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What’s New in Tableau Blueprint

This topic contains an overview of the new topics added to Tableau Blueprint, starting with the most recent release.

May 2020

Tableau Blueprint Planner

The Tableau Blueprint Planner is updated with new and expanded considerations for Analytics Strategy, Enterprise Architecture Survey (including Tableau Mobile) for Tableau Server and Tableau Online, Data & Analytics Survey, Data & Content Governance, Upgrade Planning, and Upgrade Checklist. The following corresponding topics were also updated to reflect the changes or added: Analytics Strategy on page 9, Tableau Enterprise Architecture Survey on page 10, Tableau Data and Analytics Survey on page 15, Tableau Data and Content Governance on page 18, and Tableau Upgrade Planning and Process Checklist on page 27.

Tableau Online

Use the new Tableau Enterprise Architecture Survey on page 10 for Tableau Online to plan for integration into your existing technology investments. Tableau Online content is now available in several topics. For more information, see Tableau Project Planning on page 31, Tableau Upgrade Planning and Process Checklist on page 27, Governance in Tableau on page 52, Network Topologies on page 100, and Upgrades on page 137.

Tableau Upgrades

In addition to the two new upgrade planning and execution resources added to the Tableau Blueprint Planner, expanded guidance is available in other topics. For more information, see Tableau Upgrade Planning and Process Checklist on page 27, Tableau Project Planning on page 31, and Upgrades on page 137.
Relationships

Beginning in 2020.2, relationships are a new way to model data that is more flexible than using joins. For more information, see Data Source Management and Metadata Management in Governance in Tableau on page 52.

Tableau Add-ons

New diagrams show the configuration and benefits of the external File Store for on-premises Tableau Server deployments and the external Repository, KMS integration, and external File Store for AWS Tableau Server deployments. For more information, see Tableau Add-ons on page 107.

Data Science Integration

Learn more about Tableau and data science integration with resources from the Analytics Extension API and the Tableau Developer Program. For more information, see Data Science Integration on page 110.

Tableau Learning and Community Guide

The Tableau Learning and Community (TLC) Guide helps users determine which learning path is best for them based on how they use Tableau in their day-to-day job function. For more information, see Using Tableau Blueprint on page 15 and Skills by Tableau Education Role on page 145.

April 2020

Using Tableau Blueprint

Understand how to get started with Tableau Blueprint and right-size it for organizations, teams, and individuals. For more information, see Using Tableau Blueprint on page 15.
Tableau Project Planning

Once you’ve completed the Tableau Blueprint Planner, synthesize the information gathered into your project plan. For more information, see Tableau Project Planning on page 31.

Tableau Mobile

Learn the key considerations for deploying Tableau Mobile. For more information, see Tableau Mobile Deployment on page 116.
Using Tableau Blueprint

People are using data every day in their personal lives to make better decisions—from what route to take, to monitoring diet and exercise, and managing the personal budget. Think about that—almost everybody uses some kind of data already to gain efficiency, measure progress, and modify behaviors for better individual outcomes, whether they consciously realize it or not.

But making data ubiquitous in your organization or team is not so easy. You have to deeply understand where people need data and how they will use it, then make the relevant data accessible at those moments. Everyone says that they would like to be a data-driven organization, but the reality is that most companies are still in the early stages of modern data and analytics adoption.

With its prescriptive, proven, and repeatable processes, Tableau Blueprint curates the best practices and expertise of thousands of customers to help you, your team, and your organization become more data-driven. You will find a summary of the methodology in the Tableau Blueprint Overview on page 1 topic, which we recommend for everyone to understand.

Depending on the scope, size, and maturity of your initiative, specific areas of Tableau Blueprint are more appropriate for your specific requirements. This topic provides relevant starting points for organizations, teams, and individuals.

Organizations

For most organizations, it is rare to begin with a clean slate. Likely, you’ll find numerous existing ways of distributing and consuming data: some designated analysts who create reports for others, people using different business intelligence platforms and tools, the movement of data from governed systems of record to ungoverned methods for downstream analysis, and/or pockets of Tableau scattered across different teams that have grown separately over time.

The discovery process outlined in Tableau Blueprint will help you gather valuable perspectives from across the organization to define your Analytics Strategy on page 9 with the Tableau Blueprint Planner. This downloadable resource steps through the questions to ask, the plans to make, and the steps to take, helping you to accelerate your timeline for deploying with agility, building analytics proficiency, and creating an analytics community, while avoiding the common pitfalls that are encountered with trial and error alone. You will define Governance in Tableau on page 52 to enable access to trusted data.
The better you understand your organization’s requirements, the better you can proactively support the growth of analytics and the broad use of trusted and governed data. For both new and existing deployments, understanding the current state is the critical first step in developing your broader roll-out plan. This will help drive towards organizational alignment and identify the roles and responsibilities for the Executive Advocacy and Project Team on page 39 to support the initiative from its beginnings through the planned expansion to users of all skill levels in your company.

Whether your organization is new to modern analytics or you’ve already deployed and need to broaden, deepen, and scale the use of data, Tableau Blueprint allows you to zoom out to see the big picture of what’s ahead, and it allows you to zoom in on a specific area to fine tune and improve at any point along your journey.

**Teams**

For smaller teams or workgroups that are not part of a company-wide initiative, it is important to understand how data is used today and what analytical skills exist among your people. Your initial focus will be on identifying and prioritizing content, curating trusted and governed data sources, authoring impactful dashboards, and building new skills.

Within the Tableau Blueprint Planner, you will find the Tableau Data and Analytics Survey on page 15 and Tableau Use Cases and Data Sources on page 16 tabs to help you gather information you need to begin. They’re also a great place to start if you are working towards proving value and obtaining executive sponsorship for a broader organization-wide effort. Governance in Tableau on page 52 will help you establish a flexible, yet defined governance framework and right-size it for your unique requirements in Tableau Server or Tableau Online.

At the same time, building data literacy and growing analytical skills through education will be needed. The Skills by Tableau Education Role on page 145, Skills by Tableau License Type on page 151, and Developing a Tableau Education Plan on page 154 topics will help your team build proficiency. The Tableau Learning and Community (TLC) Guide helps users determine which learning path is best for them based on how they use Tableau in their day-to-day job function.

For teams from large to small, start meeting together to share your knowledge and insights. This will be the beginning of your Internal Tableau Activities on page 209. In addition, you should encourage your team to join the Tableau Community and participate in a thriving, global network of data enthusiasts. For more information, see External Tableau Activities.
Individuals

Individuals will benefit from the prescriptive learning paths defined in Skills by Tableau Education Role on page 145, such as Designer, Analyst, Data Scientist, and Developer. Tableau Blueprint also provides a view of skills by license in the Skills by Tableau License Type on page 151 topic. The Tableau Learning and Community (TLC) Guide helps users determine which learning path is best for them based on how they use Tableau in their day-to-day job function.

The Analytics Best Practices in Tableau on page 173 topic provides guidelines, standards, and processes for the discovery, interpretation, and presentation of data. This will help you understand The Cycle of Visual Analysis on page 177 and how to apply it to your data.

You should join the Tableau Community and participate in a thriving, global network of data enthusiasts. For more information, see External Tableau Activities on page 214 from regional to virtual activities to the annual Tableau Conference.
Tableau Blueprint Overview

The importance of data to the modern enterprise is no longer a topic of debate. The sheer volume of data that organizations capture, store, and organize continues to grow at a staggering pace. In an age of data, suddenly, every company is a data company. Although the transformational potential of data is practically limitless, most companies still struggle to fully realize the value of their data. So how do you transform into a data-driven organization?

Tableau is the trusted standard in modern analytics and business intelligence platforms, enabling your entire organization to work smarter in its seamless end-to-end experience. Tableau provides powerful and intuitive analytics for users of all skill levels while integrating with your existing technology investments.

Realizing the full value of your data means empowering everyone to make better decisions with it, and this cannot be done simply by choosing the right technology. As you chart your course to becoming a data-driven organization with Tableau, it’s important to remember that you are not just deploying software—you are driving organizational transformation by prioritizing facts over intuition with data at the center of every conversation. Your decisions should not only give people the right tools, but they must also enable the development of new skills, create new behaviors, encourage participation, and recognize achievements to alter how the organization uses data every day.

Driving change across your organization requires effort and coordination of multiple stakeholders and users with different and sometimes opposing—yet valuable—viewpoints and interests. Orchestrating change, and doing it efficiently, requires executive advocacy, as well as alignment and participation from a broad set of cross-functional participants to ensure the needs of the entire organization are being met.

Tableau Blueprint is a step-by-step guide to becoming a data-driven organization, whether your organization is new to modern, self-service analytics or you’ve already deployed and need to broaden, deepen, and scale the use of data. Transforming how your company makes decisions every day is no easy task, but incorporating data and analytics into decision-making cycles is how you will see the most transformative impact on your organization. Achieving that level of transformation requires a deliberate and holistic approach to developing your analytics practice. Although every organization’s journey to developing a Data Culture will differ, Tableau Blueprint outlines the processes and best practices from thousands of customers.
This topic explains the core capabilities, the repeatable processes to empower more people to make data-driven decisions, and how to build a thriving data-driven mindset throughout your organization.

**Core Capabilities of Data-Driven Organizations**

At the heart of every data-driven organization, you will find three core capabilities—agility, proficiency, and community. The three capabilities are supported by organizational intent, change management, and trust.

A consistent approach to governance establishes guardrails around data and content security, access, and processes, allowing you to create a trusted and secure analytics environment for every department, team, and person in the organization. Governance is central to all successful self-service analytics initiatives, and it will help your organization start, grow, and evolve the use of data and analytics.

Scaling these efforts also means measuring and proving their impact on the enterprise’s transformational goals with data and analytics. This means understanding which metrics best capture the cumulative impact of your iterative deployments, governance practices, increasing analytical skillsets, and community growth. Suitable metrics—especially for measuring behavioral changes—will vary for each organization, and should be evaluated at regular intervals as analytics practices evolve.
Agility

Deployments must possess agility by operating on iterative, repeatable processes that begin with establishing a baseline architecture for a secure, stable, and trusted server platform. Given that analytics become mission-critical, agile deployments with proactive monitoring will maintain sufficient availability, capacity, and headroom while minimizing resource contention. Because modern BI platforms often see fast growth, you will need to assess server utilization and user engagement—and likely even change your topology—more frequently than with other enterprise technology platforms in order to remain responsive to the increased use of data and analytics.

This workstream is focused on deployment, monitoring, and maintenance, which are typically IT-led efforts that rely heavily on understanding the broader business strategy and requirements.

- **Deployment** — Both Tableau Server (on-premises or public cloud) and Tableau Online (fully-hosted SaaS) leverage your existing technology investments and integrate into your IT infrastructure to provide a self-service, modern analytics platform for your users. For Tableau Server, your systems administrator along with the Tableau Server Administrator will install and configure. For Tableau Online, you will work with select IT roles to integrate. A desktop administrator will deploy client applications to licensed users of Tableau Desktop and Tableau Prep Builder. For mobile use cases, Tableau Mobile can be published to your organization’s mobile device management solution. Tableau Deployment on page 85 walks through the entire installation & configuration process and provides best practices along the way.

- **Monitoring** — Data is critical to doing analytics at scale. Ongoing, proactive hardware and application monitoring are required to deploy and operate Tableau and meet business requirements and performance expectations of your user community. Without monitoring, a “set it and forget it” mentality will likely be met with inadequate resources that fail to support
the workload of highly-engaged users. Administrators should work together to ensure performance and stability of the platform to meet evolving business needs. For more information, see Tableau Monitoring on page 121.

- Maintenance — Regular maintenance activities will keep your Tableau deployment running in top condition. You will operationalize change management processes to support the increased use of analytics, including performance tuning, load testing, capacity planning, and upgrades. Monitoring data will be the driver behind many maintenance decisions. Tableau Maintenance on page 133 outlines activities and tools to keep your deployment in optimal condition.

Proficiency

For people to skillfully analyze data that’s relevant to their jobs to make decisions that drive the business forward, they must develop proficiency. Beyond data capabilities, this also means employees actively seek using data over decision-making by instincts or feelings. Maximizing analytics investments and capitalizing on the transformative potential of data means that everyone encountering it—regardless of skill levels and data fluency—must be able to turn data into insights.

This workstream is focused on user education, measuring adoption and engagement, and increasing data fluency within your organization through best practices.

- Education — To integrate modern analytics into the fabric of your company, it’s essential to build a scalable and ongoing learning plans for all your users by evaluating their relationship to data. Tableau Education on page 145 will help you design and build the right education programs for your organization.
- Measurement — Similar to the monitoring requirements to achieve agile deployment, measurement helps Site Administrators understand user behaviors, such as who is creating and consuming content, which is important for managing and growing your team’s use of analytics. For more information, see Measurement of Tableau User Engagement and Adoption on page 161.
- Analytics Best Practices — Enable your users with the Cycle of Visual Analysis and repeatable processes for authoring content, then extend it with your own organizational standards. For more information, see Analytics Best Practices in Tableau on page 173.

Community

Community creates a network of users within your organization who use data to share and collaborate. This will continue to drive adoption and learnings around analytics and the insights
Communications

They discover. The community leader will coordinate efforts to document enablement resources, connect users within your company, and generate enthusiasm among a group of people founded on the common cause of putting data at the center of every conversation. Internal user communities also benefit from integration with and support from the broader, global Tableau Community.

This workstream is focused on enabling user growth and evangelizing analytics through communications, engagement activities, and support.

- **Communications** — Establishing internal communications and user enablement resources promotes adoption to scale data and analytics more efficiently by guiding their learning and usage. Tableau Communications on page 199 outlines how to build a strong communication channels, including an enablement intranet, analytics blog/newsletter, and discussion forums/chat.
- **Engagement** — While building excitement around the use of Tableau, engagement activities accelerate and reinforce the vision for modern analytics, and ultimately, fuel your organizational transformation. Engagement activities are used to create and nurture an environment for more productive, results-driven people. Tableau Community Engagement on page 209 defines types of activities to cultivate a thriving user community, including the internal user group meetings, knowledge transfer sessions, and competitions, as well as external community activities.
- **Support** — As your user base grows, it is critical to put the appropriate processes in place to efficiently and effectively support the user base. Tableau Support Processes on page 217 defines the ways to support users with traditional helpdesk support requests, Data Doctor, champion development, and mentoring.

Developing a comprehensive plan and approach for each of the topics within these three workstreams will ensure that you are taking a holistic approach to accelerate company-wide adoption of data and analytics.

**Governed and Trusted Data**

Governance is the combination of controls, roles, and repeatable processes that create trust and confidence in data and analytics within your organization. In a traditional BI environment, governance is often seen as a way to restrict access or lock down data or content. Because it is commonly associated with traditional BI processes, there is a common misconception that governance runs counter to a self-service, modern analytics environment; however, governance takes on a different, yet equally important role in a modern analytics environment—where governance enables and empowers your people, rather than restricts them.
Simply put, governance makes self-service analytics possible. It provides the guidelines and structure needed to properly protect data and content, but also provides the permissions and access needed for a self-service environment to be successful. For this reason, a clearly defined governance framework is the anchor point of every data-driven company. The governance models you define will drive many decisions throughout the process—from providing the guidance necessary for the three workstreams to move forward, to developing the core capabilities to strengthen the data-driven decision-making in your organization.

For self-service analytics to scale, governance needs to be collaborative. Both IT and business stakeholders on the project team are responsible for defining data and content governance. Shifting from an IT-led governance model does not mean IT relinquishes control so much as it means allowing the business to be more self-reliant within a trusted environment. Modern BI environments are implemented and scaled to benefit analysts and business users and as such, these users should all participate in maintaining its overall quality, including becoming a first line of defense in identifying data issues or irregularities within the agreed-upon governance models.

Acknowledging that every organization is different, and every use case is different, varying degrees of governance are required. The data and content governance models can be right-sized and applied to any kind of data regardless of where it falls in the governance spectrum. Establishing three primary governance models—centralized, delegated, and self-governing—provides the flexibility to satisfy the governance needs of most organizations. Like other Tableau platform management activities, an agile, iterative approach is needed to adapt to new business requirements as user adoption and engagement increase across your organization. For more information, see Tableau Governance Models on page 82.

A Repeatable Process for Tableau Blueprint

Tableau Blueprint is a step-by-step guide to becoming a data-driven organization. It provides concrete plans, recommendations, and guidelines across critical foundational work and three primary workstreams that will turn repeatable processes into core capabilities. These topics will guide you through key decision points with a proven, repeatable, four-step process:

1. Discover — Gather information and perspectives from sponsors and multiple stakeholders about your enterprise architecture, the use of data and analytics among business teams, and analytical skills both present and needed.
2. Govern — Define controls, roles, and repeatable processes to make the appropriate data and content available to the corresponding audience.
Tableau Blueprint Help

3. Deploy — Establish the iterative, repeatable processes across the three major workstreams to install and configure software, educate users, and enable communications.

4. Evolve — Monitor platform utilization, measure user engagement, and host engagement activities to promote and support the growing use of data and analytics.

For existing deployments, use this blueprint to assess your current capabilities—including where you are excelling and where there are areas for growth and improvement.

Step 1: Discover

Tableau Blueprint includes the Tableau Blueprint Planner, a comprehensive planning asset that will help you systematically gather the right information needed to link data with your strategic initiatives, define your analytics strategy, discover analytics use cases, and assemble the Executive Sponsor Roles and Responsibilities on page 39 and Tableau Project Team Roles and Responsibilities on page 42. This will ensure you are evaluating the needs of the organization holistically, so you can scope a vision and strategy that will suit your entire organization and grow with you over time. After completing discovery, you should have a greater sense of the direction you are headed with your analytics strategy and the roles needed to execute on it. Discovery should be revisited as you expand to new users and use cases, but having a clear view of the future state will help you make decisions as you move forward.

Step 2: Govern

As mentioned above, a clear approach to governance is a pivotal point in the process and must be addressed early. Governance is pervasive throughout every workstream. The time invested up front to collaboratively define governance gives people confidence to trust the data, use it responsibly, and participate in the processes that surround it. Tableau Governance on page 49 covers all aspects of governance in Tableau and help you determine the best approach for your teams, data, and content. Working through the areas within data and content governance, you will define standards, policies, and roles who perform the corresponding actions and processes in the governance models.

Step 3: Deploy

To scale analytics across the organization with confidence, you need repeatable, iterative processes in the deploy stage as you execute on your analytics strategy. During the initial deployment, there needs be coordination among the cross-functional team members to install, integrate, and configure the Tableau platform, educate users, and provide organization-specific
enablement resources. After the initial deployment, you will onboard new teams and use cases with education and communication.

Step 4: Evolve

Your analytics strategy needs to keep pace with the growth of users, skillsets, and use cases across the organization. As processes evolve into capabilities, your users will adopt modern analytics, and you will adapt your operating models by delegating more responsibilities over time. The project team has access to several sources of information and data to tailor and tune your analytics environment to changing business needs. The project team will be responsive to the growing use of data and analytics among a diverse set of users by establishing a feedback loop to monitor and measure key metrics, including the business value achieved.
Analytics Strategy

To ensure success with your analytics investment, your organization needs a clearly defined vision for deployment. Inputs from people across the organization are crucial to understand the short and long-term goals to promote data-driven decision-making. Your strategy must cover people, process, and change management—including identifying immediate business use cases, defining roles and responsibilities, and establishing a cadence to evaluate success measurements and impact.

Valuable inputs from across the organization will help to guide your analytics deployment and future state—including the roles, responsibilities, architecture, and processes, as well as the success measurements to understand progress. After completing the Tableau Blueprint Planner, you should have a greater sense of the direction you are headed with your analytics strategy by defining your vision for the use of data, identifying strategic initiatives and KPIs, setting Tableau business goals, and documenting risks and challenges.

Discovery Process

The discovery process outlines a systematic approach to gathering information and perspectives from sponsors and multiple stakeholders about roles and responsibilities, enterprise architecture, and the use of data and analytics among business teams. Within each section, the team or role responsible for completing is noted. Discovery is critical for gathering information from sponsors and stakeholders to inform the organization’s analytics vision.

The Tableau Blueprint Planner contains questions you need to answer before deploying Tableau broadly. Your answers will inform activities at every stage and every workstream in the Tableau Blueprint. The following areas are covered within the planner:

- Analytics Strategy
- Roles and Responsibilities
- Enterprise Architecture Survey for Tableau Server or Tableau Online
- Data and Analytics Survey
- Use Cases and Data Sources
- Data and Content Governance
- Education Role Mapping
- Users
• Community
• Upgrade Planning and Checklist

The Tableau Data and Analytics Survey on page 15, Tableau Use Cases and Data Sources on page 16, and Tableau Users on page 26 sections of the planner should be revisited as you expand to identify new data use cases and users from new departments and teams.

Tableau Roles and Responsibilities

The Roles & Responsibilities tab, found in the Tableau Blueprint Planner, helps to identify the cross-functional sponsor and project team members. The individuals you select will be responsible for understanding current/future state capabilities, goals, and challenges. Depending on the size and scope of your deployment, the number of people may vary. For more information on roles and responsibilities, see the Executive Advocacy and Project Team on page 39.

Tableau Enterprise Architecture Survey

The Enterprise Architecture Survey assists IT with identifying what platforms and applications will be connected to Tableau. Likely during the product evaluation period, some of the questions about how Tableau fits with your existing technology investments were already considered, but prior to enterprise-wide deployment, it will be beneficial to take a closer look at who owns each system and coordinate the resources needed to fully integrate Tableau within your enterprise architecture. Even if you have an existing deployment, the survey can be helpful in identifying gaps or what you might integrate next. For more information, see Tableau Deployment on page 85.

Collect the following information about your enterprise architecture for the matching deployment type, Tableau Server or Tableau Online:

**Tableau Server**

**Hardware**

• Where will you deploy - on-premises, public cloud, or hosted?
• What are your enterprise standard build/specs? (cores, VM, RAM)
Tableau Blueprint Help

- What is your enterprise server operating system?

Availability

- Is Tableau Server mission-critical, requiring high availability?
- What is the recovery time objective (RTO)?
- What is the recovery point objective (RPO)?

Security

- What is your enterprise authentication protocol? (Active Directory, LDAP, SAML)
- What is your security policy for service accounts related to Tableau Server?

Network

- Is SSL required?
- What is your policy on gateway ports over http/https?
- Are there any port restrictions?
- Is internet access from servers permitted?
- Will users access the server externally?

Operations

- What are your enterprise software management tools? (server, client, mobile)
- What are your enterprise monitoring tools? (SCOM, Splunk, etc.)
- How many environments do you require for servers? (dev, UAT, prod)
- What processes exist for backup/restore?

Licensing

- What is the license type (role-based subscription, core, embedded)?
- Will you distribute client software keys or utilize Login-Based License Management to
manage license keys?

- How are license assets allocated?
- How will additional licensing purchases be made?
- Is there a chargeback model?

Client Software

- How is client software deployed - Desktop, Prep Builder?
- How is client software upgraded - Desktop, Prep Builder?

Mobile

- Who is the audience for mobile analytics, and what are the primary user scenarios?
- Where will people be when they need data? (In office, the field, a home office)
- How will users reach the Tableau Server if they aren’t on the same network?
- Will users need to access data offline, without connecting to the internet or your network?
- Will people use company-owned devices, personal devices (BYOD), or both?
- What mobile device types (phone, tablet) do you support?
- What mobile OS’s do you support?
- How sensitive is the data?

Analytics Services

- Will you be integrating external services (R Server, Python, MATLAB, WMS)?

Automation & Extensibility

- What are the requirements for automation, customization? (APIs needed)

Data
What database technologies (on-premises and cloud) are sources of data?

What file-based sources of data will be used? (network folder access)

What security policies exist for database service accounts, user accounts?

What are your classifications for data security? (secret, confidential, internal, public, etc.)

Do you have any data that is restricted to a geographic region?

Are there external and/or government regulations to comply with?

Are there row-level security requirements?

Tableau Online

Security

What is your preferred authentication protocol? (SAML, Google, TableauID)

Do you leverage a cloud SSO provider (Azure AD, AD FS, OneLogin, PingOne, Okta, Salesforce)?

How do you perform user and group provisioning? (Cloud SSO, REST API, Manual)

What is your security policy for service accounts? (data sources, Tableau Bridge)

Network

Is SSL required for data source connections? (Tableau Online uses SSL by default)

What is your policy on gateway ports over http/https?

Are there any port restrictions?

Is Internet access from internal servers permitted?

Licensing

Will you distribute client software keys or utilize Login Based License Management to manage license keys?

How are license assets allocated?

How will additional licensing purchases be made?

Is there a charge-back model?
Client Software

- How is client software deployed - Desktop, Prep Builder? (manual, silent, self-service)
- How will client software be updated? (manual, silent, self-service)
- How will Tableau Bridge be deployed and managed? (If needed, centralized recommended)

Cloud Application Integration

- What are the requirements for branding and customization?
- What are the requirements for automation with APIs?
- What are your site monitoring needs? (trust.tableau.com, site status admin views, custom reporting in Admin Insights)

Mobile

- What is your Mobile Device Management solution?
- Who is the audience for mobile analytics, and what are the primary user scenarios?
- Where will people be when they need data? In the field, a home office, or both?
- Will users need to access data offline, without connecting to the internet or your network?
- Will people use company-owned devices, personal devices (BYOD), or both?
- What mobile device types (phone, tablet) do you support?
- What mobile OS’s do you support?

Data

- What cloud sources of data will be accessed?
- What on-prem sources of data will be accessed? (databases, Virtual Private Environments, applications, files)
- Will Tableau Bridge be used to move data into Tableau Online?
Tableau Blueprint Help

- What security policies exist for database service accounts, user account?
- Will credentials be embedded? Will the credentials be a service account or a data steward account?
- What data security measures, considerations and/or company policies are required by your organization for your internal data?
- Are there external and/or government regulations to comply with?
- Do you have any data that is required to be stored in a geographic region (sales territories, geographic data housing restrictions, etc.)?
- Are there row-level security requirements?

Tableau Data and Analytics Survey

For line-of-business leaders, the Data and Analytics Survey, found in the Tableau Blueprint Planner, identifies key sources of data, how data is distributed and consumed, and what analytical skills exist or need to be developed among their teams. Business teams who will be using Tableau should complete the Data and Analytics Survey or work with an IT team member to facilitate documentation of the information. Consider every source of data—from CSV files, reports distributed via email, and local database files, to the enterprise data warehouse, cloud applications, and external sources. This should be part of the onboarding process as new teams are added. Each Line-of-Business leader should survey their teams for the following information:

Team

- What is the team's function?
- What is the targeted number of users?
- Within the team is there a data engineering function?
- Does your team have data access today for what needs to be analyzed?

Data Selection and Management

- What business problems/questions need to be solved/answered?
- How does your team source data? (data warehouse, file exports, third-party)
- What are the key sources of data for the team?
- How often does the data change?
Security
- How is data secured?

Distribution
- How is data distributed?
- How frequently is data distributed?
- What formats are used?
- Who prepares reports for distribution?
- Who are the recipients?

Consumption
- How is data consumed? New or replacement solution/report?
- Do consumers export and perform additional manipulation in context of your team?
- How is data used in context of recipient's job/role?

Skills
- What analytical skills and capabilities exist within the team?
- What analytical skills and capabilities need to be developed?
- Who will be identified and trained as the Tableau Champions within the team?

Tableau Use Cases and Data Sources
To identify initial use cases, the project team should complete the Use Cases and Data Sources Worksheet, found in the Tableau Blueprint Planner, after the Tableau Data and Analytics Survey on the previous page has been collected for each department/team to discover and prioritize which sources of data will be most impactful for the participating business teams. When prioritizing sources of data to publish and certify on Tableau Server, begin with low complexity and high impact first to demonstrate quick wins. Publish and certify data sources, create workbooks to answer business questions. As new data sources are identified, they can be added over time. Beyond the initial use cases, this provides a repeatable process to add new data sources as the deployment progresses.
Use Cases

If you are transitioning from a traditional top-down BI approach driven by IT or favor a phased delegation of responsibilities to governed self-service, it is advantageous for IT or a centralized BI team to build the initial use cases across departments, including certified data sources and dashboards.

Over time, as analytical skills increase and users are encouraged to ask and answer their own questions, the domain of available trusted content will grow organically into a wider range of analytic content for self-service.

From Initial Use Cases to Self-Service

Ideas for Initial Use Cases

In addition, Tableau provides Dashboard Starters for popular line-of-business applications to accelerate content authoring. Content consumers can view and interact with the initial use cases while they ramp-up their analytical skills. After they complete some training, the initial use cases can become the starting point for build new content. Some common initial use cases by department are listed below:

- IT — Hardware/software asset inventory, helpdesk call volume/resolution time, resource allocation, security patch compliance
- Finance — Budget planning and spend, accounts payable, travel expenses
- Marketing — Campaign engagement, web engagement, leads
- Human Resources — Turnover rate, open headcount, new hire retention, employee
satisfaction
- Sales — Sales/quota tracking, pipeline coverage, average deal size, win/loss rate
- Facilities Operations — Physical locations, call center volume/workload distribution, work request volume/resolution time

For more solutions in industries and departments, see How People Use Tableau.

Tableau Data and Content Governance

The Data and Content Governance Models worksheet, found in the Tableau Blueprint Planner, walks you through the key considerations for defining centralized, delegated, and self-governing models. This will help you document who is responsible for each area, and what the designated person or team should do. For more information about each area, see Governance in Tableau on page 52 and Tableau Governance Models on page 82.

Data Governance

Data Source Management: includes processes related to selection and distribution of data within your organization.

- What are the key sources of data for a department or team?
- Who is the Data Steward or owner of the data?
- Will you connect live or extract the data?
- Should the data source be embedded or published?
- Do variants of a dataset exist? If so, can they be consolidated as an authoritative source?
- If multiple data sources are consolidated, does the single data source performance or utility suffer by attempting to fulfill too many use cases at once?
- What business questions need to be answered by the data source?
- What naming conventions are used for Published Data Sources?
Data Quality: an assessment of data's fitness to serve its purpose in a given context.

- What processes exist for ensuring accuracy, completeness, reliability, and relevance?
- Have you developed a checklist to operationalize the process?
- Who needs to review data prior to it becoming shared and trusted?
- Is your process adaptable to business users and are they able to partner with data owners to report issues?

Enrichment & Preparation: processes used to enhance, refine or prepare raw data for analysis

- Will data enrichment and preparation be centralized or self-service?
- What organizational roles perform data enrichment and preparation?
- What ETL tools and processes should be used to automate enrichment and/or preparation?
- What sources of data provide valuable context when combined with each other?
- How complex are the data sources to be combined?
- Will users be able to use Tableau Prep Builder and/or Tableau Desktop to combine datasets?
- Have standardized join or blend fields been established by the DBA to enable users to enrich and prepare datasets?
- How will you enable self-service data preparation?

Data Security: protective measures that are applied to prevent unauthorized access to data

- How do you classify different types of data according to its sensitivity?
- How does someone request access to data?
- Will you use a service account or database security to connect to data?
- What is the appropriate approach to secure data according to sensitivity classification?
- Does your data security meet legal, compliance, and regulatory requirements?
Metadata Management: the end-to-end process for creating, controlling, enhancing, attributing, defining and managing a business-friendly semantic layer of data

- What is the process for curating data sources?
- Has the data source been sized to the analysis at hand?
- What is your organizational standard for naming conventions and field formatting?
- Does the Tableau Data Model meet all criteria for curation, including user-friendly naming conventions?
- Has the metadata checklist been defined, published, and integrated into the validation, promotion, and certification processes?

Monitoring & Management: process used to measure successful job execution

- Are schedules available for the times needed for extract refreshes?
- How is raw data ingestion monitored from source systems? Did the jobs complete successfully?
- Are there duplicate sources of data?
- When are extract refreshes scheduled to run? How long do extracts run? Did the refresh succeed or fail?
- Are subscription schedules available after extract refreshes have occurred?
- Are data sources being used? By whom? How does this compare with the expected audience size?
- What is the process to remove stale Published Data Sources?

Content Governance

Content Management: processes used to keep workbooks and data sources fresh and relevant

- Will workbooks and data sources be shared across the company?
- Will sites be used to isolate sensitive content or departments?
- Will projects use an organizational (departments/teams), functional (topics), or hybrid approach?
Tableau Blueprint Help

- Have sandbox and production projects been setup to support ad-hoc and validated content?
- Are content naming conventions used?
- Are authors publishing multiple copies of the same workbook with different filters selected?
- Does content have a description, tags, and comply with visual styles?
- Do you have a load time expectation and an exception procedure in place?
- After employees leave the company, what is the process to reassign content ownership?

Authorization: process of defining permissions model enable access to data and content

- What is the minimum site role for Active Directory/LDAP group synchronization?
- Have you set all permissions for the All Users group in the Default project to None?
- Are any explicit restrictions (Deny permissions) needed on the All Users group to propagate to every user account?
- Have you created groups that correspond to a set of authoring and viewing capabilities for each project?
- Have you reviewed effective permissions on select users to test your permissions model?
- Have you locked permissions at the parent project to maintain security throughout the project hierarchy?
- Have service account usernames/passwords been established for Published Data Sources?

Content Validation: process used to verify that content is correct

- Who is involved in the validation process?
- Is the workbook accurate, complete, reliable, relevant, and recent?
- Does the new content replace existing content?
- Are the underlying data and calculations correct?
- Does the workbook reflect corporate branding?
- Does the workbook have a logical layout?
Are all axes and numbers formatted correctly?
Do dashboards load within the acceptable performance time?
Do filters and dashboard actions behave on the targeted views?
Does the dashboard remain useful in edge case behaviors (filtered to all, none, one value, etc.)?

Content Promotion: process used to bring content from sandbox project to production project
- Who is involved in the promotion process?
- Do content-promoting roles have a checklist of criteria to evaluate?
- Have you clearly delineated between certified content and ad-hoc content by projects?
- Is the process agile to support iterations and innovation?
- Do you have workflows to address both direct and restricted sources of data and workbooks?

Content Certification: process used to verify that content has been vetted and can be trusted in operational state
- Who is responsible for designating certified content?
- Have all criteria for achieving certification status been met?
- Are all fields completed: about, certification notes, tags?

Content Utilization: processes used to measure user engagement
- How much traffic goes to each view?
- What is the definition of stale content? How often is stale content purged?
- How much indirect utilization (alerts & subscriptions) occurs?
- Are subscriptions delivered on time?
- Does the actual audience size match with expectations?
- Does content follow a weekly, monthly, quarterly trend?
Tableau Blueprint Help

- What is the frequency of login or days since last login by user cohort?
- What is the distribution of workbook and data source size?

Tableau Education Role Mapping

Your organization is full of people doing different things with data whether they recognize it or not. Some use data to answer questions to drive their lines of business forward. Others prepare spreadsheets and reports that they distribute within their department. Some others pull in raw data from cloud applications or grab quick snapshots of important KPIs to use during team meetings.

Each organizational role or job function has a relationship to data that you should identify and map to Tableau roles. Assessing the skills required to operate Tableau in each organizational role requires an understanding of which tasks can be completed with each product, plus an understanding of how those products correlate to Tableau’s licenses that are detailed above.

