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Chronicle

Developing a visualisation of emergent narratives in grand strategy games

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Master's Thesis in Interaction Design
Department of Applied Information Technology
Chalmers University of Technology
Gothenburg, Sweden 2013
Master's Thesis 2013:091

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Developing a Visualisation of Emergent Narratives in Grand Strategy Games

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Gothenburg, Sweden June 2013

Abstract

Many games of high complexity give rise to emergent narratives, where the events of the game are retold as a story. The goal of this thesis was to investigate ways to support the player in discovering their own emergent stories in grand strategy games. Grand strategy games are games of high complexity, and player communities based on these games are very focused on sharing stories spawned from the games. The focus of this thesis has been on collecting these stories and showing them, not creating new stories by changing the gameplay rules.

The area was explored by developing a digital prototype that was tested on users. The prototype is a chronicle for the game Crusader Kings II, which collects events that happen in the game and show them as icons and flags on a timeline. The development leading up to the prototype and final concept included literary studies, interviews, questionnaires, persona development, and paper prototyping.

The aim of this thesis was to give users an easy way to see their story more clearly. By using the familiar concept of a timeline, users can see what they have accomplished, and get a reminder when they return to a game after a long time.

Acknowledgements

This master thesis was conducted at Paradox Development Studio, a game development studio in Stockholm, Sweden, in 2013. It was done as part of the master program Interaction Design and Technologies at Chalmers University of Technology. Many thanks goes out to our supervisor, Staffan Björk at the Interactive Institute in Gothenburg, Sweden. He was the still rock in a stream of crazy design ideas, sharpening our dissoluted minds to the task. The writers of this report would like to thank all the users who participated in user tests and interviews throughout the development process. Special thanks to Fredrik Zetterman, Olof Björk, and the rest of Paradox Interactive and Paradox Development Studio, for encouragement and help throughout the development process. Thanks also goes out to our opponents Philip Wallin and Christopher Pavlic for reading and helping us to improve this work.

Edvard Rutström & Jonas Wickerström, Gothenburg June 2013

Glossary

AAR After Action Report.

LP Let's Play.

E-sport An electronic sport, the competitive play of video games.

GUI Graphical User Interface.

Clausewitz II The game engine used in Crusader Kings II. Includes a graphics engine, a sound engine, a network engine, a GUI engine, etc.

Game session The period of time that spans from when you start playing a game, and ends when you end that game. In Crusader Kings II, this period of time might stretch over months.

Play session A game session contains at least one play session, which is the period of time when a player sits down and plays the game in one instance.

Paidia Unstructured and spontaneous activities.

Ludus Structured activities with explicit rules.

Ludology The study of games and play.

Narratology The study of narrative and narrative structure.

Contents

1

Introduction

Stories have always been an integral part of human society. They are intriguing and exciting ways of transferring information from one person to another. Storytelling comes in many different forms: cave art, dance, music, tattoos and of course the written and spoken word. It pre-dates the written word and played a vital role in communication from person to person, and generation to generation. In modern society, with all its advanced ways of communication, people are constantly finding new ways of communicating their stories. The stories are no longer limited by geographical factors; nowadays people can share information with millions of people via the Internet.

1.1 Sharing Game Stories

With the technological advancement that came with the 21st century, games have taken on a new form. Games has always given rise to stories, and video games explore new dimensions of storytelling in games. These stories are created by players through the simple action of playing a game. The story can then be retold and shared. This can be especially useful in open games with a high degree of complexity.

Players can become increasingly connected to what is currently happening in the game simply by viewing the story of the game played so far. Players who play highly complex games such as Crusader Kings II and Dwarf Fortress often create After Action Reports (AAR) which are either straight retellings of the events of the game or include other elements such as dialogue between game characters. An example of such an AAR is the tale of the town of Boatmurdered, shown in Figure 1.1

Paradox Development Studio is a game development studio that creates grand strategy games which are strategic games, often where much of human history is simulated. The company has a loyal and devoted user base, and there are many AARs devoted to their games on the company's forums.

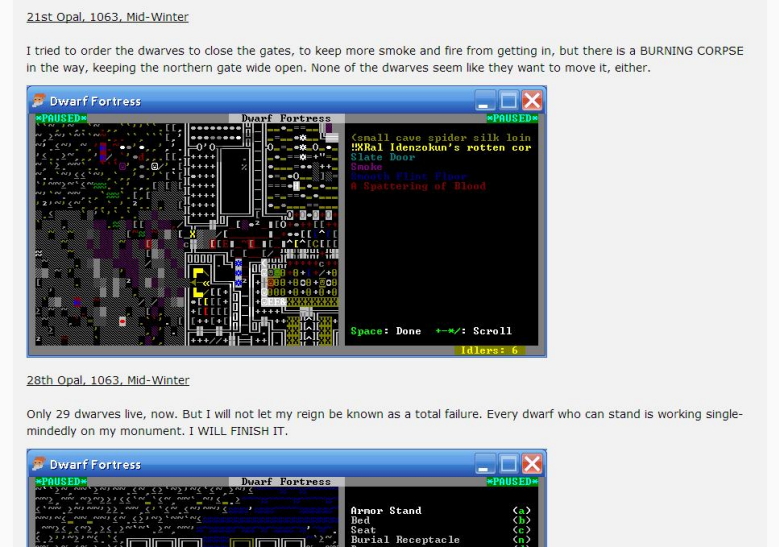

Figure 1.1: A screenshot of the story of Boatmurdered, which is shared in a forum post (Let's Play Archive, 2007)

1.2 Purpose and Research Question

The purpose of this thesis is to explore and evaluate the different possible solutions to displaying a player-created story inside a game, without altering the gameplay of the game. This subject was chosen together with Paradox Development Studio from a list of other possible research subjects. This purpose can be summarised in the research question:

> How does one support players in discovering emergent stories without explicitly changing the game rules?

This question will be explored by implementing and user testing a prototype that helps players create, share and create context for their own stories in one of Paradox Development Studio's games. This approach is much less abstract than the research question above, but it was believed that developing a prototype would allow for an example how to explain the question, not just answering the questions with theory and interviews. Attempts of visualising player stories has been made in previous Paradox Development Studio's games, such as the chronicle at the end screen of Europa Universalis III, shown in Figure 1.2. These examples have had the problem that they are essentially computer-generated text, and therefore are not very compelling. A balance would have to be achieved between letting the user input information, and gathering data from the game. The data then needs to be visualised in such a way that the players find them both helpful and aesthetically pleasing and are compelled to use them in their AAR's.

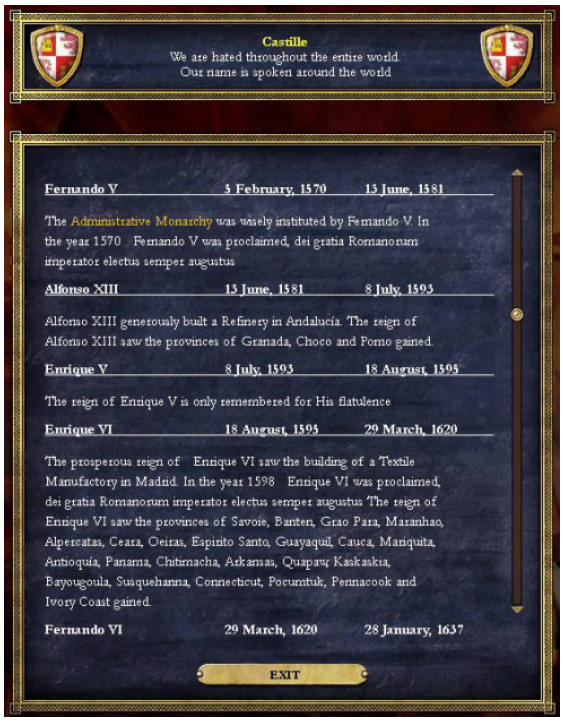

Figure 1.2: A screenshot of the chronicle in Europa Universalis III (Sorens, 2008)

1.3 Delimitations

The prototype was planned to be developed for PC with a traditional PC interface, therefore no additional effort will be put into studying how emergent narratives can be visualised in graphical interfaces such as touch screens and modern gaming consoles such as the Xbox 360 (2005), PlayStation 3 (2006) and Nintendo Wii U (2012). Many of the findings can still be valid on traditional graphical interfaces, but evaluating this will not be the focus of this thesis.

This thesis work will be carried out at Paradox Development Studio in Stockholm, in one of their grand strategy games. This means that the design should to adhere to the games' visual style. It also means that it should adhere to the games' interaction patterns and conventions. The design will be implemented using the game engine's built-in GUI system and included interface components as much as possible, since it will take time and effort to create new interface components.

The focus of our thesis is interaction design, not gameplay design. As such, we have chosen not to modify the gameplay rules. Even so, we think the players will play the game differently with a new feature.

One possible way to create these retrospective views would be to generate text based on the events that happen in the game. As it is a large technical challenge to make this text readable, this thesis will not investigate such methods.

1.4 Stakeholders

The primary stakeholders are players that play Paradox Development Studio's games, but do not necessarily create their own after action reports. It is our hope that the design developed in this thesis will help players tell their own stories, but not necessarily share it on forums. Still, people who read and follow these stories, and players who focus very much on creating AAR's are also important stakeholders. The focus is however on players less involved in the community, as they are less aware of the storytelling potential of Paradox Development Studio's games. Paradox Development Studio are of course an important stakeholder and the prototype should hopefully inspire and motivate them to continue work in this area.

It is also hoped that people interested in the field of interaction design, information visualisation and game design can learn from this thesis, so they are stakeholders for our report, although not necessarily stakeholders in the development of the prototype.

We as report writers and designers are of course important stakeholders, as we want to create the best possible design. One of us is also an avid Crusader Kings II player, having played in excess of 120 hours. While the other one of us had played no Paradox Development Studio titles, it meant that there was a mix between experience and ability to see aspects of the games studied with fresh eyes.

1.5 Report structure

The report starts with this introduction chapter, where the purpose and context of the thesis is presented. This chapter is followed by the background chapter, which describes previous work and relevant information for understanding the design space. Then follows the Theory chapter, which presents the relevant theoretical foundation and game design aspects of games with emergent narratives. The next chapter, Methodology, describes the interaction design methods used. After that, the Planning chapter details our plan as it was at the start of the project. The Process chapter which follows describes the the design development during the three months of the project. This chapter is followed by the results chapter, that presents our two results: the digital prototype and the final concept. The Results chapter is followed by the Discussion chapter, where we look back on the project and the results. Finally, the report ends with the Conclusions chapter, where the report and our findings are summed up.

2

Background

This section describes what a grand strategy game and AAR's are, as well as previous work and relevant products and games. We will also present Paradox Development Studio, where this thesis work took place, and describe previous attempts at visualising emergent stories in games.

2.1 Grand Strategy Games

A grand strategy game is a strategy game where the player controls an entire nation or empire, often over a long period of time. The player uses their nation's resources to reach different goals, often world domination. A strategy game is a game where the players long term planning and critical thinking is the key to success. Wikipedia defines strategy game as:

> "A strategy game or strategic game is a game (e.g. video or board game) in which the players' uncoerced, and often autonomous decision-making skills have a high significance in determining the outcome"

The term "grand strategy game" is quite ambiguous, but some examples of Grand Strategy games are *Nobunaga's Ambition* (1983), *Clash of Steel* (1993), and *Supreme Ruler 2020* (2008).

2.2 Paradox Development Studio

Paradox Development Studio is game development studio based in Stockholm. It is a subsidiary of Paradox Interactive and the studio develops historical grand strategy games for PC and Mac. The four most popular game series created in the studio are:

- *Europa Universalis*, about the Age of Exploration and Enlightenment
- *Crusader Kings*, about medieval Europe
- *Hearts of Iron*, about the World War II
- *Victoria*, about the Industrial Revolution

Paradox Interactive is a video game publisher and parent company of Paradox Development Studio. It has published titles such as *Magicka*, *Mount and Blade*, *A Game of Dwarves*, and *The Showdown Effect*. It has around 90 employees, and was founded in 1998. Paradox Interactive mainly publishes games for PC and Mac.

2.2.1 Paradox Plaza Forums

Paradox Interactive has a very loyal and active user community, which is mostly centred at the forums on their website Paradox Plaza. The forums have over 500,000 members which have written over 15 million posts in over 600,000 threads (Paradox Plaza, 2013). The Development Studio are known to create games which complexity warrants a forum where players can learn from and cooperate with each other.

2.3 After Action Reports and Let's Plays

After Action Reports (AAR) are stories told through text and images. These AAR's are either straight retellings of the events of the game, or include other elements, such as dialogue between imagined characters. This allows people who have a hard time understanding and playing the game to take part in it as readers of the AAR.

Let's Plays (LP) started out as long posts on community forums featuring screenshots from a game and written comments, but they have changed over time. A modern Let's Play is often a recorded video of a game playthrough with the player giving oral comments throughout the video. An example of a video Let's Play is shown in Figure 2.1. They are often used as entertainment due to various reasons: the game is not available to the public yet, people cannot afford the games, they find the commenter entertaining, or that it requires less time and energy than playing the game yourself. They are also used to teach strategies and to improve player skills, as well as showing secrets contained in the game.

2.4 Previous work

In this section we present games and projects that has had some impact on our concept design.

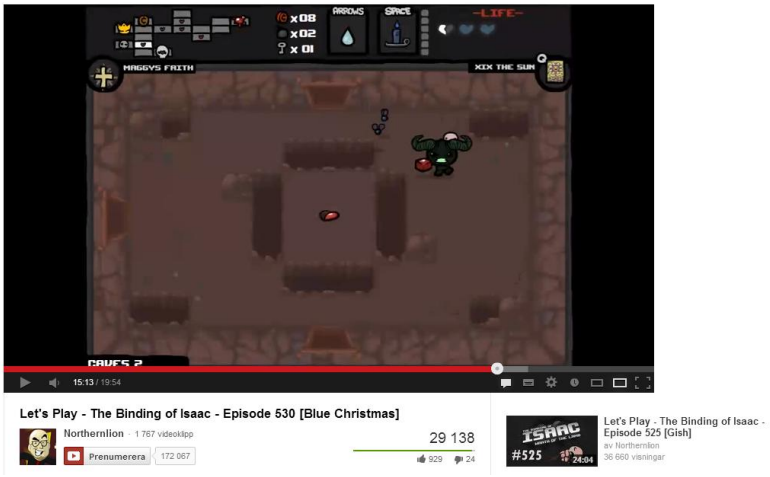

Figure 2.1: Screenshot of a video Let's Play of The Binding of Isaac uploaded to YouTube

2.4.1 Relevant games

Games have always had the potential for telling emergent stories, and below some relevant titles are described, that either allow for emergent stories to form, or attempt to summarize a certain time spent playing the game.

Crusader Kings II

Crusader Kings II is a grand strategy game released in 2012 and developed by Paradox Development Studio, and a sequel to Crusader Kings which was released in 2004. The game simulates medieval European history between the years 1066 and 1453. You play as a succession of characters rather than a nation state, starting at a location and on a date of the players choosing.

The gameplay centres around acquiring titles and power through intrigue, war and diplomacy. Since your player character will die and pass on titles and player control to the player character's heir, marriage and inheritance laws are important aspects to manage. As the player takes on the role of a feudal lord, managing the opinions of their vassals is also very important in order to avoid rebellion. All characters have attributes that affect the gameplay. When your ruler dies and has a legitimate heir of the same dynasty, that heir will inherit the lands and carry on with your legacy. Player control will then transfer to this heir. When your ruler dies and that ruler has no legitimate heir, the game is over.

Crusader Kings II is a game without any explicit winning conditions, and the players decide their own goals in the game. There exists a scoring system which allows players to compare their success to historical dynasties. This usually centres around the acquisition of territory and conquering of provinces, either through warfare or by marriages and alliances. The open-ended nature of Crusader Kings II, together with its complex character simulation, creates many interesting player stories.

Figure 2.2: *Crusader Kings II* gameplay

Dwarf Fortress

The full name of this game is *Slaves to Armok: God of Blood Chapter II: Dwarf Fortress* (2006), but is commonly called *Dwarf Fortress*. The game is a fantasy city-building game which went into alpha phase and was released to the public in 2002. The combination of an extremely complex menu system and only textual graphics gives the game a very steep learning curve. This steep learning curve means some players may not want to play the game. However, players who are interested in the stories can take part in them by reading other people's stories.

By creating a lot of interesting content, but not making it readily available for most players, Dwarf Fortress is a really popular game to make After Action Reports or Let's Plays about.

Starcraft II: Wings of Liberty

Starcraft II: Wings of Liberty is a real time strategy game, shown in Figure 2.4 created by Blizzard Entertainment and was released in 2010. It is a popular e-sports game, and the games is very gameplay-focused. The game features a post-game information screen after each match, shown in Figure 2.5. This screen contains detailed information about the match, including units and buildings built, and graphs of how large each player's army was at a specific point in time. Players may also watch recorded Starcraft II matches. Both visualisations of the game is used to analyse and improve the player's skill.

Sid Meier's Civilization

Sid Meier's Civilization is a series of turn-based strategy games, shown in Figure 2.6, although the series is more commonly known simply as the *Civilization* series. Players

Figure 2.3: *Dwarf Fortress* gameplay

Figure 2.4: *Starcraft II: Wings of Liberty* gameplay

choose a civilization to play throughout human history. After that they try to win the game by achieving one of many victory conditions, such as conquest or technological domination. Since *Civilization III* (2001), there is an end screen where game session is visualised with a time lapse of the game world that the player can control freely, shown in Figure 2.7. This results in an extremely clear visualisation of the player's progress in the game with a focus on the conquering mechanics of the game.

Figure 2.5: The end-game screen of *Starcraft II*, where the player can learn more about the match

Figure 2.6: *Civilization V* gameplay

Age of Empires II

Age of Empires II (1999) is a real time strategy game, shown in Figure 2.8, where players try to best one another at building the most powerful historical empire and defeat their opponents. It includes an area chart, shown in Figure 2.9, in the victory screen where players can compare their armies and see a bit more information that might tell them why the game ended the way it did, for example when the players reached a new technological age (an important gameplay mechanic in the game). This gives the players a simple temporal overview of the game session, even though it doesn't give any geographical information. It also shows the most important points of time and visualises an indirect cause-effect relation, where players can see when and what player choices pay off. This creates an opportunity for players to reflect and improve their gameplay.

Figure 2.7: The end game time lapse of *Civilization IV*

Figure 2.8: *Age of Empires II* gameplay

Europa Universalis III

Europa Universalis III (2007) is the third game in the critically acclaimed Europa Universalis series, and is shown in Figure 2.10. It is a grand strategy game developed by Paradox Development Studio and was released in 2007. The player chooses a country to play as, and then it is up to the player how to play the game, whether to wage war, trade, or form political alliances. The game features a chronicle system at the end of the game, as shown in Figure 1.2, which summarises all the achievements of the rulers of the nation the player chose in the form of computer-generated text. This gives a ruler-to-ruler overview of the game session.

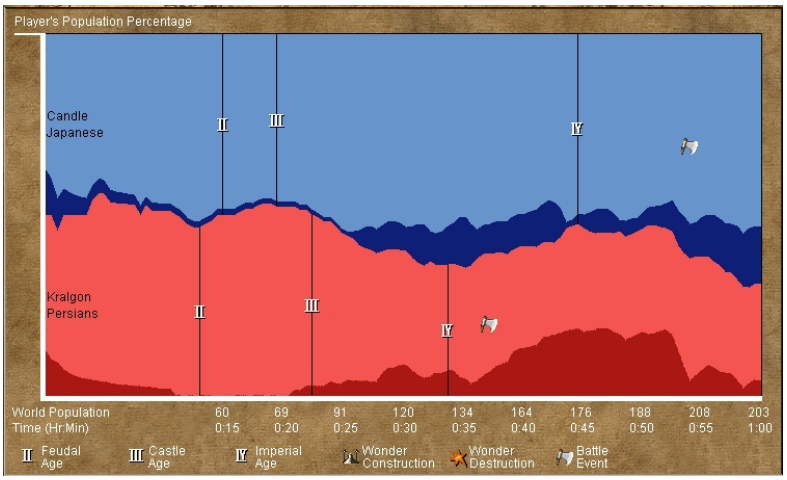

Figure 2.9: The end graph of *Age of Empires II*, showing a comparison of each players score, as well as important events

Figure 2.10: *Europa Universalis III* gameplay

The Sims 3

The Sims is a series of games which was developed by Maxis and published by Electronic Arts. *The Sims 3* (2009) shown in Figure 2.11 is the latest installment, and was released in 2009. Being more of a virtual dollhouse than a game, The Sims revolves around taking control of a virtual household. The characters, called Sims, live their lives, have jobs, get married, and so on. Because there is no set end goal, and a lot of options for customization, The Sims 3 is a very open game with many possibilities for players to

create their own stories. The Sims 3 also includes a family album feature, which allows the player to take pictures of events that happen and look back at them at a later time.

Figure 2.11: *The Sims 3* gameplay

2.4.2 Other Relevant Products

There are other areas than games that try to present information over time, which were also sources of inspiration for the concept design.

Chronozoom

Chronozoom is an interactive timeline that displays a relatively detailed version of the history of the universe, shown in Figure 2.12. The Chronozoom project demonstrated two especially interesting features:

- A smooth zooming functionality that zooms towards the mouse cursor. This prevents the user from becoming lost while zooming in the temporal view. The user gets direct feedback on the zooming motion, which makes it possible to keep track of the origin and the destination of the movement.
- Zoom buttons which lets the viewers quickly navigate through the timeline. Press a button and the associated timespan will be displayed in the window. The zoom buttons also clearly displays where a timespan starts and ends, which gives the viewer an understanding of the magnitude of the timespan.

League of Legends patch note timeline

League of Legends (2009) is a multiplayer online battle arena game which has a patch note timeline on their website. This patch note timeline, shown in Figure 2.13, is a good

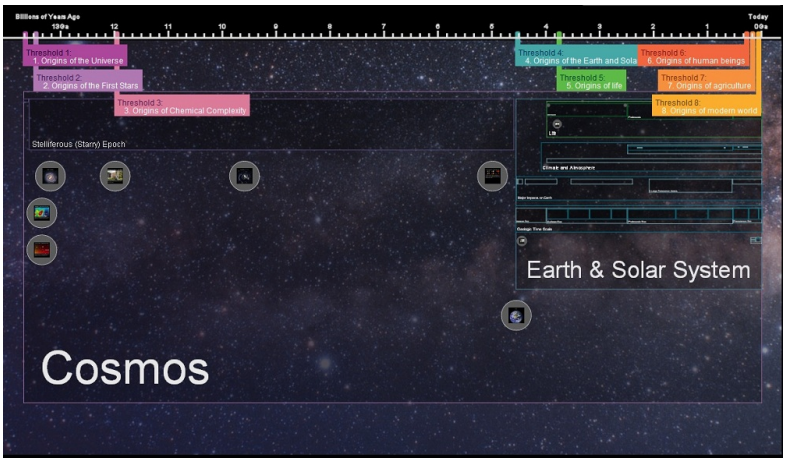

Figure 2.12: *Chronozoom* screenshot, showing how different periods are shown with varying level of detail

example of how you can arrange and structure a timeline. Some interesting aspects are the reserved space at the top for important information, and the possibility to click on events to see a more detailed description in a lightbox window.

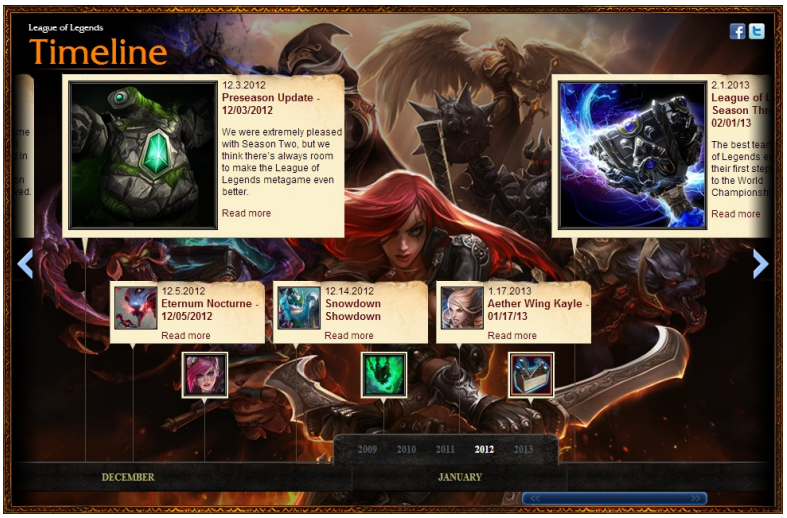

Figure 2.13: Patch notes timeline in *League of Legends*

Facebook timeline

Facebook is a social network site, where users can chat with their friends and upload pictures. The primary way of communicating is by posting text and images on your wall, which is your personal space. In 2012, Facebook introduced the Facebook timeline, shown in Figure 2.14, which shows all the events and wall posts a user has made on a

timeline, allowing users to look back to their time at Facebook.

Figure 2.14: The *Facebook* timeline shows what a user has posted in chronological order.

3

Theory

In order to understand the context of our design, we here summarize stories in games, emergent narratives, and visualizations of history and temporal data.

3.1 Game design theory

Below, we discuss the subjects of stories in games, and the concept of emergent narratives. We also discuss how to support emergent narratives in games, so that what aspects of a game's design can be supported to create a tool to highlight and track emergent narratives.

3.1.1 Stories in games

Narratives and modern video games have always had a problematic relationship. This relationship has been discussed at length in the debate between ludology and narratology. Stern and Mateas (2005) sums up the debate as the discussion of how games and narratives combine or overlap, or if they do at all. The purist ludology perspective is that games and narratives are completely separate entities and that narratives have no place in games, while the other end of the spectrum argues that games and narratives are intimately intertwined. The largest concern of the debate is that of player agency: how can a game be said to support player agency and expression if events are predetermined by the narrative? Granted, such a question implies a myriad of assumptions, such that narrative implies a fixed order of predetermined events, or that player agency and expression are the most important aspect of games.

While the focus of this thesis is not this debate, what has surfaced in this debate is that there are storytelling problems inherent in games. Adams (2013) presents three principal problems in storytelling in games: the Problem of Amnesia, the Problem of Internal Consistency, and the Problem of Narrative Flow.

The Problem of Amnesia is common for many media besides games, and can be said to be the problem where the audience does not know the story's world, rules or characters. Traditionally, there are many storytelling techniques to deal with this problem. Games have an additional problem in that they also have to introduce what actions are permitted and which are not available.

The Problem of Internal Consistency is one of the challenges central to the ludology versus narratology debate: the player's actions could potentially cause characters or the world to become inconsistent. For example, in GTA4, Nico Bellic in cut-scenes expresses a lot of regret after he kills certain character, while Nico Bellic outside cut-scenes can, if the player so chooses, act like a homicidal maniac. Adams writes that this problem can be solved by not assuming total player freedom, and putting some responsibility on the player to stay within the fiction of the game, i.e. engaging in role-playing. Role-playing could then be said to be a part of the suspension of disbelief for games. While role-playing can alleviate the discrepancy between gameplay and story, many players find it hard to role-play, according to Dormans (2006). These players may instead choose to play optimally, or decide to play around, finding glitches or setting up humorous situations. Dormans argues that a good game balance that has many interesting decisions promotes role-playing; even if there are no goals, each choice would then be interesting and potentially character-defining.

A problem of role-playing is the fact that many people will role-play a character very similar to themselves. Griebel (2006) describes a psychological study where it was shown that The Sims players will generally create and play their avatars very close to their own goals and personality. While this might not strictly be a problem, this phenomenon can reduce variety and replayability, and mean certain gameplay paths may only be explored by a small minority of players.

The third problem described by Adams, the Problem of Narrative Flow, is the fact that stories need certain events to happen in a certain order to be engaging. Traditionally, narrative events have been predetermined and players have little or no effect on the outcome. In some games, to step outside the narrative events was either impossible or associated with a game over. The extreme case would be games like *Dragon's Lair* (1983), which are little more than interactive movies. In other games, the game patiently waited for player action, despite in-game characters saying that the situation was urgent. Adams suggests creating worlds where the limitations of actions is not apparent. For example, no one expects to be able to plant flowers in a WWII shooter. He further suggests having procedural plots which adapt to player actions. These plots could unfold regardless of player action, and many smaller plots could unfold at the same time, reducing the problem where one story may not reach its dramatic resolution.

What Adams solutions exemplify is that what makes games strong is their interactivity, and that the story should serve gameplay. For example, rather than having a set narrative, the game should have a story world that allows for emergent stories to appear. A large part of such a design would then have to capitalize on emergent gameplay. Dormans notes that games with high emergent narrative potential, such as role-playing games, are more focused on paidia (unstructured play) rather than ludus

(structured play). Therefore, there can be said to be two categories of emergent gameplay: ludus-oriented emergent gameplay might involve meta-gaming and gambling, while paidia-focused emergent gameplay would be more focused on exploration or emergent narratives. Games that focus on paidia rarely have any end goal, which means the player is free to create their own goals, allowing for freer creation of player stories.

