



Architecting the ArcGIS Platform: Best Practices

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Local Government

An abstract 3D architectural graphic on the right side of the slide. It features various geometric shapes in shades of blue, orange, and green, some with topographic contour lines. The shapes are layered and angled, creating a sense of depth and perspective.

**GIS
INSPIRING
WHAT'S
NEXT**

Patterns & Practices ...

Amplify customer success by offering strategic guidance, communicating best practices, and aligning technology with business needs.



Patterns & Practices

Business First!

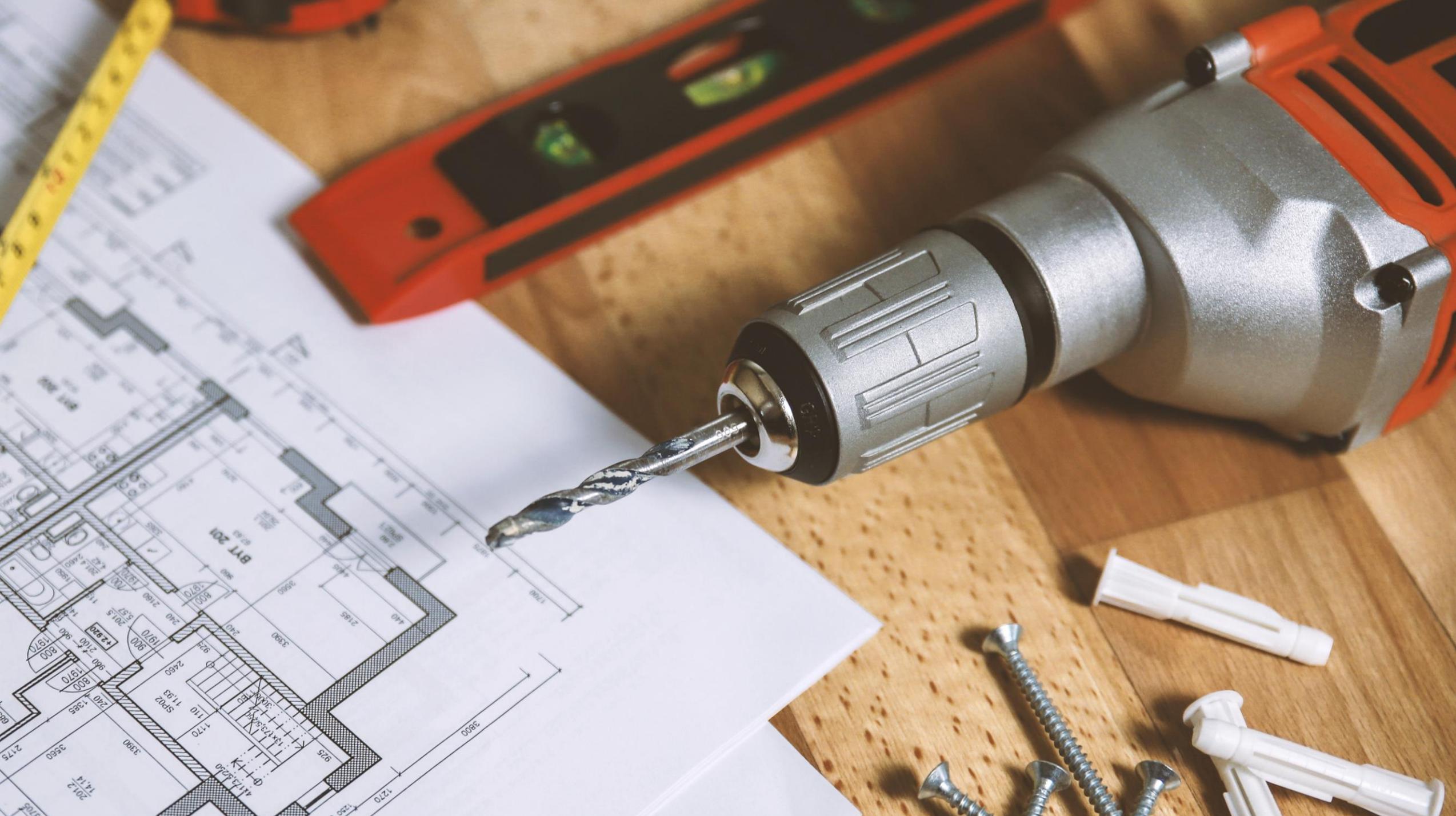


I see...





Risks?



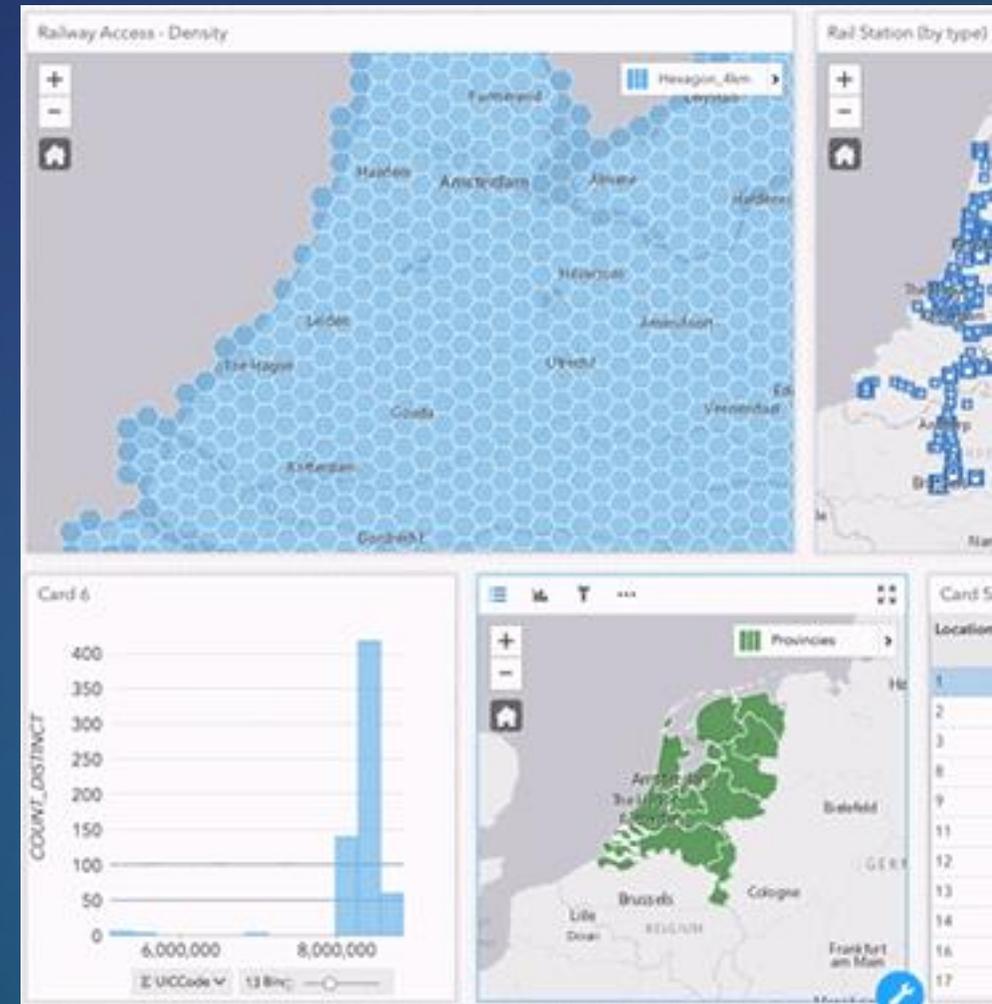
*"...You wouldn't build
a house without a
blueprint..."*

- Warren Peterson

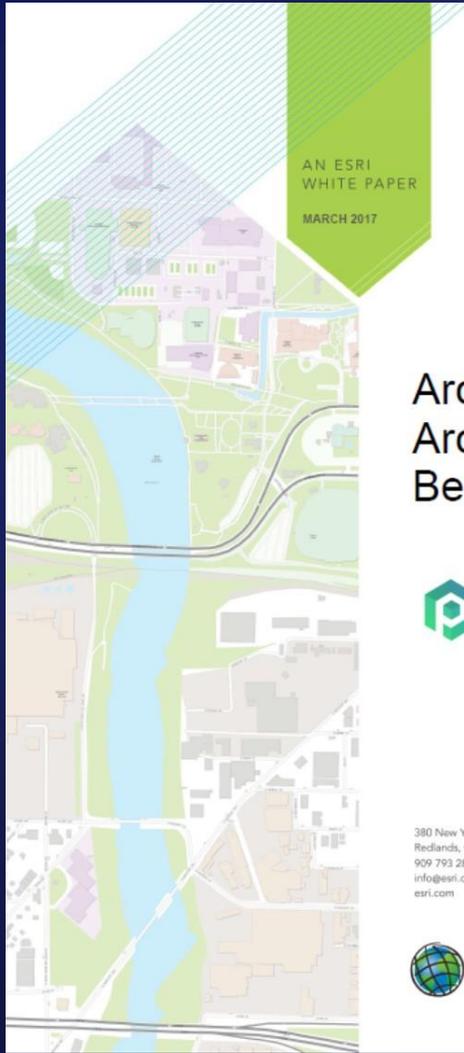


“...So don't build your
life *GIS* without one
either!”

