Discover and tell visual stories in audits

Using visual design & information design at the Netherlands Court of Audit

Linda Meijer-Wassenaar MSc

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CONTENTS

Working as an auditor in the days past. This hall, the 'Grootboekzaal' (grootboek means general ledger), used to be the NCA archives (photo - Algemene Rekenkamer, 2017).

Visual storytelling in audits to the ***next level***

When I started working as an auditor at the Netherlands Court of Audit (NCA) in September 2008, I felt like a child in a candy store. I had already worked at a smaller regional audit institution for a year, and I was eager to learn more from this larger and much older 'brother'. The NCA was founded in 1814, and is unique because of its independence. That means we decide what to audit and have access to all of the information, including confidential information, needed to perform our audits.

From the outside, being an auditor might not sound very exciting. Some people might think of the picture to the left when they think of my job. As an auditor at the NCA, I check if government does the right thing (efficiency) and whether it is done right (legality). I like to compare being an auditor to solving mysteries like Sherlock Holmes. It perfectly fits my curious nature and love of research.

After working at the NCA for nine years, I still feel like a kid in a candy store. The ever-changing nature of my job keeps it interesting. Every time I start an audit, I need to become an expert in a new subject to perform a thorough investigation. Although I don't need a stepladder to access information anymore I have access to, and need to analyze, much more information than is contained in just one library.

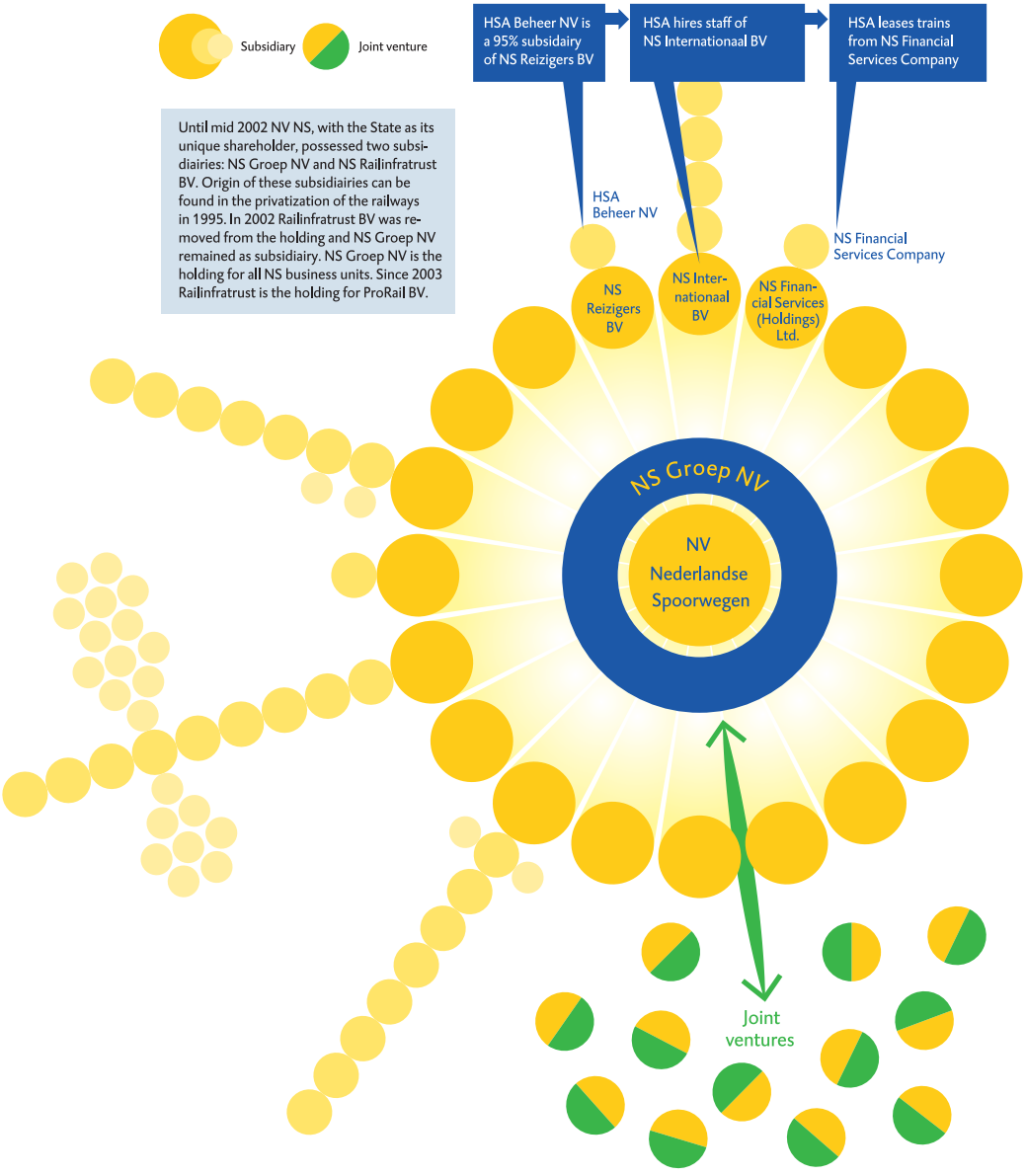
Over the years, I have changed how I document my audits. Instead of written reports, I create visual stories. I had always used visual stories, like infographics, to help me see the big picture of an audit and visuals to help me organize and compare information. I hadn't always included them in my reports. I discovered that I can express myself much more clearly by visualizing the story I want to tell.

This shift happened in 2013, while I was working on an audit of the High-Speed Rail Link South. I needed to create an overview of the organizational structure of the Dutch Rail (NS), a holding company with more than 75 subsidiaries. I presented this overview in an infographic to inform our former president of the NCA, Ms. Saskia J. Stuiveling, who at the time was our board member responsible for this audit. Her reaction was so overwhelming positive. It made me consider whether I should start sharing my visualizations with my colleagues and use them in audits. I was excited to demonstrate a different and useful approach to auditing.

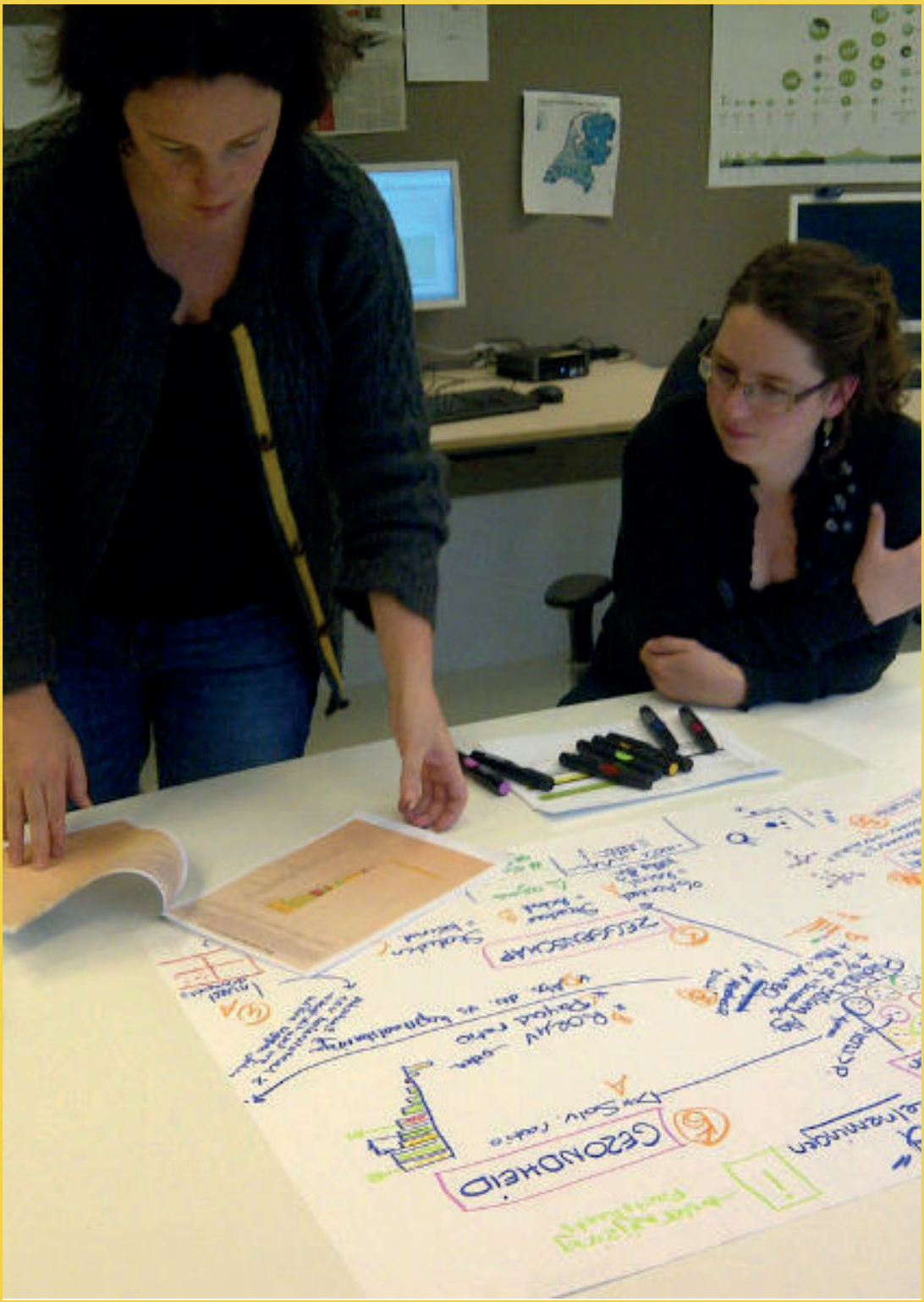
Soon after working on the High-Speed Rail Link South audit, my colleague Diny van Est asked me to join her audit team. Her team was doing an audit on the management of state owned enterprises. Not the most interesting topic. To better understand what was going on, I started working on visual stories with my former colleague, Janneke ten Kate, who also included visual stories in her work. We made sketches, threw them out, edited them, and improved them until we incorporated all of the information into visual stories that made the audit more visual.

NS and subsidairies

In 2013 NS contained 76 subsidairies and 12 joint ventures.



This overview of the Dutch Rail (NS) and its subsidairies ended up as part of an infographic in the audit report on the HSL South. (Algemene Rekenkamer, 2014: 51)



Working as an auditor nowadays. Janneke ten Kate (R) and I (L) make a visual story-board on state-owned enterprises, 2014. (photo: Diny van Est)

Diny, our audit manager, liked to call our work “small tales and big stories”. In factsheets we told small tales about the 26 state-owned enterprises: their financial status, corporate information, and more (NCA, in English, 2016). We were then able to tell the big stories, based upon the small tales and the audit itself. Together with the audit team, we turned this not-so-exciting topic into a useful, engaging and accessible audit report. Our audience, Members of Parliament, asked the Minister of Finance to present future information on state-owned enterprises in the same way as we had.

This experience was addictive. Luckily, more and more colleagues asked Janneke and I to make graphics to go with the text of their audit reports. An innovative program at the NCA allowed me to start discovering visual stories as my full-time job. At the same time, I started my Master’s of Design, searching for a way to give the ’picture-next-to-the-text’ more meaning in the work of auditors. I wanted to give visual stories a permanent place in our audit reports.

The Master’s of Design introduced me to the world of designers. The program is media-independent, so my classmates were interested in industrial design, interior design, fashion design, and graphic design. Many of them were designers eager to learn how to do research. I was the opposite – a researcher who wanted to learn about design in order to tell visual audit stories. I never would have guessed that this Master’s program would not only educate me to tell visual stories, but also cause me to reflect on the way I do audits and the way I am trained as an

academic researcher. It is great to understand the problem and the subject matter as an auditor, but how can I explain it in a way people can understand it, and find engaging? Design isn't just aesthetics or the visual story you tell, it is also about what works for the user (Walker, 2003).

I found it difficult to be open to research methods other than the classical methods I was trained in at the NCA and at my Master's in Sociology program; however, the moment I used a self-made design research method in an audit, and it gave me exactly what I couldn't achieve by following the classical methods, I understood the value of design research. I believe that combining design research with social sciences is the next level to discover and tell visual stories that people care about.

Margaret Hagan –director of the Legal Design Lab at Stanford d.school– is a great inspiration for me. My search to give the 'picture-next-to-the-text' more meaning was answered by her mission (2017): how can human-centered design make law more accessible, useful and engaging? Like auditors lawyers are content-centered and find it hard to see the true value of design. Hagan started with visual design, and meanwhile an international movement to make law more human-centered emerged. Can we do the same for audit institutions?

DESIGN RESEARCH QUESTION

During this Master's of Design I aimed to answer the following question: how can I –as auditor and designer– discover and tell visual stories at the NCA? In this thesis I will share the results of

my own design research with you. With 'YOU' I mean: auditors and designers who work at audit institutions. However, this thesis is relevant for information / visual designers in general, as balancing complexity and accessibility is our common challenge.

The results of my design research are presented in four chapters. In the first chapter I will present the audit process of the NCA, share my vision on visual and information design and bust the myth about text-driven auditors. This chapter is meant to get us on the same page. Chapter 2 shares my experiences with visual and information design in four audits. I selected these four audits on their diversity, to give some insights in how design principles can be used in audits. The third chapter is about my search for objectivity in visuals - an important value for auditors. Throughout my Master's program I looked for examples, which I want to share with you. The last chapter is a chapter about processes and roles. I created a design process that I use at the NCA, yet hope to inspire other auditors to do the same for their own institution.

Auditors work with confidential information, and so do I. In this thesis I share my insights on working with information and visual design in audits, however I have to leave some details out. The visuals and pictures I show are yellow-framed or blue-framed; respectively visuals or pictures of the NCA and of others.

Linda Meijer-Wassenaar

Hi Linda, I have a question for you. I am working on an audit. I am almost finished, but my manager asked me if I could add pictures to make it look nicer. Could you add some pictures by tomorrow? It is quite a complex matter, so you don't have to read the entire audit report. I have a spreadsheet with some more information, if that will help. Can you make a picture out of this spreadsheet? I understand that you have to know what the audit is about, but do you have any idea what kind of pictures you can add to my report?

Could you ***please*** make me a picture?

CHAPTER 1

The *picture* that goes with the text

INTRO

For many visual designers and information designers who work in a content-centered setting (e.g. audit institutions, universities, law firms), this conversation must be recognizable. In this context, you are the alien who speaks a different language. Academically-trained colleagues see you as some kind of decorator who makes things look nice. You add pictures that *help* the message to stand out, nothing more.

Luckily, those colleagues increasingly understand the true value of design – how you can use design principles for research purposes, that it helps you to make information more accessible, useful and engaging. Steve Jobs once said, "*Design isn't about how it looks, it is about how it works*" (Walker, 2003). Design puts the human in the center.

However, for many people who work at organizations who put the content in the center, it is a big step to focus on what will work for the audience instead of only on the story you want to tell. Starting with visualizing information is a good first step. Soon, you will notice that your text isn't as clear as you thought it was, so you can't make the visual you want. Nevermind visualizing complex systems.

At the NCA, we constantly work with this complexity. The way we work and our subjects are quite complex. We use standardized methods that took years to develop to ensure our audit process rules out any mistakes and is as objective as possible. Our audits must meet high quality standards. Additionally, our audience is diverse - Parliament consists of 150 people with different interests and backgrounds. Therefore, working in a human-centered way isn't easy - we work with complex information, are focused on our audit process, have to engage a very diverse audience and last but not least auditors are not trained to work human-centered.

Yet, this is the area in which I work and I want our products to be more human-centered by using visual and information design. In our thorough audit process there is little demand for discovering and telling visual stories that can make our information more accessible (do I understand it?), useful (do I need it?) and engaging (do I care?). When you put the human in the center you have to think about these questions and design products that will meet these demands.

For me, visual and information design really work to make our audits more accessible, useful and engaging and in chapter 2 I will show you how. But in this chapter I will first explain our audit process. After that, I will share my vision on the added value of information design and visual design in our audit work. Finally, I will describe the research I did with designers and auditors: are auditors as text-driven as they think they are?

THE AUDIT PROCESS OF THE NCA

The audit process of the NCA is designed to ensure the highest quality audits. Below you see the current audit process of the NCA. This process always delivers at least four products:

1. **strategic audit proposal**
   why should we audit this subject?
2. **audit design**
   how will we audit this subject?
3. **memorandum of findings**
   what did we find?
4. **audit report**
   what do we think should be improved?

The audit process of the NCA, simplified into seven product possibilities.

When this process is finished, we write a press release, use social media to disseminate our findings and offer a private presentation (when requested) to Parliament about our report to give them the opportunity to ask us questions.

If you include the press release, the social media posts, and the presentation to Parliament, each audit really creates seven

products. The NCA completes 40 or 50 audits per year, which means hundreds of products are created.

Our audit process lacks a rigorous design process to create our products. The NCA audit process is very thorough regarding the content and academic quality of our audits, but I believe our work can have a greater impact if we use a design process for the products of our work. This would allow us to really engage our internal and external stakeholders regarding each product.

Due to the confidential nature of strategic audit proposals, audit designs, and memoranda of findings (products 1, 2 and 3), I cannot show you the finished products. When you look at the pages, you will see blank space, redacted text, and obscured visuals; however, you will notice that most pages are filled with text, and that visuals are only heavily utilized in audit reports.

