactive decision tree analysis the chosen examples might have not been the most useful. The 'Rondreis' for example is very simple and not much connected to the interactive decision trees Wolters Kluwer is searching for. Looking at different out-of-scope examples can offer interesting results and is not necessary a bad thing to do, but in this case it probably would've been better to investigate more complex and fitting interactive decision trees to gather even more accurate design principles. Unfortunately, the user analysis was based solely on data from the company and written personas and user stories. For the sake of this report, it could have been more useful to actually talk to the user to gather the information needed for this report specifically. This was included in the planning of the first research proposal, but it turned out to be unrealistic to talk to users twice in a small period of time.

Ideas

A lot of different designs were made on component level for the interactive decision tree page (step 3) as this was an important aspect of the pilot study. The idea of the pilot study is to provide the groundwork and a detailed digital design is not useful if the functionalities aren't defined yet. However, the digital design phase could've started earlier as insights about the size of the components were gathered and complexities ensued while working out the interaction digitally.

User test

As an user test was carried out it is important to evaluate the results and look critically at the test method. To begin with the amount of users interviewed, which was two. Two users can not represent the whole user group of the Navigator. It is impossible to generalise the opinion and observation from two people onto a group of thousands of people. However, this does not mean the interviews were not useful. Big mistakes regarding the user interface are discovered and the first impression of the user on the subject was captured. The assumptions can be tested for the first time and this leads to important insights already. Also, the two interviews were of a sufficient length of one hour, which really provided the opportunity to go into depth and get an understanding of the interests of the user.

Another important aspect to note regarding the user test is the limited mock-up. The definition of a mock-up is broad and a mock-up can have several purposes. In this case the goal was to offer the user a practical

example, which makes it easier to have an opinion about the matter. The second goal of the mock-up was related to the research question, as to how interactive decision trees can be best integrated visually, meaning the test was also a usability test. The mock-up existed of approximately four questions for both 'leningen' and 'garanties'. As interactive decision trees could include up to 900 questions this was a very limited mock-up and opinions about the overview might not be the same with 900 questions. The time limit of the user test and the time limit within this research were reasons to not include a lot of questions. Also some functionalities, i.e. printing, were not working perfectly due to difficulties realising the interaction in the mock-up, which caused some confusion during the user test.

As one may have noticed the titles of the two mock-ups (Chapter 4.3) were not the same. This was done to investigate the user's opinion about the title, mostly if the title should be general or more specific. However, this could've influenced the results of the user test in a negative way because the results cannot be compared one-to-one anymore. The user is steered in a different direction because of the main question. This could be the reason the subject categorisation of concept two was not understood correctly as the title suggested there was a choice between 'lening' and 'garantie'. It would've been better for the reliability of the user test to have kept the titles the same.

The last aspect of discussion regarding the user test is the conclusion in this case meaning the visual design recommendations (Chapter 6.2). As stated in the chapter these conclusions were drawn from the design principles. Although the design principles are supported by findings of the analysis phase and scientific literature, a complete set of measurable requirements is not included in the evaluation of the concepts. While performing the user test 'off-track' questions were asked to gain as much information as possible. The user test set-up was mainly a guideline to come to relevant information. In this stage of the research elaborated requirements would not have been useful. The results of the research might be more subjective, but in this stage that is acceptable because the goal was to gather as much in-depth information as possible.

Implementation plan

Looking at the implementation plan a few remarks can be made. As much as was tried to include all aspects of integrating interactive decision trees in the Navigator, an incessant risk is the incompleteness of the 'Decide' and 'To Do' lists. To decrease this risk people with different perspectives, i.e. an author, were interviewed. However, the uncertainty of completeness is still existing.

Data control

In the publisher's perspective an explanation about data control is given. This subject is also incorporated in the implementation plan. The subject of data control is complex and in the report it is tried to give the most simple explanation. As this was not easy to do due to the complexity this part might have caused some confusion. The publisher spend a lot of time explaining the data control system indicating this is an important aspect to him. This is why this subject is added to the implementation plan. However there was no time left to check this explanation with the publisher and therefore important parts could be missing or could even be wrong.

The right solution?

The research started with the need to perform a pilot study on integrating interactive decision trees in the Navigator. In this last part of the discussion the question is raised if interactive decision trees are the best way to provide the user with practical content and if the user's needs are satisfied with this concept. As the user, tax and law specialists, is used to looking through piles of documents he concept of interactive decision trees would be a big change in their thinking strategy. A lot of users actually like the search and therefore providing information in a decision tree format forcing them in a certain direction could result in an insufficient balance of product-market strategy. However, if the user is given enough time to adjust their mind-set and the interest and goal of the user is captured thoroughly interactive decision trees seem a good solution to the identified need for practical content to increase efficiency.