3.1.2 Emergent narratives

Emergent narratives can then be said to be events that happen in games, that can be combined into a compelling telling of a story. For example, the story of a civilisation's rise to power in a game of Sid Meier's Civilization can be a compelling story, even though it does not rely on pre-determined events (although it does depend on pre-created elements and systems). Juul (2005) defines two different categories of games: games of emergence, and games of progression. Games of progression are heavily dependent on pre-created narrative elements such as cut-scenes and snippets of text to convey the fictional world of the game. Games of emergence are focused on the rules of the game, and the world of the game may be completely abstract, as in the case of games like *Tetris* (1984) or *Go*. Emergent narratives are distinct from machinimas, which use the assets of a game to create pre-written stories. While these kind of stories are not as tightly controlled and may not lead directly to dramatic moments, they have certain qualities of their own. Sorens (2008) presents three of these qualities:

- Emergent narratives invests the player in their actions since they have tangible and emotional effects
- Players can look back on a created story and feel a sense of achievement
- They can share their unique experience with other people

While these aspects can be present in a game with a set narrative, Sorens argues that they are certainly stronger in a game with a more emergent narrative. In addition, Juul (2001) does note that just the knowledge of there being different paths through a narrative can enhance a player's investment with a game.

That being said, there are of course many problems of creating emergent narratives. Sorens acknowledges that most players are not aware of the story they are creating, or do not value it as much as a traditional game narrative. He also identifies that the player often has difficulties knowing why something happens, and the effect of their actions later in the game. Warren Spector (McNamara, 2004), designer of Deus Ex, has said that while there are advantages of free-form narratives in games, the audience is often more used to and appreciate a linear narrative. In a more chaotic free-form game, finding the highlights of the game and presenting them to the player can be difficult. Of course, crafting a system that generates interesting stories can also be extremely challenging.

Another problem with fictional worlds in games is that players may ignore them in favour of gameplay. Juul (2005) provides an example of Quake III Arena players who started to turn down graphics settings in exchange for frame rate and clearer information.

As players got more skilled, they valued gameplay advantages over graphical, and by extension story world, fidelity.

3.1.3 Supporting emergent narratives

When seeing the qualities of emergent narratives, one could ask what elements of a game's design support the creation of emergent narratives. As one would expect, the themes and events that can be expressed by playing a game is related to the actions available to the player. Juul (2001) provides an example in the role-playing game Dungeons and Dragons. Because of its mechanics, Dungeons and Dragons is ill suited to tell stories not focused on combat or high fantasy. A game designer could carefully select the kind of actions available, and the emergent narratives possible can then to some extent be predicted. Sorens argues that dramatic stories can be crafted by using the goals of the game, taking the player through the phases of "incitement, rising action, climax, falling action, and denouement". Furthermore, Sorens (2008) argues that the emergent narrative can be made stronger by having emotional rather than gameplay-related goals, such as "Collect 100 Philistine foreskins in order to marry the King's daughter" rather than "Collect (or kill) 100 foozles".

Abstraction can also be a powerful tool in creating emergent narratives. The human mind seems wired to construct stories and patterns even if there are none. Therefore, a degree of abstraction can often be advantageous in games that want emergent narratives to appear. Frasca (2001) present an example of this from The Sims: The sims speak simlish, which is basically gibberish. Even so, they provide symbols and icons in their speech bubbles, which allow the player to fill in the blanks. By anticipating and making full use of this kind of abstractions, the game can let the player explain the behaviour of the sims, even in the cases where they act irrationally.

An active player community is also very important in games that support player storytelling. Frasca describes how players of The Sims can save their stories in the family album feature of the Sims, and then be shared online. Heliö (2005) identifies the photo album in the Sims as the kind of tool that allows players to create narratological structure from a sequence of events, and to create an emotional connection to those events. The Sims community is also a large part of the entire experience, and sharing your experience with an active community is a large part of a memorable player experience (Simons, 2007). In addition, Simons also notes that how engaging a game story depends on how familiar the reader is to the game or the story world.

Many games that strive for emergent narratives seem to take a less game-like approach: less focus on ludus, and special emphasis on paidia-oriented emergent gameplay. An example would be the difference between the game X-COM: UFO Defense and its spiritual successor XCOM: Enemy Unknown. The more recent game's designer, Jake Solomon, said the original game was more unpredictable and therefore had "higher highs" and "lower lows", because it was more of a simulation than a game. These "higher highs" would correspond to more memorable events to be incorporated into an emergent narrative. However, the "lower lows" may be unfair losses or boring passages of time. As such, a more restricted, less simulation-like design might not make for more interesting

story.

Still, there is the problem of downtime, or as Juul (2005) calls it, "dead time", where the player has to perform unchallenging or boring tasks, or just wait. In traditional media, boring sections are cut away from the story, as there is a difference between the time that passes in the story world, and the time that passes in the actual narrative (Juul, 2001) Games such as X-COM tries to alleviate this by allowing the player to fast-forward through some parts of gameplay. There are however another kind of "lower lows", which are moments of unfairness caused by the random or complex nature of the simulation. Juul (2005) observes that a classical tragedy like Shakespeare's Hamlet would be less suitable as a game since the outcome of the story is tragic, and the fictional world of a game is a large part of player motivation. While it is likely that most players would not want to play an unfair game, the tragic stories based on games of Dwarf Fortress or roguelikes proves that as long as the player is more focused on being immersed (adopting a more paidia approach to the game), unfairness and tragedy can be a huge contributing factor in creating emergent narratives.

Even so, rich simulations may not be the only way to create emergent narrative. Juul (2001) argues that rules must be simple in order to avoid players only trying to play optimally, at least in the case of tabletop role-playing games. Even so, the rules in tabletop role-playing games can always be altered by the game master, suggesting that simple surface rules which is layered on top of an interesting simulation (either simulated by a game master or a computer) would be a good way to construct games that create emergent narratives.

Juul (2005) also introduces the concept of a "retelling test" to see if a game's fictional world is incoherent. If a player cannot retell a series of events without using gameplay terms, the world is incoherent. For example, the fact that players cannot explain why Super Mario has three lives in the context of the fictional world means that the world is incoherent. While a coherent fictional world is not necessary for an interesting emergent narrative, the resulting stories will certainly be more understandable to players that have not played the game as much.

The goal for any game design that strives to capitalize on emergent narratives could then be summarized as:

- Create memorable moments, through paidia-oriented emergent gameplay
- Present these moments to the player, and make players aware of cause and effect
- Summarising the story, and allow the players to fill in the blanks
- Allowing this story to be shared, to an active community
- Having a believable fictional world, allowing the story to be appreciated by more people.

3.2 Information visualisation

Since the purpose of the thesis was to show the history and temporal data of an emergent narrative, both historical visualizations as well as more modern visualizations of temporal data is described below.

3.2.1 Historical Visualisations

As this task of summarising player stories requires a good visual display of information, it was important to find good examples and theories surrounding showing temporal data in an understandable format.

History books and visualisations made by historians are a good starting point to look at visualizations of temporal data. The majority of these visual representations were compiled by Rosenberg and Grafton (2010). What is clear from Rosenberg and Grafton is that medieval attempts at recording history was very influenced by medieval thinking, and many recordings of history were financed by rulers who wished to trace back their lineage to legendary or religious people. Others were very creative representations of time, such as in Figure 3.1, where a dragon's different body parts represent different periods of history. These kinds of visualizations can be problematic since they are very hard for a computer to create, even if they may have a pedagogical edge over more generic visualizations. Other examples of recording history was much more focused on tables, such as Phrygio's book in Figure 3.2, which made it hard to find important events or interesting periods, since every event was represented by a short text.

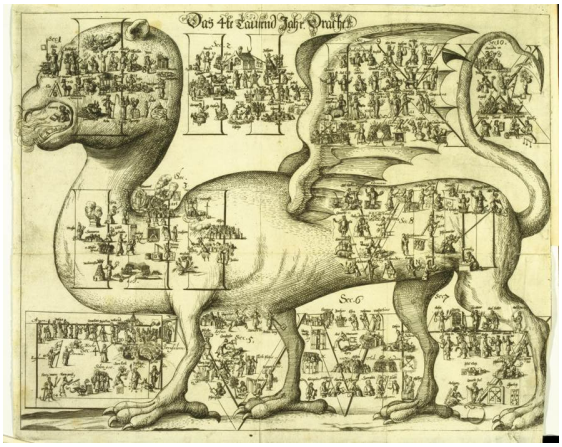

Figure 3.1: This dragon represents history, and each body parts represents an era. Physical metaphors made these drawings pedagogical tools, and aided memory (Rosenberg and Grafton, 2010).

More modern visualizations, such as The Histomap shown in Figure 3.3, have a more clear overview of history. The use of colour and information visualization techniques such as area charts provide a clearer view of history. While there are many examples of these types of visualizations, they are often focused on the territorial gains of countries

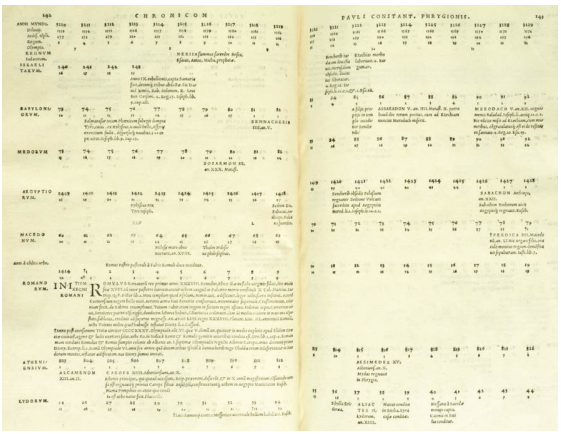

Figure 3.2: In his 16th century book, Phrygio describes historical events in a tabular layout. The reliance on text means that major events such as the Crucifixion are hard to find (Rosenberg and Grafton, 2010).

that were viewed as modern nation states. The nuances of feudal relationships, elective monarchies, or personal unions of states is hard to show, as is the fact that a culture or civilization's importance is hard to map to one variable such as land area or population size.

3.2.2 Visualisations of temporal data

Perhaps the biggest drawbacks in these traditional visualisations are that they are non-interactive, and that the data they are based on is fixed. Modern visualizations of data are much more interactive, such as the case of the patient lifelines described by Plaisant et al. (1998).

Here, each patient record is shown as a number of vertical lines, each representing a period in a patient's life, where she may have had a certain disease or have been smoking. Many visualizations of time use so called Zooming User Interfaces (ZUI), where users can show more or less detailed information by zooming in or out. This kind of dynamic changing of the level of detail has been called semantic zooming (Bederson et al., 2012). Perhaps the best known example of this paradigm is the zoom-level aware search function of Google Maps. This kind of infinite-canvas approach can also be combined with multiple views of the same data, as shown in Figure 3.4.

Another way to cope with large volumes of data is the concept of fisheye views of data. Instead of showing a homogeneous zoom level across the entire screen, the middle of the screen is more zoomed in and shows more detail than the sides of the screen. This kind of view emulates the effect of a fisheye lens for a camera, and can be both 2-dimensional (distortion on all edges) or 1-dimensional (distortion on just opposing edges). Both kinds of fish-eye are shown in Figure 3.5 and Figure 3.6. Sarkar and Brown (1992) argues that fisheye views are advantageous since they show both local detail and larger context, while not requiring constant zooming or multiple views. Fisheye views

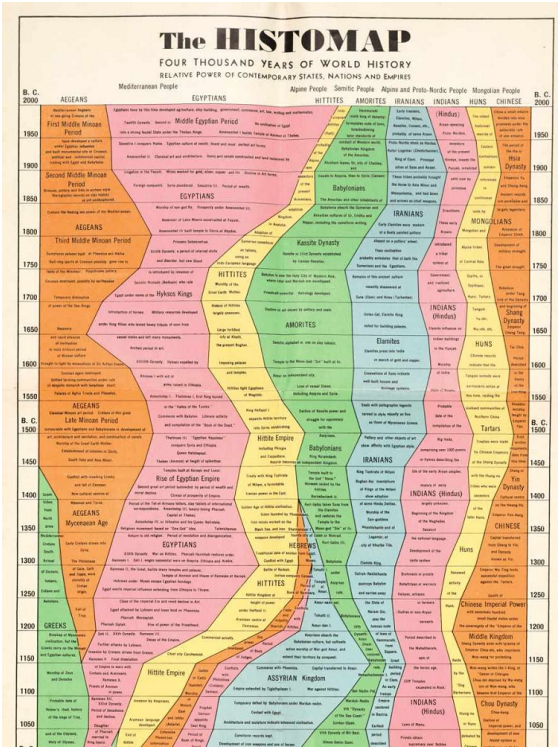

Figure 3.3: In John Spark's Histomap, the rise and fall of historical empires and peoples are shown by the width of their graph as it moves downstream through time (Rosenberg and Grafton, 2010).

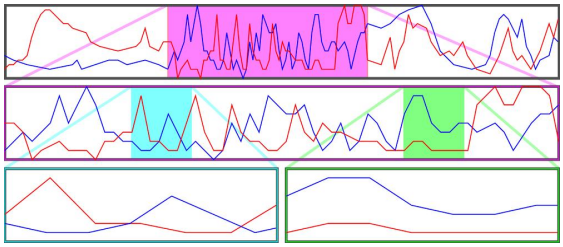

Figure 3.4: By stacking multiple views on each other, the zooming interface is supplemented by multiple views. (Javed and Elmqvist, 2010)

are not limited to 2-dimensional graph or positional-data, as shown by Furnas (1986). In Furnas paper, the fisheye principle is applied to computer code, which is more 1-dimensional in nature. Furnas utilizes the fact that computer code is hierarchical in nature, and hides certain parts of the code if it is too far away from the current focused code. Sarkar and Brown acknowledges Furnas work as fundamental, but also observe that this kind of fisheye view is suited for the rigid and discrete structure of code. For more continuous data, a smoother fisheye view is often more suitable.

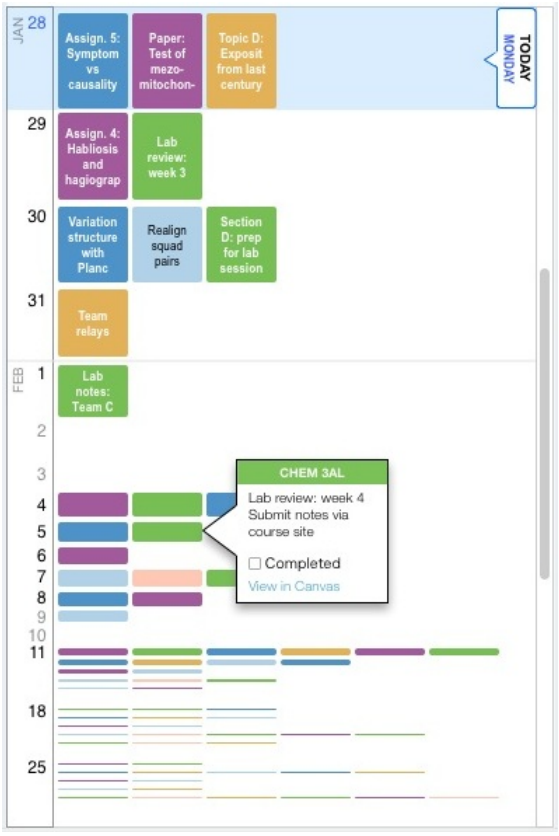

Figure 3.5: A Fisheye view of a calendar, where the currently selected date is the focus of the fisheye (cropped) (Hollowgrass, 2013).

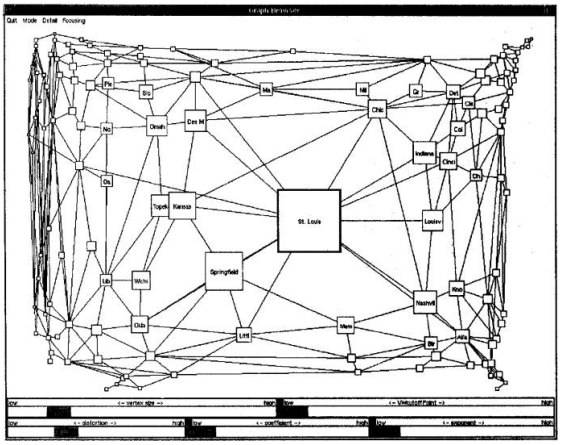

Figure 3.6: A fisheye view of a graph showing the positions and distances between cities in the US (Sarkar and Brown, 1992).

4

Methodology

The overall focus of the design process was to implement a digital prototype. While other data collection and evaluation methods exist, it was important to evaluate how the interaction with our design would work in a real setting. Even if the digital prototype was not complete, it would allow us to test the most common ways to interact with it. In order to develop this prototype, several other data collection and prototyping methods were used, and they are detailed below. The early part of the process was very focused on the design, while later parts focused on implementing the digital prototype and testing it with users.

4.1 Questionnaires

One way to acquire quantitative data about users is to use questionnaires. Questionnaires consist of a series of questions that are given to potential users or other stakeholders, often in person, by phone, or online (Rogers, Sharp, Preece, 2011). A large problem with questionnaires is that the wording of questions can influence the answers. In addition, Nielsen (2004) recommends that online questionnaires should be short, as online users attention span is very short.

4.2 Personas

The information from the questionnaires and interviews helped in the creation of personas. Personas are imagined persons based on collected user data. They help designers make the collected data more concrete, and also make the design focused on a certain person instead of trying to appeal to everyone (Chang, Lim, Stolterman). Personas can however be problematic as they can be too vague.

4.3 Paper Prototype

Paper prototypes allows designers to quickly test ideas, and also to easily involve the user in the design process with something concrete. Nielsen (2003) estimates that it is 100 times cheaper to make changes if no code has been written, and that the design decisions made early have 10 times the impact compared to decisions made later. Paper prototyping is therefore a great way to reduce cost and design risk. In addition, as there is no technical barrier, the user can suggest changes and play around with the prototype. Paper prototypes cannot however test all kinds of behaviour and functionality, and testing beyond a fixed list of tasks is difficult.

4.4 Paper prototype interview

Holtzblatt, Wendell and Wood describe paper prototype interviews as two-on-one interviews where the focus is the observation of user behaviour as he or she performs tasks. If a suggested design change comes up, the prototype is changed and tested again. One person conducts the interview, while the other takes notes (Holtzblatt, Wendell, Wood). The semi-structured interview format allowed us to ask a few fixed questions, but also have more abstract questions to discuss (Bernard, 2002). Nielsen (2010) describes two pitfalls with user interviews: users misremember, and they cannot predict future use.

4.5 Digital Prototype

While much work had to be devoted to the actual implementation, the focus of the thesis is to evaluate techniques for supporting players creating their own stories. Snyder (2004) suggests that paper prototypes are impractical if the user wants to perform his or her own tasks. Since the thesis aims to observe real use, a digital prototype was not as restricted as a paper prototype.

4.6 Observation with Think-Aloud

This user testing method consists of observation of a user performing tasks while asking her to vocalize her thoughts by thinking aloud (Rogers, Sharp, Preece, 2011). This kind of test is often conducted with one person sitting behind the user and takes notes, while another person asks the questions and provides the tasks for the user to perform. By asking the user to think-aloud, one can get a clearer understanding of his or her mental process. However, as Nielsen (2012) describes, thinking aloud can be problematic because users are not accustomed to stream-of-consciousness talking while working on a task. Therefore it is important to prompt and remind the user to think-aloud.

5

Project Plan

This master's thesis was carried out over a period of five months (20 weeks). The initial plan was divided into three phases: a preliminary study, an implementation phase, and a final phase where this report would be completed. A rough time plan of the project was created and approved, which is presented below.

5.1 Preliminary Study

For the first month of the project, we planned to conduct preliminary studies, including literature studies and further preparation for the next phase of the project. Since these studies were location independent, we would stay in Gothenburg.

Paradox Development Studio develop their games primarily using C++, an object-oriented programming language. As we had little experience programming in this language before, we had to devote time to learning it. The literature study we conducted consisted of:

- Reading C++ books
- Looking at previous examples of visualizations of temporal information
- Reading academic articles regarding the subject of this thesis
- Researching historical retellings, such as battle reports in the form of maps

The purpose of the literature study was to assess the current situation and what had been done in the field of visualizing player-made stories in-game. Furthermore, as one of us had not played any of the games from Paradox Development Studio before, time had to be spent playing them.

At this stage of the project, we had not decided which game the add-on would be developed for, so this was also an important decision to make.

During the initial month, the concept idea for the planned prototype was planned to be clarified and developed. Paradox Interactive has a very active player community on their online forums which we wanted to research, to see if the forums could be a valid source of information for this thesis.

5.2 Implementation

The following three months was planned to be spent at Paradox Development Studio, in Stockholm. During these three months, a digital prototype was going to be constructed. The digital prototype would allow us to test certain features, such as mouseover effects, that are very impractical in a paper prototype, while also allowing us to observe more genuine use.

We made the choice to construct the prototype in the game engine, to better integrate the prototype into the game and to open up the possibility of fetching data from the game session. This will also create a look and feel of the prototype that matches the rest of the game. The largest drawback of creating the prototype in-engine is that it will be constrained to the possibilities of the GUI system.

Since an already existing game engine will be used in the implementation of the prototype, it will require time to get into the code base and to learn enough of the system to be able to implement the digital prototype. As the knowledge of the code base increases, so will the knowledge of possibilities and limitations of the GUI system and our digital prototype.

When a game had been chosen we planned to start to detail the design concept and start with low-level prototyping in the form of paper prototypes and digital mockups, to be able to user test the design. In the beginning we wanted to explore several different design concepts and variants, which later on would be narrowed down and sort away designs that did not fit our design goals.

As we wanted clear deadlines to work towards, we wanted to have weekly meetings with the supervisor at Paradox Development Studio, and a deadline one month into the implementation, where we will present how far we have come with the prototype.

The implementation phase in Stockholm will end with a final presentation at Paradox Interactive where we present the findings from our thesis.

5.3 Report writing

The final month was to be spent finalizing the master thesis report in Gothenburg. Some more user testing was planned to be done at this stage. After finishing the majority of the report, we planned to present our results to our supervisor at Chalmers, examiner and peers.

6

Process

In this chapter, we describe the work carried out during this thesis. Each sub-chapter describes the work performed during approximately two weeks.

6.1 Prestudy

The first two weeks were spent in Gothenburg, performing literature studies and creating the first questionnaire survey. Before the project started, we had spent some time to learn C++.

6.1.1 Initial work

Since we wanted to have a good grasp on both theoretical and practical work that had already been made that would be related to our thesis work, we started our design process by studying literature, games, and non-game applications and websites. We decided to focused mostly on summarizing the player story, and to some extent also looking and presenting the memorable moments and sharing the resulting story. We decided to stay away from the creation of these memorable moments, as it require modifying the game rules. In addition, we wanted to learn more about AAR writers by conducting a survey. We also continued working more on our project planning, since it was not detailed enough.

It should be noted that while this was the first work we did officially on the project, there had been talks on what the subject of our thesis should be both with our intended supervisor and Paradox Development Studio.

Early on, we also played Crusader Kings II together. While we had not decided on Crusader Kings II as our focus this early on, it was deemed the most accessible of all Paradox Development Studio titles. Even so, it is quite daunting to play the first time around, as the games are all quite complex and involve everything from warfare to technology.

After consulting with our supervisor at Chalmers, the next step was to find as much literature and references in order to learn as much as possible before starting to work on the project. We decided to primarily look for game study related papers, and papers from old courses at the interaction design master's programme. These papers would form a base, but we also looked into many other areas, such as general game design, game reviews, and news articles. Eventually, the theoretical information collected would form our more detailed design goals.

6.1.2 Surveys

Since we also wanted to collect our own data, we decided to distribute an online questionnaire on the Paradox Plaza forums

Conduction of surveys

In order to form our design goals and personas based on real data, we decided to conduct two online surveys, in the form of questionnaires. While the data we would collect was not strictly scientific, it gave us actionable information in order to understand what parts of a design would be more popular or fit user behaviour better. We decided to do the survey as soon as possible in the design process, since we would risk confirmation bias if we had already come too far and made too many design decisions. Using a finished design and testing it online would also be hard to do, especially if we wanted to communicate the interactive features of the design.

Since we had little ability to change the questionnaires once they were sent out, we had to make sure the questionnaires were tested. We had trouble finding Crusader Kings II players to test the survey on, so we decided to test it on interaction design students and teachers. The reason for this testing was to find problematic questions and wording before publishing the survey online.

Both surveys were published as forum posts on the Paradox Plaza forums, which is an internet forum for all of Paradox Interactive games, although the games by Paradox Development Studio are the most discussed. The questionnaires were powered by Google Docs.

One drawback of distributing the questionnaire online was that we could not figure out the participation rate for each survey. We could not use the forum view count, since some people may return to a thread, and some may just quickly look at the thread before moving on. We also could not reliably gauge the number of people that visited a certain sub-forum, only the total number of forum visits that day. Another problem was related to the fact that the survey was published on a forum: you get strange responses on the forums, and it is hard to know if someone is making a poorly executed joke or if they are serious. We did not really want to answer the comments we got on the forums for fear of introducing bias, but we still had to keep the thread alive and not seem rude.

First Survey

The purpose of the first survey was to get a better understanding of the writers of AARs on the Paradox' forums. Even though we were not developing a tool that was to be explicitly used by AAR writers, their viewpoint is important. How people create their AARs is vital in understanding how people create their own stories in games, even though they might not share them with others. We wanted to start with a smaller study, in order to collect information to make a better, more quantitative second survey.

Important to learn from the questionnaire was how people think when they write an AAR. For example, we wanted to know what information was deemed important, how AAR writers work, and how important role-playing was to writers of AARs.

We also knew that since AAR writers would be more involved with the community, they would provide longer answers and have more patience with longer questions.

The survey was published on the Paradox Plaza forums, but private messages were also sent out to the writers of popular AARs on the forum, which was around 25 people. In order to get more general responses, the survey was not focused on any specific game. We therefore wrote that the questionnaire was part of a larger study with other games.

A detailed report of the survey is found in the Appendix B, but some important information can be summarized. Most respondents had a specific goal in mind when they started the game. The most important goals described by respondents were:

- Experimentation
- Optimization
- Personal challenges (promise to do X in Y years or before Z)
- Alternative history
- Having fun

It was also often the case that those people who role-played found it hard to abstain from playing optimally even if it would violate character consistency. In Paradox Development Studio titles, it seemed that conquering territory was the most common goal.

The survey also helped us identify three main categories of AARs: gameplay, history book, and narrative. Gameplay AARs are essentially guides how to play the game better. History book AARs are written in the style of a history book, and narrative AARs establish characters that react and take part in the events that happen during the game. What was common between all types of AARs is that they seemed to take a long time to write. Often AARs ended anticlimactically when the player's nation became too powerful. Another large factor that made people quit writing an AAR was when the writer would not find an audience on the forums.

While the answers from the questionnaire took quite some time to compile and fully understand, they gave us a good insight in how AAR writers think, and also gave us a basis for further questions in interviews and our planned second survey.

6.2 Concept Development

After two weeks, it was time to move up to Stockholm and Paradox Development Studio. Here we would continue our pre-study, develop our personas, and get to know the technology and people working at Paradox. We also worked on our three main concepts on how we would visualize the information.

6.2.1 Initial time at Paradox Interactive

After being introduced to the people at Paradox Interactive and its subsidiaries, we continued compiling the results of the first survey. After we had a good grasp on the data, we summarized our finding in a report that we handed to our supervisor at Paradox Development Studio. We were given a computer to work on at the office, with a new computer promised to arrive soon.

It was now time to choose which Paradox title we would develop our prototype for. Together with our supervisor at Paradox Development Studio, we decided upon Crusader Kings II. It was their most recent game, and was also stable and would not change much as we developed our prototype. However, the primary reason was that Crusader Kings II was very character-focused and the characters and their relationships made for interesting stories.

As we now had access to development versions of the Paradox Development Studio games, we found an intriguing, at the time unrevealed, feature. Victoria II, which is a grand strategy game about industrialism and colonialism in the 19th century, was going to implement a newspaper feature. A newspaper window would be shown to the player at regular intervals, which would include headlines taken from important events that was happening in the world. While newspapers would not be possible in the world of Crusader Kings II, it showed that there was an interest in showing emergent narratives. Still, our design was going to focus more on the information visualization. While a newspaper is closer connected to the fictional world of the game, it shows the most important events together with some articles that only contain flavour text, i.e. text that is not based on gameplay, but instead adds realism or details about the fictional world.

We also had access to Hearts of Iron III, a World War II grand strategy game. An interesting feature of that game was the battle planner, shown in Figure 6.1. The battle planner is a tool that allows players to draw arrows and lines on the map, in the style of maps of troop movements in history books. Just as in the case of Victoria II, this feature was interesting to us, especially since we could use the code to create interesting images. However, we found out that much of the code of Hearts of Iron III was incompatible with Crusader Kings II, so porting the battle planner would take more time than it was worth.

While we did not try to understand the entire code base of Crusader Kings II, we were primarily interested in how the message system works, and how events are created. When something happens in Crusader Kings II, and if this is interesting to the player, a message is shown to the player. This message may show up as a pop-up window, as

Figure 6.1: The battle planner in *Hearts of Iron III* allows players to draw arrows and lines on the map.

a small window in the game interface, or just written to a text log, shown in a part of the game interface. Whether a message is important of the player is determined by the message settings, which the user can change if he or she wishes one type of message to be shown in a more or less obtrusive way. Each type of message is also part of a category, such as military or religion.