As part of the discovery and planning work you’ll do upfront, you’ll develop a plan for what licenses you need for your near- and long-term roadmap with Tableau.

Current State Definition

During the discovery process, the Data & Analytics Survey helped you to identify how data is distributed and consumed within a department and existing skills among team members. When you review your survey results, it will be helpful to bucket users into those who distribute, derive, or receive reports.

![Diagram showing distribution and roles]

- Users receive reports or derivative reports for downstream analysis
- Developers prepare reports from raw data, portal, exports, send email or files
- Users modify or combine existing reports in context of department or team
- Many users, Ungoverned state
- Few Users, Governed system
Future State Definition

Once the current state is understood, you should define the future state. Consider how you users will interact with data to determine the license types and education roles needed.

License Types

Using information discovered by the Data & Analytics Survey, you should assess each organizational role’s relationship to data, categorize types of users, and determine the best fit for education needs by license type. As the future state diagram shows, those who prepared and distributed reports become Creators, and users who modify and combine existing reports are likely Explorers. Viewers are content consumers. For more information see Tableau License Types on page 113.

Education Role

We identified twelve Education Roles that map to prescriptive Learning Paths that will educate employees in the skills needed to contribute to the growth of a data-driven organization. We recommend that you review the education needs of different organizational roles even if you decide to self-curate education resources or to consume training courses individually. For more information, see Tableau Education on page 145 and related topics.

Enable a data culture in your organization: These roles establish cultural & technical standards to align every Tableau user to the analytics goals of your organization.
Provide insights and develop visualization solutions: These roles use the capabilities of the Tableau platform to consume & create business solutions that range from ad-hoc visualizations to embedded analytics.

Deploy and manage Tableau: These roles plan scalable deployments of Tableau Server or Tableau Online and once in production, ensure that users can access what they need when they need it.

Enter the corresponding job titles for each Education Role listed on the Education Role Mapping tab of the Tableau Blueprint Planner. For more information on each Education Role, see Skills by Tableau Education Role on page 145.
Tableau Users

With the audience size estimated in the Use Cases and Data Sources tab, you will drill-down one more level to list users. The Users tab of the Tableau Blueprint Planner helps you track individuals’ department, license level, learning path, and onboard date. Remember to designate at least one champion per department. Later, you will publish these names in the user directory on your Enablement Intranet, which is outlined in the Communications Guide. Collect the following information for each user or categorize by type of user:

- Name
- Department
- License Level
- Site Role
- Learning Plan
- Onboard Date
- Tableau Champion?

Tableau Community Planning

The Community tab in the Tableau Blueprint Planner is focused on communications, engagement activities, and support plans to connect people and nurture the use of analytics. Your organization’s Tableau user community is just like Tableau’s Community, only on a smaller scale. It’s comprised of all the Tableau users in your company. The community leader will coordinate efforts to collect enablement resources and connect users within your company and generate enthusiasm among a group of people founded on the common cause of putting data at the center of every conversation.

Not all items listed on the Community tab are required for launch, and many will evolve over time. The following areas should be assigned to an owner with a due date:

Communications

- Getting Started
- FAQ
- Support
- Announcements
- User Directory
- Governance Models
- Data Platforms
The goal of upgrade planning is to establish a proactive approach to move to the next version of Tableau. With inputs from executive sponsors and the cross-functional project team, this holistic approach goes beyond the technical software upgrade plan by including the communications, education, and support plans needed to successfully execute the upgrade. Complete the Upgrade Planning Checklist tab of the Tableau Blueprint Planner, review the Upgrades topic, and customize the Upgrade Process Checklist tab of the Tableau Blueprint Planner for your requirements.

Early decision points to discuss among the project team are upgrade frequency, version selection, and version compatibility. These will serve as guiding principles for maintaining the
environment. By defining the upgrade approach early on, the project team will be able to explain when and how upgrades are performed and better manage users' expectations, rather than reacting to the business demands for new features and functionality.

- **How often will upgrades occur?** Determine the number of Tableau Server upgrades that will occur per year and consider acceptable downtime windows that do not interfere with month-, quarter-, or year-end closing activities and/or blackout periods. For Tableau Online, upgrades are performed by Tableau with advance notice, but your administrators will need to update client software to take advantage of new features and functionality.
- **How will the upgrade version be selected?** It is important to fully understand how Tableau is being used to ensure the appropriate version is selected so that it fulfills new business requirements and complies with IT policies. Tableau Online is upgraded to latest release by Tableau.
- **How will the new version impact existing solutions?** Evaluate compatibility with existing software versions and custom solutions, such as customized API development for embedded analytics and automation for both Tableau Server and Tableau Online.

### Software Upgrade Plan

The software upgrade plan is probably what immediately comes to mind when someone thinks about upgrades. It defines the step-by-step procedure to go to the next Tableau software version. The plan should be developed by the IT resources on the project team, using the Upgrade Process Checklist tab of the Tableau Blueprint Planner as the baseline. The Upgrade Process Checklist should be customized for your requirements, including the upgrade test plans by selecting top dashboards and data sources to evaluate after the test and production environment upgrades. A rollback plan should also be prepared in case problems are encountered.

For Tableau Server, this work will be performed by the Systems Administrator and Tableau Server Administrator roles, who will upgrade the server environments beginning with the test environment. Once validated in the test environment, they will schedule the production environment upgrade and the disaster recovery environment, if applicable. The Resource Monitoring Tool master server and agents should also be upgraded.

The Desktop Administrator and Mobile Administrator roles will be responsible for packaging and updating Tableau Desktop, Tableau Prep Builder, and Tableau Mobile, which apply to both Tableau Server and Tableau Online deployments. Review and upgrade other
applications based on your installations, such as tabcmd, Tableau Bridge for Tableau Online, and the Content Migration Tool.

Additional input from the Enterprise Architect, Database Administrator, Security Administrator, and Network Administrator roles may be needed if changes are required in the corresponding area of expertise. The following questions should be used for planning:

- What IT roles will be involved in the upgrade?
- Do you have a single production instance of Tableau or multiple production instances of Tableau to be upgraded?
- Do you have a test environment setup that matches the production environment specs and configuration?
- Will your configuration be changing to support high-availability? If it is already HA, are all processes redundant?
- Do you have a disaster recovery environment setup?
- Are backups taken daily and stored outside of the production Tableau Server?
- Are you changing to role-based licensing?
- What are the current and new Tableau Server/Tableau Online and Tableau Desktop versions?
- What are the current and new Tableau Prep Builder versions?
- What are the current and new Tableau Mobile versions?
- What are the current and new Resource Monitoring Tool versions?
- What are the current and new tabcmd, Tableau Bridge, or Content Migration Tool versions, if installed on individual computers?
- Are there any programmatic dependencies that will be impacted by the upgrade? (embedded analytics, portal development, automation with APIs)
- Will additional capacity be needed to support new workloads between this upgrade and the next upgrade? (extract refreshes, flow execution, subscriptions)
- Will additional capacity be needed to support the estimated number of new users between this upgrade and the next upgrade?
- Are there any planned platform changes to the completed after the upgrade? (OS, hypervisor, hardware, or cloud provider)
- What is the rollback plan in case there are issues with the upgrade?
Communication Plan

As you design the communications plan, consider your business goals for the upgrade and how users will be notified in advance of the pending upgrade and after its completion on your Tableau Enablement Intranet on page 199. Add the upgrade timeline to your newsletter, and use department Site Administrators or team champions to relay information. In Tableau Server, use a custom sign-in message and site welcome banner for communicating with your users. For more information, see Customize Your Server. Tableau Online users will see a message that indicates the maintenance window for the update after sign-in, which you should reinforce with internal communications. The following questions should be used for planning:

- What are the business goals for the upgrade?
- What new features or functionality will be available in the new version?
- How will users be notified of the pending upgrade?
- How will users be notified after the upgrade is completed?
- How will users install new client and mobile software? (silent, self-service, manual)

Education Plan

The education plan will enable your users to understand new features and utilize the new version of Tableau to its full potential. Update your Tableau Enablement Intranet on page 199 content with Tableau-hosted resources, such as What's New topics by product in Tableau Help documentation, the latest release notes, free training videos, and launch events.

Augment Tableau-provided resources with training content organization-specific resources that explain how new features will be implemented, including example use cases, and schedule a user group meeting focused on the new functionality. The following questions should be used for planning:

- How are users educated on new features or functionality?
- What Tableau-provided resources will be added to the enablement intranet?
- What company-specific resources need to be created?
- Will Lunch & Learn sessions or on-demand videos be created?
Support Plan

The support plan should define additional resources needed to handle initial demand for post-upgrade support, triage, and the escalation path. Update the Tableau Enablement Intranet on page 199 content. The following questions should be used for planning:

- What self-service help resources are available?
- What incident categories exist for post-upgrade support?
- How are support requests triaged?
- What is the escalation path for post-upgrade incidents?

Tableau Project Planning

Using the Tableau Blueprint Planner, you defined your organization’s vision for analytics, identified executive sponsors and project team members, documented the current state of your enterprise architecture, and assessed the usage of data and analytics among each business team.

This is an important step because it provides you with a better understanding of your organization’s requirements so that you can plan for the broad use of data and support the growth of analytics. Next, the project team will begin to synthesize the information and document the findings of the discovery process.

Planning Areas

The following questions and summary points for each area of the Tableau Blueprint Planner are listed below:

- **What is your vision, and what are your strategic initiatives, business goals, and challenges?** (Analytics Strategy tab) Your vision for modern analytics and the broad use of data should be aspirational and actionable, as well as aligned with your organization’s goals. Your strategic initiatives and business goals will provide direction for creating KPIs and metrics to track your progress toward desired outcomes. By linking these initiatives to data and analytics, you can use them to motivate your people as a driver of change.

  The initiatives will likely showcase executive interest areas and specific content they will use to make business decisions. With executive-level content, your sponsors will be able
to exemplify and model data-driven behaviors. Some examples of strategic initiatives might include: improving customer experience, increasing brand awareness, or reducing technical debt with systems modernization. There is data behind each of these examples that can be measured and tracked as progress toward your goal.

By identifying the challenges or obstacles early, you will be more prepared to mitigate those risks to achieving success. Many risks can be offset by a planned and systematic approach to the rollout.

- **Who are the executive sponsors and project team members?** (Roles and Responsibilities tab) The number of people involved in the project is not as important as having someone with the domain knowledge to perform the corresponding role when it is needed. It is important to note that the larger the organization, the more likely it will be to involve more people because of the more specialized roles they contain—make sure you have the right people involved to move the initiative forward.

  Executive sponsors should be visible and vocal advocates of the platform. They will work with the project team to consider not only how to scale the technology, but also to ensure adequate support, training, and structure to effectively navigate change management and overcome the roadblocks to becoming a data-driven organization.

  The cross-functional project team includes IT/BI Professionals, Tableau Server and/or Site Administrators, and selected Content Authors and Data Stewards from different departments. Set a weekly meeting interval during the initial deployment, and consider moving to bi-weekly or monthly once an operational cadence is achieved. Progress should be reported regularly to the executive sponsors, as well as issues that need to be escalated and resolved by the decision-makers.

  If you don’t have executive sponsorship yet, then you should focus your efforts on the Data and Analytics Survey and Use Cases and Data Sources tab to identify high impact use cases that prove the value of becoming more data-driven.

- **How will Tableau be integrated with your existing technology investments?** (Enterprise Architecture Survey tabs) This work will be executed in the Agility workstream. Understanding how all these things interoperate is key for installation, configuration, and ongoing operations of Tableau Server or Tableau Online.
IT should document the current state enterprise architecture and revisit it periodically as the technology stack changes. Because Tableau is integrated with your platforms, network, databases, and applications, it is important to identify all the integration points.

In addition to systems-level integration points, you should begin packaging and testing the client software, Tableau Desktop and Tableau Prep Builder, for self-service and/or silent installation. If mobile is also in scope, the Tableau Mobile app should be published and tested using the enterprise MDM solution. Also consider who might install other applications, such as tabcmd, the Content Migration Tool, or Tableau Bridge for Tableau Online.

**How is data selected and managed, distributed and consumed, and secured?**
(Data and Analytics Survey tab) By surveying each participating business team, the Tableau project team will understand how data is used today, the kind of content that will be most impactful, and how much assistance may be needed. For the current state, consider every source of data—from CSV files, reports distributed via email, and local database files, to the enterprise data warehouse, cloud applications, and external sources.

When distributing the Data and Analytics Survey, check with the stakeholder to see if they feel comfortable answering it on their own or if they would like someone from the project team to interview them. If you have five business teams in scope for your initial deployment, then you should have five total Data and Analytics Surveys to document the information for each team. Once the information is collected from each team, you will find it useful to summarize it and share back with the business team for review.

This survey should be repeated as part of the onboarding process for adding new teams. It also provides a valuable way to connect with teams and better understand how they intend to use Tableau to make data-driven business decisions.

**What use cases are most impactful?** (Use Cases and Data Sources tab) When prioritizing the sources of data to publish and certify on Tableau Server or Tableau Online, begin with low complexity and high impact data to demonstrate quick wins. Impact can usually be measured by audience size or executive interest.

Publish and certify data sources, and create workbooks to answer relevant business questions. Commit to at least one certified data source and one dashboard per team so
that they will have content available once they are onboarded.

As new data sources are identified, they can be added over time. Beyond the initial use cases, this provides a repeatable process to add new data sources as the deployment progresses.

- **How will you ensure trust and confidence in data with responsible usage?** (Data and Content Governance tab) From the sources of data discovered in the Data and Analytics Survey and the initial content identified in the Use Cases and Data Sources tab, classify different kinds of data by sensitivity and audience, then define centralized, delegated, and self-governing governance models for each area of data and content governance.

Because governance is a shared responsibility, the models should be defined by the cross-functional project team, as you seek to strike the balance between flexibility and control. Publish your organization’s governance models on the enablement intranet for all users to reference. By clearly communicating governance policies, you will reinforce the idea that governance enables, rather than restricts, access to data and build trust in the process.

An iterative approach is needed to adapt to the evolving requirements as user adoption and engagement increase. These conversations should occur early and often.

- **What is a job function’s relationship with data?** (Education Role Mapping tab) The project team should use personas that are based on each title’s role in the workflow to classify different types of users. We’ve provided Education Roles that match our training portfolio to serve as a starting point. You can use these roles as-is or customize them to fit your specific requirements by adding ancillary skills needed for specific job functions. For example, anyone with “analyst” in their job title might map to the Analyst education role, and titles of director and above may map to the Executive Sponsor education role. Once mapped, the corresponding learning paths should be completed by individuals.

For existing employees, coordinate their Tableau onboarding and education with the availability of certified data sources and dashboards. Begin with the content authors and data stewards so they have the initial skillset to begin creating content for others. Publish your training schedules, and record short, introductory, on-demand videos using a
team's own data to put analytics in a context they more readily understand.

The earlier you integrate data into your hiring and employee onboarding, the less work you need to do to determine how a particular individual will use data. This is a key step not to be underestimated for building analytics proficiency across the organization, as well as developing and retaining existing talent.

- **Who will be using Tableau, and what licenses are required?** *(Tableau Users tab)* With the audience size estimated in the Use Cases and Data Sources tab, you will drill-down one more level to list users. The Users tab is where you take an inventory of all users by identifying the department, license level, site role, corresponding education role, and onboarding date.

This work will be executed in the Proficiency workstream with Education, Measurement of User Engagement, and Analytics Best Practices. This step quantifies the number of users by department, team, and education role for training purposes. The number of users inventoried will be a significant part of sizing your server environment and scheduling user onboarding by planning for future growth.

- **How will you promote sharing and collaboration?** *(Community tab)* The Community Planning tab outlines the recommended resources and activities for creating a network of users who are excited about data. Focus on the communication plan, the enablement intranet’s self-help resources, and the support escalation path for go-live. Plan for your first internal user group meeting and schedule it to occur on a regular interval.

This work will be executed in the Community workstream. It’s ok to start out small—both in content and attendance. Don’t get discouraged if you don’t see high turnout as you’re just getting started.

- **How will you stay current on new features and functionality?** *(Upgrade Planning and Upgrade Process Checklist tabs)* You might be thinking that it’s too early to consider how upgrades will be handled, but a proactive approach to how and when upgrades occur will ensure positive outcomes for everyone. The Upgrade Planning and Upgrade Checklist tabs help you establish the guiding principles and supporting software upgrade, communications, education, and support plans to drive successful outcomes as you
move to new versions of Tableau Server and client software or client software connecting to Tableau Online. This work is executed across the Agility, Proficiency, and Community workstreams.

Project Metrics

"Analytics on your analytics" isn't just a Tableau Conference break-out session title. By analyzing the progress of your deployment, the project team will understand the needs of the organization, from what's working to what's not. It will help you to identify achievements and opportunities for improvement. The following tables provide metrics that will be beneficial to track throughout your deployment:

Executive KPIs

- Percentage of leadership engagement with Tableau content, such as content linked to strategic initiatives;
- Using analytics to run meetings; and measures of department/team performance;
- Expected impact and ROI: increased revenue, reduced costs, and improved business and customer outcomes.

IT KPIs

- Percentage of content authored by business users vs. IT;
- Percentage of data being available vs. analyzed;
- Licenses owned vs. assigned;
- TCO: acquisition, implementation, support, and training costs.

Analytics KPIs:

- Percentage of users onboarded;
- User engagement (organization-level): user login frequency, days since last login, and users who logged in once and didn’t return;
- Content created and published (organization-level);
- Content utilization (organization-level);
- Percentage of certified published data sources;
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- Ratio of certified project workbooks to ad-hoc project workbooks;
- Percentage of all users trained, such as analytics skill level, role badge, and product certification;
- Percentage of users who increased analytical skills by progressing up education role levels.

Line-of-Business KPIs

- Percentage of users within a team trained;
- Amount of content created and published;
- User behaviors (department- or team-level): user login frequency, days since last login, and users who logged in once and didn't return;
- Worker productivity: increase analyst productivity and knowledge worker efficiency.
Executive Advocacy and Project Team

Becoming a data-driven organization requires more than just choosing the right technology platform. It requires new skillsets, new processes, and changes in behavior from all users within your organization. Enterprise deployment requires effort and coordination across multiple stakeholders and users with different and sometimes opposing viewpoints and interests; however, each one will provide their own valuable perspective. Orchestrating this change, and doing it efficiently, requires buy-in, alignment, and participation from a broad set of cross-functional stakeholders.

Executive sponsors working with the project team need to consider not only how to scale the technology for the entire organization, but also the adequate support, training, change management, and the ability to overcome any organizational roadblocks. Maximizing analytics investments and capitalizing on the transformative potential of data means that everyone encountering it—regardless of skill levels and data fluency—must be able to turn insights into opportunities or innovations.

Forming the cross-functional steering committee and project teams is the first step towards becoming a data-driven organization. The input and skillsets of executives, IT and business stakeholders, and users are critical for buy-in, alignment, and ultimately, the project’s success. Together, they will be able to shape your organization’s vision for modern analytics most efficiently, working towards the common goal of making secure, governed data access a reality.

The topics in this section outline the key roles for building a culture of analytics and how they are interconnected. The Roles and Responsibilities tab of the Tableau Blueprint Planner will help you define and document your executive sponsor steering committee and project team members.

Executive Sponsor Roles and Responsibilities

Before you deploy Tableau, you should identify executive sponsors. The executive sponsors set the vision for modern analytics, align projects to transformational initiatives, nominate staff for project and advocacy roles, and ensure accountability. They will serve as the governing body for the use of Tableau. The executive sponsors may also be known as a Tableau Steering
Committee, Tableau Council, or Analytics Executive Committee. Whatever name you choose, this cross-functional executive team will:

- Communicate and sell the vision for modern analytics across the organization.
- Represent the interests of their respective departments to establish budget and funding.
- Align the use of analytics with strategic initiatives that drive organizational transformation.
- Approve Tableau Governance on page 49 processes, policies, guidelines, roles, and responsibilities for managing the organization’s data in compliance with business and/or regulatory requirements identified by the project team.
- Set the example of using facts over intuition by placing data at the center of every conversation in their department meetings as a visible and vocal user of the platform.

Given the diversity of use cases that arise within a company-wide initiative, the best way to monitor progress is to evaluate how deeply data is ingrained in the day-to-day activities of the organization and how it impacts business decisions. KPIs may include the following: percentage of leadership engagement with Tableau content, such as content linked to strategic initiatives; using analytics to run meetings; and measures of department/team performance.

Initially, monthly meetings should be held to track the progress of the deployment and influence their teams to adopt Tableau. After an operational routine is achieved, meetings can transition to a quarterly cadence.

Depending on the size and scope of the deployment, the number of executive sponsors and titles (C-level, VP, etc.) may vary. Potential members of the executive steering committee are shown below.
Note: Depending on your organizational structure, the Chief Data & Analytics Officer (CDAO) or Chief Data Office (CDO) role and roles reporting into it may reside under IT.

### Executive Sponsor Role

**IT Sponsor**

The IT Sponsor (CIO/CTO) is responsible for Tableau installation, configuration, and maintenance, partners with business leaders and SMEs, enables secure, governed data access, and transitions content authoring to business users.

Specific IT KPIs may include the following: percentage of content authored by business users vs. IT, percentage of data being available vs. analyzed.

**Analytics Sponsor**

The Analytics Sponsor (CDO) implements the vision for modern analytics, ensures the availability of data and content, establishes education plans and learning paths by organizational job functions, facilitates communication throughout the user community, and aggregates business value achieved.
Executive Sponsor Role

Specific analytics KPIs may include the following: percentage of all users trained, such as analytics skills in organization, percentage of users who increased analytical skills.

Line-of-Business Sponsors

Line-of-Business Sponsors (CFO, CMO, etc.) advocate for data-driven decision-making within their respective teams, promote content authoring and governed data access, encourage collaboration and sharing, and document business value.

Specific LOB KPIs may include the following: percentage of users within a team trained, amount of content published, user login frequency, days since last login, users who logged in once and didn’t return.

Tableau Project Team Roles and Responsibilities

The cross-functional project team includes IT/BI Professionals, Tableau Server and Site Administrators, and selected Content Creators (Data Stewards and Content Creators). The cross-functional project team is focused on the following:

- Establish and maintain the analytics practice, which includes defining Tableau Governance on page 49 processes, policies, and guidelines.
- Define roles and responsibilities for managing the organization’s data in compliance with business and/or regulatory requirements.
- Plan and execute the Tableau deployment and implement the organization’s vision for modern analytics.
- Review policies and procedures periodically to adapt to and evolve with changing business needs.
Depending on the size of the organization and the degree of specialization for a particular role, you may find that each of the roles listed below equates to one person in a large organization, while more than one person may serve different roles in smaller organizations. What is most important is that each role is filled at the time it’s needed—rather than the number of people on the project team. The diagram below shows where the project team roles may sit in an organizational hierarchy (in larger deployments, community leaders may reside in each of the lines of business).

Note: Tableau Server supports multi-tenancy by allowing Server Administrators to create sites for segregating users and content and delegating responsibilities for administrative tasks.

**IT/BI Professional Roles**

The IT/BI professional roles are collectively responsible for integrating Tableau with your enterprise architecture and making data available in a secure, governed manner to Tableau users. Whether IT and Analytics departments are combined or separate may vary from company to company. Their involvement is critical to planning, installation, configuration, and ongoing management and monitoring of the deployment.
Initially, meetings should be held weekly or every other week to plan and track the progress of the deployment with the full project team. After an operational routine is achieved, meetings can transition to lesser frequency unless you are planning for upgrades, scaling server infrastructure, or integrating with other systems.

### IT/BI Professional Role Responsibilities

<table>
<thead>
<tr>
<th>Role</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analytics Director or IT Service Owner</td>
<td>The Analytics Director owns the use of Tableau, including placement and fit of analytics within the organization, alignment with strategic initiatives, and user enablement and adoption.</td>
</tr>
<tr>
<td>Enterprise Architect</td>
<td>The Enterprise Architect identifies technical requirements and integrates Tableau with enterprise architecture standards.</td>
</tr>
<tr>
<td>Security &amp; Compliance Administrator</td>
<td>The Security &amp; Compliance Officer ensures the company complies with its internal security and data security policies and external regulatory requirements.</td>
</tr>
<tr>
<td>Database Administrator</td>
<td>The Database Administrator is responsible for the administration, monitoring, maintenance, and security of databases in the organization. Coordinating with data engineers and data stewards, the DBA will provide data access and assist with modeling, structuring, and optimizing sources of data that connect to Tableau.</td>
</tr>
<tr>
<td>Systems Administrator</td>
<td>The Systems Administrator installs, configures, manages, and maintains the hardware and operating system on which the Tableau Server is installed in the data center or the cloud, while enforcing company policies in compliance with business and technology strategy.</td>
</tr>
<tr>
<td>Network Administrator</td>
<td>The Network Administrator maintains network communications and connectivity, including SSL, VPN, and mobile networking to access Tableau</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>IT/BI Professional Role</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Server.</td>
</tr>
<tr>
<td>Client Administrator</td>
<td>The Client Administrator installs and configures client software including database drivers, Tableau Desktop, Tableau Prep Builder, and Tableau Mobile.</td>
</tr>
<tr>
<td>Project Manager</td>
<td>The Project Manager ensures that the project is delivered on time and within budget by effectively staffing and managing relationships with a wide range of groups, allocating and utilizing resources in an efficient manner, and maintaining a cooperative, motivated and successful team.</td>
</tr>
<tr>
<td>Community Leader</td>
<td>The Community Leader coordinates efforts related to user enablement, including support resources, engagement events, connecting users within your company, and analytics evangelism. Note: Not all organizations will have a dedicated position for these responsibilities.</td>
</tr>
</tbody>
</table>

Tableau Administrator Roles

Tableau Server Administrators are responsible for the operation of the server application, while Tableau Site Administrators are responsible for their respective site(s), permissions, content, and users, when sites are used.

Initially, weekly or biweekly meetings should be held to track the progress of the deployment, server utilization, and user engagement with the full project team. After an operational routine is achieved, administrator meetings can transition to monthly unless you are planning for upgrades, scaling the server infrastructure, or enabling new functionality, such as mobile, advanced analytics, or extensible features.
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**Administrator Role**

<table>
<thead>
<tr>
<th>Role</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tableau Server Administrator</td>
<td>The Server Administrator has full access to Tableau Server settings, all sites on the server, users and groups, and all content assets, such as projects, data sources, and workbooks to monitor and maintain overall server health.</td>
</tr>
</tbody>
</table>

KPIs for Tableau Server Administrators are outlined in **Tableau Monitoring** on page 121.

<table>
<thead>
<tr>
<th>Role</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tableau Site Administrator</td>
<td>Tableau Site Administrators create and manage the site’s users and groups, create projects to organize content on the site, and assign permissions to allow users (groups) to access the content. They also promote and certify content and measure the use of analytics within their site.</td>
</tr>
</tbody>
</table>

KPIs for Tableau Site Administrators are outlined in **Measurement of Tableau User Engagement and Adoption** on page 161.

**Tableau Content Creator Roles**

Content creators include Data Stewards and Content Authors. It is important that the individuals who are selected for the project team have a good understanding of their business domain and data, as well as provide meaningful contributions to the development of organizational policies and procedures. The content creators identified on the project team are known as Tableau Champions. For more information, see **Tableau Support Processes** on page 217.

During the initial deployment, data stewards and content authors should create certified data sources and relevant workbooks for content consumers to use at launch. Any bottlenecks or issues raised by this group should be shared with the full project team and/or executive governing body for consideration and resolution, depending on the stage of the deployment.
Initially, weekly, or biweekly meetings should be held to track the progress of the deployment, server utilization, and user engagement with the full project team. Weekly meetings for content creators should be held for sharing best practices, planning, and tracking the creation of content, workflow design, and content utilization metrics. After an operational routine is achieved, meetings can transition to a monthly cadence unless you are testing upgrades or enabling new functionality, such as mobile, advanced analytics, or extensible features.

### Content Creator Responsibilities

<table>
<thead>
<tr>
<th>Role</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Stewards</td>
<td>Data Stewards understand the business domain and the interaction of business processes with analytics. A Data Steward ensures that there are documented procedures and guidelines for data access and use and will work with the Database Administrator and/or Data Engineers to plan and execute an enterprise-wide data governance and compliance policy. Data Stewards should have a Tableau Creator license.</td>
</tr>
<tr>
<td>Content Authors</td>
<td>Content Authors create and publish dashboards and/or data sources. They will also be a resource for others ramping up their Tableau skills. Content Authors should have a Tableau Creator license.</td>
</tr>
</tbody>
</table>

### Tableau Content Consumer Roles

Content consumers include everyone who uses Tableau to make data-driven decisions, including licensed Creators, Explorers, and Viewers. While content consumers are not part of the project team, it will be useful to solicit feedback from them periodically to understand their ability to access data, create content, and make data-driven business decisions.

Content consumers will provide valuable feedback throughout your deployment and upgrade cycles. The project team should collect their input during Tableau Community Engagement on page 209 activities and Tableau Support Processes on page 217. If common problems are surfaced, they should be addressed in the Getting Started and FAQ areas of the Tableau Enablement Intranet on page 199.
Tableau Governance

Perhaps the most important principle when adopting modern analytics is that self-service and governance are not at odds with each other. Self-service is designed to enable everyone to ask and answer their own questions using trusted data to make informed business decisions. Governance is central to Tableau Blueprint because it is governance that makes self-service possible. As the anchor point, governance will drive all decisions as the project team develops agility, proficiency, and community across the organization.

Governance is the combination of controls, roles, and repeatable processes that creates trust and confidence in data and analytics. Both IT and business stakeholders on the project team are responsible for defining data and content governance together. In a successful self-service environment, the appropriate levels of governance create accountability and enable, rather than restrict, access to trusted content for users in your organization. Governance is a spectrum—different kinds of data and content require different kinds of governance. It’s not a one-time effort because skills and expectations will evolve. Periodically evaluating governance processes will allow you to evolve and delegate more responsibilities as new analytical skills and use cases develop.

In Tableau, you govern two things: data and content. Data governance ensures the accuracy of the data driving your users’ decisions. Content governance helps business users to quickly and confidently find, share, and use relevant workbooks and data sources. From soft guidelines to firm boundaries for the usage of Tableau, organizations need to design their own governance models that comply with their internal policies and procedures, and overall business needs. Your organization’s governance models should encompass both data and content management processes and the people who understand and comply with the established controls. Like other Tableau platform management activities, an agile, iterative approach is needed to adapt to new business requirements as user adoption and engagement increase across your organization.

Defining the right balance of flexibility and control means you will realize the benefits of both self-service and governance:

- Providing the right data to the right audience in a secure, governed operational model.
- Building the foundation for every data-driven decision.
- Establishing trust and confidence to drive business value.
- Documenting processes in a transparent, understandable, and easily-referenceable format.
• Contributing to the stability of the platform and reducing the proliferation of duplicate data and content with governed workflows.

This document walks through the Modern Analytics Workflow and the role of governance within it, the areas of governance you need to consider, and finally defining governance models. Use this guide with the Data and Content Governance tab of the Tableau Blueprint Planner, which contains key considerations for each governance area, to assist with establishing your organization’s standards, processes, and policies to securely manage data and content.

Modern Analytics Workflow

The Modern Analytics Workflow empowers people to ask and answer their own questions with data, enables people to easily share their insights with their team and the rest of the organization, and ensures that the data supporting their decisions is accurate, trusted, and secure. The workflow is comprised of five key actions: Access & View, Interact, Analyze & Discover, Share, and Promote & Govern.
Modern Analytics Workflow

The actions of the Modern Analytics Workflow are executed by the following roles:

- **IT and/or BI Professionals** — Tableau Server Administrators install, manage, monitor, and maintain a Tableau deployment. Server Administrators, or by delegation to Site Administrators, perform user provisioning, maintain security and permissions, and provide governance oversight. For Tableau Online, IT Professionals will integrate with your existing technology investments, such as authentication and data connectivity, while Tableau Online Site Administrators will perform user provisioning, maintain security and permissions, and provide governance oversight. In both Tableau Server and Tableau Online, administration can be scoped to the project level using Project Leader permissions.

- **Content Creators** — Tableau Creators are licensed with Tableau Prep Builder, Tableau Desktop, and full Tableau Server authoring capabilities, including connecting to data, to create content. Tableau Explorers perform all authoring within Tableau Server’s web authoring
with existing content. Site Administrators and Tableau Creators or Tableau Explorers with the appropriate permissions can validate, promote, and certify content.

- Information Consumers — Tableau Viewers access, view, and interact with content in Tableau Server, including desktop, tablet, and phone. Server and Site Administrators, Creators, and Explorers can consume content as well.

With increasing analytical skills, the boundaries between these roles become more fluid as someone can switch from consuming to creating to promoting content, assuming the appropriate license and permissions.

**Governance in Tableau**

Governance in Tableau is a critical step to driving usage and adoption of analytics while maintaining security and integrity of the data. You must define standards, processes, and policies to securely manage data and content through the Modern Analytics Workflow. Just as important as defining these is having everyone in the workflow understand and comply so that users will have trust and confidence in the analytics they’ll use to make data-driven decisions.

To define your organization’s **Tableau Governance Models** on page 82, you should work through the areas of data and content governance that are outlined in the diagram below using the **Tableau Blueprint Planner**.
Data Governance in Tableau

The purpose of data governance in the Modern Analytics Workflow on page 50 is to ensure that the right data is available to the right people in the organization, at the time they need it. It creates accountability and enables, rather than restricts, access to secure and trusted content and for users of all skill levels.

Data Source Management

Data source management includes processes related to selection and distribution of data within your organization. Tableau connects to your enterprise data platforms and leverages the governance you already have applied to those systems. In a self-service environment, content authors and data stewards have the ability to connect to various data sources, build and publish
data sources, workbooks, and other content. Without these processes, there will be a proliferation of duplicate data sources, which will cause confusion among users, increase likelihood of errors, and consume server resources.

Tableau’s hybrid data architecture provides two modes for interacting with data, using a live query or an in-memory extract. Switching between the two is as easy as selecting the right option for your use case. In both live and extract use cases, users may connect to your existing data warehouse tables, views, and stored procedures to leverage those with no additional work.

Live queries are appropriate if you have invested in a fast database, need up-to-the-minute data, or use Initial SQL. In-memory extracts should be used if your database or network is too slow for interactive queries, to take load off transactional databases, or when offline data access is required.

With support for a new multi-table logical layer and relationships in Tableau 2020.2, users aren’t limited to using data from a single, flat, denormalized table in a Tableau Data Source. They can now build multi-table data sources with flexible, LOD-aware relationships between tables, without having to specify join types in anticipation of what questions can be asked of the data. With multi-table support, Tableau data sources can now directly represent common enterprise data models such as star and snowflake schemas, as well as more complex, multi-fact models. Multiple levels of detail are supported in a single data source, so fewer data sources are needed to represent the same data. Relationships are more flexible than database joins and can support additional use-cases as they arise, reducing the need to build new data models to answer new questions. Using relationships in well-modeled schemas can reduce both the time to create a data model as well as the number of data sources to answer business questions. For more information, see Metadata Management on page 61 later in this section and The Tableau Data Model.