Deliverables

The concept visualisation was made at the beginning of the idea phase and as one may have noticed not all designs included in this visualisation were realised. A choice was made to mainly focus on step 3 of this visualisation and to make designs for step 1 and the wordwheel of step 2 as well. These three designs will be the most different from the current functionalities of the Navigator. The other designs stated in the concept visualisation, i.e. search results, relevant articles, still need to be designed.

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APPENDIX

A. Research Proposal

B. Requirements

C. Workshops about decision trees

D. Ideas Ja/Nee

E. User test questions

A. Research Proposal

Research Proposal

Designing an interactive decision tree for Wolters Kluwer

by Renske Hortensius

Introduction

This research proposal for a bachelor thesis for Industrial Design will describe the specifics of the assignment. This proposal contains background information, motive, goal, research questions, strategy, planning and bottlenecks and solutions. At the end of this proposal definitions of certain terms are explained. These are underlined in the text.

Background information

"Wolters Kluwer provides legal, business, tax, accounting, finance, audit, risk, compliance, and healthcare professionals the essential information, software, and services they need to make decisions with confidence." [1]

The company originally was founded in 1836. Due to a merger of the two publishers Kluwer and Wolters-Samsom the company in current form started in 1987. Products of Wolters Kluwer are designed for a big range of sectors and products are both services and books. Professionals in the above stated sectors make use of their services. An educative branch called Wolters-Noordhoff was part of the company for twenty years but was sold in 2007. Wolters Kluwer operates in over 180 countries and has around 19.000 employees all over the world.[2] The headquarter is established in Alphen aan den Rijn. In 2015, approximately 83 percent of the company's revenue was gathered by digital software and services. The company is also listed as one of the 100 most sustainable corporations in the world.[3] The most important values of the company are 'Focus on customer success', 'Make it better' and 'Aim high and deliver'.

Wolters Kluwer has an online information portal in the Netherlands called the Navigator. The Navigator provides information mostly to jurists and tax specialist. It has been part of the company for many years and the development is an ongoing process. In this online portal laws and regulations, jurisprudence, policies, literature and comments are accessible. Customers use this portal to gather information to support a lawsuit for example. A big part of the Navigator is the search engine where all the information can be accessed. Filters help narrowing down the amount of hits and helps customers to find the information they are looking for. The developers of the Navigator work with the scrum approach. Every three weeks a new function should be added and implemented in the Navigator.

[1] http://wolterskluwer.com/
[2] http://www.wolterskluwer.nl/over-ons/wereldwijd
[3] https://en.wikipedia.org/wiki/Wolters_Kluwer

Motive

Wolters Kluwer wants to create the biggest possible added value for their customers. Therefore customer is key in all of their products. They present themselves as online knowledge supplier and are always looking for innovative ways to deliver information to their customers. A new idea arose to provide information to professionals clearly and easily to enable them to give the best advice to their clients by offering interactive decision trees in the Navigator. In the current situation customers have to search for specific information in several regulations, laws and other documents. It can take a lot of time to find the right information. This tree should make it easier for the customer to find information and therefore come to the right decision, without having to search for and read through a lot of documents. The input is a practical question and by asking the right follow-up question the output offers the user the right information to give the best advice to their client. The ultimate goal is to let the customer find practical information efficiently. A future goal is the feedback from the service to the customer, instead of the other way around. This is easy to explain with an example. If a law changes, this has to be changed within the system. Every customer who ever included this law in their decision making process should be notified, so the advice (potentially) can be adjusted.

Besides Wolters Kluwer the customer of Wolters Kluwer, the clients of the customer and the program developers also are stakeholders. The professional is the end users and they want to find necessary information like up-to-date laws and regulation as easy and quickly as possible to guide themselves or their clients to the right decision. This decision is dependent on the information in the decision tree. Clients of the professional want the best possible advice to their question. They are dependent on the professionals and therefore on the decision tree in the Navigator. The program developers are included in the design process and the final design has to be feasible.

Goal

Wolters Kluwer wants to support their customers in the best way possible by offering interactive decision trees in the Navigator that enables them to find practical information easily and efficiently. The goal of this bachelor assignment is to perform a pilot study on this decision tree. Research has to be done where in the Navigator the decision tree can be incorporated best and what is needed to implement this tool. It also consists of making prototypes that show the possible visual and substantive outcomes of the tree in the style of Wolters Kluwer. The focus of this assignment is on the navigation and the visual aspect of a specific part of the decision tree, where with help of literature the requirements for such a system will become clear. This will be realised starting with gathering general information about interactive decision trees. Secondly, the customer will be described elaborately and the Navigator will be explored thoroughly. Thirdly, possibilities for a suiting decision tree for Wolters Kluwer will be explored and fourthly, a user test will be carried out and adjustments will be made to the concept. The customer will be involved throughout the design process. A completely functioning system that is ready for integration in the Navigator is *not* part of the assignment. The entire assignment will be completed within fourteen weeks.

