

Upgrading The Tennessee DOT TRIMS Application To A New GIS Platform

Presented by:

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Project Steps

- Develop a T-DOT Migration Plan
 - Did not recommend a “TRIMS” Replacement
 - Does not Select or Recommend the final system
 - Provides Recommendations and Pathway to Selecting a new Platform
- Perform Migration & Upgrade



Project Goals

- Migrate from the current MGE and MicroStation environment
- Take advantage of current software
- Allow improvements in the data processing workflow
- Consolidate software platforms so that a single GIS platform is used for all spatial operations.
- Better Utilize State's Enterprise GIS database residing in Oracle Spatial.
- Reduce or eliminate customized third party programs and subroutines.
- Utilize "Off the Shelf" software wherever possible.
- Re-engineer or streamline the data editing and output processes to improve efficiency.
- Create an "open ended" system that will allow for cost effective enhancements and upgrades as required.



What is TRIMS?

- Roadway information on the highways, roads, and streets in Tennessee.
- Information such as
 - Surface condition breaks
 - Geometrics of the road
 - Land use
 - Other features of the road
- Used throughout TDOT for data locations and complex analysis
- Inventory is collected on over 87,000 miles of highways and roads in Tennessee



What is TRIMS?

- Tennessee Roadway Information Management System
 - Field collected using Global Positioning System (GPS) vans with distance measurement.
 - Loaded into an editing package
 - MGE GIS by Intergraph Corporation
 - MicroStation CADD
 - Custom applications and processes

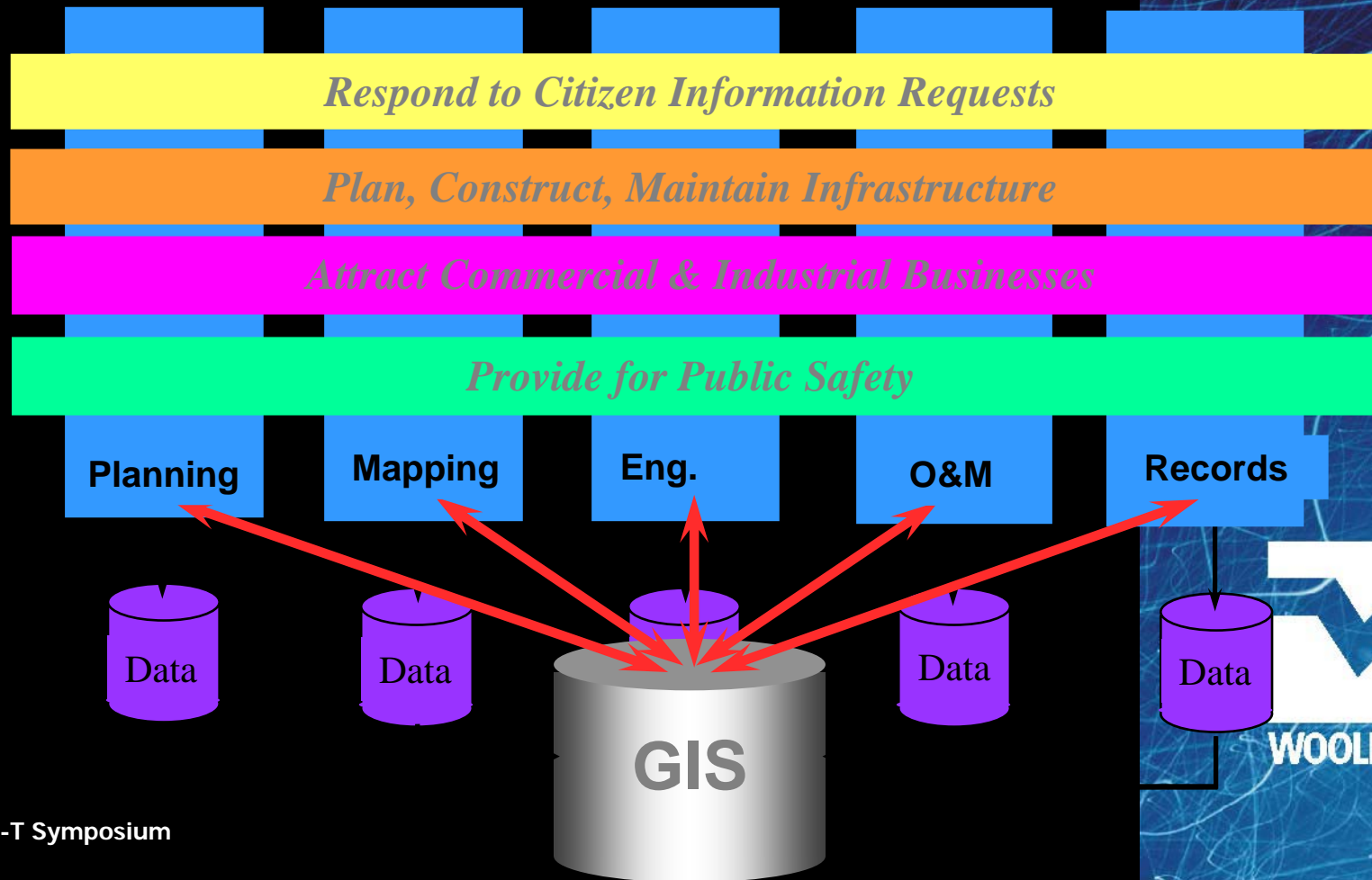


Project Approach

- Phase 1 – Process Documentation
- Phase 2 – “Best Practices” Study
- Phase 3 – Cost-Benefit Analysis
- Phase 4 – Data Migration Plan



Enterprise GIS Is A Spatial Integrator of "Islands of Information"





