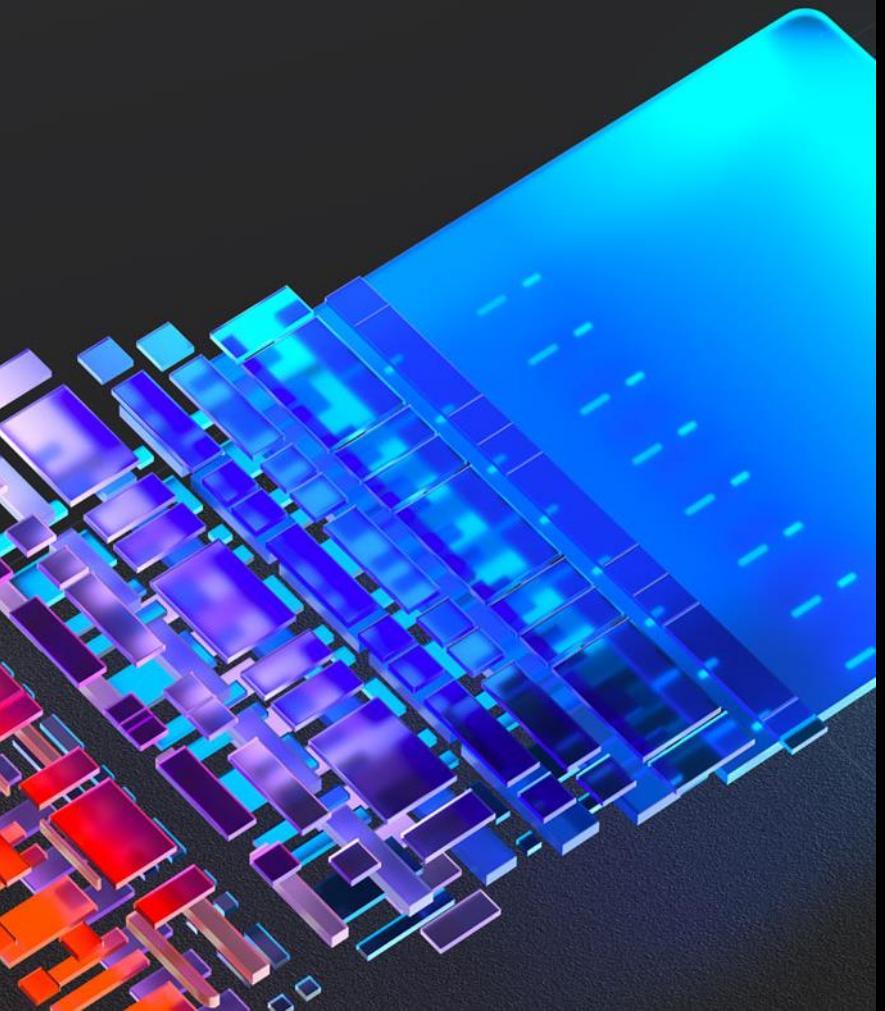




Embedded Analytics



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Data Analytics
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Frederic Gisbert
Cloud Solution Architect
Data Analytics
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Workshop Embedded Analytics



L'intégration de fonctionnalités analytiques dans vos applications constitue une attente forte pour vos clients ?

Rejoignez-nous pour une session dédiée à l'offre PowerBI Embedded dans Azure pour tirer pleinement bénéfice des avantages du cloud natif.

Nous détaillerons tous les scénariis de déploiements possibles en Multitenant, mono tenant.

Agenda (2h00)

- Introduction
- PowerBI Embedded
- Product/Licensing/Authentication Flow
- Integration with Azure Data Services
- partner benefits & program
- Demo Playground & APIs
- Deploy artifacts in partner tenant
- Deploy Template Apps in customer tenant
- Extensibility [AI Visuals | Custom connectors | PowerPlatform integration | CDM & Dataflows]
- Roadmap
- QnA



Power BI Embedded



Integrate Power BI dashboards, reports, IA visuals natively into your apps



Manage throughput and scale dedicated capacity on demand



Sign-on (SSO) and RLS without AAD Tokens



Customize interaction design with your apps



Train ML models and Apply to datasets up on refresh

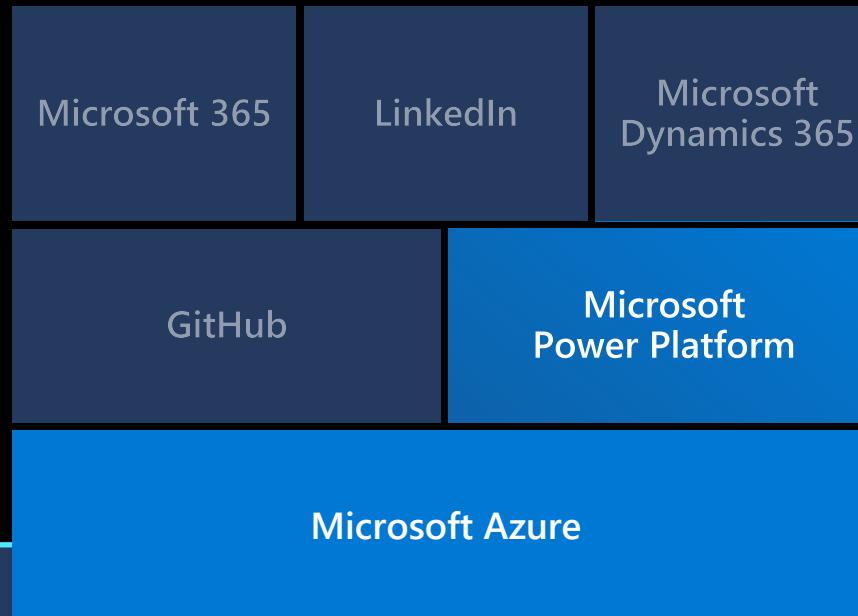


Distribute paginated reports to offline users



Open and interact with Reporting Services mobile reports and KPIs

Microsoft cloud



Identity, security, management, and compliance



Power BI



Power Apps



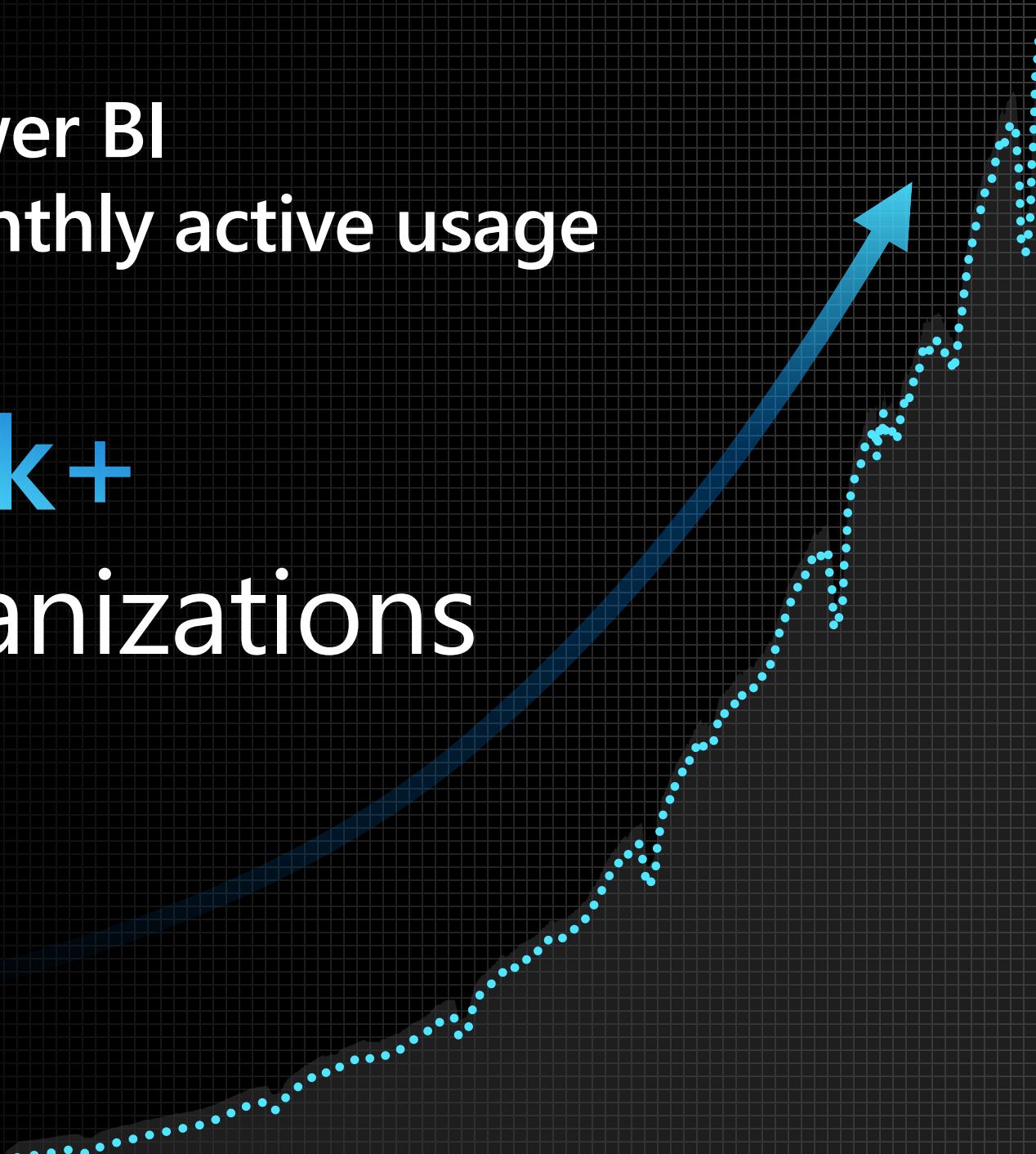
Power Automate



Power Virtual Agents

Power BI
monthly active usage

260k+
Organizations



Thriving community



1.4M
Community
Members

300+
Independent
Power BI User
Groups Worldwide

Customer Ideas

- **500k+ User Votes**
- **95k+ Active Users**
- **23k+ Active Ideas**

Rapid innovation

December

REPORTING

- Customize current theme (preview)
- Export current theme
- Setting table column or matrix value as a custom URL
- KPI visual formatting settings
- New decomposition tree formatting
- Filter pane toggle button in the new ribbon
- Automatic Page Refresh query details (preview)

ANALYTICS

- Load more for Analyze insights
- New DAX function: Quarter

VISUALIZATIONS

- Personalization of the visualization pane is now generally available
- xViz Hierarchy tree
- xViz Bullet chart
- xViz Parallel Coordinates
- xViz Gantt chart
- Zebra BI charts
- Zebra BI tables
- Drill Down Combo Bar PRO by ZoomCharts
- Annotated Bar by Queryon
- Tachometer 5 Ranges
- ValQ licensing updates

DATA CONNECTIVITY

- Azure Data Lake Storage Gen2 connector is now generally available
- Power Platform Dataflows connector
- PostgreSQL connector now includes the Npgsql provider
- AtScale connector is now generally available
- Azure Time Series Insights connector
- Data Virtuality connector
- Zucchetti HR Infinity connector

DATA PREPARATION

- Updates to AI Insights functions (preview)

TEMPLATE APPS

- Omnichannel insights for Dynamics 365
- Customer service analytics for Dynamics 365
- Microsoft Forms Pro for Customer Service

SERVICE AND MOBILE

- Power BI Mobile "new look" generally available

January/February

REPORTING

- Hierarchical slicer (preview)
- Updates to the new ribbon (preview)
 - Title bar updates
 - Keytips
 - Accessibility

ANALYTICS

- Incremental refresh generally available
- New DAX Functions
 - FirstNonBlankValue
 - LastNonBlankValue

VISUALIZATIONS

- Funnel and pyramid chart by xViz
- OEE Dashboard by 3AG Systems
- Organization chart by MAQ Software
- PI VIZpack by PQ Systems
 - Histogram
 - Individuals control chart
 - Individuals and moving range control chart
 - Multi-group individual chart
 - X-bar control chart
 - X-bar and range control chart
 - P-chart
 - U-chart
- Updates to Zebra BI tables and charts

TEMPLATE APPS

- Microsoft 365 usage analytics
- NFL analytics by P3
- Acterys for Quickbooks, Xero & WorkflowMax

DATA PREPARATION

- Non-admin support for query diagnostics

DATA CONNECTIVITY

- MicroStrategy connector is now generally available
- FHIR connector is now generally available
- Factset connector
- TIBCO connector
- Jamf Pro connector
- Asana connector

SERVICE AND MOBILE

- Power BI report server January release
- Updated Premium Capacity Metrics app with health center
- Improved report usage metrics
- Featured content in Power BI home

March

REPORTING

- New action types for buttons
- Page navigation
- Drill through (preview)
- Multi-column sort for tables
- Dual axis for line chart
- Filter pane search
- Updates to decomposition tree
- Bars per level formatting option
- Updates to behavior of data bar length
- New ribbon is now on by default

ANALYTICS

- New DAX function: COALESCE

VISUALIZATIONS

- Waterfall chart by xViz
- Updates to ArcGIS Maps
 - New connection options
 - Enterprise support is now generally available
 - Support for multiple reference layers
 - New table of contents

TEMPLATE APPS

- Azure DevOps dashboard by Data Maru
- TeamsPower by Encamina

DATA PREPARATION

- Query diagnostics is now generally available

DATA CONNECTIVITY

- Hive LLAP connector
- Cognite connector

OTHER

- Enhanced dataset metadata (preview)
- Using default system credentials for web proxy
- New instructor-led administrator in a day training

SERVICE AND MOBILE

- New search experience for Power BI service
- Power BI mobile Interaction settings

April/May

REPORTING

- Automatic page refresh for DirectQuery (preview)

ANALYTICS

- The new Q&A visual

VISUALIZATIONS

- PowerApps visual is now included by default
- New xViz visuals
- Hierarchical Variance Table
- Linear Gauge
- Tag Cloud

DATA CONNECTIVITY

- Sagra Emigo connector generally available
- Azure Cost Management connector updated
- New Workplace Analytics connector

DATA PREPARATION

- Query diagnostics
- Data profiling enhancements

TEMPLATE APPS

- Project Web App

OTHER

- New file format: .pbids
- Performance improvements for modeling operations
- Power BI app for Teams (preview)
- Power BI Premium Per User

SERVICE AND MOBILE

- New Look for Power BI mobile (Preview)
- September update for On-premises data gateway
- Template apps update (Preview)
- Roadmap updates
- Lineage view
- Dataset impact analysis
- Dataflow certification
- Copy a visual as an Image
- New look for workspaces
- Custom navigation for Apps
- Shortcuts in Android app

Largest global footprint



50+
Datacenters
Worldwide

43
Languages

National Clouds
US Government,
China & Germany

Why the world's largest organizations are standardizing on Power BI



Leading BI capabilities



Fully governed & trusted



Best economics

97%
servicenow

of Fortune 500
companies use
Power BI

Select ISVs building with Power BI Embedded



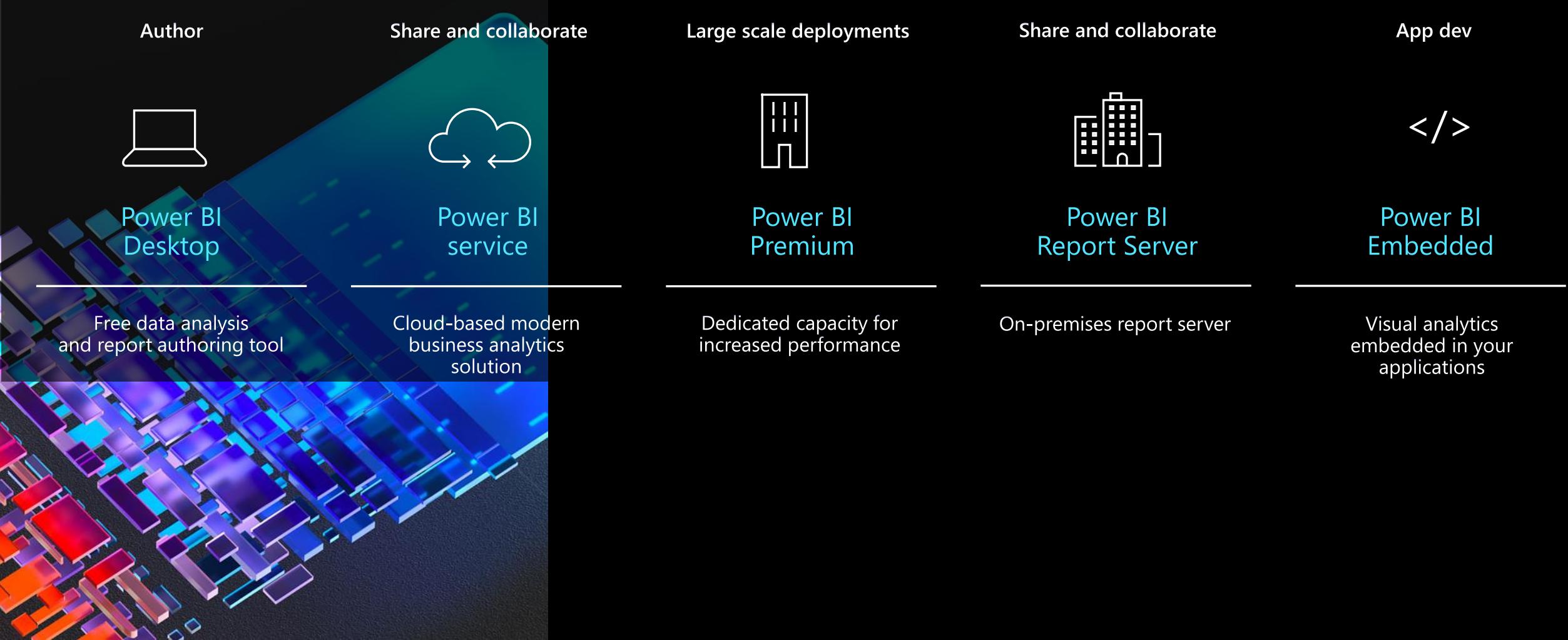


Power BI

Data Culture



Power BI product portfolio



Power BI Embedded

Embed stunning, fully interactive reports and visuals into your applications



Spend time focusing on your product instead of building visual analytic features from scratch



