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Personalization of the Children's Museum

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1. Design Problems
2. Users and requirements
3. Conceptual models
4. Prototyping and design
5. Evaluation

Appendixes

- A. Use Case Diagram
- B. Rfid chip

1. Design problems

What do we want to create?

We want to create a system for personalization in the Children's Museum (CM) and to provide enjoyable and exciting entertainment for the visiting children.

In addition we want the child to have a good learning experience.

Project Scope

This project is designed for children museum. In addition it also can be used for a primary school or children's park. And this project can be altered easily when the environment is changed. It depends on what kinds of graphical result you want.

Product Features

All products designed for children are aimed to let children become more interested in the trip inside the museum. And let them focus on the subjects the museum provided. Besides, children might also get knowledge or information on their trips.

Possible problems:

When several kids enter an area at the same time, the exhibit needs to have rules for its behaviour.

The kids might not enjoy seeing their picture or avatar on the wall.

The kid may lose their device.

Some kids might not understand some exhibits. The interface might not be simple enough.

We will need to test and evaluate our concepts on a test group of kids.

What are our assumptions?

Children will think it's fun to see themselves or their avatar on screens throughout the museum.

They will appreciate a personalized reward with pictures of them doing stuff

What are our claims?

A reward system will make the learning even more interesting for the kids with added incentives.

Will it achieve what we hope it will? If so, how?

Yes by showing the child's avatar on the screen giving them a personalized effect and by the receiving of a webpage link or a video-cd documenting the child's visit.

Redesigning our device

By using a method called Scamper, Developed by Bob Eberle, we tried to redesign our device by brainstorming.

Scamper is an acronym for Substitute, Combine, Adapt, Modify, Put to another use, eliminate and reverse.

Scamper is designed so that we will get fresh ideas and views on our product. Since all the words in scamper are verbs, it will induce action on our product.

We asked ourselves different questions using this technique:

Is there anything with our device we can substitute?

For materials that can be substituted, we decided on either use of an radio chip or a barcode/barcode reader.

A radio chip in a toy is the main alternative... but it's presentation can be substituted e.g.:

-Hat, Necklace, Cane, Card, T-shirt, Mask, Ring or belt.

As for the handout/delivery of our device this can be done either with a machine(automatic) or a human (Manual)

Any parts of our device that could be combined?

We have our rfid chip combined with a toy, who interacts with interface(s), which interacts with e.g. speaker, lights/visual

And we will combine the handout station with the hand-in station.

Can we adapt our device?

We can use different avatars and nicknames.

How can we modify our device?

Can our device be used in different areas?

Our product can, with some simple rewriting, be used in places like: a shop ,Park, Parking house, Ikea, School, Kindergarten

Anything in our device that can be eliminated, to simplify things?

If we eliminate the toy covering our rfid-radiochip it will most likely be destroyed by the child, not being robust enough.

Can we reverse usage of our device?

We decided this doesn't really apply to our device's usage, since usage is quite linear.

- A child enters the museum, receives device, uses device, delivers device.

2. Users and requirements

What methods we have selected and Why

Client, Customer and other users

The client here in this project is a child visiting the children's museum. The child's age is 3-12 years (arguably higher for max age). For those ages 0-3 there will hopefully be a separate section.

They have other demands and understanding of things than our target group.

Customer here we can say is the people who work at the museum and serves the children visiting. There is also a need for someone who fixes problems that may occur in the use of the project, and they are the other users.

Product Perspective

The basic technique that will be used here is RFID (Radio Frequency Identification). This technique has been undergoing development for a few years, and is used in many places.

RFID is easy to get and an available technology. The following is the description of the user-experience when a child visits the museum

When a child enters the museum he/she receives a physical object that provides the child with a unique id. The physical object can be anything, e.g. a bracelet, a cane with a comic figure on, prince or princess crown, thing children may appreciate. The child can at the entrance to the museum register with an employee at the museum, choose their avatar, and receive their device. The chips for RFTS are placed in these objects. Before the child receives the device, the personal information will be written to the chip, e.g. name, age, favourite etc.

