Foreword

This master thesis was written during the time-period from spring 2006 until summer 2007, under the supervision of Associate Professor Dino Karabeg, University of Oslo.

The motivation for this thesis is two-fold. Our first motivation is to show how technology in general, and specifically the use of information technology, can empower local cultures and economies and reverse the negative trends in globalization. In order to do so, we have developed a prototype for the tourism industry, where we have applied TopicMap in the Authentic Travel way of thinking. By doing this we believe we are making a positive contribution to preserve local cultures and economies. By preserving these local cultures we can enrich the lives of the people living there and all those who want to experience new things. After all, for most travelers, experiencing what is different and authentic for the places they travel to, is what traveling is all about.

Throughout history people have always been traveling. Traveling allow us get away from our daily context and experience new cultures, meet new people and get new inputs and experiences to enrich our knowledge about both the world we live in and even ourselves. By making people aware and conscious about how important these local cultures are will make a difference in
order to preserve these. The consequence of this conscious making and empower-ment and preservation of these local culture and economies will make a positive contribution to globalization.

Our second motivation is to study the application of Topic Maps in e-commerce. Perhaps the most central challenge in e-commerce is to offer the customer what the customer wants or needs. We study and develop techniques for using Topic Maps towards this goal. Of course the two mentioned motivations are closely related.

In this thesis we:

- develop a prototype for Authentic Travel to show how Topic Maps can be used to facilitate Authentic travel and e-commerce
- evaluate visitnorway.com in contrast of the prototype through, a use case
- discuss advantages of Topic Map in e-commerce, specifically e-commerce in Authentic Travel, and possibilities for future research and development

We want to thank our supervisor, Dino Karabeg, for being a great help during the development of this thesis.

Mehdi Zare & Atle Wandsvik
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Chapter 1

Introduction

1.1 Background

The problem area which motivates this master thesis is that technological and economical progress often has negative consequences on small economies and culture, a problem which is associated with the world globalization. We want to show that Information Technology can be used to preserve and empower small economies and culture and reverse the negative trends in globalization. To be more specific, we want to study how the use of TopicMaps can help preserve and empower local culture and economies in the setting of tourism with the thinking of Authentic Travel.

Throughout the history people have always been traveling. Traveling allow us get away from our daily context and experience new cultures, meet new people and get new inputs and experiences to enrich our knowledge about the world we live in and even ourselves. For an individual, traveling might change the understanding and acceptance of the different aspects of life and the world we are all a part of. The key to these new impulses and experiences
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are much about the different cultures in different parts of the world.

As stated by Ryan (Ryan 1997), as a result of globalization and modern economy, there is a paradox happening in tourism today. As the tourism industry grows, it provides growth for big international hotel chains, restaurant chains etc. The tourism industry is becoming more and more capitalized, thus this industry tries to maximize profit. As the big international chains grow, they put the small and authentic ones out of business. This eventually has a impact on the local culture and the local economy. This also has a major negative impact on tourism in general, since, for most travelers, experiencing what is different and authentic for the country they travel to is what traveling is all about. If someone from USA is visiting Norway, he probably doesn’t want to stay at the "Holliday Inn" and eat at "McDonald’s".

There is also another point to this. If the large hotel chains, restaurant chains etc. drives all the small authentic ones out of business this will not only be a loss for tourism (the travelers), but also for our culture and our heritage. For many small authentic businesses the only way to preserve their business, and by that preserve our culture that lies within, is to be based on tourism. For most of these businesses this is the only way to make the money needed to run the business.

So how can this trend be turned, so that the authenticity of the country will be preserved, and tourism will grow? It’s obviously that some of the reason for this trend is the possibility to make information about the business you run available. Many have tried to make their own web-page, send out some flyers, advertise in magazines etc. but that’s not nearly enough. To make people visit a web-site it needs to be promoted, and flyers and advertising are
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not the way to go for most of these businesses. And these small businesses don’t have a lot of money to spend on marketing. So the idea to turn this trend is to make an authentic tourism portal, where all these small authentic businesses can promote their business for very low cost or no cost at all. But this raises a new problem. If the portal has thousands of small businesses represented in their system, how will the traveler be able to find the ones that the traveler finds interesting and wants to visit. And if the traveler don’t have any prior knowledge about the country how does the traveler know where to start, what to look for? And planning a trip might take forever.

Furthermore, it might not be enough to just make an authentic tourism portal, just to make the information accessible. For both the traveler and the small authentic business it is of importance that this portal can guide the traveler to find exactly what the traveler would like to do and experience. It is not necessary to get as many tourists as possible to visit a small authentic restaurant. It’s about getting the right people to find the right places. The things they will enjoy and have a nice experience from.

In order to make a positive contribution to the world, and local culture and economies that are based upon tourism, and thus reverse the negative trends in globalization we are confident that the right use of technology is of importance. Specifically, we are confident that Topic Map can be used to empower local culture and economies. In the next chapter we will take a look at, and explain what Topic Map is, and why we believe that this technology, and this way of thinking, can make a positive contribution. Specifically we will have a look at how this technology can contribute to the tourism industry with the Authentic Travel thinking applied.
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1.2 Authentic travel and Information Design

Information Design is by definition creating and using information in such a way that it can make a positive impact to contemporary people and culture. Our project needs to be considered as a contribution to Information Design as well. Authentic Travel International is a cross-disciplinary project whose goal is to design a new way to travel and work in the tourism industry. By bringing the traveler as close as possible to what is local and authentic for the place they travel to, we believe that this will empower local culture and enrich the traveler’s experiences.

By using Information Design, thus designing information for its purpose, we are confident that this is possible to achieve. By using the Topic Map technology as the base technology in a portal, which we will call the Authentic Travel Portal, we crave to reach the goal of empower local culture and enrich traveler’s experiences.

As stated in the previous section there can be many challenges to an authentic travel portal. There will be a lot of information, and a lot of destinations to travel to. If this information is structured in an insufficient way it might be as useless as not having such a portal at all.

Traveler’s point of view

The first aspect is from the traveler’s point of view. How can Topic Map be used in planning a trip to a country the traveler has little or no knowledge about? This problem can be divided into two main aspects.

The first, how does the system provide the traveler with a place to start? Neither the system nor the traveler might not know what the traveler are
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looking for. The traveler probably doesn’t know what possibilities for activities, accommodation, happenings etc. exists in the country.
The second, when the system has provided the traveler with a start, how can Topic Map be used to guide the traveler to the resources the traveler wants? All travelers probably have different starting point, and want to experience different authentic things on their vacation. Does the Topic Map technology provide the possibility to meet that requirement? If so how?

If Topic Maps only provides the "index" and the associations, will that be enough for the user, or does the system have to provide something more to guide the user through the planning of the vacation.

The authentic business point of view

How can Topic Map be used to make authentic businesses more accessible on the web? The system has to provide an easy way for the business to maintain and update their information. What they provide, how much it costs and so on. And there have to be an easy way to link together the different authentic businesses so it makes it easy for the traveler to find, that means to make the system capable of guiding the traveler in a way that makes both the traveler and the authentic business happy.

1.3 E-business

Most Introductions to e-business open with a history of the growth of the internet, and prediction for the growth of e-commerce and e-business. E-commerce is doing business electronically across the extended enterprise. It covers any form of business or administrative transaction or information exchange that is executed using any information and communication technology.
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E-business is a wider concept that embraces all aspects of the use of information technology in business. It include not only buying and selling, but also servicing customers and collaborating with business partners, and often involves integration across business processes and communication within the organization.

Most of the excitement around e-business is integrally associated with the potential of the internet, and more specifically the web. Whilst these technologies are central it is important to take a more holistic perspective and to recognize that e-business, especially in business-to-consumer applications, is concerned with allowing customers access through whichever channel they choose. This might include mobile phone and personal digital assistant with WAP display or public access kiosks in airport railway stations and shopping centers. In other words, consumers will demand the option of consulting information on the move as well as through fixed machines in their office, home or even their train seats.

E-business describes the application of information and communication technologies to business processes in all sectors of the economy to reduce costs, to improve customer value and to find new markets for products and services. In this paper we are going to find new e-business strategies to make authentic travel website easier and more attractive for the user, with help of Topic Map and dynamic websites. We are going through a distributed system process to make it easier for developers.

1.4 E-business strategies

In common with any other business activity, e-business needs to be guided by a business strategy. E-business strategy is concerned with establishing
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business goals and objectives, making decisions about how those objectives will be achieved.

Strategy formulation for e-business has much in common with strategy formulation for other business context or functions. There is a danger that, in the race to capitalize on the fast growing e-business markets, business may forget the basic, overlook fundamental business principles and neglect adequate strategy formulation.

E-business strategy must also link into plans for the execution of the strategy in any of the various functional areas on which e-business might impact. In particular the e-business strategy must inform the e-business plan. One part of this plan will be associated with the development, maintenance and review of the website. The e-business strategy must also embrace operation and service delivery.

Most businesses would not adopt a new business strategy, such as opening up a new office or shop, without first doing some very careful planning. Planning helps to ensure that the precious time, money and energy invested in any new strategy are not wasted. Without good plans new ventures can easily go wrong, due to such things as poor timing, unreasonable expectations or even adopting the wrong approach in the first place.

Authentic Travel Portal adopts strategy of other tourism websites in tourism point of view. But on the other hand it focus on local culture and small businesses which are not relevant in the current tourism web industry. Therefore we can say this might be a new business strategy that focuses on both areas.
Chapter 2

Methodology

As stated in the introduction, we are confident that the right use of technology in general, and specifically the use of Topic Map, can make a positive difference regarding globalization. To show that it can, in our case applied to the world of tourism in the context of Authentic Travel, we have made a prototype which is described in more detail in chapter 4. Before we go into the details of the prototype we want to clarify the technologies we have used, with the focus on Topic Map.

Before going into details about Topic Map we will provide a quick overview of all the other technologies we have used in order to develop the prototype described in chapter 4.

2.1 eXtensible Markup Language (XML)

XML (eXtensible Markup Language) is a markup language for documents containing structured information.
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Structured information contains both content (words, pictures, etc.) and some indication of what role that content plays (for example, content in a section heading has a different meaning from content in a footnote, which means something different than content in a figure caption or content in a database table, etc.). Almost all documents have some structure. A markup language is a mechanism to identify structures in a document. The XML specification defines a standard way to add markup to documents (Walsh 1998).

XML specifies neither semantics nor a tag set. In fact XML is really a meta-language for describing markup languages. In other words, XML provides a facility to define tags and the structural relationships between them. Since there's no predefined tag set, there can't be any preconceived semantics. All of the semantics of an XML document will either be defined by the applications that process them or by style sheets (Walsh 1998).

Why do we use xml?

The reason we use XML in Authentic Travel Portal is to avoid storing data in the Topic Map. Because there are some restriction of using occurrences in a topic, and it will be ineffective to read data from Topic Map if there are several occurrences. By just referencing the topic id in the XML file it will be possible to structure data very easy. There are also no restrictions on what data and what type of data that can be added. It's possible to store topic information, related websites, images and etc.
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2.2 Document Object Model (DOM)

Document Object Model (DOM) is a platform- and language-independent standard object model for representing HTML or XML and related formats.

