

Establishing a GIS Program in O&G

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Introduction

- Present a POC on Decision Support Systems and Dashboards as an implementation Guide
- Other Use Case scenarios
- Architecture and Infrastructure
- Recommendations for developing a Roadmap (Shaping Curve) for a GIS Strategy and 3-Tier Infrastructure
- Present Lessons Learned and Best Practices that support the Strategy
- Summary
- Q&A

Objectives

- The objectives of the presentation are to
 - Demonstrate GIS use scenarios in O&G with a specific POC Use Case as a Guide

Objectives

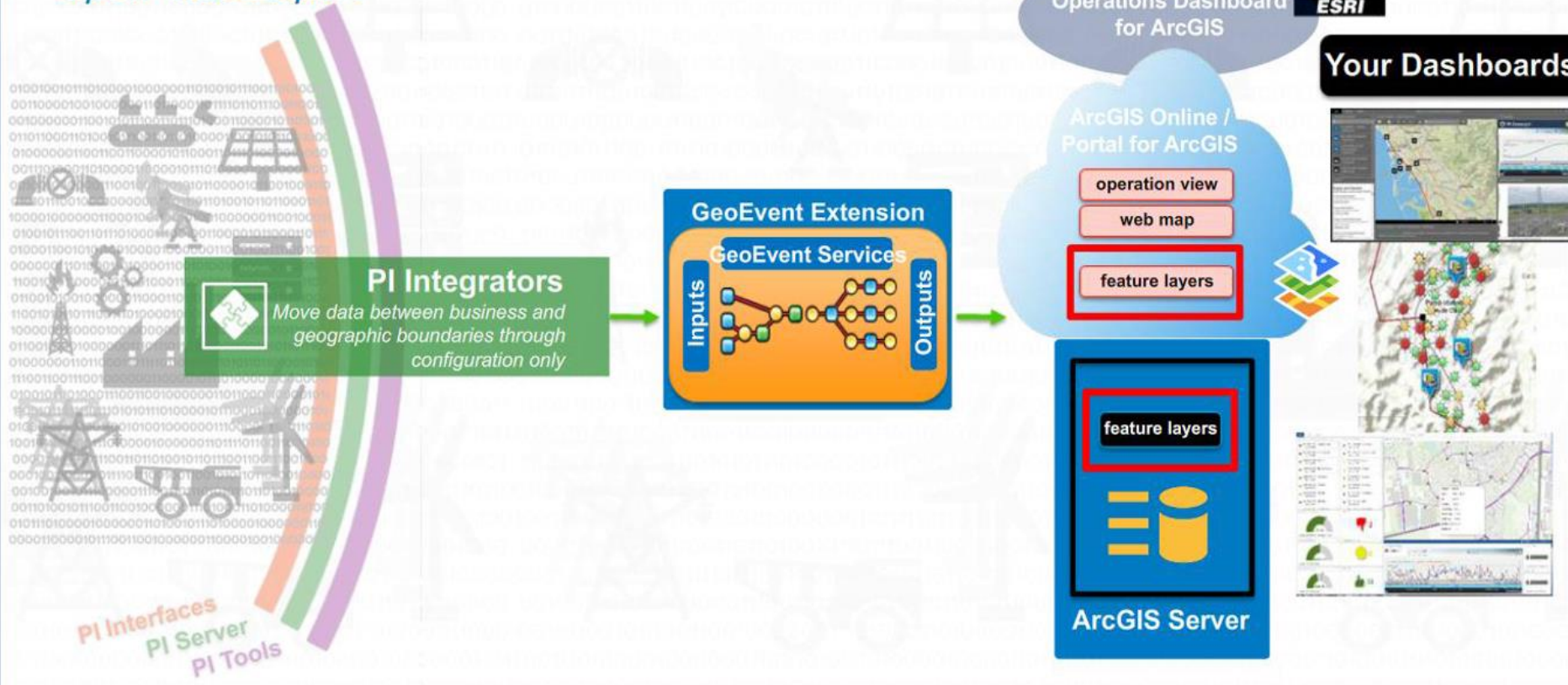
- The objectives of the presentation are to
 - Demonstrate GIS use scenarios in O&G with a specific POC Use Case as a Guide
 - Show the foundations and milestones of a Roadmap for a GIS program in a recommended timeline
 - Present the fundamentals of a GIS infrastructure for functionality, performance and security
 - Present some important Lessons Learned
 - Communicate Best Practices for a robust, scalable architecture, along with guidelines for the system implementation, efficient deployment and sustainable maintenance