Connect to countless data sources so that you can expose insights to your customers



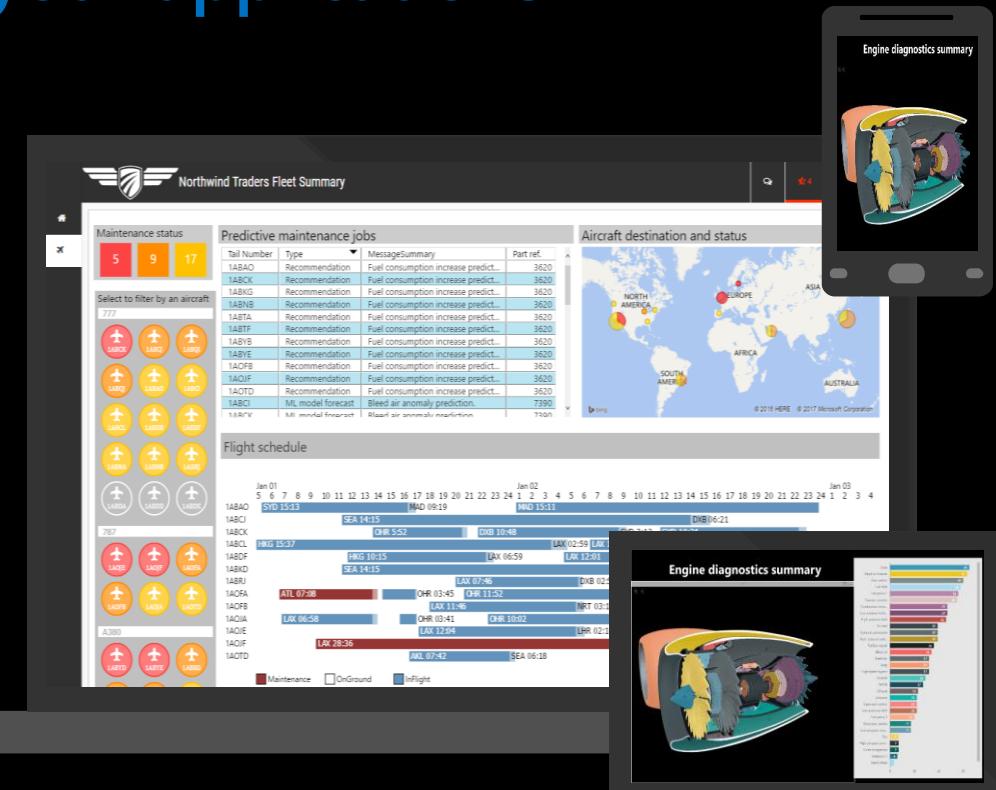
Take advantage of our existing Custom Visual library or dream up the right visual for your customers



Embed consistent, easy-to-navigate visualization experiences across any device



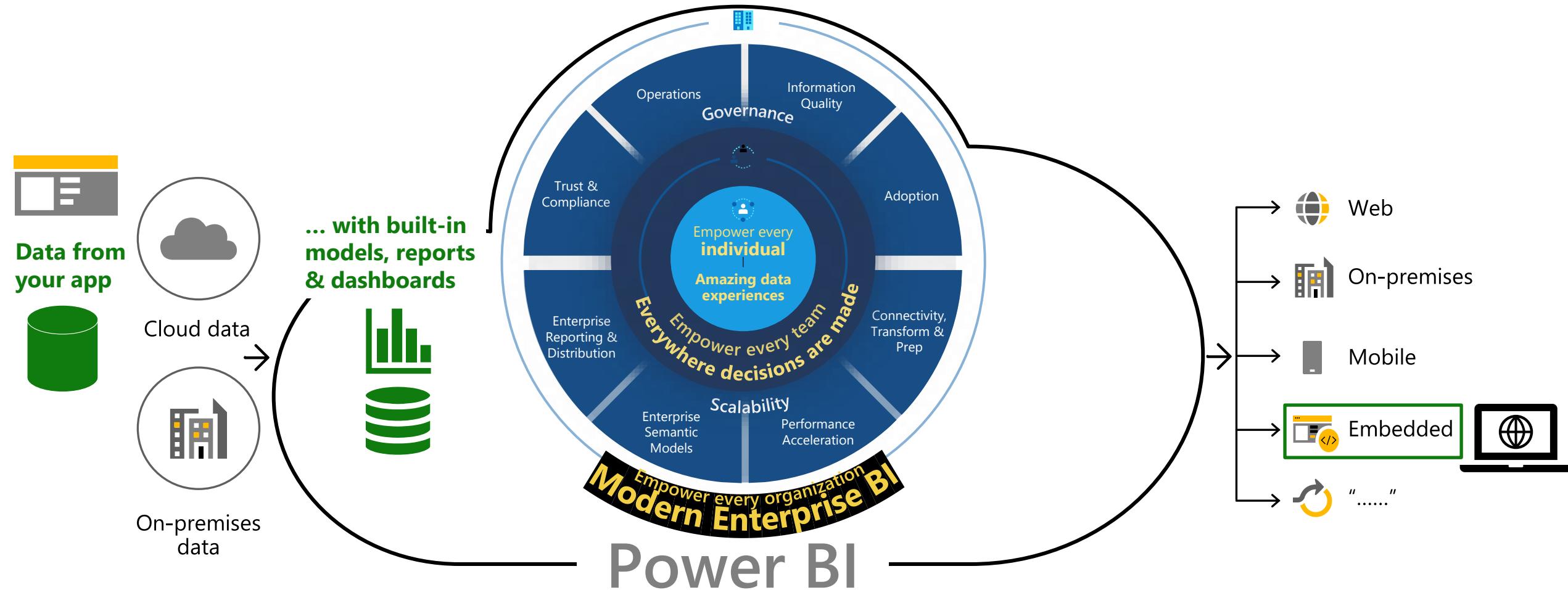
Leverage other familiar services like Visual Studio, Azure Web Apps and other Azure services





Power BI

Modern embedded analytics for your app



Power BI Embedded in a nutshell



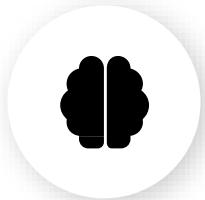
Leverage decades of analytics expertise



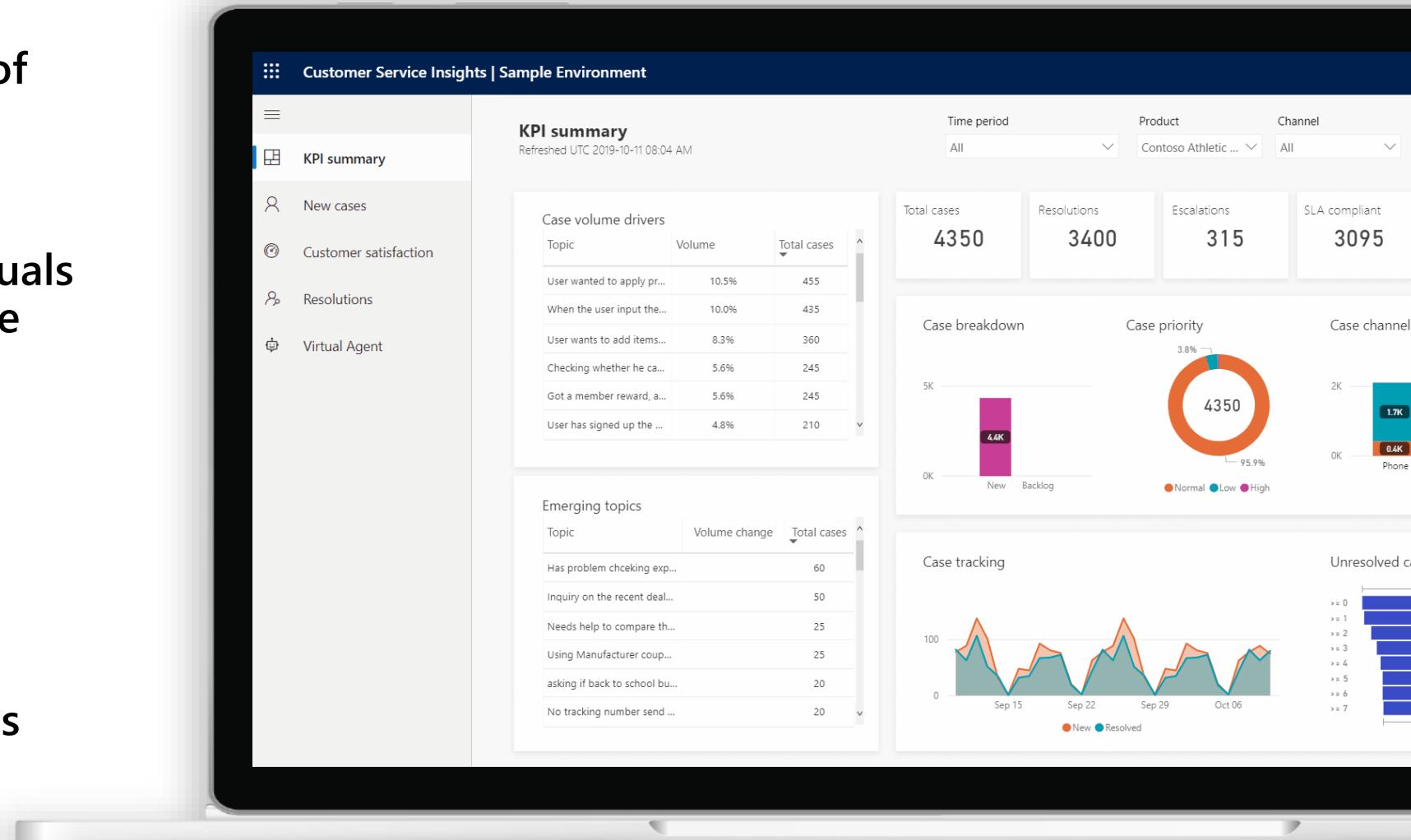
Total control of visuals and user experience



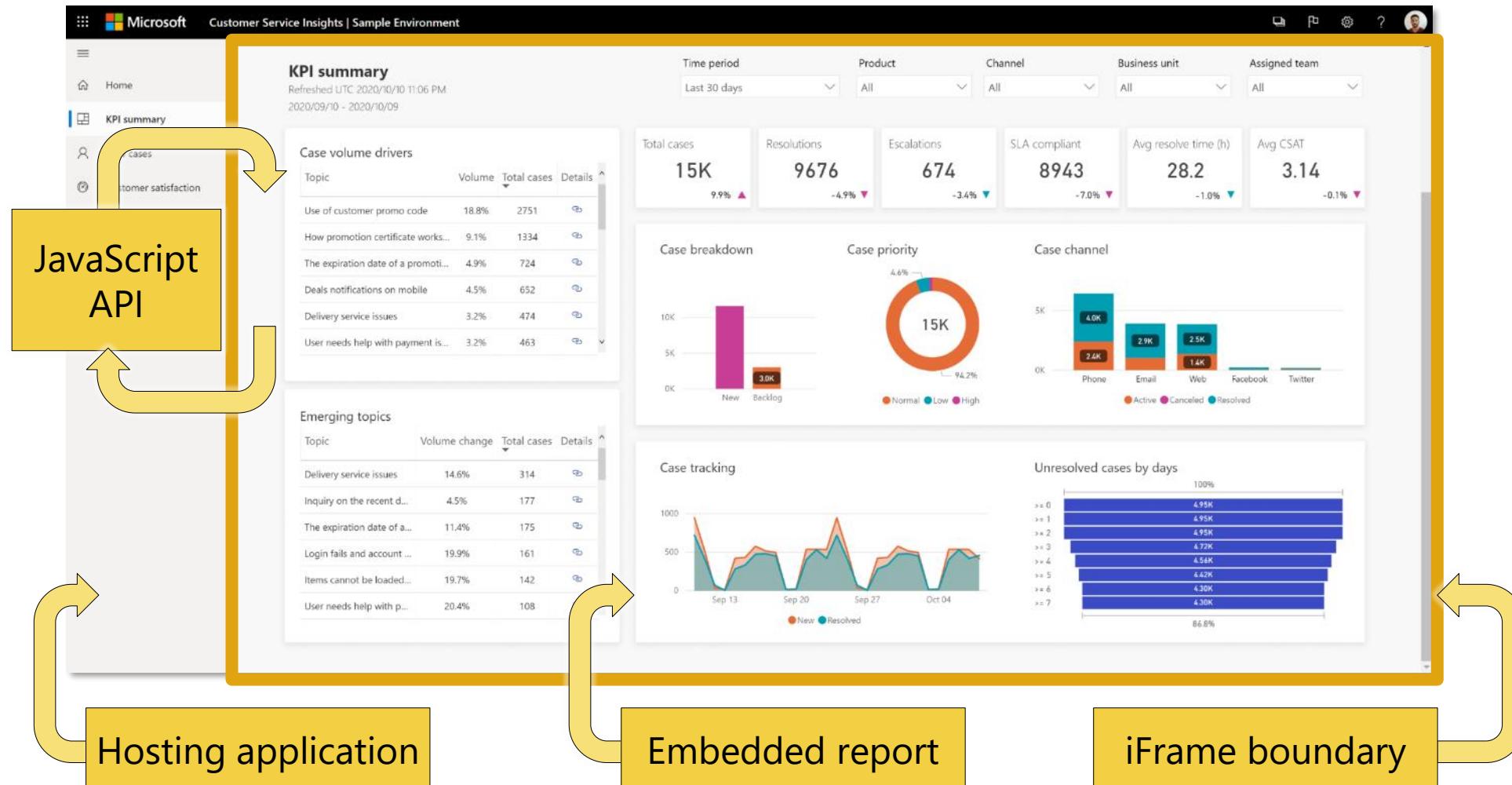
No end user licensing required (ISV scenario)



Purpose built for software companies



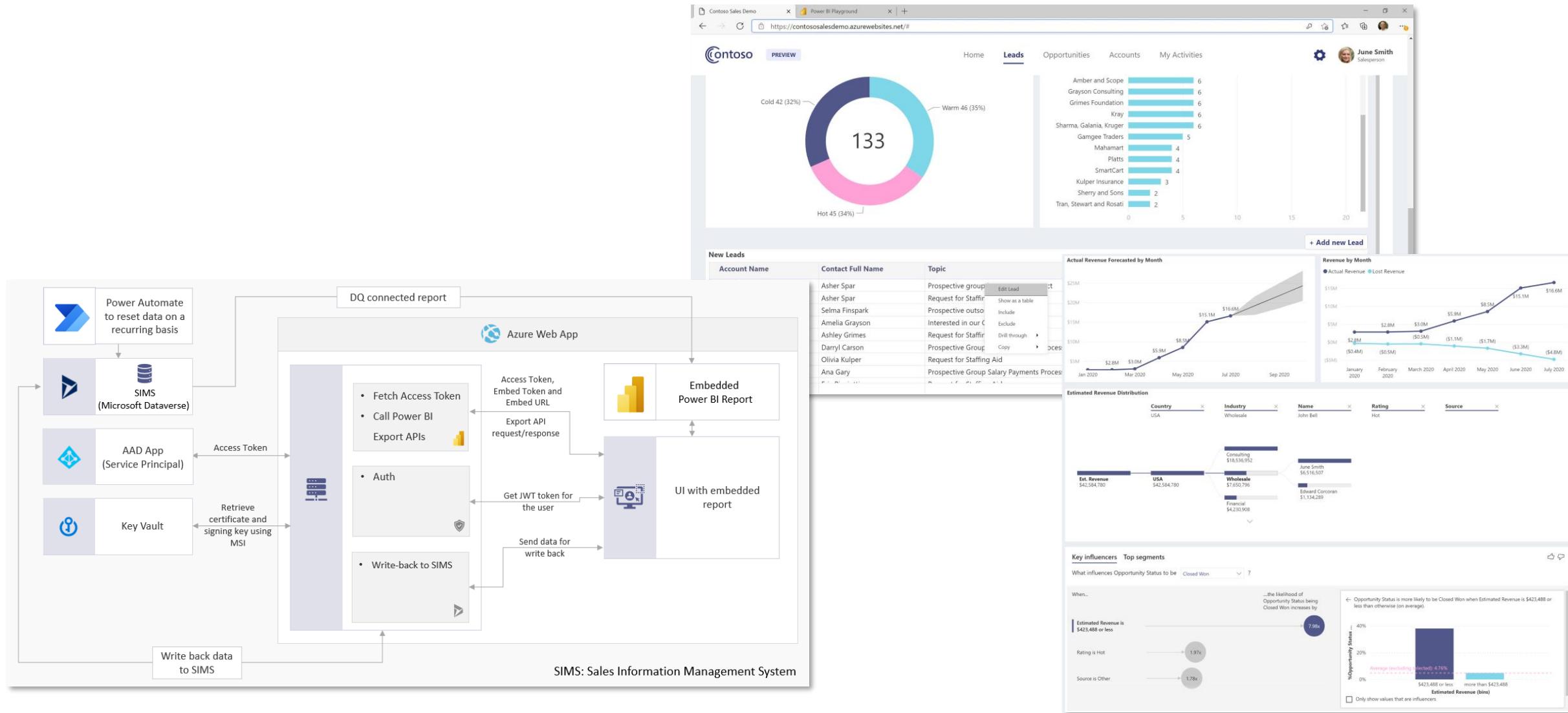
Power BI JavaScript SDK



Power BI Embedded APIs

| | |
|------------------------------------|--|
| Embed & Manage Artifact | <ul style="list-style-type: none">• Embed: Report, Visual, Dataset (New Report), Paginated Report, Dashboard, Tile, Q&A• Manage the above artifacts as well as PBIX files, data gateways, workspaces, users, data refreshes |
| General Operations | <ul style="list-style-type: none">• General UX control: pane visibility, print. Full screen mode, reload• Raise events on UX artifacts behavior (loaded, rendered) |
| Properties | <ul style="list-style-type: none">• Get artifact metadata: id, report pages, report visuals |
| Navigation | <ul style="list-style-type: none">• Set report to navigate to a page, set report page status to active• Raise event when user changes report page |
| Authoring | <ul style="list-style-type: none">• Create, Remove & customize visual: change type, add/remove data field, set/reset visual property• Get: visual capabilities, data fields, visual property |
| Filters & Slicers | <ul style="list-style-type: none">• Control filters: apply and set and get value(s), at report, page and visual level• Set and get slicers state |
| Edit & Save | <ul style="list-style-type: none">• Toggle between edit and view mode, save and save as the report, raise an event on save operations |
| Menu Operations | <ul style="list-style-type: none">• Extend visual(s) options and context menus, sort visual menu options |
| Layout | <ul style="list-style-type: none">• Apply custom layout and check mobile layout for report pages, show and hide visual headers |
| Bookmarks | <ul style="list-style-type: none">• Get bookmarks, control pane visibility, apply/play bookmarks, capture bookmark |
| Data | <ul style="list-style-type: none">• Raise data selected event (with data in JSON), export visual data, raise button clicked event |
| Manage Capacities | <ul style="list-style-type: none">• Monitor and manage capacities• Buy, scale up and down, pause and resume capacity - using ARM (Azure Resource Management) |

