

Tag Story

Mid Term Report

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by

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Problem Space

Users of digital devices for games are very screen focused. They rarely lift their eyes from their devices, and their devices are also rarely used for physical interaction with the world outside of the screens, where the virtual gameplay takes place. One can argue that new, mobile technologies have made us more connected and social, and provides new and interesting arenas for playing games with each other, but at the same time we have become more secluded and inactive. This is the problem area we have chosen to focus on.

The way we perceive playing digital games usually entails being stationary, indoors and focused on a single surface for a long period of time. This way of enjoying games has many problems, mainly related to inactivity and isolation. We are becoming less aware of the world around us and what it has to offer, as we spend more and more time peering into the world through a “digital looking glass”. The technological possibilities we have available today, especially in the mobile world, already provides many mechanisms and possibilities for changing this.

Even though modern games have many social arenas built into them, both in the form of online multiplayer modes, and also online communities, it is rare for many different ethnographies to come together and play together in the physical realm. Traditional gaming, for instance board games are a typical example of the opposite. Picture a family vacation where mom, dad and the kids go into an all out war on each other over a game of Risk, or perhaps mom can break dad’s bank in a game of Monopoly to much amusement for the kids. It is this social aspect we believe digital games can benefit from.

Goals

What we want to achieve is a mobilization of the otherwise inactive users, consumers of digital services and games, aiming at a wide target audience, ultimately bringing together a diverse group of people. However, for the sake of the prototype, we have to keep a more narrow focus, e.g. designing stories for students as a target audience. We would like to see, in a final version, a broadly adapted and varied use of the system, e.g. within educational situations, for instance creating “history trails” that school classes can partake in.

Our challenge in Tag Story is somewhat of a paradox; we want to create a service where the intention is to use the digital surface as little as possible. The difficulty lies within knowing when we should prompt the user for interaction with our app, and how we should do so. Because after all, our intent is to get people out and experience the world outside of their device, relegating only the bare minimum of requirements of coordination and interaction to the screen when strictly necessary. The game is the world, the phone is the facilitator.

Technical elements

As outlined in our wonder document we want to create a mobile app and a web site to support our concept. The app is being built on the Android platform, and it and the web site will both communicate with a shared service layer that provides the stories and possible interaction paths in the game. We have started work on all of these elements and are progressing nicely.

Our concept

We want to remedy the inactivity problem by creating a game which shifts the focus from a digital surface to the physical world, using the mobile device as a facilitator for physical interaction with the environment. The concept which we introduced in our wonder doc, Tag Story, is still much of the same as when we first introduced it. Over time as we talked and developed our prototype, new problems arose, and also new possibilities. In this report we will focus more on the developments of the concept, rather than repeating what has already been said in the wonder document. First however, we want to account for a small literature review.

Literature review

Wearable Computing Meets Ubiquitous computing: reaping the best of both worlds

This article touches upon the perceived tension between ubiquitous computing and wearable computing. Ubiquitous computing is understood as computing delegated, and distributed, to the environment, e.g. in “smart rooms” that understand who the user are and what they want. The difficulty with this, as proposed in ‘99, is that of privacy, where the authors say that one would want to avoid sharing too much information all over the place. Ironically, this is what has happened with facebook.

It is discussed whether wearable computing can alleviate this problem, by putting the sensors on the person, instead of in the environment. The problem as they see it is that personal, wearable computing knows little about the locale without a connection to the surrounding. In other words, you have to have some form of connection in order to let the computer(s) have a sense of the surrounding.

The proposed meshing of the two concepts as put forward by the article is today outdated, as a hybrid has already been developed extensively. Mobile technology has grown advanced, and even more interconnected. The barrage of sensors on a personal piece of mobile technology can, and often do, connect with the environment. In short, Rhodes, Minar and Weaver (1999) predicted the future fairly well.

