

CHALMERS



S2I

E-City Shopping Center

Master of Science Thesis [in the Programme Software engineering and technology]

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Göteborg, Sweden, March 20102010

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S2I E-City Shopping Center

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S2I is a proof of concept system of the concept E-City Shopping Center. E-City Shopping Center is a new idea which is being extended from classical E-Commerce Solutions.

Department of Computer Science and Engineering

Göteborg, Sweden March 20100

S2I
E-City Shopping Center

Thesis Report

PREFACE

This is a thesis within Masters Program “Software Engineering and Technology” at Chalmers University of Technology. The supervisor of this study is Björn Von Sydow.

We are very grateful to our supervisor who helped us a lot in better understanding this thesis and writing the report.

Göteborg, Jan 2010

Jie Lin

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ABSTRACT

In this thesis classic E-Commerce concept is extended to the concept of an E-City Shopping Center. This concept is rather bound with a city than the whole world. It will provide customers in a specified city with freedom of purchase. It will try to create a virtual city on the internet, in which we will map some of the real city shopping functions. In a real city, the customer can walk on the streets, can do window shopping or buy something, while in a virtual city, the customer can walk on streets with the help of a map, can see different items in a shop, purchase something and can also visit the real shop (by watching its information in the virtual city) to get “Touch and Feel” of the thing.

The goal of this thesis report is to analyze and study this new concept, to find different ways and solutions (and to compare them) for its realization, and to implement a prototype, proof of concept, system.

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1. INTRODUCTION

1.1. BACKGROUND

Traditional shopping in a city is done by people almost everyday. There are different ways, such as window shopping, searching for new shops or products, looking for sales or just enjoying cafes in the shopping centers. By this traditional way of shopping, people can feel, smell, or try on a product before they buy it, and they can get the product immediately after purchasing.

Following the development of software and network technology, E-Commerce shopping has become more and more popular. Various products from different corners of the world are provided by E-Commerce websites. E-Commerce often offers users competitive prices and users can search for, browse and buy products in the website without going out to do a traditional shopping. However, it will take users several days to get their purchased products.

E-City Shopping Center, which will be introduced in this report, is a new way of shopping which combines traditional shopping and typical E-Commerce. An E-City Shopping Center is a local website, which is bound to a specified city. A map of the city is offered to provide the function of browsing, navigating and searching. Users can move around the local map, see different shops and get information. Icons of shops, cafes, restaurants, bars, cinemas as well as public community services are shown on the map to support a complete concept of a “city”. A user will be able to click on the icon and find further information about that particular business. The business information could contain a link which could be a single page if the business owner only wants to display some advertisement, offers or promotions, or it could be a complete web shop which contains all the products, sale and purchase modules. The user can search for a shop either in a particular area or whole city, and purchase interesting products. He can also book a seat in the restaurant or find a pub in the city. The user could also visit the physical shop after browsing information in the website. E-City Shopping Center will bring some of the joys and benefits of traditional shopping to E-Commerce and provide a more lively and attractive experience than traditional E-Commerce. Users will also find an easy way to get access to some small but classical shops, which may be in some corner of the city.

E-City Shopping Center will also offer shops a simple and cheap way to have presence on the web. Especially for small businesses, E-City Shopping Center will provide them with a cheap and convenient way because they don't need to set up and maintain their own web site anywhere. A shop could be set up with a very simple page and the business owner could be able to develop his site by himself. The business owner would be provided with a user-friendly editor and he would need very little technical knowledge to use it.

1.2. DISTINGUISHED FEATURES

S2I is a prototype, proof of concept implementation of an E-City Shopping Center, to be developed in this thesis. Shop Center and S2I Editor are two core ideas of S2I, where Shop Center is for the user and S2I Editor is for the business.

Shop Center provides a center for all shops hosted by S2I. It provides a convenient way to look for different shops by browsing and navigating through web pages. A customer can go to the Shop Center to get the information of city shops easily, instead of searching and browsing other hundreds of sites. This is the same concept as large shopping malls in real life where a lot of different businesses can be found under the same roof. The real shopping center grabs the customer's attention by the number and diversity of shops it has; Shop Center will do the same. The traditional concept of E-Commerce system is based on the platform for products, but S2I provides the platform for shops.

To make Shop Center more convenient and to enforce the E-City Shopping Center concept, we need a very effective and interactive way of searching. Therefore, Shop Center provides two interesting ways of searching i.e. Map Searching and Shop Searching. Shop Searching is like a traditional way to search businesses of a user interest. In Shop Searching, the results will be displayed on a single page in the form of a grid. The freedom of searching is the key here. The user could search any business with its items or categories. On the other hand, Map Searching is the way of searching shops which is more close to the E-City Shopping Center concept. It will basically provide two functions. First, the shop in S2I can be bound to a map, which provides the geographical information such as shop location and detailed address. The searching conditions, such as

area or location, will be given by the user, and the user can check where the shop he is searching for is located. The user can also customize search for a certain kind of business displayed on the map by specifying different search criteria (name, category, area which is discussed above). The second function is that the customer can browse the map in a certain area to find a shop he is interested in. For example, it is useful if the user only wants to find a restaurant around his living place. This second feature will also help the customer to move or hang around the map and can see different businesses around the streets. The user can select interesting shops; can click on them to see their details or to go to the shop's link and browse the shop's webpage.

S2I Editor is also a main part of S2I. It is used by the business owner who wants to make or edit a web page on S2I. It provides an easy and user-friendly way to edit web pages on S2I. S2I Editor will provide some advanced functionalities. It can be used to edit a template, create a new template, or do graphical editing. The business owner doesn't need to write any code for the HTML webpage. If the business owner is advanced enough, he could also be able to write/edit some HTML/JavaScript code. The S2I Editor will also be provided with drag and drop functionality, which makes the edit quite simple. The S2I Editor will provide edit on spot, which enables a business owner to edit any text on its place (i.e. while viewing his web pages he will be able to edit any static text).

1.3. PURPOSE OF THESIS PROJECT

The goal of the S2I project is to discuss the technical possibilities of creating a centralized E-City Shopping Center system. The purposes of this thesis report are as follows:

- Analyze the new concept, and compare it with traditional shopping and E-Commerce shopping.
- Design and implement a prototype system.
- Consider interfaces to the other functions, such as the interface to logistics system and customer's forum.
- Evaluate tools and frameworks which are used for development.

2. OVERVIEW OF THE SYSTEM

2.1. MODULES AND STAKEHOLDERS

S2I, Shop to Internet, is a prototype implementation of the E-City Shopping Center concept. There are three stakeholders of the S2I System: business owner, user and administrator. The S2I System is divided into three modules, where each module is distinguished by its stakeholder.

Business Module is used by the business owner to set up and customize his own business on S2I. This module includes S2I Editor. A business could be a bar, a restaurant, or a shop etc. The business owner does not need to host its site anywhere else. All his pages will reside within the scope of this module and he will be able to create/update them with the help of S2I Editor.

