WITHIGO:[1] A LOCATION BASED SERVICE -
GIS INTERNET APPLICATION

By David Dubauskas
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Introduction

The WITHIGO application is a Geographic Information Systems (GIS) application, served over the Internet. The proposed application combines two rapidly emerging technology trends; Internet Push Technology or Publishing (PT) and Location Based Services (LBS). The combination of these technologies provides for a powerful and precise communication tool for local governments, business, advertisers, etc, who wish to communicate geographically relevant information to persons utilising a Web Browser.

Typically web site providers offer standard content to all consumers, who view pre-defined web pages through standardised navigation. With "Pull Publishing" information is published on Web Sites or pages and the consumer must search, locate, and "pull" the information they want to their computer. The user must decide when and what to consume. Newspapers, books, and magazines are examples culled from outside the Internet domain (Kyrnin).

A newer trend in web sites offerings is to offer personalized content. In a personalized web site consumers can pre-determine what content they would like to see. Push technology or "Push Publishing", as Kyrnin refers to it, selectively provides information to the consumer. Kyrnin a web developer, sites TV and radio stations as example of "push" publishing. She states, "The TV and radio stations are continuously broadcasting the latest information. All the consumer need do is flip a switch and the information is there." Examples of this can be readily seen in search engines like *My Yahoo* (Yahoo) where a user selects channels or content they wish to receive. Content often available is weather, sports, business, and local news.

As mentioned, LBS is a new and rapidly expanding market. This technology utilises the Internet, hand held communication devices (PDAs), and Global Positioning System (GPS). The Wireless Development Network (Hayes) states that "subscribers…will soon be able to use GPS-enabled mobile phones, PDAs and other wireless devices to locate themselves and tap into new applications like mobile yellow pages, enhanced safety calling and roadside assistance, location sensitive billing, personal navigation and tracking services".

Euro Beinat (Beinat 30) provides a respectable overview of LBS technology and its market potential in a magazine article entitled *Location-Based Services: Market and Business Drivers.* Beinat suggests "LBS will become a larger market than traditional GIS in the medium term". The already large market growth in Europe and Japan, suggests that this technology is gaining public acceptance and is a relevant avenue for business and governments to pursue.

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[1] WITHIGO – What In The Heck Is Going On? An alternate name is "My Neighbourhood".

In relation to the Internet, Beinat positions LBS as an "extensibility service" (such as email access from a [handheld]). However LBS's is distinct from e-mail or other similar extensibility services because it has a critical location or geographic component.

LBS technology is versatile in that it can be used for almost any application that utilises location-based information. Because the WITHIGO concept cannot be applied to every LBS application it becomes useful to identify what functions WITHIGO addresses within the LBS framework.

Table SEQ Table * ARABIC 1– LBS applications and dependence to location accuracy and relevance to WITHIGO (Adapted from Location Based Services Requirements Documents, Randolph Wohler – Editor – GSM north America, 2000)

Again, Beinat provides a useful framework that can be used to define what aspects of LBS WITHIGO addresses and is presented as follows:

- **Information Services** provide information about objects close to the user (in terms of distance, travel time or other). Examples are: locate my position, locate an address, locate an ATM, check traffic conditions on the highway on my route, find a parking lot nearby, take me to the theatre, find the cables and maintenance schedule for this section of the network, make a reservation at a nearby restaurant, etc.

- **Interaction Services** are based on the interaction between mobile users/objects and do not require a "mobile Internet' component or content sources. Examples are: Where is my nearest colleague? Where area my children? Where is the shipment now? Where is my car?

- **Mobility Services** support smart mobility and revolve around navigation capabilities. Examples are: How do I get from A to B? What is the quickest re-route to avoid this traffic jam? When to leave to catch then next train/bus?

WITHIGO can be positioned in the above framework under the category of **Information Services**, with some functionality falling into **Mobility Services**.

WITHIGO Concept

The intent of WITHIGO is to utilise a spatial database for the purpose of pushing geographically relevant information to a consumer. In the context of a municipal government there are many geographic **Events** that can affect a resident. Such examples are:

> "What development permits are occurring in my neighbourhood?"
> "Where is the closest bus stop and when is the next bus arriving?"
> "When will County spring clean my street?"
> "When will the County plough the snow on my street?"

For these questions or Events to be answered the WITHIGO application must know the geographic location of the resident (web client). To process this question residents are asked, as part of their login profiling/customisation process (Figure 1 - Login Customization/Profiling), to provide their civic address. The address is stored in a database and, when requested, passed to the GIS Software where it is Geocoded.

The profiling/customization page is required for users of the WITHIGO application. Such a page could be a stand-alone process specifically for WITHIGO or ideally included as part of a web site's total customization process. The profiling/customization process is needed so that users may indicate what Events they wish to be notified about. For example, a user may not wish to see or know about bus schedules, as they do not use that service. They would subsequently have an option of "un-checking" that item, indicating that they do not wish to see information pertaining to buses.

