



Best Practices for Collecting User Requirements

Gerry Clancy

Glenn Berger

Requirements

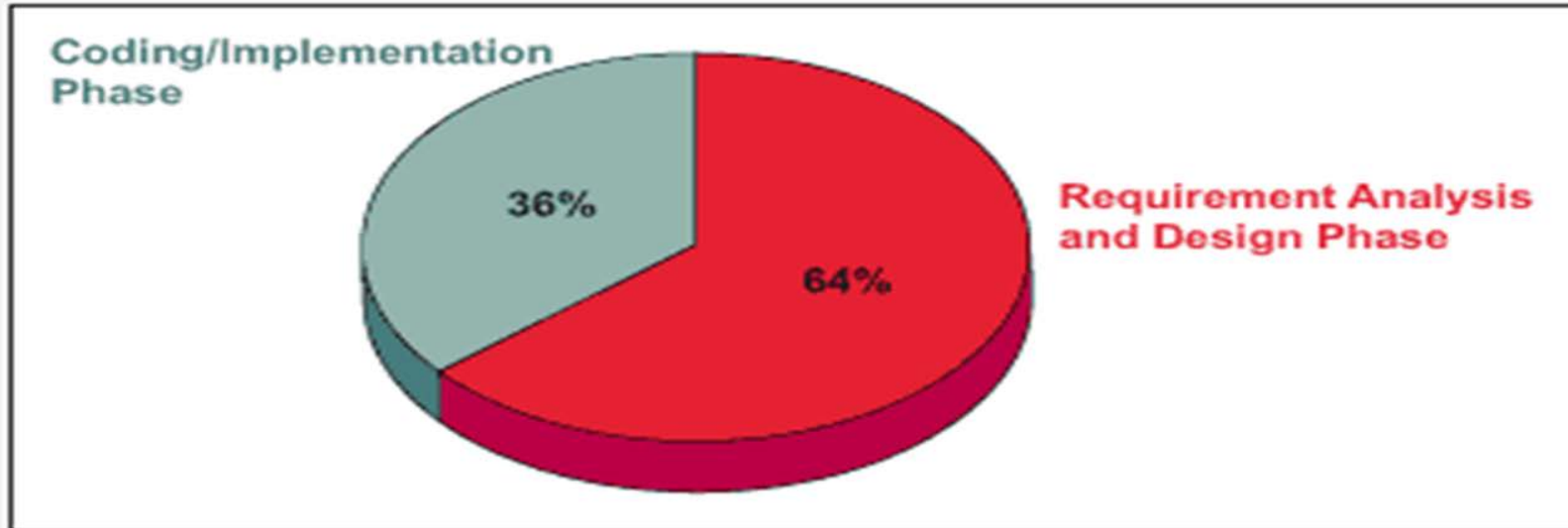
Provide direction for program success



Why Requirements are Important?

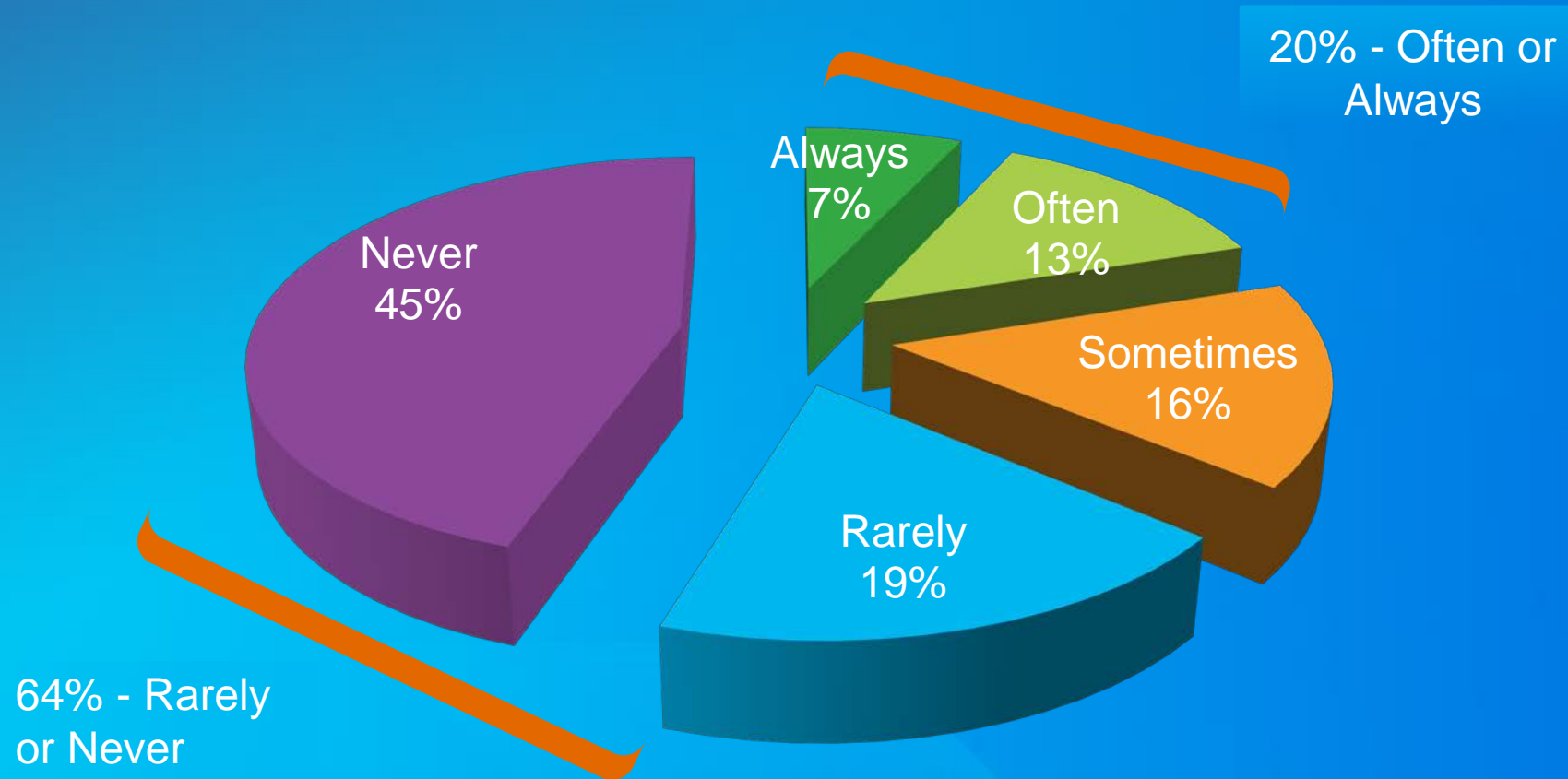
Early mistakes lead to costly fixes

Figure 3: Origin of Software Defects (Source: Crosstalk, the Journal of Defense Software Engineering)