User Module provides the user functions. The module includes Shop Center. The user will use Shop Center to search and browse different shops either by Shop Searching or Map Searching.

Administration Module is used by administrators of the system to manage S2I, as well as provide a way to make services easy for business owners and users on S2I.

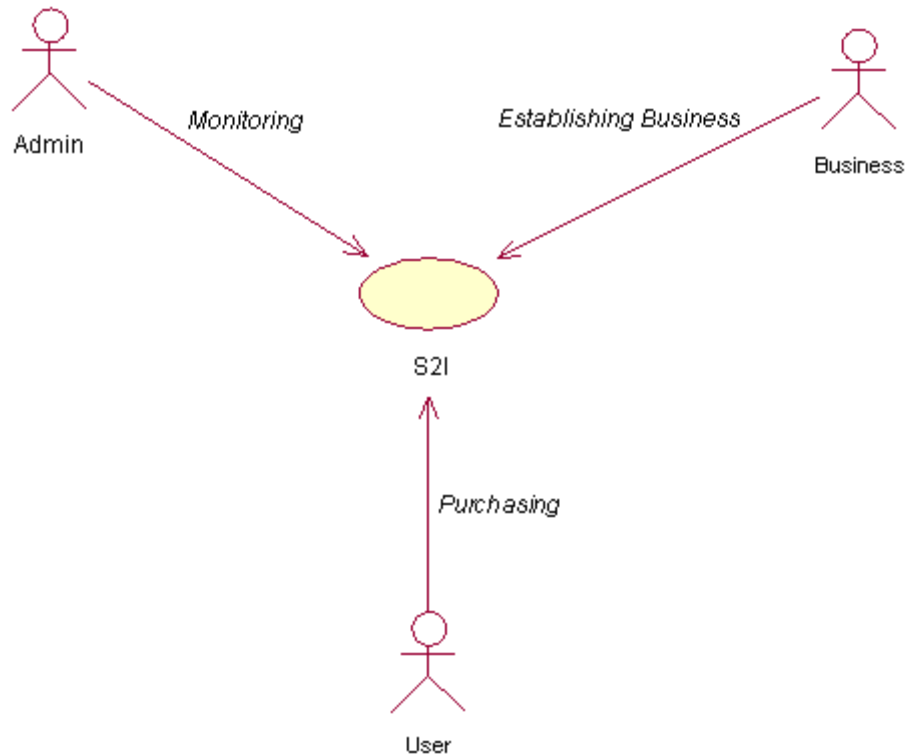


Figure – 1 Overview of system

2.2. DELIMITATION AND BOUNDARY CONDITIONS

- S2I forms an online business center for a certain city. To accomplish this, business owners need to host their pages on S2I and they would not have their unique web address like www.abcshop.com. It could be considered as an option for future extensions.
- S2I can be used as E-Market Center of E-Commerce mode B2C, Business to Customer. S2I will not be applied on C2C, Customer to Customer mode.
- S2I will not be used to open a separate E-Commerce web shop.
- The main functions for E-Commerce will be developed, such as functions to open an online shop on S2I, the functions to purchase and sell. Some functions, such as logistic and customer forum which are also significant, will not be considered at the moment, because of the time limitation. Interfaces to these functions will be defined in S2I so that it could be easily considered for possible future extensions.

3. OTHER WEB SOLUTIONS

When the idea of S2I was formed, we tried to find websites implementing the E-City Shopping Center idea in Sweden, Pakistan and China, but there is no such similar E-City E-Commerce solution at the moment. In this section, the other E-Commerce solutions, such as traditional B2C, C2C and also independent E-Commerce solutions are analyzed, the solutions which are not connected with E-Commerce but is a part of S2I concept (e.g. Google Maps), are also discussed. The aim is to implement their good features, to overcome the limitations and to use them in the proposed solution of S2I. The idea is to make our proposed solution a better choice which would fulfill the need of E-City Shopping Center idea. The analysis is mainly undertaken in Sweden.

3.1. OTHER E-COMMERCE SOLUTIONS

Even though E-City Shopping Center is different from traditional E-Commerce idea, it is still important to discover the main features of traditional E-Commerce solutions and to provide them as basic functions of S2I.

3.1.1. TRADITIONAL B2C E-COMMERCE SOLUTIONS

Amazon.com [25]

Description: Amazon is very popular E-Commerce website which works around the world, launched online in 1995.

Good Features: Very simple to use, a traditional online shop solution. One can find different kinds of products (books, electronics, cloths etc) on one site. One can also sell his products on Amazon by setting up an account.

Deficiencies: No HTML Editor is present for customization. It can not used as E-Market Center (e.g. no place for restaurants, pubs, bars). No map support (there is no physical store present).

3.1.2. B2C E-MARKET CENTER E-COMMERCE SOLUTIONS

Prisjakt.se [1]

The main page of the website:

A sample search result is shown:

Butik	Omdöme	Mervärde	Pris	Inkl frakt	Länkar
	★★★★★ (165 omdömen)	Ingen hämtavgift Inga kortavgifter Avbet. och faktura till privat	7 810:-		Till ClickOK
	★★★★★ (90 omdömen)	Märkesvaror inom data, tele, foto och HIFI till låga priser	7 912:-	8 031:-	Till Amentio
	★★★★★		7 912:-	8 037:-	
	★★★★★		7 995:-	8 114:-	
	★★★★★ (2 omdömen)	Ny Webshop, Stort Sortiment VISA, MC, Faktura, Avbet Snabba Leveranser	8 337:-	8 337:-	Till MP Butiken
	★★★★★ (56 omdömen)	Hämta fraktfritt i Örebro Kort, bank, faktura, avbetal. 8 års utmärkt Service, Support	8 343:-	8 438:-	Till Multitech Data
	★★★★★ (10 omdömen)	Kvalitet, Service & Support sedan 1985. Snabb leverans Stort sortiment	8 698:-	8 867:-	Till ECE Data
	★★★★★ (66 omdömen)	Faktura & avbetalning Hämta fraktfritt i Helsingborg Sverige, Danmark & Finland	8 716:-	8 771:-	Till Webbshoppnen

If the user clicks on one of the results, he will be connected to the specified shop:

Description: One of the most popular E-Commerce website in Sweden. The webpage is developed in PHP.