- Warren Peterson



Best Practices Documented



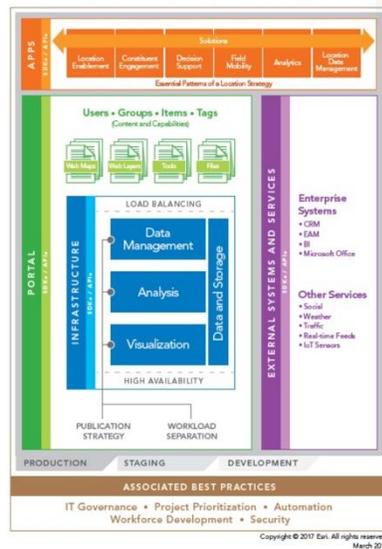
Architecting the ArcGIS Platform: Best Practices



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ArcGIS Conceptual Reference Architecture



Architecting the ArcGIS Platform: Best Practices
Project Prioritization
March 2017

Introduction
A simple method of project selection, prioritization, and sequencing to improve the overall return on investment in ArcGIS. Mitigate implementation risk by testing project challenges with business benefits. Focus on high-value, low-implementation projects, and avoid projects that are difficult or risky and deliver little business value. Experiment and learn with low-risk, low-challenge projects and carefully pursue projects that present significant challenges and high benefit. Organizations that embrace project selection, prioritization, and sequencing methods can typically meet with the continuous delivery of high business value and high returns on their investment.

The way that organizations value their technology investments is by prioritizing projects using a benefit versus challenge matrix. The benefit aspect relates to the value derived from completing the project (such as increased productivity through better distribution of assets, reduced costs through more effective routing, or more informed decisions through improved situational awareness). The challenge aspect focuses on the level of effort or risk required to complete the project (including considerations like technology maturity, time to delivery, and level of effort). By plotting as matrix, such as the one offered in Figure 1, potential projects may be evaluated and pursued with the greatest benefit.

Recommendations
In Figure 1, the green oval is labeled aggressively embrace because it represents projects that provide clear benefits and are relatively easy to accomplish (e.g., configurable COTS templates that deliver a focused set of usable results). Saving out on these projects and developing a tolerance of delivery will produce ongoing value to the organization.

Cautiously embrace projects, represented by the blue rectangle, are more challenging but still valuable. Typically, these are long-term projects that require careful planning to deliver desired results. They may require additional resources, planning, or mitigation actions to achieve the desired benefit. The additional effort to manage this may also lengthen project duration, delaying the instant gratification boost that low-challenge projects can achieve with more challenging projects should produce clear benefits that are not otherwise achievable.

The purple diamond is labeled experiment because it represents projects that are good for developing manageable challenges. Use these projects to learn new technology or try new things to solve a current development environment. Experimentation will lead to greater understanding, which will help to reach avoid the red hexagon, as these projects are challenging and offer little business benefit. Trying to implement projects will be costly and diverting from the overall platform value delivery.

A benefit versus challenge matrix may help qualify projects based on their value and risk to the organization value, plot projects on this matrix and prioritize the ones that offer the greatest benefit with the lowest risk through experimentation, challenge will be reduced and benefits will be easier to achieve. Do a cadence of key, high-value projects, and take time to plan more challenging projects. Avoid low-value, all-or-nothing. Organizations that embrace this simple but effective project prioritization method derived high technology investments and achieve greater success in their platform implementation.

[Link to Reference Architecture](#)

Architecting the ArcGIS Platform: Best Practices
Real-time GIS Strategy
March 2017

Introduction
Real-time GIS allows organizations to tap into streaming data from sensors, devices, and social media feeds for situational awareness and digital. With real-time GIS, maps and datasets are continuously updated, trends are observed in real time, and key personnel are alerted the moment activity or performance reaches a critical threshold. Organizations that embrace location in their real-time capabilities can speed decision-making and maximize the impact of their decisions.

Recommendations
Plan an approach to ingest and manage real-time data, transform that data into actionable information through analytics, and disseminate the intelligence to the right people as part of a real-time GIS strategy. Overhydrate real-time data ingestion from a wide variety of locations and sources, to decision makers and operations teams as well as the persistence of events for later analysis and use. ArcGIS ingests the status of assets, events, problems, environments, and services from Internet of Things (IoT) devices and sensors. Choose from a variety of patterns to manage real-time data to operational awareness and business performance. Breakdown real-time event visualization, and optimally analyze the data to an enterprise-wide.

Once real-time data is ingested, analyze and filter incoming data on the fly. As decision makers can address changes as they occur, high-volume and high-velocity data can be low-challenge, even when displayed on a map. Use location-based and attribute-based filters to evaluate incoming data and determine its relevance and importance. For example, apply a spatial filter based on a geographic area to determine if an asset is inside, outside, entering, or exiting an area (see Figure 1). Additionally, to increase intelligence and insight, analyze and search incoming data using processing capabilities of performing real-time, spatial, and geographic operations. Transform and search real-time data to make a more relevant and actionable to decision makers.

Decision support is enhanced when organizations disseminate real-time data that has been transformed into actionable information. Quantitative variety of critical operations that are addressed to the appropriate user, specific locations of moving assets (such as active time periods) and the status change of an asset (notification to key personnel to best manage and/or another) is important to consider real-time data from monitoring and stationary assets to decision support. Organizations need access to content and metadata inherent sensors and devices. Organizations that embrace the location aspect of their real-time operations and make faster, more informed decisions.

[Link to Reference Architecture](#)

Architecting the ArcGIS Platform: Best Practices
ArcGIS Portal Implementation Considerations
March 2017

Introduction
A generalist portal is an integral component of the ArcGIS platform, enabling customers to realize the full capabilities offered by a comprehensive GIS. When planning to implement a generalist portal, consider the business purpose, security needs, and available deployment patterns to achieve the best results.

Recommendations
To deliver distributed GIS capabilities, organizations often implement separate and multiple portals for different business purposes. For example, an on-premises portal (Portal for ArcGIS) might be used to meet department-specific business requirements, while an SaaS (software as a service [SaaS]) portal (ArcGIS Online) might support consistent engagement and the delivery of open data. Implementation and partners must consider how a business unit can benefit from having its own portal, such as how the portal might enable teams to manage location data, share analysis results, or produce decision support apps.

Security is one concern because a business unit would implement a separate portal within their organization. To ensure its content, capabilities, and applications. For example, a Department of Health and Human Services may want to implement a business unit-specific, on-premises portal to support sensitive mapping and analysis functions with protected health data. In this example, the Internet data security requirements, and business needs are so strict that implementing a separate on-premises portal is warranted. Other business units that derive content and benefits from a generalist portal. The authoritative data that results from that location may then be shared through the organization's primary portal (e.g., ArcGIS Online), for greater dissemination. Organizations also benefit from a range of deployment options for their portal, extending from SaaS to fully on-premises. It is very common for organizations to have a hybrid deployment that includes both Portal for ArcGIS in their infrastructure (on-premises or cloud-hosted) as well as ArcGIS Online (SaaS) offerings. Many organizations are also choosing for Managed Cloud Services to host their primary portal, so they can focus on applying proprietary to their business objectives while Esri manages the infrastructure. Consider the variety of deployment options in the context of business goals, the intended audience, anticipated availability or service level agreement (SLA), and available datasets. Choose the right level to maximize value to the business.

Generalist portals are an integral component of the ArcGIS platform and are critical for applying a consistent content of engagement. Take time to understand the business needs and workflow of different groups when determining the need for private or shared portals. When choosing an implementation strategy, consider security needs, such as data privacy, as well as business workflow, such as data or content. Implement portals to enable GIS capabilities across the organization and drive value through sharing location information.

[Link to Reference Architecture](#)

