Designing Antikythera—
A tactile interactive poetry application for iPad

MA Thesis by Shakti Dash
Designing Antikythera—
A tactile interactive poetry application for iPad

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Thank you

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Abstract

*Antikythera*, concept/authored by awarded Finnish poet *Saila Susiluoto* is a tactile\(^1\), interactive poetry application for iPad and touchscreen tablets. It is based on the *Antikythera Mechanism\(^2\)*. A collection of over 200 poems across six story worlds, *Antikythera* is an audio-visual universe of generative, experimental and game-like experience for reading poetry on screens. The app engages the reader through concepts such as non-linearity, randomness and appearing/disappearing lines that respond to the reader’s touch and sensor readings of the tablet device.

As the primary designer associated with the project, my role has spanned through various stages from concept to final production. As a MA thesis work, *Designing Antikythera* takes the form of a narrative dialogue for the body of work it represents. The thesis aims to discuss approaches, challenges and best-practices for designing tactile and interactive experience for touchscreens when the inspiration and design metaphors are inspired from a physical historical artefact such as the Antikythera mechanism. While the primary aspect of the thesis is the production itself, relevant literature review and discussion is aimed towards the academic relevance of topics such as digital design and interactive/generative narratives in the ever changing landscape of screens and technological advancements.

As our means of expression expand, what challenges do we as designers and storytellers face in how we think beyond the interface? Additionally, how do we focus on the overall experience and intent—be it reading, entertainment or adventure?

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\(^1\) *Tactile*: Of or connected with the sense of touch / Designed to be perceived by touch (no date) Oxford Dictionary

\(^2\) *Antikythera mechanism*: (~200 BC, Greece) discovered in the early 1900s is an ancient mechanical analog computer designed to calculate astronomical positions.
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Background

In May 2014, I was invited by Mika Tuomola to meet and discuss the Antikythera project along with Saila Susiluoto and Rasmus Vuori. Mika had been working closely with Saila towards directing the artistic vision for the project. The meeting served as a beginning towards designing the Antikythera iPad application in the coming months. My role in the project was to design all aspects of the Antikythera iPad application—starting from conceptual sketches to defining the structure, interaction flows and visually crafting them into pixel perfect designs for implementation.

As a multidisciplinary designer with over 7 years of experience in the digital design industry, I had the necessary experience for this project. What particularly interested me about this project were the overlapping areas of non-linearity and interactive narratives for screens—which is something I have been exploring through my own work with interactive comics and as a student at the Media lab Helsinki. Antikythera provided an opportunity to take this as a professional, research and personal learning experience in a rare collaboration with talented individuals from varied backgrounds.

The challenges were plenty to begin with, starting with the fact that I did not understand a word of Finnish literature! Furthermore, there were an overwhelming number of cross-disciplinary subjects such as—history, art, engineering, mathematics, astronomy, science and design—all of which contributed towards the background research for gaining insight and inspiration for Antikythera. How do we design the experience of reading interactive literature (poetry) with a machine that happens to be one of the greatest scientific discoveries of all times?
The Antikythera worlds

Antikythera—the machine

“More than a hundred years ago an extraordinary mechanism was found by sponge divers at the bottom of the sea near the island of Antikythera. It astonished the entire international community of experts on the ancient world. Was it an astrolabe? Was it an orrery or an astronomical clock? Or something else? For decades, scientific investigation failed to yield much light and relied more on imagination than the facts. However research over the last half century has begun to reveal its secrets. The machine dates from around the end of the 2nd century B.C. and is the most sophisticated mechanism known from the ancient world. Nothing as complex is known for the next thousand years. The Antikythera Mechanism is now understood to be dedicated to astronomical phenomena and operates as a complex mechanical “computer” which tracks the cycles of the Solar System.”
— The Antikythera research project

Antikythera—the tactile poetry app

“In the summer of 2012, the National Archaeological Museum of Athens hosted an exhibition of artefacts from the Antikythera wreck. The exhibition included a mechanism more than 2200 years old, partially corroded statues, intricate jade-green glass objects, bronze fragments as well as modern replicas of the Antikythera mechanism which were delicate, precise instruments. The mechanism stayed in my mind and made me restless with its connection to the universal—to the spinning of planets, the positions of the sun and moon—its ingenuity and intricacy, its originally round moving parts. I tried to sketch the structure of the mechanism on a piece of paper. I tried to think how the mechanism could be manifested in poetry, but I quickly understood that this time, my piece of paper was useless, even impossible. My long-harboured desire to experiment

