TRANSITIONING A WATER UTILITY INTO AN ENTERPRISE GEOGRAPHIC INFORMATION SYSTEM

Thursday, April 26th, 11:30 – noon Room #404

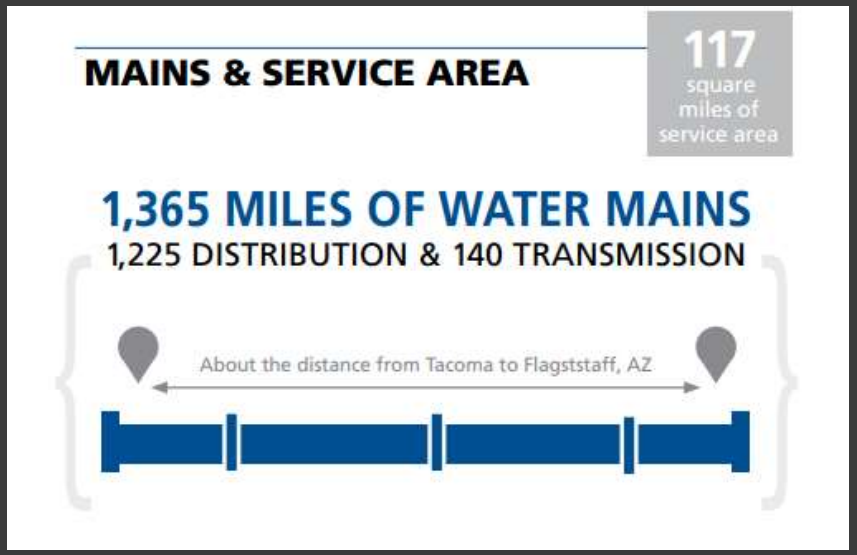
TACOMA WATER
TACOMA PUBLIC UTILITIES

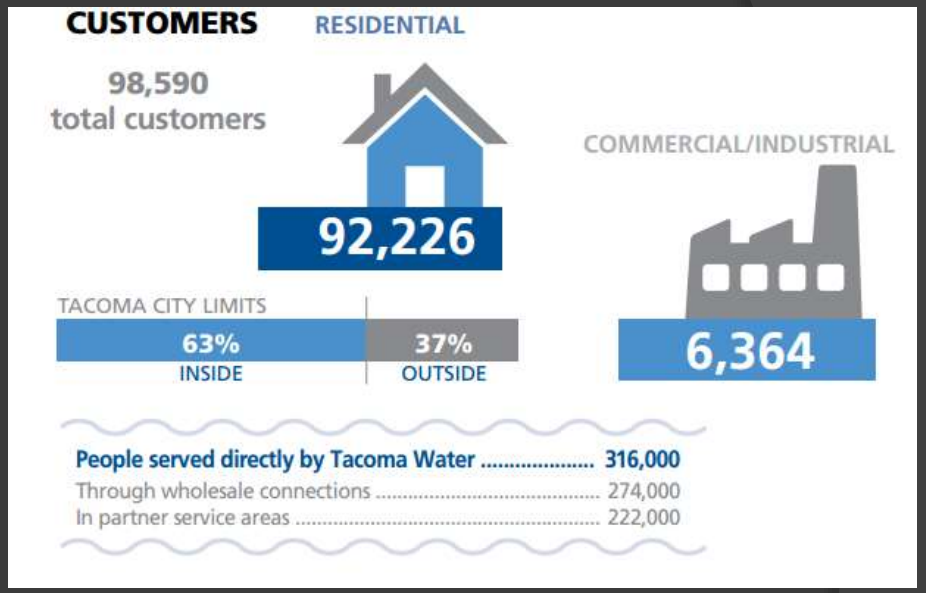
Presented By: Andy Simpson

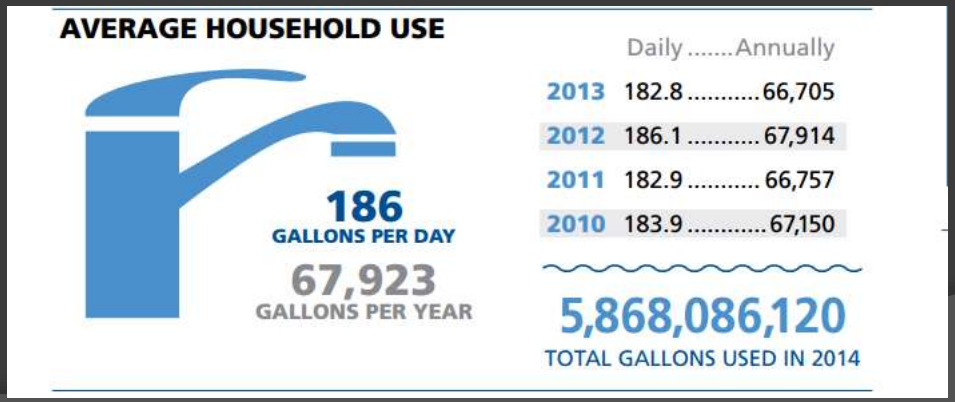
TACOMA WATER GIS TRANSFORMATION

- The Drawing Years
- Initiatives & Vision
- Transformation Approach
- Then & Now
- Process & Data Improvements
- Looking Ahead
- Resources & Summary

ABOUT TACOMA WATER:







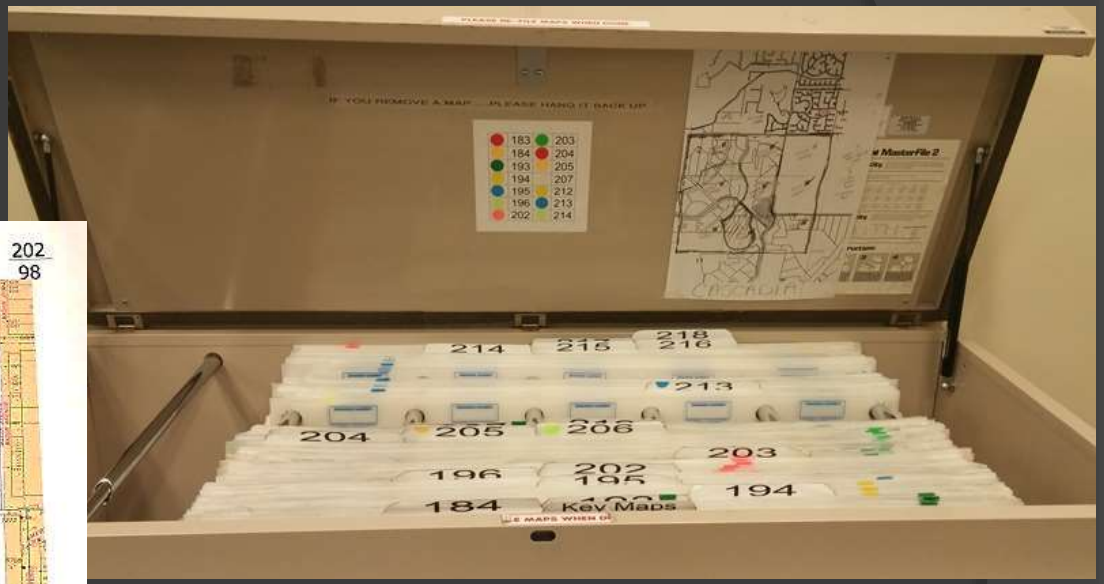
TACOMA WATER
TACOMA PUBLIC UTILITIES

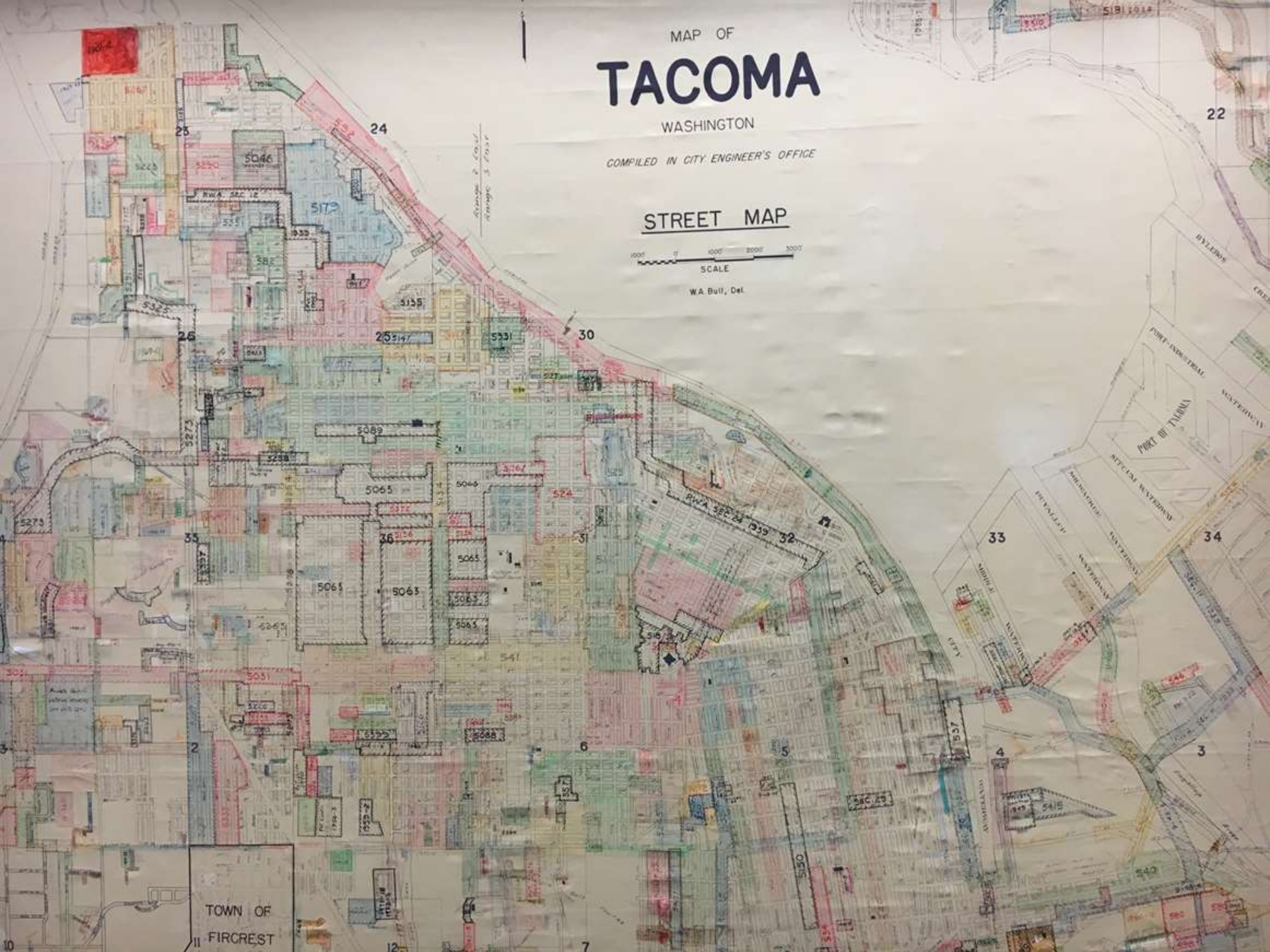
THE DRAWING YEARS *- 20 years of digital drawings*