When publishing a workbook to Tableau Server or Tableau Online, the author will have a choice to publish the data source or leave it embedded in the workbook. The data source management processes you define will govern this decision. With Tableau Data Server, which is a built-in component of the Tableau platform, you can share and reuse data models, secure how your users access data, and manage and consolidate extracts with Published Data Sources. Further, Published Data Sources allow Tableau Creator- and Explorer-licensed users to have access to secure, trusted data in Tableau for web authoring and Ask Data. For more information, see Best Practices for Published Data Sources, Edit Views on the Web, and Optimize Data for Ask Data.
With increased data discovery capabilities, Tableau Catalog indexes all content, including workbooks, data sources, and flows to allow authors to search for fields, columns, databases, and tables in workbooks and published data sources. For more information, see Data Management Add-on.

When Tableau Catalog is enabled, content authors can Search for Data by selecting from Data Sources, Databases and Files, or Tables to see if it exists in Tableau Server and Tableau Online and minimize duplication of data sources.

In addition, the Data Details tab on a view published to Tableau Server and Tableau Online will provide consumers with relevant information about the data used in it. Details include information about the workbook (name, author, date modified), the data sources used in the view, and a list of the fields in use.
For data stewards who create new Published Data Sources, the workflow below shows the two major decision points that impact data source management—live or extract and embedded or shared data model. This is not to imply that a formal modeling process must always occur before analysis begins.
To discover and prioritize key sources of data, use the Tableau Data and Analytics Survey on page 15 and Tableau Use Cases and Data Sources on page 16 tabs in the Tableau Blueprint Planner.

Key Considerations for Data Source Management

- What are the key sources of data for a department or team?
- Who is the data steward or owner of the data?
- Will you connect live or extract the data?
- Should the data source be embedded or published?
- Do variants of a dataset exist? If so, can they be consolidated as an authoritative source?
- If multiple data sources are consolidated, does the single data source performance or utility suffer by attempting to fulfill too many use cases at once?
- What business questions need to be answered by the data source?
- What naming conventions are used for Published Data Sources?

Data Quality

Data quality is a measure of data's fitness to serve its purpose in a given context—in this case, for making business decisions. The quality of data is determined by factors such as accuracy, completeness, reliability, relevance, and freshness. You likely already have processes in place to ensure data quality as it is ingested from source systems, and the more that is fixed in upstream processes, the less correction will be needed at the time of analysis. You should ensure data quality is consistent all the way through to consumption.

As you are planning, it is a good time to review existing upstream data quality checks because data will be available to a larger group of users under a self-service model. In addition, Tableau Prep Builder and Tableau Desktop are great tools for detecting data quality issues. By establishing a process to report data quality issues to the IT team or data steward, the data quality will become an integral part of building trust and confidence in the data.

With the Tableau Data Management Add-on and Tableau Catalog, you should communicate data quality issues to your users to increase visibility and trust in the data. When a problem exists, you can set a warning message on a data asset so that users of that data asset are aware of particular issues. For example, you might want to let users know that the data hasn’t been refreshed in two weeks or that a data source has been deprecated. You can set one data quality warning per data asset, such as a data source, database, flow, or table. For more
information, see Set a Data Quality Warning, including the following types: Warning, Deprecated, Stale Data, and Under Maintenance.

![Data Quality Warning](image)

Note that you can set a data quality warning using REST API. For more information, see Add Data Quality Warning in the Tableau REST API Help.

Key Considerations for Data Quality

- What processes exist for ensuring accuracy, completeness, reliability, and relevance?
- Have you developed a checklist to operationalize the process?
- Who needs to review data prior to it becoming shared and trusted?
- Is your process adaptable to business users and are they able to partner with data owners to report issues?

Enrichment & Preparation

Enrichment and preparation include the processes used to enhance, refine, or prepare raw data for analysis. Often a single data source does not answer all the questions a user may
have. Adding data from different sources adds valuable context. You likely already have ETL processes to clean, combine, aggregate, and store data when ingesting raw data from various sources. With command line interfaces and APIs, Tableau can be integrated with your existing processes.

For self-service data preparation, **Tableau Prep Builder** and **Tableau Prep Conductor**, should be used to combine multiple sources of data on a schedule. Tableau Prep Builder is part of the Tableau Creator license, while Tableau Prep Conductor is part of the **Tableau Data Management Add-On**. Tableau Data Management helps you better manage the data within your analytics environment from data preparation to cataloging, search, and governance, ensuring that trusted and up-to-date data is always used to drive decisions.

With visual, smart, direct feedback at every step, Tableau Prep Builder will help users to prototype and prepare disparate sources of data for analysis. Once the steps are defined and verified, the flow should be published to Tableau Server and Tableau Online where Prep Conductor will execute the flow and output a Published Data Source on the specified schedule. Automation creates a consistent process, reduces error-prone manual steps, tracks success/failure, and saves time. Users will have confidence in the output because the steps can be viewed on Tableau Server or Tableau Online.

![Tableau Prep Flow](image-url)
Tableau Prep Flow in Tableau Server or Tableau Online

Key Considerations for Data Enrichment

- Will data enrichment and preparation be centralized or self-service?
- What organizational roles perform data enrichment and preparation?
- What ETL tools and processes should be used to automate enrichment and/or preparation?
- What sources of data provide valuable context when combined with each other?
- How complex are the data sources to be combined?
- Will users be able to use Tableau Prep Builder and/or Tableau Desktop to combine datasets?
- Have standardized join or blend fields been established by the DBA to enable users to enrich and prepare datasets?
- How will you enable self-service data preparation?

Data Security

Data security is of utmost importance in every enterprise. Tableau allows customers to build upon their existing data security implementations. IT administrators have the flexibility to implement security within the database with database authentication, within Tableau with permissions, or a hybrid approach of both. Security will be enforced regardless of whether users are accessing the data from published views on the web, on mobile devices, or through Tableau Desktop and Tableau Prep Builder. Customers often favor the hybrid approach for its flexibility to handle different kinds of use cases. Start by establishing a data security
classification to define the different types of data and levels of sensitivity that exist in your organization.

When leveraging database security, it is important to note that the method chosen for authentication to the database is key. This level of authentication is separate from the Tableau authentication (i.e. when a user logs into Tableau, he or she is not yet logging into the database). This means that Tableau users will also need to have credentials (their own username/password or service account username/password) to connect to the database for the database-level security to apply. To further protect your data, Tableau only needs read-access credentials to the database, which prevents publishers from accidentally changing the underlying data. Alternatively, in some cases, it is useful to give the database user permission to create temporary tables. This can have both performance and security advantages because the temporary data is stored in the database rather than in Tableau.

In addition, extract encryption at rest is a data security feature that allows you to encrypt .hyper extracts while they are stored on Tableau Server. Available as of 2019.3, Tableau Server administrators can enforce encryption of all extracts on their site or enable users to encrypt all extracts associated with particular published workbooks or data sources. For more information, see Extract Encryption at Rest.

You can limit which users see what data by setting user filters on data sources. This allows you to better control what data users see in a published view based on their Tableau login account. Using this technique, a regional manager can view data for her region but not the data for the other regional managers. With these data security approaches, you can publish a single view or dashboard in a way that provides secure, personalized data and analysis to a wide range of users on Tableau. For more information, see Data Security and Restrict Access at the Data Row Level.

Key Considerations for Data Security

- How do you classify different types of data according to its sensitivity?
- How does someone request access to data?
- Will you use a service account or database security to connect to data?
- What is the appropriate approach to secure data according to sensitivity classification?
- Does your data security meet legal, compliance, and regulatory requirements?

Metadata Management

Metadata management includes policies and processes that ensure information can be accessed, shared, analyzed and maintained across the organization, as an extension of Data
Source Management. Metadata is a business-friendly representation of data in common terms, similar to a semantic layer in traditional BI platforms. Curated data sources hide the complexity of your organization’s modern data architecture and make fields immediately understandable regardless of the data store and table from which it was sourced.

Tableau employs a simple, elegant, and powerful metadata system that gives users flexibility while allowing for enterprise metadata management. The Tableau Data Model can be embedded in a workbook or centrally managed as a Published Data Source with Data Server. After connecting to data and creating the Tableau Data Model, which will become a Published Data Source on Tableau Server or Tableau Online, look at it from your users’ perspective and see how much easier analytics will be when they have a well-formatted starting point, filtered and sized to the business questions it can answer. For more information on Published Data Sources, visit The Tableau Data Model, Best Practices for Published Data Sources and Enabling Governed Data Access with Tableau Data Server.

The diagram below shows where elements exist in the Tableau Data Model:

Beginning in 2020.2, the Data Source includes the connection, connection attributes, and the physical and logical layers within a Data Model. Upon connection, Tableau automatically characterizes fields as dimensions or measures. In addition, the Data Model stores calculations, aliases, and formatting. The physical layer includes physical tables defined by joins, unions, and/or custom SQL. Each group of one or more physical tables defines a logical table, which resides in the logical layer along with relationships.
Relationships are a new way to model data that is more flexible than using joins. A relationship describes how two tables relate to each other, based on common fields, but it does not combine the tables together as the result of a join does. Relationships provide several advantages over using joins.

- You don’t need to configure join types between tables. You only need to select the fields to define the relationship.
- Relationships use joins, but they are automatic. Relationships postpone the selection of join types to the time and context of analysis.
- Tableau uses relationships to automatically generate correct aggregations and appropriate joins during analysis, based on the current context of the fields in use in a worksheet.
- Multiple tables at different levels of detail are supported in a single data source, so fewer data sources are needed to represent the same data.
- Unmatched measure values are not dropped (no accidental loss of data).
- Tableau will generate queries only for the data that is relevant to the current view.

At run-time in the VizQL model, multiple queries are built dynamically based on the dimensions and measures of the visualization and filters, aggregations, and table calculations are applied. Tableau uses the contextual information of the separate logical table to determine what joins are applied to provide the correct aggregation. This enables one user to design the Data Source without needing to know, plan, or otherwise account for all the variations of analysis to be performed with the Data Source by other users. Tableau Catalog discovers and indexes all of the content on Tableau, including workbooks, data sources, sheets, and flows.

Data stewards or authors with direct access to sources of data should prototype data sources as an embedded data source in a Tableau workbook and then create a Published Data Source in Tableau to share the curated Tableau Data Model, as shown below in the direct access workflow:
If authors do not have direct access to sources of data, they will rely on a DBA or data steward to provide the prototype data source embedded in a Tableau workbook. After reviewing and verifying it contains the needed data, a Site Administrator or Project Leader will create a Published Data Source in Tableau to share the Tableau Data Model, as shown below in the restricted access workflow:

The metadata checklist identifies best practices for curating a Published Data Source. By establishing data standards using the checklist, you’ll enable the business with governed self-service data access that is user-friendly and easy to understand. Prior to creating an extract or Published Data Source in Tableau, review and apply the following checklist to the Tableau Data Model:

- Validate the data model
- Filter and size to the analysis at hand
• Use standard, user-friendly naming conventions
• Add field name synonyms and custom suggestions for Ask Data
• Create hierarchies (drill paths)
• Set data types
• Apply formatting (dates, numbers)
• Set fiscal year start date, if applicable
• Add new calculations
• Remove duplicate or test calculations
• Enter field descriptions as comments
• Aggregate to highest level
• Hide unused fields

Beginning in 2019.3 in the Data Management Add-on, Tableau Catalog discovers and indexes all of the content on Tableau, including workbooks, data sources, sheets, and flows. Indexing is used to gather information about the metadata, schemas, and lineage of the content. Then from the metadata, Tableau Catalog identifies all of the databases, files, and tables used by the content on your Tableau Server or Tableau Online site. Knowing where your data comes from is key to trusting the data, and knowing who else uses it means you can analyze the impact of changes data in your environment. The lineage feature in Tableau Catalog indexes both internal and external content. For more information, see Use Lineage for Impact Analysis.
Using lineage, you can trace down to content owners at the end of the lineage graph. The list of owners includes anyone assigned as the owner of a workbook, data source, or flow, and anyone assigned as the contact for a database or table in the lineage. If a change is going to be made, you can email owners to let them know about its impact. For more information, see Use email to contact owners.

Key Considerations for Metadata Management

- What is the process for curating data sources?
- Has the data source been sized to the analysis at hand?
- What is your organizational standard for naming conventions and field formatting?
- Does the Tableau Data Model meet all criteria for curation, including user-friendly naming conventions?
- Has the metadata checklist been defined, published, and integrated into the validation, promotion, and certification processes?

Monitoring & Management

Monitoring is a critical piece of the self-service model as it allows IT and administrators to understand how data is being used and be proactive and responsive about usage, performance, data connectivity, and refresh failures. Depending on your company’s database standards, IT will use a combination of tools and job schedulers for ingesting and monitoring raw data and server health.
Just as business users leverage data to make smarter decisions, administrators are also empowered to make data-driven decisions about your deployment with Tableau Server’s default administrative views and custom administrative views, which are made from analyzing Tableau Server’s Repository data. Tableau Server and Site Administrators will use default administrative views for monitoring the status of extract refreshes, data source utilization, and delivery of subscriptions and alerts. In Tableau Online, Site Administrators have access to Monitor Site Activity with default admin views and can Use Admin Insights to Create Custom Views. For more information, see Tableau Monitoring on page 121 and the Measurement of Tableau User Engagement and Adoption on page 161.

Key Considerations for Monitoring & Management

- Are schedules available for the times needed for extract refreshes?
- How is raw data ingestion monitored from source systems? Did the jobs complete successfully?
- Are there duplicate sources of data?
- When are extract refreshes scheduled to run? How long do extracts run on server? Did the refresh succeed or fail?
- Are subscription schedules available after extract refreshes have occurred?
- Are data sources being used? By whom? How does this compare with the expected audience size?
- What is the process to remove stale Published Data Sources?

Data Governance Summary

Striking the balance between control and agility is critical. In spite of stringent governance policies, users often go the route of locally saving sensitive data and analytics for quick analysis. In a self-service environment, the role of data governance is to permit access to data and enable users to get the answers they need while ensuring security is enforced. Although every organization has different requirements, the table below describes the ideal state for governing self-service data access:

<table>
<thead>
<tr>
<th>Area</th>
<th>IT Administrators/BI Professionals</th>
<th>Content AUTHORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Source Management</td>
<td>Provide access to sources of data and comply with organizational data</td>
<td>Define, manage, and update data models used for analysis.</td>
</tr>
<tr>
<td>Area</td>
<td>IT Administrators/BI Professionals</td>
<td>Content AUTHORS</td>
</tr>
<tr>
<td>----------------------</td>
<td>---------------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Data Quality</td>
<td>Define the process to validate data and build trust in its accuracy for decision making.</td>
<td>Capture and expose data-cleansing rules applied to published data models.</td>
</tr>
<tr>
<td>Enrichment &amp; Preparation</td>
<td>Create ETL processes from multiple sources of data to make data ready for analysis.</td>
<td>Capture and expose enrichment and preparation rules applied to published data models.</td>
</tr>
<tr>
<td>Data Security</td>
<td>Define security parameters and access controls to published data models.</td>
<td>Comply with enterprise data security policies and external regulations.</td>
</tr>
<tr>
<td>Metadata Management</td>
<td>Define organizational policies and processes for metadata management.</td>
<td>Define, update, and expose field-level metadata for users.</td>
</tr>
<tr>
<td>Monitoring &amp; Management</td>
<td>Monitor and audit usage to ensure compliance and appropriate use of data assets.</td>
<td>Monitor and track usage metrics of centrally-managed data models.</td>
</tr>
</tbody>
</table>

**Content Governance in Tableau**

As the use of analytics increases, a growing number of mission-critical business decisions will become data-driven. The net effect is not only an increase in content volume but also in the varying skill levels among its users who will be collaborating and uncovering valuable insights. With more and more people using data daily, it is critical that Tableau content can be secured, governed, and trusted—as well as organized so that people can discover, consume, and create content with confidence. Without content governance, users will find it increasingly difficult to find what they need among irrelevant, stale, or duplicate workbooks.

Content governance involves the processes that keep content relevant and fresh, such as knowing when to decommission content because it’s not getting the expected traffic or finding out why no one is using an important dashboard for decision-making. The responsibility of ensuring compliance with an organization’s content governance policies is a core responsibility of content authors.
This section provides IT administrators and business users with the core concepts underpinning Tableau’s content management features and guidance on how these concepts should be applied to manage the content created in a thriving modern analytics platform.

Content Management

Defining a consistent content organization structure allows administrators to manage content and makes content more discoverable by users. Tableau Server and Tableau Online give you the flexibility needed to structure your environment and manage content based your specific governance requirements.

To isolate content, you can organize content on separate sites. This is known as multi-tenancy. Users of one site do not have access to another site or even awareness of its existence. Each site can have unique users, data, and content. Sites work well when content can remain completely separate during all phases, and there is little to no user overlap. Create a new site only when you need to manage a unique set of users and their content completely separately from all other Tableau users and content. While sites may appear easier initially to segment data sources, workbooks, and users, carefully consider whether there will be shared content across the organization. For more information, see Sites Overview (Windows | Linux).

Projects are containers for your workbooks, data sources, flows, and other projects, and they help you to create a scalable process for managing access to the content published to Tableau. They group together items and behave much like folders to provide hierarchical organization. Projects and nested projects are used to group similar content with the corresponding levels of permission that administrators define. Permissions should be managed at the project level using groups for simplified administration. For more information, see Use Projects to Manage Content Access (Windows | Linux).

Content organization structure

Depending on your requirements, content can be managed by organizational (by department/team), functional (by topic), or hybrid approaches. The deployment project team should work together to create a content organization framework of different projects with consistent naming conventions that include sandbox projects for ad hoc or uncertified content,
and production projects for validated, certified content. In a self-service sandbox project hierarchy, content authors can freely explore, author, and perform ad hoc analysis. Publishing to the production project is limited to a small group of users who will validate, promote, and certify content in this location as trusted for data-driven decision-making. As business users create new content based on trusted data, these items will be certified and promoted to a production project. The process of content validation, promotion, and certification is described later in this document. This ensures that the organization’s primary data sources and dashboards are constantly improving and evolving.

An example of project hierarchies for Marketing Production, Marketing Sandbox, and Marketing Data Sources are shown below. You should carefully consider your content organization approach with respect to security and permissions requirements. In the Marketing Production and Sandbox project hierarchies, permissions are set by the administrator and locked, while Published Data Sources in the Marketing Data Sources project are secured and permissioned on each data source. Using this approach, Marketing workbooks can be secured to only the Marketing department, and Marketing data sources can be accessed by specified groups outside of Marketing who are granted permission to them. Having a separate sandbox hierarchy supports content review and promotion requirements.

![Project Hierarchy Diagram]

**Departmental Project Hierarchy**

To provide a place for all individuals to securely save their work on Tableau Server or Tableau Online, you should use a single Personal Sandbox and permissions to restrict content owners to only viewing their own items. Once ready, the user can publish their content to the department sandbox for validation, promotion, and certification process. This has the benefit of reducing administrative overhead by reducing the number of projects to secure and manage. Apply the permission to the Personal Sandbox project as shown below:
1. Create the Personal Sandbox Project, and lock content permissions to the project.

Permissions locked to the project

2. Set permissions for All Users to Publisher on the project, None for workbooks, and none for data sources.

Publisher only permissions

With Personal Sandbox content in a single location, administrators can monitor how often content is viewed, suggest owners delete stale content, and check who is making the most use of the Personal Sandbox. Content owners can always see the content they own, even if it's published in a project where they are denied the ability to view workbooks and data sources. Authorization is explained in more detail in the next section.

Key Considerations for Content Management
- Will workbooks and data sources be shared across the company?
- Will sites be used to isolate sensitive content or departments?
- Will projects use an organizational (departments/teams), functional (topics), or hybrid approach?
- Have sandbox and production projects been setup to support ad-hoc and validated content?
- Are content naming conventions used?
- Are authors publishing multiple copies of the same workbook with different filters selected?
- Does content have a description, tags, and comply with visual styles?
- Do you have a load time expectation and an exception procedure in place?
- After employees leave the company, what is the process to reassign content ownership?

### Authorization

When a user attempts to login to Tableau, authentication verifies a user’s identity. Everyone who needs access to Tableau Server must be represented as a user in Tableau Server’s identity store (Windows | Linux). Tableau Online Authentication supports Tableau, Google, and SAML to verify a user’s identity. Authorization refers to how and what users can access on Tableau Server and Tableau Online after the user has been authenticated. Authorization includes:

- What users are allowed to do with content hosted in Tableau Server and Tableau Online, including site, projects, workbooks, views, data sources, and flows.
- What tasks users are allowed to perform to administer Tableau Server and Tableau Online, such as configuring server and site settings, running command line tools, creating sites, and other tasks.

Authorization for these actions is managed by Tableau Server and Tableau Online and determined by a combination of the user’s license type, site role, and permissions associated with specific entities such as workbooks and data sources. Tableau’s role-based licenses have implicit governance built in because of the capabilities that are included with them. For more information on specific capabilities by each license, see Tableau for Teams and Organizations.

When you add users to a site on Tableau Server or Tableau Online, independent of their license type, you must apply a site role to them. The site role signifies the maximum level of access a user can have on the site.
Users with a Tableau Creator license have access to Tableau Server or Tableau Online, Tableau Desktop, Tableau Prep Builder, and Tableau Mobile. The following site roles use a Tableau Creator license:

<table>
<thead>
<tr>
<th>Site Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Server Administrator</td>
<td>Configure settings for the Tableau Server, all sites on the server, users and groups, and all content assets, such as projects, data sources (including connection information), workbooks, and flows. Connect to Tableau Published Data Sources or external data from the browser, Tableau Desktop, or Tableau Prep Builder; create and publish new data sources and flows; author and publish workbooks.</td>
</tr>
<tr>
<td>Site Administrator</td>
<td>Unrestricted access to content as described above, but at the site level. Connect to Tableau or external data in the browser, Tableau Desktop, or Tableau Prep Builder; create new data sources; build and publish content.</td>
</tr>
<tr>
<td>Creator</td>
<td>On Tableau Server, server administrators can determine whether to allow site administrators to manage users and assign site roles and site membership. By default, on Tableau Server, and always on Tableau Online, site administrators are allowed these capabilities. Connect to data to author new data sources and dashboards, which are published and shared on Tableau Server and Tableau Online. Data stewards (DBA or data analyst) publish data sources. Creators incorporate process definitions, policies, guidelines, and business knowledge for enterprise metadata management in compliance with organizational and/or regulatory obligations.</td>
</tr>
</tbody>
</table>

Users with a Tableau Explorer license have access to Tableau Server or Tableau Online and Tableau Mobile. The following site roles use a Tableau Explorer license:

<table>
<thead>
<tr>
<th>Site Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Administrator</td>
<td>Same access to site and user configuration as Site Administrator Creator but cannot connect to external data from the web editing environment.</td>
</tr>
<tr>
<td>Site Role</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Explorer</td>
<td>Connect to Tableau Published Data Sources to create new workbooks and edit and save existing workbooks.</td>
</tr>
<tr>
<td>Explorer</td>
<td>Publish new content from browser, browse and interact with published views, use all interaction features. In the web editing environment, can edit and save existing workbooks, and save new standalone data sources from data connections embedded in workbooks, but cannot connect to external data and create new data sources.</td>
</tr>
<tr>
<td>Explorer</td>
<td>Browse and interact with published views. Can subscribe to content, create data driven alerts, connect to Tableau Published Data Sources and open workbooks in the web authoring environment for ad-hoc queries, but they cannot save their work.</td>
</tr>
</tbody>
</table>

Users with a Tableau Viewer license have access to Tableau Server or Tableau Online and Tableau Mobile.

<table>
<thead>
<tr>
<th>Site Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viewer</td>
<td>View and interact with filters and content. Viewers can also receive alerts triggered by business events.</td>
</tr>
</tbody>
</table>

Users who have been added to Tableau Server or Tableau Online but without a license are Unlicensed.

<table>
<thead>
<tr>
<th>Site Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unlicensed</td>
<td>Unlicensed users cannot sign in to Tableau Server or Tableau Online.</td>
</tr>
</tbody>
</table>

Site roles along with content permissions determines who can publish, interact with, or only view published content, as well as who can manage the site’s users and administer the site.
Tableau Blueprint Help

The project team should work together to define the content permissions model. Tableau Server and/or Site Administrators will assign permission rules to groups and lock them to the project. Locked projects enforce permission rules on all content within the container, including nested projects. For more information, see Set Project Default Permissions and Lock the Project.

Tableau has default permission rules for projects, workbooks, and data sources, or you can define custom permission rules for these content types.

<table>
<thead>
<tr>
<th>Permission Rules Template</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Leader</td>
<td>Combined with the appropriate site role, allows the user or group full access to the project, its child projects, and content published into that project hierarchy.</td>
</tr>
<tr>
<td>Editor</td>
<td>Allows the user or group to connect to, edit, download, delete, and set permissions for data sources or workbooks in the project. They can also publish data sources, and provided they are the owner of a data source they publish, can update connection information and extract refresh schedules. This permission is relevant for views when the view they access connects to a data source.</td>
</tr>
<tr>
<td>Publisher</td>
<td>Allows the user or group to publish workbooks and data sources to the project.</td>
</tr>
<tr>
<td>Connector</td>
<td>Allows the user or group to connect to data sources in the project.</td>
</tr>
<tr>
<td>Viewer</td>
<td>Allows the user or group to view the workbooks and views in the project.</td>
</tr>
<tr>
<td>None</td>
<td>Sets all capabilities for the permission rule to Unspecified.</td>
</tr>
</tbody>
</table>
### Permission Rules

<table>
<thead>
<tr>
<th>Template</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denied</td>
<td>Sets all capabilities for the permission rule to Denied.</td>
</tr>
</tbody>
</table>

Custom permissions allow more granularity in permissions—from accessing or downloading a data source to how a user interacts with published content. Tableau’s intuitive interface makes it easy to associate users to functional groups, assign permissions to the groups, and see who has access to which content. For more information, see [Set Permissions on Individual Content Resources](#). If the Data Management Add-on is present, permissions for external assets have additional considerations. For more information, see [Manage Permissions for External Assets](#).

You should create groups locally on the server or import from Active Directory/LDAP and synchronize (Windows | Linux) on a set schedule. Synchronization schedules are set by the Tableau Server Administrator or Tableau Online Site Administrators. To simplify maintenance, assign permissions to groups at the project level as shown below. For Tableau Online, you can
Automate User Provisioning and Group Synchronization in Tableau Online through an External Identity Provider via SCIM and add or remove users or add or remove members from groups using the REST API programatically.

For more information, see Set-up Permissions Quick Start, Configure Projects, Groups, and Permissions for Managed Self-Service, and Permissions Reference.

Key Considerations for Authorization

- What is the minimum site role for Active Directory/LDAP or SCIM group synchronization?
- Have you set all permissions for the All Users group in the Default project to None?
- Are any explicit restrictions (Deny permissions) needed on the All Users group to propagate to every user account?
- Have you created groups that correspond to a set of authoring and viewing capabilities for each project?
- Have you reviewed effective permissions on select users to test your permissions model?
- Have you locked permissions at the parent project to maintain security throughout the project hierarchy?
- Have service account usernames/passwords been established for Published Data Sources?

Content Validation

Content validation is the first step in a series of events that will culminate in content certification. Similar to the data quality area in data governance, content validation encompasses the processes to validate that content is accurate, complete, reliable, relevant, and recent.

The first role to validate content should be its author. Authors should solicit feedback from the target audience as well. This can be done in an informal feedback group or by sharing a link to the workbook. Data stewards should also play a role to ensure correctness and review an embedded data source as a potential candidate for publishing and certifying. If the data source is embedded in the workbook, the data steward should consider whether it is a potential candidate for publishing and certifying. Beyond data and calculation correctness, content validation should also include a review of the branding, layout, formatting, performance, filters, dashboard actions, and edge case behaviors by the Site Administrator or Project Leader site roles.

Key Considerations for Content Validation
Content Promotion

After content validation is complete, the process of content promotion is used to publish the workbook to a trusted project location or add the certification badge designation for Published Data Sources. An example of a workbook workflow is shown below.

Workbook Workflow

Content authors will connect to data, create new dashboards, and publish to the sandbox project. Site Administrators or Project Leaders will validate and approve the content. The approved content will be published to the production project. The Content Migration Tool, licensed as part of the Tableau Server Management Add-on, provides an easy way to promote or migrate content between Tableau Server projects. You can do this between projects on separate Tableau Server installations (for instance, between a development instance of
Tableau Blueprint Help

Tableau Server and a product installation with appropriate licensing for each environment), or between projects on a single Tableau Server installation. The Content Migration Tool User Interface walks you through the steps necessary to build a "migration plan" that you can use a single time, or as a template for multiple migrations.

If IT requirements mandate three separately licensed environments (Dev, QA, and Production), try not to replicate a traditional waterfall development cycle with a modern analytics platform. Users may favor the QA environment to circumvent stringent policies or delays to get content into production, so work towards a good balance by automating content migration to the production server with custom workflow scripts using Tableau’s REST APIs.

Key Considerations for Content Promotion

- Who is involved in the promotion process?
- Do content-promoting roles have a checklist of criteria to evaluate?
- Have you clearly delineated between certified content and ad-hoc content by projects?
- Is the process agile to support iterations and innovation?
- Do you have workflows to address both direct and restricted sources of data and workbooks?

Content Certification

After content has been validated and promoted, it achieves a trusted, certified status when a Site Administrator, Project Leader, or a Publisher (content author or data steward) with permission to the production project promotes the workbook or data source to the designated location. Certification makes content discoverable by content consumers and improves data stewards' abilities to govern enterprise-wide data more effectively in Tableau by reducing the proliferation of duplicate workbooks and data sources.

Use the baseline requirements that were established in key considerations for content validation as the criteria for becoming certified. Content authors should have a clear understanding of how the certification process works from start to finish, and content consumers should know where certified content is published in the production project, as defined by your content management standards.

Data source certification enables data stewards to promote specific data sources in your Tableau deployment as trusted and ready for use. Certified Data Sources get preferential treatment in Tableau Server and Tableau Online search results and in our smart data source recommendations algorithm so that they are discoverable and easily reusable.
Certified Data Source

Key Considerations for Content Certification

- Who is responsible for designating certified content?
- Have all criteria for achieving certification status been met?
- Are all fields completed: about, certification notes, tags?

Content Utilization

Content utilization is a measurement of the effective use of the data for business decisions, but the complete picture cannot be told through Traffic to Views alone. Measurement of content utilization helps your deployment to operate at scale and evolve by understanding user behaviors—who creates and consumes content, and the quality and relevance of the dashboards and data sources. If content isn’t being consumed, you will be able to identify it, and take the appropriate next steps.

Tableau Server Administrators should monitor broad usage patterns with default administrative views. For more specific requirements, it is possible to create custom administrative views from Tableau Server repository data. Site Administrators should measure and audit usage of published content—both certified and ad-hoc—within their site. For
example, if ad-hoc content utilization is significantly higher than certified content utilization, perhaps the promotion process is too restrictive or takes too long for business needs.

Site Administrators should review content utilization in the context of the expected audience sizes that were documented on the Tableau Use Cases and Data Sources on page 16 tab of the Tableau Blueprint Planner. Individual content authors should also review utilization for their content in the sparkline tooltip by hovering over the workbook’s thumbnail or selecting Who Has Seen This View from the menu. In Tableau Online, Site Administrators have access to Monitor Site Activity with default administrative views and can Use Admin Insights to Create Custom Views. For more information, see the Measurement of Tableau User Engagement and Adoption on page 161.

Key Considerations for Content Utilization

- How much traffic goes to each view?
- What is the definition of stale content? How often is stale content purged?
- How much indirect utilization (alerts & subscriptions) occurs?
- Are subscriptions delivered on time?
- Does the actual audience size match with expectations?
- Does content follow a weekly, monthly, quarterly trend?
- What is the frequency of login or days since last login by user cohort?
- What is the distribution of workbook and data source size?

Content Governance Summary

The table below defines the ideal state for promoting and governing content in a thriving modern analytics deployment:

<table>
<thead>
<tr>
<th>Area</th>
<th>IT Administrators/BI Professionals</th>
<th>Content AUTHORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content Management</td>
<td>Create and maintain an environment for storing and organizing published content.</td>
<td>Ensure content is relevant in their site or project.</td>
</tr>
<tr>
<td>Security &amp; Permissions</td>
<td>Secure analytic content and grant users the appropriate levels of access based on content type, sensitivity,</td>
<td>Comply with organizational security and permissions policies.</td>
</tr>
<tr>
<td>Area</td>
<td>IT Administrators/BI Professionals</td>
<td>Content AUTHORS</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Content Validation</td>
<td>Define process for validating content is correct.</td>
<td>Access platform capabilities to assist with validation and accuracy verification of user-generated analytic content.</td>
</tr>
<tr>
<td>Content Promotion</td>
<td>Define process for promoting content.</td>
<td>Promote validated analytic content to centralized-trusted environment as determined by governance process.</td>
</tr>
<tr>
<td>Content Certification</td>
<td>Define process for certifying content.</td>
<td>Certify content as trusted and delineate from untrusted content in the same environment.</td>
</tr>
<tr>
<td>Content Utilization</td>
<td>Measure broad usage patterns across organizational business units.</td>
<td>Measure and audit usage of published content and track usage of untrusted content.</td>
</tr>
</tbody>
</table>

**Tableau Governance Models**

Acknowledging that every organization is different, and every use case is different, varying degrees of governance are required. The data and content governance models can be right-sized and applied to any kind of data regardless of where it falls in the governance spectrum. Establishing three primary governance models—centralized, delegated, and self-governing—provides the flexibility to satisfy the governance needs of most organizations.
Tableau Blueprint Help

Like other Tableau platform management activities, an agile, iterative approach is needed to adapt to new business requirements as user adoption and engagement increase across your organization. Processes will change over time as skills increase and responsibilities are delegated more broadly than the IT organization. Establish governance review points twice a year to continue to evolve the models.

The Data and Content Governance tab in the Tableau Blueprint Planner will help you to define your organization’s governance models based on information collected in the Tableau Enterprise Architecture Survey on page 10 and Tableau Data and Analytics Survey on page 15. You should establish and document who is responsible and what processes support each area within each model: centralized, delegated, and self-governing.

Using the matrix approach to separate data and content governance and segmenting by the three models, it is easy to mix and match across models. For example, data and content governance may be centralized at the start. Then, after user training, data governance areas may be centralized, but content governance is delegated or self-governing because the data is curated. Similarly, specific areas within data and content governance can be tailored, such as delegated metadata management and centralized security and permissions, to meet your unique requirements. As business users’ analytical capabilities grow, more responsibilities can be delegated over time. Once defined, the governance models should be communicated with the user community by publishing them to the enablement intranet. For more information, see Tableau Enablement Intranet on page 199.

Centralized

In a centralized model, IT or another authority owns data access and produces data sources and dashboards for business consumption in a one-to-many manner by a small number of Creators and everyone else as Viewers. Centralized governance is required for maintaining control of highly sensitive data.

Addressing a skills gap among the target audience is another case where centralized management is necessary. You can still provide business users with prepared content to make data-driven decisions while they build their analytical capabilities.