Although the number of visuals in reports has increased over the past few years, the lack of visuals in strategic audit proposals, audit designs, and memoranda of findings shows that auditors prefer to work only with text.

For each of the four main produc
these examples randomly, yet nc
see here has 135 pages.

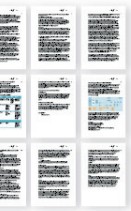
Product 1: *Strategic audit proposal*

Product 2: *Audit design*

Product 3: *Final memorandum of findings*

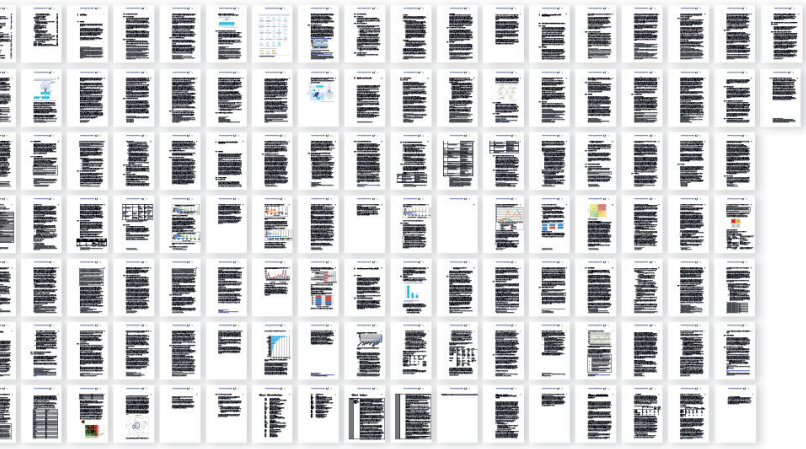
Product 4: *Final audit report*

cts of the NCA you can find an example. What you see are the pages of each document. I selected ot older than 1,5 year. The memorandum of findings sometimes exceeds 200 pages, the one you

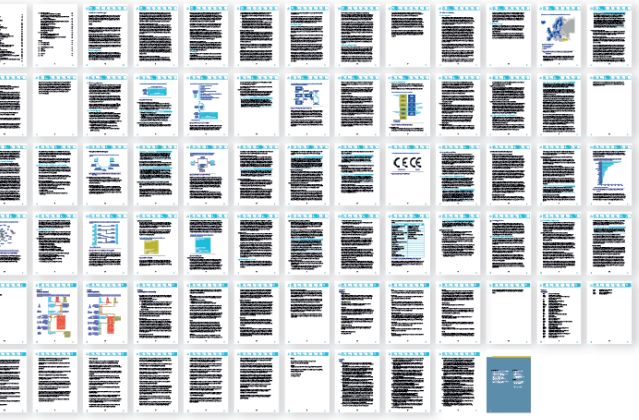


Who reads product 1?
Board, Management Team, Quality Control, Communications Department, auditors that are interested

Who reads product 2?
Involved Board member and Manager, Quality Control, organisations that are audited



Who reads product 3?
Board and Management Team, Quality Control, organisations that are audited, Communications Department



Who reads product 4?
This product is public, yet amongst others these people are interested: Parliament, involved Minister(s) or Secretaries of State, organizations that are audited, journalists. NCA: Board, Management Team, Quality Control, Communications Department.

Text is an important part of any product, but I would like to bring more attention to the added value of information design and visual design. A wide variety of internal and external stakeholders must read and comment on our work. Wouldn't it be nice if design is used in a way those readers find more accessible, useful and engaging?

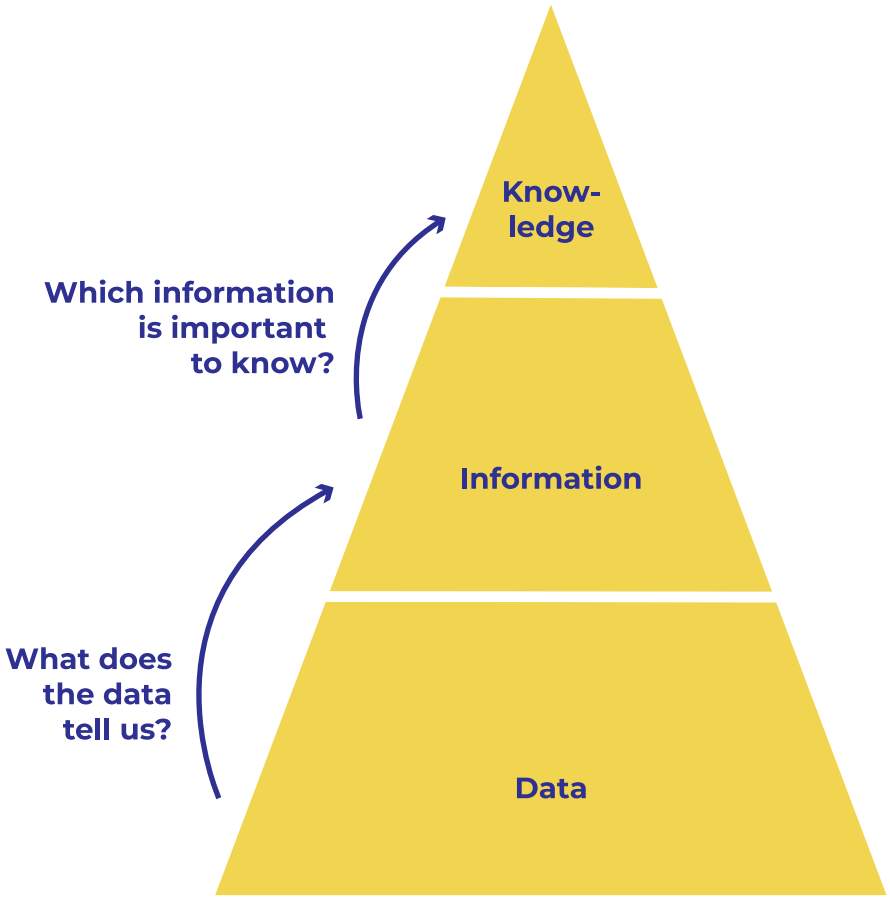
THE ADDED VALUE OF INFORMATION AND VISUAL DESIGN

In the introduction I explained that I use information design and visual design in audits at the NCA. Because of these experiences I am convinced that the use of information and visual design can make our audits more accessible, useful and engaging. But what is information design? And how is it different from visual design?

Robert E. Horn defines information design *as "the art and science of preparing information so that it can be used by human beings with efficiency and effectiveness"* (Jacobson, 2000: 15). Documents with a clear layout, tables that help me to understand the information, a flow chart which explains an organizational structure - all examples of information design. I see information design closely related to the data-information-knowledge-wisdom hierarchy (Ackoff, 1999: 3). According to Ackoff (1999: 3) information is 'functional' data, and knowledge is 'instructional' information.

On the right is my visualisation of the data-information-knowledge pyramid (wisdom is excluded from this pyramid, as it

Data-Information-Knowledge hierarchy



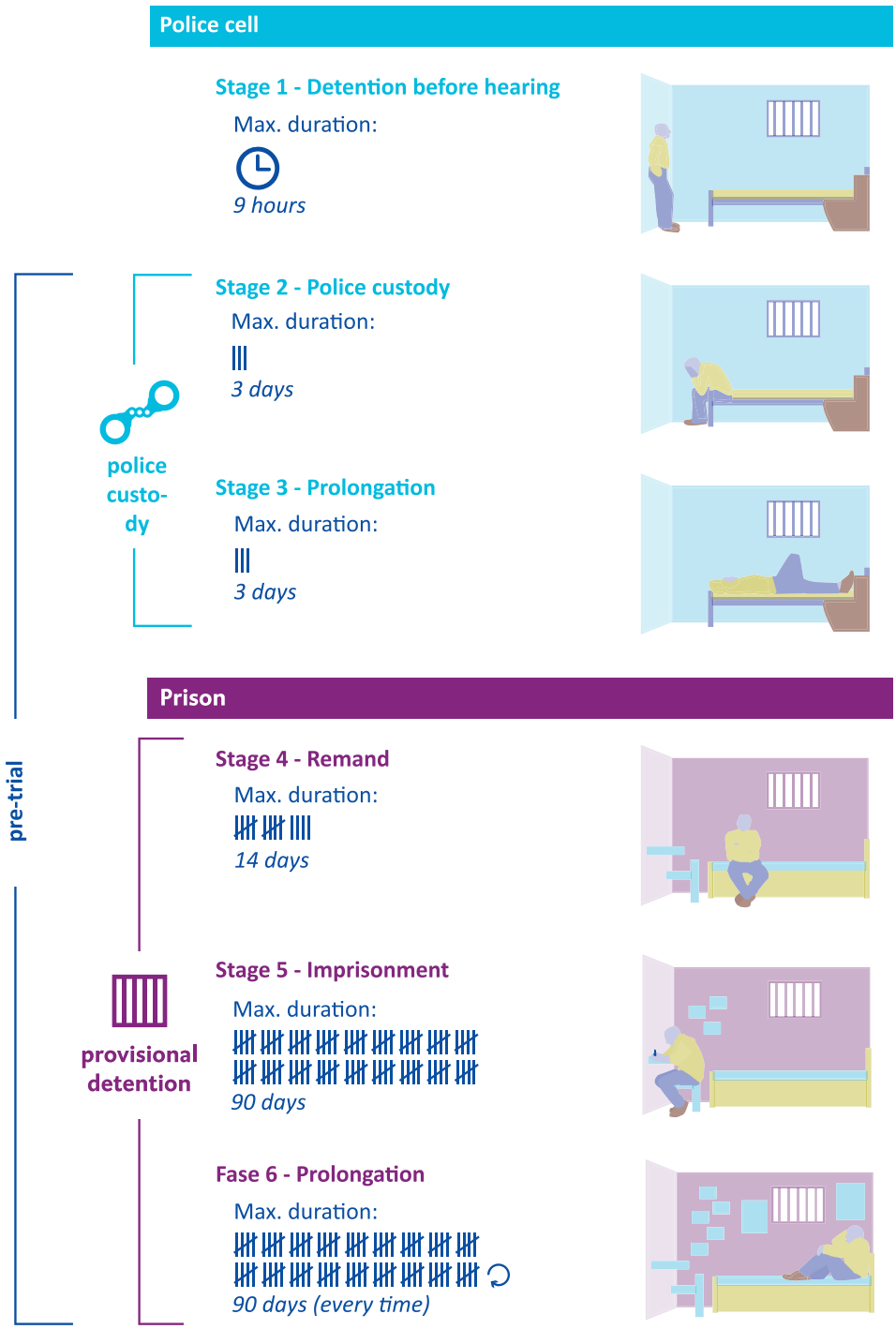
The data-information-knowledge hierarchy (Ackoff, 1989: 3) visualized to use in audits of the NCA.

is too personal to my beliefs). Whenever I work on an audit, I use information design to discover 'what does the data tell us?' and 'which information is important to know (as an MP)? Alberto Cairo, data journalist and information designer, calls "information graphics and visualization a significant part of information design" (2012: 18).

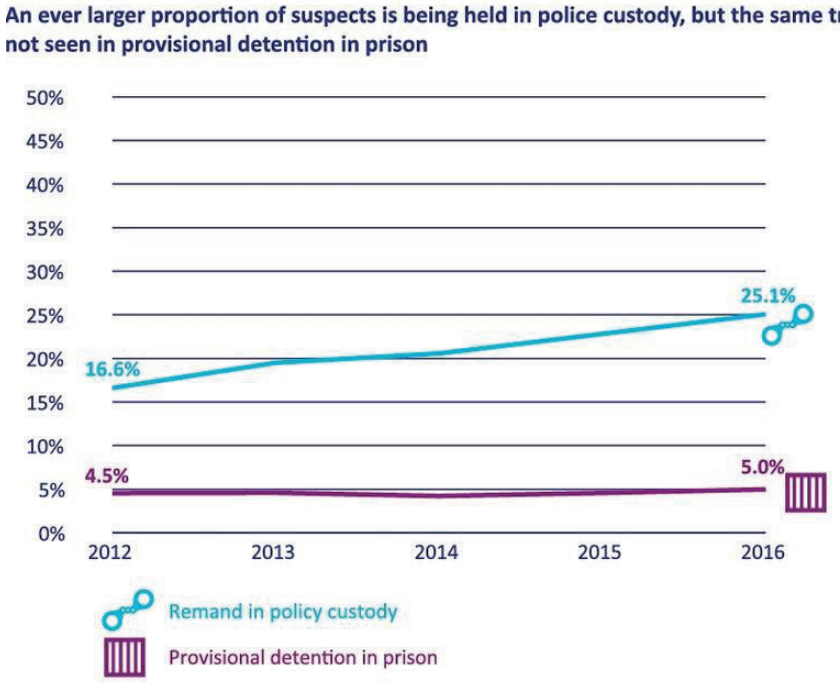
While information design helps me to understand information more easily, visual design for me is about visual language. I use visual design to transform the story into a visual story. Cairo sees these visual elements as a feature of an information graphic (2013: 51): *"graphic displays can be either figurative or non-figurative."* (2013:19). Non-figurative graphics are abstract graphics, they don't represent the real world, and figurative graphics –to some extent– do. For me, this definition is too narrow.

I will explain the distinction between information design and visual design by showing an infographic I made. In an audit on pre-trial we wanted the audience to fully understand what pre-trial means. The infographic is on the right (Algemene Rekenkamer, 2017: 8). It shows the following information: location, definition of pre-trial, six stages and duration. The figurative elements are: icons, counting marks and illustrations. You might say that these figurative elements are decoration, yet they do have a function. These icons were used in the datavisualizations throughout the report (you can see an example on page 22), while the distinction between police custody and provisional detention was an important part of the audit. That

Two stages of pre-trial: police custody and provisional detention, preceded by detention before trial



Infographic on pre-trial in an audit from the NCA (Algemene Rekenkamer, 2017: 8).



Datavisualization on pre-trial (Algemene Rekenkamer, 2017: 22)

is why we decided to emphasize the distinction by using icons and colours (blue and purple).

The counting marks and the illustrations on the other hand, might be called decoration. Do we need to mention the duration of six stages three times? I don't think so, but I still don't regret our decision. We wanted people to see the difference in size (counting marks), the original numbers and what this duration might look like (illustrations of someone who is waiting). The illustrations tell a story about pre-trial, the subject matter is about being in a cell for a certain period of time.

Location	Stage	Duration max.	Definition 1	Definition 2
Police cell	1 - detention before hearing	9 hours	-	-
Police cell	2 - police custody	3 days	police custody	pre-trial
Police cell	3 - prolongation	3 days	police custody	pre-trial
Prison	4 - remand	14 days	provisional detention	pre-trial
Prison	5 - imprisonment	90 days	provisional detention	pre-trial
Prison	6 - prolongation	90 days (every time)	provisional detention	pre-trial

Table with information used in the infographic on page 21.

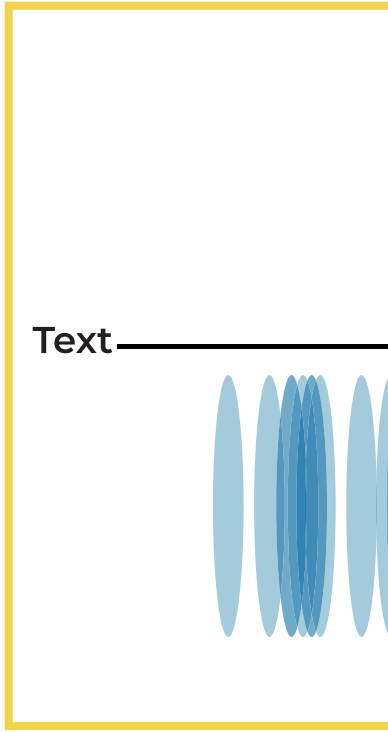
Information design delivered the structured and ordered information, like this table. The information is made accessible and it is useful information when you want to know more about pre-trial. Yet, visual design engages the audience - it transforms the story into a visual story. Cairo would call the visual story I made information design that features figurative graphics. For me, this is both information design and visual design. By using information design and visual design I can discover ánd tell visual stories that do justice to the content and are engaging.

Still the question remains why auditors find it difficult to use visual and information design. I thought that it had to do with the way auditors are trained: text-driven. I assumed that auditors are text-driven and designers are image-oriented. Yet, I discovered something else. In the next section you can see what I discovered.