- AutoCAD for map editing
  - Updates performed by sheet
- Map Guide for online map viewing
  - Quarterly refresh schedule
- Counter Maps
  - Available in multiple locations
- “Blue Book” map book in offices & vehicles
  - Created using AutoCAD and Photoshop (by different team)
  - Produced approximately every 4 years

TACOMA WATER
TACOMA PUBLIC UTILITIES

THE DRAWING YEARS -



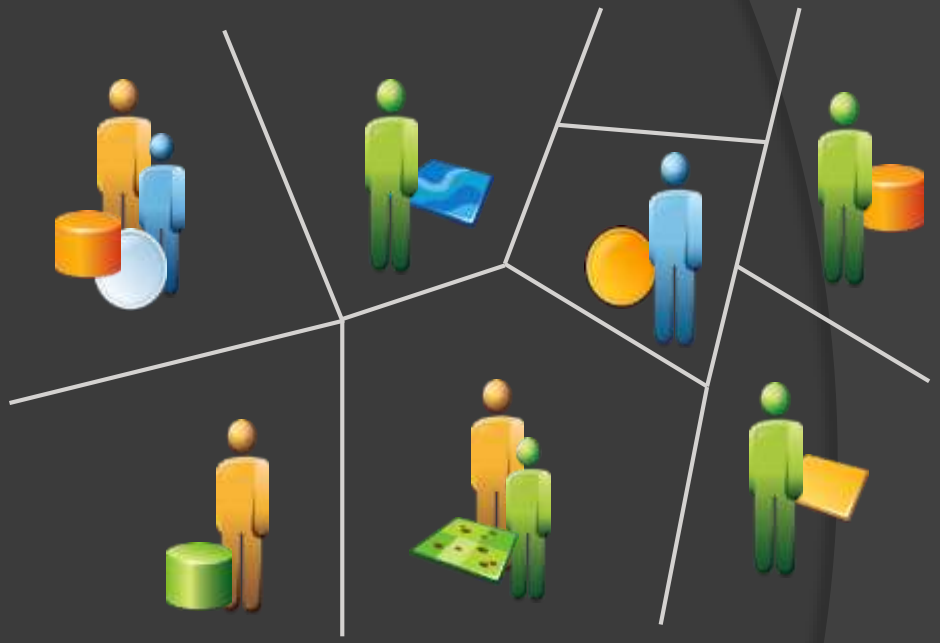

MAP OF
TACOMA
WASHINGTON
COMPILED IN CITY ENGINEER'S OFFICE
STREET MAP
SCALE
W.A. Bull, Del.
TOWN OF
FIRCREST
PORT OF TACOMA
RWA SEC 24
RWA SEC 12

THE DRAWING YEARS -

POCKETS OF DATA

- Various formats, some shared, some not

- Separate ESRI-based system for ad-hoc map requests
- Many spreadsheets storing other water network data
- Bentley hydraulic modeling system not kept current with production system
- Redundant data across other City departments
- Wide use of Google Earth, creating and storing point data



TACOMA WATER
TACOMA PUBLIC UTILITIES

THE DRAWING YEARS *- Some issues that led to change*

3 Major Issues:

1. Basemap Issues
   - Service area extends beyond the City of Tacoma
   - County adjusted their basemap resulting in “wrong” location of water network
   - Decision to stop county updates in 2006

2. Two Different Sources for Map Products
   - Counter maps to scale, Blue Book not to scale
   - Redundant map updates

3. Slow Update Cycle
   - Both online and paper maps
   - Poor or No Communication about Updates

TACOMA WATER
TACOMA PUBLIC UTILITIES

STRATEGIC PLAN STARTS THE CHANGE

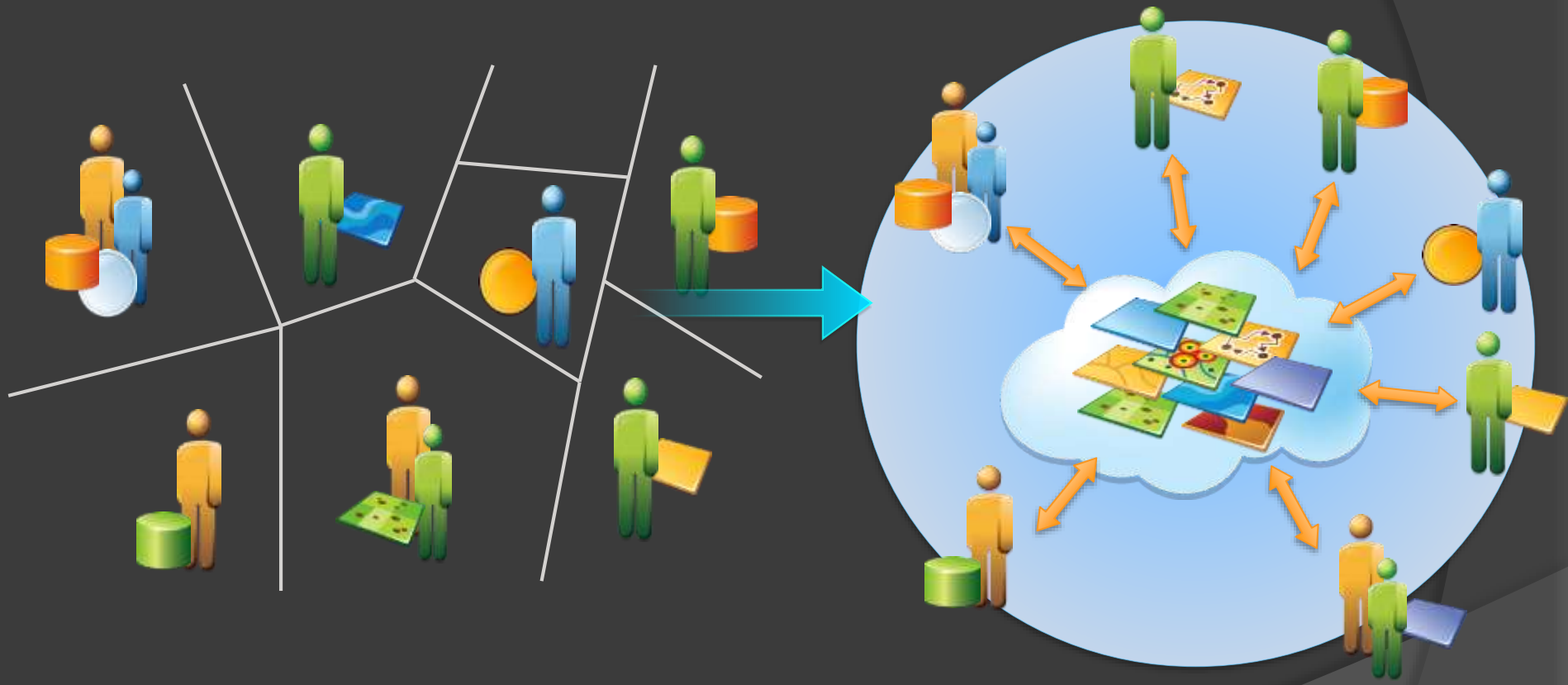
Tacoma Water Organization Initiatives:

- Improved Access to Information (IP06)
  - Improved data currency & quality
- Enable Informed Decision-Making (IP11)
  - Good Data & Tools = Good Decisions
- Leverage Technology (IP12)
  - Integration of Systems
  - More digital and less paper documents
  - Configure, not customize
- Communicate Effectively (IP10)