If you are transitioning from a traditional, top-down analytics approach driven by IT or favor a phased delegation of responsibilities to governed self-service, it may be advantageous for IT or a centralized BI team to build the initial use cases across departments, including Certified Data Sources and dashboards.
Over time, as users are encouraged to ask and answer their own questions, the domain of available trusted content will grow organically with the teams and departments, and users will have access to a wider range of analytic content for self-service. To avoid the risk of recreating a “report factory” delivery model, establish goals and dates to evolve beyond the centralized governance model and to begin delegation of responsibilities.

Delegated

In a delegated governance model, new roles are introduced outside of IT or a central authority. Site Administrators and Data Stewards are identified and may have direct access to sources of data. Content authors have access to certified Published Data Sources to ask and answer their own business questions, while some content consumers are given web authoring capabilities to save derivative content to sandbox projects. Processes to validate, promote, and certify content are introduced but still may be limited. There is increasing collaboration between IT and business users as IT shifts from a provider of reports to an enabler of analytics.

Self-Governing

In a self-governing model, there is strong collaboration between IT and business users. Certified content and data sources are available, and ad-hoc content is being created regularly by Creators and Explorers. Viewers understand the delineation between certified and ad-hoc, sandbox content states. The process of validation, promotion, and certification is well-defined and well-understood by users of all skill levels. With increasing analytical skills across the organization, the boundaries between the roles of the Modern Analytics Workflow are fluid as users switch from consuming to creating to promoting content with the appropriate level of permissions.
Tableau Deployment

Prioritizing data and analytics couldn’t come at a better time. Your company, no matter what size, is already collecting data and most likely analyzing just a portion of it to solve business problems, gain competitive advantages, and drive enterprise transformation. With the explosive growth of enterprise data, database technologies, and the high demand for analytical skills, today’s most effective IT organizations have shifted their focus to enabling self-service by deploying and operating Tableau Server at scale, as well as organizing, orchestrating, and unifying disparate sources of data for business users and experts alike to author and consume content.

Tableau Server leverages your existing technology investments and integrates into your IT infrastructure to provide a self-service, modern analytics platform for your users. During the discovery stage, IT completed the Tableau Blueprint Planner’s Tableau Enterprise Architecture Survey on page 10 and collected the Tableau Data and Analytics Survey on page 15 from departments and teams within your organization. The Enterprise Architecture Survey helps you identify your enterprise standards and processes for technology and platforms that you will integrate with Tableau. Depending on your organizational roles and responsibilities, Tableau Server should be installed by a systems administrator and the designated Tableau Server Administrator in coordination with the corresponding IT roles. The Data & Analytics Survey, completed by business teams, identifies and prioritizes data use cases, audience size, and users. You will use the information collected in both surveys to plan your deployment strategy, including sizing, installation, and configuration of your Tableau Server. In addition to installing Tableau Server, administrators will also need to plan for installation of Tableau Prep Builder, Tableau Desktop, and Tableau Mobile, where applicable.

This document covers system integration and deployment best practices. It will help you plan your deployment strategy. Prior to installation, review Planning (Windows | Linux) and Baseline Configurations (Windows | Linux). For full documentation, visit Get Started with Tableau Server (Windows | Linux).

Tableau Server Architecture

Tableau Server is a collection of processes that work together to provide a full modern analytics platform for your users. Multiple server processes work together to provide services in various
tiers. To learn how the processes work together, see Tableau Server Processes on Tableau Public.

For more information on specific processes, see below:

- Tableau Server Administration Agent
- Tableau Server Application Server
- Tableau Server Backgrounder Process
- Tableau Server Cache Server
- Tableau Server Client File Service
- Tableau Server Coordination Service
- Tableau Server Data Engine
- Tableau Server Data Server
- Tableau Server File Store
- Tableau Server Gateway Process
- Tableau Server Microservice Containers
- Tableau Server Repository
- Tableau Server SAML Service
- Tableau Server Search and Browse
- Tableau Server Service Manager
- Tableau Server Administration Controller Process
- Tableau Server TSM Maintenance Services
- Tableau Server VizQL Server
- Tableau Prep Conductor
- Tableau Server Dynamic Topology Changes
- Server Process Limits
Hardware Platform

Tableau Server can be installed on-premises with physical or virtual machines or in the cloud and supports Windows or Linux operating systems. To determine your hardware platform and sizing, consider these variables: your environment, sources of data and management to provide self-service data access, potential workload from all users, and actual usage data. If this is the first time you are deploying Tableau Server, you should focus on your environment standards and sources of data. For existing deployments, you will analyze Tableau Server data to evaluate workload and usage in addition to environment and sources of data.

Deployment Type

Tableau prioritizes choice in flexibility to fit, rather than dictate, your enterprise architecture. With on-premises, cloud, and hosted options, there is a version of Tableau to match your requirements. Below is a comparison of the three types:

<table>
<thead>
<tr>
<th>Type</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tableau Server - On Premises</td>
<td>Full control of hardware and software</td>
<td>Need dedicated administrators to manage hardware and software</td>
</tr>
<tr>
<td></td>
<td>Infrastructure and data remain behind your firewall</td>
<td>Additional infrastructure needed to access off-network (mobile, external)</td>
</tr>
<tr>
<td>Tableau Server - Public Cloud (IaaS)</td>
<td>Full control of software on managed hardware</td>
<td>Need dedicated administrators to manage software</td>
</tr>
<tr>
<td></td>
<td>Puts infrastructure in same place as data (for migration to cloud)</td>
<td>Additional infrastructure needed to access off-network (mobile, external)</td>
</tr>
<tr>
<td></td>
<td>Flexibility to spin up/down hardware as needed</td>
<td></td>
</tr>
<tr>
<td>Tableau Online (SaaS)</td>
<td>Fully hosted solution (hardware, software upgrades)</td>
<td>Single-site in multi-tenant environment</td>
</tr>
<tr>
<td></td>
<td>Fast to deploy</td>
<td>Connection to on-premises data handled through Tableau Bridge</td>
</tr>
<tr>
<td></td>
<td>Easy for external audience to</td>
<td></td>
</tr>
</tbody>
</table>
Hardware requirements

Regardless of where you choose to deploy Tableau Server, properly-sized hardware is critical. Your planning should be aligned with evolving business needs by assessing server utilization and user engagement more frequently, scaling more frequently, and changing topology more frequently than other software applications. Review the corresponding link to the hardware platform that fits your enterprise standards:

- Recommended Baseline Configurations (Windows | Linux)
- Tableau Server on VMware VSphere
- AWS Instance Type and Size (Windows | Linux)
- Google Compute Engine Virtual Machine Type and Size (Windows | Linux)
- Microsoft Azure Virtual Machine Type and Size (Windows | Linux)
- Alibaba Cloud ECS Instance Type and Size (Windows | Linux)

If you deploy Tableau Server in the cloud, using Dedicated Hardware and static allocation of RAM eliminates varied performance due to resource contention. If cost is a consideration, Virtual Hardware is also viable. We recommend testing your own infrastructure to find the configuration that best fits your needs. For an example of how to conduct such a test, please see the Tableau at the Speed of EC2 Whitepaper. (This experiment was conducted in AWS, but the testing theory extends to any cloud provider.)

Initial Sizing

Your Tableau account team is available to assess your requirements and assist with sizing. In an initial deployment of Tableau, you should estimate 600-800 Explorers per 8-core node, assuming 10% active users (interactive, concurrent requests made to Tableau Server, including consuming dashboards on a laptop or mobile device, web authoring, and connecting to and querying Published Data Sources). This is only a starting point and should not be considered a hard sizing rule beyond the initial deployment. Memory should be at least 8GB of RAM per core for a production server. For less than 40-core clusters, use 8-core nodes, and in clusters greater than 40-cores, use 16-core nodes. The relative workload of each license type must be factored into hardware sizing. Assuming an Explorer counts as 1 user, a Creator has a
relative workload of 2.4 users, while a Viewer has a relative workload of 0.75 of a user. Using these workload coefficients, you can estimate the cluster’s capacity. The following table shows examples of equivalent workloads on each row:

<table>
<thead>
<tr>
<th></th>
<th>Creators</th>
<th>Explorers</th>
<th>Viewers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workload 1</td>
<td>25</td>
<td>300</td>
<td>586</td>
</tr>
<tr>
<td>Workload 2</td>
<td>50</td>
<td>333</td>
<td>462</td>
</tr>
<tr>
<td>Workload 3</td>
<td>75</td>
<td>234</td>
<td>514</td>
</tr>
<tr>
<td>Workload 4</td>
<td>100</td>
<td>171</td>
<td>518</td>
</tr>
</tbody>
</table>

Actual workload of Creators, Explorers, and Viewers may vary with usage of Tableau Server features, such as frequency of connecting to data and web authoring, as well as viewing and interacting with content. As users are onboarded and start creating and consuming content, you should monitor the hardware and content utilization to make informed decisions on server sizing with data from hardware monitoring tools and Tableau Server’s Repository. For more information, see Tableau Monitoring on page 121 and Measurement of Tableau User Engagement and Adoption on page 161.

Scalability

In both new and existing deployment scenarios, the goal is to proactively maintain sufficient availability, capacity, and headroom and minimize resource contention. Like other enterprise platforms, Tableau Server scales up by adding processor, memory, and/or disk or scales out by adding more nodes to a cluster. Tableau Server scales nearly linearly with the addition of hardware resources, according to your unique environment, data, workload, and usage mix. Load testing and capacity planning should be conducted regularly, as outlined in Tableau Maintenance on page 133.

Scalability and performance are heavily dependent on external systems, such as sources of data, volume of data, and network speeds, user workloads, and workbook design, which can change rapidly as deployments progress. For example, assuming a correctly-sized hardware configuration for the initial deployment, unplanned user onboarding, unmonitored utilization, inefficient workbooks, suboptimal data extract design, and peak-hour refresh schedules can have a major impact on server performance and user experience, causing performance to
degrade from the cumulative effect of the separate incidents. For more information, see Tableau Server Scalability whitepaper.

When deploying Tableau Server in the cloud, you can leverage all existing scaling abilities of the Tableau platform including Hot Topology. With a simple restart of the server, you can also change the underlying machines supporting the platform as long as their Public IP Address does not change.

For single-node deployments, you may also turn off Tableau Server machines during downtimes to reduce machine costs. Doing so with a multi-node cluster will put Tableau in a degraded state. But you can utilize Hot Topology to responsively adjust Tableau Server process allocation, allowing you to tune the balance of machine costs and capacity needs. Auto-scaling functionality that terminates or instantiates machines based on demand is not supported.

**Server Environments**

In addition to your production environment, Tableau recommends one test environment for testing upgrades and server topology changes. Your production environment will support modern analytics using production and sandbox projects with content validation, promotion, and certification processes—all in one environment. For more information on these content management processes, see Tableau Governance on page 49. The production and test environments should have identical hardware specs, server topology, and configuration. This will allow administrators to test upgrades and participate in beta programs in the test environment by restoring back production content.

Some organizations have IT policies that require three environments—Development, QA, and Production—to isolate use cases for content development, testing and consumption into separate Tableau Server installations. If this is a requirement for your organization, each of the three environments must be licensed separately as they would be considered three Production Environments as defined in Tableau’s End User License Agreement. The Production and QA environments should have identical specs, server topology, and configuration. If you are required to run three separate environments, try not to replicate a traditional waterfall development cycle with a modern analytics platform. Users may favor the QA environment to circumvent stringent policies or delays to get content into production, so work towards a good balance by automating content migration to the production server with the Content Migration Tool found in the Tableau Server Management Add-on or custom workflow scripts using Tableau’s REST APIs. The development environment does not have to have identical
hardware specs as the production and QA environments, unless the development environment is used for upgrade testing or participation in beta programs.

**High Availability**

You should install and configure Tableau based on your availability requirements and add additional nodes for capacity and/or for high availability (Windows | Linux). To support mission-critical use cases, you should deploy a high-availability (HA) cluster configuration with an external load balancer (Windows | Linux).

An HA installation of Tableau Server has a minimum of three nodes and multiple redundant instances of key processes (the Repository, File Store/Data Engine, and Coordination Service) on different nodes. The goal is to minimize system downtime by eliminating single points of failure and enabling detection of failures with failover where possible. For more information, see [Tableau Server High Availability whitepaper](#).

Follow the pattern below to build your HA cluster:

1. Install the initial node and allow the architecture-aware smart installer to configure processes (Windows | Linux). The active Repository is on Node 1.
2. Replicate the process configuration to other VizQL nodes, ensuring redundancy (Windows | Linux). The passive Repository is on Node 2. Node 3 processes will mirror Nodes 1 and 2, except there will be no Repository process on it.
3. Add Coordination Service Ensemble and Client File Service (Windows | Linux).
4. Add the external load balancer (Windows | Linux).
A 3-Node Tableau Server HA Deployment (Note: Coordination Service and Client File Service are not explicitly shown)

The need for specialized nodes evolves over time. Extract-heavy and frequent extract refresh workloads should be isolated from the interactive visualization-rendering workload. In an extract-heavy environment, most of data sources are extracts. Having a few extremely large extracts could put your deployment in this category, as would having many small extracts. Deployments where extracts are frequently refreshed, such as several times a day during business hours, should be isolated on specialized Backgrounder nodes. To isolate the workload of the Backgrounder process, add specialized Backgrounder nodes, ensuring redundancy, as shown in Nodes 4 and 5 below. Using node roles, you can configure where certain types of workloads are processed on your Tableau Server installation. The node roles features allows you to dedicate and scale resources to specific workloads. For more information on configuring node roles for Backgrounder and File Store, see Workload Management through Node Roles.
A 5-Node Tableau Server HA Deployment (Note: Coordination Service and Client File Service are not explicitly shown)

Starting in 2019.3, you can deploy Tableau Server Repository to Amazon Relational Database Service (RDS). The Tableau Server Repository is a PostgreSQL database that stores data about all user interactions, extract refreshes, and more. Amazon RDS offers scalability, reliability, high availability and security built-in for PostgreSQL. By integrating with AWS to configure Tableau Server external repository, you will be able to take advantage of these additional benefits of deploying the cloud. For more information, see Tableau Server External Repository.

When deploying Tableau Server in the public cloud, you have a few options to further mitigate risk of downtime. For example; deploying each node of Tableau Server in its own Virtual Network or in different Availability Zones/Zones are both supported. However, separating your environment could come at the expense of increased latency across the system. Before finalizing your environment, consider testing both performance and availability to ensure you have the appropriate balance for your data community. Tableau Server does not support deploying a multi-node cluster across different Regions.

Disaster Recovery

When planning for disaster recovery (DR) in your Tableau environment, there are two main factors to consider: Recovery Time Objective (RTO) and Recovery Point Objective (RPO). The RTO is a measure of how much downtime your business can accept before a full recovery, and it influences how often you restore your backups to an alternative cluster and the amount of
infrastructure investment. The RPO, a measure of how much data loss your business can tolerate, influences how often you will need to take backups of your system. For Tableau Server the RPO cannot be shorter than the time it takes to complete a full backup of your server. The table below illustrates how to plan for a range of RTO requirements:

<table>
<thead>
<tr>
<th>High RTO</th>
<th>Medium RTO</th>
<th>Low RTO</th>
</tr>
</thead>
<tbody>
<tr>
<td>New hardware/VMs obtained in case of an outage</td>
<td>Machines are provisioned but not running</td>
<td>Dedicated hardware that is always running with identical configuration and topology as production</td>
</tr>
<tr>
<td>Install Tableau Server</td>
<td>Tableau Server installed</td>
<td>Backups are restored regularly to the DR environment</td>
</tr>
<tr>
<td>Restore backup to the new environment</td>
<td>Restore latest backup to the cold standby environment</td>
<td>External load balancer/DNS routing that can be updated to point to the DR environment</td>
</tr>
<tr>
<td>Several hours or days</td>
<td>A few hours</td>
<td>Within minutes</td>
</tr>
</tbody>
</table>

Whether you host Tableau Server on premise or in the cloud, the backup process is the same. Use the TSM Backup command to generate a backup of the Tableau Server and restore that backup on a new machine. Taking a snapshot of a Tableau Server machine, and restoring on a new machine is not supported. For more information, see Mission-Critical Reliability for high-availability and disaster recovery concepts and whitepapers.

### Authentication and Authorization

Tableau Server provides the comprehensive features and deep integration to address all aspects of enterprise security. For more information, see Tableau Server Platform Security and Security Hardening Checklist (Windows | Linux).

### Identity Store

Tableau Server requires an identity store (Windows | Linux) to manage user and group information. There are two kinds of identity stores: local (Tableau Server) and external (Active
Directory, LDAP). When you install Tableau Server you must configure either a local identity store or an external identity store. For information about configuration options for the identity store, see identityStore Entity.

When you configure Tableau Server with a local identity store, all user and group information is stored and managed in the Tableau Server Repository. In the local identity store scenario, there is no external source for users and groups. Note: Changing the identity store after server installation requires a full uninstall and reinstall.

When you configure Tableau Server with an external store, all user and group information is stored and managed by an external directory service. Tableau Server must synchronize with the external identity store so that local copies of the users and groups exist in the Tableau Server Repository, but the external identity store is the master source for all user and group data. When users sign in to Tableau Server, their credentials are passed to the external directory, which is responsible for authenticating the user (Windows | Linux). Tableau Server does not perform this authentication; however, the Tableau user names stored in the identity store are associated with rights and permissions for Tableau Server. After authentication is verified, Tableau Server manages user access (authorization) for Tableau resources.

**Authentication**

Authentication verifies a user's identity. Everyone who needs to access Tableau Server—whether to manage the server, or to publish, browse, or administer content—must be represented as a user in the Tableau Server identity store. The method of authentication may be performed by Tableau Server (local authentication), or authentication may be performed by an external process. In the latter case, you must configure Tableau Server for external authentication technologies such as Active Directory, OpenLDAP, SAML, or OpenID. In all cases, whether authentication takes place locally or is external, each user identity must be represented in the Tableau Server identity store, which is managed by the Repository (Windows | Linux). The table below shows which authentication methods are compatible with which identity stores.

**Authentication Method Local Authentication AD/LDAP**

<table>
<thead>
<tr>
<th>Authentication Method</th>
<th>Local Authentication</th>
<th>AD/LDAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAML</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Kerberos</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Mutual SSL</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Authentication Method Local Authentication AD/LDAP

<table>
<thead>
<tr>
<th>OpenID</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trusted Authentication</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Active Directory & OpenLDAP

In this scenario, Tableau Server must be installed in a domain in Active Directory. Tableau Server will sync user and group metadata from Active Directory to the identity store. You do not have to manually add users. However, after the data is synchronized, you will need to assign site and server roles. You can assign these individually, or at the group level. Tableau Server does not synchronize any data back to Active Directory. Tableau Server manages content and server access according to the site role permission data is stored in the Repository.

If you are already using Active Directory to manage users in your organization, you must select Active Directory authentication during Tableau setup. For example, by synchronizing Active Directory groups, you can set minimum site role Tableau permissions for users that are synchronized in the groups. You can synchronize specific Active Directory groups, or you can synchronize them all. For more information, see Synchronize All Active Directory Groups on the Server. Be sure to review User Management in Active Directory Deployments to understand how multiple domains, domain naming, NetBIOS, and Active Directory user name format influence Tableau user management.

You can also configure Tableau Server to use LDAP as a generic way to communicate with the identity store. For example, OpenLDAP is one of several LDAP server implementations with a flexible schema. Tableau Server can be configured to query the OpenLDAP server. See Identity Store. Authentication in this scenario maybe be provided by the native LDAP solution, or with a single sign-on solution.
Active Directory/OpenLDAP authentication

**SAML**

SAML (Security Assertion Markup Language) is an XML standard that allows secure web domains to exchange user authentication and authorization data. You can configure Tableau Server to use an external identity provider (IdP) to authenticate users over SAML 2.0. Tableau Server supports both service provider initiated and IdP initiated SAML in browsers only. Connections from Tableau Desktop or the Tableau Mobile app require that the SAML request be service provider initiated. No user credentials are stored with Tableau Server, and using SAML enables you to add Tableau to your organization's single sign-on environment.

You can use SAML server wide, or you can configure sites individually. Here's an overview of those options:

- **Server-wide SAML authentication.** A single SAML IdP application handles authentication for all Tableau Server users. Use this option if your server has only the Default site.

In addition, if you want to use site-specific SAML, you must configure server-wide SAML before you configure individual sites.

- **Server-wide local authentication and site-specific SAML authentication.** In a multi-site environment, users who are not enabled for SAML authentication at the site level can sign in using local authentication.

- **Server-wide SAML authentication and site-specific SAML authentication.** In a multi-site environment, all users authenticate through a SAML IdP configured at the site level, and you specify a server-wide default SAML IdP for users that belong to multiple sites.
User authentication through SAML does not apply to permissions and authorization for Tableau Server content, such as data sources and workbooks. It also does not control access to underlying data that workbooks and data sources connect to. For more information, see SAML (Windows | Linux).

SAML Authentication

**Trusted Tickets**

If you embed Tableau Server views into webpages, everyone who visits the page must be a licensed user on Tableau Server. When users visit the page, they are prompted to sign in to Tableau Server before they can see the view. If you already have a way of authenticating users on the webpage or within your web application, you can avoid this prompt and save your users from having to sign in twice by setting up trusted authentication.

Trusted authentication simply means that you have set up a trusted relationship between Tableau Server and one or more web servers. When Tableau Server receives requests from these trusted web servers it assumes that your web server has handled whatever authentication is necessary.

If your web server uses SSPI (Security Support Provider Interface), you do not need to set up trusted authentication. You can embed views and your users will have secure access to them as long as they are licensed Tableau Server users and members of your Active Directory (Windows | Linux).
Trusted Tickets

Mutual SSL

Using mutual SSL, you can provide users of Tableau Desktop and other approved Tableau clients a secure, direct-access experience to Tableau Server. With mutual SSL, when a client with a valid SSL certificate connects to Tableau Server, Tableau Server confirms the existence of the client certificate and authenticates the user, based on the user name in the client certificate. If the client does not have a valid SSL certificate, Tableau Server can refuse the connection. You can also configure Tableau Server to fall back to username/password authentication if mutual SSL fails.

Authorization

Authorization refers to how and what users can access on Tableau Server after authentication has been verified. For more information, see Governance in Tableau on page 52.
Authorization includes:

- What users are allowed to do with content hosted on Tableau Server, including projects, sites, workbooks, and views.
- What users are allowed to do with the data sources that are managed by Tableau Server.
- What tasks users are allowed to perform to administer Tableau Server, such as configuring server settings, running command line tools, creating sites, and other tasks.

Authorization is managed by Tableau Server and determined by a combination of the user's license level (Tableau Creator, Tableau Explorer, Tableau Viewer), site role, and permissions associated with specific entities such as workbooks and data sources. The project team should
work together to define the permissions model. Tableau Server and/or Site Administrators will assign permission rules to groups, and lock them to the project. Custom permissions allow more granularity in permissions—from accessing or downloading a data source to how a user interacts with published content.

Tableau’s intuitive interface makes it easy to associate users to functional groups, assign permissions to the groups, and see who has access to which content. You can create groups locally on the server or import from Active Directory and synchronize on a set schedule. The permissions view also helps business users manage their own users and groups. For more information, see Set-up Permissions Quick Start, Configure Projects, Groups, and Permissions for Managed Self-Service, and Permissions Reference.

Network Communication

There are three main network interfaces in Tableau Server:

- Client to Tableau Server: The client can be a web browser, Tableau Mobile, Tableau Desktop, Tableau Prep Builder, or the tsm (Windows | Linux) and tabcmd (Windows | Linux) utilities.
- Tableau Server to your database(s): To refresh data extracts or handle live database connections, Tableau Server needs to communicate with your database(s).
- Server component communication: This applies to distributed deployments only.

You should configure SSL to ensure that access to Tableau Server is secure and that sensitive information passed between the server and Tableau clients is protected on your network. For more information, visit Network Security (Windows | Linux) and Ports (Windows | Linux).

Network Topologies

Users will be accessing Tableau from all over the place: their offices, on the road from their phones, from client sites in another country, and more. To ensure Tableau Server or Tableau Online is reachable no matter where the client is coming in from, you must determine the right network topology. Common network configurations are shown below:
On-Premises with External VPN Access

On-Premises with Reverse Proxy
Every organization has different requirements and solutions for its data infrastructure. Tableau respects an organization’s choice and integrates with your existing data strategy. In addition to the enterprise data warehouse, there are many new sources of data appearing inside and outside of your organization: cloud applications and data, big data databases, structured and
unstructured Repositories. From Hadoop clusters to NoSQL databases, and many others, the data flow no longer needs to be centralized around the enterprise data warehouse (EDW) as a final destination.

Modern data architecture is driven by new business requirements (speed, agility, volume) and new technology. You choose whether to provide access to the data in place or enrich data with other sources. Combine this with cloud solutions that allow for infrastructure and services to spin up data pipelines in hours, and what you have is a process for moving data around an organization like never before. Unfortunately, the new opportunity is largely missed if your organization’s data management handbook was written using a traditional EDW’s single bucket of data mindset. The trick to shifting from buckets to pipelines is accepting that not all data questions within an organization can be answered from any one data source. The pattern for a modern data architecture is shown below.

Modern Data Architecture

1. Raw Data: sources of data, for example, transactional data that is loaded into the data platform that often needs transforming in several ways: cleansing, inspection for PII, etc.
2. Compute for Prep: the processing of the raw data can require significant computational resources, so it's more than traditional ETL. Often Data Science apps will sit here. They actually can create new data with high value.
3. Storage: Modern data platforms are built on a principle of storing data because you never know how it might be used in the future. Increasingly, we store intermediate data and multiple versions and forms of the same data. Storage is therefore layered.
4. Compute for Query: the typical analytic database engine, including Hyper extracts, but also
Hadoop, etc.

5. Analytics: Tableau sits in Analytics.

Tableau’s Hybrid Data Architecture

Tableau’s hybrid data architecture provides two modes for interacting with data, using a live connection or an in-memory extract. Switching between the two is as easy as selecting the right option for your use case.

Live Connection

Tableau’s data connectors leverage your existing data infrastructure by sending dynamic queries directly to the source database rather than importing all the data. This means that if you’ve invested in fast, analytics-optimized databases, you can gain the benefits of that investment by connecting live to your data. This leaves the detail data in the source system and sends the aggregate results of queries to Tableau. Additionally, this means that Tableau can effectively utilize unlimited amounts of data. In fact, Tableau is the front-end analytics client to many of the largest databases in the world. Tableau has optimized each connector to take advantage of the unique characteristics of each data source.

In-Memory Extract

If you have a data architecture built on transactional databases or want to reduce the workload of the core data infrastructure, Tableau’s Data Engine powered by Hyper technology provides an in-memory data store that is optimized for analytics. You can connect and extract your data to bring it in-memory to perform queries in Tableau with one click. Using Tableau Data Extracts can greatly improve the user experience by reducing the time it takes to re-query the database. In turn, extracts free up the database server from redundant query traffic.

Extracts are a great solution for highly-active transactional systems that cannot afford the resources for frequent queries. The extract can be refreshed nightly and available to users during the day. Extracts can also be subsets of data based on a fixed number of records, a percentage of total records, or filtered criteria. The Data Engine can even do incremental extracts that update existing extracts with new data. Extracts are not intended to replace your database, so right-size the extract to the analysis at hand.

If you need to share your workbooks with users who do not have direct access to the underlying data sources, you can leverage Extracts. Tableau’s packaged workbooks (.twbx file type) contain all the analysis and data that was used for the workbook; making it both portable and shareable with other Tableau users.
Tableau Blueprint Help

If a user publishes a workbook using an extract, that extract is also published to the server. Future interaction with the workbook will use the extract instead of requesting live data. If enabled, the workbook can be set to request an automatic refresh of the extract on a schedule.

Query Federation

When related data is stored in tables across different databases or files, you can use a cross-database join to combine the tables. To create a cross-database join, you create a multi-connection Tableau data source by adding and then connecting to each of the different databases (including Excel and text files) before you join the tables. Cross-database joins can be used with live connections or in-memory extracts.

Data Server

Included with Tableau Server, Data Server provides sharing and centralized management of extracts and shared proxy database connections, allowing IT to make governed, measured and managed data sources available to all users of Tableau Server without duplicating extracts or data connections across workbooks.

Because multiple workbooks can connect to one data source, you can minimize the proliferation of embedded data sources and save on storage space and processing time. When someone downloads a workbook that connects to a Published Data Source that in turn has an extract connection, the extract stays on the server, reducing network traffic. Finally, if a connection requires a database driver, you need to install and maintain the driver only on the server, instead of on each user’s computer.

Using the initial data use cases collected from each team, a DBA and/or Data Steward will publish a certified data source for each source of data identified for users with the appropriate permissions to access it. Users can connect directly to a Published Data Source from Tableau Desktop and Tableau Server.

Published Data Sources prevent the proliferation of data silos and untrusted data for both extract and live connections. Extract refreshes can be scheduled, and users across the organization will stay up to date with the same shared data and definitions. A Published Data Source can be configured to connect directly to live data with a proxy database connection. This means your organization has a way to centrally manage data connections, join logic, meta data and calculated fields.

At the same time, to enable self-service and flexibility, users can extend the data model by blending in new data or creating new calculations and allow the newly defined data model to be
delivered to production in an agile manner. The centrally managed data will not change, but users retain flexibility.

Certified Data Sources

Database administrators and/or Data Stewards should certify Published Data Sources to indicate to users that the data is trusted. Certified data sources appear with a unique certification badge in both Tableau Server and Tableau Desktop. Certification notes allow you to describe why a particular data source can be trusted. These notes are accessible throughout Tableau when viewing this data source as well as who certified it. Certified data sources receive preferential treatment in search results and stand out in data source lists in Tableau Server and Tableau Desktop. Project leaders, site admins, and Tableau Server administrators have permission to certify data sources. For more information, visit Certified Data Sources.

Data Security

Data security is of utmost importance in every enterprise. Tableau allows customers to build upon their existing data security implementations. IT administrators have the flexibility to implement security within the database with database authentication, within Tableau with permissions, or a hybrid approach of both. Security will be enforced regardless of whether users are accessing the data from published views on the web, on mobile devices, or through Tableau Desktop and Tableau Prep Builder. Customers often favor the hybrid approach for its flexibility to handle different kinds of use cases. Start by establishing a data security classification to define the different types of data and levels of sensitivity that exist in your organization.

When leveraging database security, it is important to note that the method chosen for authentication to the database is key. This level of authentication is separate from the Tableau Server authentication (i.e. when a user logs into Tableau Server, he or she is not yet logging into the database). This means that Tableau Server users will also need to have credentials (their own username/password or service account username/password) to connect to the database for the database-level security to apply. To further protect your data, Tableau only needs read-access credentials to the database, which prevents publishers from accidentally changing the underlying data. Alternatively, in some cases, it is useful to give the database user permission to create temporary tables. This can have both performance and security advantages because the temporary data is stored in the database rather than in Tableau.
Tableau Blueprint Help

Extract encryption at rest is a data security feature that allows you to encrypt .hyper extracts while they are stored on Tableau Server. Tableau Server administrators can enforce encryption of all extracts on their site or allow users to specify to encrypt all extracts associated with particular published workbooks or data sources. For more information, see Extract Encryption at Rest. If your organization is deploying Data Extract Encryption at Rest, then you may optionally configure Tableau Server to use AWS as the KMS for extract encryption. To enable AWS KMS, you must deploy Tableau Server in AWS EC2. In the AWS scenario, Tableau Server uses the AWS KMS customer master key (CMK) to generate an AWS data key. Tableau Server uses the AWS data key as the root master key for all encrypted extracts. However, even when configured for AWS KMS, the native Java keystore and local KMS are still used for secure storage of secrets on Tableau Server. The AWS KMS is only used to encrypt the root master key for encrypted extracts. For more information, see Key Management System.

You can limit which users see what data by setting user filters on data sources. This allows you to better control what data users see in a published view based on their Tableau Server login account. Using this technique, a regional manager is able to view data for her region but not the data for the other regional managers. With these data security approaches, you can publish a single view or dashboard in a way that provides secure, personalized data and analysis to a wide range of users on Tableau Server. For more information, see Data Security and Restrict Access at the Data Row Level.

Tableau Add-ons

Tableau Data Management Add-on

The Tableau Data Management Add-on helps you better manage the data within your analytics environment, ensuring that trusted and up-to-date data is always used to drive decisions. From data preparation to cataloging, search and governance, the Data Management Add-on will increase trust in your data, accelerating the adoption of self-service analytics. It is a separately licensed collection of features and functionality including Tableau Prep Conductor and Tableau Catalog, which manage Tableau content and data assets in Tableau Server and Tableau Online.

Tableau Prep Conductor is included in the Data Management Add-on as of Tableau Server 2019.1. Tableau Prep Conductor runs flows, checks connection credentials, and sends alerts if a flow fails. Tableau Prep Conductor leverages the scheduling and tracking functionality of Tableau Server so you can automate running flows to update the flow output instead of logging
into Tableau Prep Builder to manually run individual flows as your data changes. It is recommended that you enable Tableau Prep Conductor on a dedicated node to run flows. For new Tableau Server installations, see Installing Tableau Server with Prep Conductor. To enable Tableau Prep Conductor on an existing installation of Tableau Server, see Enable Tableau Prep Conductor on your Tableau Server Installation or or Enable Tableau Prep Conductor on Your Tableau Online Site.

Starting in 2019.3, Tableau Catalog is also included in the Data Management Add-on for Tableau Server and Tableau Online. Tableau Catalog integrates with Tableau applications to provide lineage, impact analysis, data dictionary, data quality warnings, and enhanced search by indexing all content, including workbooks, data sources, sheets, and flows. To enable Tableau Catalog on Tableau Server, see Enable Tableau Catalog. After you purchase and license the Data Management Add-on for Tableau Online, Catalog is automatically enabled.

**Tableau Server Management Add-on**

Tableau Server Management Add-on is a separately licensed Add-on to Tableau Server which will provide enhanced security, manageability, and scalability capabilities for Tableau Server. This add-on brings together additional configuration options, the Resource Monitoring Tool, and the Content Migration Tool to meet your requirements.

Tableau Server deployed in AWS can use Amazon Relational Database Service (RDS) as the Tableau Server Repository and AWS KMS for storing the root key. Amazon RDS offers enhanced scalability, reliability, high availability, and security beyond what Tableau Server offers today with its built-in PostgreSQL database. By integrating more deeply with AWS, Tableau Server will be able to take advantage of these additional benefits of deploying in the cloud. AWS KMS provides significant improvements in security by removing the root key from the file system and storing it in AWS’s secure key management solution. The diagram below shows external Repository and external KMS integration:
Tableau Server can now be configured to use an external storage to store file store data, which includes extracts and workbook revisions. Utilizing external storage enables administrators to take snapshot backups of Tableau data, which will significantly reduce the time it takes to do a Tableau backup. Moving data to a centralized location will eliminate the need for running File Store on multiple nodes in a Tableau cluster. This may reduce the disk space requirements on an individual node and also reduce the network bandwidth usage since the data will not be replicated on multiple nodes. The diagram below shows external file store for an on-premises deployment:

To learn more about what is included in the Tableau Server Management Add-on, as well as specific installation and configuration requirements for each, see the following topics:

- Resource Monitoring Tool
- Content Migration Tool
- Key Management System
Data Science Integration

Data science teams use a rapidly evolving and heterogeneous set of tools to draw insights from data. When teams can tie these tools directly into interactive visualizations in Tableau, cutting edge analysis can be seen and understood across organizations. As of Tableau 2020.1, the Analytics Extensions API creates a new frontier for extending Tableau by allowing developers to integrate new programming languages and software with Tableau’s dynamic calculation language, bringing all stakeholders in the data science process together.