1 Project Overview | The Antikythera Mechanism Research Project (no date) Available at: http://www.antikythera-mechanism.gr./project/overview (Accessed: 26 August 2015).
with digital formats and their poetic possibilities found a matrix. This launched a process that would span many years, resulting in Antikythera, an interactive work for the iPad with more than 200 poems. At the time, the Antikythera mechanism was thought to have 32 gears, and the number 32 is a repeating motif in my work—I wrote six separate collections of poetry, each of which repeat 32 themes. The themes have a great personal significance to me. Imagery of freedom, travel and adventure repeats frequently, but I also tried to find universal themes that encompass the human condition, such as birth, love and death. These themes are used in the oracle section of Antikythera. You can ask a question on a particular topic and the machine will answer a short poetry fragment. The overarching theme of the collections became European history, particularly its painful points: the destruction of cultures, witch hunts, class societies, the rise of the Nazis, concentration camps, the turmoil of the world wars. Antikythera can be read in many ways, in many different orders. Its digital repertoire includes verses that switch places, disappearing poems which consist of verses already in the section, words that change meaning, unexpectedly appearing verses, and the text that reacts to touch and movement. It is also a multimedia work of art: images and sounds form an integral part of the Antikythera poems.”

—Saila Susiluoto

(English text from the Antikythera installation at the Helsinki Observatory, designed by architect & media artist Jaakko Pesonen 20-30 Aug 2015, Poetry Moon (Runokuu) and Media Facades, Helsinki Festival)

For more information, please refer to Saila’s essay Projekt Antikythera2 (in Finnish), published in Janolehti.

Merging the two worlds

The two contrasting worlds of Antikythera, the physical reinterpreted as the digital is a unique concept, in both its content and form. The project is a collaborative effort and would not have been possible without the contribution of the multidisciplinary team behind it. The upcoming chapters of this MA thesis define my role, insights and process in this collaborative effort.

Antikythera was launched in Apple App Store on August 19, 2015 accompanying the book release for Ariadne on August 21, 2015. It is available as an app download for iPad on the Apple App Store.

Research Questions

1. What does the approach for designing tactile and interactive experiences for touch screens entail when the inspiration for the interaction and design metaphors are taken from an actual historical artefact such as the Antikythera mechanism?

2. What design decisions and principles were used in achieving the goals for the artistic/design research question?
Antikythera’s story-worlds

The Antikythera collection comprises of six sections or story-worlds, each containing 32 poems written on 32 separate themes. Below are brief descriptions of the Antikythera story-worlds—

“Ilmalaivakirjeet Hindenburgilta (Zeppelin Letters from The Hindenburg) is about young Adele and LZ 129 Hindenburg’s last journey in 1937. Labrys, the feminist and feminine version of the story of Ariadne, is set on the Treblinka extermination camp. Noita (The Witch) tells about the 17th century witch-hunt in Finnmark, Vardo Island, Norway. Keisarinna (The Empress), Elisabeth of Austria monologues about restlessness, rage and lack of freedom. Taiteilijakuvia (Images of Artists) is situated in pre-war Vienna and discusses poverty, art, love, sex and artist’s muses via two voices: Oskar Kokoschka’s doll of Alma Mahler and Egon Schiele’s lover Valerie Neutzil. Kaupunkitarinoita (Town stories) imagines a medieval European town with a whole new set of little ghost and horror stories between poetry and prose – it’s about poverty, evil and horror.

There is also an Orakkeli (Oracle) in Antikythera, divining mechanism based on the “free verses” of all the poems in the thematically organised database. The database also provides the reader with date, season and moon phase sensitive daily verses via the moon interface traveling in astronomical realtime unless interrupted—the cosmos goes on unless a reader pauses it.”

— (Susiluoto et al., 2015)

1 themes: departure, birth, death, dream, freedom, love etc.
**Project timeline and team**

**Phase One—Concept Design**
*Preliminary design, prototyping and grant applications*  *(June–December, 2014)*

**Phase two—Production**
*Antikythera iPad app development with Taiste and sound design*  *(January–August, 2015)*

**Concept Team**
- Saila Susiluoto (poet/author-initiator, Artistic Vision)
- Mika Tuomola (Director, Artistic Vision)
- Rasmus Vuori (System Architecture)
- Shakti Dash (Interaction-Visual-UX Design)

**Production Team**
- Saila Susiluoto (poet/author-initiator, Artistic Vision)
- Mika Tuomola (Director, Artistic Vision)
- Rasmus Vuori (System Architecture)
- Shakti Dash (Interaction-Visual-UX Design)
- Antti Nykyri (Sound design)
- Taiste (Production Partners)
- Tuomas Jalamo (Project Manager)
- Valtteri Maki (UX and motion designer)
- Mikko Harju (iOS Developer)
Objectives

At this stage the majority of the poems were written and the structure of the overall collection was in place. The following questions were the primary design problems to solve at this phase—

1. What does the Antikythera application look like?
2. How does the metaphor of the Antikythera mechanism translate into a digital user-interface?
3. How do we achieve the above while keeping in mind the primary functionality—the reading experience?

