Serving Fremont Employees with a “One Stop Shop” Enterprise Web App

Enterprise GIS: Lessons from the Trenches

By
John Leon and Christine Frost
Introduction

Phases of Development
- GIS Online (*Autodesk MapGuide*)
  - 1st web application quickly developed and easily adopted
- After 12 years our technology is out of date
  - What are our options?
- Enterprise GIS aka eGIS (*ArcGIS Server*)
  - Stage 1 - Redesigned Dispatch Site (*Painless*)
    - “This is great... I love it!”
  - Stage 2 - Soft Roll Out (*Resistance*)
    - “Why do we have to change?”
  - Stage 3 - Training (*Apprehension*)
    - “There’s an EXTRA click!”
  - Stage 4 - Go Live! (*Acceptance*)
    - “Now that I tried it... I can’t go back!”

Lessons from the Trenches

Yet to come...

Thank you!
City of Fremont Facts

- 4th most populous city in San Francisco Bay Area
  - 90 Square Miles
  - 220,000 population
  - 900 employees
    - GIS Team of 4

- Lead Agency of the Southern Alameda County GIS Authority (SACGISA)
  - City of Newark, Alameda County Water District (ACWD) and Union Sanitary District (USD)
  - 120 Square Miles
  - Over 1400 employees
Phases of Development
Background

- Year 2000, had spent 5 years developing data with no obvious end-product
  - Needed to prove investment dollars

- Critical demand for access to property information and ability to generate mailing notifications

- Initial implementation of Esri MapObjects mailing list application proved unsuccessful

- 1 month pilot project with AutoDesk MapGuide gave us...
Established technology since 1996 with a solid customer base
  o Affordable and bundled with all required software
    ▪ Autodesk Author - quickly author maps
    ▪ Autodesk Server - mapping service
    ▪ Macromedia ColdFusion - quickly allowed for us to create custom reports

JavaScript based

Extremely stable with fast mapping and reporting performance

Proven quick development and deployment

Required minimal training for end users
  o Trained over 300

Extremely flexible and customizable
  o Ability to add layers, data and reports without consultant assistance
Property Selection
The Kitchen Sink Layer Legend (that Overflowed)
Property Report
(Left Hand Report)
Automatic Mailing Notification
# Mailing Report

(Listing of all properties – non filtered)

## Mailing Report of All Situs and Owner Addresses

**Number of Records:** 314

### Select Mailing Labels Report Options
- Include APN's
- Create Mailing Labels Report

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Your computer operating system is Windows 7.

If you experience issues “Viewing or Opening” this report in Excel from the link below then please [click here](#) to install a Windows 7 Fix. After installing the Windows 7 Fix you will need to reboot your computer for the fix to take affect. Otherwise you may proceed to the next report or save report on your computer and then open the file using MS Excel.

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"View/Save As" Report in Excel or Comma Delimited Text (CSV)

**Do NOT** use this report for mailing labels. Please use “Create Mailing Labels Report” link above.

---

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<thead>
<tr>
<th>#</th>
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<th>APN</th>
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<th>ADDRESS</th>
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# Mailing Report

*(Duplicate owners removed)*

## Mailing Labels Report of All Situs and Owner Addresses

289 Deliverable Situs and Owner Addresses  
3 Undeliverable Owner Addresses  
28 Undeliverable Situs Addresses - (1 of 28 is not selectable due to incomplete address information)

Select addresses to ADD to the Avery 5160 Mailing Labels...

(You can also select them individually)

- All Deliverable Situs and Owner
- All Undeliverable Owner
- All Undeliverable Situs

Create my Avery 5160 Mailing Labels with 0 addresses that I've selected...