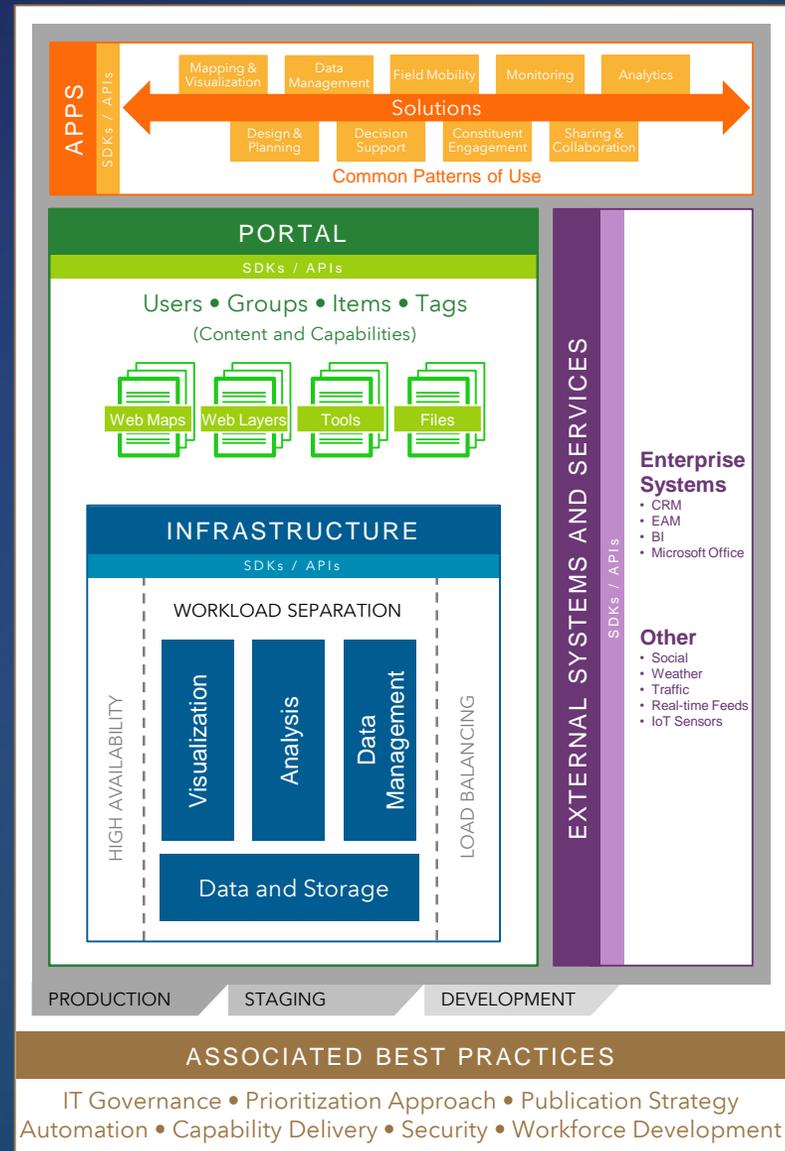


Figure 1. The portal component of ArcGIS allows organizations to manage their GIS content, business strategy, and growth. ArcGIS Online is a cloud-hosted portal that provides health data. In this example, the Internet data security requirements, and business needs are so strict that implementing a separate on-premises portal is warranted. Other business units that derive content and benefits from a generalist portal. The authoritative data that results from that location may then be shared through the organization's primary portal (e.g., ArcGIS Online), for greater dissemination. Organizations also benefit from a range of deployment options for their portal, extending from SaaS to fully on-premises. It is very common for organizations to have a hybrid deployment that includes both Portal for ArcGIS in their infrastructure (on-premises or cloud-hosted) as well as ArcGIS Online (SaaS) offerings. Many organizations are also choosing for Managed Cloud Services to host their primary portal, so they can focus on applying proprietary to their business objectives while Esri manages the infrastructure. Consider the variety of deployment options in the context of business goals, the intended audience, anticipated availability or service level agreement (SLA), and available datasets. Choose the right level to maximize value to the business.

DISCLAIMER



The ArcGIS Conceptual Reference Architecture



Best Practices

Patterns and practices for overcoming business challenges



Amplify customer success with a business first approach

Best Practices

Patterns and practices for overcoming business challenges

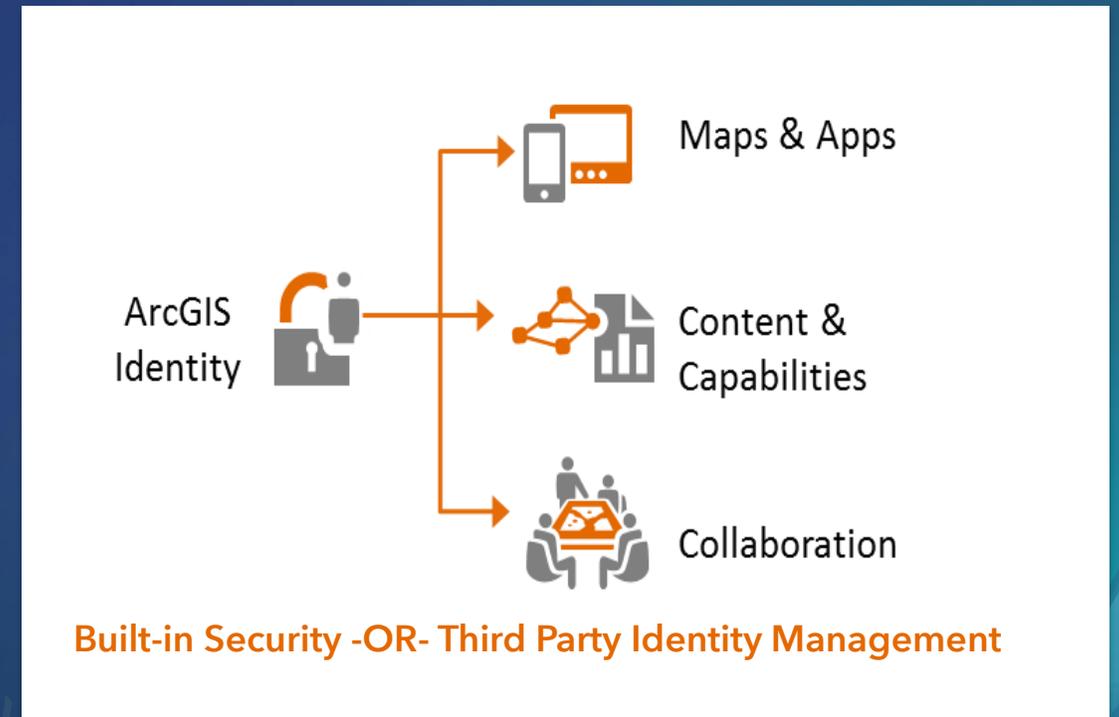


Amplify customer success with a business first approach

Best Practice: Manage Identities

Uniquely and securely describe user access to maps, apps, data, and analysis

- **Configure in the portal**
 - Users
 - Roles
 - Privileges
- **Incorporate in your apps**

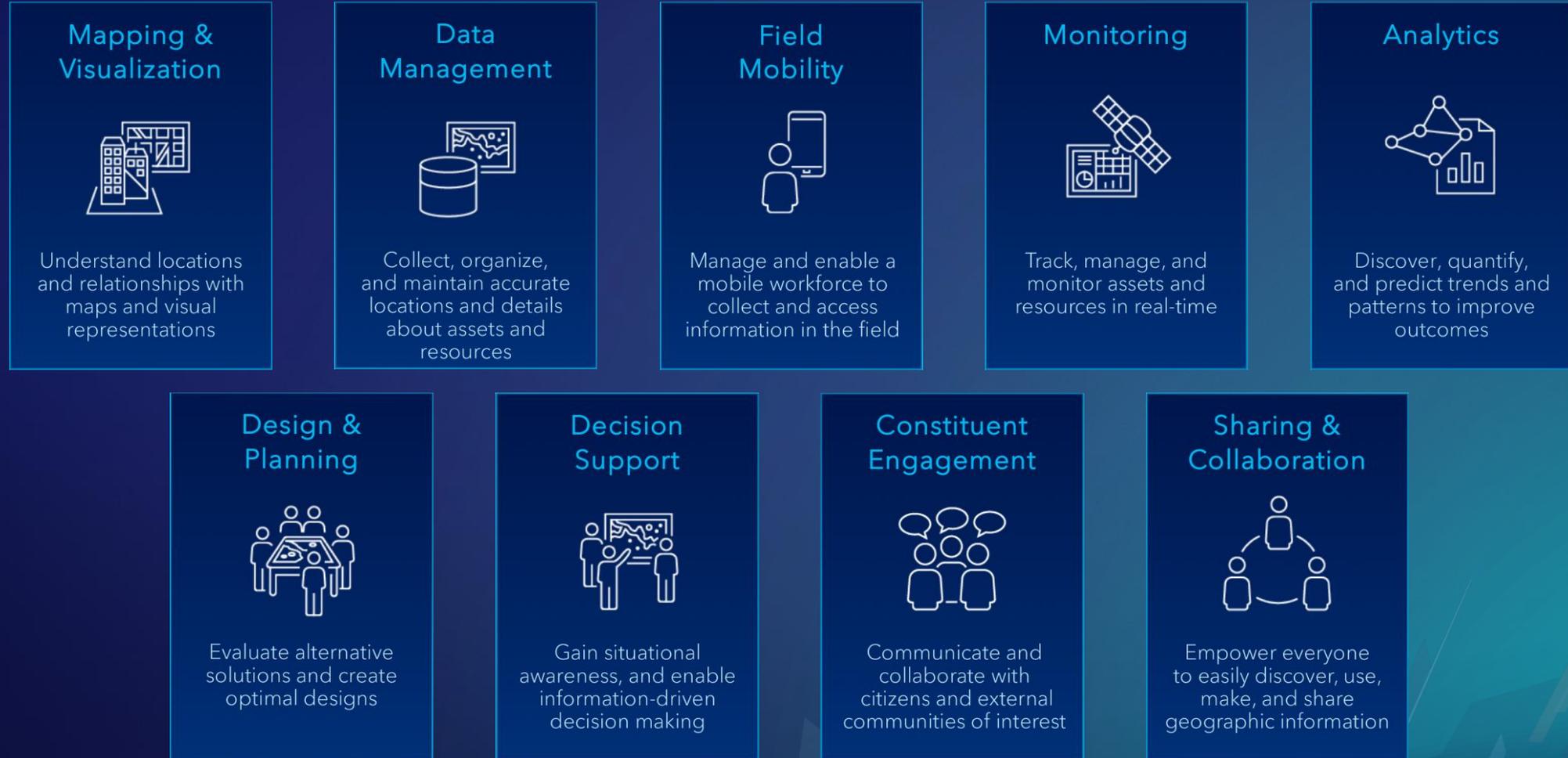


Identity enables participation!