The child is now uniquely identified and will use their device throughout the museum. And wherever the child uses his/her object their avatar will appear at the exhibit or post their interacting with. This interaction can span the entire museum or just some parts. There are several sections disposed as some kinds of scene, e.g. fairy tale's room, forest with special animals or flowers, etc. These sections have a reader at the entrance to the exhibit, picking up the child entering.

When the device comes near the reader machine, information is read from the chip and some information is written back, e.g. the child has visited this section with section name. And the exhibit will welcome the child first, and then show the whole introduction for this section. This part depends on if there is other device (e.g. speaker) connects to reader machine. For example, the exhibit is called "the beautiful forest". A television screen shows a video: "welcome Joe to the beautiful forest. It is now summer in the forest. You can find deer, squirrel (or others animal) here. Where are they?"

The child can also be rewarded for their behaviour throughout the museum. Their avatar can change mood. They can earn "credits" to be used on other exhibits, etc.

When the child is exiting the museum, we now have lots of data on the child's behaviour at the museum, and can personalize a webpage for the child, print out a diploma or burn a video cd with them on it..

As an added bonus this system will provide statistics on usage of the different installations at the museum, so evaluation of exhibits will become easier.

(it is also possible to use this to keep track of where everyone is. For private or public use)

External Interface Requirements

3.1 Interface for client

Here client is the children who visit the children museum. Interface for them is the object they get when they come to the museum, a bracelet, a cane, a crown, etc. These are favourite for them, and they are glade to carry them to visit the museum.

At the section where special designed for them, forest, bottom of ocean, etc, there will have a reader machine. The interface might be a paragraph of the voice or fairy picture (for fairy's room). There, machine will read and rewrite information to the chip combined with the object they get at the beginning.

When children finish trip on the museum, information in the chips will be then name of section they have visited, and some descriptions of the section. That can be take home by children if they want (might write to a VCD), and they might use home when they like to recall the happy time they spent at the museum.

3.2 Interfaces for Administrator Children Museum

Here customer is the people who work with these objects what be chosen by the children. At the beginning they will write in the information of the children, name, age, etc. This interface we can use directly from the RFID technique self. When the children finish their visit at museum, they will read the information from chips what children might carry them spread all over the museum. This information includes where children visited, and brief description of the children visited. We might also make a full description for all section in the museum, and all of these can write to a VCD as a gift for the children.

4 Functional Requirements

These are illustrated in the use case diagrams in appendix A

5. Other Non-functional Requirements

Not designed now.

6 Other Requirements

Since the RFID is the core technique for this project, we also add the requirements for it as the other requirements.

3. Conceptual models

A conceptual model is “a high-level description of how a system is organized and operates.” (Johnson and Henderson, 202, p. 26)

From our experience we know that most places similar to the CM, that provide an enjoyable and exciting environment, are crowded. We assume that the children might want to be Heroes, not a one of the crowd in the CM. They might want to be unique, and to show their identity to others. With our Concept we can give them an opportunity to choose their personality, their avatar who is a hero they want to look like.

We have to take in consideration the fact that the little children who are under 7 year can not interact with the system directly. Their parents or companion have to supervise their activities. They have to help and support them for choosing avatar and taking care of the device.

We have chosen different items in which we can implement the Radio chip - toys, clothes, adornments and jewelry. All these things may serve as devices, but we have to evaluate them in order to understand which of them the children like, which are most stout and safe and whether some of them could be dangerous in some extent for some of the children.

We will describe our conceptual model in terms of interface metaphors.

We want to design a method that will work and serve as a memory for the visitors of the CM and could present their visit in the museum in pictures, sounds and movies for the future. We decided to create a personal web page for everyone that has visited the CM and put on the web their pictures and movies taken during their visit. If they want to share their experience in the museum with their friends, the only thing they have to

do is to send a link to their personal web page. This is a good way of making advertisement for the museum and to attract new clients.

In addition the child can receive their museum experience recorded on a video-cd.

Conceptual design – input/output, media, technology

There are a lot of cameras in the CM that take pictures of every child on every game. The system recognizes the children via the chip that everybody carries with him/her and put the pictures and sounds on their personal web page.