This phase was crucial since the concept design and basic prototype was necessary for us as a team to apply for grant applications to fund the project’s production in the future.

Seeking metaphors—mapping the concepts of Antikythera collection to the actual mechanism

There are multiple schematics, proposals and model reconstructions for the Antikythera mechanism. However, our pursuit was not to rebuild the physical Antikythera digitally. The design problem was to understand the mechanism enough to be able to map the concept and the body of poems to known components of the machine. I started out by watching documentaries about its history, interviews of scientists and researchers and looking at animated demonstrations of the moving components of the machine. I focused on the outer dials and the operating interface first as the gears were too intimidating and complex to begin working with.

I observed that the primary interface of the hypothetical working model comprised of a hand-held crank, similar to a mechanical watch crown (figure 7). All the complexities of this incredible machine were hidden away inside. Rotating the crank set to rotation multiple pointers of the mechanism simultaneously—setting to rotation and displaying the astronomical positions of the sun, moon and the known five planets on the front side (figure 5). This was mapped to two large dials at the back to the Metonic\(^2\) and the Saros\(^3\) cycles (figure 6).

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2 Metonic cycle: is a period of very close to 19 years that is remarkable for being nearly a common multiple of the solar year and the synodic (lunar) month.

3 Saros cycle: a period of approximately 6,585.3 days (18 years 11 days 8 hours)
The pointer for the moon was particularly fascinating since it made for an easy association in the context of a digital interface providing instant feedback of the moon-phases on rotation. The artistic vision of the interface and environment of Antikythera app was heavily leaning towards the central presence of a machine—the design for the machine interface thus relying on skeuomorphism. I proposed the suggestion to the team on mapping the rotation of the moon-dial as a primary interaction to select a storyworld. This was something everyone readily agreed to. Also, since we were working with a non-conventional interface for navigating and interacting with poetry, it was important to anchor on simplicity of use early-on. The moon-phases were extremely visual and could reflect the real astronomical phase with ease, being connected to a digital calendar. In conclusion, the interaction to rotate and select goes back to the early days of the iPod classic after all.

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1 The term “skeuomorphism” is derived from the Greek words “skeuos,” which means vessel or tool, and “morph,” which means “shape.” Skeuomorphism refers to a design principle in which design cues are taken from the physical world. This term is most frequently applied to user interfaces (UIs), where much of the design has traditionally aimed to recall the real world.
Sketches and moodboard

The early visual concepts were low-fidelity and I frequently returned to the drawing board. The work process was highly collaborative and I was discussing ideas regularly with Mika and Salla. Constant sketching ensured a consistent flow of dialog and validation of ideas. We were meeting once-twice a month to brainstorm, discuss, benchmark, prototype and repeat. I had benchmarked existing applications and collected inspiration on online moodboards\(^2\) that were easy to share with the team. Simultaneously, I was following a similar process of approaching the second layer of interactions, the gears.

\(^2\) Antikythera Motion. Niice (no date) Available at: https://niice.co/m/5f36f9158409f6d25904b26277354ab9 (Accessed: 1 August 2015).
Antikythera Stills. Niice (no date) Available at: https://niice.co/m/s958ad0261b929b643bd1920274ed1be (Accessed: 1 August 2015).

The Gears—the central machine linking the storyworlds to the poems

The next layer of transitioning from machine to poetry and back was essential towards building the narrative of mapping the contents of Antikythera to the metaphor of the machine. I was looking into the structure of the gears, visually trying to look for patterns. We were discussing at this point to map each section/story-world to its corresponding gear, with regard to a size and associated colour. It was however essential to have a consistent narrative, even if they were entirely representational.

Of the several examples available online, I would like to highlight two. The first one (fig.9) is a video showing an animated assembly of the mechanism. The animation is shown from several perspectives of individual components forming an assembly and then closing into a boxed mechanism. The second one is an interactive and immersive 3-dimensional construction running on an iPad build (fig.10).
The skeletal aesthetic quality and the tangible possibilities of manipulating the Antikythera Mechanism on a touch screen tablet was inspiring, and reinforced the direction we were heading towards. The planetary schematic (figure, Evans et al, 2012) for the gearing layout for Antikythera mechanism consisted of five known planets—Mercury, Venus, Mars, Jupiter and Saturn. I similarly followed the pattern for mapping the six story-worlds of Antikythera to the planetary worlds of Antikythera Mechanism. The arrangement was not overwhelming in complexity and was visual enough to proceed forward with. The process of mapping relevant metaphors/components, eventually added to the working of the overall concept in the digital and interactive space.