6.2.2 Continued prestudy

At this stage of the process, we had to develop our design goals, personas and how our design would work on a basic level.

The personas we had discussed using before arriving at Paradox Interactive were now to be developed. We wanted the personas to be done as soon as possible, as it otherwise would have been easy to get stuck in how we as designers would view our design, and not how an end user might see it. After studying literature on personas, we started brainstorming based on the data we had collected from our first survey. We created four different personas: Christoffer, Jakob, Anna, and Jeanette which would cover most types of users to help while designing our prototypes and mockups. Christoffer was focused on gameplay and winning, Jakob cared about community, Anna wanted to understand all the game systems and experiment, while Jeanette wanted to write detailed AARs. Anna is shown in Figure 6.2.

During the brainstorming session, eight personas were created, but only four were deemed important or distinct enough. These four personas then took on aspects of the four discarded ones, if we deemed those aspects important enough. We also gave each persona an image and some background information, in order to view them more as real people. We did not base our personas on any demographic data such as age or gender. Primarily, this was because we did not have access to any demographic data, but we also did not want to get biased, for example by assuming all players of Crusader Kings II were male.

Figure 6.2: Anna, one of the personas developed in this phase. She cared mostly about exploring and exploiting the game systems.

We also investigated the possibility of getting statistics from the automatic play data that Crusader Kings II and Steam collects. However, this data was deemed too confidential for us to use.

After studying literature and historical visualizations further, we came to the conclusion that we had two alternative in showing temporal data. Either we could devote a positional axis to be a time axis (as in the case of timelines or graphs), or we could map it to change over time (as in a video or time lapse). We identified that the major problem with the time lapse was that it was not as easy to search through as a timeline, since only one moment in time can be shown. We also wanted the player to modify and add new events that happened in the game; doing this in a design focused on a time lapse would be more difficult. For example, we found that one can add status updates to the Facebook timeline at any date, which works very well. Doing the same in a time lapse format would probably have been less intuitive. The idea of having a timeline was also problematic, since it was hard to see the location of an event, or where a war is taking place. Such information would be very important for players who try to understand why something happens. The main difference between using a timeline or a time lapse as a basis for our data visualization would be the focus on one of two things. In a timeline, the time that an event happens is more important, since you can clearly see

what happened before something else. In a video, the position of an event is clearer, since it can be seen in relation to all other events happening at the same time.

In order to evaluate our different visualizations of the temporal data, we created mockups of our designs, which are described in detail below. These mockups helped us understand how much screen space was available, and how different user interface elements interacted.

During this phase, we continued to work on the two basic visualization ideas, but we also wanted to start working on our second survey. This survey would target regular Crusader Kings II players. As we were also finished with our first survey, we asked respondents if they would be interested in meeting us for an interview in a later stage in the process. We also started looking for more players to interview, by posting on the forums but also sending private messages to Swedish speaking forum members. We decided to prioritize face-to-face interviews rather than performing them via telephone, since phone interviewees could not test our paper prototype. If we would not find enough people, we would have to perform some interviews over the phone or Skype.

6.2.3 Second survey

The purpose of the second survey was to use the data we had gathered from the first one to do a shorter survey that would reach more people. The people we targeted was now Crusader Kings II players, but not necessarily people who were interested in AARs. We wanted to learn how they thought about and shared their stories. We were also curious about how players changed goals, and what goals they had, since we had ideas about tracking the personal goals of players in some way. The questionnaire was made shorter in order to maximize the number of responses.

In order to ensure a good questionnaire, we brainstormed ideas for questions based on the previous questionnaire, but also what we wanted to learn in order to develop our concepts. As before, the questionnaire was tested on teachers and fellow students before it was deployed.

With the second survey, we hoped to learn how the general Crusader Kings II player played. For instance, we wanted to know how many role-play their characters in Crusader Kings II. However, publishing the questionnaire on the forum would mean that most respondents would be more involved in the community and the game than the average Crusader Kings II player. Just as before, the questionnaire was posted on the Paradox Plaza forums, but now in the Crusader Kings II sub-forum, and we sent no private messages. We did not attempt to ban respondents of the previous survey from answering the second one, but we did post in the forum with a different account to lessen this effect.

Just as with the first survey, a detailed report is found in Appendix C. Still, some conclusions are summarized below. Around 100 people responded to the survey.

Most people cared more about role-playing and alternative history, although many also had mostly gameplay-related goals. About 7 in 10 role-played often or very often, which means that it is very popular.

As we had seen in the previous survey, boredom, not finding an appropriate challenge, or achieving their primary goal were the main reasons for feeling finished with their game.

Only about 15% said they played the game to its end year of 1453. Only a third felt satisfied when finishing a game session. It seems that people enjoy playing the game, but they are not always satisfied when the game ends.

About two-thirds shared their stories on the forums or to other people, and only 3% of the respondents wrote AARs. AAR writers are therefore a very small minority, as would be expected from the amount of work required when writing an AAR.

6.2.4 Forming design goals

After collecting some data and performing our game and literature studies, we started drafting our design goals, i.e. what needs we wanted our design to fulfil. Our design goals would allow us to make informed design decisions, although which design goal was most important changed as we performed more data collection. The primary purpose of our design was to make players more aware of the stories they create, and remind the players that the stories are interesting.

One of the most important goals of our design was that it should not take away narrative power from the player. While we could create some kind of representation of a player's game session, making it rigid and unchangeable would not make it very useful. Humans are far more suited for connecting the narrative threads, and it is the player, not the computer, that is the primary resource in creating interesting retellings of gameplay. For example, the results of our prototype should be able to be modified by the user, for example by removing certain parts, adding annotations, and so on. The computer should also help the player remember important events, and also allow the player to make annotations and notes in order to lower cognitive load and focus on gameplay. Possibly, the design could also help players get back into a game session which they had left for some time. The player should also have some say in how the data is gathered, perhaps by deciding which events are important. At the same time, the program could infer important events from how much attention is spent on them. One concrete way of doing this could be to measure the currently set game speed in games such as Europa Universalis or Crusader Kings II, since playing at high speeds suggests that nothing interesting is happening.

Another aspect that would be desirable in the final design would be some way to reinforce some kind of narrative structure. This could be done by finding and present out causal links, or trying to find and highlight dramatic situations such as those described by Polti (1924), such as Self-sacrifice, Abduction, Obstacles to love. The design should also support the player in setting her own goals, and upon failing or succeeding, show the player's success towards that goal. These goals could create a certain narrative sense, as the player's story has its ups and downs as goals succeed and fail. Completion of these goals could be supported by giving the player gameplay rewards, although since our prototype will not focus on gameplay details, this is not as important.

Presenting a goal steers the player towards a play style, which may be detrimental to the players power in creating their own story. It is easy for players in games like The Sims to just try to amass cash, instead of being more free in their goal formation. We decided not to provide the player with explicit gameplay goals, as it was outside the

scope of this thesis. Even so, it is important to be aware that goals is a large part of storytelling. One idea is a todo-list, which would be completely controlled by the player. It is a good way to keep the goals separate from gameplay, and invite players to think about their goals and the story they tell in a more structured manner.

Furthermore, we also wanted the design to allow the user to compare her game session with other players. The primary reason for this decision was that we believed that a story would be more compelling if the player would be aware of all the different things that might have happened, even with the same preconditions. The emergent narrative would become richer if the player is aware their experience is unique. Players could for example start in the same location and world, and then compare how their game sessions evolved and differed. One example of this is so called Games of the Month for Sid Meier's Civilization on the Civfanatics forums (Civfanatics Forum, 2013). A Game of the Month is when someone shares a save file for others to continue on in order to get the best score. In a historical game such as Crusader Kings II, one could also compare the player's world history to that of real world history.

One problem our design would hopefully solve is the fact that players are not always aware of the big picture. They are likely to get stuck in minute-to-minute gameplay, and focus more on playing optimally. While trying to play optimally is not necessarily a problem, it may diminish the importance of the fiction world of the game. One solution to this problem could be to present some retrospective information at a regular interval, so that the player is reminded of his part in a bigger picture. For example, each time a regent dies in Crusader Kings II, a short summary of his or her reign could be presented.

Another problem that was apparent in games such as Europa Universalis III is that computers are not very good at generating text that is enjoyable to read. Instead of trying to solve this rather complex problem, we decided we would focus more on visualizing the information instead. This is a task better suited to computers, and also is abstract enough that players can explain the data with their own words. A purely textual presentation leaves fewer blanks for players to fill in, which is important if the player wants to interpret events in their own way.

In addition, we had some constraints on our design. Since the design should support the player's stories, it is important that it does not break the fictional world of the game. Using metaphors from the modern world would probably feel out of place in the real world. For example, using generated newspapers like in SimCity would feel out of place in a game set in the middle ages. It could also mean that animations or interactive elements may feel out out of place if not done with care.

Another constraint is that since a lot of users like to share their stories, we had to make sure that the resulting files should be easy to share. Using simple text files and image files would allow players to simply copy their contents such as notes and screenshots and share online. Even so, it is not a major focus of our prototype, since the technical challenges and design risks are very small. Also related to this desire to share your story would be some kind of way to share the entire state of the game at a glance. This could of course also have benefits for the game interface itself.

6.2.5 Concepts

Working from our two basic ideas, timeline and time lapse video, we started creating basic mockups, quickly rejecting some ideas, and keeping others for more deliberate consideration. By using our design goals and personas, we could evaluate the concepts to see if they were viable. When looking at a medieval manuscript that depicted rulers portraits on a line, we created an alternative concept which we called lifelines. In addition to these three concepts, we had some ideas on how the main game interface could control which data was collected by the game. Each of the three concepts, and the ideas for collecting the data, is presented below. We decided to call the design we were working on the Chronicle, to stay within the fictional world of Crusader Kings II.

In-game Note and Data Collection

The basic idea of this concept is how the player would select data that would later be stored and presented to the user in one of the three visualization concepts. As such, it does not stand on its own and requires some way to present the data. In addition, the design challenges were determined to be quite low, so creating a prototype with this functionality was not as important as exploring the three visualization concepts.

There were two important features in this concept. The first feature is the ability for users to press a button to disable or enable a certain kind of event being shown in the Chronicle. This button would show up on message windows, whether they were popup or not. We wanted the button to be noticeable, but not too intrusive. It should not be in the way of players who only care for the gameplay, also it should be noticeable so that the feature is not overlooked. The mockups of how these buttons would look in the game interface are shown in Figure 6.3 and Figure 6.4. The second feature is shown in Figure 6.5. The idea was to use the alert icons in the game to show that the chronicle had been updated. This was to remind the player that he or she is playing a story. We were however a bit unsure if this would be too intrusive.

One aspect of the initial data collection idea is the ability to make your own notes while staying in the main interface. The user would open a small window where they could make a personal note on what was happening at the time. Also, the user can select certain events to go into the log, which would be a supplement to data that would be collected automatically. This means that the player has some narrative control, which was one of our main design goals. The note-taking would also help players in forming goals and remembering them. A problem with this approach is that players would require some additional way to make notes retroactively if they missed making a note.

Timeline concept

The timeline concept was one of the first ideas that was developed. It appealed to us because of its simplicity. Most people would be familiar with a timeline, where events are marked out in chronological order on a line. As we wanted the user to be able to tailor what information was shown, the user could expand flags that extended from each

Figure 6.3: An extra button in a pop-up message window allows users to add new events to the Chronicle.

event, showing more detailed information. In most cases, this information would be a short snippet of text of what had happened, although each flag could include other information such as maps or portraits of important characters.

The overall look of the timeline is shown in Figure 6.6. Flags extend from the main timeline, where events happen. The change of player character from one ruler to the next is shown in a larger flag. This flag is shown in more detail in Figure 6.7. In Figure 6.8 the area that is shown for when a ruler changes has been made larger to show more information. The larger size of these boxes would also split the timelines in more discrete chunks, which reinforces the character-focused and cyclical nature of Crusader Kings II. Even so, it might be intrusive, so we would iterate further on this part of the concept.

We also had some ideas of how we could integrate graphs in the timeline. For example, as shown in Figure 6.9, a chart could be shown behind the timeline. At this point in time, we considered showing the territorial gains of the major nations on this graph. Still, other data could be shown in the chart, and the user could perhaps choose which data to show. In Figure 6.10 we show an alternative version of the timeline where the graph has some space reserved for itself, since we were concerned that the graph would not be shown clearly if it was behind the flags.

In addition, we had some ideas on how to help the player navigate through history. In Figure 6.11, a miniature timeline is shown. The user can pan on this smaller timeline,

Figure 6.4: An extra button in a message window allows users to add new events to the Chronicle.

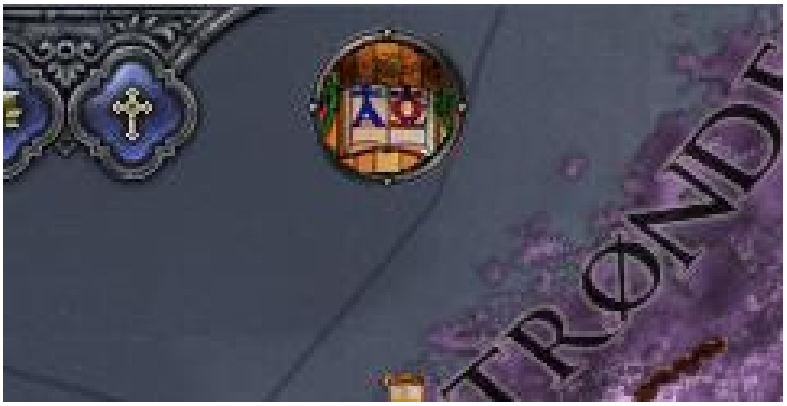

Figure 6.5: A possible alert that the Chronicle has changed.

or use it to get an overview of the entire timeline, akin to the minimap used in the actual game. The detail shown in the mockup is however probably not possible for a span of almost 400 years.

The greatest advantage of the timeline would be the temporal overview over a larger period of time. It would also allow players to easily add notes at any time, by simply clicking on the timeline. Even so, the timeline would have a harder time showing geographical change over time. The flags could contain maps of what the game looked like at that time, and the graphs could display geographic data in a limited way, but it would not be as visceral or detailed as a time lapse video of territories changing hands.

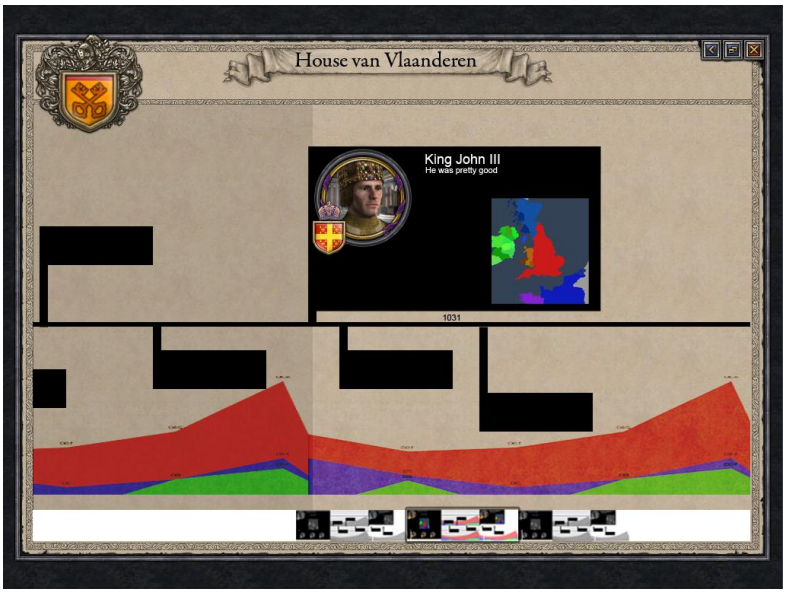

Figure 6.6: An overview of the timeline concept.

Figure 6.7: Cropped version of Figure X, where one can see the ruler flag which shows when a player changes ruler.

It would also be harder to compare your timeline to someone else's, as the events you choose to open might be very different from what another person chooses to open.

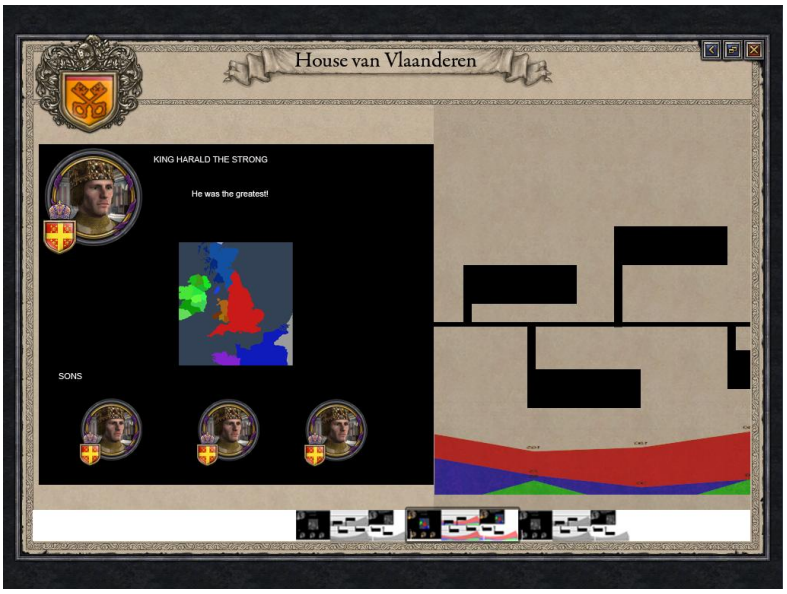

Figure 6.8: An alternative to the ruler flag, where the change in ruler takes up much more space, creating a break between rulers.

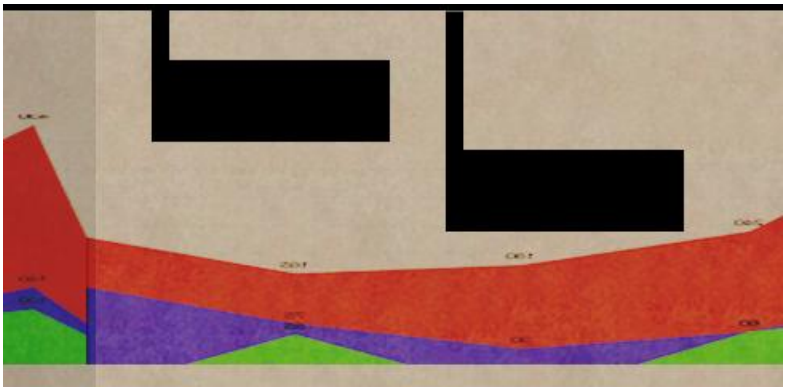

Figure 6.9: Example of how an area chart could be used in the background of the timeline to show quantifiable information.

Time lapse concept

The time lapse concept was inspired mainly by the kind of time lapse video shown at the end of the game the Sid Meier's Civilization series.

The basic view of the time lapse concept is shown in Figure 6.12. The player can control the playback of the time lapse on the left by using the speed controls in the top right, or navigate with the combined seek bar and area chart. This chart could also include icons for major events to help with navigability. The events that are recorded show up on the map, but also on the list to the right. The right area has tabs which allows the user to instead see statistics of their current holdings, or see another time

Figure 6.10: An area chart shown as a separate part of the timeline, which would make it easier to read at the expense of space.

Figure 6.11: A minimap of the entire timeline, showing where the user is at the moment, as well as allowing for navigation.

lapse video on the right, as shown in Figure 6.13. This time lapse can then instead show actual history or another savegame, allowing the user to compare his or her story, enhancing the feeling that the player's story is unique.

The time lapse concept is in some ways the opposite of the timeline concept. It is much more focused on the geographical data of the world, but at the same time it cannot show a temporal overview of a period of time. This concept would perhaps be more favourable in a game like Europa Universalis or Civilization rather than Crusader Kings II, since Crusader Kings II is more concerned with titles and characters. Territorial gains are not as directly related to player success.

The time lapse video seemed like a good way to compare two play sessions, to easily see what players did differently, or how their game session differed from real history. At

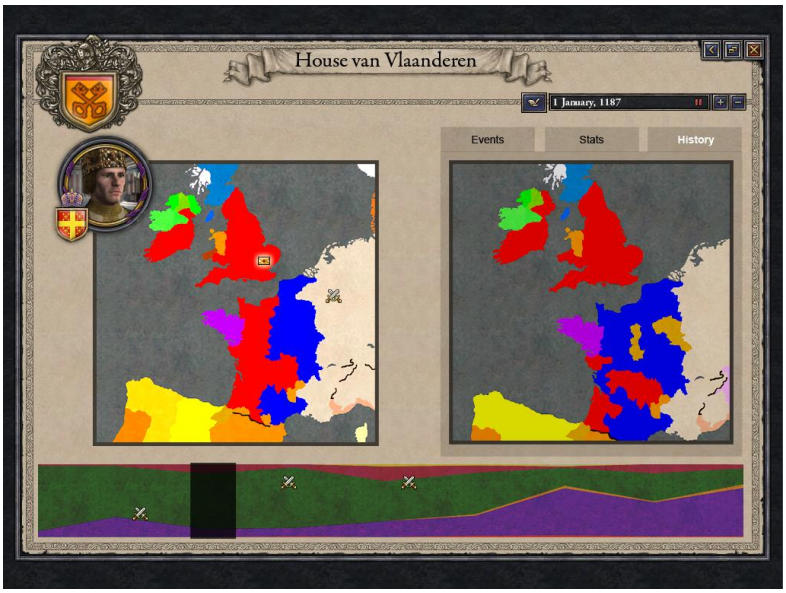

Figure 6.12: The time lapse concept, with the user comparing his playthrough with actual history or another players savegame.

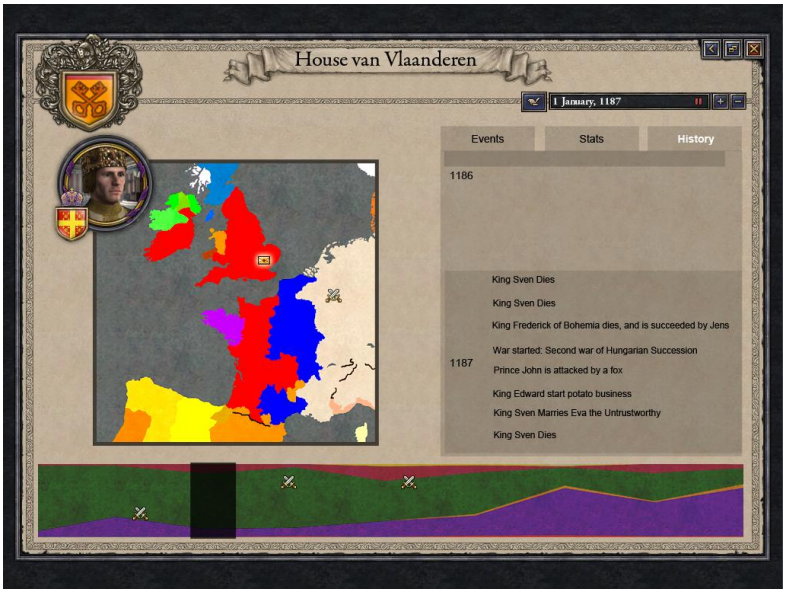

Figure 6.13: The time lapse concept also allows the user to see relevant events as a log.

the same time, taking a screenshot of a time lapse video would not be very informative since the dynamic nature of the time lapse contains a lot of information.

Even so, compared to the timeline concept it is much harder to make a note at a specific date, as you then have to navigate to that date using only the seek bar or the

speed controls. A time lapse would also not fit very well into the fictional world of Crusader Kings II, unless some kind of magical crystal ball metaphor was established.

Lifeline Concept

This concept was developed from two ideas. Firstly, we had found a medieval manuscript, shown in Figure 6.14, which we thought would work well in the fictional world of Crusader Kings II. Secondly, we knew the timeline and time lapse concepts lacked information about character interactions, which is a central aspect of Crusader Kings II. We started creating a mockup for this concept, shown in Figure 6.15. When we started working on this mockup we found that making this kind of visualization dynamic and change as the player played the game would be very difficult. The manuscript we based the concept on was written with all information already known and relatively fixed. Our visualization would change over time, as the player would look at it multiple times during play. Therefore, we decided to discard this idea, but the manuscript became our inspiration for the lifelines concept described below.

The character lifelines concept retains the line where each ruler is shown with a portrait. A mockup of how it would look is shown in Figure 6.16. There are also secondary lines running parallel to the rulers timeline. These represent the lifetimes of important characters around the player characters. When a character interacts with another, a vertical line is drawn between the two characters, and an icon shows what kind of interaction took place, as shown in Figure 6.17. The user could then move the mouse cursor over the icon to get a tooltip with more detail.

If the user wants to add a note, he can click on one of the horizontal or vertical lines. If there is room for a note, a semi-transparent icon is shown, as seen in Figure 6.18. This kind of functionality would also work in the timeline concept, although in this design, the user can specify which character he or she wishes to attach the note to.

The most important aspect of the lifelines concept is that it clearly shows character relations, such as character getting claims, declaring wars, gaining titles, and so on. This means that it would be clearer to see why a character behaves in a certain way. Just as with the timeline concept, the lifelines concept does not show geographical data as clearly as the time lapse. It would also be somewhat difficult to compare two players' game sessions, as there is no real map data.

The biggest problem with the lifelines is the fact that it has to change a lot as new data is recorded. A character that was deemed important before may have to be removed if a more important character is born. This would probably cause confusion as the positioning of lines changes as time goes by.

Concept Presentation and Feedback

We presented the concepts described above to our supervisor at Paradox, as well as to the studio manager at Paradox Development Studio. They provided some feedback and thoughts on our concepts.

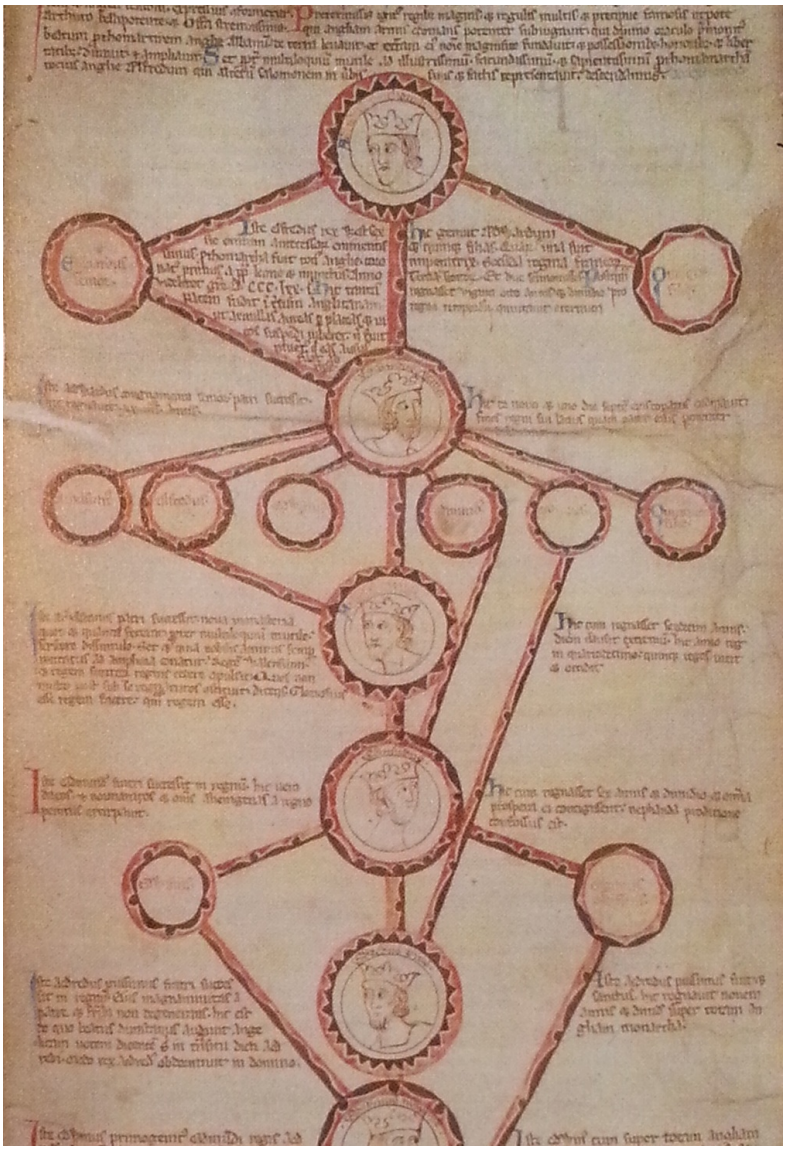

Figure 6.14: In this timeline, each king and his heirs are shown as circles, with the main line reserved for the current king (Rosenberg and Grafton, 2010).

One interesting idea we got as feedback was that it was interesting to see how each ruler had expanded the lands during his or her reign. It was suggested we could show a map coded with different colours for each rulers, such as the map shown in Figure 6.19.