Because DOM supports navigation in any direction (e.g., parent and previous sibling) and allows for arbitrary modifications, an implementation must at least buffer the document that has been read so far (or some parsed form of it). Hence DOM is likely to be best suited for applications where the document must be accessed repeatedly or out of sequence order. If the application is strictly sequential and one-pass, the SAX (simple api for xml) model is likely to be faster and use less memory (W3C 2005).

XML DOM

The XML Document Object Model (XML DOM) defines a standard way for accessing and manipulating XML documents.

The DOM presents an XML document as a tree-structure (a node tree), with the elements, attributes, and text defined as nodes (w3schools n.d.).

In Authentic Travel Portal, we use DOM to parse XML data into JAVA. In the next sections there will be more information on how DOM is used.

2.3 Java Database Connectivity (JDBC)

JDBC is an API for the Java programming language that defines how a client may access a database. It provides methods for querying and updating data in a database. JDBC is oriented towards relational databases. The Java
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Platform, Standard Edition includes the JDBC API together with an ODBC implementation of the API enabling connections to any relational database that supports ODBC. This driver is native code and not Java, and is closed source.

JDBC-ODBC Bridge

The Java Software bridge provides JDBC access via ODBC drivers. Note that you need to load ODBC binary code onto each client machine that uses this driver. As a result, the ODBC driver is most appropriate on a corporate network where client installations are not a major problem, or for application server code written in Java in three-tier architecture.

2.4 XML Topic Maps (XTM)

XML Topic Maps (XTM) is an XML grammar for interchanging internet based Topic Maps. The primary aim of XTM is to improve the search of information over the web. XTM describes the interconnected resources in the web. They make the searching of documents on a particular subject much easier since the related materials can be retrieved easily using XTM.

It is easy to create and process XTM document and is compatible with XML. XTM documents are readable. The main purpose of XML Topic Maps (XTM) is to give you the knowledge about resources, and where they can be found. XML Topic Maps (XTM) represents the structure of information resources and this structure is used to define topics and their association between different topics.
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2.5 Topic Map Query Language (TMQL)

Topic Map Query Language (TMQL) is an XML-based extension of Structured Query Language (SQL), a query language developed for use in meeting the specialized data access requirements of Topic Maps. Two types of data access for Topic Maps are: information retrieval, which is focused on separate search instances of a single user looking for specific information; and information filtering, which is a query process that builds up a sort of user profile, filtering information to construct a selection of data relevant to a particular user.

TMQL is made to create a standard query language for Topic Map. With TMQL you can move data between applications. Support for TMQL in Topic Map systems will provide some support for application portability. TMQL can return data from the Topic Map based on criteria such as:

- single values
- collections of values
- values arranged in columns and rows
- constructed XML values
- Topic Map fragments

2.6 Topic Map Application Programming Interface (TMAPI)

TMAPI is a programming interface for accessing and manipulating data held in a Topic Map. The TMAPI specification defines a set of core interfaces
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which must be implemented by a compliant application as well as a set of additional interfaces which may be implemented by a compliant application or which may be built upon the core interfaces.

TMAPI has been developed in an open process by developers working on Topic Map processors and Topic Map applications and placed into the public domain. There are no restrictions on its use. TMAPI hopes to do for Topic Maps what SAX and DOM did for XML - provide a single common API which all developers can code to and which means that their applications can be moved from one underlying platform to another with minimum fuss (www.tmapi.org 2005).

There are several implementations that have been developed based on TMAPI:

TM4J- Topic Map for Java TM4J is an Open Source Java library for working with Topic Maps. It provides its own API but also provides TMAPI interfaces. TM4J can be used with three back ends: in-memory, Ozone (an Open Source object-oriented database) and Hibernate (for use with relational databases such as MySQL).

TinyTIM - a tiny in memory TMAPI implementation TinyTIM is an Open Source TMAPI in memory implementation with a small jar footprint. TinyTIM is suitable for Java applets like hyper graph. TinyTIM also implements the latest Index API proposal.

XTM4XMLDB - Topic Maps for XML databases XTM4XMLDB is an Open Source TMAPI implementation for native XML databases like eXist or Apache Xindice as backend.
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OKS - Ontopia Knowledge Suite The OKS is a commercial suite of Topic Maps tools for building, maintaining, and deploying Topic Map-based applications. It has a native API, but also supports TMAPI, and adds support for tolog, the Ontopia Schema Language, full-text search, as well as frameworks for building Topic Maps-based web applications.

2.7 Topic Map

Before we start to define Topic Maps we need to define a wider concept explicitly Semantic Web. The Semantic Web is a web of data. There is a lot of data we all use every day, and it’s not part of the web. I can see my bank statements on the web, and my photographs, and I can see my appointments in a calendar. But can I see my photos in a calendar to see what I was doing when I took them? Can I see bank statement lines in a calendar? Why not? Because we don’t have a web of data. Because data is controlled by applications, and each application keeps it to itself.

The Semantic Web is about two things. It is about common formats for integration and combination of data drawn from diverse sources, where on the original Web mainly concentrated on the interchange of documents. It is also about language for recording how the data relates to real world objects. That allows a person, or a machine, to start off in one database, and then move through an unending set of databases which are connected not by wires but by being about the same thing.

This Semantic Web can be achieved by adding semantic structures to the current Web. Many candidate techniques have been proposed, such as semantic networks (Woods 1975), conceptual graphs (Michel Chein 1992), the
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Semantic networks are basically directed graphs (networks) consisting of vertices linked by edges. Edges express semantic relationships between the vertices.

The conceptual graphs theory developed by Sowa (Sowa 1984) is a language for knowledge representation based on linguistics, psychology and philosophy. RDF data consists of nodes and attached attribute/value pairs. A node can be any web resource (page, server, basically anything for which you can give a URI), or another instance of metadata. Attributes are named properties of the nodes, and their values are either atomic (character strings, numbers, etc.), metadata instances or other resources. This mechanism allows us to build labeled directed graphs.

Topic maps, as defined in ISO/IEC 13250 (ISO/IEC 13250:2000 Topic Maps: Information Technology – Document Description and Markup Languages 1999), are used to organize information in a way that can be optimized for navigation. Topic maps were designed to solve the problem of managing large quantities of unorganized information. Information is not useful if it cannot be found or linked to. In the paper-publishing world, there are several mechanisms to organize and index the information contained within a book or document. Indexes allow readers to go directly to the portion of the document that is relevant to their information needs. Topic maps can be thought of as the online equivalent of printed indexes. Topic maps are also a powerful way to manage link information, much as glossaries, cross-references, thesauri and catalogs do in the paper world. Topic Maps allow users to
create a large quantity of metadata and tightly interconnected data. They constitute a kind of semantic network above the data themselves (Grand & Soto n.d.).

![Image of a topic map](image)

**Figure 2.1: Topic Map - Overview**

The core of Topic Maps can be summarized very succinctly: a Topic Map consists of a collection of topics, each of which represents some concept. Topics are related to each other by associations. A topic may also be related to any number of resources by its occurrences.

Topic Maps are described as the "GPS of the information universe", as they are designed to enhance navigation in complex data sets. Although Topic Maps allow organizing and representing very complex structures, the basic concepts of this model - topics, occurrences and associations - are simple.
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![Topic Map Illustration]

**Figure 2.2: Topic Map - Illustration**

A topic is a syntactic construct which corresponds to the expression of a real-world concept in a computer system. The figure 2.2 represents a very small Topic Map which contains four topics: Norway, Østlandet, Oslo, and Byporten. These topics are instances of other topics: Norway is a Country, Østlandet is a region, Oslo is a city and Byporten is a shopping center. A topic may be linked to several information resources - e.g. Web pages - which are considered to be somehow related to this topic. These resources are called occurrences. In the Topic Map represented on the figure 2.2, occurrences of the topic Oslo may be URLs pointing to some pictures or maps. Occurrences help organize data and understand their context by providing means of linking real resources to abstract concepts. It is important to notice that topics and information resources belong to two different layers. Users may navigate at an abstract level - the topic level rather than directly within
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data. The concepts presented so far - topics and occurrences - allow organizing information resources with regard to a concept. However, it is interesting to describe relationships between these concepts, which are possible in Topic Maps through topic associations. An association adds semantics to data by expressing a relationship between several topics, such as Østlandet is located in Norway or Byporten is a shopping center in Oslo, etc. Every topic involved in an association plays a specific role in this association, for example, Norway plays the role of container and Østlandet plays the role of contained. One advantage of Topic Maps is that they add semantics to existing data - by organizing and describing them - without modifying them. Moreover, one single Topic Map may describe several information pools and several Topic Maps may apply to one single information pool. In this section, we described Topic Maps basic constructs:

Topic Maps contain topics which are connected by associations and which point to information resources through occurrences. Topics Maps can enhance navigation and information retrieval in complex data sets by adding semantics to these resources. However, a topic may have a high number of dimensions, as it is characterized by its name(s), its type(s), its occurrence(s) - the resources which are related to it - and the role(s) that it plays in associations. Moreover, Topic Maps may also be complex because of their size: they may contain millions of topics and associations.

2.8 Creating Topic Map

There are three main steps for developing the Authentic Travel Portal. The first step is to create a Topic Map by using XTM, then use an API to handle XTM files and develop an interface to browse it as shown in Figure 2.3.
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Figure 2.3: System overview

Creating a Topic Map involves four steps:

- Define the theme which should be covered. (In this case Authentic Travel)
- Collect topics which are relevant for the theme
- Collect external information resources, such as web sites (so-called occurrences) for each topic.
- And finally, think about relationships between the collected topics (so-called associations).

In this project the theme will cover Authentic Travel in Norway. Then we need to find as many topics as needed, which are relevant to an authentic traveler in Norway. Some examples of topics could be:

"Norway, Country, Capital, City, Oslo, Bergen, Activities, Restaurants, Munch museum etc."

By looking at these examples it is obvious that not all the topics are relevant to each other as we usually think about Metadata, but this is the point of Topic Map. The data doesn’t need to be of the same type. It will be enough if we think they have some relation with each other. At the same time we can also categorize these topics.
"A topic can be anything, regardless whether it exists or not, whether it is of physical nature or just an idea or expression."
(Pepper 2000)

If we look carefully at these topics we find that Norway, Oslo, Bergen and Munch museum are just names of some places and Country, Capital, City, Activities, Restaurants are types of some places. In a Topic Map we call them topics and topic-types respectively, but generally in Topic Map implementation topic-types will also be represented as topics.

The next step is to collect information about each topic. In a Topic Map they will be called occurrences. This information will be like a description of the topic, website or pictures etc. in this case it is not that necessary to make occurrences for topic-types, but it would be fine to make some descriptions for some unfamiliar topic-types.