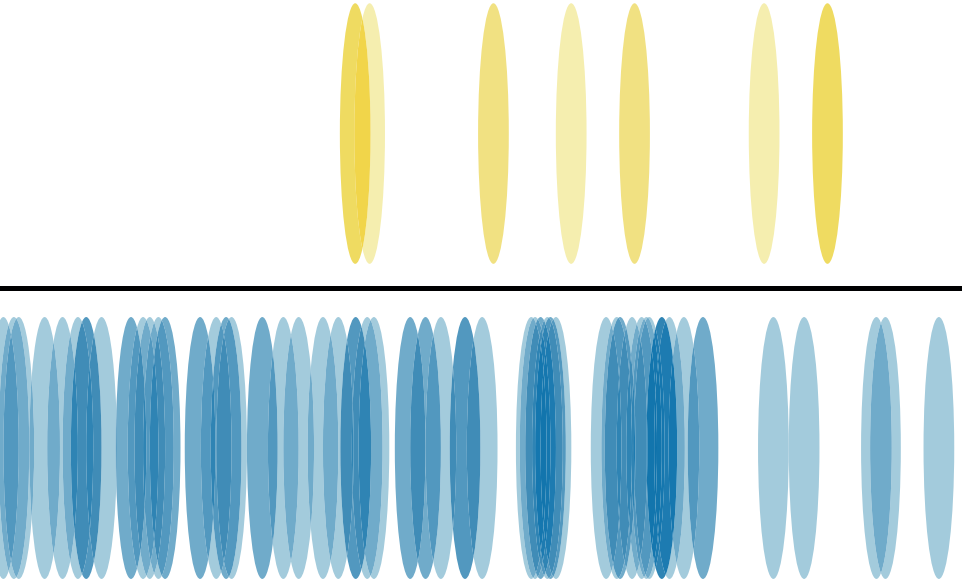
TEXT-DRIVEN OR VISUAL-DRIVEN

I asked 15 **designers** and 83 **auditors** to place themselves on a scale from text-driven to image-oriented. As I expected, designers identified themselves as more image-oriented than text-driven. Auditors placed themselves all over the scale, from text-driven to image-oriented. This survey did not support my assumption that auditors would identify themselves as text-driven. If some auditors felt image-oriented, why didn't they include visuals in their products?

To answer this question, I asked the auditors who identified themselves as image-oriented if they used visual or information design in their products. Almost none did; however, they did use mind maps or flowcharts to better understand the information they work with. The main reasons for not including visuals in the finished products were that the auditors did not feel the visuals were aesthetically pleasing, the auditors felt that they did not have the appropriate software to make graphics, or the auditors had never thought to include visuals in their finished products.



Are you really as ***text-driven*** as you think you are?



N = 98, 5 different groups, May - Sept 2017

CHAPTER 2

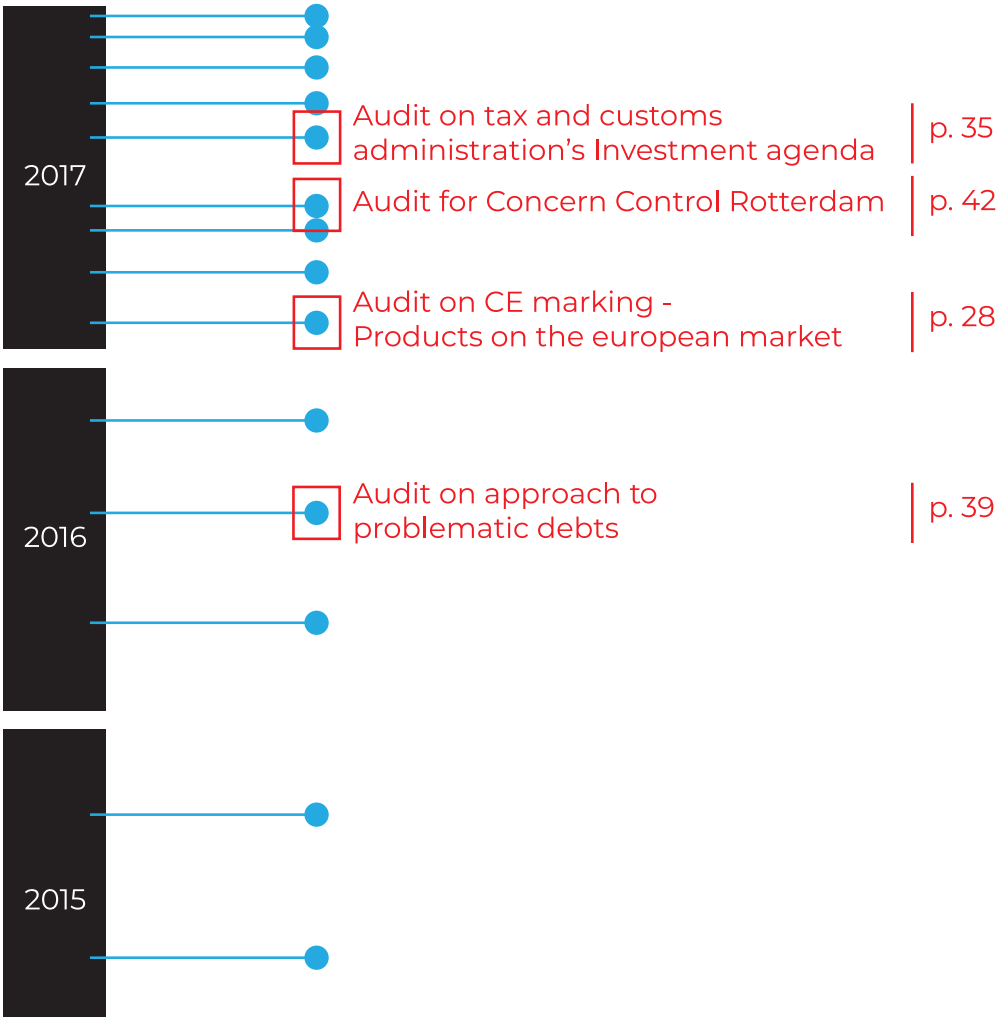
Discovering ***visual stories*** at the NCA

INTRO

Since 2016, I have been a member of an innovative program at the NCA called DOEN. This change in position has allowed me to work full-time with audit teams to make their stories more accessible, useful, and engaging. As a result, the number of opportunities for me to contribute my information and visual design expertise to the audit process has increased.

The graphic on the right shows a few visual stories I have created for audits. It is not exhaustive, and only includes memoranda of findings and the audit reports (products 3 and 4), but the number of audits using visuals has clearly increased.

The dots outlined with red boxes are the examples of my practice with information and visual design that I will explain in the following pages: an audit on CE marking, on the Investment Agenda of the Tax and Customs Administration, on the approach to problematic debts and an audit with an audit department of a Dutch municipality. These examples will show how I used visual and information design to make the data and the information in the audit more accessible, useful and engaging.



Overview of audits in which I was involved (not exhaustive).

CE MARKING - PRODUCTS ON THE EUROPEAN MARKET

In 2016 I was involved in an audit on CE marking (NCA, 2017). The marking on products means that the product complies with European safety, health and environmental rules. Private actors like manufacturers and importers are responsible, but the system is under the supervision of public actors like inspectorates. This audit topic is an especially relevant example because CE marking has such widespread effects.

Our main goal was to make people care about the CE marking system, or more specifically, the vulnerabilities of the CE marking system, if any were identified through the audit process. We had to engage people. To achieve that we used information design and visual design. We first simplified and visualized the CE system, and next we made the data on unsafe products bearing a CE mark accessible and engaging by giving the data a face.

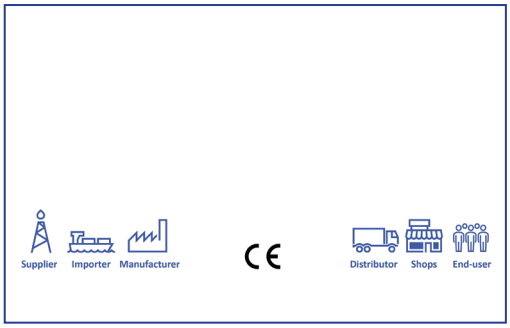
VISUALIZING THE CE SYSTEM

The European Union needs 147 pages to explain the CE system (2016). We were aiming for one visualization. But first, we needed to understand the CE marking system ourselves. In order to understand this system, I made a first draft of a visualization of the system. It was a triangle with three main players: the public actors (government, inspectorates, Europe), the market and the consumer. I discussed this first version with the team (see picture on the next page), but we decided that it lacked many details.

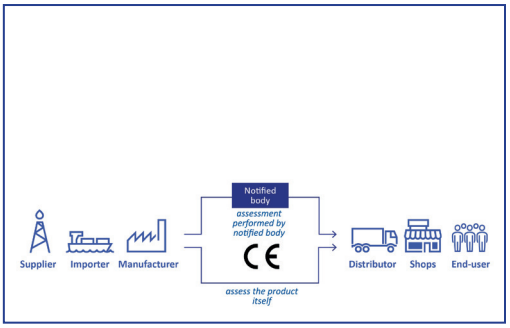
The auditteam discussed the first version of the visualized CE-system.

Many versions followed, and each time a better version emerged. It took us until after the audit report was published to agree on a final version with the appropriate level of detail, which is pictured as a storyboard on page 30. This version was used in the presentation about our report. Designing our presentation helped us to come up with the final graphic because we presented the system in a sequence. That helped us to tell the visual story in a way that had the right level of nuances and still was accessible for the layman. You can see the sequence of slides we used in our presentation to explain the CE system in the visual storyboard on the next page. The text is a summary of the text we used during a presentation.

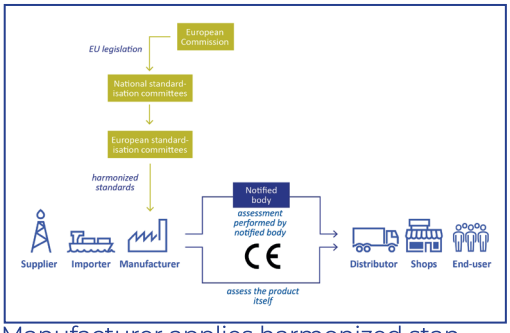
These slides enable us to tell the story on the CE system in an accessible and engaging way, yet it still does justice to the complex information. [the text is summarized]



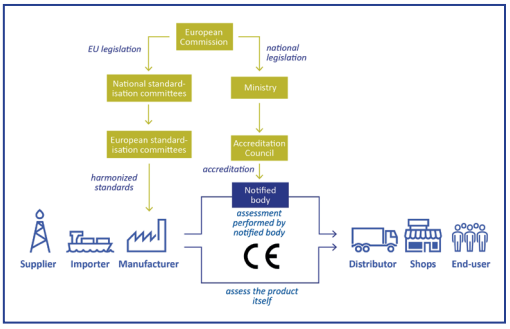
These six actors are involved in the CE system.



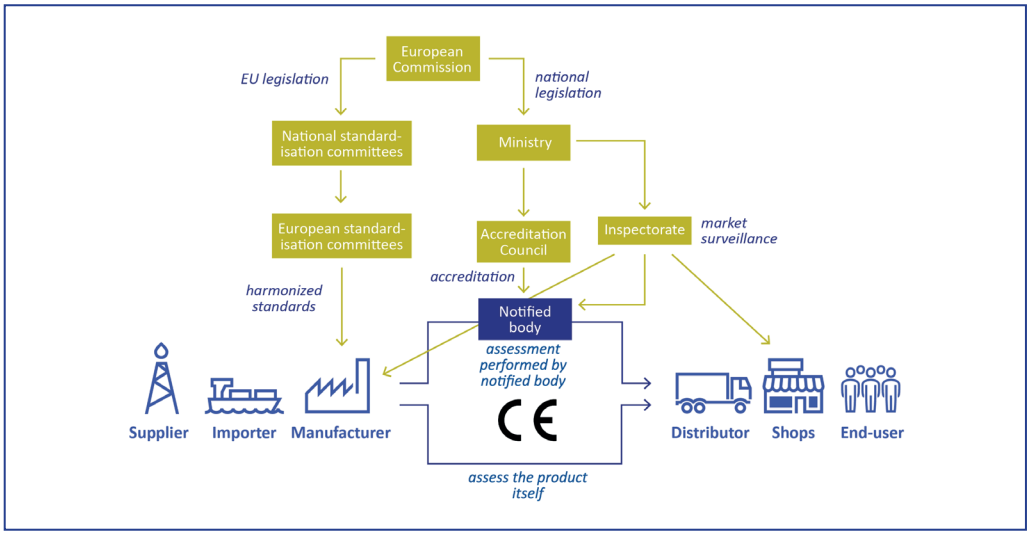
Assessment of the product by notified body or by manufacturer.



Manufacturer applies harmonized standards, EC is responsible.



Implementation into national legislation. Accreditation of Dutch notified bodies.

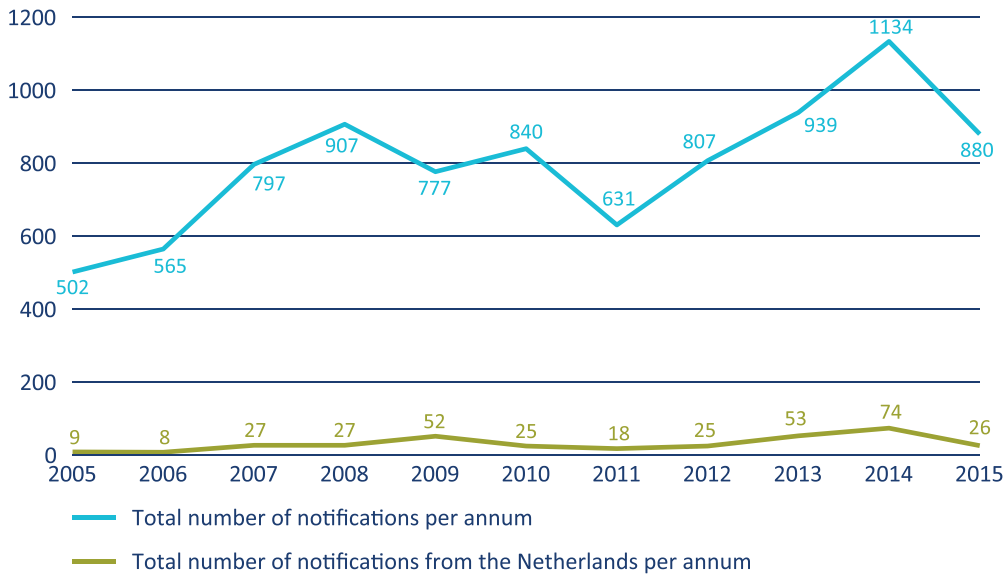


Market surveillance by inspectorates, based upon national legislation. They can inspect manufacturer, notified body and shops.

GIVING THE DATA 'A FACE'

The visualized CE system formed the base for a 'product journey'. We followed a product from its start in the Netherlands to the consumer. The reason we invented this project journey was to give the existing data on unsafe products (in the public database called Rapex) 'a face' by making the data more accessible and engaging. To understand the size of this database, you can find the datavisualization of the database below. The data shown in this visual adds up to about 10.000 products, an average of 800 unsafe products each year.

Only a small proportion of total RAPEX notifications come from the Netherlands



About 800 unsafe products each year are notified by inspectorates (2017: 32). Only a small proportion come from the Netherlands, yet this shows only the tip of the iceberg.

A datavisualization like the one I showed is useful, because it answers an important question: how big is the problem? Yet, it is just numerical data. It doesn't give information on how these unsafe products enter the market or what kind of products they are. We wanted to answer these questions and give 'the data a face'. This way we aimed to engage the audience by telling them the story behind the data.

First we used the database to select two unsafe products that had nevertheless entered the market. We looked for product groups that had the most notifications in the Netherlands. Toys had the most notifications, fireworks had the second most notifications, and gas appliances had the third most notifications. Fireworks are country-specific, so we decided to investigate toys and gas appliances. We then identified two unsafe products in each of these groups. The two specific products will not be named here.

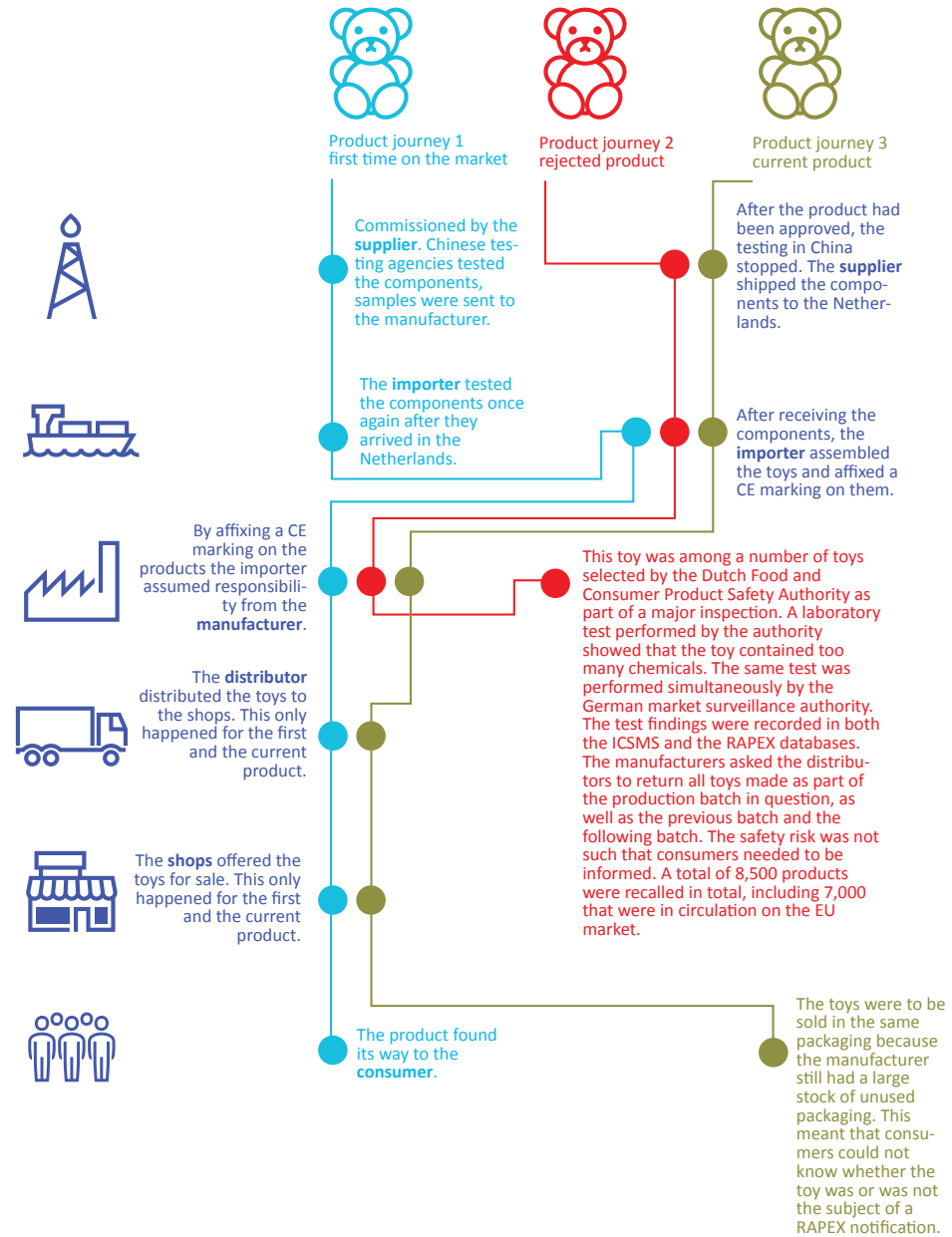
On the next page, you can see the final visual of the product journey that the selected toy made (NCA, 2017: 63). We interviewed the manufacturer (who was also the importer), the shop (which was also the distributor), the inspectorate, customs and the consumer protection organization. We thoroughly researched the product journey from creation to consumer.