It was also suggested that we show more information about succession, especially in the case of more complex inheritance laws or elective monarchies.

The fact that the player could control what data was collected was very well received, since they knew that the chronicle in Europa Universalis III had problems collecting the right data.

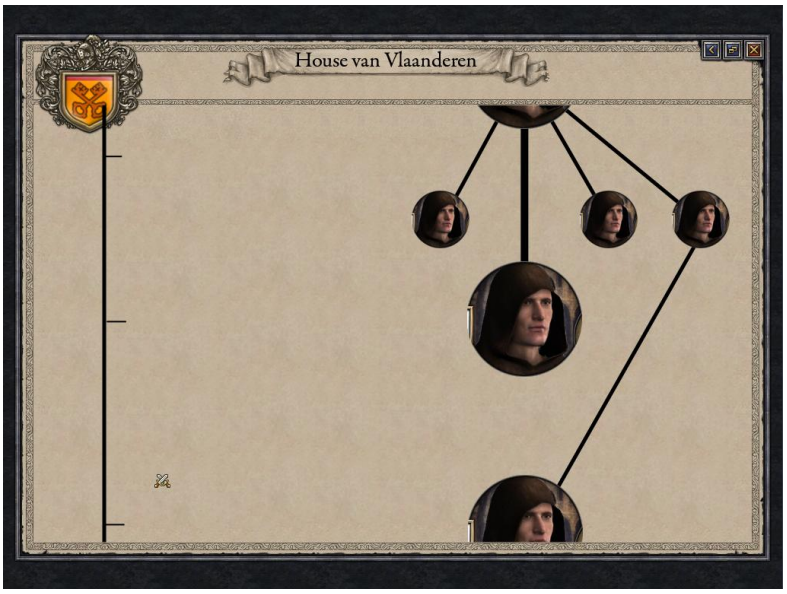

Figure 6.15: The mockup of our version of the visualisation shown in Figure X.

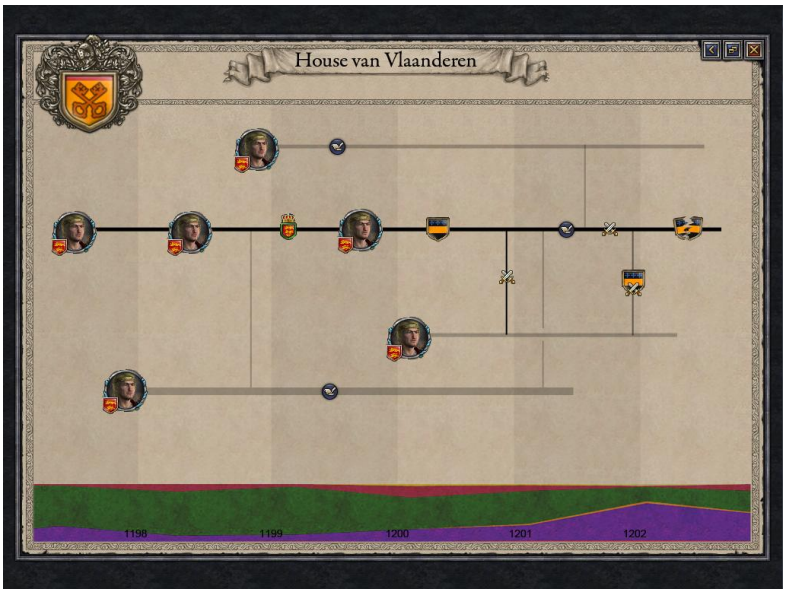

Figure 6.16: An overview of the character lifelines concept

We also got feedback that while the time lapse was interesting, they were concerned it did not give a good enough overview.

Regarding the lifelines concept, there was some concern that figuring out which characters were important would be too difficult. The connection between characters was well received, but at the same time, this kind of information should be able to be

Figure 6.17: Detail of the character lifelines concept, showing an interaction between two characters as a vertical line with an icon.

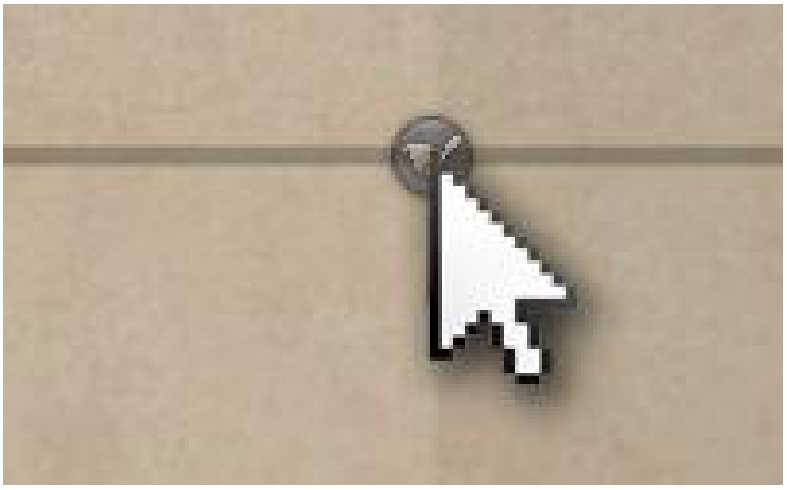

Figure 6.18: By showing a transparent icon, there is a hint that a note can be added.

shown with the timeline concept.

The timeline concept was the most popular, as it was viewed as the most interactive, as the user could open and close flags at will. It would also work easily on any timescale, by not showing certain minor events if the timescale was too large. It would also not change over time as the user played, or if certain events were filtered away. It was also suggested that characters that participated in a certain event could be highlighted in

Figure 6.19: A map of the Ottoman Empire, as it expanded under different rulers. This kind of map could be used in our timeline or lifelines concepts (Wikimedia)

some way, as a way to show character interactions.

Persona Analysis

To evaluate our concepts, we also used our personas to give feedback and thoughts on our designs. The personas can be found in Appendix A, and during this phase in the process, we had our first iteration of our personas.

Our personas had very different views of the in-game note-taking and recording system. Our more gameplay focused personas would not use this functionality, while our more role-playing personas would use it a lot more. We also had to come to terms with the fact that some interesting occurrences would be hard to keep track of. A concern that arose while working with the personas was the fact that we assumed that the data we collected would mostly be related to the player's own realm. Some personas might be more interested in the overall history of the world. In the end, our more important personas would be more interested in local history, so we would focus more on that when we collect the data.

They also disagreed when it came to the timeline concept. The personas interested more in history wanted to be able to compare the timeline they create to real history. Another feature that would be useful to our more community focused personas would be the ability to take wide screenshots of the timeline, or save the information in a text format.

Our personas also had some opinions on our time lapse concept. The ability to

compare with history would have a mixed reception. More gameplay-focused personas would find it boring, and would instead like to compare to other players, to see what they have done better than others or just to see that they are improving.

For the lifelines concept, we had many of the same concerns raised by our personas. As before, balancing between local history and world history, and balancing between gameplay and history, were the primary problems.

6.3 Deciding on one Concept

As almost one month had passed, it was decided that we would start working more on the digital prototype, which meant that we had to narrow down our concepts to one, and decide the details so that implementing the digital prototype would go faster.

During this time, we also had our first interview and paper prototype test.

6.3.1 Continued Work on the Concept

We decided we needed to start deciding which concept we would work on, so that we could create a digital prototype. There was still some programming we could do before deciding, although we would have to make a choice of concept so we could implement more specific features. In addition to this, we also needed to know which data we should collect from the game. We also structured up our planning more, and refined our weekly goals and created a programming backlog. The backlog would contain all known programming tasks, ordered on their importance to the project.

We also received another computer, and after a few days of computer problems we could now work in parallel on developing the code. During this phase of development, we also tried to schedule in regular meetings with our supervisor at Paradox Development Studio. As he was quite busy, these meetings were not very regular.

After presenting our concepts during the last week of the concept development phase, we now decided to discard the time lapse concept, after doing the persona analysis and getting the feedback from the presentation. It was discarded primarily because it did not fulfil our stated design goals as well as the other two concepts: it gave a poor overview, and creating notes would be cumbersome for users. In addition, it would probably be very draining on the game's performance. A lesser reason was the fact that this approach is similar to Sid Meier's Civilization's end screen, and we did not want to retread the same ground.

Since we now had our two main concepts (timeline and lifeline), we decided to make a paper prototype of these two concepts. We also decided to keep our mockups for the time lapse and in-game data collection and show them to our future interviewees to get some more opinions on them, but we would not develop them further.

As we worked on the design and the prototypes, we also worked some with the implementation. We started logging messages, battle results and most siege results, but no interface work was done before we had received feedback on the paper prototype.

Since we were now more familiar with Crusader Kings II, we started discussing how our design would fit in with the interaction patterns and interface design decisions of Crusader Kings II. We found out that setting a window to fullscreen would not pause the game. This was because the game would still have to work in multiplayer, and pausing in multiplayer would not be well received by the other players. We also found that some windows used the right mouse button to drag and pan around. While this felt unintuitive, it was based on the decision that all windows would move if you dragged with the left mouse button. We decided we would rather have an intuitive interface, so if it was possible, we should pan with the left mouse button. Additionally, we also wanted to implement zooming in both concepts, so the user could zoom in or out to view more or less detail.

6.3.2 Paper Prototype

Our primary goal with creating the paper prototype was not to test usability, but rather to have a concrete base to discuss the design with the interviewees. Discussing the design in more general terms would probably generate less valuable feedback, as users are usually not good at predicting future use. The paper prototype was also useful in testing how the concepts would work when we interacted with them. It also helped us generate ideas and quickly test different layouts, and see how much space we could work with.

As we tested the paper prototypes we had a few scenarios and tasks in mind, but we also allowed the user to explore the prototype, as exploration of the temporal data was an important aspect of our design. Since we involved the user into design, we had to keep in mind not to be too easily swayed by their opinions.

As our interviews were focused on our paper prototypes, we hoped to give users something concrete to help them know if they would use a feature. In order to help with the problem of user misremembering actual use, we asked no such questions, except where we asked about their most vivid memory of story that had happened in Crusader Kings II. We also showed a screenshot of Crusader Kings II during the interview to help users remember.

Since both our designs would require the users to pan left and right to navigate, we simulated this movement with a frame that we placed on a wide strip of paper. The user could then move this frame, or move the paper behind, so as to pan left and right. The frame setup is shown in Figure 6.20.

The timeline prototype consisted of a single line, with cut out sticky notes of icons representing events attached. This prototype is shown in Figure 6.21. We also used sticky notes for the flags, which allowed us to remove and add the flags as they were opened and closed. The prototype without the flags is shown in Figure 6.22 We user tested both starting with all flags open and all flags closed.

The lifelines prototype worked in much the same way as the timeline prototype, with sticky notes for the icons, but we also had the parallel character lifelines and tooltips. The prototype is shown in Figure 6.23 and Figure 6.24. To simulate the user hovering

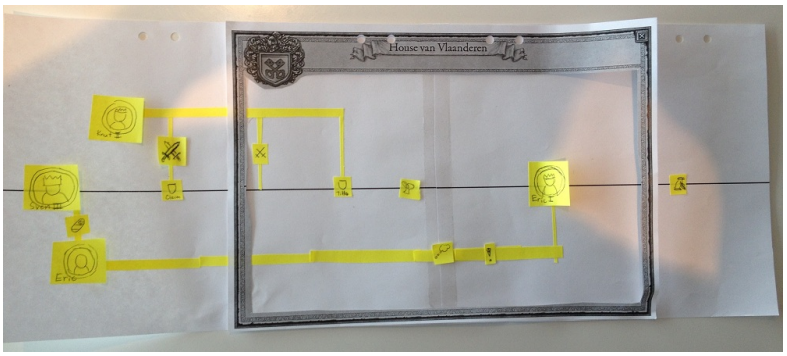

Figure 6.20: The frame shows what would be shown in the window, and panning is done by moving the underlying paper

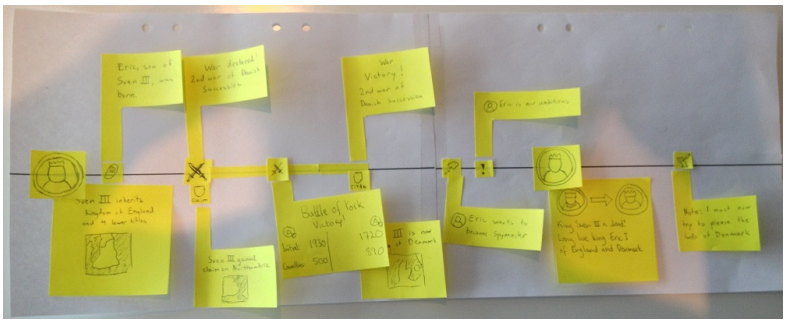

Figure 6.21: The timeline paper prototype with all flags opened

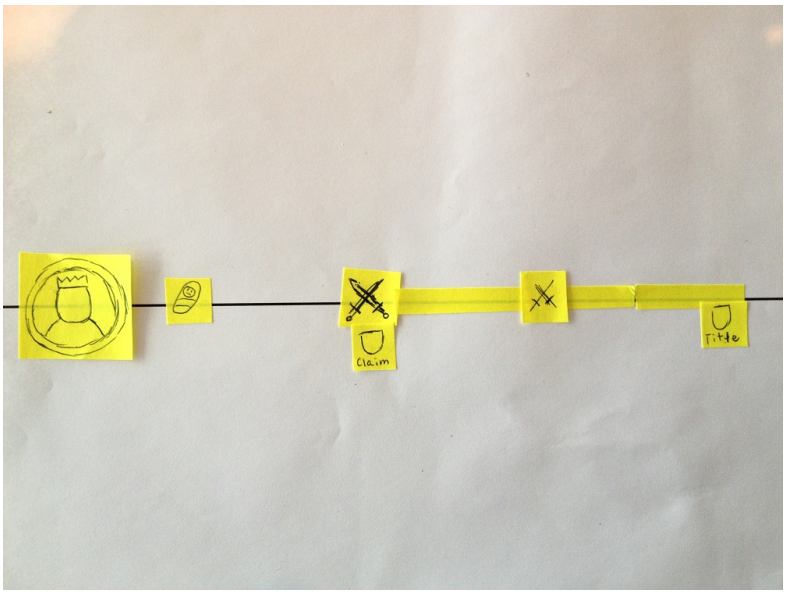

Figure 6.22: The timeline paper prototype with all flags closed

over an item, they were asked to point where the mouse pointer was at that time with a pen, and a tooltip would appear in the form of a sticky note.

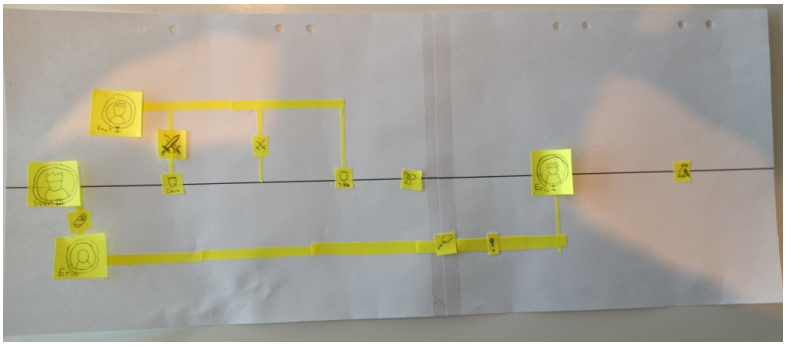

Figure 6.23: The lifelines paper prototype.

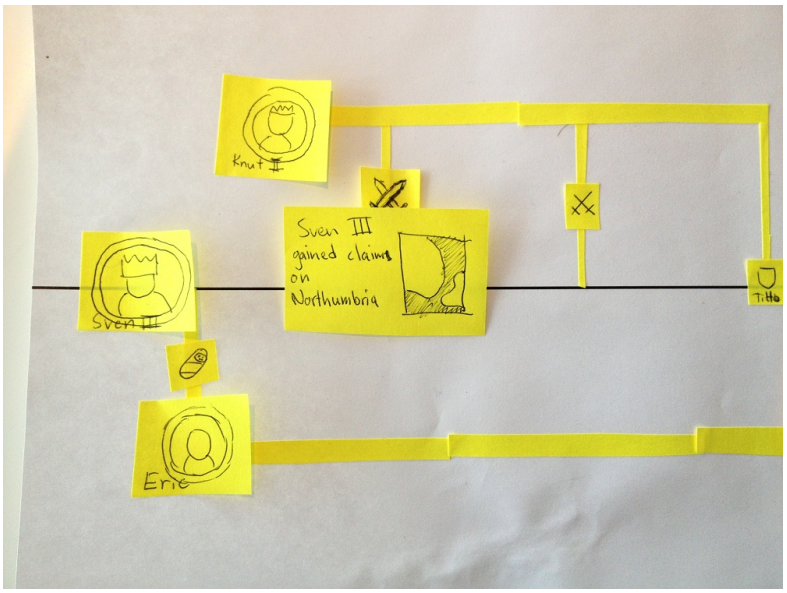

Figure 6.24: The lifelines paper prototype with a tooltip open.

Both prototype had the same type of events, and we alternated which prototype we would show first, so that we could get a feeling for if the user would understand one visualization of the story better than the other.

6.3.3 Initial work on the Digital Prototype

As we now started to code more, we wanted to learn more about the GUI system. We also discussed implementing both concepts, but we found we would rather have one focused prototype since it could better show how the concept would work in a real use setting.

In order to work faster, we copied the source code for an in-game window to work on. A window can be said to be split into two parts: the C++ code, and the GUI-file. The GUI-file is responsible for the layout, while all the dynamic parts and logic is in the C++ code. We did find early on that this kind of setup meant you had to rebuild and start the game a lot, and this took a few minutes each time you wanted to test something. The GUI system also had some bugs which made it hard to work with. Therefore, optimization was not a high priority.

After the first week, we had a timeline that could be dragged around inside a window, although we had problems where the timeline would lag behind the window if the window was moved. The initial look of the prototype is shown in Figure 6.25.

Figure 6.25: The window that would eventually develop into the Chronicle Window

6.3.4 Interview process

As we wanted to get user feedback on our paper prototypes and our concepts, we constructed our interviews to focus on the paper prototypes. We also devised some initial questions about each person to understand how they played Crusader Kings II. After showing the prototypes, we also had prepared some questions about what they felt about the prototypes. We also decided upon what tasks the user should perform. Most importantly, the user should be able to explain what events had happened in the prototype.

The structure of the interview and the questions we were going to ask were tested internally to make sure they made sense and were not ambiguous. We also wanted to make sure the interview did not take too much time, approximately an hour, since we knew that if the interviewee got bored, we would get less useful feedback. In order to make sure the interview ran smoothly, one of us was designated as the interview conduc-

tor, while the other took notes and operated the paper prototype. We also changed or added questions if any interesting discussion had come up during a previous interview.

We then started contacting the Crusader Kings II players we had found who also lived in Stockholm. Since you would have to be familiar with Crusader Kings II to understand the paper prototypes fully, we did not want to test with people who had not played the game. We decided that if we had time, we would test on inexperienced users to test for more general usability issues.

Since some of the information we might share with the interviewees could be confidential, and we also wanted protect the identity of the interviewee, we created an Interview Non-Disclosure Agreement. In it, we agreed not to divulge the identity of the interviewee to anyone except our supervisor at Chalmers. The interviewee also agreed to keep secret what he learned from the interview. This written document helped us show the person we interviewed that we were serious and that they could say anything they wanted.

First interview

We conducted one interview during the first week of this period, with an AAR writer who had written AARs for Crusader Kings II. Our interviewee played many different games, but his favourite genres were role-playing games (both computer and tabletop) and strategy games. His most memorable play sessions in Crusader Kings II involved both imposing artificial constraints on himself, such as only conquering small island nations as Iceland, and role-playing in multiplayer. He really enjoyed when something unexpected would happen, such as inheriting or being granted a title without expecting it, or when he could take revenge on his friends in multiplayer.

He plays each character with their own goal based on their personality. He admitted it was often hard to keep this play style, and instead ignoring the personality of the current ruler. He usually stops playing if nothing happens for a long period of time, or if the game becomes too easy. For him, it is much more fun being the underdog, even though it does not always go well. He often creates imagined personalities for certain characters, and then he is disappointed when they do not act according to his idea of that character.

If he could decide, he would want to collect all the events that happen in the game, even if it would be detrimental to performance. He does acknowledge that some data is more important than others, such as larger wars, intrigues in your court, and global events. He thinks the important events are those that happen to his character, and all the larger countries.

In general, he liked both the timeline and the lifelines concepts. He did think that zooming would be necessary to be able to show important information. He would use this zooming to be able to compress a certain period to fit the screen, and then use it in his AARs. Primarily, he would use the Chronicle to look back on a game where he did not take notes, or just use it to remind himself when returning to a game after some time.

When he tried the timeline prototype, he noted he would rather have all flags collapsed at the start, as it would be too much information otherwise. We observed that the

opening and closing of flags was tedious for our subject, although it could have depended on the fact that a paper prototype is not as fast as a digital prototype in finding and showing the correct flag.

As he tried the lifelines prototype, he noted it was much easier knowing what was going on without having to click anything. As we observed him using the prototype, we found the tooltip approach was tricky to prototype, but also that it did not allow him to compare the details of two events without moving back and forth.

After testing both prototypes, he noted that AAR writers would probably not mind so much excise for their more involved use cases. It would be better to focus on the more casual user, since AAR writers had more patience, he thought.

Second interview

Our second interview subject played mostly Paradox games, but also played some role-playing games. His favourite parts of Crusader Kings II was using intrigue and assassinations to get to titles. His goals were mostly focused on trying new and interesting things, but he also liked conquering new territory. Usually, he would stop playing about three hundred years into the game when he felt that he could not come up with any more interesting goals. His goals would often span multiple rulers, as he thought that characters lived for too short a time to have an impact.

As for collecting the data to retell it, he sometimes made savegames with the explicit purpose of going back and looking at them. However, he rarely did. He found the Chronicle feature in Europa Universalis to be an interesting idea, but he found it hard to read as the text was too awkward.

After we had tested both prototypes, our interview subject found the timeline concept to be more straightforward and easy to understand. However, he liked the lifelines concept a bit better, since it showed the interaction between characters. In the lifelines, we found that he wanted to be able to remove and add characters manually, if he found that they were not interesting.

Our interview subject also agreed with the person we had interviewed previously in that the time lapse was better for an end-game visualisation. He liked the maps of the timeline concept, but thought characters were more important. He also thought the history comparison was a nice feature.

In the end, he thought he would use the design, but that you might forget to take notes as you were playing. He would mostly use it to look back on previous achievements and getting back into an old savegame. It would be good to use as a visual aid to remember what had happened to he could retell the events for his friends.

6.3.5 Discarding two concepts

As we realized that time was running short and we wanted a good digital prototype to observe the user in a more real use scenario, it was time to decide upon a main concept. There was only about two months left of the implementation, and working with the game engine and GUI system would be time-consuming.

As described before, we had decided not to focus on the in-game data collection, since we determined that designing and implementing this feature would cost more time and effort than it would further our work towards answering our research question.

The time lapse video concept had already been discarded. In addition to those reasons found above, we also thought it was difficult to do filtering on the events and get immediate feedback on what was filtered away. It would also not be very well suited to show things that are not related to maps, such as court intrigue.

Be that as it may, there were of course some advantages of the time lapse that we hoped to bring into our final concept. Maps were very popular with both our interviewees and with our supervisor at Paradox Development Studio, and is something we should try to integrate into our final concept in some form. It was also a good way to show wars, troop movement and conquest, which would be hard to integrate into our other concepts. It also allows the user to connect an event to its location. However, the location of some events would not be very interesting, yet linking an event with its position is still an aspect we would have liked to see further developed. Finally, the time lapse concept was the only one that utilized the fact that there already is a file in the game containing the history of all the provinces, which gave it a unique way to compare to history.

After having two interviews and discussing amongst ourselves and our two supervisors, we decided to abandon the lifelines concept. There were many reasons why we preferred the timeline concept, primarily its simplicity.

The simplicity of the timeline makes it very easy for players to understand, as most people has seen a timeline before. The lifelines concept used multiple timelines, which sometimes made it hard to understand if two events happen simultaneously. The single, unified timeline also made note-taking much more straightforward. Also, the timeline concept would be simpler to implement, which would allow us to focus more on the interaction design, and less on implementation details and algorithms.

Furthermore, the tooltips that showed over events in the lifelines concept was necessary since there was not enough space to show flags or any information that would stay for a longer time. This meant that users had to switch back and forth to compare two events.

We also had the problem that important characters (however we would decide importance) would appear and reappear in the lifelines concept due to the importance of characters changing over time. This would mean that the last few years before the current date would be very chaotic as character importance levels changes dynamically, forcing the layout to adapt. It was also unclear if the user would understand this importance level and how it affected the layout. Characters might also completely disappear, at which point the notes attached to their timeline would potentially disappear.

The timeline was also interesting from an exporting perspective: by opening a select amount of flags, users could then tailor how their screenshots or text export would work.

Another useful aspect of the timeline design was that it was extensible. Parts from the two discarded concepts seemed easy to integrate into this design.

Perhaps what is most important about the lifelines concept is the fact that it allows the user to quickly see which event happened with a certain character. We had some

ideas on how to implement this in the timeline concept, such as highlighting related characters or events when another character or event was clicked. For now, these ideas were not prioritized, but would be discussed more later in the process. This idea would still not work as well as the lifelines concept when trying to show character interactions, since there is only a single timeline.

Another facet of the lifelines visualization was that it gave an overview of character interactions without requiring any interaction at all, which could help when the player sees the Chronicle for the first time.

While problematic, the ability to add notes to certain characters and create some form of dialogue between them was also an appealing part of the design.

6.4 Refining the timeline concept

As we had decided upon the timeline concept, it became time to start implementing the digital prototype in earnest, and also expanding upon the design concept.

6.4.1 Collecting data

During the design process, we continually collected data and performed interviews, and this phase was no exception.

Further literature study

At the suggestion of our supervisor at Chalmers, we looked at various historical atlases, and other historical visualizations. We found some interesting ideas for how we could show maps, primarily that we could use shades of a colour to show how a country expanded its territory over time.

Third interview

We conducted our third interview at the end of this phase. We used the same format as the previous interviews, as our digital prototype was not stable enough, and the interview was conducted in Gothenburg where we did not have access to the source code. In addition, we wanted more feedback on the time lapse and lifelines concept.

This time, the interviewee was not a big AAR writer, as he had only written two small AARs for the first Crusader Kings game. Our interviewee played mostly strategy games and computer role-playing games. He liked playing interesting situations such as playing Spain as a heretic. As our previous subjects, he stopped playing when the game became too easy or could not figure out any more goals. His goals were on the scale of unifying nations. He sometimes switched to nations he viewed as too powerful mid-game and played poorly intentionally, to weaken their position.

He thought the most important information one could show was maps. He also wanted character's histories to be easier to find, as this is not supported at the moment. At the same time, he thought that the history of the world is just as important as the

history of your dynasty or player character. As previous interview subjects, he wanted something akin to our time lapse concept, at least before we showed our prototypes.

After testing the prototypes, he liked the timeline better because of its clarity, but he thought it might focus too much on the player character. For example, while it was easy to see that there was a war, it was difficult to see who was involved in the war. He also was unsure if the timeline would become too similar as time went on. He thought some events were not interesting, so he would like some way to remove them.

When we showed the time lapse concept to him, he liked that he could see the geographical information, but he also thought it was a bit impractical. In contrast with previous interviewees, he did not care for the map comparison feature. He also thought the time lapse felt non-interactive.

After the interview, we decided we would show our unfinished digital prototype of the timeline concept. He suggested some kind of seek bar or minimap of all time, an idea that we had had before. He thought you would not need to zoom out all the way if you had a minimap. He would also like to see the timeline connected to the rest of the game, such as using a portrait as a shortcut to viewing that character's information.

6.4.2 Working on the design concept

As we realized that developing the digital prototype would take some time, a lot of time this phase was devoted to finishing the design concept to such a degree that we would have an implementation roadmap for the digital prototype.

Information prioritisation

During this phase, we wanted to figure out which data was important for us to show. We played Crusader Kings II with more consideration to what information was important while playing, and what information was important in retrospect. In addition, we used the lessons we had learned from the questionnaires and the interviews in what kind of events were important to the most interesting stories to decide what events the design would prioritize. As we did this, we realized that taking notes for an AAR is an exhausting process. We decided we would focus on 10 to 20 different entry types, such as wars, ambitions, plots, and so on. We also figured out which attributes (date, attacker, defender, et cetera) each of these entries would have.

One important aspect of our design that we had to decide was if we as designers decided what events were important, or if the user should have more control of what information was important. We decided that the design would guess which events were important. While this approach can never prioritize completely according to the user's wishes, we had observed from interviews that people would only use the timeline intermittently. Also, by focusing on making a good guess on event priority, we could introduce players the concept of story creation without requiring users to set up filtering and search options. In an ideal design, we would base the decision on what events were important on aspects like who the event happened to, and how far away they were,

among other factors. Furthermore, the ability for users to slightly change the importance of certain events would also be interesting to explore further. Still, some filtering or searching would probably be preferable, in order to accommodate for different use cases depending on what kind of story the user was interested in viewing.