The final step is to create relations between topics. In a Topic Map these will be called Associations. Associations can be every relation you can find between topics.
Chapter 3

Topic Map for Authentic Travel Portal

Maybe one of the most common problems, or challenges, with the use of Topic Maps is defining the ontology for the domain in which the Topic Map is intended to describe. To define the ontology for the whole domain of tourism, and then also Authentic Travel, is a huge task, and could probably be object for a master thesis itself. In this project the ontology is simply based on some obvious categories needed to make a prototype of what the Authentic Travel Portal may look like, and what kind of functionalities it has to offer. The ontology and the Topic Map described in this project is far from complete, but it is used to show what the use of Topic Map offers in the Authentic Travel context.

In this chapter we will have a look at how the Topic Map for the Authentic Travel Portal are constructed and how it is defined in XTM. At the end we will describe how all the elements of the Topic Map are used in order to work towards the goals stated in the introduction.
3.1 Ontology

The process of defining the ontology for authentic travel was based on the process "ontology capture" as described by Mike Uschold & Michael Gruninger (Uschold & Grüninger 1996). After a brainstorming session to find all concept that might be relevant and then grouping these into somewhat loose categories the result looked quite promising. The first draft of the ontology looked like this:

![Ontology Diagram]

**Figure 3.1: Topic Map - Draft**

This is, as mentioned before not nearly a complete ontology for Authentic Travel, it is only to show the possibilities and the power that the use of Topic Maps provides. In a complete ontology for Authentic Travel there would probably be a need for a lot more information and thus a many more
3.2 Walkthrough of the ontology

In the brainstorming process the first concept that came to mind was "country". In this project the focus will be on Authentic Travel for Norway, so this category could might have been skipped, but for future expansion this category was found useful to include. It can also be used as a starting pont. Further in the brainstorming process a lot of concepts and categories where proposed, but only a few where chosen, to keep it simple at this stage. The following is a description of the key concept that was chosen.

Country

As mentioned before, the topic type of country might not be necessary for this project, but is chosen to be a part of the ontology for further expansions, and as a starting point.

Region

A country can exist of different regions. These regions would just be a subset of all the places registered in a country. The purpose for this is to provide an overview of what places that exists in different regions of a country. So if the user wants to find out "what places can I visit in the north of Norway?" given that "north of Norway" is defined as a region, this categorization of places in different regions would be useful. It would also be useful if the user want to know "What can I do in north of Norway, and where can I do it?"
CHAPTER 3. TOPIC MAP FOR AUTHENTIC TRAVEL PORTAL

Place

The concept "Place" where chosen since this was the most generic concept for defining cities, villages and other places that exists in a country. As you can see this abstract topic was divided in to two concepts, so far. Furthermore, as you can see, a place has associations to a region, as mentioned above. It also has an association to a country, since a place obviously has to exist within a country. The last two associations are to activity and accommodation, since both have to take place in one or more places.

Accommodation

Accommodation was defined as an abstract concept, and divided into motel, cabin, and hotel. This is to define what type of accommodation it is. Accommodation has an association to place, as mentioned above. It also has an association to a category. This would be of interest for the user. When the user wants to find accommodation the Authentic Travel Portal can provide information not only if it is a hotel, but also if it lies in the mountain or in the city.

Activity

The last concept was activity. It can be argued if there should have been more categorization, e.g. activities, sightseeing, attractions etc. The reason that only the concept activity was chosen was that this is defined as "something you could do". So if you want to go to a museum or take a look at different attractions, this is still something you could do. The abstract concept activity is then divided into all these different things you could do in a place, for simplicity only three was included at this stage. The activity, like accommodation, also has an association to a category. This is useful for the
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user in the sense of "I want to go dining, but not in the city".

3.3 Improvements

After some of research and actually programming and using Topic Map we found that this model needed some improvements. These improvements included a better way to categorize the topics by categorizing the Associations. As we mentioned before associations are actually relations between topics. By categorizing associations we can access the same type of associations and by having the associations it is very easy to access the related topics. The other improvement was to make a bit more hierarchical architecture. The reason to do this was to decrease the size of available information when accessing topics. This was achieved by decreasing the direct relation to each topic.

Like figure 3.2 shows the Topic Map begins from country and move on to smaller parts. The notable change is the associations. As we mentioned before every association has its own type like association between areas and dining is of type "area_dining". But this type is a subclass of "todo" as well. Every other association that represents location of something in a particular area will have the same type. Like it is shown in this model all todo associations are red. If we add another type of association like nearby, it will also get a new super type "nearby". The reason for doing this was to access data easier. For example, if I want to find everything to do in an area like Oslo Central Station we just need send a request to Topic Map and get all todo association types in this area. By having the association and area topic it will be very easy to get the related topics and categorize them. If we imagine that the API returns a collection of todo association we have all
association in this type and then we can get its subclasses.

![Diagram](image)

**Figure 3.2: Topic Map - Improvements**

This model helped us to add more functionality to the Authentic Travel Portal more efficiently. It was also helpful in order to develop a more dynamic system.
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3.4 Defining a Topic Map for Authentic Travel Portal in XTM

Topic Maps can be defined in different formats such as XML, Database etc. we are going to use the ISO-standard XML Topic Map (XTM) to define it.

Like every other XML documents, a Topic Map document (XTM) starts off with a header specifying the version of XML, followed by the Topic Map tag. The <!-- ... --> can contain any comment the author would like to provide.

```xml
<?xml version="1.0"?>
<topicMap id="Authentic-Travel"
    xmlns = 'http://www.topicmaps.org/xtm/1.0/'
    xmlns:xlink = 'http://www.w3.org/1999/xlink'>

<!--
The map contains information about Authentic traveling in Norway.
More comment and nice description goes here, maybe also
author information.
-->

.... here topics and associations go ...

</topicMap>
```

3.4.1 Topics

After that, any number of topics and associations can be added to this Topic Map. The sequence of these declarations does not matter.
CHAPTER 3. TOPIC MAP FOR AUTHENTIC TRAVEL PORTAL

```
<topic id="norway">

</topic>

<topic id="oslo">

</topic>
```

A topic will be declared with `<topic>` tag and an id attribute that will be used as an internal identification that can be referred form somewhere else.

```
<topic id="norway">
<baseName>
  <baseNameString>Norway</baseNameString>
</baseName>

</topic>

<topic id="oslo">
<baseName>
  <baseNameString>Oslo (Capital of Norway)</baseNameString>
</baseName>

</topic>
```

BaseName is an external representation. This baseName indicates how the topic should present itself to the end user. In most cases it will be similar to
CHAPTER 3. TOPIC MAP FOR AUTHENTIC TRAVEL PORTAL

the internal identification, but that is not necessarily. As we see in the code the baseName differ from internal identification.

```xml
<topic id="norway">
  <baseName>
    <baseNameString>Norway</baseNameString>
  </baseName>
  <occurrence>
    <resourceRef xlink:href="http://www.norway.com/" />
  </occurrence>
</topic>

<topic id="oslo">
  <baseName>
    <baseNameString>Oslo (Capital of Norway)</baseNameString>
  </baseName>
  <occurrence>
    <resourceRef xlink:href="http://www.oslo.com/" />
  </occurrence>
</topic>
```

Since, for most of the topics, there is also information on the web, it would be useful to add references to these web-pages within a topic. This is done with so called occurrences. It’s possible to have any number of occurrences for a topic. It can be pure text, link or reference to a picture.

Sometimes it is also very useful to classify our topics by more general terms. A classification of a topic references such a more general topic:

```xml
<topic id="norway">
  <instanceOf>
```

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CHAPTER 3. TOPIC MAP FOR AUTHENTIC TRAVEL PORTAL

```
<topicRef xlink:href="#country"/>
</instanceOf>
<baseName>
  <baseNameString>Norway</baseNameString>
</baseName>
<occurrence>
  <resourceRef xlink:href="http://www.norway.com/"/>
</occurrence>
</topic>

<topic id="oslo">
<instanceOf>
  <topicRef xlink:href="#city"/>
</instanceOf>
<baseName>
  <baseNameString>Oslo (Capital of Norway)</baseNameString>
</baseName>
<occurrence>
  <resourceRef xlink:href="http://www.oslo.com/"/>
</occurrence>
</topic>
```

As it shown above, by using `<instanceOf>`, norway will refer to a more general topic, country, and the same situation with Oslo that refers to city. The next thing we should do is to make two new topics for these references. These references are often referred to as topic types.

```
<topic id="country">
<baseName>
  <baseNameString>Country</baseNameString>
</baseName>
```
CHAPTER 3. TOPIC MAP FOR AUTHENTIC TRAVEL PORTAL

<topic id="city">
  <baseName>
    <baseNameString>City</baseNameString>
  </baseName>
</topic>

We don’t bother too much with occurrences or future classifications for these topics.

This was the simplest way to define a topic. It is up to the author of the Topic Map to decide whether this process of classification should be continued.

3.4.2 Associations

The next step in creating a Topic Map is to connect the topics, which is the most important thing in order to create the Topic Map. To create associations we need to find a meaningful relation between topics and define the role played by the topic in the association.

Topics can have many associations with each other. We need to use a meaningful association. Associations can be like:

- Is located in

- Created by

- Is capital of

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A simple example can be Oslo is located in Norway. We need to define roles because someone could interpret: Norway is located in Oslo. To avoid confusion and to make it perfectly clear who is who and who plays which role in the association we use the following scheme:

- the topics involved in the association are called members
- and the members play roles

As figure 3.3 shows. In XTM the Association will look like:

![Diagram](image)

**Figure 3.3: Association with roles**

```xml
<association>
  <instanceOf>
    <topicRef xlink:href="#is-located-in"/>
  </instanceOf>
  <member>
    <roleSpec>
      <topicRef xlink:href="#country-role"/>
    </roleSpec>
    <topicRef xlink:href="#Norway"/>
  </member>
</association>
```
CHAPTER 3. TOPIC MAP FOR AUTHENTIC TRAVEL PORTAL

<member>
  <roleSpec>
    <topicRef xlink:href="#city-role"/>
  </roleSpec>
  <topicRef xlink:href="#Oslo"/>
</member>
</association>

Every time we introduce a reference a new topic (topicRef xlink:href), we have to define its topic, or topic type. In this case we have defined country and city as topic types before. To avoid confusion we call the role types country-role and city-role.