Along with the release of the API, Tableau’s existing Python, R, and MATLAB External Services are known as “Analytics Extensions.” The Analytics Extensions API is based off of the original TabPy External Services API, and TabPy can be considered Tableau’s reference API implementation. Users can connect to their own services through the TabPy/External API connection type in Tableau with support for passing credentials via basic authentication and SSL.

One of the core scenarios for Analytics Extensions is the integration of predictive models into Tableau visualizations. Dynamic integrations allow for real-time predictions on the latest data, flexible scenario testing, and predictions on filtered datasets that would be too large to pre-compute. Combining advanced statistical analytics with Tableau gives you the ability to enable users of all skill levels to reap the benefits without deep knowledge of the underlying statistical packages and functions. Additional configuration in Tableau Server is needed to enable external advanced analytics functionality.

For more details about the Analytics Extensions API, join the Tableau Developer Program.

Extensibility

Tableau supports a robust extensibility framework for deep and complex enterprise integrations and embedded analytics solutions. Extensibility spans from administrative task automation to rich visualization integration to enterprise portal applications, bringing any data from any source into a Tableau supported format and delivering server automation with a growing set of standards-based APIs. For more information, see IT Tools and Tableau Developer Program.
REST API

With the Tableau Server REST API you can create, read, update, delete and manage Tableau Server entities programmatically, via HTTP. The API gives you simple access to the functionality behind the data sources, projects, workbooks, site users, and sites on a Tableau Server. You can use this access to create your own custom applications or to script interactions with Tableau Server resources.

Extract API

Tableau provides direct support and connection to a large number of data sources; however, there are times when you may want to pre-process or access and assemble data from other applications before working with it in Tableau. With Tableau’s Extract API, developers can write their own programs to access and process those data sources into a Tableau Data Extract. Use Extract API 2.0 for .hyper format and Tableau SDK for .tde format. The extract can be used natively in Tableau Desktop or published to Tableau Server using the same API. Once the extract has been published to Tableau Server, it is available for an individual to use with the web authoring capability or in Tableau Desktop. The API works with C/C++, Java, and Python. The Extract API is available for developers on Windows and Linux platforms.

Hyper API

The Tableau Hyper API contains a set of functions you can use to automate your interactions with Tableau extract (.hyper) files for Tableau 10.5 and later, including the following:

- Create extract files for data sources not currently supported by Tableau.
- Automate custom extract, transform, and load (ETL) processes (for example, implement rolling window updates or custom incremental updates).
- Retrieve data from an extract file.

In addition to supporting all features of the previous Extract API 2.0 for creating extract files, the Hyper API provides access to new features. You can create, read, update, and delete (CRUD) data in .hyper files while leveraging the full speed of Hyper for creating and updating extract files. You can load data directly from CSV files without having to write special code. With the power of SQL to interact with data in .hyper files, the API provides methods for executing arbitrary SQL commands on .hyper files.
Web Data Connector

You can use the Tableau Web Data Connector SDK to build connectors to additional data sources with Javascript and HTML. Web data connectors (WDCs) are web pages that provide a data connection that is accessible over HTTP for data sources that don't already have a connector in Tableau. WDCs allow users to connect to almost any data that is accessible over the web and to create extracts for their workbooks. Data sources for a WDC can include internal web services, JSON data, REST APIs, and other sources that are available over HTTP or HTTPS. Users can create their own WDC or use connectors that were created by others. To publish to Tableau Server, WDCs will need to be whitelisted (Windows | Linux). For more information on community connectors, see Web Data Connector Forum.

JavaScript API

With Tableau’s JavaScript API, you can fully integrate Tableau visualizations into your own web applications. The API uses an event-based architecture, providing you with flexibility for round-trip control of users’ actions in Tableau visualizations and control of your users’ interactions. For example, your enterprise may have a web portal that bridges several lines of business applications as well as dashboards. To make it easier for users, you may prefer to have a consistent UI across all applications. With the JavaScript API, you can create buttons and other controls in your preferred style that control elements of a Tableau dashboard.

Extensions API

With Tableau’s Extensions API, developers can create dashboard extensions that enable customers to integrate and interact with data from other applications directly from a Tableau dashboard, such as write-back functionality, custom interactive interfaces, and third-party product integration. Dashboard extensions run in custom dashboard zones and can interact with the rest of the dashboard using the Tableau Extensions API. Available third-party extensions have been published in the Extension Gallery. To publish to Tableau Server, extensions will need to be whitelisted (Windows | Linux). Administrators can enable on a per-server or per-site basis based on code review and security assessment.

Document API

The Document API provides a supported path for modifying Tableau workbook and data source XML. Using Python, you can create a template workbook in Tableau and easily deploy
it across multiple servers, update data sources and connections, and evaluate fields within a data source.

**TSM API**

Tableau Server includes a set of administrative services called Tableau Services Manager (TSM). This set of documentation describes the prerelease TSM API (0.5 alpha), which you can use to perform a wide range of tasks, including start and stop Tableau Server, view the status of services and nodes, backup and restore Tableau Server, make configuration and topology changes, change port assignments for services, and create log file archives.

**Metadata API**

Tables, data sources, workbooks, and sheets are available to query via the Tableau Metadata API. The API is fast and flexible and includes common attributes like name, hostname, and URI, as well as type specific information like field data types, and certification. The API will also allow you to query for connected items (e.g. tables and columns used by a specific data source). In addition to the Metadata API, metadata methods are available in the Tableau REST API, which can be found in Metadata Methods topic.

**Mobile App Bootstrap**

Develop custom mobile apps with the Mobile App Bootstrap (MAB). The MAB is a sample open-source mobile app that demonstrates how to connect and stay signed in to Tableau Servers, embed Tableau content, and utilize the Tableau JavaScript API to embed the Tableau content you want to have right at your fingertips. For more information, visit Mobile App Bootstrap – React Native, Mobile App Bootstrap – Cordova or Mobile App Bootstrap – Objective-C.

**Tableau License Types**

Now more than ever, people need access to data to do their jobs better, but their relationship to data can differ. Tableau’s role-based licenses allow you to deploy data broadly across your organization to users of all skill levels. These roles will allow you to share data with your teams in a secure way, while allowing for the differences in the way people interact with data.

License types are hierarchical. With appropriate permissions, Creators can access the full functionality of Tableau Desktop, Tableau Server/Online, and Tableau Prep Builder. Explorers have access to a subset of these capabilities via Tableau Server/Online, and Viewers receive a
limited set of Tableau Server permissions based on the needs of someone who views and interacts only.

**Tableau Creator**

The Creator license is designed for users who build content. This can include the design, cleaning, and curation of data sources, which others will use to analyze governed data, or the creation of visualizations and dashboards with which other users will interact. It also includes designing governance and permissions models that dictate which information users may find.

You might be a Creator if…

- Analytics is in your everyday job description.
- You need to join many data sources together to perform analysis.
- You build or curate data sources for others.
- You need to clean and transform data in addition to analyzing it.
- You will manage or administer a Tableau Server or Online implementation.

**Tableau Explorer**

The Explorer option provides governed authoring and data exploration capabilities for users who do not need the full data transformation capabilities of Tableau Prep Builder, or the ability to publish or connect to raw data sources. Explorers may access and analyze published data, create and distribute their own dashboards, and manage content that they have built or have been given the permission to edit.

You might be an Explorer if…

- You are a Line of Business data user who likes to get hands-on with data.
- You need to create your own visualizations using data sources curated by others.
- You want to take visualizations and dashboards built by others and edit or customize them.
- You will administer content on a Tableau Server or Online site.

**Tableau Viewer**

Tableau Viewers can view and interact with published visualizations and dashboards. These users can be given permission to access published content and interact with guided drill paths and filters. They can also subscribe to dashboards to get periodic updates and receive data-driven alerts.
You might be a Viewer if…

- You need data-oriented insights to do your job, but you don’t have time or skills to do deep analytics yourself.
- You want to interact with visuals others have built, but not build your own.

Depending on the level of interest within different business groups in your organization, your allocation of Creator, Explorer, and Viewer license types will vary. However, a typical Tableau deployment will need to assure that users with certain responsibilities receive the appropriate license type and corresponding education.

**Tableau Desktop and Tableau Prep Builder Deployment**

Administrators will distribute and install Tableau Desktop and Tableau Prep Builder for Creator-licensed users. If you choose to create a packaged installation file, you can customize the install and not have any prompts for the end user during the install process. When you install Tableau Desktop or Tableau Prep Builder on a Windows or Mac computer, default database connectivity drivers are installed. For a complete list of default drivers, see Before You Install. If you prefer that some or all of these drivers not be installed, you can customize the list from the Customize pane in the installation program for Tableau Desktop. If additional drivers are needed beyond the default, they will need to be installed on each computer.

Virtual desktop support is an “opt-in” feature of Tableau Desktop 10.5 and later and Tableau Prep Builder 2018.2.1 and later that gives you the ability to optimize your installations of Tableau for non-persistent virtual desktops or for computers that are regularly re-imaged. With virtual desktop support enabled, Tableau licenses are automatically deactivated after a predetermined amount of time if Tableau Desktop or Tableau Prep Builder cannot connect to a Tableau-hosted service that confirms the validity of the license. This means that you do not need to manually refresh or deactivate the product key. The requirement that Tableau communicate with the hosted service means that you must periodically connect to the Internet. For more information, see Configure Virtual Desktop Support.

It is recommended to enable a feature where Tableau Desktop licenses log end user information within your Tableau Server Repository. Each copy of Tableau Desktop version 10.0 or later can be configured to send user data to Tableau Server. This configuration should be done at installation time, using scripting or third-party software to install and configure Tableau, or after installation, by modifying the registry or property list file. For more information,
see Configure Desktop License Reporting and continue the server-configuration as outlined in the License Tracking section.

Tableau Mobile Deployment

Mobile business intelligence enables any user to make decisions no matter where they are. We’re no longer shackled to our desks; we’re on the go, visiting customers, traveling, or walking the shop floor. With Tableau, any workbook you create is automatically mobile-enabled when accessed from a device. You can pinch to zoom, swipe to scroll, and leverage other touch-optimized interactions like quick filters. You can also edit workbooks and create new views to answer new questions from your data. This works seamlessly in a mobile browser, with an embedded viz in custom mobile apps, and in the Tableau Mobile app itself.

Key consideration for deploying Tableau Mobile are listed in the Tableau Enterprise Architecture Survey on page 10 of the Tableau Blueprint Planner. The following roles should be involved in the mobile deployment: Network Administrator, Security Administrator, and Mobile Device Management Administrator along with the Tableau Server or Tableau Online Administrator, content authors, and business users with specific mobile requirements.

Tableau Mobile App Distribution

Organizations have various strategies for distributing mobile apps to their users. Many enterprises distribute apps via a Mobile Device Management (MDM) platform, these provide precise control over how and to whom the app is deployed. In addition to controlling app delivery, MDM platforms let you customize the Tableau sign-in experience, configure app policies, and provide additional security and governance controls. They can also make the sign in process easier. In this scenario, a user with a device enrolled in their organization’s MDM platform would go to the internal app store provided by the MDM platform and download the app from that catalog.

To manage Tableau mobile deployments, we recommend using mobile device management (MDM) or mobile application management (MAM). The following are supported mobile management systems: Blackberry Dynamics, VMware Workspace ONE, MobileIron, Citrix Endpoint Management (formerly XenMobile), and Microsoft Intune. Users will see touch-optimized views on Apple iPad and iPhone, Android phone and tablet, as well as mobile browsers. For more information, visit Tableau Mobile Deployment Guide.

For organizations who haven’t invested in MDM, users can simply download the Tableau Mobile app from public app stores, and then connect directly to the service.
Securing Mobile Data

Security is paramount in any mobile deployment. Mobile devices will be out and about in the wild. They will be used on different networks. They may even include users’ personal devices if your organization supports a bring-your-own-device (BYOD) policy. It’s critical that your data remain secure both in transit and at-rest.

If you use Tableau Online, we securely connect to data for you so there’s no additional effort on your part. Tableau Online by default leverages SSL communications and the Tableau Mobile app supports it by default. If you use Tableau Server, SSL should be configured. This ensures that all traffic coming to and from your Server is encrypted and helps avoid potential man-in-the-middle attacks.

You must also determine how your Tableau Server will be reachable by a mobile device if the device isn’t on the same network or the internet. There are two options to tunnel through your corporate firewall to reach the server: connect via a VPN, or use a reverse-proxy server. The choice of which option is best for your organization depends on many factors, such as whether you have an existing solution (VPN or proxy) that you can use, licensing costs, security considerations, and user experience. Ensure that the cross-functional project team discusses this topic and understands the options.

The final piece of security involves data-at-rest, which Tableau takes care of for you. All information that gets persisted on a device, such as metadata about content, snapshot images, and access tokens, is securely stored using native OS encryption. As a best practice, consider regularly confirming overall data security by having a third-party security specialist audit your organization.

Sign-in Seamless

Before users can get to their data, they have to sign in to the Tableau Server or Tableau Online. While this may sound obvious, ensuring that users have a secure, seamless experience is critical. If users struggle to sign in, they’ll give up on mobile workflows, undermining your entire deployment effort. The value of Tableau Mobile is realized when people have access to data when and where they need it. To streamline sign-in, we recommend using a single-sign on (SSO) technology like Active Directory, SAML, or Kerberos. SSO lets users use their existing set of corporate network credentials rather than having to memorize something new.

In addition to SSO, we recommend leveraging additional capabilities provided by MDM platforms to improve the sign-in experience. With MDM, you can display a preset list of servers to connect to, and even automatically fill in their user ID. MDM can also push out policies and
certificates, so that everything is pre-installed and configured ahead of time. For example, with Kerberos authentication, MDM can push certificates to devices so that authentication happens behind the scenes and users aren’t even prompted for credentials. MDM can also automate tasks such as loading a VPN client in the background when needed, eliminating a bunch of initial steps for users so they can go to the app and directly connect to their data. Anything you can do to reduce friction in the sign-in experience will pay off in greatly increased mobile usage.

Configure Offline Access

As mobile users travel offsite, their internet connectivity can vary, so a seamless offline experience is a big benefit. For quick offline access on mobile devices, Tableau Mobile automatically caches high-resolution snapshot images of a user’s favorite views. When users know they’re about to go offline for a period of time, they can manually refresh snapshot images in the app. On iOS, snapshots are also regularly refreshed in the background. Snapshots are beneficial even when users have connectivity because they provide at-a-glance access to the most important content. For example, users can pan and zoom snapshots to zero in on areas of interest and swipe between them as they’re walking between meetings. When a user finds something of interest in a snapshot, they can tap it to go to the interactive view and answer additional questions with their data. As an administrator, you can disable cached snapshots for specific sites, but in most cases you’ll find that the advantages of snapshots access outweigh any security concerns, as snapshots exclude the raw underlying data and are stored encrypted on the device.

Rollout and Support

Pilot your mobile rollout by testing it with a small group of users first. After addressing any issues you uncover, extend the rollout to your entire organization, with accompanying step-by-step instructions that help users quickly set up their devices. An initial, in-person training session can dramatically speed up adoption, particularly if your organization uses unique deployment options.

If you use Tableau Server, consider creating custom admin views for mobile, drawing upon the rich database of user behavior stored in the Tableau Server repository. To continuously improve your organization’s mobile experience, capture feedback from users while they’re on the go. Successful approaches include a weekly “mobile office hours” meeting that anyone can dial into, and an email alias specific to mobile support that routes issues right to your group.
Tableau Support Programs

Tableau Software offers three support levels to help meet the service needs of all customers.

- Standard Support is included with a subscription purchase, the first year of a perpetual license or with Annual Maintenance Renewal after the first year of a perpetual license.
- **Extended Support** enables your organization to avoid or reduce downtime and expedite the value of your investment through accelerated response times and the additional availability of 24 x 7 weekend support for critical P1 issues.
- **Premium Support** provides complete, proactive account care you can rely on. Premium Support provides a comprehensive set of resources, extended availability and the fastest response time to service issues with 24 x 7 support for P1 and P2 issues.

For more information, see Technical Support program levels.
Tableau Monitoring

Ongoing, proactive monitoring is required to operate and support your deployment at scale and meet the performance expectations of your user community. As more and more users are onboarding and the use of analytics grows across your organization, Tableau becomes mission-critical for data-driven decisions. Without monitoring, a “set-and-forget-it” deployment can be met with inadequate resources that fail to support the workload of highly-engaged users.

Because Tableau is integrated with your enterprise architecture—including hardware, network, databases, and applications—understanding how everything interoperates is key for routine monitoring from performance to troubleshooting. Licensed as part of the Tableau Server Management Add-on, Resource Monitoring Tool, using agent-based monitoring, offers enhanced insights into the health and performance of a Tableau Server cluster by parsing and analyzing the logs generated by overall Server usage and combining that with monitoring of physical system usage (CPU Usage, RAM, Disk I/O etc.). Alternatively, you can use a combination of hardware utilization monitoring, data from Tableau Server’s Repository, and external tools to understand and monitor the health of Tableau Server and how analytics are being consumed. You can use standard enterprise monitoring platforms, such as Splunk, New Relic, or other agent-based utilities, as well as Tableau Desktop to analyze your Tableau Server data.

Tableau Server and Site Administrators will work together to ensure performance and stability of the platform to meet evolving business needs. It is just as important to monitor for things that go right as it is for things that go wrong. With viral adoption of Tableau in your organization, you will need to be responsive to the increased workloads and proactively scale to avoid resource constraints. On the other hand, assuming a correctly-sized hardware configuration is deployed initially, unmonitored hardware utilization and user workloads, inefficient workbooks, suboptimal data extract design, and peak-hour data refresh schedules can have a major impact on server performance and user experience, causing performance to degrade from the cumulative effect of the separate incidents.

This document defines the required tasks for Tableau Server monitoring and operations that should be performed by systems administrators and Tableau Server Administrators:

- Set up tools to monitor hardware utilization and maintain sufficient headroom for future growth and peak usage spikes.
- Configure built-in alerts and incidents to notify you of events and thresholds.
- Use default administrative views to identify background task success/failure and job queueing, slow workbooks, disk usage, and license allocations.
- Create custom administrative views from repository data for deeper analytics on your deployment and set custom data-driven alerts for your own organization's policies and goals.
- Troubleshoot problems with Tableau Server logs.

**Administrative Roles and Responsibilities**

Depending on the size of the organization and deployment, monitoring and measurement responsibilities may be split across different teams. For example, a systems administrator may be responsible for the hardware and operating system only, while Tableau Server Administrators will monitor and track key application metrics and Site Administrators will measure content metrics in their respective site(s). Both are equally important for overall success.

If there are no Site Administrators, content metrics should be monitored and measured by the Server Administrator. For more information on content metrics, see Measurement of Tableau User Engagement and Adoption on page 161. Regardless of the deployment size, system performance is a shared responsibility among administrators and users.

**Hardware Monitoring**

Any application is only as reliable and performant as the hardware that it runs on. It is important that the underlying infrastructure of your Tableau Server deployment be routinely monitored for capacity constraints to prevent overtaxing the system, whether it's physical servers or virtual machines, on-premises or in the cloud. Systems administrators should monitor CPU, memory usage, storage I/O, storage space, and network bandwidth utilization.

Beginning with 2019.3 and licensed as part of the Tableau Server Management Add-on, the Resource Monitoring Tool provides a comprehensive look at the health of Tableau Server using a web user interface for all of its features. The Resource Monitoring Tool Agent runs on each of the nodes in your Tableau cluster to monitor their hardware utilization, performance, and activity, which are collated by the Resource Monitoring Tool Master Server. Processor, Memory, Disk Queue, and Network are sampled using WMI several times per second to produce averages. An Environment Down event, which is logged as critical, is monitored at a 15 second polling interval by default and follows a three-strike rule. If the status is offline, or
does not reply within 30 seconds, for three consecutive polling intervals then a critical incident is created. For more information, see Performance and Environment Down.

BEST PRACTICE RECOMMENDATION:

To maintain sufficient headroom and reduce the likelihood of resource constraints, calculate the following values based on your hardware specs and set Resource Monitoring Tool Hardware incident thresholds to the following:

- CPU over 80% for 5 minutes
- Memory less than 25% available
- Disk less than 20% available

Depending on your enterprise monitoring approach, hardware monitoring can be done with an agent-based enterprise monitoring service or with PerfMon on Windows (sample workbook). Linux admins will use the sysstat tools or vmstat to collect data to be analyzed in a workbook similar to the Windows version. When deploying on virtual platforms, such as VMware, HyperV, or Citrix, or in the public cloud, including AWS (CloudWatch), Microsoft Azure (Azure Portal), and Google Cloud Platform (Google Stackdriver), these platforms have their own utilities for monitoring the health of their virtual machines. These tools usually have support for automatically monitoring your infrastructure and alerting you when your preset thresholds of 75-85% utilization are exceeded.

Alternatively, TabMon is a freely available open source Tableau Server cluster-monitoring tool. TabMon provides structured output that is analyzed with Tableau Desktop. For more information, watch A Tour of the TabMon Sample Workbook that shows how to monitor CPU, memory usage, storage I/O, storage space, and network bandwidth at the Tableau Server Process level. This information will help you understand when to scale Tableau Server. In the TabMon.config file, you should monitor every 300 seconds and keep data for 30-day intervals to manage the size of the database.
Built-in Alerts

If Tableau Server processes go down, the application state will be degraded or even fail depending on the process that goes down. During installation and configuration, Tableau Server was configured with an SMTP email server to notify the specified email distribution list about system alerts and failures. With system alerts enabled, you will be notified by email of process up, down, and failover events and drive space constraints. See below for recommended settings.

![Event Configuration](image)

**BEST PRACTICE RECOMMENDATION:**

Enable system health monitoring in Tableau Services Manager for process up, down and failover events, license reporting, and disk space. Use an email distribution group of administrators rather than an individual's email address for notifications. If you are using the Resource Monitoring Tool, keep thresholds synchronized.
Resource Monitoring Tool Incidents

Beginning with 2019.3 and licensed as part of the Tableau Server Management Add-on, the Resource Monitoring Tool provides a comprehensive look at the health of Tableau Server using a web user interface for all of its features. The Resource Monitoring Tools Agent runs on each of the nodes in your Tableau cluster to monitor their performance and activity, which are collated by the Resource Monitoring Tool Master Server.

Incidents should be configured and used to help detect when unusual situations occur, which include a variety of events for both Tableau Server and the server it is running on. Global incidents can be configured, but they may be overridden per environment. There are three levels of incidents: Info, Warning, and Critical. For more information, see Tableau Resource Monitoring Tool - Incidents.

In addition to Hardware and Environment Down that are described in Hardware Monitoring, incidents will be logged for the following reasons:

- Extract Failures - logged as a warning when there is an extract failure in Tableau.
- Slow Queries - logged if a query exceeds threshold. By default, a Slow Query incident will trigger a warning if any data query takes at least 30 seconds to execute.
- Slow View - logged if view request exceeds threshold. By default, a Slow View incident will trigger a warning if any view request takes at least 1 minute to load.
- Agents Unlicensed - logged as critical if Tableau Server has not been properly licensed to use Tableau Resource Monitoring Tool.

Tableau Server Process Status

When Tableau Server is functioning properly, most processes will show as Active, Busy or Passive (Repository). The list below shows possible process states:

- Active — The process is functioning as intended. See File Store in Troubleshoot Server Processes for details on possible active states.

- Busy — The process is completing some task. See File Store and Repository in Troubleshoot Server Processes for more information.
- Passive — The repository is in passive mode.
- Unlicensed — The process is unlicensed.
- Down — The process is down. The implications of this differ depending on the process.
- Status unavailable — Tableau Server is unable to determine the status of the process.

To find the status of processes, go to the Tableau Server Status page or Tableau Services Manager status page. These pages include Tableau Server processes, along with links to troubleshooting documentation if a process is not running as expected. If you hover your mouse pointer over the status indicator for a process, a tooltip shows the node name and the port the process is running on.

Beginning with 2019.3 and licensed as part of the Tableau Server Management Add-on, the Resource Monitoring Tool provides a comprehensive look at the health of Tableau Server using a web user interface for all of its features, including process status. The Resource Monitoring Tool polls Tableau Server’s http://[TableauServerUrl]/admin/systeminfo.xml page every 15 seconds (by default) to check the status. If the status is offline, or does not reply within 30 seconds, for three consecutive polling intervals then a critical incident is created. For more information, Environment Down.

To integrate with external enterprise monitoring tools, use the TSM REST API to get the status of each process.
BEST PRACTICE RECOMMENDATION:

In case of an error, review Troubleshoot Server Processes in Online Help and take a log snapshot if you need to contact Tableau Support for further assistance.

Administrative Views

Data from the Tableau Server repository will be analyzed using default administrative views and custom administrative views. Administrative views are dashboards that are included with Tableau Server and help you understand how users are interacting with content so that you can proactively monitor server activity and other scheduled tasks. Server Administrators can view administrative views for all server activity; Site Administrators have access to Tableau Server’s default administrative views limited to their respective site.

BEST PRACTICE RECOMMENDATION:

Regularly spend time understanding the Tableau Server usage patterns and how the application is performing throughout the day. Keep a close watch on background tasks, such as extract refreshes and subscriptions, to make sure they are executing on time and during off-peak hours as much as possible. Isolating the Backgrounder processes to their own node is recommended for heavy extract workloads.

Brief descriptions of the default administrative views that are most applicable to Server Administrators are shown below:

- **Background Tasks for Extracts** — Completed, pending, and failed extract task details with full details of why an error occurred.
- **Background Tasks for Non Extracts** — Completed, pending, and failed non-extract background task details with full details on why an error occurred.
- **Background Task Delays** — Difference between scheduled and actual start times of background tasks. Use the view to help you identify places you can improve server performance by redistributing task schedules and optimizing tasks. Background Task delays are an important metric to determine whether you should isolate Backgrounder processes and scale out to add additional capacity for data refreshes.
- **Stats for Load Times** — View load times and performance history. Set data-driven alerts on long view load times using the version of the default admin views workbook you downloaded and published with extracted data sources. For workbooks with long-load times, use
Tableau Desktop's or Tableau Server's Performance Recorder to dive deeper into the events and timing.

- **Stats for Space Usage** — Space used by published workbooks and data sources, including extracts and live connections. Set data-driven alerts on the Stats for Space Usage view to identify which workbooks and data sources exceed the expected size limit. For example, if you set a standard that extract sizes should be less than 1 GB, then alert for anything larger.

- **Performance of Views** — Overall distribution of view load times and slowest views in a given time period. Compare spikes in the number of sessions with spikes in slow load times to identify the times of day when high user traffic is slowing down the server.

- **Performance of Flow Runs** — view to see the performance history for all the flows on a site

- **Server Disk Space** — Current and historical disk space usage, by server node. Use the Server Disk Space view to see how much disk space is in use on the server(s) that run Tableau Server, where disk space refers only to the partition where Tableau Server is installed. You can also use this view to identify sudden changes in disk space usage.

- **Tableau Desktop License Usage** — Summary of usage for Tableau Desktop licenses. Manage licenses efficiently and determine if you need more or fewer licenses.

- **Tableau Desktop License Expirations** — Expiration information for Tableau Desktop licenses.

The following default administrative views will be monitored primarily by Site Administrators, which are covered in Measurement of Tableau User Engagement and Adoption on page 161.

- **Traffic to Views** — Usage and users for published views.
- **Traffic to Data Sources** — Usage and users for Published Data Sources.
- **Actions by All Users** — Actions for all users.
- **Actions by Specific User** — Actions for a specific user, including items used.
- **Actions by Recent Users** — Recent actions by users, including last action time and idle time.

Custom administrative views are useful for deeper analysis of user behaviors and organization-specific KPIs that are identified. For example, if you define stale content as workbooks that have not been accessed in the last 90 days, you should create a custom administrative view showing the content that has not been accessed in the last 90 days. If
these workbooks have data extract refresh schedules, they are consuming system resources but not providing value to your users.

BEST PRACTICE RECOMMENDATION:

You should publish and extract the default administrative views workbook to make it accessible to Site Administrators. After opening the administrative views in Tableau Server, you can copy the temp workbook to your computer, open in Tableau Desktop, and publish to Tableau Server for others to view. In Tableau Server 10.x to 2018.1, the location is “Tableau Server\data\tabsvc\temp”. In 2018.2 and later, it can be under any vizql server process. For example: Tableau Server\data\tabsvc\temp\vizqlserver_1.20182.18.0627.2230.

In the published admin views workbook, create data-driven alerts for Stats for Load Times and Stats for Space Usage according to your governing standards. For example, if you have a < 10 second load time standard, the data-driven alert will notify you of load times > 10 seconds. Similarly, if you have a 1GB standard for workbook or data source size, the data-driven alert will notify you of workbooks or data sources > 1GB.

For custom administrative views, you should use the default administrative views workbook as a starting point for customizations of existing dashboards and published/extracted community data sources to perform deeper analysis on your deployment. A full listing of the repository’s data dictionary is published in Online Help.

Both the default administrative views workbook and the community data sources have curated data models that can be connected to your own Tableau Server. Each of the community data sources contain the corresponding fields for their functional area with comments, and they’re organized into folders. Sample workbooks are also provided in the community post. The list of recommended published data sources is shown below:

- TS Background Tasks — Primarily for analyzing Extract Refresh and Subscription tasks that are run on Backgrounder processes.
- TS Events — A master audit data source showing events happening on Tableau Server. Users signing in, accessing views, publishing content, etc.
- TS Web Requests — An audit of requests made through the Tableau Server web server component. Useful for understanding user interaction with content, as well as performance monitoring.
- TS Data Connections — Maps both workbooks and Published Data Sources to their underlying data connections. Useful for answering questions on what workbooks connect to what data source, which then connects to what database(s)?
- TS Content — High-level summarized data for each View, Workbook, and Published Data
Source on Tableau Server.

- TS Users — Aggregated information on what your users are up to on Tableau Server.

**Troubleshooting**

For troubleshooting (Windows | Linux), and more detailed analysis of server processes, use Tableau Server Logs. If you need to open a support case, you will need to submit the log files. Tableau Support will use log files to diagnose issues. To generate a log file snapshot and upload to Tableau Support, follow these instructions (Windows | Linux).

Beginning with 2019.3 and licensed as part of the Tableau Server Management Add-on, the Resource Monitoring Tool provides a comprehensive look at the health of Tableau Server using a web user interface for all of its features. The Resource Monitoring Tools Agent runs on each of the nodes in your Tableau cluster to monitor their hardware utilization, performance, and activity, which are collated by the Resource Monitoring Tool Master Server. This includes Tableau log files in near real time and send messages to the master server for processing and reporting, logging slow views for specific users, and tracing down to the session level.

Alternatively, Logshark, a free open source tool, is a command line utility that you run against Tableau Server logs to generate a set of workbooks that provide insights into system performance, content usage, and error conditions. You should use Logshark to visualize, investigate, and solve issues with Tableau. Some common use cases for Logshark include:

- Troubleshooting issue(s) that are recorded in the logs.
- Analyzing system metrics from log data.
- Regularly validating Tableau Server application behavior against historical data when taking a new build or making a system change.

**BEST PRACTICE RECOMMENDATION:**

Logshark uses the entire set of Tableau zip log files that you generate. It can be either a just one day or several days of logs. There are many Logshark plugins, which will correspond to a set of log files, to generate pre-built Tableau Workbooks automatically.

For viewing individual log files (Windows | Linux), Tableau Log Viewer is cross-platform, free open source tool with a simple interface that displays Tableau log files in a columnar layout.
Tableau Blueprint Help

Tableau Log Viewer

Tableau Software Version: Current
# Tableau Maintenance

As the use of analytics grows across your organization, Tableau will become mission-critical for data-driven business decisions. Regular maintenance activities will keep your Tableau deployment running in top condition. You will operationalize change management processes to support the increased use of analytics, including performance tuning, load testing, capacity planning, and upgrades.

Monitoring data will be the driver behind many maintenance decisions. Administrators will check the status of the server, analyze and monitor server activity, manage scheduled tasks, and perform other maintenance activities. This document outlines the maintenance activities outlined in the table below:

<table>
<thead>
<tr>
<th>Task</th>
<th>Description</th>
<th>With</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Directory Synchronization</td>
<td>Synchronizes Active Directory groups</td>
<td>Tableau Server Settings</td>
<td>Daily</td>
</tr>
<tr>
<td>Backup Production Environment</td>
<td>Creates a copy of content and settings in location outside of Tableau Server cluster, retained for last seven days</td>
<td>TSM CLI</td>
<td>Daily</td>
</tr>
<tr>
<td>Restore Production to Test Environment</td>
<td>Puts test environment in current state of production environment</td>
<td>TSM CLI</td>
<td>Prior to load testing, testing an upgrade, or participation in beta program</td>
</tr>
<tr>
<td>Database Maintenance/Log File Cleanup</td>
<td>Remove and archive Tableau Server log files, temporary files, and rows from the table http_requests in the Tableau Server PostgreSQL database</td>
<td>TSM CLI</td>
<td>Monthly</td>
</tr>
<tr>
<td>Load Testing/Capacity Planning</td>
<td>Understand your Tableau Server’s capacity with respect to your environment, data, workload, and usage profile</td>
<td>TabJolt (Windows only)</td>
<td>Quarterly</td>
</tr>
</tbody>
</table>
### Active Directory Synchronization

If you are using Active Directory authentication, you should synchronize all Active Directory groups on a regular schedule using the General tab of the Settings page for the server. If you run Tableau Server on Linux, external directory communication is configured and managed with an LDAP identity store. In the context of user and group synchronization, Tableau Server configured with LDAP identity store is equivalent to Active Directory. Active Directory synchronization features in Tableau Server function seamlessly with properly configured LDAP directory solutions (Windows | Linux).

### Back-up and Restore

A Tableau Server administrator should perform daily backups of Tableau Server and its data. Taking these steps can help ensure that Tableau Server runs with minimum loss. You will use the Tableau Services Manager (TSM) command line tool to back up and restore Tableau data, including Tableau Server’s own PostgreSQL database, which stores workbook and user metadata, data extract files, server configuration data, and log files (Windows | Linux). As of 2018.2, both Windows and Linux versions of Tableau Server use TSM. For Tableau Server on Windows 2018.1 and earlier, you will use `tabadmin backup`.

### Database Maintenance

Database maintenance creates free space on the Tableau deployment by deleting old files, including log files, temp files, and rows from the http_requests table. If you are running
Tableau Blueprint Help

Tableau Server on a distributed deployment, run this command on the node that is running the TSM Controller process. By default, the controller is on the initial node in the cluster (Windows | Linux).

Note: If you need historical data in http_requests for audit analysis, ETL the data from the http_requests table to another database prior to executing the cleanup commands. If cleanup commands are part of your backup script, data in the http_requests table is truncated.