Build for Value

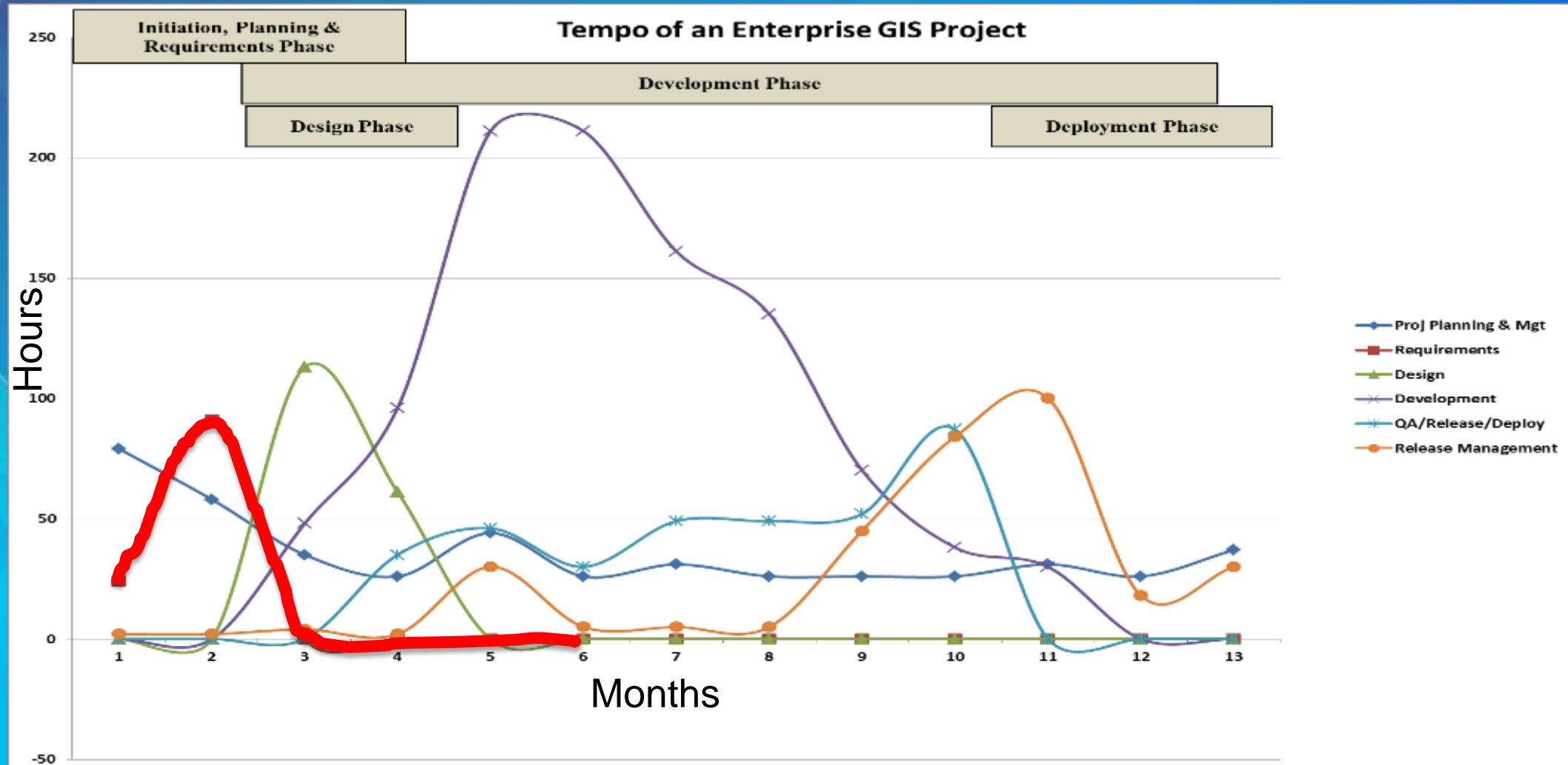
Requirements evolve over time



Standish Group Study Reported at XP2002 by Jim Johnson, Chairman

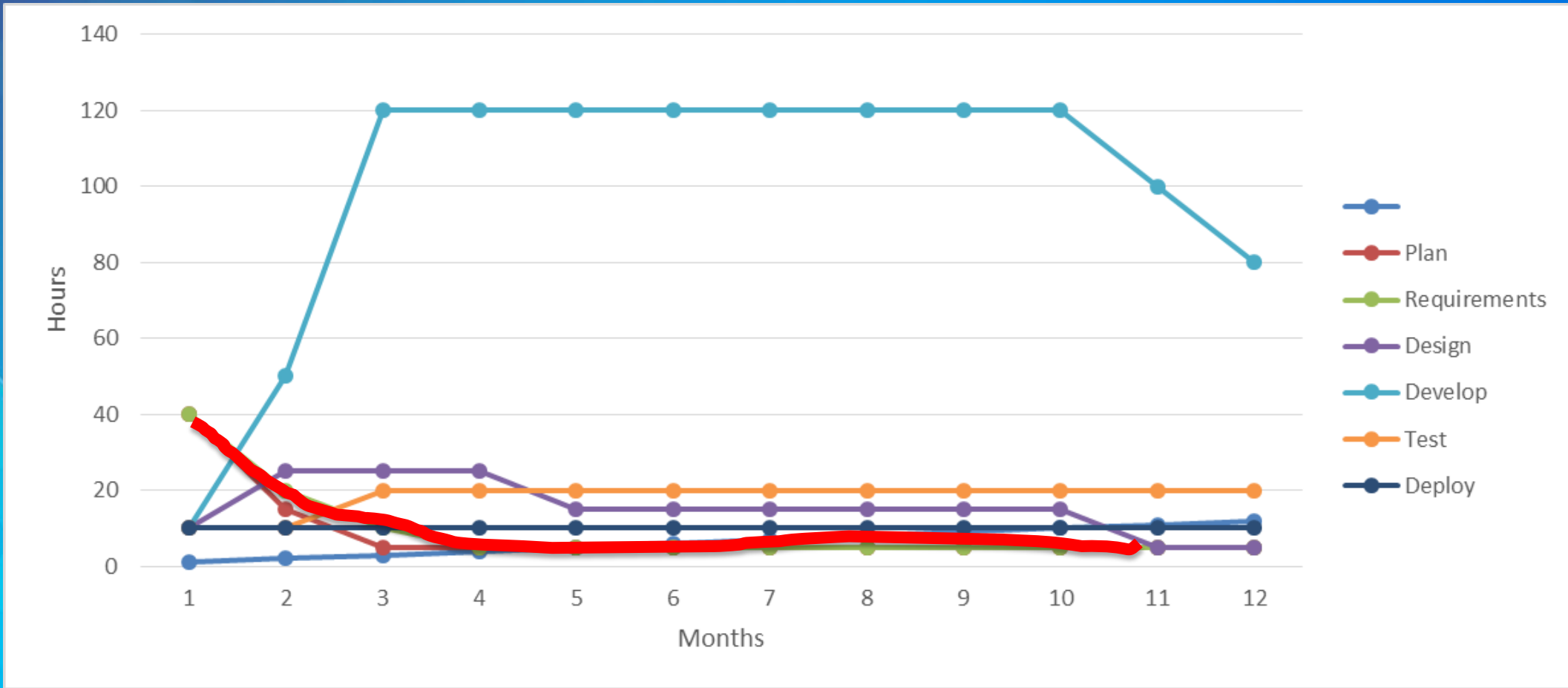
Where do Requirements fit?