Since we are using flags to show information about an event on the timeline, we decided there would be four levels of information, with more important information shown as the user digs deeper. These four levels are illustrated in Figure 6.26. The first level is simply looking at the icon on the timeline. From this, the user can see how important an event is by its icon size, and when it happened by its position on the timeline. The second level is hovering over the icon and seeing a tooltip. The tooltip would show the exact date of the event, and also what kind of event it was. Clicking on the icon would open the flag, showing more detailed information depending on the kind of event, which would be the third level of information. In addition, clicking on the flag would reveal the fourth level, which could be a pop-up window or lightbox with the maximum amount information. This view would be good for events that wanted to show large maps or images. As some entries on the timeline would be more important than others, we decided that their flags would already be open when they are created, to make sure the timeline would not be too barren at the start.

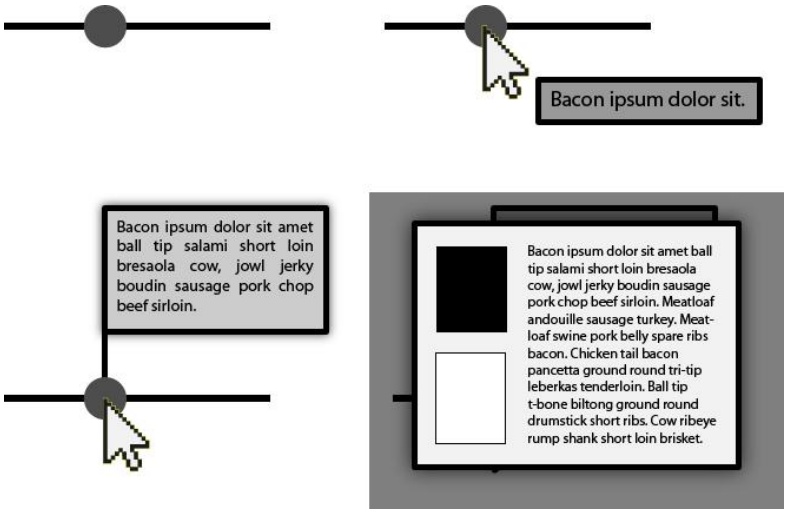

Figure 6.26: The four levels of information, from top left to bottom right.

We also considered whether we would show timelines tied to other characters than the player characters. We decided against this, since it would take too much time to implement, require too much data to be collected, and from our interviews we had found that player character history was slightly more important than world history.

Semantic zooming

In order for the user to view different time periods, he or she should be able to zoom in and out on the timeline. Users can then zoom in to show detail, and zoom out for an

overview and to navigate quickly between periods. This kind of zooming, as described in the Theory chapter, is called semantic zooming.

In order to show the user that zooming in to view more detail is possible, simply showing or hiding the icon based on zoom level is not enough. We decided to have an intermediate level, which is just a small dot, shown in Figure 6.27. The user cannot interact with this dot, but the dot will turn into a full icon that can be interacted with when the user has zoomed in.

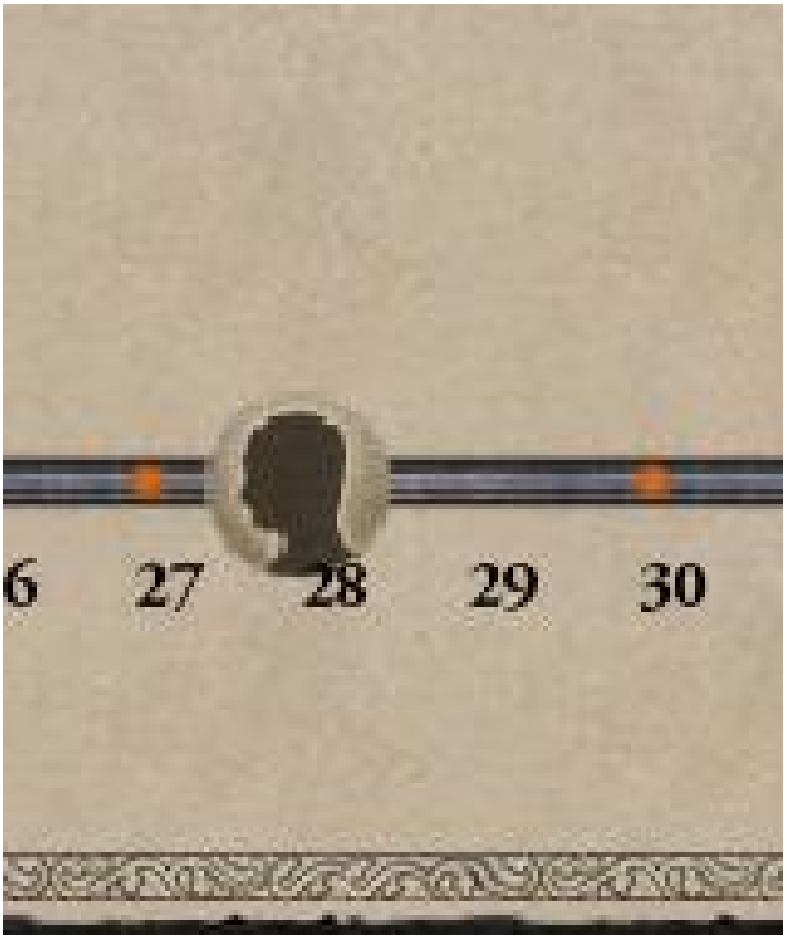

Figure 6.27: An important event surrounded by less important events which there is no room for, and are therefore shown as dots.

Another problem arises when the user zooms out. If a lot of flags are open, they could become too tightly clustered when the user zooms out. A solution could be to close some flags, but we decided against this as this would take control away from the user. Also, some flags would disappear as the icon turns into a dot.

A consequence of zooming is the it gives an implicit summary of a period, by only showing the most important events of that period. This means that the explicit summary

shown on the ruler's flag does not need to show all the information about that ruler, as more is available on the timeline as events. Still, graphical summaries such as maps would still make sense to show on the flag depicting the ruler's death and ascension to the throne.

As we were experimenting with zooming in the digital prototype, we also discussed using a fisheye lens, to put more detail on the events in the middle of the screen. We decided to not use this distortion, since we felt it would not correspond well to our paper metaphor of the look and feel. We also scaled the icons of the events to show their importance, and a fisheye lens would distort this information if it also re-scaled the icons. Not rescaling the icons would be an alternative, but it would probably be harder to understand as a fisheye lens metaphor for users.

Layout

At the start of the design process, the timeline was placed in the middle of the window. During this part of the development we decided to move the timeline down. Firstly this was an aesthetic choice inspired by the League of Legends patch note timeline (which is described in the Background chapter), as it looked less static compared to having the timeline stuck in the middle. The primary advantage quickly became apparent, as we now had more space for larger style flags. This would allow us to have one row of flags below the line as well, in order to avoid flagpole overlap. The new position of the timeline is shown in Figure 6.28.

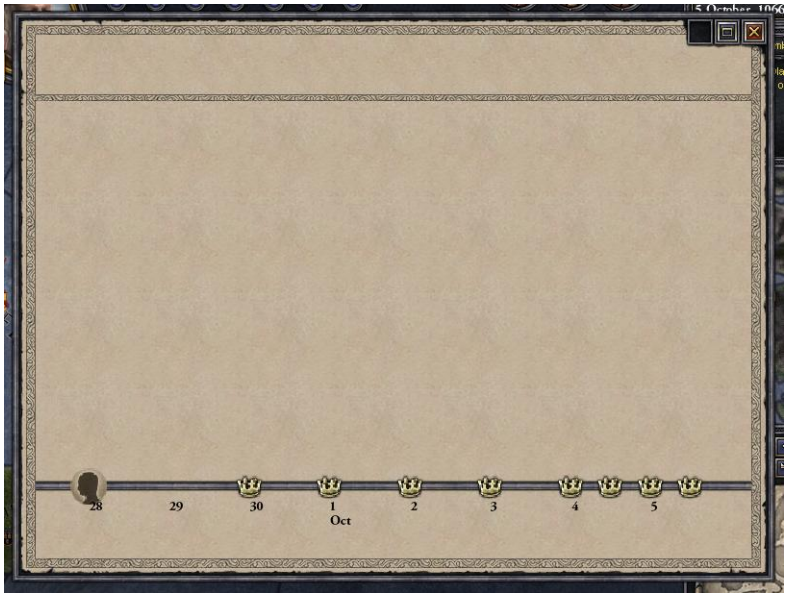

Figure 6.28: Moving the timeline down

As the new position of the timeline could imply a certain categorization to the user, it was decided to evaluate what kind of categorization was possible and if we should

implement it. However, no categorization made sense beyond the fact that large flags that required space would have to be above the line. Since large flags might exist for any kind of event, it was decided that there would be no categorization of event groups into flags below or above the line.

After working with the information prioritization, we also considered alternative designs for the icons on the timelines. This pin design would allow us to better make use of the free space above and below the line, and also use some of the advantages of the lifelines concept, by showing what character had interacted with the main character. However, after doing mockups of these pins, we found that they were too hard to understand, and the icon approach was much clearer and simpler.

Navigation

After discussing with our interviewees, we also decided that dragging left and right rather than up and down to move back and forth in time would be preferable, as we wanted the scroll wheel of the mouse free to perform zooming.

As had been suggested in our initial concept, a *minimap* could be used to navigate the timeline. After discussing the idea, we decided not to focus too much on it at this stage of the design. It was believed that zooming might be enough to get an overview, and there was also concern of how to show 400 years of history in such a limited space. To compensate for the lack of a minimap, we decided that the users should be able to zoom to show the entire span of the game, from 1066 to 1453. This would allow the user to see his or her progress through the game.

Handling too many Events

As some events would happen on the same day, we had to decide how to show them, in a way that we called *stacking*. We could either stack the icons horizontally or vertically, as shown in Figure 6.29. Initially we decided upon stacking the events vertically, as we thought we would have plenty of space vertically. It would also make it clear to the user that all events happened on the same day. Stacking the events horizontally to fill up the entire space of a day would imply some events happened before others, which according to the logic of the game is not strictly true. However, after feedback from our third interview and realizing that some events do come after others even if they are on the same day, we eventually decided to stack horizontally.

From the interviews, we had also noted that users wanted the ability to remove events. As all our interviewees had mentioned it, we thought it to be an important feature. Still, by hiding events, there must be some way to undo the hiding. Also, hiding a single event might not be useful as there are hundreds or even thousands of events. Because of these complications, the hiding functionality would not be prioritized to be implemented in the digital prototype.

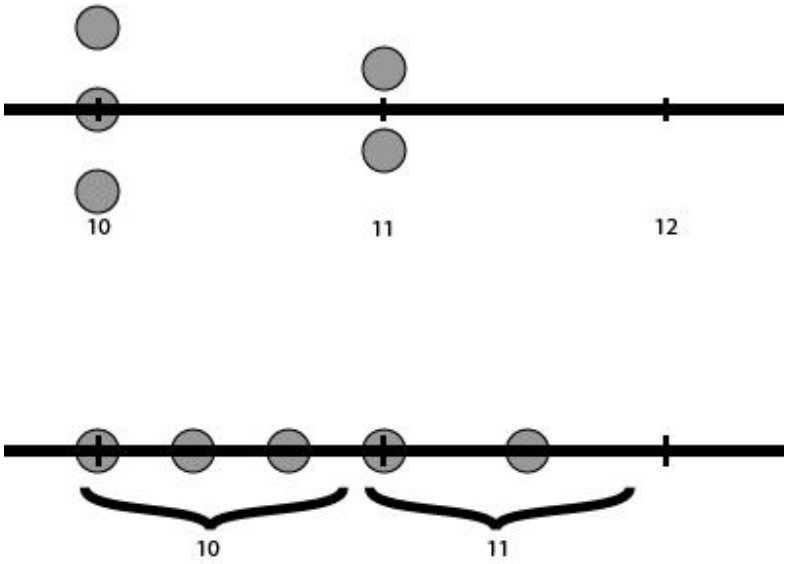

Figure 6.29: Stacking multiple events that happen on the same date vertically and horizontally, respectively.

Note-taking

As we wanted to empower the user to create their own narrative, we wanted allow the player to take notes. In order for these to feel as integrated as possible, we decided notes would be new flags created by the user, where she can enter her own text. In order to create these notes, the user clicks on the timeline, and a flag appears with a text box. To show the user that this is possible, a semi-transparent icon or a tooltip would be shown when hovering the mouse pointer over the timeline.

Another idea for note-taking was allowing the user to edit already existing flags and change the flavour text or short description that already exist. We wanted this functionality because the standalone notes described above take up too much space. Standalone notes are not directly connected to an event and therefore better suited to describe a period of time.

We also discussed the possibility of letting the user click somewhere on the timeline, and get a map of how the game world (medieval Europe in our case) looked at the time that was clicked on. However, this would probably be a technical challenge, as well as one that could require some processing power and therefore loading time. As such, this feature was not highly prioritized to be included in the digital prototype.

Showing rulers

As we had established from our interviews, the player character and the change of player character as he or she dies were important for players of Crusader Kings II. During this phase, we created some variants on how they could look, experimenting with size and

what information we could show in them.

In Crusader Kings II, when a portrait is linked to a specific character, that portrait is updated as the character grows older. This was not desirable in our design, as we wanted to show how the player character or other characters change and grow over time. It would show the age and state of characters in a clearer way than if the character kept the same portrait throughout the timeline. Therefore we decided to have snapshots of characters stored at the time an event happens, so that the portrait can show these snapshots instead, and that the title and nickname of the character would change over time.

6.4.3 Digital prototype

While we did not spend the entire two weeks of this phase on implementing the digital prototype, some time could be spent each day on working on it.

Prototype limitations and implementation problems

One of the larger implementation problems we had encountered with our digital prototype was that subwindows of our chronicle (which would include most elements) would lag behind the main window.

As the user interface system was quite rigid, creating mockups continually allowed us to drag-and-drop elements in the mockup, noting their positioning and transferring it to the digital prototype.

Another large problem we had at this phase was that the panning of the timeline was done by dragging with the right mouse button. This was because both the left and middle mouse buttons were reserved for moving the window and panning the game map, respectively. This turned out to be a learnability problem when showing the prototype in our third interview. We decided to fix this problem at a later time, as there was still things we needed to implement that was more interesting to test.

As the concept and prototype developed and we got feedback from our supervisor at Paradox Development Studio, it was decided to try to focus more on characters. It was also suggested that we try to integrate the Chronicle data into savegames so that we could try larger periods of time without having to play through all of it.

New Features in Prototype

As we decided on design issues, we also developed our prototype. During this phase we spent much time learning the Crusader Kings II codebase.

Firstly, there is now a separate window for our Chronicle feature, which shows a timeline that can be panned to the left and right to move through time. Dates are shown on the timeline allowing the user to see where in time he is, and the user can zoom in and out to see more or less of the timeline. Each message that is sent to the player through the message system is shown as an icon on the timeline. One of these message events on the timeline is shown in Figure 6.30.

Figure 6.30: A message is shown as an icon on the timeline, with one of them having their flag opened

The prototype also included tooltips, which allows the user to see more details about an event on the timeline. There is also a tooltip shown when hovering on an empty section of the timeline, indicating that a note can be added, but nothing happens if the user clicks.

If the user clicks one of the icons, a flag is shown with more detailed information about the event. This information is just text at the moment, which is lifted directly from the message description. The state of an entry, i.e. if it its flag is shown or hidden, is saved in memory so that the Chronicle will not forget the users actions when he reopens the window or pans away from the flag. However, no saving to or loading Chronicle data from a file was implemented yet. The opened flag is shown in Figure 6.30.

In addition, the character snapshots described above were implemented, and they are shown in the ruler change flags as both the name of the ruler and a portrait.

In order to better show what time had passed and what the current date was, the prototype has two different looks of the timeline. For the period before the game started and the period that has not happened the yet, the timeline is semitransparent, while it is opaque for the period of time from the start of the game to the end of the game. This division is shown in Figure 6.31.

To make zooming as useful and understandable as possible, scrolling the mouse wheel causes the timeline to zoom in to the current mouse position, which is the same behaviour as zooming in on the map. Since the steps on the scroll wheel are discrete, the zooming was smoothed out so that the user can clearly see that he or she is zooming in. The dates shown on the timeline also react to zooming. When zoomed far in, days are shown, while zooming out shows months and years, and hides the days.

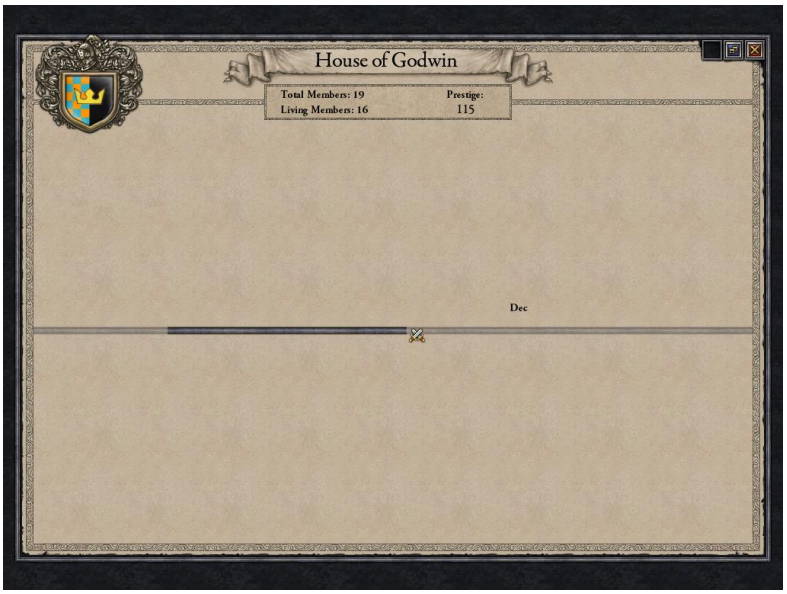

Figure 6.31: The division of the timeline into three parts: before the start of the game, the time that has been played, and the future. Only the time that has been played is completely opaque.

The prototype also stacks messages that were received on the same day vertically.

In the prototype, we also experiment with a feature we called *glueing*. If the user pans until reaching the end of the rightmost padding, the Chronicle would pan automatically to the right as time passed in the game.

6.5 Preparing for the first User Test

After we had done three interviews, we wanted to make sure the next interview would focus on the digital prototype. During this phase, we would take the feedback gathered, improve our digital prototype and then test it. There was now slightly less than one month of implementation left in the project, so getting user feedback on the digital prototype was very important.

6.5.1 Design Work

The design work at this stage was mostly directly implemented into the digital prototype, but some work was also done in mockups were the implementing would be problematic.

We returned to discussing the minimap concept. While doing mockups of it, we found that there was not enough space to fit maps, graphs or ruler portraits on the minimap. These were our primary candidates of what information would both be easily readable and also give enough information for the user to know where he was on the timeline. However, we found that there was very little horizontal space for the minimap

in order to show this information clearly, especially if the player has played for a long time. Furthermore, we had observed users playing in both windowed and fullscreen mode. Since we wanted to support users playing in windowed mode, the minimap would only fit in the fullscreen mode. As such, it was not deemed important to implement at this time.

After getting feedback from third interview, we changed so that entries stack horizontally. In order to allow less important events to be hidden, we implemented an algorithm that would hide events if their icons collided with another event that is more important.

Seeing the prototype developing, we were not satisfied with the look of the icons, as we had used icons that appeared elsewhere in the game. While this spared us having to draw our own icons in the correct style, they were not perfect for their purpose. We decided that making special icons was something for a final design, not for a digital prototype.

We worked more on the design of ruler entries. We had come up with a new functionality, which would zoom to fit a specific ruler's period of reign if the rulers portrait was clicked. It was decided to implement this feature in the digital prototype, to see how this kind of navigation would work.

The look of wars and ruler entries was changed. Since a dead player character has two flags, one for his death and one for his ascension to the throne, we decided to use these flags as an *arch*, which is shown in Figure 6.32. For example, the period you play as a certain character would have its leftmost flag pointing to the right, and the rightmost flag would point to the left. This concept worked well when testing with the functionality that allowed users to zoom to fit a ruler reign in the window as described above, as it provided a visual overview of a certain period.

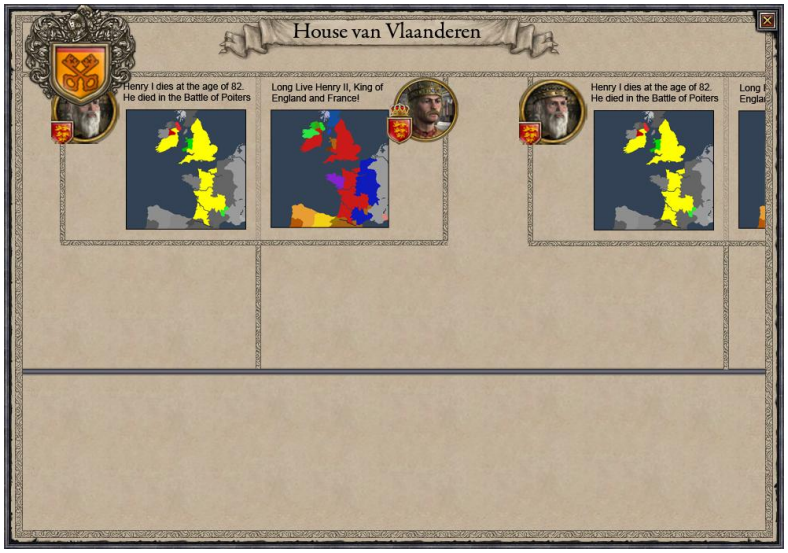

Figure 6.32: The different ruler flags create an arch which frames a period of time.

To fit these large flags in the window while zooming out, they had to be closed. If two

ruler flags overlap, one is hidden. The flag signifying the start of a player characters reign was determined to be more important than the flag concerning her death for navigation and scanning purposes. Therefore, if these two flags collide, the flag showing the end of a reign is hidden. If two flags which both are the start flags of two different rulers' periods, the rightmost one is shown, as that ruler is more recent and tend to be more interesting.

6.5.2 User Test and fourth Interview

For the first time during the project, we could now properly test with a digital prototype instead of a paper prototype. We decided not to show the paper prototypes, as it was decided we would not gather significantly more information from them. The testing of the prototype was more focused on usability at this stage, but we kept most of the old interview questions as we had not yet returned to a user we had previously interviewed. The prototype was tested using observation and thinking aloud, leading the user through a set list of tasks. After the test, we asked more general questions, now that the design was more clear to the user. A photo of the Interview is shown in Figure 6.33.

Figure 6.33: Testing the prototype, with one designer giving the user tasks.

Our test user played almost exclusively Paradox Development Studio games, with his favourite being Hearts of Iron, which he played mostly multiplayer. His favourite aspects of Crusader Kings II was the deep simulation and seeing the characters interact in complex ways. As he plays, he tries to play historically, and not try to play optimally. While he had written no AARs for Crusader Kings II, he had written a few for his multiplayer Hearts of Iron II games.

What was most striking from the tests was that he mostly appreciated the gameplay

advantages of the Chronicle, using it to form goals, plan ahead, and get reminders. As such, he rarely had the Chronicle window in fullscreen mode. Also, he desired a stronger coupling with the game, such as clicking on flags to see where on the map they happened.

He also appreciated the zooming which allowed you to see more or less detail, but it was hard for him to see that events were hidden if you were too far zoomed out. He suggested the same idea we had, which was to have the icon show up as a dot instead of hiding it completely. He would also like filtering option, such as combat events, vassal events, domestic events, and foreign events.

As we had also thought about before, he wanted the ability to expand flags to see even more information, such as maps or detailed reports of battles.

6.5.3 Developing the Digital Prototype

As we developed the digital prototype, we found that resizeable windows was difficult to implement. As such, the flags would have to be a fixed size, which means that some messages would be too long to fit. We also removed the dynasty coat of arms and other elements since they appeared behind our flags.

We experimented with panning using the left mouse button, but since the code to do this was not integrated into the engine itself, it was not very robust and the window would move frequently anyway.

While implementing the notes, we also found that the editable text boxes in Crusader Kings II only support one line of text. We determined this was good enough for our digital prototype, but of course multiple lines would be preferable. At this time, there were more important features to implement, and testing if multiple lines would be better than a single line was not very interesting.

Diffmaps

Since we wanted a lot of map information, so called *diffmaps* were implemented, which are shown in Figure 6.34. They were called this because the original idea was to show the difference between the ruler's realm at the start of her reign and the realm at her death. However, the functionality could be extended to any kind of map. In order for them to not show too much of the entire map of Europe if the country shown in the map is small, the map is zoomed in to fit the relevant provinces inside the map bounds, but with a minimum size.

Saving and Loading

The digital prototype now supports saving and loading the game and retaining the Chronicle data. This allows us to create sample games that we can load without having to play for an extended period of time. Still, if a new type of entry is added to the prototype the old save files will not contain these events, requiring us to create new savegames as new types are added.

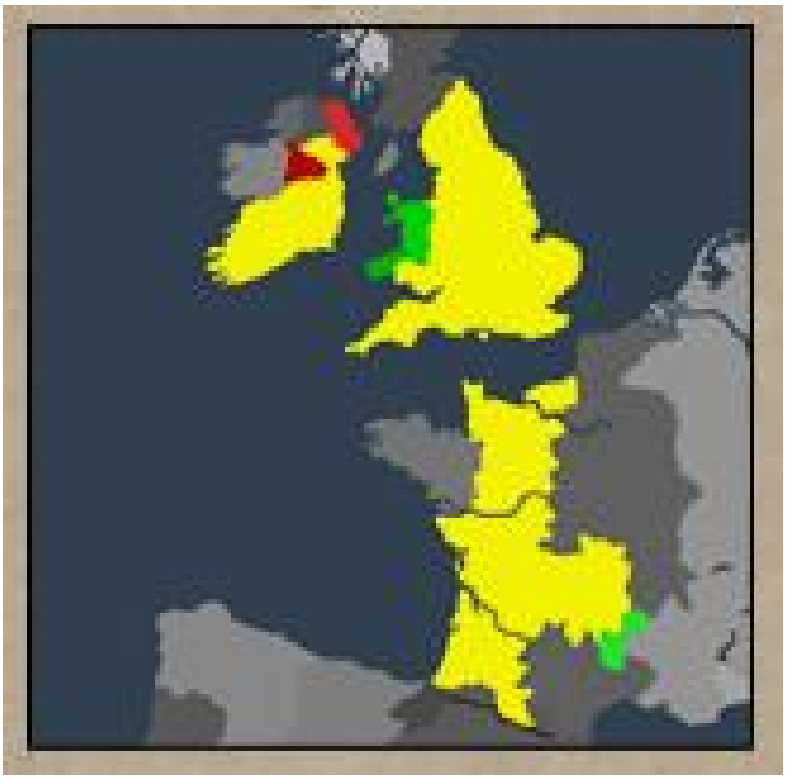

Figure 6.34: A mockup of how diffmaps could work. Yellow areas are provinces that have not changed, green are new conquests, and red are lost provinces.

6.6 Polishing

This would be the last phase before it would be time to start extensive user testing. As such, the design and prototype would have to be cleaned up and improved to not let minor usability problems take up too much time in the tests.

6.6.1 Finalizing the concept

During this phase, we focused mostly on usability and improving what existed rather than making major changes.

Changes in look

We added drop shadows to the windows which made the Chronicle to look more three-dimensional. This was done because it was not obvious to users that some windows were in front of others. We also changed the graphics used for the dots, as the old ones were too bright and colourful.

In previous designs, we would have an extra month at the start of the game to act as padding. As we wanted this padding to be the same number of pixels on all zoom levels,

we wanted the padding period to depend on the zoom level. This proved to be too hard to change in our digital prototype, and therefore other features were prioritized instead. The intended behaviour is shown in Figure 6.35.