Needs Assessment



Implementation Plan

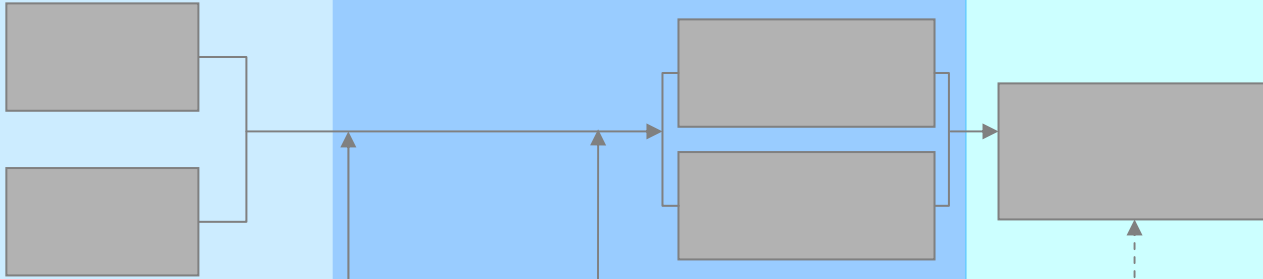


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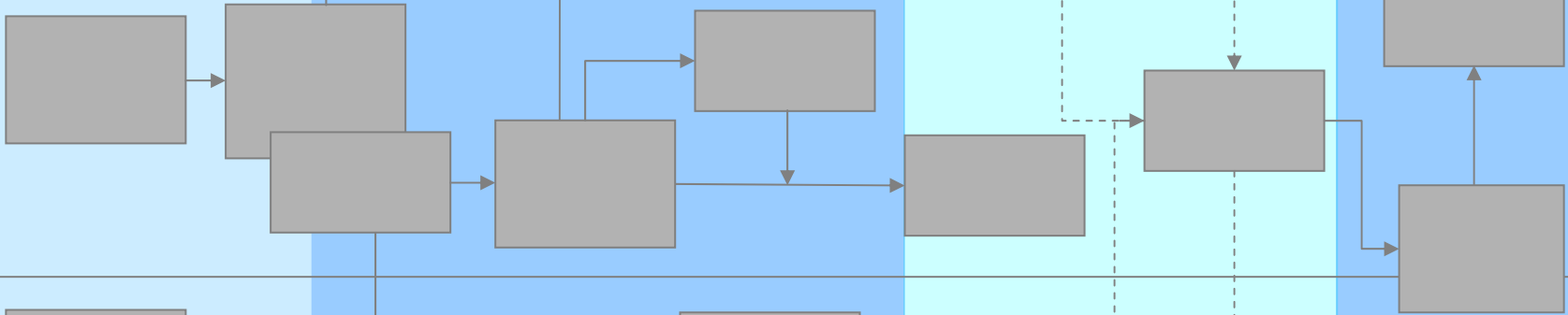