Waterfall implementation

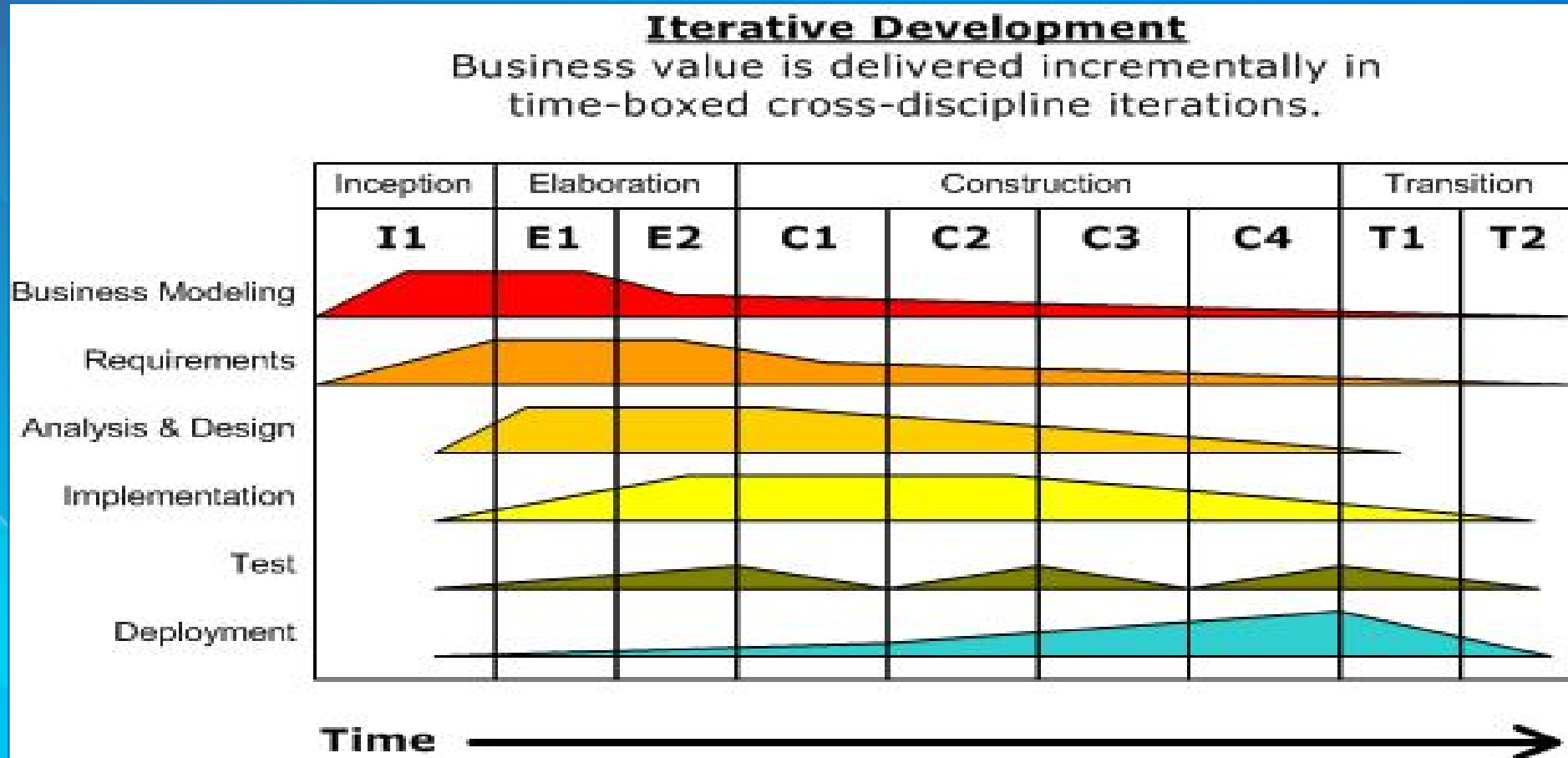


Where do Requirements fit?

Agile implementation

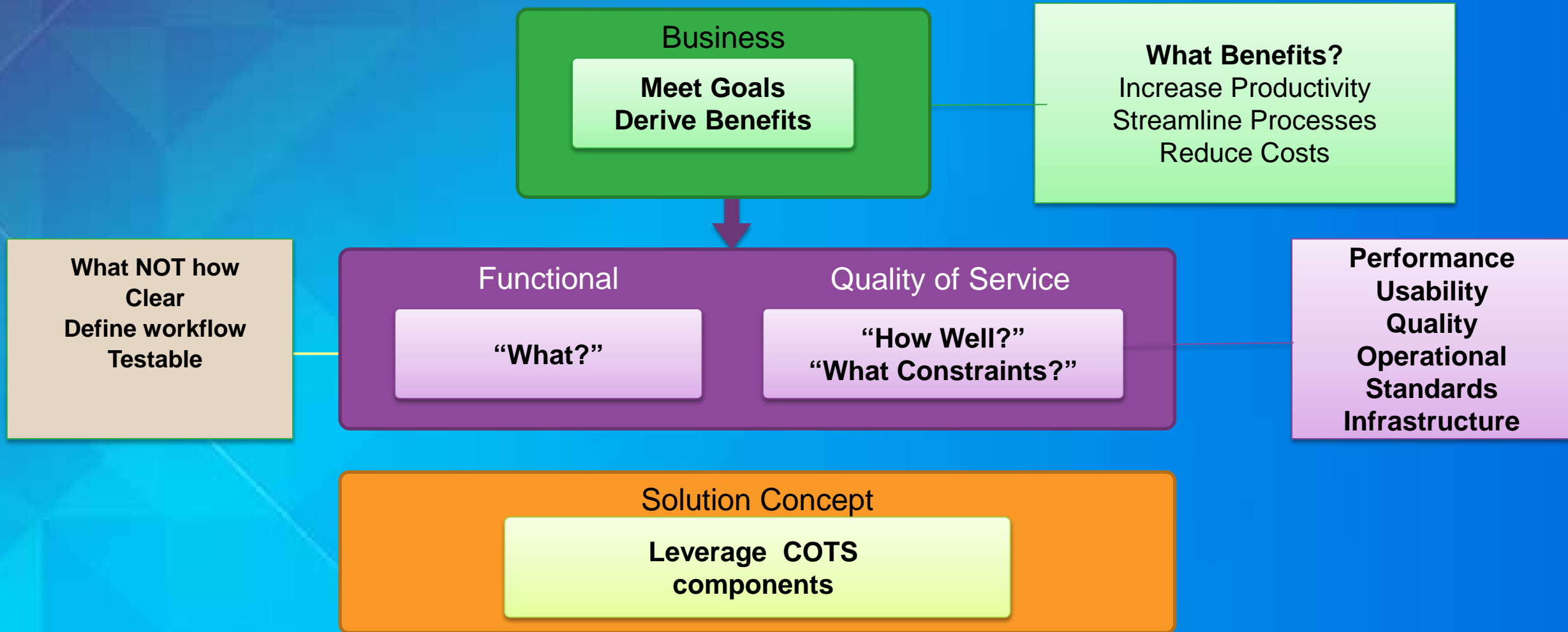


Where do Requirements fit?



Types of Requirements

Business, Functional/Technical, COTS



So how do you get there....