When they exit from the CM they receive the address of the page.

4. Prototyping and design

What methods we have selected and Why

We have chosen some avatars, but it will be better to ask the children for their choice of avatars. That is why we intend to make a survey with children. Different age groups would prefer different heroes. The little children will like the heroes from the fairytales and cartoons like Winnie the Pooh.

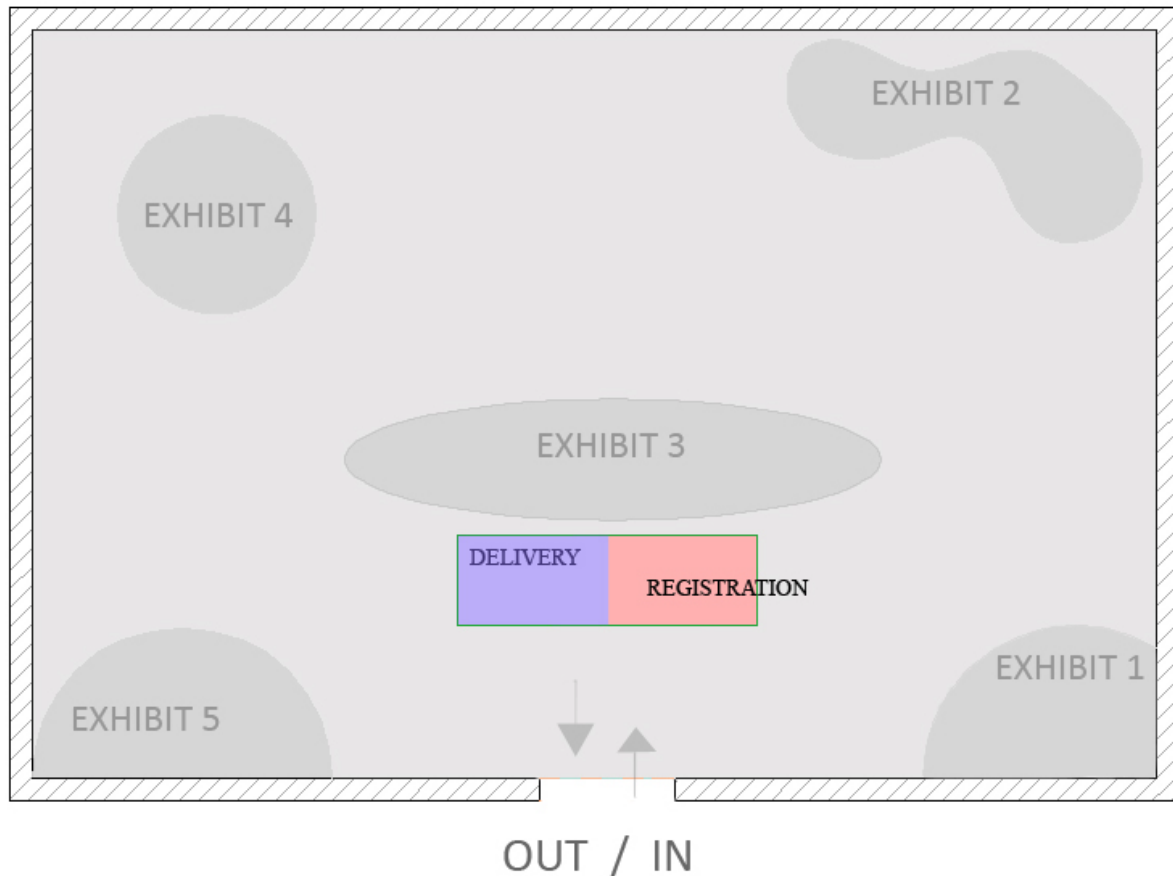
The older boys may like to be Spiderman or a Pop star.

In order to prepare proper devices for the proper ages we have to find out:

What kind of heroes like the different group of ages?

Then we have to find out what kind of items is good to use for the different ages in order to prevent to crush the devices and to be sure that they will be used for the purpose.