ORGANIZATIONAL THINKING ABOUT DATA

2014 Current State:

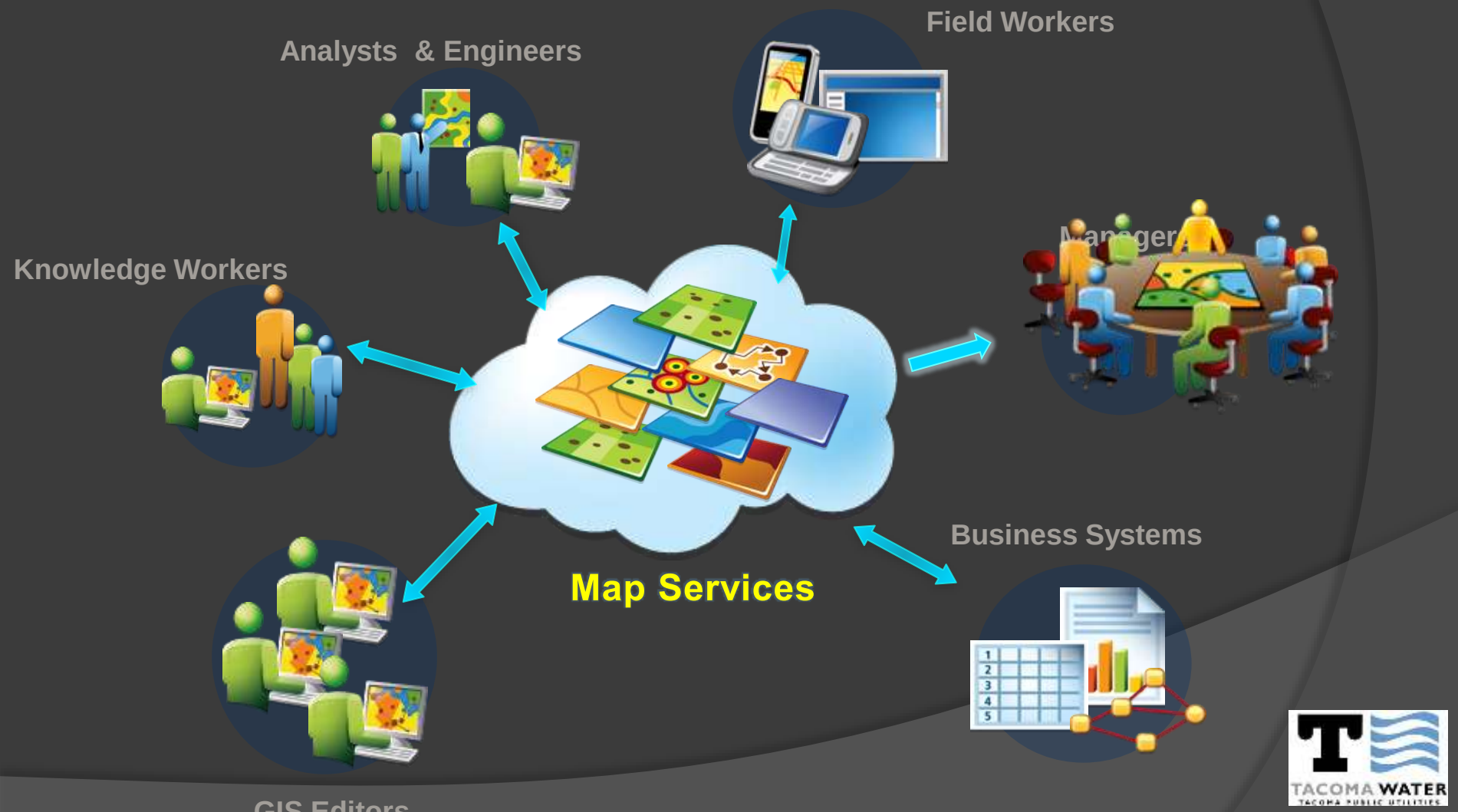
Future State:



TACOMA WATER
TACOMA PUBLIC UTILITIES

GIS VISION

Provide Geo-Spatial Capabilities Across The Entire Organization

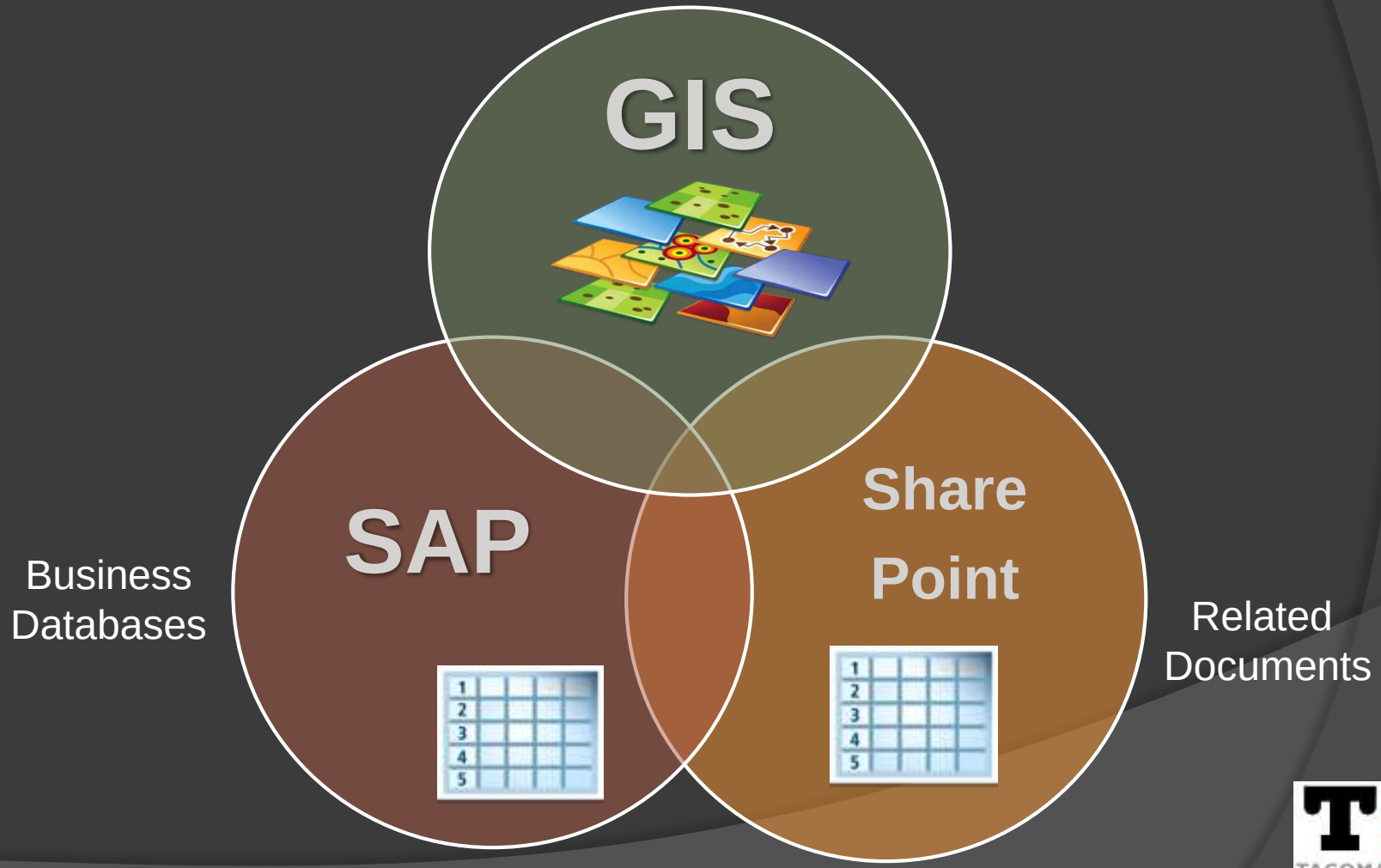


GIS SERVICE DELIVERY

Consumed by everyone on any device

ENTERPRISE VISION

"One source of the truth" for decision making



TRANSFORMATION APPROACH USED

- Threw away consultant report!
  - Called for traditional out-sourced development & data conversion
- ESRI Small Utility Enterprise License Agreement (ELA)
  - Provides a suite of products for enterprise use, training, and technical support
- ESRI Enterprise Advantage Program
  - Provided a jump-start and knowledge transfer for staff
- Proof of Concept
  - To test data model, data conversion, and end-user tools
- Configuration, not customization
  - ESRI's Local Government Information Model and Water Utility toolset
  - ArcGIS Online end-user tools

TACOMA WATER
TACOMA PUBLIC UTILITIES

TRANSFORMATION APPROACH USED

How did we do it?

- Needs Assessment & User Requirements Gathering
- Iterative & Incremental development
- Solutions evolve through collaboration
- Rapid & flexible response to change
- Agile Development Concept:
  - Working software over comprehensive documentation
  - Responding to change over following a strict plan
- The system is being used daily use but is not finished
  - *The system will never be finished!*

TACOMA WATER
TACOMA PUBLIC UTILITIES

PROJECT GOVERNANCE

- Steering Committee:
  - Water Management Team
- Project Stakeholders:
  - One or two representatives from each Water section (10 total)
- Asked to be GIS Evangelists & Super Users

- Representatives from the field and the office
- Distribution and Supply Engineers
- Water Quality Technicians
- Asset Management
- Rates & Finance

TACOMA WATER
TACOMA PUBLIC UTILITIES

CHANGE MANAGEMENT

- Communications Plan
  - Weekly project team meetings
  - Bi-weekly Stakeholder team meetings
  - Monthly Steering committee meetings
  - Monthly project newsletter for all staff
- Training Plan
  - “Just in time”
  - Targeted training for different groups
- Planned For Business Process Changes
  - Via Stakeholder Team
  - Still working on this!!