After making many visualizations with one journey, I realized that the product really underwent three journeys. This required three different visualizations of each of these journeys.

The product journey of the toy visualized in our audit report on CE marking (2017: 63)

Reconstruction product journey toys

The manufacturer placed the toy on the market. We reconstructed three 'journeys' the product made: which journey did it make and what was the reason that a product with a CE marking entered the market while it did not comply to the EU rules.



I identified the first journey as when the product enters the market, the second journey as when the unsafe product is taken off the market, and the third journey as when the product was safe again. We used the same method to determine the journey of the gas appliances. In this journey we collected a lot of information from the notified body. The journey of the toy didn't include an assessment by a notified body (an external certifier), because this step was irrelevant to our investigation of the toy.

The most important question we asked during the interviews was, "How is it possible that this unsafe product gets a CE-marking and enters the market?". This direct question allowed us to collect valuable information. When working on a complex topic, it is easy to get lost in abstract answers. However, using this product as a conversation piece (or even a light version of a cultural probe (Gaver, Dunne, Pacenti, 1999)) allowed us to gather relevant, concrete information about the journeys and about the system.

Visualizing the CE system and giving the data a face by reconstructing the product journey allowed us to discover and tell accessible, useful and engaging visual stories in our report. In total the audit report contained 18 visuals, and next to the many positive reactions of stakeholders to our report two different primetime news broadcasts (NOS Journaal, RTL Nieuws) picked up our audit and did an item about CE marking.

AUDIT ON TAX AND CUSTOMS ADMINISTRATION'S INVESTMENT AGENDA

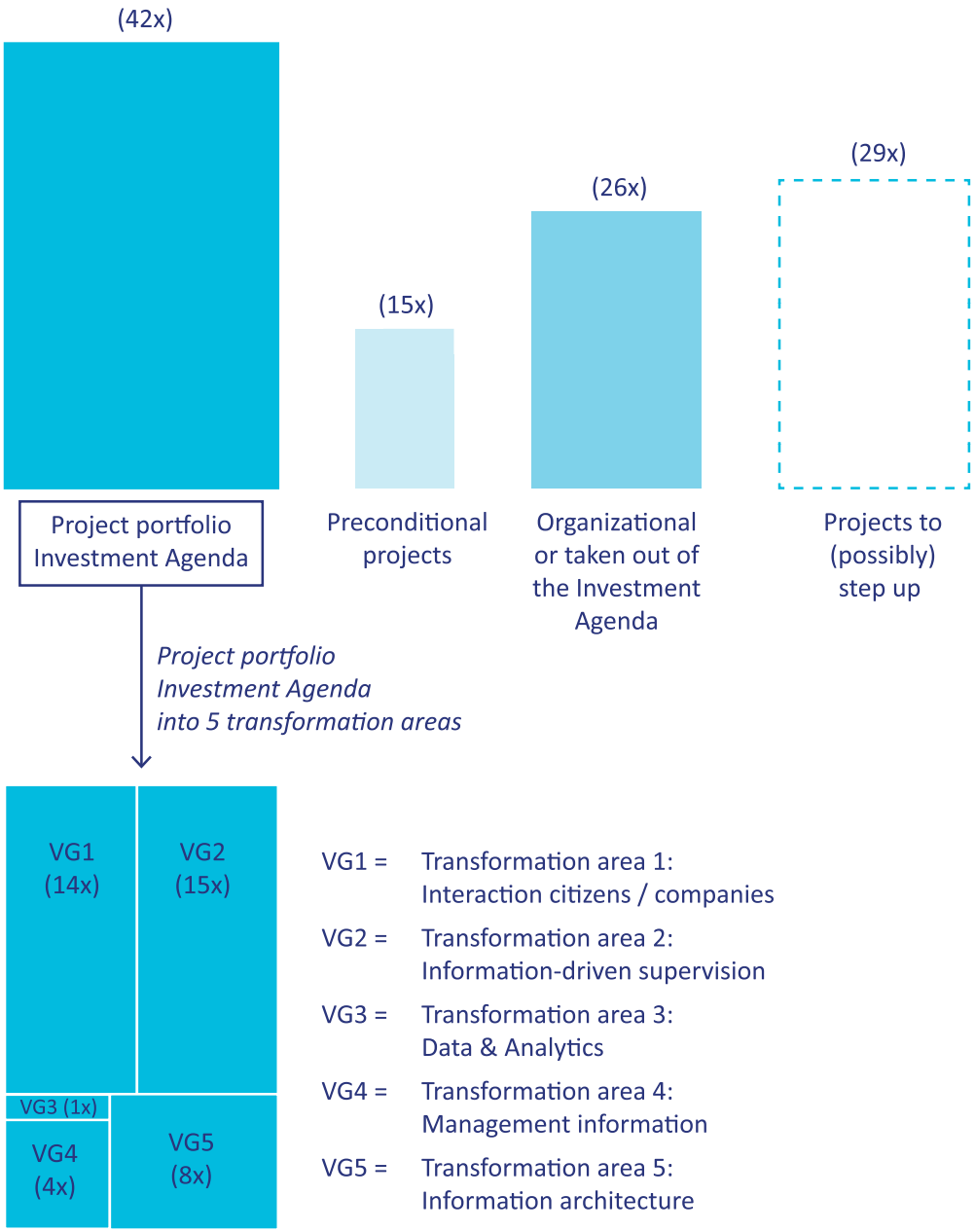
The House of Representatives, through the State Secretary for Finance, asked us to audit the regularity and efficiency of expenditure for the Tax and Customs Administration's Investment Agenda. We had already researched this topic in our 2016 Government Accountability Audit, so the goal of this audit (Algemene Rekenkamer, 2017) was to provide additional value to the original audit.

We wanted to offer Parliament a visual overview of the business case in 2015 and the current state of the Investment Agenda (IA). Together with the team, we mapped the investment projects. Mapping information is a method to organize, arrange and label information. For example, you can explain all the investment projects by using a few pages of text, or you can cut the information into smaller pieces, label the pieces, and arrange the pieces by their scope. This helps the reader to better understand, remember and to analyze the information (Davies, 2011: 280).

Mapping the projects of the IA was quite a challenge, because Tax and Customs Administration (TCA) had a hard time filling in all of the information that our map showed was missing. Next to that, the audit team and I found it difficult to map the information of the TCA - we had to ignore information in order to compare the projects, yet we didn't want to ignore important details. We made many maps to end up with the two visuals I show on the next two pages.

Visual of the IA projects compared to the total projects of the TCA (2017: 8).

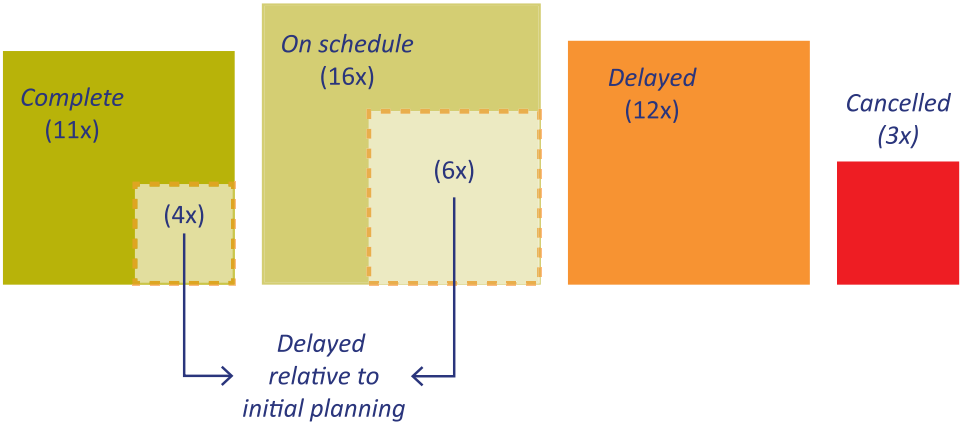
The total portfolio of projects related to the Investment Agenda contains four different components: the Investment Agenda is divided into five transformation areas



On the left and below, you can see two maps we made by using information design and ended up in our audit report. The map on page 36 was the result when we started to compare the projects in the IA to the projects that were related to the agenda but weren't included in the IA. For instance projects that are a precondition when you want to execute the IA projects, yet the NCA didn't include them in the IA. We also wanted to highlight the five focus areas of the IA-projects, to explain to Parliament that the IA projects have different goals. To understand the value of this graphic you must know that Parliament gets this information in a lot of different official

Information about the current status of performance doesn't represent a complete picture relative to the initial planning

Current status of performance, July 2017, portfolio of 42 projects of the Investment Agenda:



Visual that shows the current status of performance of the IA projects related to the information we found in the initial planning (2017: 9).

documents. This is the first visual overview they received in the past two years.

The second map, on page 37, compares the way the TCA labels the current state of performance. We found that 10 projects had been delayed. That information disappeared due to the way the TCA label the current state of performance, but through our visualization, we could make that clear.

I made many drafts of both of these maps. We were struggling to create a visual story that made sense to our audience and did justice to the content. When we tried to simplify the information, details got lost. We needed to align the text and the visuals very closely so that people could understand what we were showing them.

In the end, the visuals were used in both the summary and the report itself. The visuals were so effective that we were able to use them on their own in the aftercare: in our presentation to inform Parliament and to inform journalists of our findings. Another example on how information design and visual design can discover and tell visual stories that are accessible, useful and engaging.

PROBLEMATIC DEBTS

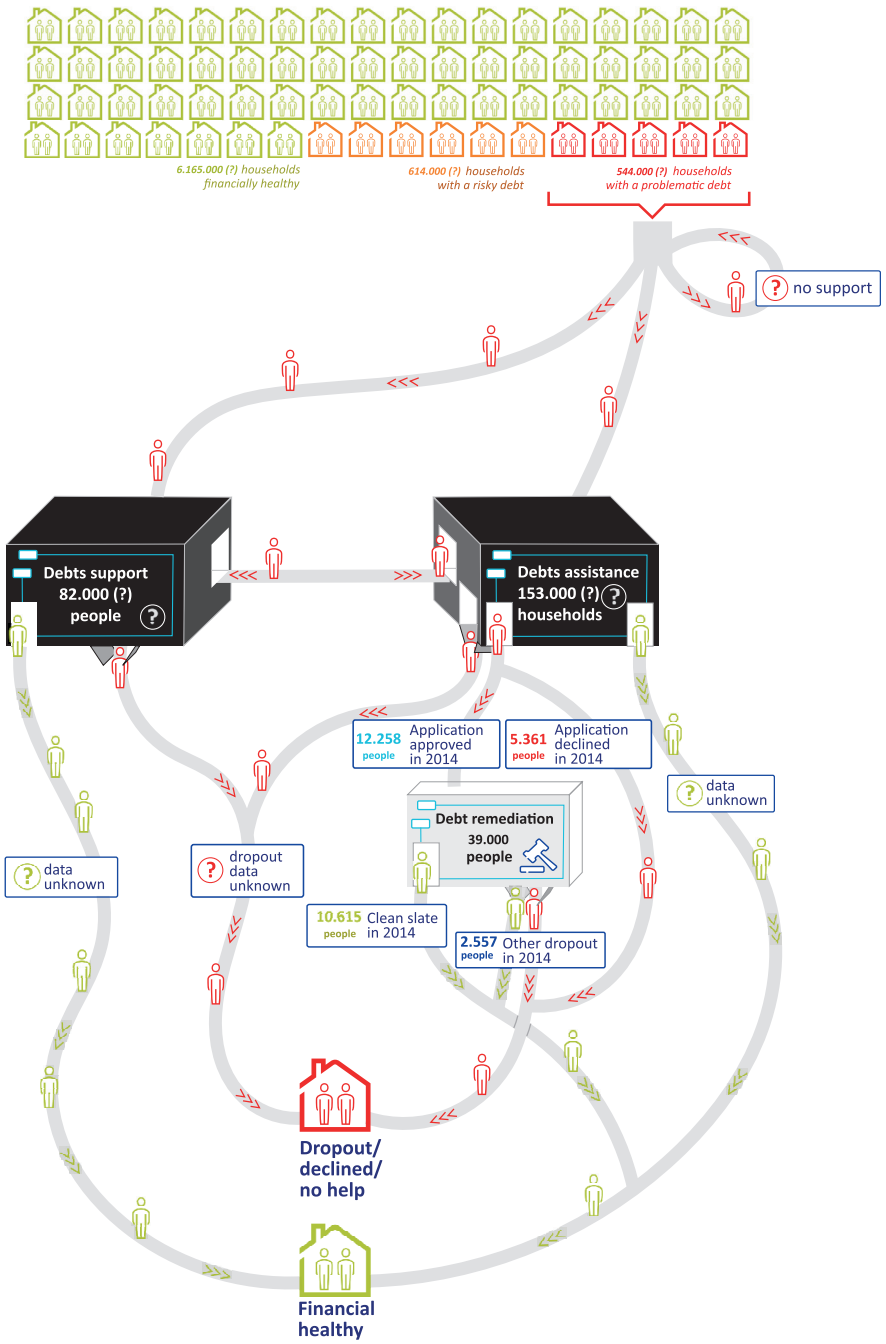
In June 2016, we published an audit report on problematic debts (Algemene Rekenkamer, 2016). My colleague Janneke and I worked together with the audit team to make the visualizations in the report. We were then asked to make an animation based on the information in the report. Neither of us had ever made an animation - or even an explainimation - before, but we were eager to apply our design skills to a new medium. We asked an animator, Jaap de Vries, for on-the-job training.

Our starting point was the visual we made for the report, you can see on the next page. Together with the audit team we had visualized the system and used data to add information about the performance of this system. In the visual you can see that we visualized the different journeys people with problematic debts make throught the system. Yet, the main problem was that the system was a metaphorical 'black box', which we then decided to use in the visualization. These elements - the journeys and the black box - were the key elements in the animation.

You can watch the animation (in Dutch) on https://www.rekenkamer.nl/publicaties/videos/2016/06/30/aanpak-problematische-schulden

When we made the visualizations which we used in the audit report, we discovered that the story we wanted to tell was suitable to be animated. People with problematic debts followed

Visual story on how governments in the Netherlands approache problematic debts (Algemene Rekenkamer, 2016: 5)



different pathways to get help, yet we didn't know exactly how many people followed these pathways. Only the data on people who had to go to court (debt remediation) was available. Of course, we could have told this message in text, showing Parliament this message by using visuals was much more convincing.

When we made the animation the visualizations we used in the report helped us a lot, and fortunately they did as we couldn't deviate too much because of the quality steps in the audit process. First we created a visual storyboard, which proved to be a great tool. The auditors were able to see our representation of the story and we could check whether or not we got all the details right. Animator Jaap taught us to "look for the verb in each sentence", because the verb is an action you can visualize and animate. Actually this tip is also very helpful when you visualize information, animated or not.

The duration of our animation is over 4 minutes, quite long for an animation. Yet, the audit team and boardmember were very pleased with the results of this experiment. It shows us that it is possible to make an animated visual story about an audit report, that engages the audience. In our animations we used visuals to explain our story, not just made an animated powerpoint presentation. I think that the cooperation between the audit team and designers (Janneke and I) really worked. We worked together closely to do justice to the content and visualize the information.