Power BI Embedded Contoso Sales Demo

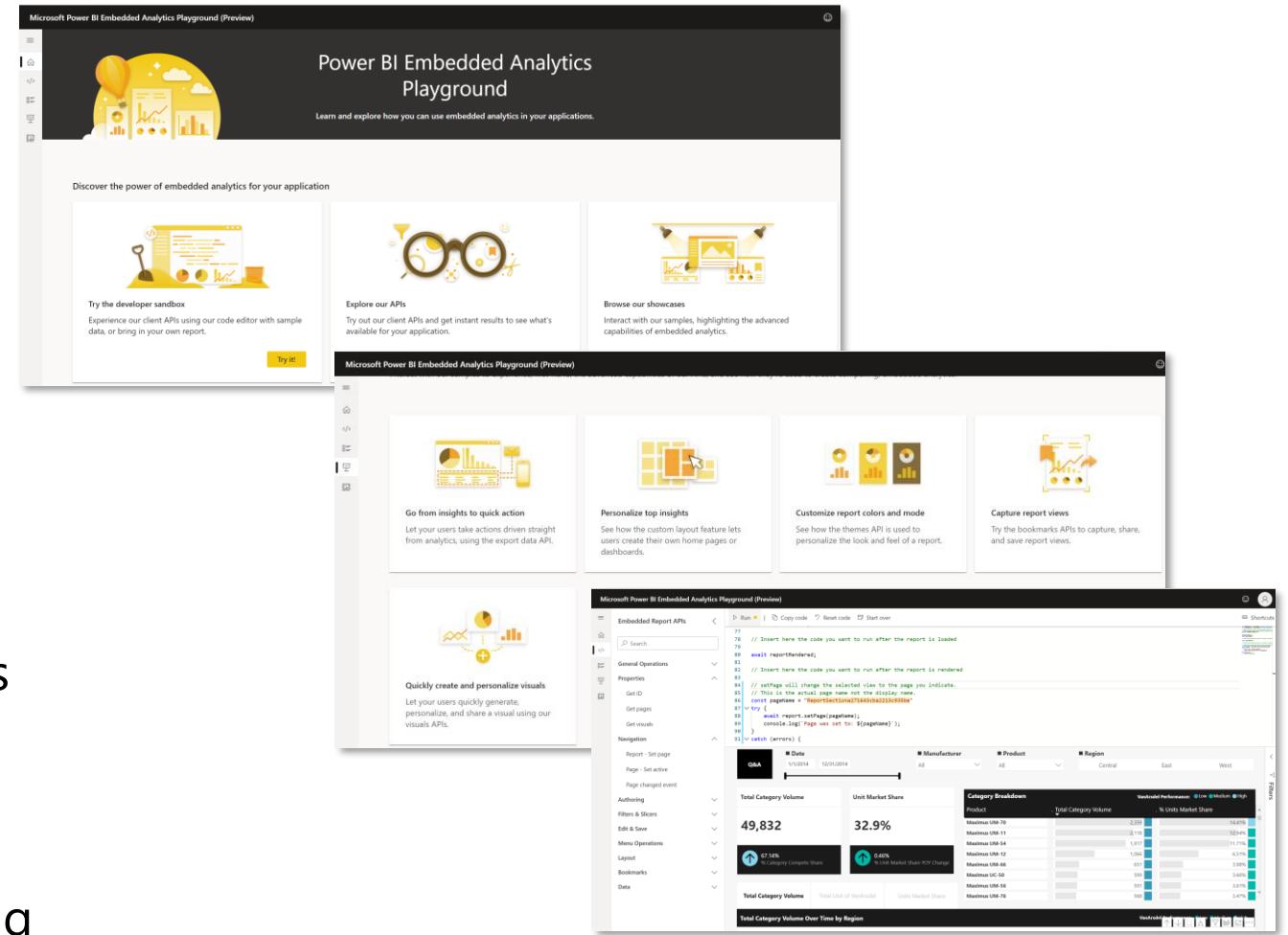


<https://contososalesdemo.azurewebsites.net/> with source code [on GitHub](#)

Demos: Power BI Embedded Playground

**Control the user experience,
report layout and interactions**

- Match to your brand with color themes
- Interact programmatically with visuals
- Allow ad-hoc visual creation and editing
- Provide answers immediately with Q&A
- Use visual data to respond with action in the app



- <https://aka.ms/pbijs> or
<https://playground.powerbi.com>

Power bi Embedded

Licensing Options
AuthN/Authz workflow
implementation

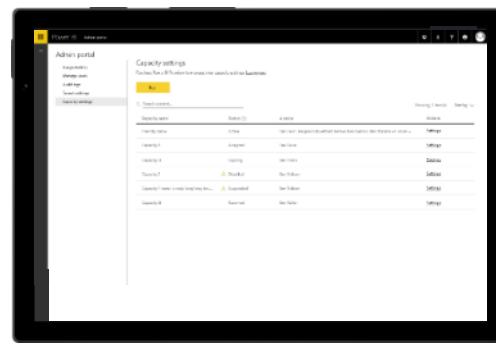
Create



Power BI Desktop
(Free)

Analyst/
BI Professional

Provision



Setup embedded solution

Power BI Pro
\$10/month

Developer
DevOp/Admin

Embed

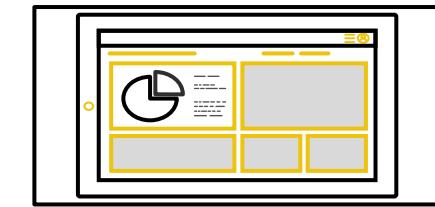
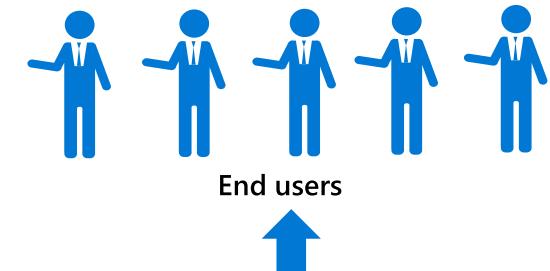


REST & JS APIs

Developer

Deploy

Scale using Capacity-based licensing



Power BI Embedded
Start for \$1/hour Your application

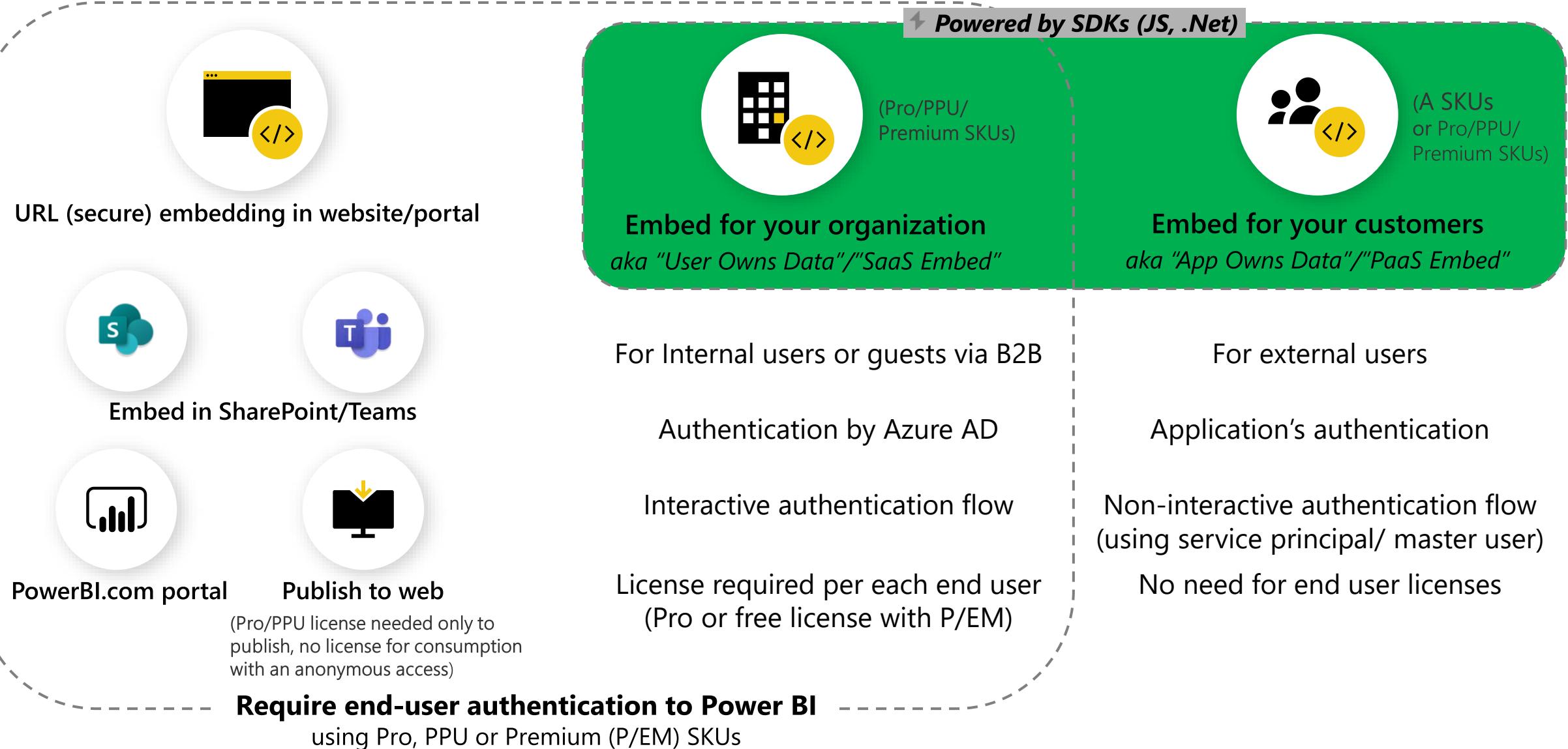
Developer
DevOp/Admin

Manage

Power BI Products & Licensing Options

| Consume and embed with the PBI service | | | | |
|--|---|--|--|--|
| Premium capabilities | | | | |
| Capacity licensing at scale | | | | |
| Author | Author & Share | | Scale | Embed for ISV Apps |
| Desktop | Pro | Premium Per User (PPU) | Premium | Embedded |
| Licensed per user - for <u>free</u> | Licensed per user per month (<u>free trial</u>) | Licensed per user per month (details in here) | Licensed by capacity per <u>month</u> (P SKUs) | Licensed by capacity per <u>hour on Azure</u> (A SKUs) |
| Ad-hoc data exploration and report authoring | Build dashboards Share and collaborate Package and publish apps | Same as Pro with access to Premium capabilities | Large scale deployments without requiring per user licensing | Embed for your application used by external app users |
| Report Builder | Premium EM SKUs | | | |
| Author paginated reports | Lower capacity with yearly commitment | | | |
| See further details here | SKUs that can work with PBI end-user authentication | | | Cannot work with PBI end-user auth. in production |

Power BI - Deployment and Embedding Options



Embedding Authentication & Authorization Options

| | For Power BI Users (aka "User owns data"/"for your organization"/SaaS) | For non-Power BI Users (aka "App owns data"/"for customers"/PaaS) |
|--|--|---|
| App registration | Optional on an AAD tenant associated with Power BI | Required on an AAD tenant associated with Power BI to generate Service Principal for Authentication |
| App Authentication | For administrative tasks hosting app may need to authenticate via a Service Principal or Master User | Only the hosting app is authenticated (to generate an access token) via a Service Principal or Master User |
| User registration | End users registered as AAD users on the same AAD tenant that Power BI uses (optionally as B2B guests) | End users do not need to registered as AAD users and no Power BI license needed per user. |
| User management for Power BI content | Done by Power BI (granting access to workspace content) via APIs or via the service portal | Done by the hosting application by associating users to a workspace's content (can be to specific artifacts) |
| User authentication | End user get prompted and signs into Power BI service. A corresponding access (AAD) token is generated per user | No end user authentication is done for Power BI/AAD the hosting app is responsible to authenticate end users |
| User authorization (artifacts and data) | With the end user's access (AAD) token the app can embed Power BI artifacts that the user has access to in the Power BI tenant. | With the access token context, an embed token is generated by the hosting app for a specific user to use a specific Power BI artifact. Authorization is handled by the app via its own user management mechanism. |
| ➤ RLS (Row Level Security) | RLS can be used to scope the data for a specific user via their AAD identity and role | The app can optionally use roles and effective identity in embed token to scope data dynamically via RLS |

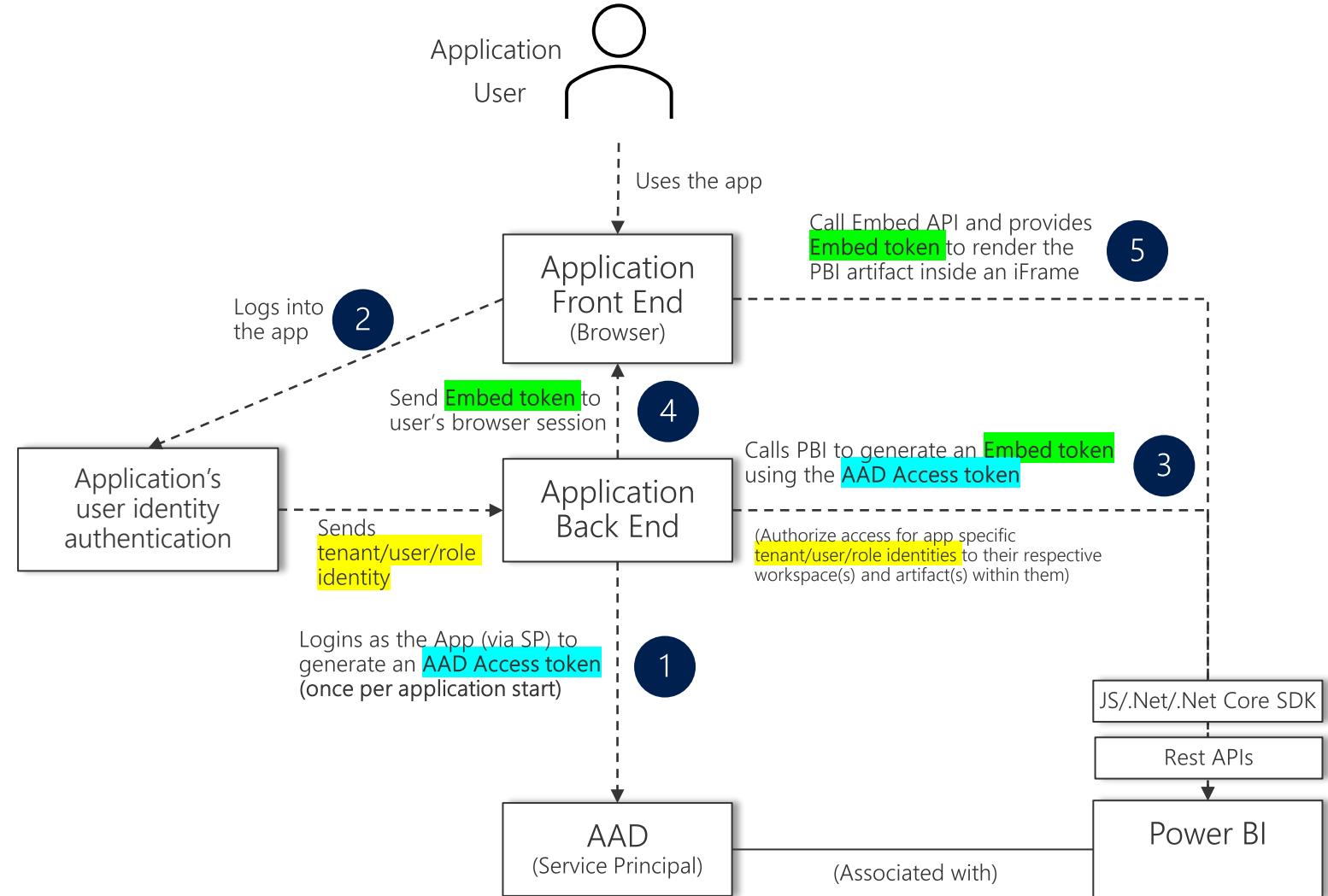
Embedding AuthN/Authz Flow for non-Power BI Users