Discuss similar industries



Assess business workflows



Prioritize workflows



Create a plan



Add Details



Conduct kickoff meeting

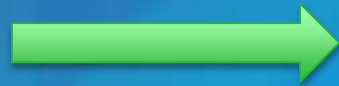


Kickoff meeting

- Bring everyone together
- Executive leadership important
- Why is it important to your organization
- Provide timeline and structure
- Break into smaller working groups

Approach and Agenda

Kickoff meeting



Discuss

- Introductions and overview
- Organizations in similar industries

Assess

- Business functions and workflows
- Workflows that could benefit from location information

Smaller working groups



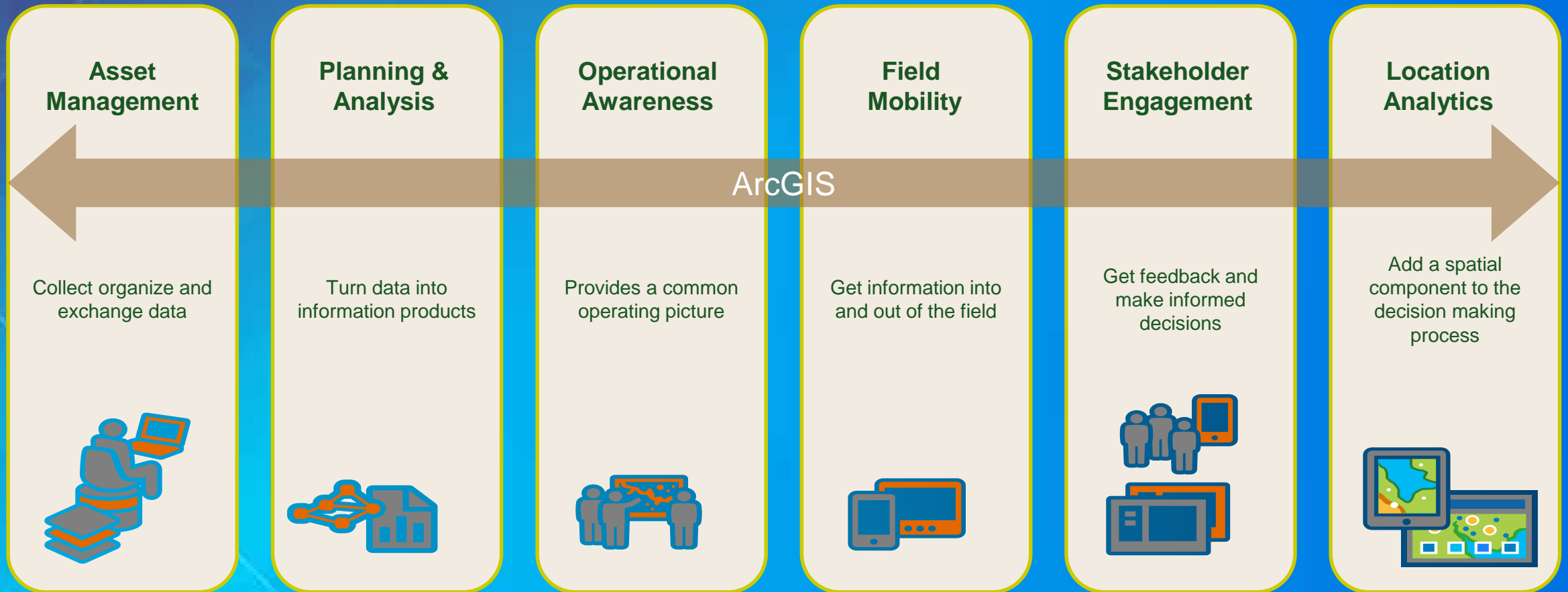
Prioritize

- Prioritize workflows

Summarize

- Business
- People
- Discuss next steps

Similar industries ...what are the GIS Patterns that apply