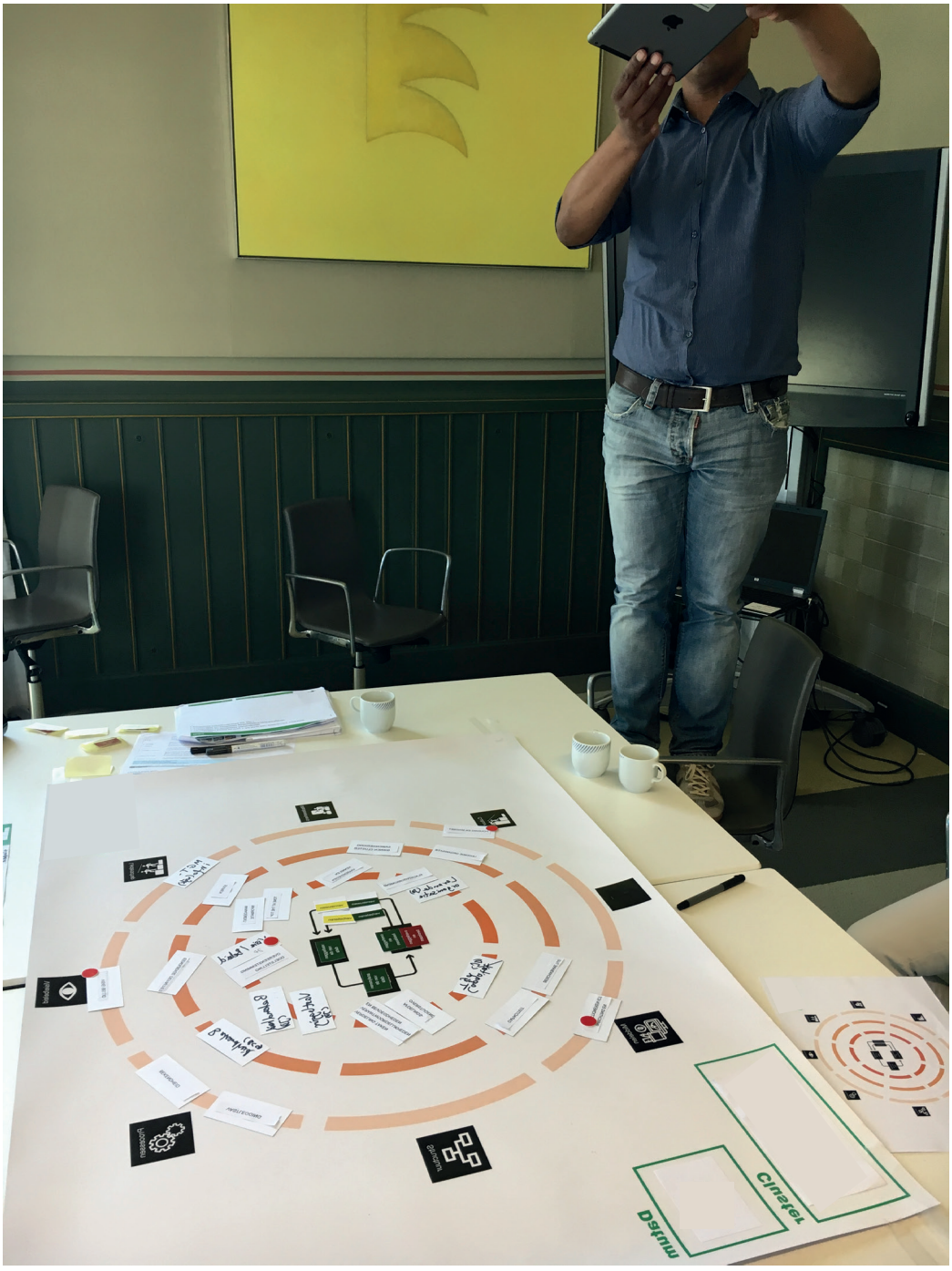
VISUAL AUDIT METHOD

An audit department of a Dutch municipality asked me to help their audit team with an innovatieve research method that involved visual design. We called it 'visual audit'. The basis of this innovative method was a social scientific method called 'Focus group'. A group of people give their opinion on what extent their departments learn from complaints by citizens and respond to each other's opinions. I cannot go into details on the subject matter (the audit isn't made public), but I like to show how visual and information design can be used from the start of an audit.

The audit team and I came up with a big map that served as the centre of the conversation. All participants were asked to debate different topics and decide for every topic on what content it contributed to the way the team had learned. The team had to put the subtopic on the map - the closer to the centre, the more it contributed to learning.

There were a few elements of this map that made it a successful method. First, it literally showed how the participants think about the way they learn. By putting a subtopic in a specific place on the map, the participants could start discussing if and why the subtopic belongs in that place. It also forces the group to make a choice. Second, the audit team could work more efficiently because the photo they took after each meeting served as audit material. We could then transform the photographs into visualizations more easily. And third, includ-

An auditor photographs the visual audit map at the end of the meeting.



ing visuals of the map in the audit report made the report easier to understand.

The team got a lot of positive feedback on this method and the way the results were presented. During the 'visual audit' the respondents were very positive on how professional the map looked. So, how it looks do matter[1], they took the method more seriously. A few respondents even wanted to use this method with their colleagues (and of course we shared the method with them). Also the clients of the audit department were very pleased with the way the audit team presented the results. The team used visuals based upon the meetings (unfortunately I cannot show them due to confidentiality) to get the message across.

This method should be tested and perfected by using it in more audits. Hopefully soon the NCA will use it in future audits. Though it already showed positive results, we should learn more about the best circumstances and on which subject matter this method can be used. For me it showed that you don't have to wait with visual and information design until you collected the data. Even the collection of data can be a moment to use visual and information design in order to discover and tell visual stories.

[1] Gaver, Dunne and Pacenti describe how aesthetics are important when working with participants (1999: 25-26).

IN SUMMARY

Supreme Audit Institutions, like the NCA, want to audit in order to "improve [government's] performance and functioning" (NCA, n.d.). That is why we check if government does the right thing and if it is done properly. This isn't as easy as it sounds. Auditors work with complexity: the subject matter is difficult to understand, there are contradictory interests at stake and mostly the right data or information is missing. In order to have impact, we have to engage people. They have to understand what we are telling and showing them (accessible), and the information has to help them to act (useful).

By using visual and information design I believe we can make our audits more accessible, useful and engaging. I showed four examples of how information design and visual design can do that.

What all examples have in common is that we tried to engage the audience. In the audit on CE marking we didn't stop when we visualized the data, we wanted the audience to fully understand what the data was about. That is why we gave the data 'a face', by inventing a method called 'product journey'. We did the same with the data about the Investment Agenda. As an audit team we asked ourselves: what should Parliament know about this agenda? We 'mapped' the projects to give an overview of all the projects of the Tax and Customs Administration related to the Investment Agenda. This had not been done before, and the visual stories added value to the political

debate. The idea to make an animation on problematic debts emerged when we imagined that our audit would interest a wider audience. And that this audience would find the different pathways people with problematic debts can follow confusing. That is why we chose an animated visual story to take time to explain the complex information. And for the audit in the municipality we purposely designed a method that would support the discussion between the respondents, because the subject matter - did we learn? - is quite subjective. We also wanted a professional look, so the respondents would take the method seriously.

So, thinking of ways to engage your audience (and asking yourself: who is the audience?) is important. Another element that I find important when using visual and information design is iteration. Iteration is a key element of design research, as I learned in my Master's. In brief: you execute your first idea, test it and you improve your prototype or sketch by using these insights. And after that you test again and improve again. Until your design works.

I try to approach this designer's manner in audits. In the audit on CE marking I made a lot of different visualizations of the CE system and tested them on the audit team. I did the same thing with the audit on the Investment Agenda. My sketches from the start don't look like the final version, because I tested it many times with the audit team, managers and boardmember. The visual storyboard we used to animate the audit on problematic debts worked as a test case. Janneke and I could

test the animated story with the audit team: did it work, did we miss important element, did we do justice to the content? During the audit in the municipality the first visual audit map was tested with the team, and they made some changes in the design. But in fact, this first visual audit was the real test and I think next time we will use an improved version.

The proof of the pudding is in the eating and I have to be honest - I didn't ask the customers what they thought of this new dish. I know that the auditors, our management team and our board adopted the visual stories I discovered and told. However, the reaction of our customers - Members of Parliament - is only incidental and through back channels. As auditors we don't have access to Members of Parliament, so it is difficult to arrange this kind of feedback. Yet, I think we should make it part of our audit process. I think it will help us to engage our audience more and that way increase our impact. Luckily, our president of the NCA (successor of Saskia J. Stuiveling) and the Auditor-General of the Finnish Supreme Audit Institution make statements (see page 48 (National Audit Office of Finland, Oct 2017) and page 49 (NCA, n.p.) that fit my belief on engaging our audience.

While auditors find it hard to visualize, whether they are image-oriented or not - see page 24-25 - in the next chapter I will share my own quest for visuals that would be suitable to use in audits.

"We at the Supreme Audit Institution need to know the needs of our customers. We need to understand how in a given national context, the global trends of digitalization, open data and data-analytics shape the expectations of our stakeholders. We need to understand, which parts of our clientele await a luxury serving and which parts are looking for a quick snack."

Tytti Yli-Viikari,
Auditor-General at the National Audit Office of Finland

"In this age of information overload,
it's vital to be aware that
our stakeholders are much
more likely to take notice of
tailor-made interventions.
Make them care!
And don't forget that it's not just
a question of looking back
into the past. It's equally
important to look forward
into the future and to constantly
try out new tools and
new angles of approach."

Arno Visser,
President at The Netherlands Court of Audit

CHAPTER 3

In search of *objectivity*

INTRO

As academic researchers, auditors prize objectivity. Objectivity is a very abstract concept, so it can be difficult to define. I define objectivity as the lack of interference of opinions or coincidences in an audit. This allows the results of your audit to be a truthful representation of what has occurred, and therefore, to be reproducible.

Reliability and validity form the base of academic research, and both are critical to our work at a Supreme Audit Institution (SAI) like the NCA. We work at a high level within the political arena – Parliament is our customer. The interests of members of Parliament are diverse and conflicting. Objectivity is the best way for SAIs to overcome these conflicting interests and present facts to inform political debate. All auditors at the NCA strive to contribute to this debate with objective audit results.

Auditors often ask me how to create an objective visualization to go with their text. I have experienced if too much information is included, the visual becomes too complex and inaccessible. And if too much information is excluded from the visual,

the visual might not be an objective representation of the audit results and might not be useful. The goal is to show information that makes the visual accessible, useful and engaging without sacrificing objectivity, to find the balance.

While objectivity is an important part of audits, I began my 'search of objectivity' in visualizations. I looked for literature to find out what makes visuals objective. In this chapter I will share these insights with you, and end this chapter with a few basics on objectivity in visualizations.

VISUALIZATIONS USED FOR SCIENCE

Lorraine Daston and Peter Galison collected visualizations used in science in their appropriately titled book, "Objectivity". They (2007: 17) define objectivity in their writing.

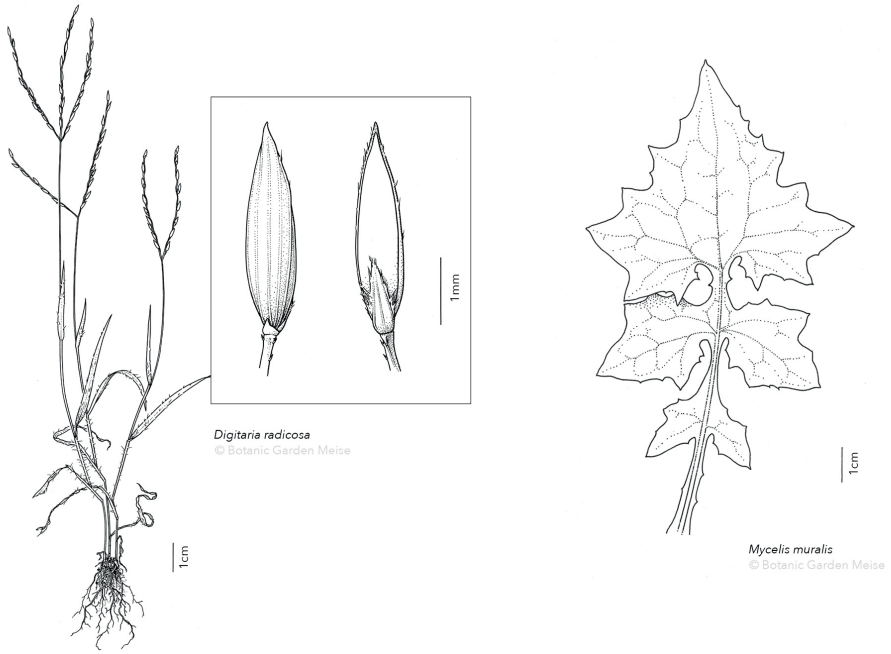
"To be objective is to aspire to knowledge that bears no trace of the knower – knowledge unmarked by prejudice or skill, fantasy or judgment, wishing or striving. Objectivity is blind sight, seeing without inference, interpretation, or intelligence."

This definition of objectivity differs from Ackoff's definition (page 18). Daston and Galison researched objectivity of scientific visuals through a historical context. They discovered that scientific images were developed within the past two centuries. They distinguish three "codes to epistemic virtues" in these images: truth-to-nature, mechanical objectivity and trained

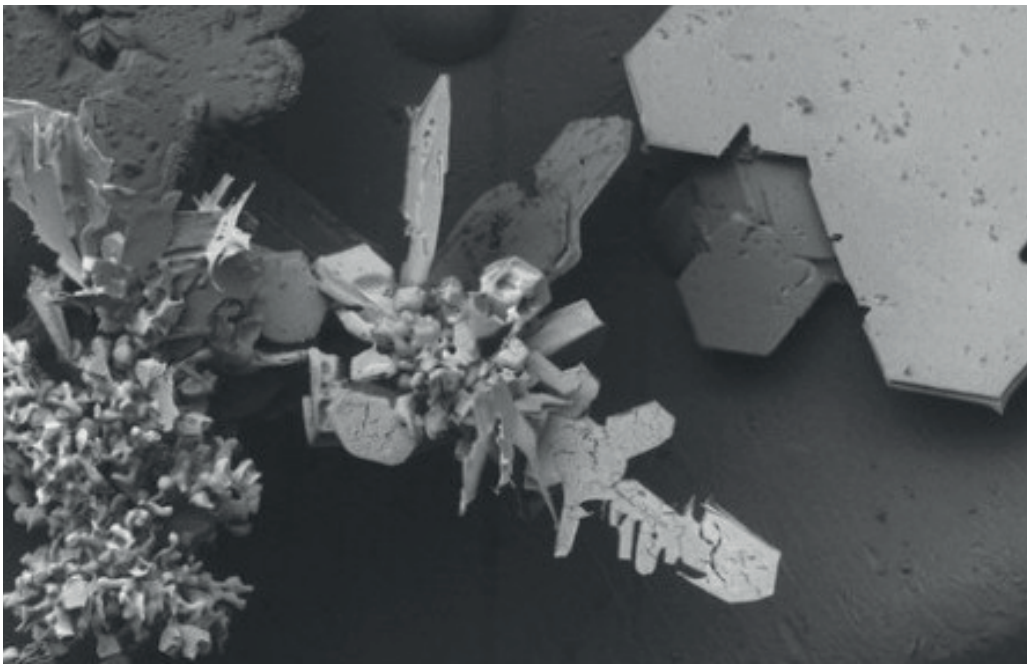
judgement. Epistimic means ‘related to knowledge’, Daston and Galison described that epistemic virtues - or the way science valued knowledge - changed over the years. That change can be seen in scientific images, and that is what Daston and Galison show in their book.

Atlases are an example of images that show the virtue of truth-to-nature. I have included one by Sven Bellanger, who works at The National Botanic Garden of Belgium, on the next page. These images are “an idealized perfected, or at least characteristic example of a species or other natural kind” (42). This type of image is still used in biological science and medical training.

Example of ‘truth-to-nature’ by Sven Bellanger (n.d.).



Mechanical objectivity was the reaction to truth-to-nature. Images were no longer created by the scientist, but rather by using a camera. The goal was to take away the scientist's involvement in the creation of images to minimize subjectivity of images. It was "better to present the object just as it was seen" (44-45). An example of mechanical objectivity is snowflakes photographed through a microscope, pictured below.

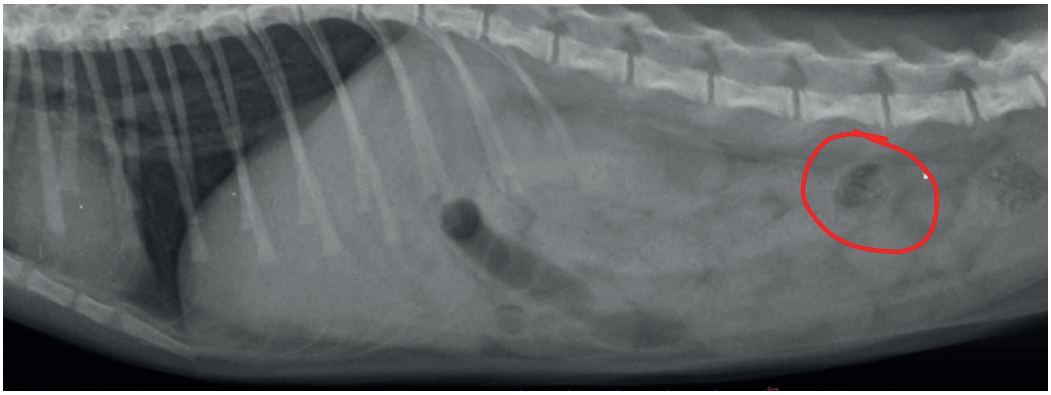


Example of 'mechanical objectivity': snowflakes under a microscope by Randommization (2012).