Figure 1 - Login Customization/Profiling

Once Geocoded, spatial analysis is used to determine what Events are relevant to the resident. The Events are then summarised and presented on a single web page in the form of textual bullets or paragraphs. Each Event provides text, perhaps a link to another web page, or a link to an ArcIMS Map Server (Figure 2 - WITHIGO Home Page).
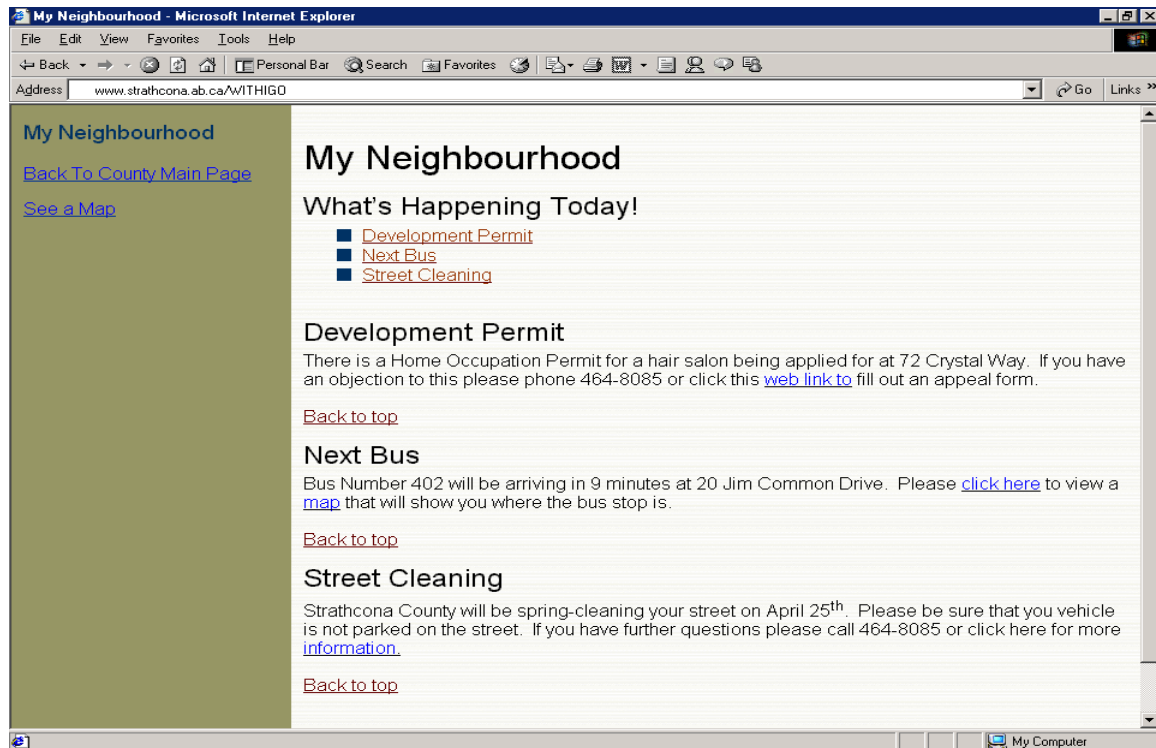
Figure 2 - WITHIGO Home Page

Design

The design methodology is for a production system. The design outcome is such that a prototype system can be derived. The context or target design is for a municipal government environment (Strathcona County). A modified formal system development methodology (Poiker, Et El) has been used to create the design. The model focuses primarily on the technical workings of the application with minimal consideration for the user interface. In creating the design the following issues are addressed:

1. Database Requirements
2. Logical Model
3. Software & Hardware Choices
4. Custom Programming

The database requirement looks at two aspects. The "geographic events" relevant to residents and secondly the spatial data sets required to derive the Events. A logical model illustrates how the databases and spatial functions integrate and work together. Hardware
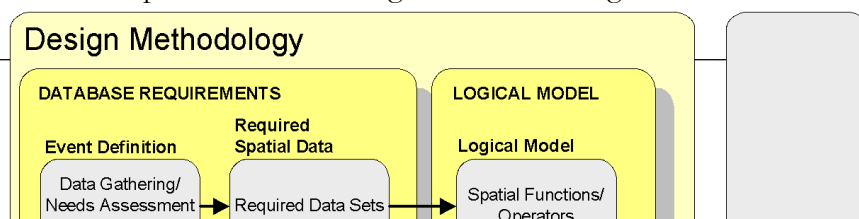
requirements are identified and ESRI's GIS Software products are selected to deliver the optimal configuration and use of spatial functions and operators.

The Prototype can be built with minimal programming however the final production version will require custom programming

Event Definition

As this is a particularly new concept[2], it becomes necessary to conduct primary research in order to determine which Events are applicable to WITHIGO. The main county telephone switchboard was interviewed, County Departments were surveyed, and the County's web site was examined in order to derive a comprehensive Needs Assessment. In addition some of the more progressive municipal web sites studied to determine what popular questions residents are asking. The results of this data gathering are detailed in Appendix A and the examination of the County's Web Site in Appendix C..

Presented in Table 2 are the potential candidate Events that could be used in the WITHIGO Application[3]. It is of interest to note that nearly eighty percent of the data collected had a geographic component. Of this percentage nearly half were usable as WITHIGO Candidates.

It's expected that once WITHIGO is implemented, and shared with others, that additional Events will be exposed.

Event (Concern)	Department
Who is my Councillor?	Elected Officials
How far is the closest fire hall?	Emergency Services
When/where is the fire ban?	Emergency Services
Information regarding County Projects i.e. Twinning of highway?	Engineering
When will weed spraying occur?	Environmental Operations
When is Garbage Pickup?	Environmental Operations
Where is the Waste Recycling Station?	Environmental Operations
Where is nearest bus stop & what is that bus-stop number?	Legal & Legislative Services
What is my lot size/where are my property lines?	Planning & Development Review/EEP
What is my legal description?	Planning and Development Review
When will my street be ploughed?	Public Works
When will street cleaning occur (exact day)?	Public Works
Does the County own the fence on my property?	Recreation, Parks, & Culture
Where is the closest playground?	Recreation, Parks, & Culture
What time is the next bus (usually includes what Route# & destination)?	Transit
Where are my water hook-ups?	Utilities
Permit notification.	Planning & Development Review

[2] Despite a reasonable search for comparable applications I was unable to find any. Some applications I found do use the same concept i.e. locate nearest store, but these are queried with non-spatial databases.