Tours Add High-Tech Treasure Hunts to Sightseeing

In this online article over at “The Wallstreet Journal”, Anne Tergersen talks about a way for nonprofit organizations, and museums with low budget to gather more attention and bring more visitors. By using geocaching, they are able to bring exciting treasure hunting to usually regular sightseeing spots. One good example is Shetland Amenity Trust who uses geocaching to bring people to Norse sightseeing sites, since it “gives people a reason to come, even when there are no physical remains” as the British nonprofit organization says.

This is something we hadn't thought about when we started this project, but after reading this article we discussed the possibilities and how Tag Story can collaborate with museums about Norwegian heritage sites (which are often green piles). We also believe this is an area in which Tag Story really can shine.

User generated feedback

In the long term user collaboration and user generated content will be required for the growth and sustainability of the Tag Story user group. Giving the players the possibility to give feedback directly from the current location in the story through the mobile application will therefore be necessary. The feedback could be of trivial nature, for instance when a player wants to make a comment on a especially interesting part of the story, for the rest of the world to know. Error handling could also benefit greatly from user feedback e.g. when a tag went missing. Reporting this deficiency would enable the developers to be aware of the problem and take measures to correct it.

Halone et al., (2008) investigated how a collaborative route planning system based on user feedback improved the service. When an obstacle was found during the participants route, making it impossible to continue to the desired destination, they reported it with their mobile device, and were given a new route suggestion instead. Following this pattern eventually leads to the goal of the route, and at the same time the route planning application was greatly improved by the crowd. However, the users did quite frequently skip to report minor obstacles which was not necessary to report, but which made the journey less enjoyable towards the desired destination. It is worth noting that these results could very well have been influenced by an unsatisfactory user interface or otherwise troublesome software, making it a hassle to use more than absolutely necessary. At least Tag Story aspires to achieve a great variety of users and receiving a great multitude of feedback.

Disturbing attentional shifts

Since players will have to shift focus between information displayed on the mobile device and the physical environment, striking the right balance between the two will distinguish success from failure. Avoidance from looking at the display for long intervals, and with a high frequency, will give the players more time to engage in the environment they travel through. How you design the interface on the handheld, and what kind of information you show, will to a large extent define how much time the players need to “dive” into the screen-content to figure out what to do, and how to do it. The tasks will also probably be quite dissimilar from one story to the next, and therefore the time needed will vary greatly. Another potential hassle might be the actual scanning needed when encountering a tag at a story-point, which quite easily could “disturb” the gameplay if not working correctly or smoothly.

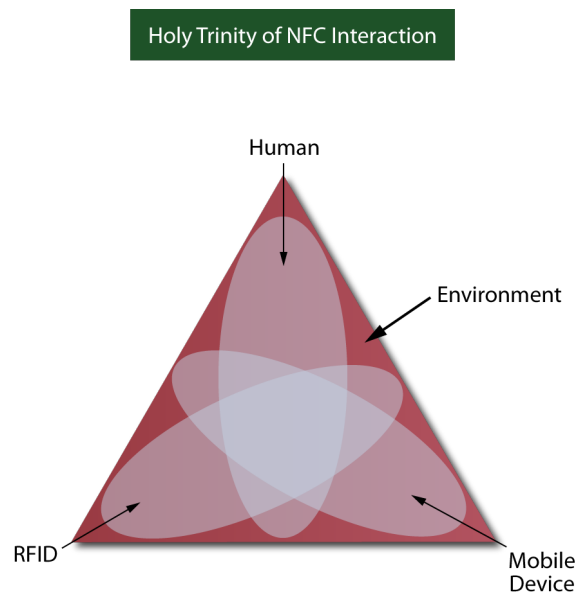
Alsos et al., (2006) explored how different interaction techniques for using handheld devices together with stationary displays worked in a hospital setting. One of their main findings involved how easily digital devices interrupted face-to-face communication between patient and physician. Even though the Tag Story applications main purpose is not mediation of direct communication between the players, but guidance through the story, the usability of interaction techniques will be influenced by both social factors and of use context during gameplay. During group-play, ongoing focus shifts back and forth from screen content to the environment, could easily disturb the social interaction of the players, and thus degrade the outdoor experience we hope to achieve.

