A DISAGGREGATION AND REDESIGN OF TECHNOLOGY LITERACY

A design anthropological contribution to the innovation processes of the Danish Museum of Science and Technology

Rune Svendsgaard 20125607

Malte Lundby Siglev 20125939

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Supervisor Anders Koed Madsen

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Dansk Resume

Det følgende kandidatspeciale omhandler et designbidrag til Danmarks Tekniske Museums innovationsprocesser. Specialet undersøger fænomenet teknologisk dannelse, der i organisationen bag museet fremstår som et normativt sigte for formidlings-strategien og som således er et udgangspunkt for en forestående innovation.

Data er indsamlet kvalitativt gennem et feltarbejde med metoderne interviews, observationer og workshop som de bærende søjler. Teoretisk forholder specialet sig til problematikken gennem aktør-netværksteori (ANT), post-fænomenologi samt Design Thinking.

Analysen leder til et design værktøj, der er udviklet til at understøtte museets innovationsproces. Værktøjet er konstrueret med udgangspunkt i fem parametre, der tilsammen konstituerer teknologisk dannelse. Således kan værktøjet bruges til at evaluere diverse udstillinger eller dele af udstillinger med udgangspunkt i at vurdere, hvordan materielle og humane aktører påvirker oplevelsen og formidlingen af teknologisk dannelse. Afslutningsvidst peger specialet på fire konkrete cases, hvor teknologisk dannelse bliver evalueret gennem designværktøjet. Værktøjet er udviklet ud fra designteorien om infrastruktur, hvorfor det kan bidrage til museets innovation processer nu og i fremtiden.

English Abstract

The following master thesis concerns a design contribution to the innovation processes of the Danish Museum of Science and Technology. The thesis investigates the phenomenon technological literacy, which in the organisation of the museum is a normative aim for the dissemination strategy and thus a point of departure in a forthcoming innovation.

Data is collected qualitatively through field work with interviews, observations and workshop as the main methods. Theoretically the thesis analyses the problem through actor-network theory (ANT), post-phenomenology and Design Thinking.

The analysis leads to a design tool that is developed to support the innovation processes of the museum. The tool is constructed with point of departure in five parametres, which constitute technological literacy. Hence the tool can be used to evaluate various exhibitions or parts of exhibitions to discuss, how material and human actors affect the experience and dissemination of technology literacy. Concludingly the thesis offers four cases, where technological literacy is evaluated via design tool. The tool is developed with reference to the design theory of infrastructure to contribute to the innovation processes of the museum now and in the future.

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1.0 Introduction

In the municipal of Helsingør 40 km north from Copenhagen is the Danish Museum of Science and Technology (DMST) located. The museum is more than 100 years old and houses objects from the late 19th century up until today. Here you find airplanes hanging from the ceiling, gigantic diesel motors, buses and automobiles alongside computers, cellphones and video games. All original and unique pieces in the puzzle about the history of science and technology.

In the beginning of this year the museum announced their forthcoming plans of relocation. In 2023 the museum is planning to move into the old combined power and heating plant, Svanemølleværket, in the northerly harbour in Copenhagen. The museum wishes to attract more visitors with a more attractive address and facilities, which are better suited as museum halls, than what is the case now.

It was, therefore, natural for these two scholars of the science and technology studies (STS) to reach out the museum, with whom, as the name indicates, obvious interests are shared. STS have traditionally been focusing on issues regarding the interplay between users on one hand and science and technology on the other (Bruun Jensen, et. al. 2007). The move to Svanemølleværket has launched an innovation process at the museum and the museum have hired an innovation manager to lead this work with designing a new overall dissemination strategy. Rethinking and modernizing the ways the museum convey its knowledge on the history of science and technology completely both in ways of tone of voice, visual identity and exhibitional style. The initial wonder was thus standing: How do a museum of science and technology innovate and move itself? The case we found ourselves in was, thus, to dive into an innovation process concerning transforming a worn down museum into a new modern one by rethinking the dissemination of the museum entirely. We wished to do so from a design and techno-anthropological perspective (Børsen and Botin, 2013) and focus on the users in the innovation project, which again is of high importance in the STS tradition

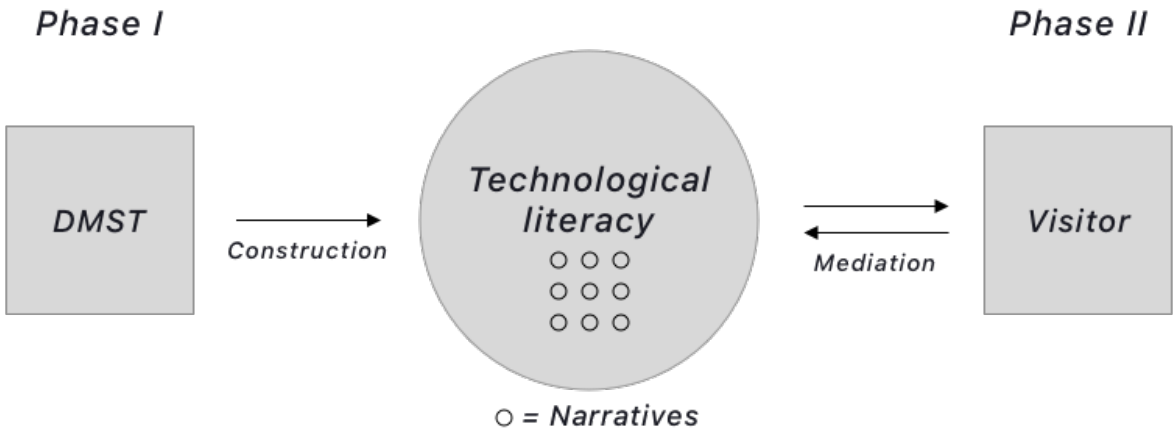
(Elgaard Jensen, 2003). Ultimately we wished to ask: Who are the users and how are they involved?

We brought our wonder with us to our first interview with the innovation manager and the main curator to sharpen the focus on the context. The two museum employees presented a large variety of problems, which the museum was facing in light of the move. Amongst many, two initially emic concepts arose, which have stuck to the thesis since then.

First concept is *technological literacy*. The concept was presented as a vision statement for the general dissemination of the museum. They aspire to call for technological literacy amongst their visitors, in such it is a normative aim. To reach such aim the museum have exhibitions, which conveys knowledge about the history of science and technology in various ways. The two employees had different views on, what technology literacy is, or rather, could be. As they elaborated upon, technological literacy is not a locked concept with a clear definition. It is flexible and can be used to describe the objective of many different areas in the history of science and technology dissemination. One exhibition might call for a focus on the technical parameters on a given technology while another exhibition might focus on the societal background for a technological breakthrough. Common for either way to convey technology literacy is the use of narratives as the medium for such aim. By such, technological literacy is communicated to the visitors through different narratives. One narrative being the how far a specific car could drive on a liter of gasoline, while another could be about the societal consequences of flying. Both are aiming to communicate towards the umbrella term of technological literacy. Narratives are too an emic term, which describes the ways the dissemination is being carried out and what story is being told. Technology literacy is thus a concept, which is difficult to define, but still used by the organisation to describe their endeavour. We, therefore, wanted to investigate it: What does it consist of, how is it constructed? Ultimately leading for us to investigate the narratives, which (ideally) lead to technological literacy.

Second concept is the notion of the current museum and its exhibitions as a *laboratory* for the future museum. In such an arena where ideas can be tested out on users. The main curator, who presented this way of seeing the museum, stated that even though it is an old museum, where many of the exhibitions are randomly placed and the condition of many of the objects are rather poor it is a good way to understand the need and wishes of the visitors. We found this idea intriguing, because if the museum halls are a laboratory in which the museum curator are scientists creating new exhibition, then we would be the scientists studying the scientists. And further, within the frame of a laboratory, we wanted to study the visitors and their relation to the exhibition, which would further assist us on sharpening the attention towards the question of what technological literacy is, and how it is perceived by the visitors.

These two concepts have thus been shaping the problem statement. Not in the sense that the organisation needed us to study them, but rather as tools for critical reflection on the innovation process. It, therefore, lead us to a structure of analysis, in which we investigate the narratives leading to technological literacy first and following the experience of the visitor in its interplay with such narratives. The relation between narrative and technology literacy will be elaborated further upon later. Hence following the dissemination from idea to execution. The structure can be depicted as follows:



Model 1.0. Analysis structure

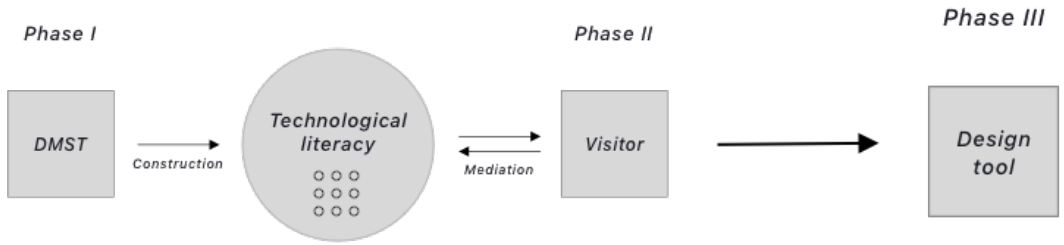
In phase one we have sought to investigate what technological literacy is from the perspective of DMST. The nature of technology literacy is vaguely described. We know

that it is an aim for the organisation, however it is not precisely defined. It, therefore, raises the question of what it is constituted of. How are the users affected by technological literacy? How is the organisation doing so? And, how are the museum objects? To answer these question we have allied ourselves with core thinker of STS, French anthropologist and philosopher, Bruno Latour, who in his actor-network theory (ANT) discusses how human and non-human actors link together to form heterogenous networks (Latour, 1986). Our focus is in this sense; what technological literacy is constituted of in an actor-network theoretical framework - which actors are in the network? We have followed technological literacy from idea to execution. In praxis we analyse the design process of the newest exhibition at the museum, which we regard as the newest representation of how technological literacy is being conveyed. The exhibition, Next Level, consist of different entities, which collectively forms narratives. We follow the constitution of three narratives to discuss how the exhibition calls for technological literacy.

In phase two we continue to analyse the relation between narratives and visitors. We do so by drawing on the Dutch philosopher Peter-Paul Verbeek (2005 and 2011) and his notions on human-technology-world relations. This approach allows for us to engage the user into the investigation of the innovation process of the museum. The analysis seeks to follow the experiences constituted in the interplay between visitors and narratives to discuss how the exhibitions call for an user enactment of technological literacy. This interplay between human and technology, or visitor and exhibition, is by Verbeek referred to as mediation.

Concludingly the bipartite analysis serves as point of departure in a design contribution to the innovation processes the museum is in. We seek to understand the ways narratives are constructed and shape experience, which is ultimately an endeavour to investigate the ways meaning and knowledge are constituted through entities (both human and non-human) in the museum. We are inspired by American pragmatism John Dewey and his notion of problematization, which, simply put, seeks to disaggregate an unsettled situation to suggest new ways to think about it (Koed Madsen, 2013). Our

unsettled situation is the concept of technological literacy, which, we find, have a constitutional phase where curators are constructing narratives towards it and followingly an experience phase, where visitors are engaging with these. We study both phases to concludingly suggest a series of heuristics, which seek to build a (new) understanding of technological literacy. In such we follow a progressive pragmatic mode of inquiry, in which we determines the problem and furthermore provides a resolution to this (Ibid.). Put simply: We disaggregate technological literacy to reconstruct it later.



Model 1.1 Structure of analysis leading towards the design tool

We will, practically, design a tool, which can be used by the organisation to understand the ways technological literacy is constituted in the interplay between visitor and exhibition to feed into the innovation process. The tool is grounded in a design thinking tradition, which seeks to design infrastructure rather than finalised products (Bjögvinsson, 2012). Ultimately we suggest a change in the understanding of technological literacy from a discourse point of departure in which the visitor's social background is highly important to a socio-material understanding of technology literacy, where the materiality too shapes the experience of the visitor. In such, we wish to materialize technological literacy. The problem formulation is as follows:

- *How can an infrastructuring design tool based on translation of narratives and mediation of experiences contribute to innovation processes of technological literacy at the Danish Museum of Science and Technology?*

2.0 Problem Field

The following chapter will elaborate on the problem statement presented in the previous chapter by introducing the key concepts and actors, which constitute the framework. Hence a thorough introduction to the field that the ethnographic project seeks to uncover, introductions to the concepts of narratives and technological literacy and finally an introduction to the theoretical tradition the thesis positions itself in to unfold the problem.

2.1 The Danish Museum Of Science And Technology

The Danish Museum of Science and Technology (DMST) is a museum founded in 1911 as part of the Technical University of Denmark. In 1965 it moved to Helsingør, where it still is to this day. The museum holds a series of diverse exhibitions, which each tells a different part in the history of science and/or technology. In the museum halls you hence find prototypes for dimension and weight from the 17th century, a collection of H.C. Ørsteds' apparatus used in the discoverment of electromagnetism in the 1820's and many other more or less important breakthroughs up until today. Over the years the museum has been merged with a couple of minor museums, among these most prominent a former plane museum, which have entailed that quite a few planes take up a lot of place in the museum. Some hanging from the ceiling other standing on the ground accessible for the visitors.

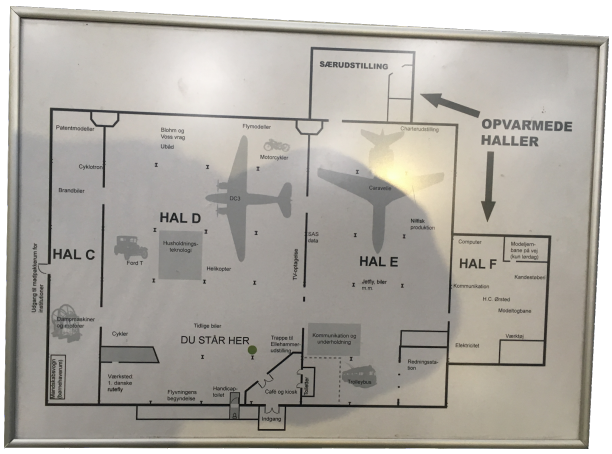
2.1.1 Exhibitions - The material carriers of technological literacy

Walking through the doors at DMST takes you into the two enormous former shipyards, which in their presence create a material symbiosis between history and context. Here, 100 years ago, ships were built displaying state of the art engineering and now, the history of science and technology is on display. As you step out of the combined entrance and shop area and into the wide open areas of exhibitions, you instantly feel a

wall of cold air surrounding your body. The building was built to keep the warm out and the cold in, which require the winter visitor of the museum to keep their outdoor clothes on. This creates a rather unique bodily experience of physically being indoor, but feeling like standing outside in completely calm and yet freezing weather.