[3] Items from this list will be selected for use in the proto-type based on data availability, complexity and county business priority.

Table 2

A more detailed description of what each Event or concern is about and its relationship to the WITHIGO Application is available in Appendix B – Explanation of Events.

Required Spatial Data

Once the Events have been determined the next step is to identify what type of spatial data sets are needed to correspond to each Event. Once identified the listing is compared against the county's existing data sets to determine what, if any, additional spatial data sets must be built[4].

Event (Concern)	Existing Data	Required Data (to be built)
Who is my Councillor?	Address (point) Wards (polygon)	
How far is the closest fire hall?	Address[5] (point) Fire Hall Location (point) Street Network (lines)	
When/where is the fire ban?	Address (point)	Fire Areas (polygon)
Information regarding Road Projects	Address (point) Road network (line) Address (point)	Project area (points, lines, polygons)
When will weed spraying occur?	Street Network (line) Parcel (polygon)	Spray Route (line)
When is Garbage Pickup?	Address (point)	Garbage Area (Polygon) – Relatively easy to create 7 or so polygons.
Where is the Waste Recycling Station?	Address (point) Road network (Line)	Waste Sites (Point)
Where is nearest bus stop & what is that bus stops number (and destination)?	Address (point) Road network (Line)	Bus Stops (points) Bus Routes (routes)
What is my lot size/where are my property lines	Address (point) Parcel (Polygon) Orthophoto (Raster)	
What is my legal description	Address (point) Parcel (Polygon)	
When will my street be ploughed	Address (point) Street Network (line)	Plough Routes (line)
When will Street Cleaning Occur	Street Network (line)	Clean Routes (line)
Does the County own the fence on my property?	Address (point) Parcel (Polygon) Fence (Line)	

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[4] Untimely all Events or concerns have a business case, for implementation into the production system. For prototyping purposes only those Events that have an existing data sets will be utilized.

[5] The Address Point file is the anchor to this application and most concerns require this file.

Where is the closest Playground?	Address (point) Road network (Line) Park Locations (Point)	
What time is the next bus	Address (point) Road network (Line)	Bus Stops (points) Bus Routes (routes)
Where are my water hook-ups	Address (point) Parcel (polygon)	Currently under development: Scanned images or Water data (lines)
Development permit in vicinity	Address (point)	Permit (Point) Permit (Buffer-Polygon)

Logical Model

The Logical Model (Figure 3 WITHIGO Logical Model) is comprised of a series of spatial data themes. In addition to showing the database requirements, the model also shows the relationship to Internet services and other required software/database components.

There is a distinction between the production database and the prototype. In creating a prototype the ESRI software applications Arc/Info or Arcview can be used to create a script that that performs the spatial operation. The results of these operations are a spatial join; subsequently the attributes from the individual shape files are appended to the Address Point file. Given the number of operations to be performed the processing is expected to be slow and is not a suitable technique for a production environment. However as this author is familiar with the software mentioned the prototype would use this approach.

Once the queries are run all of the relevant attributes are appended to the Address Point file. When the Geocoding occurs the values (text strings) in the address point shape file are passed (HTML/XML) to the My Neighbourhood (WITHIGO) web page and inserted into the appropriate paragraph.

The second method and the method recommended for the production application utilizes ESRI's Spatial Data Engine (SDE). This method provides many advantages such a fast performance in a real-time environment, and the ability to continually update the database[6]. These advantages are offset by the complexity, custom programming, and software costs.

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[6] Each Event (Shape file, SDE Table) has a different update cycle, some daily others annually. SDE would allow real-time updating by various distributed data stewards, which would result in timely updates. Timeliness is important for such Events as Street Cleaning, Snow Ploughing, and Permits.

Figure 4 - WITHIGO Logical Model

Check Personalization in order to determine which Events to query

Returns Text Strings for inclusion in HTML/XML Template

Main Internet Server

County Home Page

PROTOTYPE

WITHIGO Page (User Inputs Address)

WITHIGO Page (Address from Personalization)

Address Check

Address Passed

PROTOTYPE

SDE Server (Production)
Shape File (Prototype)

GEOCODING
SDE Spatial Function: ST_Locator

Address (Point)

PK	Add_ID
	Shape
	Unit
	House_Num
	Street_Name
	Street_Type

Intersect

SDE Spatial Function:
ST_Intersects (g1 ST_Geometry, g2ST_Geometry)

Fence (Line)

PK	Fence_ID
	Shape
	Fence_Flg

No Address

Applicable Maps

Address Found Custom Events

Nearest

Within

PROTOTYPE

Authentication Server

Personalization/Authentication Server/Database
(Holds the Web Browers ID & Civic Address)

Authentification Server

PK	Authent_ID
	Browser_ID
	Civic_Addres
	WITHIGO Events

ArcIMS Server

Returns Map:
- Lot Line Map Service
- Playground Map Service
- Transit Location Map Service
- Waste Station Map Service

SDE Spatial Function:
ST_Distance (g1 ST_Geometry, g2 ST_Geometry)

Fire Hall (Point)

PK	Fire_ID
	Shape
	Name

Water Hook Up (Point)

PK	Wat_ID
	Shape
	Drawing_Num

SDE Spatial Function:
ST_Within(g1 ST_Geometry, g2 ST_Geometry)

Gargage Pickup Areas (Polygon)

PK	Garb_ID
	Shape
	Garbage Area
	Pickup_Date

Permit (Buffer)

	Shape
	Permit_ID
	Permit_Num

Request

Directions

NetEngine: Network Navigation & Directions

Playground (Point)

PK	Play_ID
	Shape
	Name

Server Location Uknown at this time.
Possibly hosted on SDE Server or ArcIMS Server.