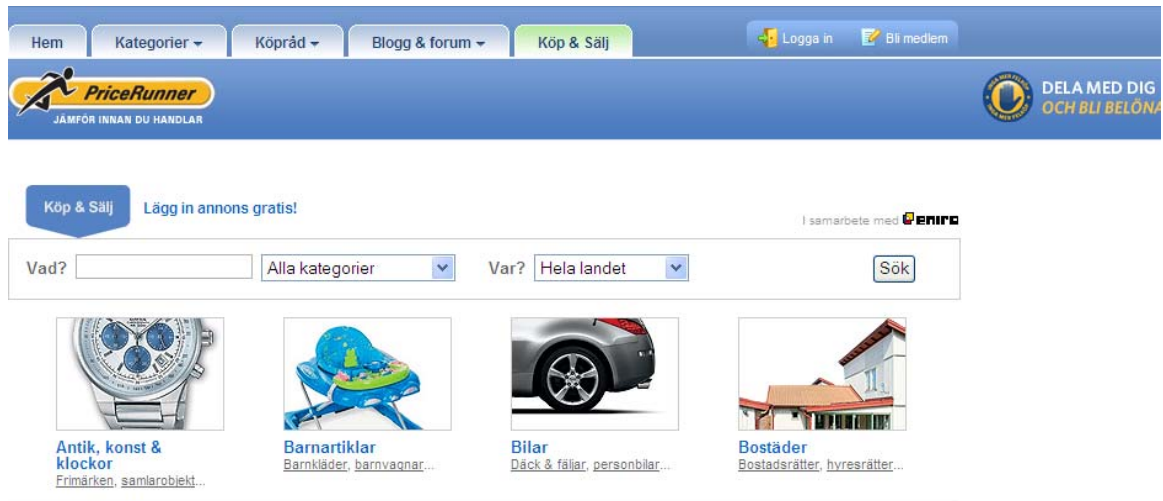
Good Features: Comprehensive market center for different kinds of products, such as clothes, electronic products, sports items and so on. The products are mainly searched by category. The customer can be connected to a specified shop by the link provided in the website. It increases business chance by providing an E-Market Center for all businesses on the website.

Deficiencies: No HTML Editor for business owners who want to open online shop by themselves. Customers can only search products by category. It doesn't support the concept of city. Separate hosting: if a user has his own website than he could be able to use their services.

Pricerunner.se [2]



The products can be searched by category as well as area. Areas are not defined with respect of a city; they are defined with respect of the country. Areas are defined by text, not by a map.



The customer will be connected to the shop's website, when a specified product is clicked.

Description: One of the most popular E-Commerce website in Sweden.

Good Features: Products can be searched by category and area easily; customers can be connected to a specified shop in which they are interested.

Deficiencies: There is no city concept; there is no HTML Editor for business owners who want to open online shop by themselves. There is no hosting of shops, business owners needs to have their own website linked to Pricerunner, or they can just provide the product's information. It doesn't provide the information for the other businesses such as restaurant, bars except commercial products.

3.1.3. TRADITIONAL C2C E-COMMERCE SOLUTIONS

Eniro.se [3]

The products can be searched by category and area:



<p>Antikt, konst & klockor Frimärken , Samlarobjekt ...</p> <p>Barnartiklar Barnkläder , Barnvagnar ...</p> <p>Bilar Däck & fälgar , Personbilar ...</p> <p>Bostäder Bostadsrätter , Hyresrätter ...</p> <p>Bygg- och inredning Byggmaterial , Trädgård ...</p> <p>Båtar Motorbåtar , Segelbåtar ...</p> <p>Datorer Bärbara , Lagring & minnen ...</p> <p>Digitalkameror & foto Kameror , Videokameror ...</p>	<p>Hemelektronik MP3 , Stereo, radio, HiFi ...</p> <p>Kläder & skönhet Accessoarer , Hälsa , Väskor ...</p> <p>Mobiler & telefoner Mobiltelefoner , Faxar ...</p> <p>Motor & övriga fordon Husvagnar , Motorcyklar ...</p> <p>Musik, film & spel TV-spel , PC-spel , Filmer ...</p> <p>Musikinstrument Gitarrer , Slaginstrument ...</p> <p>Möbler & inredning Badrum , Kök & matsalsmöbler ...</p> <p>Sport & friluftsliv Cyklar & tillbehör , Golf ...</p>	<p>Senast inlagda annonser</p> <table border="1"> <tr><td>15:56</td><td>Sittvagn/sulky ...</td><td>200:-</td></tr> <tr><td>15:55</td><td>TV-produktionsss...</td><td>0:-</td></tr> <tr><td>15:55</td><td> Antrasitgrå ply...</td><td>450:-</td></tr> <tr><td>15:50</td><td> Hej!! Säljer sn...</td><td>850:-</td></tr> <tr><td>15:45</td><td> rex trekking sp...</td><td>700:-</td></tr> <tr><td>15:44</td><td>Kursböcker i sp...</td><td>100:-</td></tr> <tr><td>15:42</td><td> Bokhylla@Gungst...</td><td>550:-</td></tr> <tr><td>15:40</td><td> Renrasig Maine ...</td><td>7000:-</td></tr> <tr><td>15:37</td><td> LV dog carrier</td><td>2800:-</td></tr> <tr><td>15:32</td><td>Fender Stratoca...</td><td>1:-</td></tr> <tr><td>15:26</td><td>Dam kläder alla...</td><td>50:-</td></tr> <tr><td>15:23</td><td> Mat, choklad oc...</td><td>20:-</td></tr> <tr><td>15:21</td><td>Säng ramar på s...</td><td>300:-</td></tr> </table>	15:56	Sittvagn/sulky ...	200:-	15:55	TV-produktionsss...	0:-	15:55	Antrasitgrå ply...	450:-	15:50	Hej!! Säljer sn...	850:-	15:45	rex trekking sp...	700:-	15:44	Kursböcker i sp...	100:-	15:42	Bokhylla@Gungst...	550:-	15:40	Renrasig Maine ...	7000:-	15:37	LV dog carrier	2800:-	15:32	Fender Stratoca...	1:-	15:26	Dam kläder alla...	50:-	15:23	Mat, choklad oc...	20:-	15:21	Säng ramar på s...	300:-
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15:26	Dam kläder alla...	50:-																																							
15:23	Mat, choklad oc...	20:-																																							
15:21	Säng ramar på s...	300:-																																							

For every specified product the related location in the country is given through map:

Köpes: > [Barnvagnar](#) Ta bort annons Ändra annons

Sittvagn/sulky gärna med suflett Skåne 5 sep 15:56

Visa på karta

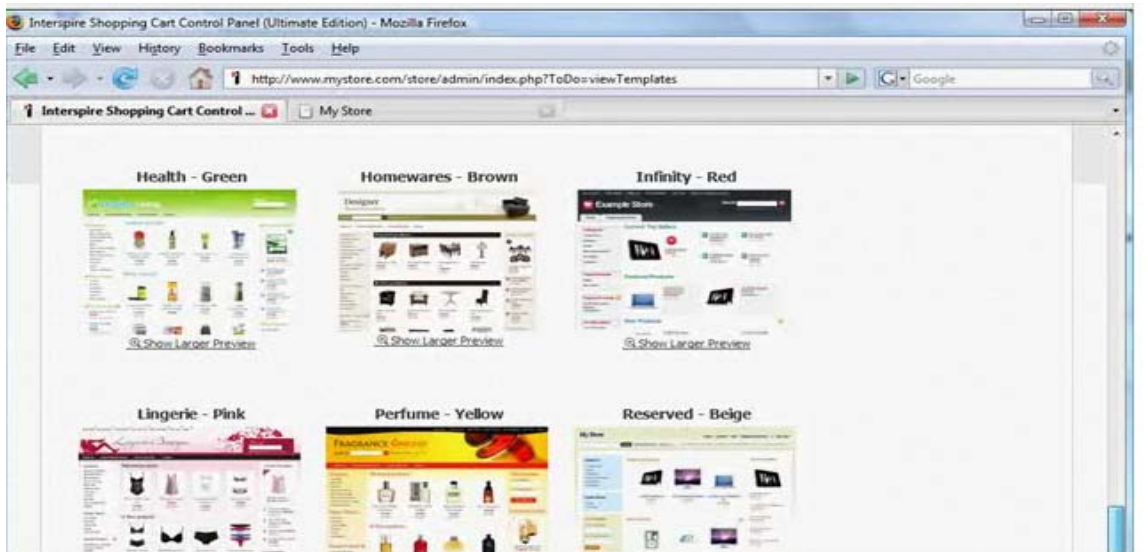
Description: Very popular Swedish E-Commerce website. The supplier in Eniro is individual.

Good Features: Products can be searched by category and area easily. The location of the supplier is provided through map.

Deficiencies: No HTML Editor for business owners who want to open online shop by themselves. No website link through the map.

3.1.4. CUSTOMIZABLE E-COMMERCE SOLUTIONS

Shopping Cart [4]



Description: Shopping Cart is used to open online store with full functionalities. It provides HTML template, which can be used directly to set up an online shop or can be customized easily.

Good Features: It is easy and convenient to use HTML template and editor for specified website development. Drag and drop function of HTML Editor is user friendly. It supports full functions for a web shop solution.

Deficiencies: It is too complicated and expensive for small and medium businesses. It is the solution for a specified business, if a business owner wants to open an online shop then he can use Shopping Cart. There is no map and centralization of the businesses (every business has its own separate online shop); therefore it does not provide support for E-Market Center.

Dotnetnuke.com [5]

Description: Dotnetnuke is an open source web application framework ideal for creating, deploying and managing interactive web, intranet and extranet sites.

Good Features: It is developed by ASP.net and is open source. It contains an enterprise portal, built-in content management system, elegant skinning engine, and the ability to display static and dynamic content.

Deficiencies: It can not be used as E-Market Center and no HTML Editor for business owners, who want to open online shop by themselves.

Oscommerce.com [6]

Description: Oscommerce Online Merchant is a very popular open source E-Commerce solution. It is developed in PHP.

Good features: It is open source and developed in PHP and MySQL.

Deficiencies: It doesn't support E-Market Center and no HTML Editor for business owners, who want to open online shop by themselves.

Dashcommerce.com and Dotshoppingcart.com [7]

Description: Dashcommerce and Dotshoppingcart are ASP.net open source E-Commerce application.

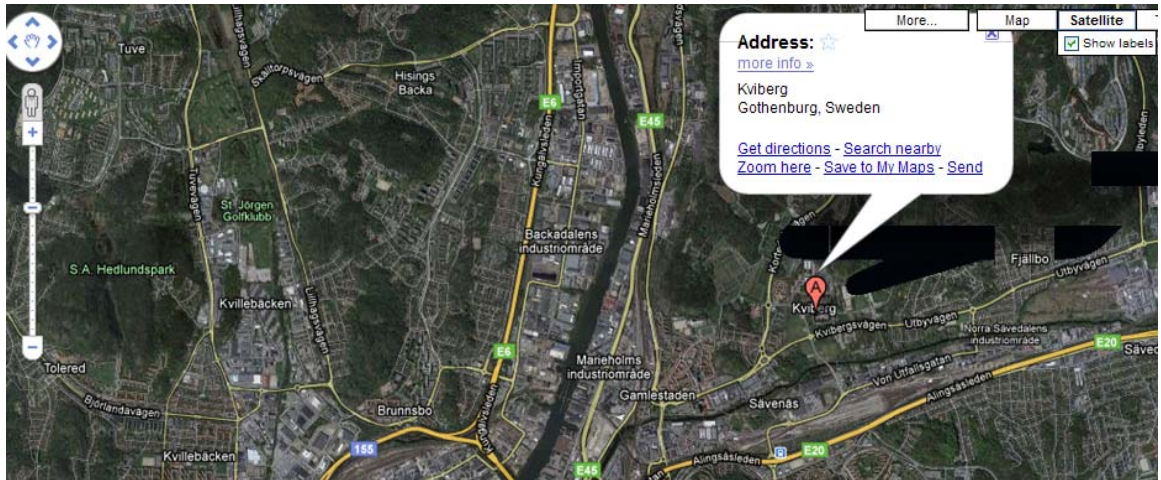
Good features: It is open source and developed in ASP.net.

Deficiencies: It doesn't support E-Market Center and no HTML Editor for business owners, who want to open online shop by themselves.

3.2. MAP RELATED SOLUTIONS

Map Searching of S2I is considered as the main function to support E-City Shopping Center idea. Some map related general solutions (not E-Commerce) are discussed below.

Google Maps [8]



Description: Google Maps is a map of the world which could be integrated with other software solutions. Google provides this service for free.

Good features: Users can search any real address in Google Maps and the result will be shown in the map. Interfaces are provided by Google to provide Map Searching functions.

Deficiencies: Customization is needed for integration with S2I, for example, the location in the map will be shown not only when it is searched by address, but also by shop name.

Västtrafik Solution[9]

Sitemap | Search

västtrafik Startpage [Travelling](#) [About Västtrafik](#)

Travelling / Travel planner

Travelling

Conditions for travel with Västtrafik

Route network & stop maps

Time tables

+ Travel guarantee

- Travel planner

Departure from stop

Changes to services

Travel planner

Searched trip: Nordstan, GÖTEBORG (Hållplats) - Centralstationen, GÖTEBORG (Hållplats) (Friday 2 October 2009)

[New search](#) | [Change search](#)

Show the price for:

	Departure	Arrival	Time	Changes	Vehicle type	Price
<input type="checkbox"/>	18:46	18:48	00:02	0	Bus 25	16.50 SEK
<input checked="" type="checkbox"/>	18:49	18:50	00:01	0	Bus 17	16.50 SEK
<input type="checkbox"/>	18:59	19:00	00:01	0	Bus 17	16.50 SEK
<input type="checkbox"/>	19:00	19:02	00:02	0	Bus 21	16.50 SEK
<input type="checkbox"/>	19:01	19:03	00:02	0	Bus 25	16.50 SEK
<input type="checkbox"/>	19:09	19:10	00:01	0	Bus 17	16.50 SEK

Description: Västtrafik is a public transport website which provides the transport information of buses, trams, ferries and trains in Västra Götaland, Sweden.

Good features: Detailed timetable is returned when a user search for transport information. It can be used as a possible extension of the S2I if the administrator of the S2I wants to supply this service to users. It can also show the connection of two addresses on the map.

Deficiencies: It is just for the support of a single traffic service in the city.