Conceptual Model

In this section an outline of the conceptual model used for the real-life gaming adventure Tag Story will be provided. The intention is to provide a concise explanation of the main bodies of interaction of the gaming mechanics, their relation to each other and how they mutually

influence each other in a user situation.

Visualizing the interacting bodies as a triangle with human player, mobile device and RFID tag at each point in the environment will give an overall schematic of the different parts of the system. Interaction will occur between the user and both the mobile application and the environment, as well as the mobile applications interaction with the environment. The mobile application is both the driving force and mediator of the current story, enabling the user to follow the narrative, as well as serving as a map for orientation, guiding the players from one point in the story to the next, by providing location or hints of the tags along the route. Before taking a closer look at how the interaction between the different parts of the conceptual model works together, the actual choosing of playing scenario in the Tag Story application will be discussed.



Story selection

The user will be able to choose different stories listed in the Tag Story application. Each story will have a description of the scenario and length of the route, in addition to the average time consumption of the other players on that particular route. This will make for a good starting point, enabling the players to make a suitable choice according to their preferences. Such properties enables the users to easily sort out irrelevant choices like location relative to the users current location, or a longer route compared to what the player had in mind for the occasion. Giving the user a good indication of time consumption and route length secures desirable expectations and provides the desired mental frame for the journey ahead.

User- and device-interaction

As previously described the player has to follow instructions from the Tag Story application in finding story points, so called tags, guiding them through the chosen scenario from start-tag to end-tag. Two different types of stories are available to the player; single-choice and multi-choice stories. The simplest kind is of course the single-choice story, were you only get one option from the current tag to the next one, resulting in a linear narrative from start to end. As soon as you arrive at a tag and scan it you will get presented with the puzzle or task you have to solve. Upon solving the task the players will be able to reach to the next part of the story where a new tag

awaits, and so the story moves forward.

When scanning a tag the prototype will provide one four types of tasks or puzzles presented to the players as either textual, imagery, sound and GPS queues for each option in the story. In the multi-choice stories you could therefore provide the task with a different medium for each of the four choices pertaining to a player, providing Tag Story with multimodal interaction. This will serve as an interactive real-life adventure version of the old textual adventure book formula. In these stories you were skipping from one part of the book to the next, according to the choices made, and hence you were successively brought through the narrative. One of the greatest strengths of these types of narratives is the possibility to play it all over again after finishing it the first time, because of the unexplored possibilities in the remaining choices. Therefore multi-choice stories can be perceived as graphs where you move from one node (tag) to the next node, with the possibility to retrace your steps to a previous node, in case you get stuck on a puzzle. You could of course also visit a new storyline out of curiosity by taking a new yet unexplored route.

In this section we have investigated how the player interacts with the mobile device through four types of modal-interaction ques; textual, imagery and GPS presented to the screen or through the loudspeakers as sound. Of course one could also easily imagine the combination of text and images or sound and images providing the right cue for reaching the next story-point, and this will certainly be implemented. In the next section, the interaction between players and the environment will be discussed.

User- and environment interaction

Obviously an important aspect of the game is its outdoor setting, where players move through the terrain of the physical environment guided by the story on their mobile devices from one section to the next. Therefore the interaction between the players and their direct environment will be as important as their interaction with the Tag Story application, and striking the right balance between the two will be of the utmost importance. A well known fact is the enchanting quality electronic devices has on its users. Unfortunately there are good chances that the player will be immersed in the virtual content on screen, while wondering around in the woods, and this would be a failure of how the developers intended the workings of the gameplay. So how to facilitate the crucial balance between player-device versus player environment interaction? For the time being this would be purely a speculative and and hypothetically interesting exercise which has to be thoroughly tested in the prototype, however we have some initial thoughts about striking a good balance.