Use Case

Title	<ul style="list-style-type: none"> •O&G Production Monitoring Dashboard
Description	<ul style="list-style-type: none"> • Process Automation & RT Performance Monitoring • SCADA & PI (OSIsoft) • Systems Integration
Pain Points	<ul style="list-style-type: none"> • No consolidated view of the production dynamics and safety alerts from diverse data sources • Lack of integration of this data with GIS to discover the potential benefits of location intelligence in monitoring the production data
Business Benefits	<ul style="list-style-type: none"> • Cost savings from real-time monitoring and addressing operating condition abnormalities before they become critical; improves responsiveness, productivity and decision quality • Health, Safety, Security, Environment (HSSE) regulations compliance and adherence with real-time alerts and decision making process
Solution Overview	<ul style="list-style-type: none"> • Senior Management Dashboard to monitor the production KPI at well level, field level, region level and state level by aggregating the production • Operations team can have a dashboard to monitor the R-T production data, safety alerts • Fleet managers can have a dashboard to monitor the vehicles, geo-fences, incidents etc.
Status	<ul style="list-style-type: none"> • Demo application has been built with ESRI ArcGIS Server, Portal for ArcGIS, GeoEvent Processor and Operations Dashboard • PI real-time data is simulated with GeoEvent processor

Use Case

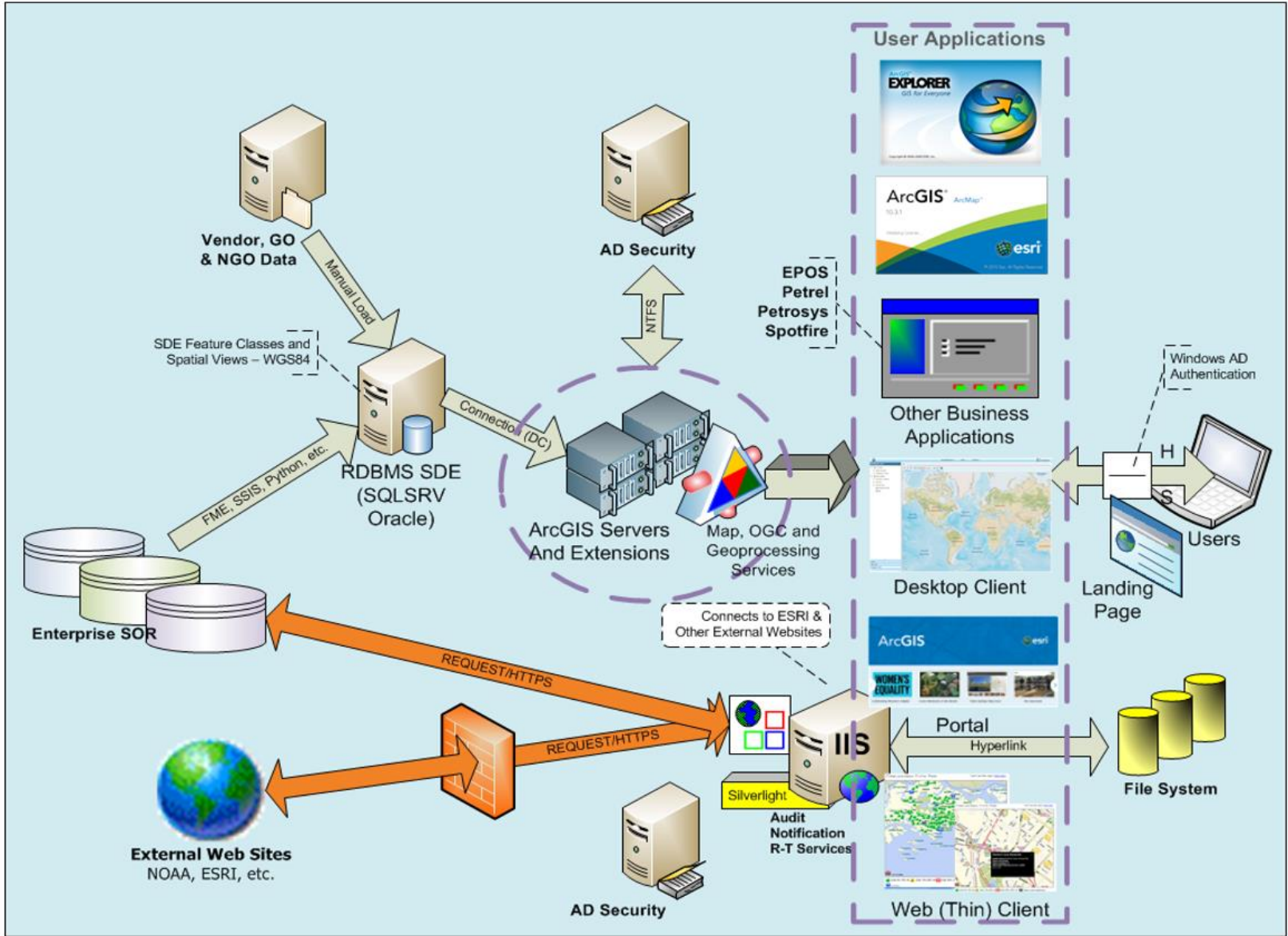
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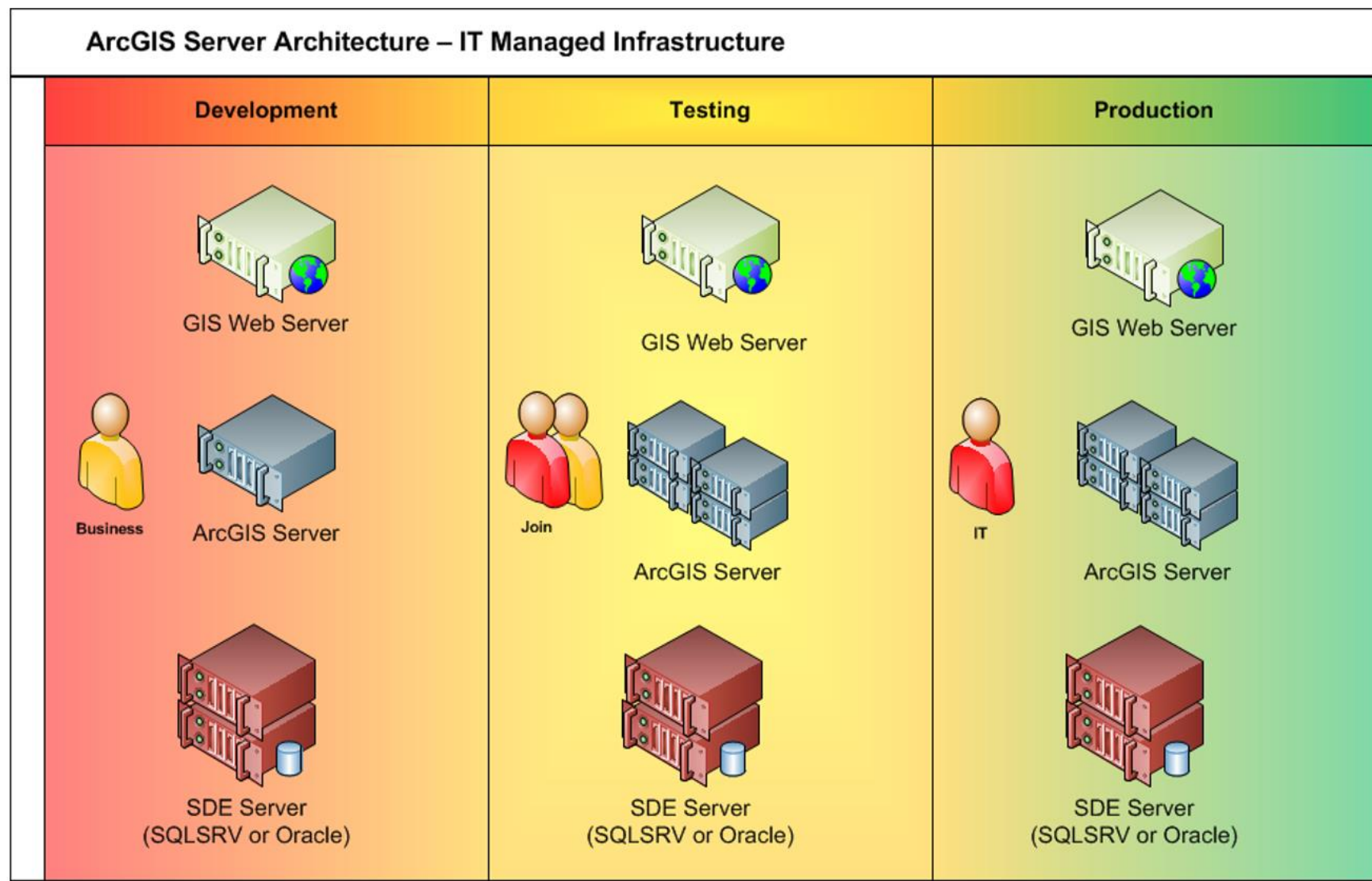
Use Case Scenarios