TRANSITION

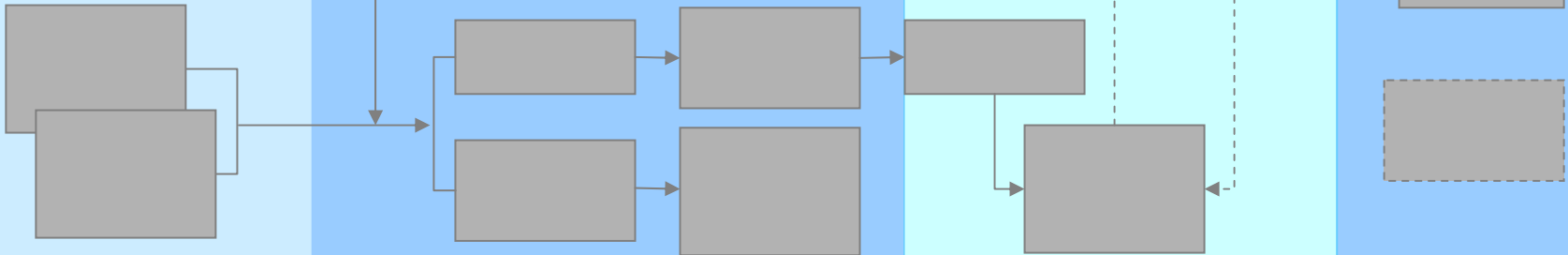
FUNCTIONS



TECHNOLOGY



DATA



PEOPLE





Needs Assessment



Implementation Plan



BUILD



TRANSITION

FUNCTIONS

Document Workflow Processes

Define Application Requirements

TECHNOLOGY

Evaluate Existing Computing Environment

DATA

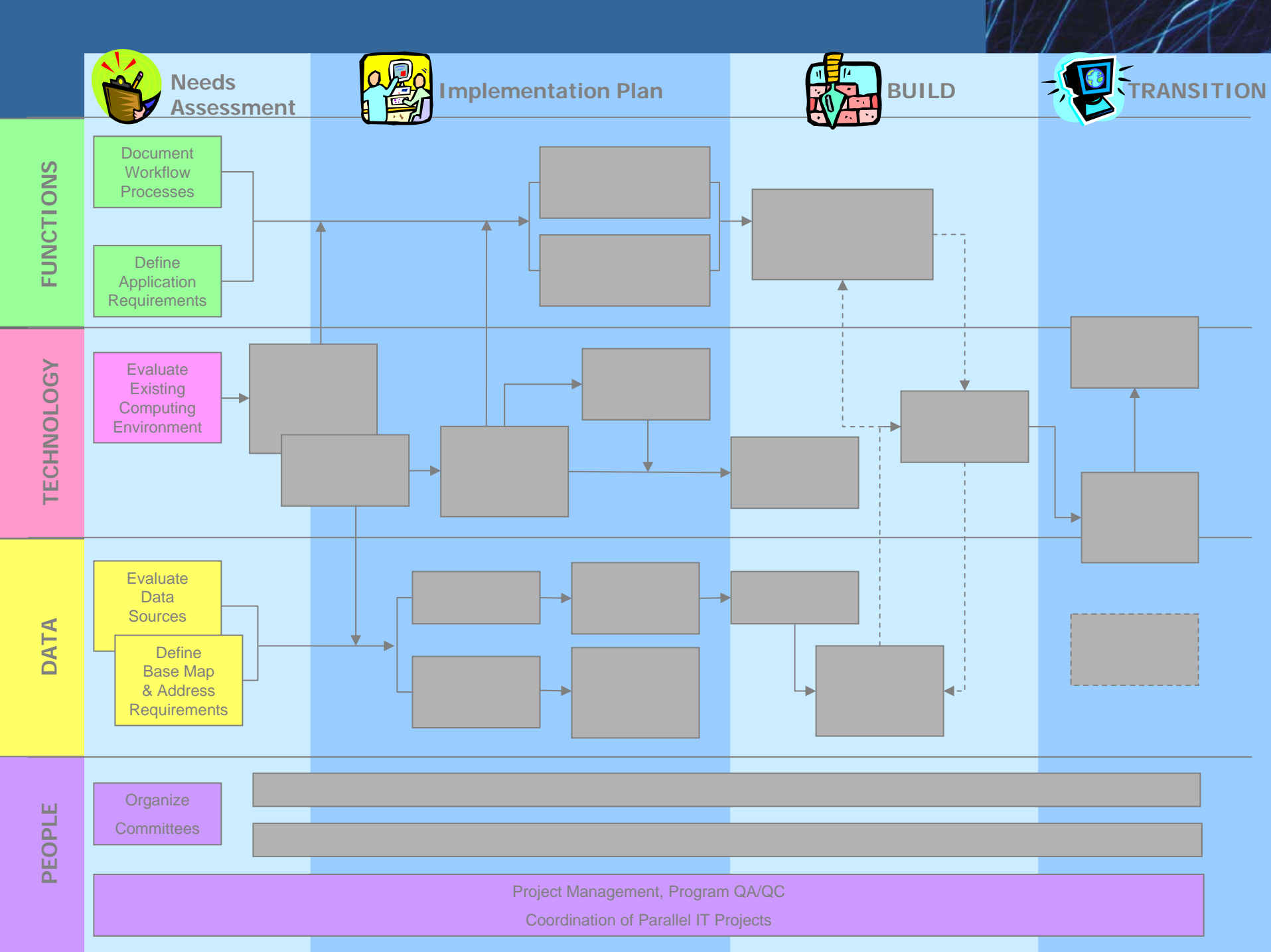
Evaluate Data Sources

Define Base Map & Address Requirements

PEOPLE

Organize Committees

Project Management, Program QA/QC