As you shake of the first cold impression and begin to look around the museum, you glance at planes hanging in the ceiling above 150 years of technological history, for instance; the oldest driving car, a submarine, gigantic diesel motors, bicycles, motorcycles, first edition Macintosh computers, Nokia cell phones and the newest centerpiece; the space capsule that transported the first ever Danish astronaut through the atmosphere back to Earth. To every object in the halls you will find signs that conveys background stories of many sorts about the given object. One sign might introduce the power of a specific engine, while another sign next to a bicycle is explaining societal implication of a specific bicycle design. Everywhere you look you will find objects and signs.

The museum is divided into different sections, which are each further divided into minor exhibitions. The below picture is taken of the map, which meets the visitors as they enter.



Picture 2.0 Map of the museum

As it can been seen on the picture the architecture creates two big rooms (Hal D & E), two small (Hal C & F) and the top room, which is dedicated to a special exhibition. In these rooms different exhibitions are on display. Among many: A corner is about the invention of planes and the art of flying, one is about the first Ford automobile, another

about a former Danish ambulance service and in the two small rooms in the top and to the right there are exhibitions about respectively the development of industry and one about the smartphone. Beside demarcated exhibitions the museum are showcasing different means of transportation. Mostly planes and automobiles in the different spots around the museum. Three planes, which are standing on the ground, can be accessed to the amusement of (mainly) the visiting children, while the different cars are only to be viewed. This division is rather distinctive for the entire museum. Either you engage passively with the exhibition or the objects by reading or looking or, you engage actively by sitting, trying, touching, playing etc. with the exhibition. Common for the two ways of engaging with the objects of the museum, we find, is a sense of unifying the visitors. The old bus invites the visitors to walk into it and feel the cushions of the 1960 public transport, and, sitting inside of it, you can hear people talking about their experiences (or lack of) with busses through the ages. However, the objects of the museum also unify visitors around passive exhibitions. For instance, a crashed and sunken plane, which from a visitor perspective can either be looked at or read about. Whether such an experience is to be considered passive and the bus the opposite is naturally debatable, however for now, it is noteworthy there exists an active/passive dichotomy, which the exhibitions can be interpreted within.

2.1.2 The organisation

The museum is facing a paradigm shift. In february this year it was made public that the museum intends to move to the combined heat and power plant "Svanemølleværket" in 2023, when it shuts down. This has created a two-folded organisation. One side, which runs the museum as it is now and one side, which develops and fundraises the new museum. In reality, the two departments are overlapping. In one interview the main curator formulated it:

"The museum, as it is today, is a laboratory for the museum to come"

The old museum is thus an arena, where ideas can be tested and the investigation for the modern museum of the history of technology, which is strived for, can be pursued. In the organisation of the museum we, therefore, find a series of curators, who are working with the developing and designing tasks of creating exhibitions. This collection of employees are in charge of the dissemination, which meets the visitors and furthermore the safekeeping and categorisation of the museum objects. The curators are hence working on two levels with the objects. They are displaying a fraction of the collection in the exhibition, but the majority of the objects are zealously stored in a warehouse. Alongside the curators working to convey knowledge about the history of technology is the school service. Here, a handful of student employees execute different classes for students in all ages on technological, innovational and societally developments based upon the exhibitions and objects in the museum.

The other part of the two-folded organisation is the developing department, where the innovation manager is leading the work. Here, the structural plans of the new museum are being laid out while funds are sought to finance them. This part of the museum is furthermore interested in evaluating the existing museums strategies to assess the potential implementation of such to the new museum. This project falls within this last evaluating praxis of the museum. We seek to investigate the notion of technological literacy from a qualitative perspective to discuss the socio-technical construction of it.

2.1.3 Museums in Denmark

Museums are an institutional and fundamental part of the historicity of the world. Most cities around the world has one or multiple museums featuring historical or contemporary objects. The Danish Museum of Science of Technology is officially a culture-historical museum, which in a legal sense implies that it shall elucidate the culture of Denmark, the world and their interdependence. Furthermore the collection of objects is to be the foundation of both the scientific community as well as the common enlightening of the society.

Where other disciplines actively takes part of the history through inventions, warfare, ethical considerations, artistics compositions, ideation etc. museums (generally) work with storing, preserving and telling the story of these innovations. These innovational breakthroughs constitute discursive and material collective perceptions of humankind, which the museums through exhibitions curate what and what do not matter in this grand tale. Some artifacts are given a high degree of importance and exposure - others less so. At the Danish Museum of Science of Technology, for instance, there is an immediate focus on technologies of transportation. The invention of the museum itself dates back to the Age of Enlightenment and sprung from the philosophical turn, where reason became the predominant epistemological theory of knowledge and museum partook an instrumental role in this endeavour (Hooper-Greenhill, 2000). Museums were to be an universal archive tasked with collecting, producing and presenting knowledge to the public, with the latter seen as separate actors from this practise and were, simply, receivers of this knowledge. The public were to be educated.

However, shifts in the present-day thinking has led to discussions about the role of museums in contemporary society and whether museums, as currently constituted, pose problematic challenges for itself and the public. The common denominator of these challenges can be summarised as a clash with the undisputed voice museums historically has possessed. Critical questioning of the role of the objects in the museum, the stories constituting their historical and contemporary meaning, and the role of the visitors visiting the museum. Museum theorist Janet Marstine explains this in her book "*New Museum Theory and Practise"* (2005), where she argues:

> *"When we look at a museum object we might think that we see something pure and "authentic" – untouched since its creation. We have a tendency to see museum objects as unmediated anchors to the past (...) Decisions that museum workers make (...) all impact on the way we understand objects. Museums are not neutral spaces that speak with one institutional, authoritative voice. Museums are about individuals making subjective choices"* (ibid.: 2).

Marstine calls for a new epistemological view on the knowledge production of museums, where the public is urged to form individual opinions, as opposed to uncritically absorbing the information. Museums are not omniscient, unbiased narrators of history. Marstine argues that museums utilises framing devices (ibid.) to control the viewing process of audiences and present an uncontradictory progression of history, where a framing device can take the shape of anything from a light bulb to an audio headset. This notion of framing devices implies a reconfiguration in the apparatus of museums, where greater emphasis are put on the role played by the objects in and the users of museums. Framing devices becomes further interesting when Marstine writes that for the public to:

> *"to achieve cultural literacy, it is crucial to understand that museums don't just represent cultural identity, they produce it through framing"* (Marstine, 2005 p. 4).

It is, therefore, insufficient, according to Marstine, for museums to produce knowledge solely on issues as functions, aesthetics or the history of the objects in the construction of cultural literacy as this, simply, leads to uncontested truths (perhaps) adopted by audiences and thus not leading to critical thinking amongst the museum visitors. In dissimilar fashion, the museums should display the sites of controversy and ultimately engage the audiences opinions.

So where does that leave us? We will adopt this emphasis on the importance of the engagement of users by museums put forward by Marstine, and followingly incorporate an intrinsic focus on the visitors in our contribution to an innovation process of technological literacy at DMST. We can benefit from visiting Torben Elgaard Jensen and Morten Krogh Petersen and their take on user involvement in innovation projects (2016). The two of them state that the inclusion of users in innovational endeavours is a historical constant, and that their actions are "*constitutive of the relevans, usefulness and meaningfulness of a socio-technical system*" (Elgaard Jensen and Petersen, 2016. p. 137). The actions of users, or in our case their experiences, are, therefore, not that they

simply are receivers of technological literacy, but that they are co-constitutive of it. However, we will retain a focus on the museum and their construction of technological literacy in order to investigate their production of knowledge, yet not place them on an objective pedestal impervious to claims of subjectivity. Our hope is that by combining the two, we will derive at a more holistic and comprehensive contribution to the innovation processes of technological literacy by DMST.

2.2 Key Concepts

Moving from a focus on the field, we wish to present the two main concepts of the thesis. Firstly narratives and hereafter technological literacy. The two concepts are mutually dependent since narratives are the communication tool for reaching technological literacy. We will, due to their different origins, present them in turn.

2.2.1 Narratives

Across the exhibitions the common denominator is that *narratives* are present as visitors interact with the exhibitions. Narratives are manifested in many ways. They are being conveyed through the signs, which the curators have designed. Here historical background and technological specifications for the objects and exhibition are being presented. Further, it is also a narrative when a visitor is playing around in the cockpit of the flight simulator. A narrative is thus not locked as a purely textual medium, but is also material. Common for the narratives is that they are, intentionally or not, constituted by the organisation of the museum. Either as writing the sign or in the placement of the different objects in an exhibition.

We build the concept of the narratives from two points of departure. First, and foremost, narratives are the emic term, which the museum staff use to describe the meaning and aim of the different objects and exhibitions. The organisation holds that it is a narrative, when a sign explains the power of a specific engine and it is a narrative,

when an exhibition tells a story about carbon dioxide in the atmosphere. Hence, narratives can be both narrow and broad in the dissemination.

Secondly, we draw upon the theoretical base in narrative theory (Kindt & Müller, 2003; Richardson, 2000; Prince, 1982; Fotis, 2003; Mulholland, Wolff and Kilfeather, 2016), which assists us in defining the concept of the narrative even further. Narrative theory occur in a plethora of scholarly works from numerous fields and disciplines outside literary studies. The reason for this lies in the historical background of narrative theory, or narratology as it is similarly known by. Narratives originate from the mid-nineteenth century Europe and USA, where normative assumptions about rhetoric and poetics as well as practical knowledge from authors of literature and critics thereof was accumulated by scholars in order to construct professional knowledge about narratives (Kindt & Müller, 2003). These scholars all published papers and cited each other and consequently together constituted a new field of science. The notion of narratology was first introduced in 1969 by Russian Tzvetan Todorov, and between him and french literary scholars, new methods where proposed, though they differed in their degree of structure (ibid.). This was the beginning of structuralism inside the field of narrative theory, however soon after poststructuralism emerged and it challenged the ideas put forth by structuralism and consequently, the whole foundation of narrative theory (ibid.). This resulted in versions of narrative theory to scatter into other disciplines such as theology, psychology, sociology and so forth. This led to the what is called the "narrativist turn", which was a call for a contextualist oriented theory of interpretation (ibid.). This controversy is still ongoing and therefore narrative theory cannot be said to have a clear identity. Even the history of narrative theory just summarised is up for debate. Brian Richardson argues that:

> "*These attempts invariably prove inadequate; indeed, the history of narrative theory itself contradicts the critical narrative just outlined*" (Richardson, 2000 pp. 171).

Richardson defines narrative theory as: *"(...) a representation of a causally related series of events"* (2000, pp. 170). Gerald Prince's widely cited definition is: *"the representation of at least two real or fictive events in a time sequence, neither of which*

presupposes or entails the other" (1982, pp. 4). We find Fotis Jannidis' focus on the medium of representation interesting and agree when he argues: *"that is hardly feasible for meaningful structural descriptions to be independent of the medium of representation"* (2003, pp. 38).

Common is the focus on the narratives as representations - the differences are how it is investigated. However, this ongoing epistemological uncertainty is not for this project to decipher as our endeavour is an investigation into technological literacy, and not into black-boxing a theoretical notion. However, we are interested in the interpretational focus, which narrative theory enables, since visitor interpret the narrative of exhibitions differently. As exemplified above, one visitor might play around in the cockpit, while another would read the sign. Both visitor in the same exhibition, same narrative - but different interpretation.

Where will, therefore, abandon narrative as an analytical theory, but continue with narratives as an analytical ethnographical tool. We will, therefore, utilise the following simple definition of narratives:

> "*A narrative can be understood as the telling of a story. A narrative comprises both the story (what is told) and the discourse (the means by which it is told)*"
> (Mulholland, Wolff and Kilfeather, 2016., 2016 p. 3).

Story and *means* hit the nail on the head for our context of a museum, and fittingly the quote also derives from an academic chapter concerning narratives in museums. This understanding of narratives allows us to investigate what is being communicated and how it is being communicated in the relation between object and visitor. Narrative is a term, which uncover both the content, story, and the medium, means, of a given dissemination. It is, therefore, a term, which helps us to investigate the story behind a given object.

The analysis of the exhibition design is, therefore, focusing on the way in which material and human actors are constituting different narratives about objects of the history of science and technology. The narratives are the stories, which holds the aim of the organisation of technological literacy.

2.2.2 The notion of technological literacy

The DMST is calling for different types of dissemination in the quest to convey their contribution to the history of technology. There are, among others, games to play, buttons to push, videos to watch, audio to listen to and (an endlessness of) signs to read. We argue that these types of dissemination can be positioned on the continuum between active and passive involvement of the visitors placing the playing dissemination in the active extreme and the reading dissemination in the passive extreme. Common for both ends of the continuum are the fact that they are types of narratives, which are calling for a learning experience of the visitor. Either in the form of learning the feeling of the interior of an old bus or as learning the performance of an old flight engine. Research suggest that a learning experience of a visitor is heavily based upon the identity and motivation of the visitor, while the interaction with exhibition is influencing "but not dictating" the learning outcome (Falk, 2006). This project, however, is not directly seeking to investigate learning outcome, but rather the experience with technological literacy.

Museum theorist Eilean Hooper-Greenhill brings forward the idea of the post-museum (Hooper-Greenhill, 2000), which is an understanding of the museum as an arena to engage and share power with audiences and promote social understanding. She writes:

> *"Museums today have the opportunity to push at existing borders, to change current relationships, to manipulate and break down old orthodoxies, to enable a broader, more inclusive approach to a more inclusive society"* (ibid.: p. 31).

The concept of a post-museum is a positive, paradigmatic proposal for the institutional future of museums, which challenge the notion of the museum as a classical learning space, but insist on calling for an innovative and engaging relation between museum and visitor.

The notion of literacy is in a Danish context difficult to translate to English, since literacy in an English tradition normally refers one's ability to read and write, it

can, however, also describe specific expertises by using prefixing, for instance; digital literacy, general literacy and in our case technological literacy. The Danish word is "*dannelse"*, while it in German and other nordic countries is referred to as "*bildung"*.

Technological literacy is, therefore, to be understood in a broader context. It is not a lecturing endeavour for the museum to make sure the visitors know the technological details of the technology they have been shown. Technological literacy is rather a goal to wake an interest amongst the visitors towards technology and to illuminate the omnipresence of technology in the everyday life of the visitor. In a interview curator expressed it as follows:

> *"It would be cool, if they (the visitors red.) figure out how an aircraft works, but that would be an extreme ambition, but it might be that people comes to the museum and sees a lot of things and might get an awareness that technology is something that concerns them. (...) The conception about this museum as a learning institution, from which people are leaving brighter is a hoax. It is about lifting minor pieces and create an interest and saying that technology is of importance to us all"*
>
> Curator on technology literacy, translated from Danish to English

In this way, the concept of technological literacy is represented in the above theoretical considerations. Technological literacy is the product of a relation between the visitor, hers or his motivation (Falk, 2006), the object or exhibition and lastly the narrative. It is thus a concept within the framework of the post-museum (Hooper-Greenhill, 2000), which calls for the museum to become an arena to engage its visitors.