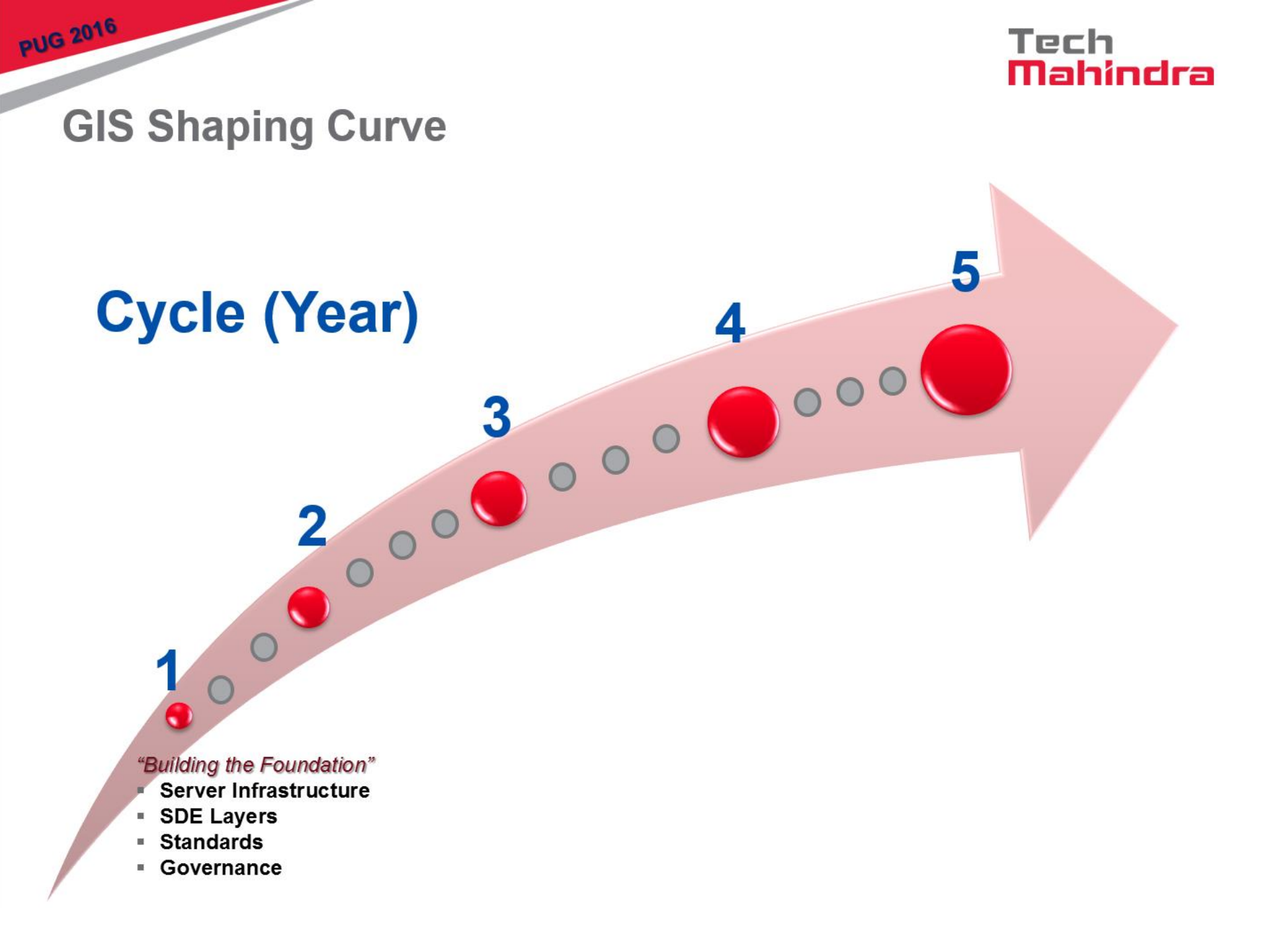
- Real-Time Operations Centers and Dashboards tied to external sources, SCADA or PI/OSIsoft (desktop or web client) using Web Services and the GeoEvent Extension
- Consistent and Performant Data Visualizations when using SOR containing data in different Datums and Projections
- COP for Emergency Response or Evacuation planning for predictable hazards or unpredictable disasters
- Health, Environment & Safety for monitoring on-shore and off-shore facilities for Regulatory Compliance and reporting
- Reservoir or Asset Management using G&G and Public information to perform iterative Geo-Processing analysis and evaluation
- One-stop-shop O&G desktop information aggregators to integrate diverse business data sources that are hierarchically and spatially related