The GPS will probably be both the most difficult and easiest interaction to handle at the same time. Because of its nature of binding the player to the screen, you would have to check to see if your position in relation to the goal position has changed into your desired direction, meaning the players interaction with the environment is not necessary to reach the next story-point. This can be considered a drawback, but at the same time has the handy benefit of providing easy to find tags, helping players finding starter-tags, and eliminating any possibility of not finding the beginning of the story-point. Pictures, on the other hand, will almost certainly enhance the interaction between the environment and the player, since perceiving the environment is necessary for being able to spot the next story-point. Some rechecking of the picture will almost certainly happen in most cases, reassuring the player that the right spot has been discovered.

The combination of a story-text together with a picture can both ease or make it more difficult to find the next tag. A riddle in combination with the picture could interfere with the players

one-to-one recognition of the environment provided by the picture, since some of the players attention will be use for pondering the solution of the riddle instead of looking. To the contrary, a textual description in addition to the picture will almost certainly make it easier for the players in reaching the next node, since it can support and enhance certain features within the picture, and hence in the environment as well, enabling for a better identification of the right spot in the scenery.

Lastly, we will briefly mention the interaction between the mobile device and the environment facilitated by near field communication (NFC). Tag scanning can be executed with the mobile device running the Tag Story application in near proximity to the tag. For a more detailed description of the workings of NFC and security issues in relation to the technology, see the section of technological concerns.

Users and possibilities

For the sake of our prototype it would make most sense to narrow down our intended target audience. However, as one of the goals of our project is to bring different people and age groups together, we have to make clear that even though for the sake of testing we intend to be very specific, e.g. test with students, our final concept will entail multiple target users.

It is also important to note that we intend for our concept to be generative (Zittrain, 2006). What we mean by this is that more than just creating a single, locked down and centrally controlled service, rather we want to create a platform, which can be extended and adopted for multiple purposes. This is the hallmark of generative systems, that they are adaptable, accessible, easy to use and has good capacity for leverage, i.e. do much with little (Zittrain, 2006).

However, we cannot just create a blank framework and hope that somebody will pick up on it. The platform has to be “bootstrapped” in the form of a simple, yet fun and engaging application of it, so that the possibilities of the platform can be demonstrated, and hopefully also attract a critical mass (Aanestad & Skorve 2010).

An example of how one can facilitate for a bootstrapping process is described by Aanestad and Skorve (2010); *“fundamental principles include building on the installed base, starting ‘small’ and avoid applications where ‘user investments’ are not immediately rewarded with benefits for the users who invest their time and effort to make it work”*. As an example, this is how Facebook started their enterprise, initially only opening up for one educational institution at the time (starting small), building on existing user base (students) and creating immediate reward for the users of their system. By bootstrapping their initial system in this way, they achieved good marketing effects through the user base they had ensnared, who saw an increased value in the system by connecting with more and more people, also those that were not affiliated with a university. This prompted the expansion of facebook into the public domain for everyone to use; a feedback effect which perhaps was not part of the initial idea on Mark Zuckerbergs side.

Our process and findings

Workshop

We kickstarted our project by having a hackathon¹ almost immediately after we initiated our project. The hackathon, or more formally, the workshop, was spent attempting to develop a quick and dirty early prototype of our app. All group members were present, in addition to a friend of ours who helped us with graphical design.

To begin with we had a quick breakfast meeting where we delegated different tasks to the group members and wrote a couple of use case scenarios each. The use cases we wrote were for different target audiences, i.e. the father who wants to plan an excursion for his family, the awkward teenager who wants to go on a date, and a hardcore gamer. After everyone was jacked up on carbs and coffee and the use stories were agreed upon, we got to work on the rudimentary prototype.

The outcome of the workshop was a basic service platform which supported user authentication and creation, creation of new basic stories, several graphic design elements, and a basic working prototype of the android app which was capable of reading tags and communicating with the service layer (API).

After the workshop each of the group members continued carrying out work on their representative tasks.

Design process

The design choices we've agreed upon so far in our process (e.g. hackathon) has, out of necessity, been focused upon what we actually aim to implement in our prototype. There are several features we would like to see implemented in the future, but because of the limitations of time and resources, we have found it necessary to keep the prototype fairly basic.