Best Practice: Patterns of Use

Common geospatial functions that re-occur across business models and environments



The patterns are a framework for driving value

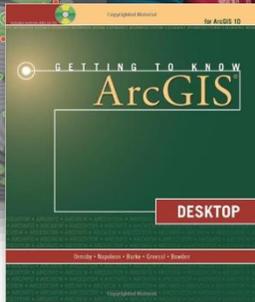
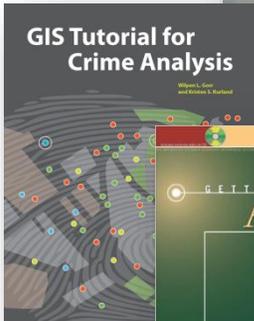
Best Practice: Essential Patterns of a Location Strategy

Common geospatial functions that re-occur across business models and environments

<ul style="list-style-type: none"> ○ Expressed Need ● Partial Use ● Comprehensive Use 	Mapping & Visualization	Data Management	Field Mobility	Monitoring	Analytics	Design & Planning	Decision Support	Constituent Engagement	Sharing & Collaboration
Planning & Zoning	●	●	●	○	●	●	●	●	●
Operations & Maintenance	●	●	○	●	●	●	●	○	○
Emergency Management	●	●	●	○	●	●	●	○	○
Parks & Recreation	●	●	○	○	●	●	●	○	○
Licensing & Inspections	●	●	●	○	●	●	●	○	○
Assessment	●	●	●	○	●	●	●	●	○
Community Services	○	○	○	○	○	○	○	○	○

Best Practice: Workforce Development

Equip people with knowledge and experience



Esri Technical Certification Program

The Esri® Technical Certification Program gives you the opportunity to distinguish yourself by becoming an expert in your area of expertise, whether you're a professional using ArcGIS® software, a developer of GIS applications, or a GIS administrator.

Category	Certification	Entry	Associate	Professional
Desktop	ArcGIS Desktop	10.3	10.1 10.3	
	ArcGIS Desktop Developer		10.1 10.2	
Developer	Web Application Developer		10.1 10.2	
	Enterprise Geodata Management		10.1 10.3	10.1 10.3
Enterprise	Enterprise System Design		10.1 10.2 10.3	
	Enterprise Administration		10.1 10.2 10.3	

Workforce Development should not be considered a *cost*, but rather an *investment*

Unlimited Access to Self-Paced E-Learning

If you or your organization have an Esri qualifying product with a current maintenance subscription, unlimited access to all of our self-paced e-Learning resources is yours to enjoy—anytime from anywhere. It's learning without limits.

Achieve greater value and a faster return on investment from ArcGIS



Best Practices

Patterns and practices for overcoming business challenges



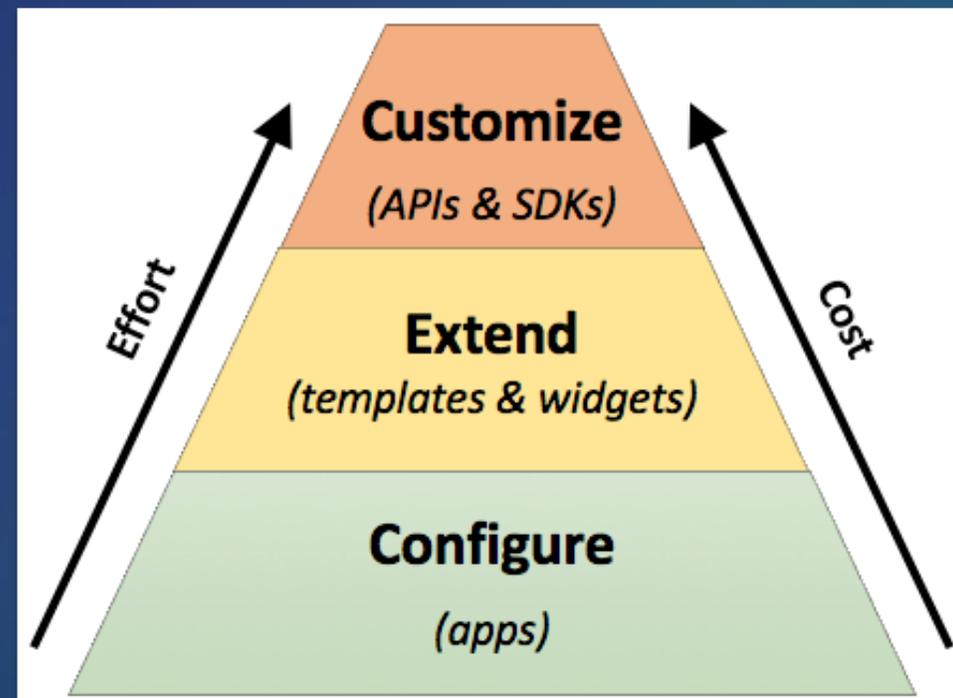
Amplify customer success with a business first approach



Best Practice: Application Implementation Strategies

Minimize cost and maximize development resources

- **Configure *First***
- **Extend *Existing* Apps & Templates**
- **Use the ArcGIS Web *APIs* and *SDKs***

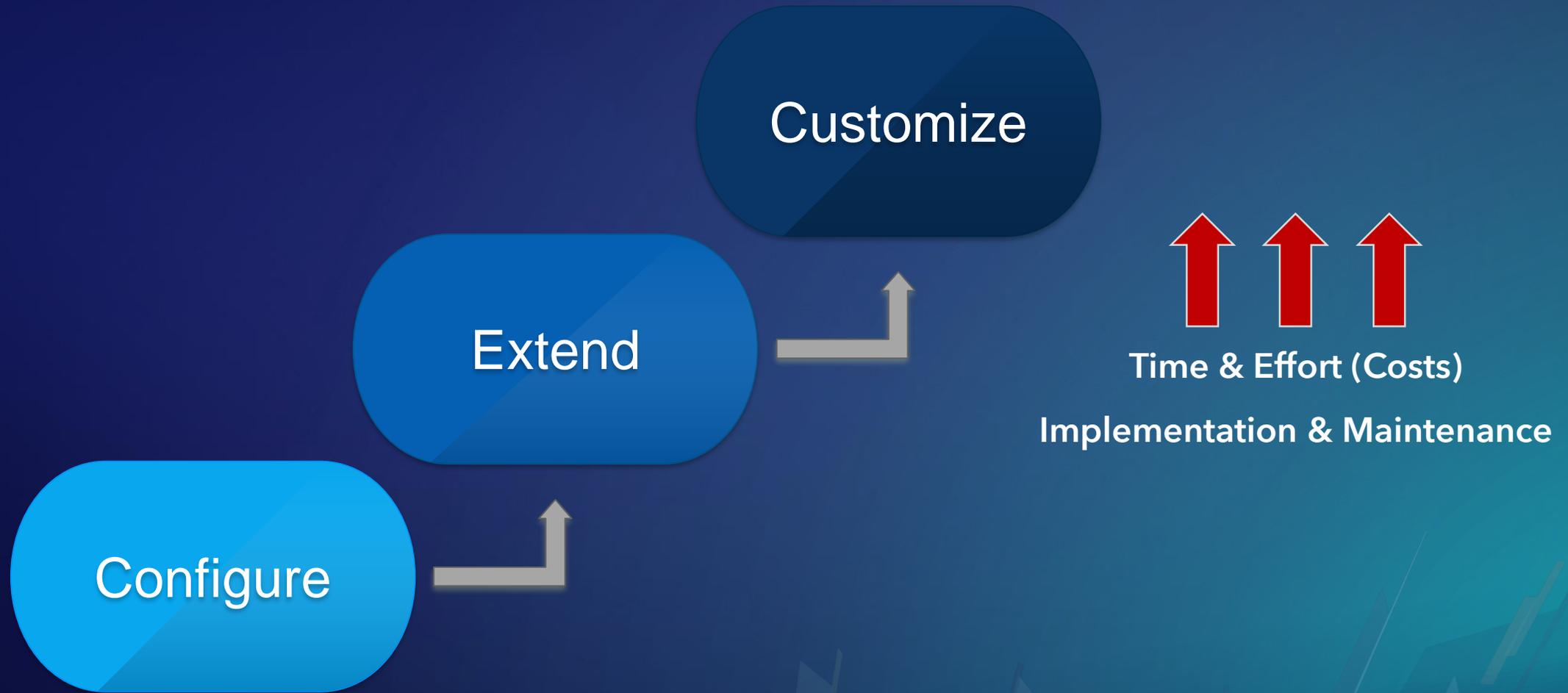


Configure first for the lowest cost and least effort

Deviations from "core" increase risk!