From a practical perspective, technological literacy also have important aspects. These techno-anthropologist become acquainted with the concept for the first time in the initial interview with the main curator and the innovation manager. They were defining the concept slighter different from one another, however they did not disagree with each others interpretation, merely accepting that it had elasticity. The main curator, for instance emphasised how technological literacy is about learning how technology is constructed technically and how technologies differ technically. The innovation manager, however, stressed the importance of conveying how technology shapes society and vice versa. This can be seen as a continuum, where the "hard" dissemination of

technological literacy concerns with the technical aspects of technology are in one extreme whereas the societal and individual effects of and on technology are considered in the "soft" extreme. It is, therefore, important to note that technology holds multiple meanings, which can also be seen in the exhibition, where both hard and soft dissemination figure.

Question, however, still stand: How is technology literacy constructed - in praxis? What makes up technology literacy? Who are the actors? What are their relation? And, how can it be utilised to form a design tool?

2.2.3 Theoretical Considerations

Finally in the project design, we wish to account for our theoretical considerations and the background of the traditions we step into. We draw on three main theories, which on an ontological level are intertwined in their understanding of how objects are present in the world. In the following we will account for this coexistence. The arguments in the analysis will be based on respectively actor-network theory (ANT) for the first part while the latter is grounded in post-phenomenology. The design tool we suggest after the analysis is inspired by the sub-genre of Design Thinking concerned with designing infrastructure and Things.

Starting of with ANT and post-phenomenology, which make up the theoretical foundation for the analysis. The two traditions share a common ontology, which allows them to work relatively frictionless together in the following analysis. Both traditions argue that objects have agency. ANT springs from a tradition of studies on the construction of scientific facts through infamously ethnographic laboratories studies in the 1980's (Blok and Elgaard, 2009; Latour and Woolgar, 1986). The argument is that scientific facts are the product of translations between different both human and non-human actors, which are linked together in networks. Along this line we find the post-phenomenological argument that object and subject co-constitute a reality (Verbeek, 2005). Further, Verbeek present an argument that technology mediates praxis. He does so by using Latour's concept of "script" and the American philosopher Don Ihde's

concept of *"multistability" to form: "a vocabulary for technological mediation"* (Verbeek, 2011: 9-11). The two traditions are thus both arguing that objects are to be taking into account when discussing (a) praxis. However, they do differ in the target of analysis, which we incorporate in the structure of the analysis. ANT, as the name imply, focuses on how multiple actors links together to constitute networks through "translations", while post-phenomenology is used to investigate experience occurring in the interplay between a subject and a object. In our analysis this is naturally applied, when we firstly use ANT to investigate how narratives are constituted by various translations of actors and following analyse the experience of visitor in its meeting with narratives.

Design Thinking is a broad field in which we positions ourselves within the tradition of designing an infrastructure and Things. We are inspired by Bjögvinsson et. al. (2012), who are utilising Latour to argue that any design process should include the the socio-material (Ibid.: 102). They argue that where the design of "things" is, simply, a matter of building through material, the design of "Things" is the assembly of social, political and material entities. The point both parties are making is further strengthened by Latour in his discussion on the concept moving from a perception of things as matters-of-facts to matters-of-concern (Latour, 2005). Latour argues that we are to view objects as: *"(...) interesting, variegated, uncertain, complicated, far reaching, heterogeneous, risky, historical, local, material and networky"* (Ibid.: 11). Thus investigate how objects are constituted by many different actors and, as we wish to do, how objects are to be designed through many different actors. Latour, therefore, develops the concepts of Dingpolitik, which is referring to the etymological meaning of parliament. We should, Latour argues, consider the investigation of objects as an entity, which constituted of many different concerns - alike a parliament, which is constituted of many different political entities of different concerns. Hence also the emphasis on the capital T, in Bjögvinsson et. al. (2012) theory.

Bjögvinsson et. al. builds their argument up through the concept of infrastructure. When designing Things, the designer should considered the many matter-

of-concerns, which are to constitute it. In our case we investigate the narratives and visitor experience to argue which heuristics can be used to constitute technological literacy at the museum. In other words, we seek to investigate, which parameters can be used to define technological literacy. This design tradition is thus well suited to argue that materiality have (an) agency and, therefore, should be included in the design process. We will naturally use these concepts to design our tool.

The theories will be further elaborated upon, when they are applied in the analytical work. However prior to this, we will account for the two main theoretical notions, which figured in the problem statement.

2.2.3.1 Translation

In the analysis we seek to investigate the translation process of narratives (Latour, 1990). We will follow a single curator in his construction of an exhibition. A translation is in this regard the mobilisation of human and non-human actors in order to extend the association of visitors experiencing the narratives. A translation can both be authoring a sign and through negotiation include a third party in the exhibition.

2.2.3.2 Mediation

Following the investigation of the translation of narrative we seek to understand how the visitors' experiences are affected by such narratives. We utilise Verbeek's notion of mediation (Verbeek, 2005) to analyse this. Mediation refers to the interplay of subject and object, which constitute a reality or experience. The concept is thus used to describe the ways both the visitor and a narrative are in a relation.

3.0 Methodology

We will in this chapter present our selection of methodological tools and discuss reflections we have had on the way. Our process has been marked by an extensive accessibility, where we have been free to come and go as we pleased inside opening hours, but simultaneously an organisation in disruption, where it has been difficult to decode who to contact at various points in time. Delving into our methodological considerations are, therefore, synchronously delving into the experience of performing a study in this specific field of a museum. The thesis is a qualitative ethnographic endeavour from which data originates from two interviews, a workshop and a comprehensive series of participant observation.

We will first account for the interview we conducted, then the observations we performed at the museum and lastly the workshop we held with representatives from DMST. This suggest a structural, chronological order, which has not been present. Instead we have conducted our observations between our interviews and workshop, which has enabled us to iterate on the problem as the project has progressed and take our learnings from interviews and workshop with us in the participant observation and vice versa.

Phase I: Initial interview with the innovation manager and the main curator

Phase II: Participant observation in the exhibitions

Phase III: Workshop with the innovation manager and the main curator

Phase IV: Participant observation and interviews with visitors in the exhibitions

Phase V: Interview with curator of Next Level

Phase VI: Final participant observation focusing on Next Level

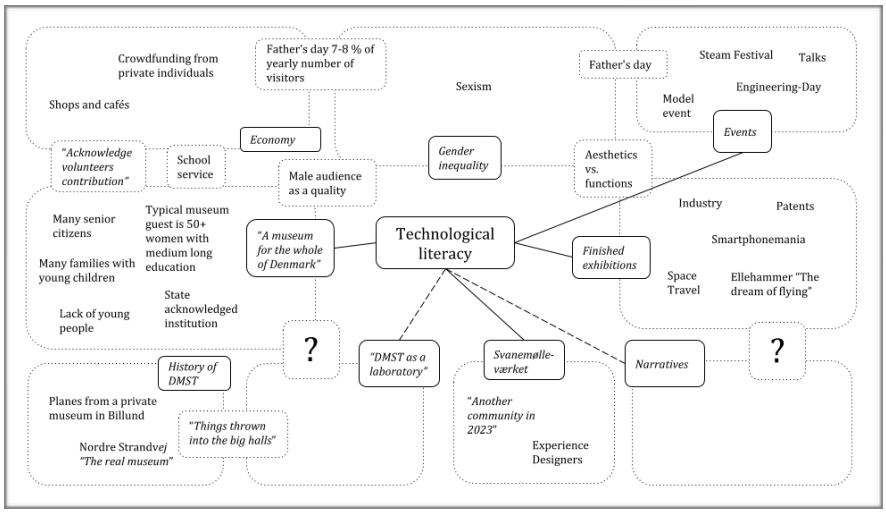
3.1 Interview

In the beginning of the project we had an interview scheduled with the innovation manager of DMST. She was to explain what the museum was currently doing and what

we could possibly contribute with. We prepared the interview by writing an interview guide (Brinkmann and Kvale, 2015) to support the structure of the interview. The intentions of the interview were to understand the motives behind and process of the move to Svanemølleværket. Just before the interview started, the three of us met the main curator and he was asked if he wanted to participate, in which he answered yes. Later in the project, we have noted this as an important coincidence. In the presence of these two actors, we instantly witnessed differential attitudes towards DMST, both in relation to what it was and what it should become in the future. The two of them disagreed on elemental and fundamental issues such as the meaning of technological literacy, most important characteristics in the dissemination of the exhibitions and whether Father's day, a recurrent event of the museum, was a site of gender inequality. Further, we were presented with approximately fifteen various problems we could investigate for them, with them making suggestions in turns. Suggestions like for instance crowdfunding from private persons, improving the shop and cafe for visitors and investigating volunteers contribution to the museum. Early in the interview we had to abandoned the initial interview guide and instead focus on the perplexing new development of an extensive series of potential problems to investigate. We ended the interview with stating that we would reassess and sum up the different interesting points laid out by them. After the interview we felt compelled to take a step back and explore if we could find a common denominator between all the things said, relative to what we would be able to investigate in the field. The interview, therefore, went from an relatively structured with specific question on for instance user involvement to an open, exploratory, interview (Ibid.: 126), where focus were on the various wonders and problems the museum were facing on a general level.

In order to find a focus in a now open interview, we transcribed it and employed Adele Clarke and her notion of situational analysis (2005). Clarke rethinks grounded theory and proposes three kind of maps that can contribute to the work with coding: situational maps, social world/arena maps and positional maps. In this process, the main question we asked ourselves was: "What and who are in the broader situation?" (Clarke,

2005, p. 94). We especially found inspiration in the situational map to code our data, where a researcher in a disorderly fashion plots in all the actors deemed analytically pertinent. Chaos is welcomed as the main purpose is to gather all actors found interesting. Many maps were drawn and iterated upon. Our final situational map is seen below. All the entities seen in the map are actors. In the center of the map figures technological literacy. For the reader this map may seem chaotic and confusing, so we will offer some context. The ones in solid boxes are to represent the actors "behind" it in the bigger dotted boxes. They are, therefore, categorising them into one coherent whole. Some of them we have defined, and others are directly taken from the interview. The actors in small dotted boxes, who are placed in the middle between two bigger dotted boxes, are to be understood as being in both categories. The solid boxes that technological literacy has lines to are in relation to it contrary to the ones without. The amount of actors figuring in the map does not make it sensible for us to explain them all; however, we will account for some who we find in need of explanation:



Model 3.0 Situational Map of Technological Literacy

Economy and *Gender inequality* were demarcated from the thesis due to their weak relation to technological literacy. Economy seemed to be more related to the museum being viable economically than being related to the product of technological literacy produced on the museum floor. Gender inequality seemed to be a whole, separate project, where if went down that road it would lead us to something entirely different than an investigation of technological literacy. Yet the actors placed in the middle of the

these two actors and the ones with relation to technological literacy, we found important to note and include in the further investigation.

Events were specifically regarding *Father's day*, but we did not deem it realistic to include it in the investigation of technological literacy as the date of this event is two days before the deadline of the thesis, making it next to impossible to conduct any ethnography. We therefore delimited ourselves from this aspect.

Lastly, two dotted lines are seen from technological literacy to *"DMST as a laboratory"* and *Narratives*. They are to represent boxes that were deemed relevant and in relation, but without any actors solely in its category "behind" it. "DMST as a laboratory" was mentioned by the main curator, when he explained how the planes from a private museum in Billund were thrown into the big halls at DMST, because it simply had to fit logistically. Therefore, he saw, the big halls with planes as a laboratory where there could be experimented with the objects and visitors to find the things that worked before moving to Svanemølleværket. Narratives were mentioned by both the innovation manager and the main curator and were emphasised as something very important, they could, however, not entirely explain what it covers. Narratives were a new concept for us. We were, as a result of their emptiness, intrigued by the these two categories and wished to investigate them further. We were in similar fashion interested if there could be said to be an actor respectively both in "A museum for the whole of Denmark" and "DMST as a laboratory", and *Finished exhibition* and Narratives, since that would be a site of interest for us and something we could investigate and consequently contribute with. These are marked as question marks. Methodologically speaking, we simultaneously predicted that the users and exhibitions were something we could investigate in the field of study. We had therefore, by utilising the situational map, narrowed our scope and found a focus for the further investigation.

One last aspect of this preliminary interview is the notion of *Gatekeepers* (Kristiansen og Krogstrup, 1999). A gatekeeper refers to a person in power of either granting or rejecting access to the field of study. As a result of this interview, we now found ourselves having two gatekeepers in the form of the innovation manager and the

main curator. For the duration of this project, we could count on them to give us access to other actors deemed of interest. However, it is important to be vary of and reflect on whether a gatekeeper only gives access to certain actors or situations in order to protect the field, themselve or others (Ibid.). Even though we kept an eye on this for the whole process, and did not find an instance where this was evident, it is important to note that we are investigating on the basis of the wonders and issues, which were raised in the first interview. In other words, our thesis takes point of departure in the gatekeepers perception of the museum's problems. For instance, it was the main curator who told us about the other curator making the new exhibition "Next Level" and put us in touch with him. It was therefore beneficial that the main curator became our gatekeeper, as we potentially would not have been able to conduct the interview with the other curator otherwise.

The interview with the curator of "Next Level" was performed differently than the preliminary interview. Instead of sitting in a nice and quiet environment of an office, we met him at the museum floor where visitors were already engaged with the various games in a loudly manner. It did not feel natural to carry around a physical printed-out interview guide, so we instead embraced the situation and the interview became more of a chat than an interview as a result. We walked around the exhibition and the curator told us about the objects as we met them as well as the decisions and considerations he had performed. It was a different and rewarding experience. This allowed us to have focus on the materiality of the exhibition, since the curator could easily point towards the different objects of the exhibition and elaborate on why, for instance, they were placed as the where.