Access to Power BI is through a service/user account

- AAD account/Service Principal representing the hosting application
- Owns the Power BI App workspace(s) where contents are stored

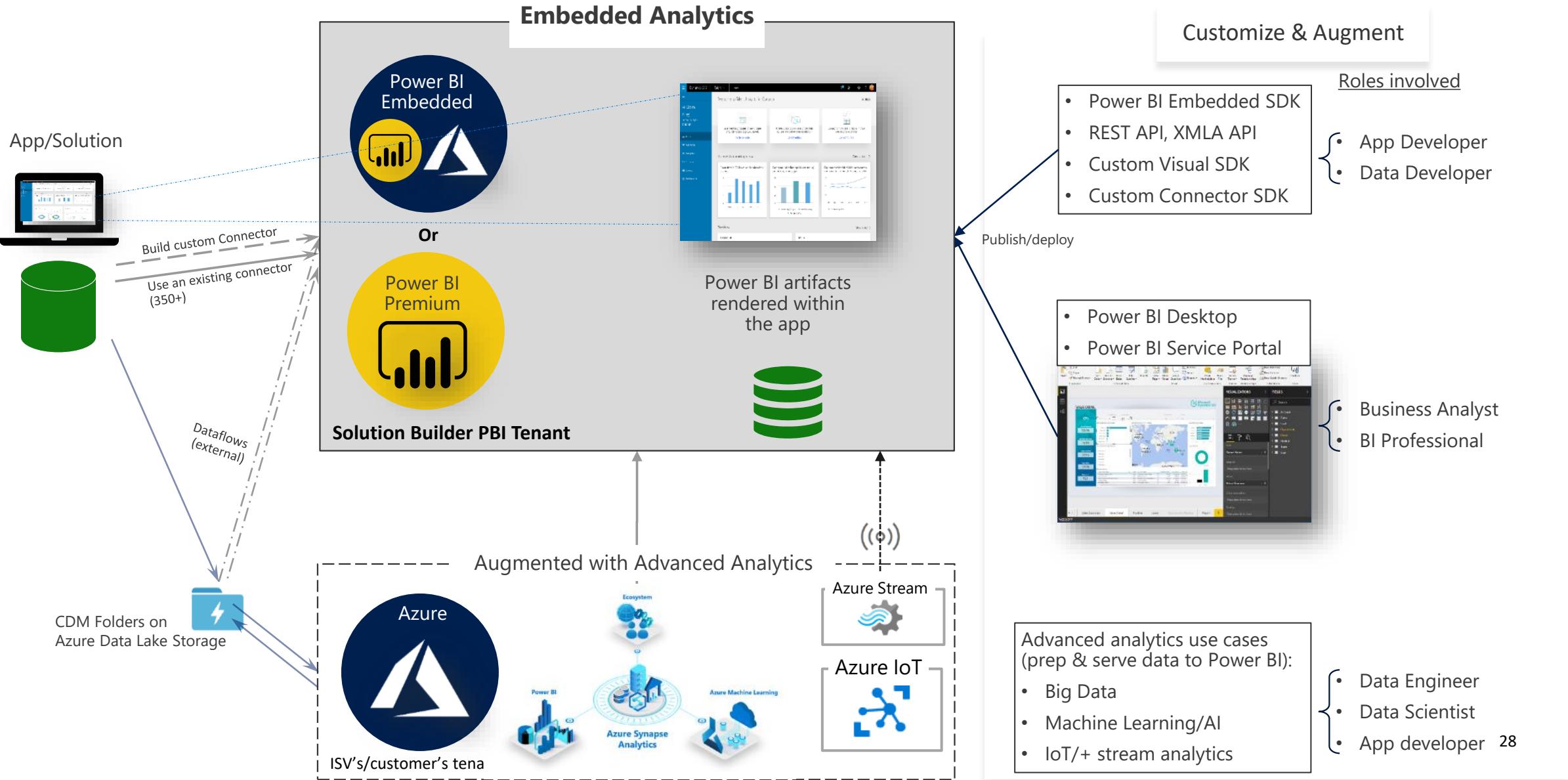
Application is responsible for:

- Authenticating the user (can use any authentication method)
- Authorized access to Power BI specific artifacts using the **Embed token** created by Power BI



Integration with Azure Data Services

Power BI Use Cases for Solution Builders



Integrate with Azure Synapse Analytics, our modern datawarehouse

In Public Preview

The screenshot shows a Microsoft Power BI dashboard titled "Microsoft | Skateboard Store". The dashboard features a "What If..." section where users can adjust the "Return Rate" from 25% to 24%. It includes a bar chart comparing "Net Sales" and "Forecast" across various stores like Abbas, Aliqui, Barba, Contoso, Fama, Leo, Natura, Palma, Pirum, Pomum, Quibus, Salvus, VanArsdel, and Victoria. The total net sales and forecast are both listed as \$30,772. A line chart shows the "What If" analysis forecast over time from January to July 2019. The interface also includes a "Develop" sidebar with options like "SQL scripts", "Power BI datasets", and "Power BI reports".

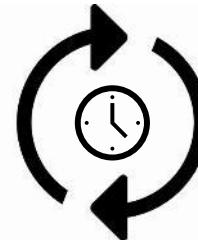
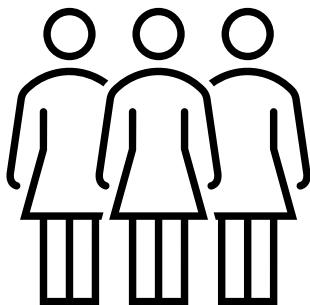
| Store | Net Sales | Forecast | Extra Profit |
|-----------|-----------------|-----------------|--------------|
| Abbas | \$2,646 | \$2,646 | \$0 |
| Aliqui | \$3,724 | \$3,724 | \$0 |
| Barba | \$1,568 | \$1,568 | \$0 |
| Contoso | \$2,842 | \$2,842 | \$0 |
| Fama | \$3,626 | \$3,626 | \$0 |
| Leo | \$1,764 | \$1,764 | \$0 |
| Natura | \$1,274 | \$1,274 | \$0 |
| Palma | | \$0 | \$0 |
| Pirum | \$2,744 | \$2,744 | \$0 |
| Pomum | \$1,372 | \$1,372 | \$0 |
| Quibus | \$2,940 | \$2,940 | \$0 |
| Salvus | \$2,646 | \$2,646 | \$0 |
| VanArsdel | \$2,548 | \$2,548 | \$0 |
| Victoria | \$1,078 | \$1,078 | \$0 |
| Total | \$30,772 | \$30,772 | \$0 |

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Introducing performance accelerator

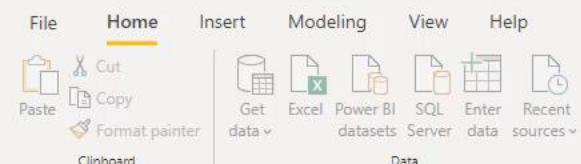
Power BI collects query patterns and determines materialized views for optimal performance

Synapses creates materialized views and directs Power BI queries to them producing superior performance



In Private Preview, contact your Account team to participate or sign-up at <https://aka.ms/IPAPreview>

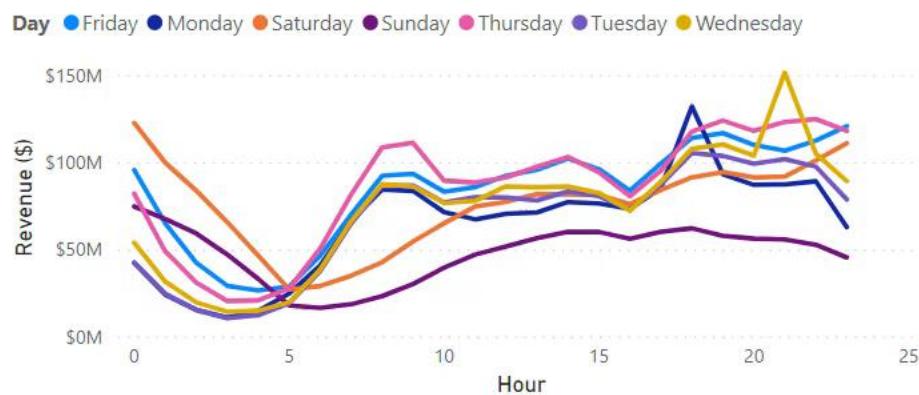
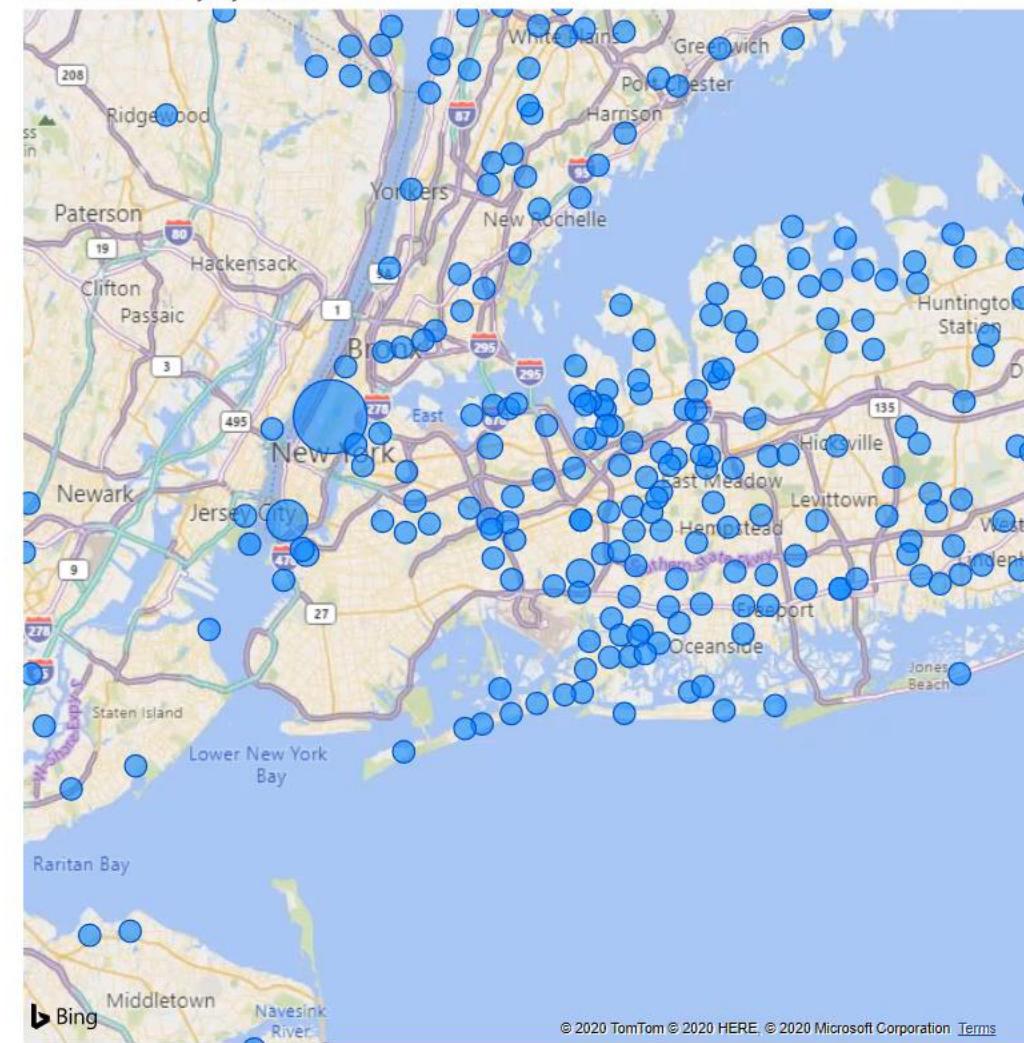


**Country**

- Canada
- United States
- Unknown

Monthly Sales Summary

| Month | Number of Sales | Total Sales Revenue (\$) |
|--------------|--------------------|--------------------------|
| March | 989,260K | 14.20bn |
| May | 959,973K | 14.41bn |
| April | 949,364K | 13.91bn |
| October | 948,473K | 14.37bn |
| January | 927,637K | 12.91bn |
| June | 903,922K | 13.58bn |
| November | 902,288K | 13.43bn |
| September | 892,409K | 13.56bn |
| December | 878,382K | 13.25bn |
| February | 877,891K | 12.29bn |
| July | 870,717K | 12.82bn |
| Total | 10,896,614K | 160.75bn |

Hourly Revenue Rate**Sales Summary by Area**

Partner benefits

ISV Scenarios

Technical & business benefits

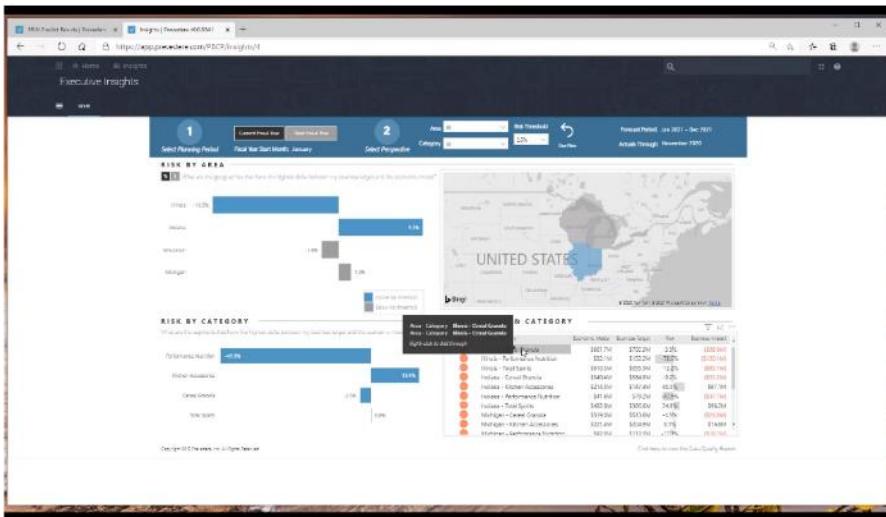
Go Big Program

prevedere - Customer Story

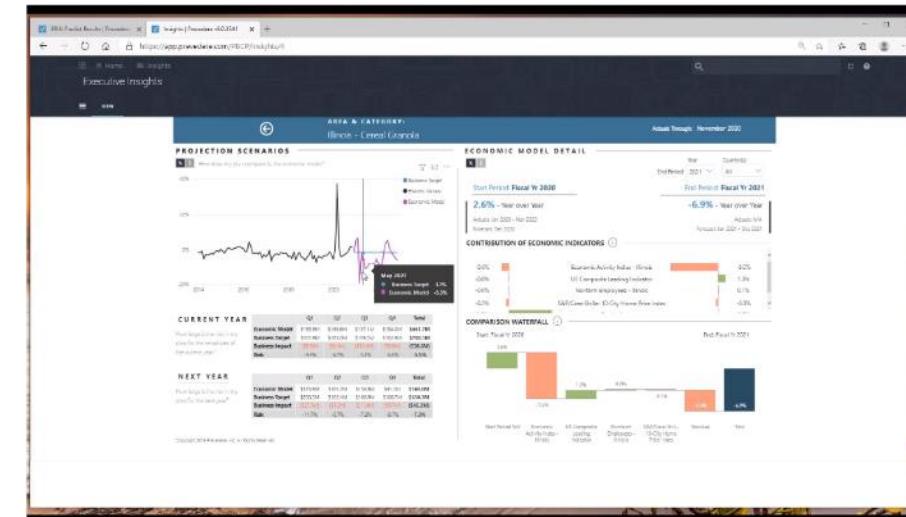
Intelligent forecasting helps executives make strategic decisions



Prevedere's solution helps companies understand and predict markets and geographies trends in order to take better timely strategic decisions (e.g.: economy, climate change, energy demand, trade policies and COVID-19 impact).