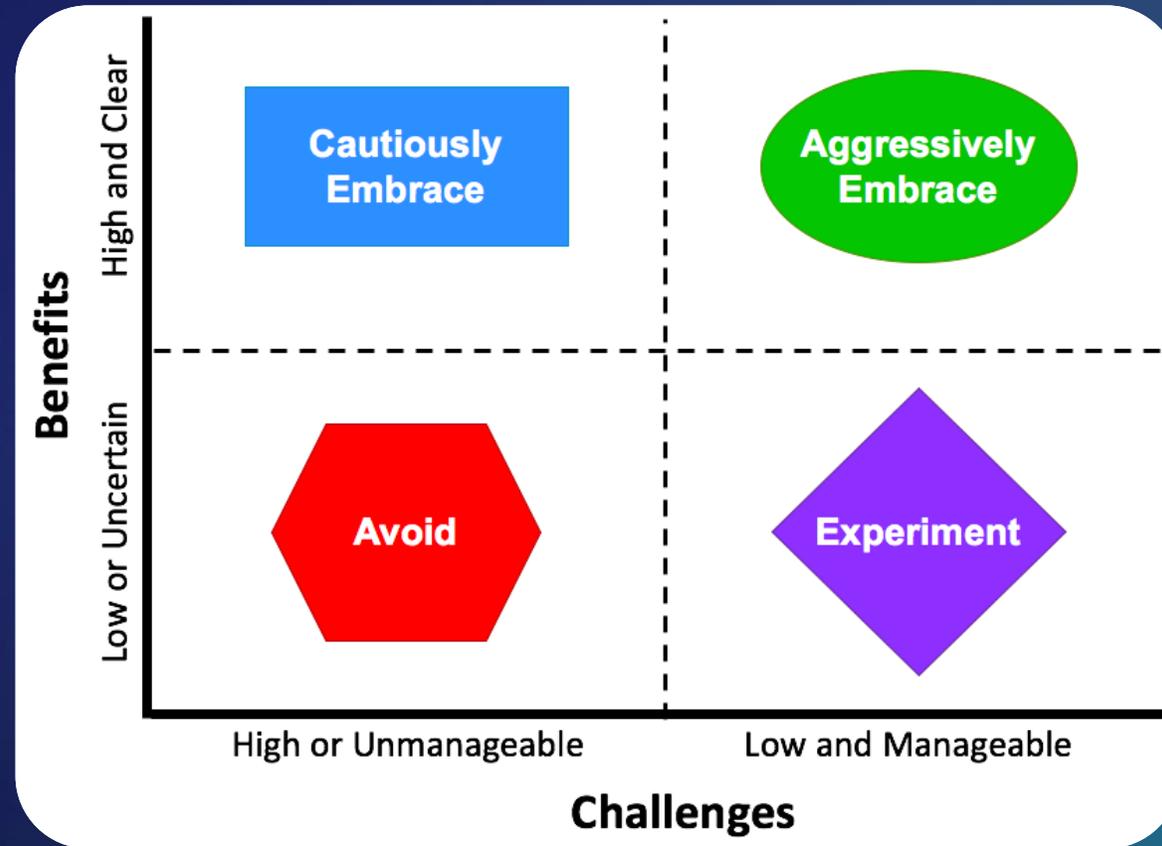
Best Practice: Application Implementation Strategies

Minimize cost and maximize development resources



Best Practice: Project Prioritization

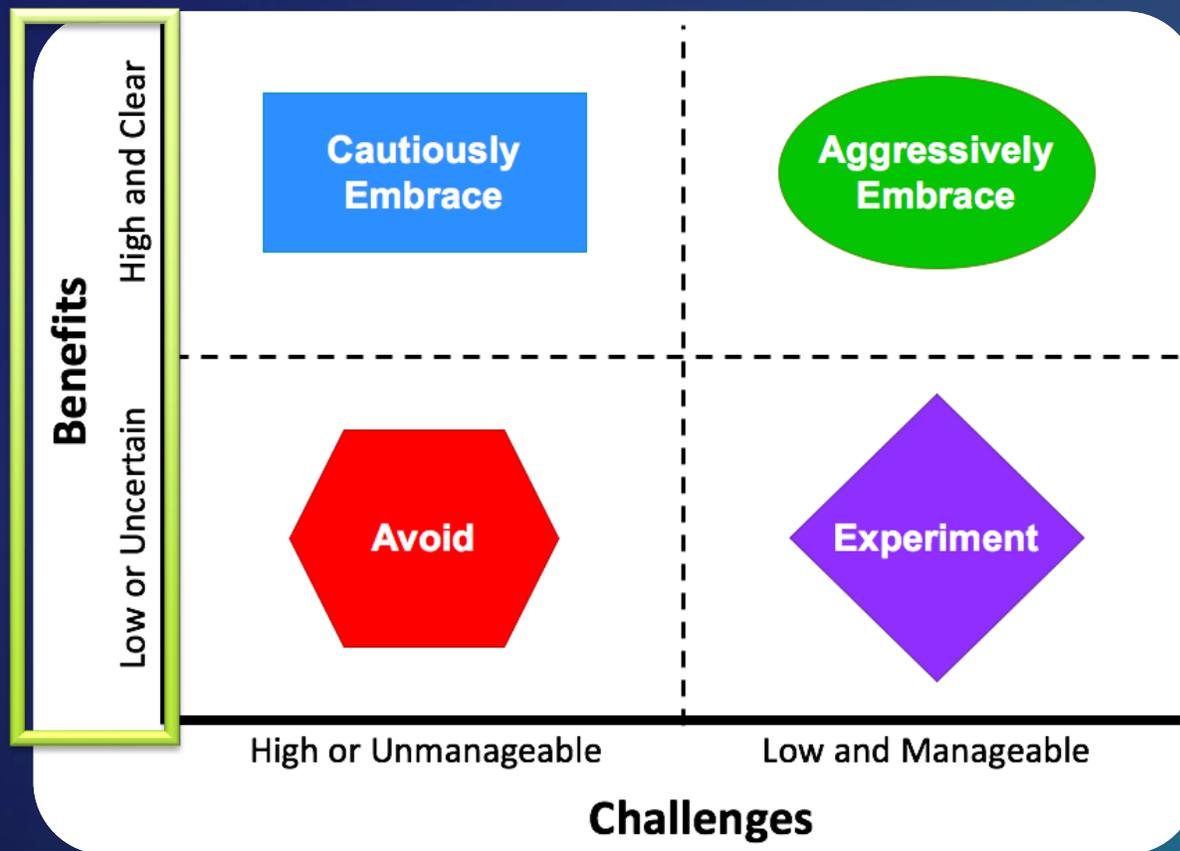
Maximize success by balancing business benefits with challenges



Drive value from technology investments

Best Practice: Project Prioritization

Maximize success by balancing business benefits with challenges



Drive value from technology investments

Best Practice: Project Prioritization - Benefits

Measure the Impact of GIS on Org Units

<ul style="list-style-type: none"> ○ Expressed Need ● Partial Use ● Comprehensive Use 	Mapping & Visualization	Data Management	Field Mobility	Monitoring	Analytics	Design & Planning	Decision Support	Constituent Engagement	Sharing & Collaboration
Planning & Zoning	●	●	●	○	●	●	●	●	●
Operations & Maintenance	●	●	○	●	●	●	●	○	○
Emergency Management	●	●	●	○	●	●	●	○	○
Parks & Recreation	●	●	○	○	●	●	●	○	○
Licensing & Inspections	●	●	●	○	○	○	○	○	○
Assessment	●	●	●	○	●	●	●	●	○
Community Services	○	○	○	○	○	○	○	○	○

Best Practice: Project Prioritization - Benefits

Measure the Impact of GIS on Strategic Interests

	Mapping & Visualization	Data Management	Field Mobility	Monitoring	Analytics	Design & Planning	Decision Support	Constituent Engagement	Sharing & Collaboration
Child & Maternal Health	●	●	○	○	●	●	●	●	○
Community Development & Housing	●	●	○	○	●	●	●	○	○
Criminal & Social Justice	●	○	○	○	●	●	●	○	○
Jobs, Education & Workforce	○	○	○	○	●	●	○	○	○
Environment & Energy	●	○	○	○	○	○	○	○	○

Best Practice: Project Prioritization - Benefits

Measure the Impact of GIS Initiatives on Strategic Interests

<ul style="list-style-type: none"> ○ Limited/No Enablement ● Partial Enablement ● Direct Enablement 	Child & Maternal Health	Community Development & Housing	Criminal & Social Justice	Jobs, Education & Workforce	Environment & Energy	Benefit Score
ArcGIS Platform Upgrade	●	●	●	●	●	▶▶ ▶
GeoEvent Server Implementation	○	○	○	○	○	▶
Commercial Investment Story Map	○	●	○	●	○	▶▶▶▶
Community Education Resources Story Map	○	●	●	●	○	▶▶▶▶
Utility Operations Dashboard	○	○	○	○	●	▶▶▶▶
Custom Energy Map Viewer	○	○	○	○	●	▶▶▶▶
...More GIS Projects	○	●	●	○	●	▶▶▶▶