3.2 Observations

As mentioned before, we had the joy of an extremely accessible field of study. We had been given the code to the backdoor used by regular employees and could simply walk into the museum when needed. The museum was furthermore open for visitors six days a week, so there was also plenty of flexibility in that regard. We tried to balance the

days of observations so that we both experienced weekdays and weekends. The museum does not have a lot of visitors though. Around 50 people visits the museum on a weekdays and approximately 200 in weekends, so when we performed observations there was not always people present by the exhibitions. It was, as a result, not a given that we were to see visitors when we visited the museum. To delve into how we conducted our observational study, we will visit Søren Kristiansens and Hanne Kathrine Krogstrups definition of classifications, which is based on the american sociologist Raymond Gold (Kristiansen og Krogstrup, 1999 p. 101). This classification suggest a continuum where the total observer is in the one end, and the total participant in the other. Between those figures the observer as participant, which is closest to the total observer, and the participant as observer, which is closest to the total participant. This offers various degrees of observation and participation, where all are perfectly fine, but constitutes different methods for gathering of empirical data. We have utilised both ends of the continuum. In the beginning of the fieldwork we were more of a total participant, where we attempted to experience the museum as a visitor. One of us had never been there before, so it was sensible to utilise this as methodological opportunity. Even though we could walk into the museum through the backdoor, we entered the museum at the front door just as a regular visitor would. We walked onto the museum floor, experienced the cold sensation for the first time, discovered the various exhibitions, read the signs, sat in the vehicles and walked up into the large passenger plane. Later on in the project we had grown accustomed to the museum and its exhibitions and started to a greater extent observe the regular visitors instead of focussing on ourselves as ones. We quietly followed them around and eavesdropped on the conversations they were having. When the possibility arrived, we also attempted to engage in conversation with them and ask them various questions about their experiences. We have, therefore, utilised the whole continuum of observer and participant, and we would argue that without it, we would not have gathered the same, rich empirical data that we did. The increasing engagement with the visitors helped us iterative the problem. After the initial interview we sought to investigate how the visitors were positioned in regard to the

issues raised, after the workshop we focused on how the visitors and the narratives were related and after the last interview with the curator of Next Level we focused our participant observation amongst the visitors in very same exhibition. Vice versa we brought observations we had made into play in the interviews and the workshop for the organisation to reflect upon.

Observations are, besides the interaction with the phenomenon studied, only empirical data if one set down one's thoughts. This we have done by writing field notes in the field, and later type them out as thick descriptions. This method is based on the american anthropologist Clifford Geertzs and his *Deep Play: Notes on the Balinese Cockfight* (2005). This method encourages researchers to depict the situations observed in the most detailed and comprehensive manner possible, which have internally in our little two-man group allowed us to understand each other experiences and thoughts. Besides thick description, we have been inspired by the the Danish sociologist Kim Rasmussen and his discussion on how pictures can contribute to observational studies (2007). Rasmussen explains how photographs taken in the field can help the researcher in remembering photographically and contribute with other aspects than field notes. For an example a picture of a person's facial expression offers detail the researcher otherwise could have missed. Furthermore, Rasmussen argues that photographs accompanied by text can help the reader open up their pre-understanding. In our case, photographs and explanation of an exhibition can help the reader open up their pre-understanding of what an object is and how dissemination about it is done, as they themselves can interpret the photographs and what they depict. We have, therefore, utilised as many photographs as we deemed beneficial in the following analysis.

3.3 Workshop

We planned a workshop, where we wished for several key actors from the organisation of DMST to participate. The hope was that together we could define various performances of selected exhibitions, which we could use in the further work with technological literacy. We had constructed around two dozens cards each with a picture

of an exhibition, its location on the museum floor and underneath various boxes to be filled out. The picture below shows an example. The first and largest box is named “The essential narrative”. We wished for the participants to define the, in their eyes, most important narrative of a given exhibition, as we had experienced different interpretations of what this relation between objects and experiences should produce. By defining one, overall narrative on each card, we hoped that they would be able to act as tangible showcases produced by themselves, which could initiate a discussion about technological literacy among them when presenting and comparing. Underneath the essential narrative figured various boxes containing notions we had encountered in our fieldwork that the participants could check. We left room for three boxes that they could define themselves if needed be. These boxes were added in the hope of further defining the essential narrative, while also perhaps initiating a discussion about why one exhibition maybe were to call for learning, and another for entertainment.

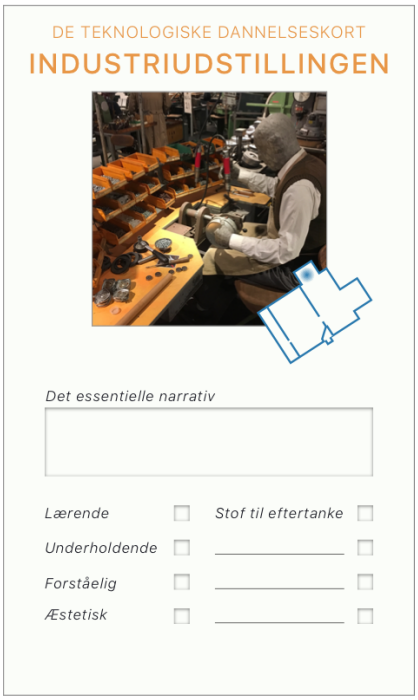


Image 3.0 Template of design game for the workshop

We were inspired by Eva Brandt and her arguments on how design games as an ethnographical tool can involve users to affect the design process (2006). Brandt presents various different design games and emphasises that a game should not be one

specific. Common for them all, however, are the featuring of rules and physical pieces, which the actors can use as *things-to-think-with*. In the end, she explain how a design game should produce insights and a common view, as well as a physical artefact that can act with definitiveness. We attempted to follow these guidelines put forth by Brandt. We hoped that the cards could become things-to-think-with and through discussion generate a common view, or the beginning of one, on technological literacy or alternatively, point towards differences in the perception of technological literacy.

However, we quickly realised that we needed to change our plan. Most of the people we had invited cancelled and we were left with the main curator and the innovation manager; two people whose opinions we already were thoroughly versed in. Nevertheless, we decided to move forward and still conduct the workshop. The format became more of an interview than a workshop, since the design game was thought as a way for more than two actors to discuss different matters regarding narratives. The both of them still completed two cards each though, which we utilised later in the project process. We finished the workshop now interview with a lengthy discussion about technological literacy, where they shared valuable and interesting insights on how narratives and technological literacy are linked together. The cards ended up as acting as a point of departure instead.

4.0 Analysis

4.1 Phase I

In this opening part of the analysis we will uncover how the museum stage an exhibition and consequently investigate how they construct narratives. The focal point of the analysis is a single case, where a curator is leading the creation of a new exhibition called “Next Level”, which revolves around the history of computer games. In this endeavour considerations are made and choices carried out, which on the whole showcases deliberate actions towards desired narratives. All in all, we have identified three narratives, which we will analyse in this scope: 1) Practises around games; 2) Danishness; and 3) Evolution of technology. The narratives are, in the eyes of the curator, a path towards technological literacy. His goal is, therefore, uniform to the normative aim of the organisation of Danish Museum of Science and Technology (DMST), that the narratives will constitute technological literacy amongst the visitors of the exhibition. We will, however, argue that this is part one of technological literacy, since users interaction with the exhibition are imperative for the constitution of technological literacy. The analytical process is thus following in genesis of the concept of this emic notion. We will follow the curator’s path towards the completion of this specific exhibition, while also add empirical work from interviews and observations. We will analyse the curator’s actions by utilising actor-network theory and specifically, employ the notion of translation (Latour, 1979; Latour, 1990; Elgaard Jensen, 2003) to investigate how different actors becomes present in the exhibition. However, before doing so, we will account for the theoretical considerations and state how these will be applied in the analysis.

4.1.1 Actor-network theory

Actor-network theory originates i.a. from the book *Laboratory Life: The Construction of Scientific Facts* (1979) written in collaboration between the French philosopher Bruno Latour and the British sociologist Steve Woolgar. The two authors investigate a laboratory and seek to show how scientific facts are not ‘found’, but contrary are

constructed through a scientific process of both human and non-human actors. They, therefore, epistemologically position themselves in a constructivist paradigm that wishes to remove the dichotomy between subjects and objects and rethink them and their interrelation in heterogeneous networks (Latour, 2016; Elgaard Jensen, 2003). We thus position ourselves inside a theoretical tradition that assign both human and non-human actors agency and utilises heterogeneous networks as a way of understanding relations. An important aspect of actor-network theory is that of stability. When a network reaches stability and predictability it becomes an actor (ibid.) An actor can simply be understood as everything that can be ascribed (an) action. We will go more in-depth with the case of the curator, the new exhibition and the action of narratives later in the analysis, but for now it is important to clarify that, according to actor-network theory, the curator and the games in the exhibition can be understood as actors, but the narrative can also be seen as an actor; that is, if its network ultimately becomes stable. In this analysis we will accordingly not investigate how the curator finds a narrative in the work with the exhibitions, but instead how the curator attempt to construct a stabile heterogene network of a narrative. We will do this by investigating how the curator associates himself with other actors, and we will do this by following the translations, which will be elaborated upon in the following.

In order to utilise the notion of translation we have found inspiration in the article "*Technology is society made durable*" (Latour, 1990). Here Latour investigates how innovations come about and uses an example of a hotel manager introducing a sign requesting the customers to leave their keys at the front desk so less keys will be displaced. This sign turns out to be insufficient so a metal weight is introduced to the keys, ultimately making them heavier, in the hope of the request becoming more accepted and less keys lost. What Latour utilises this banal example for is to show that the succession of a statement depends on the actors and non-human actors associated with it. We, therefore, find it of great importance to define what Latour references when he uses to word 'statement':

"*By statement we mean anything that is thrown, sent, or delegated by an enunciator. The meaning of the statement can thus vary along the way, and it does so as a function of the load imposed by the enunciator. Sometimes it refers to a word, sometimes to a sentence, sometimes to an object, sometimes to an apparatus, and sometimes to an institution. (...) The word 'statement' therefore refers not to linguistics, but to the gradient that carries us from words to things and from things to words.*"
(Latour, 1990:106).

Normally one would think of statements as something produced by humans, but Latour expands the notion and instead rethinks it as something co-shaped by human and non-human actors in a socio-technical world. Statements can be anything. We should not simply follow the statement through a context, but on the contrary follow the construction of context and text. If we return back to the example deployed by Latour, the hotel managers request - or statement - for customers to leave their keys at the front desk has changed with the metal weights attached, since customers are no longer following the first statement, but are instead liberating themselves from a heavy object. The statement has, in the words of Latour, been translated and the hotel manager, the customers and the keys have changed. The final result is that the keys are left at the desk. Latour argues that the successfulness of a statement depends on the loads imposed on it, which he calls 'programs of actions'. This can be simply explained by an example: The hotel manager adding the metal weight is a program; if a customer was to wrench the metal weight free from the key it would be an anti-program; and finally the hotel manager precluding breakage would then be an anti-anti program. Perplexing as that may sound, it can simply be understood as the process of countering the reservations against a statement to make it more predictable; or in other words: to mobilise actors to follow you. Translation is, therefore, the investigation of how a key actor attempts to mobilise other actors to construct a statement; or in the words of Latour: the extension of association through exploration of substitutions.

This offer the structure of this part of the analysis: The curator will be understood as the enunciator of a statement (hotel manager); the programs of actions performed by the curator in this endeavour will be the mobilisation of actors (adding

weight to the keys); and lastly the statement will be the narratives (leave your keys). We will now continue to the case itself and investigate the translations.

4.1.2 The construction of narratives

We quietly walk around in the exhibition with the curator while he explains his thought process. Around us appear a drowning noise from the visitors playing the various games and we have to carefully listen to his words. He has been working on creating the exhibition for the past four months and he can meticulously explain every item and why everything is, where it is. "Next Level" originates from HEART - Herning Museum of Contemporary Art - and DMST has borrowed it for a season, meaning until autumn this year. Thereby the exhibition will be there the whole summer. The curator speaks about how he had to refashion the exhibition to make it better suited to technological history than to cultural history. He elaborates:

> *"It was important for me to have some kind of story, so it was not just objects lying around. My role was therefore to translate the exhibition into a format we could use here at Danish Museum of Science and Technology. I could probably just have staged the exhibition as it were at HEART, but I did not deem that the best solution for us."*

The quote indicates a translation process, where the curator chooses to construct something new as opposed to simply relocating the same exhibition into the museum building. If we, perhaps confusingly, turn this analysis upside down, we can temporarily view HEART as the enunciators and the curator as an actor in need of mobilisation. HEART has constructed an exhibition and when it arrives in the hands of the curator he changes it so it fits with his wishes. The construction by the curator can, thereby, in the vocabulary of Latour, be seen as anti-programs, which HEART does not counter with anti-anti programs. One could ask, why would they need to? The point is not that they need to counter them, but more importantly that they do not and another exhibition is constructed, ultimately showing that the curator is on a mission to construct a new materiality for dissemination. Let us imagine a scenario where HEART declines any changes, which would lead to an exhibition completely identical (or no exhibition) at

DMST. Such scenario would lead the curator to perform as few translations as possible; if any at all. However, the curator is allowed to make changes and did so. We can thereby conclude, if we return to the original analysis formula of the curator as the enunciator, that he wishes for a specific statement to become predictable and true.

The question then becomes: What is the statement? When asked more directly about what he wanted the visitors to experience by visiting the exhibition, he said:

> *"When you have seen the exhibition, then you will hopefully have a new view on computer games. You will know it has a long technological history. You will know that there is a lot of different ways to use computer games."*

The history and usage of computer games were the two main messages he wanted the visitors to leave the exhibition with. We told him we had encountered the notion of technological literacy frequently in conversations with other actors in the organisation of the museum, to which he replied, that it had been in the back of his mind when constructing the exhibition. This goes hand in hand with our previous interpretation of technological literacy, since we here hear the curator describing his use of it as an underlying notion always present when disseminating knowledge to the visitors. It is a constant that have to be present in order for the normative aim of the organisation to be achieved. However, as emphasised before, the understanding of it can vary depending on who you ask. "Next Level" is, therefore, the closest we can come to actually understand this fluid notion of technological literacy from the perspective of DMST, because we here can investigate a curator seeking to achieve it. However, the statement is not technological literacy, but instead narratives. We can benefit from revisiting the quote where the curator says it was important for him to have a story as opposed to (simply) have objects lying around. He wishes for the exhibition to tell a story on his behalf. He does not, by contrast, wish for the visitors to engage with the objects without some prefigured context. The narratives are the stories he wants to attach to the objects so they are not, in his words, 'just objects lying around'. Narratives are, as we have defined earlier, the story that is told and the means by which it is told. Further, the

narratives are aligned with the normative organisational mission, stories that relate to the grand tale of technological literacy.

We can, therefore, deduct from this that the statement, borrowed from Latour, is the narratives the curator are creating, and the action of these narratives are to call for technological literacy. In praxis, the curator are constructing an exhibition, which contains narratives. One narrative is for instance a sign consisting of text explaining a period of time, while another is the specific arrangement of objects, creating a specific story with specific means to tell it. A narrative is, hence, also a material matter.

The last questions that can be raised here is naturally: How does the curator perform this statement? We will argue, and in the following analysis attempts to show that the curator mobilises other actors; human as well as non-human. We will show how human actors outside DMST are negotiated with and how materialities (non-human actors) are arranged in order for the curator to achieve his goal. We will, in other words, investigate the translations executed by the curator. By following his construction of the narratives, the stories he tells and the means by which he tells them, we can discuss the concept of technological literacy as a normative aim in an organisational setting. We will, therefore, follow the curator in his endeavour of translating "Next Level" into an exhibition with the use of three distinctive narratives in the search of technological literacy.