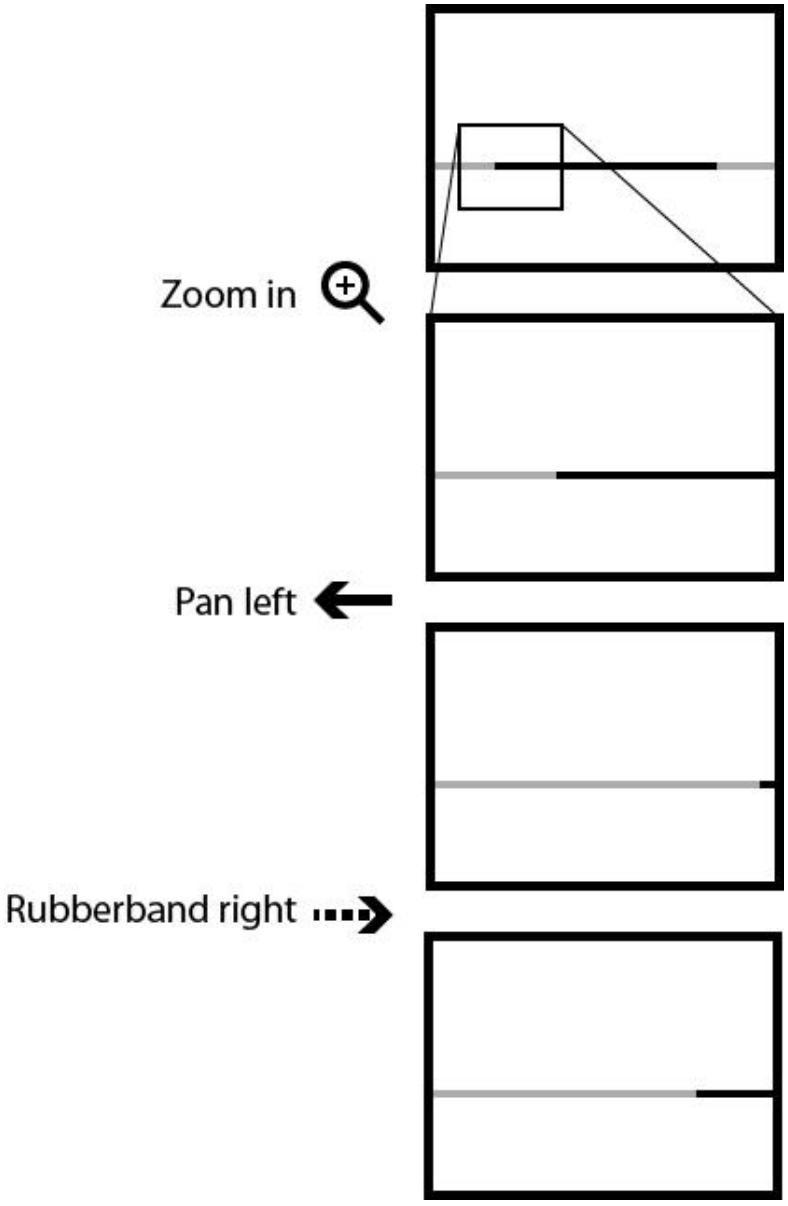

Figure 6.35: At first, there is a set padding amount on both the left and the right of the time that has actually passed since the start of the game. When the user zooms in, and then pans, the timeline is automatically rubberbanded back to the right in order to show a certain portion of the elapsed time.

Navigation buttons

After feedback from the test, we also added two navigation buttons: one that allows the user to quickly zoom to show all available play time (between 1066 and 1453), and one to show the current date. In order to more clearly show to the user that you cannot pan too far left or right, a rubber banding effect was added, where the timeline would snap back when the mouse button was released.

Flag changes

The flags also went through some changes. Primarily, flags should now move to the front of the screen when clicked, as we had observed users had problems reading flags that were obscured by another flag. We added the portraits of the involved characters on a flag. Because users can right-click on a portrait to go to that character's information page, this allows players to see more details about the characters involved in an event.

Addition of war flags

During this phase, we also tested our current concept with our personas, to get a better understanding of what our users would want. We realized from doing this analysis we should add special entries for wars.

These would be pairs of flags, which would be linked together so that opening one would open the other. The leftmost flag would point to the right and show the start of the war, with a map of the two competing sides and what provinces they fought over, as well as the portraits of the main attacker and main defender. The rightmost flag would point to the left and show the two sides at the end of the war, also with a map. A mockup for these war flags is shown in Figure 6.36. This second map was not implemented in the prototype because of time constraints. For now, the right map is a dummy map, showing the same image as the first map of the war. Also, any allies called into the war are not shown at this time.

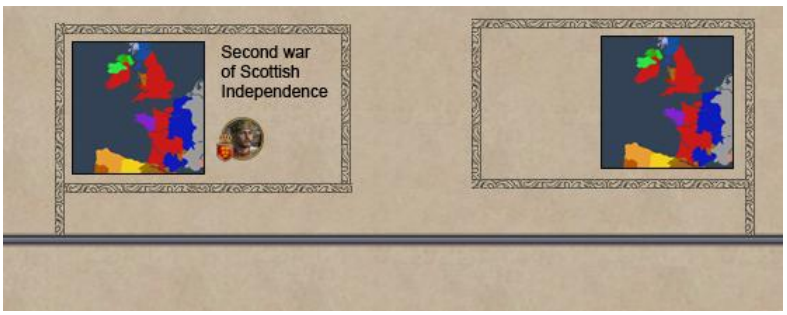

Figure 6.36: Early mockup of the war flags.

Both war flags have a button that allows the user to show the span of the war. If the war is not over, the span of the war is from the start of the war up to the current date.

Improving note flags

We also made some changes to how note flags work, mainly to improve usability. Only one note flag should be open at any time, opening a new one should close the last one. It was also decided that no more than one note should be allowed per day, to avoid users clogging the timeline with notes.

Adding to the ruler flags

The ruler flags also went through some changes, and the new ruler flag in the prototype is shown in Figure 6.37. Since we wanted to show the primary title of a ruler, we used the crown and shield with the coat of arms of the primary title applied to them. This crown also changes appearance depending on the tier of the landed title. A landed title can then be inherited, lost in wars, given away, or be destroyed. Landed titles have five tiers: Baron, Count, Duke, King, and Emperor.

Figure 6.37: New ruler flag as implemented in the prototype.

We added a list of icons for all the personality traits of a ruler, because we believed that this information would be interesting for players who engage in role-playing. From our testing, we had also found that it would be interesting to see in what way a player character died, so we copied the approach already in Crusader Kings II, which is a small skull icon in the corner of a portrait, with a tooltip describing the cause of death.

The ruler flag also show the personal score accumulated by each character, since this is an easy way for players to gauge their success. While not an important goal for most players, the score measures how well your dynasty and characters are doing. Each character earns their own amount of score that is added to the whole dynasty's score. At the end of the game, the score is used to compare your dynasty to a historical one.

The ruler flag for when a player character's period start now also has an additional map, which shows the extent of the character's realm at the start of that character's period. This map was added because zooming out causes the flags pointing to the left (which have the diffmap) to become hidden, making it hard to see territorial gains over time when zooming out. This new map would also allow players to see if any provinces were lost due to inheritance when changing player characters. While testing the diffmap shown on a dead ruler's flag, we realized that it could not show provinces that were gained and then lost during the lifespan of the ruler. The reason for this behaviour is that the map is created when a ruler dies, and is compared to the map at the start of his reign. We decided that this would be such a rare occurrence that it would probably be enough to only show what provinces were kept at the end of a player character's reign.

We had previously added the ability to see a ruler's reign by pressing that rulers portrait. Since the functionality was useful, we added buttons to see the ruler spans both to the right and to the left of a ruler flag pair, and therefore removed this functionality from clicking the portrait. These two buttons were then placed on the central portrait. This allows users to browse from ruler to ruler by clicking on the buttons, moving back and forth through history, which is shown in Figure 6.38.

Figure 6.38: Using two buttons, the user is able to flip from ruler to ruler.

Testing and persona analysis

After we had analysed the concept with our personas, we also found that special visualizations for titles changing hands and gaining claims would be useful for our users. We also wanted to log what Crusader Kings II calls events. While we have used the term event to mean anything that happens in the game, the events of Crusader Kings II are

decision points where something happens and your character has to react. These are a large part of role-playing, so they should also be shown in the Chronicle, together with the player's response.

While we had planned to start user testing with our previous interviewees, no one could attend during this phase. Therefore, we conducted an in-house test with two of the employees at Paradox Development Studio. While they would be more biased, we still got valid feedback. We got some ideas of how to do filtering of the events, and reinforcing the importance of getting the right kind of events to be shown to the user.

6.6.2 Further work on the digital prototype

Most of the work on the digital prototype this week was focused on making the prototype ready for testing. To prepare for the upcoming user tests, we had to go through all tooltips in the prototype. Some of the information was used for debug purposes, so it had to be removed.

At this time, we also were able to prevent elements inside the Chronicle from lagging behind when the window is moved, although we have poor control over the rendering order of elements. This had little impact apart from the fact that dots would sometimes be shown over event icons.

The functionality where icons would turn into dots when overlapped, which we called *grouping*, was also rewritten as it was buggy and would hide events that should not be hidden. Despite this, there is a bug where the positioning of icons will jitter back and forth one pixel before settling, causing flickering in the icons as they switch back and forth from being visible to being shown as only a dot. While it was annoying and potentially distracting for users, we had to admit we would not have time to fix it.

We also tested the performance of our Chronicle, and while the amount of GUI elements can become quite large, we found that we could at least run games stretching over ten years with little impact on performance. While the game can run for hundreds of years, ten years was enough for our testing purposes, and we were aware we gathered too much information.

During this phase, we also got rid of most of the problems associated with panning with the left mouse button. While there are some bugs related to this remaining in the prototype (such as the windows sometimes being dragged along by the mouse), the intuitiveness of using the left mouse button is worth these minor bugs.

Since we do not really have a good way of determining the importance of an event, it was decided that each event's importance rating, which previously had been an integer in the range of 1 through 5, would have a small amount of randomness added to it. Primarily this was to make sure that the latest event would not be assumed to be the most important.

We also added a few checkboxes so that users can filter out certain categories of events. These categories are not considered final, they are there more to show the potential of using filters, and was intended to be tested on users during the next phase.

6.7 Final User testing

During this final phase of development, we focused on getting as much feedback as possible by conducting user tests.

6.7.1 Final design work

While little time could be devoted to designing new features in the last weeks, one of the new features that was implemented in the digital prototype was character highlighting, shown in Figure 6.39. The basis of this feature had been discussed earlier, and the aim of this feature was to allow players to quickly be able to see what events any one character had participated in. By clicking on a portrait, any portrait of that same character would be highlighted. If the portrait of that character was inside a flag that was closed, the icon of the corresponding entry would highlight instead. This feature could allow players to click on an enemy to see how he came to dislike you.

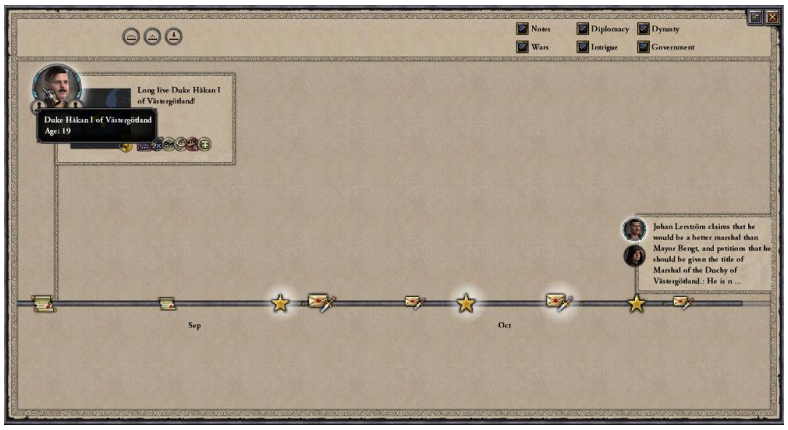

Figure 6.39: The user can click on a portrait to highlight all events related to that character.

Another feature was also implemented, where certain zoom levels would completely ignore fetching certain events if their importance was too low. While this started out as an optimization to avoid creating too many dots and therefore slow the game down, it had a certain clarity in that it became clearer that an event had a certain level of importance. This behaviour is shown in Figure 6.40. On the other hand, it also meant that there would be no dot to show that zooming in was possible, which could prove to be a problem when users should discover that they can zoom.

Some time was also spent on creating mockups on the overall layout spacing of the flags, the timeline, dates, and other visual elements.

6.7.2 Final work on digital prototype

For the digital prototype, most of the time was spent on responding to feedback that we received from the user tests, and working on improving the message categories. Extensive

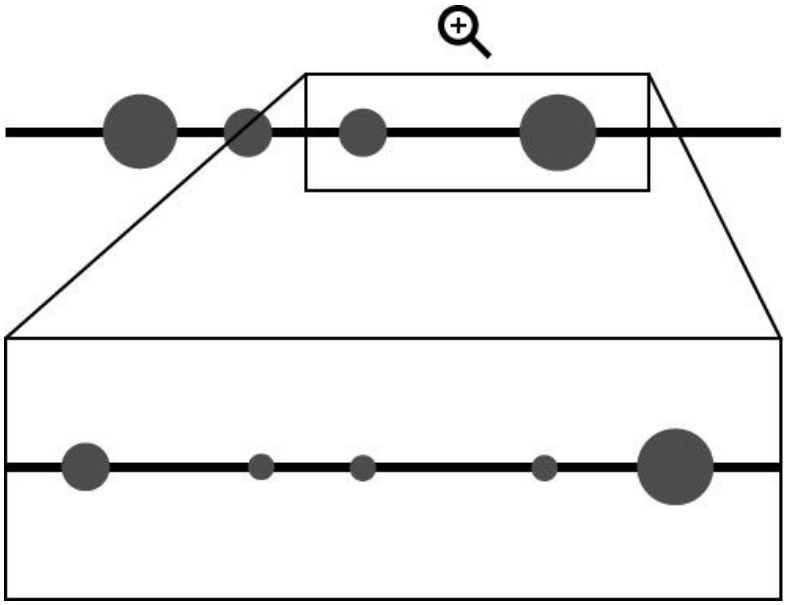

Figure 6.40: As the user zooms in, less important events are shown.

testing also allowed us to find and correct minor bugs. We found some elements which lacked tooltips, and as described above, the highlighting feature was implemented.

6.7.3 User tests

This phase was mostly focused on doing user tests. Three of our previous interviewees returned, and we found a new test subject in Gothenburg.

User test 1

Our first tester this phase was the same person we interviewed in our second interview. A photo from the user test is shown in Figure 6.41.

Apart from various usability issues that we would improve for the next tests, there were some interesting problem. One was the fact that the space bar pauses and unpauses the game, even when the Chronicle window is in fullscreen, which causes problem if a note is being written but the user accidentally loses the focus of the text box. Our test subject also noted that while the filters were a nice idea, they needed to be clearer, which we knew since the filter categories were not final, and what we were actually testing was the idea of filtering. Also, the dots for less important events was not noticed by our test subject.

Despite these problems, he really enjoyed browsing for detailed events which he felt would make it easier to write an AAR. He also liked the arch created by seeing the span of a dead player character.

When we asked if he had any ideas for new functionality, he would have liked to see

Figure 6.41: Our first user test for this phase of the project

more information about when provinces changes ownership, and would also like to see a summary of the world history of the game world at the end of the game. He would also have liked to have some form of settings for deciding for himself which types of events were more interesting.

User test 2

For our second user test, we invited back the person who had first tested our digital prototype. He was therefore the only tester who had seen the prototype in more detail before.

While he liked that he could access the character information page from the Chronicle, he thought right-clicking was unintuitive, and it was hard to know what could be right-clicked, and what could not. He also thought that it was sometimes hard to get a good overview, as there would be too many flags with uninteresting information open.

Even so, he really liked that he could navigate from ruler to ruler with the span buttons, and that he could use maps and personality traits to compare each ruler. He also appreciated that all the ruler flags were on a separate vertical section of the window, but he thought there was potential to add more information here, such as a timeline of that ruler.

Most interestingly, he thought that the Chronicle could be used in multiplayer games, and show strictly multiplayer events such as chat messages. He also thought it could help gameplay in complex games such as Hearts of Iron III, where many events happen at the same time. A smaller version of the timeline could then be shown as part of the main in-game interface.

User test 3

After we had returned to Gothenburg, we once again met up with our interviewee from our third interview.

As in the previous tests, the dots were hard to see, and he had problems finding a specific character by using the highlight function. We also found that he did not use the fullscreen mode.

Overall, he found the interaction intuitive, yet he thought there were many unnecessary events. This could be compared to our first user test, where a lot of detail was greatly appreciated. He does however admit that he would use it in a more casual manner, mostly caring about the maps. According to him, it is slightly too focused on AARs for his taste.

He liked that he could see an overview of the war by pressing the zoom to span-button, but would like to hide events that are not related to the war.

User test 4

For our final user test we found a Crusader Kings II player in Gothenburg. As such, he had no previous knowledge of our design or our prototypes.

His favourite games were Europa Universalis II and League of Legends. His favourite moment in Crusader Kings II was when he inherited Italy for no apparent reason. When playing, he was more interested in role-playing, but he usually cannot keep role-playing as he often performs poorly when he does. As most other players we have asked, he stopped playing when there was too much micromanagement, but also when there was too much pressure to perform well. He had not written any AARs for digital games.

For this test, we had modified the dots we use to show hidden entries to be more visible, but our tester found these to be confusing. Eventually, he understood the purpose of them, when zooming in on one of them. He zoomed relatively rarely, but he discovered that you could zoom with the mouse wheel very early as a side effect of using the zoom buttons. He also found that there were too many entries shown, especially certain less interesting ones such as characters acquiring ambitions that were not a threat to him.

He did find the semantic zooming to be very useful, although he would also like to see some kind of generated text akin to the chronicle in Europa Universalis III. He acknowledged that this would perhaps be hard to do and the resulting text might be choppy, but he thought it would be interesting to read anyway. He especially wanted flavour text that could describe characters and events in a more vivid way. Like others before him, he also wanted to see a timeline for the the history of the game world, as a complement to the one focusing on the characters.

7

Results

In this chapter, we present the results of our thesis. Our main goal was to find a practical way of showing emergent narratives in Crusader Kings II. As such, the main result would be the concept we arrived at in the end of the process. Even so, the digital prototype developed corresponds quite well to the final concept, although it is more of a proof of concept rather than a full product. The digital prototype could be used as a basis for a full product, as there are naturally different ways to take the concept from this point in time.

7.1 Final Digital Prototype

After testing our digital prototype in the last phase of development, some minor changes were made. The entire prototype at the end of the project is described below.

7.1.1 Logging

The first step towards showing things in the prototype is how we should collect the data, and what data we should collect.

The majority of data we collect is in the form of messages, which are already shown to the player when something happens in the game. The player can set the priorities of these messages to decide if they show up as pop-ups, message boxes on the right side of the game interface, as text in a message log, or not show up at all. The prototype uses these priorities to determine the importance of the message.

When the player character dies, control is passed on to his or her heir. Keeping track of these changes is therefore simple, it is just a matter of checking if a character that has died was the player character. If she was, then we can save information about the dead player character and his heir. Two maps are created at this time, one for each character, although they are not rendered to a texture until they are needed.

The diplomacy system is used to keep track of wars. If a war starts where the player is one of the attackers or one of the defenders, the Chronicle log keeps track of that war. The importance of a war is determined simply by if it has the player as a main attacker or defender, or if he or she is only a minor part of the war. When a war ends, the Chronicle Log compares it with any wars it currently keeps track of, and notes that the war has ended. There is a limitation to this approach as a player can join a war after it has started, and therefore, the Chronicle Log would not find any war to end. This behaviour is undesirable, but it was deemed sufficient for a prototype. Furthermore, as there are many reasons for wars (called Casus Belli), it can be problematic to calculate the exact provinces that are fought for. Therefore, this calculation is simplified in the prototype. The major drawback of this simplifications is in the case of civil war, where the entire country is considered contested territory.

The prototype also keeps track of what Crusader Kings II calls events, which are decision points in your character's life. As the prototype also logs what the player decides, this means that once a button for one of the selections is clicked, the event is logged. Since the game pauses when one of these events appears, the date of the event will still be correct. Even so, event windows do not pause the game in multiplayer in order to avoid interrupting other players. This means that the date for an event will be the date of the decision when playing in multiplayer. This might be preferable, as the event does not actually have an effect until a decision is made.

Finally, the prototype will log when titles changed hands, but only if the player character is on any of the two ends of the transaction. When the owner of a title changes, the title and its de jure provinces is saved. The de jure provinces are provinces which are considered to legally be part of that title, even though this may not be the case at the moment. As the de facto provinces were harder to calculate, it was decided that de jure provinces would be sufficient for the prototype. There was not time to test all different ways a province could change hands, and it seems that not all cases were covered.

When a character is needed in an entry in the log, such as a rule change or a message involving a character, a snapshot of said character is saved. These snapshots freezes the character in time, meaning the portrait will not change over time. The snapshot contains the name of the character as well as any data to render the portrait such as DNA and the sex of the character. The DNA of the character is basically a packet of data how the portrait should render. The title of the character is also recorded so that the frame of the portrait can be shown properly. Other information, such as character traits which are only used in the ruler flags, are not saved in the character snapshot as they are not used everywhere and do not change the portrait.

7.1.2 Layout

The digital prototype is shown in Crusader Kings II as a standard window, albeit with a few tweaks on how it works compared to a simpler window. The Chronicle window is opened by pressing the F9 key. While a dedicated button in the interface would be needed in the final product, it was decided that this was not a major concern for the

prototype.

The window can be toggled from windowed to fullscreen mode. The fullscreen mode allows for more spacing between the flags, but there are no major differences between the two modes. The fullscreen mode is however less crowded and can therefore be easier to overview.

All events in the game are shown as icons, which are placed on a timeline. The prototype fetches log entries from the previously collected data, and creates subwindows based on these entries. The timeline is divided into three sections: the period before the start of the game, the period from the start of the game to the current date, and the period after the current date.

7.1.3 Navigation

There are three major ways to navigate in the prototype: panning, zooming, and clicking different types of buttons.

The panning is accomplished by simply left-clicking and dragging on an area inside the Chronicle. The speed of the panning is directly related to the mouse cursor movement. The left-click to pan action is not found anywhere else in Crusader Kings II. Instead, right-click is used to pan in certain windows. Even so, using the left mouse button to pan was the intuitive action of all our test subjects, so we decided to break Crusader Kings II conventions for this action.

Zooming in and out is performed using the mouse wheel. This is similar to how the player navigates the game map. Zooming assumes that the user's mouse has a wheel, but in our testing setup this was always the case.

In order to quickly navigate to different parts of the timeline, there are three navigation buttons in the top bar of the timeline. They allow the user to zoom out to show all the time from 1066 to 1453, zoom to show the elapsed time of the current game, and zoom to the current date. There are also buttons on war flags, which allows the user to zoom to fit a certain war inside the window. The ruler flags also have buttons to show the span of that ruler inside the window, which allows the user to browse from ruler to ruler.

7.1.4 Visualization

The prototype has a basic system for showing flags. Each event has an icon that can be clicked to open a flag with more detailed information. The size of the icon is related to the importance of the event: a more important event has a larger icon. All events with an importance level above a certain threshold will have their flag opened when it is added to the timeline.

Some flags have maps showing more information. Flags regarding the transferral of titles have a simple map showing the provinces included in the title. For the war flags, both flags show the same map: what provinces belong to the attacker, what provinces belong to the defender, and what provinces are contested in the war. The map used in the flag at the start of a player character's reign shows that character's realm at his or

her ascension. The map at the end of a character reign also shows these provinces, but also shows which provinces were lost and gained during that player character's reign.

Ruler flags cannot be manually closed or opened, but will open if there is enough room. This because rulers are a central part of finding where you are on the timeline.

If multiple events happen on the same day, they are spaced out so that they fill up the space to the next day. While there is no strict ordering of events that happen on the same day, events that happen because of player actions will be ordered correctly.

Primarily for performance reasons, entries with low importance will not be fetched if the zoom level is too far out. A consequence of this is that the user can control the importance of events to show by simply zooming.

To mitigate the problem of showing too many icons and these icons overlapping each other, any icon which overlaps another will hide the least important of the two events. To ensure that this does not depend on the date of the events when both have the same importance, each event has a small random number added to their importance level. The hiding of events is not absolute: hiding an event will simply turn it into a dot, hinting to the user that you can zoom farther in.

7.1.5 Different kinds of flags

The basic flag is the message flag. It has an icon that changes depending on what message category it is, and it shows the text of the message in the flag. At the left edge the two characters that this message concerns are shown. Some messages concern only one character, so only one portrait is shown.

The war flags have portraits for the main attacker and main defender shown on the left edge, and a map showing the countries involved in the war. If the war has ended, there are two flags, one for the start and one for the end of the war. These flags are linked so that opening or closing one of the flags opens or closes the other. Both flags also has a button that zooms to show the timespan of the war. These war flags are shown in Figure 7.1

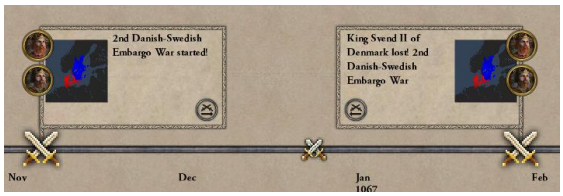

Figure 7.1: A pair of war flags, marking the start and end of a war.

Whenever the player character dies, two ruler flags are added. These flags are separate from the other flags, and open and close automatically. These flags show the previous and new rulers name, title, traits, and realm. These ruler flags are shown in Figure 7.2.

The flag that is shown for the decision points that is called events by Crusader Kings II look very much like those for messages. The difference is that the player can see what

Figure 7.2: Ruler flags created on the death of the player character

the player's response was to the event. Because the flags could not be resized and event texts are very verbose, there is often not much room on this flag, but it was included more to show the potential use of these flags.

When a title changes owner from one character to another, a special flag is used to show this occurrence. The icon for this event is the coat of arms for the title in question, and the flag contains a map of the provinces of the title. This title change is shown in Figure 7.3.

Figure 7.3: The flag created when a title changes owner.

7.1.6 Notes

To give the player more narrative power, she can also add notes to the timeline by clicking on an empty space on the timeline, so that he or she can have more control over the story created. In our prototype, there are some bugs related to notes, but the intended behaviour is described here. When the player creates a note, a flag is opened and the the editable textbox gains the keyboard focus. The user can then type any kind of text, although the text is limited to one line; writing more causes part of the text to

be hidden. If the user clicks outside the note flag and there is no text in the note, it will be removed. A note can also be removed by clicking the remove button. Clicking the icon closes the note, just as any other flag. The one line note in the prototype is shown in Figure 7.4.

Figure 7.4: One line note.

7.1.7 Integration with game interface

There are two main ways the user can reach other windows in the game. The most common way is to right-click on any of the portraits in the game. This kind of interaction works on any other portrait in the game, although it is not the most well known functionality. Right-clicking shows a radial menu that allows the player to go to that character's information page, take a diplomatic action with that character, and some other functionality. There are also shield icons in the ruler flags. These shields have the coat of arms of the associated character's primary title, and the user can click these shields to open the corresponding title's information page.

7.1.8 Filtering and highlighting

There are two ways in the prototype for the user to directly filter out what information is shown. The zooming and hiding of less important events could be considered a more implicit way to filter events, which can be used together with the two more explicit filtering options.

At the top of the window, there are a number of checkboxes. If these checkboxes are deselected, the events of that category are hidden. These categories are based on the implementation of message categories in Crusader Kings II, so they are not ideal. There is no way to hide the ruler flags, as they are essential for navigating the timeline.

The user can also left-click on any portrait, and that character is now considered highlighted, and all the portraits of that character will have a halo applied to them. If a portrait is inside a flag but that flag is closed, the highlight effect is applied on the icon instead. This highlighting allows a user to get an overview of a character's events

on the timeline, such as seeing the events leading up to a war or seeing the actions of an disloyal vassal.

7.2 Concept

As some things were not possible in the GUI system, would have taken too much time to implement, or was not prioritized high enough to test in the prototype, some of the functionality was left for the final concept, which is presented below.

7.2.1 Logging

One of the most common concerns raised throughout the process was how to collect the right data. Our prototype is very simple in how it collects its data, but even more so in how it determines the importance of an event. In the final concept, there is a more complete way to prioritize the events. There are many techniques that can be used to do this, especially if one takes inspiration from search results and online store recommendation algorithms.

We found from interviews that more control was desired, or at least better feedback on which events were more important. While a few of our testers found the events importance to be pretty good, some other users found that some of the events were very uninteresting to them. Some kind of minor control of the importance of events would then strike a balance between catering to casual users, while still allowing players with different play styles to choose what information would be important to them.

7.2.2 Layout

As we found out from the tests, some users preferred using the Chronicle window in fullscreen, while some kept it in its smaller windowed mode. Some played the game with the Chronicle window open, while others paused when they wanted to read the Chronicle. This means that we could not focus on just the fullscreen view in our prototype, even though it had more space. Having too much information while the window is in fullscreen mode would mean that the windowed mode would feel too cramped. That being said, there is room in the fullscreen mode for extra and not as critical information. In the final concept, the fullscreen mode also includes a minimap of sorts, which allows the user to navigate more quickly through the timeline. The minimap is essentially portraits of the most important rulers, where less important rulers are hidden if there is no room.

One idea we had in our concept that was never implemented in the prototype was to have the background colour of the period of a ruler alternate between a lighter and darker shade. This allows users to more easily see the ruler periods and at the same time give feedback on the zoom level.

Another problem that was encountered in the prototype was that there was not enough space between the start and the end dates and the sides of the window. In the final concept, this space is increased, but there is also be a check so that the user does

not zoom in and only sees days that have not happened. If this happens, the timeline rubberbands back until a date that has passed is shown in the window.

7.2.3 Navigation

In the final concept, the zooming buttons are still pressed down until the user does a panning or zooming action, at which point they are again clickable. This is to adress the problem of users trying to click the zoom buttons multiple times in a row even though it would have no effect.

In the prototype, a feature called glueing was implemented. The idea was that if the user was viewing the current date and had not paused the game, the window would glue to the current date as it changed. This would allow users to keep the Chronicle open in a window while playing without having to interact directly with it. However, few users found this feature, and it was not implemented completely in the prototype. Even so, it is part of the final concept as it is useful when using the Chronicle at the same as playing the game. This was a behaviour we observed in user tests, and glueing does not interfere with regular navigation.