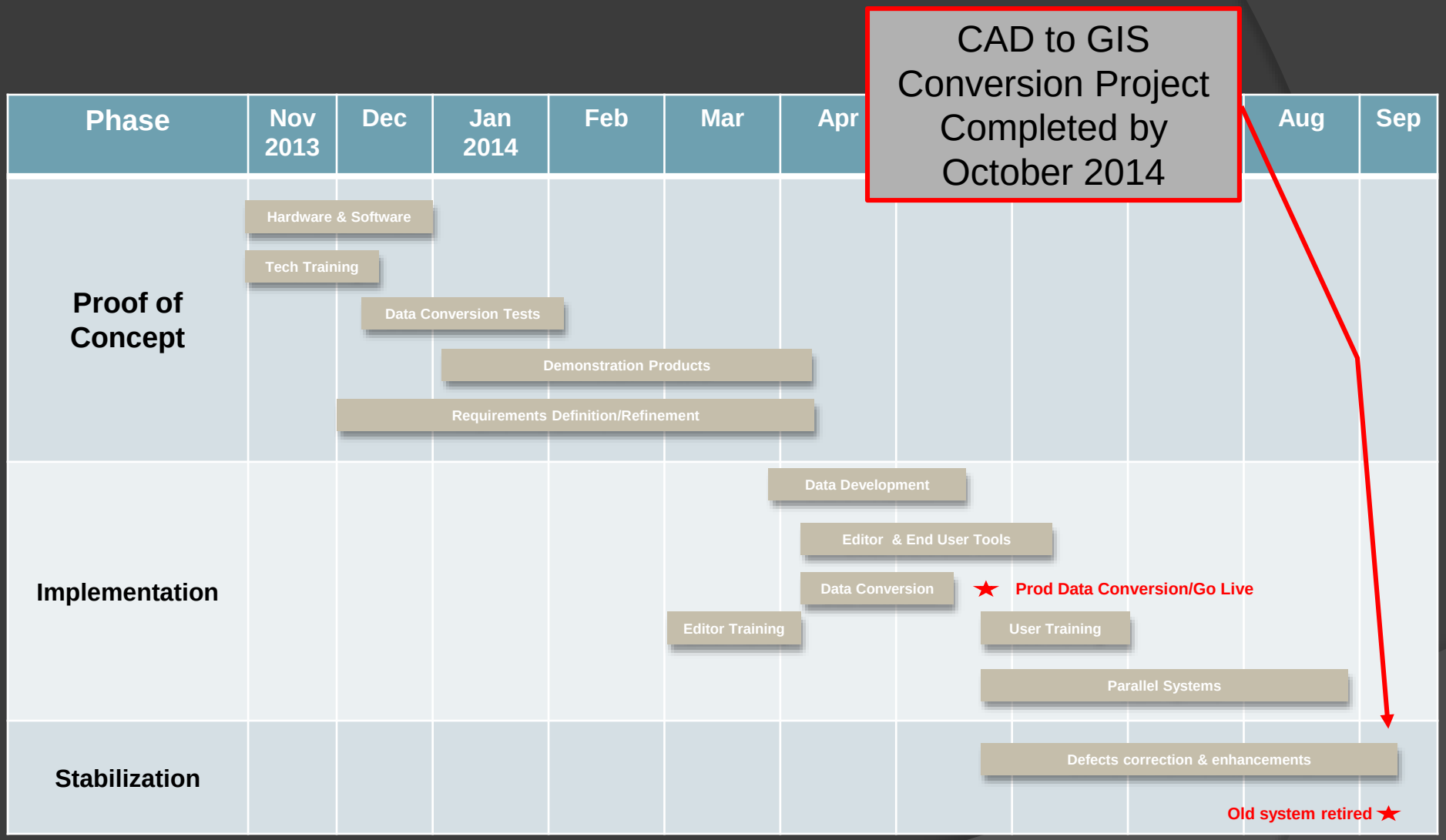
CHANGE MANAGEMENT

Project Challenges:

- We knew we had poor data
  - Out of date and incomplete
- We knew we had poor business processes
  - Business systems incomplete
  - Combination of paper and digital processes
- We decided to deal with these after implementation
  - Better tools for this in ESRI product suite
  - Resolving business process issues would take a lot of time and were likely to change with GIS

TACOMA WATER
TACOMA PUBLIC UTILITIES

PROJECT SCHEDULE



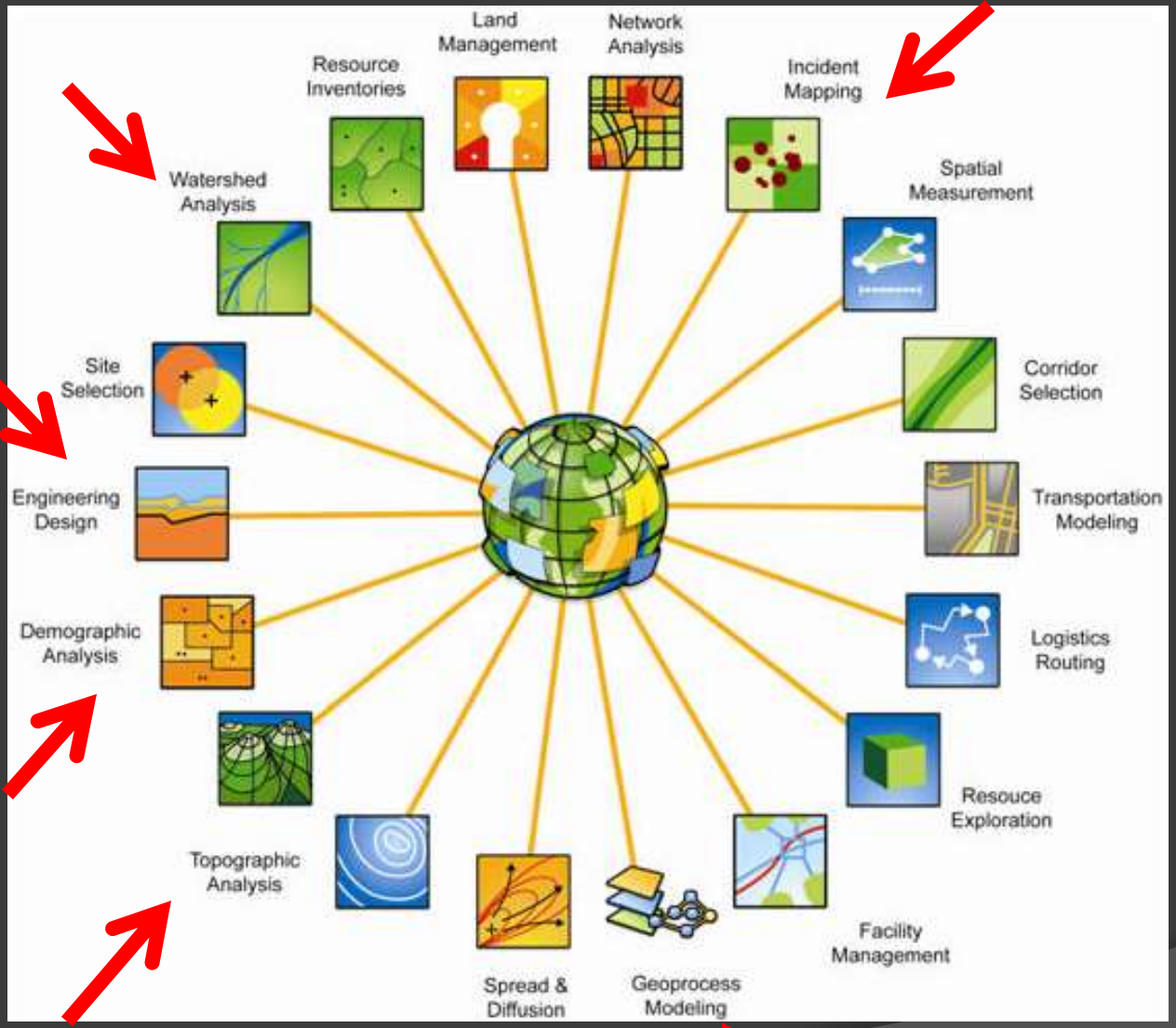
BEFORE & AFTER

One "Swiss Army Knife" Application to Targeted Applications

ORGANIZATIONAL TRANSFORMATION

The Organization Starts To Understand what GIS can do!

ORGANIZATIONAL TRANSFORMATION



Plus, the following:

-Hydraulic Modeling

-Economic Modeling

-Water Quality Sampling

STAFF TRANSFORMATION

Before 2014:

- **3 Engineering Techs**
  - AutoCAD projects by sheet
  - Peer review of work
- **1 Map Guide analyst**
  - Map Guide updates & support
  - Quarterly refresh
- **1 Hydraulic Modeler**
  - Also provided ad hoc ESRI support

Now:

- **2 Engineering Techs**
  - ArcMap projects from queue
  - GPS Adjustment
  - Data Entry projects
- **3 GIS Analysts**
  - QA/QC of Data
  - Data clean-up projects
  - Ad Hoc Maps and Apps
  - Python Scripting
  - New Tool Development
- **1 GIS Supervisor/System Admin.**
  - Data Replication & Enrichment Processes
  - End-user Development
  - Group Administration
  - Work Program Development
  - Boards and Committees

TACOMA WATER
TACOMA PUBLIC UTILITIES

PROCESS TRANSFORMATION

Before 2014:

- Updates by CAD Map Sheet
  - Large backlog of updates
  - Basemap issues
- Crew work documents
  - SDO cards copied and sent to us
  - Batches with cards months old
- Data Alignment with Basemap
- Quarterly Online Updates
- No map error tracking
- No integration with SAP

Now:

- First in/first out project queue
  - New project queue kept under 10
  - Monthly updates of basemap
- Digital documents
  - Cards scanned and loaded to SharePoint
  - Queue kept under 10
- GPS project underway
- Weekly online updates
- Online Map Mark-ups
- Weekly Data Enrichment or Publishing
- Established a Work Program