4.1.3 Narrative I: Practices around games

The first narrative revolves around the usage of computer games at various times in history. The "Next Level" exhibition items consist of old arcade and console video games, which together showcase eras of the technology from the early 1960's until today. Where HEART centred the exhibition around the visual and aesthetics of the games, the curator is compelled to tell the story of the practises developed by these inventions. As he explained:

"I had to change it so it fitted with the museum. We are a different museum and the exhibition had to show that. We wanted the guest to feel like they were in a teenager's room or a video game arcade."

The wish of the curator was for the visitors to have a feeling of being present at these points in time regardless whether the visitor had lived through them or not. A teenager today should get the experience of being a teenager playing arcade games in 1980's, Nintendo 68 in the 1990's or Playstation 1 in the 2000's. As the quote indicate there are several installments of "Next Level". If we focus on the three that first meets the eye when entering the exhibition then the first tells the story of video game arcades, the second of teenager's rooms in the 1990's and early 2000's and the third of the introduction of the internet as a gaming platform. These three different point in time disseminate not only the development of computer games, but also the practises around them. Video game arcades where large halls you left home and went to in order to play with your friends and others. The invention of the console and consequently the console games allowed one to sit at home and play with friends instead. The introduction of the internet enabled one to still play at home, but now you could play against strangers from around the world. However, this story focuses less on the development of the technology, and more on the practises that was produced by it. Going to a video game arcade was arguably a different practise than playing at home; or at least the curator wants the visitors to reflects on this by experiencing it. The picture below depicts the arcade games.

We can clearly see the intention of the curator in his arrangement of the the arcade games. Instead of scattering them out across the room they are placed in a huddle to represent how they once stood in the video game arcades. The visitors are forced to play next to each other and to hear the other players either loudly roar when the Space Invaders invade or complains when Pac-Man gets caught.

We can here profitably visit Latour and his interpretation of translation. At HEART the arcades were placed in corners of the exhibition, but at DMST they are clustered together. The curator anticipates that the visitors wish to play the arcade

games and so he counter any anti-program of playing by themselves that they may have by removing that option altogether. The move is subtle, yet the impact is huge. The visitors are now forced to experience how it was to stand in a video game arcade with other people around you. One could argue that if the machines were scattered all over the museum, the same experience would not be achieved. The curator shows us the first step in his construction of the narrative of practises around games. The arcade games are exactly the same as at HEART, but he utilises them to tell a different story. It is the translation phase of mobilisation (Latour, 1990), which guides the arcade games to enter the network of this narrative. The narrative of practises around games (the statement) is, in the vocabulary of Latour, loaded when the arcade games are slotted next to each other. The narrative of practises around games is a step closer to becoming more true and predictable.

Image 4.0 The arcade games

A natural question one could raise, is what can practises around games exactly be defined as? The one, which we have already described, is the experience of playing not only the same games, but also playing in the same manner as people did back in the day. When the visitor do so, the hope, of the curator, is that they learn about and reflect on

how practises are today and ultimately how they change. Another correlating definition can be given by the following quote from the curator:

"In the beginning people were not able to to sit at home and play games; they had to go to video game arcades. It was a social event."

Practises also relates to, what can be described as, a continuum of socialness. In the eyes of the curator, the times of arcade games were a social event where people met physically and played together; implying a change where playing games became more of a single-handed experience. The second installment is, as mentioned, a teenager's room in the 1980's. The picture below depicts this. The curator has arranged couches and televisions accompanied by a console and a console game to show how a teenager back then played computer games. The visitor can move straight from standing at the arcade games to sitting in a couch playing Mario Kart. As the picture depicts, the curator has allied himself with iconic posters and something as old school as lava lamps in order for the visitor to feel like they are in a 1990's teenage room. Where the curator before rearranged the arcade games in a huddle to reflect the practise from that time, here he mobilises other actors as well to achieve his goal. With using the vocabulary of Latour, these additional items are, by the curator, the exploration of substitutions in order to make experiencing the practise more predictable. If the guests could not sit in an old couch or not see relatable things from this point in time, the practise would arguably become less apparent. However, if we return to continuum of socialness, we also see something else interesting in the picture: The dividers. They stand in stark contrast to the lack of dividers between the arcade games. Here the curator clearly wants to emphasise a change in practise in regard to the social and has mobilised dividers in order to do so. The dividers create the sensation that one is secluded and alone or simply with a friend or family member, depending on if you visit the museum alone or with others. The curator loads the social aspect in the narrative by mobilising dividers to create a physical separation between people. This newly introduced materiality attempts to extend association by substitution, because the same result would arguably not be

achieved with a sign explaining it. A translation has been made - one that gets the curator one step closer to his wished for narrative.

Image 4.1 The teenage room

The picture below depicts cube shaped boxes stacked upon one another. They are created by the curator and placed all over the exhibition. Where HEART had signs placed next to the items, the curator has chosen to gather the text and centralise it near the items.

Furthermore, he explains how he chose to reduce the total amount of text. He argued that the former exhibition was too text-heavy and he wished to diminish it in the hope for the visitor to be more inclined to read it. In the scope of Latour, this is a clear example of programs of actions. By predicting that the guests want to read as little as possible (anti-programs), he reduces text and invents a cube with all of it on it (program). The cubes also has pictures on it showing people back in the day using the machines such as the infamous "Kim 'Cannon' Arm". If we imagined a scenario where a guests could not read - a realistic scenario being a child without adults nearby - the pictures would be able to tell a story without the text. Not being able to read would still be an anti-program, but here the pictures would become the anti-anti-program. The

cubes, thereby, seemingly solve a lot of the anti-programs guests could have when visiting the exhibition. Yet the biggest contribution the cubes offer is the increased focus on the games. By not assigning every game with a sign, more focus is assigned to the play itself. Visitors are, by the curator, encouraged to play instead of reading. This suits the narrative and limits the barrier for them to experience the practises around gaming. The hope is that visitors first inform themselves by reading the cubes (the first thing one meets when engaging the exhibition) and secondly delve into playing and interacting with the different games. The curator has, thereby, by inventing and introducing the cubes, loaded the narrative in the hope of it being experienced.

Image 4.2 - Cube shaped box

The third installment, and the last that will be analysed in this narrative, is the technological development of the internet gaming. This is symbolised by an enormous television screen showing clips of the Danish e-sport pro team Astralis competing in some of the biggest counter-strike competitions in the world. The curator has himself contacted Astralis and asked if they would enter into the exhibition. Astralis serves, for the curator, a dual purpose, where the first will be discussed here in reference to the narrative of practises around games, and the second in the next narrative of Danishness. While Astralis, in the video clips, are focussed on prevailing against their opponents, thousands of fans are cheering them on in a massive stadium. This is not only a

completely different practise, where instead of playing oneself one watch pro players perform, but also a return to a social, physical intimacy. The fans standing next to each other hug each other and celebrate with one another when Astralis gains ground on the other team. It is a social event. This is a intentional choice by the curator, since he could also have shown teenager's rooms today, where young people plays hours and hours everyday against other players from around the world. Hence, an arguably lesser physically social experience. Today there is less reason to sit together and play, because you can "meet" online. A discussion about tangible and abstract socialness is not for us to enter into here, but it is interesting that the curator has chosen one instead of the other or not simply both. We can firmly deduct that the narrative of practises around games takes shape in accordance with this choice. It becomes a different story. The television screen with Astralis is mobilised to successfully translate the message the curator wishes for.

The different translations the curator seeks to construct the narrative of practises of games through are thus as follows: 1) The arrangement of the arcade games. 2) The creation of a teenager's room in the 1990's by setting up couches, posters and lamps and importantly, the dividers who separated visitors from one another. 3) The cube shaped boxes that called for more playing and less reading. 4) Lastly the addition of Astralis showing how thousands of fans are watching other play in stadiums. All these materialities are mobilised to construct the narrative of practises around games. Practises around games becomes, as a result, a story about how practises once were, how they changed and how they are today, while also focussing on its embedded socialness and the call for trying the games. A narrative has been translated. We can, therefore, conclude that technological literacy, in the view of the curator and DMST, is about practises around and usage of technology as well as the social context it has both created and figured in.

4.1.4 Narrative II: Danishness

We begin where we left of, namely with Astralis, yet we now move onto a new narrative that the curator attempts to constructs, which, as the title indicates, concerns Denmark. The curator explained that he wish to reduce the "highbrowed" dissemination inherited from HEART and focus more on a national, relatable perspective. National as something identifiable is, thereby, wished for by the curator. As the curator frankly states:

> *"If we had build this exhibition from the scratch, then we would probably have been more focussed on the Danish perspective."*

It is therefore, clearly, imperative for the curator that he finds a national association between computer games and Denmark, and as a result, we can now follow him in his endeavour of translating "Next Level" into an exhibition about Danishness. Astralis figure as the epitome of this. The big television screen is the first part of this narrative. Actually, as can be seen on the picture below, a whole wall is dedicated to the Danish E-sport pro team Astralis.

Image 4.3 The Astralis wall

The wall is filled with medals from tournaments, used sponsored computer gear such as a worn-out keyboard missing keys from the virtual battle and pictures of the team celebrating achievements. Astralis is by far the most successful and well-known Danish E-sports team on the counter-strike scene and the game of counter-strike attracts some of the biggest crowds as well as prizes for the winners. The curator explains that the yield of adding Astralis to the exhibition was twofold: First to show how games has moved from the video game arcades to the teenager's room to livestages in stadiums filled with thousands of spectators cheering in the background; second to couple the exhibition with a Danish perspective. The first, as mentioned before, supports the narrative of practises around games, where the latter relates to the construction of this new narrative. Just how highly he valued the inclusion of Astralis in the exhibition is shown by his summary of the negotiations with the team's management. The curator tells us the story of how he made contact with the team and asked if they would be interested in being present in the exhibition. What followed was a lengthy process of negotiation, where actors from Astralis was adamant about certain achievements and sponsors being referenced, while the curator was determined on not having too much text while also preserving space for other aspects. Furthermore, the curator found it imperative that the prizes and computer gear were unique and original. Ultimately, the curator stated he was satisfied with the resulting balance. We can here see, in the scope of Latour, mobilisation of actors by the curator. Astralis has some anti-programs, which the curator counter with anti-anti-programs in the negotiation phase in order to achieve his goal: inclusion of Astralis in the exhibition according with his terms.

The question then becomes, why was the exact inclusion vital for the curator? There are to be dozens of different, possible national inclusions available for his choosing. He explained what Astralis are capable of:

> *"They are the number one for young people and it deeply appeals to them. They are very important within their short, living memory."*

The significance of Astralis is, therefore, not only that they are Danish, but also that they are well-known and looked up to by younger people. We can here benefit from

revisiting the interview we conducted with the innovation manager and the main curator. The two of them stated that DMST needed to be "a museum for the entire population of Denmark". Firstly, the importance of a Danish perspective is from an organisational viewpoint further emphasised as an important aspect. Secondly, the entire population indicates a desire to relate to both young and elder visitors. According to the curator, 96% of teenage boys regularly plays computer games and 49% does so daily. Where the elder population of Denmark perhaps can relate to the arcade and video console games, the younger population can relate to Astralis. The curator anticipates that younger visitors, as a result of their age, will not be able to relate to arcade games and video console games, and he counter this anti-program by, in the vocabulary of Latour, mobilising Astralis. As a result, the curator seemingly constructs a narrative for, in relation to age, the whole of Denmark and succeeds in fulfilling both a self-proclaimed as well as organisational criteria. Furthermore, this is also possibly why the curator was so adamant that the computer gear and prizes were unique and originals. He predicts that the younger visitors are fans of Astralis, and that the computer gear and prizes will carry more weight if coming from real situations with the team instead of being promotional items perhaps already at the disposal of the younger people at home. By utilising Astralis in the ways just analysed, the curator has taken the first, seemingly big, step towards translation of the narrative of Danishness.

There is an additional benefit from bringing Astralis into the exhibition. If we revisit the narrative investigated before, practises around games, we analysed how Astralis became the symbol for age of internet in gaming. The enormous screen hanging at the top of the wall is so loud, both in the extent of the visual it displays and in the intensity of the sound it exhaust, making it difficult to miss wherever you find yourself gaming and as a result, the visitors will definitely see it. Therefore, Astralis also serves the purpose of luring the visitors away from playing the arcade and console games and baits them to transition into the new narrative. If we revisit Latour and his notion of programs of action, we can elaborate on the translation that occurs. The curator predicts that it will be difficult to detach the visitors from playing the games and while he

seemingly is happy that they are playing, he utilises Astralis in an attempt to lure them over to the new narrative and learn something new. Something he, and the organisation of DMST, clearly values highly and wishes to be engaged by the visitors. The curator, thereby, predicts that the visitors will have an anti-program of wanting to keep playing, but by choosing a famous and well-known Danish example of gaming, he hopes to counter this. He loads the narrative of Danishness in such a manner that he hopes visitors will engage it. Two significant translations of the narrative of Danishness have, therefore, been made: Firstly, the first building block in the narrative in the form of Astralis; And secondly, one that attempts to get visitors to engage with it.

The curator has, sneakingly, added a picture with Helsingør E-sport Association to the wall with Astralis. The curator explains that he, additionally to the national, found a local perspective important as well. This dichotomy of national versus local is interesting, since one could argue that a local perspective would be detrimental to the national, as less people would be able to relate to it. However, the addition also becomes the link between Astralis and next part of the narrative of Danishness, leading one to think that the curator probably has done a cost-benefit analysis in this regard. The wall with Astralis is part of the h-shaped construction that, when walked around it, grants the curator the ability to split the exhibition into four smaller parts. The first small part that meets the visitor is about the second Danish computer and the first Danish computer game. Where Astralis maybe inspires awe-inspiring and instantly fascination due to its reputation and stature, the exhibition items here perhaps less so. The curator possibly anticipated this, and attempted to link the two parts in the best manner he could. Helsingør E-sport Association, thereby, becomes a program of action, which ultimately, in the eyes of the curator, attempts to counter any anti-programs visitors might have against walking past the wall with Astralis after experiencing it. The picture respectively depicts the computer on the left and the game on the right. The curator tells how DMST already had the computer in its preservation, which led him to include it. In the preservation was also the game, yet not the original one. The curator reached out to the museum “Bornholms Technical Collection” to ask if he could acquire the game. A deal

was stroke and as a result, he could now present both the original game (in the middle of the picture) and the newer one (on the right in the picture). The original game was invented by the Danish poet, mathematician and inventor Piet Hein in 1945. The game can be characterised as being in similar vein to the well-known game of tic tac toe. Visitors can then play to test themselves against the computer or simply observe and read about a 1960's Danish computer game. These two materialities differ from the one of Astralis, where the latter relates to Danish people using the technology, and the former to Danish inventions of the technology. The narrative of Danishness, therefore, takes an additional shape and the curator has attempted to seamlessly link the two into the same narrative. A translation has been made.