Research questions

1 What is an (interactive) decision tree?
- 1.1 What kind of (interactive) decision trees already exist?
- 1.2 Which different ways exist to navigate through a (interactive) decision tree?
- 1.3 Which possible solutions can the tree give?
- 1.4 How does the structure of a (interactive) decision tree look like?
- 1.5 Which components do interactive decision trees contain?

2 Who are the competitors?
- 2.1 Which companies are already using an interactive decision tree?
- 2.2 Which companies offer interactive decision trees?
- 2.3 Which systems exist with the same function as a decision tree?

3 What are the characteristics of the customer?
- 3.1 What is the customer's expertise?
- 3.2 What kind of information does the customer need?
- 3.3 For what purpose can a decision tree be useful?

4 How is the interactive decision tree going to be integrated in the Navigator?
- 4.1 What is the Navigator?
- 4.2 Which functions does the Navigator have?
- 4.3 How do you navigate through the Navigator?
- 4.4 How does the data system of the Navigator work?

5 Which possible interactive decision tree designs are suitable for Wolters Kluwer?
- 5.1 What are general user interface requirements?
- 5.2 Which function is the interactive decision tree going to fulfill?
- 5.3 Which kind of interactions are possible?
- 5.4 Which navigation suits Wolters Kluwer?
- 5.5 Which visual design suits Wolters Kluwer?
- 5.6 How do the navigation and visual design support each other?
- 5.7 Which restrictions are imposed by program designers?

6 What are the requirements for an interactive decision tree for Wolters Kluwer?
- 6.1 Which visual components have to be included in the tree?
- 6.2 Which functions does the tree has to fulfill?
- 6.3 Where in the Navigator can the tree be found?

7 Which interactive decision tree design suits Wolters Kluwer best?
- 7.1 Which design do the customers prefer?
- 7.2 What are the integration difficulties of different designs?

Strategy

To accomplish the goal and to answer the questions above a strategy with corresponding requisites has been devised for each research question.

Question	*Strategy*	*Requisites*
1	▪ Desk research ▪ Attend workshop ▪ Run through several interactive decision trees	▪ Scientific articles and patents ▪ Media ▪ Interactive decision trees
2	▪ Desk research	▪ Scientific articles and patents ▪ Media
3	▪ Desk research ▪ Interviews	▪ Media ▪ Questionnaire ▪ Customers of Wolters Kluwer
4	▪ Expert-review ▪ Desk research	▪ Access to Navigator ▪ Expert Wolters Kluwer
5	▪ Desk research ▪ Brainstorm sessions ▪ Expert-review ▪ Prototyping	▪ Scientific articles and patents ▪ Documents and systems of Wolters Kluwer ▪ Expert Wolters Kluwer ▪ Basic knowledge about coding ▪ Program designer Wolters Kluwer ▪ Adobe programs ▪ Axure
6	▪ Desk research ▪ Based on previous findings	▪ Scientific articles and patents ▪ List of all previous findings
7	▪ Expert-review ▪ User test	▪ Expert Wolters Kluwer ▪ Customers of Wolters Kluwer ▪ Research proposal ▪ Prototype

Planning

A provisional planning has been drafted. The project is divided into five phases. These are called the preparation, analysis, ideas & concepts, testing & development and finalizing phase. A milestone meeting is scheduled at the end of each phase, meaning the phase is finished and the next phase should start. Both the bachelor examination and presentation to the company will take place before the 11th of July. Due to its size the diagram is placed on the last page of this proposal.