TACOMA WATER
TACOMA PUBLIC UTILITIES

AFTER IMPLEMENTATION

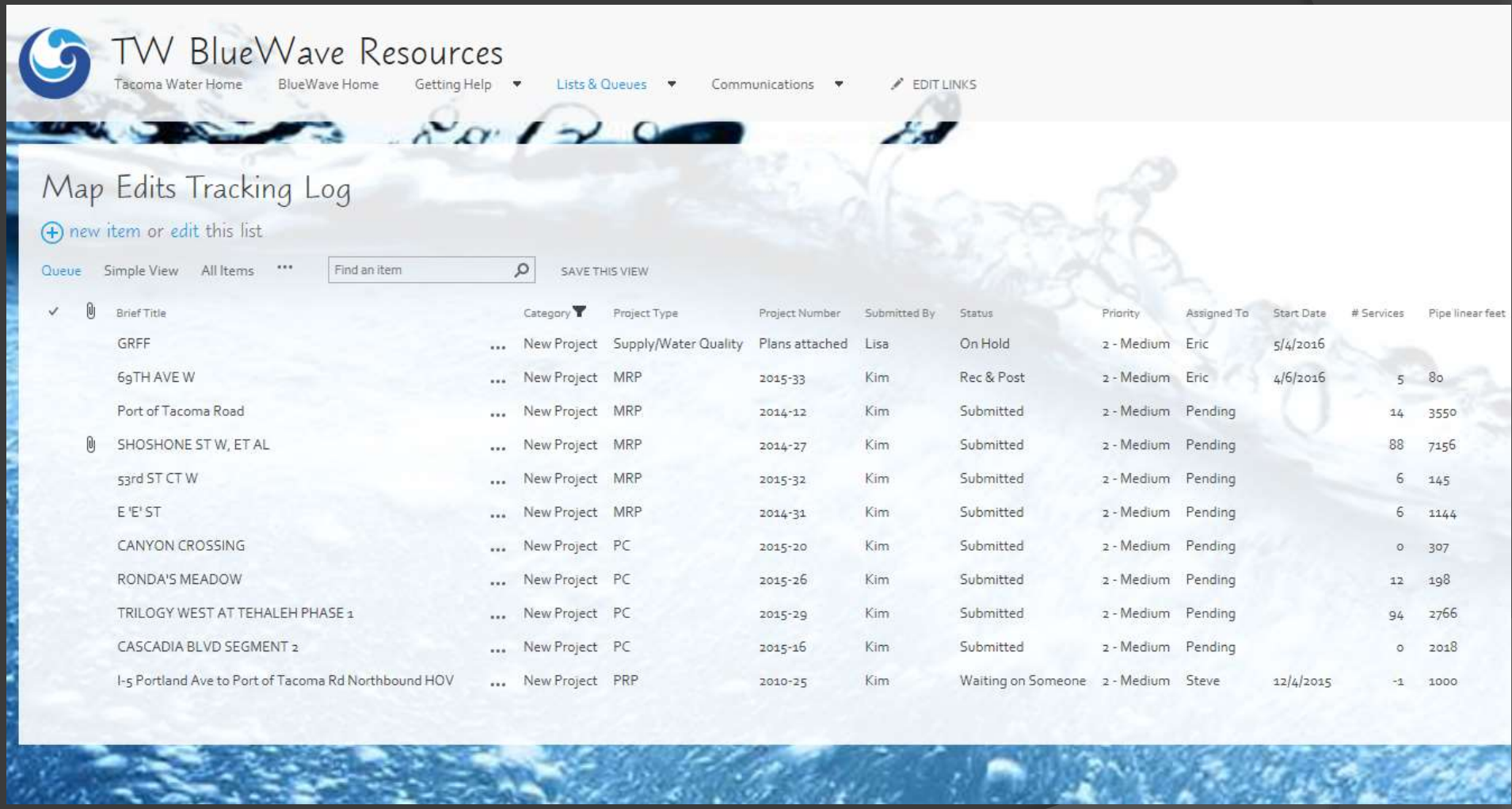
Old Methods:

- Tile-based, file-based maps
- Disconnected systems
- Distributed data responsibility
- Old basemap
- Multiple map versions
- Positional accuracy maps
- Manual map book (4 year cycle)
- Email & phone corrections
- One “Swiss Army Knife” application
- Duplication of effort
- Poor data quality

New Methods:

- Continuous versioned geodatabase
- Integrated systems
- Centralized data responsibility
- Basemap kept current (monthly)
- One enterprise version
- Movement towards survey accuracy
- Data Driven Pages map book (on demand)
- Online map mark-ups
- Targeted, tactical, intuitive applications
- Streamlined business processes
- Poor data quality…but with an improvement path

QUEUE AND GIS WORK TRANSPARENCY



Brief Title	Category	Project Type	Project Number	Submitted By	Status	Priority	Assigned To	Start Date	# Services	Pipe linear feet
GRFF	New Project	Supply/Water Quality	Plans attached	Lisa	On Hold	2 - Medium	Eric	5/4/2016		
69TH AVE W	New Project	MRP	2015-33	Kim	Rec & Post	2 - Medium	Eric	4/6/2016	5	80
Port of Tacoma Road	New Project	MRP	2014-12	Kim	Submitted	2 - Medium	Pending		14	3550
SHOSHONE ST W, ET AL	New Project	MRP	2014-27	Kim	Submitted	2 - Medium	Pending		88	7156
53rd ST CT W	New Project	MRP	2015-32	Kim	Submitted	2 - Medium	Pending		6	145
E 'E' ST	New Project	MRP	2014-31	Kim	Submitted	2 - Medium	Pending		6	1144
CANYON CROSSING	New Project	PC	2015-20	Kim	Submitted	2 - Medium	Pending		0	307
RONDA'S MEADOW	New Project	PC	2015-26	Kim	Submitted	2 - Medium	Pending		12	198
TRILOGY WEST AT TEHALEH PHASE 1	New Project	PC	2015-29	Kim	Submitted	2 - Medium	Pending		94	2766
CASCADIA BLVD SEGMENT 2	New Project	PC	2015-16	Kim	Submitted	2 - Medium	Pending		0	2018
I-5 Portland Ave to Port of Tacoma Rd Northbound HOV	New Project	PRP	2010-25	Kim	Waiting on Someone	2 - Medium	Steve	12/4/2015	-1	1000

TACOMA WATER
TACOMA PUBLIC UTILITIES

GIS WORK PROGRAM DEVELOPMENT

Benefits of a Work Program:

- Tracks all of the GIS Projects and Activities in one location
  - Creates Transparency within the Group and also with outside groups
  - GIS Resources not an endless well
- Estimates Staff time for particular GIS work
  - Helps create an understanding around what it takes to do certain GIS work
- Estimates when work will be completed and sets the priority
- Protects staff from unrealistic expectations
- Helps manage conflicting priorities from multiple departments
- Creates groups within the GIS group to complete a GIS project

Cons of a Work Program:

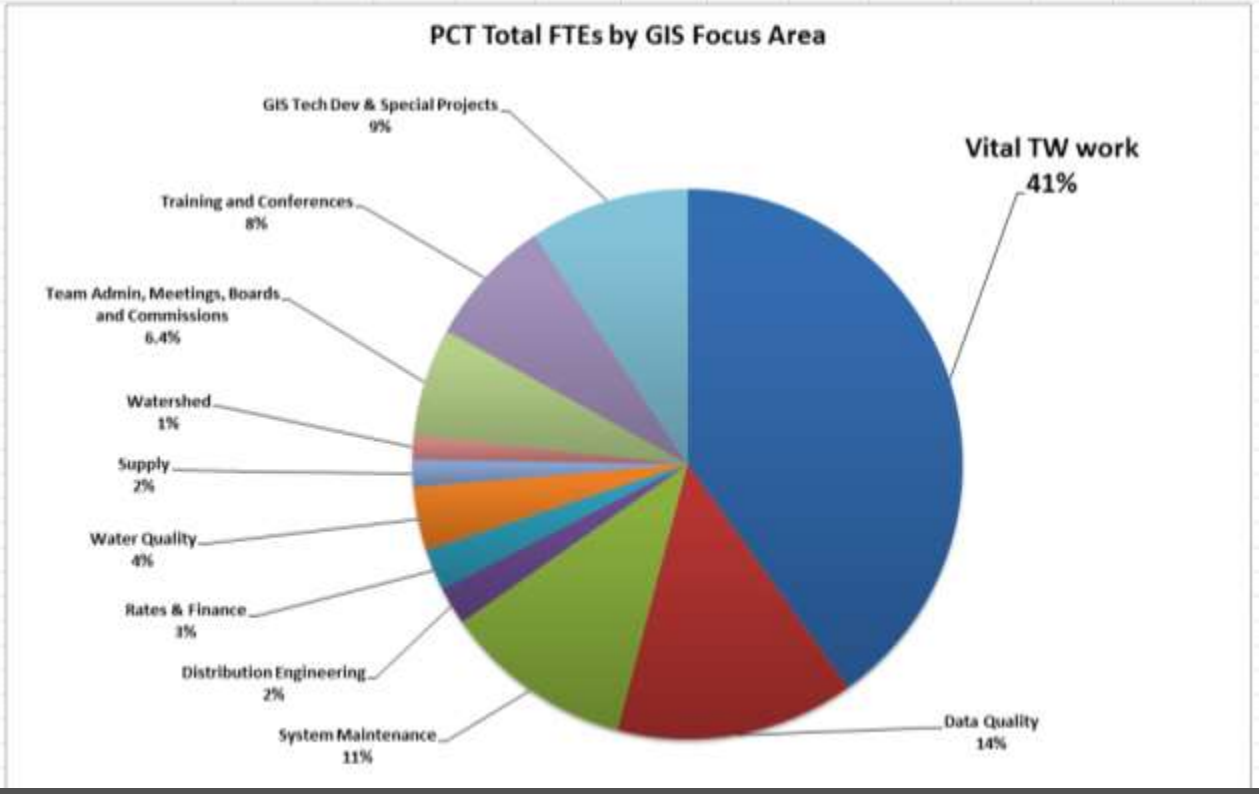
- Time Consuming, takes a lot of thoughtfulness
- Requires a person or group to think about what they will be doing in the future
- Requires a few coordination meetings with outside groups
- Takes effort to keep it going