11. Antikythera mechanism schematic
12. Antikythera proposed (Evans et al)
Visual Concepts

The next round of iterations were a solid interpretation of everything we had been discussing for the past months. The app architecture was simple, comprising of three layers—

1. **Section selection**
   The home-screen of the *Antikythera* app. It comprises of a moon-dial clocked to its astronomical phase and position depending on the reader’s calendar and time-zone. The moon-dial also functions as the app’s main element of interaction, which when rotated selected a corresponding section at six clock positions. The 6 orbits represent a section/story-world and visually map the reader’s progress along the orbits. (fig. 13, 14)

2. **Poem navigation**
   On selecting a section, the screen reveals the gears representing the 6 story-worlds. The story-world selected in the previous screen highlights the corresponding gear in this screen. It was a conscious decision made by *Saila* to not have any titles for the poems. Instead, she recommended that we use the first two-three words of the poems to indicate/evoke the reader’s mood and attention. The reading of the poetry was associational, thematic and purely accidental. The associated poems were visualised as constellations with radiating interconnected lines. There is no order of reading the collection and the decisions on the interface and interaction support in the creation of such accidents as well. On reading further, the user will unlock further associations between the storyworlds in the form of constellations. (fig. 15, 16)
3. Poems

Once the user arrives at a selected poem, the reading order is linear and logical. The user can go back and forward in the section/story-world that they are currently in. The read poems appear as new constellations (dots), thus creating newer associations for the user to read from. Saila had several ideas on making the poems responsive to the user’s touch and the sensor readings of the tablet device. Appearing and disappearing lines, small puzzles, ghost poems and animated poems to state a few. All these ideas were waiting to be animated, prototyped and tested for the reader’s evaluation. However, those would be explored in the second half of the project. (fig. 17)
Grant applications & funding
The screens above were subsequently used to apply for the funding necessary to take the work forward. The applications received both the prestigious fundings from Arts Promotion Centre Finland, Promotion Centre for Audiovisual Culture (AVEK) and Kone Foundation.

Concluding the concept phase
Rasmus in the meantime had built an online database for all the poems along with a demo running on iPad for show and tell. We were ready to move into production after a short winter-break.
Technical implementation and Production

Objectives
A kickoff meeting was organised at the Helsinki Observatory in January 16, 2015 to meet and discuss next steps with Taiste. The team from Taiste was responsible for the technical implementation of the Antikythera iPad application for an estimated release by August 2015. We evaluated the existing concepts and were working on a strict timeline and budget over the next three months. Our responsibilities were clearly defined and so were our deliverables (please refer to diagram p.11 for team and timeline).

Antti Nykyri, responsible for sound-design was also joining the team adding a much needed layer to bring the story-worlds to life. Overall, a day well-spent getting inspired at the Helsinki Observatory.

Tools and working methods
Consistent and transparent communication was important since our meetings were usually digital—Skype for weekly team meetings and Trello to keep track of progress and delegate tasks when necessary. We occasionally used emails for miscellaneous discussions and updates.

We used Dropbox for managing files where every member of the team had access to necessary information and updates.

The designs were created on a variety of softwares, mostly Adobe Creative Cloud (Photoshop/Illustrator/After Effects/Indesign). My process of approaching the design is covered in further detail within the literature review section (p.51)

Scope and Constraints
Taiste’s development environment and team were based in Turku, Finland while the rest of us in Helsinki. Although our digital-communication efforts worked efficiently, there are times when working together or meeting face-to-face is just more efficient. Also, we were strictly building a minimum viable product keeping in mind the practical constraints of time and budget.

1. The Helsinki Observatory, originally designed by C. L. Engel and completed in 1834, houses the Centre for Astronomy, a visitor centre of the Helsinki University Museum, where school children and other visitors can learn about space, astronomy and the history of astronomy.
2. Taiste are a digital design agency based in Turku and Helsinki, Finland.
http://www.taiste.fi/en/
Interaction and UX flow
Before beginning the work on Visual design for implementation, I worked closely with Valtteri Mäki from Taiste. Valtteri is an experienced UX designer also skilled with motion-design/animations which were crucial at this stage for prototyping certain ideas that required evaluation. We reviewed the existing concepts and the user-experience, flows and logic and refined them further (Figures 20, 21 and 22). The subsequent pages best explain the detailed interaction diagrams that helped streamline the user flows and interactions in the release version of the application.