Coordination of Parallel IT Projects





Needs Assessment



Implementation Plan

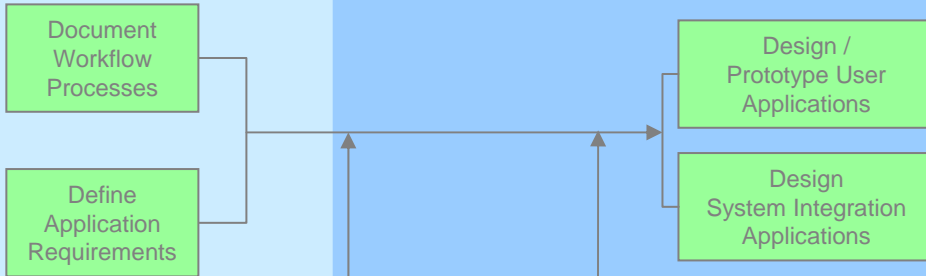


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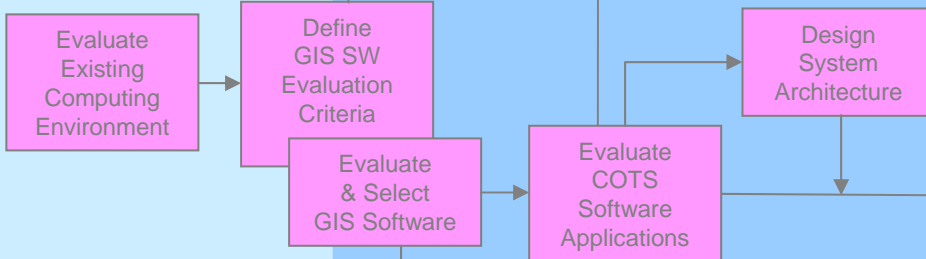


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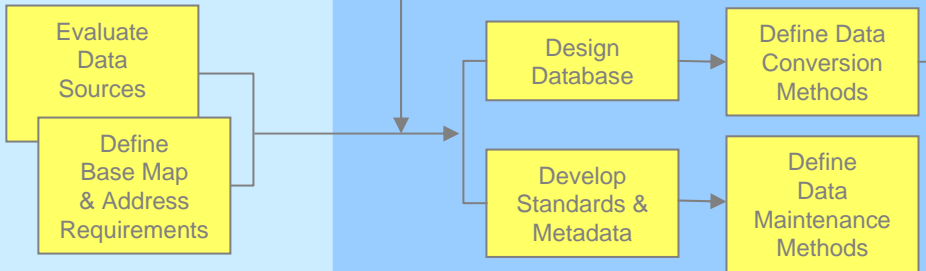
FUNCTIONS



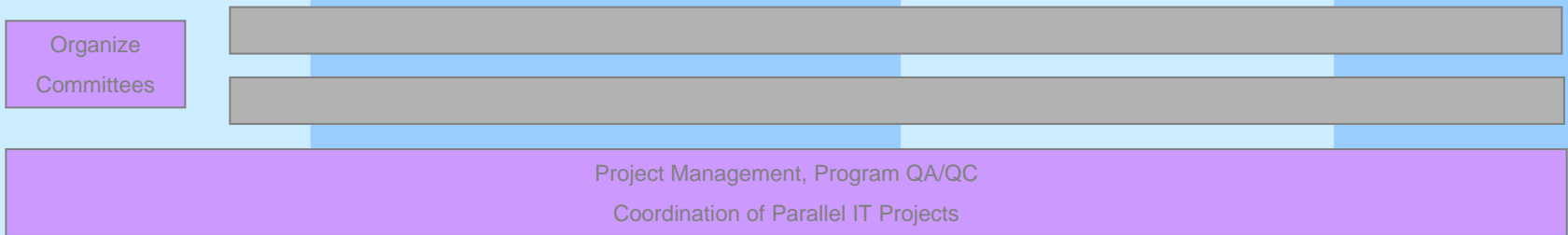
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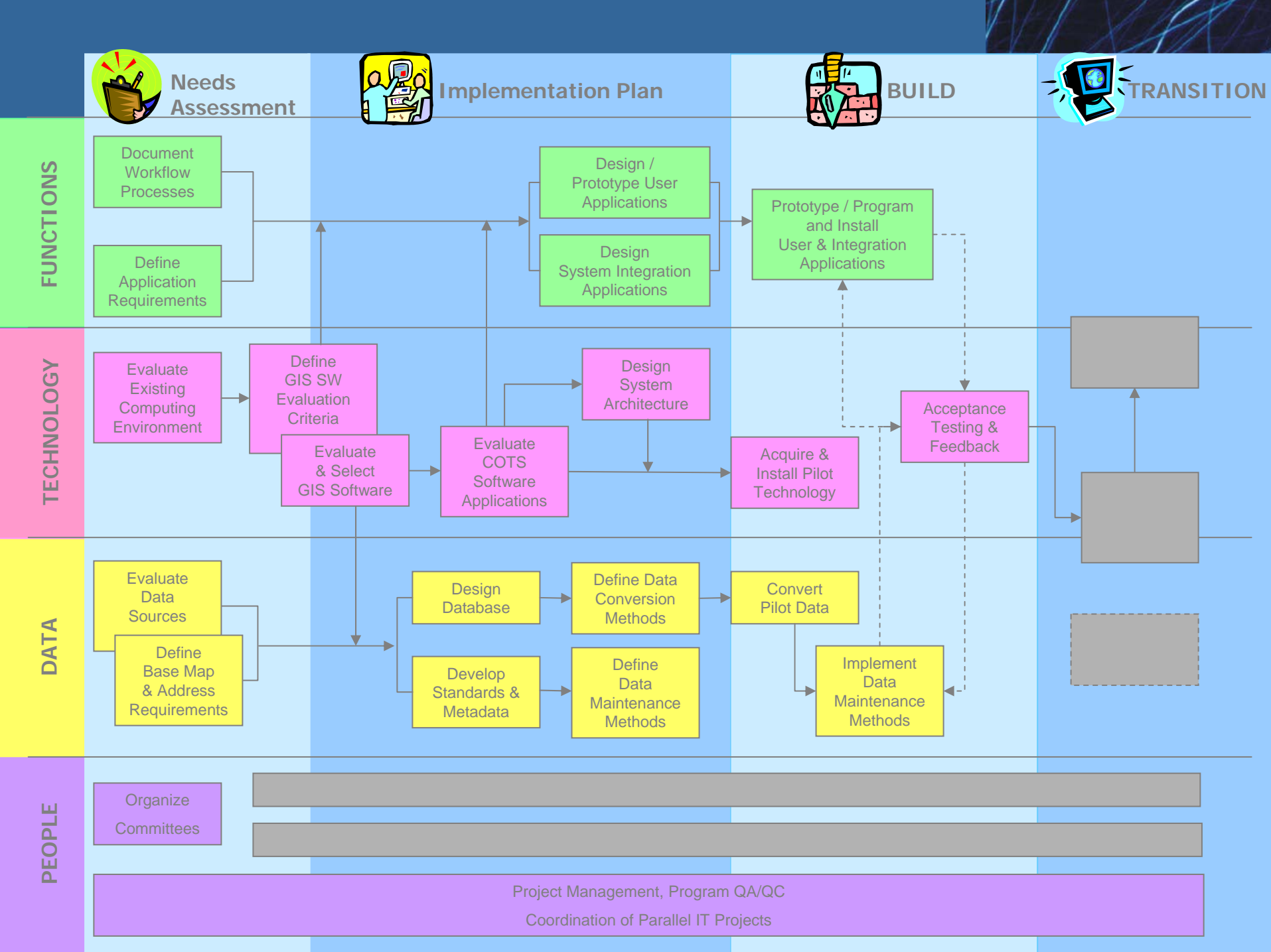