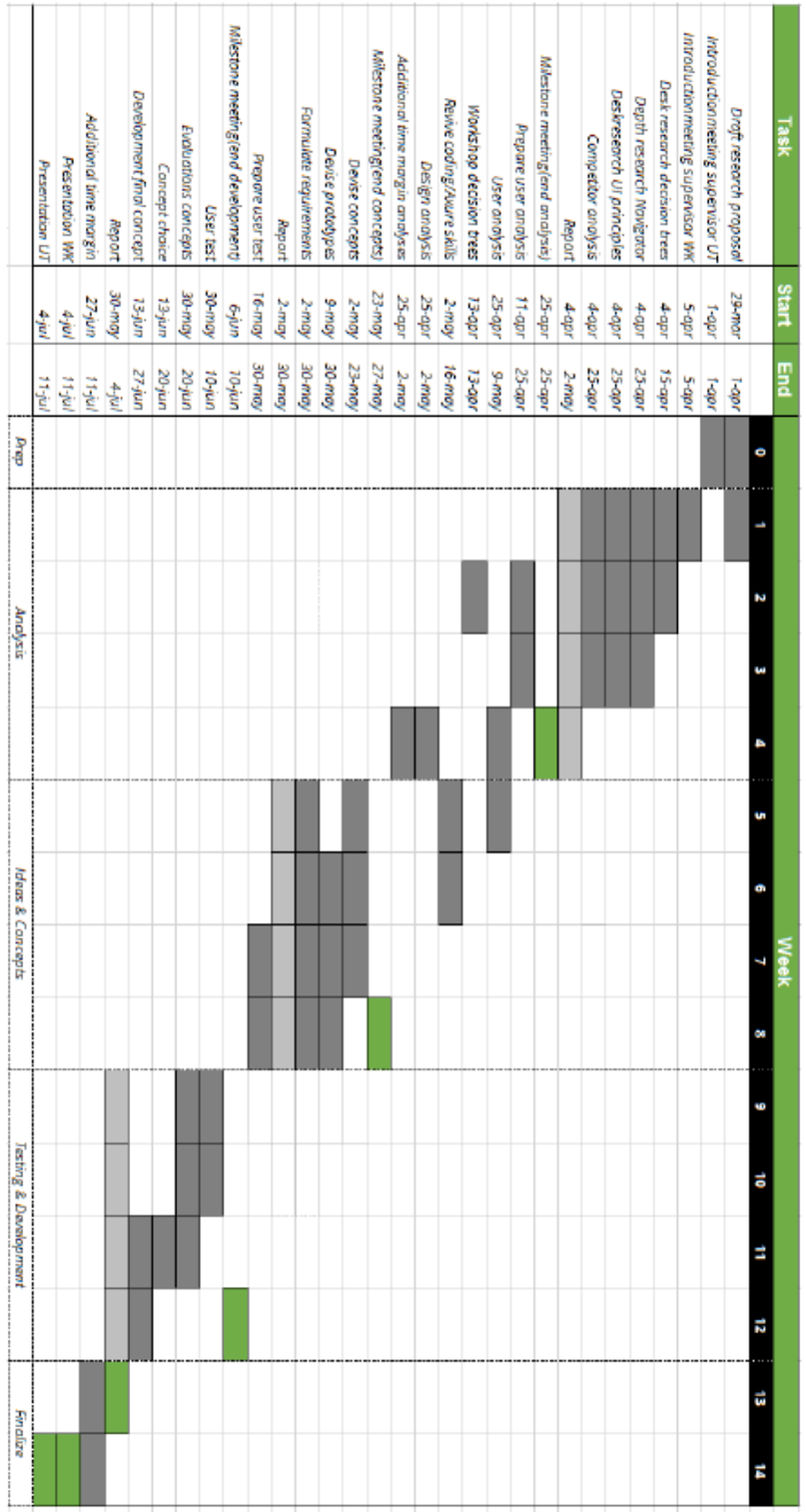
Bottlenecks

With every project bottlenecks and unexpected situations occur. Below a few expected bottlenecks and their solutions are listed.

Bottleneck	*Solution*
Making contact with customers. As of right now, it is unclear how they can be approached.	Start the informing and contacting process early.
The appointments with customers. They are experts in the field and will have busy schedules. It will probably takes a lot of time and effort to make the appointment.	Start contacting early and potentially lower the amount of participants.
It could be difficult to determine the completeness of the requirements.	Consult different people and adjust requirements after the user test.
Producing a completely working decision tree is not part of this assignment. A creative solution has to be found to show the solution to the customers.	Ask help from an expert or make a very simple mock-up.
The preparation and execution of a user test can take a lot of time.	Test on a small scale or in a different way.

Definitions

Customer	The juridical and tax professionals who use the Navigator.
Decision tree	A system with multiple levels of data where questions of the customer are answered through follow-up questions.
Navigation	The way a user operates a system.
Specific part	A specific substantive subject, to be determined.