Overview of the museum:



1. Child enters IN
2. Child registers, selects avatar and receives Device at registration desk
3. Child moves from exhibit 1-5 interacting with their device at each exhibition
4. Child delivers device at delivery and receives diploma/Video-cd and Web page link
5. Child exits museum OUT

5. Evaluation

Evaluation is needed to make sure the user can use the product and that they like it.

(Rogers, Reece Sharp, Interaction Design: Beyond Human Computer Interaction,12.2.1)

How the static devices will interact with the portable devices (the items)

We have to evaluate where to put the cameras.

How the children perceives the different avatars.

How the children enjoy the exhibits. (Including the personalized experience)

A questionnaire may not seem like the right way to evaluate childrens responses.

We think the best way to go about is to do personal interviews.

Appendix A

Use Case Diagram:

A use case diagram is a diagram that shows the relationships among actors and use cases within a system.

Use case diagrams are often used to:

* Provide an overview of all or part of the usage requirements for a system or organization in the

Form of an essential model or a business model

* Communicate the scope of a development project

* Model your analysis of your usage requirements in the form of a system use case model

A use case model is comprised of one or more use case diagrams and any supporting documentation such as use case specifications and actor definitions. Within most use case models the use case specifications tend to be the primary artifact with use case diagrams filling a supporting role as the "glue" that keeps your requirements model together. Use case models should be developed from the point of view of your project stakeholders and not from the (often technical) point of view of developers. There are guidelines for:

1. Use Cases
2. Actors
3. Relationships

1. Use Cases

A use case describes a sequence of actions that provide a measurable value to an actor. A use case is drawn as a horizontal ellipse on a UML use case diagram.

2. Actors

An actor is a person, organization, or external system that plays a role in one or more interactions with your system (actors are typically drawn as stick figures on UML Use Case diagrams).

3. Relationships

There are several types of relationships that may appear on a use case diagram:

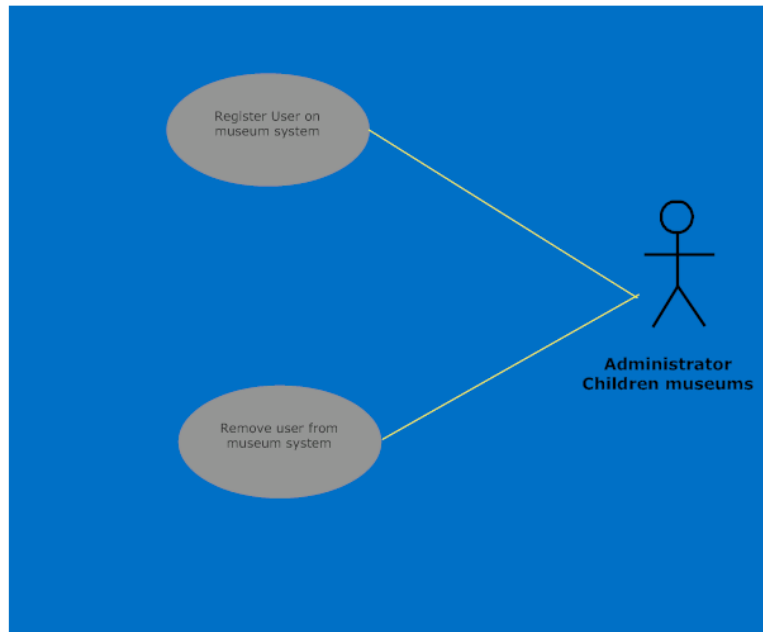
- * An association between an actor and a use case
- * An association between two use cases
- * A generalization between two actors
- * A generalization between two use cases

References: The Object primer, Third Edition, Agile Model-Driven Development with UML 2.0

In our project we have tried to illustrate how our system will function by using this technique.