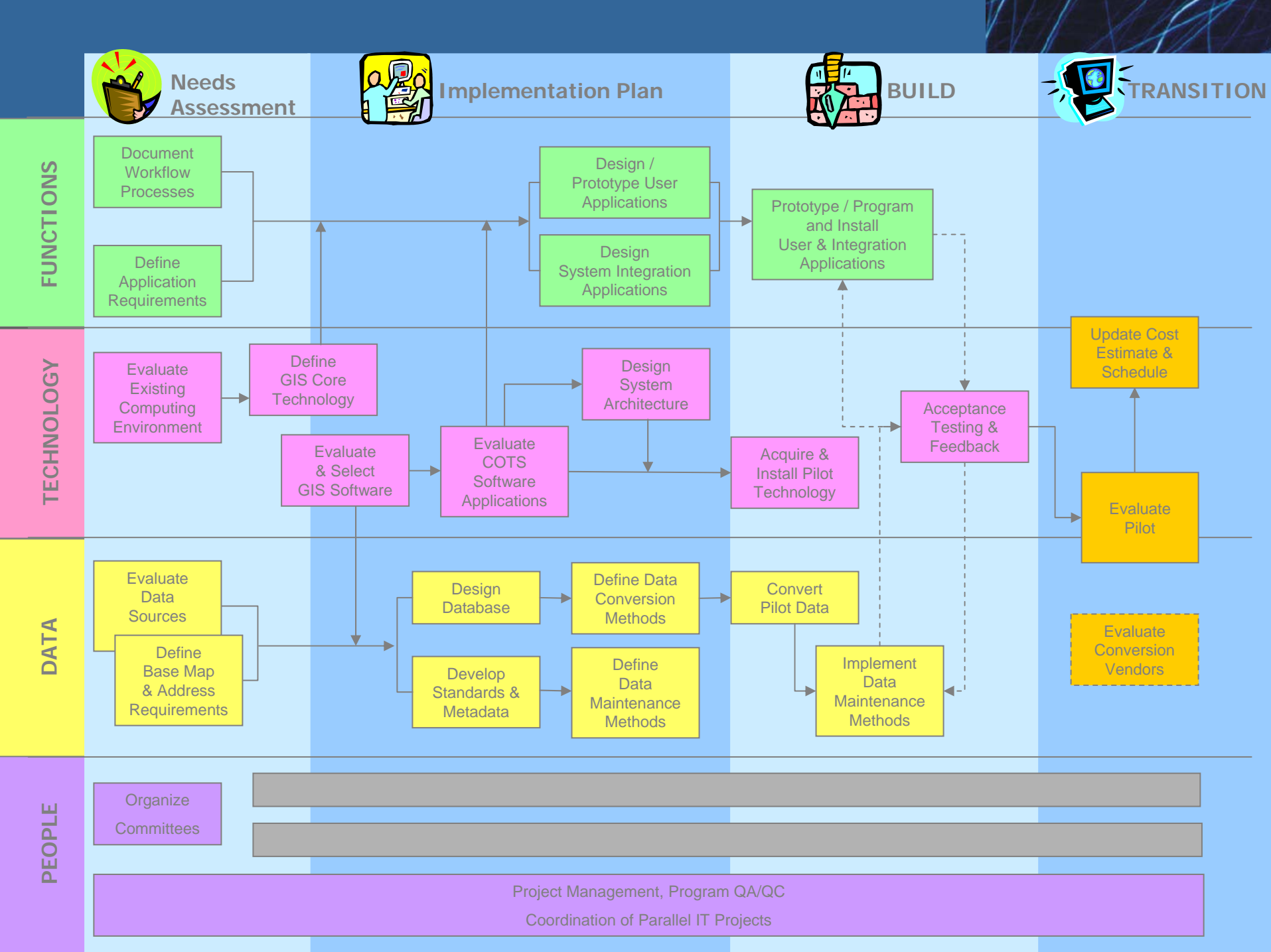
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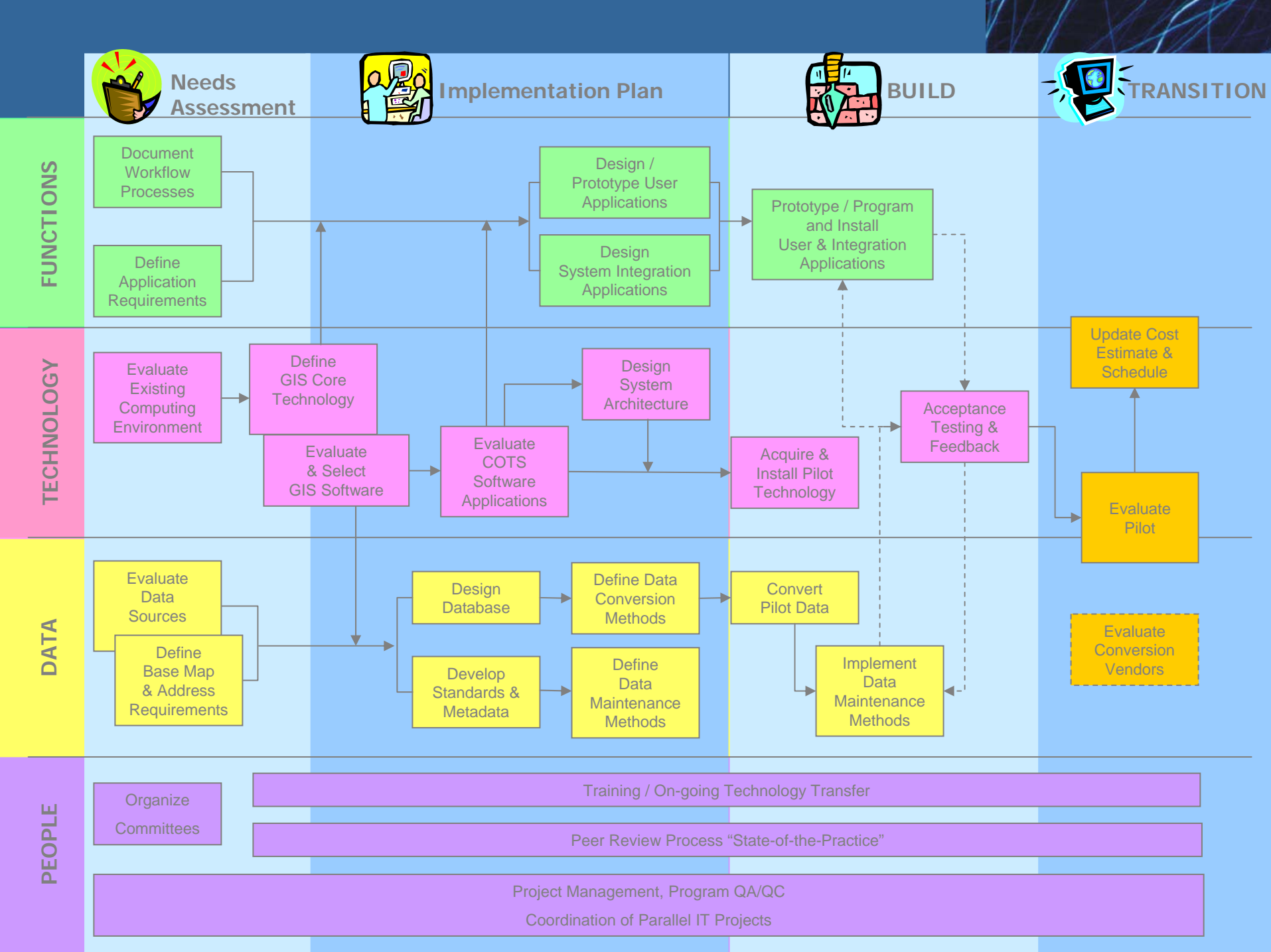