Best Practice: Project Prioritization - Benefits

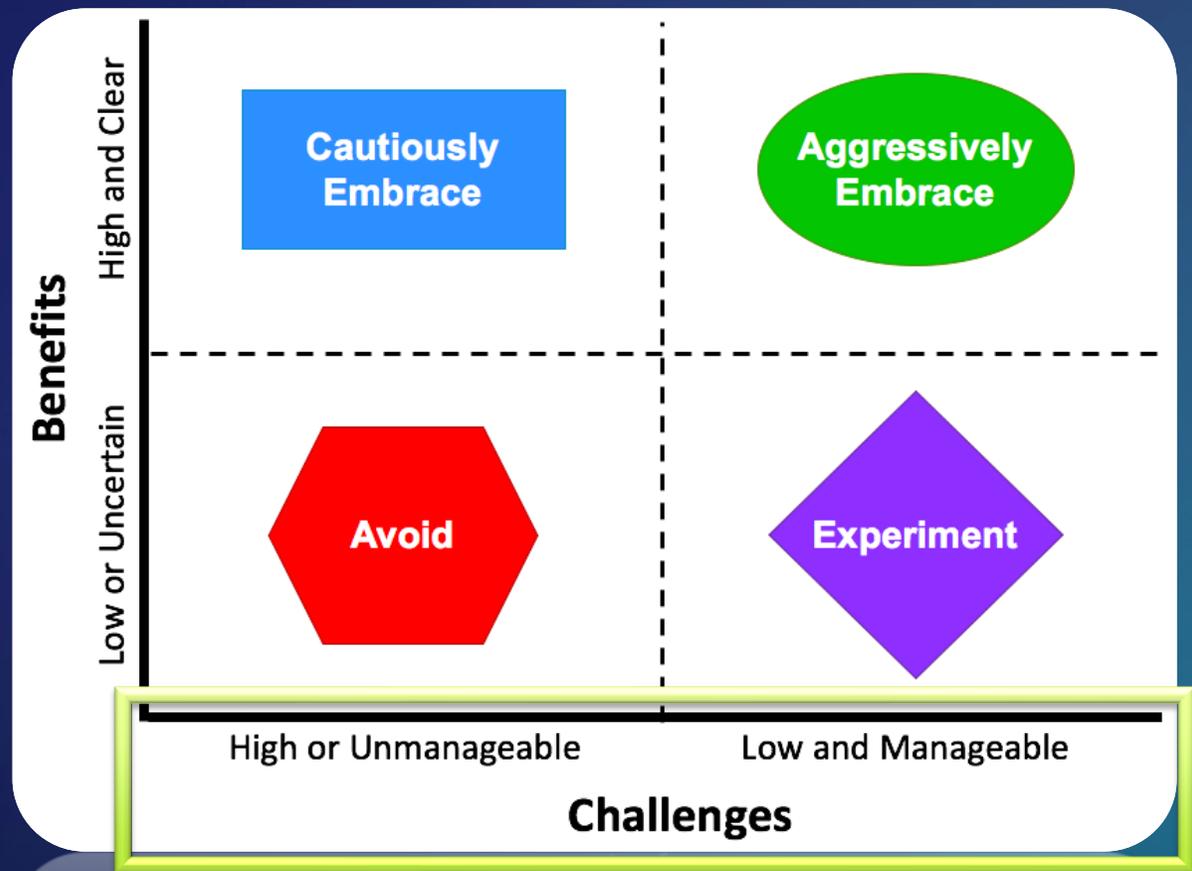
Measure the Impact of GIS Initiatives on Strategic Interests

<ul style="list-style-type: none"> ○ Limited/No Enablement ● Partial Enablement ● Direct Enablement 	Child & Maternal Health	Community Development & Housing	Criminal & Social Justice	Jobs, Education & Workforce	Environment & Energy	Benefit Score
ArcGIS Platform Upgrade - Prototype CMH & CSJ Solutions	●	●	●	●	●	▶▶▶▶▶▶
GeoEvent Server Implementation - Prototype Historical Analysis for CMH, CSJ & EE	●	○	●	○	●	▶▶▶▶▶▶
Commercial Investment Story Map	○	●	○	●	○	▶▶▶▶▶▶
Community Education Resources Story Map	○	●	●	●	○	▶▶▶▶▶▶
Utility Operations Dashboard - Community View	○	●	○	○	●	▶▶▶▶▶▶
Custom Energy Map Viewer	○	●	○	○	●	▶▶▶▶▶▶



Best Practice: Project Prioritization

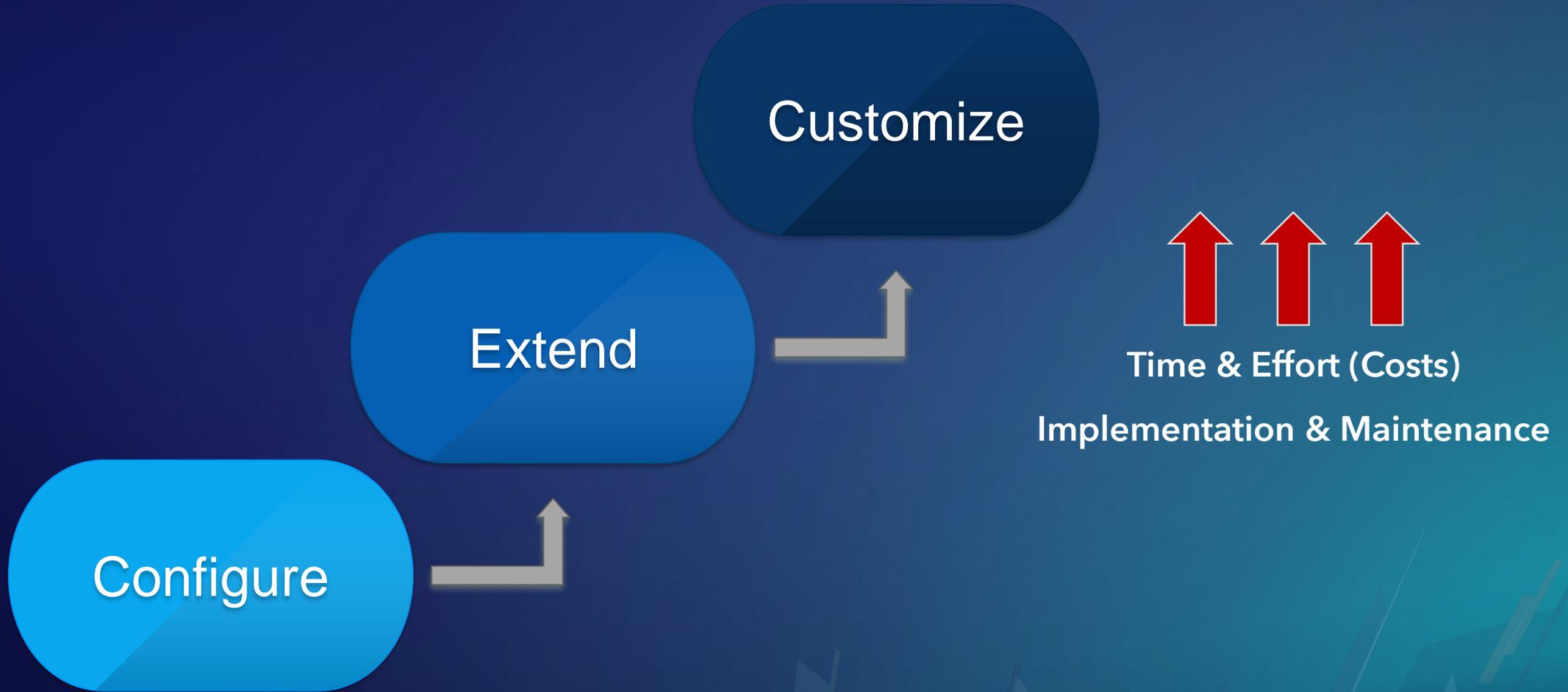
Maximize success by balancing business benefits with challenges



Drive value from technology investments

Best Practice: Project Prioritization

Assessing the Challenge Posed By GIS Initiatives



Drive value from technology investments

Best Practice: Project Prioritization

Assessing the Challenge Posed By GIS Initiatives

	Configure	Extend	Customize	Effort Score
ArcGIS Platform Upgrade - Prototype CMH & CSJ Solutions	●	○	○	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
GeoEvent Server Implementation - Prototype Historical Analysis for CMH, CSJ & EE	●	○	○	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Commercial Investment Story Map	●	○	○	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Community Education Resources Story Map	●	○	○	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Utility Operations Dashboard - Community View	●	○	○	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Custom Energy Map	○	○	●	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>



**Aggressively
Embrace**



**Cautiously
Embrace**



Experiment



Avoid

Break 

Best Practices

Patterns and practices for overcoming business challenges



Amplify customer success with a business first approach

Best Practice: Security

Securing the ArcGIS platform should be addressed early in the design process as techniques and approaches may vary depending upon business needs and environment

- Authentication/Authorization
- Filtering
- Encryption
- Logging/Auditing



Leverage the organization's existing security framework!



Who *are* these people?

What can they use?





Best Practice: High Availability

A design approach that targets a prearranged level of operational performance during a period of time

- Improve service delivery
- Reduce risks

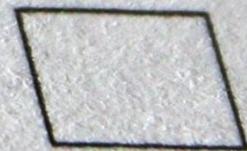
Availability (%)	Downtime per year	Downtime per week
95.0	18.25 days	8.4 hours
99.0	3.65 days	1.68 hours
99.9	8.76 hours	10.1 minutes
99.99	52.56 minutes	1.01 minutes
99.999	5.26 minutes	6.05 seconds

What is the acceptable downtime for your business workflows?