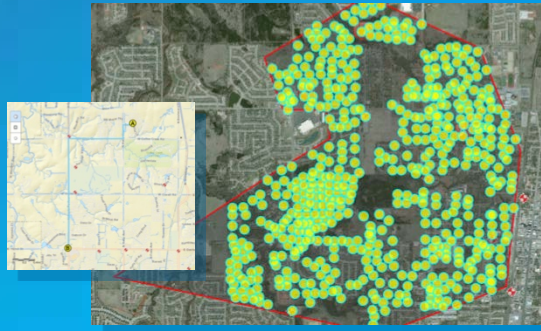
GIS Solutions

Building Permit Management



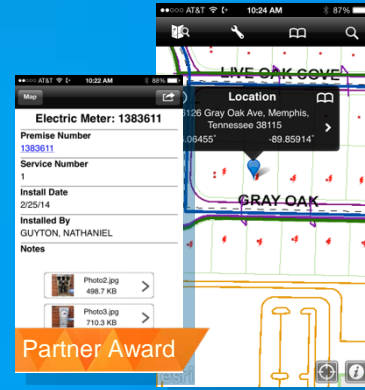
CityView
Canada

Fire Hydrants



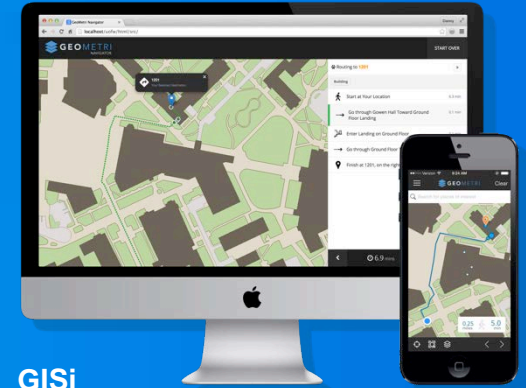
Cityworks
Oklahoma

Meter Data Collection



SSP Innovations
Tennessee

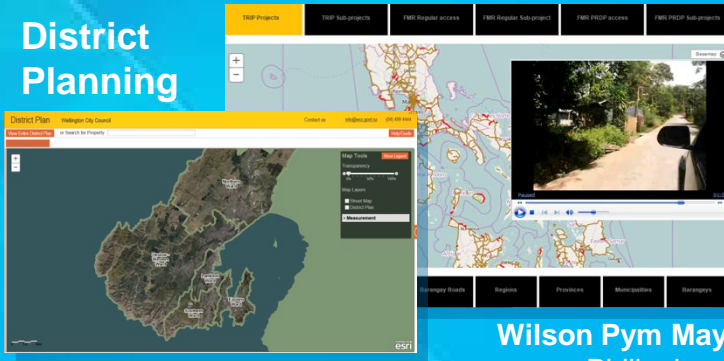
Campus Navigation



GISi
Washington

Road Construction Planning

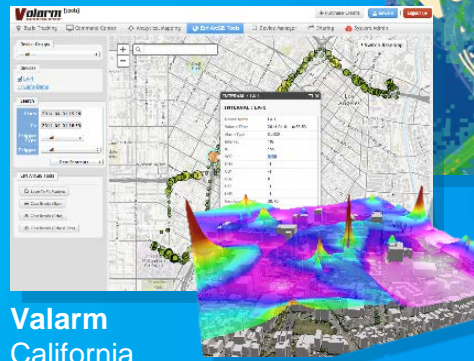
District Planning



Isovist
New Zealand

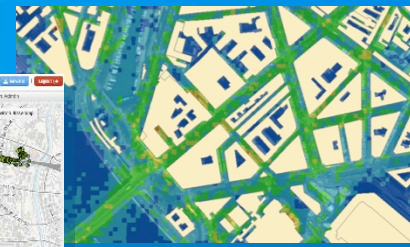
Wilson Pym May
Philippines

Air Quality Sensors



Valarm
California

Air Pollution Analysis



ARIA Technologies
France

Work Orders

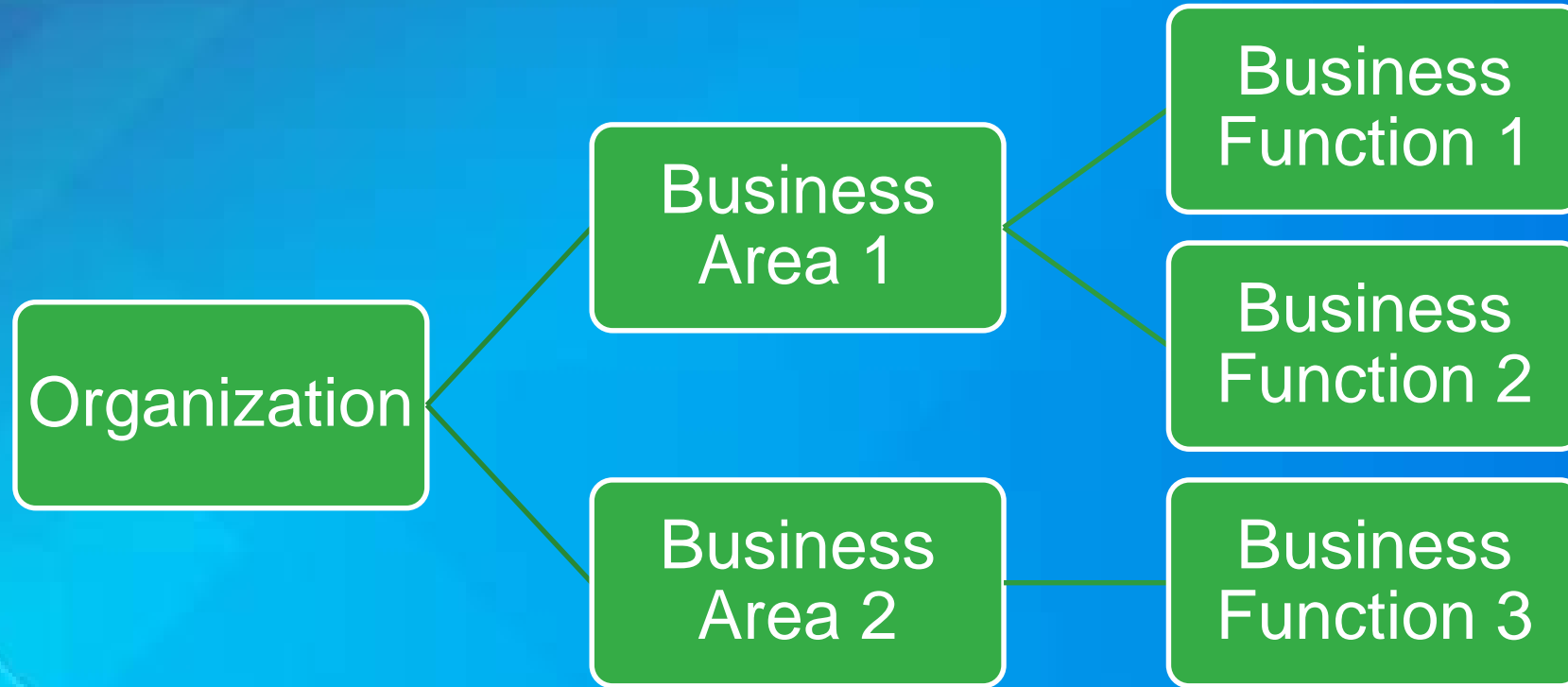


Trimble
Illinois

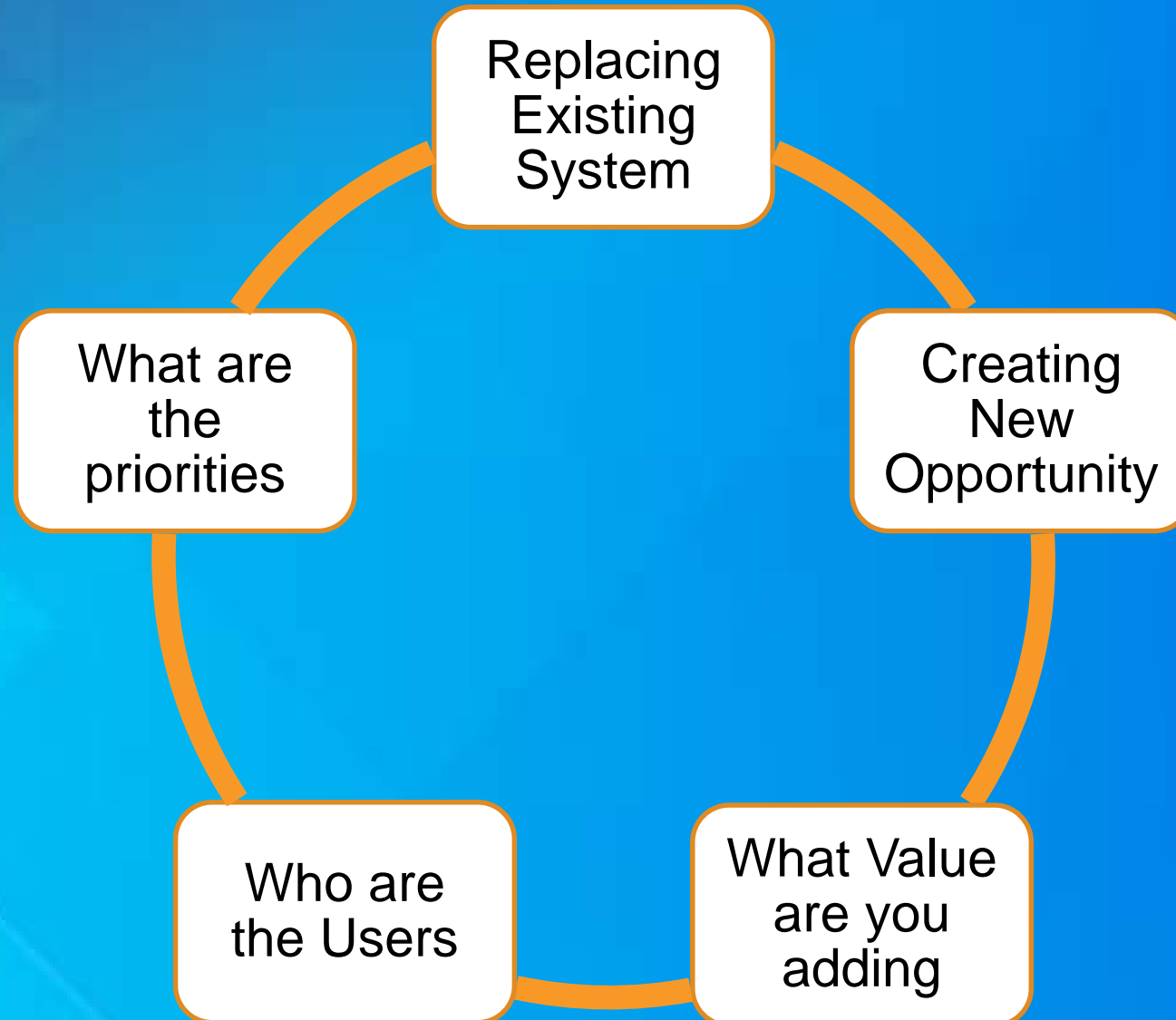
How to collect business needs...