PEOPLE



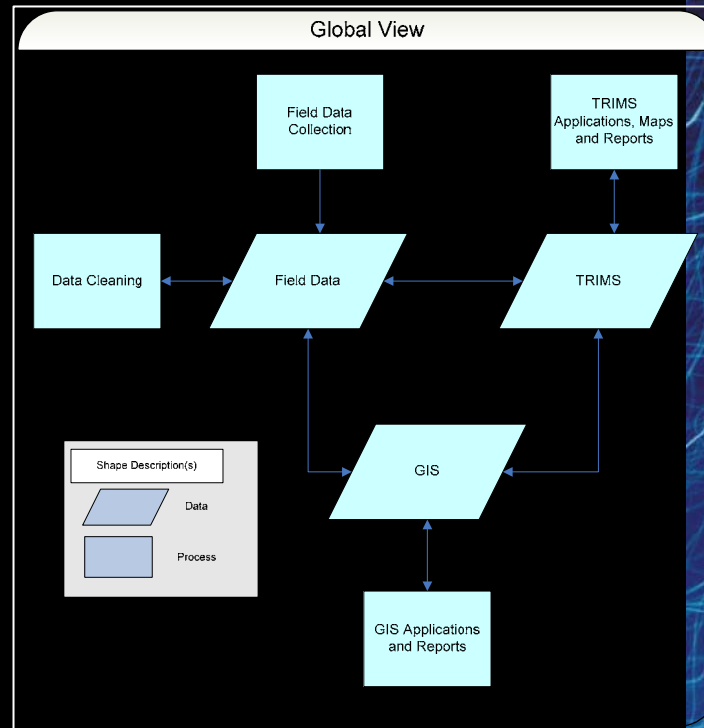




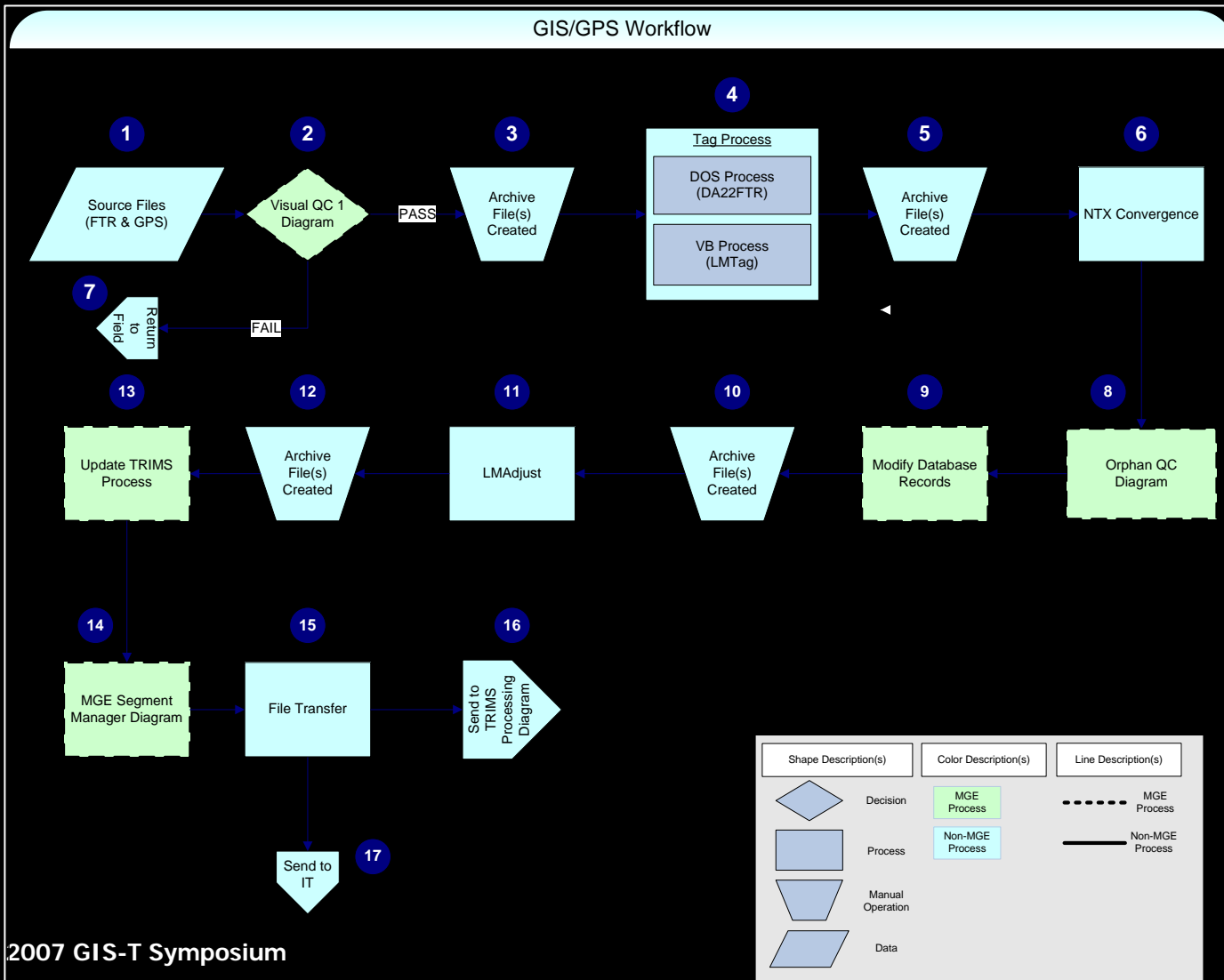


Phase 1 – Process Documentation

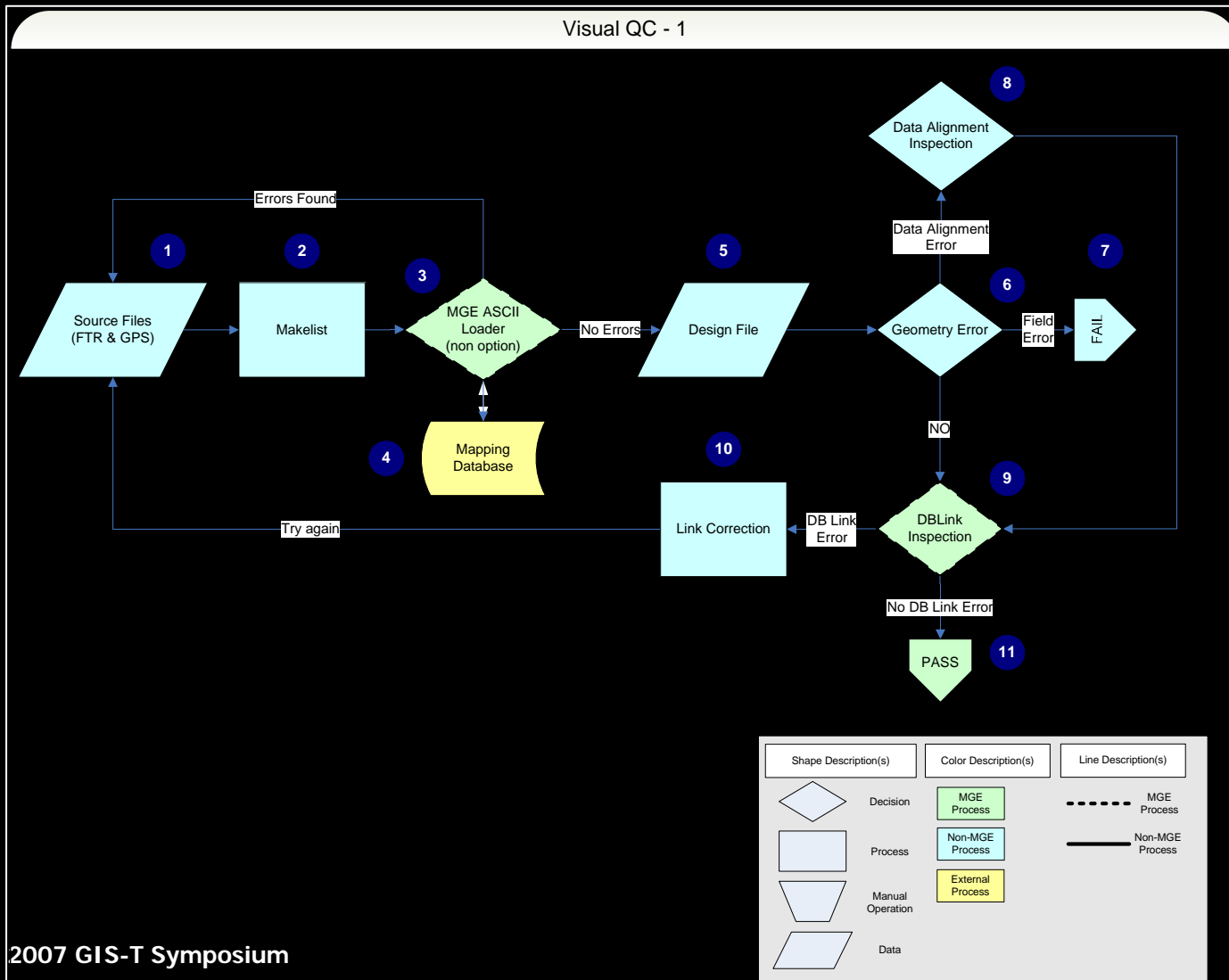
- MGE Based
- Built over 20 Years
- Works well, but could improved or streamlined