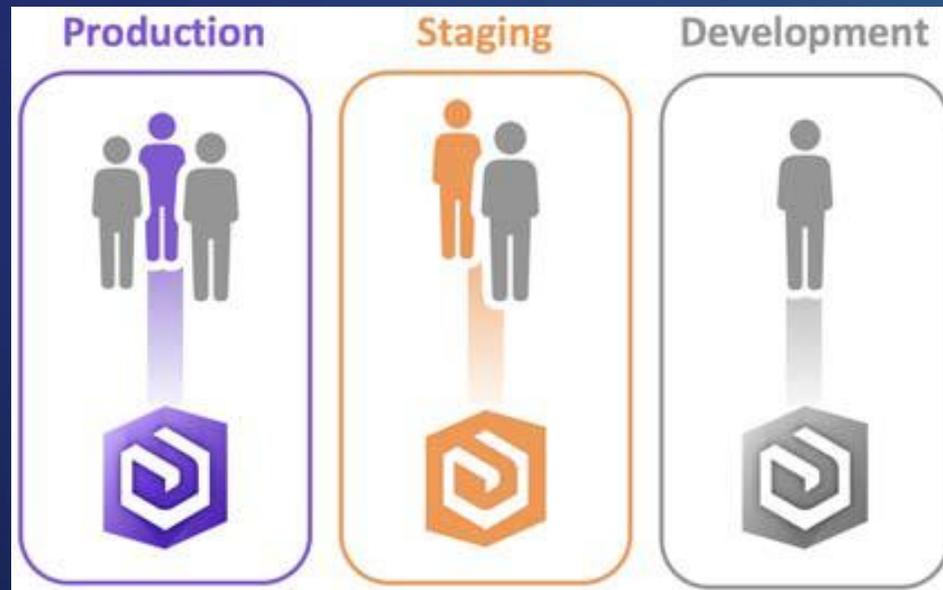
I Agree



Best Practice: Environment Isolation

Separate and distinct compute environments

- **Production:** *an operational, real-time compute environment*
- **Staging:** *a separate, mirrored, pre-production environment*
- **Development:** *a limited scale environment sufficient for primary code and data modeling*



Reduce risk and protect operational systems from unintentional changes and negative business impacts



Oops!!!



Good?





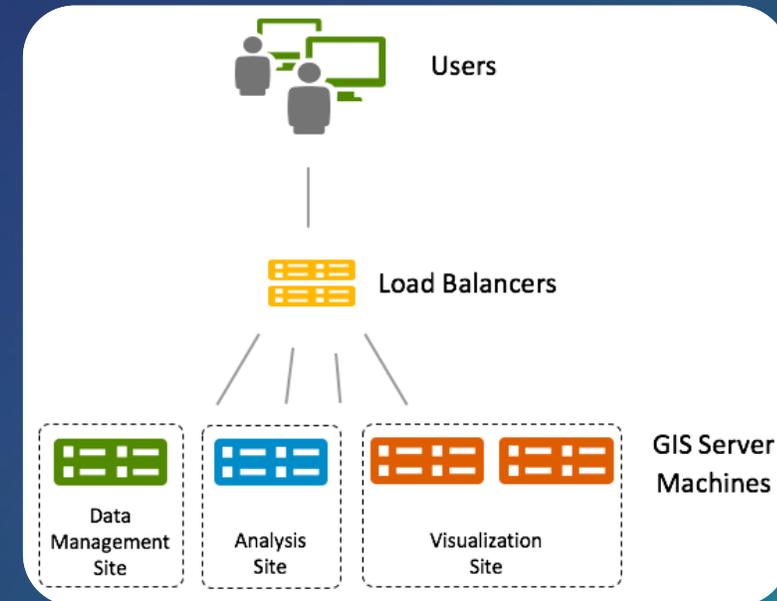
Fast enough?



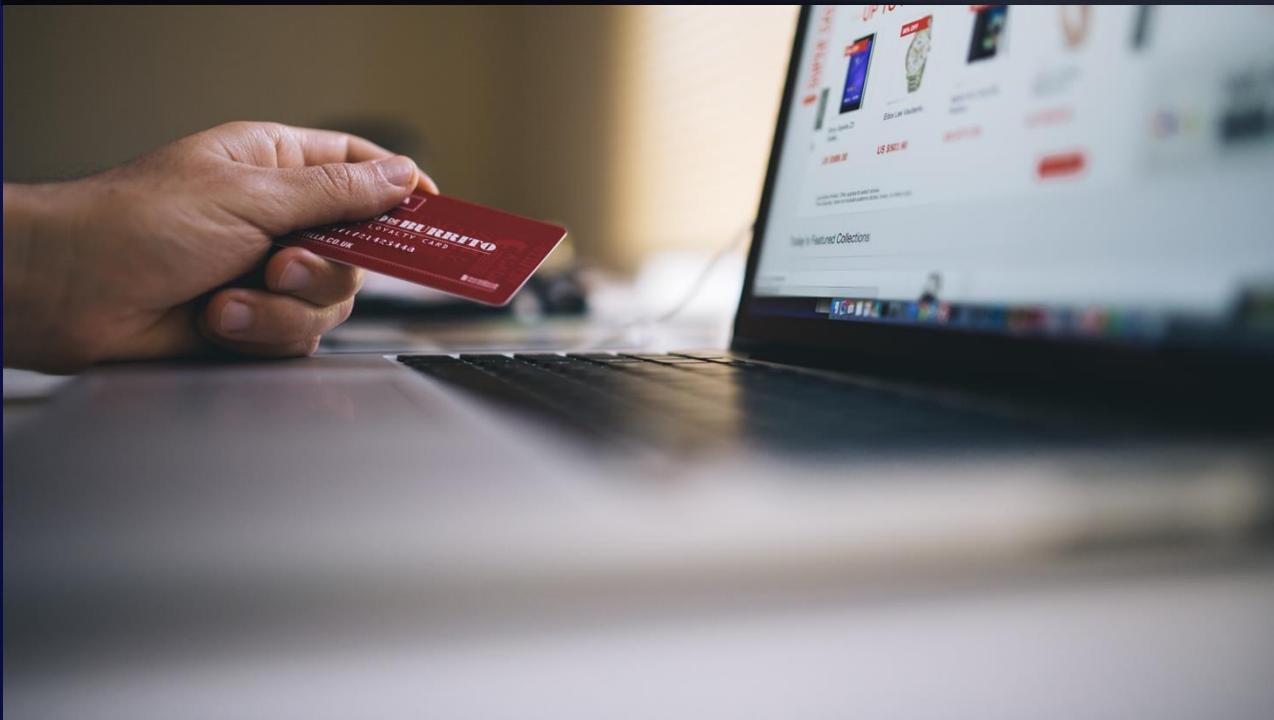
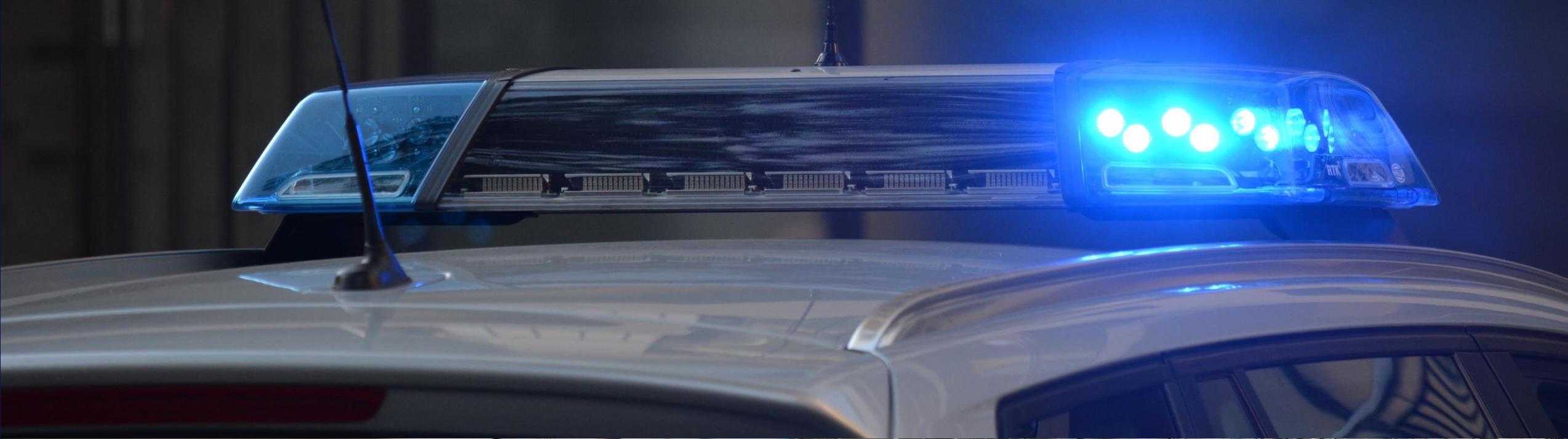
Best Practice: Workload Separation

Separate technology deployments by solution pattern

- Improve service delivery
- Reduce risks
- Minimize system resource contention



Typically SLAs determine which server deployments need to be separated.