B. Requirements

Stakeholder	Customer Need	Importance	Requirement
User	1. I want to find the Decision Tree in the Navigator	10	Decision Trees are shown in the search results in the Navigator Decision Trees are shown in the word wheel All Decision Trees can be accessed on an individual page Decision Trees can be found on a Theme page Search results in the Navigator can be filtered on Decision Trees
	2. I want to give the right advice to my client	10	An algorithm exists that defines the relevancy of a result of a Decision Tree The result is synchronised with information from the Navigator within one month of information release Nav The result is understood within 15 minutes
	3. I want to go back to a previous question	10	Previous questions can be accessed
	4. I want to change my answers	10	Answers can be changed
	5. I want to print the Decision Tree	10	Every question of the Decision Tree can be printed Every given answer of the Decision Tree can be printed A selection of questions and given answers of the Decision Tree can be printed All questions and given answers of the Decision Tree can be printed The result of the Decision Tree can be printed Personal notes from the Decision Tree can be printed
	6. I want to save the Decision Tree to my computer	10	Every question of the Decision Tree can be downloaded Every given answer of the Decision Tree can be downloaded A selection of questions and given answers of the Decision Tree can be downloaded All questions and given answers of the Decision Tree can be downloaded The result of the Decision Tree can be downloaded Personal notes from the Decision Tree can be downloaded
	7. I want to favourite the Decision Tree in the Navigator	10	The Decision Tree can be marked as favourite in the Navigator
	8. I want to save the Decision Tree in the Navigator	6	Information is saved to an account in the Navigator Every given answer of the Decision Tree can be saved in the Navigator A selection of given answers of the Decision Tree can be saved in the Navigator All given answers of the Decision Tree can be saved The result of the Decision Tree can be saved Personal notes from the Decision Tree can be saved
	9. I want to access previous completed Decision Trees	6	Previous completed Decision Trees can be accessed
	10. I want to re-use the information from previous filled in Decision Trees	3	Information from previous Decision Trees can be saved Information from previous Decision Trees can be copied Information can be imported into a Decision Tree
	11. I want to be notified when a Decision Tree I use has changed	5	Indication at the Decision Tree if it has changed Personal notification in the Navigator if a used Decision Tree has changed Personal notification if a used Decision Tree has changed
	12. I want to be notified when a Decision Tree I use is going to change	2	Indication at the Decision Tree if it is going to change Personal notification in the Navigator if a used Decision Tree is going to change Personal notification if a used Decision Tree is going to change
	13. I want to name my Decision Trees	5	The Decision Tree can be named in the Navigator The Decision Tree can be named on the page itself
	14. I want to add personal notes to Decision Trees	7	Personal notes can be created in a Decision Tree Personal notes can be accessed in the Navigator
	15. I want to see an overview of my given answers	6	An overview of the given answers can be seen at the results An overview of the given answers is shown at all times while filling in the Decision Tree
	16. I want to see an elaborate explanation with each question	5	An elaborate explanation is shown at each question An elaborate explanation can be shown at each question
	17. I want to see an overview of all asked questions	6	An overview of the asked questions can be seen at the results An overview of the asked questions is shown at all times while filling in the Decision Tree

	18. I want to see a categorisation of the questions	2
	19. I want to see an overview of all Decision Trees in the Navigator	6
	20. I want to use a Decision Tree on several devices	7
	21. I want to search through all available Decision Trees in the Navigator	6
	22. I want to find Decision Trees from the Navigator in Google	1
	23. I want my personal information to be secured	8
	24. I want to share information with my colleagues	5
	25. I want to know my progress of filling in the Decision Tree	3
	26. I want to be able to send the result immediately to my client	2
	27. I want to know what other users chose	1
	28. I want to come to a result fast	7
Author	29. I want to be notified when a Decision Tree has to be changed	6
Author	30. I want to use a template to create a Decision Tree	5
Author	31. I want to create a Decision Tree in the Navigator	10
Author	32. I want to change a Decision Tree in the Navigator	10
Author	33. I want to receive credit for my work	7
Business	34. I want to know if Decision Trees are being used	10
Business	35. I want to gain revenu from Decision Trees	10
	36. I want to create overview	10

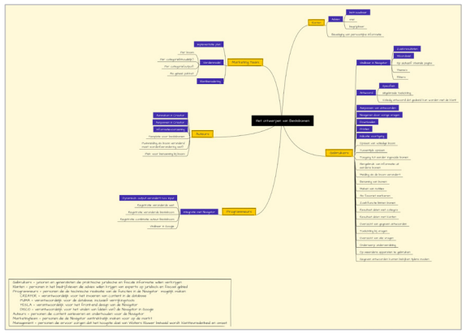
Questions are categorized Category is shown at each question All categories are shown at each question
An overview of all Decision Trees in the Navigator exists
Decision Trees are compatible with a laptop Decision Trees are compatible with a PC Decision Trees are compatible with a tablet Decision Trees are compatible with a phone
A search engine specifically for Decision Trees exists Decision Trees can be opened directly from the search results
Decision Trees from the Navigator can be found in Google
Personal information is only accessible to the user
The result can be e-mailed The result can be shared on social media A completed Decision Tree can be e-mailed A completed Decision Tree can be shared on social media
The progress of filling in the Decision Tree is shown
The result can be e-mailed to the client The result can be shared with the client on social media The result contains an elaboration without actual law texts
The answers of users are tracked At each question an indication of the most chosen answer is shown
The Decision Tree is completed within 50 screens The Decision Tree is completed within an hour
A notification gets send when a Decision Tree has to be changed
A template is accessible for creating Decision Trees for the authors A template is incorporated in the software for creating Decision Trees for the authors
Information in the Decision Tree can be created in the Navigator by the author The structure of the Decision Tree can be created in the Navigator by the author
The structure of a Decision Tree can be changed by the author Every question can be changed by the author
The author is credited at the Decision Tree itself The author is credited in the Navigator
The behaviour of the user is tracked The information about the tracked behaviour can be accessed
A businessplan is drafted Decision Tree overview is scalable (adapting to amount of trees, 3 or 500) Navigator can still be used if Decision Trees are not available at all to a user
Input and Output on the same page Subject categorization Seeing response immediately when changing a field Ability to go back to any question you want Ability to return to decision tree, if linked to another page Reduce fear of incomplete information
Indication of progress Indication of chosen path Show future questions Show if a question is required Clear boundaries where the decision tree ends