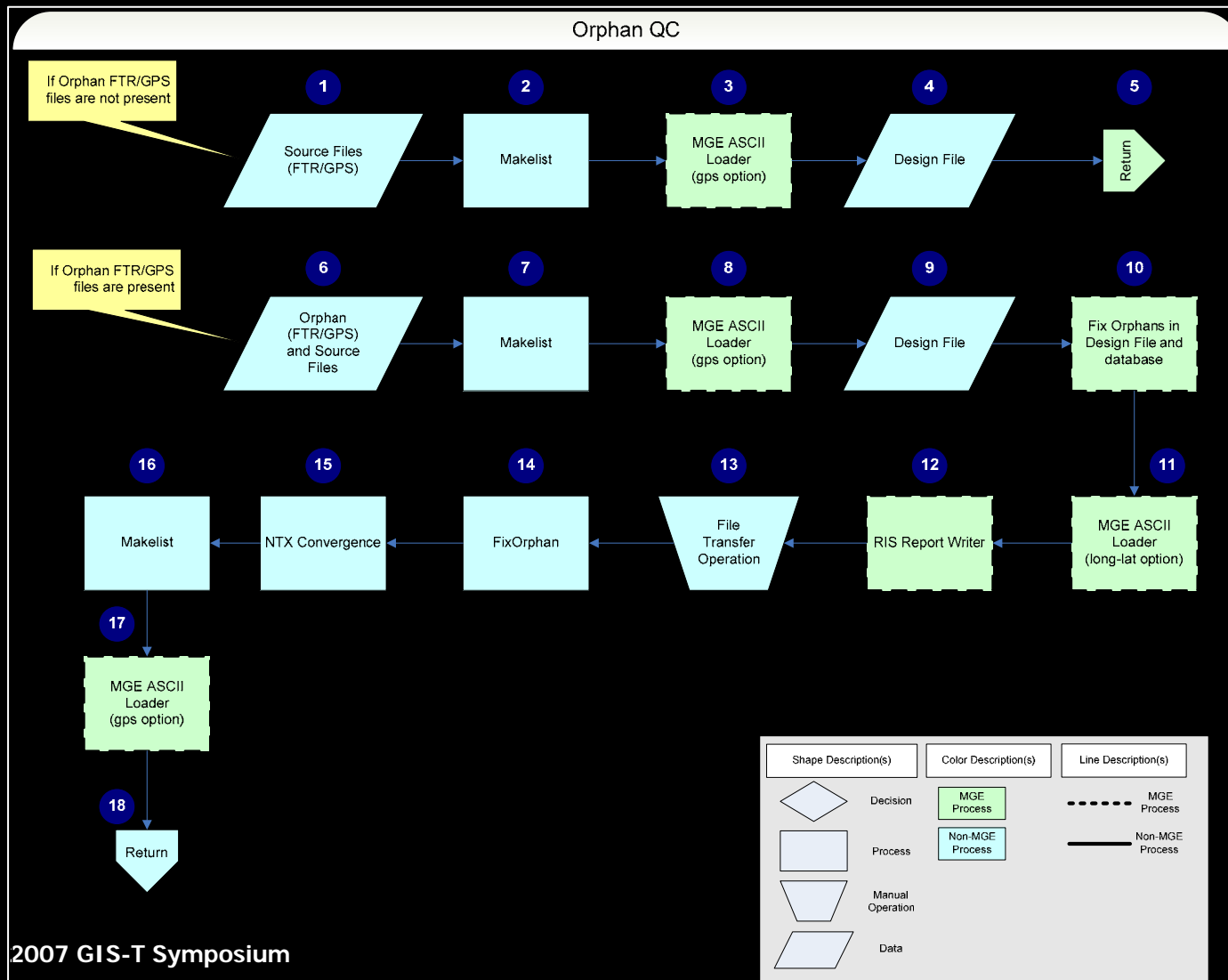
GIS/GPS Workflow



Visual QC Workflow 1

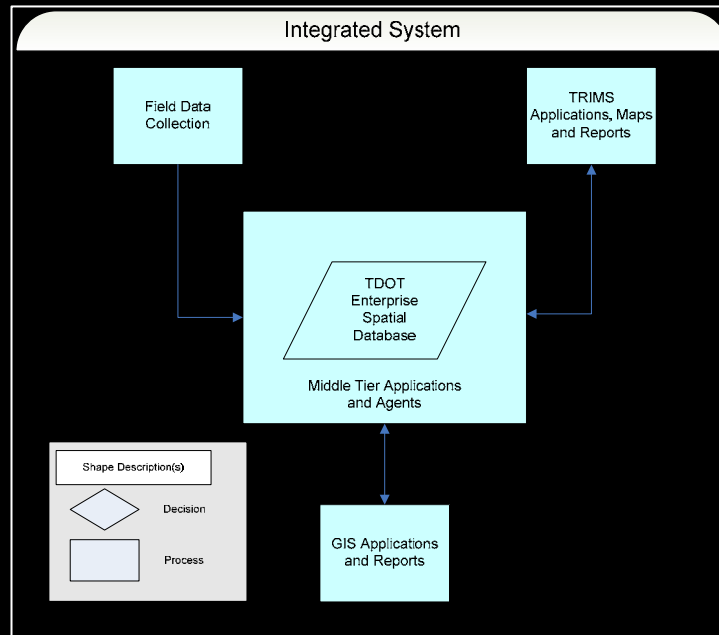


Orphan Record QA Workflow



Phase 1 Summary

- Significant effort is required to maintain synchronization between the GPS collection database and TRIMS
- Opportunities exist for process improvement
- Nothing precludes T-DOTs goals



Peer Review Process

- Conducted Interviews
- Reviewed Documentation
- Used to determine “Best Practices”



Phase 2 – Peer Review

- Deployment Approach
 - How is the GIS organization structured within the Agency.
- Size of GIS Team
- Annual Contract Budget
 - A reflection of the work that is performed “in-house” versus “outsourced” and can be useful in the CBA (Phase 3).
- GIS Software Environment
 - Only agencies that use a broad mix of GIS in their enterprise were considered.
- RDBMS Software
 - A requirement was the use of Oracle.
- Spatial Data Manager
 - Only DOTs that incorporate Oracle Spatial in their software environment were considered.



Peer Review Selection

Table 2-2. Peer Review Selection Criteria

Criteria	Tennessee	CALTRANS	Minnesota DOT	Montana DOT
Deployment Approach	Enterprise GIS	Core Department w/ End Users	Enterprise GIS	Core Department w/ End Users
Size of GIS Team	14	14	8.5	4
Annual Contract Budget	\$800,000 80% Outsourced	\$500,000 75% Outsourced	\$200,000 75% Outsourced	\$250,000 15% Outsourced
GIS Software Environment	<u>ESRI</u> <ul style="list-style-type: none"> ArcGIS ArcView ArcIMS <u>Intergraph</u> <ul style="list-style-type: none"> MGE GeoMedia WebMap <u>Caliper</u> <ul style="list-style-type: none"> TransCAD <u>Bentley</u> <ul style="list-style-type: none"> Microstation 	<u>ESRI</u> <ul style="list-style-type: none"> ArcGIS ArcInfo ArcView ArcIMS <u>Intergraph</u> <ul style="list-style-type: none"> GeoMedia WebMap <u>Bentley</u> <ul style="list-style-type: none"> Microstation 	<u>ESRI</u> <ul style="list-style-type: none"> ArcGIS ArcInfo ArcView ArcIMS <u>Bentley</u> <ul style="list-style-type: none"> Microstation 	<u>ESRI</u> <ul style="list-style-type: none"> ArcGIS ArcInfo ArcView
RDBMS Software	Oracle Spatial Some SQL Server	Oracle Spatial	Oracle Spatial	Oracle Spatial
Spatial Data Manager	ArcSDE Oracle Spatial	ArcSDE Oracle Spatial	ArcSDE Oracle Spatial	ArcSDE Oracle Spatial

Source: 2006 GIS-T "Survey of States" and Peer Review Interviews



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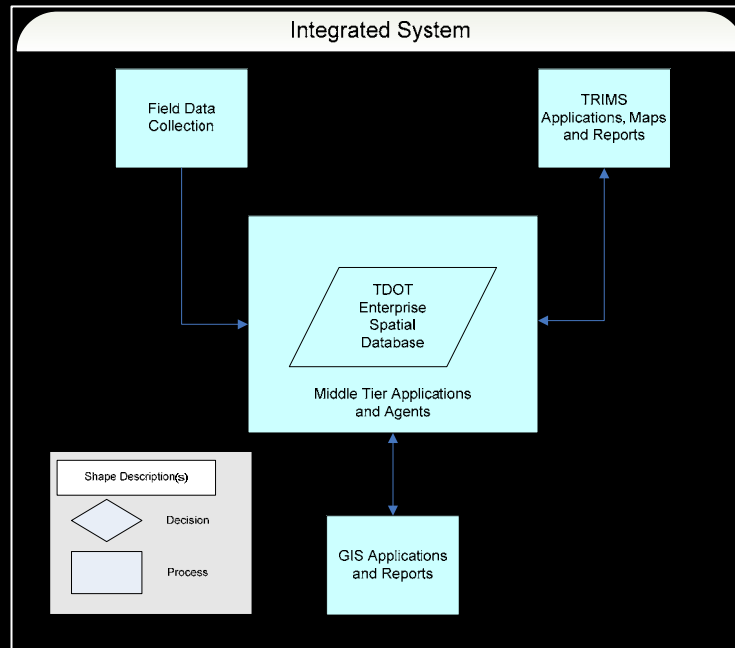
Phase 2 – Summary