<topic id="is-located-in">
  <baseName>
    <baseNameString>is located in</baseNameString>
  </baseName>
</topic>

<topic id="country-role">
  <baseName>
    <baseNameString>Country role</baseNameString>
  </baseName>
</topic>

<topic id="city-role">
  <baseName>
    <baseNameString>City role</baseNameString>
  </baseName>
</topic>
CHAPTER 3. TOPIC MAP FOR AUTHENTIC TRAVEL PORTAL

Associations can connect more than two topics as well. Like Oslo is the capital of Norway. In XTM this association is defined like this:

![Diagram of Oslo and Norway as capital of country]

**Figure 3.4: Association with multiple members**

```xml
<association>
  <instanceOf>
    <topicRef xlink:href="#City-is-capital-of-country"/>
  </instanceOf>
  <member>
    <roleSpec>
      <topicRef xlink:href="#city-role"/>
    </roleSpec>
    <topicRef xlink:href="#oslo"/>
  </member>
  <member>
    <roleSpec>
      <topicRef xlink:href="#capital-city-role"/>
    </roleSpec>
    <topicRef xlink:href="#capital"/>
  </member>
</association>
```
3.4.3 Occurrence and Resources

Occurrences specify a resource supplying further information relevant to a topic (Altenburger 2000). As we already know, a topic can have any number of occurrences. We are now going to find out what an occurrence may consist of. In general, information can be external to a Topic Map, such as references to web sites; or, they can be integrated directly into a map as a (short) text. In Topic Map terminology external resources are managed via resourceRefs
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while internal are captured by resourceData. Thus, the distinguishing feature between these two resources is that:

- the resourceRef links to an external information resource
- the resourceData is a short piece of information

```
<topic id="norway">
  <instanceOf><topicRef xlink:href="#country"/></instanceOf>
  <baseName>
    <baseNameString>Norway</baseNameString>
  </baseName>
  <occurrence>
    <instanceOf><topicRef xlink:href="#description"/></instanceOf>
    <resourceData>Norway is the best place in the world</resourceData>
  </occurrence>
  <occurrence>
    <instanceOf><topicRef xlink:href="#webpage"/></instanceOf>
    <resourceRef xlink:href="http://www.norway.com/"/>
  </occurrence>
</topic>
```

Each occurrence can have a type. instanceOf specifies the more general terms, which the resource belongs to. Contrary to resourceRef or resourceData, the instanceOf is optional within one occurrence.

It is possible to link other information such as a text-file or picture into occurrence.
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<topic id="norway">
  <instanceOf><topicRef xlink:href="#country"/></instanceOf>
  <baseName>
    <baseNameString>Norway</baseNameString>
  </baseName>
  <occurrence>
    <instanceOf><topicRef xlink:href="#picture"/></instanceOf>
  </occurrence>
</topic>

Each individual resourceRef or resourceData is embedded in its own occurrence. It’s not allowed to list several websites within one occurrence.

3.4.4 Scope

As we know, a topic characteristic can be a base name, an occurrence or an association. The assignment of such a characteristic can be considered to be valid only within a certain scope. Considering that not everybody is interested in everything or is supposed to have access to all the information, the Topic Map author should be aware that the information in the Topic Map could be viewed in different contexts. To indicate this context he has the option to scope either:

- the baseName of a topic
- an occurrence in a topic, or
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- an association

As an example of scoping a base name we could indicate a certain language the base name is written in. Let us assume the topic Norway should be covered in two languages, English and Norwegian:

```xml
<topic id="norway">
  <baseName>
    <scope>
      <subjectIndicatorRef xlink:href="http://www.topicmaps.org/xml/1.0/language.xtm#en" />
    </scope>
    <baseNameString>Norway</baseNameString>
  </baseName>
  <baseName>
    <scope>
      <subjectIndicatorRef xlink:href="http://www.topicmaps.org/xml/1.0/language.xtm#no" />
    </scope>
    <baseNameString>Norge</baseNameString>
  </baseName>
</topic>
```

A particular language, such as 'English' is referenced by http://www.topicmaps.org/xml/1.0/language.xtm#en where after the ",#" a two letter language code indicates a particular language. A list of other language supported is available at http://www.topicmaps.org/xtm/1.0/language.xtm.

A topic may have multiple base names in the same scope or in multiple scopes. If you do not scope a baseName, the scope is so-called unconstrained
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and that name is always valid in any context.

An example for scoping occurrence can be the www.norway.no that displays information in English for foreigners and www.norge.no that display information for Norwegians.

```xml
<topic id="norway">
  <instanceOf><topicRef xlink:href="#country" /></instanceOf>
  <baseName>
    <baseNameString>Norway</baseNameString>
  </baseName>
  <occurrence>
    <instanceOf><topicRef xlink:href="#webpage" /></instanceOf>
    <resourceRef xlink:href="http://www.norway.no" />
  </occurrence>
  <occurrence>
    <scope><topicRef xlink:href="#norwegian" /></scope>
    <instanceOf><topicRef xlink:href="#webpage" /></instanceOf>
    <resourceRef xlink:href="http://www.norge.no" />
  </occurrence>
</topic>
```

Use of scope in associations is very helpful. In an association the relationship may not be relevant for each member. By using scope you can specify that.
Back in our example

```xml
<association>
  <instanceOf>
    <topicRef xlink:href="#City-is-capital-of-country"/>
  </instanceOf>
</association>
```
Here scope specifies that this relation is relevant for just Oslo. Scopes can be used to reduce the amount of information presented to a user. The more a system knows about the users background (language, preferences, etc.), the more tailored the information can be.

3.4.5 Variant

The variant element type is used to add a variant name to a topic name. For example to use shopping topic and we just want to have another name to
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display it on the screen we use a variant name to reach this purpose.

```xml
<topic id="shopping">
  <instanceOf>
    <topicRef xlink:href="#activ"/>
  </instanceOf>
  <baseName>
    <baseNameString>Shopping</baseNameString>
    <variant>
      <variantName>
        <resourceData>Go shopping</resourceData>
      </variantName>
    </variant>
  </baseName>
</topic>
```

In this example we use a variant name "Go shopping" instead for real baseName that is shopping. We can have as many variant names as we like for each baseName.

3.4.6 Summary

In this chapter we have shown the different basic parts a Topic Map consist of. The most important parts are associations and scope. By using these we connect different topics and give them different meaning according to the context in which they are accessed. In Information Design this is a powerful tool, and helps designing information in such a way that we meet the user in the right context and gives the user what the user wants. As we will show in the next chapter this can be used to connect businesses together and make them more accessible. This will also help us guiding the user, in the sense of
CHAPTER 3. TOPIC MAP FOR AUTHENTIC TRAVEL PORTAL

giving the user relevant options. By doing that we are moving towards the goals stated in the introduction.
Chapter 4

Prototype

As described before, and by others, there are some negative trends happening in tourism today. Our approach to this problem is that the use of technology can, and are, playing a role in this scenario. With that approach our thoughts are that using the right technology the right way, technology can be used to turn negative trends to something positive, and then not only positive for one of the involved parts, but for all. The key is to make the different actors and participants interact with each other and instead of competing they could work together.

In order to show some ideas about how technology can encourage preserving both cultural and economical aspects of, I would say any domain, but in this case the tourism industry, we have developed a prototype. This prototype is just that, a prototype, and has a lot of room for improvements and, as we will elaborate on later, there are still a lot of ideas and functionalities yet to be implemented. This prototype is just to show some general ideas on how the Topic Map technology can be used in this domain, and that it actually have something positive to offer the world of tourism in the sense of

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both the traveler and all the small businesses deeply depending on tourism. With our approach, and the idea of Authentic Travel, that it is important to preserve these small businesses to preserve the local culture and the local economy, we have a good starting point to make a difference.

This prototype shows how the use of Topic Map can make information more available to the users, and provide more interesting information for the user based on the user’s personal choices and likings. In tourism it is of importance that you make your business visible for those interested. It is not always enough to just have your business exposed to a large amount of users if they are not interested in what you have to offer. With that in mind the prototype is trying to show how we can connect the right users to the right places.

4.1 Development process

The development process was somewhat a struggle at the early stages. We had all these ideas and saw all kinds of possibilities. All these new ideas lead to a rapid rate of changes in the system, the data and the Topic Map. All the functionalities of the prototype are described in more detail later in this chapter.

We started off with developing a browser, meant to provide an interface for browsing the data in the Topic Map. We made sketches of how the user interface should look like, and what kind of data we wanted. This led to a lot of different approaches to what kind of structure, or ontology, the Topic Map should have. In addition to this we focused on making it as dynamically as possible. This was because we wanted the ability to just add new categories and data to the Topic Map and make them available without
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having to reprogram anything.
After this we started to develop the profile functionality as well as we started to explore the possibilities for the map functionality. Developing the profile was a bit of a challenge. We tried different approaches before we finally ended up with something that was satisfying. Regarding the map functionality we ended up using google map. We considered other public available providers as well, but this was what fit our purpose best. The challenge here was to get the coordinates for all the places we wanted to have in the Topic Map. Since google map’s geocoder didn’t work well for Norway we had to manually find the right coordinates.

The last thing we developed was the travel planner. At first we made this module use its own Topic Map with additional associations and data than the Topic Map for the browser. After a while we realized that doing that was not very good. So we had to change it to use the same as the browser. Doing that also involved some changes in the browser as well. The last thing we did was making the design for the portal, and added more data to the Topic Map to make it become more usable and show the potential and the different functionality in a better way. When we started to discuss the design and layout we saw that the original idea was not working as well as we thought at an early stage, so we ended up making quite drastic changes to the layout.

Since this was the first practical use of Topic Map for the both of us it was quite interesting to see how the prototype improved as our understanding of the technology and its possibilities improved.
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4.2 System overview

The prototype was based on the java implementation of TMAPI, TM4J, described in section 2.6. This API was then combined with JSP (Java Server Pages) and Java Servlets. These technologies provided an easy access to the main focus of the prototype, namely the use of Topic Map. The system mainly consists of four parts, the TM4J api, the data storage in both xml and a database, the user interface in JSP and java Servlets to put it all together.

![Diagram](image)

**Figure 4.1: System overview**
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When the system starts it will use the tm4j to read and parse the Topic Map. In this prototype we use an in memory backend for tm4j, meaning that while the system runs the entire Topic Map is stored in memory and any changes to the Topic Map are lost when the system shuts down unless the entire Topic Map is written to the xtm file before it shuts down. After reading and parsing the Topic Map the system reads the associated data for each topic stored in an external xml file. The system is then ready to accept requests from the user interface.

The user interface consists of two main parts, browser (described in section 4.3) and travel planner (described in section 4.5). Planning a trip involves two important steps. The first is to decide where to go. This can be done in different ways, but either you want to travel to a place just because you want to, or you want to travel to a place that has something to offer that you would like to do. Then when you know where you are going you want to find what this place has to offer, regarding activities, accommodation etc. In order to help in the planning process we have divided the user interface into two different parts, the browser and the travel planner. These can be looked at as different scopes, because when a user is in the browser the user is browsing different places in a country which offer things according to the profile (described in section 4.4), meaning the user wants to find a place to travel to which has at least the things the user would like to do. When the user finds a place the user would like to travel to, the user can proceed to the travel planner. This can be considered as a different scope, because now the user is not looking for a place to travel to, but looking at what possibilities are available at the chosen location. The different parts in the user interface are described in more detail in the following sections.
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4.2.1 Class diagram

Figure 4.2: Class diagram
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4.2.2 Use case diagram

In this prototype we didn’t concern about having an administrator user. The only user of this system will be a normal user and we consider that the system is up and running. Administrator interface can be implemented in future.