Since the prototype was tested with a mouse with a wheel, zooming in and out was performed by using the mouse wheel. In order to support this action with mice that do not have wheels, pressing the right mouse button and dragging up and down zooms in and out in the concept.

7.2.4 Visualization

While there are some problems of grouping events in the prototype, they are because of bugs and not visualization problems. These bugs would cause flickering of icons as they are hidden and revealed repeatedly. This is due to some rounding error in the code that we did not have time to find. The semantic zooming was greatly appreciated by the users, and allows them to decide which periods of history are important. Still, the user should be able to control which events are shown as icons and which are shown as dots. Therefore, the final concept show events as dots if they are below a certain importance threshold, which is determined by the zoom level. This is to some extent already true in the prototype, but events are hidden, not shown as dots, which does not give the user a hint that they can zoom in.

The opening and closing of flags worked well in the prototype, although they could not be resized which made some text disappear.

The GUI system in Crusader Kings II also had no support for easily animating the scale or position of the flags, which would prevent problems of flags suddenly popping into existence. For example, the ruler flags appear very suddenly as the user zooms in. In the final concept, flags like this are instead animated, allowing for smoother transitions.

Another problem that occurred in the prototype was the fact that there is a maximum zoom level, and there is no limit on how many events that can happen on one day. This means that if too many events happen on one day, the least important ones will be shown as dots, but there is no way for the user to zoom in to see these events. This problem is

solved in the concept by simply removing these events, since these events are extremely unimportant, being overshadowed by many other that happen on the same day.

Since we did not test our prototype with colour blind users, carefully choosing the colours of the maps was not a priority, but for a completed product that would be used by many people, this would a more important concern. We also had a problem in that our maps can only show a province as one colour. The maps in Crusader Kings II can show some provinces as two colours, with the secondary colour layered over the base colour as diagonal stripes. This allows us to show occupation, or contested areas in the war maps, in a much clearer way, as shown in Figure 7.5. In the final concept, we would also use time as a component in the maps. For example, the map at the death of a ruler uses the brightness of the colour to show when a province was gained, with a brighter province would have been gained more recently.

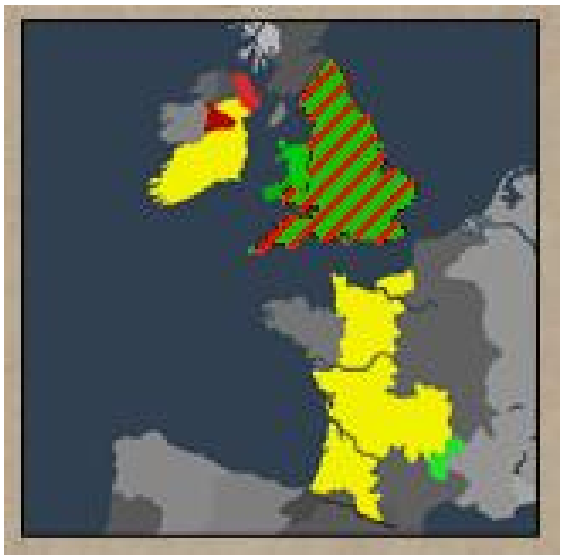

Figure 7.5: A different variant of the diffmaps with striped areas to denote territories that were gained and lost during one ruler's reign.

Another improvement of maps from our prototype would be to make them more interactive, as we found many users clicking on the map. In the final concept, users can pan around these maps, and let hover over specific provinces to see their names and other information in a tooltip.

In the final concept, flags are moved to the front simply by hovering over them. This was the behaviour expected by some users, and also lets users click on the flag to open a pop-up. The user had to click on the flag to move it to the front in the prototype because of time and technical constraints.

7.2.5 Different kinds of flags

Some limitations were placed on the flags in our prototype. For example, there was not enough time to implement a map for the flags signifying the end of the war. This map could show the two warring factions after the end of the conflict. By drawing a line between the two if the mouse pointer was hovered over any of the two icons, the two wars flags are also linked visually. In the final concept, the war map supports showing any kind of war, and can also show wars that you entered at a later stage. These flags are shown in Figure 7.6.

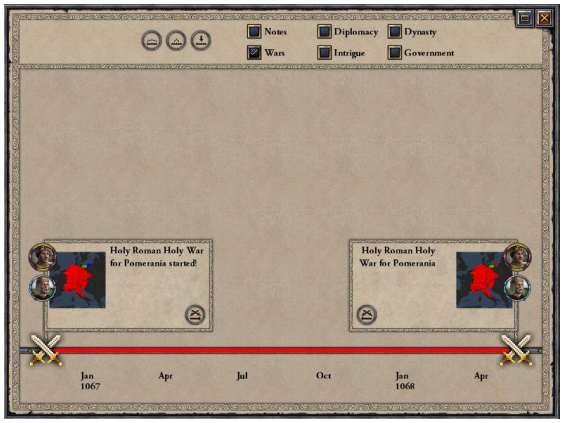

Figure 7.6: The war maps with different maps at the end and start of a war, and a line shown on mouseover.

As discussed when we first created the timeline concept, the final concept would include popup windows that can be opened to see more information about an event. However, events such as wars shows the other characters involved in the war, and how well the war went as time passed.

The ruler flags' fourth level of information also shows more information, such as character skills and spouses. In addition, it shows the pretenders to the throne when a character dies, and which characters received any land beyond the primary heir.

The decisions in events are shown better in the final concept, and the alternatives presented are also saved. The popup for event entries looks very similar to the original event window, so players can revisit their decisions and see how they could have played differently, enhancing the feeling that they have control over the emergent narrative.

One major event that we did not have time to implement in the prototype was a special event for battles. These would show how many died on each side, a map of where the battle took place, the major commanders and so on. The popup of this kind of flag shows a more detailed breakdown of casualties and the commanders in the battles. By pressing the button to show the span of a war, the relevant battles of that war will also be shown.

7.2.6 Integration with game interface

The integration with the main game interface by clicking on portraits and shields was appreciated by users, so in the final concept this idea is extended further. By clicking on maps, the user is taken to that area in the game. Also, a problem appeared when opening another window from the Chronicle, as the Chronicle window was still at the front of the newly opened window. Naturally, this is not desired in the final concept. The Chronicle window should also be minimized in some way if a new window is opened, especially if the Chronicle is in fullscreen mode.

7.2.7 Notes

In the final design, notes are further expanded. They support multiple lines, as shown in Figure 7.7, but the user can also change the text of any event. While this could be abused to change the message text, the user is only fooling herself.

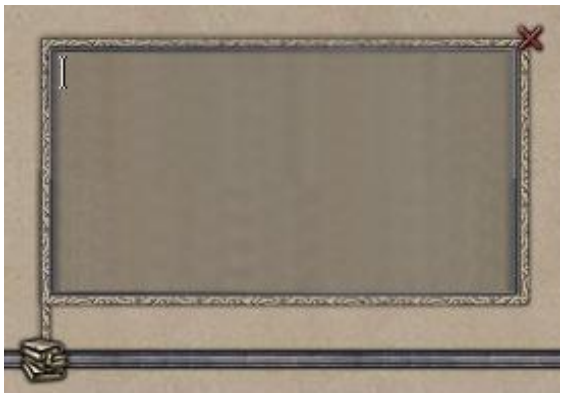

Figure 7.7: A note with support for multiple lines

As we found in user testing, some users found that it was too easy to add a note by mistake. In the final concept, notes are instead added by right-clicking on the timeline. A contextual menu is then opened, where the user can choose to either create a note, or generate a map flag. This map flag has a map of how the world look at that moment. This map might take awhile to generate, so the user has to be given feedback that the game is processing the map.

7.2.8 Filtering

In the final concept, the filtering categories are now linked more clearly to the different events, since they no longer rely on the message types in Crusader Kings II. Instead, they are partitioned into categories such as Domestic/Foreign and War/Peace.

7.2.9 Features not present in prototype

While not a primary focus of our design, some users wanted to be able to export the information in the Chronicle. In the final concept, there are two ideas of how to do this. The user can export the Chronicle as screenshots, which includes the entire timeline, or perhaps a specified subset. The user can open and close flags to determine what information. should be shown in the screenshot. Additionally, the user can export the text in the flags as well as their date to a text file. To make sure that this text does not become too long, only the text of opened flags would be exported. This functionality would probably require some way to quickly collapse or expand all flags.

We would also add the ideas from our initial concept development, where the main GUI supports taking notes and determining what information would be saved. A button is added to every message window, which would allow the user to mark this event as important in the Chronicle. As only more advanced users of the Chronicle would use this, this kind of functionality can be turned off.

A frequent question that was asked by many users was how it would work if you changed the player character mid-game, which is something you can do if you load a savegame. In the final concept, one would show a tear signifying the end of this timeline, and a new ruler flag similar to the one used at the start of the game, as shown in Figure 7.8.

Figure 7.8: The tear in the middle signifies when the player changed from one dynasty to another.

Another interesting feature in the final concept is the integration of screenshots and savegames into the timeline. When the game is saved or a screenshot is taken, this would create an entry on the timeline. This allows users to go back to previous points in the game, and also use screenshots as visual notes.

In addition, the final concept should include some way to undo actions such as editing flags, adding your own notes, deleting notes, or hiding certain types notes.

8

Discussion

In this chapter, we discuss the results of our thesis, namely the concept and the digital prototype. Furthermore, the methodology and the future of the design and the design space is discussed.

8.1 Results

While the concept was the main result of our thesis, we will also discuss how the prototype was received during our user tests.

8.1.1 Reviewing design goals

At the start of the process, we established design goals that we would aim for during the design process. While these goals would change in importance as more information became available, it is still valuable to discuss how well we achieved them, or if they were deemed unimportant.

One of our primary goals was to give the player narrative power to decide how to interpret the events of the emergent narrative. A primary focus of our design was to have some ways for players to connect the dots, even when events seem abstract or disjointed. In our concept, we use notes that allow the user to fill in these gaps. While notes is one way to support this in our concept, it is missing more visual ways of filling the gaps, using screenshots, drawing tools, and so on. These are not included in our concept because of concerns about complexity. For a pure AAR writing tool, these features would be much more important.

While we had not considered the gameplay side-effects too much while designing, we found that the Chronicle would be a good way for users to get reminded of past events when they return to a savegame after a period of time. While not the most common way for quitting a game of Crusader Kings II, it is a rather anticlimactic resolution for the player's story when they cannot get back into it because they have forgotten what

happened. The concept as it is now could certainly save more data and focus on giving more control to the player as to what data would be recorded, but that would also mean that less invested users would feel alienated.

A large part of the design was also finding and presenting causal links. While the highlighting of characters allows players to trace another character's history in relation to their own, it relies on the user finding these situations. This may very well be enough, as designing an algorithm that understands what the players find interesting might be next to impossible. Even so, the highlighting is probably not the most powerful method of finding causal links. Alternatives could both be focused on exploring more ways to show important characters, as shown in the lifelines concept, or to focus more on the connections between events such as wars, plots, alliances, and so forth. In addition, more powerful filtering options might also bring out these cause-effect relationships, but then the user is actively searching and not really discovering them, which is not the focus of our design.

Early on in the process, we decided to put less focus on player created goals, as even though they are an important part of the emergent narrative, they influence gameplay too much. If we were to support these goals, it would be implicitly. The note system allows players to add notes in the future, which could serve as goals or reminders. While these reminders could alert the player to what his goals were, or act as some form of to-do list, this could become too distracting for certain groups of players. Because of this, it is not part of our final concept, but could be a feature in an alternate design for a different kind of user.

While there was not enough time, and the digital prototype was not complete enough, the idea of sharing and comparing each players work was very interesting to us. This was because players grow more attached to their emergent narrative if they know that it is unique, so sharing plays an important part. While exporting text and images is in the final concept and was a much requested feature, getting players to actually share the results would be another challenge entirely. Many AAR writers had a hard time finding their audience, and their work was therefore in vain. Hopefully, as the Chronicle is a design for more transient users, the regular players would become more aware of the story potential of the games, and actively seek out the more ambitious AAR writers. The goal of the current design is therefore not to compete with AARs, but rather serve as an inspiration. The current design cannot compete with AARs made by people, and it probably never can. The amount of customization and personality that is in a true AAR probably means that a generated summary of event can only act as support.

Something we did not have time to investigate was if it would be necessary to remind players of their story as it unfolds. While buttons in the main interface for recording events into the Chronicle might be enough, we could not perform any long-term user studies that show that a reminder would have to be shown. We did find from our literature study, our interviews, and surveys that players frequently stop role-playing when they lose sight of their goal of creating a story, and therefore some kind of reminder would possibly be necessary.

One interesting side-effect of our visualization was that it neatly solved the problem

of generated text. In generated text systems like the one in the Europa Universalis III chronicle, there is always the risk that the algorithmic writer spends too much time on describing one detail of the game. While the flowing text is certainly appealing to some players, as we found in our user test, there is no control over the level of detail. By simply zooming and filtering in the Chronicle, the user can get a much clearer overview of the story, where the player's own interests come first. Text is still important, but the length of text no longer decides how big an element is in the overall visualization, which can be a valuable lesson for other designs in the same area.

While it was not explicitly stated as a design goal, we wanted players to use the Chronicle to graduate from players to AAR writers, or at least help them on their way. While our more AAR focused users were helped by the Chronicle, they were not our main concern. This transition from a player who only uses the Chronicle for a few maps, to one who writes notes and publishes the results, was an important part of our design. We believe that the current design supports this behaviour, since it lies somewhere between simply playing and starting writing your first AAR. Even so, because of the time-consuming nature of running long-term user tests, we have no concrete evidence that players will graduate to AAR writers over time. The design could however be clearer in its distinction between beginner and advanced use, as we observed in user tests that users could zoom in too far and see only minor events.

8.1.2 Concept discussion

While the above discussion concerns our design goals, it is also important to consider possibilities and alternatives to our final concept.

More ways to show information

In our concept, there are four levels of information to each event: icon, tooltip, flag, and pop-up. A possible problem would be when the event does not have enough information to warrant a pop-up, such as when it is only a minor message. Therefore, the fourth level may sometimes be disabled, although this would require the design to show that the pop-up is not available.

In the ruler flags, the traits of the ruler is shown. While we discussed showing character skills (such as martial and diplomatic skill), we had determined that traits were more interesting for a role-playing player, while the skills would be more interesting for a player who cares more for gameplay. Since we had determined that a majority of players preferred role-playing, we show the skills. The skills of the character could of course be shown in the pop-up, but it could be that this prioritisation is wrong. We did not have time to user test this, so traits may not be desirable over skills for most players.

From the questionnaires and interview, we found that few users cared about the score, instead having their own goals. Yet, in the concept, each ruler's private score is shown in his or her flag. We decided to show this information because it would allow users to gauge how important a ruler was. However it might be that there is some other

way to measure how important a ruler is, although there was not enough time to explore this in this thesis.

As we described in the concept, going into fullscreen mode means that the minimap of the timeline is shown. There are of course other information that could be shown. We discussed showing charts and graphs, if these are not already available in the already existing ledger. What information would be the best coupled with the timeline is of course something that would have to be investigated.

Information collection

In the concept, the user has little influence on what information saved. This was because we determined most users would be transient when using the Chronicle. Since we have no long-term user testing to support this assumption, a further investigation would be ways for the user to change the importance of an event. For example, the user might mark an event as more important or less important, essentially giving it three discrete importance levels. A more advanced alternative might be to let the user control the importance of each type of event, in a similar way of how the message settings work in Crusader Kings II.

During development, we also considered the problem of supporting old saves. However, it would be impossible to retroactively collect the all the data the design needs. A minimal version of the data could be collected, and the user could be alerted that not all data can be collected retroactively. This feature might be useful for some players returning to an old game, although it is unsure how many would use it.

Alternative ways of interaction

During our concept development, we considered using the alerts in the game to remind the user that the Chronicle had changed. While this alert would not be triggered by every change, we still determined that it would be too intrusive and not fit with the other alerts, which are all related to gameplay problems that need to be resolved. Therefore, we decided against this approach, although some kind of reminder functionality might be necessary. The buttons on event windows might be sufficient, but it was not something we had time to test. A possible solution to this problem might be to have the button for the Chronicle highlight instead. However, this would not work well with the current interface conventions in Crusader Kings II.

Another possibility that occurred to us during user tests was that a note's importance level could be related to the current zoom level. This would allow users to control a note's importance implicitly, making detailed notes when zoomed far in, and more general notes when zoomed out. Still, we did not have time to test this, and we deemed the risk that users would not discover this nuance of the design.

A large interaction design problem with our final concept is that it requires undo and redo functionality. We did not have the time to implement this in the prototype, and while traditional undo and redo buttons might work, there are probably better ways to enable the users to revert to a previous state.

Navigation

One discussion that we had during this thesis was if the user should be able to pan in two dimensions rather than one. This would mean that there is more vertical space to show more information, such as having multiple timelines running in parallel, each showing a different character. While this would require much more data to be collected, it could allow for some interesting comparisons, if the panning up and down does not involve too much excise. We chose to keep our concept simple, but a more advanced design might explore panning in two dimensions.

We also chose to omit the functionality to change what character is currently shown on the line, as tracing lineages for non-player characters is not always as straightforward, with one character replacing another. It could certainly be done, but it would require more work and perhaps even a different visual look for these alternative timelines.

Look and feel

One problem encountered in the prototype was the fact that event texts can be very verbose. This created problems when trying to fit these to the flag. While the problem might be mitigated by having the full text in the pop-up, it does not allow for understanding the event by just looking at the flag at a glance. Potentially, one could solve this by having shorter descriptions of the events specially written for the Chronicle, although this might be too time-consuming.

When we were developing the mockups for the design, we wanted to have a paper metaphor to tie in with the theme and fictional world of Crusader Kings II. The direct panning of the timeline does make it behave like a scroll. The rubber banding effect when panning outside the Chronicle does feel very physical, although it is debatable whether it can be said to be part of the paper metaphor. However, the semantic zooming might be the hardest to justify using the paper metaphor. Even so, it was deemed that this interaction was so essential to users filtering the information, that it was worth breaking the metaphor.

A problem that arose in user testing was that users did not see the dots of less important events. Therefore, they did not always immediately understand that they could zoom in. When the visibility of the dots was adjusted, users could see them, but then expected to interact with them directly. One way to solve this problem is to find the right balance between visibility and affording zooming in. Still, this balance might be hard or even impossible to strike, and therefore another solution might involve allow limited interaction with dots, such as zooming in on them when they are clicked. This could of course create other problems, which once again reinforces the importance of user testing.

A minor problem that appeared in testing was that the dummy flag on the rightmost of a pair of two war flags would confuse users. If we had known this, we would have opted to replace the dummy map with a true placeholder image, as users would probably understand the limitations of the prototype.

8.1.3 Feedback from users

A problem we faced while considering the users of our design was the fact that they were quite diverse in their playing style and interests. Since Crusader Kings II is such a complex game, different players find different systems interesting. Therefore, it is a bit surprising that most of the users found our design interesting and would use it, even though some admitted that they would use it less.

Perhaps most striking is the fact that a few players found it interesting primarily as a gameplay tool. This could mean that a timeline concept could be used in other areas, such as for planning and an alternative way to using pop-ups to show events.

While our design focused more on the history of the player characters, some players would want more information about the state of the world. We had anticipated less interest in this as players do not have as much influence over these events, but we knew the rich simulation can give rise to stories without player input. While major events in foreign countries will appear on the timeline, it would probably require some separation from the main timeline.

8.2 Method

In order to understand how valid our results are, we here discuss the methods we used, what worked and what did not, and what other methods we could have used.

8.2.1 Evaluating methods used

In our planning, the first month would be spent only on design work. While design decisions were made throughout the project, it was here the most of the decisions were done. Therefore, it had to end with a concept that was finished enough to start implementing as a digital prototype. This meant that we could not spend as much time on the initial design process to explore alternative designs that would perhaps have yielded interesting lessons on how to show emergent narratives in the more general case. Even so, the digital prototype allowed us to observe real use, and as such was highly valuable. Because of this, we wanted to involve the users in the creation of the paper prototype. While this was great for the development of a design that would be appreciated by the users, there is a risk that the design does not exactly solve the problem posed at the start of the project. Even so, if the design would not be appreciated by the users it would not be used, and therefore cannot be said to be successful.

The initial pre-study was a good way for us to understand the problem space, and how emergent narratives are formed. Identifying elements of a game design that support emergent narratives allowed us to enhance these elements in our design. However, it was difficult to find any related work that directly applied to our situation: The Sims provided a similar but limited design in its photo album, but there were no examples of more involved designs. The historical visualizations were helpful, but they were all created with all information known, which meant that they did not fit so well when converted to a dynamic computer program.

The questionnaires gave us great feedback from the community. While there is always a question of how well the questionnaire results correspond to the actual user base, it gave us enough information to prioritise our design decisions. Additionally, while we tested the questionnaires before sending them out, there is always the risk that the wording of the questions influence the users. Even so, the engaged community of the Paradox forums and their interest in writing their detailed opinions allowed the questionnaires to be longer and more detailed than usual.

To understand the user better, we decided to create personas, although they were not used very often. We based the personas and their importance on the questionnaires, while their personalities were developed from the information we gathered from the interviews. This allowed them to be more useful than simply thinking about what our interviewees would like. Even so, it was hard to only think in the terms of personas, and often design decisions were based directly on interviews and questionnaires. An interesting problem occurred while working with personas: we would note the design decision reached after a persona analysis, but forget we used the personas. As such, we forgot that they were used, and therefore felt we had to use the personas more. Paradoxically, this meant that we used personas more often than if we had not forgotten about using them.

The mockups we developed during the process allowed to quickly iterate before implementing features in the digital prototypes. Even so, we did not use the mockups enough to explore the different concepts and ideas we had. This was mostly because of time constraints and the necessity to make decisions. Furthermore, the rigidity of the GUI system also meant that the mockups would be quite basic.

The paper prototypes and the semi-structured interviews gave perhaps our best understanding of our users. The paper prototype allowed us to work quickly and get lots of feedback, since users did not feel hindered by their technical or drawing ability. It was however difficult to test mouse hovering functionality, as well as aspects like size and positioning of GUI elements. The paper prototype only took a few days to completely develop, with some extra days for polishing after testing it on users. The time spent was well worth it, especially considering how quick and cheap paper prototyping is.

The interview questions also improved over time, as new questions were added based on interviewee answers. On the other hand, it might be argued that the interview answers cannot be directly compared, yet as the interviews were conducted continually, having the same interview questions would probably not have worked well, as the design changed between interviews. The NDA, enclosed as Appendix D, we wrote to ensure the privacy of the interviewees was not strictly necessary, but according to us it seemed to give our interview a more serious tone.

The resulting digital prototype proved to be very useful, especially when it was tested with users. While it only tests one concept, it can be used as inspiration for generating new concepts. This is especially true in an area where there are few predecessors. The digital prototype did however take a long time to implement compared to the paper prototype and the mockups, and there was no time to perform a long term test. C++, the language used to implement the prototype, was also not too familiar to us, and is also not the quickest language to program in. In addition, the intricacies of the GUI system

and size of the Crusader Kings II code base meant that quite a lot of time had to spent reading and understanding already existing code. Even so, implementing the digital prototype outside of the engine would mean that we would only have access to basic save file data, which would not have been enough. The digital prototype would also not be able to be used as the game was played, which many users greatly appreciated. The user tests we performed mostly identified usability problems and confirming we were on the right track. While thinking aloud could be awkward for users, we also saw different play styles and how the chronicle would be used.

Finding users was a major problem in the project, and Nielsen and Landauer (1993) states that the optimal amount of test users lie between 3-5 people per test. The time constraints of the project also made long term usage tests impractical, which makes reasoning about the real use of our design more difficult.

8.2.2 Alternative methods

While the main user of our design would not be AAR users, we discussed writing an AAR to better understand what information was important, and what should be saved. We did some note-taking, and found it was a lot of work. It would take too much time from our work, and we decided to focus on other aspects of our project. This approach was inspired by the so called "Being your user" technique described by the Design Council (2013).

During development, we also found that a dedicated project space would have been useful, as described by the Design Council (2013). There was limited space at Paradox, which required us to move from our computers if we wanted to have detailed discussions. In addition, we could not have our paper prototype and personas visible at all times, which would have made us more mindful of them.

At the start of the project we considered doing a focus group or workshop (Design Council, 2013), inviting multiple users at the same time to work on our concepts. However, we quickly found we could not find enough users that were both living in Stockholm and played Crusader Kings II.

8.3 Generalising the Design

While the design presented in this report is geared towards Crusader Kings II, there is of course the possibility to extend the design to other games. The basic concept of a timeline would probably work well for most of Paradox Development Studio's other games, since they are dealing with history and the time-scale is approximately the same. Nevertheless, Crusader Kings II is much more concerned with the interaction of characters than the other grand strategy titles. For instance, a visualization of Europa Universalis would be more concerned with territorial gains, colonialism and trade. A timeline might still be appropriate, although the idea of a time lapse might be more interesting for Europa Universalis. This would also be true for Hearts of Iron, where troop movements, campaign plans, and the conquering of territory is the central focus. A game like Victo-

ria would be an especial challenge, as it is more concerned with economy, internal affairs and politics rather than territorial changes. As expected, the emergent narrative of a game is influenced by its mechanics and systems, and such the visualization would have to focus on other aspects.

If the design would be extended beyond grand strategy games, it would necessarily be changed even more. At this level, it is more important to consider whether the main way players play is paidia or ludus. While grand strategy games strike a balance between paidia and ludus (although Crusader Kings II seems to focus more on role-playing), games like The Sims and Dwarf Fortress are much more focused on paidia. It could be expected that players of these games are more likely to write their own stories, and perhaps a more AAR-focused design would suit them better. On the other side of the scale, games like Starcraft and Age of Empires are more competitive and focused on ludus. One would expect players of these games being less interested in writing their stories, instead favouring gameplay related feedback and information, and telling their stories through recorded video. In a game in the middle of the spectrum, such as Civilization, some information presented at the end of the game is related to gameplay, while others are linked to the fictional world. For example, there are demographics in many of the later entries in the series. While these demographics are linked to game variables, such as literacy being related to technology level, it is presented to the player simply to immerse the player more in the world. Whether to show the game data clearly or obscure it as demographics would then be a design choice between supporting ludus and paidia.

The timeline concept has of course been seen outside of games. Most notably, Facebook changed their profile page into a timeline page, showing important events and status updates for a user. This focus on showing the user's story is an interesting development in social media design, although it is not the focus of this thesis.

8.4 Future Work

If there was more time, we would have liked to work more on our prototype, implementing the features in the final concept, and also explore more ways to support players exploring the timeline. For example, with a fourth level of information in the form of a popup, and more ideas based on the character highlighting. There is also a great need to perform long-term user tests, to see how user behaviour changes during game sessions which are longer than an hour.

In more general future work, it would be interesting to design similar systems for many different games, to see how they would differ. For example, how would a similar design work in The Sims?

While the digital prototype is not ready for release, a possible experiment in the future would be to see how the design could be integrated into the Paradox community, beyond just exporting text and images.

9

Conclusions

The aim of this thesis was to investigate ways to support the player in discovering their own emergent stories in grand strategy games. The focus has been on collecting these stories and showing them, instead of creating new stories by changing gameplay rules. This question was explored by implementing and user testing a prototype that helps players get context for their own stories in one of Paradox Development Studio's games. The game chosen was Crusader Kings II, as it provided the most potential for storytelling with its focus on characters.

The main goal of the project has been to develop a digital prototype, although numerous other techniques have been used throughout the development. The project started with a literature study and a situation analysis, where we studied relevant literature and games to create the design goals for our prototype. Personas were created to represent our users, based on information gathered from online questionnaires and in-person interviews. The interviews were coupled with testing two paper prototypes, to arrive at one design concept. The digital prototype was developed according to this concept, although the prototype influenced the continued development of the concept to a high degree. When the digital prototype was complete enough, it was continuously tested and adjusted with users using observation and think-aloud.

The result of the project is both the prototype and our final design concept. The concept is a timeline, where events that happen in the game are recorded. The user can navigate around this timeline by panning and zooming. Zooming allows the user to see events of lesser importance, and therefore get details on a period in history by simply zooming to that period. The user can also get more information about an event by clicking on it, with a total of four different levels of information: icon, tooltip, flag, and pop-up. The user can also filter events by selecting certain categories, and by highlighting an interesting character to see what events he or she took part in.

These kind of features support the player in seeing their story more clearly, and without much effort from the user. The timeline concept was found by user testing

to be quite simple and easy to understand, and all users thought they would use the functionality. Most would use it to look back on a game they had played, and they felt such a feature was missing in the original Crusader Kings II.

In the future, it is hoped that more work is done in the area of showing players how unique and interesting their play sessions can be. This would allow players to feel more invested and proud of what they achieve in games where there is little goal apart for what the users set for themselves. It is also hoped that companies like Paradox Development Studio embrace the storytelling aspect of their games more, and support ways for players to share and discover their emergent stories.