A drastic reaction to mechanical objectivity, called structural objectivity, followed. Structural objectivity prohibited all images with the hope of eliminating all subjectivity; however,

scientists recognized the value of visualizations. Daston and Galison identify trained judgement as the epistemic virtue that followed structural objectivity. Images defined by the epistemic virtue of trained judgement highlight patterns or delete artifacts (46). To better understand how these images look, you can see an example of an x-ray below.

The circle shows where the bowel of a cat is obstructed, an example of trained judgement (Dierenarts De Laak, 2016).



Daston and Galison's work helped me to put my desire to make better objective visualizations into a historical context. Elements of the objective visualizations that Daston and Galison presented might work for visuals to use at the NCA. For instance, visualizing the perfect situation (truth-to-nature) to explain how the ideal workflow would look like. Or a picture of an unsafe traffic situation to illustrate the unique situation (mechanical objectivity). Or highlights in a datavisualization to help the reader understand what is important (trained judgement). Nevertheless, these kinds of objective images can not

be used for all visual stories the NCA wants to tell. It is difficult to use 'truth-to-nature', 'mechanical objectivity' or 'trained judgement' in the visual about the CE system I made (see page 30), as there is more that one visual display of 'manufacturer' or 'end-user'.

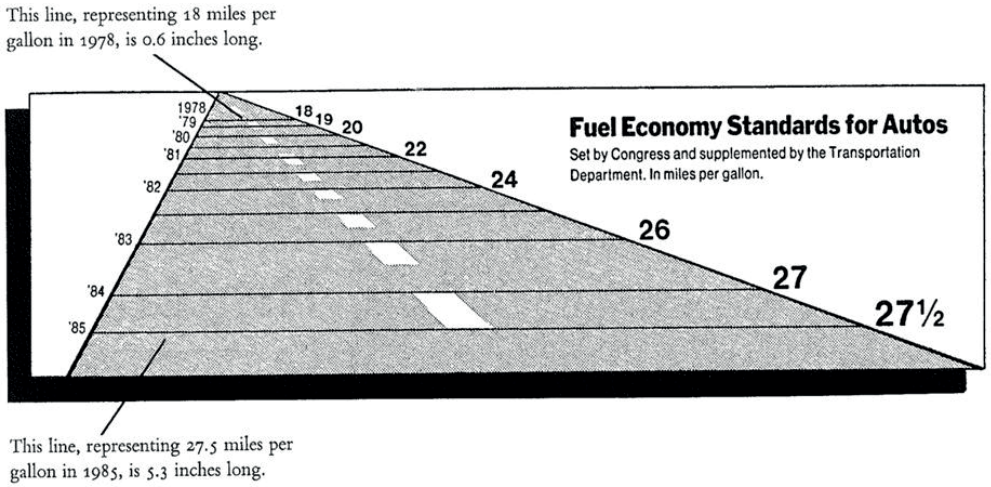
IN SEARCH OF VISUAL INTEGRITY

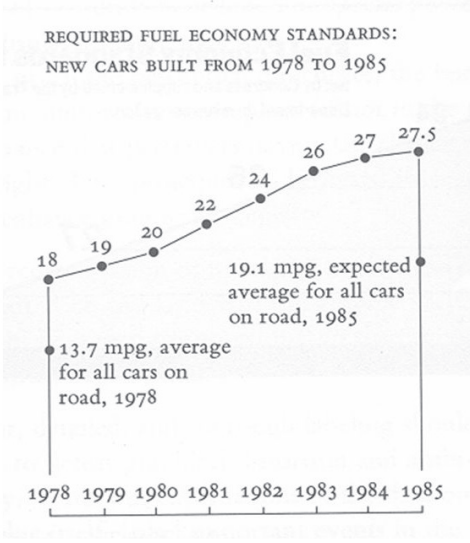
Although scientific visualizations were not totally the right approach to visuals for NCA audits, studying Daston and Galison was valuable. Some of my colleagues are greatly in favor of the work of Edward Tufte, so I looked for inspiration in his book 'The visual display of quantitative information' (2001).

Tufte, a statistician and emeritus professor, approaches the visualization of information from a scientific angle. He specializes in the design of statistical graphics and uses his training as a statistician to inform his design principles. In his book he recommends that readers "*communicate information through the simultaneous presentation of words, numbers, and pictures*" (10). However, he cautions readers against deceiving the audience with visuals. To avoid this, he explains his approach to calculate to what extent a visualization of data "lies." He calls this approach "the lie factor".

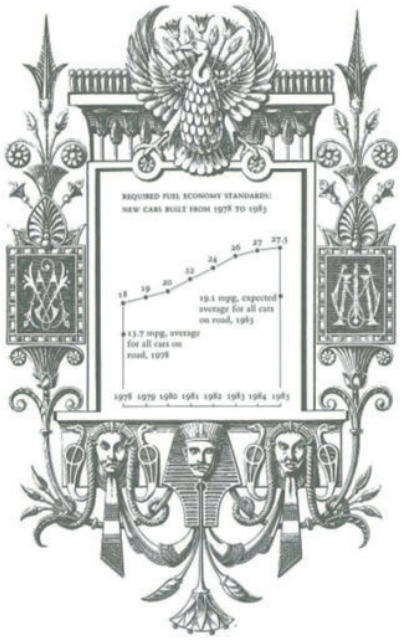
The lie factor (57) is calculated by dividing 'the size of the effect shown in graphic' into 'the size of effect in data'. Tufte explains this by using the example included on the next page. The upper visual has a high lie factor. The percentage difference between

Tufte shows this visual from the New York Times from 1979 as a bad example with a high lie factor (2001: 57).





Same data but shown in a way that the visual doesn't lie, according to Tufte (2001: 58).



Same data visualization with decorations (2001: 59).

the length of the lines representing 18 miles per gallon and 25 miles per gallon is 783%, yet the percentage difference between 18 miles per gallon and 25 miles per gallon is only 53%. Therefore, the lie factor is 783 divided by 5, or 14.8. According to Tufte, a lie factor of 14.8 is too high. In contrast, the visual in the lower left corner of the same page shows an appropriate visualization of this data. Beyond the lie factor, Tufte discusses how design affects data visualization. Tufte says the following (59) about the visual included in the lower right corner:

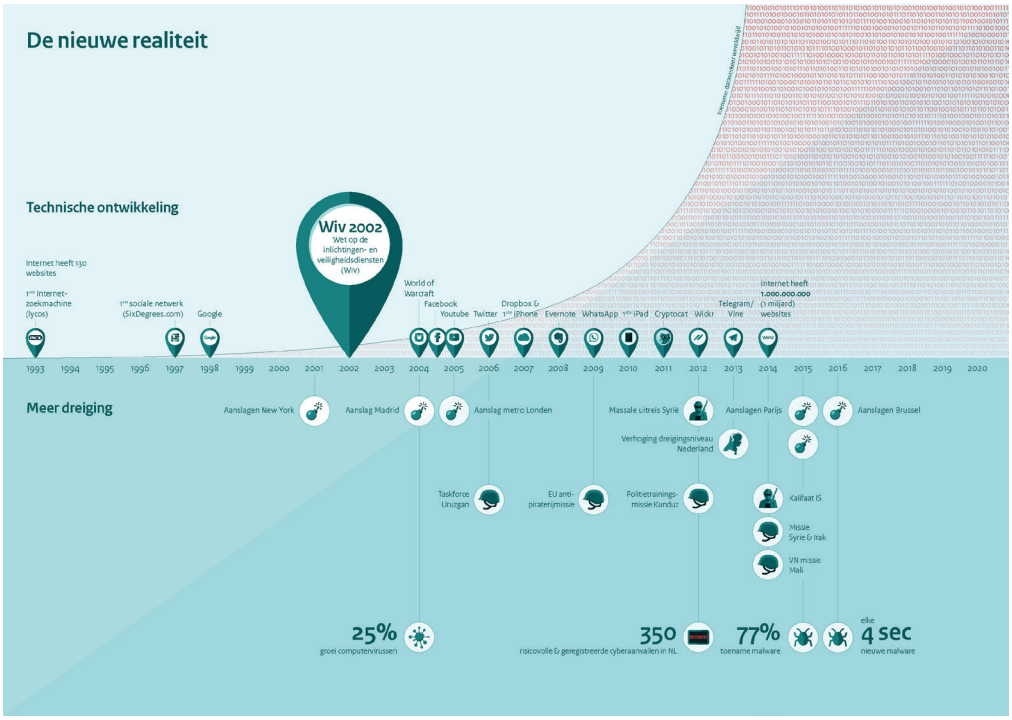
"Sometimes decoration can help editorialize about the substance of the graphic. But it is wrong to distort the data measures – the ink locating values of numbers – in order to make an editorial comment or fit a decorative scheme. [...] Here are many decorations but no lies: [about the visual]."

Tufte believes in austere data visualizations and refers to anything but the data as decoration. Although I agree with Tufte regarding the importance of visual integrity, I disagree with his stance on decoration. I felt that decoration serves a function, but I couldn't find support for my belief in Tufte's work. He made his opinion clear when he wrote that any ink that is not used for showing the data is not in the best interest for the viewer (96).

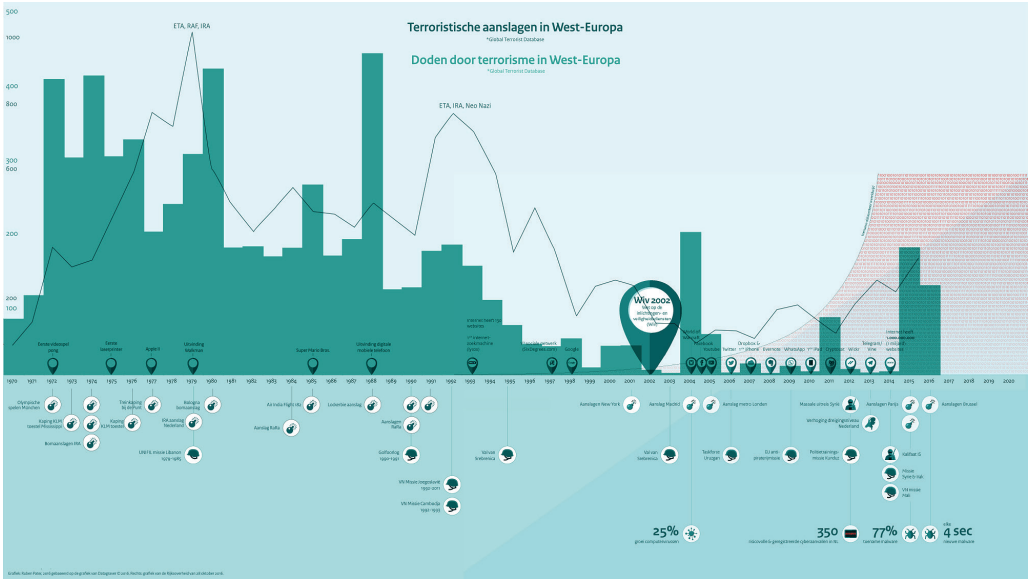
A relevant example of how data visualizations can lie is pictured on the next page. The Dutch General Intelligence and Security Service created this infographic to convince people

that tougher laws against terrorism were needed. In short, a new law would have given the Dutch General Intelligence and Security Service more power, which they claimed they needed to prevent terrorist attacks in Western Europe. The infographic shows amongst others the implementation of the law on the service itself (called: Wiv in 2002), some technical developments (introduction of internet, whatsapp, etc) and an increase in data traffic worldwide. The intimidating title, "The new reality," convinces the audience that this new law is needed.

Infographic on technical developments and the agitation in the world, made by Rijksoverheid (2016).



Stephan Ockhuizen and Ruben Pater made an infographic in response to the Dutch General Intelligence and Security Ser-



Infographic to place the infographic by Rijksoverheid into perspective (Korteweg, 2016).

vice's infographic. They used data on the number of terrorist attacks in Western Europe and the number of deaths caused by terrorism in Western Europe to create their infographic. It showed that terrorism is not as urgent of a problem as the Dutch General Intelligence and Security Service's infographic would have you believe.

Tufte's work taught me about visual integrity – that data visualization leads the audience, and that heavy-handed design choices can distract the audience from the important take-aways of a data visualization – but I still wanted to learn more about how visual design can add value to data visualizations. To explore this idea further, I consulted another scientist: Hans Rosling.

DATA TO UNDERSTAND AND ENJOY

Hans Rosling was a renowned information designer and scientist. He wanted to convince the world that if you want to understand the world, you have to look at the facts (De Corrrespondent, 2017). Very important in my search is his next quote in a BBC documentary (2010: 0.10-0.19):

"Having the data is not enough. You have to show it in ways people both enjoy and understand."

Rosling explains the development of lifespan and income of 200 countries in the last 200 years in 4 minutes.

Still from the BBC documentary where Rosling explains the 200 year-development of 200 countries in 4 minutes by using data (2010).

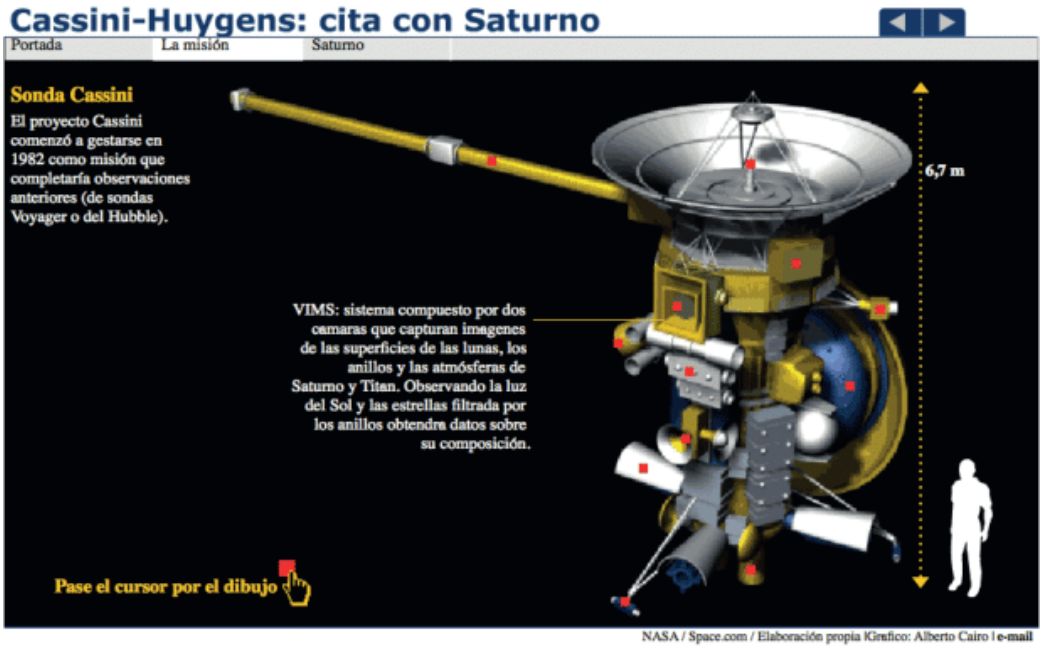
For me this is an excellent example how to make data engaging, useful and accessible, without loosing objectivity. First of all, his performance is very enthusiastic, it is a joy to watch him explain the data. Secondly, he really thought about how he should present the data. And takes time to explain everything you see. For example. he explains what the bubbles are, why they are moving and he makes it fun by stopping the chart at his own year of birth.

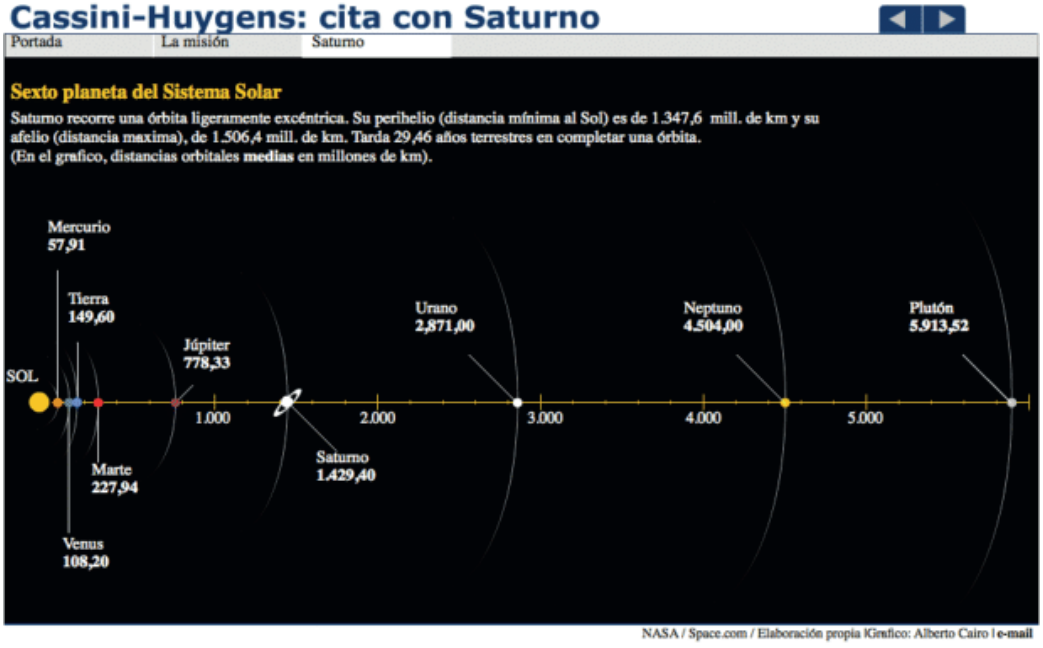
Rosling showed me 'visual integrity', and how to be engaging at the same time. He understands that people don't like to look at data visualizations, you really have to engage them in the visual. The most important thing he uses to engage people is explaining what happens and what it means.