Executive Insights Dashboard with Power BI Embedded within the Prevedere web portal



Drilling down into specific detail on the Power BI Embedded report

Peredevere's reasons for choosing Power BI Embedded:

- ✓ Power BI popularity is growing with their top customers
- ✓ The ability to embed reports directly into Prevedere's portal and easily automate alerts
- ✓ The low price and easy adoption without sacrificing on technology and features

Customer Evidence



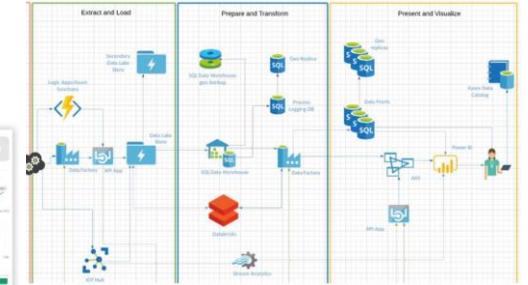
Veolia

Environmental, sustainable, data-driven solutions

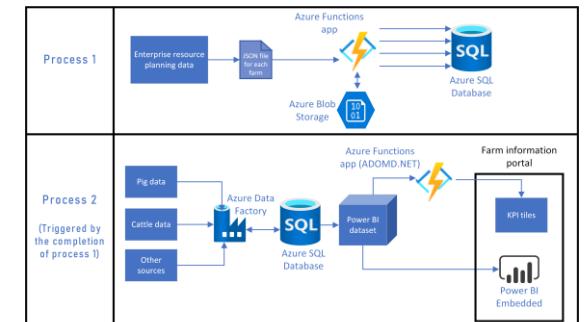
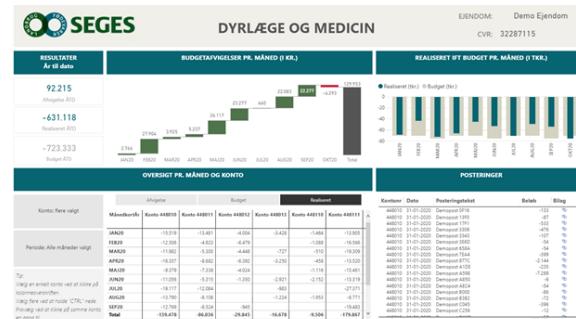


"We used to have 1,000 SSRS reports... Now we have one standard report, which can be sent to everyone. We use row-level security so when a customer signs in they only see their data. Our board absolutely loves Power BI!"

Sharon Matthews: Reporting and Analytics Manager



Leading Danish agricultural advisor SEGES creates Power BI Embedded solution to deliver critical insights to farmers



Power BI Benefits for ISVs/Solution Builders

Efficiently embed augmented analytics for your app

- ✓ Achieve **faster time to market** and **minimize** development & maintenance
- ✓ Leverage **modern elastic analytics cloud platform** with global reach
- ✓ **Augment insights** with built-in **AI** features and **ML** capabilities

Deliver flexible integrated analytics

- ✓ **Customize** the visual analytics **experience** to address various use cases
- ✓ **Drive** your app's users to **act on insights in context** to enhance outcomes
- ✓ **Extend as needed** with relevant connectivity and visualizations
- ✓ **Seamlessly integrate** with the Microsoft cloud platforms
(Azure, Office 365, Power Platform)

Partner Quote: *"Using Power BI Embedded removed 80% of the development effort. We deliver Power BI dashboards and let Microsoft provide the analytics power, support, and documentation - while we focus on core value."*
– Scott Welch, Co-founder, Edsby

Business Benefits of Power BI Embedded for ISVs

- ✓ Reduce development and maintenance costs
- ✓ Adapt faster to market changes to seize opportunities
- ✓ Quickly accommodate specific customer analytics needs
- ✓ Differentiate from competition with state-of-the-art AI-assisted analytics
- ✓ Monetize the application data and insights to create new revenue streams
- ✓ Charge extra for special advanced and self-service analytics within the application

What's Next?

- Start exploring and testing out the relevant capabilities:
 - [Embedded Analytics](#) and [Power BI Embedded on Azure](#)
 - [Power BI Embedded JS SDK documentation](#)
 - [Multi-tenancy with Power BI Embedded \(session recording\)](#)
 - APIs: [Power BI Rest APIs](#), [XMLA public preview](#)
 - [Power BI developer samples](#)
 - [Getting started with Power BI embedding setup tool](#)
- Plan for a PoC/Pilot for your solution
 - Use case
 - Objectives and success criteria
 - Scope (time span, resources, technologies)

Power BI Embedded Go Big Program

(for apps with at
least 1,000 users)

Partner Gets:

- Introduction to embedding with PBI: pricing, licensing, uses cases, capabilities, dev training
- Guidance on implementation architecture and best practices (multi-tenancy, CI/CD)
- A single point of contact to navigate and connect to product teams
- An advocate for the partner's solution needs
- Prioritized access to private previews (if, and when available)

Partner Gives:

- Engages proactively and share information under NDA
- Syncs periodically (weekly or bi-weekly) via online meetings
- Commits dev resources for PoC or pilot to test out capabilities
- Commits to deliver the Power BI based solution to customers
- Optionally be used as reference/customer story

Deployment Models

Multitenant -> Shared dataset & Report binding

Tenant isolation -> multiple datasets & Dynamic binding

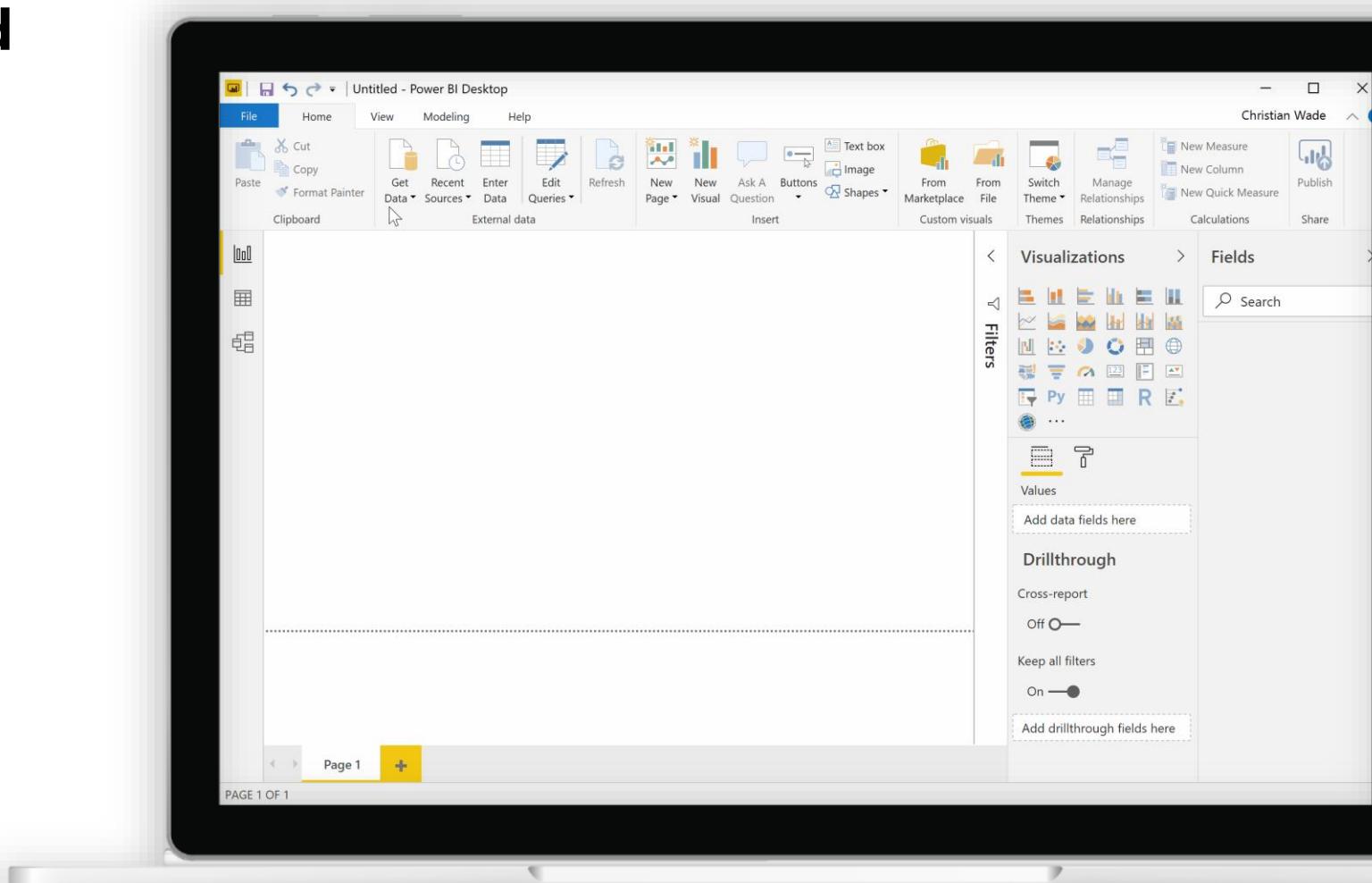
Shared datasets and Power BI APIs



Shared datasets are supported across all embedding types

Rebind report: generate cross-workspace connections

Clone report: Copy reports across WS and connect to central dataset



Shared Dataset



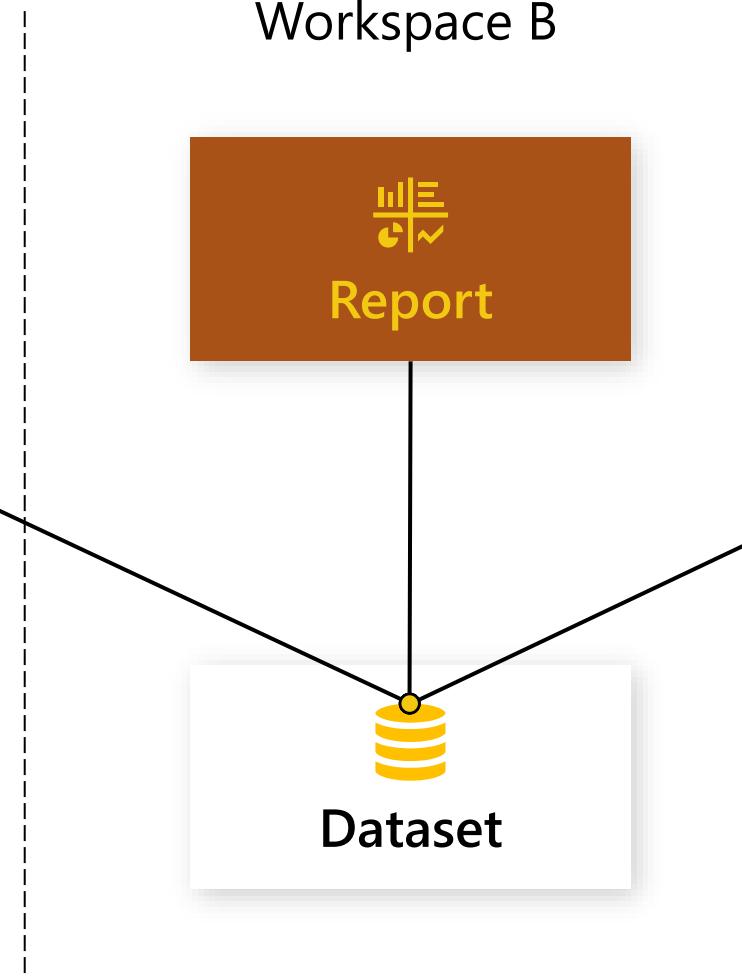
Workspace A



Workspace B



Workspace C





Dynamic binding

Session-based binding of visualizations to data

No more 100s of copied reports/ dashboards

Power BI Dynamic Binding Demo

The application will embed the report listed in the Report Id with both datasets that's listed in each one of the dataset Id fields using dynamic binding.

Embed

Report Name: SalesReport

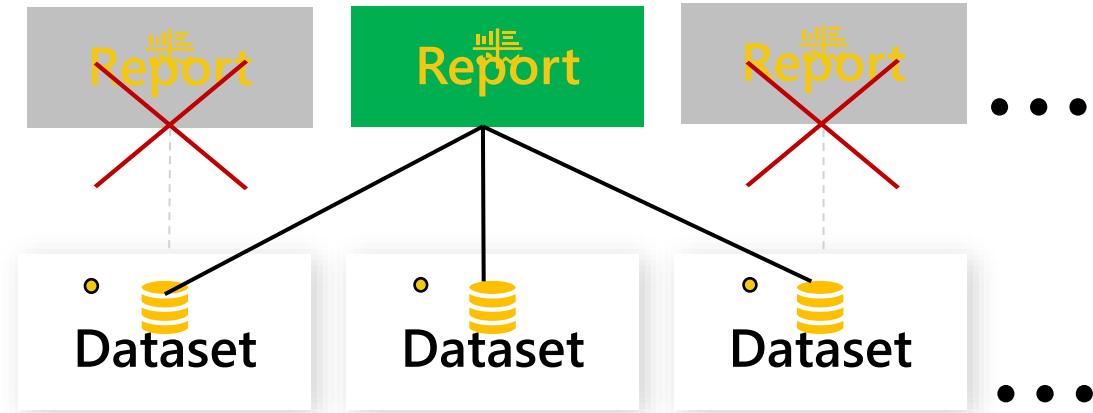
Report Id: 9ccdee62-ab2c-44c9-9cea-20dae80ab587

Dataset Id 1:

Dataset Id 2:

Embedded Report Customer 1

Embedded Report Customer 2



Shared datasets vs. Dynamic binding



Target scenario

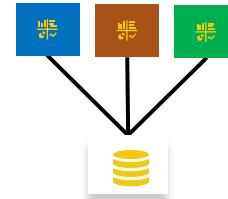
Datasets are used as

Reports are used as

Automation

Main advantages

Shared Datasets



Internal organizational use

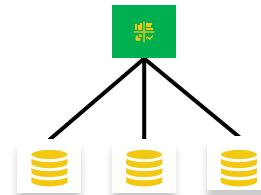
'One source of truth'

Various reports, provide 360 view of organization

REST API;
Object-based

- Central management of data
- One source of truth
- Easier for analysts

Dynamic binding



External customer analytics

A single customer data

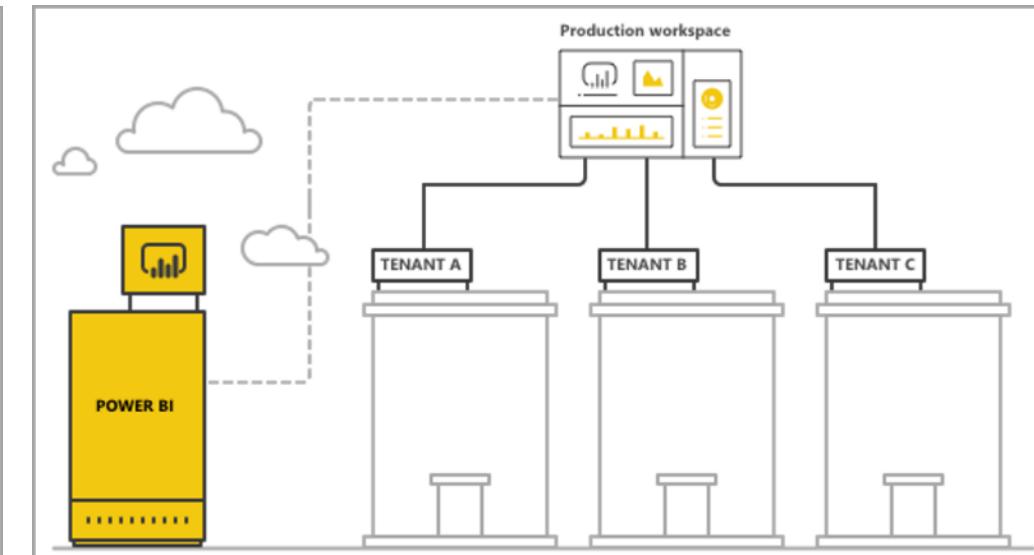
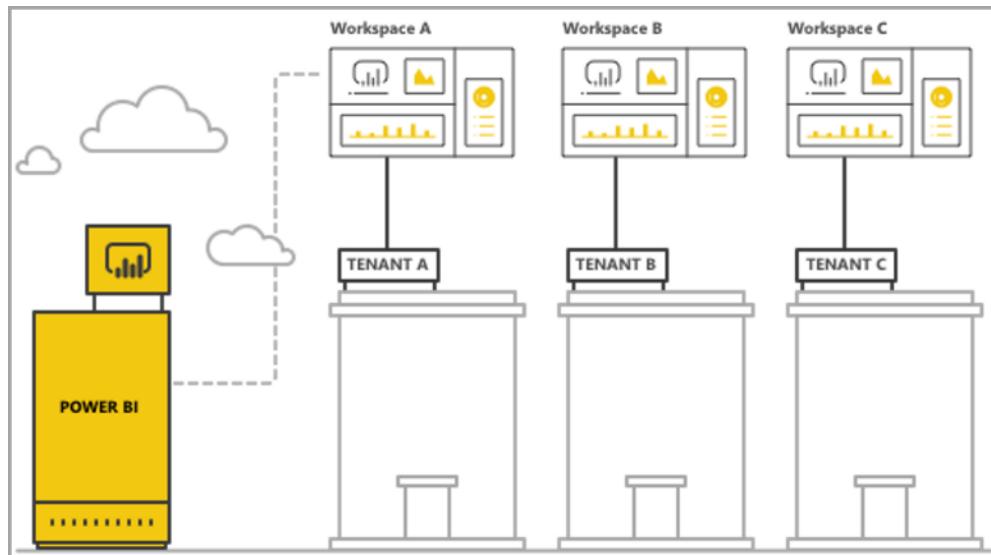
Template reports, show same analytics for each customer