3.3. S2I SOLUTION - COMPARISON

After analysis, the difference between S2I and the compared solutions can be studied as a business mode comparison. The idea of S2I is different from the traditional E-Commerce modes, such as B2C, C2C, and customizable E-Commerce solutions.

3.3.1. BUSINESS MODE COMPARISON

Traditional and E-Market Center B2C to S2I: In a traditional and E-Market Center B2C solution, there is no E-City concept, while Map Searching of S2I supports the E-City concept. Purchasing and selling are the main features of traditional and E-Market Center B2C solution, but in addition to these basic functions, it can also be used as advertising function and provide the business information for the user. No other businesses like restaurants, pubs are available in traditional and E-Market Center B2C solution, while S2I provides a way for these businesses to be present onwards and contribute to the complete concept of “City”. Prisjakt and Pricerunner also play the role as E-Market Center to businesses, both contain different product’s information and then this product’s information is linked with the website of the shop. It is product-driven approach. The S2I will have a business-driven approach, in which each shop will be connected with its products. The user will search for a respective shop and then he can purchase something from it.

Traditional C2C to S2I: In a traditional C2C solution, the individual customer can put their product’s information in the website just by using a single link

webpage. No complete solution of the website is needed. This function is not available in S2I, because S2I only acts as platform for businesses, not for individuals. S2I is better organized and systemic. The map function is available in some of C2C websites, such as Eniro.se (Section 3.1.2). Eniro.se supports map but in a limited way. The user can just see the location of a product owner (where he can get that product from the owner). In S2I, the user can browse the map and also search a business in a certain location or area.

Customizable E-Commerce solutions to S2I: The customizable E-Commerce solutions are solutions for individual shop owners who want to have an online shop. The solutions which we have analyzed are mainly focused on web-edit, which is how to open an online shop for a single business. Dotnetnuke, Dashcommerce and Dotshoppingcart are developed using ASP.net, and are open source, which means that the database and architecture are available for further analysis. The Shopping Cart also gives the basic idea of an HTML Editor and drag/drop function. It is significant to analyze these solutions in order to know how to develop a better HTML Editor for S2I. These individual E-Commerce solutions can not provide hosting and business owners need to host their websites somewhere while in S2I this will be automatic.

Map Related Solutions to S2I: Google Maps are also able to display different businesses in an area on a map, but they are not restricted with a city and the user can not see detailed information or make a purchase. In S2I map support will be enhanced and will contain all needed information (provided by business owner), connected with the web pages of the business.

4. ANALYSIS AND CHOICES MADE

4.1. REQUIREMENTS

Informal requirements from introduction has been analyzed and a feature list is constructed which is attached in Appendix-A.

4.2. S2I ARCHITECTURE

S2I adopts a commonly used three layered architecture. The layered approach helps in dividing tasks if more than one people are working on a project. It is also helpful in bug fixing where you just need to focus on a respective layer. It supports modular approach. As shown in figure 2, S2I is divided into PL (Presentation Layer), BLL (Business Logic Layer), and DAL (Data Access Layer).

Presentation Layer (PL): In this layer the user will interact with the system. It will contain all the web forms and graphical images required for the designing of S2I. In S2I, PL is divided among Shop Center and S2I Editor. Shop Center will contain graphical interface related to Map Searching, Shop Searching, registration of the user, and registration of the business. PL of S2I Editor is important because it should be user friendly so that the business owner can use it easily.

Business Logic Layer (BLL): In this layer the actual code will be written, therefore this layer is the most important layer. It will contain the functional algorithms which will enable communication between PL and DAL. In S2I, BLL is further divided into two sub modules, BLL for Shop Center, and BLL for S2I Editor. Shop Center will contain functions for searching, browsing, displaying shops on the map, and registration for both the user and the business. S2I Editor will contain functions for drag and drop, editing web pages, and edit on spot.

Data Access Layer (DAL): DAL will provide the access to database. The functions related to data reading, writing, and updating will be the part of this layer. One possible option is the LINQ which could be used as DAL. DAL could be the same for both Shop Center and S2I Editor. S2I Editor needs access to DAL for managing the HTML contents of web pages edited in it.

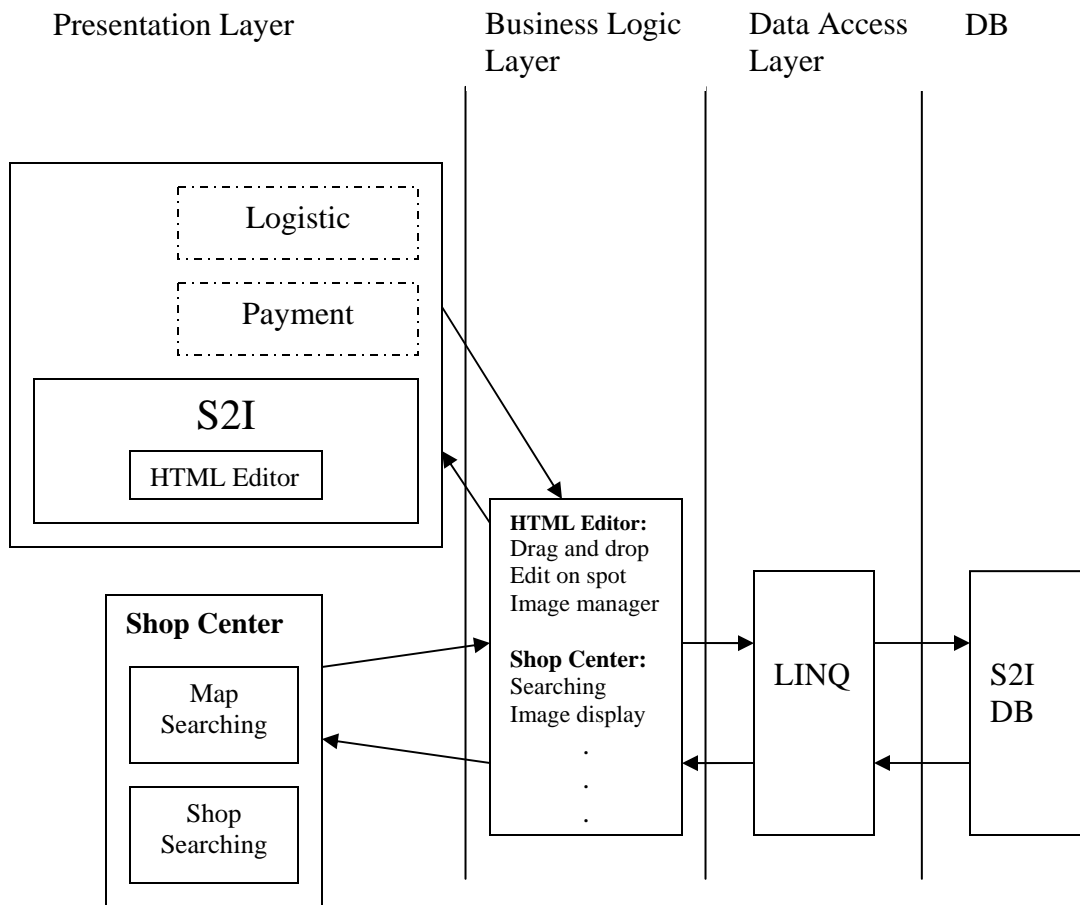


Figure –2 Architecture of S2I

4.3. S2I REALIZATION

The description and possible development ways of S2I components are given below.