Flow 3
Interaction map for the Antikythera navigation screens
Iteration 2.
3.3.2015

22. Antikythera, UX Flow diagrams, source: Valtteri Mäki
Visual Design

The deliverable at this point was the task of detailed visual design for every single screen that the application would include. This also included artworks for the six story-worlds/sections. The screens were designed in logical steps keeping in mind the possible interactions and their subsequent actions.

For an application with over 200 poems, typography was extremely crucial for the overall experience. However, every poem was formatted differently and had its interactions pre-defined. The task of crafting each poem to a typographic perfection was out of scope in this duration. For the choice of fonts within the application, we used a classical serif typeface (Hoefler text) for the titles and modern sans serif (Avenir next) for the interactive text elements. Both typefaces were available for iOS development and suited Saila’s preferences.

The screens were redesigned based on the updated typefaces, a well defined grid and finalised colours for use within the application. Overall the designs had more detail and interactions were clearly defined with contextual tutorials that would appear automatically to guide a first-time user.
25. Antikythera, opening screen

26. Antikythera, Opening screen animation: daily line

27. Antikythera, Home screen, first time user

28. Antikythera, Home screen, returning user
29. Antikythera, Section Selection: Hindenburg

30. Antikythera, Gears/Poem navigation: active gear (pressed)

31. Antikythera, Section Artworks

Labreys, Noita, Keisarinna and Kaupunkitarinoita by Shakti Dash
Ilmalavakirjeet Hindenburgiltta, "Cloud-Head" by @folkertgorter license: CC BY 3.0 / cropped differently from original
Taiteilijakuvia, Source: http://images.superfamous.com/Hot-Tub "Hot-Tub" by @folkertgorter license: CC BY 3.0 / Hue modified from original
**Evaluating concepts with motion prototypes and animations**
Along with the progress for the visual design of the app, Valtteri worked on animated demos demonstrating the flow of interactions and animations from the app’s homescreen to the poetry reading layer. He also worked on the tactile animation concepts relevant to the execution of interactive poetry. Having an animator in the team was a great plus as the concepts could be evaluated without spending expensive resources and time on developing. The animations were well received and were further refined through testing internally within the team and a group of beta-testers.

**Sound design**
The sound design by Antti Nykyri included looping themes for each section/story-world, response to tactile interactions such as gestures and rotation of gear wheels and also an elaborate theme for the final animated poem that concludes the Antikythera collection.

**Production challenges**
The visual design for Antikythera was delivered by the end of February 2015, as per the schedule. We had certain difficult decisions to make and agree on at this point. With respect to the ease of implementation and in the interest of reducing the number of steps, there were a few proposals that Taiste and Mika discussed and suggested to the team—

1. Simplifying the home screen by removing the progress indicators (planets in orbits) and the central circular button to confirm section selection. It was suggested that dragging and releasing the moon would instantly switch to that section/story-world.
2. The progress of reading through the collections would organically still appear as new constellations on each gear-wheel.

In practice, this was solved by redesigning the homescreen as proposed and it benefitted the team and timeline to make the implementation simpler. While the purpose of the earlier homescreen was to encourage personalisation through the planetary trails corresponding to the user’s progress, it was not a core functionality of the app itself. In the revised example of the redesigned homescreen, rotating the moon-dial resulted in realtime feedback of the sections/story-world artworks blending into each other.

**Revised Visual design**
The revised Visual design included a simpler home screen and refinement to the gear-navigation for poem selection. The final deliverables included a complete UX flow map for the Antikythera app, 47 screen designs and a design guideline communicating the design decisions for implementation. Some of the final UI designs are shared below—

32. Antikythera, Home screen with Oracle unlocked, release version
33. Antikythera, Home screen, release version

34. Antikythera, First time user tutorial, release version

35. Antikythera, Home screen, moon positions, release version

36. Antikythera, Hindenburg, release version
Ystävänää ei voi tietää kuka hän on, edes lapsestaan
vakavien palkoita se ehtii, päinvastoin
Barenstistemä on helteinen ja lempellä
kulttuuri laiva liusaa sarroamaan
katu tuulinen ja riipy, sen odoottava, ammottava suu
niirellä muistama heikki, simposiumen
hylättä leffäteentä, homeroesbajinen verho, lokit
lapenta pitäen pientä elämäntä kotija puusikko

41. Antikythera, Poem reading screen, release version

42. Antikythera, Poem reading screen (night mode), release version

43. Antikythera, traveller’s collection, release version

44. Antikythera, author’s reading order, release version
Literature review

Approaching Skeuomorphism—

Locating Antikythera in the depth of the digital narrative and digital design

The terms ‘interactive’ and ‘digital’ are both ubiquitous. There are abundant references to the interpretation of poetry, literature and interactive narratives in the context of digital web and apps. While design plays a crucial role in its success, it also faces the danger of being contained in a homogeneous landscape. Everything looks the same (Gertz et al., 2015). Gertz further argues that it is not due to the emergence of trends such as responsive design1 and flat design2, but due to the higher demand for better designed interfaces (ibid).