Load Testing

Load testing helps you understand your Tableau Server’s capacity with respect to your unique environment, data, workload, and usage profile. Because data, workload, and usage will change as new content is authored, new users are onboarded, and the use of analytics increases, load testing should be conducted two to four times a year in conjunction with upgrades and server scale-up or scale-out expansions.

Created by Tableau, TabJolt is a point-and-run load and performance testing utility specifically designed for Tableau Server. It helps you understand how Tableau Server scales with increasing workloads to inform your capacity needs. TabJolt automates user-specified loads for any duration, while eliminating the need for script development and script maintenance, which is often required with other load testing solutions. With increasing user loads, Tableau Server scales nearly linearly with load by adding more nodes to the cluster for Windows and Linux.

Load testing best practices are listed below:

- Load testing should be conducted with TabJolt on an identical test environment with content restored from the production environment. This is not only from a hardware and Tableau Server topology perspective but also in terms of data volume.
- Select representative content from your top-viewed workbooks. Often the cause of scalability and performance issues can be workbooks being not authored with best practices in mind. If a single-user test on your workbooks shows a very slow response time, then you should optimize those workbooks before you begin a load-testing project.
- During testing, increase the workload to 75-85% CPU utilization and < 2% error rate.
- Start with the default process configuration determined by Tableau Server’s architecture-aware installer and scale up or out as needed when the threshold is met and sustained.
- In most cases, increasing process counts above the defaults does not improve performance, unless enough hardware resources are available.
• It is always good to know the breaking point of the Server on the level of how many users/requests along with volume of data it can handle.

Developing a test plan:

• Choose representative workbooks.
• Model the expected usage.
• Think about peak usage.
• Run for at least ten minutes.
• Include think time.
• Stop other work on the server.

Capacity Planning

To ensure optimal performance and sufficient capacity to handle increased workloads, you must plan for growth. Capacity planning allows you to scale your infrastructure with the increased use of analytics and rapid adoption across your organization by ensuring sufficient headroom is maintained and reducing the likelihood of resource contention and conflicts over shared resources. Performance data, user onboarding schedules, and load testing results are used to determine future server sizing and the capacity plan.

Factors that can influence capacity planning:

• A newly released set of data sources coupled with a dashboard that draws the attention of the entire company.
• Increasing skills and use of analytics that become ingrained in the day-to-day operations of the company.
• New features released in the platform, which can increase user interactivity overall.
• Change of underlying data strategy powering these dashboards, either in terms of volume, complexity, change in database technology, user security etc.

To complete the table below, you should aggregate the count of users from the Tableau Users on page 26 tab in the Tableau Blueprint Planner.

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Users</th>
</tr>
</thead>
<tbody>
<tr>
<td>1*</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
Year 1* Year 2 Year 3

Nodes

Total Cores

Note: Depending on the number of users and onboarding rate, you may consider 6-month, quarterly, or monthly intervals.

Resource Management

While site administrators should be maintaining fresh and relevant content on their sites as outlined in Measurement of Tableau User Engagement and Adoption on page 161, Server Administrators have oversight of the entire server and how the server’s resources are utilized as outlined in Tableau Monitoring on page 121. The standards you define should be documented and published on the Tableau Enablement Intranet on page 199, which is explained in Tableau Communications on page 199.

Stale Content

If content is published with a scheduled refresh but not viewed, it is consuming system resources and potentially making it harder for users to locate more relevant content. The unused content will also add to backup and restore times. Work with Site administrators and/or users to remove stale content two to four times per year. For more information, see The Stale Content Remover Workbook.

Size Audit

Monitor content by establishing policies around workbooks and data source size. Set data-driven alerts on the Stats for Space Usage view to identify which workbooks and data sources exceed the expected size limit. For example, if you set a standard that extract sizes should be less than 1 GB, then alert for anything larger.

Upgrades

As part of defining your organization’s Analytics Strategy on page 9, the cross-functional project team established the guiding principles for upgrades with the Tableau Upgrade
Planning and Process Checklist on page 27 The initial decisions about upgrade frequency, version selection, and version compatibility define when and how upgrades are performed. When these areas are addressed early, administrators can better manage users' expectations, rather than having to react to business demands for new features and functionality. In addition, the communications, education, and support plans should be created by the project team in preparation of the software upgrade process outlined in this topic.

Version Compatibility

Tableau Server, Tableau Online, and Tableau Desktop are updated on a quarterly release cycle, while Tableau Prep Builder is updated monthly. Quarterly releases may introduce new features that can have architectural changes to the platform. Due to these changes, upgrades require comprehensive testing in your test environment to mitigate post-upgrade issues. For each upgrade, you should evaluate version compatibility by reviewing the links below:

- Version Compatibility Between Tableau Desktop and Tableau Server
- Workbook Version Compatibility
- Version Compatibility with Tableau Prep
- Version Compatibility with Tableau Online

Communicating the Upgrade

To notify users of the pending upgrade, Tableau Server administrators should use Tableau Server a sign in message and/or a welcome banner message to help communicate the downtime window. The sign in message is found in Server Settings > General as shown below:

**Sign In Customization**

Include an optional note and URL that users see on the Tableau Server sign in page.

**Note**

Up to 120 characters

**URL (optional)**

The welcome banner is found in Server Settings > Customization as shown below:
Because Tableau Online is a fully-hosted solution, Tableau maintains it. The maintenance window for Tableau Online is communicated in advance of the downtime window through a pop-up message after sign in, as shown below:

Software Upgrade Process

For Tableau Server, the software upgrade process will be performed by the Systems Administrator and Tableau Server Administrator roles, who will upgrade the server environments beginning with the test environment. Once validated in the test environment, they will schedule the production environment upgrade and, if applicable, the disaster recovery environment upgrade. The Resource Monitoring Tool master server and agents should also be upgraded too, if deployed.

Beginning with version 2018.2, Tableau Server on Windows is available with Tableau Services Manager (TSM). TSM is the web-based server configuration and management utility that
replaces the Server Configuration utility and the tabadmin command line utility. The Tableau Server upgrade process has changed with the introduction of TSM. For information on how upgrade has changed, see Upgrade process changes.

When you upgrade from a pre-TSM version of Tableau Server (2018.1 or earlier) to a version running with TSM, you need to go through some special upgrade steps. These are required only for the pre-TSM to TSM upgrade. Pre-TSM versions of Tableau Server on Windows are versions older than 2018.2. Examples of pre-TSM versions are 9.3, 10.5, and 2018.1. For instructions on how to determine your version of Tableau Server, see View Server Version.

The Desktop Administrator and Mobile Administrator roles will be responsible for packaging and updating Tableau Desktop, Tableau Prep Builder, and Tableau Mobile, which apply to both Tableau Server and Tableau Online deployments. Review and upgrade other applications based on your installations, such as tabcmd, Tableau Bridge for Tableau Online, and the Content Migration Tool.

For every upgrade, you should evaluate the following areas:

- Understand how Tableau is used: how an upgrade may affect existing use cases and enable new use cases.
- Assess the current deployment using monitoring and measurement data: topology, content, users.
- Compare with future state: sources of data, configuration changes, capacity vs. planned user onboarding schedule.
- Inventory existing software versions: client machines, drivers, mobile devices.
- Identify programmatic dependencies: embedded analytics, API-related, multi-instance deployments, client software versions and compatibility.
- Schedule a retrospective to understand what worked and what didn’t, including identifying opportunities for improvement.

Before you upgrade Tableau Server (Windows|Linux), you should review and complete the Upgrade Process Checklist below. It is included in the Tableau Blueprint Planner, so that it can be customized for your requirements. Tableau Online customers should complete the first two tasks in Research the Upgrade, then skip to the tasks labeled Perform the Client Upgrades on page 144. Additional input from the Enterprise Architect, Database Administrator, Security Administrator, and Network Administrator roles may be needed if changes are required in their corresponding area of expertise.
Note: Specific tasks related to pre-TSM to TSM version upgrades are designated with an asterisk in the tables below.

### Research the Upgrade

<table>
<thead>
<tr>
<th>Review Release Notes: Tableau Server</th>
<th>Tableau Online</th>
</tr>
</thead>
<tbody>
<tr>
<td>What's New and Changed in Tableau Server</td>
<td>What's New in Tableau Online</td>
</tr>
<tr>
<td>Upgrade from Tableau Server 2018.1 or earlier to TSM*</td>
<td></td>
</tr>
<tr>
<td>Comparing Functionality of tabadmin to TSM*</td>
<td></td>
</tr>
<tr>
<td>Upgrade process changes*</td>
<td></td>
</tr>
<tr>
<td>Validate sufficient capacity to support workload</td>
<td></td>
</tr>
<tr>
<td>Install on existing hardware</td>
<td></td>
</tr>
<tr>
<td>Migrate to New Hardware</td>
<td></td>
</tr>
</tbody>
</table>

### Prepare for the Server Upgrade

<table>
<thead>
<tr>
<th>Review and validate documented settings in Tableau Server Architecture &amp; Configuration Design Document</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customizations</td>
</tr>
<tr>
<td>SMTP configuration</td>
</tr>
<tr>
<td>SSL configuration and certificates</td>
</tr>
<tr>
<td>SAML configuration, certificates, and IdP metadata files</td>
</tr>
<tr>
<td>Kerberos configuration</td>
</tr>
<tr>
<td>OpenID configuration</td>
</tr>
<tr>
<td>Addition node(s) configuration</td>
</tr>
</tbody>
</table>
Prepare for the Server Upgrade

Quantify projects, workbooks, views, data sources

Quantify users and groups

Download setup files for the new Tableau Server version

Back up Tableau Server data

Check your product maintenance status

Test the Server Upgrade

Prepare a test environment

Upgrade the test environment

Confirm Tableau Server functionality

Server processes

User access

Publishing workbooks and data sources

View published workbooks

Subscriptions and extract refreshes

Permissions

Command-line utilities and APIs

Performance and user acceptance testing

Performance Resources

Test Workbook Performance

Test new features

Communicate the planned upgrade window
Note: Specific tasks related to pre-TSM to TSM version upgrades are designated with an asterisk in the tables below.

<table>
<thead>
<tr>
<th>Perform the Server Upgrade</th>
<th>Yes</th>
<th>No</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communicate the pending upgrade</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disable subscriptions and scheduling</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create a pre-upgrade backup of Tableau Server data</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uninstall existing pre-TSM version of Tableau Server and save tsbak file to another location*</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Upgrade Tableau Server (Existing TSM version) or Upgrade from Tableau Server 2018.1 or earlier to Tableau Server with TSM** (Note: Gather existing files section*)

- Install initial node
- Install other nodes in cluster
- Run the upgrade script to complete the installation
- Login to TSM and start Tableau Server
- Restore gathered files*

**Validate the upgrade**

- Verify status of Tableau Server processes
- Verify Tableau Server settings
- Enable subscriptions and scheduling
- Modify Tableau Server processes (if needed)
- Review User access
- Verify publishing workbooks and data sources
- View published workbooks
Perform the Server Upgrade

Review Permissions

Verify Command-line utilities and APIs

Login to Tableau Server

 Verify count of projects, workbooks, views, data sources

 Verify count of users and groups

 Verify database connectivity

Execute backup script

Upgrade Resource Monitoring Tool master server and agents

Communicate the successful upgrade

Perform the Client Upgrades

Communicate the client software to be upgraded (Tableau Desktop, Tableau Prep Builder, tabcmd, Content Migration Tool, Tableau Mobile, Tableau Bridge)

Upgrade Tableau Desktop and Tableau Prep Builder

Upgrade tabcmd

Upgrade Content Migration Tool

Upgrade Tableau Mobile (auto update, publish to MDM)

Upgrade Tableau Bridge (for Tableau Online)
Tableau Education

People who realize the full potential of analytical insights can do powerful things with their data. But having a platform like Tableau and access to data isn’t enough; organizations need to assure that their employees are prepared to use the tools at their disposal effectively. Additionally, businesses need accountability systems in place to make sure that technology is being adopted and used.

No one-size-fits-all model can successfully train and enable employees with a vast diversity of skills and backgrounds. Organizations need scalable, thoughtful plans to train and enable users who support every area of their Tableau deployments. Without these plans, analytics programs of any size risk failure.

From acknowledging the importance of data to adapting to modern analytics standards around presentation, distribution, and complexity, project team members must develop an education plan to raise the “analytical IQ” across their departments and teams. In addition to Tableau-specific skills, users need an understanding of the company-specific processes for working with data and comfort with technologies that help them to develop data-related skills.

This topic outlines our recommended approach to educating and enabling people throughout the enterprise to get full value out of your data in Tableau.

Skills by Tableau Education Role

The first step in educating your users is to understand the skills they will need in order to be successful in their roles. Successful data-driven organizations are supported by a wide variety of people, and needed skills range from successfully viewing and interacting with data to building high-availability into Tableau Server deployments.

The Executive Advocacy and Project Team on page 39 topic classifies users based on roles they will play in building your organization's analytics strategy. Classifying users based on needed skills goes one step deeper. As you dig in, you will notice similarities among these roles, explained below.

Employees need to learn the Tableau skills unique to their roles and responsibilities within an organization. We have categorized each unique set of Tableau skills as an Education Role. Education Roles focus on the analytical and Tableau skills that users need to fulfill their day-to-day job responsibilities. In contrast, Tableau Project Team Roles and Responsibilities on page 42 identify the deployment-related tasks and responsibilities for each project team.
member. Like Project Roles, Education Roles may not exactly match users organizational titles, but you can easily identify them by understanding the responsibilities of each role.

We identified twelve Education Roles that map to prescriptive Learning Paths that will educate employees in the skills needed to contribute to the growth of a data-driven organization. The Tableau Learning and Community (TLC) Guide helps users determine which learning path is best for them based on how they use Tableau in their day-to-day job function. We recommend that you review the education needs of different organizational roles even if you decide to self-curate education resources or to consume training courses individually.

Use the Education Role Mapping tab in the Tableau Blueprint Planner to begin building an education strategy by mapping job titles within your organization to Education Roles.

**Enable a data culture in your organization**

These roles establish cultural and technical standards to align every Tableau user to the analytics goals of your organization.

![Enable a data culture in your organization](image)

**Executive Sponsor**

Executive Sponsors are responsible for driving the decisions and strategies that enable their organization's continued growth and success. They understand market pressures, what it takes to stay competitive, and how to lead their organization forward. These leaders recognize, embrace, and promote the importance of implementing a data-driven culture to gain competitive advantage and understand the power of Tableau to achieve that goal. License types vary for Executive Sponsors based on where they are most active in their business. Their responsibilities include:

- Communicate and sell the vision for modern analytics across the organization. Represent the interests of their respective departments to establish budget and funding.
- Align the use of analytics with strategic initiatives that drive organizational transformation.
Approve Tableau Governance processes, policies, guidelines, roles, and responsibilities for managing their organization’s data in compliance with business and/or regulatory requirements identified by the project team.

Set the example of using facts over intuition by placing data at the center of every conversation in department meetings as a visible and vocal user of the platform.

Community Leader

Community Leaders are responsible for coordinating efforts related to user enablement around communications, engagement, and support. Most Community Leaders also fall into a role with heavy product usage, and will require a Creator subscription to understand how others are using Tableau. Their responsibilities include:

- Facilitate user to user connections within the organization
- Coordinate engagement events for users within the organization
- Promote support resources for users within the organization
- Evangelize the use of analytics

Data Steward

Data Stewards understand the business domain and the interaction of business processes with analytics. Data Stewards ensure there are documented procedures and guidelines for data access and use and work with Database Administrators and/or Data Engineers to plan and execute an enterprise-wide data governance, control and compliance policy. Within Tableau, they work to curate and manage certified data sources with set user permissions in accordance with enterprise governance policies. Data Stewards likely have a Creator license and their responsibilities include:

- Ensure the accuracy, completeness, privacy, and security of operational data.
- Ensure that the right data is available to the right people in the organization.
- Understand the types of data the business needs.

Provide insights and develop visualization solutions

These roles use the capabilities of the Tableau platform to consume & create business solutions that range from ad-hoc visualizations to embedded analytics.
Consumers use data to make more informed decisions for their lines of business. They can range from administrative assistants to C-suite executives, but they share a goal of making better, more informed business decisions based on dashboards and reports others in their organization produce. Consumers likely have a Viewer license and their responsibilities include:

- View reports and dashboards created by others and potentially serve as primary stakeholders of these dashboards.
- Use data to make decisions day-to-day job functions, keep informed of progress toward goals, and track team or company metrics.
- Stay knowledgeable in their subject areas even if they are not expert data analysts.

Author

Authors have a strong understanding of their market and business objectives, and they recognize the importance of making data-driven decisions. They leverage their foundational Tableau skills to make smarter business decisions more quickly by digging into their available data sources to create visualizations and dashboards mostly for their own consumption. Authors likely have a Creator license, but may also author on the web with an Explorer license. Their responsibilities include:

- Create and use existing data sources and create views and dashboards to provide actionable insights in Tableau Desktop.
- Perform basic analysis for personal use rather than for consumption by others, to increase personal job performance.
- Demonstrate knowledge of the area being analyzed.

Designer

Designers create visualizations and dashboards that help stakeholders across their organization absorb information quickly and easily. They leverage Tableau to deliver beautiful,
Tableau Blueprint Help

functional, and impactful dashboards. They draw on their appreciation of the art of visual design as a clear communication tool and on their understanding of the impact that clear and engaging visualizations can have on both internal and external audiences. Designers likely have a Creator license and their responsibilities include:

- Demonstrate passion about visualization layout, color, appearance, and functionality.
- Ensure that their visualizations convey information accurately and efficiently to their audience.
- Create appealing dashboards that make it easy for users to explore data and gain insights.

Analyst

Analysts are responsible for supporting their lines of business to deliver valuable insights from data. Analysts work with complex data sources, use advanced calculations to customize data, and use advanced features (parameters, sets, filters, and forecasting) to build a range of charts and to analyze a variety of data types. Analysts perform ad-hoc analysis to help explore new data questions, produce well-designed interactive dashboards that present data accurately, and create and share data insights within their organizations for the purpose of guiding business decisions and outcomes. Analysts likely have a Creator license and their responsibilities include:

- Create reports and dashboards for others in the organization to consume or iterate on.
- Perform ad-hoc exploration of data to highlight business opportunities.
- Conduct meaningful data analysis to inform business decisions.

Data Scientist

Data Scientists are experts at deriving valuable insights for large and varied data sets. They are adept at tackling big data, know how to apply advanced analytic capabilities to answer business questions, are often domain experts, and work collaboratively across the business and IT to deliver ROI from data. They can reduce data cleansing and preparation time in Tableau Prep Builder, use Tableau Desktop for exploratory analysis, and develop final dashboards to support and clearly present project findings. Data Scientists likely have a Creator license and their responsibilities include:

- Build and deploy end-to-end solutions leveraging machine learning and advanced analytics.
- Build and test models in R, Python, or other coding languages, perform simulations, and tune models for enterprise production.
• Work with stakeholders throughout the organization to identify opportunities for leveraging company data to drive business solutions.

Developer

Developers translate the needs of the business into the software tools, applications, and automated processes that keep their organizations lean, smart, and efficient. They leverage Tableau to create new data products, embed visualizations and dashboards into current solutions, improve analysis processes, and integrate organizational insights into other external platforms and portals. Developers likely have a Creator license and their responsibilities:

• Embed and integrate Tableau vizzes into internal and external web applications (e.g. Salesforce).
• Script automation tasks.
• Build web data connections to bring in data from sources without native connectors in Tableau.
• Create custom data extracts.
• Create Dashboard Extension add-ins for customized workflows in Tableau.

Deploy and manage Tableau

These roles plan scalable deployments of Tableau Server or Tableau Online and once in production, ensure that users can access what they need when they need it.

Site Administrator

Site Administrators manage, monitor, and maintain sites on Tableau Server or Tableau Online. They manage site organization, content publishing, groups, users, and permissions. Through their monitoring efforts, they know the latest details on site utilization, adoption, performance, and compliance. Site Administrators are key to the adoption of Tableau Server or Tableau Online in their organizations. Site Administrators have a Creator license and their responsibilities include:
Create and manage site users and groups.
Create projects to organize site content.
Assign content permissions to users and groups.
Monitor site metrics such as content usage, success of extract refresh tasks, and user activity.
Troubleshoot user issues with a site.

Server Administrator

Server Administrators ensure that their installation of Tableau Server runs smoothly. Key elements include securing the server, managing licenses, managing users, monitoring and troubleshooting server issues, and performing server maintenance. Server Administrators work tirelessly to ensure that Tableau Server is not only operational but meets the ongoing needs of the enterprise. Server Administrators have a Creator license and their responsibilities include:

- Install and configure Tableau Server.
- Perform server maintenance (e.g., backups, updates).
- Monitor server performance and usage.
- Manage all sites, users, groups, and content on Tableau Server.
- Create sites.

Server Architect

Server Architects plan Tableau Server deployments and ensure their success. Key success factors include integrating the deployment with preferred authentication options, monitoring server, and scaling server overtime to meet enterprise demand. Once implementation is complete, server architects maintain the deployment and help to investigate and resolve server issues. Their responsibilities include:

- Plan enterprise server deployments.
- Configure server authentication options.
- Monitor, maintain, and scale server deployments to satisfy business requirements.
- Automate server monitoring and maintenance tasks.
- Investigate and resolve server issues.

Skills by Tableau License Type

License type defines the features and functionality available when using Tableau products. In large deployments, learning paths defined in Skills by Tableau Education Role on page 145
are a best practice. In smaller deployments, however, users may act in many different organizational roles, and determining skills needed by license type may be sufficient.

We list education resources aligned to Tableau licenses here. Free resources supplement the formal training that helps to build a holistic, foundational understanding of the platform. Organizations that wish to collate free resources to build their own training curriculum may do so; however, we recommend comparing the resources required to develop and maintain an internal education program versus using Tableau Education. In addition to being actively managed and consistently updated by Tableau, Tableau Education classes prepare users for Tableau product certification exams.

Tableau Creator Skills

Users with Tableau Creator licenses have access to the entire Tableau platform to analyze data and to build content for themselves and their organizations. These users perform tasks that range from basic analysis to using Tableau's advanced functionality to inform business decisions.

Resources for Tableau Creators include:

- eLearning for the Creator
- Desktop I Classroom Course
- Desktop II Classroom Course
- Desktop III Classroom Course
- Prep Classroom Course
- Visual Analytics Classroom Course
- Free Training Videos

Additional ancillary skills can be beneficial. For example, the following general competencies required to be a Tableau Creator can be summarized as:

- General data knowledge — How to connect to and prepare data, general data structures, joins, and basic SQL.
- Analytics best practices — Generating data questions, data visualization, data storytelling.
- Business knowledge — Familiarity with the business challenges and metrics monitored by business leaders.
- Design fundamentals — Layout/design of dashboards, infographics, and other graphical documents.
Most Server Administrators and Site Administrators also have Creator licenses. They are responsible for installing, administering and maintaining servers and server sites used at their organizations. They are responsible for security, performance, governance, and scalability for their users.

Resources for Tableau Site or Server Administrators include:

- eLearning for the Creator
- Server Administration Classroom Course
- Server Architect Classroom Course
- Free Training Videos

Other ancillary knowledge needed for Server Administrators, which are defined in more detail in Tableau Deployment:

- Scripting for automation
- Command line interfaces and APIs
- Server sizing and topology
- Network infrastructure and protocols

Tableau Explorer Skills

Users with Tableau Explorer licenses author simple visualizations through the web, navigate Tableau Server or Tableau Online environments, and understand the principles for creating effective views with data. Resources for Tableau Explorers include:

- eLearning for the Explorer
- Web Authoring Classroom Course
- Free Training Videos

Additional ancillary skills can be beneficial for Explorers, such as:

- Analytics best practices – Generating data questions, data visualization, data storytelling
- Business knowledge — Familiarity with the business challenges and metrics monitored by business leaders
- Design fundamentals — Layout/design of dashboards, infographics, and other graphical documents
Tableau Viewer Skills

Users with Tableau Viewer licenses navigate Tableau Server or Tableau Online environments, read various chart types, and know how to interact with visualizations.

Resources for Tableau Viewers include:

- Free Consumer Learning Path
- Free Executive Sponsor Learning Path
- Free Training Videos

Developing a Tableau Education Plan

An education plan outlines how your employees will gain the skills needed to be successful in their roles. Before considering enablement options, it is important to identify who your users are and what skills they need to fulfill their specific responsibilities to make your Tableau deployment successful. Find more information about defining your users in Tableau Education Role Mapping on page 23.

Education is an ongoing process, and users need readily available tools to stay up to date on the latest product or feature releases. A well thought out plan streamlines skill development for existing and new users. As you consider enablement options, think about the following:

- **Who are your users and how many are in each role?** This information can be aggregated from the Tableau Users on page 26 in the Tableau Blueprint Planner.
- **Where are they located?** Users can be in a single location or spread across multiple locations.
- **How quickly do they need to get up and running?** Consider organizational-level initiatives or goals that are impacted by the success of your users.
- **How do they like to learn?** Some learners prefer an immersive classroom experience, while others prefer self-paced learning that accommodates their day-to-day work.

These answers will help you determine which enablement options best fit your users individually and your organization as a whole.

Learning Paths

Role-based learning paths are designed to accelerate user proficiency. Each path is curated by product experts to provide users with the right resources at the right time. Learning paths include self-paced eLearning content, classroom courses, free resources, and assessments
available through Tableau’s eLearning platform. Learning paths guide users in each Education Role to develop the necessary skills while encouraging those with existing analytic skills to accelerate to more advanced levels. For more information, see education products on the Learning Paths overview.

Learning Paths map to Skills by Tableau Education Role on page 145 and provide clear paths for every role you’ve identified in your organization. Users may need to complete multiple paths if their responsibilities fall across more than one Education Role.

All Learning Paths are included in the eLearning for the Creator subscription, and a subset (Executive Sponsor, Community Leader and Consumer) are available in the eLearning for the Explorer subscription (some paths include classroom courses at additional cost).

Enable a Data Culture:

- Executive Sponsor (free)
- Community Leader (free)
- Data Steward

Provide insights and develop visualization solutions:

- Consumer (free)
- Author
- Designer
- Analyst
- Data Scientist
- Developer

Deploy and manage an optimized environment:

- Site Administrator
- Server Administrator
- Server Architect

In addition to curated skill building activities, each learning path includes knowledge checks to ensure the concepts and skills learned are being fully absorbed. Each learning path ends with a skills assessment that covers the core concepts from the path. Upon passing the assessment, the user is awarded a Role Badge (more information about Role Badges here). A user who does not pass is given a detailed list of lessons to review before attempting the assessment again.

To explore content from each learning path, see Tableau eLearning samples.
Education Resources

Role-based learning paths are the most scalable and consistent way to enable users (link to Learning Path Landing Page) However, paid training courses and other resources can also be consumed individually. This allows an organization to add resources to a learning path in order to increase the breadth or depth of a user’s skill set, if needed.

- **eLearning** – Tableau eLearning is web-based training users can consume at their own pace. Courses are interactive and designed to help users learn how to use Tableau, regardless of skill level. Subscriptions include access to Learning Paths and courses.
- **Classroom Courses** – Comprehensive instructor-led training allows users to get up to speed quickly. Available in-person in cities worldwide or virtual, classroom courses are designed to provide a distraction-free learning environment. Organizations with large groups of people requiring training at the same time may save time and money by choosing to have a Tableau trainer lead classes on-site.
- **Free Training Videos** – These pre-recorded videos supplement formal training and are a great way to quickly orient users to a specific feature or concept. These videos are not intended for stand-alone training and should be paired with a more formal training solution.
- **On-Demand Webinars** – This library ofwebinars acts as a repository for knowledge sharing for everything from Tableau product releases to niche industry topics.

Organizations wishing to curate their own training materials for Tableau users will need to collate Tableau documentation, videos, and other ancillary skill resources for corresponding job functions. Organize these materials into programs that provide recommended coursework with sequential skill and knowledge development.

In addition to Tableau’s education resources, add your own organizational context to help users learn how to apply these product skills to their day-to-day job functions, company sources of data, and organizational best practices. Internal programs should have clear goals and deadlines, and users should have adequate time to meet them.

Accountability and Reward Systems

Accountability and reward systems are series of checkpoints and milestones along a user’s skill development path. They establish common goals and achievements across an organization to encourage users to stay motivated and engaged in building their skill sets.
Education is an ongoing process, and as an organization's deployment grows, users need opportunities for continuous learning and rewards.

Consider these three approaches to validate skills to incorporate into your education plan:

- Role Badges
- Tableau Product Certification
- Skill Belts

**Role Badges**

Users earn role badges by passing low-stakes, multiple-choice skills assessments of core concepts at the end of role-based learning paths as shown in *Skills by Tableau Education Role* on page 145. Role badges encourage and motivate users to keep learning in order to demonstrate their knowledge of particular roles. Users are not required to complete all the courses in a learning path in order to take the skills assessment, so more advanced users can skip ahead. They will demonstrate that they hold the necessary skills for the role by earning a passing score. Users who do not pass are given recommendations for the eLearning or Classroom courses that will best answer their skill gaps. Because Role Badges are available to share via a public URL, they also support progress monitoring and measurement at the organizational level. The badges can be incorporated into your organization's LMS system or intranet. Role Badges and Skills Assessments are accessed through an eLearning subscription.

**Certification**

Tableau Product Certifications enable users to prove their expertise and to distinguish themselves. Holding a Tableau Certification demonstrates that a user is able to apply knowledge of Tableau products in a formal setting. These proctored exams are higher stakes than role badge skills assessments because they follow industry standards for professional certification programs. Encouraging and supporting certification within your teams shows commitment to their professional development and creates clear, actionable milestones for individuals to work toward. By building a core group of certified users, you increase their confidence and encourage them to elevate the skill sets of their peers. There are three levels of certification, Specialist, Associate and Professional, available for two products, Desktop and Server.

<table>
<thead>
<tr>
<th>Exam Level</th>
<th>By Product</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Difficulty</strong></td>
<td></td>
</tr>
<tr>
<td>Specialist</td>
<td>Tableau Desktop Specialist –</td>
</tr>
<tr>
<td><strong>Coming soon</strong></td>
<td></td>
</tr>
<tr>
<td>Certification</td>
<td>Associate</td>
</tr>
<tr>
<td>---------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Tableau Desktop Certified</td>
<td>Tableau Desktop Certified</td>
</tr>
<tr>
<td>Associate – tests comprehensive functionality and product expertise.</td>
<td>Professional – tests advanced functionality and application of visual best practices.</td>
</tr>
</tbody>
</table>

Online, proctored exams are delivered 24/7. Instead of traveling to testing centers, users can test anywhere in the world if they meet computer and network requirements. Exams are also delivered in person at select Tableau events, like Tableau Conference.

**NOTE: How are Certification badges different from role badges?**

Certification badges recognize users’ significant achievement of proving product knowledge by passing high-stakes, proctored, secure exams. Role badges recognize users’ less significant achievement of passing self-proctored, non-secure skills assessments.

**Skill Belts**

A skill belt program is an internally-created badge and reward program that aligns with an internally curated education program. A skill belt program should motivate and reward users who sequentially build measurable knowledge in product functionality, storytelling, design, best practices in visualization and performance, and community resources. In order to complete each skill level, users should be required to volunteer as peer and mentor resources for new applicants. This ensures participation and organically builds community across the organization by encouraging users to share knowledge, evangelize data-driven decision making, and motivate others to improve their Tableau skills.

A skill belt program relies on both applicants and champions for administration, governance, and promotion. You may have additional resources to help administer the program. For
example, many large organizations have learning management systems and may prefer to manage assessments within those content delivery systems.

Required content and measurement tools can be standardized across skill belts and merit badges; for example:

- **Hands-on** — Instructional videos or webinars for users to follow along with, often including accompanying Tableau workbooks.
- **Whitepapers** — Written, long-form instructional documents for users to read.
- **Best practices** — Consumable content in a variety of formats that generally focuses on visual and performance best practices. Content will include more technical and governance-related topics as users achieve higher skill levels.
- **Storytelling** — Consumable content in a variety of formats that specifically addresses the soft skills users need to effectively tell stories with data.
- **Blogs** — Informational content from a variety of sources, generally from Tableau or notable public community figures like Zen Masters. Content may include hands-on activities, best practices, or additional resources.
- **Reference materials** — Reference documents, community guides (e.g., GitHub), other instructional reference materials (e.g., chart hierarchy) and other supplemental materials.
- **Challenges** — Tableau workbook practices for users to complete, with solutions included for reference.
- **Milestones** — Significant tasks users must complete to achieve a skill belt or a merit badge.

You should not expect everyone to engage in all the available content, nor to master all the available skills at every skill belt level. Advancement through the program should be based on exposure to concepts and building knowledge, not mastery. For example, users can achieve expert-level recognition without having to learn to script in Python. Only some users need to script in Python, but all users need to demonstrate an understanding of how Python and Tableau can be used together and, more importantly, how this can help the organization.

**Gamification**

A defining characteristic of any skill belt program is the gamification of learning. Gamification is an educational approach to motivate students to learn by using game elements and design in a learning environment. It can help users overcome fatigue or anxiety and keep them engaged. By incorporating the right mechanics, gamification can increase engagement and participation and inspire users to continue learning.
One successful way to gamify is by offering compensation or a reward (e.g., organizational status) for academic achievements, proper behavior and social engagement like helping peers, commenting, and adding value. Skill belts and merit badges can be designed to recognize academic achievement and volunteerism while communicating status or prestige within your organization. To encourage engagement, you should come up with fun skill belt and badge names. "Jedi Master" sounds a lot more exciting than "Analytics Expert." Perhaps you want to involve your community in picking the belt names (e.g., a contest). If your community picks the names, they are already invested in success before you have kicked off the program.

Another important feature of gamification is to make the program as social as possible to simulate the feel of a classroom or classroom community. This is important for achievers that need peer recognition, but also motivates through peer pressure or friendly competition with other participants. You can have a leader board to display top scores and vizzes, for example. We also suggest events such as Makeover Monday and Viz Games to increase competition and provide additional reward and recognition opportunities. Lastly, the program should be transparent to participants. While advancing within the course work users know what the next step is and what to expect. This creates anticipation! Anticipation is a strong motivator and gets students excited and engaged for longer periods of time and the flow of learning.
Measurement of Tableau User Engagement and Adoption

As Tableau is deployed broadly across your organization to users of all skill levels, administrators need to ensure that the content that is being created and consumed is discoverable, fresh, and relevant to your audiences. To accomplish this, administrators should measure the user engagement and adoption.

Measurement helps your deployment to operate at scale and evolve. It helps you understand user behaviors—who is creating and consuming content and the quality, the relevance of the dashboards and data sources being published, and the use of certified versus sandbox. If content isn’t being consumed, you will be able to identify it and take the appropriate next steps.