Figure 4.3: Use case diagram
CHAPTER 4. PROTOTYPE

4.3 Browser

![Image of Authentic Travel Portal - Browser]

**Figure 4.4: Authentic Travel Portal - Browser**

The browser is the default part of the system, meaning that this is the first page displayed when the user enters the system. It will show the country "Norway" as its default topic. The browser will provide a way to generally get information about the country and places the user can visit and things that could be experienced at these locations. In the left column all the associated topics to the current topic are displayed, meaning that for the default topic "Norway" it will list all topics that are associated to this country, like cities, regions etc. The title for each block or group of associations is dynamically retrieved from the Topic Map, and uses the scoped name for the actual association. As described in the Topic Map section this means that for the city-country association it will show "Has cities" if the current topic is a
CHAPTER 4. PROTOTYPE

country, but will show "Is located in" if the current topic is a city.

The middle part, called the content part, will display information about the current topic. This information is retrieved from the xml file as described in the data storage section. It also has a "add topic" button. This is so that the user can add this topic to the list of "user topics". The "add topic" button is disabled if the user is not logged in. Furthermore there is a "plan trip to this location" button. If the user clicks on this button the user will enter the travel planner, and start to plan a trip from the selected place (or topic). This button is disabled if the user is not logged in. The last part of the browser is the map. This will provide a map with a pointer at the current topic, and the associated topics. This is described in more detail in section 4.7.

4.3.1 Use case descriptions


## CHAPTER 4. PROTOTYPE

<table>
<thead>
<tr>
<th>Use Case:</th>
<th>Add user topics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary Actor:</strong></td>
<td>Authentic Traveler</td>
</tr>
<tr>
<td><strong>Goal in context:</strong></td>
<td>Add topic to the user profile</td>
</tr>
<tr>
<td><strong>Scope:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Level:</strong></td>
<td>User</td>
</tr>
<tr>
<td><strong>Stakeholder and interests:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Precondition:</strong></td>
<td>User is either temporary logged in or logged in as registered user.</td>
</tr>
<tr>
<td><strong>Trigger:</strong></td>
<td>User adds topic.</td>
</tr>
<tr>
<td><strong>Main Success Scenario:</strong></td>
<td>1. User select desired topic.  2. User click on add topic.</td>
</tr>
</tbody>
</table>
| **Variations:** | 2a The selected topic is already is in user’s topics.  
   2a.1 System skips addition. |

### Table 4.1:

<table>
<thead>
<tr>
<th>Use Case:</th>
<th>Plan trip</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary Actor:</strong></td>
<td>Authentic Traveler</td>
</tr>
<tr>
<td><strong>Goal in context:</strong></td>
<td>Start travel planner at the current location.</td>
</tr>
<tr>
<td><strong>Scope:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Level:</strong></td>
<td>User</td>
</tr>
<tr>
<td><strong>Stakeholder and interests:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Precondition:</strong></td>
<td>User is logged in as registered user.</td>
</tr>
<tr>
<td><strong>Trigger:</strong></td>
<td>The user wants to plan a trip to the current location.</td>
</tr>
<tr>
<td><strong>Main Success Scenario:</strong></td>
<td>1. User select desired topic.  2. User clicks on plan trip.</td>
</tr>
<tr>
<td><strong>Variations:</strong></td>
<td></td>
</tr>
</tbody>
</table>

### Table 4.2:
4.3.2 Sequence diagram

Figure 4.5: Sequence diagram - Browser
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4.4 Profile

The title of this section might be a bit misleading, since most people associate the word "profile" with personal information. In this prototype we don’t focus on profile as a presentation of yourself, it is there to support the user in finding the information he or she wants. As we know the Topic Map for the Authentic Travel Portal contains many topics, and will continue to grow as long as the system exists. Showing all of these topics at once will probably lead to confusion and frustration for those who use the system.

With all this information available there is a need for some kind of filtering so the user only sees those things which are relevant and interesting for the user. Our goal is to give the user the needed information without confusing the user. To solve this there could be different approaches and different solutions. To make a filter that would function in an optimal way we think there have to be a combination of different solutions. In this prototype we have looked at two different solutions and combined them into a user filter for the Topic Map and the information associated with it.

In order to use the profile functionality you need to log in to the system. The system actually provides two different login options, one guest login, and one registered user login. If you want to log in as a guest, you just provide a name, that can be pretty much anything, and you are logged in. The guest login is just a session based login, which means that when the user ends the session all the stored data will be erased. The guest users also have limited functionality, more on that later. The guest user can register a user account at any given time. By doing that all the data stored in the guest account will then be stored permanently in the new registered account.
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After the user has logged in, either as guest or as a registered user, the profile section will show a list of "user topics". For the guest user this will of course be empty since no data are stored permanently for this user. For the registered user the list will contain all the user topics that the user has previously added to his "user topics".

4.4.1 Adding user topics and its purpose

Figure 4.6: Authentic Travel Portal - User topics

After the user has logged in and started browsing the system, the user can add any topics that might be interesting, to their "user topics" by clicking the "add topic" button on each topic. This topic will then be added to the users list of "user topics". As far as this prototype goes the list of "user topics" is just to provide functionality for sort of a check list. If the user
CHAPTER 4. PROTOTYPE

finds an interesting topic the user can "save" it in the list of user topics for later use. As we will be discussing later, there can also be another use for this list of topics. It can be used to help the system finding and filtering the information based on the topics the user has added to the list of "user topics". This could help the system to provide more accurate and interesting information to the user. In this prototype this has not been implemented. Any of the added "user topics" can be removed from the list at any time if the user wants to.

4.4.2 Filter and its purpose

![Diagram](image_url)

**Figure 4.7: Authentic Travel Portal - User profile**

As mentioned before there will be a lot of information provided by the system. In order to filter out uninteresting information for the user we made
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functionality for the user to tell the system what he or she likes. You have to be a registered user in order to get access to this functionality.

This functionality is actually divided into two parts. The first part is that the user can choose from a list of different topic types which are dynamically generated from the Topic Map. These are typically "todo" things as mentioned in the Topic Map chapter (chapter 3). These "todo" things are typically something like dining, shopping, fishing etc. So if the user only chooses "shopping" the system will only display topics of that type, and not everything else. If the filter is empty, all topics will be displayed.

The second part is more like meta information. We provide an option for the user to tell the system things like budget, if you are on a low, medium or high budget, or physical shape, if you are injured or in a wheelchair you probably don’t want to go for a long walk in the woods. Unlike the first part, these options are not collected from the Topic Map itself, nor are the filtering based on the Topic Map itself. These options are set up in a more static way, and the filtering is done based on the data connected to each of the topics in the Topic Map. We made it this way since these kinds of things are not topics, but merely attributes on the topics.

4.4.3 Use case descriptions
### CHAPTER 4. PROTOTYPE

<table>
<thead>
<tr>
<th>Use Case:</th>
<th>Register user</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Actor:</td>
<td>Authentic Traveler</td>
</tr>
<tr>
<td>Goal in context:</td>
<td>The user gets registered in the system.</td>
</tr>
<tr>
<td>Scope:</td>
<td></td>
</tr>
<tr>
<td>Level:</td>
<td>User</td>
</tr>
<tr>
<td>Stakeholder and interests:</td>
<td></td>
</tr>
<tr>
<td>Precondition:</td>
<td>User is either logged in as a guest user, or not logged in.</td>
</tr>
<tr>
<td>Trigger:</td>
<td>The user wants to be registered in the system.</td>
</tr>
<tr>
<td>Main Success Scenario:</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>User selects profile tab in profile area.</td>
</tr>
<tr>
<td>2.</td>
<td>User enters username.</td>
</tr>
<tr>
<td>3.</td>
<td>User enters Full name.</td>
</tr>
<tr>
<td>4.</td>
<td>User enters password.</td>
</tr>
<tr>
<td>5.</td>
<td>User enters Email address.</td>
</tr>
<tr>
<td>6.</td>
<td>User clicks on submit button.</td>
</tr>
<tr>
<td>7.</td>
<td>System displays &quot;user is successfully registered&quot;.</td>
</tr>
<tr>
<td>Variations:</td>
<td></td>
</tr>
<tr>
<td>2a</td>
<td>The system displays a user name chosen by user from temporary login.</td>
</tr>
<tr>
<td>2a.1</td>
<td>The user skips entering username.</td>
</tr>
<tr>
<td>5a</td>
<td>Username already exists.</td>
</tr>
<tr>
<td>5a.1</td>
<td>User enters new username</td>
</tr>
<tr>
<td>5b</td>
<td>Email is in wrong format.</td>
</tr>
<tr>
<td>5b.1</td>
<td>User corrects the email address.</td>
</tr>
</tbody>
</table>

**Table 4.3:**
CHAPTER 4. PROTOTYPE

<table>
<thead>
<tr>
<th>Use Case:</th>
<th>Remove user topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Actor:</td>
<td>Authentic Traveler</td>
</tr>
<tr>
<td>Goal in context:</td>
<td>User remove topic from the &quot;user topics&quot;.</td>
</tr>
<tr>
<td>Scope:</td>
<td></td>
</tr>
<tr>
<td>Level:</td>
<td>User</td>
</tr>
<tr>
<td>Stakeholder and interests:</td>
<td></td>
</tr>
</tbody>
</table>
| Precondition: | 1. User is either logged in as a guest user or as a registered user.  
2. User must at least have one topic in the "user topics". |
| Trigger: | User wants to remove a topic from "user topics". |
| Main Success Scenario: | 1. User click remove button in front of chosen topic.  
2. System remove selected topic. |
| Variations: | |

Table 4.4:

<table>
<thead>
<tr>
<th>Use Case:</th>
<th>Save profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Actor:</td>
<td>Authentic Traveler</td>
</tr>
<tr>
<td>Goal in context:</td>
<td>Update the &quot;user filter&quot;.</td>
</tr>
<tr>
<td>Scope:</td>
<td></td>
</tr>
<tr>
<td>Level:</td>
<td>User</td>
</tr>
<tr>
<td>Stakeholder and interests:</td>
<td></td>
</tr>
<tr>
<td>Precondition:</td>
<td>User is logged in as registered user.</td>
</tr>
<tr>
<td>Trigger:</td>
<td>User saves the profile.</td>
</tr>
</tbody>
</table>
| Main Success Scenario: | 1. User choose "user profile" tab from profile area.  
2. User chooses desired topic types.  
3. User clicks on save button. |
| Variations: | |

Table 4.5:
### Table 4.6:

<table>
<thead>
<tr>
<th>Use Case:</th>
<th>User login</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary Actor:</strong></td>
<td>Authentic Traveler</td>
</tr>
<tr>
<td><strong>Goal in context:</strong></td>
<td>User log in to the system.</td>
</tr>
<tr>
<td><strong>Scope:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Level:</strong></td>
<td>User</td>
</tr>
<tr>
<td><strong>Stakeholder and interests:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Precondition:</strong></td>
<td>User is successfully registered in the system.</td>
</tr>
<tr>
<td><strong>Trigger:</strong></td>
<td>User login and can access data that he saved in database before.</td>
</tr>
<tr>
<td><strong>Main Success Scenario:</strong></td>
<td>1. User enters username.</td>
</tr>
<tr>
<td></td>
<td>2. User enters password.</td>
</tr>
<tr>
<td></td>
<td>3. User clicks on login.</td>
</tr>
<tr>
<td><strong>Variations:</strong></td>
<td>2c Wrong username or password</td>
</tr>
<tr>
<td></td>
<td>2c.1 User enters correct username and password.</td>
</tr>
</tbody>
</table>
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4.5 Travel planner

The idea of having a travel planner in this system came in the middle of the development process. The travel planner is meant to be a utility for the user to plan their trip more easily. This travel planner is meant to be used in two different scenarios. The main scenario is when the user actually is on the spot, for instance Oslo. The secondary is used on the web. The advantage of the use on site is that it could be connected to a GPS to automatically determine the location of the user. This is then meant to be used on a step by step basis. When the user arrives in for instance Oslo central station (Oslo S) the system determines where he is based on the location provided by a GPS. The system then provides the user with options on what to do. These options will be based on the user’s profile and the time of the day. The functionality of GPS is not developed in the prototype yet because of lack of time. The only way to get to the travel planner is from the browser. When the user is on any place like City, Area or some places except for country, the user can easily choose to plan a trip to that location. In this section we will go through every part of the travel planner.