4.3.1. SHOP CENTER

Shop Center of S2I mainly consists of user interface components.

4.3.1.1. Map Searching

In Map Searching, shops will be displayed on a map of a particular city. The user can browse shops around the streets. The user can also customize his searching by giving different searching conditions, such as selecting a particular area in a city or searching

directly with shop name or address. The shop is displayed on the map as an icon and the user is able to see the shop information on an info window by clicking on that icon. The user can also open the website with the help of a link provided on the info window.

Nowadays there are several map solutions which are offering free services. These solutions are analyzed to see which solution provides best services and easies integrate into the S2I solution.

Two quick options are:

Bing Maps: It is Microsoft solution for the map [16]. Microsoft provides an AJAX based API [18] for the use of its map into any project. API is well documented. Sample code for Bing Maps integration is also available.

Google Maps: Google offers free maps with a lot of features. Map can be customized into Road, Terrain and Satellite styles. Google offers two versions of the API [17] for its map. One is Static Map API which is actually version 2.0 and the other one is version 3.0. As the name suggests, version 3.0 is the latest one, but the Google is updating them continuously. In v3.0, Google has changed a lot of functions. It is possible that the Google is still providing v2.0 to remain compatible with the people who are still using it. The Google API also provides a way to add markers on the map, to add info windows to the marker and to change marker image.

Bing and Google Maps are quite interesting to use and have good features. The API for both is very well documented. We have studied a good article comparing the two [25]. We decided to use Google Maps instead of Bing Maps. Both are almost similar in major functionalities, but we do have some experience before with the Google Maps. Google Maps are quite easy and fun to integrate into web pages. One also has more freedom and control over the map with the help of the API. Google Maps are also older than the Bing Maps so we think Google Maps would be more mature than Bing Maps.

From the two versions of the Google Maps API, the v3.0 will be used, which is the latest one. We are not sure if there any other difference because the later version 2.0

is mentioned as “Static Map API”. We need to sign up for a key for v2.0 and that key then should be used to access Google Maps, but for the v3.0 we don’t require any key.

4.3.1.2. Shop Searching

Here a user can see shop’s information in a tabular form. The user can search shops with the same parameters as he can in Map Searching, like name, area and address. The user can also customize Shop Searching with the help of shop or item categories.

Shop Searching is very common type of searching. It will be developed from scratch.

4.3.2. S2I EDITOR

S2I Editor will be used to develop online web pages. It will provide a business owner great flexibility in designing of his personal pages and also a way to introduce cheap hosting because a business owner will create and use web pages within the scope of the S2I and will not need any external tool or 3rd party solution for it. It will also help in minimizing maintenance cost, because business owners are able to maintain web pages by themselves. Therefore S2I Editor is a strong part of the idea if we need to focus on small and medium businesses.

S2I Editor could be used for following tasks:

- Create new web pages
- Edit already created web pages
- Create templates which could be used again
- Use templates provided by the S2I admin
- Connect web pages with the database

With all the above functionality, the challenge is to create a better and more advanced editor in which business don’t need to write single line of code, because it is very likely that the business owner is not familiar with programming. Therefore, it is easy to handle a design tool rather than a development tool.

There are several options to choose from as a starting point for S2I Editor. A first thought could be to download some already developed basic HTML Editor and try to change it to fulfill S2I's needs. The biggest challenge in this approach is that it is time consuming in understanding already developed editor and to modify it according to S2I's needs. Different possible free and open source HTML Editors are searched and analyzed.

Some basic HTML Editors found on the net are the following.

- **Microsoft AJAX HTML Editor in AJAX Control Toolkit**

Microsoft has developed AJAX as ATLAS. Microsoft Visual Studio.net has great support for AJAX. In Visual Studio.net 2005, AJAX is not provided by default, so you need to download it from [11] and install it. Visual Studio.net 2008 has built-in support for AJAX and no extra component is required.

Microsoft also released a library of AJAX enabled controls known as AJAX Control Toolkit. This toolkit has a lot of advanced controls and its latest edition which is based on .net framework 3.5 contains an AJAX enabled HTML Editor as a control. It can be used just by dragging and dropping controls into the project. It is easy and convenient to use.

- **Winthusiasm HtmlEditor**

It is a very attractive HTML Editor. It can be downloaded from [12]. It is open source and is available for both Visual Studio.net 2005 and 2008. It could be included into Visual Studio.net solution and then be dragged from "user controls" into the required web pages. The source code is neat and managed.

- **HTML Area**

Another basic HTML Editor, can be found from [13]. It is also open source. It is not in the form of a separate project. The source code files can be included into the required project directly.

Another way would be to develop an HTML Editor is from scratch to get complete control over the process. Some useful information can be found here [14] which could be helpful if one try to implement HTML Editor. It would be much easier to add more needed functionality, because in that case it is not required to understand code.

There are some other features which are also needed to develop with basic HTML Editor according to requirements of the S2I.

1. Template Handling

Template could be saved in the form of separate files or directly in the database. The HTML Editor could display these templates in a dropdown list so that the business owner could use them in his web pages very easily.

2. Display Item Categories

This feature is needed if a business owner wants to show item categories on his web page. These would be specialized controls and could be made available in a drop down list. These controls would load data from the database. They will enhance the S2I Editor and will make it purposeful; otherwise only having a basic HTML Editor is useless for the scope of this project.

3. Add Items in web page

Like item categories, items are also needed to be displayed on the requirement of business owner on his web pages. Items could be displayed in different styles. The styles could be provided in a drop down list. Items could be handled in the same way as categories.

4. Drag and Drop feature

Drag and drop feature could made S2I Editor more robust and easy to use. Items can be dragged and dropped from one place to another. One way to

accomplish this is to write some JavaScript code for drag and drop. Another more interactive way is like iGoogle, which can be found here [15].

5. Display Images

Displaying images is very common on web pages. Therefore S2I Editor should also support this feature interactively. The challenge here is how to store those images. One way is to use the typical file system and use images on the disk in specific business directory. Other way is to store them in the database. For this purpose, Image Manager is developed, which could allow user to save images into database and can show old saved images, so that business owner could easily add them into the web page.

6. Edit on spot

Another very interactive feature is to provide edit on spot. In view mode, if business wants to edit some static text on the page, he is able to do that right on the spot. For accomplishing this some code in JavaScript would be needed, so that it can make the desired text editable on the client.