The arguments in favor of skeuomorphism are that it makes digital objects more aesthetically pleasing and helps the user understand how to handle an unfamiliar object. Gaver emphasizes that the role of metaphors in design should be in guiding users’ exploration of a system rather than conveying the actual knowledge about how exactly the system in question is supposed to be used (Gaver, 1992). Apple, once known for its icons laden with skeuomorphic references made a polar shift with iOS 7, embracing a flatter and homogenous style and encouraging everyone within its ecosystem to follow the same guidelines (Schiff, 2015). There was a general acceptance and understanding within the industry that people were already comfortable with touching glass and did not require physical buttons.

As a practicing design professional, I unconsciously found myself shifting away from skeuomorphic approaches. This was perhaps also due to the lack of demand for it, since the major ecosystems we design for on an everyday basis have long abandoned the styles in favour of simplicity and functionality. I realised its larger affect when it made me hesitant towards approaching the design for Antikythera’s primarily skeuomorphic interface. Such ideas or references on direction when discussed with Saila or Mika put forward references to the existence of a mechanical universe and references to a machine. While designing several aspects of the Antikythera iPad app, a lot of clarity was ultimately achieved through constant dialogue. Ultimately, I realised that skeuomorphism in this aspect was about communicating the purpose of the overall concept and not only the function it enables. It was beyond the interface and guidelines in terms of giving the application a memorable experience and not just a physical reference or tool (Tobias Ahlin, 2012). Coupled with sound, animations and a purpose, it was a means for adventure for a reader. Antikythera is a unique concept, both in its content and form and translating the affordance of the physical metaphor to the interface ensured the core concept of the narrative.

This was an excellent practical reference for me as a designer and perhaps one of the important learning outcomes on this project to be able to see beyond the screen’s affordances and its grain (Chimero, 2013).

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1 Responsive web design (RWD) is a web development approach that creates dynamic changes to the appearance of a website, depending on the screen size and orientation of the device being used to view it. RWD is one approach to the problem of designing for the multitude of devices available to customers, ranging from tiny phones to huge desktop monitors.

2 Refers to a style of interface design which removes any stylistic choices that give the illusion of three-dimensions (such as drop shadows, gradients, textures, or other tools that add depth) and is focused on a minimalist use of simple elements, typography and solid colors.
On designing apps

“How are apps made? Painfully with deliberation or effortlessly without thought. Blind inspiration. Eight hours over a lazy weekend. Fifty grand a day. A million dollars a syllable. Do not look for the sense in it.”

—How Apps are Made, Craig Mod

Mod’s statement sums up the practices of the creative industry and process bluntly with grace and humour. From an ideal point of view, the design process is an enriching act with regard to the context, problem and intent. On the other hand, there are aspects of processes that are repetitive with regard to application of knowledge and skills. Knowledge and skills that are constantly challenged in the real environment comprising of time, funds, competition and innovation. Frank Chimero describes the visual challenges in interaction design as an edgeless surface of unknown proportions, comprising of varied individual fragments that purpose to a readable whole in the instance of a moment (Chimero, 2015).

Apps run natively on a compatible hardware and also adapt to technological advancements and features in hardware and software. Given these possibilities, Antikythera could exist as a project on the internet as a responsive website, as separate native apps on popular platforms such as Windows, Android and Apple—in a range of desktop computers, laptops, tablets and mobile. This is an example of the choices and fragmentation that one has to consider. Apps on leading platforms (iOS, Android etc.) get regularly updated in accordance with the yearly pattern for major updates on hardware and operating systems (Hains, 2015; Android, 2015). The leading platforms also share design guidelines, APIs and software documentation for transparency, encouraging users and content creators to be aware of the possibilities and limitations. This in turn completes the cycle for adaptation and awareness for everything that is new—essentially translating to knowledge and skills. The aspects of adapting to the changing landscape of screens, newer technologies and future concepts add to the excitement/challenges of it all.

Designing Antikythera for iPad (iOS) was a conscious decision taking into consideration the intended audience, user base and relative ease of implementation. Shown below are examples of screen size fragmentation in Android and iOS respectively.
Aspects of usability

Jacob Nielsen (Nielsen, 1995), a pioneer in usability heuristics states 10 principles that stand true even today.