TACOMA WATER
TACOMA PUBLIC UTILITIES

GIS WORK PROGRAM

Projected FTE and Hours by GIS Resource

FA #	GIS Focus Area	AS Hours	AS FTE	KM Hours	KM FTE	SP Hours	SP FTE	KB Hours	KB FTE	MH Hours	MH FTE	ES Hours	ES FTE	IT Analyst Hours	IT Analyst FTE	Intern Hours	Intern FTE	Total FTE	Total Hours
FA1	Vital TW work	92	0.05	456	0.24	760	0.41	722	0.39	1,450	0.78	1,700	0.91	-	0.00	-	0.00	2.78	5,176
FA2	Data Quality	41	0.02	857	0.46	460	0.25	244	0.13	158	0.08	54	0.03	0	0.00	0	0.00	0.97	1,814
FA3	System Maintenance	284	0.15	209	0.11	274	0.15	644	0.35	20	0.01	10	0.01	0	0.00	0	0.00	0.77	1,441
FA4	Distribution Engineering	125	0.07	0	0.00	46	0.02	128	0.07	0	0.00	0	0.00	0	0.00	0	0.00	0.16	299
FA5	Rates & Finance	106	0.06	100	0.05	20	0.01	86	0.05	0	0.00	0	0.00	0	0.00	0	0.00	0.17	312
FA6	Water Quality	104	0.06	0	0.00	374	0.201	0	0.00	4	0.00	0	0.00	0	0.00	0	0.00	0.26	482
FA7	Supply	22	0.01	0	0.00	0	0.00	154	0.08	0	0.00	32	0.02	0	0.00	0	0.00	0.11	208
FA8	Watershed	60	0.03	8	0.00	24	0.01	88	0.05	0	0.00	0	0.00	0	0.00	0	0.00	0.10	180
FA9	Team Admin, Meetings, Boards and Commissions	474	0.25	70	0.04	70	0.04	70	0.04	70	0.04	70	0.04	0	0.00	0	0.00	0.44	824
FA10	Training and Conferences	504	0.27	56	0.03	136	0.07	152	0.08	72	0.04	56	0.03	0	0.00	0	0.00	0.52	976
FA11	GIS Tech Dev & Special Projects	622	0.33	300	0.16	32	0.02	100	0.05	160	0.09	0	0.00	0	0.00	0	0.00	0.65	1,214
	Totals:	2,434	1.31	2,056	1.10	2,196	1.18	2,388	1.28	1,934	1.04	1,922	1.03	0	0.00	0	0.00	6.93	12,926



Total Available Hours To be Worked:

6 staff x 1,864 = 11,184

Over Allocation: (1,742.00)

GIS WORK PROGRAM

FA# 1 - Tacoma Water Vital Work

FA#		GIS Project, Goal or Task	Overall Priority	Priority	Owner	Lead	Team	Status	Q1	Q2	Q3	Q4	AS		KM		SP		KB		MH		ES		IT Analyst		Intern		Total FTE	Total Hours
FA1	A.	Map All New/Replacement (Distirbution and Supply) Main Projects	V	H	AIM	MH	MH, ES, KB, SP, KM	Ongoing	X	X	X	X		0	20	0.0107	20	0.0107	20	0.0107	600	0.3219	300	0.1609		0		0	0.515	960
		1.) Reporting on projects, assign work, misc for Stakeholders	V	H	AIM	AS	AS	Monthly	X	X	X	X	6	0.003		0		0		0		0		0		0		0	0.003	6
	B.	Map All New/Update Existing water Distribution Orders for Service (DO's)	V	H/L	AIM	MH	MH, ES, KB, SP, KM	Ongoing	X	X	X	X	16	0.009	100	0.0536	100	0.0536	140	0.0751	400	0.2146	200	0.1073		0		0	0.513	956
		1.) Organize DO cards into que and assign new orders and retires. File service removes in proper Map Grid. Update Sharepoint	V	H	AIM	KB	KB, MH	Ongoing	X	X	X	X		0		0		0	48	0.0258	30	0.0161		0		0		0	0.042	78
		2.) Reporting on DO status to Stakeholders	V	H	AIM	AS	AS	Monthly	X	X	X	X	3	0.002		0		0		0		0		0		0		0	0.002	3
	C.	Map/Update all of the Salmon DO's (New or Replaced Hydrants)	V	H	AIM	MH	KM, MH, ES	Ongoing	X	X	X	X		0		0	20	0.0107	20	0.0107	200	0.1073	80	0.0429		0		0	0.172	320
		1.) Reporting on SDO status to Stakeholders	V	H	AIM	AS	AS	Monthly	X	X	X	X	1	0.001		0		0		0		0		0		0		0	0.001	1
	D.	GPS Adjustment Proj., GPS point Collection	V	H	AIM	KM	KM, ES, SP	Ongoing	X	X	X	X		0		0	80	0.0429	20	0.0107	0	0	400	0.2146		0		0	0.268	500
		1.) Create GPS Area Checksuts, Field Maps. Check Data back into the database	V	H	AIM	KM	KM, KB	Ongoing	X	X	X	X		0	200	0.1073		0	50	0.0268		0		0		0		0	0.134	250
		2.) "In Office" Data Adjustment for all below ground facilities	V	H	AIM	ES	ES, SP	Ongoing	X	X	X	X		0		0		0		0	100	0.0536	600	0.3219		0		0	0.376	700
		3.) QA/QC of GPS adjusted Areas - Data Reviewer	V	H	AIM	SP	SP	As Needed	X	X	X	X		0		0	40	0.0215		0		0		0		0		0	0.021	40
		4.) Reporting on GPS status to Stakeholders	V	H	AIM	AS	AS	Monthly	X	X	X	X	3	0.002		0		0		0		0		0		0		0	0.002	3
	E.	Map Markups	V	H	AIM	KB	MH, ES, KB, SP, KM, AS	Ongoing	X	X	X	X	10	0.005	100	0.0536	40	0.0215	160	0.0858	100	0.0536	100	0.0536		0		0	0.274	510
		1.) Reporting on Map Markup Progress to Stakeholders	V	H	AIM	AS	AS	Monthly	X	X	X	X	1	0.001		0		0		0		0		0		0		0	0.001	1
	F.	2018 Emergency Maps Data Refresh	V	H	AIM	AS	KB, AS	In Progress	X				2	0.001		0		0		0		0		0		0		0	0.001	2
		1.) Update the Computer in the EOC with fresh Data, make sure it works	V	H	AIM	KB	KB	Not Started	X	X	X	X		0		0		0	4	0.0021		0		0		0		0	0.000	
		2.) Create a New Emergency Map set of data to be published with the ArcExplorer Application	V	H	AIM	KB	KB	Completed	X				2	0.001		0		0	4	0.0021		0		0		0		0	0.003	6
		3.) Work with UTS to install the new 2018 Emergency App with new Data and train maintenance staff	V	H	AIM	AS	KB, AS	Not Started	X	X			16	0.009		0		0	16	0.0086		0		0		0		0	0.017	32
	G.	Update the 2018 BlueWave Map Book	V	M	AIM	SP	SP, AS	Not Started				X	4	0.002		0	16	0.0086		0		0		0		0		0	0.011	20
		1.) - Incorporate new facilities and Add additional symbology, Update Emergency Contact Info	V	H	AIM	SP	SP, KB, AS	Not Started				X	2	0.001		0	20	0.0107		0		0		0		0		0	0.012	22
		2.) - Possibly add Hydrant listing? Get feedback from BlueWave Stakeholder's Group	V	H	AIM	SP	SP, KB, AS	Not Started				X	2	0.001		0	4	0.0021		0		0		0		0		0	0.003	6
	H.	Weekly Data Reviewer Data Checks, follow up and correct before Thursday publish	V	H	AIM	SP	SP, KB, AS	Ongoing	X	X	X	X		0		0	40	0.0215	16	0.0086		0		0		0		0	0.030	56
		1.) Design/Create new check as needed, follow-up with staff	V	H	AIM	SP	SP, KB, AS	Ongoing	X	X	X	X	10	0.005	20	0.0107	80	0.0429	20	0.0107	20	0.0107	20	0.0107		0		0	0.091	170
		2.) Make sure Data is published weekly, and all scripts run correctly- Auto Rec/Post - Versioning, DB Health	V	H	AIM	SP	SP, KB, AS	Ongoing	X	X	X	X		0		0	100	0.0536	80	0.0429		0		0		0		0	0.097	180
	I.	Hardcopy Flushing Maps for the flushing crews	V	H	AIM	SP	SP, KB	Ongoing	X	X	X	X		0		0	100	0.0536	40	0.0215		0		0		0		0	0.075	140
	J.	"Ad Hock" Mapping Requests, quick less than 1 day to create, 1 off maps & Apps	V	H	AIM	KB	SP, KB, AS, KM	Ongoing	X	X	X	X	10	0.005	16	0.0086	80	0.0429	80	0.0429		0		0		0		0	0.100	186
	K.	Maintain and Monitor the Editing Environment including Edit Template performance, Versioning, Rec/Post - make adjustments as needed	V	H	AIM	SP	SP, KB, AS	Ongoing	X	X	X	X	4	0.002		0	20	0.0107	4	0.0021		0		0		0		0	0.015	28
							FA #1 Projected Total Time in FTEs:						92	0.05	456	0.24	760	0.41	722	0.39	1,450	0.78	#####	0.91	0	0	0	0	2.8	5,176

DATA:

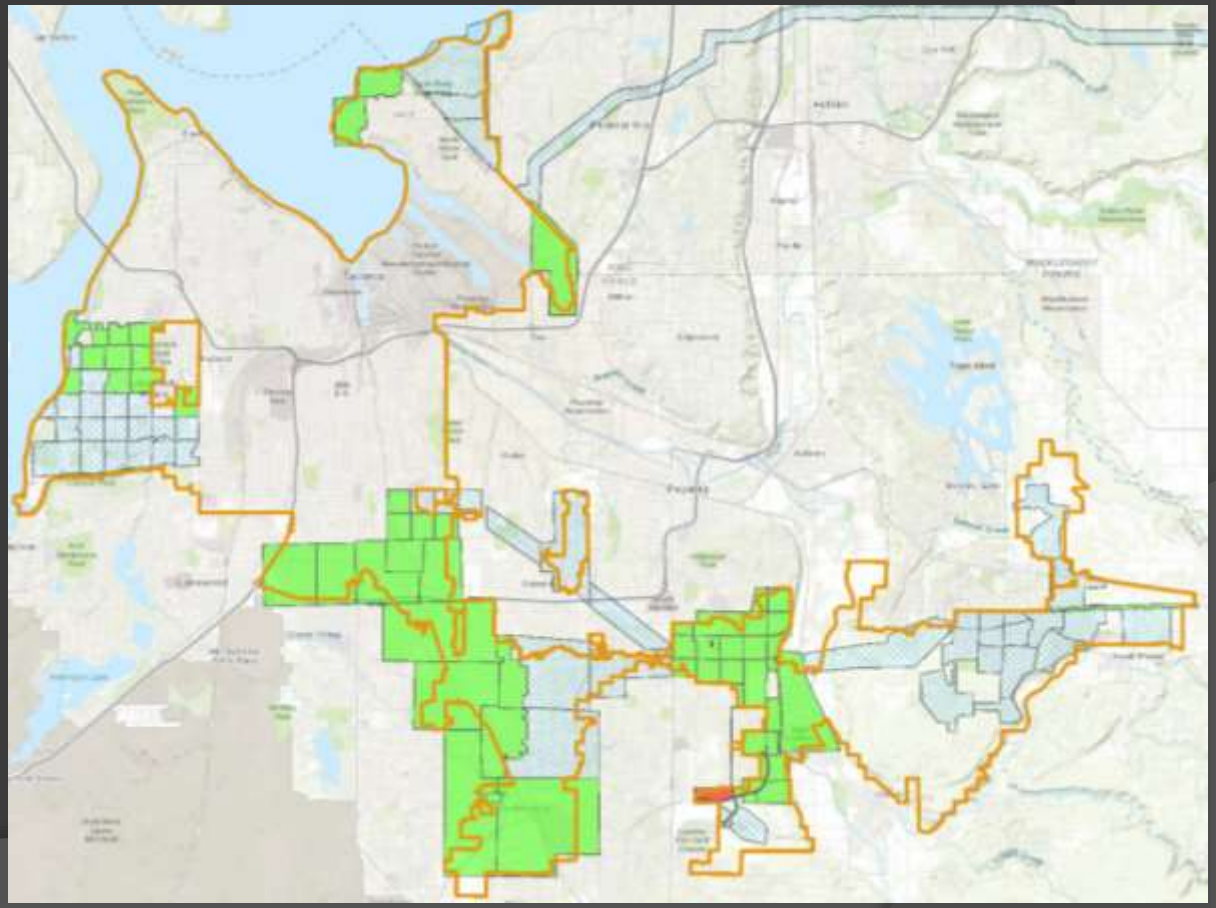
- factual information (such as measurements or statistics) used as a basis for reasoning, discussion, or calculation

- #1 Priority for our GIS Group
- Implement Feedback Mechanisms
  - Map Mark-up tool
  - Communicate with the End User about the data change
  - Report on changes made every chance we have
- Should be based on a physical document whenever possible
  - Ex: Published Plan Set
- Good Data = More Confidence
  - Takes time and effort to build
    - Ex: Spatial Adjustment Project
  - Use the ESRI QA/QC toolsets
    - Ex: **Data Reviewer**

TACOMA WATER
TACOMA PUBLIC UTILITIES

IMPROVING DATA - SPATIAL ADJUSTMENT PROJECT

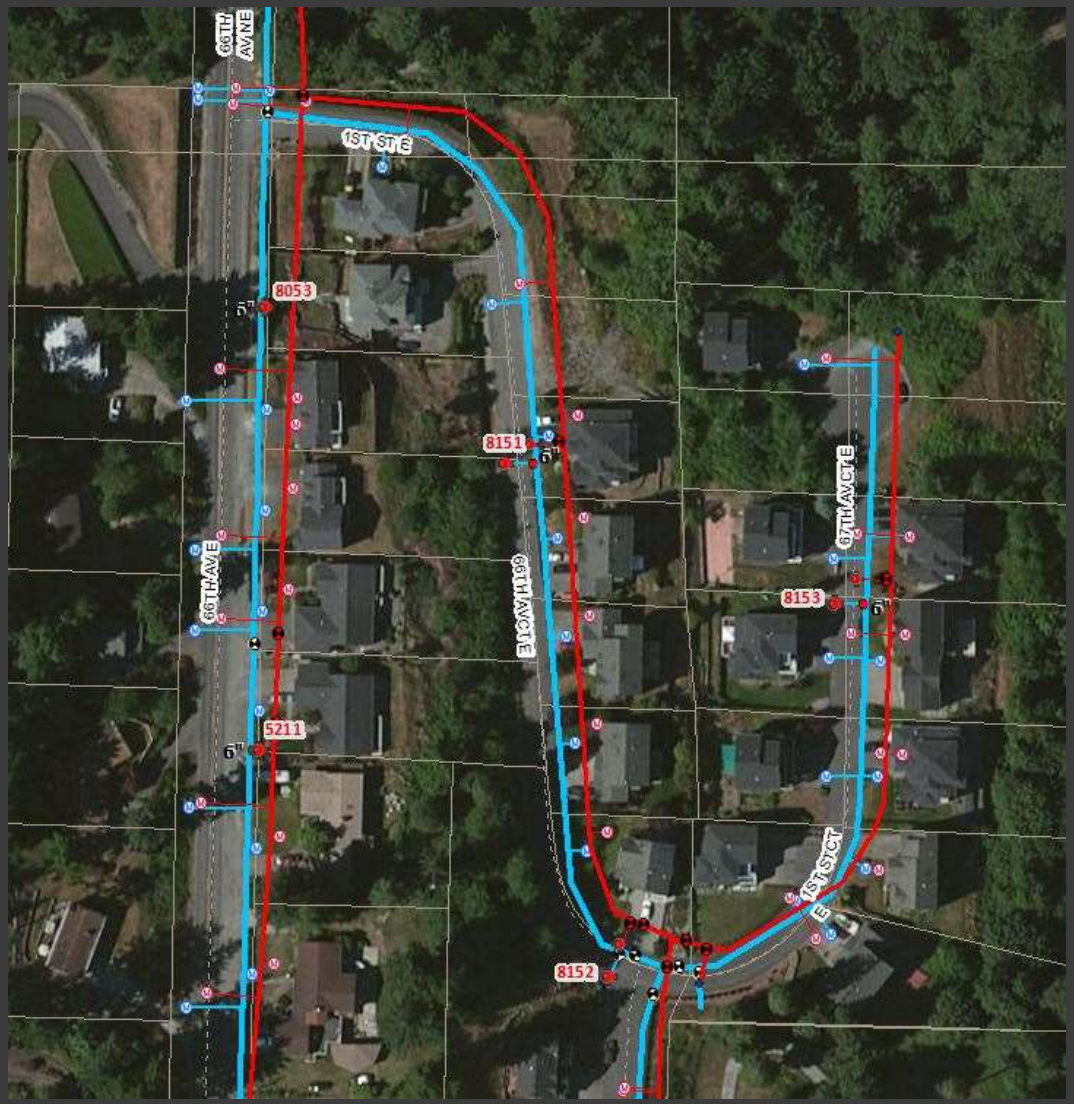
- Trimble Geo 7x device
- One FTE editor completing both the office adjustments and GIS field data collection
- Focusing on areas outside of the city first
- Expected to take 4-6 years