Someone else who finds it important to understand your audience is Alberto Cairo, who I mentioned in the first chaper.

THE FUNCTIONAL ART

'The functional art' (2012) is written by Alberto Cairo, a visual journalist, information designer, and professor. In his work, I hoped to learn more about the function of visual language in information visualization, or infographics. Cairo explains that one of the main features of infographics is Abstraction-Figuration (52). Abstraction-Figuration can be defined as: visuals that use realistic elements are more figurative, while visuals that do not use realistic elements are more abstract.





Top visual is an example of figurative visualization, and the visual below is an example of abstract visualization by Alberto Cairo (2012: 53).

For example, study the two visualizations of the same NASA mission to the left. The top visualization is more figurative; it is quite a realistic representation of this NASA mission. The bottom visualization is an abstract representation of the same mission. Surprisingly, in this case, the abstract infographic has more informative value. The figurative infographic explains the mission, but the abstract infographic gives more insights into the mission.

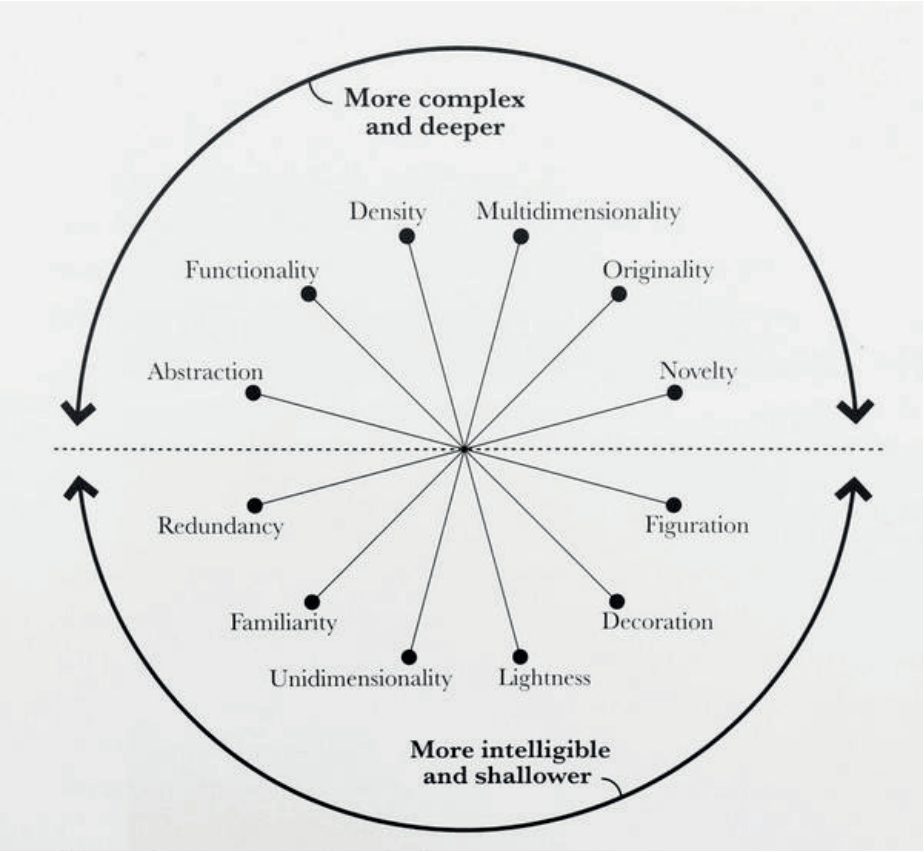
Like Tufte, Cairo warns that decorative elements can interfere with the information presented and must be used with care. Cairo takes his audience into account when he designs infographics (59):

"The complexity of a graphic should be adapted to the nature of your average reader."

Cairo takes the audience into account in his infographics by finding a visual form that fits the story, determining how much the audience knows about the topic, and learning to what extent the audience is trained to understand data visualizations. He mainly creates infographics for a broad audience, so he ensures that they are easy for the average person to understand. Cairo balances six different features in each infographic, which are shown in his "visualizations wheel" (51) on the next page.

He distinguishes between two main goals: infographics that are "more complex and deeper" or "more intelligible and shal-

The visualization wheel by Alberto Cairo (2012: 51).



lower." He suggests (61) that people who prefer Tufte's rational, scientific approach to infographics are in favor of more complex and deeper infographics. Conversely, people interested in design, emotion and aesthetics are in favor of more intelligible and shallower infographics. Cairo's visualization wheel is a helpful tool to give an overview the different features of an infographic. I agree with him on the tailor-made solution that every visual story needs. Some audits are more technical, so

the audience consists of specialists. Then, I tend to use more abstract visual stories (like the visualizations on the Investment Agenda, page 36). While other audits have a more general audience. In that case I use more figurative features, as Cairo calls it. His work inspired me to explore the more artistic side of information design. This led me to the data visualizations of David McCandless.

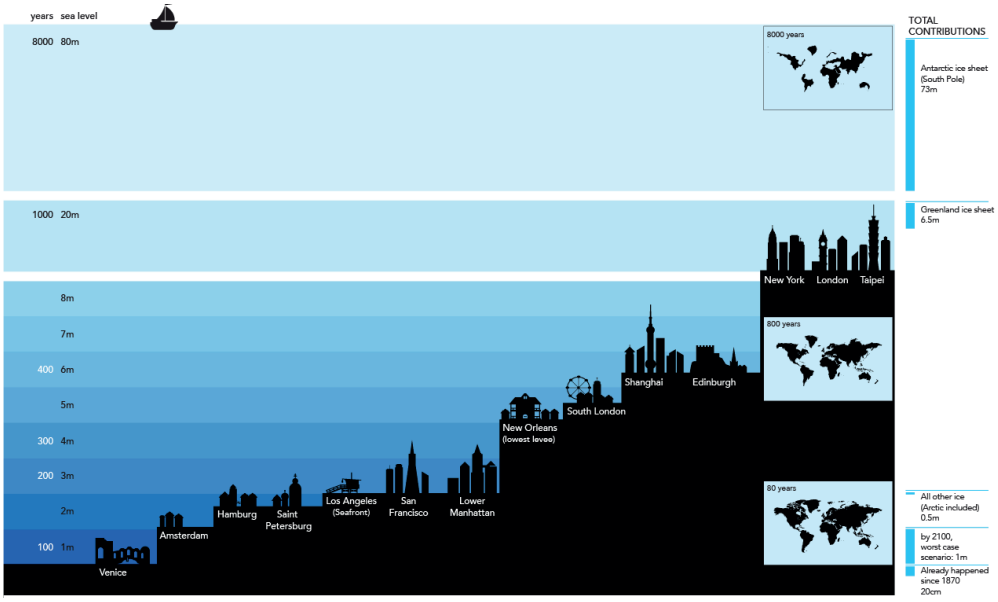
INFORMATION IS BEAUTIFUL

It is no coincidence that David McCandless' book is titled "Information is beautiful". McCandless explores ways to make "visualisations approachable and beautiful, in order to make information more meaningful" (2009: 9). He writes:

"I went for subjects that sprang from my own curiosity and ignorance – the questions I wanted answering. I avoided straightforward facts and dry statistics. Instead, I focused on the relationship between facts, the context, the connections that make information meaningful."

On the next page, you will see an infographic that would be suitable for an audit report but could benefit from some editing. The context of this infographic is clear. The colors and the boat show that it is about high water and cities that might one day be under water. He utilizes white space to highlight the axes. People will also recognize and understand the form of a bar chart. However, the way McCandless represents the Y-axis is less powerful. You can see that he jumps from 8m

Infographic on rising sealevels by David McCandless (2009: 74-75).



to 20m and then another jump to 80m. I understand that he made this choice in order to compare the cities but it is a design choice that dominates the data. The global maps and the information on the right are placed outside of the infographic (an extra axis), which shows that McCandless wants to tell too many stories in one infographic. Although McCandless makes some design choices that distract from the data, his expertise with figurative elements can be valuable to our work at the NCA.

McCandless selects his topics in a very subjective way, his goal is to feed his curiosity. He plays with different data sets and let design principles dominate the data. I think it is important to be straightforward about the data, without only presenting

dry statistics (McCandless, 2009: 1). The visualizations McCandless made tipped the scale to the other side: people might enjoy the data, yet it looses objectivity (in my definition) by letting the design decide how the visual looks. This taught me that there is valuable information to be learned from work at the subjective end of the spectrum.

IN SUMMARY

Like many auditors and researchers I am in search of objectivity. In this chapter I looked for ways to be as objective as possible when I tell visual stories. Although only based on literature and my own experiences with visual stories, I found some insights that helped to answer my questions.

I wanted to know how to create visual stories that are objective. Daston and Galison showed me some beautiful images that are used by scientists. These objective visuals are suitable to explain and show how a perfect situation must look, to illustrate how a unique situation can look or what to look for in a complex image. Yet, the images are a very close representation of reality and the subject matter we audit deals with more abstract matter, like finances or performances.

Objectivity for me is about minimising personal interference. Tufte's focus on visual integrity is for me an important part of being objective. Design choices mustn't dominate the visual display of data or information.

Rosling and Cairo showed me how subjectivity can help to make visualizations that are engaging, yet show the data in an objective way. Rosling taught me that people should both understand and enjoy data in order for them to care. He shows the data as it is, however he makes sure that people want to listen to him by being witty and explaining all the elements of the visualization. Cairo gave me an overview of the possible features of an infographic and how to play with these features to create infographics that are useful, accessible and engaging.

And last but not least McCandless showed me the usefulness of artistic or subjective ways to visualize information. By letting subjectivity rule over dry statistics, he shows another way to handle data. He ends up with different data stories, but are they objective? The way he selects his topics is subjective, yet the way he visualizes the data is not (although he sometimes let design choices dominate the data). He breaks Tufte's rules, however he shows a different side of the data that is inspiring.

The next chapter is about creating a design process for the NCA, which combines auditing and designing. And how we should embrace 'testing' as part of designing.

CHAPTER 4

Visual stories and audits: about ***process*** and ***roles***

INTRO

Now that I have explained information design and visual design (chapter 1), showed some examples of how I use this in audits (chapter 2) and shared my search for objectivity with you (chapter 3), it is the right moment to think practically. What should a design process for the NCA look like? What about roles: which roles should be involved in this process?

Concerning the design process I looked for existing processes. I used my own design expertise to pick out the right elements that fit the NCA. In the next section I will describe how I created the NCA-design-process, and will show what it looks like.

Next to the design process it is important to be aware of the different roles that should be involved in a process. I did some interviews with 'peers', in the sense of organizations that work in a content-centered area. These interviews gave me insights into the different roles that are involved and moreover how they cooperate to create the best visual stories.

DESIGNING THE NCA-DESIGN-PROCESS

There are a lot of different ways to design as Hugh Dubberly points out in his Compendium of Models (2005). He collected more than 100 different design processes (2005: 6). I focused on three design processes that are either focused on information design in particular or are well-known models for design thinking:

- *Sheila Pontis* - a design process to think and do
- *British Design Council* - a design process to diverge and converge
- *Stanford d.school* - a design process that puts humans in the centre

SHEILA PONTIS - A DESIGN PROCESS TO THINK AND DO

Information designer and researcher Sheila Pontis asked a few information designers to share their design processes. She compared these processes and came up with the unique process you can find on the opposite page. She presented this process during the Infographic Conference (Pontis, 2016).

An important insight she got from comparing those different processes is the distinction between **thinking** and **doing**. The thinking-stage is about understanding the problem, the user or the audience and the subject matter. Next step is to simplify the information, followed by design proposals. Then the doing-stage starts: making, evaluating and testing.

The core of designing information according to Sheila Pontis (2016).

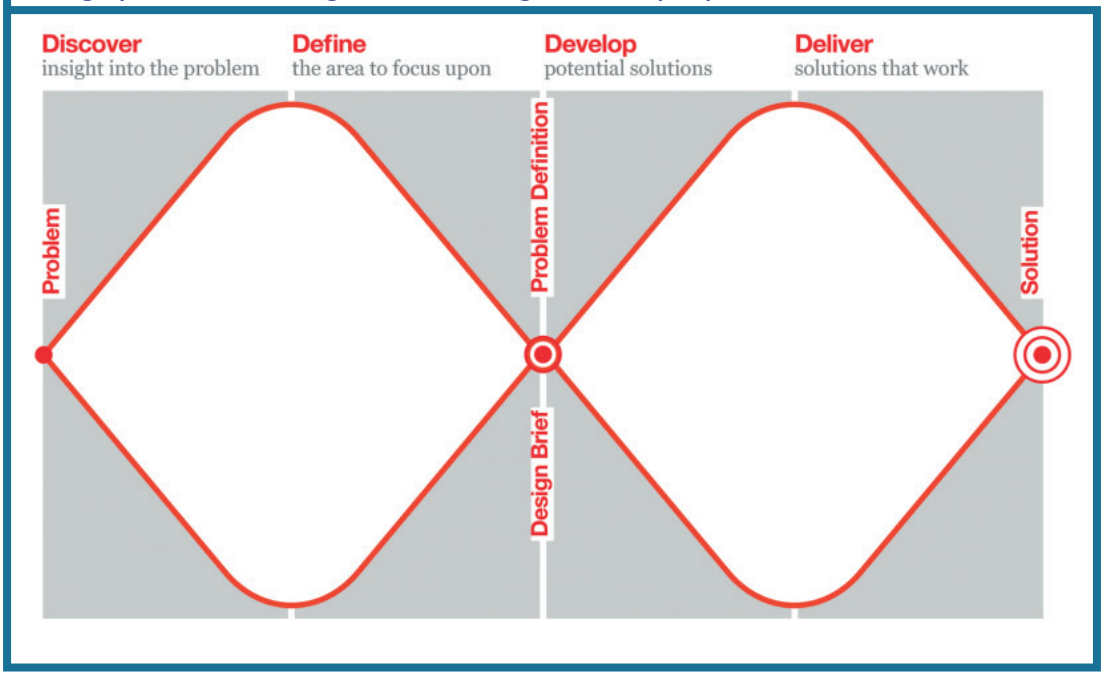
I favor the distinction Pontis makes between thinking and doing. It is very important to first understand what the audit is about and who will read it before making a design. When you don't understand the user or the audience, you can't make a design that fits. Moreover, Pontis talks about 'simplification', whereas I would prefer to clarify or decipher. It is not about making the system more simple, it is about explaining it in a way people will understand - making it accessible and engaging.

BRITISH DESIGN COUNCIL - A DESIGN PROCESS TO DIVERGE AND CONVERGE

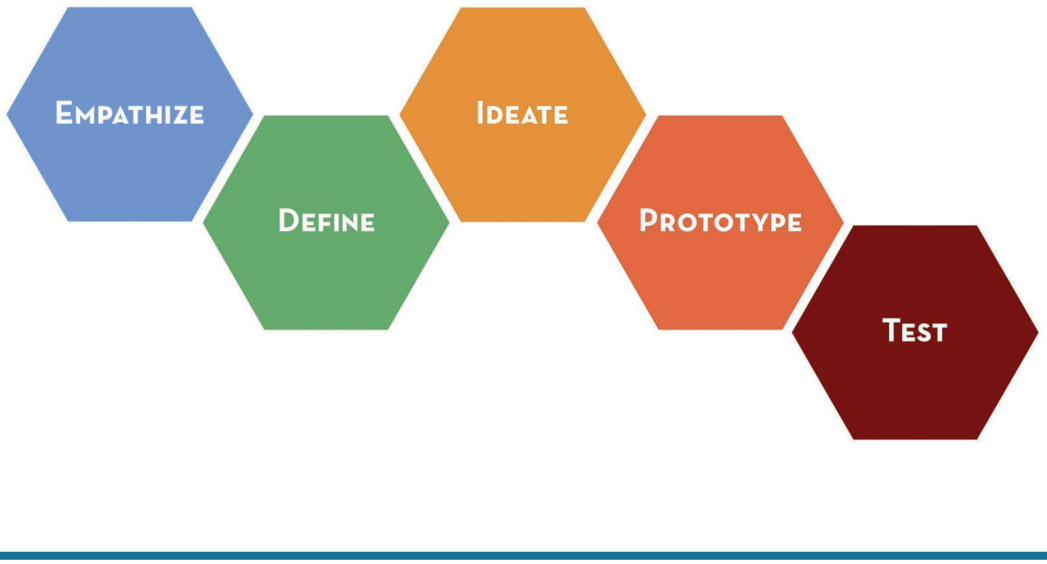
Another design process I found was made by the British Design Council and is called the 'Double Diamond' (n.d.). The shape symbolizes divergent thinking (wide) - think of all possible ideas - and convergent thinking (small) - choose and refine the best

of those ideas. This movement of divergent and convergent thinking happens twice: the first time to define the problem that has to be solved and the second time to pick the best solution. And then you get two diamond shapes:

Design process according to British Design Council (n.d.).