Transit Tickets (Point)

PK	Tick_ID
	Shape
	Name
	Hours_Oper

Waste Recycle Station (Point)

PK	Waste_ID
	Shape
	Name

Street Cleaning (Route)

PK	Route_ID
	Shape
	Date
	Priority

Nearest Bus (Point)

PK	Bus_ID
	Shape
	Stop_ID
	Desitination
	Stop_Time

County Projects (Polygon)

PK	Proj_ID
	Shape
	Name
	Type
	Start_Date
	End_Date

Fire Ban (Polygon)

PK	Fire_ID
	Shape
	Ban_Flg

SnowPlough (Route)

PK	Route_Id
	Shape
	Date
	Priority

Weed Spraying (Route)

PK	Weed_ID
	Shape
	Route_ID
	Date

Ward (Polygon)

PK	Ward_ID
	Shape
	Ward Number
	Councilor Name

Parcel (Polgyon)

PK	Parcel_ID
	Shape
	Area
	Legal

Hardware/Software Requirements

This application requires six major hardware components with various brands of software running on each box. Table 3 - Required Hardware & Software and Figure 4 Hardware Software Configuration provides the working configuration and software.

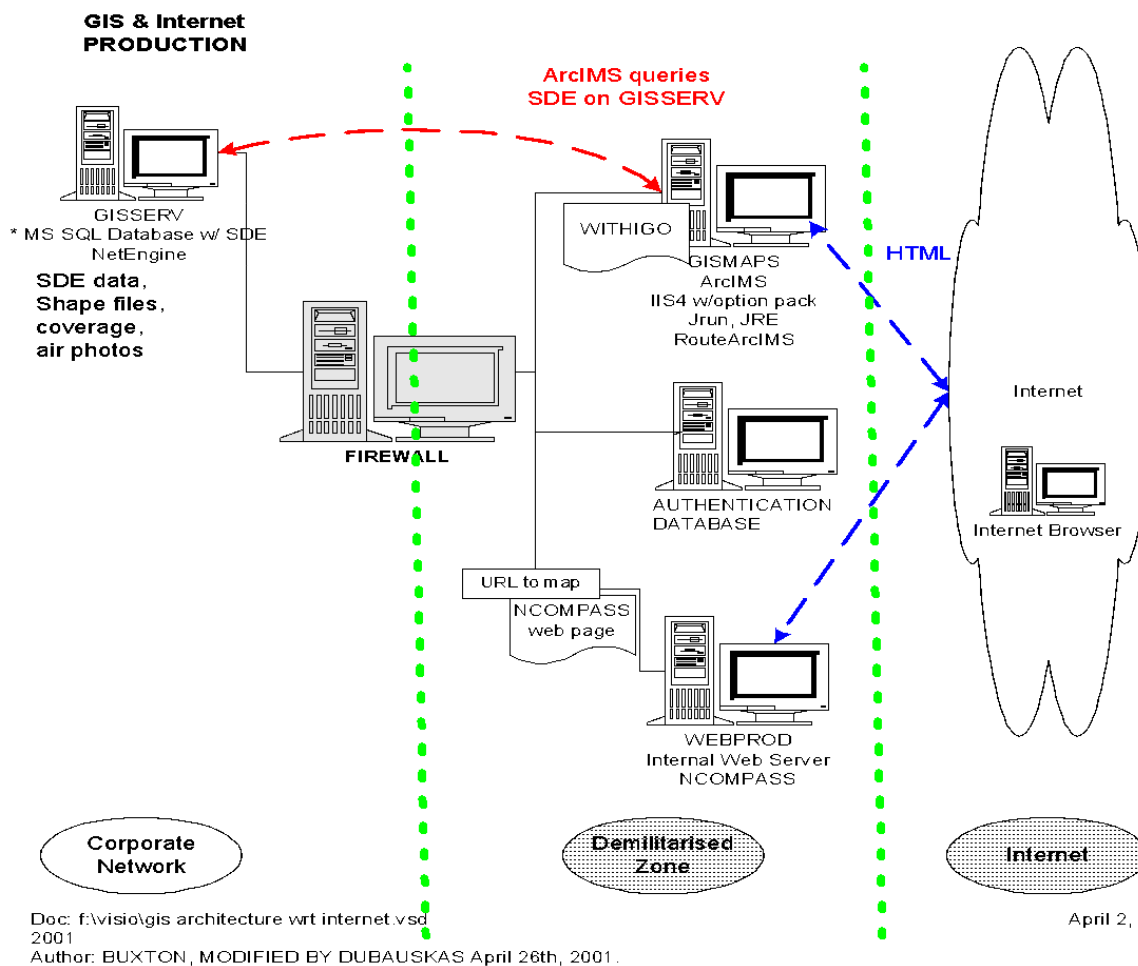| Hardware	Software Components
Spatial Database Server	SDE, NetEngine[7]
Fire Wall	Fire Wall Software (unknown)
ArcIMS Server	ArcIMS 3.0, ArcIMS Route Extension
Authentication Database	Custom built MS SQL
Main Web Site Server (NCompass)	NCompass Software
Web Browser	Internet Explorer, Netscape

Table 3 - Required Hardware & Software

Figure SEQ Figure * ARABIC 5 – Hardware Software Configuration

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[7] It's undetermined at this time whether the Events requiring routing/directions ill be processed using NetEngine or ArcIMS's software extension ArcRoute. The choice of which software to use will warrant further investigation. Events requiring directions will not be used in the Prototype.