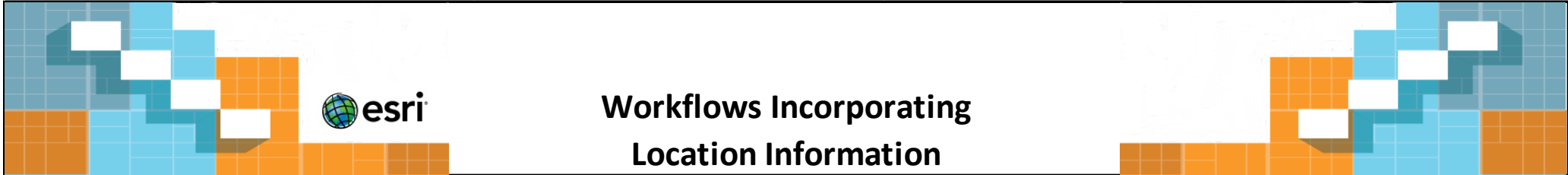
- Key business units
- 5-10 staff in each working group
- Look at your org chart
- Who are the primary users
- What are their business needs

Organization overview



Focus on the business workflow






Workflows Incorporating Location Information

Business Area: [Insert Business Area Here]

Current or new workflow	Use of location information	What's the business value?	Priority <input type="text" value="▼"/>
			High
			Medium
			Low

Water Department

 Workflows Incorporating Location Information			
Business Area: Water Dept.			
Current or new workflow	Use of location information	What's the business value?	Priority <input type="text"/>
Locate water dept. assets in the field	<ul style="list-style-type: none"> • Map of assets by type • Color assets by last maintenance date 	<ul style="list-style-type: none"> • Improve the maintenance program and better manage financial needs 	Low
Manage water leaks	<ul style="list-style-type: none"> • Map of assets by type • Location of leaks, service calls • Map showing pipe segments affected by leak (upstream, downstream) • Location of field crews • Customer locations (addresses, service, meter) 	<ul style="list-style-type: none"> • Reduce water waste • Reduce infrastructure damage • Improve service request response time • Improve budgeting of infrastructure projects • Preventive maintenance 	High
Identify Properties in Service Area Not Connected to System	<ul style="list-style-type: none"> • Create a map of properties and color by usage 	<ul style="list-style-type: none"> • Potential additional revenue stream 	Medium
Coordinate sampling program	<ul style="list-style-type: none"> • Identify sample location on map color by sample type 	<ul style="list-style-type: none"> • Improve the sampling rate by getting better coverage across county 	Low

So what should be in your GIS Plan?

- Vision statement
- Key workflows
- Approach – lifecycle, budget and staffing
- Key things you need from the rest of the organization
- Schedule – overview of key milestone target dates
- Assumptions, dependencies and risks
- Appendices – WBS, roles, key points of contact etc.

Requirements and Analysis

● You have a set of preliminary workflows

● Analyze and flesh out requirements

● What information is not clear?

Next Steps – How to add details to your business requirements

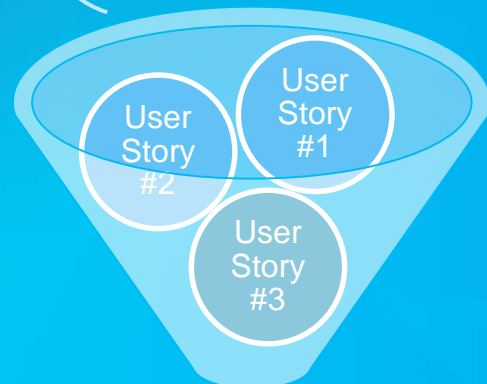
Evolutionary Refinement of Requirements

Product Backlog

1		
2		
3		
4		
5		

Requirements

- Who is it for?
- What is the result?
- Why is it needed?



Sprint Plan/Backlog



Tasks



Working Increment

User Story

- **Simple, brief descriptions of functionality**
- **Primarily from a user (role) perspective**
- **Sized for planning**
- **Testable**



focus on the user

**As a [role], I can
[feature] so that [reason]**

Field Worker

Real Estate
Manager

Public Citizen

Data Provider

Analyst

User Stories

Simple and concise

As a real estate manager, I need to interact with a map to explore new locations.

As a data provider I need to be able to upload my data to the client on a monthly basis, so that I can provide the most up-to-date data for analysis.

As a public citizen, I need to interact with a map to see where new permits are allowed and potential site my new business.

As an analyst, I need the ability to create a map with pop-ups to build easy-use-maps for management.

As an analyst, I need to the ability to run hurricane models from Provider X and see the results on a map, so that I can better understand the impact on our book of business.

As a real estate manager, I need to receive information by clicking on potential sites to better understand the property.

As a real estate manager, I need interactive map capability on my iPad so that I can travel minimalistic during site visits.

User stories

facilitate a conversation with the team



Hey! Something to look at, talk about, comment on, react to...



The team



User Stories

Progressively decompose your stories

As a real estate manager, I need to interact with a map to explore new locations.

As an analyst, I need the ability to create a map with pop-ups to build easy-use-maps for management.