There is some overlap between this approach and the analysis Pontis made. Yet, I really recognize the divergent and convergent thinking in my own process. It also points out the difference between scientific research and design research. Scientific research has only one diamond, you diverge (explore the problem) and then you converge (answer the question). While design research makes another 'diamond' by diverging (explore all potential solutions) and converging (choose the solution that works).



Design thinking process by Stanford d.school (n.d.).

STANFORD D.SCHOOL - A PROCESS THAT PUTS HUMANS IN THE CENTRE

A widespread approach to design thinking is the process that the Hasso-Plattner Institute of Design at Stanford (known as Stanford d.school) introduced. The core in this approach is that it is human-centered. Using this approach you try to understand the users of your design, within the context of your design (n.d.: 1).

This design process contains five stages: empathize, define, ideate, prototype and test. In the first stage - **empathize** - you try to understand the people involved in the problem. Your design has to solve the problem as they experience it. The second stage - **define** - is a synthesis of all the things you collected in the empathize-stage. It helps you to focus on the right problem. In the third stage - **ideate** - you can brainstorm about all possible solutions to the defined problem. To go from the ideate

stage to prototype-stage you have to choose two or three ideas by using criteria that you create. In the fourth stage - **prototype** - you execute your design and iterate it into the best design to solve the defined problem. 'Build to think' - d.school calls a big advantage of prototyping (n.d.: 2). The final stage - **test** - is when you test the prototypes on your users and other people who might like to use the prototype. It is an opportunity to get information about the prototype to make it better.

What really stands out for me is the empathize-, define- and the ideate-stages. As Pontis already showed it is important to understand the user, and this is a big part of the design thinking model of Stanford d.school. Furthermore the define-stage is a slightly similar to the Double Diamond, you converge by defining assumptions. It is not only about the content but also about the technical or practical limitations, like time. And the ideate-stage resembles the 'design proposals' Pontis mentions or the 'develop-stage' in the Double Diamond. For me 'ideation' is broader than 'proposal' or 'develop'.

THE NCA-DESIGN-PROCESS

In the previous sections I pinpointed a few elements that I recognize when I think of my own design process at the NCA. My design process is something that has developed over the years, yet I never tried to make it concrete. By using the insights of other design processes combined with my own experience in discovering visual stories I want to make a tailormade design process for the NCA.

First of all, you must consider that a design process differs from an audit process. Designers have a different approach to understand problems. They explore problems by doing. First, they try to challenge the assumptions that come to their minds when they explore the field. They build a prototype and start testing it on users. That will give them new insights and creates input to make a new prototype. They will repeat until the product stands the testing.

Auditors, on the other hand, first try to understand the problem and its causes. Mostly they will explore the problem by absorbing information through documents and interviews. Then they will use existing or new standards to see whether or not the current situation meets the standards. They will write down to what extent government meets the standards, and where it doesn't, auditors make recommendations so the situation can be improved.

An iterative approach and a knowledge approach. A big difference but also a big similarity is that both auditors and designers want the problems to be solved. Auditors want to solve the problem by finding out what causes it. And they tend to send their message about what they found into the world, instead of checking whether the message came accross. And that is why I think a designer's approach is useful: exploring by doing ánd engaging the user (does the design work?).

The combination of both our audit process and a design process would add value for the NCA. That is why I designed

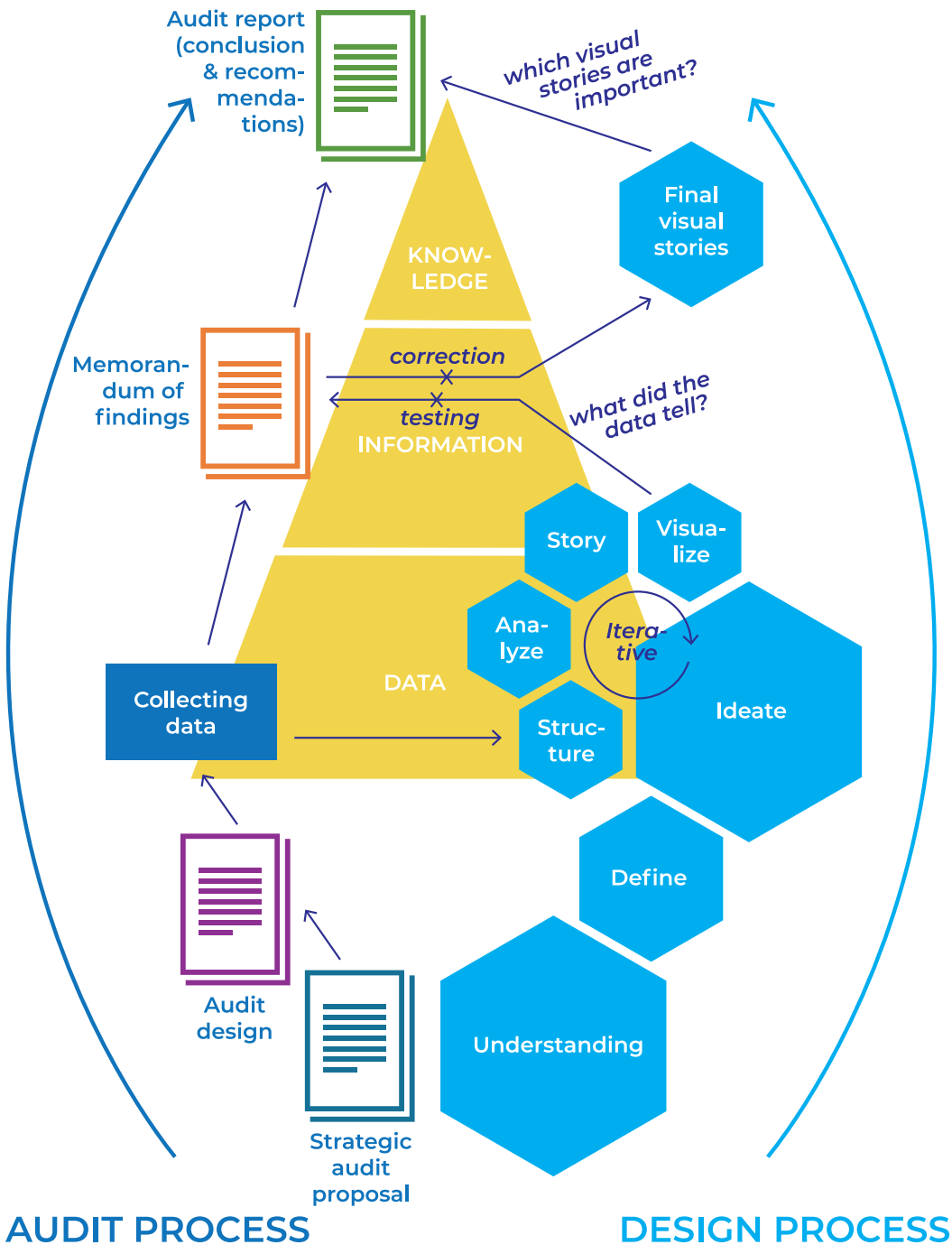
a process that combines those two processes. Yet, there was no design process, only in my head. In any case it will contain the elements I found in the three existing design process I explained earlier:

- thinking & doing
- diverge & converge
- empathize, define & ideate

On the right you can find the NCA-Design-process. The left side of the visual is the audit process, as explained in chapter 1, yet I added the 'collecting data'-moment between the 'audit design' and the 'memorandum of findings'. In the middle you find the process from data to information to knowledge (see page 19). And on the right you see the design process, my own process.

The design process begins at the bottom, with 'Understanding' - understanding the audience, the problem, the subject matter (see Pontis). During the strategic design proposal the audit team is asked about the impact the audit will have. They have to think about their audience and the problem: what will be the added value of the audit?

Next is define (see d.school). You can see that the hexagon is smaller than the 'Understanding'-hexagon. It symbolizes the convergence (see double diamond). This is the moment the process of understanding (exploring) stops and with the audit team I determine the focus. It also includes practical planning.


Audit report (conclusion & recom-menda-tions)
which visual stories are important?
Final visual stories
KNOW-LEDGE
Memoran-dum of findings
correction
testing
INFORMATION
what did the data tell?
Story
Visua-lize
Ana-lyze
Itera-tive
DATA
Collecting data
Struc-ture
Ideate
Define
Audit design
Understanding
Strategic audit proposal
AUDIT PROCESS
DESIGN PROCESS

Ideate (see d.school) is an important moment in the design process. Again I start to diverge and come up with ideas.

Quite soon I start with *doing* (see Pontis). When the audit team collects data, I can start to structure the data, e.g. by mapping. Together with the team or alone I analyze the data to discover different stories. Mostly I first visualize or sketch the stories, to discuss with the audit team. Together we determine which stories will be used, or if we need more or different visual stories. Then I pass the circle again (iterate), yet this time the visual stories I made serve as a starting point. Depending on the visual stories the product will be an animation, or an infographic, or just a simple bar chart.

When the visual stories are finished - yet still in draft - they become a part of the memorandum of findings. At this moment a lot of internal stakeholders give their comment on the text and we can test the visual stories - are they clear, do they add value? Then the review by the bureaucrats starts, and when the memorandum of findings is a final product I can start to make the final visual stories.

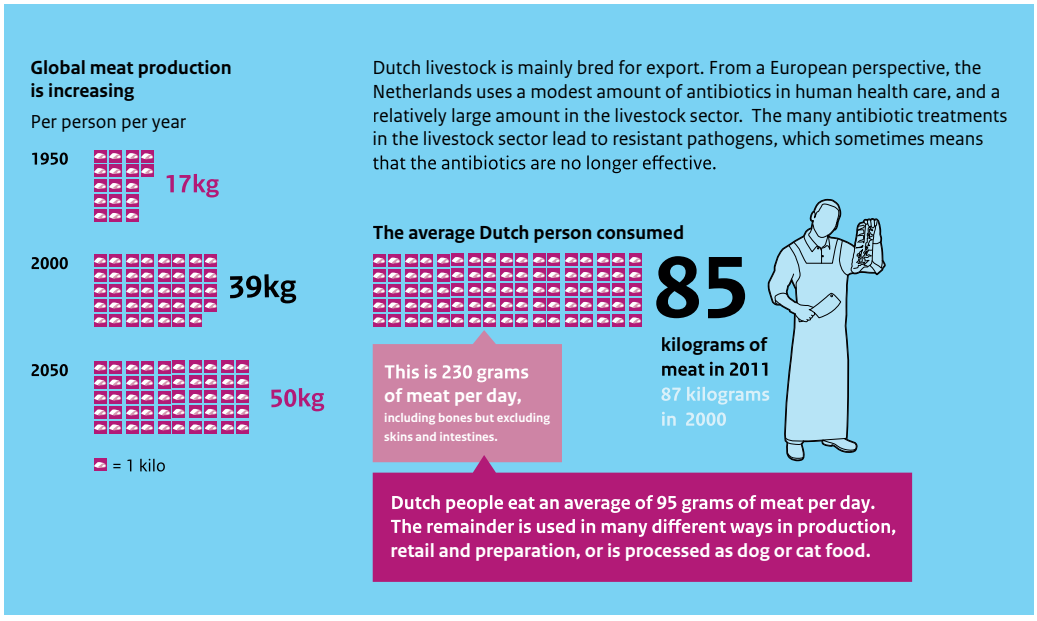
The step from findings (information) to audit report (knowledge) is again a moment of choices: what is important for Parliament to know? And in the case of the visual stories: how can we explain and show this to them in a way they find accessible, useful and engaging? At the moment we know Parliament appreciates our visual stories, yet we don't test this properly. Hopefully in the future we will do that as well.

DESIGNERS AND AUDITORS WORKING TOGETHER

Below you can see part of a visual made by the PBL, 'an autonomous research institute in the fields of the environment, nature and spatial planning' (n.d.). The visualization originated from the cooperation of researchers (knowledge) and designers (visual story). PBL explained (2016) that this major project involved their in-house designers, a designer from outside (Frederik Ruys) and a so-called transformer, someone who translates between researchers and designers.

The NCA-Design-process is about how knowledge and design can reinforce each other. However, in order to do that it's not only about the process, it is also about how you work together in order to be succesful. PBL tends to use transformers as

Infographic on global meat production, by PBL (2012: 14).



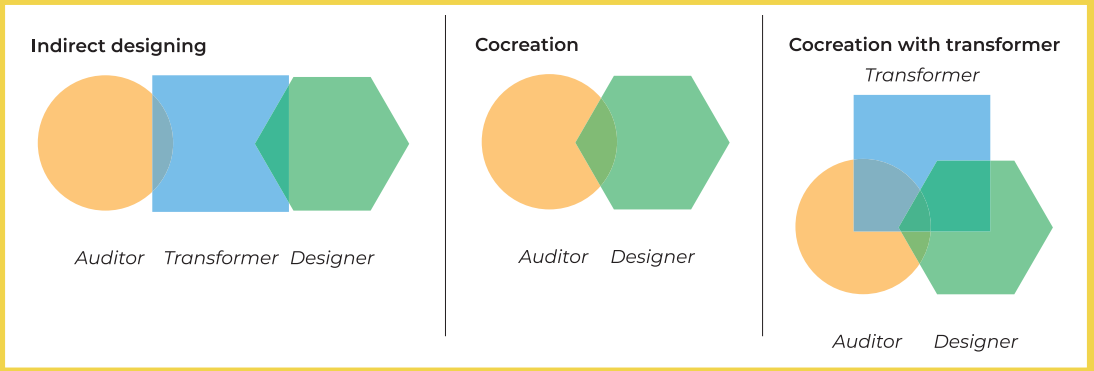
interpreters between designers and researchers. Yet, they don't always use transformers. Researchers get used to creating visual stories, so some researchers bring already pre-sorted information to make a visual story, according to PBL (2016).

I interviewed a few organisations like the NCA and PBL, whose work is to some extent content-centered ánd who make visual stories like infographics, animations and so on. These were:

- NRC - a Dutch daily newspaper
- SCP - The Netherlands Institute for Social Research
- RVO - Netherlands Enterprise Agency
- NAO - National Audit Office (UK)
- Stibbe - a Dutch law firm

I won't go into detail on how these organizations work (at least they all work with designers), yet the information they gave me enabled me to see some patterns. There are three ways to work together: indirect designing (with a transformer, who for me is someone who guides the team and is a translator), cocreation (no transformer) or cocreation with a transformer. I visualized these patterns below.

Three ways to create visual stories, based upon interviews.



There is no right or wrong, yet for me cocreation (with or without a transformer) works best while it enables all the expertise to come together to create visual stories that do justice to the content and design. The four audits in chapter 2 all show cocreation, I am the transformer and designer. In order to be more efficient - while the NCA creates a few hundred products each year - it is best to seperate these two roles. As transformer I guide the designer(s) and the audit team to create visual stories that do justice to the content.

Margaret Hagan of the Legal Design Lab encourages this kind of guided cocreation. In an interview (Oct 2017) she told me that designers and lawyers both want to solve problems, yet use different approaches. Designers want to simplify, but you need nuances because of the complexity of the subject matter. And lawyers just want a monkey that can make things look pretty, she said, and her main challenge is always get the lawyer to respect the designer. That is why I think cocreation with a transformer works best.

Although it sounds as if we have worked this way for years at the NCA, we are still finding out what works best. Probably the coming years will give me more good practice in discovering and telling visual stories together with designers and auditors.

The next chapter is the conclusion. The Master's of Design brought me a great deal of new knowledge and skills which makes the conclusion a new starting point for me.

CONCLUSION

To conclude: the ***next level*** of visual stories

Visual stories in content-centered organizations, like the NCA, have to loose the image of the picture-that-goes-with-the-text. Visual design and information design help to make knowledge more accessible, useful and engaging, and help to transform data into information, and information into knowledge.

Auditors produce a lot of text, but I showed that not all auditors are text-driven. Yet, those who are image-oriented don't use visualizations in their audits. This has to do with the way they value visualizations: as an aesthetic translation of the knowledge they have written so thoroughly.

I hope that by showing some examples auditors will use visual and information design more easily in their audits. I hope they will give higher value to visual stories and not think of them anymore as 'pictures-to-go-with-the-text' that are created when the audit is finished. As shown in the examples, you have to think how you will engage your audience and use an iterative process to come up with visual stories that are accessible and useful. Visual design and information design are ways to do that.

Yet, the NCA lacks a design process, although we create a few hundred products each year. That is why I came up with the NCA-Design-process, that combines the audit process and design process. This process is based upon my own experiences and existing design processes. It gives space to use visual and information design early on. Writing it all down won't do the trick anymore in this era of information overload. You have to think in a human-centered way, like designers do. That is why the organizations I talked to involve designers in their work, with or without a transformer.

Working with designers also means you have to let in some subjectivity. The struggle to remain objective while using visualizations is one I tried to explore by researching literature. In chapter 3 I shared my own search for visual stories that are objective but also accessible, useful and engaging. Basic elements are: visual integrity, explain to the audience what they see and make sure your visual story fits your audience by balancing different features like figurativeness and abstractness. This way you can create visual stories that have the right level of nuance.

To write a conclusion feels odd while working in a human-centered way in a content-centered area, is still at its beginning. The knowledge and skills I learned during the Master's enabled me to go to the next level in my work: a transformer who guides auditors and designers in creating visual stories instead of an auditor who creates visual stories on her own. By sharing these insights I hope to inspire more audit institutions to take this next step.

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COLOPHON

Discover and tell visual stories in audits; using visual design and information design at the Netherlands Court of Audit

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