In our concept we imagine that, in the future, the stories in the game can be created by the users themselves. The stories would be ranked and categorised in a crowd sourced fashion. This is a feature we will not implement in the prototype, because this feature entails many challenges that are difficult to overcome. Some of these challenges pertain to how one distributes and installs tags in the various areas. For instance, do you need permission from someone to stick a tag on a tree? How do you do it? And what about physical security? The last thing we want is for someone to place a tag in a location which is dangerous, e.g. coaxing someone to climb to the top of a tree. More on this in the next section.

For the time being we will therefore not implement functionality in the app or web page for creating new stories. Rather we will have our own, simple backend tools for creating new stories and initiating tags. The actual functionality we do intend to implement in the prototype has largely been covered in the section on the conceptual model.

One large feature of our concept relates to how we intend to "gamify" the Tag Story concept. It is clear that the fundamental idea behind the concept warrants some gamification mechanisms, as the app is intended to serve as a reward for engaging in an activity. Some of the mechanisms we plan to implement are social dimensions, e.g. online ranking boards where you can showcase your achievements and badges. Some examples are "best time" for a story, "most stories completed" or even "most imaginary wilderbeast slain". As pointed out by

¹ A hackathon is more or less a gathering where developers and designers meet for an extended period of time, usually all night, in order to hack and come up with something clever. See Urban Dictionary <http://hackathon.urbanup.com/5667582>

Rhodes, Minar and Weaver (1999) over a decade ago, we have to take care when we design these features, so that we don't further pervert our sense of privacy as has happened with online social platforms today. In other words, badges and achievements should not easily give information about where you have been, how often you trend a certain location, and perhaps even skip on information such as when something occurred.

Tags

Another challenge is the choice of NFC tags. Firstly, not all phones support NFC technologies. One of the more popular phones, the iPhone, does not support NFC, and probably won't support it for a long time either. Because of this it would be desirable to have a hybrid solution, where the tags that we deploy contain both NFC and QR-codes. We believe that NFC is preferable to QR in many situations. QR codes are sensitive to lighting conditions, you have to line up your camera correctly, and depending on the quality of the camera in your phone results can vary and make it difficult to read. NFC requires only that your phone is in close proximity to the tag. Several vendors provide this option, however QR-codes the drawback of not being re-programmable, meaning that we either have to pre-generate a set of identities for a large amount of tags, or we have to create fairly complex procedures for programming and associating QR information with NFC information.

Security

There are three main security concerns that we need to be aware of when working with this project. These are; fuzzing, phishing, and spoofing.

Fuzzing: Is basically when you try to inject code to exploit how the tag is read on the device. A good example can be found in "Vulnerability Analysis and attacks on NFC-enabled Mobile Phones" by Collin Muller. In short it is about changing the physical tag who change the behaviour the user scanning the tag will perceive.

Phishing: Similar to fuzzing, but instead of injecting code, there is a "man in the middle" attack where for example the web site the tag is referring to is switched out with a different page looking like the original one.

Spoofing: As the two other security risk, spoofing also require the NFC-tag to be changed or in some way modified. And in some sense similar to phishing, but is more about falsifying data.

The biggest security problem we have is removal of our tags. In other words plain vandalism. There is no easy solution to avoid people taking the tags down, so all we at least for now can do is to add a easy to use feature letting users report missing tags and the corresponding GPS-coordinates.

To avoid harmful or bad experiences from people switching out the tags with malicious tags are a different story. We've been discussing different approaches and found out that the app when running will handle all NFC handling and then carefully detect if the tag scanned belongs to Tag Story, and if not inform the user that this is not one of our tags and warn them of attacks and then ask what they would like to do.