Image 4.4 The second Danish computer and the first Danish computer game

The last part we will touch upon in the construction of Danishness is the curator's use of text. The curator is meticulous in his selection of text to include in the exhibition. Examples could be the cube shaped boxes that had less text than the text at HEART and the lengthy negotiation process with Astralis on what text to include on the wall. Therefore, it becomes apparent that when the curator has allied himself with Jakob Stegelmann and the latter has designed and written some of the text for the exhibition, it is not a decision that has been taken lightly. Stegelmann is a famous critic of games and

has since 1989 hosted the iconic DR television program "Troldspejlet". It still runs in television to this day. As a result, both the young and elder visitors of the exhibition possibly have a relationship to Stegelmann and associate him with knowledge and, in the eyes of the curator, hopefully also joy. On the webpage of the exhibition, Stegelmann is mentioned as the curator, who has picked out the games the visitors can play. He is, therefore, by the curator regarded as someone of significant weight when it comes to getting people to visit the exhibition. Stegelmann is, in the vocabulary of Latour, a program of action by the curator to counter the anti-programs of the visitors of maybe not being interested in engaging with the narrative. The hope is that when a visitor sees his name the person will take one's time to visit the museum and exhibition or read the the text and as a result, learn something.

Once again, we will briefly outline what we have analysed in this part and what it means. Astralis was introduced into the exhibition by the curator to serve multiple purposes: First to create a Danish perspective; Second to especially relate to the younger people; And third to link up with the rest of the narrative. Already existing inventory and newly gathered items, in the form of the second Danish computer and both the original and new first Danish computer game, was added by the curator to expand his tale of Danishness in relation to computer games. Lastly, Jakob Stegelmann was utilised by the curator to load this narrative in the hope of it being experienced. These, human as well as non-human, actors were mobilised by the curator to construct the narrative of Danishness. For the curator and DMST technological literacy can thus be said to hold a necessity of a Danish affiliation, which relates to first: Age - in that both the young and elder part of the visitors are to achieve a sense of acquaintance with the items; and second: Innovations - in that the need for presentation of Danish inventors who contributed with technological developments.

4.1.5 Narrative III: Evolution of Technology

The third and last narrative constructed by the curator concerns the development of technology through the times. It consist of two display cases: One of old arcade games

and one of video game consoles. If we begin with the old games as they can be seen on the picture below. The games were a part of the original exhibition from HEART. However, the curator wished to present the games differently than at HEART. As he explained:

"I was vexed that the games were reduced to being simply visual objects"

The curator elaborates that the games were displayed in a line 'only' to show the design and aesthetics in the packaging of the games and thus presented without text. As can be seen in the picture, the curator has rearranged them and added text. The text is formulated by the curator and tells the story of how a plethora of games were released in what he describes as the "the golden age of arcade games", where games such as Pac-Man and Space Invaders first saw the day of light. However, technology developed and the invention of the video game console made people play at home and the arcade game became obsolete, resulting in the market crashing. The game E.T. at the top in the picture, is especially interesting in this regard, as it became the symbol of the collapse in 1983. Both critically and commercially it was one of the worst games in history, and it was one of the last arcade games released. The story of technological development is constructed by the curator. The arcade games are exactly the same as at HEART, yet he utilises them in a different manner: They are translated. By adding text and rearranging them, the curator hopes that more visitors will engage with them. With this, the curator constructs a new narrative about the evolution of technology.

Image 4.5 Display of arcade games

The narrative is strengthened by the display of video game consoles, which is located a few feet from the game display case. This is seen on the picture below. This section exemplifies the evolution that the video game technology has gone through over time, both in regard to becoming faster, smaller and more visually impressive. The curator explains how there was an extensive console war between Nintendo and Sega, where both competed for dominance of the market. With the introduction of the PlayStation, the two former combatants lost ground and the new kid on the block became the dominator. This was partly true due to it being the only one containing a DVD-player, and into the bargain it was cheaper than regular DVD-players. The display, thereby, lauds the winners of this gaming race while also showing the losers. It also tell the story of why some video game technology became widely used and others obsolete, or at least less used. The video game consoles were not at HEART, but added by the curator since they already were at the curator's disposal in the storage facility of the museum. By arranging them, adding a story and placing them close by the arcade games, they, thereby, gets entangled in the evolution of technology. The two display cases constitutes the same narrative only after the actions of the curator.

Image 4.6 Display of video game consoles

Jakob Stegelmann is once again featured in this part of the exhibition. He has formulated some of the text to both the arcade games and the video game consoles. Where the text, formulated by the curator, next to the exhibition items are shorter and more to the point, Stegelmann is allowed more space to dive into the matter, where he for example talks about what people loved about the technology and how that could be. The curator, in this case, clearly attempts to get the visitors to engage with the narrative by using a Danish beloved figure. Furthermore, as the picture below depicts, the curator has strengthen the chance of this by allowing the text to be mobile. The visitor can, as a result, pick up the text, which is printed out on thick cardboard, and walk around with it simultaneously discovering the items and reading as needed. This, however, also adds the downside of the text missing, when a new visitor is in need of information about the items. This is a calculated risk the curator has seemingly taken. This is interestingly different from the use of Stegelmann to tell the story of a narrative of Danishness, and instead utilising a Danish, famous person as a mean to tell the story of the evolution of technology. He, furthermore, also becomes the link, as we have seen deployed by the curator before, between the narrative of Danishness and the evolution of technology, by allowing Stegelmann to figure in both and due to his text being transportable.

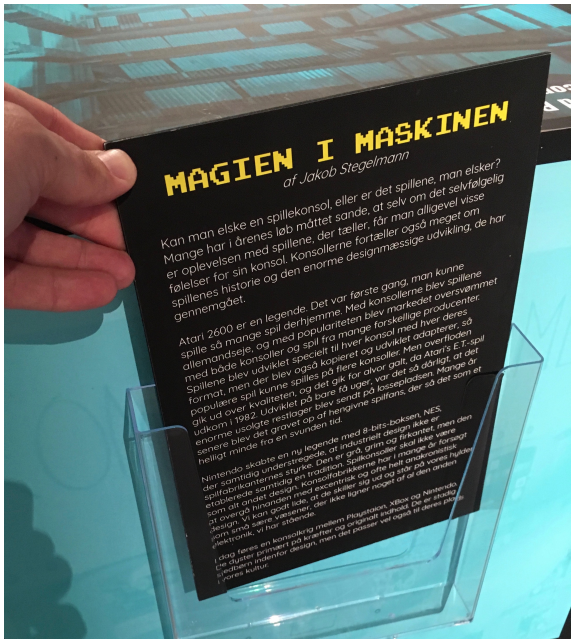


Image 4.7 The mobile text by Jacob Stegelmann

The narrative on the evolution of technology can thus be summarized in three points: Firstly, the curator deployed arcade games attained from HEART and translated them into a story of development of technology. Secondly, he builded upon this story by adding video game consoles already at his disposal. Third and lastly, the curator utilised Stegelmann once again, but now in a manner to, in the hope of the curator, predict more engagement by the visitors, while also making the text written transportable. We can thus conclude that technological literacy, by addition of this narrative of the evolution of technology, also concerns the historical development that technology has gone through over the years.

4.2 Phase II - The Visitor Perspective

In the following analytical chapter we will dive into the aftermath of the organisational construction of narratives uncovered in the previous pages. The analysis is thus seeking to follow a chronological order to discuss first; the construction of exhibitions and narratives and now; their relation to visitors. The argument is that technological literacy amongst the visitors is a normative aim for the museum organization and, it is constituted in the interplay between visitor and exhibitions. The concept of technology literacy is thus constituted through the visitors interpretations and usage of the exhibitions, which besides being different from the curators intentions also is heavily differentiated between the visitors. In order to investigate this interpretive flexibility, we wish to draw upon the notions of Peter-Poul Verbeek (Verbeek, 2005; Verbeek, 2011) and his work on human-technology relation in a post-phenomenological sphere.

4.2.1 Post-Phenomenology

The point of departure of the post-phenomenological tradition is the understanding that technologies play an important role in our, human's, lifeworlds (Verbeek, 2005: 123). This 'role' is by Verbeek conceptualized as mediation, by which he argues that technologies mediate in the constitution of reality between humans and the world. An infamous example, which Verbeek draws upon, is how glasses are mediating the lifeworld of the person, who is wearing them by constituting a clearer vision of the world. The question is, therefore, what mediations occur in the museum halls, when visitor meets exhibition?

In our case we are focusing on the role of the exhibition, the, in the eyes of the organisation, material carrier of technology literacy, in the constitution of an experience of the visitor at the Danish Museum of Science and Technology. Zooming in on this specific part of the process is as illustrated below.

Model 4.0 Relational interplay of visitor and exhibition

This is a, somewhat, ordinary discovery of user experience at a museum. As discussed by many beforehand (Falk and Dierking, 2011) the visitors of museums have differentiated experience based upon their social background, motivation etc. However, what these ethnographers of technology wish to draw into attention is the agency of the material non-human actors, which are present in the field of DMST. These actors take many forms, however, we will term them as exhibitions as an umbrella term for the museum objects or installations, which visitors engage with throughout their visit.

The analytical approach is centered around the notion that the mediation is constituted mutually between the object and the subject through relations (Verbeek, 2005). Verbeek is building these concepts on the basis on the work of the American philosopher and post-phenomenologist Don Ihde (2011). It is argued that experience of the world is transformed via artifacts. Objects, in other words, take part in the constitution of reality. The wheelchair user is necessarily greeting people differently, because of the height difference and likewise is the cell phone user communicating differently with its peers, because the cell phone enables it. The technologies, which are surrounding us, are actively shaping our experience. At the Danish Museum of Science and Technology we see this too. The exhibitions are shaping the ways in which the visitors are experiencing the museum objects and thus the constructed narratives.

Verbeek elaborates the argument on mediation by specifying four different relations of mediations (Verbeek, 2005. p. 123-128)., which lead to different consequences for the ways in which human actors experience the world. Artefacts

transform experience, as Verbeek puts it. It is thus a question of how they do so. The four relations of mediations offer an answer to this.

First, the embodiment relation, which is the mediation, where artefacts transform the sensitivity of the human body to the world. A pair of glasses, as mentioned above, transform the human body to see a clearer world.

Second, the hermeneutic relation, which transform experience through a required interpretation. An example is here is an thermometer, which represent the temperature through numbers.

Third, the alterity relation, which is technologies that posses a kind of independence that allows for them to interact with humans. An automatic train ticket machine is used by Verbeek to exemplify. It can dispense tickets, but also answer questions on route information. The technology of an alterity relation has a background network, which is irrelevant to the constitution of an experience of the subject. The subject do not need to now how a ticket machine is coded to buy tickets, for instance. In such, these technologies are referred to as a quasi-other, because they (can) act independently.

Fourth, the background relation, which is the technologies that are present, but hidden to the user. A central heating system, for instance, is heating rooms without the user needs to interact or be aware of it.

The three first relations is to be read as positioned in a continuum. In the one extreme is the embodiment relation, where the artefact becomes an bodily, close to invisible, experience, which is in contrast to the alterity relation, where the transformation of experience is due to an active interaction between subject and object. The artefact of an embodiment relation is, therefore, referred to as a quasi-I, as they becomes part of the human. Between these two extremes we find the hermeneutic relations, in which the artefact is required to be read, but do not possess an autonomy. The background relation will not be utilized throughout the following analysis. This is due to a focus on the ways visitors interact with the exhibitions that are visible and physical to them. There are background relation present in the museum. Take for

instance the cold temperature caused by the architecture, this affects the visitor experience, but will not be analysed.

The theory on mediation of relations is thus a useful tool for us to investigate the differentiated experiences, which is constituted in the museum halls when visitors, the subjects, are in relation with the exhibition, the objects.

4.2.2 Analytical accounts of visitors and exhibitions

To investigate the differentiated experiences, which visitors are having in the museum halls, we are ethnographically focusing on four groups of visitors and their interplay with exhibitions. The four visitor groups are cases of equally constitutions of experience between exhibition and visitor. The social bias suggested in the headlines are therefore, simply, a token of methodology, since we have followed, observed and interviewed visitor groups in the museum rather than the stagnant and silent exhibition.

Visitor #1: Families with children

First example of visitors is the family centered group with children. A visitor, which holds many types of constellations. Grandparents, parents, children, grandchildren, aunts, uncles, friends and many more. Common is a non-institutionalised relation between adults and children, by which the museum visit is to be considered an event of leisure.

We found that the order, which the museum was experienced in this group, tended to be determined by the children's engagement towards the exhibitions. As the children ran around the museum their attention was caught by different parts of the museum. For instance, the large passenger plane, which stands as the centerpiece in hall E, has inviting stairways in the bow and the stern for visitors to access the plane freely. Throughout the many days of observation in and around the plane it was clear to see that this accessibility to a, traditionally, not very accessible means of transport offered a playground for, especially children. The experience of walking around the museum is

thus, in this visitor group, mediated by the ever changing relations of attention, which the children constitute with objects as for instance the stairway into a plane. Soon after engaging in one exhibition it is on to the next one. Often pointing, asking or commenting on what it was, and in such creating a point of reference to the object.

It was found that a member of the visitor group, either child or adult, could present their knowledge about the object, which led the initial relation to the exhibition. In a interview with a family group with children of grandparents and grandchildren it was clear that the group was establishing a relation to the exhibition. One grandfather visiting the museum with grandchildren and his wife expressed the following:

"It is interesting to see the things we (himself and his wife red.) have lived with and have had in our lives and tell our grandchildren about them"

Image 4.8 Veteran Cars

He was experiencing the exhibition about old cars he had had by reminiscing and explaining, meanwhile his grandchildren and wife were also engaging in the museum by hide-and-seek amongst the gigantic planes and the very-same automobiles, hence having a completely different bodily experience of the exhibitions. The situation is thus illuminating two types of relation, which one group can experience simultaneously in the same exhibitional setting. The grandfather is engaging with the exhibition in a hermeneutic relation. The exhibition is being read as he observes an object reminding

him of past times. He reads the objects visually as reads the appurtenant sign. Both of which call for an interpretation to shape the grandfather's experience. The children and grandmother, on the other hand, are having an experience in which the exhibition play a different role. Here, the children and grandmother are in an embodied relation with the exhibition. The car, which the grandfather is looking at, becomes a hideout for his grandchild thus shaping the experience of being hidden.

A second family with children group had a different, and more immediate, approach in engaging with an exhibition. The family consisting of what presumably was a mother and her two children, was walking through an exhibition displaying the development of the modern home, when they came across a 1960's bathroom and the youngest child happily concluded:

"This place is big enough to play around in… and you can also pee!"