We will develop S2I Editor from scratch. At first it seemed not to be a good idea to build a basic HTML Editor and then to extend it, but we think it is. The functionality which we need later is quite extensive. The features (e.g. template handling, drag and drop etc); which we require for S2I forces us to have full understanding of the code written for the development of the editor, which could be difficult if we download an open source one.

For image handling in S2I Editor, we thought to store images into the database instead of in separate files in business directory. In the database it would be easier to move or manage them. It would also be more secure that all of our resources are present at one place (i.e. in database) and we just need to make it well protected.

4.3.3. DEVELOPMENT TOOLS AND LANGUAGES

In order to develop S2I we thought about several tools and languages.

1. Java

Eclipse could be used as an IDE for developing application in java. We have worked in Eclipse before but we did not develop any web application.

2. ASP.net

We have worked a lot in ASP.net (C#.net as server language). Visual Studio.net is the natural IDE for it. The .net framework is quite extensive framework for developing any kind of application. There are a lot of reusable components built in ASP.net. We also found some open source E-Commerce solutions in ASP.net which could provide a base for the S2I.

3. PHP

We also found some open source solutions in PHP (e.g. Oscommerce [6] is very reliable and rich featured open source E-Commerce product). There are some places where web hosting for PHP is almost free.

We have chosen ASP.net (C#.net as server language) as a language and Visual Studio.net 2008 for IDE which comes with .net framework 3.5. The main reason for this choice is our experience. We worked more in ASP.net than other languages. Another prominent reason was that we also found enough reusable components and help with ASP.net which was sufficient for the realization of this thesis. Visual Studio.net 2008 is a perfect IDE with built-in support for LINQ and AJAX.

4.3.4. S2I MANAGEMENT

Management is an important part of any application. S2I Management is divided into two stakeholders Administrator and Business Owner, therefore in S2I there are two kinds of management:

- **Admin Management**

Administrator of the site is able to manage all businesses registered in a S2I installation. He will take care of templates creation for the S2I Editor and he

will also provide his services to the business owner if they are unable to create web pages for them. He will also manage customer registration.

- **Business Owner Management**

The business owner would also need to manage his business. The business owner could manage web pages through S2I Editor, can manage items, items categories.

This functionality could be created by adding few management level web forms in S2I and giving them needed access over the database tables. For example, the business owner should be able to add, update, delete over items table in the database. We can find some management modules for the business owner on the internet because it is very common part of E-Commerce solutions (except S2I Editor) and we can also make it from scratch.

We will develop management modules from scratch because we need full customization of the management modules according to the requirements of S2I, which is difficult, if we will download some already developed solution.

4.3.5. LANGUAGE TRANSLATION

This is an important feature. It will help S2I to be acceptable globally. S2I could be made Multi-Language in different ways.

- 1. Different Resources**

Normally we could have two kinds of resources to translate; image resources and text resources. For image resources we need different images for every language and for text resources we could have different texts either in the database or in the separate language files.

- 2. Google Translator**

Google Translator can be found here [19]. It is a simple JavaScript code which we need to add in our web pages and then the Google Translator would translate those pages for us. This feature is very good in a sense that we don't need to do anything, a very quick and reliable way. We can't translate images with this way. The Google is continuously improving its translation quality.

3. Translator Class

Another way is to develop a translator class which could have functions to translate from one language to another. The main challenge here is to write the language translation code, but for this we can call Google Translator [20]. In this way the translation will remain the same as in the method 2, but here we would have more control over the process.

4. Microsoft Translator

Microsoft also supports web pages translation [21]. For this Microsoft provides two ways, Widget and Ajax API. In Widget we need to add a widget into our website. It is a premade language choice drop down Widget. The user will just select a language and the required web pages will be translated. In the Ajax API we could have more control and we can write some JavaScript code for translation by calling functions from Microsoft Translator Ajax API.

For the Language Translation we thought about the third solution which is Translator Class. As the Translator Class will be server based (not JavaScript) we would have more freedom in development. It is also not limited to one translation provider (e.g. currently we will use Google Translator in the class, but we can replace it any time if we found something better than that).

4.3.6. DATABASE

For the choice of DBMS (Database Management System), possible options could be SQL Server, My SQL, Access and Oracle. The choice of DBMS is greatly affected by

the development tools. For example: if we will choose Visual Studio.net then SQL Server and Access would be the right options.

For the database model, we can get help from some open source E-Commerce solutions to see their model (e.g. Oscommerce). Obviously the database model which would we get from these sites would not 100% fit into the S2I but we can change it to our needs. It will also make this process quick and we can get a reliable database in a very short period of time.

Programming of DAL (Data Access Layer) could also be done by using some pre-made solutions. Currently we could have two options here:

1. LINQ (Language Integrated Query)

LINQ is an extension to Microsoft .net framework. Microsoft provides LINQ as a new way to access database very easily and effectively. In LINQ every table is represented as a class. One single row/tuple of data will be represented as a single instance of the corresponding class (e.g. a User Table will have a User Class and a Users Collection: Both User Class and Users Collection will be auto generated by LINQ). We can also query the data in LINQ with the help Language Integrated Query system (in which we can write queries within the language with the help of commands/reserve words) which is similar to normal queries. If we want to use LINQ we just need to focus on Visual Studio.net.

2. Trivial Query-Result Model

The normal database access mechanism is to access database via query or stored procedure. Almost all development languages provide some ways and means to communicate with the database. So this method is most generally accepted.

SQL Server 2005 is our choice for the DBMS. Our choice for the development tool (i.e. Visual Studio.net) also affected this decision. Visual Studio.net has built-in

support for SQL Server 2005 express edition. We don't need to install a separate database system. We will use LINQ for the Data Access Layer. It is also built-in with the Visual Studio.net 2008 and it will help us a lot while dealing with the database. Dealing with Classes than the Tables is rather simple in programming.

4.3.7. SMS AND NEWSLETTERS

SMS and Newsletters are very useful ways for E-Marketing. We can send any kind of information as a SMS or in Newsletters (e.g. some advertisement, announcement, offers etc).

1. Newsletters

Newsletters are being sent in the form of email. For sending an email we require an email gateway which is very common and is normally bundled with the package when we purchase an online domain.

The other thing which we could require is the Newsletters. The Newsletter will be sent by the business owner to the user. One option is, to let business owner create Newsletters for himself with the help of S2I Editor. The business owner can also be provided with a set of pre-defined Newsletters and he can choose which to send.

2. SMS

A S2I business owner can send SMS just like Newsletter to subscribed users. Here business owner would be able to select from some template SMS or he would be able to create a new SMS. For sending a SMS we need to have some SMS gateway.

We can purchase a SMS gateway from internet. There are a lot of SMS gateways available. Some are global, to the whole world and some are more useful in a specific area.

We can also make a SMS gateway for ourselves. For creating a SMS gateway we will need a small mobile phone API and a mobile phone attached to our server. We can also create an API with the help of AT Commands which are widely supported by the mobile phones [22]. This API will be served as an interface between our S2I application and the mobile. There is also a SMS Sender application provided by Microsoft which could be found here [23].