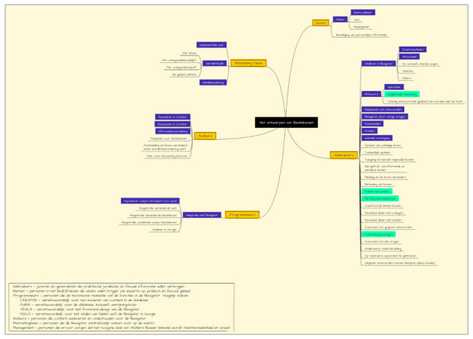
Designer	37. I want to let the user know where in the system they are	10
	38. I want to create consistency	10
	39. I don't want to stress the user's attention	10
	40. I want to decision tree to be able to scale	10
	41. I want the decision tree to be accesible for people with disabilities	10
	42. I want to maintain the decision tree	10
	43. I want to create a flexible design	10

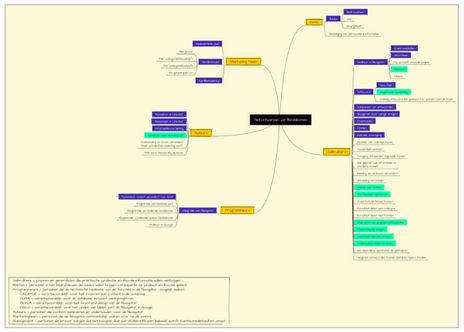
Clear indication when you're leaving the decision tree
Minimze different pages Interface design fitting with Navigator style Same lay-out, same interaction Consistent entry fields Consistent direction of flow Consistent directory links
Minimize visual searching time Not presenting all information at once Balance amount of questions on one page
Sizeable page if window size changes Functionalities consistent when changing page size Compatible with different operating systems Compatible with different internet browsers Responsive design
Take into account colour blindness Take into account dyslexia
Develop time Costs Maintenance Performance
Adaptive to different inputs Adaptive to different outputs Adaptive to elaborate explanation Adaptive to various total amount of questions

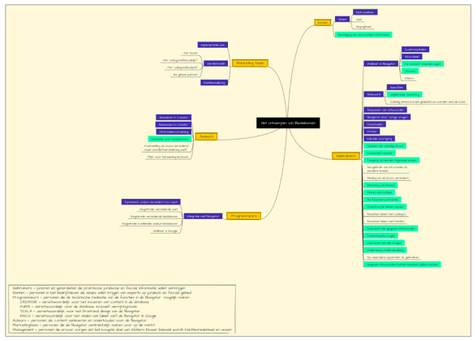
C. Workshop about decision trees

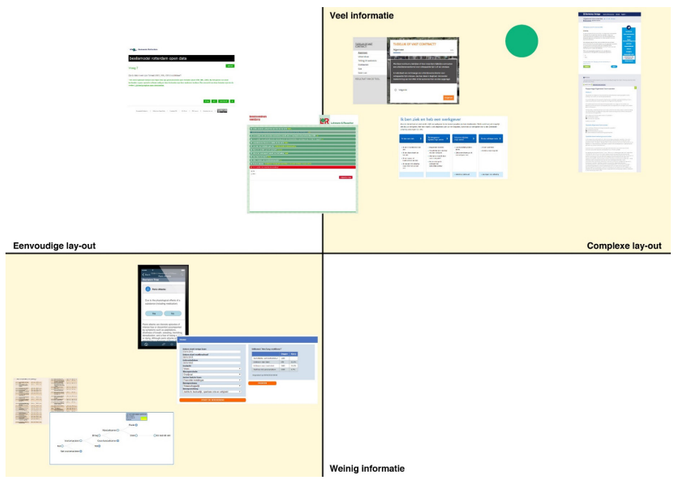
During the ongoing of this research three workshops were organised with people from the company, which were sessions of one and a half hour where several people from different backgrounds were invited to share their opinions about interactive decision trees. People such as the product owner of the Navigator and publishers, editors, UX Designers, managers of Wolters Kluwer were included in the meetings. Below images used in this workshops are presented. The first four explaining different component level concepts and the last figure is an overview of the analysed existing decision trees.











D. Ideas Ja/Nee

E. User test questions

Gebruikerstest Beslisbomen

OPZET

Doel van het onderzoek:

Onderzoeken of het concept 'Beslisbomen' positief wordt ontvangen

Onderzoeken welke functionaliteiten van de beslisboom de gebruiker wenselijk vindt.

Vaste variabele: content

Afhankelijke variabele: functionaliteiten

Onderzoeken of het ontworpen concept begrepen wordt door de gebruiker.