System Architecture



Environments





Lessons Learned

Title	Plus/Delta	Key Lessons
Vision & Strategy	<p>Clear vision and strategy helps early acceptance and setting of expectations</p> <p>Defines longer horizon than some Projects would expect. Could discourage stakeholders that do not understand long term value</p>	Define early and communicate clearly the vision and the strategy, the expected costs and Business benefits, and get consensus and commitment to the plan. Provide a Phased approach with both short term and long term outcomes.
Data Strategy and Quality	<p>Define the SDE Data role with the Client Applications and establish a common baseline. Define early the Standards and Work Flows</p> <p>O&G data comes from diverse SOR repositories using different Datums and Projections</p>	Applications will use imagery. It is easier to adjust your SDE vector Datum and Projection of that of the imagery than vice versa. Use the SDE as the staging repository for the Datum than change the source data.
Experience	<p>Crucial in establishing the Roadmap and team mentoring</p> <p>Avoids following dead-end paths</p>	Endow the team with members that have done similar projects and implementations

Best Practices

Title	Recommendation
GIS Architecture	Build Strategy, Object Oriented Architecture, Requirements and a Roadmap for a Framework to provide Service Oriented Functionality to GIS Applications. Spend time in designing solution.
Version Management	Version Management in TFS. Provide labeling standards and check-in/check-out protocol to return to established control point.
Public Relations	Develop early the relationship with the Business and the artifacts to promote the GIS program, with easy access to applications and Use Cases in a Corporate Portal. A POC is the best advertisement.
Supportability	Use Web Applications to support the large GIS community of users and allot desktop applications only for Power Users with Business need. Requires far less resources and cost to support.
Client Applications	Avail set of consistent GIS web applications to enable users to view the business confidential data and easily perform well-defined work flows. Allow larger footprint and training requirements client applications for Power Users with appropriate Business need.
Maintenance	Keep system software and applications current with the technology. Allow more back-end functionality to ease migration.

Best Practices

Title	Recommendations
SDE Feature Class MOC	Use XML Export/Import methods and XML Notepad to manage the SDE Feature Classes. Easier to manipulate with accuracy, control field order and field attributes, and manage the Spatial References.
Spatial Views	Create Spatial Views on the SDE side as opposed to using Joins
Metadata	Associate Metadata with FC and MS early in the DEV environment and propagate them all the way to PRD
Scripting	Use FME and Python to develop robust scripting for regular data maintenance. FME is good for linear workflows with good error handling. Python is better for data downloading, iterative processing and complex logic.
Map Services	Organize Feature Classes and Spatial Views in coherent thematic Map Services with no more than a dozen layers for performance and content organization. Use layers with scale dependencies for a clean result. Keep Point layers at the top and Polygons at the bottom. Avoid any type of fill as much as possible.
OGC Services	Enable OGC Web Map Services for data integration with other software packages to extend the client reach of the map content.

Summary

- Building an effective enterprise GIS system is a complex operation with many moving parts
- Requires time and money investment to build, and the commitment to maintain current both the system and application software, as well as the underlying data
- System improvement is continuous and cyclic between Data Quality improvements and 2D/3D Visualization enhancements
- Metadata and Layer documentation are important for the organization to find and effectively use the GIS assets with minimal duplication of resources
- Develop clear utilization and cost/benefit metrics for the Leadership to ensure continued support

Summary

- GIS implementation is based on the tripod of Data Quality, appropriate IT infrastructure and supportable Client/Server Architecture
- The GIS middleware (ArcGIS Servers) is key to not only consistent data delivery but also Security Management
- Is important to develop early a core expert user base (SME) that can guide the rest of the casual users and minimize organizational desktop support load
- Promote collaboration and feedback between the Data Team, the GIS Team and the SME on their respective areas of expertise