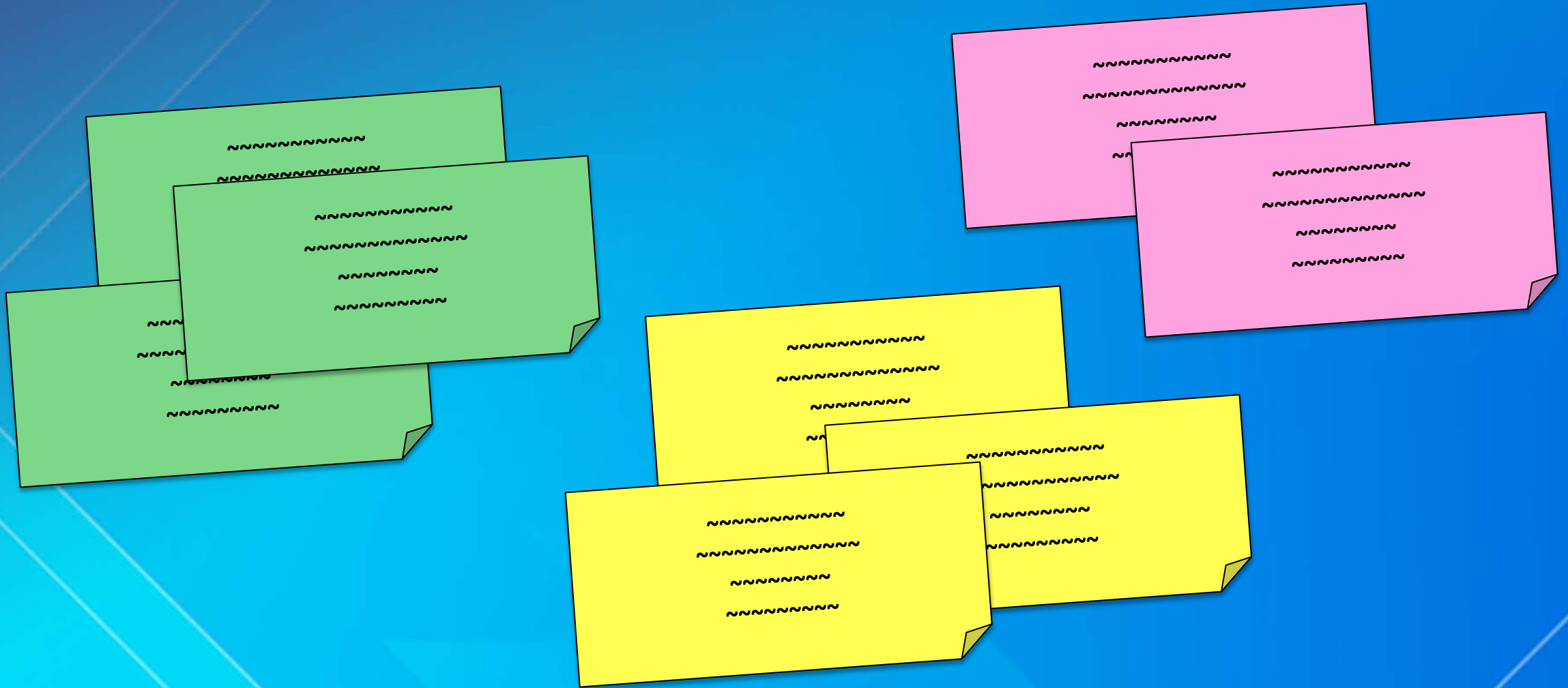
As a real estate manager, I need to receive information by clicking on potential sites to better understand the property.

As a real estate manager, I need to be able to see a pie chart of surrounding demographics so that I can match consumer demand with product.

As a real estate manager, I need interactive map capability on my iPad so that I can travel minimalistic during site visits.

User Stories

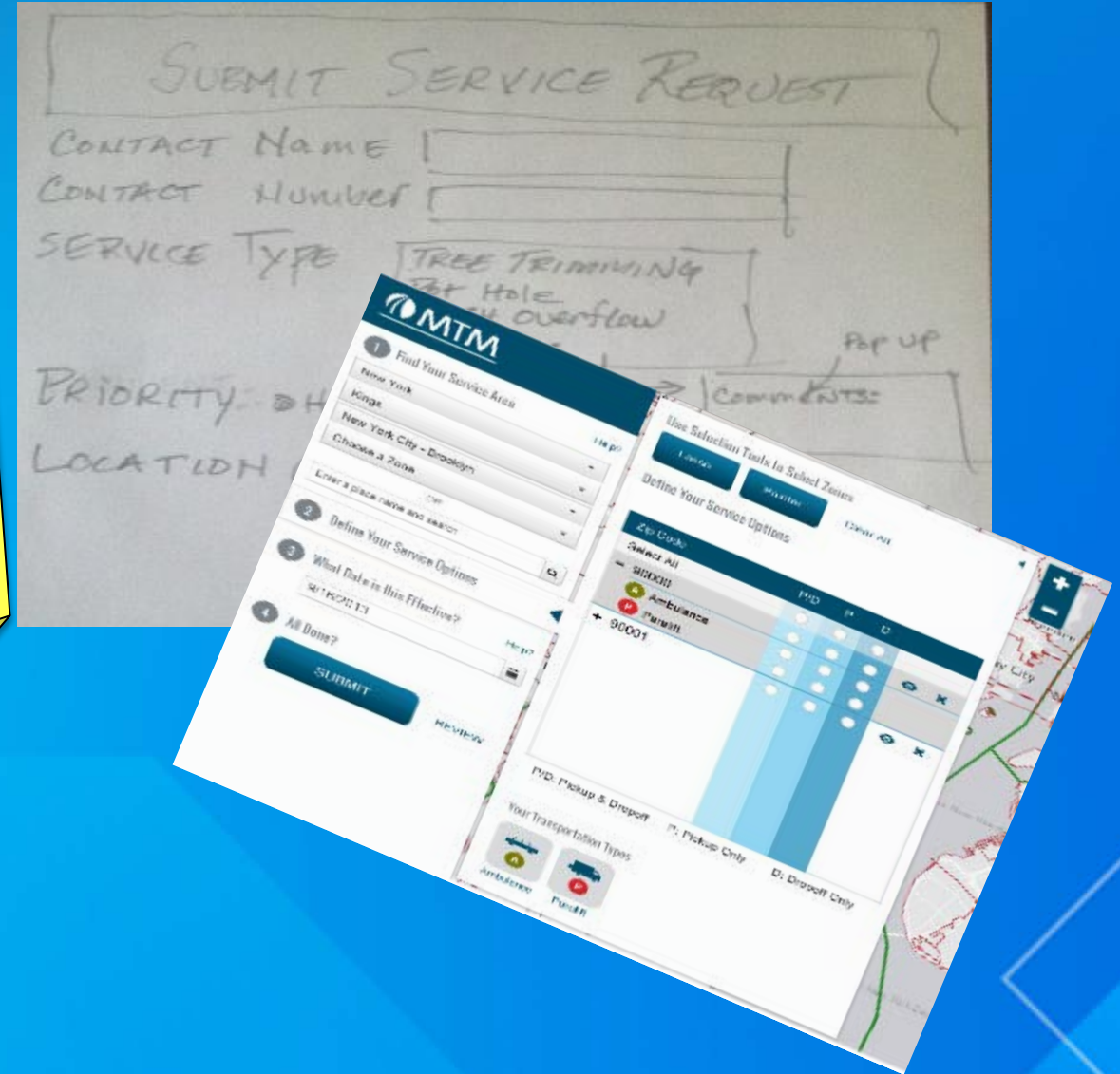
Consider grouping them into themes



Not always about [a user]

Capture key concepts

As a user interface, I need to look like the following image so that I can be intuitive to use



Use Paper Cards

Keep them simple and concise

As a Farmer, I need to be able to overlay existing data on top of my basemap in order to see different data while working in the field.

39776

Browser Back Warning

As a Groove user, I want to be warned if I hit the 'back' button in my browser so that I don't lose my data in the application.

Acceptance:

- user receives pop-up with "Cancel" or "Continue" options
- user can "cancel" and stay on the same page
- user can "continue" and be directed to previous page
- user will be logged out of application if they choose "continue"
- Functionality in IE, Chrome, Firefox browsers

Example – Leak Management – Isolation Trace

Decomposing work into manageable pieces



Keep user stories visible

Focus of daily meetings



Requirement Management Tools

Licensed and Open Source

Microsoft Team Foundation Server (TFS)

The screenshot displays the TFS web interface for requirement management. At the top, there are navigation tabs for 'Developing Requirements', 'Work Breakdown [Results]', and 'Start Page'. Below this is a toolbar with various icons for actions like 'Save Results', 'Refresh', and 'Open in Microsoft Office'. A status bar indicates 'Query Results: 12 items found (4 top level, 8 linked items, 1 currently selected). The query has been modified.'