JavaScript API;
Session-based

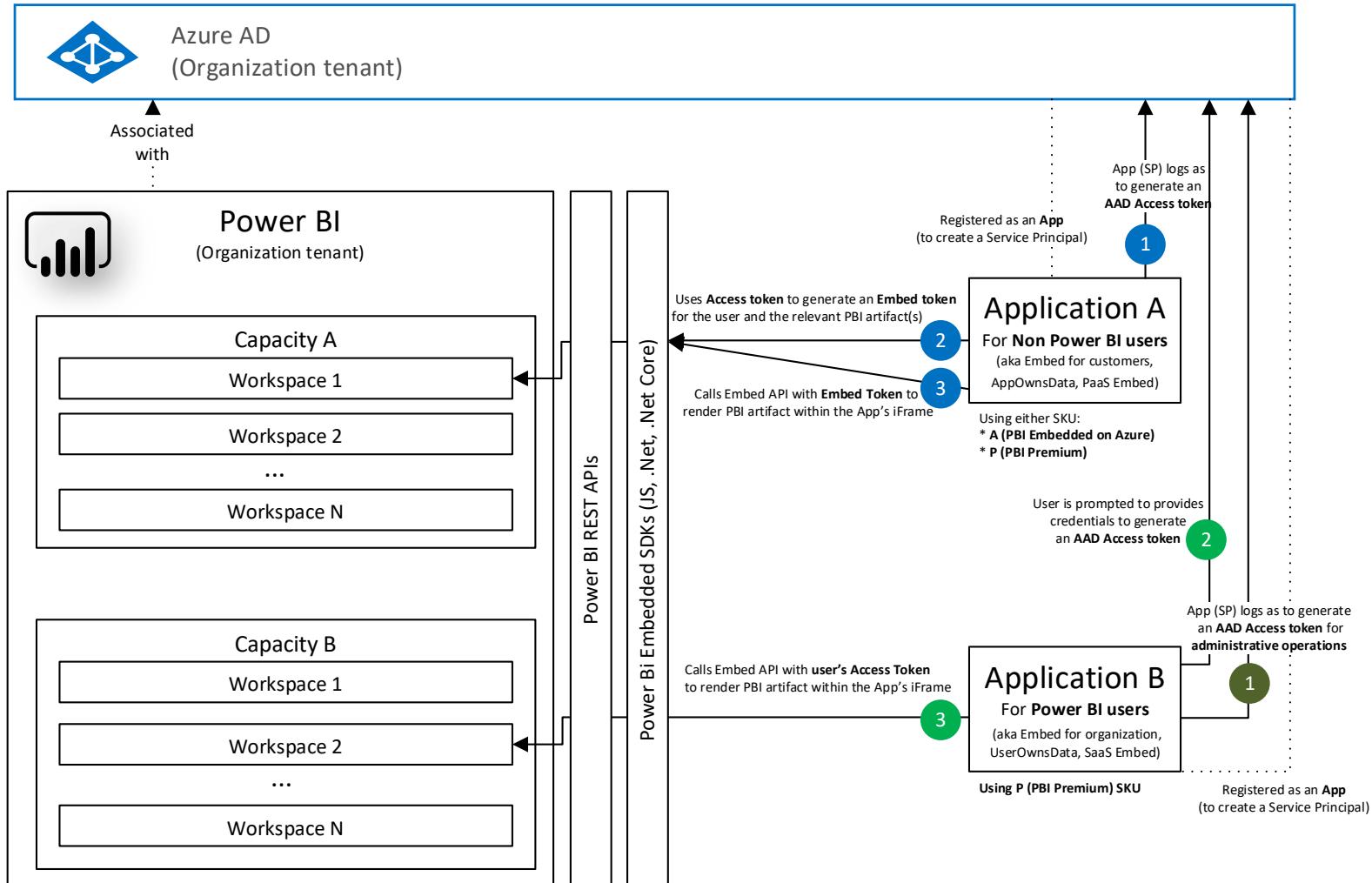
- Central management of visualization templates
- Easier for developers

Embedding Application Multi-tenancy Models

| Criteria | A single dedicated workspace per tenant | Shared workspace for multiple/all tenants |
|---------------------------------------|---|--|
| Data Architecture | Best when tenants have separate data sources | Best when all tenants share the same data source |
| Data Isolation | Good (each tenant has a dedicated workspace and dataset(s)) | Moderate (shared dataset with access control per tenant) |
| Scalability | Good (separate datasets enables scalability optimization) | Low (constrained by dataset limits) |
| Multi-Geo needs | Good (each workspace can be mapped to a capacity on a different region) | Not recommended to use if Multi-Geo is needed |
| Automation and operational complexity | Good automation to manage the individual tenant. Complex to manage many artifacts at scale | Easy to manage Power BI artifacts but complex to manage RLS at scale |



App Tenant Isolation by SP, Capacity & Workspace

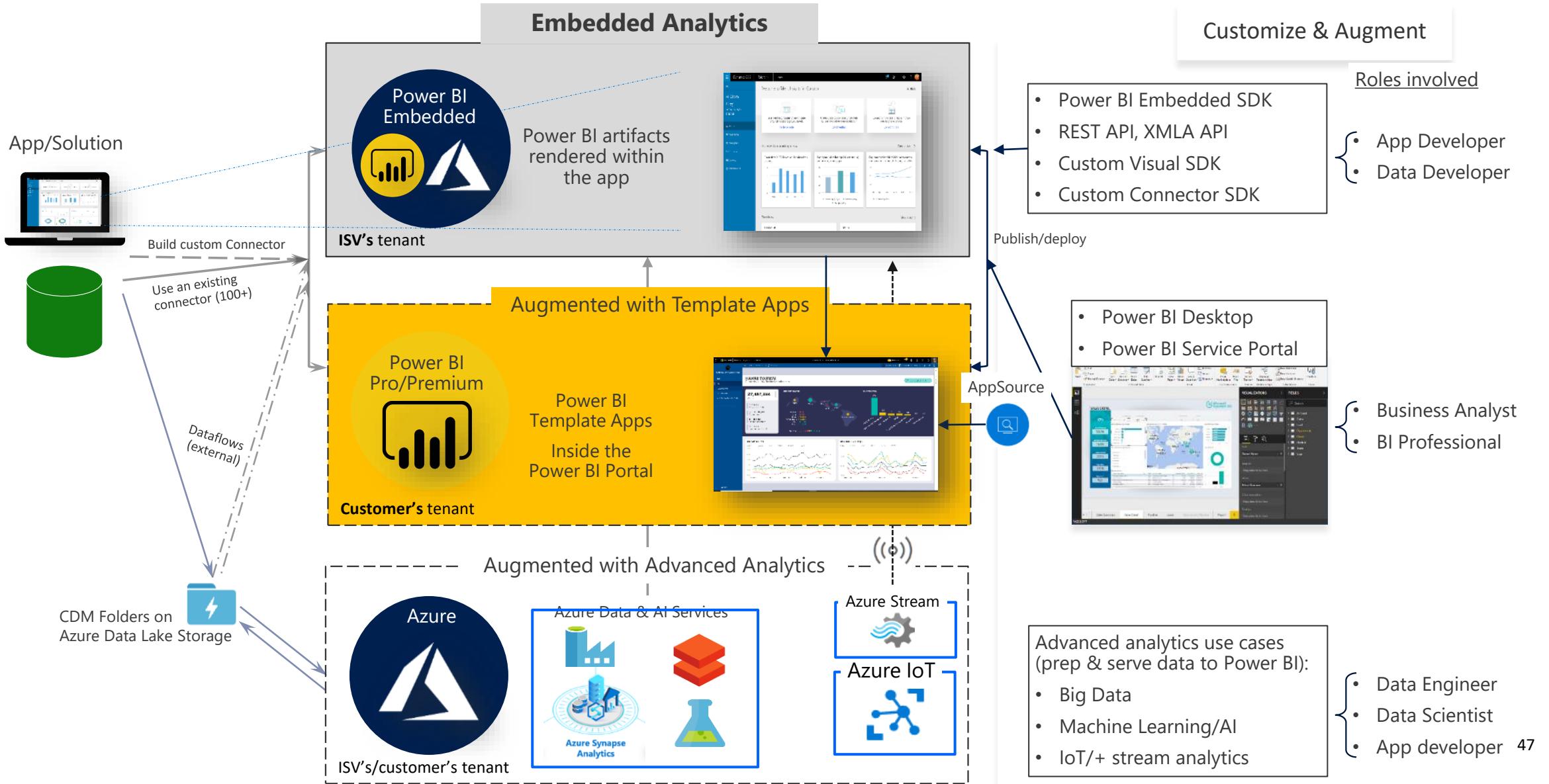


The Application's Service Principal (SP) should be allowed programmatic access to (via an AAD Security Group) in the PBI Admin portal. SP should be given access only for the workspace(s) of the app. [The App's SP cannot access or manage other capacities /workspaces](#)

Deploy Apps in customer tenant

Embedded apps
template apps

Augmenting Embedding with Template Apps



Comparing Analytics Use Cases for Solution Builders

| Category | Embedded Analytics | Packaged with Template App |
|------------------------|--|---|
| Programmatic control | Higher level of control over user experience (via PBIE SDK/APIs) | No control over user experience |
| Coding effort | Requires coding with SDK/API | No coding required for implementation |
| End user customization | Some: limited to <u>reports</u> - customize or create new | Full: customize or create new reports, <u>dashboards</u> , <u>datasets</u> and <u>dataflows</u> |
| Data scope | Use data that the app has access to | Can use any data that the customer has access to |
| Tenant Ownership | The Solution builder Tenant (typically). <u>No need</u> for customer owned tenant | The customer tenant. Customer <u>must own</u> a Power BI tenant |
| Where consumed | Consumed <u>within</u> the app (rendered via iFrame) | Consumed in <u>outside</u> of the App (typically in the Power BI service portal) |
| Which Users | Intended for the app users only | Any user that can consume via Power BI service |

Both use cases can be used together depending on customer and the solution builder needs.

Template Apps - Package and Distribute Power BI Content

Partner Experience

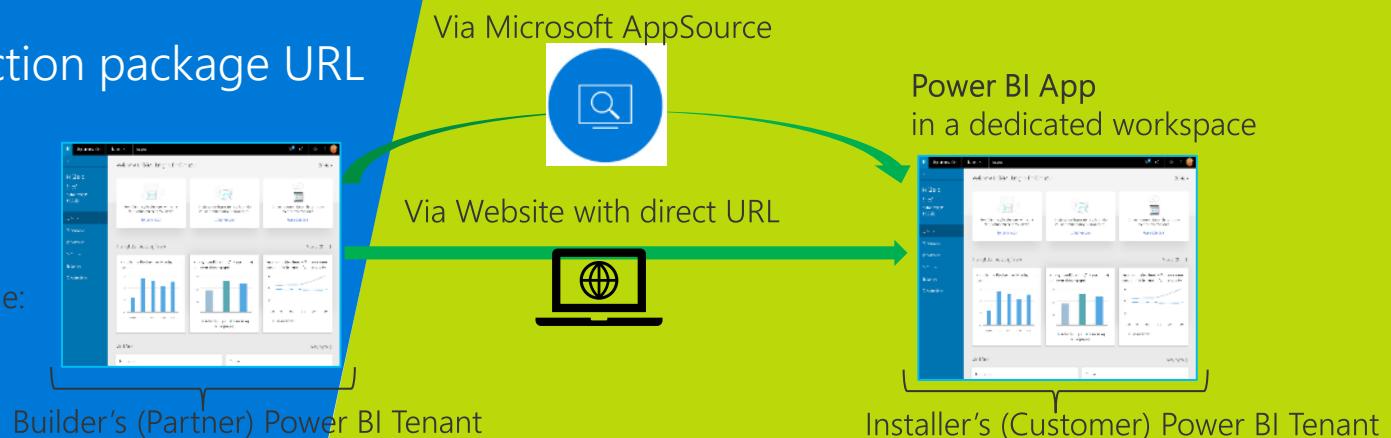
- Use Power BI Desktop to build a data model and report(s) in a .pbix file with query parameters
- Create a Template App workspace and import the file
- Create and setup the app:
 - **Branding** (name , description, support site, logo and theme color)
 - **Set landing page** (a report or a dashboard)
 - **Protect IP/data:** control dataset **model** editing and **data** export/access
 - **Manage dataset parameters** (query parameters)
 - Control access for testing phase at partner's tenant
- Create a test package and run internal validation
- Generate a preproduction and production package URL
- Publish URL to AppSource or share with customers via your Website

Power BI Template App can include:

- Dataset with sample data
- Reports
- Dashboards

Customer Experience

- Find the Power BI Template App on [Power BI App gallery](#) or Microsoft [AppSource](#) or use the direct URL from the partner's website
- Install and configure as a Power BI App into a workspace
 - Connect to data sources (fill in dataset parameter(s))
 - Explore the app with sample data
 - Edit the workspace to customize and grant access to other users
- Users start using the Power BI App



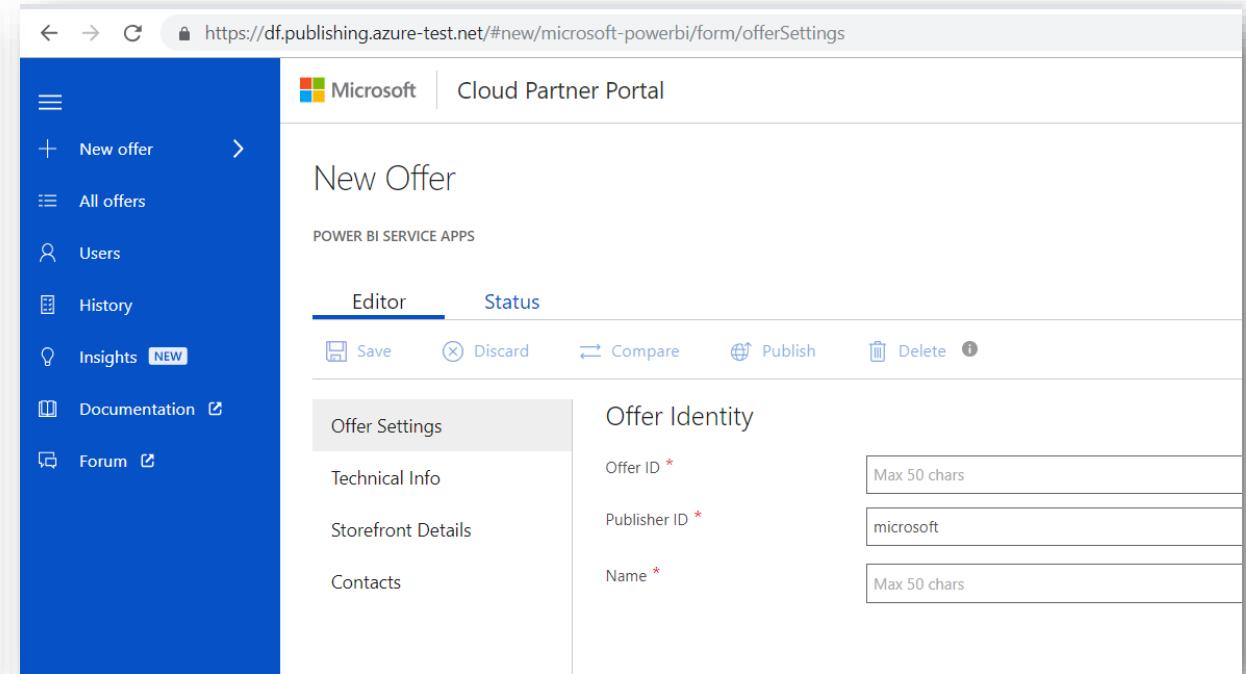
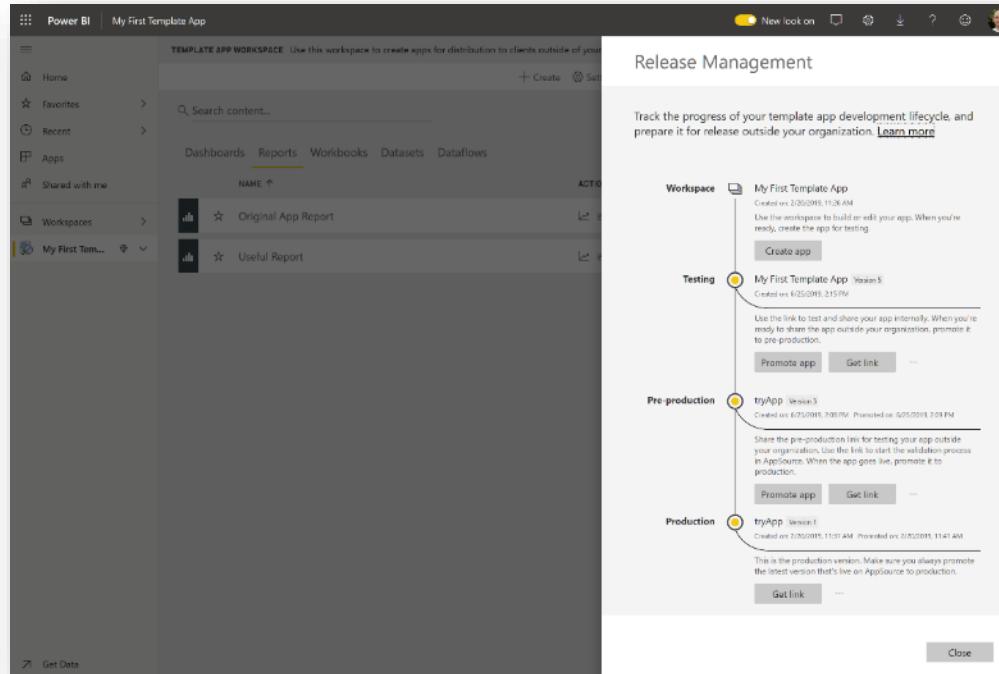
Partner Experience: Publishing a Template App