Performance

Internet traffic in general is very low on the existing Strathcona County Web Site averaging 5000 hits per month over a three-month period. The majority of this traffic is related to Job Postings. Activity for map related pages is even lower with the most active map (Land Use Bylaw) averaging less than 56 hits.

Activity relating to maps on the Strathcona County server, (Appendix C – Strathcona Web Site Statistics) where WITHIGO will be hosted, is very low. The existing infrastructure should be able to handle the load.

Custom Programming

In a business environment an ideal scenario is to utilize "out of the box" solutions. This approach provides for efficient maintenance and operating costs. Typically most software packages, when purchased, have technical support, and a planned forward migration path (upward compatibility). When an organization uses custom programming in an application they have the additional burden of managing the migration path. This usually means programming the revisions in-house or contracting out the updates.

For the full and complete implementation of the WITHIGO concept custom programming is required. The concept uses leading edge technology (ArcIMS, Routing, and SDE), and is multi-disciplined (Spatial Database, Internet) so finding and retaining a single consultant to create the final application will be a difficult task. Finally on-going maintenance, for WITHIGO, could be difficult and costly.

Nonetheless, cautions aside, the following programming elements are needed to make WITHIGO a reality.

Web Page HTML Template

Programming Task One – Pass text/data from SDE to Web Page

Strathcona utilizes Ncompass web authoring tool. While a very good product the "out-of-the-box" solution does not allow for a database feed via the application GUI. XML or HTML scripting is required to feed the data output from SDE to the appropriate location on the "My Neighbourhood Web Page". The Neighbourhood web page would be a standard "template" requiring the insertion of the relevant Event or text. Its undetermined at this time whether the optimal scenario would be to store the full text of each Event in SDE, or whether just portions of the text would be passed.

Take the following Event for example. The black text would be a "standard phrase" but the blue text in brackets would be a feed from the database and concatenated or "inserted":

- There is a [Home Occupation Permit] for a [Hair Salon] being applied for at [72 Crystal Way]. If you have an objection to this please phone XXX_XXX or click this web link to fill out an appeal form.

Programming Task Two – "My Neighbourhood" Navigation and Look & Feel

If the Neighbourhood web page template cannot be created in Ncompass because of the modifications or special programming (Task One), the layout, graphics, text, etc. will have to be modified by a professional web artist to match the corporations corporate image.

There is also a requirement for two pages. One with an address input box and one without. Assuming a user is not "Authenticated" they need to input an address to make the application work. Alternatively a single template could be built with an address input box. Such a template would then allow "Authenticated" persons to try WITHIGO from a different address, such as a friend or relative's house.

Programming Task Three - Address Handling

The Authentication Database will store the web browser's Id. When the web browser "logs-on" it checks the Authentication Database and finds the corresponding address (input from the user at the personalization stage). This address is sent to the Geocoding engine in SDE. The address will be then be the basis for the spatial queries and return the appropriate data to the My Neighbourhood web page.

In the event the user is not "Authenticated" the address must be input on the web page. This address would be passed using HTML/XML to SDE.
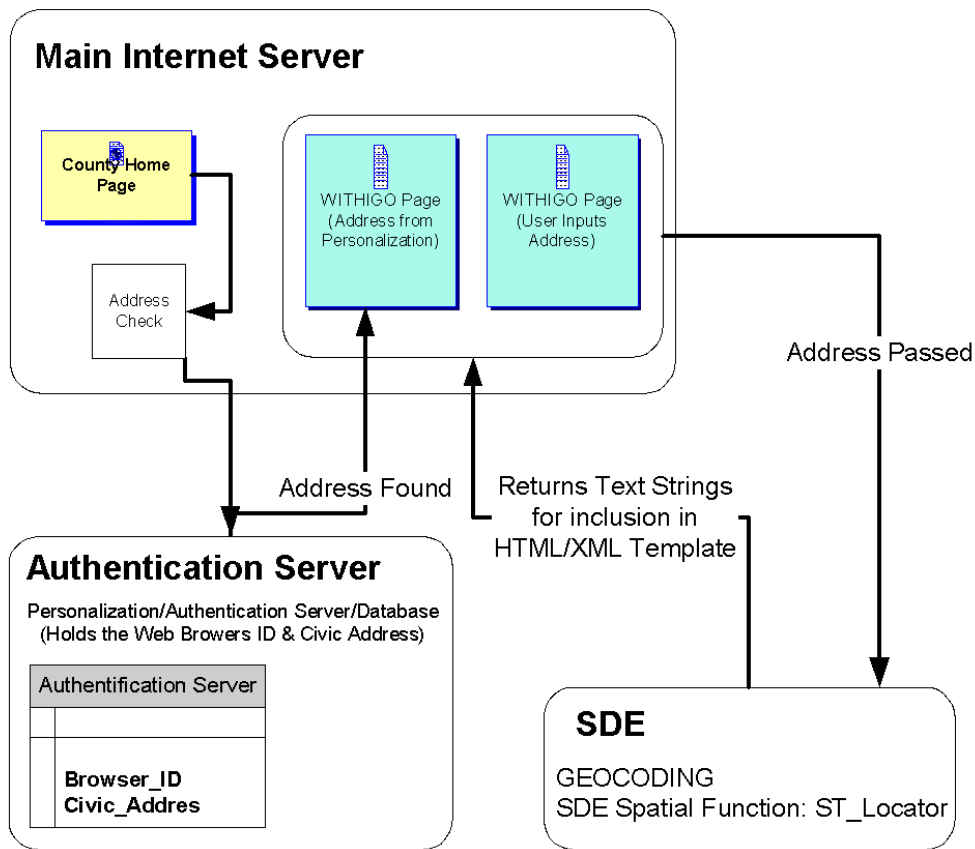

Figure 6 - Address Handling

Programming Task Four - SDE Queries and Integration

The database queries in SDW would have to be created, as well as the external calls to the Authentication Database and Main Web Server.