We did not decide anything for SMS and Newsletters because currently they are not part of S2I System.

5. RESULTS AND CONCLUSION

S2I prototype is implemented. A proof of concept system for Shop Center and S2I Editor is developed. The prototype is implemented in such a way, so that it could be extended in future.

The implementation is divided into two parts, S2I Editor and Shop Center. In S2I Editor only basic features of a typical HTML Editor are implemented, like bold, change font etc. Three modes are developed for S2I Editor, Design mode, HTML mode and Preview mode. An Image Manager is also developed for S2I Editor which helped the business owner to upload and manage images easily.

In Shop Center the user and the business registration modules are developed. Map Searching and Shop Searching both are developed. Currently shops are displayed on the map with required information, but they are not connected with their respective web pages (which could be developed using S2I Editor). Searching features (e.g. search by area, address, name etc) are fully developed and are working. We can say that Shop Center is almost complete.

Complete database model is designed and realized in SQL Server 2005. Complete Data Access Layer is generated with the help of LINQ. We have also developed a class for translating language but we did not integrate it into our code.

For the complete realization of S2I, we need to focus on S2I Editor, Administration, and Sale and Purchase modules.

5.1. DIFFICULTIES

There were some limitations of the S2I project. Time limitation, was one of the reasons why only the core part of S2I project was developed. Only the interfaces to some of the other parts were defined, such as, logistics, payment system, and forum. All these parts can be treated as a separated development project, which can be integrated into S2I later.

We had some difficulties during the development. The concept of S2I and development technology was new to us and important to the success of the development. Some of the technologies and components were never used before. Time and energy had required to study before development. The main technology used in S2I project was the

Google Maps, the Google Translator and the LINQ. For Google Maps, APIs were important to study. How to connect the Google Maps into the S2I and how to customize map according to the requirement of the S2I were studied (e.g. customization of information windows and map icons of the Google Maps for S2I). For database, the S2I was using LINQ as the Data Access Layer. We never used it before. Therefore a lot of search is needed, which was also quite difficult in such a short time.

5.2. POSSIBLE FURTHER EXTENSIONS

There are interfaces defined for further extensions. They are interfaces connected to logistics component, payment component, forums, and hardware interaction. The further extensions will be needed to support whole concept of the S2I. These components would be developed separately and then would be integrated into the S2I.

The S2I is only provided with a 2D map (but as Google and other rivals are trying to develop a 3D map of the world), we can change it later to 3D map, and then it would support a complete virtualization of a city on the web.

5.3. CONCLUSION

The concept of “E-City Shopping Center” is new and interesting. It could also be a possible future business plan and a new way to attract more users to E-Market. There are two main stakeholders of E-Commerce, the user and the business owner. For the user, the main ease which they would have would be the concept of centralization of businesses in a specific city; and for the business owner, S2I will be a cheap but effective way to introduce their business and products to users.

When we started this concept as our thesis, it was not a mature concept. We were also not sure about a lot of things but when we started working, the concept become more mature and now we have more knowledge and understanding of it (e.g. the term “E-City Shopping Center” also evolved during the thesis, at first we thought it as “Shop to Internet” or “Virtual City”).

We think that the idea “E-City Shopping Center” and its realization “S2I” is a good idea, the market centralization and the focus on small shops could prove the core

points of this idea. We are hopeful to continue working on it after the completion of this thesis.

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7. GLOSSARY

S2I	Shop to Internet, it is a web application solution.
E-City Shopping	E-City Shopping, a new shopping way combines the Traditional Shopping and E-Commerce Shopping.
Framework	The skeleton of a system which can be customized to develop other similar systems with little effort (it is not necessary that system could only contain reusable classes, it could have graphical interface for customization)
E-Commerce	Buying and selling of goods or services over the internet.
S2I Editor	HTML Editor, which is used by the business to create and manage the online shop on S2I
ATLAS	Microsoft solution for AJAX
DBMS	Database Management System
Web Hosting	Web space/domain for hosting websites

APPENDIX- A – PROPOSED FEATURES LIST

No.	Module	Description	Notes
1	User Module		
1.1	Open an account		
1.2	Searching		Search interested product by different ways. Search could be complex and simple
		Search by area	
		Search by shop name	
		Search by product category	
		Search by price	
1.3	Ordering		Order the interested products
		Make an order	Can be deleted automatically if not accepted in 3 days
		Order status	Check if the order is accepted

1.4	Payment		Provide different ways of payment
1.5	Your page		
		Personal information	Provide personal information
		Prefer shops	Save prefer shops
		Prefer products	Save prefer products
2.	Business module		
2.1	Register for an account		Register as a member of S2I framework, account ID is required to be shop registration name
		Free account	Free for first 3 months use, and max deal is 20,000Kr
		Payment account	Use after 3 months
2.2	Open a shop		Have a shop link in S2I framework
		Choose a template	Free template is provided
		Buy advanced template	

		Use an exist template	Import an exist template
		Edit the template	
2.3	Improve the sorting result of specified shop		
		Buy a sorting seat	Buy a sorting seat from administrator: Sorting is basically a way or rating which will be count during searching. When customer will search which shop should be displayed on top, this would be handled by a sorting rating, which could be purchased.
		Publish advertisement	5 advertisement for free user, and the more advertisements, the higher of the seat
2.4	Manage own shop		
		Upload products	
		Delete products	
		Update products	
		Order management	Manage the order from the customer as well as statistics
2.5	Customer management		Communicate with customer by different way
		Add new customer	

		Newsletters management	
		SMS management	
3.	Administrator module		
3.1	Shop		Open shop for S2I user
		Create/Update Templates	Create Templates
		Manage Templates	Manage Templates
		Open Shop	Help Customer opening a shop
		Add/Update Items, Stocks and Payment Ways etc	User or Admin will perform these tasks
3.2	User Registration Management		Activate user account after its registered
		Activate user account	
3.3	Manage sorting sequence		Give specified sorting seat to the shop who purchase it
3.4	User management		Send latest

			information for users
		User category <ul style="list-style-type: none"> • Advanced • normal 	Provide different service for different user
		User contact way <ul style="list-style-type: none"> • Web account • Email • Phone Number 	Manage user account
		Newsletters management	
		SMS management	
3.5	Customer account management		
		Account security	
		Business statistics	Get the statistics of the deal activity
4	General Functionality		
		Multi-lingual support <ul style="list-style-type: none"> • English • Swedish 	

		HTML Editor	HTML editor can let customers to create templates for them easily without writing a single line of code. We can search for already available HTML Editors and can improve them for our usage. The template created by editor should be compatible with the site.
		Edit On Spot	User should have ability to edit its templates or web pages on spot.
		Drag and Drop Menus	User can drag and drop menus and can change the layout of its webpage.
		MAP	Site will be integrated with Google maps for providing a better way for searching and finding an exact location for a shop.
5	Optional Features		
		Newsletters	Users could be able to send newsletters to their customers
		SMS	User could be able to send SMS advertisements to their special customers