Stage Power BI Service

- 1 Create a **test** package and run internal validation
- 2 Promote the test package to **pre-production** for validation outside your Power BI tenant, and submit it to AppSource
- 3 Promote the preproduction package to **production**

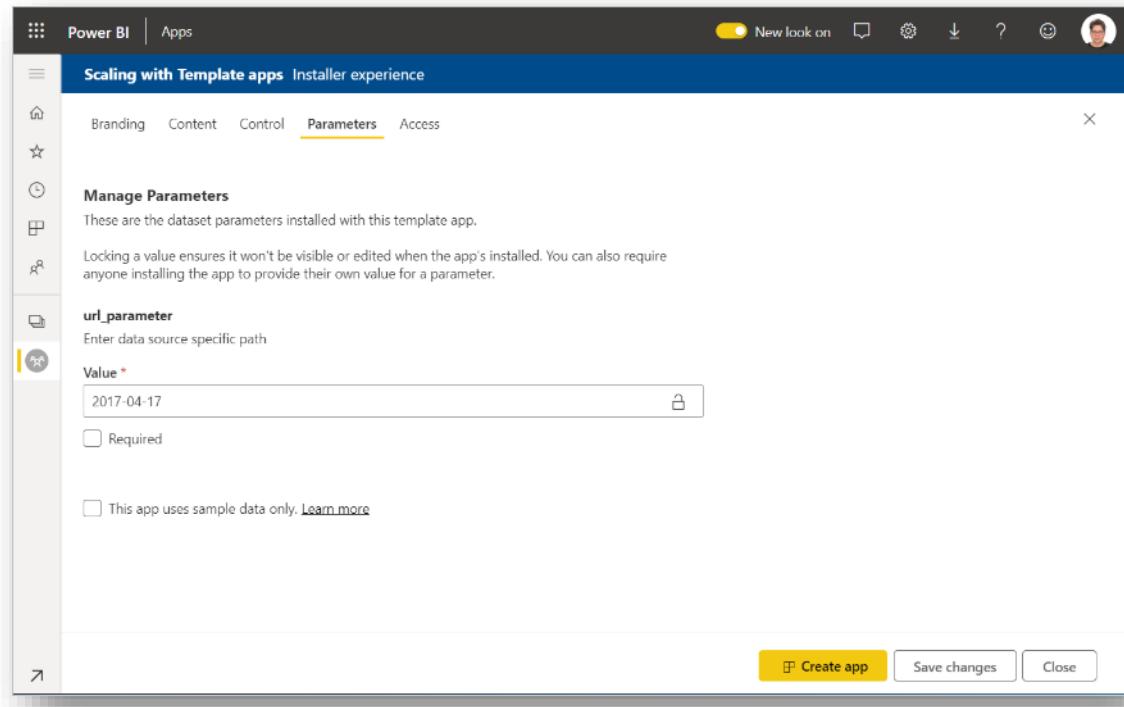
Cloud Partner Portal (for AppSource)

- Register as a partner
With your pre-production package URL, create a Power BI template app offer and start the validation process
Go live on [Power BI App gallery](#) and on Microsoft [AppSource](#)



The screenshot shows the Cloud Partner Portal interface for creating a new offer. The URL in the browser is <https://df.publishing.azure-test.net/#new/microsoft-powerbi/form/offerSettings>. The left sidebar includes links for 'New offer', 'All offers', 'Users', 'History', 'Insights NEW', 'Documentation', and 'Forum'. The main area is titled 'New Offer' and 'POWER BI SERVICE APPS'. It features two tabs: 'Editor' (selected) and 'Status'. Under 'Offer Settings', there are fields for 'Offer ID *' (Max 50 chars), 'Publisher ID *' (microsoft), and 'Name *' (Max 50 chars). Other sections include 'Technical Info', 'Storefront Details', and 'Contacts'.

Template Apps - Codeless Experiences



The screenshot shows the 'Get started with your new app' welcome screen. The title is 'Get started with your new app'. Below it is a sub-instruction: 'Explore your app with sample data, go to the workspace to customize as needed and share with your organization, or connect your data to get up and running.' The screen is divided into three sections:

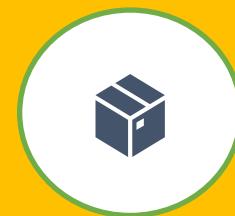
- Connect your data**: 'Connect to a data source to view your new app with your own data.' It features an icon of a cylinder with a gear inside and a cloud below it. A 'Connect' button is at the bottom.
- Explore with sample data**: 'Open your new app to start exploring with sample data.' It features an icon of a magnifying glass over gears. A 'Explore app' button is at the bottom.
- Customize and share**: 'Your app comes with a workspace, so you can customize and share it, just like an app you built yourself.' It features an icon of a workspace with multiple screens and data visualizations. A 'Edit workspace' button is at the bottom.

At the bottom right is a link 'Don't show this again'.

Integration and extensibility options for Power BI solution builders



POWER BI
EMBEDDED



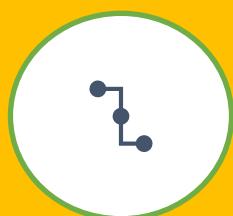
TEMPLATE
APPS



CUSTOM
VISUALS



CUSTOM ML
MODELS



CUSTOM
CONNECTORS



DATAFLOWS AND
CDM FOLDERS

Package & Delivery

Visuals/ML Analysis

Data Connectivity

The Most Complete AI Capabilities in a BI Product



Data Scientists

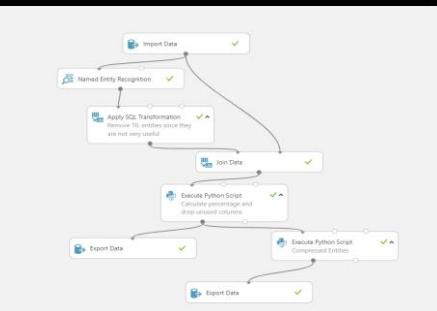


Analysts

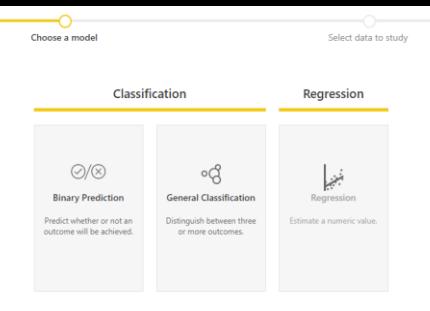


End users

Extend with Azure ML



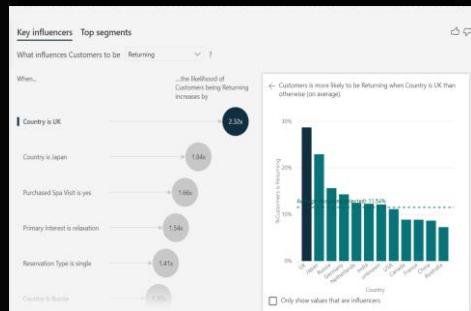
Create ML models



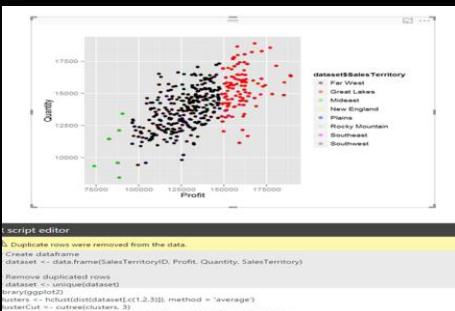
Sentiment Analysis



Key Driver Analysis



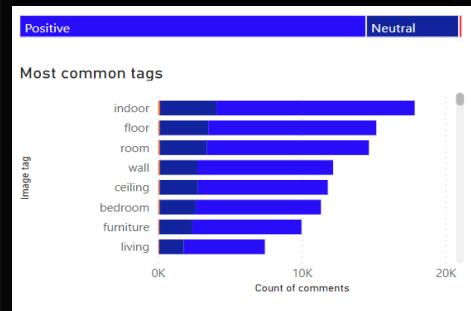
Python & R Integration



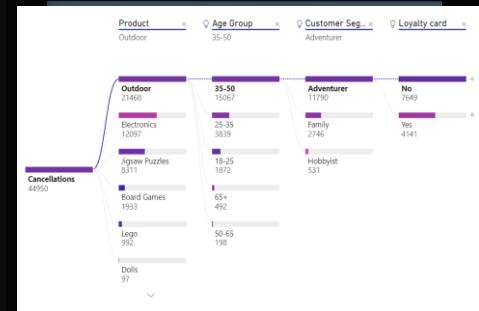
Explore Predictions



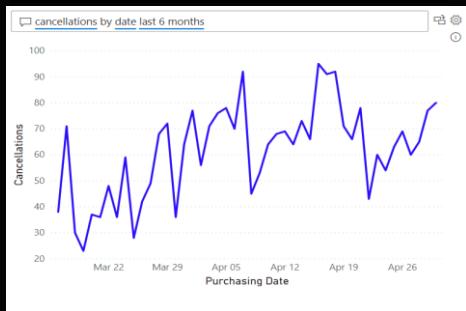
Key Phrase Extraction



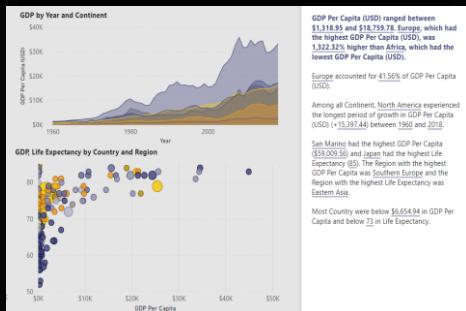
Root Cause Analysis



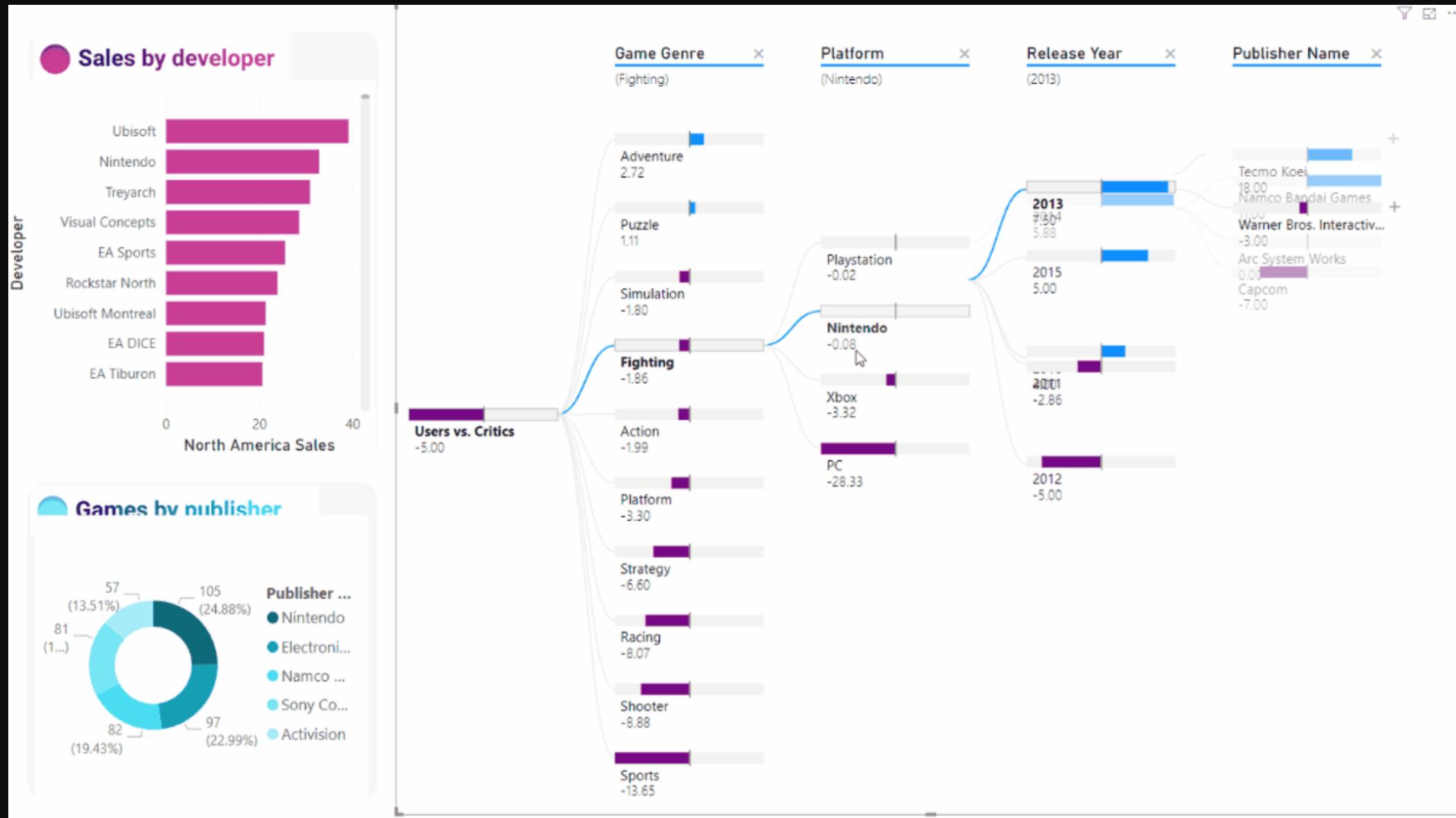
Q&A



Smart Narratives



The Most Complete AI Capabilities in a BI Product





Online Sales - Power BI Desktop

File Home Insert Modeling View Help

Get data Refresh New visual More visuals New measure Sensitivity (preview) Publish

Product Analysis

Sales across time

Revenue

Sales by Product

Cancellations and Returns

Visualizations

Fields

Add data fields here

Drill through

Cross-report

Off

Keep all filters

On

Add drill-through fields here

Transactions Products Final Product Anomalies Sales across time Products Explore Cancellations Ask Questions +

Page 5 of 7



Microsoft | Power BI | My workspace Supply Chain Demo | Data updated 10/12/20 ▾

File ▾ Export ▾ Share ▾ Chat in Teams Comment Subscribe Edit ...

Reset to default Bookmarks View ▾

Backorder Analysis

Ask a question about your data

Try one of these to get started

| | | |
|---|---|---------------------------------------|
| what is the % on time orders by demand type | what is the product availability by demand type | top plants by backorder \$ |
| top plants by product availability | what is the % on backorder by region | what is the % on time orders by month |
| what is the backorder \$ by brand | what is the % on backorder by brand | what is the % on time orders by brand |
| sort backorder percentages by shipment type | | Show fewer suggestions |

... % on backorder by Demand Type

| | | | |
|-----------------------|--------------------|-----------------|----------------|
| Volatile (High Price) | Stable (Low Price) | Volatile (Lo... | Stable (Hig... |
| Intermittent | Cyclical | Growing | |
| Seasonal | No Segment | Declining | |

Backorder \$ by Month

Backorder %

Month

January February March April May June



Q&A setup

Getting started

Getting started

Field synonyms

Review questions

Teach Q&A

Manage terms

Suggest questions



Field synonyms

Add terms people might use as synonyms for the fields and tables in your data.

[Field synonyms](#)



Teach Q&A

Teach Q&A to understand questions and terms people might use.

[Teach Q&A](#)



Review questions

Review questions people have asked and fix misunderstandings.

[Review questions](#)

Help Q&A understand people better

The screenshot shows the 'Teach Q&A' interface. It includes sections for 'Field synonyms', 'Review questions', and 'Suggest questions'. Each section has a corresponding yellow button labeled with its name. To the right, there is a detailed chart titled 'How well does Q&A understand?' which displays various performance metrics for different demographic groups.

[Learn more about Q&A](#)



Suggest questions

Help people explore your data by adding suggested questions.

[Suggest questions](#)





Microsoft Power BI My workspace Supply Chain Demo | Data updated 10/12/20

Supply Chain Analytics

Number of Products by Demand Type

| Demand Type | Sub-Segment | Description |
|-----------------------|----------------|------------------------------------|
| Stable (Low Price) | Growing | Products with growing demand. |
| | Intermittent | Products with intermittent demand. |
| Stable (High ...) | No S... | Products with no specific segment. |
| | Volatile (L... | Products with volatile low price. |
| | Declining | Products with declining demand. |
| Volatile (High Price) | Volati... | Products with volatile high price. |

Backorder \$ by Region

| Region | Backorder \$ |
|-----------|--------------|
| Midwest | \$48K |
| West | \$38K |
| Northeast | \$18K |
| Southwest | \$15K |
| Southeast | \$2K |

Key Influencers Top segments

What influences Product to be on backorder

When...the likelihood of Product being on backorder increases by

- Demand Type is Volatile (High Price) 2.32x
- Demand Type is Volatile (Low Price) 2.14x
- Manufactured Goods is <70% 1.73x
- Forecast Bias is Accurate (5% to -5%) 1.50x
- Forecast Accuracy is Below 50% 1.44x
- Demand Type is No Segment 1.35x
- Demand Type is Growing 1.27x

← Product is more likely to be on backorder when Demand Type is Volatile (High Price) than otherwise (on average).