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"View/Save As" Report in Excel or Comma Delimited Text (CSV)

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<th>#</th>
<th>NAME</th>
<th>ADDRESS</th>
<th>CITY STATE ZIP</th>
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<th>TRANSFER DATE</th>
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<td>PAO ELAINE TR &amp; PAO JEFF TR</td>
<td>101 ELLINWOOD DR</td>
<td>PLEASANT HILL CA 94523-7722</td>
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<td>KONTECH USA INC</td>
<td>1077 SANNTIA CT</td>
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<td>KARUPRIY NABESHP.C &amp; SIVAARA TRS</td>
<td>1860 MOUTRY AVE STE 400</td>
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### Mailing Report
*(PDF of mailing list)*

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FREMONT CA 94538 | 3100 CAPITOL AVE # E  
FREMONT CA 94538 | 3100 CAPITOL AVE # F  
FREMONT CA 94538 |
| OCCUPANT | OCCUPANT | OCCUPANT |
| 3100 CAPITOL AVE # H  
FREMONT CA 94538 | 3100 MONROY AVE # 100  
FREMONT CA 94538 | 3100 MONROY AVE # 101  
FREMONT CA 94538 |
| OCCUPANT | OCCUPANT | OCCUPANT |
| 3100 MONROY AVE # 102  
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FREMONT CA 94538 |
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FREMONT CA 94538 | 3100 MONROY AVE # 405  
FREMONT CA 94538 |
# Permit Reports

## Project Summary Report

**TOTAL NUMBER OF CASES:** 155

1. **Project Name:** 35036  
   **Project No.:** 35036  
   **Site Address:** 3300 CAPITOL AVE  
   **APN:** 501 113004900  
   **Case Type:** PLU  
   **Case No.:** A-35036  
   **Received:** Status:  
   **Description:** ORIGINAL GREEN CARD INFO + BMP PLAN SPEC.

2. **Project Name:** 35040  
   **Project No.:** 35040  
   **Site Address:** 39000 LIBERTY ST  
   **APN:** 501 113004900  
   **Case Type:** PLU  
   **Case No.:** A-35040  
   **Received:** Status:  
   **Description:** ORIGINAL GREEN CARD INFO + BMP PLAN SPEC.

3. **Project Name:** UNDERGROUND CABLE RELOCATION  
   **Project No.:** ENC2015-00799  
   **Site Address:** 3350 CAPITOL AVE  
   **APN:** 501 113004900  
   **Case Type:** ENC  
   **Case No.:** ENC2015-00799  
   **Received:** 4/30/2015  
   **Status:** 55  
   **Description:** Trench - 1800' along Capitol Ave to install conduits. Override new cables through new d (see plans). Restore sidewalk area and asphalt pavement per City of Fremont standards. All traffic to CA MUTCD guidelines. ***Working hours from 8:30 AM to 2:00 PM on Wednesdays and Fridays at Farmer's Market and Street Eats. Normal working hours shall be from 8:30 AM to 4:00 PM on Monday through Thursday.***

4. **Project Name:** FESTIVAL OF INDIA - TENTS  
   **Project No.:** BLD2015-00539  
   **Site Address:** 3350 CAPITOL AVE  
   **APN:** 501 113004900  
   **Case Type:** BLD  
   **Case No.:** BLD2015-00539  
   **Received:** 7/30/2014  
   **Status:** FNL  
   **Description:** FIRE CODE - Install 4 - 40x40' Temporary Tents for Dining Area at the Festival of India - (tgir)

5. **Project Name:** FESTIVAL OF INDIA - STAGE  
   **Project No.:** BLD2015-00540  
   **Site Address:** 3350 CAPITOL AVE  
   **APN:** 501 113004900  
   **Case Type:** BLD  
   **Case No.:** BLD2015-00540  
   **Received:** 7/30/2014  
   **Status:** FNL  
   **Description:** BLD - Festival of India - Temporary skirted stage 40x20' high, including portable stage inspection date 8/17/13 P.M. (tgir)

## CASE Activity Report

**Date Printed:** 6/30/2015

**Project Name:** UNDERGROUND CABLE RELOCATION  
**Case Type:** ENC  
**Case Number:** ENC2015-00799  
**Date:** 4/30/2015  
**Received:**  
**Status:** 55  
**APN:** 501 113004900  
**Site Address:** 3350 CAPITOL AVE  
**Description:** Trench - 1800' along Capitol Ave to install conduits. Override new cables through new ducts and connect to manhole (see plans). Restore sidewalk area and asphalt pavement per City of Fremont standards. All traffic control set up shall conform to CA MUTCD guidelines. ***Working hours from 8:30 AM to 2:00 PM on Wednesdays and Fridays shall be restricted due to Farmer's Market and Street Eats. Normal working hours shall be from 8:30 AM to 4:00 PM on Mondays, Tuesdays, and Thursdays.***