1. **Visibility of the system status**, so that the system always keeps the users informed about what is going on, through appropriate feedback within a reasonable amount of time.
2. **Match between system and the real world**, so that the information appears in a natural and logical order.
3. **User control and freedom**, so that users can undo or redo with ease.
4. **Consistency and standards** and the need to follow the platform conventions.
5. **Error prevention**, so that design can prevent a problem from occurring.
6. **Recognition rather than recall**, so that the instructions for use of the application are visible and/or easily accessible whenever required.
7. **Flexibility and efficiency of use**, that allows users to tailor frequent actions.
8. **Aesthetic and minimalist design**, so that dialogues only contain information that is relevant and frequently required.
9. **Help users recognize, diagnose, and recover** from errors. The application must indicate the precise problem and must constructively suggest a solution.
10. **Help and documentation**.

These usability considerations have been a crucial aspect of designing Antikythera and all questions above require a simple answer before implementing the design. While iOS design guidelines were considered, the interface for Antikythera is significantly different from conventional reading applications. This led to the creation of contextual tutorial screens, which would enable a user to understand how the application worked and define the tasks the user needed to perform at the onset as well as at any time the user needed it.

Within the application, the user is always aware on where they are and where they can proceed next. A back button takes the user back one step logically—based on the app’s architecture (e.g. return to Homescreen from Poem navigation); or depending on where the reader is navigating from (reader navigates back to the same storyworld in the poem navigation view from the reading view). The user-flows (p.29, 32, 47) were extensively designed and tested within the team for the optimal expected behaviour for the release version.

Affordances and gestures

The concept of affordances originates from ecological psychology; and was proposed by James Gibson (1977, 1979) to denote possibilities for action provided to the actor by the environment. This strongly resonated with designers’ concern about making possible uses of their products immediately obvious. This concept came to play a central role in interaction design and Human-Computer Interaction (HCI) as well (Kaptelinin, 2014). Also, Gaver points out that information about affordances is not only limited to visual information, and that tactile information and sound should be taken into account in design (Gaver, 1992). Gestures, being a form of tactile interaction have been in use since the development of smart devices. Gestural user interfaces allow people to interact with products and systems using familiar everyday physical movements (Bressler, date unknown).

Following the same approach, the Antikythera app uses translated gestures from the machine—rotation & locking for poem associations and provides a clear feedback—both sound and visual, at every stage. This is necessary for intended behaviour of the system architecture in order to communicate with the user at an intuitive level without intimidating them with any complexities.
Best practices

Design guidelines
First and foremost, it is recommended as an industry standard best practice to thoroughly read the documented iOS Human interface guidelines\(^3\) before starting to design an app for the iOS platform. The guidelines are well designed and up-to-date with visual references to understand the context. While I have been designing applications in the past am well-versed with the guidelines; the guidelines are always helpful to revisit to evaluate possibilities.

There are several challenges that may come during the process of designing and developing apps, however, being aware of the correct and up-to-date information for the target device in question should definitely not be one of them.

Designing for high density screens
The iPad is a powerful computer with a very high-density display also referred to as the retina display\(^4\) (iPad3 and above, March 2012 onwards). The screen resolution of this device is 2048×1536, often referred to as 2x—implying twice the resolution in pixels. While the Antikythera app runs and looks best on the latest hardware, it can run on an older device such as the iPad2 or the iPad mini as well. These older devices have half the resolution of a retina display, which is also referred to as 1x with a device resolution of 1024×768. I had my design files set up to support both the resolutions and it often means starting the design at the lower resolution or at a 1x scale.

In practice, I was using Adobe Photoshop and Illustrator CC to design for the application screens and graphic assets. I closely follow the working methods documented by Marc Edwards\(^5\) on his website pertaining to Visual design and working methods that are frequently updated. I always start building design assets on 1x resolution, due to several advantages. Just like wireframing and prototyping can help flesh out concepts, building at 1x helps flesh out view and asset sizes (Edwards, 2015). Moreover, the assets are vector objects and are aligned on a pixel perfect grid. Exporting assets in 2x is far more reliable when the document is set up in the correct way.

Exporting graphical assets for implementation
No matter what design tool is used to arrive at the final designs, the screens created on them are primarily for reference. For the purpose of implementation the graphical assets in the correct formats along with a design guideline are what are most important of all. This is the only way to ensure that how the design looks is how it is finally implemented. This is almost always the very final step and one of the most crucial ones which when executed correctly can save valuable time and resources.

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4 Retina Display is a marketing term developed by Apple to refer to devices and monitors that have a resolution and pixel density so high – roughly 300 or more pixels per inch – that a person is unable to discern the individual pixels at a normal viewing distance.
5 Marc Edwards: https://bjango.com/articles/
Design process

'The squiggle' diagram (below) by Damien Newman sums up the process of designing Antikythera.