Existing technologies

The idea and technology behind Tag Story is built upon a lot of different solutions and application used today. The idea of going from tag to tag is based upon orienteering and the use of GPS in Geocaching. Orienteering is an old sport where you use your navigational skill getting from point to point in the fastest time. Geocaching on the other hand let the user find what is

called a cach based on GPS coordinates found on one of the many Geocaching websites. We wanted to combine the use of GPS, cach and the going from point to point in orienteering. As there are no known solution today that does this. And not at all in the way we are thinking about it. The closest one would be Zombies, run! which motivates people to start running by putting them in a post apocalyptic world where they need to run and do chores for the base they are living in. It's all neatly showcased in an app (for both Android and Iphone). While you are running you are served stories based on the current mission you are on, and it also plays random music from you phone randomly like an radio. In one way Zombies, run! is just an interactive audiobook.

There are also other application trying to bring people of the coach and get outside, and one is the Norwegian app called "Ut.no turguide", which help you to plan treks in the Norwegian wilderness.

Instead of having the users play with all these three apps, we want to combine the idea and solutions into one app. We're taking the point to point from orienteering, and combine it with the GPS coordinates from Geocaching as one of the solutions from getting from one point to another. Using the story part from Zombies, run! we want to people to discover a new part of a chosen story each time they visit a new tag. And to avoid having people just looking for tags randomly we want them to be able to make their own stories and plan routes using the idea behind Ut.no.

Collaboration

We see many possibilities collaborate with institutions or organizations that might harness the possibilities of our app. Den Norske Turistforening (DNT) could be a part of the project and we could organize an experience with our stories and their trails. They have good knowledge of where people like to go outdoors etc. and our app might expose their services to a larger audience. Having tags placed along their routes might also make people less prone to taking tags down if we can show that they are approved by DNT.

School institutions could also use the app to engage students in a way that takes them outdoors and lets them play with technology while learning about nature, biology, geology etc. Imagine a story where students are exploring nature through our app, while learning about for instance the photosynthesis.

Another possibility is to create maps in the app that guides participants through important areas in institutions. An example would be a hospital, the app could guide a patient through all the important places at the hospital. The app could provide an experience that engages the patient while still giving him or her vital information about the institution. Another example is a map that shows new students around campus, teaching them about the most important buildings as well as showing them places for fun student activities. One post could be "go to RF-kjelleren and buy a waffle".

In the article "Orientational Passport" by Fitz-Walter et. al. an app is designed to show students around campus. The article states that one of the most useful functions was the functionality of a map combined with gamified rewards for checking into certain places at the campus. Students rated this as the most satisfying and useful activity, and thought it was more engaging than exploring the campus in a traditional way. The same mechanisms is possible to create in our app as well. The check-in functionality will be facilitated by scanning a tag, opening up many possibilities of engaging "tours" around museums, schools etc.

Why NFC instead of check-in?

The activity of checking in is a feature facilitated by mobile devices with GPS and some kind of software with a check-in functionality. As previously mentioned a number of services are available that uses this concept, with Foursquare being the most popular service. Foursquare offers a game-like experience for users where checking in at certain locations using GPS will earn the user rewards at the site. Foursquare has recently started to collaborate with businesses so that real life rewards might be obtained (in example free pizza at a restaurant) for certain achievements obtained by checking in. But the mechanism of checking in via GPS is not very accurate. A user can check-in to a location just by being around 150 meters away from the actual location. This makes it possible to cheat, and users can claim rewards for checking into locations they have not actually been present.

The article by Avinash et. al. discusses this problem and suggests a solution where physical presence is required. By using an NFC reader at the check-in location, physical presence will be assured by requiring the user scan a NFC tag present in their phone or a card with an RFID tag. This method is said to be more tactile and actually requires less of the users technology than other methods like scanning a QR-code or checking in via GPS.

This discussion is highly relevant to our project as we want to prevent cheating. Opposite to the solution in the article, we want the NFC reader to be in the hands of the user. But physical presence will still be required and distributing RFID tags at places that are being scanned is much cheaper than distributing NFC readers. By solving this problem we can actually provide a more secure solution to check-ins than services like Foursquare, which opens up endless business possibilities for our project.

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