4.5.1 User interface

The user interface of the travel planner looks like figure 4.8. This page is like the browser in many aspects. There is a navigation panel on the left side that the user can choose the next action. In the center part of this page we have the current topic name and description. There is also a map that shows the current position. And in the right panel we have the user information and thing related to the user profile.
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![Diagram of Authentic Travel Portal - Travel planner](image)

**Figure 4.8: Authentic Travel Portal - Travel planner**

### 4.5.2 Navigation panel

Navigation panel is meant to bring the user possibilities at the current position. It will also help the user to browse through topics. In top of the navigation panel we have a field called time filter. In the Authentic Travel Portal there are topics like shopping centers, restaurants etc. that has opening hours. This function is made to work in real time. The Clock shows the current time, and if the time filter is set to off then the system will show all the places in current area and the system doesn’t consider if the place is open or not. If the user set the time filter on then the system filters out places that are not open at the current time. This functionality is very useful if the system runs on laptop, PDA or any other mobile device. This function helps the user to plan in real time.
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The next block represents categories of things that the user can choose to do, like get something to eat, go shopping, find a hotel etc. this will be the "normal" way to navigate this part of the system. To describe this part of travel planner we need to describe the next block of the navigation panel as well. The next block is "Thing to do in this place:" this block will normally show all the possibility that the user has in this particular place. The user must normally choose the next action from here. Both time filter and the previous block "What would you like to do?" filters this block. In other words, the result of both filts are displayed here. If the user chooses "Go shopping?" then this block will change name to shopping in this area and displays only shopping centers available in the current area. The same thing will happen for other choices.

In the next block, "places nearby this area", the system will display nearby places to the current topic. This is useful if the user has no more choices in the things to do block or the user wants to jump to another area, because the previous block only displays activity in the current area, but nearby places block will show actually places that are near to the current topic or area.
This section is fully controlled by the Topic Map. If there is an association which is related to this topic and it is of type "nearby" it will be displayed here.

As figure 4.9 shows, the area Oslo S has 2 shopping centers located in and a dining place, Fyret, is near to Oslo S then the system will display Fyret as a nearby topic for each of Oslo S, Byporten and Oslo City, but if Fyret is selected as a current topic then system will just show Oslo S as the nearby place.
The next block is "Other people did go to:". In this block the system will display topics other users chose when they were at the present place. The system will sort these topics by the number of people who made that choice. This will help the user to make a faster decision. This functionality is being controlled by our database. Every time a user chose to go to a place the system will update this information in the database. We will describe this in more detail later on.

The next block is the "recommended places:" In this block the system will display recommended places tagged by the system administrator. This block is meant to be an advertisement for some particular places. The administrator can manually tag the topic as recommended, then it will show up here. The Next block displays "Area’s in this city". The user can with help of these topics jump to another area in the current city. Like explained before,
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some part of our Topic Map model is hieratical. This means that it begins with biggest then go into more details. So to display this information the system must traverse to the areas then find the related city when we have the city the system displays all areas in the current city.

The Next block is "Cities in this region:". Here the system will list all the cities in this region. This block is the same as previous block but it will traverse the Topic Map to find the city, then its region, and then find all the cities in this region. The next block "Cities in this Country:". will do the same thing but it returns all the cities in the current country. This is illustrated in figure 4.10.

![Diagram](image)

**Figure 4.10: Topic Map - Hierarchy**
4.5.3 Content

The content area of the travel planner consists of five different parts.

The first part is the header, which shows the name of the current topic. This name is actually the baseName which is taken from the Topic Map. If the current topic is an activity it will show this topic’s rating as well. The rating is represented as stars. We will describe this in more detail later on.

The next part is the description of the current topic. This will display a short text, ingress, and then the body text of the topic. These are both taken from the xml file where the data of each topic is stored. At the end of this section there is a "Go here" button. This is meant for the user to click if the user actually would like to visit this place. By clicking on this button the user trail, which is a functionality to keep track of all the places the user has planned to visit, will be updated with the current topic. The user trail is listed in the profile area. If the user already has been to the current topic, meaning it is in the user’s user trail, the button will say "go here again".

The third part in the content is the user comments. This will show a list of all the user comments given on this topic. It will show the username of the user who comment this topic, the date of when it was added and of course the comment.

The fourth part, at the right side of the content, the system provides a map. On this map the user can see the current place and by just holding the mouse cursor over the other topic links the location of these places will be marked in the map. The marker is removed when moving the mouse cursor away from the link.
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The last part, which is located beneath the map, is a block that contains a form for both rating and comments. Each user can give comment and rate the topic after they have been to this place. Both the user comments and the rating are meant to help guide the user in the process of planning a trip. The user rating is displayed as stars to the right of the topic title. The rating is an average of all the user rating on this topic. The system always shows five stars, if the average rating is zero all these are white, but if the average is two then two of the white stars are filled with yellow color. Each user that is logged in and has been to a place has the possibility to add a rating for that topic. The rating is, for now, given by choosing 1 to 5 yellow stars.

4.5.4 Use case descriptions

<table>
<thead>
<tr>
<th>Use Case:</th>
<th>Set time filter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Actor:</td>
<td>Authentic Traveler</td>
</tr>
<tr>
<td>Goal in context:</td>
<td>Filter topics based on current time.</td>
</tr>
<tr>
<td>Scope:</td>
<td></td>
</tr>
<tr>
<td>Level:</td>
<td>User</td>
</tr>
<tr>
<td>Stakeholder and interests:</td>
<td></td>
</tr>
<tr>
<td>Precondition:</td>
<td>User is logged in as either guest or registered user.</td>
</tr>
<tr>
<td>Trigger:</td>
<td>User wants to filter topics based on current time.</td>
</tr>
<tr>
<td>Main Success Scenario:</td>
<td>1. User set the time filter on. 2. System applies the time filter</td>
</tr>
<tr>
<td>Variations:</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.7:
### CHAPTER 4. PROTOTYPE

<table>
<thead>
<tr>
<th>Use Case:</th>
<th>User rating</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary Actor:</strong></td>
<td>Authentic Traveler</td>
</tr>
<tr>
<td><strong>Goal in context:</strong></td>
<td>Add a rating to the current topic.</td>
</tr>
<tr>
<td><strong>Scope:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Level:</strong></td>
<td>User</td>
</tr>
<tr>
<td><strong>Stakeholder and interests:</strong></td>
<td></td>
</tr>
</tbody>
</table>
| **Precondition:** | 1. User is logged in as either guest or registered user.  
2. User has been to this place. |
| **Trigger:** | User wants to rate the topic. |
| **Main Success Scenario:** | 1. User selects the rating level.  
2. User clicks on submit.  
3. System updates current rating. |
| **Variations:** | |

**Table 4.8:**

<table>
<thead>
<tr>
<th>Use Case:</th>
<th>Go to selected place</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary Actor:</strong></td>
<td>Authentic Traveler</td>
</tr>
<tr>
<td><strong>Goal in context:</strong></td>
<td>Add current topic to travel plan and system reposition the user to this topic.</td>
</tr>
<tr>
<td><strong>Scope:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Level:</strong></td>
<td>User</td>
</tr>
<tr>
<td><strong>Stakeholder and interests:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Precondition:</strong></td>
<td>User is logged in as either guest or registered user.</td>
</tr>
<tr>
<td><strong>Trigger:</strong></td>
<td>User wants to add the current topic to his/her travel plan.</td>
</tr>
</tbody>
</table>
| **Main Success Scenario:** | 1. User clicks on go here button.  
2. System updates user trail.  
3. System updates trace data.  
4. System updates the user location. |
| **Variations:** | |

**Table 4.9:**
4.5.5 Sequence diagram

![Sequence diagram - Travel planner](image_url)

**Figure 4.11:** Sequence diagram - Travel planner
4.6 Data storage

In the start of the development process all the data concerning a topic where stored in the Topic Map as occurrences. This can of course be done and be used with success, but when we wanted to make the user rating and user comments in the "Travel Planner" we found it to be quite a challenge because we would have to write this information to the Topic Map, in memory, and then write the entire Topic Map to file for the new data to be stored. We then decided to only use the Topic Map as a resource for navigation ("a gps for data") and store all the data about the topics outside of the Topic Map. The only thing which can be considered as data left in the Topic Map is the "baseName" and the "variantName".

In order to store the data we use XML and a SQL database. The data that where considered to have a slow rate of updates, like address, position, description etc. are stored in the XML file and the data that where considered to have a high rate of updates, like user comments and user rating, are stored in the database.

The reason for this is two parted. First we wanted to show that when we use a Topic Map for navigation, the data can actually be stored in different ways and it doesn’t really matter. And the reason we stored the data with a high rate of updates in a database was for convenience and possible future performance issues. It is obvious that reading/parsing and writing large xml files are slower and can be more inconsistent than storing the data in a database. The reason we stored the rest of the data in the xml file was just to prove the point that it doesn’t matter for the Topic Map where the data are stored.
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4.6.1  XML

There are many ways to use xml in the authentic travel portal, but we only consider two models. The first model was to have an xml file for each topic. Each topic in Topic Map has a unique ID. This ID can be used as filename for xml file the other way is to reference from occurrence of each topic to the xml document. This is a very effective way if there is a large amount of data in the Topic Map.

![Diagram of Topicmap using XML 1](image)

**Figure 4.12:** *Authentic Travel Portal - Topic Map data 1*

The next model is to have one xml file for all topics and store data for each topic in xml nodes. Each node then has an id that refers to the topic id in Topic Map file. We used this model in our prototype. This is an effective and fast way to access data if there is not too much data.
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Figure 4.13: Authentic Travel Portal - Topic Map data 2

The difference between these two models are actually quite significant even if it doesn't seem to be. In the first model the system read each xml file just when there is a request for accessing it, which basically would mean one xml file for each request.