Vaste variabele: content

Afhankelijke variabele: visueel

Benodigdheden:

Mobiel voor voice recording

Laptop + Oplader

Opzet gebruikerstest papier voor bij de test zelf

Laptop (of Papier en pen) om opmerkingen te kunnen notuleren

Opzet:

Deel 1. Pre-test Interview

Deel 2. Concept Beslisbomen testen

Deel 3. Onderzoek Functionaliteiten (Design constant, functionaliteit variabel)

Discussie aangaan mbt case. Starten vanuit basisfunctionaliteiten (MVP). Vragen welke functionaliteiten op welke plek handig zouden zijn. Iteratief onderzoeken. Tijdens het gesprek functionaliteiten toevoegen en visualiseren.

Deel 4. Onderzoek Usability (Functionaliteit constant, Design variabel)

De verschillende digitale visuele concepten voorleggen en onderzoek naar begrijpbaarheid, interactie en visueel design.

Deel 5. Afsluiting

UITVOERING

Deel 1 Pre-Test Interview

Uitleggen wat het doel is en wat er met de feedback gedaan wordt.

Kennismaken

Doel: Kennismaken, respondent op zijn gemak stellen.

- Kunt u mij kort iets vertellen over uw functie?
  [verantwoordelijkheden, activiteiten, hoe lang]

Kluwer Navigator

Doel: inzicht in beeld, functie en gebruik van Navigator.

- Gebruikt u Kluwer Navigator in uw functie?
  [Maakt u daarbij ook een gebruik van Legal/tax Intelligence of Rechtsorde of een andere zoekmachine?]

- Wat komt als eerste bij u op als u aan Kluwer Navigator denkt?
  - Woorden, beelden, associaties?
  - Wat zijn uw ervaringen met Kluwer?

- Waarvoor gebruikt u Kluwer Navigator? Met welk doel?
  - Naar wat voor soort informatie zoekt u?
  - Waarom gebruikt u dan Kluwer Navigator?
  - Welke taken voert u uit op Kluwer Navigator?
    [printen, zoeken, lezen?]

- Hoe vaak gebruikt u Kluwer Navigator? (keren per week/maand?)
  - Positieve punten:
    [wat gaat goed, positieve punten, voordelen]

  - Verbeterpunten:
    [wat gaat minder goed, wat kan beter]

Deel 2 Concept Beslisbomen testen

Doel: Onderzoeken of het concept beslisbomen aan zou slaan.

- Zoals ik eerder uitlegde ben ik bezig met het onderzoeken hoe praktische content in de Navigator kan worden gebruikt. Wat verstaat u onder praktische content?

- Wat voor soort praktische content zou u nuttig vinden in het kader van uw werkzaamheden? [denk bijvoorbeeld aam repetitieve werkzaamheden, complexe werkzaamheden ….]

- Als ik het over een beslisboom heb, wat stelt u zich daarbij voor? *[checken benaming, is de term beslisboom bekend?]*

- Wat voor soort informatie zou u verwachten in een beslisboom? Waarom? *[checken van rekenmodellen, contracten, concrete vragen etc.]*

- Wat voor resultaat zou u verwachten bij een beslisboom? *[ja/nee antwoord, relevante artikelen, compleet contract]*

- Zou praktische content een extra toevoeging zijn op de Navigator? Zou u het gaan gebruiken? Zo ja, waar voor? Zo nee, waarom niet? Voor wie zou het wel nuttig kunnen zijn? *[testen doelgroep]*

- Kunt u een concrete case bedenken waarbij een beslisboom handig zou kunnen zijn? In welke situatie zou u de beslisboom gebruiken? *[checken zelfstandig invullen of met klant]*

- Als u een concrete vraag hebt en het antwoord zoekt in de Navigator. Hoe lang duurt het ongeveer voordat u bij de juiste content bent belandt? *[Hoe groot wordt de efficientieslag?]*

- Kunt u een indicatie geven hoe veel tijd u maximaal aan het invullen van een beslisboom zou willen besteden? *[minuten/uren]*

- Zou u een systeem als een beslisboom vertrouwen dat het juiste advies er uit komt? *[vertrouwen = meer kans op gebruik]*

- Vindt u dat een nieuwe manier van informatie aanbod in de vorm van interactieve beslisbomen zou passen bij de Navigator? *[imago]*

- Zou u jezelf kunnen voorstellen dat u beslisbomen gaat gebruiken?

- Wat zouden redenen zijn om het te gebruiken?

Deel 3 Onderzoek functionaliteiten

Doel: belangrijkste functies achterhalen

A

Eerst uitleggen wat ik versta onder een interactieve beslisboom. Puur het beantwoorden van vragen in de structuur en dat het aantal vragen flexibel is. Niets vertellen over evt. functies! Een papieren blad voorleggen met een aantal ingevulde vragen (wel geïntegreerd in de Navigator), maar zo minimalistisch mogelijk.