ID	Iteration Path	Title	Requirement Type	Work Item...	Prior...	Assigned ...	State	Req...
1498	SystemX\Increment 1	Solution should allow anyone in public to submit a request for service via a we...	Scenario	Requirement 2		Glenn Berger	Proposed	
1499	SystemX\Increment 1\Build 1	User has capability to add name and contact	Feature	Requirement 2		Glenn Berger	Proposed	
1500	SystemX\Increment 1\Build 1	System generates work order ID	Feature	Requirement 2		Glenn Berger	Proposed	
1501	SystemX\Increment 1\Build 3	System verifies email address	Feature	Requirement 2		Glenn Berger	Proposed	

The detailed view of requirement 1498 shows the following information:

- Title:** Solution should allow anyone in public to submit a request for service via a web application
- Requirement Type:** Scenario
- Assigned To:** Glenn Berger
- State:** Proposed
- Reason:** New
- Classification:** Area: SystemX, Iteration: SystemX\Increment 1
- Planning:** Priority: 2, Urgency: Pending, Blocked: No, Committed: No
- Description:** Use Case No. 001. Description: Submit service request. 1>User is prompted for name and contact info. 2>User can select 'no'. 3>User is prompted with service types: tree trimming, pot hole, trash overflow, graffiti or other. 4If 'other' user is prompted for comments. 5>User is prompted to assign priority (1-10). 6>User is prompted to enter location via street intersection, street address or identification on a map. 7>System provides tracking number to user. 8>User is prompted if they want to be notified. 9>Upon work order completion user is emailed or contacted that issue has been resolved.
- History:**
 - 7/16/2012 1:42:48 PM Edited by Glenn Berger
 - 7/16/2012 1:44:06 PM Edited by Glenn Berger
 - 7/16/2012 1:44:54 PM Created by Glenn Berger

JIRA

The screenshot shows the JIRA issue tracking interface. At the top, it states 'Displaying issues 1 to 11 of 11 matching issues.' Below this is a table of issues with columns for Key, Summary, Sub-Tasks, Assignee, P (Priority), Status, Resolution, Created, Updated, Due, and Fix Version.

T	Key	Summary	Sub-Tasks	Assignee	P	Status	Resolution	Created	Updated	Due	Fix Version
	SYSX-6	Solution should allow anyone in public to submit a request for service via a web application	SYSX-7, SYSX-8, SYSX-9	Glenn Berger	High	Open	Unresolved	07/16/12	07/16/12	08/17/12	
	SYSX-7	SYSX-6 / User has capability to add name and contact		Glenn Berger	High	Open	Unresolved	07/16/12	07/16/12	08/17/12	
	SYSX-8	SYSX-6 / System generates work order ID		Glenn Berger	High	Open	Unresolved	07/16/12	07/16/12	08/17/12	
	SYSX-9	SYSX-6 / System verifies email address		Glenn Berger	High	Open	Unresolved	07/16/12	07/16/12	08/31/12	
	SYSX-10	Solution should allow user to enter 'service type' information	SYSX-11	Glenn Berger	High	Open	Unresolved	07/16/12	07/16/12	08/17/12	
	SYSX-11	SYSX-10 / Application presents valid choices to user (tree trimming, pot hole, trash overflow other)		Glenn Berger	High	Open	Unresolved	07/16/12	07/16/12	08/17/12	
	SYSX-12	Solution is expected to streamline process of how the public provides information	SYSX-13	Glenn Berger	High	Open	Unresolved	07/16/12	07/16/12	09/07/12	
	SYSX-13	SYSX-12 / If returning user, then system populates email address or name based on field entry		Glenn Berger	High	Open	Unresolved	07/16/12	07/16/12	09/07/12	
	SYSX-14	Solution should not require GIS expertise	SYSX-16, SYSX-17	Glenn Berger	High	Open	Unresolved	07/16/12	07/16/12	09/07/12	
	SYSX-16	SYSX-14 / User can enter interaction		Glenn Berger	High	In Progress	Unresolved	07/16/12	07/16/12		
	SYSX-17	SYSX-14 / User can select on a map		Glenn Berger	High	Open	Unresolved	07/16/12	07/16/12		

At the bottom of the page, it again states 'Displaying issues 1 to 11 of 11 matching issues.'

Requirements Process

Things to avoid

- Avoid long lists of requirements
- Do not be judgmental
- Prepare for conflicting requirements
- Avoid requirements that are ambiguous
- Avoid requirements that describe HOW (unless you are using COTS approach)
- Don't forget to prioritize
- Requirements must have a "reason"



Requirements

THE most important part of a project

- **Solid requirements gathering leads to successful projects**
- **Consider solution, COTS capabilities before collecting additional requirements**
- **Involve the right people in the process**
- **Pick a methodology that fits your project**
- **Focus on the level of detail that is appropriate**
- **Important to prioritize and allocate**
- **Invest plenty of time to secure customer approval**

References

- *Agile & Iterative Development: A Manager's Guide* by Criag Larman, Addison-Wesley, 2003
- *Software Requirements* (2nd Edition) by Karl Wiegers, Microsoft Press, 2003
- *Use Case Driven Object Modeling with UML* by Doug Rosenberg and Matt Stephens, Apress, 2008
- *Writing Effective User Cases*, A Cockburn, Addison-Wesley, 2001
- *Agile Development with ICONIX Process* by Doug Rosenberg, Matt Stephens, and Mark Collins, Apress, 2005

References

www.agilemanifesto.org

<http://alistair.cockburn.us/>

<http://www.iconixsw.com/>

<http://www.pmi.org/default.aspx>

Where to go From Here?

* Repeat Sessions

Tuesday	Time	Room
Managing an Enterprise GIS Project: What You Need to Know from the Start *	8:30-9:45am	08
Establish an Initial Operating Capability for Your Enterprise	10:15-11:30am	06C
Managing an Enterprise GIS Project: Best Practices for Collecting User Requirements*	10:15-11:30am	08
Enterprise GIS: Security Strategy	10:15-11:30am	06E
Enterprise GIS: Performance and Scalability	1:30-2:45pm	06E
Managing an Enterprise GIS Project: Create a Manageable Plan	3:15- 4:30pm	06C

Wednesday	Time	Room
Managing an Enterprise GIS Project: What You Need to Know from the Start*	1:30-2:45pm	06E
Deploying Apps in the Cloud	3:15-4:30pm	17A
Inject GIS into your Business Systems	3:15-4:30pm	06E
Enterprise GIS: Performance and Scalability*	3:15-4:30pm	06C

Thursday	Time	Room
Enterprise GIS: Database Planning	8:30-9:45am	04
Enterprise GIS: Architecture Deployment Options	1:30-2:45pm	06E
Managing an Enterprise GIS Project: Best Practices for Collecting User Requirements *	1:30-2:45pm	15B
Deploying Apps in the Cloud*	3:15-4:30pm	06C
Enterprise GIS: Security Strategy*	3:15-4:30pm	06E

Thanks

Gerry Clancy – gclancy@esri.com

Glenn Berger – gberger@esri.com



Understanding our world.