Prototype

A prototype will be attempted in the following weeks after this submission. The approach taken will be to:

1) Attached selected Events to the Address File as attributes. This will provide the data needed to post the web site.
2) Create a "My Neighbourhood Template.
3) Pass an address from the "My Neighbourhood Template" to either Arcview or ArcIMS and Geocode the result.
4) Take the results from the ArcIMS/Arcview Query and past them back to the "My Neighbourhood Template".
5) Display the results.

Conclusion

The original WITHIGO concept was to deliver spatial information without the user viewing a map. It became evident, quite quickly, that WITHIGO cannot only meet that expectation but deliver more. As a geographic communication tool for large governments and business WITHIGO closes the door on the "where" factor of Internet surfing. The potential is vast.

This author suggests that WITHIGO, coupled with demographics, and utilized for target marking, could be considered a "killer app". Unlike current and existing "location based" Internet applications that use non-spatial database, WITHIGO promises to be scalable and ultimately (compared to conventional DBMS) dynamic with database relationships much easier to maintain.

All the technical components (hardware, software, data) to build the application exist in the IT/GIS Industry today. It's just a matter of piecing them together to build WITHIGO.

Works Cited

Professional Site
Hayes, Nicki. The Wireless Development Network
    http://www.wirelessdevnet.com/channels/lbs/features/newsbite11.html   1
Kyrnin, Jennifer.
    http://html.about.com/compute/html/library/weekly/aa120400a.htm?rnk=r1&terms=
    push+technology   1
My Yahoo - http://my.yahoo.com/   1

Article in a Magazine
Euro Beinat Ph.D. "Location-Based Services: Market and Business Drivers" GeoInformatics
    Volume 4, April 2001: 6-9.   2

Course Notes
Poiker, Tom, Derek Reeve, Jim Petch, Mel Woodcock, Josef Srobl. UNIGIS: Organizational
    and Social Aspects of GIS, 3rd Edition, 2000   6

Hardware Diagram
Buxton, Cary. "GIS and Internet Production". Strathcona County Information Technology
Services. April 2001……………………………………………………………………10

Appendix A – Event Definition (Needs Assessment)

As mentioned earlier in the report it became necessary to conduct primary research in order to determine which Events would be applicable to WITHIGO. The following pages are the detailed findings.

Main County Switch Board Interview

Recognizing that the county's main switchboard is a front line tool for communicating with residents it became apparent that this would be an excellent source for determining location based questions commonly asked by residents.

Arrangements were made to track in-coming calls at the County's main switchboard. Switchboard operators were not informed as the nature of the study, but were simply asked to track the nature of the call, for which department the call was directed, and if applicable how many times the question was a duplicate of a previously asked question.

After three days of tracking calls the operators were interviewed and subsequently informed of the nature of the project. They were further asked to identify frequent calls that occurred during other times of the years, for example snowplough questions, in the winter.

Over one hundred calls were logged. The calls were summarized and sorted according to frequency. The calls relating to geographic location were then given a flag value of one. These selected items were further refined to determine whether they were usable in the WITHIGO Internet Context (Table 4).

The results are summarized as follows:

Table 4

Event (Concern)	Department	Frequency	Geographic Relationship	Usable In WITHAGO
How far is the closest fire hall	Emergency Services	1[8]+	1	1
What is my legal description	Planning and Development Review	1+	1	1
When will my street be ploughed	Public Works	1+	1	1
When will weed spraying occur	Environmental Operations	1+	1	1
When will Street Cleaning Occur	Public Works	1+	1	1
Complaint about the condition of rural roads	Public Works	4	1	1
When is Garbage Pickup	Environmental Operations	3	1	1

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[8] Frequency numbers with the plus sign were not necessarily recorded in the three-day survey, but were indicated to be high volume questions by switchboard personnel.

When/where is the fire ban	Emergency Services	2	1	1
Who is my Councillor	Elected Officials	2	1	1
Where are my water hook-ups	Utilities	2	1	1
Disposal of Paint (closest facility)	Switch Board	1	1	1
Information regarding twinning of highway	Engineering	1	1	1
Where is the Waste Recycling Station	Environmental Operations	1	1	1
Where are campgrounds	Economic Development		1	1
Where are R.V. Sanitary Waste Recycling Stations	Environmental Operations		1	1

Department Survey

County departments were solicited for ideas that could be used in WITHIGO. E-mail was sent to 41 departments or branch heads (6 responses were received) asking what their most frequently asked questions were. Again the survey questions was vague as to the particulars of Geographic Location and WITHIGO, and simply asked what their top questions were. The questions were summarized in Table 5 - Most Frequently Asked Questions) and each question was identified as to whether it was geographically relevant and secondly whether it was applicable to the WITHIGO application.