**CASE CONTACTS:**

**ACTIVITIES:**

- Application Received
- (F) Issue Permit
- (F) Reprint Permit

**DISPOSITION:**

- DONE
From “Basic GIS” to “One Stop Shop”
Feed it and they will come

- GIS Online quickly became the alternative Document Management System
  - Linked Assessor Maps, Alameda County Assessor, etc.
  - Linked to Permitting system to retrieve Project and CASE reports
  - Linked Tract Maps, Fire maps, etc.
  - Linked Historical Planning Documents, Plans, Photos, Construction Drawings, etc.
  - Linked Buildings to Maintenance Work Order System, Facility Drawings, etc.
12 Years later

- Reality sets in - the Workhorse technology is out of date
  - Product and Server OS are no longer supported
  - No mobile solution available
  - Mapping and Cartography quality was basic at best
  - Dated user interface

- Biggest user complaints
  - Only programmed for Internet Explorer
  - Download and install ActiveX plug-in for Internet Explorer
What do we next?

- How do we come close to matching performance, ease of use, functionality and retain our custom reporting?

- How do we come close to matching the Google user experience?
  - Needed regional mapping to get away from the floating island effect

- How do we handle the kitchen sink data layers approach?
  - Single use web applications were clearly not an option

- Do we have ANY money?
What are our options?

- Do we know if anyone has migrated from MapGuide to Esri?
- Do we go with Esri or Open Source solution?
- Do we look at Commercial Off-the-Shelf (COTS) solutions?
- Do we contract out as custom work?
Pilot Testing

- YES... we looked at all options!

- Results...
  - No vendor nor COTS could match...
    - Performance
    - Functionality
    - Custom Reporting for the multitude of feature types
      - Address, Property, Utilities, etc.
    - Internal business workflow
      - Mailing, Linked documents
  - Custom programming...
    - Cost prohibitive
    - Restrictive to further in house development

- Are there ANY more options?
The “Light Bulb” moment...

- Hey, maybe we can do this in house
  - After Attending Esri UC, coding for web application development was demystified
  - “Piggy backed” on consultant’s “knowledge transfer”

- Created our own pilot
  - More promising results than previous options
Fremont Police Dispatch was the first at the door

- Needed to have spatial reference outside of our jurisdiction for stakeouts, SWAT situations, serve warrants, mutual aid, etc..

Developed an application within a week

- Expanded Basemaps
- World wide address locator
- Integrated Google Street View
- Linked into web services - Santa Clara County, USGS, FEMA, etc.
- Added PG&E and National Pipeline and Utility data
- Enhanced phone search and ability to select from the map

The reaction was?
“This is great... I love it!”

- Instant adoption
- No complaints
- Immediately requested to add more
- Minimal training
- Painless deployment
eGIS for Dispatch
Santa Clara County
(Web Service)
Based on eGIS for Dispatch success, decision was made to create version for City staff

Sent “All User” email introducing new application

Gave a “Show and Tell” to various departments

Sent another “All User” email asking to “Please!” give it a try and provide feedback
  - Crickets, Nada, Nothing, Niet, etc.

No choice but give deadline for MapGuide to be turned off
  - Countdown timer was visibly placed

The reaction was?
Nooooooooooo!!! #$%#!
Before “GIS Online goes OFFLINE” needed to provide training

Sent “All User” email with 3 month advance notice to sign up for eGIS training classes

Trained over 125 users over a 5 week period

Committed to implementing any missing layers, searches and reports by “Go Live” launch date

The reaction was?
There’s an EXTRA click!
Received some feedback during training

A week before launch we got a lot MORE feedback

Scrambled to meet deadline of promised commitments and incorporate feedback

Finally... we’re LIVE!