Here, the youngster is engaging with the exhibition in a learning experience. The exhibition and her are joint creating an experience of learning, which we argue is a hermeneutic relation. The child is interpreting the exhibition visually and as follows in a relation with the exhibition in which she learns about toilet facilities. This is showcasing how visual interpretation is present, since the case is about a child, which is definitely too young to engage in a hermeneutic relation of text, however, it is still an interpretation, which is required. The girl is visually interpreting the exhibition to her lifeworld. The objects, or artefacts, of the exhibitions are thus mediating her experience of the museum enabling her to learn.

These examples are showcasing a mutual constitutions of mediation between families with children. The exhibitions calls for an interpretation, visually or through text, of the visitor, which leads to different experiences. One is reminiscing and some are learning about sanitary facilities of the 1960's. Others are in an embodied relation, where the exhibitions of the museum is constituting a playground as they run into a passenger plane to hide in a game of hide and seek. Common for the different relations is the engagement with the exhibition. The visitors are thus "*in"* a relation with rather

than establishing a relation to the exhibition. The exhibition mediates an experience, in which the objectivity and the subjectivity co-constitute the relation.

Turning back the attention towards the narratives, which we analysed the construction of in the previous chapter, we find an interesting relationship between visitor interaction and the narrative goal of the museum. The toilet exhibition, which we drew upon showcasing a hermeneutic relation mediating a girl's experience, we find having a slightly different narrative, when we interview the main curator. He formulated the narrative of the exhibition as follows in the small design game we had designed:

"Technology is a part of our everyday - we use technology everywhere"

Image 4.9 "Do Not Touch" sign

He further added that the exhibition was intended to be learning, entertaining, understandable, call for reflection and have many recognizable things. The girl's play around in the exhibition is, therefore, quite aligned with the overall narrative, which the curator had intended. She learns, is entertained and did recognize the toilet. However, what we wish to draw into the lights is, how the materiality of the exhibition is only contributing to this narrative in relation to the girl's interpretational skills. If we compared the playfulness of the girl to the hide and seek, which the other family with kids were engaging in, we find, one side a girl playing and learning while interpreting

and on the other side an embodied playful experience. Common for both playing experiencing is that they take place in a material exhibition, which are not calling for such behaviour. The museum objects are either behind showcases or attached with "do not touch" stickers. We, therefore, argue that the experiences that the exhibition mediates are limiting by the physical presence, because they are intentionally made for the visitor, which the grandfather represents: A calm, reading and, perhaps, reminiscing observer.

The visitor group of family with children showcases how the museum build and arrange their exhibitions to accommodate the hermeneutic relation, illustrated by the grandparent and his relation to the objects and signs, but that the embodied relation also constitutes nevertheless, when children and playful elder engage with the exhibitional items. One child "simply" plays, while another learn something on the way. Technological literacy is, therefore, in the investigation of the relation between visitors and objects, mediated to also be about learning through playing - even though that was never intended by the museum in the building of the narrative. The toilet, in the mere presence of it as an object, in relation with a child mediates a new narrative, and one that affects other people visiting the museum. In such, a narrative is only stable to the point in time, where an actor is experiencing it - in these cases either through body or interpretation.

Visitor #2: School class

The second visitor, which we investigate through the mediation of relation theory is the school class. The museum is executing a series of lesson plans of every class in the ground school and gymnasiums and many classes are visiting on own hand. The school classes are, therefore, quite present in the grand picture of the visitors.

We dive into a day in which a school class is being lectured in the exhibition about the evolution of the modern industry. The teacher, who is employed by DMST, is teaching the class about development of the assembly line, while referencing the different museum objects, which are surrounding them.

Image 4.10 The assembly line in the industry exhibition

The exhibition is in the far top corner of the museum. It is located in one of two heated rooms in the museum, which is why the entrance is constructed as a massive isolating iron door. This creates a warm, but not very visited room, since it, almost, seems hidden in the museum. Walking through the door takes you to an exhibition centered around an assembly line of vacuum cleaners. The lighting in the room is dimmed and the human-like figures, which can be seen in the picture above, looks more like silhouettes than the realistically looking wax figures in the main halls. This contributes to a relaxing atmosphere, which stands in contrast to playfull visitor-exhibition relation investigated in the previous section. The exhibition is relatively new and is designed by the main curator of the museum. In an interview with him we asked him as part of our design game to fill out a small text box to describe the grand narratives of the exhibition. He described it as follows:

"Technology affects the way we work. Industry has made us richer. Industry disciplines us. What we are to learn from the past."

To summarize, we are in front of a relation of a visitor; a school class and its lecturer and a relaxing exhibition, which narratives are as stated above.

The class is standing around the assembly line as the teacher speaks about the different objects and processes involved in the production of vacuum cleaners in the middle of the 20th century. The narrative, which the teacher is seeking to present for the

students, is focusing on the facts that the industry has made us richer through discipline. In such much aligned with the narrative that the main curator had intended in the construction in the exhibition.

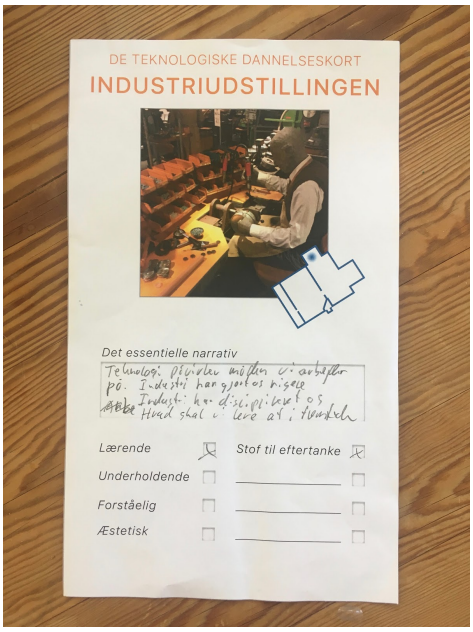


Image 4.11 Filled out design game

Looking at the relation of the visitors and the objects, however, might illuminate another constitution. The students are looking alternating at the objects the teacher is explaining properties and functionalities about. The objects are rather distanced from the students, as they are only pointed towards and the interpretation of the objects is left to the teacher. In such, we argue that the objects becomes quasi-others, which in the relations to the students, stands alone in the dissemination. The relation to the student and that the mediation of experience is thus through the alterity relation.

In this human-technology-world relation we find a (more) align relationship between the intentional constructed narrative from the museum and the narrative, which the visitors (students) are engaged with. Further align, we find, the level of technological literacy. The students are engaging in narratives constituted by the surrounding objects and the educational session, thus establishing experience close to the organisation intentions of technological literacy. Since, of course, points towards a further investigating of whether or not the students actually learned anything, however

we wish to demarcate from such evaluation, and only note the ways in which the passive experiences (seem to) call close to alike perception of technological literacy.

Visitor #3: Expert

Third example is centered around the group of experts. This group of visitors is present in the museum with point of departure in a different pre-understanding of specific knowledge about certain objects in the museum. The experts are thus (necessarily) not experts on the entire museum, but rather on one or a few of the exhibitions or just one single object in one exhibition. The experts engage with the museum from a specialized perspective, compared to the other visitors. The expert is, as the above visitor groupings, relatively fluid in its character. In such, the expert is not locked in its role, but can naturally be a part of a family with kids or the school class.

The expert distinguish itself by interpreting and engaging with the exhibitions in the museum object on a highly intellectual level. Presumably higher than what the general visitor is capable of. One example is a middle aged visitor, who in a family-like constellation pointed towards a specific plane motor engine and said to his group:

"It is quite clever that the pistons are located on the sides!"

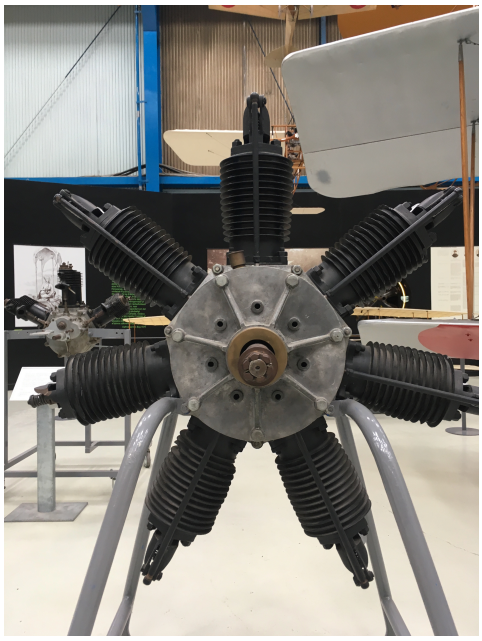


Image 4.12 The "clever" pistons

The group of visitors are standing in the part of the museum dedicating to the invention and evolution of planes over time, while they are listening to the expert. The expert is displaying a specific and in-depth understanding of the museum object in the interpretation of it or, in relation with it. In interviewing various visitors we found that one general, among others, motivation for visiting the museum was to see objects, which the visitor knew something about. Either because they, as in the this above example, knew about an object on a highly technical level, because they had own an object or simple because they had read about an object in the media, which they then wanted to see on the museum. The latter was quite present in the space exhibition featuring the space capsule of the Danish astronaut Andreas Mogensen. In the museum literature (Falk and Dierking, 2011) we see how motivation for the visit to a museum is of great importance for the learning outcome. The expert is thus a highly motivated visitor, who, in theory, is in a good position to learn.

What we see, however, is a slightly different experience. The expert is reading the sign about the plane engine and looking at the plane engine, while he conveys his knowledge about the engine to the other visitors in his group. We are not arguing that the expert is not learning anything, but pointing towards the circumstance of the experience. The objects of the exhibition are to be interpreted and they are so by the expert. He looks at the engine to determine the shape and function of it and then he reads the sign. The sign, which is depicted below, is however not read and engaged by many. Looking through the text of the sign might help to understand this. The sign is written in technical language creating a high level of complexity. It is, therefore, our argument that the relation of the expert and the exhibition is a hermeneutic relation, due to the visual and textual interpretation happening.

The hermeneutic relation, which the exhibition is mediating, is beside taking effect on the experience of the expert also affecting the visitors the expert is visiting the museum with. Again, looking at the materially of the exhibition can help us investigate the narrative, which is being conveyed. The point of departure here is firstly the plane engine and secondly the sign attached to it. This constellation is being interpreted by the

expert, who are then conveying his interpretation to his peers, thus using the narrative of the museum to construct a new. The narrative of the museum is, in this case, a communication tool to the highly knowledgeable visitor. This leads to one of two scenarios, where either the visitor is able to understand the narrative constructed by DMST or, the other way around that the narrative is lost in translation.

A high level of pre-understanding is, naturally, not the only way to engage with an exhibition of such character. One might consider visitors having an experience of for instance the aesthetics of the engine. However, we argue that to fully grasp upon the intended narratives one has to understand relative technical concepts of plane engineering. Further, when the recounted narrative the expert is conveying to its peers is, naturally, shaped by the expert's pre-understanding and interpretation of the text. The outcome of technological literacy is, therefore, likewise altered in regard to such pre-understand and thus different that what the organisational aim of the narrative was intended. On the contrary, if the group was experiencing the exhibition without the expert interpreting the narrative for them, we can imagine a scenario, where the exhibition is experienced as alienating, because it is difficult to understand. This was the cases, when these techno-anthropologist visited the museum the first times, back when we did not know what pistons and especially not why it was clever they were placed on the sides of the engine. Experiencing the plane engine in that scenario called for a different narrative, which left the visitor, us, in confusing, because we could not dissect the meaning of the exhibition.

Visitor #4: Gamer

Our fourth and final visitor, which we wish to investigate in this part of the analysis, is not a visitor defined by its social properties as those are above. This section, instead, focuses on the visitor in the newest exhibition of the museum "Next Level". We wish to draw the relation that happens in this specific exhibition into the analysis, because we find this exhibition the most updated toward the normative aim of technological literacy, since technological literacy as a concept is constantly developing, as we elaborated

upon in the problem field. The newest exhibition must, therefore, materialize the closest to the core of technological literacy. This will, in other words, give us a concept of, what the state of technological literacy is on an exhibitional level now. We have, therefore, also studied the construction of the exhibition in the first part of the analysis, by which we can follow the concept if not from from cradle to grave, then from idea to execution. We, therefore, dive into the relational experience analysis in the very beginning of the exhibition: In front of the video game arcade. Here, as we have presented in the previous chapter, visitors can try legendary arcade games like Pacman and Space Invaders alongside many more. The games' 1980's synth based soundtracks are firing on all cylinders as you walk around the slot machines. The visitors are drawn into this auditory and inviting atmosphere, as the curator intended and if the museum is visited concurrently with a school class this is perfectly evident. The visitors tryout different games, talks about which ones they know, which ones are fun and which ones are not. To say the least, the opening area of the exhibition is spirited as one might think about (or remember) video game arcades 40 years ago. The first narrative, practices around games, is therefore seemingly stabile to its intentions. This can further be examined, when we investigate the relation of the visitor and the exhibition through mediation theory. In such epistemological framework the slot machine are mediating the experience of the visitor through an alterity relation. The technology is a quasi-other (Verbeek, 2005), in which the technological is seemingly working autonomously in the the interplay with the visitor. The ghosts in Pacman are chasing you and the enemy ships in Space Invaders are similarly programmed to fire at you. Walking further down the exhibition we come by the teenage rooms with sofas and different console games, which alike the arcade call for visitors to play and too draw people in to be engulf in the virtual world for as long as it take to drive three rounds in Mario Kart or fight in Mortal Kombat.

After the playful area the exhibition begins conveying the two last narratives: Danishness and evolution of technology. These are more classical in their dissemination. The objects are, as we have seen in other exhibitions, either in showcases

so they can not be touch or attach with do not touch stickers. Next to the objects we find text, which in this exhibition is not solely constructed as signs, but also as posters in background of showcases, cardboard flyers the visitor can take with them and as tetris figures, which can be used to both display text and be used as a place to sit. At least, this is what was intended by the curator. However, the textual dissemination, which we argue is a technology calling for a hermeneutic relation to mediate the experience of the visitors, is deeply neglected by the visitors. In our observation study we found an overwhelming attention towards the first part of the exhibition, but second to none toward the latter part. The Tetris inspired signs illuminates this interestingly. The curator had intended these as both signs to be read and as stools, which the visitor could sit on and study one of the cardboard flyers, they are, however, crawled upon by many visitors and in such become a climbing wall, rather than what was initial intended by the curator.

The narratives are, therefore, playing out differently in the reception of the visitors. The practices around games are met, as the visitors are in the atmosphere of an arcade, however the two last narratives, which are calling for heavier interpretational work of the visitor are pushed in the background. Both figuratively and in practice, as these materialize themselves in behind the video game arcade and consoles.