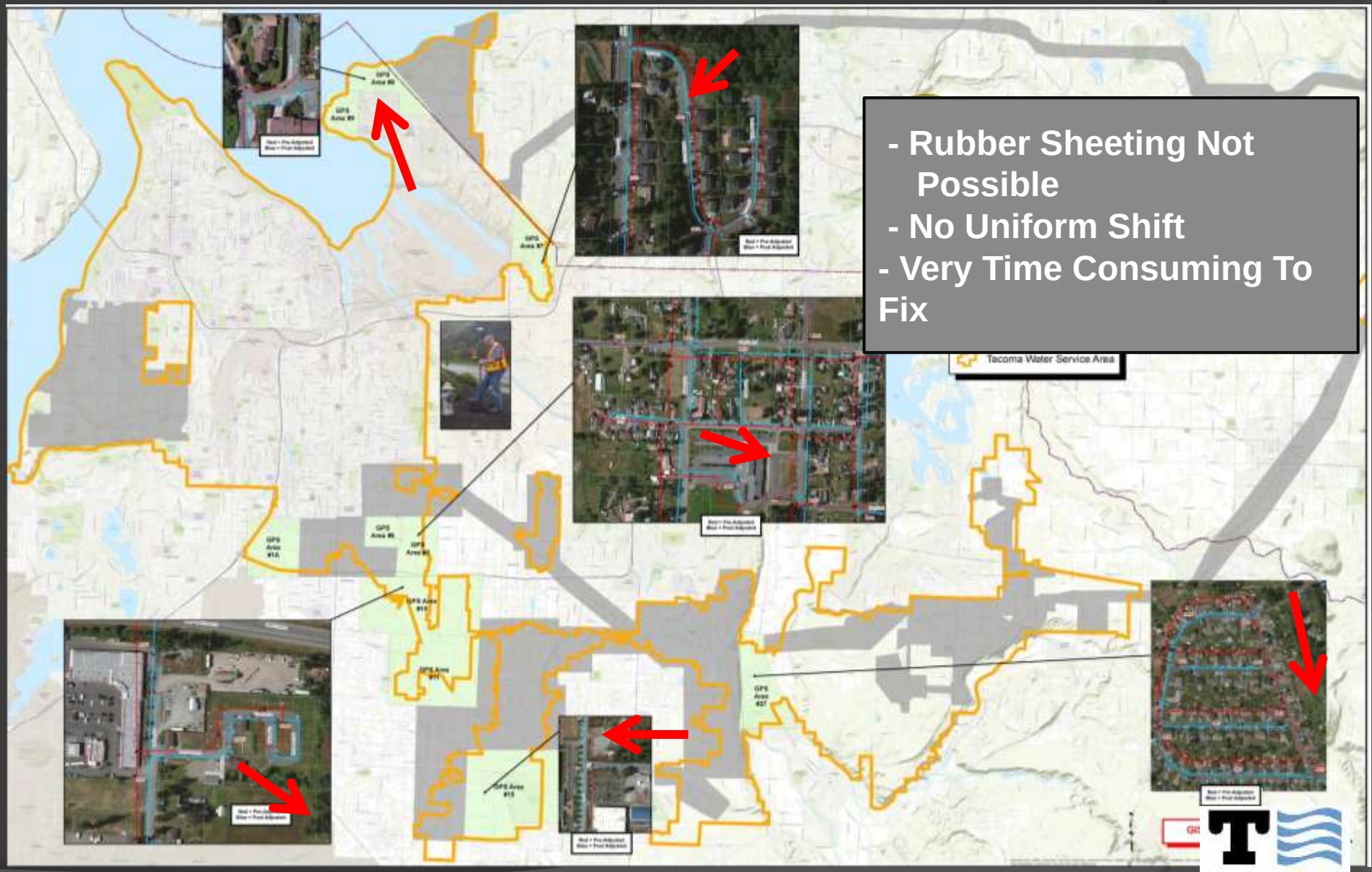
TACOMA WATER
TACOMA PUBLIC UTILITIES

IMPROVING DATA

IMPROVING DATA - SPATIAL ADJUSTMENT PROJECT



IMPROVING DATA - SPATIAL ADJUSTMENT PROJECT



IMPROVED GIS SERVICE DELIVERY

MATURITY TRANSFORMATION

TACOMA WATER
TACOMA PUBLIC UTILITIES

LOOKING AHEAD

- Continue To Produce Good Data
- Continue To Communicate with the Organization
- Continue Working with Our Stakeholders
- Look for More Opportunities to Further Leverage the GIS Technology
  - Mobile Work Management Tools
  - Further Integration with SAP
  - Tighter Integration with Hydraulic Model
- More Maps, more Dashboards, more Web Apps and more Web Services!!

TACOMA WATER
TACOMA PUBLIC UTILITIES

RESOURCES & SUMMARY

Local Gov. Info Model or LGIM

http://solutions.arcgis.com/local-government/help/local-government-information-model/

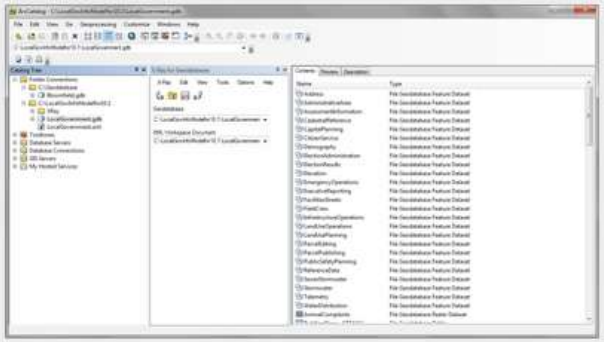
ArcGIS for Local Government ▾ GALLERY COMMUNITY DOCUMENTATION SEARCH esri

Local Government Information Model

Home | Get Started

Overview

The Local Government Information Model can be used to organize your geographic information and deploy the ArcGIS for Local Government maps and apps. It is a harmonized information model of GIS datasets designed to support the data management and analysis maps and apps deployed with an ArcGIS geodatabase.



The information model is supported by the ArcGIS for Local Government Service Catalog. This service catalog provides a collection of layers that can be used to publish feature layers in your ArcGIS organization and deploy a series of ArcGIS for Local Government solutions.

You can configure the information model and feature layers to support specific business needs in your organization by selecting and implementing specific features that are part of this integrated information model or by adding fields and modifying field and layer aliases to reflect terms more widely used in your organization.

REQUIREMENTS | WHAT YOU GET | WHAT'S NEW | DOWNLOAD

You may be interested in

ArcGIS for Local Government includes several related maps and apps that also can be configured in your organization:

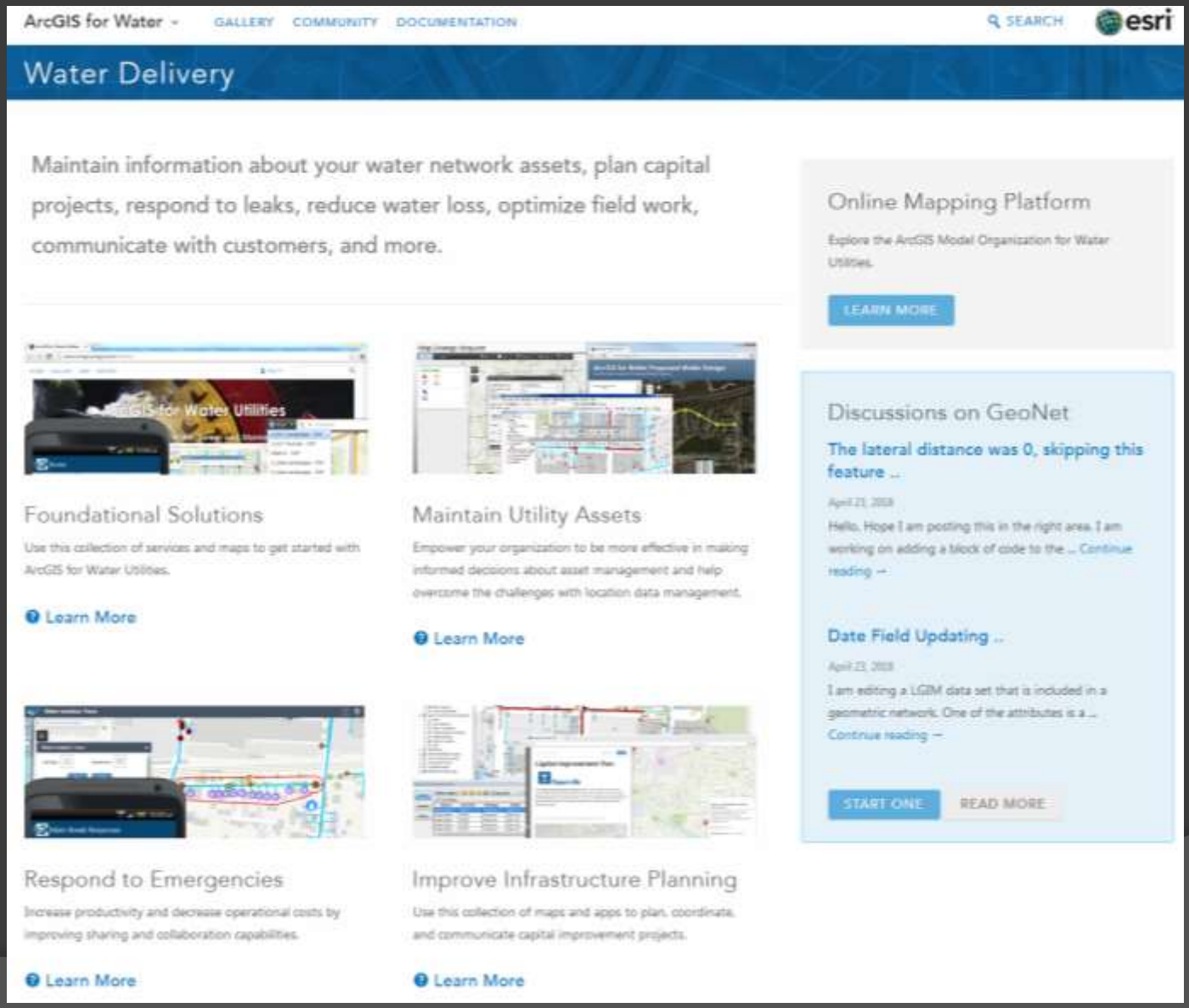
- ArcGIS for Local Government Service Catalog
- ArcGIS Solutions Schema Migration Wizard
- X-Ray for ArcCatalog Add-in
- Set Map Data Sources Tool
- Gizinta GIS Data Movement Tools

TACOMA WATER
TACOMA PUBLIC UTILITIES

RESOURCES & SUMMARY

ESRI Water Solutions Team

http://solutions.arcgis.com/water/water-delivery/



Talk to Jeremiah:

Jeremiah Ervin

Global Water Practice

Esri - One International Court
Broomfield, CO 80021

T 303 449-7779 x8264
M 720 688-3322

jervin@esri.com

TACOMA WATER
TACOMA PUBLIC UTILITIES

Questions?

Andy Simpson, GISP
253-441-4860
asimpson@cityoftacoma.org

TACOMA WATER
TACOMA PUBLIC UTILITIES