Acknowledgements

- **The TechMahindra GIS Team (India) for the Use Case**
- **The O&G Clients for the opportunity to develop the Lessons Learned and implement the Best Practices in developing the GIS Strategy**
- **All the individuals throughout the years that provided their creativity and hard work on projects, as well as those who contributed great ideas and valuable feedback**

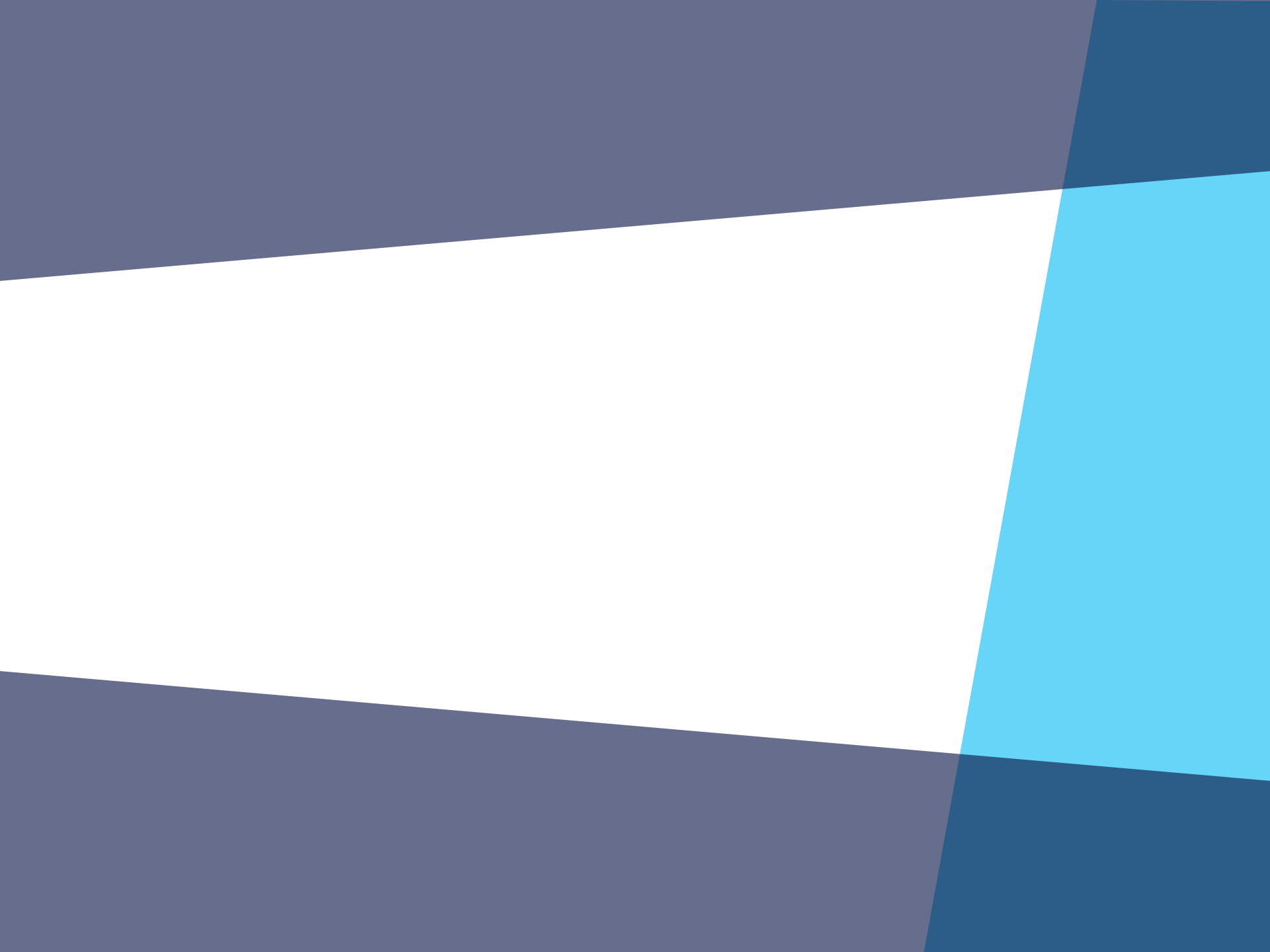
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Q&A



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