Understanding the relationship between data sources and workbook content, users, and server performance, scalability, and sizing is a reliable way to look into current usage and future growth. Open communication between Server Administrators and Site Administrators is needed to plan for new users and use cases on the platform. Consider this:

- A team or group of users has a known collection of sources of data that can be identified and prepared for them as Published Data Sources or embedded in workbooks.
- Published Data Sources, as well as embedded data sources, are used to populate dashboards.
- Dashboards have a specific audience, or group of users who should view them. User engagement drives server scalability and sizing decisions.
- Server sizing decisions define hardware and licensing requirements, which are aligned with budget planning and procurement requests.
Tableau Administrative Roles and Responsibilities

Depending on the size of the organization and deployment, measurement and monitoring responsibilities may be split across different teams. For example, a systems administrator may be responsible for the hardware and operating system only, while Tableau Server Administrators will monitor and track key application metrics and Site Administrators will measure content metrics in their respective site(s). Both are equally important for overall success.

If there are no Site Administrators, both application and content metrics should be monitored and measured by the Server Administrator. Regardless of the deployment size, system performance is a shared responsibility among administrators and users. For more information on hardware metrics, see Tableau Monitoring on page 121.

Tableau Administrative Views

Data from the Tableau Server repository will be analyzed using default administrative views and custom administrative views. Administrative views are dashboards that are included with Tableau Server and help you understand how users are interacting with content. Site Administrators have access to Tableau Server’s default administrative views.

Find Administrative Views on the Status Page

Brief descriptions of the site default administrative views are shown below. Site Administrators should view these on a weekly basis to understand the users’ behavior.

- Traffic to Views — Usage and users for published views. Compare the traffic to the expected audience size.
- Traffic to Data Sources — Usage and users for published data sources. Compare the traffic to the expected audience size.
- Actions by All Users — Actions for all users to see site activities.
**Tableau Blueprint Help**

- **Actions by Specific User** — Actions for a specific user, including items used.
- **Actions by Recent Users** — Recent actions by users, including last action time and idle time.
- **Background Tasks for Extracts** — Completed, pending, and failed extract task details with full details of why an error occurred.
- **Background Tasks for Non Extracts** — Completed, pending, and failed non-extract background task details with full details on why an error occurred.
- **Stats for Load Times** — View load times and performance history. Set data-driven alerts on long view load times using the version of the default admin views workbook you downloaded and published with extracted data sources.
- **Stats for Space Usage** — Space used by published workbooks and data sources, including extracts and live connections. Set data-driven alerts on the Stats for Space Usage view to identify which workbooks and data sources exceed the expected size limit. For example, if you set a standard that extract sizes should be less than 1 GB, then alert for anything larger.

Custom administrative views are useful for deeper analysis of user behaviors and organization-specific KPIs that are identified. The Tableau Server Administrator will extract and publish the default administrative views workbook and community data sources so others can perform deeper analysis on users within your site. This will permit users and project leaders who manage content (but are not full administrators) to view and measure consumption. The list of recommended published data sources is shown below:

- **TS Users** — Aggregated information on user activity.
- **TS Content** — High-level, summarized data for each view, workbook, and Published Data Source on Tableau Server.
- **TS Background Tasks** — Primarily for analyzing Extract Refresh and Subscription tasks that are run on Backgrounder processes.
- **TS Events** — Essentially a master audit data source showing events happening on Tableau Server—users signing in, accessing views, publishing content, etc.
- **TS Data Connections** — Maps both workbooks and published data sources to their underlying data connections. Useful for answering questions about what workbooks connect to what data source, which then connects to what database(s)?
Tableau Server Content Utilization

Utilization is the effective use of the data visualizations for business decisions but the complete picture cannot be told through Traffic to Views alone. When viewing this data, put it in the context of your expected audience size that was documented on the Use Cases tab of the Tableau Blueprint Planner.

For example, if a Published Data Source has an audience of 500 users who should use it at least once a day, then we would expect the Traffic to Views dashboard to show approximately 10,000 views in a month (20 business days * 500 users). Now, if 250 people view the dashboard 2 times a day, then you’re at 50% engagement and that’s your cue to understand whether the information is relevant, there is a skills gap, or half the audience doesn’t realize that such a dashboard that will help them do their job even exists.

Individual content creators can see utilization for their content in the sparkline tooltip by hovering over the workbook’s thumbnail or selecting Who Has Seen This View from the menu.

Content Utilization

1. Within a site or project, what is the view traffic? (Monthly) — Understanding the usage trend for a site and project will help you understand growth or whether additional community activities can educate users on available content. Below, you can see traffic in the project represented in red has dropped off dramatically, while the remaining colors at the bottom are flat.
2. What is view traffic in last 180 days vs 30 Days? (Monthly) — Low traffic views should be reviewed and archived based on activity threshold within a time period. If content is published but not viewed, it is consuming system resources and potentially making it harder for users to locate more relevant content. Your server administrator can automate archiving per site. In the example below, only three dashboards (orange) have had been accessed in the last 30 days.
3. What is a workbook’s audience size relative to access events? (Monthly) — When identifying use cases for new content, you should estimate the audience size for a particular workbook. By comparing the distinct count of consumers to the number of access events, you can understand the impact of content. Content in the lower left (low audience/low traffic) should be reviewed and removed if it is no longer useful.

4. What is a data source’s audience size relative to access events? (Monthly) — Similar to the previous example, when identifying use cases for new content, you should estimate the audience size for a particular data source. By comparing the distinct count of consumers to the number of access events, you can understand the impact of content. Content in the
lower left (low audience/low traffic) should be reviewed and removed if it is no longer useful.

5. Who is creating/owning content? (Monthly) — Users who create and share content are putting your organization’s modern analytics vision into practice. To understand who is publishing to Tableau Server, review project, workbook, and certified and uncertified data source owners.
Tableau User Engagement

Engagement is a measure of user behavior, both direct and indirect. Direct engagement includes viewing and interacting with a dashboard, connecting to a data source, and web authoring. Indirect engagement includes subscriptions and alerts that are delivered to a user.

1. How many times have users logged in? (Monthly) — To measure user engagement, you should start by quantifying the number of logins, users who login once and didn’t return, and users who never logged in. If twelve users have logged in once and didn’t return, you should determine why.

   ![Login Frequency Chart]

   There are 12 users who logged in once and didn’t return.

   Login Frequency

   2. Is the use of content becoming habitual? (Monthly) — Quantifying the number of days since last login is a good indicator of whether users are in Tableau Server. For example, with 4,065 users logging in to Tableau Server from 0-49 days, use of Tableau Server is high. This can be especially useful if HR data is joined to view engagement within a department or team.
Days Since Last Login

3. Are subscriptions and alerts being used? (Monthly) — It’s important to consider the direct (publish, view, and interact) and indirect (subscriptions and alerts) activity on Tableau Server. Even if users are not interacting directly with content, they may be receiving emails from subscriptions and alerts.

Subscriptions & Alerts
Content Size and Performance

Performance is a shared responsibility in Tableau Server because of the cumulative effects of slow dashboards and long-running extract refreshes can have on the entire system. Based on performance thresholds you define, you should work with users to improve performance to expectations. The dashboards below can be found in the default administrative views on Tableau Server.

1. What is the distribution of workbook and data source size? (Weekly)

2. How long does it take for views to load? (Weekly) — Have you set a load time expectation to identify when a workbook is loading too slowly? Do you have an exception procedure in place?
3. How are extracts performing? (Weekly) — See the successes and failures of extracts and determine if you’re experiencing long extract refresh times.

4. Are subscriptions delivered on time? (Weekly)
Compliance

Compliance is the measure of how users are following internal company policies and procedures and external regulations where applicable. Below are some examples of policies to be defined or may already be in place:

1. Are usernames and passwords using a service account or an individual account? (Weekly)
2. Are embedded passwords elevating permissions for data access? (Weekly)
3. When implementing Row Level Security at Tableau Data Source or Dashboard level are appropriate measures taken on user permissions? Such as who can and cannot do editing/download? Can the RLS be pushed to database level?
4. Are visual styles being adhered to? (Colors, branding, type of visualization, etc.)
Analytics Best Practices in Tableau

Analytics best practices enable your users with guidelines, standards, and processes for the discovery, interpretation, and presentation of data. In addition to the common best practices listed here, consider what additional organization-specific practices you will layer on top to enable your users with repeatable processes that will evolve into analytical capabilities.

Once defined, you should publish your organizational best practices to the Tableau Enablement Intranet on page 199. A mix of pre-recorded content, web meetings, and in-person sessions should also be used to introduce, reinforce, and institutionalize best practices as part of transforming into a data-driven organization. While not intended to be an exhaustive list, this document compiles some of the most common analytics best practices.

Why Visual Analytics?

Visual analytics is a means of exploring and understanding data. It supports and accelerates the analysis process itself. You can ask a question, get the answer, and ask follow-up questions—all within a visual interface. A story unfolds from one visual summary to another. Later, you can retrace the story to rethink, explore further, and share. In short, visual analytics allows you to go in any direction with your thoughts while you view and interact directly with the data.

Pre-attentive Attributes

Visual analytics leverages pre-attentive attributes to guide you down the most useful paths. Pre-attentive attributes are information we can process visually almost immediately, before sending the information to the attention processing parts of our brain. The pre-attentive attributes are shown below.
Pre-attentive Attributes

These are generally the best ways to present data, because we can see these patterns without thinking or processing. In fact, these attributes evolved in humans as ways to quickly assess a situation, discern a pattern, and choose whether to react. When authoring visualizations in Tableau, content creators will be visually encoding data to reveal new insights.

Explaining Visual Encoding

As you deploy Tableau broadly across the organization, some people will see the immediate value of visual analytics while others may hold on to traditional spreadsheets or reports in a tabular format. You will likely need to communicate the value of visual analytics and help those people see data differently by walking through what’s possible when data is visually encoded—namely by using color, shape, and size.

The steps below are helpful in making data visualizations more familiar if you are creating them for someone else. First, start with a familiar tabular format. Here is an example of how someone might view sales and profit in a text table. To find the highest and lowest values, it requires a full table scan of the rows and columns.
# Tabular Data, Plain

Adding color to negative numbers and formatting them with parentheses makes them stand out, but only if you’re looking for negative numbers. For everything else, a table scan is required to compare values.

## Tabular Data with a Color for Negative Values

<table>
<thead>
<tr>
<th>Category</th>
<th>Sub-Category</th>
<th>Central</th>
<th>East</th>
<th>Region</th>
<th>South</th>
<th>West</th>
<th>Sales</th>
<th>Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furniture</td>
<td>Chairs</td>
<td>$86,951</td>
<td>$6,553</td>
<td>$96,504</td>
<td>$8,008</td>
<td>$96,176</td>
<td>$6,817</td>
<td>$1,214</td>
</tr>
<tr>
<td></td>
<td>Tables</td>
<td>$138,185</td>
<td>$6,380</td>
<td>$141,890</td>
<td>$7,880</td>
<td>$140,652</td>
<td>$8,022</td>
<td>$2,804</td>
</tr>
<tr>
<td></td>
<td>Bookcases</td>
<td>$124,175</td>
<td>$2,990</td>
<td>$132,885</td>
<td>$9,580</td>
<td>$131,595</td>
<td>$10,059</td>
<td>$3,239</td>
</tr>
<tr>
<td></td>
<td>Drawers</td>
<td>$139,254</td>
<td>$3,906</td>
<td>$143,974</td>
<td>$5,388</td>
<td>$142,688</td>
<td>$6,978</td>
<td>$3,848</td>
</tr>
<tr>
<td>Office</td>
<td>Storage</td>
<td>$45,926</td>
<td>$3,970</td>
<td>$47,370</td>
<td>$4,660</td>
<td>$46,020</td>
<td>$5,680</td>
<td>$4,070</td>
</tr>
<tr>
<td>Supplies</td>
<td>Printers</td>
<td>$168,823</td>
<td>$2,044</td>
<td>$171,000</td>
<td>$3,288</td>
<td>$169,950</td>
<td>$4,200</td>
<td>$2,000</td>
</tr>
<tr>
<td></td>
<td>Mailing List</td>
<td>$78,639</td>
<td>$1,899</td>
<td>$80,538</td>
<td>$3,391</td>
<td>$79,312</td>
<td>$4,000</td>
<td>$2,000</td>
</tr>
<tr>
<td></td>
<td>Paper</td>
<td>$17,482</td>
<td>$6,042</td>
<td>$18,573</td>
<td>$3,815</td>
<td>$17,651</td>
<td>$3,797</td>
<td>$1,179</td>
</tr>
<tr>
<td></td>
<td>Supplies</td>
<td>$89,467</td>
<td>$6,662</td>
<td>$91,760</td>
<td>$4,135</td>
<td>$90,660</td>
<td>$6,760</td>
<td>$4,175</td>
</tr>
<tr>
<td></td>
<td>FOB</td>
<td>$55,705</td>
<td>$1,155</td>
<td>$57,850</td>
<td>$5,320</td>
<td>$56,050</td>
<td>$4,660</td>
<td>$3,050</td>
</tr>
<tr>
<td></td>
<td>Employees</td>
<td>$9,687</td>
<td>$2,778</td>
<td>$10,785</td>
<td>$4,125</td>
<td>$10,000</td>
<td>$4,050</td>
<td>$1,950</td>
</tr>
<tr>
<td></td>
<td>Expenses</td>
<td>$24,415</td>
<td>$2,073</td>
<td>$25,683</td>
<td>$3,125</td>
<td>$24,800</td>
<td>$2,973</td>
<td>$1,073</td>
</tr>
<tr>
<td></td>
<td>Utilities</td>
<td>$7,830</td>
<td>$764</td>
<td>$7,975</td>
<td>$744</td>
<td>$7,900</td>
<td>$710</td>
<td>$210</td>
</tr>
<tr>
<td>Technology</td>
<td>Network</td>
<td>$72,406</td>
<td>$2,312</td>
<td>$73,615</td>
<td>$1,915</td>
<td>$72,965</td>
<td>$1,815</td>
<td>$1,650</td>
</tr>
<tr>
<td></td>
<td>Servers</td>
<td>$26,727</td>
<td>$6,406</td>
<td>$28,223</td>
<td>$5,929</td>
<td>$26,890</td>
<td>$5,991</td>
<td>$1,932</td>
</tr>
<tr>
<td></td>
<td>Accessories</td>
<td>$339,096</td>
<td>$7,282</td>
<td>$346,685</td>
<td>$8,136</td>
<td>$342,777</td>
<td>$7,787</td>
<td>$5,975</td>
</tr>
<tr>
<td></td>
<td>Copiers</td>
<td>$27,206</td>
<td>$2,506</td>
<td>$28,223</td>
<td>$3,018</td>
<td>$27,900</td>
<td>$3,563</td>
<td>$3,979</td>
</tr>
</tbody>
</table>

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**Tableau Software**

Version: Current 175
Next, as an intermediate format between a text table and a full visualization, color can be applied to the sales and profit measures individually to show high and low values, but it still requires the viewer to reconcile ranges of color between the two measures.

Sales & Profit Highlight Table

<table>
<thead>
<tr>
<th>Category</th>
<th>Sub-Category</th>
<th>Central Region</th>
<th>East Region</th>
<th>South Region</th>
<th>West Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furniture</td>
<td>Bookcases</td>
<td>Sales</td>
<td>Profit</td>
<td>Sales</td>
<td>Profit</td>
</tr>
<tr>
<td></td>
<td>Chairs</td>
<td>$1,234</td>
<td>$456</td>
<td>$789</td>
<td>$1,023</td>
</tr>
<tr>
<td></td>
<td>Tables</td>
<td>$2,345</td>
<td>$567</td>
<td>$890</td>
<td>$1,234</td>
</tr>
<tr>
<td></td>
<td>Office Chairs</td>
<td>$3,456</td>
<td>$678</td>
<td>$901</td>
<td>$1,234</td>
</tr>
<tr>
<td></td>
<td>Desks</td>
<td>$4,567</td>
<td>$789</td>
<td>$1,023</td>
<td>$1,456</td>
</tr>
</tbody>
</table>

Tabular Data with Sales and Profitability by Color Gradients

Finally, show the full visualization with sales encoded by length and profit encoded by color. Immediately, the viewer can see highest sales and lowest profit.

Sales & Profit

<table>
<thead>
<tr>
<th>Category</th>
<th>Sub-Category</th>
<th>Sales</th>
<th>Sales</th>
<th>Sales</th>
<th>Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furniture</td>
<td>Bookcases</td>
<td>$1,234</td>
<td>$456</td>
<td>$789</td>
<td>$1,023</td>
</tr>
<tr>
<td></td>
<td>Chairs</td>
<td>$2,345</td>
<td>$567</td>
<td>$890</td>
<td>$1,234</td>
</tr>
<tr>
<td></td>
<td>Tables</td>
<td>$3,456</td>
<td>$678</td>
<td>$901</td>
<td>$1,234</td>
</tr>
<tr>
<td>Tech</td>
<td>Phones</td>
<td>$4,567</td>
<td>$789</td>
<td>$1,023</td>
<td>$1,456</td>
</tr>
</tbody>
</table>

Visual Data with Sales by Bar Length, Profitability by Color
Using this approach, you will be able to introduce and explain the benefits of visual analysis to your organization’s Tableau users. You should record your own introduction video and post it on the enablement intranet.

The Cycle of Visual Analysis

Visual analysis is a non-linear process. For example, a user might start with an initial task or question in mind, find relevant data, and prepare it for analysis. During analysis, she realizes that she needs additional data, so she goes back a couple of steps to get more data, choose a new visual mapping, and develop a new insight. This example can be repeated for any of the other steps of the cycle of visual analysis.

The flow of analysis is difficult or impossible to achieve in traditional BI. Instead of exploiting the power of visual cues and iteration, it is heavily milestone-driven. Requirements gathering leads to development, then to testing, and eventually to launch. With visual analysis, the steps become more fluid as the answer to one question often leads to other questions, and new insights are uncovered.
Start with Questions

Whether you are authoring for yourself or for others, the cycle of visual analysis starts with a task or business questions to be answered. When asking data questions, start with a broad topic then add specificity to each question. For example, a call center manager’s questions from summary to detail might look like the following:

- How many calls are received monthly?
- Where do the calls come from?
- What are the top call types?
- Who answers the most/least calls?

Often the person analyzing the data also understands the underlying business questions. In other cases, someone might come to you with a need for a dashboard and what business questions it needs to address. Regardless of what the process of requesting this kind of assistance is, the steps for success are similar.

- Build rapport for a productive working relationship built on trust. Find out about their experiences and try to speak their language.
- Ask open-ended questions like "What do you want this dashboard to tell you?" or "What question do you want to answer?" rather than "Do you want a line graph?" or "Should I make a trend line?"
- Use examples: Show existing dashboards and ask what would make them better.

Get Data

Your users have questions that can be answered with data, but do they know how to find the right source of data and connect to it? From a variety of structured, semi-structured, and raw sources of data to siloed data within different departments of the organization, knowing where to get the right data is one of greatest barriers to becoming a data-driven organization.

During the discovery process, the Tableau Data and Analytics Survey on page 15 in the Tableau Blueprint Planner identified key sources of data and how data is distributed and consumed within each department or team. With specific sources of data documented on the Tableau Use Cases and Data Sources on page 16 tab of the Tableau Blueprint Planner, you should prioritize which ones will be most impactful by audience size and create Published Data Sources in Tableau Server.

Beyond the initial use cases, content creators should understand how to get data to answer new business questions. Using the Data & Analytics Survey is a repeatable way to discover new use cases and assess whether the needed data exists already in Tableau Server. If it is
already available as a Published Data Source, then content creators can connect to it and begin analyzing it. If it does not exist, authors should collaborate with Data Stewards and work with the data they have—even sample data files—and prototype with the data available, rather than waiting to proceed with a perfect operationalized dataset. Once the full data set is available, the operationalized dataset will replace the sample.

Choose Visual Mapping

After getting data, content creators will start to explore data by adding measures and dimensions to the view, and Tableau presents users with the most effective visualization. At any time in the authoring of content, the type of visualization can be changed. As creators explore the data and visually encode it with the pre-attentive attributes, they will be able to derive insights from it.

Choosing the appropriate type of visual mapping for the type of analysis is critical for deriving insights and driving towards action. There are five primary types of visual mappings that content creators and consumers should understand:

- Comparison, represented as a bar
- Spatial, represented as a map
- Temporal, represented as a line
- Compare two measures, represented as a scatterplot
- Precise number, represented as a text table

View Data

Tableau visualizations often show the unexpected—relationships, outliers, and trends. A surprise finding stimulates the thought process, encouraging deeper analysis or a different path of exploration. Tableau’s interaction model is based on the concept of incremental change: Whenever you perform an action (e.g., filter), Tableau instantly shows you the new result.

Why is incremental change important? It lets us intuitively explore a broad space of possible visualizations to find the right one. It allows us to focus on the exploration task, where questions lead not just to answers but also to more questions. It also lets us learn visual analytics at our own pace. We can build sophisticated representations of data slowly and incrementally as we learn how to look at information. Tableau’s interface is based on the process of incrementally refining a question into an answer. Every Tableau user, not just analysts, to be able to derive meaningful information from data and base their decisions on data.
Develop Insights

Data analysis and data visualization were once separate tasks. An analyst would run queries or write calculations to get answers from a data source, and then export results as a specified chart or graph. But by making the process querying data visual, you explore your data in a richer, more meaningful way. With visual analytics you can build an analysis and learn from it simultaneously as opportunities for further investigation present themselves.

Critical thinking with data is about finding insight, and communicating the insights in an optimal, engaging way. Visual analytics makes asking and answering questions of your data intuitive, regardless of whether you are a creator or a consumer—as we continue to ask “why”.

Critical thinking with data is important to the decision-making process for both content creators (often analysts, developers or data scientists) as well as for information consumers. Both groups should ask themselves these questions as they develop insights:

- What question should I ask?
- And when I get the answer, do I trust it?
- Do I have the ability to question if my data is useful? If it’s correct?
- Am I using all the facts? Am I trying to confirm biases I have?

Act (Share)

Shared findings lead to actions, results, and solutions. In fact, unshared discoveries are useless. You can share different types of content via Tableau Server:

- Tableau Prep Flows: Prep flows can be published to Tableau Server and scheduled to run when you need them to with Prep Conductor.
- Published Data Sources: You can publish data sources that others can use to build new workbooks. A data source can contain a direct (or live) connection to your database or an extract you can refresh on a schedule. For more information, see Best Practices for Published Data Sources and Enabling Governed Data Access with Tableau Data Server.
- Workbooks: Workbooks contain your views, dashboards, and stories, and data connection. You can include local resources, such as background images and custom geocoding, if they reside in a location that the server or other Tableau users cannot access.

A dashboard checklist is a useful resource to ensure that published content meets the purpose and answers the business questions intended. Data stewards should also play a role to ensure correctness and review an embedded data source as a potential candidate for publishing and certifying. Beyond data and calculation correctness, content validation should also include a review of the branding, layout, formatting, performance, filters, dashboard actions, and edge.
case behaviors by the Site Administrator or Project Leader site roles. For more information on content validation, promotion, and certification, see Tableau Governance on page 49.

Visual Best Practices

Visual best practices are key to developing informative visualizations that drive your audience to act. A dashboard is successful when people can easily use it to derive answers. Even a beautiful dashboard with an interesting data source could be rendered useless if your audience can’t use it to discover insights.

Think not just as an analyst but also as a designer and consumer. Dashboards should have interactive elements that are discoverable and predictable, follow a sensible, logical layout, and have a simplified design that makes complex decisions easier. It is important not to assume that people automatically know what it takes to clearly and effectively communicate with data. Here are a few whitepaper links to share on your enablement intranet:

- Visual analysis guidebook
- Which chart or graph is right for you?
- Good enough to great
- Designing efficient workbooks

You can find a list of books by renowned data visualization experts in the appendix. Adding these whitepapers and books to the resources of your analytics community can lead to a deeper understanding and internalization of visual best practices.

Audience

The best visualizations have a clear purpose and work for their intended audience. It’s important to know what you are trying to say and who you are saying it to. Does your audience know this subject matter extremely well or will it be new to them? What kind of cues will they need? Thinking about these questions before you begin designing will help you create a successful dashboard. For example, you would present aggregated, summary-level data and KPIs to an executive audience rather than row-level transactions.

Context

Make sure your views include context. Titles, captions, units, and commentary all help your audience to better understand your data view. Always strive to tell stories with your data and
your visuals. Understand that good stories involve more than just data, and consider the following:

- Mind your aesthetics and know that what is effective is often affective. In other words, an effective view can create an emotional response and a genuine communication to your audience.
- Style is also important. Make sure that your views are consistent and pleasing to the eye. Your views are representative of who you are and what you care about.
- Dashboards that people can interact with are very engaging. Interactive elements allow your audience to manipulate the data, ask and answer questions, and arrive at findings on their own. This helps to foster trust in your data.
- Make your views vivid and memorable. Pay attention to structure and context.

**Chart Choice**

**Chart choice** should depend on the question you are trying to answer or a specific insight you are trying to communicate. There is almost always a trade-off involved, with different chart types each having their own advantages and downsides. You should always ask yourself if your chosen chart type best conveys the message you are trying to share and if it can be easily understood by your audience. The table below explains the chart types in Tableau’s Show Me panel and when to use each. This should be published to your enablement intranet to educate new users.

<table>
<thead>
<tr>
<th>Chart</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line</td>
<td>Viewing trends in data over time.</td>
</tr>
<tr>
<td><img src="image" alt="Line Chart" /></td>
<td>Examples: Stock price change over a five-year period, website page views during a month, revenue growth by quarter.</td>
</tr>
<tr>
<td>Bar</td>
<td>Comparing data across categories.</td>
</tr>
<tr>
<td><img src="image" alt="Bar Chart" /></td>
<td>Examples: Volume of shirts in different sizes, website traffic by origination site, percent of spending by department.</td>
</tr>
<tr>
<td>Heat Map</td>
<td>Showing the relationship between two factors.</td>
</tr>
<tr>
<td><img src="image" alt="Heat Map Chart" /></td>
<td>Examples: Segmentation analysis of target market, product adoption across regions, sales leads by individual rep.</td>
</tr>
<tr>
<td>Chart</td>
<td>Description</td>
</tr>
<tr>
<td>-------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Highlight Table</td>
<td>Providing detailed information on heat maps. Examples: The percent of a market for different segments, sales numbers in a particular region, population of cities in different years.</td>
</tr>
<tr>
<td>Treemap</td>
<td>Showing hierarchical data as a proportion of a whole. Examples: Storage usage across computer machines, managing the number and priority of technical support cases, comparing fiscal budgets between years.</td>
</tr>
<tr>
<td>Gantt</td>
<td>Showing duration over time. Examples: Project timeline, duration of a machine’s use, availability of players on a team.</td>
</tr>
<tr>
<td>Bullet</td>
<td>Evaluating performance of a metric against a goal. Examples: Sales quota assessment, actual spending vs. budget, performance spectrum (great/good/poor).</td>
</tr>
<tr>
<td>Scatterplot</td>
<td>Investigating the relationship between different variables. Examples: Male versus female likelihood of having lung cancer at different ages, technology early adopters’ and laggards' purchase patterns of smart phones, shipping costs of different product categories to different regions.</td>
</tr>
<tr>
<td>Histogram</td>
<td>Understanding the distribution of your data. Examples: Number of customers by company size, student performance on an exam, frequency of a product defect.</td>
</tr>
</tbody>
</table>
### Chart Description

**Symbol maps** — Use for totals rather than rates. Be careful, as small differences will be hard to see.

Examples: Number of customers in different geographies.

**Area maps** — Use for rates rather than totals. Use sensible base geography.

Examples: Rates of internet-usage in certain geographies, house prices in different neighborhoods.

**Box-and-Whisker** — Showing the distribution of a set of a data.

Examples: Understanding your data at a glance, seeing how data is skewed towards one end, identifying outliers in your data.

### Layout

How your audience “reads” your dashboard is not a trivial consideration. Your dashboard’s purpose is to help guide the reader’s eye through multiple views in coordination and tell the story of each insight. Your dashboard needs a sensible “flow” and a logical layout of different pieces of information. The more you employ better dashboard design, your users will discover what’s happening, why, and what’s most important. Consider how you’re guiding their eyes across the dashboard. Are you showing the user where to look next?

Design theory gives us plenty of advice on how best to succeed. Layout is a key component of any successful dashboard design, here are a few concepts you want to think about when building visualizations:

- **Newspaper or Z-layout** — The most important content is put either at the top or the left of a visualization, as users move right and down for more specific content.
- **White space** — Using negative space (blank spots) and padding to delineate sections of your visualization – don’t use thick “grid lines” as you would see in a table.
- **Size** — More important pieces of content (KPIs, summary visualizations, etc.) should be larger than other items.
- **Device type** — With device-specific dashboards you can create the optimum viewing experience on desktop, laptop, tablet, and phone.
Color

Color is one of the most powerful aesthetic features because it’s an attention-grabber. It’s the first thing we notice, and it can immediately highlight specific insights or identify outliers, but it is not an unlimited design resource.

Using color effectively is critical for producing quality data visualizations — color types (alerting vs highlighting), creating custom color palettes, and consistency—are key aspects to build into your standards.

The correct use of color is critical for producing coherent and impactful data stories. The key factors that should be taken in to consideration for any successful dashboard are:

- Managing color choices — The primary color(s) that make up most of your design should be a neutral color. Using techniques like grayscale, you maximize the possibility for contrast and visibility of your data driven points. Your extended colors—accents, emphasis, and alerts—should reflect the brand. Any extended color should be used sparingly to draw attention to key messages within the data.
- Color types — Understand when to use sequential, diverging, categorical, highlighting, or alerting color motifs.
- Custom color palettes — Build your own company palettes to bring a sense of uniformity and provide guiderails for new users.
- Consistency — Double-check your visualizations to make sure a color (e.g. red) does not mean three different things. Similar and repeated colors can imply a relation where one doesn’t exist.
- Accessibility — Remember to account for color blindness in the design process.

Titles & Subtitles

Titles are an easy way to make your dashboard more digestible for your audience. You add more context with subtitles that describe how to interact with the worksheet or dashboard. This is a powerful and simple way to make dashboards easier to navigate. In the example below, the question pulls the audience in and then tells the audience how to answer the question using the dashboard.
Effective Title and Subtitle

Similarly, by changing your filter title to something more intuitive, you guide viewers through how to interact with a dashboard.

Example of a Filter

**Tooltips**

Tooltips guide the audience by highlighting important information. In the example below, the County and State are highlighted through a bold effect and color change, and we don’t have to partition our scatter plot further. We add important and related dimensions and measures in
the tooltip. This helps save space and declutter the dashboard so our viewers can focus on gleaning insights instead of interpreting the visualization.

Effective Tooltip

If the viewer notices something interesting in the tooltip, they can interact directly with the tooltip and watch the rest of the visualization come to life, highlighting related marks and outliers.
Formatting a Tooltip

Fonts

Typography is important. It can be tempting to use many font types and sizes in a dashboard. Don’t do that; instead, define a clear hierarchy for your typography. In the example below, there is a top, mid, and low-level font. The mid-level is blue to focus viewer attention. Color draws the eye to the most important level (which needn’t necessarily be the top-level font).
Top, Mid, and Low-Level Fonts (Courtesy of The Big Book of Dashboards)

Make sure that font selection is done to reinforce a visual hierarchy within your visualization through size, boldness, color and type.

- **Size** — Larger elements convey importance as they catch the eye. Save your largest fonts for KPIs, titles, etc.
- **Boldness** — Bolder elements convey importance as they catch the eye. You can vary boldness throughout your visualization in conjunction with size. For example, your title and KPIs could both be 24pt font, but making your KPIs bold will “pop” them, allowing your audience to focus there first.
- **Color** — Generally it’s good to stick with gray and black hues in your titles, text, and KPIs. You can “pop” your KPIs by giving them a color treatment, but you have to balance this with the other colors used in your visualization. Darker colors will draw the eye, so it’s wise to lighten your titles so they don’t compete for visual attention.

**Dashboard Size**

By default, Tableau dashboards are set to use a fixed size. If you keep this setting, be sure to construct your visualization at the size which it will be viewed. You can also set Size to Automatic, so Tableau automatically adapts the overall dimensions of a visualization based on screen size. This means that if you design a dashboard at 1300 x 700 pixels, Tableau will resize it for smaller displays—and sometimes this results in scrunched views or scrollbars. The Range sizing feature is helpful for avoiding this.
Dashboard Size Range

If you’re using Tableau Desktop to create dashboards, you can also design for specific device layouts, so that on tablets, for example, your dashboard contains one set of views and objects, and on phones it displays another. See Create Dashboard Layouts for Different Device Types for steps.

Dashboard Interactivity

When designing a dashboard, you need to consider your audience, and how you can communicate to them that they can interact with the dashboard. Skilled users know to click and experiment, but new users may not have the knowledge or confidence. Your job is to help them make these decisions consciously, not by accident.

It’s important to make any interactivity obvious to your audience—even by creating subtitles to instruct them to click or hover for more information. Add interactivity to your data using filters, tooltips, and actions. Filters are the most obvious way interact with a dashboard. Users can also interact with your visualizations by selecting marks and hovering to see tooltips. The actions you set up can respond with navigation and changes in the view. The table below enumerates the ways to create interactivity in your dashboards.

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highlighting &amp; Highlight Actions</td>
<td>- Easily find data of interest while remaining within context.</td>
</tr>
<tr>
<td></td>
<td>- See other marks with shared attributes.</td>
</tr>
<tr>
<td>Type</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Filtering &amp; Filter Actions</td>
<td>- Focus on data you want to analyze.</td>
</tr>
<tr>
<td></td>
<td>- Control context of data.</td>
</tr>
<tr>
<td></td>
<td>- Show relevant data and remove unnecessary data.</td>
</tr>
<tr>
<td>Parameters</td>
<td>- Explore what-if scenarios.</td>
</tr>
<tr>
<td></td>
<td>- Customize your views.</td>
</tr>
<tr>
<td></td>
<td>- Enhance dashboard flexibility.</td>
</tr>
<tr>
<td>Sets &amp; Set Actions</td>
<td>- Dynamically update the members of a set.</td>
</tr>
<tr>
<td></td>
<td>- Compare parts to whole.</td>
</tr>
<tr>
<td></td>
<td>- Seamlessly drill down through hierarchies.</td>
</tr>
<tr>
<td></td>
<td>- Update a calculation by interacting with data.</td>
</tr>
<tr>
<td>Tooltips</td>
<td>- Provide details on demand.</td>
</tr>
<tr>
<td></td>
<td>- Keep your dashboard minimalistic.</td>
</tr>
<tr>
<td></td>
<td>- Insert a viz in a tooltip.</td>
</tr>
<tr>
<td>URL Actions</td>
<td>- Incorporate external content in a dashboard.</td>
</tr>
<tr>
<td></td>
<td>- Provide more in-depth information on demand.</td>
</tr>
<tr>
<td></td>
<td>- Link users to websites.</td>
</tr>
<tr>
<td></td>
<td>- Direct users to additional content.</td>
</tr>
</tbody>
</table>

When designing dashboards, consider how and why you incorporate interactivity into the dashboard. The following questions are helpful:

- Why does a viewer need to interact with the dashboard?
- What extras insight will be gained through the interactivity?

### Designing for Performance

When we talk about performance, we mean the speed with which you can work in Tableau. That might mean the speed of data analysis—for example, if you work in Tableau Desktop on a large corporate database that takes forever in real time when you access it remotely. Or it might
mean simply the speed of loading views or dashboards that you access on your desktop or from Tableau Server.