In the other model the system reads the entire xml document and stores the data in memory. When there is a request for accessing the data for a specific topic, the system will just read it from the memory. Therefore if there is a large amount of data the system will have a longer startup time, and consume more memory while running, but in the other model the system will only read and parse a very small file for each request.
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The structure and content of the xml file

As we mentioned before the XML document we used for the authentic travel portal store all data in one file.

```
<topics>
  <topic id="topic1">
    ...
  </topic>
  <topic id="topic2">
    ...
  </topic>
  ...
</topics>
```

The root node is named topics and has child topics. In every topic we have an id which is identically the same as the topic id in the xtm file. The other information are child of this node.

```
<topic id="">
  <address>
    <street/>
    <streetNumber/>
    <postalCode/>
    <postalAddress/>
  </address>
  <position longitude="" latitude="" zoom="" icon=""/>
  <description/>
  <info/>
  <image src="" width="" height=""/>
  <HomePage/>
```
CHAPTER 4. PROTOTYPE

The system will parse each topic to an object named topicInfo. TopicInfo has a variable for each element and attribute of a topic node. The address is stored in a separate object named address. All topics info are stored in a hash map where the key is the topic id and the value is a the topic info object. When the system needs to access these data it will only send a request and get a topic info object.
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4.6.2 Database

In this prototype we ended up using MS-Access as our database. We chose this because it provided the possibility for having a local database for our prototype. At first we tried to use a file-based database called JCDATABASE [26]. This was a good and simple solution early in the process when we had no need for advanced SQL functionality. Later in the process, as we added more functionality like rating and user comments, we needed a more advanced and robust database.

In order to access the database we used Jdbc, this provides a good interface for any database.

![Database Diagram]

**Figure 4.14:** Database overview
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4.7 Map functionality

The idea of having a map in the Authentic Travel Portal came at an early stage in the development process. The map should mark the location of each topic dynamically as the user browsed the different topics. We were also planning to use the map as an additional way for navigation by displaying all the different topics on the map, and make them clickable so the user could use this to navigate to the wanted topic.

The first idea was to make our own map in flash, but after a while we found that there are websites that offer different map services, such as Google map and Yahoo map. These both provide API's for web developers.

4.7.1 Google map

Google map has a simple and easy to use the Javascript API. It also has a fluid interface and brilliant looking map marker fly outs. It has large developer base and lots of how-to's available.

The problem with google map is that it lack of a good so-called "Geocoding service". Geocoding is the process of assigning geographic identifiers (e.g., codes or geographic coordinates expressed as latitude and longitude) to map features and other data record, such as street addresses. A geocoder is a piece of software or a (web) service that helps in this process. [Wikipedia]. Google map provides a geocoder, but for our use, namely Geocoding Norwegian addresses, it wasn’t sufficient.

We need a third party program to find latitude and longitude and send them to Google map API.
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4.7.2 Yahoo map

After a while of researching each API we found that we need latitude and longitude values for each place to locate it. We need a third party program to find these values and send them to the map API's. Yahoo map is compatible with only addresses, but doesn’t work properly for all places.

The other idea was to set a Latitude and Longitude value for each place. These values can be either occurrence or an association for a topic. The system then will control each topic coordinate and send it to map API.

4.7.3 How does the map work in the authentic travel portal.

We decided to use google map because of its simple API. Then we decided to use geographical coordinates (Latitude and Longitude). The only thing we should do was to find these coordinate for each topic then send it to google map to display the place.

As mentioned before, each topic can have external data related to it. Then the coordinates are the positioning data and there could be an occurrence for each topic. In the early stage of development we made new occurrence as the source for coordinates. After we began to use XML in the Authentic Travel Portal we found that we can actually move coordinates data to the XML file. Then each topic has a position reference. Here is an example to how the coordinates represent in XML.

```xml
<topic id="oslo_city">
  <address>
    <street>Stenersgaten</street>
    <streetNumber>1</streetNumber>
  </address>
</topic>
```
In this example there is information about Oslo City shopping center. In the position field we see some information as attributes like longitude and latitude values, zoom level and icon color. The Authentic Travel Portal will process these data and send them to the google map API. Google map use the coordinates to position the place then zoom the map to get the perfect view of the place. Then the icon will mark the current place with the right color. Each type of topics has its own zoom level and icon to distinguish each type on the map. Here is how this place will look like on map.
4.7.4 Calculate distances

Calculating distances is also another possibility that having coordinates brings to the system. There is a class name MapUtils in this system, which the system uses to send coordinates to, and it returns the distance between two coordinates. This distance is not calculated with the actual road between two coordinates, it is just a distance between two points with a straight line.
Chapter 5

Future improvements and additional functionalities

In this chapter we will take a look at future improvements and new functionality for the authentic travel portal. In the next chapter we will discuss the authentic travel portal in the aspect of both the already existing tourism site, visitnorway.com, and in the aspect of information design and polycsopic modeling. We will discuss these things in the light of all the improvements and possibilities in the Authentic Travel Portal as well.

As the process of developing the authentic travel portal prototype proceeded we came up with a lot of ideas for additional functionalities. In the prototype, we ended up implementing the ones we thought of as the most important and basic. After finishing the prototype we see that the functionalities we implemented has room for improvements.
CHAPTER 5. FUTURE IMPROVEMENTS AND ADDITIONAL FUNCTIONALITIES

5.1 Improvements in the prototype

The first thing worth mention here is of course the lack of data added to the system. As for now we only added a very few cities and activities. So for the system to be useful for the intended users there have to be a lot more data in the system. We felt that for showing the strength and the purpose of using this technology in this setting it was sufficient.

Validation and error handling

We have not implemented any kind of validation. In the registration form the user can enter any kind of data, and still be registered. As for the registration the system doesn’t check whether a user with the selected username already exists in the system. The system doesn’t give any kind of feedback if the user does something wrong, like trying to log in with an invalid username or password. Since this is only a prototype it is good enough as it is now, but if this was a release version these improvements should of course been implemented.

Info window in the map

In the map, in both the travel planner and the browser, we only mark the different places on the map with a small "pin" or an icon. Google map provides the ability to add information boxes to the map. We think it might be useful to add an information box with the topic title, maybe its rating and a short description to the map when the user points the mouse over a location (as described earlier).
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Distance calculation

As for now the distance calculation only calculates the distance between two points with a straight line. This distance can be quite different from the actual walking/driving distance between the two points. A better way to do this would be to actually show the walking/driving route on the map, and calculate that route’s distance between the two points.

Store user trails and the ability to have several trails for each user

In the prototype the user trail is not stored in association to the user. This means that when the user log out the user trail, which actually represents the planned trip, disappears. The user trail should be stored, and be accessible the next time the user logs in, allowing the user to continue planning the trip. There should also be an ability for the user to have multiple user trails, or planned trips, and be able to open a previous user trail and continue planning that trip.

5.2 Additional functionalities for the authentic travel portal

Travel plan summary

On of the most important function that can be added to Authentic travel is travel plan summery. While the user is planning a trip there should be a possibility to get a summary of the things already planned. The user should also be able to request a copy of it by email.
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Navigable map

By this we mean that the already implemented map should be clickable, so it can be used as an alternative form of navigation.

Pre-defined tour suggestions

By pre-defined tour suggestions we mean that there could be for instance a driving route from Kritiansand to Bergen, which are divided into smaller parts, so that the user can choose to drive along this suggested route. The user is then given options in order to choose different places to visit along the route, and are then given alternatives on things to do and experience on these places.

Search

Search functionality is one important functionality in any information system, including the Authentic Travel Portal. This could be implemented in different ways, but should at least provide a basic free-text-search.

Tags

By tagging we mean to label a topic with some kind of keywords. This functionality like, comment and rating, is to get user experiences about the different places. The only difference is that user can use some specific words to describe the topic. This will also help the search functionality to find better matches.
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GPS

This functionality is only meant to be used on mobile devices. The System can find the user’s position and then give the user possibilities in that particular area.

List all topics of the same type

This function is to give the user an overview of all the same type of activities. For example if the user clicks on fishing then system will display all the fishing places in a given scope (country, region, city etc.).

User community

By a community in this sense we mean that there should be functionalities that allow users and persons running authentic businesses to communicate, share experiences, thoughts etc.

Administration

It’s obvious that there is a need for some kind of administration of the Authentic Travel Portal, in the sense that there have to be someone in charge of the data in the system, to keep it updated and consistent. Furthermore there have to be some way of generating the funds needed to keep the Authentic Travel Portal running.
5.3 Administration and business strategy for the Authentic Travel Portal

In order to get and keep the Authentic Travel Portal running there are some considerations to be made. We need a way to collect relevant data and keep it updated. Getting data and keeping it updated can be somewhat a challenge for every system with a considerable amount of entries. Getting all the right associations, scopes, variant names etc. can be a challenge to organize, and is a huge editorial job. One way this might be solved is to delegate the responsibilities to those closer to the data. For instance, a guy running a hotel somewhere, might have a web-page, but does not have a lot of resources to promote the web-page and thus the hotel. By being a part of the Authentic Travel Portal the promotion will be happening without much extra effort. And by putting the guy that runs the hotel in charge of updating the information and associations to his hotel would probably be a win-win situation for both. The owner of the hotel gets a good way of promoting his web page, and his hotel, in a nice setting, and the Authentic Travel Portal gets updated data for free. Furthermore the persons closer to the data are more likely to set up more accurate associations etc. because they know the area and are probably more up to date regarding what is happening in the located area and areas nearby.

To keep the system running it is not enough to just get the right and right amount of data into the system. Everything has a cost, and the Authentic Travel Portal is no exception. So how can the system generate the funds needed to keep it running?

There are different approaches to this. One way can of course be the use of
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commercials, like banners and so on. It would probably be interesting for companies like airlines, train companies, bus companies etc. connected to the tourism business to advertise in such a portal. This would usually generate income based on user traffic, and with high traffic it could probably generate a considerable amount.

Another possibility is to charge a small amount for each entry in the system, meaning that if someone would like to have their hotel or restaurant etc. as a part of the Authentic Travel Portal they would have to pay a small yearly fee. At this point it is not that important, since there is still work to be done before an Authentic Travel Portal could be released, but it is important to be aware of the possibilities that exists within this area. And for future record it will be necessary to look deeper into this and develop a business plan for the Authentic Travel Portal.
Chapter 6

Authentic travel portal in contrast of visitnorway.com

To evaluate advantages that the Authentic Travel Portal brings to a traveler and what kind of consequences it has on the tourism industry, we are going to compare it against another website that operates in the same area. To achieve this we are going to discuss advantages and disadvantages of this site. We chose to compare the authentic travel portal against visitnorway.com. The reason for doing this is that visitnorway.com has the same focus as the Authentic Travel Portal, in fact tourism. Visitnorway.com is one of the most comprehensive tourism website in Norway. There is a lot of information and it is updated on a daily basis. Why do we need the Authentic Travel Portal then, if there already is a website that gives us this information?