48. Squiggle by Damien Newman

The process for design always begins with uncertainty and refines with research streamlining towards a concept. This was our approach and working methods for the first phase of the project. During the second phase of technical implementation and production, we achieved the final design through clarity and focus.
Conclusion

The Antikythera project is ready and available to millions of readers online via the Apple app store. Designing Antikythera was one part of the effort. The realization of the Antikythera project has been countless hours of collective effort from a multidisciplinary and talented team. In reality it is a truly collaborative effort with great planning, focus and motivation. To our credit, we have worked efficiently to achieve this result in over a year inspite of tight timelines and budget constraints.

It had been a good opportunity to learn a lot of new things and break some assumptions. Looking back I find myself with even more ideas and newer approaches, if I had to approach the design process all over again. However, this is certainly not an end to this project. There are several possibilities on how this machine may evolve and even more so in the context of its digital reincarnation.

Events and achievements (2015)—
1. Introduced at the Aalto Festival, Media Lab Demo Day (May 28)
2. Annikki Poetry Festival (June 6) and 27th Lahti International Writers’ Reunion (LIWRE2015) (June 14–16)
3. 21st International Symposium on Electronic Art (ISEA), Vancouver, Canada (August 14-18)
4. Antikythera installation by Jaakko Pesonen at the Helsinki Observatory (Aug 19–30) with a special evening for Night of the Arts event (August 20)
5. Public launch along with Saila Susiluoto’s Ariadne, transmedial book part of the Antikythera story world, published by Otava

I personally look forward to the launch of the upcoming English version in near future (estimated 2016) and also for the sake of this project to be experienced by a wider international audience.

What could have been done differently?

The present Antikythera app is a wonderful example of taking an idea from concept to reality. However, like a first release of anything it may have elements that could be improved through continued effort. The shortcomings within the application exist due limitations in primarily schedule and budget. The production team had all the skills required to have implemented them in due time and effort. The shortcomings are again, not mistakes. Enough care was taken that the release version is functional and experiential, while certain features could be compromised. I discuss a few thoughts and perspectives below—

Typography

For an application that is primarily designed for reading, the typography could have been executed better. Since the poems are associative and animated, they were pre-formatted in a certain way that would have required additional time to redesign and create specifications for. Additionally, it was my limitation as a designer to not understand the language or its context without working personally with Saila herself. If given a chance, I would be very excited and willing to do this.

Personalisation

Certain screens and features could not be implemented in the release version. For example, the traveller’s journey (p.) included in the final concept as a means to make the application personal to the user by showing them a catalogue of their read poems. Just like owning a book, the experience, progressing through an adventure narrative, a space for the reader’s own journey are important elements of personalisation. Also, the concept homescreen () with planet associations as metaphors to the story-world’s was an element of personalisation that did not make it to the release version. The hints within the application for the interactive poems are shown as subtle hints to the reader. The ability to reverse the changes would have helped in cases where the reader may have wanted to compare texts or accidentally ignored them.
**Accessibility** is another important aspect that could have been improved upon. Allowing users to set a larger font size than default, setting the reading background to a user-set preference to dark or light is a useful feature for continuous reading.

**A note on the term tactile**

Antikythera has a defined emphasis on being a tactile poetry app. While the term tactile has a strong association to a sense of touch, it is an imminent progress through technology—associating the sense of touch and gestures on screens and computing devices. Tactile in this case relates to a feedback that is visual, sound or both. Well designed interfaces and games almost take away the realisation between the action and reaction as the feedback is instantaneous.

Haptic screens that register pressure, communicate through electrical impulses are slowly starting to make their way into consumer devices such as Apple Watch. The possibilities of a third element of real tactile feed is simply an exciting possibility for a concept such as this. How tactile would be our experiences in the future and what kind of machines and story-worlds shall we create with such possibilities?
Bibliography


Project Overview | The Antikythera Mechanism Research Project (no date) Available at: http://www.antikythera-mechanism.gr/project/overview (Accessed: 26 August 2015).


(Kaptelinin, Victor (2014): Affordances. In: Soegaard, Mads and Dam, Rikke Friis (eds.)


(no date) Available at: https://upload.wikimedia.org/wikipedia/commons/thumb/0/06/Antikythera-proposed-1.svg/815px-Antikythera-proposed-1.svg.png (Accessed: 31 August 2015).

(no date) Available at: https://upload.wikimedia.org/wikipedia/commons/thumb/e/e8/Antikythera_mechanism.svg/752px-Antikythera_mechanism.svg.png (Accessed: 31 August 2015).