The results are as follows:

Departments - The Most Frequently Asked Questions			
Department	**Frequently Asked Question**	**Geographic Relevance**	**WITHIGO Relevance**
Legal & Legislative Services	Why are they spraying for weeds and killing all the vegetation		
	Why are the trees being cut down		
	Why aren't our side streets cleaned or when (in a snowy year)		
	All kinds of concerns and questions about Heartland's development		
	Why would council even consider a casino, a multi-purpose centre, etc.		
	Why can't you do something about my neighbours unsightly property		
	Why is the County increasing the width of 520...		
Transit	Where is nearest bus stop & what is that bus stop number	X	X
	What time is the next bus (usually includes what Route# & destination)	X	X
	What is closest location that I can buy passes or tickets for Transit	X	X

Recreation, Parks, & Culture	Does the County own the fence on my property?	X	
	Where is the closest Playground	X	X
Strathcona Wilderness Centre	Where area you located?	X	Routing Application
	How long is the drive out there?	X	Routing Application
	What do you have out there? Accommodations, camping		
	What do you have besides skiing?		
	What special Events do you have?		
	What programs do you offer?		
Transportation Services	Why is there no parking in my cul-de-sac?		
	Where is my property line?	X	X
	Why is there no left turn arrow at the intersection?		
	How can we slow down the traffic on my street?	X	
	How are the speeds determined on roads?		
Public Works Operations	When will you plough/sand my road?	X	X
	Exactly which day will you sweep my street, (and will you tow or ticket my car if I don't move it)?	X	X
	Do you guys get a discount at Tim Horton's?	X	
	When will you repave my road?	X	X

Table 5 - Most Frequently Asked Questions

Internet Search

The Internet search provided poorer results than expected. The initial search was to find Municipalities that had instituted an application similar to WITHIGO. MetaCrawler Search Engine[9] was used to execute this search. Sites that offered a similar type of LBS Service were not found. A second search was instigated, this time FAQ's or Frequently asked questions were searched for. Results for this tended to be municipality specific but there were some common questions that could be adopted by Strathcona County. Summaries of these results are as follows:

- When is brush picked up?
- Where can I dispose of waste?
- What is my lot size?
- How can I locate my water connection?
- Where are the truck routes?
- Where are the hunting areas?

City of Coldwater

http://www.coldwater.org/faq/index.htm

When do the different Boards/Commissions meet?
Q. Do I need a permit for a sign or fence?
Q. Does the City survey property?
Q. Do I need a permit to have a garage sale?
Q. When is brush picked up?

City of Peterborough, On.

http://www.city.peterborough.on.ca/

How do you reach the Disability Office located at the Ministry of Community and Social Services office at 178 Charlotte Street, Peterborough?

I have large amounts of mulch/green waste. Where can I dispose of it?
Large amounts of mulch/green waste can be taken to the Landfill Site and left in the green waste bins provided.

District of Maple Ridge

http://www.mapleridge.org/faq.html

Where can I obtain my lot size?
How can I locate my property line pegs?
How can I locate my water connection?
Where can I obtain a street map of Maple Ridge?

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[9] Metacrawler is a robust search engine that uses 13 other search engines, such as AltaVista, Excite, Google, Lycos, etc, to find results.

City of Shawnee

http://www.cityofshawnee.org/FAQs/FAQshawnee.htm

Where are the truck routes?
Can I split my lot?
Where can I hunt?
What are the proposed public works projects for my area?

Additionally search engines that are customisable, such as Yahoo or Excite, were reviewed. As described earlier in this paper these sites provide a regional perspective i.e. weather, local news, etc.   Initially it was thought, by this author, that using the client's postal code linked these services. Closer inspection of the sites revealed that content is pushed based on what a user selects or chooses rather than a Geocoding or database matching process. Specifically they must select, from a list, local news or weather this has relevance.

My Yahoo

http://my.yahoo.com/

While it's possible to customize My Yahoo to display local weather and news, the user must select from a list the information they wish to receive.

Excite

http://www.excite.com

Similar to Yahoo, Excite search engine offers pushed content based on your location.

Personalization Information-
Information to provide customized features. Get local weather reports and Events, your horoscope, and other helpful features.
(At Excite we value your privacy and guarantee to adhere to the policies of Trustee)

First Name: [   ]

Last Name: [   ]

Appendix B – Explanation of Events

Who is my Councillor?
An often asked question by residents so that they can correspond with their Elected Official.

How Far is the Closest Fire Hall?
This question is commonly asked for homeowner's insurance purposes. There are two spatial operators for obtaining an answer, as the bird flies or as the fire truck travels.

As the bird flies is perhaps the simplest spatial operator to implement in that it can be queried directly inside SDE. As the truck travels would require a remote procedure call to an ArcIMS Route, which would first determine the closest fire station and subsequently the distance.

When/where is the fire ban?
Because of Strathcona's Large Rural base many farmers and acreage owners have controlled burns on their property. Due to dry spells burning is banned in some areas of the County, at certain times of the year. Depending on where the resident reside they may or may not be allowed to light a fire.

Information regarding Road/County Projects
The decision here is not such much as to whether we can find the closest project but rather how does the scope of the project affect the user. If it is construction on a major arterial into and out of Sherwood Park, then many users over a large geographic extent are affected. The residents adjacent to the project are most certainly impacted. One way to handle this scenario is to create "affected persons" polygons for each project. A decision for each project would have to be made as to how big an area the project affects adjacent properties, all traffic corridors within a kilometre and their adjacent properties. While not exactly scientific or logically consistent, a polygon theme could be created that includes all county projects

When will weed spraying occur?
Weed spraying occurs along certain rural roads, affecting properties adjacent to these roads. Finds the nearest street. Once identified the street would contain "weed routes" with attribute data relating to time/date.