Best Practice: Publication Strategy – Geospatial Content Delivery

Publication is the act of delivering content (data, services, and applications) to appropriate consumers

- Performance
- Reliability
- Security



Example: ArcGIS Online helps decouple contending usage patterns



Key Takeaways

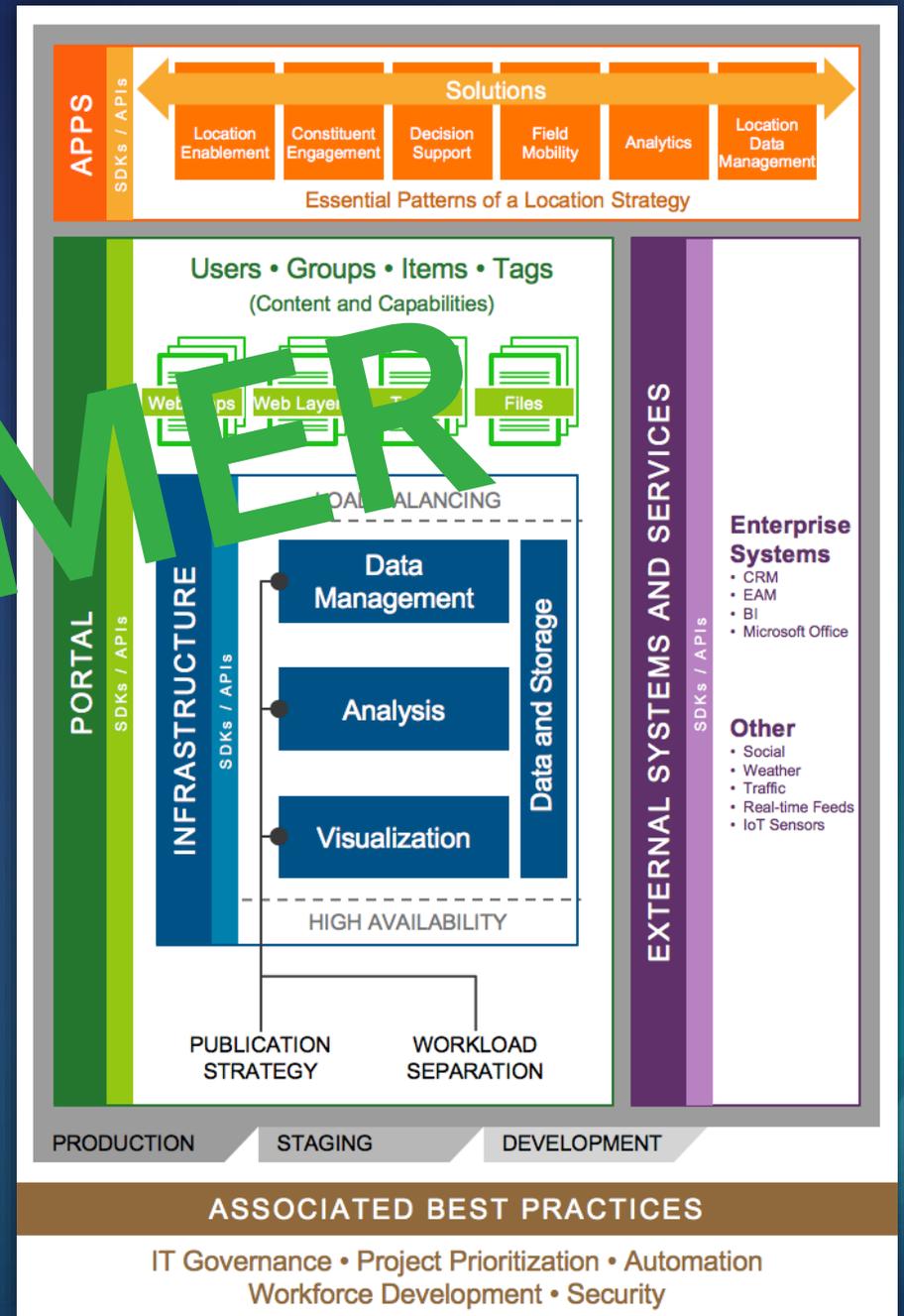
The image features a dark teal background with a white, wavy, organic pattern on the left side. The text "Key Takeaways" is centered in a white, sans-serif font. On the right side, there are several overlapping, colorful geometric shapes in shades of orange, yellow, and light green, creating a sense of depth and movement. The overall aesthetic is modern and professional.

...You wouldn't build a house without a blueprint. So don't build your ~~life~~ GIS without one either!"

- Warren Peterson

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DISCLAIMER



Best Practices

Patterns and practices for overcoming business challenges



Amplify customer success with a business first approach

Best Practices

Patterns and practices for overcoming business challenges



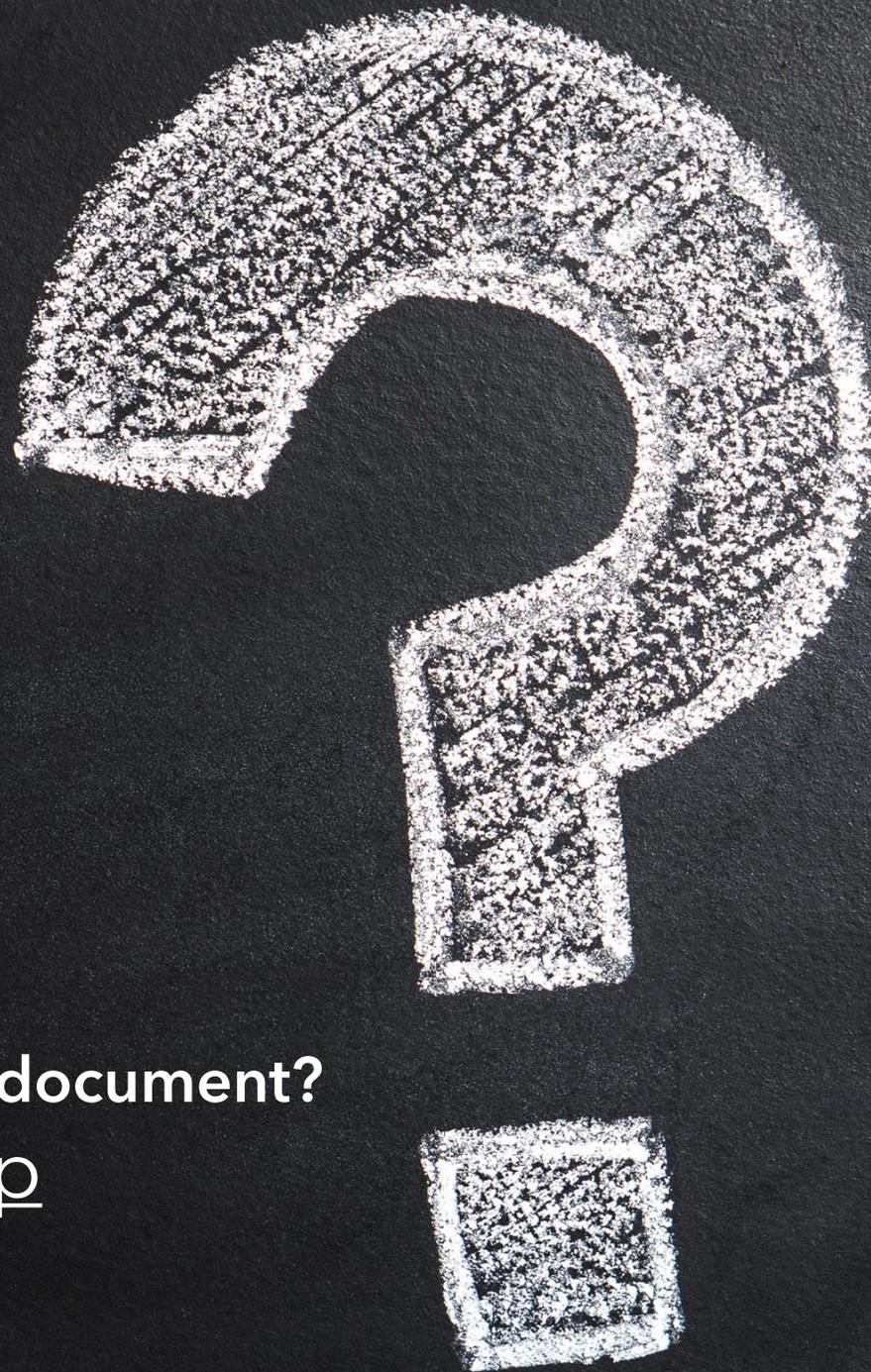
Amplify customer success with a business first approach

Best Practices

Patterns and practices for overcoming business challenges



Amplify customer success with a business first approach



Which Best Practices are currently included?

People

Capability Delivery, Patterns of Use, Managing Identities, Workforce Development

Process

Application Implementation Strategy, IT Governance, Prioritization Approach

Technology

Automation, Distributed GIS, Enterprise Integration - Application Patterns, Environment Isolation, High Availability, Infrastructure, Load Balancing, Publication Strategy - Geospatial Content Delivery, Real-time GIS Strategy, Security, Workload Separation

Where can I find the document?

- go.esri.com/bp



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