Next Level is thus succeeding in its endeavour for the most part. The narrative of creating a practice around games is quite present. Visitor are playing around with and discussing the arcade and console games in the opening of the exhibition. The part of technological literacy, which focuses on giving the visitor a physical feeling of objects from the history of science and technology is thus proved successful. However, the parts of technological literacy, which concerns the historical background for technological and scientific breakthrough seems unresolved, since the visitors almost never come out of the opening playful zone.

5.0 Contribution

The closing part of this thesis' analytical part will, as we have mentioned in the introduction, take form as a contribution to the innovation processes of technological literacy at The Danish Museum of Science and Technology (DMST). The contribution is a design tool, which can be implemented to discuss and evaluate certain areas of existing and future parts of an exhibition. Before we dive into the actual design we will account for the design theoretical tradition we seek to position the project within.

5.1 Design Things And Infrastructure

We draw the following design on the article *Design Things and Design Thinking: Contemporary Participatory Design Challenges* by Erling Björgvinsson, Pelle Ehn and Per-Anders Hillgren (2012), who investigate and argue for a design process towards Things rather than things. Björgvinsson et. al. combine Bruno Latour's understanding of objects as heterogeneous networks of human and non-human actors, which are in relation with each other through translations with a design oriented focus. The quest is to design objects, which are not things, but rather Things referring to matters of which various actors are constituting. Matters, which Latour would specify as matters-of-concern (Latour, 2005).

The method to achieve Things rather than things is to design towards an infrastructure. Objects are thus to be designed continuously over time meaning that as the needs of the actors and the actors change so shall the objects. Björgvinsson et. al. define this as a process of "design-after-design" (2012. p. 104). We should, therefore, as designers incorporate a way for the product to develop over time so it can also meet the needs of the users in the future. Our product is a guide to evaluate and discuss specific aspects of the exhibition at the DMST in the light of viewing the exhibitions as a laboratory. In such laboratory the organisation wishes to aim for technological literacy

amongst the visitors, we suggest a way to evaluate and discuss to what extent this can be reached.

To achieve a product, which can be designed after it has been designed, we have created a design tool, which overtime can evolve and take new form. The guide is as per default set to evaluate parts of exhibitions on five parameters, but we predict as the guide is used by the organisation that some (if not all) of the parameters will change over time. The guide is, in other words, made up by parametres, which because of a design infrastructure can be changed over time. However, for now, the parameters are based on our analysis.

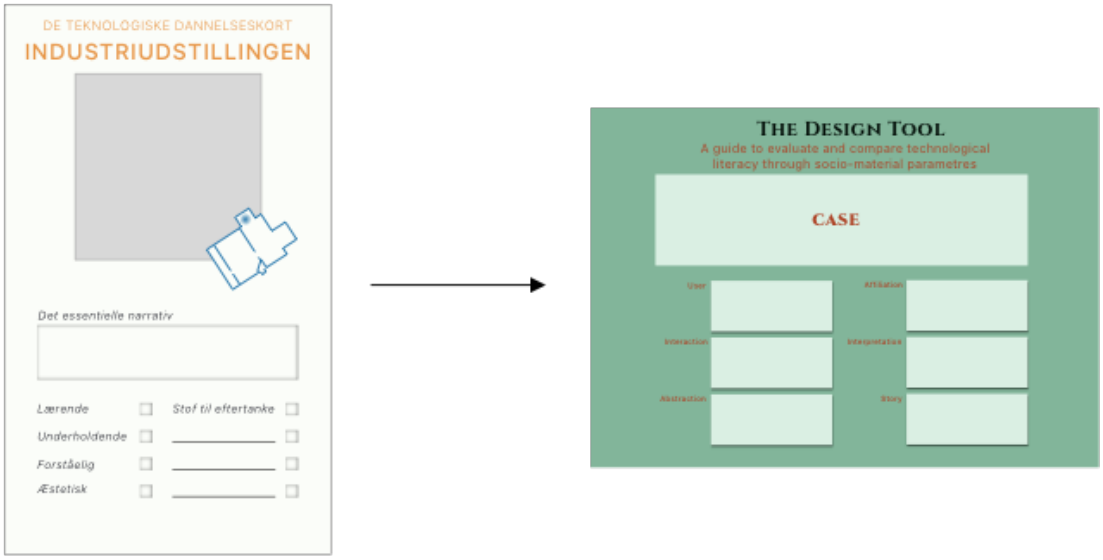
5.2 The Design Tool: A Guide To Evaluate And Compare Technological Literacy

We have in the previous analysis shown the translations occurring in the construction of three narratives and further, mediating relations in the interplay of visitor and exhibition. This has provided us with giving us insights on the process of innovating an exhibition and the later perception of the visitor. We have found a series of parametres, which shape the ways the museum and thus technological literacy is experienced by the visitors. Of these we have delimiting ourselves to five:

- Interaction
- Abstraction
- Affiliation
- Interpretation
- Story

In the first workshop with the museum organisation we presented a design game that sought to discuss what the narratives in the different exhibitions were about. Our design tool now is an iteration on this game. It is a guide for evaluating ways the museum

exhibitions or parts of exhibitions can be understood, however, it is not limited to understanding the exhibitions based on discursive narratives, which the first iteration was focusing on. The tool, therefore, has a photo of the given exhibition or part of an exhibition in the top and a user type on top of the five parameters to be filled out below. We will in the following refer to photo and the user type as the case. This guide thus focuses on how technological literacy can be evaluated through socio-material constituted cases. Further the design has an inherent structure, which allows it to compare two or more cases, since it can showcase differences and similarities.



Model 5.0 The iteration from design game to design tool

We have found that to understand the experience, and thus the perception of technological literacy, of the visitor, one have to take the materiality into account due to mediation (Verbeek, 2005). The parameters are, therefore, seeking to discuss both the social and the technological causes for a visitor experience. In the following we will account for the five parameters and their analytical point of departure.

Interaction refers to physical engagement the visitor (can) have with the cases. For instance, the planes, which we have discussed earlier, are accessible and call for visitors to play around in them. Hence, they call for a high level of interaction. The contrary is for instance a sign, which call for the visitor to stand still and read. We see this clearly around the narrative of "practices around games", where the curator seeks for the exhibition to call for the visitors to play with the games. Another example of a

high level of interaction is in the visitor experiences through embodied relations to the exhibition. The family, for instance, playing hide and seek are interacting with the exhibition to a high extent.

Abstraction is the intellectual level the case requiere of the visitor to understand it. This is evidently thought of and incorporated into various signs throughout the museum. The cubes in Next Level, for instance, is purposely seeking a lower level of abstraction through pictures, whereas the abstraction of the sign about plane engine is high.

Affiliation is to describe how closely related the visitor is to the case in its everyday life. For instance, a visitor is closely related to a smartphone, but (presumably) not to the 100 years old beer vending machine. The narrative Danishness is an example of this, where the curator seeks for a recognisability in the exhibition through Danish trademarks as the E-sports team Astralis for the, mainly, younger audience and Jakob Stegelmann and Piet Hein to the older.

Interpretation refers to the interpretive flexibility, which is very present in the visitor-exhibition relation. Case's dissemination can be interpreted in many ways. For instance the passenger plane call for many different interpretations of the visitor. Some interpret the exhibition to be about how planes are a big influence on the global warming, while others interpret it to be a playground. On the other hand, we find signs to have less interpretive flexibility: There are only, we wish to argue, a few ways to interpret the maximum speed of a veteran car. The level of interpretation is clear, when we investigate the hermetic relation. Here we find both visual and textual interpretation, which makes the visitor have differentiated experiences with the very same exhibition, thus constituting different narratives. Interpretation is closely related to both abstraction and affiliation, since both can be a blockade for interpretation. If the sign, for instance, is too abstract or the object is too alient the visitor might lose interest and thus not interpret. On the other hand if an exhibition is either/or not too abstract or the visitor can affiliate with it, we can see a relative higher level of interpretation. This was, for

instance, present when the girl were interpreting the WC-exhibition, because she knew what a toilet was.

Story is referring to the discursive part of the narrative the organisation has constructed about the case. This aspect was the key element in the first iteration, but is now one of five, whereas the first four have a stronger material tie. It is, however still as important for the constitution of technology literacy. The story is clearly present in the narrative evolution of technology, where the visitors follow the development of the gaming technology over time. This is a focused discursive communication, which is done through text by Jakob Stegelmann.

5.3 Manual To The Design Tool

We will now present four examples of the design tool, which take point of departure in four cases from the thesis analysis. It is though important to underpin that these are only examples and should be challenged by the organisation in a forthcoming workshop. The design tool is created to be used at a workshop with with representatives from the museum's organisation as well as with visitors of the museum, to make sure as many actors are with in the design process. In such the tool is a medium for the actors to express their different needs and ideas about technological literacy around. In the following there will present a template, then our four examples with point of departure in the analysis and finally empty templates for future iteration.

The Design Tool

A guide to evaluate and compare technological literacy through socio-material parametres

The WC area in the home exhibition

User

Young child, 5-6 years old, with her mother and older brother

Interaction

A lot of interaction with the room, as she runs around. However, little interaction with WC, as she is not allowed to touch it

Abstraction

She understands that it is a toilet like today

Affiliation

She links the space to her own experience with a WC and her playfullness

Interpretation

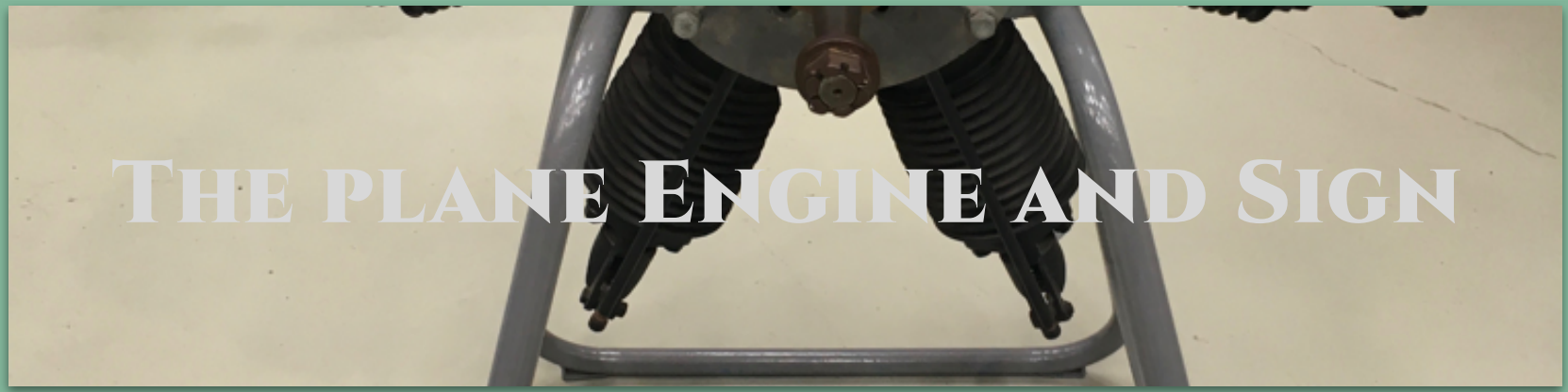
How toilets used to look and the fact that the space is big enough to play in

Story

How technology is part of our everyday life

The Design Tool

A guide to evaluate and compare technological literacy through socio-material parametres



User

Middle aged man, who knows alot about plane engines (expert)

Affiliation

He knows the specific engine

Interaction

Very little interaction

Interpretation

The specific engeneering of the specific plane engine

Abstraction

He understands the complexicity of the engine and the sign

Story

What makes a plane fly

The Design Tool

A guide to evaluate and compare technological literacy through socio-material parametres

User

Grandfather visiting with his partner and grandkids

Affiliation

Very high, since he had this exact model of a car

Interaction

Little interaction: He stands and reads a sign

Interpretation

He use to own this car, so i interpret the car as part of his life

Abstraction

He understands the communication of the sign

Story

The technical specification of the car

The Design Tool

A guide to evaluate and compare technological literacy through socio-material parametres

User

12-13 years old girl visiting the museum with her school class

Affiliation

She did not know any of the arcade games beforehand, but her knowledge of modern computer games makes her see links

Interaction

High level of interaction with multiple machines

Interpretation

The intepretation of the arcade is to play and have fun with her class mates

Abstraction

She quickly learns how to play the games

Story

The story is to show how people have played with arcade games

The Design Tool

A guide to evaluate and compare technological literacy through socio-material parametres

CASE

User

Affiliation

Interaction

Interpretation

Abstraction

Story

The Design Tool

A guide to evaluate and compare technological literacy through socio-material parametres

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6.0 Conclusion

We have throughout the thesis presented our contribution to the innovation processes of technological literacy at the Danish Museum of Science and Technology. Through the use of various qualitative methodological tools such as interviews, observations and workshops for gathering empirical data, and by applying two theoretical instruments in the form of Actor-Network Theory and Post-Phenomenology to analyse that knowledge, we arrived at a design tool that seeks to feed into the further processes at the museum. The design tool is not to be seen as a final product, but instead as a designed infrastructure for engagement in future innovation processes regarding technological literacy.

The analysis is divided into two sections. First, we followed a curator's translation of three narratives in the exhibition Next Level to derive at the newest case of technological literacy by the museum. Overall we found three narratives: Practises around games, Danishness and Evolution of technology. Practices around games were about the changing character of practises through the ages and a focus on an embedded socialness and on trying the games available. Danishness were found to be the necessity of a Danish affiliation specifically related to age and innovations. Evolution of technology concerned the historical development that games has gone through over the years. In the second part we analysed the constitutions of experience between visitors and exhibitions that pointed towards the mediation of new narratives, hence towards new aspects of technological literacy. We found four visitor groups each showcasing differentiated experiences: Families with children, School class, Expert and Gamer. Families with children showed the mediation of learning through playing in the relation between child and exhibition, which simultaneously affected the other relatives visiting with the child. School class found an aligned relationship between the educational session and surrounding objects mediating an experience similar to the intentions of the museum. Expert illustrated the relation between a knowledgeable person and abstract dissemination mediating an interpretation differently from the museum's intentions, also

affecting the experiences of the visitors with the expert at the museum. Gamer found a successful mediation of visitors experiencing the playful zone, yet not historical background for technological and scientific breakthroughs.

The design tool is a way of evaluating cases of technological literacy through five parameters that we have encountered in the bipartite analysis. The five parameters are: *Interaction*, *Abstraction*, *Affiliation*, *Interpretation* and *Story*. The design tool is designed to act as a point of departure for the museum to put greater emphasis on users and materiality in their future innovation processes of technological literacy. Furthermore, the tool is constructed with reference to design infrastructuring, in which the product is of a fluid character that can be easily altered. This is because we argue that technology literacy will change over time, since the actors constituting it will too.

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