When is my garbage going to be picked up?
As the address centroids are located within a garbage pickup area this question can be answered by selecting the garbage area that contains the address node. Attributes for the garbage areas dictates the pickup date.

Where is the Waste Recycling Station?
A commonly asked question this Event would locate the Waste Recycling Station and provide driving directions (using ESRI's NetEngine) on how to get there.

Where is nearest bus stop & what is that bus stop number and destination? (What time is the next bus)
This Event would locate the nearest bust stop. Attributes for the bus stop would include the number, destination, and time when the next bus will arrive.

Where are my property lines?
Where are my property lines becomes a bit more difficult in that a "picture" or air photo, with the lot lines superimposed should ideally be presented to the user. The user would click on a web link "where are my lot lines", which would then pass them to an ArcIMS Server. The server would have air photos and lot lines rendered. When passed to the ArcIMS Server the address would automatically locate the user's lot and zoom to the extent of the lot.

What is my lot size/legal description?
A question often asked by residents that can be answered with a simple query. The address node always resides within a parcel. The query would return the lot size or legal description.

When will my street be ploughed?

Finds the nearest street. Once identified the street would contain "plough routes" with attribute data relating to time/date. This is a very similar Event to Weed Spaying.

When will Street Cleaning Occur?
This question is addresses the same issue as ploughing & weed spraying.

Does the County own the fence on my property?
The County shares fences that line major roads in Sherwood Park. There are hundreds of households along these routes that share a fence with the County. As there are possible financial assistance to these property owners should choose to repair or improve the fencing, the resident/County need to know if they share a fence.

Where is the closest Playground?
Similar to the fire station question this Event could use two different spatial operators for obtaining an answer; as the bird flies or as the baby buggy travels. Unlike the fire station event the preferred answer would use network routing and provide directions or perhaps a map.

Where can I buy a bus pass?
Like the playground Event, directions could be given to the web client to find the closest location to buy a buss pass. Alternatively a map could be displayed showing the location where bus passes could be bought.

Where are my water hook-ups?
Primary a question asked in acreage and new developments it is also a question asked of existing homeowners. The County has currently organizing and converting its underground records to digital format. The question would return the appropriate tiff image, which would have the utilities, displayed on it. As well as being a technically challenging event to implement it also has some business/organizational issues related to it in that a services already exists (First Call) and is a preferred choice.

Appendix C – Strathcona Web Site Statistics

The following matrix is used to determine what types of mapping that currently exist or is planned for the county web site. It addition it provides benchmarks to help predict performance issues.

Existing or Proposed	Spatial Representation (Original) Source	Web Format	Function (Original)	Plug-In Required	Time to Load (Cable)	Time to Load (56k)	Status	URL	Spatial Representation	Function (Proposed)	User Sophistication
Transit Map	AutoCAD	PDF/Vector	Pan/Zoom Print	Adobe	20 seconds initial load, instantaneous pan/zoom, 17 seconds to print map	85 seconds initial load, instantaneous pan/zoom, 17 seconds to print map	2000	http://www.strathcona.ab.ca/scweb.nsf/WebpageviewTransitHomePage?OpenDocument	Shapefile	Locate address and then boolean to closest bus stop. Possible to/from routing with list of buses to catch.	Easy - Transit Riders
Election Map	Shapefile	ArcIMS	Infinite Pan/Zoom Print				2001	http://gismaps/website/wardapriI3	Shapefile	Locate address and return list/query of voting areas and voting centre.	Easy - Potential Politicians
Garbage Maps	AutoCAD	GIF Web Page	None	None	3 Seconds	6 Seconds	2000	http://www.strathcona.ab.ca/scweb.nsf/WebpageviewWasteCollection-ParkMap?Opendocument	Shapefile	Locate address and indicate pick up date (date changes based on holidays's).	Easy - All Residents
Economic Development Location Maps	Shapefile	DjVu	Pan/Zoom Print		10 Seconds to bring up Viewer - Instantaneous pan/zoom	8+ Minutes	2000	http://www.strathconacounty.com/navigation/maps menu.htm	Shapefile	Pan/Zoom, Print	Easy/Medium - Business Market
Snow Plough Maps	AutoCAD	PDF/Vector	Pan/Zoom Print	Adobe	8 Seconds to bring up PDF	45 Seconds	2000	http://www.strathcona.ab.ca/scweb.nsf/b94b1b573378777a872565380 0779eca/df4c9568ee 78324187 2566bf008 2173a?OpenDocument	Shapefile	Locate Address and return data of snow plow and map.	Easy - All Residents
Land Use Maps	Shapefile	PDF/Raster	Pan/Zoom Print	Adobe	4 Seconds to bring up PDF (50 plus pdf files to choose from)	40 Seconds	2000	http://www.strathcona.ab.ca/scweb.nsf/WebpageviewPermittingInformationDocsO 8?Opendocument	Shapefile	Locate Legal to find lot and subsequent zoning designation, Pan/Zoom, attribute Query,Print	Medium - Developers/General Public
Site Locator	Shapefile/AutoCAD	ArcIMS	Pan/Zoom Query, Identify, report output, buffer	Java	Not yet tested		2001		Shapefile	Pan/Zoom, Print, attribute query, locate address, print reports, buffer, turn layers on/off	Medium - Business Market
Shortest Route	Shapefile	ArcIMS	Shortest Route, report output.	Possibly Java	Not yet tested		2002		Shapefile	Input to/from address, print directions, pan/zoom, print map	Medium - Tourist