- Validates T-DOTs Potential Approach
 - Take advantage of current software
 - Allow improvements in the data processing workflow
 - Better Utilize State's Enterprise GIS database residing in Oracle Spatial.
 - Reduce or eliminate customized third party programs and subroutines.
 - Utilize "Off the Shelf" software wherever possible.
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 - Create an "open ended" system that will allow for cost effective enhancements and upgrades as required



Phase 2 Summary

- Desired environment is viable
- Opportunities exist to leverage lessons learned
- Nothing precludes T-DOTs goals



Phase 3 – Cost-Benefit Analysis

- Required by the State Department of Finance's Office for Information Resources.
- Pre-Defined Template
 - Initial Cost Assessment
 - Operation Cost Assessment
 - Benefit Assessment
 - Risk Assessment
- Estimates for Budgeting Purposes
 - Final System not yet known
 - Benefits cannot be fully quantified
 - Many benefits are "intangible"



Example Operational Costs

Microsoft Excel - CBA Spreadsheet.xls

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	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
	Cost Category	Description	Cost Center/ Funding Source	2008	Existing Costs (yes/no)	2009	Existing Costs (yes/no)	2010	Existing Costs (yes/no)	2011	Existing Costs (yes/no)	2012	Existing Costs (yes/no)	2013	Existing Costs (yes/no)
1	Personnel														
2	Project Management	Project Management Time		50,000	yes	60,000	yes	15,000	yes	15,000	yes	15,000	yes	15,000	yes
3	Infrastructure: Project Mgmt, LAN/WAN, Systems	Project Staff time for Implementation		20,000	yes	50,000	yes	10,000	yes	10,000	yes	10,000	yes	10,000	yes
4	Data Resource Management				no		no		no		no		no		no
5	Other				no		no		no		no		no		no
6															
7	Software				no		no		no		no		no		no
8	Application Software Lease or License Fees				no		no		no		no		no		no
9	Application Software Maintenance or Upgrades				no		no		no		no		no		no
10	DBMS Software Lease or License Fees				no		no		no		no		no		no
11	DBMS Software Maintenance or Upgrades				no		no		no		no		no		no
12	System Software Lease or License Fees				no		no		no		no		no		no
13	Systems Software Maintenance or Upgrades	Cost dependent on product used. Estimated at \$10,000 annually.			no	10,000	no	10,000	no	10,000	no	10,000	no	10,000	no
14															
15	Training and Travel														
16	IS staff or Contractors	Annual Training Budget for New System Software		15,000	no	15,000	no	15,000	no	15,000	no	15,000	no	15,000	no
17	Business Unit Staff	Annual Training Budget for New System Software		10,000	no	10,000	no	10,000	no	10,000	no	10,000	no	10,000	no
18	Consulting Staff				no		no		no		no		no		no
19															
20	On-going Operations														
21	Telecommunications & Network Services				no		no		no		no		no		no

Financial Summary Initial Cost Assessment **Operational Cost Assessment** Benefit Assessment Risk Assessment

Draw AutoShapes

Ready

NUM

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Example Risk Assessment

Microsoft Excel - CBA Spreadsheet.xls

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C14 Yes, and used for project planning

	A	B	C	D	E	F	G	H	I	J
	Risk Factor	High Risk	Normal Risk	High	Normal	NA				
1	Mainline impact	Major impact on organization's main business objective and goals	Minimal impact on organization's main business objective and goals		X					
2	Commitment by management	Senior management not actively involved	Management is committed to project		X					
3	Project length	Over 1 year	1 year or less		X					
4	Project team size	Over 10 people	10 people or less		X					
5	Project team experience	Project team staffed with inexperienced personnel or does not have appropriate functional and / or technical skill	Project team staffed with experienced personnel with appropriate functional and technical skills		X					
6	Percentage of time key project members dedicated to the project	Less than 50%	More than 50%		X					
7	Project manager experienced	No prior experience in this type project	Experience in this type project		X					
8	Number of outside organizations or agencies to coordinate	2 or more	Less than 2		X					
9	User participation	Minimum user participation	User personnel actively participating in project		X					
10	User support	Users / sponsors are not committed to project	Strong user sponsorship	X						
11	User impact	Significant impact on user daily operations	Minimal impact on user daily operations	X						
12	Cost benefit analysis	Approximations used are not based on proven practice standards (estimating guidelines)	Costs from quotes and proven practice standards (estimating guidelines)	X						
13	Existence of a clear business plan	No	Yes, and used for project planning		X					
14	Scheduled completion	Inflexible completion dates (absolute deadline) with little delay tolerance because other development depends on the completion	Completion dates are set but no other development or processing depends on the completion		X					
15	Hardware / Software	Vendor or specific equipment or software does not have proven record or performance	Vendor and / or specific equipment or software has proven performance		X					
16	System complexity	Pioneering, new hardware / software, extensive software modifications	No significant unique or new considerations, minor software modifications	X						
17	Project size	More than 1,000 workdays	Less than 1,000 workdays		X					
18	Quality of data to convert	Complex data base conversion requirements or questionable data integrity	Data conversion is straight forward		X					
19	Required level of security	High security level required for data: storage, transmission, access	No significant security requirements beyond basic network security		X					
20										
21										
22										
23										

Financial Summary Initial Cost Assessment Operational Cost Assessment Benefit Assessment Risk Assessment

Draw AutoShapes

Ready NUM

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Phase 4 – “Moving Forward”

- Adopt a formal strategy for GIS development for all TDOT data sources and departments.
- Create an effective data model that supports both present and future mapping needs.
- Utilize best management practices to bench mark how other transportation agencies are handling GIS implementation. Include issues such as planning, budget, benefits, staff, and vendors.
- Continue educating Department leadership regarding GIS capabilities and potential.
- Demonstrate that GIS provides a measurable return on investment. This can be accomplished by continually updating an assessing the validity of the Cost-Benefit Analysis
- Demonstrate that GIS can assist TDOT in reaching its strategic objectives.
- Integrate the GIS with other systems' data.
- Evolve business processes to take advantage of GIS technology.



Lessons Learned & Conclusions

- Have a Flexible Process
- Understand Client Dynamics
- Software will Evolve
- T-DOT is "Moving Forward"
- Geometry will be exported to the Enterprise database
- TRIMS process will be "streamlined" and "simplified"



Questions

- Rick Hammond, GISP
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