Administrator of museum children

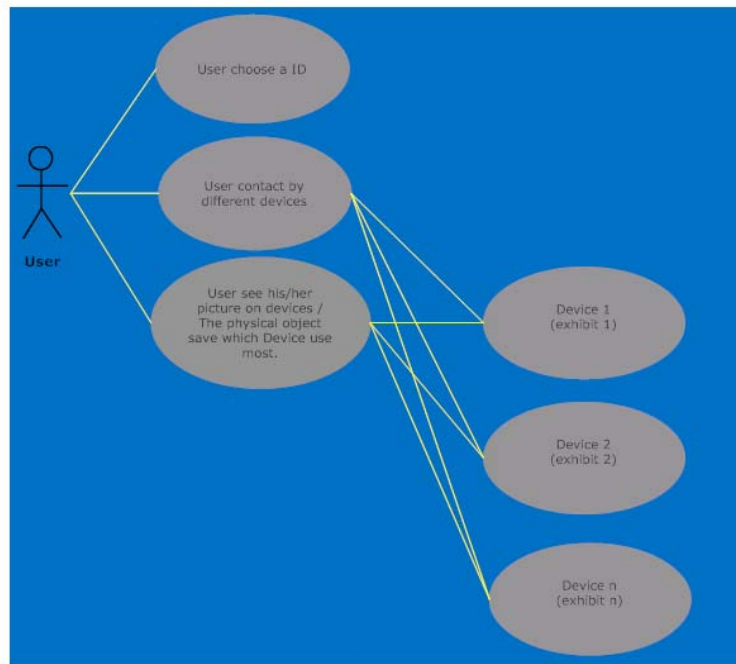
(Actors):



Administrator at children museum registers the user on museum system.

Administrator removes the user form the museum system.

User: (Actors)



User choose a ID, This Id can be an avatar of a comic figure or get their picture taken.

User take contact with different devices (exhibits).

User see his/her picture on different devices (exhibits).

Appendix B

RFID

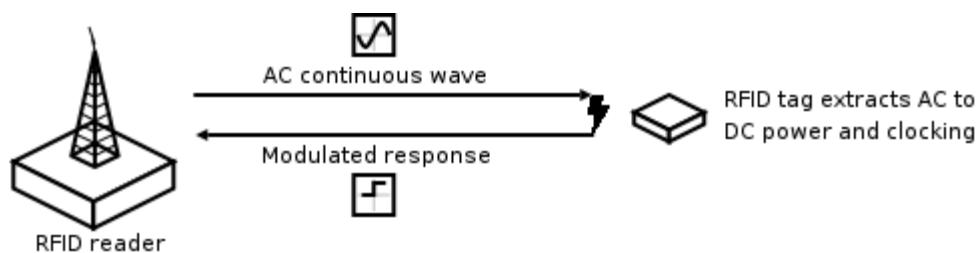
Radio-frequency identification (RFID) is an automatic identification method, relying on storing and remotely retrieving data using devices called RFID tags or transponders.

An RFID tag is an object that can be applied to or incorporated into a product, animal, or person for the purpose of identification using radio waves. Some tags can be read from several meters away and beyond the line of sight of the reader.

Most RFID tags contain at least two parts. One is an integrated circuit for storing and processing information, modulating and demodulating a (RF) signal and can also be used for other specialized functions. The second is an antenna for receiving and transmitting the signal.

A technology called chipless RFID allows for discrete identification of tags without an integrated circuit, thereby allowing tags to be printed directly onto assets at lower cost than traditional tags.

Today, a significant thrust in RFID use is in enterprise supply chain management, improving the efficiency of inventory tracking and management. However, a threat is looming that the current growth and adoption in enterprise supply chain market will not be sustainable. A fair cost-sharing mechanism, rational motives and justified returns from RFID technology investments are the key ingredients to achieve long-term and sustainable RFID technology adoption



In our project, we just use the RFID technology, either develop or improve it. The RFID chips will be placed in the devices that the children museum provides, and the RFID reader will be placed at the entrance of every exhibit hall. Details will be described in the thesis.

Reference:

[Mind Tools - SCAMPER - A Tool for Generating Products and Services](http://www.mindtools.com/)

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http://www.coda.ac.nz/cgi/viewcontent.cgi?article=1001&context=unitec_scit_di

<http://ieeexplore.ieee.org/iel5/7756/33539/01593568.pdf?arnumber=1593568>

<http://en.wikipedia.org/wiki/RFID>