Performance and efficiency should be treated as part of the design process—not as an afterthought. Responsiveness is an important success factor for end users when viewing reports and dashboards, so making your workbooks run as quickly as possible makes for happier users.

There are several factors that make a workbook “efficient”. Some of these factors are technical and some more user-focused but in general an efficient workbook is:

- **Simple** — Is it easy to create the workbook and will it be easy to maintain in the future? Does it take advantage of the principles of visual analysis to clearly communicate the message of the author and the data?
- **Flexible** — Can the workbook answer multiple questions the users want to ask, or just one? Does it engage the user in an interactive experience or is it simply a static report?
- **Fast** — Does the workbook respond quickly enough for the users? This may mean time to open, time to refresh, or time to respond to interaction. This is a subjective measure, but in general we want workbooks to provide an initial display of information and to respond to user interactions within seconds.

The performance of a dashboard is impacted by the following:

- The visual design at both the dashboard and worksheet levels, e.g. how many elements, how many data points, use of filters and actions, etc.
- The calculations, e.g. what kind of calculation, where the calculation is performed, etc.
- The queries, e.g. how much data is returned, impact of custom SQL, etc.
- The data connections and underlying data sources.
- Some differences between Tableau Desktop and Tableau Server.
- Other environmental factors, such as hardware configuration and capacity.

For more information, see [Designing Efficient Workbooks](#).

**Accessibility**

To make your views accessible to as many people as possible—or if you work in an environment that is subject to US Section 508 requirements or other accessibility-related laws and regulations—you can use Tableau to build data views that conform to the Web Content Accessibility guidelines (WCAG 2.0 AA). This includes building views that are accessible to users who use screen readers, braille keyboards, keyboard-only navigation, and so on. For more information, see [Build Data Views for Accessibility](#).
Organizational Assets

Developing organizational assets—such as a style guide, template workbooks with pre-selected fonts, colors, negative space, etc.—will help your users adopt visualization best practices. It’s important for creators and viewers to both understand what “great” looks like and have a common reference on how to best develop, deliver, and consume content. Your community leaders should work on socializing great content across the organization and share any assets on your Tableau Enablement Intranet.

By providing users with content that looks and feels familiar, you can dramatically speed up adoption. Additionally, you can build consumer confidence by producing content that is recognizable as part of a brand. The core themes to keep in mind when designing your standard are text, color and consistency.

- **Text** — Use of text is not limited to custom fonts; it is also about the use of text and lettering to enhance your analytics and storytelling to improve cognitive recognition of analytics.
- **Color** — Use custom color palettes, and capitalize on pre-existing associations to increase speed to insight. In addition, keep in mind best practices regarding color-blindness and limit the amount of discrete colors on a dashboard. If your brand has bright colors, use a neutral color palette and use your brand’s colors to call out specific items on a dashboard instead of using them for main colors.
- **Consistency** — Consistency doesn’t mean having to have a set of identical visualizations or dashboards. Think about how to convey the same look and feel while allow room for design and creativity.

Before creating your corporate-branded standard, remember that you should never compromise efficient analytics for design or stylistic elements. While some design elements can actually increase analytic value, you should never make something that looks good at the expense of performance or functionality.

**Visual Style Guide**

Do your users know what a great dashboard looks like? By publishing a Visual Style Guide, you will give your users a start on design, as well as guidance on how to differentiate between ad-hoc and certified content, which fonts and brand colors to use, and formatting options. This style guide can be a document or a Tableau workbook.
Dashboard Layout Template

Dashboard layout templates help creators to assemble polished dashboards by adding their individual sheets into predefined layout containers. You can download sample dashboard layouts from Tableau Public and customize it with your own logo and colors.

![Dashboard Layout Template](image)

Dashboard Layout

Dashboard Review Checklist

You would not distribute documents to stakeholders without the proper review, revision, and release processes, and dashboards are no different. Dashboards need to be reviewed and validated before they are promoted and certified.

The first person to validate content should be its author. Authors should solicit feedback from the target audience as well. This can be done in an informal feedback group or by sharing a link to the workbook and encouraging comments. No dashboard is right the first time. Time and collaboration are ideal ways to hone in on the best representation of your data. Other people’s opinions will bring fresh perspectives. Consider the following:

- What type of formal or informal means do we need to gather feedback?
- How can we encourage a constructive conversation?
- Has there been time spent on gathering feedback, improvement, and iteration?

Create a dashboard checklist to help users apply visual best practices and a consistent design with a style guide. Every content creator should apply the checklist of your organizational standards to their work before sharing it with others.
Data Stewards should also play a role to ensure correctness and review an embedded data source as a potential candidate for publishing and certifying. Beyond data and calculation correctness, content validation should also include a review of the branding, layout, formatting, performance, filters, dashboard actions, and edge case behaviors by the Site Administrator or Project Leader site roles.

**Metadata Checklist**

The metadata checklist below shows best practices for curating a Published Data Source as outlined in *Tableau Governance on page 49*. By establishing data standards using the checklist, you’ll enable the business with governed self-service data access that is user-friendly and easy to understand. Prior to creating an extract or Published Data Source in Tableau Server, review and apply the following checklist to the metadata model:

- Validate the data model
- Filter and size to the analysis at hand
- Use standard, user-friendly naming conventions
- Add field synonyms and custom suggestions for Ask Data
- Create hierarchies (drill paths)
- Set data types
- Apply formatting (dates, numbers)
- Set fiscal year start date, if applicable
- Add new calculations
- Remove duplicate or test calculations
- Enter field descriptions as comments
- Aggregate to highest level
- Hide unused fields

**Presentation Guidelines**

The last mile of analyzing data is taking insight and communicating it to others. Regardless of the data skill level, people should be able to show a dashboard and clearly articulate a data-driven message in a meeting or a presentation. Designing charts for presentation requires special considerations because a complex chart that works for you on your laptop screen won’t work in a presentation.

When sharing some insight, consider the key purpose of the chart. What is the main message? In the example below, the charts shows malaria cases in Zambia following work by global non-
profit organization, PATH. The key message is the 93% reduction in cases; notice how that is stamped on the slide very clearly.

Stated Conclusion with Visualization

Think about how long the chart will be on the screen for. While you might intimately understand the chart, your audience will be seeing it for the first time. If you want to show a complex chart, you must spend the time explaining it. The malaria example above can be understood in moments because of the visual and stated conclusion. A good rule of thumb is that a chart should be understandable by your audience in less than half the time it is on the screen.

Your audience needs to be able to read the relevant parts of your chart. The font defaults to very small fonts because they are designed for consumption on a laptop/monitor. These font sizes don’t work on big screens. Two version of the same chart are shown below. The chart on the right has fonts large enough to be read by everyone in the room.
Legend Incorporated into Visualization

You should use color very wisely to highlight your message. Imagine you are tracking customers by day of the week, and you want to highlight that weekends have far fewer customers than weekdays. The chart on the left (below) most effectively convey that message. It uses a simple color scheme to convey an insight much more clearly than the one on the right.

Color used for emphasis vs. too much color

Before you present your insights in charts, consider the following:
• Have you added state conclusions to tell the story in the data?
• Can the fonts be read from the back of the room you will be presenting in?
• Is color used for highlighting your message rather than decoration?
• Is the chart simple enough to be understood during the time it will be on the screen?

The main takeaway is an appreciation that a dashboard or complex analytical chart, designed for desktop screens are almost never the appropriate choice when sharing insights in meetings or presentations.
Tableau Communications

When you deploy Tableau broadly across your organization, establishing internal communications and enablement resources promote adoption to scale data and analytics more efficiently. Our most successful customers use a variety of self-service help methods to get started with Tableau, answer frequently asked questions, and locate other Tableau users within the company.

This topic outlines the enablement intranet, discussion forums, and newsletters to assist the analytics sponsor and community leader. Depending on what works best for your company, the list of topics below showcases the many ways you can communicate with your user community. With a well-defined communications plan, you will build your user community, nurture the use of data and analytics across all skill levels, and minimize the resources needed to answer common questions.

Tableau Enablement Intranet

As your deployment grows from hundreds to thousands of users, it can be difficult for users to connect with one another. The enablement intranet allows numerous users to connect across departments and geographic locations. It will serve as the hub for all Tableau resources with the goal of creating a consistent user experience and helping everyone form new habits based on best practices.

The following sections define topics you can publish on your intranet that will allow your user community to quickly and easily find information about onboarding, governance policies and procedures, other Tableau users, and more. By sharing this information proactively, you’ll get ahead of the questions and lower the barriers to providing governed, self-service analytics. An example site map is shown below:
Getting Started

When a new user is interested in a license, who do they contact? What do they need to know to start using Tableau? What resources are available? As Tableau is deployed broadly across your organization, if you’re the only one trying to onboard every user, there will be trouble ahead. As more users adopt, it becomes more difficult to effectively manage and support the user community because there aren’t enough resources to provide one-on-one assistance.

The “Getting Started” area connects new users with necessary resources on your intranet and throughout the company. Get users over the hump, and onto using Tableau, instead of struggling. This is the first step to empower users and build your organization’s Tableau community.

Think of the common questions you might get:

- How do I obtain a license and install software or access Tableau Server?
- What are the basic skills for each license level? (detailed below)
- When is training and what is needed for my corresponding role?
- Who is using Tableau in my department?
- How do I connect to data?
- What certified data sources are available?

Additionally, publishing links to Tableau’s Online Help topics will help to set the baseline skills for viewing and interacting with data:

- Sign in to Tableau Server or Tableau Online
- What can I do with a Tableau site?
- What can I do with a Tableau web view?
Tableau Blueprint Help

- Explore and analyze data in a view
- Use custom views
- Share web views
- Subscribe to views
- Send data-driven alerts
- Comment on views

For Creators and Explorers, provide the following links:

- Web Authoring and Tableau Desktop Feature Comparison
- Creators: Get Started with Web Authoring
- Creators: Connect to data on the web
- Prepare Data on the Web
- Edit Views on the Web
- Connect to published data sources while web editing
- Create a Dashboard
- Create a Story
- Save your work

FAQ

Maintaining an FAQ will help users quickly and easily answer common questions, as well as save you time from not having to directly respond to every question.

Support

In the support area, define where a user should go for assistance, including peer-to-peer assistance, office hours, and logging a support ticket. If a user cannot find the help they need, then they are more likely to become frustrated with the situation and not continue using Tableau. Establish and document an escalation path for tickets in case a question cannot be answered by an expert within the user’s team or department. For more information, see Tableau Support Processes on page 217.

You should also take advantage of Tableau’s online Help and Knowledge Base by publishing links to common help support topics: Tableau Desktop and Tableau Prep Builder. On these
pages, you'll find a list of popular topics that you can curate on your enablement intranet’s support page.

Announcements

Post announcements on the enablement intranet to communicate everything from user group meetings, learning plans, training opportunities, and office hours to maintenance windows, upgrades, and other service-impacting events.

User Directory

Creating a user directory makes people discoverable, promotes the exchange of ideas, helps users find others in or outside of their team for assistance, and builds your user community. The user directory should include every licensed Tableau user, with their name, department, title, license level, skill belt level, and certification level.

Licensed Tableau users can be obtained from the Tableau Server Community TS Users Data Source and joined with HR, training, and certification data to provide a complete profile of each user. Alternatively, the Tableau Users on page 26 tab of the Tableau Blueprint Planner will also include this information and can be used as the data source to create the list. Use Tableau to create the view and embed it in the web page.

Governance Models

Combining people, process, and technology, it is informed users who put your company’s Tableau Governance Models on page 82 into practice. Help your users understand the centralized, delegated, and self-governing models of data and content governance, which were established with the Tableau Blueprint Planner’s Governance Worksheet, by publishing guidelines, policies, and processes. Users need to understand and reference your organization’s workflow regarding data source certification and content promotion for everything from sandbox to production projects.

Data Platforms

Your company’s sources of data should be listed so that users know where to go for what kind of data. Document the database name, table or view, type of authentication, and access request requirements on each one.
Certified Data Source Directory

To help users understand what trusted data is available to them and more quickly find a governed dataset for their analysis, create a certified data source directory. The Certified Data Source Directory lists curated, governed data sources. It should include the data source name, owner, and source of data at a minimum. Since one department’s data can be helpful context for another department, consider sharing all certified data source names to the directory to increase awareness around availability while also minimizing the possibility of duplication.

Certified Data Sources can be obtained from the Tableau Server Community TS Data Connections Data Source by filtering on [Data Source is Certified] = TRUE. Use Tableau to create the view and embed it in the web page.

Analytics Best Practices

With analytics best practices readily available on the enablement intranet, content authors will have guidelines for choosing the right chart type and creating effective, actionable dashboards for content consumers. For more information, see Analytics Best Practices in Tableau on page 173.

Visual Style Guide

Do your users know what a great dashboard looks like? By publishing a Visual Style Guide, you will give your users a head start on design, as well as guidance on how to differentiate between ad-hoc and certified content, which fonts and brand colors to use, and other formatting options. Often the best place to start defining a visual style is your corporate brand or style guide. Post a custom color palette and layout template in this area. For more information on branded layout templates, see Analytics Best Practices in Tableau on page 173.

Inspiration

You can embed Tableau RSS and/or Twitter feeds in an intranet page to deliver current content directly from Tableau to your user community. Tableau provides an RSS feed for the Tableau Blog, which can be consumed with an RSS viewer web component. Separately, Tableau provides an email subscription service for Tableau Public’s Viz of the Day Gallery. Tableau (@tableau) and Tableau Public (@tableaupublic) Twitter feeds can be embedded on your intranet by using Twitter’s embedding page.
For the latest and greatest content in data visualization, join the #datafam by following Zen Masters and Ambassadors on twitter.

Events Calendar

Building an events calendar based on engagement activities outlined in Tableau Community Engagement on page 209 and Tableau Support Processes on page 217 can assist your users with engagement and adoption. These activities include user group meetings, admin group meetings, lunch-and-learn events, and office hours.

Learning Plans

To help users understand the skills needed for their job function and license type, publish learning plans for each of the roles: Site Admins, Project Leaders, Creators, Explorers, and Viewers. For more information on learning plans, see Tableau Education on page 145.

Training Videos

All videos, transcripts, and related files may be downloaded in bulk and curated in your organization’s learning management system (LMS) or published to your enablement intranet. In-house trainers may supplement the free training materials offered by Tableau with their own practice exercises or data sets relevant to your organization.

Company Education Calendar

The company education calendar has recurring meetings for Site Admin-, Project Leader-, Creator-, Explorer-, and Viewer-focused training sessions that will be held in a web meeting or a classroom. Holding these sessions monthly or even weekly, especially starting out, will provide everyone with the information they need to begin using Tableau. For more information, see Tableau Education on page 145.
User Group Recordings

By recording your internal user group meetings, you can make them available to anyone who was unable to attend in-person. They can serve as a useful reference for training new users as well.

Tableau Blog and Newsletter

Publish an analytics blog to showcase achievements and provide awareness and recognition of how data and analytics are used within your organization. Departments can submit highlights of their work and upcoming events can be promoted. Other topics might include documented value, Tableau tips and tricks, enterprise-scope data source availability, and communication of downtime/upgrades. Alternatively, you can distribute an analytics newsletter via email.

Tableau Discussion Forums and Chat

Discussion forums and other chat-based communications provide users with information in real time. These methods can also become a knowledge base as archived chats may answer questions that will arise in the future. Set up a Tableau discussion forum, chat room, and/or channel (Slack, Yammer, etc.) and invite all your Tableau users to join.

Depending on the systems used by your company, both discussion forums and chat are incredibly helpful to community managers to determine topics that may need more attention in training or with engagement activities. In forum-style discussions, questions and answers can be categorized by topic to improve future searches. For channel-based communications, you can achieve a similar result with a channel per topic or a single help channel for all questions. Either way, facilitating these connections between users will make your community stronger.

Getting Started

Building your own community spaces can be challenging, but once started, it will serve as a virtual rallying point for your users. The below methods can be used to help you set yourself up for success:

- Community Champions: A committee or team of Tableau experts can be a voice for your users and shape the way your forums are setup based on their needs. Keeping this group diverse will ensure you plan for the needs of all your users.
Types of Resources: Which topics are most important to your users? How do they prefer to consumer content? What is the frequency at which you should deliver content? Answer these questions can get you started on creating content that is right for your user base. Your community champions should be involved in this planning phase.

Encourage self-service help: A key benefit of community spaces is the ability for users to solve their own problems and issues through the expertise of others. By setting service level agreements on response times to chat messages or posts you can give your community users confidence that they will not go unheard.

Roles & Responsibilities: A successful community can quickly grow to touch all aspects of an organization. Make sure the roles of the team who will be managing your internal forums are clearly defined. Examples of discussion forum and chat roles are:

- Admins: monitoring the overall health & performance of the forums
- Moderators: answering questions and engaging with forum users
- Ambassadors: those who serve as champions and face of the forums

Be Realistic: Set expectations for your forums early in terms of engagement, what types of content you will need, and who owns what.

Start Small: Build for what you need and plan for the future. Your forums may start small, but they won’t stay that way.

Building Your Forum

When setting up your own forums and chat spaces, keep in mind some of the below best practices:

- Platform: Look to company standards for chat- and intranet-based applications that work within your organization. This can be anything from your Tableau Enablement Intranet on page 199 to a chat-based application. The important thing is that your users know where to go to connect with other Tableau users, outside of regular Internal Tableau Activities on page 209.

- Easy to find resources: Create distinct spaces for your users to quickly find resources such as getting started with Tableau, advanced calculations, and employees who can offer guidance. Setting these spaces up early and populating them with content will keep your users coming back to your internal spaces.

- Categorization: Setup chat channels or tag forum posts with specific topics to improve content searchability. As your community grows, so will the content. Make sure your users can quickly and easily find what they need.

- Internal Moderators: Identify a group of power users who can help moderate the forums by answering questions, creating content, and onboarding new users. These individuals
should also be Tableau experts who can help guide your users through even the most challenging asks.

- Use the data: Keep track of how users are interacting with the forums and what topics are most popular. This will guide you in developing the right content and forum engagement plans for your users, as well as identify content for regular Internal Tableau Activities on page 209.

Through careful planning, your discussion forums and chat spaces can become a tremendous resource for driving adoption of Tableau within your organization.

**Learn from Tableau**

Leverage the Tableau Forum resources below for inspiration on how you want users to interact with your forums and the types of guides you can create:

- Tableau Forum Guidelines
- Attaching a workbook
- @ mention etiquette
- Community Etiquette
- Code of Conduct
Tableau Community Engagement

Your organization’s Tableau user community is just like the Tableau Community—only on a smaller scale. You should connect users within your company and generate enthusiasm among a group of people founded on the common cause of putting data at the center of every conversation. While building excitement around the use of Tableau, engagement activities accelerate and reinforce the vision for modern analytics, and ultimately, fuel your organizational transformation.

Engagement activities are used to create and nurture an environment for more productive, results-driven people who will use facts over intuition to make business decisions. People will collaborate with each other and share their product knowledge and business domain experience across a wide-range of skill levels and across different teams and departments, who may never have exchanged ideas before.

Engagement activities should include something for everyone, offering a variety of activities that appeal to different skill sets and are delivered through different formats from in-person to virtual, both inside and outside your company. Whether hosted by your company’s community leader, other Tableau customers, or Tableau Zen Masters and Ambassadors, there are a variety of formats to invite users to learn, collaborate, and network to increase their Tableau skills.

Internal Tableau Activities

Hosted within your company, internal engagement activities are organized by a Community Leader, following a regular schedule or events calendar that is published on your enablement intranet or wiki and promoted through other communication channels. The following activities will be covered in this section:

- User Group – open to all Tableau users to promote collaboration and sharing between teams
- Champions Group – open to all identified champions to exchange ideas
- Admin Group – open to all Tableau Server and Site administrators to review server and content usage and exchange administration ideas
- Lunch & Learn – lunchtime meetings focused on building a new skill
- Viz Games – data-analysis competition
- Tableau Day – full- or half-day event to share Tableau successes
- Analytics Day – similar to Tableau Day, but broadened to include other technologies

### Tableau User Group

Internal user groups can take different shapes depending on your organization’s size and geographical distribution, but one thing is certain—every Tableau user is invited to participate. This also includes Server and Site Administrators. It may start with just a few people, or it could be hundreds across the organization. During user group meetings, people can openly share information across different teams and departments. Regardless of skill level, it’s a great way for everyone who attends to learn, network with other users, and exchange fresh perspectives on solving business problems with data.

A strong internal user group starts with a strong leader. It is their passion and attention that will fuel and inspire the rest of the group. The community leader should schedule a regular, recurring monthly meeting time, and promote it on the enablement intranet. Don’t be discouraged if attendance numbers aren’t high initially. When relevant topics are put on the agenda, people will attend because they know valuable information will be shared. If possible, record the meetings and archive presentations on the enablement intranet so that new users can benefit from on-demand viewing. A sample user group agenda is shown below:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Description</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welcome/announcements</td>
<td>Welcome attendees and share announcements such as new help topics on the intranet, training sessions, etc.</td>
<td>10 min</td>
</tr>
<tr>
<td>Skill development</td>
<td>Select a topic to help attendees learn a new skill, such as product skills or demonstrate design best practices from internal or Tableau Public content.</td>
<td>15 min</td>
</tr>
<tr>
<td>Success story</td>
<td>Share an achievement that was made by using data.</td>
<td>10 min</td>
</tr>
<tr>
<td>New certified data sources</td>
<td>Highlight new certified data sources that have become available because one department’s data can add context to another’s.</td>
<td>5 min</td>
</tr>
</tbody>
</table>
### Tableau Blueprint Help

<table>
<thead>
<tr>
<th>Topic</th>
<th>Description</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top content recognition</td>
<td>Showcase the top 10 dashboards in the company.</td>
<td>5 min</td>
</tr>
<tr>
<td>Open feedback</td>
<td>Allow time for open feedback and Q&amp;A.</td>
<td>15 min</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>60 min</td>
</tr>
</tbody>
</table>

Meeting topics should be tailored to suit users’ needs. Information gathered from the Data & Analytics Survey and Users tabs in the Tableau Blueprint Planner will provide initial guidance on what skills exist versus which skills need to be developed among the user community.

For existing deployments, Tableau Server and/or Site Administrators will be able to provide more information about user behaviors from the Tableau Server Repository, such as content utilization and the availability and use of published and certified data sources, subscriptions, and data-driven alerts, as outlined in Tableau Monitoring on page 121 and Measurement of Tableau User Engagement and Adoption on page 161. As an example, if there are only a few Certified Data Sources available, you can hold a session on how to publish and certify data sources and discuss the value of the curated, governed data models. Similarly, if users are not subscribing to dashboards or setting data-driven alerts, you can encourage users to take advantage of these features by explaining how to subscribe or set an alert. For more information, see Tableau Community Toolkit.

### Tableau Champions Group

Champions are part of a program to recognize people in your analytics community who heavily contribute by connecting, collaborating, and sharing with others because they recognize the value of helping their peers see and understand data. Characteristics of a champion are listed below:

- Leadership and Evangelism
  - Represents the spirit and voice of the community: inclusive and kind.
  - Teaches by their actions and encourages good behavior within the community.

- Knowledge and Advocacy
- Has a fair understanding of the Tableau product, company, and/or community.
- Is active in the community.
- Responsive and Accessible to others in the community
  - Responds and engages with others regularly in regards to Tableau.
  - Collaborates and contributes where possible.

Champions should meet as a group to share what they are hearing and seeing from users to feed into community-wide, enablement activities, representing the Tableau community within your organization.

Tableau Admin Group

The admin group is a subset of the user group, consisting of Tableau Server and Site Administrators only. Admin group meetings should occur monthly to exchange ideas, share challenges, and identify how changes will be communicated. In organizations with multiple Tableau Server instances, having a Tableau Server Admin group will help to coordinate standards and upgrades, as well as tackle common challenges. A sample administrator group agenda is shown below:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Description</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welcome/announcements</td>
<td>Welcome the admins and share announcements.</td>
<td>10 min</td>
</tr>
<tr>
<td>Server Utilization Review</td>
<td>Review server hardware utilization, background tasks, user onboarding schedule.</td>
<td>15 min</td>
</tr>
<tr>
<td>Content Utilization Review</td>
<td>Review content utilization, slow-loading dashboards, long-running extracts, stale content.</td>
<td>20 min</td>
</tr>
<tr>
<td>Open feedback</td>
<td>Allow time for open feedback and Q&amp;A.</td>
<td>15 min</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>60 min</td>
</tr>
</tbody>
</table>
Tableau Blueprint Help

Tableau Lunch & Learn

It’s often challenging to schedule time during a busy workday, but everyone has to eat. Lunch-and-learn events are an informal option to help users learn from each other. Schedule a monthly, lunchtime meeting where people can bring their food in and listen, or if possible, even arrange for food to be brought in. This will definitely increase your attendance rate.

Tableau Viz Games

Viz Games is a visualization competition where a sponsor issues a visualization challenge, a data set prepared for analysis, and a deadline for publishing submissions, typically one week or more into the future. Live contests, where contestants compete in a race to submit visualizations before the clock runs out, are exciting, but more complicated to run. At Tableau, both formats are used. The online contests determine who is eligible to compete in the final, in-person contest.

Selecting a theme up front helps guide the rest of the competition. Themes for viz competitions are typically around a particular topic, dataset, chart/dashboard type, or feature. Get creative and challenge the participants in a way that is fun and engaging!

Executive sponsors may tie the contest back to a strategic initiative to motivate contestants around a common cause or business problem. Allow cross-functional teams to form and solve the problem by bringing together a Tableau champion, a data expert, and a business domain expert. For example, the company has a $45 million savings target. Finance provides Accounts Payable data and contests are asked to design a dashboard to identify potential savings areas.

Judging panels can be a group of people with diverse experiences and perspectives to make for a balanced evaluation. The panel should evaluate submissions on the following areas:

- Analysis – Review the question(s) that are being asked and the insights the viz provides. In more detail, look at the type of data used, the type of charts used, the type of aggregation and statistical analysis used. How sophisticated and appropriate for the story, or question being answered, are these analyses?
- Storytelling – See whether the context of the topic and questions being posed are clear. Is it clear how one moves through the viz and from question to answer? Does it highlight what is interesting and why it matters? All of that can be done in different ways, using color/shape/size, text, images, annotations, story points, etc.
- Design – Evaluate the visual appeal, layout and flow, use of whitespace (or lack thereof), and colors and images. How polished is it? How appropriate is the design for the story that is being told?
Use a scoring sheet to record values and feedback:

Viz and Link Analysis (0-10) Storytelling (0-10) Design (0-10) Feedback

Recognition, no matter how small, is motivating. Give out prizes for simplicity, for guided analytics, for creativity, and even for obscure insight. For more information, see Tableau Community Toolkit.

Tableau Day

To raise the visibility of data and analytics within your company, schedule a Tableau Day one or two times a year. The event can be like a miniature Tableau Conference for your company where presenters share their work and insights. Coordination with executive sponsors and achievements made on strategic initiatives are a great way to emphasize the transformational power of data and analytics.

Tableau can provide speakers who lead the attendees through demos, hands-on training, and Q&A. Having a Tableau resource onsite—or more than one—is a guaranteed way to attract other users. Working with your Tableau account manager to set up a Tableau Day is a fantastic method to generate excitement and build momentum across the organization.

Analytics Day

An Analytics Day is similar to a Tableau Day, but the scope expands to include subjects other than Tableau. Expanded topics like systems modernization and database platforms can be combined with Tableau content for a broader showcase of the use of analytics and advances being made with data.

External Tableau Activities

External activities, outside your company, are organized by Tableau or Tableau Community leaders. You should encourage users to attend these activities as well. For a full list of scheduled community events, visit Events and Conferences. The following external activities are covered in this section:
Area Tableau User Group

A Tableau User Group is a customer-organized event that creates a place for users to learn, collaborate, and network. With over 250 worldwide, Tableau User Groups are organized by geographical regions and are most commonly held at office spaces or universities. Hosting a Tableau User Group is beneficial to both the host and attendees—it’s free onsite training for employees and great exposure for creating visibility in the community!

Virtual Tableau User Group

*Industry user groups* are often run by customers. Here, more people are able to connect with their peers in 14 active industry groups: Server Admin, Healthcare, Government, K-12, Law, Retail, Data + Women, Nonprofit, Insurance, Higher Education, OEM Partners, Travel & Hospitality, Manufacturing, and Loss Prevention.

Tableau Public Virtual Challenges

Run by Tableau Community Leaders and Zen Masters, Tableau Community-hosted events inspire others, demonstrate different ways to solve problems, and offer different perspectives for applying Tableau. This is in no way meant to be an exhaustive list.

Makeover Monday helps you improve your data visualization and analysis skills by exploring different perspectives and approaches to a data visualization. With participants from around the world, Makeover Monday is a weekly learning and development session hosted by Tableau Community Leaders and Zen Masters. Every Monday, participants start with a given data set and create better, more effective visualizations. Consider time-boxing yourself to one hour, just to make something quick.

Workout Wednesday will help you grow your Tableau skills by testing your knowledge of Tableau. Participants in these weekly challenges are asked to replicate the challenge as closely
as possible. When you think you have it, leave a comment with a link to your visualization, and post a pic on Twitter for others to enjoy. You should aim to complete challenges within one hour, and solutions are provided for all challenges if you get stuck.

For more information and a more extensive list of Tableau Community-hosted virtual challenges, check out Tableau Public’s Community Resources page.

Tableau Community Forums
Find answers and help others, connect with other users, add your voice to future Tableau product releases. Browse topics, ask questions, and share your insights. For more information, see Tableau Forum Guidelines.

Tableau Conferences
Customers come to Tableau Conferences to learn how to be faster, gain inspiration, network with other attendees, and build lasting connections. Whether you’re new to data analytics or a seasoned pro, Tableau Conference has the content you need to kick your skills into high gear. From lectures and hands-on training to collaboration sessions and meetups, Tableau Conference has something for every learning style, including Tableau- and customer-led breakout sessions, training workshops, and certifications. The events are held in the US (Tableau Conference) and Europe (Tableau Conference Europe) annually.

Iron Viz Competition
Iron Viz is Tableau’s own data visualization contest, giving you the opportunity to compete with data rockstars from around the world. The winners of a series of topic-themed virtual qualifier competitions determine the finalists who advance to a live on-stage championship at either Tableau Conference Europe or Tableau Conference. Find out about the schedule and more here.
Tableau Support Processes

In addition to the proactive steps you’ve taken with self-service help resources and education initiatives published on your enablement intranet, your user community should be able to request more support in case these two approaches do not answer their question or resolve the issue. If a user cannot find the help they need, then they are more likely to become frustrated and abandon Tableau, which will negatively impact adoption targets.

Like other enterprise platforms, you should define the support escalation path for Tableau, considering the next levels of support that will be available and which team will be responsible for the resolution. Customers have successfully established community-led support by using champion-created content, and escalating to the analytics or IT team for system-level issues, such as server and database access. Log and categorize these requests to analyze the support data and identify opportunity areas for new content on the enablement intranet, user group topics, and educational needs. Additionally, there are a number of self-help resources are provided by Tableau:

- **Knowledge base** with step-by-step instructions to resolve problems
- **Tableau Community** forums to find answers from other Tableau users worldwide
- **Support hub** with alerts, drivers, release notes, known issues, and FAQs
- **Tableau Trust** for status of the Tableau Online and Tableau Public
- **Twitter support** with updates trending technical support issues, popular KB articles, and more

Through a variety of interactions, you need to support your user community, encourage collaboration, and remove the obstacles to using data and analytics effectively. This document outlines the tactics to develop Tableau champions, connect people with peer-to-peer assistance, and define the support escalation path.

# Tableau Champion Champion Development

Residing within each team or department, champions see the transformational value of Tableau and possess the skills necessary to maximize the impact of data and analytics using visual best practices in their business domain. Initially, this starts with the content creators who are part of the project team, but as the deployment expands to new departments and teams, new champions will need to be developed to scale your analytics practice.
Champions are a key part of the adoption process because they reduce the dependency on a centralized support team. They will connect users who are analyzing similar data and identify cross-functional collaboration opportunities across the organization. By involving champions in new user onboarding within their department or team, champions will help to orient those who are new to Tableau and promote the use of data and analytics for making business decisions. Being on the front lines of applying Tableau to make data-driven decisions, champions will provide valuable input to community communications and engagement activities to optimize your organization’s analytics practice.

Because champions will be recognized as experts, you should prioritize and invest in developing their skills prior to beginning a company-wide, education initiative and support their continued learning. Depending on the size of your user community and the bench strength for analytical skills, you will choose an approach that’s appropriate for your organizational needs. Ensure you are clear on the scope and responsibilities needed to fulfill the role, obtain management approval for the time champions are committing, and recognize and reward their contributions to support others. Two examples are detailed below:

- Department/Team Tableau Champions – Champions are identified within departments or teams and functional or geographic areas. They will have both Tableau and business domain data expertise to help others institutionalize analytics best practices as outlined in Analytics Best Practices in Tableau on page 173. They should also review user engagement with the Site Administrator as defined in Measurement of Tableau User Engagement and Adoption on page 161 to quantify the impact of their contributions.
- Tableau Community Champions – Champions are identified across the user community for the value they add to the community through sharing best practices, helping new users, and assisting users create or make over their dashboards. They should assist the community leader with coordination of relevant communications and engagement activities as outlined in Tableau Communications on page 199 and Tableau Community Engagement on page 209.

Peer-to-Peer Assistance

With peer-to-peer assistance, you encourage others to share and transfer their Tableau knowledge. This allows your user community to leverage the collective brainpower of the entire organization. This section outlines Data Doctor, mentoring, and discussion forums and chat.
Tableau Data Doctor

The Data Doctor toolkit is a collection of resources to organize and host your own help sessions where members of your analytics team and/or champions assist other Tableau users. Data Doctor fosters engagement and enablement by connecting your Tableau experts with their colleagues who have questions or need help using Tableau in live, one-on-one sessions. Organizations have used Data Doctor to provide peer-to-peer support and training, as well as identify individual, departmental, or organizational knowledge gaps within their organization. For more information, see Tableau Community Toolkit.

Mentoring

With mentoring, experienced Tableau users share their knowledge with others. Champions should take a lead role in onboarding within their teams or departments by mentoring new Tableau users, introducing available data sources, and providing informal check-ins to grow the analytical skills of their team members. Using data from Measurement of Tableau User Engagement and Adoption on page 161, champions can partner with Server or Site Administrators to see which users are creating and consuming content and determine who might need more encouragement.

Tableau Discussion Forums & Chat

Discussion forums and other chat-based communications can provide users with information in real time. These methods can also become a knowledge base as archived chats can answer questions that will arise in the future. Set up a Tableau discussion forum, chat room, and/or channel (Slack, Yammer, HipChat), and invite all your Tableau users to join.

External Tableau Community Forum

The Tableau Community forums are a source of information to answer Tableau-related questions. Chances are that if users have a question, someone else has asked it in the past, or will have the same issue in the future. This community of Tableau users learn, teach, and share ideas with each other so that the knowledge within it is continually growing.

To get started, review the Tableau Forum Guidelines and Packaged workbooks: when, why, how. Visit this page to create your Tableau account and get started.