To answer this question we are going through a story about the Brazilian couple Jeff and Jane. Jeff and Jane are recently retired and want to go on a two week vacation. They are very interested in other cultures and new experiences. They are both very fond of the traditional Portuguese-Brazilian
CHAPTER 6. AUTHENTIC TRAVEL PORTAL IN CONTRAST OF VISITNORWAY.COM

dish called Bacalhau which in many cases in Brazil are made out of Norwegian codfish. Since they think that the Norwegian codfish is very tasty, they would like to go to Norway and experience more about the Norwegian culture and especially Norwegian fish traditions. Jane is very interested in history. She has heard about Norwegian history and she wants to visit a fishery museum. They would also like to try traditional Norwegian food and would love to find out how to make these traditional courses. As they have never been to Norway and only heard about Norway through buying Norwegian codfish they have very little knowledge about the country. Since they are going to be in Norway for two weeks they do want to experience other things as well. They like to travel authentic because they think it is more exiting to participate in other cultures instead of just watch, or observe them. In order to plan their trip they obviously need some guidance.

Jeff opens his personal computer, search on the Internet and finds visitnorway.com. There is a lot of information on this web-site. On the front page there are some nice pictures of Norwegian landscape and some other pictures about some events and festivals, so far so good, but nothing about fishing yet. In the top navigation menu there are some links to things like activities and sights, destinations, accommodation etc. As Jeff knows fishing might be an activity "also in Norway" he clicks on activities and sights. Nothing about fishing yet, but there is a new navigation menu at the left side now. He clicks on activities. The website leads him to a new page. He can find everything but fishing. But when he read the articles carefully he finds an article about catch the big fish and this is the only thing he can find here.
As we see in figure 6.1 there is a lot of information here, but there isn’t any relations between topics and places. Jeff might not be able to go mountain hiking when he chooses fishing, because they might be in two separate places. The information here are too general and don’t focus on a specific user. When Jeff clicks on the topic catch the big fish, he will enter another page, but there still isn’t any concrete place where he can find more about fishing.
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Figure 6.2: Visitnorway.com - Catch the big fish

There are some related links on the right side of the page. This looks promising, but where are these places? The only thing he can do here is to click on some external link that leads him to other websites. But where can he go fishing? And when he finds a place to go fishing, what else can be done there? As mentioned before, Jeff and Jane travel together, and they are both interested in other cultures and want to experience traditional Norwegian food, maybe visit a museum etc. How can Jeff find a place to go
fishing, and in addition to that find out what other things he and Jane can do there? There is no connection between activities and places. Therefore Jeff gives up finding the information he is looking for in visitnorway.com

Jeff searches the Internet again and finds the Authentic Travel Portal. The first page is very simple there is an overview map of Norway and some information about the country. There is a navigation menu on left side and a user login on the right side. The first thing he does is to write his name to create a profile, and then he is able to choose things he is interested in. He chose fishing on activities and museum because his wife Jane is very interested in visiting a museum. There is also an option to choose type of accommodation; they don’t chose anything here because it does not matter what type of accommodation they are offered. The next section is to choose budget and as they are not so wealthy they choose medium. Furthermore, since they are both fund of Bacalhau they would like to try traditional Norwegian food made out of fish, so they check the fish category under dining. Finally they click on save and the system then filters the information according to the choices they have made.
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Figure 6.3: Authentic Travel Portal- Browser and Profile

Then Jeff begins to navigate through the website. The authentic travel portal will now just show him places where he can go fishing and places that have museums. When they choose one of those places they also get options for accommodation in that area and suggestions for places where they can go to try out some Norwegian fish courses. When he finds places or things that are interesting he can add these topics to his user topics in order to remember them and easily go back to those topics for further reading and exploring. The map also provides information about where in Norway all the different things are located. When he finds a location, a city, a region etc. that looks promising he can click on the "plan your trip from here" button to start planning his trip to that location more specific. In the travel planner page he can find other stuff in this area like other activities, where other people did go to, recommended places, user comments and rating on
different topics etc. When he finds interesting things to do, places to eat and
sleep he can add these to his travel plan and get a summary of the things he
has planned to do so far. So as he browse the Authentic Travel Portal he finds
that Lofoten sounds like an interesting place, so he choose to start planning
a trip here. He finds that there is some guy running a rorbu which is a small
cabin that lies just a few meters from the sea. If he rent a room there he can
get access to a boat to go fishing, he can also join the local fishing men when
they go fishing. Furthermore there is a small local restaurant nearby which
serves traditional Norwegian food. There are a few museums not far away,
and many other things they both can do, that they hadn’t even thought of.
And as a bonus, if he travels there from late May to late June he can even
experience the midnight sun.

By looking at this story we can answer the question above. The answer is
in fact navigation. Creating good web site navigation is the most important
task a web designer has to accomplish in the web design process. Web site
navigation is the pathway people take to navigate through sites. It must be
well constructed, easy to use and intuitive. Poor navigation does not help
users and often, the site can prove to be less accessible than others. Good
navigation is fundamental to good web design - in both business and informa-
tional sites - users should be able to find information easily. If the navigation
is not easy to use or intuitive users will quickly go elsewhere in search of
information. We often see ourselves in front of web sites without knowing
what to do next. The navigation is so well hidden or disguised that some
users simply don’t know how to use it. Navigation is the single most impor-
tant element in creating accessible and usable web sites (Mardiros n.d.). Our
experience when we were reviewing visitnorway.com was that there were a
lot of interesting information and topics. The main problem, in our opinion, was that all these interesting things had no relation to each other, and it was hard to figure out the navigational structure. It was hard to explore and discover the information we were looking for without getting confused.

In the Authentic Travel Portal the Topic Map provides, in our opinion, a very good and intuitive navigational structure. The Topic Map always provides all relevant information according to the topic the user has selected. By organizing information like this the system filters out the irrelevant information and prevents the user to run into "dead ends". Another problem in visitnorway.com is that the website gives the user too much irrelevant information at once. The user can easily be confused and doesn’t know where to begin or where to go.

A regular user who wants to visit Norway might not have much information about this country. There is a possibility that the user has just heard about Oslo or some other cities or places in the country. The best way to give information to this kind of user is to begin from less and then extend the information and get into details. One of the most useful examples in this matter is if you will explore a jungle you have the best view from top of the mountain to see all of it then go in the jungle to explore it. The same issue is for information as well. The user will see the overview of the "information jungle" and then go into details. If the user gets too much information in details the user will get confused quickly and might go to other places to find the information. It doesn’t matter how good this information is and how updated it is, as long as it is structured and presented in a bad way. In the Authentic Travel Portal the user will get relevant information each time. This is also one of the other strengths that Topic Map brings to this website.
Another problem in visitnorway.com is the map. There is a link to the map everywhere in the site but when you click on it you must search again to find the things you are, or were looking for. After you have searched for something you will get some marks on the map and a list of all the things that corresponds to your search. This list just contains the title and is clickable only if there is an external web-site for this place. A better design would be, when you are at a topic, you could look at it without searching on the map again. And the mark on the map should be clickable so that the user
can find more information about the place. The map gives the user too little information on each topic, and in many cases it provides too many topics. This might lead to confusion.

![Visitnorway.com Map](image)

**Figure 6.5: Visitnorway.com - Map**

Designing information is not just about obtaining information and publishing it. It is also about how to present it to the user. Visitnorway.com is a very good website with good visual design and lots of information but it doesn’t have very good information design values.
Chapter 7

Conclusion

As stated in the introduction we wanted to show how the use of information technology, and specifically Topic Map, can be used in order to empower and preserve local cultures and economies. Furthermore we wanted to explore the possibilities the use of Topic Map brings to the context of e-business, specifically e-commerce. The main challenge in travelling authentic is actually considered to be a problem regarding logistics. This is not an issue when you order a package from a travel agency, because they coordinate your trip, and you get everything under one roof so to speak. Travelling authentic has this challenge because the authentic traveler has to organize and coordinate the trip independently. However, if we can provide a satisfactory solution to the logistic problem, we may anticipate that many or perhaps most people will travel the authentic way. Our results show that the Topic Map technology has the potential to solve the logistic problem.

The core problem regarding logistics in this setting is to manage and organize information about these small authentic businesses in order to make them easily accessible for the intended user. To solve this issue we used Topic
CHAPTER 7. CONCLUSION

Map. By connecting the authentic businesses together and putting them into a context, both geographically and thematically, the system provides the user with a semantic overview and relevant information.

As described in section 4.3 and 4.5 the browser filters information according to the profile, while the travel planner does not. The argument for doing this is that these are meant to be used in different context or scope (not to be confused with the Topic Map scope). In the browser the user looks at places that are candidates for planning a trip to, because they all have activities, attractions etc. according to the user's profile. This is to help the user to choose which places to plan a trip to. The system provides a start (e.g. Norway) and tells the user "these are the places that have what you are looking for". This is a starting point, "top of the mountain view". When the user finds an interesting place the user can choose to plan a trip there. By using the travel planner the user is in another context or scope, not looking for a place to travel to, but looking to plan a trip to a place in detail. When the user has found a place to travel to we don't want to filter the information that much. We want to show what this place has to offer. By doing that we provide possibilities for the user to find interesting things that the user might didn't think of.

This solution to the logistic problem offers a huge advantage in the way of doing e-business. By making authentic travelling as easy as the traditional way of travelling and offer more attractive and exciting experiences, we will see a new positive trend in the tourism industry. As a result of this new trend we anticipate more people to travel the authentic way. This advantage provides a possibility for all the authentic businesses to keep their business running because, as we stated in the introduction, their existence are depen-
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dent on tourism. By preserving the already existing authentic businesses and get them running well can be somewhat encouraging for others to start new authentic businesses.

By developing the prototype we have shown what possibilities the use of Topic Map has and that information technology can be used to make a positive contribution to both e-business and globalization.

We have shown that Topic Maps can facilitate Authentic Travel, but as we mentioned in chapter 3 the Topic Map used in the prototype is far from complete. In order to maximize the effect of the use of Topic Map, future research is necessary in order to make a complete ontology for Authentic Travel. Authentic Travel is a huge domain, and has a lot of concepts, and categories that needs to be categorized and connected in an intuitive and self-explanatory way.

As we mentioned in chapter 1.3 one important issue in e-business, specifically business-to-consumer, is to let the user access information through whichever channel they choose. For future research we suggest that the Authentic Travel Portal, specifically the travel planner, is made accessible through mobile units (e.g. PDA). Then the user can access and use the travel planner more actively when travelling. The system should be made capable of taking the advantage of a possible integrated or connected GPS as well.

Of course the Authentic Travel Portal needs an administration interface as well. This interface has to support a distributed redaction, so that persons running an authentic business can get access and edit the information and
associations for the business they run.
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