The reaction was?
Take your Pick
Welcome to eGIS
Selecting a property
Search by

Text Input or Graphic Selection

Search TriCity Data

Search Option: Address

Address Number: 3400

3300

Street Name: Stevenson or Steve

capitol

Unit Number: A or A14

Search TriCity Data

Search Option: APN

Use one of the graphic tools

Clear
Results and Buffering

Search TriCity Data

Features Selected: 3

3300 Capitol Ave # B
City: Fremont
Zipcode: 94538
APN: 501 113004900
Key: 64019

3300 Capitol Ave
City: Fremont
Zipcode: 94538
APN: 501 113004900
Key: 64017

3300 Capitol Ave # A
City: Fremont
Zipcode: 94538
APN: 501 113004900
Key: 63899

Search TriCity Data

Apply a buffer distance:

300 Feet

Search entities of:

APN
Buffered Results, Datagrid and Report Options
Layers

- Landmarks and City Facilities
- Land Constraints
- Zoning and General Plan
- Public Safety
- Engineering
- Traffic
- Parks and Maintenance
- Alameda County Flood Control
- Local Utilities
- Facilities Maintenance
- FEMA
- Contours
- Tri-City
- Pictometry
- Annotation
- Santa Clara County Cities (www)

Layer Visibility

- Land Constraints
  - Earthquake Induced Landslide
  - Earthquake Induced Liquefaction
  - Earthquake Fault Trace
  - Earthquake Fault Trace - Zone
  - Very High Fire Hazard Severity Zones
  - Toe-of-Hill
  - Measures A and T
    - Measure A
    - Measure T
USGS Landslides (Web Service)
Widgets Galore!
Basemap Options, Share Map Location and Link List
Draw and Measure widget

Area: 39,249.58 sq ft
Perimeter: 813.70 ft
Swipe Spotlight widget
Google Street View widget
Drop Coordinates with Street Views widget
eGIS (ArcGIS Server)

Benefits and Challenges

- **Benefits**
  - Fast mapping performance
  - Works with ColdFusion
  - Ability to pull in REST services from other agencies
    - Weather, FEMA, USGS, etc.
  - Clean interface with Flex or JavaScript
  - Widgets contributed from ESRI community
  - Mobile solutions available
  - Available to multiple web browsers
  - Available to PC and MAC
  - Setup of editing sessions via web browser
  - Web token security and integrating with our City’s Active Directory
  - Multiple basemaps for user to choose from
  - No conversion of GIS data sources
eGIS (ArcGIS Server)
Benefits and Challenges

- Challenges
  - Handling large datasets
    - Contours
  - Data publishing
    - Caching versus Map Service versus Feature Service
  - Programming
    - Widgets versus API
    - Integrating ColdFusion reports
  - SDE versus File Geodatabase
    - Syntax differences
  - Programming for multiple web browsers
    - IE versus Firefox versus Google Chrome
  - Server configuration and setup
    - Security issues - Authentication, Active Directory, IIS, etc.
    - Performance - load balancing
    - Number of users potentially accessing eGIS
Lessons from the Trenches

- Underestimated how comprehensive and replied upon GIS Online truly was

- False Assumptions
  - We have savvy users
  - People like and want new technology similar to their own personal devices
  - If you ask nicely, people will be happy to help out and test (for their own benefit)
  - We can do this in-house, no problem
    - If it works for one group, it will work for another
Lessons from the Trenches

Hindsight

- Change is not accepted/embraced equally
- Must be able to show obvious advantage for change
  - Dispatch was a success because we met their need and gave them more
  - We lacked incentive for City staff to test without having full functionality of old site or enough of new must-haves
- We do GIS development everyday but we’re novices when it comes to getting message out and attaining widespread buy-in
  - Still grasping with how to communicate change
- Developing in-house - It’s ALL on US!
  - Conflicting work assignments created significant delays while software evolved and changed
  - No proven rollout or true stress/performance testing
  - We know the data the best, can implement change on the fly and continue to expand and improve
Yet to come...

- Incorporate Pictometry widget
  - View Oblique Photos
  - Measurements - height, diameter, elevations, etc.

- Reformat reports
  - Separate data into categories

- Add demographic data

- Add user preferences option to save settings

- Migrate to JavaScript, HTML5, etc.

- Link to additional business systems

- GO Mobile
Thank you!

- Christine Frost - cfrost@fremont.gov
- John Leon - jleon@fremont.gov
  - Open Data Portal
  - Public eGIS Interactive Map

Acknowledgements
- Esri
  - Srinivas Suryanarayanaiah
  - Venu Kanaparthi
- Honorable mention
  - Robert J Scheitlin, GISP