This thesis was very practical in its approach to the area, and therefore could only touch briefly on many of the interesting aspects of emergent narratives in games. Even so, our work shows that there is certainly interest amongst players of games with long game sessions, such as grand strategy games, to have a retrospective tool that helps the player to visualise the stories they created when playing the game. Our user tests show that our prototype seems to be a good example of how to do this, and shows that you can provide interesting visual storytelling without relying only on text. This would be essential to attract players to think more consciously as themselves as storytellers.

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Appendix A: Personas

This is a description of the four personas we developed and worked with throughout the design process. This is the second iteration of the personas, where they have been influenced not only by the surveys we carried out on the Paradox Plaza forums, but also by the interviews we carried out.

Kristoffer - Gamer, winner

Motivations: Dominate the game he plays, and all other players. Min-maxing the systems of the game.
Goals: Optimize his play style (through reading AAR's and playing)
Enjoys: Winning, critiquing others, going alone, efficiency, shorter story AAR's
Dislikes: Losing, writing too much, waiting
Bartle: Killer/Achiever
Quote: “I am the only one who can improve myself!”
Occupation: Student, spends a lot of time playing Starcraft II and Paradox Games
Education: High school
Hobbies: Playing games, training his body, tennis

Jeanette - AAR writer, history nerd

Motivations: Learn the game systems and historic characters. Tell a story to both herself and others.
Goals: Create alternative history, immerse herself in the game world, playing suboptimally for immersion.
Enjoys: History, role-playing, internal dialogues, immersive games, going along with the flow of the game
Dislikes: Uneventful games, sticking to one nation, too similar or uneventful games. Immersion- or story-breaking in games.
Bartle: Explorer (Fiction)
Quote: “One time, I almost lost because I was so invested in the character of my incompetent ruler.”
Occupation: Runs her own business
Education: University
Hobbies: Reading history books, documentaries, writing AAR's, role-playing

Jakob - AAR, social guy

Motivations: Meeting new people, sharing new experiences
Goals: Make friends online, create something in the game that is fun to share
Enjoys: Playing around, communities/forums, learning how to play (to make better stories), role-playing, pottering (playing a bit casually). Weird and funny stuff that happens.
Dislikes: When I fail to please. Games with no community element.
Bartle: Socializer
Quote: “Community is beautiful!”
Occupation: Part time
Education: High school
Hobbies: Gaming, all kinds, AAR's a lot

Anna - Gamer, explorer, breaker

Motivations: Explore the game to its fullest, proud in finding stuff that no one else has found.
Goals: Find out what is possible
Enjoys: Understanding systems, exploring stuff on her own, modding, breaking systems, reading save files, creating weird situations
Dislikes: Manuals, tutorials, compiling an AAR after something cool happened
Bartle: Explorers
Quote: “I managed to turn the entire world Orthodox in Crusader Kings!”
Occupation: Software engineer
Education: University
Hobbies: Coding, reading some gameplay AAR's

Appendix B: First survey results

Purpose

The purpose with the survey was to **get a better understanding of the writers of AARs** on the Paradox' forums. Even though we are not developing a tool that are to be explicitly used by AAR writers, we still think their viewpoint is important. How people create their AARs is vital in understanding how people create their own stories in games, even though they might not share them with others. We wanted to start with a smaller study, in order to get information to make a better, more quantitative study later.

Respondents

The survey was published in the Paradox Development Studio-section of the Paradox Plaza forums 2013-01-30, and was closed six days later. During this period, we received **48 responses** from the 264 users who viewed the forum thread. The thread also received 16 replies, whereas several of them expressed interest in the results.
In order to attract more respondent, we sent Private Messages to **26 popular AAR writers** who had some of the most popular AARs in recent Paradox Development Studio titles.

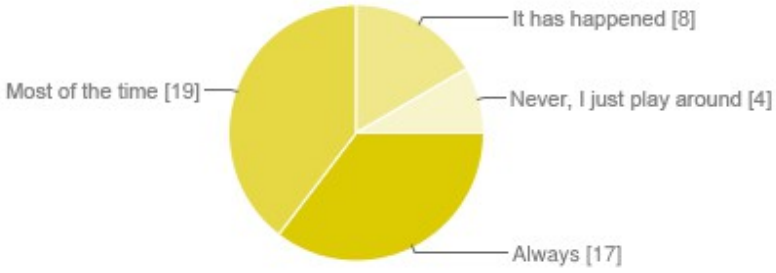
Number of responses over time

Goals

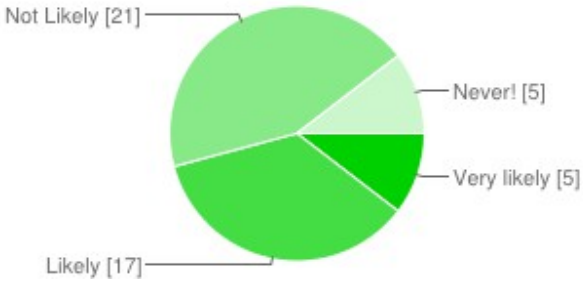
These questions were given to all respondents.

Questions

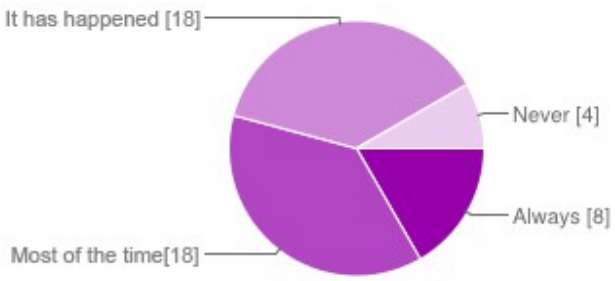
When playing a game with no clear winning goal, how often do you set your own long-term goals?



If a goal is too hard, how likely are you to change your long-term goal?



In these kinds of open games, how often do you role-play your character (or nation)?



What kinds of goals?

“Having fun! but mostly role-play oriented goals”
“World Motherfucking Domination.”
“They are usually territorial goals, though not necessarily aggressive.”
“Do X before anyone else, Achieve Y before Z turns have passed...”
“**Not very serious goals**, perhaps creating some strange construction in Garry's Mod or Minecraft, or building a silly space station in Kerbal Space Program”
“Vary **based on circumstances present in the game**, the ambitions or traits of a character, or the situation the state is placed in.”
“In a Europa Universalis 3 game as Sweden, I was determined to conquer the entirety of the Baltic shores. **If there is a formable nation available, I strive to fulfill the requirements for forming it**.”
“**Depends on what and whom I play** as and changes all the

> time! I generally try to avoid taking too much territory (generally!) and instead try to imagine what the people guiding the country, the collective mood of its populace, and other such dominating factors are. Then I let random events and moments of chaos guide the rest - and with a bit of narrative on top, try to **cobble together something that resembles a history**!"

Reflections

From this data, we first find that around **75% usually play with some kind of self-imposed goal**, although it is not uncommon to simply start a game to see what happens. Although these players say they have no goals, they of course form smaller goals as they play.

There also seems to be some **correlation between people who are role-playing and people who are likely to stick to their goals**. This suggests that when a player invests in a character or nation, they will try to achieve their characters goal no matter the odds, and even if it leads to defeat.

Another important aspect of this data is that it confirms our beliefs that the **forming and completion of goals is important for players**. Perhaps one could let players set their own goals, and for the game to know when they are accomplished. In some ways, this would be similar to missions and ambitions which are already present.

We also found that a lot of the **goals are dependent on current conditions**, and that some players had a **hard time playing sub-optimally just to fit the character** or nation they are playing.

In summary, the types of goals that respondents highlighted were:

- Experimentation
- Optimization
- Personal challenges (promise to do X in Y years or before Z)
- Alternative history
- Having fun
- Combinations of the above

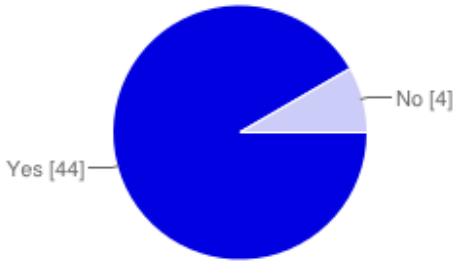
Conquering territory was given by many as their **primary goal**. Therefore, the changes of the game map over time is probably a valuable visualization of player progress.

AAR readers

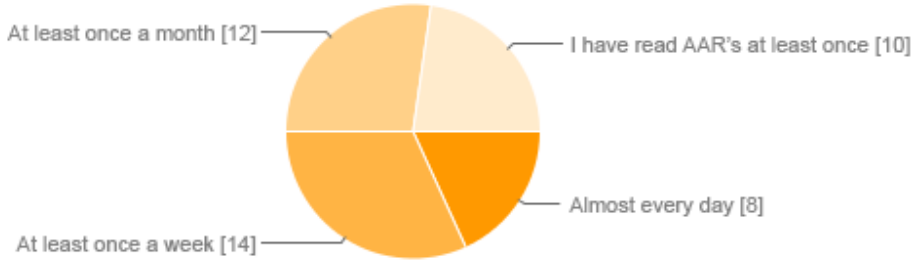
These questions were given to all respondents who have read an AAR at least once.

Questions

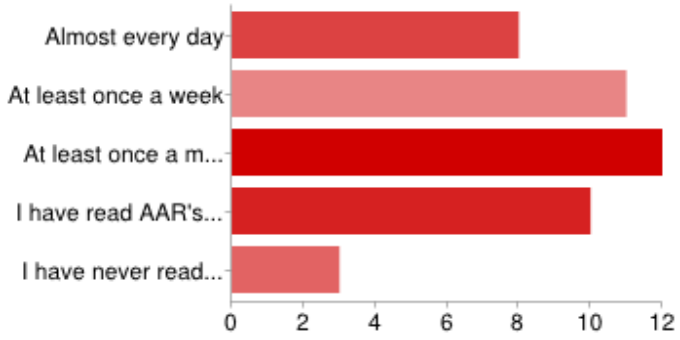
Have you ever read an AAR?



How often do you read AARs for any kind of game?



How often do you read AARs of games from Paradox Development Studio?



What kinds of AARs do you prefer?

Have you ever changed your play-style after reading an AAR?

“I've usually gotten **good tips on game mechanics** and often found out new fun stuff to [do]”
“I have gained appreciation for the **immersion potential of countries** I would not have otherwise bothered to play with.”

“AARs haven't really changed my play-style because even though I like role-played AARs as such **I strife for the maximal efficiency** when playing games and there don't tend to role-play much.”
“I am more likely to "roleplay", even when just playing by myself without writing an AAR about the game, making decisions that may not be the most optimal at the time, but **promise a good story.** I have also completely stopped save-scumming (before, I had a tendency to load a previous save if a battle went awry, for example).”
“Paradox Interactive games **aren't mastered overnight** so much knowledge are gained this way.”

Reflections

From the quantitative questions, we can see that most respondents seem to read mostly AARs of Paradox Development games, which is to be expected given that they are visitors of the Paradox Plaza forums. Even so, if we assume that all who write AARs also read them, we find that **4 of 18 of non-writers have never read an AAR.**

We also see that **narrative style AARs are very popular, but also detailed gameplay descriptions.** Narrative and history books were said to take a lot of time to read, but they were still popular. No one mentioned preferring a mix of the two. A mix would also probably take too much time to read, so it may be best to try to focus on either narrative or gameplay when generating a retrospective of player actions.

Screenshots was said to be very important for a good AAR, especially if it was in the style of a narrative. Images may be less important in strategy-focused AARs.

Other important ingredients in good AARs were said to be:

- Real world connection
- Alternative history
- Focus on important events
- Details (especially in gameplay-focused AARs)
- Events, creating twists and turns
- Not just “what”, but also “how”
- Pictures were often favoured over words
- Defeats and tragedies are interesting

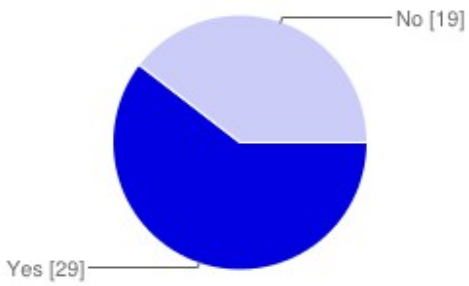
The last point is interesting. It may be that people who role-play or write AARs are much more tolerant with losing, which may cause players to explore the game further.

AAR writers

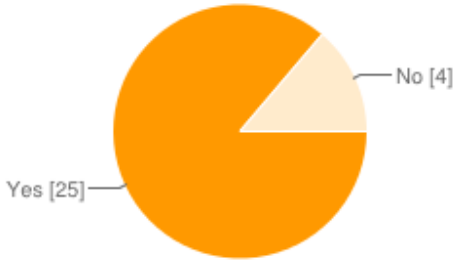
These questions were given to all respondents who have written an AAR at least once.

Questions

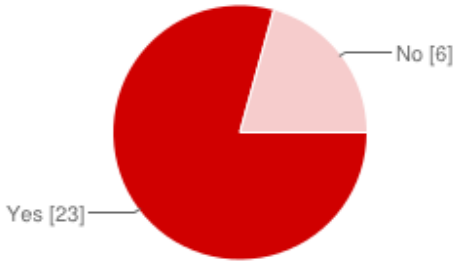
Have you ever tried writing an AAR?



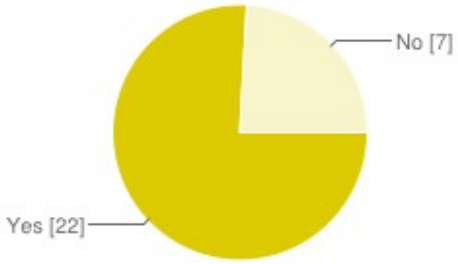
Have you ever published an AAR?



Have you ever started creating an AAR, but stopped?



Are you more likely to play "in character" if you are writing an AAR compared to when playing normally?



Why did you start creating an AAR, but then stop?

“If you play past some point, you usually become too powerful and the **game becomes too easy**, meaning that it takes the challenge out of AAR and makes it mostly ‘went to war with X, crushed them, took province Z, then went to war with Y, crushed them etc’ “
“Both times, I was writing a narrative AAR and **underestimated how much work it would be**, and was not confident enough in my abilities to go on. Recently, a **public recognition inspired me to resume** a narrative AAR, but there is still another older one that's gathering dust.”
“I often have **multiple AARs going at once** -- sometimes I favor one and lose interest in another.”
“interrupted at one point and after abandoning the game for a long period of time it was **too difficult to get into the same story once more**.”

What kinds of tools and programs do you use to make your AARs?

- Word
- Paint/Photoshop
- Research on Internet
- Excel
- Skitch (Evernote image annotation tool)
- Clausewitz editor (Save-game editor)
- Fraps (for screenshots)
- Paper and pen

Is there any tool or functionality that would make AAR creation better?

“Most functionalities that would improve AAR creation would be in-game, mostly pertaining to **tracking and recording actions** occurring in-game.”
“**In-game planning tools,** e.g. the **battle planner** from Hearts of Iron 3: For the Motherland.”
“No, creating a successful AAR **isn't about tools it's about a vision** for the AAR and sustaining the effort to keep going after the initial push.”
“I would benefit massively from a hotkey that I could press and **type in a short note** that would be saved in a text file, affixed with the in-game date of when I wrote it. Another hotkey would take a screenshot and allow me to quickly type a caption, and would also be affixed with a date. This would help me **keep track of what is happening and what I am thinking**, as I prefer to play for a period of time, then write afterwards, rather than write as I'm playing, as some others do. Currently, **I have to either meticulously alt-tab to a notepad** and write the note and date, which is very tedious, or take a multitude of screenshots and pore over them later to figure out what is happening, which takes a lot of space since Paradox games save screenshots as .bmp files, and is unreliable, since screenshots do not record my thoughts and plans.”
“Probably depends on the person writing the AAR, what kind of AAR they are writing, and far too many factors to create a one-size-fits all solution. **The wikipedia-links present in Crusader Kings' 2 are a good start**; perhaps a 'post-game comparison' to our timeline and the state it was in compared to the game played? An automatic screen-capture program, or in-game jotting pad?“
“A way to relate graphics and text together easily.”

What would make you create AARs more often, or make you start writing AARs?

“I suppose if the game could **present me with a comprehensive report**, I might like to slim it down by extracting the most interesting parts.”
“A job as a lighthouse operator (or something equivalently monastic).”
“...the AI is easy to defeat, so I prefer games (and thus writing AARs about games) that are multiplayer.”
“An easy tool to make AARs, that can be used while I am playing. It should be able to **help me find the screenshots I have taken,** maybe immediately, and **help record some things (when did the war start/end, who cuckolded me, etc)**.”
“**Good and frequent comments from the readers** and reduced in-game micromanagement (one of the prime reasons of writer's fatigue in case of AARs IMO).”
“**Inspiration** - either becoming interested in a city or country, or getting an idea for a character who could be fun to write about.”
“More **tangible rewards** for well-done AARs. There is a multitude of user-administrated awards in circulation on the Paradox forums, most being pass-the-trophy weekly spotlights, but having the publishers reward outstanding AARs with something small but tangible like cheap DLCs, a small amount of Blue Coins on Gamersgate, or even just unique titles and badges on the forums would be encouraging.”
“I tried but, I do **forget to make notes and take screenshots.** Maybe I should write a script that triggers a pop up notice reminding me that I should make notes for my AAR.”
“If there's one thing that can be learned from AARs, it is the

amount of goodwill even something simple like them can bring.”

“And trying to imagine what might most help others with their AAR-work: **Encouragement** that you don't need lots of words, pictures, or anything to make an AAR. **Try it out, even once**. It is said often, but never enough; the experience is wonderful - you'll learn more about history, stretch your creativity, and share something with people who appreciate it. “

Reflections

From the quantitative data, we can see that players are **much more likely to role-play when writing an AAR.** This could mean that if we support “regular” players with simple AAR tools, they may role-play more often, even if they do not publish their results.

By far the most common concern from people who tried writing AARs was the fact that the **creation of AARs is very time consuming**. Especially handling screenshots, and taking notes were said to be very tiring. Other reasons were **save file corruption**, which was surprisingly common. Even though there are auto-saves, the fact that it may be hard to reproduce gameplay may mean that it is hard to continue. In some tool for writing AARs, handling this problem may be preferable. Finally, a large reasons for giving up AARs was that **they became less interesting or too easy.**

Some AAR writers were also concerned that they **did not find an audience**, and other stated that their **audience was their main reason to continue**. It is therefore important to find a way to match the right reader with the right audience, and the forum may not be the best system to do so. At the same time, some AARs are just going to be of too low quality.

Some respondents also had trouble swapping between games, or “**getting back into the game**”. Better ways to see the history of your game, and understand the state of your nation at a glance should help with this problem.

We also found that users did only rudimentary image editing on their screenshots. This could prove an **opportunity to provide more visually interesting screenshots**. One problem with having some kind of aesthetic style applied to screenshots may be that players are more aware of the similarity between screenshots.

Many AAR writers also thought that having some kind of **in-game writing and screen capturing tool would be useful**. When asked what would help them create AARs, the respondents mentioned:

- Screenshot tools, captions, notes, dates, cropping
- Tracking and recording actions (notes)
- Linking graphics and text
- Finding an audience
- A clear goal of the AAR
- Real world rewards (DLC, discounts, etc).
- Battle planner (as in Hearts of Iron 3)
- Reminders to take notes (regular retrospectives)

One user argued that it was the **vision and motivation** that was the most important. However, since creating an AAR involves a lot of excise, minimizing busywork would probably mean more and better AARs.

Also, some AAR writers had troubles with motivation when they were **unsure if they would be able to finish the AAR.** Perhaps allowing players to limit their playing time would remove the compulsion to play until the end date.

Appendix C: Second survey results

Purpose

The purpose of this survey is to get a better understanding on how players retell the stories they create while playing Crusader Kings II. To do this we also try to get an understanding of when and how they end their game session. Is it when the game ends in 1453, do they put a stop to it when they reach their own self-declared goals, or do they simply stop because they get tired or angry? Since we are also exploring the possibility to create a way for players to state their own in-game goals, we had to research whether or not this is a feature that players want.

Respondents

The survey was published in the Crusader Kings II subforum under the Paradox Development Studio-section of the Paradox Plaza forums 2013-02-08, and was open during the weekend. The survey was closed on Monday 2013-02-11.

We received **103 responses** from the 568 users who viewed the forum thread. We removed two responses that clearly were non-relevant since they mostly included profanity and opinions on German dictators.

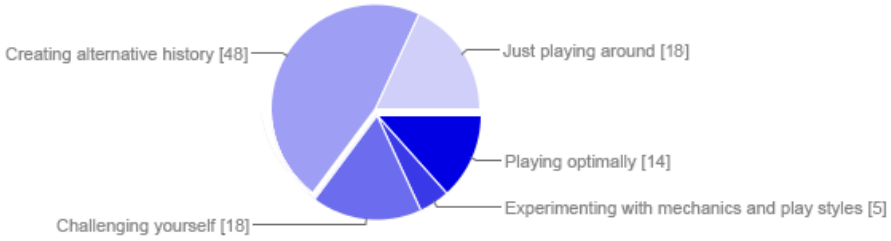
Number of responses over time

All questions were presented to all respondents, but only the closed questions were mandatory. The open text questions could be left empty.

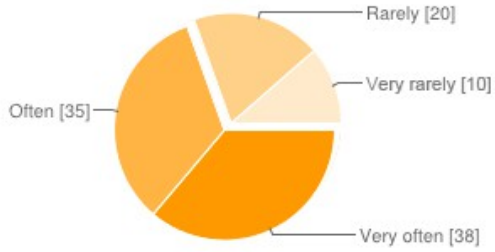
Goals

Questions

Which of the following goals is the most important for you in Crusader Kings II?



How often do you set your own goals with no clear ending conditions?



Reflections

As we can see from the responses above, it seems that **a lot of people care more about alternative history rather than pure gameplay**. About 36% of the respondents said they mostly cared about gameplay-related goals. While it is important to be mindful of the fact that a player's primary goal and their playstyle does not need to correspond, we can still argue that pure gameplay is not the main reason to play Crusader Kings II. This would mean that our design could have great value for the user even if it does not focus on improving the player's performance.

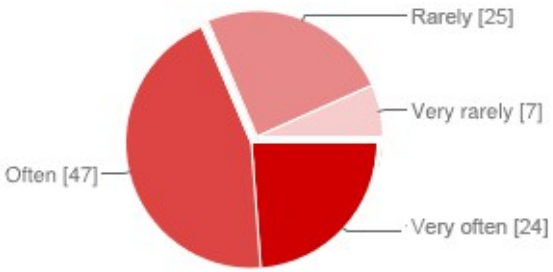
A lot of respondents, about 71%, rarely or very rarely had any goals that were quantifiable or achievable, such as “conquering as much as possible”. Creating some kind of goal-tracking feature for them might not be very valuable.

These results means that most people seem to try to play around in a historical sandbox. As we see later, this could mean that people often stop when they are bored rather than satisfied.

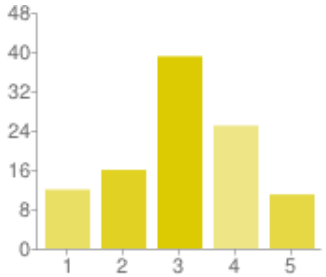
Play style

Questions

How often do you role play your character in Crusader Kings II?



What is more important for you, a historically correct simulation, or a well-balanced game?



1 is focus on history, 5 is focus on balance

Reflections

Role-playing is really popular in Crusader Kings, with 69% of respondents doing it often or very often. It is therefore important that our design supports role-players, such as keeping track of characters and their relations.

While role-playing is important, it seems most people want to role-play in a well-balanced game rather than in a more harsh or random historical simulation. However, one problem we found with this question is that there is a middle alternative, which did not force respondents to pick a side. The reason for asking this question was as another way to gauge if players cared more for the fictional world or the gameplay, and it seems that they are not as opposed as we first thought.

End conditions

Questions

When do you feel that you are finished with a game of Crusader Kings II?

“Depends vastly on the circumstances of the playthrough in question, but usually when I've reached a point where I've got new ideas I want to try out or I've lost interest in the one I was currently doing.”
“When am bored with the present campign. This is usually due to success and expansion; usually all my goals have been accomplished, managing a large empire has become tedious, steamrolling rivals has become too easy. By this point the game is often also very predictable, which further decreases my enjoyment.”
“When I reach the end date, or my dynasty dies off. I want to see how it all works out.”
“When I see no threat left to my survivability or no threat left that cannot be defeated. If playing as certain historical kingdoms or Empires, I set specific goals. Examples include: starting in 1099 play the Kingdom of Jerusalem and survive and take Alexandria/Cario. Byzantine Empire, retake lands of the Roman Empire/end Great Schism.”
“When the challenges presented by the game have diminished to the point of being meaningless. “

When you finish, how do you feel?

“I feel proud of my conquests and excited about doing it again as someone else roleplaying a different scenario. I enjoy looking at the map and seeing how things have turned out and trying to predict where they'd go in the next few centuries.”
“Wanting to tell my friends how the game went.”
“motivated to try things differently after I've learned from my mistakes or I've discovered new strategies”
“Depends on game. But generally, I'm a bit of sad. It is my dynasty, my rulers, my kids and they are over...It is sad.”
“I feel satisfied that I was able to do what I did, perhaps have some regrets to some things I did not do. Also a little sad feeling that I should get a life. ”
“Usually, "what if".... what if I hadn't landed that backstabbing relation, what if I had gone Cathar, what if Genoa hadn't sccoped up the coastal province I was eyeing...? Etc. ”
“I usually convert the game to EU3 using the converter "CK2 to EU3 - C# / Lua" so I tend to feel an urge to go on.”

How do you share your experience of the game with others?

Either via amusing/interesting anecdotes and discussion on the forums, or discussion with the few friends I have who also play Paradox games!
Both my fiancee and I play the game, frequently together (multiplayer), and we often discuss our playthroughs. Mostly however, like a novel or a paper-and-pencil role playing game, CK2 is a personal experience, confined to my own mind. I

have considered writing a so-called "After Action Report", but never actually did so.
I've got one friend who plays with me sometimes, and we'll talk about our separate games when we aren't playing one together, even though he always just plays as the Holy Roman Emperor. With other friends I might mention that "all my f*cking sons died and I had to legitimize my bastard" but don't really go into details.
I don't normally share unless I want to make a point on game mechanics.
Sometimes I doo screenshots with intention of making an AAR afterwards, but when I have no interest to continue playing, I lose any interest in making an AAR. Succession games are more productive, I've played a couple of games at regional strategic forum (not paradoxplaza).

Reflections

Boredom was by far the largest reason for players feeling done with a playthrough. If combined with those responses concerning a too low difficulty level or too complex and uneventful endgame, they made up over 30% of the responses.

Another large part of players, **about 20%, felt finished with a game once they had achieved their primary goal**, usually in the form of creating an imperial title.

Only about **15% said they played the game to its end year of 1453.**

The rest of the responses were more diverse, but could be summarized to the following categories:

- Too high challenge
- Divergence from plausible history
- Unengaging emergent story or characters
- Frustration
- Unable to get back into game after a longer break

As we saw from these responses, few players actually finish the game the “proper” way, that is, see the end game screen. This would mean that if we want to have a retrospective for the player to view, it has to be integrated into the game for the player to see it.

Even so, about a third felt satisfied when they had finished a game session. At the same time, **about a fourth of respondents felt more negative emotions**, such as boredom, fatigue, or frustration. It therefore seems that while people enjoy playing the game, they are not always satisfied with the game ending. Some people also felt bitter-sweet emotions, feeling a bit sad they had to end the game.

As for people sharing their stories, **slightly more than a third preferred to share their stories via person-to-person communication**, usually talking in person, or talking via voice-chat. **About a third said they usually shared their experience on forums or social media**, and slightly **less than a third did not share their experiences at all**. Those who said why, cited the fact that they did not know anyone who was into the game.

Only about 3% of respondents shared their experience in the form of an AAR, so it is important that we do not focus on AAR creation too much beyond the basics, since the AAR writers are such a small part of the user group.

Appendix D: Interview Non-Disclosure Agreement

A non-disclosure agreement was given to all interviewees and user testers during this thesis work. The agreement consisted of four points, where point 1 was added after the first interview to make sure that information about the Chronicle were kept between ourselves and the testers. Below is an exact copy of the non-disclosure agreement we gave out before the tests and interviews:

Both the interviewer and the interviewee agree on and are aware of the following points:

1. The interviewee will not disclose any information about the project to anyone other than the interviewers, the interviewers' supervisor or employees at Paradox Interactive or any of its subsidiaries.

2. While the interviewers is doing their master's thesis at Paradox Interactive, they are *not* formally affiliated or employed by Paradox Interactive or any of its subsidiaries.

3. The identity of the interviewee will not be disclosed to anyone except the interviewers and their supervisor at Chalmers University of Technology. Any answers the interviewee gives may be published in a public report, yet the identity of the interviewee will not be disclosed.

4. The project that the interviewers are working with is not an official project by Paradox Interactive, and the project is not necessarily going to be part of a finished product.

Interviewer	**Interviewee**
Signature: _____	Signature: _____
Name: _____	Name: _____
Date: _____	Date: _____