Stel u voor dat beslisbomen geïntegreerd zouden worden in de Navigator.

- Waar in de Navigator zou u een beslisboom willen vinden? *[overzichtspagina wenselijk? Filters]*

- Wat vindt u van de term beslisboom? *[duidelijk genoeg?]*

- Op welke zoekterm zou u zoeken om een beslisboom te vinden? *[uitzoeken voor titel boom en hoe boom boven water komt bij zoekresultaten]*

- Als u dit nu voor u ziet, welke functionaliteiten kunt u bedenken die bij de interactieve beslisboom nuttig zouden kunnen zijn? U kunt hierbij denken aan al bestaande functionaliteiten van de Navigator, maar nieuwe functionaliteiten mag u zeker ook benoemen.

    - *[Zou u de mogelijkheid willen hebben om antwoorden aan te passen?*
    - *Zou u de boom als favoriet willen markeren?*
    - *Wat zou u willen printen/downloaden?*
    - *Zou u het nuttig vinden om uitleg bij de vragen te krijgen?*
    - *Zou u het nuttig vinden relevante artikelen te kunnen lezen, direct in de beslisboom?*
    - *Zou u er persoonlijke aantekeningen bij willen maken?*
    - *Zou u het resultaat op willen sturen naar collega's?*
    - *Zou u het resultaat op willen sturen naar de klant?*
    - *Zou u een beslisboom willen opslaan om hem op een later moment af te maken?*
    - *Zou u een beslisboom willen kunnen doorlopen op uw tablet of telefoon?*
    - *Zou u een indicatie van de voortgang noodzakelijk vinden(percentueel)?*
    - *Zou u er op attent willen worden gemaakt als er een nieuwe beslisboom online zou komen te staan?*
    - *Zou u er op attent willen worden gemaakt als een beslisboom inhoudelijk aangepast is vanwege bijvoorbeeld een wetsverandering?]*

Deel 4 Onderzoek Usability

Doel: testen of concept begrepen wordt en of de visuele presentatie naar wens is

Ik ga u nu **twee** ontwerpen voorleggen. Hierbij is het belangrijk om te vertellen dat de inhoud niet volledig klopt, het gaat om het idee. Het zijn nog concepten waarbij het doel van dit onderdeel is te achterhalen of de functies op deze manier begrepen worden. Denk hierbij vooral hardop en leg uit waarom u naar bepaalde plekken gaat. Vraag alle vragen die u hebt.

- Wat is uw eerste indruk van dit scherm?
- Wat ziet u voor functies op het scherm?
- Hoe vindt u de weergave. Denk hierbij aan lettergrootte, spacing, kleurgebruik.
- Probeer eens tot een resultaat te komen. Let hierbij niet op de specifieke content omdat deze is geminimaliseerd voor een effectieve gebruikerstest.
- Open een toelichting. Wat ziet u gebeuren? Vindt u dit handig?
- Stelt u zich voor dat u een fout heeft gemaakt in een antwoord. Probeer dit de wijzigen. Wat vindt u van wat hier gebeurd?

- Kunt u de algemene goede punten en slechte punten van de ontwerpen voor mij herhalen?

(Denk aan: meerdere vragen per pagina? Indicatie van voortgang(percentage)? Wat precies printen? Opslaan in de Navigator voor hergebruik informatie?

Deel 5 Afronding

Doel: inzicht verkrijgen in de algemene mening en beleving van de respondent.

Introductie: We hebben nu alle scenario's doorlopen. Hartelijk dank hiervoor. Nu wil ik graag wat afrondende vragen stellen.

- Welk cijfer zou u geven aan wat we vandaag getoond hebben (1 op10)? [beslisbomen]

  [Als u daarbij alleen wat we wel hebben scoort en niet wat we nog niet hebben]

  Waarom?

- Wat is uw algemene indruk van beslisbomen?
  - Wat was goed / sterke punten?
  - Wat kan beter / verbeter punten?
  - Zou de Navigator beter zijn met het toevoegen van beslisbomen?
    [Wat zijn de punten die opvallen?] [beter, slechter, algemene indruk]

- In hoeverre mist u nog iets aan Kluwer Navigator?
  - Wat zou Navigator tot de perfecte website maken voor u?

- hoe beoordeelt u het gebruik van Navigator in vergelijking met websites van andere leveranciers?
  - Zijn er functionaliteiten in andere informatiewebsites die u prettig vindt?

- Ziet u nog verbeterpunten of problemen ten aanzien van Navigator die we nog niet besproken hebben? Misschien iets heel anders dan ik net getoond heb?

Afronden / afsluiten

- We zijn bij het einde aangekomen van dit interview. Heeft u nog iets wat u kwijt wilt?
- Afronden, bedanken participant.