%Product is on backorder

| Demand Type | %Product is on backorder |
|-----------------------|--------------------------|
| Volatile (High Price) | ~28% |
| Volatile (Low Price) | ~23% |
| No Segment | ~16% |
| Growing | ~15% |
| Seasonal | ~13% |
| Declining | ~12% |
| Cyclical | ~11% |
| Intermittent | ~11% |
| Stable (High Price) | ~11% |
| Stable (Low Price) | ~8% |

Average (excluding selected): 11.34%

Demand Type

Only show values that are influencers



Microsoft Power BI My workspace Supply Chain Demo | Data updated 10/12/20 ▾

Search (2) ... ? ! ? User profile

File Export Share Chat in Teams Comment Subscribe Edit ...

Reset to default Bookmarks View Filters

Root Cause Analysis

Average of Backorder % by Month

The chart displays the average backorder percentage for each month. The y-axis is labeled 'Month' and lists the months from September at the top to June at the bottom. The x-axis is labeled 'Backorder %' with tick marks at 0% and 5%. Each month has a dark blue horizontal bar. A tooltip for March shows a value of 5.07%.

| Month | Backorder % |
|-----------|-------------|
| September | ~5.5% |
| October | ~5.0% |
| November | ~4.5% |
| December | ~4.5% |
| January | ~5.5% |
| February | ~5.5% |
| March | 5.07% |
| April | ~4.5% |
| May | ~4.5% |
| June | ~5.0% |

High Risk Low Risk



Business Analysts

Anomaly Detection



Online Sales - Power BI Desktop Justyna Lucznik (MSIT)

File Home Insert Modeling View Help Format Data / Drill

Get data Excel Power BI datasets SQL Server Enter data Recent sources Transform data Refresh New visual Text box More visuals New measure Quick measure Publish

Product Analysis

Sales across time

Revenue

Product Board Games Electronics Jigsaw Puzzles Lego Outdoor

Sales

80M 60M 40M 20M 0M

Jan 2018 Jul 2018 Jan 2019 Jul 2019 Jan 2020

Year

Revenue

\$6K \$4K \$2K

Mar 2019 May 2019 Jul 2019 Sep 2019 Nov 2019 Jan 2020 Mar 2020

Purchasing Date

Sales by Product

Cancellations and Returns

Product Cancellations Returns

Outdoor 20K 10K 0K

Jigsaw Puzzles 8K 5K 2K 0K

Electronics 12K 8K 5K 2K 0K

Board Games 10K 7K 4K 2K 0K

Lego 2K 1K 0K

Transactions Products Products Final Sales across time Explore Cancellations Ask Questions Product Anomalies +



https://msit.powerbi.com/groups/c5135f90-6a81-4bf5-82b2-07ac37e20e93/dataflows/d06c809d-c317-4814-8df2-e181d1be5fe

Power BI Hotel Analytics > Hotel Reviews

Edit queries

Power Query

Get data Refresh Options Manage columns Transform table Reduce rows Add column AI insights Map to standard Combine tables

AI insights [2] Hotel Reviews

= Table.AddColumn(#"Invoked CognitiveServices.ScoreSentiment", "CognitiveServices.ExtractKeyPhrases", each CognitiveServices.ExtractKeyPhrases([reviews_text], "en"))

| | A ^B categories | A ^B city | A ^B country | 1.2 latitude | 1.2 longitude | A ^B name | A ^B province | reviews_date | reviews_dateAdded | A ^B reviews_text |
|----|------------------------------|---------------------|------------------------|--------------|---------------|---------------------|-------------------------|------------------------|------------------------|----------------------------------|
| 1 | Hotels | Princeville | US | 22.226 | -159.481 | Hotel 2 | HI | 5/5/2016, 5:00:00 PM | 3/31/2017, 11:32:19 AM | We had A/C issues at 3:30 .. |
| 2 | Hotels | Princeville | US | 22.226 | -159.481 | Hotel 2 | HI | 6/1/2016, 5:00:00 PM | 3/31/2017, 11:32:19 AM | A/C was broken. Hotel was .. |
| 3 | Vacation Rentals,Resorts &.. | Honolulu | US | 21.282 | -157.831 | Hotel 4 | HI | 10/7/2015, 5:00:00 PM | 2/25/2017, 12:32:57 PM | We had a one night stay at .. |
| 4 | Hotels | Princeville | US | 22.226 | -159.481 | Hotel 2 | HI | 6/23/2016, 5:00:00 PM | 3/31/2017, 11:32:19 AM | Elevator was broken. |
| 5 | Vacation Rentals,Resorts &.. | Honolulu | US | 21.282 | -157.831 | Hotel 4 | HI | 9/16/2015, 5:00:00 PM | 2/25/2017, 12:32:57 PM | Unprepared for the unwecl .. |
| 6 | Hotels | Kapaa | US | 22.043 | -159.338 | Hotel 5 | HI | 5/31/2016, 5:00:00 PM | 3/31/2017, 11:32:19 AM | I expected that the Jacuzzi .. |
| 7 | Vacation Rentals,Resorts &.. | Honolulu | US | 21.282 | -157.831 | Hotel 4 | HI | 9/26/2015, 5:00:00 PM | 2/25/2017, 12:32:57 PM | For the price that I paid for .. |
| 8 | Hotels | Princeville | US | 22.226 | -159.481 | Hotel 2 | HI | 6/12/2016, 5:00:00 PM | 3/31/2017, 11:32:19 AM | At Night A/C very loud, als .. |
| 9 | Hotels | Princeville | US | 22.226 | -159.481 | Hotel 2 | HI | 6/13/2016, 5:00:00 PM | 3/31/2017, 11:32:19 AM | The A/C in my room broke. |
| 10 | Hotels | Princeville | US | 22.226 | -159.481 | Hotel 2 | HI | 7/29/2016, 5:00:00 PM | 3/31/2017, 11:32:19 AM | Great beach park off the la .. |
| 11 | Hotels | Princeville | US | 22.226 | -159.481 | Hotel 2 | HI | 6/4/2016, 5:00:00 PM | 3/31/2017, 11:32:19 AM | Our room was on the bott.. |
| 12 | Vacation Rentals,Resorts &.. | Honolulu | US | 21.282 | -157.831 | Hotel 4 | HI | 2/15/2016, 4:00:00 PM | 2/25/2017, 12:32:57 PM | We spent 2 weeks in this h .. |
| 13 | Hotels | Princeville | US | 22.226 | -159.481 | Hotel 2 | HI | 7/1/2016, 5:00:00 PM | 3/31/2017, 11:32:19 AM | Terrible view from my \$300 .. |
| 14 | Vacation Rentals,Resorts &.. | Honolulu | US | 21.282 | -157.831 | Hotel 4 | HI | 9/2/2015, 5:00:00 PM | 2/25/2017, 12:32:57 PM | Older property but it is sup .. |
| 15 | Vacation Rentals,Resorts &.. | Honolulu | US | 21.282 | -157.831 | Hotel 4 | HI | 8/18/2015, 5:00:00 PM | 2/25/2017, 12:32:57 PM | We stayed here for over a .. |
| 16 | Vacation Rentals,Resorts &.. | Honolulu | US | 21.282 | -157.831 | Hotel 4 | HI | 12/10/2015, 4:00:00 PM | 2/25/2017, 12:32:57 PM | When we had booked this .. |
| 17 | Vacation Rentals,Resorts &.. | Honolulu | US | 21.282 | -157.831 | Hotel 4 | HI | 7/29/2016, 5:00:00 PM | 2/25/2017, 12:32:57 PM | Loved the beach and servic .. |
| 18 | Vacation Rentals,Resorts &.. | Honolulu | US | 21.282 | -157.831 | Hotel 4 | HI | 2/15/2016, 4:00:00 PM | 2/25/2017, 12:32:57 PM | I hesitate to share negative .. |
| 19 | Hotels | Princeville | US | 22.226 | -159.481 | Hotel 2 | HI | 7/29/2016, 5:00:00 PM | 3/31/2017, 11:32:19 AM | Beautiful renovation. The h .. |
| 20 | Vacation Rentals,Resorts &.. | Honolulu | US | 21.282 | -157.831 | Hotel 4 | HI | 3/26/2016, 5:00:00 PM | 2/25/2017, 12:32:57 PM | Positives: Location! It is on .. |
| 21 | Hotels | Kapaa | US | 22.043 | -159.338 | Hotel 5 | HI | 7/30/2016, 5:00:00 PM | 3/31/2017, 11:32:19 AM | This hotel is on the beach .. |
| 22 | Vacation Rentals,Resorts &.. | Honolulu | US | 21.282 | -157.831 | Hotel 4 | HI | 10/4/2015, 5:00:00 PM | 2/25/2017, 12:32:57 PM | Clean room, old style, 196.. |
| 23 | Vacation Rentals,Resorts &.. | Honolulu | US | 21.282 | -157.831 | Hotel 4 | HI | 12/12/2015, 4:00:00 PM | 2/25/2017, 12:32:57 PM | The accommodation is bas .. |
| 24 | Vacation Rentals,Resorts &.. | Honolulu | US | 21.282 | -157.831 | Hotel 4 | HI | 3/1/2016, 4:00:00 PM | 2/25/2017, 12:32:57 PM | The entrance to the hotel i .. |
| 25 | Vacation Rentals,Resorts &.. | Honolulu | US | 21.282 | -157.831 | Hotel 4 | HI | 9/16/2015, 5:00:00 PM | 2/25/2017, 12:32:57 PM | Rooms were nice, basic bu .. |
| 26 | Vacation Rentals,Resorts &.. | Honolulu | US | 21.282 | -157.831 | Hotel 4 | HI | 10/25/2015, 5:00:00 PM | 2/25/2017, 12:32:57 PM | I booked this hotel for mid .. |
| 27 | Hotels | Princeville | US | 22.226 | -159.481 | Hotel 2 | HI | 5/5/2016, 5:00:00 PM | 3/31/2017, 11:32:19 AM | Loved the view from my ro .. |
| 28 | Hotels | Princeville | US | 22.226 | -159.481 | Hotel 2 | HI | 4/19/2016, 5:00:00 PM | 3/31/2017, 11:32:19 AM | A/C unit was disgusting an .. |
| 29 | Vacation Rentals,Resorts &.. | Honolulu | US | 21.282 | -157.831 | Hotel 4 | HI | 2/28/2016, 4:00:00 PM | 2/25/2017, 12:32:57 PM | The staff were really friend .. |
| 30 | | | | | | | | | | |

Name: Hotel Reviews
Entity type: Custom
Applied steps: Source, Navigation, Navigation 1, Invoked CognitiveSer..., Invoked CognitiveSer...

1 warning

Cancel Done



Microsoft Power BI 2 - Demo Gen2

Online Shoppers Intent

Tables Machine learning models

| TABLE NAME | TABLE TYPE | ACTIONS |
|---|------------|---------|
| Online Visitors | Custom | |
| Purchase Intent Prediction v1 Training Data | Custom | |
| Purchase Intent Prediction v1 Testing Data | Custom | |
| Online Visitors enriched Purchase Intent Prediction v1 | Custom | |
| Online Visitors enriched Purchase Intent Prediction v1 explanations | Custom | |



Python - Power BI Desktop

File Home Insert Modeling View Help External Tools

Paste Cut Get data v Excel Power BI SQL Enter data Dataverse Recent sources v Transform Refresh data v New visual Text box More visuals v New measure Quick measure Sensitivity (preview) v Sensitivity Publish Clipboard Data Queries Insert Calculations Share

Build visuals with your data

Select or drag fields from the Fields pane onto the report canvas.

Filters Visualizations Fields

Add data fields here

Add data fields here

Values

Add data fields here

Drill through

Cross-report

Off On

Keep all filters

On

Add drill-through fields here

Page 2 +

Page 1 of 1



Power BI Supply Chain - Power BI https://msit.powerbi.com/groups/0f8d48b2-6b16-4d50-87c0-0f2304577cc3/dataflows/c1562d0b-6af1-486c-bfb5-9a23e2f69a29

A: Questions That... Power BI - Edit Blog... GitHub - Microsoft... #PowerQuery ALP Project

Microsoft Power BI Supply Chain Final View Sales Orders Search 32 ?

Backorder risk model training report

This report summarizes the model performance and training details and enables you find an optimal threshold for defining your business outcome.

Apply model Edit model

Home Favorites Recent Create Apps Shared with me Deployment pipelines Learn Workspaces Supply Chain Fin... ▾

How the model was evaluated

The model predicted On backorder probabilities for a test set of 9044 records and compared the predicted outcomes (based on the selected threshold) to the historical outcomes.

Model performance

The Area under the curve (AUC) observed on the test set is : **85%**

Different features have varying influence on the predicted outcome. Click below for details.

See top predictors

Predicted high risk Predicted low risk

| | Actual high risk | Actual low risk |
|------------------|------------------|-----------------|
| Actual high risk | 1.77K | 2.26K |
| Actual low risk | 316.00 | 3.48K |

84% Precision of records predicted as high risk are likely to actually be high risk

46% Recall of records that are actually high risk are likely to be predicted as high risk

Probability Threshold 0.00 0.78 Increase Recall Increase Precision

Cost-Benefit Analysis

Get data Model Performance Accuracy Report Training Details 4K

Type here to search

7:56 PM ENG 11/17/2020



Programmatic Visual Authoring



Create new visuals programmatically

Edit existing visuals according to user's actions

Empower any user to be a BI creator and explore data anyway they want

Contoso

Actual Revenue par Industry

Number of Opportunities par Industry

Estimated Revenue par Salesperson

Create quick visual

Choose the visual type

Line chart

Set your fields

Axe X: Industry

Axe Y: Actual Revenue

Légende: Select Légende

Format your visual

Legend

Category

Value

Title

Type your personalized title

Title alignment

Actual Revenue par Industry

Estimated Revenue par Salesperson

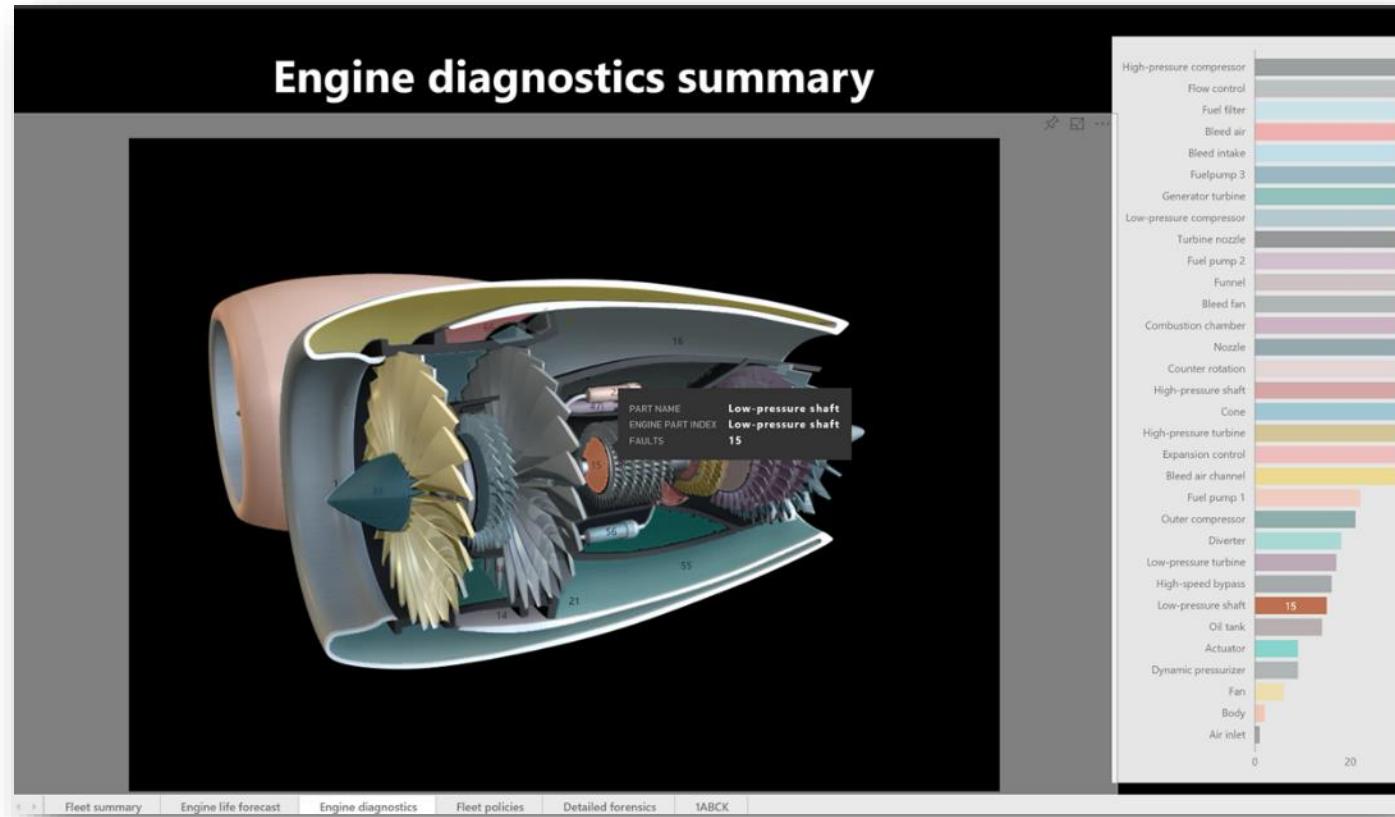
Create

<https://playground.powerbi.com/en-us/showcases-gallery/quick-visual-creator>

Custom Visuals

Visualize insights in
the context of
your business

- Empower customers to analyze and visualize your application's data more effectively
- Use a rich, open-source library to create stunning data visualizations, fully-customized to your application's specific needs



Develop Custom Visuals

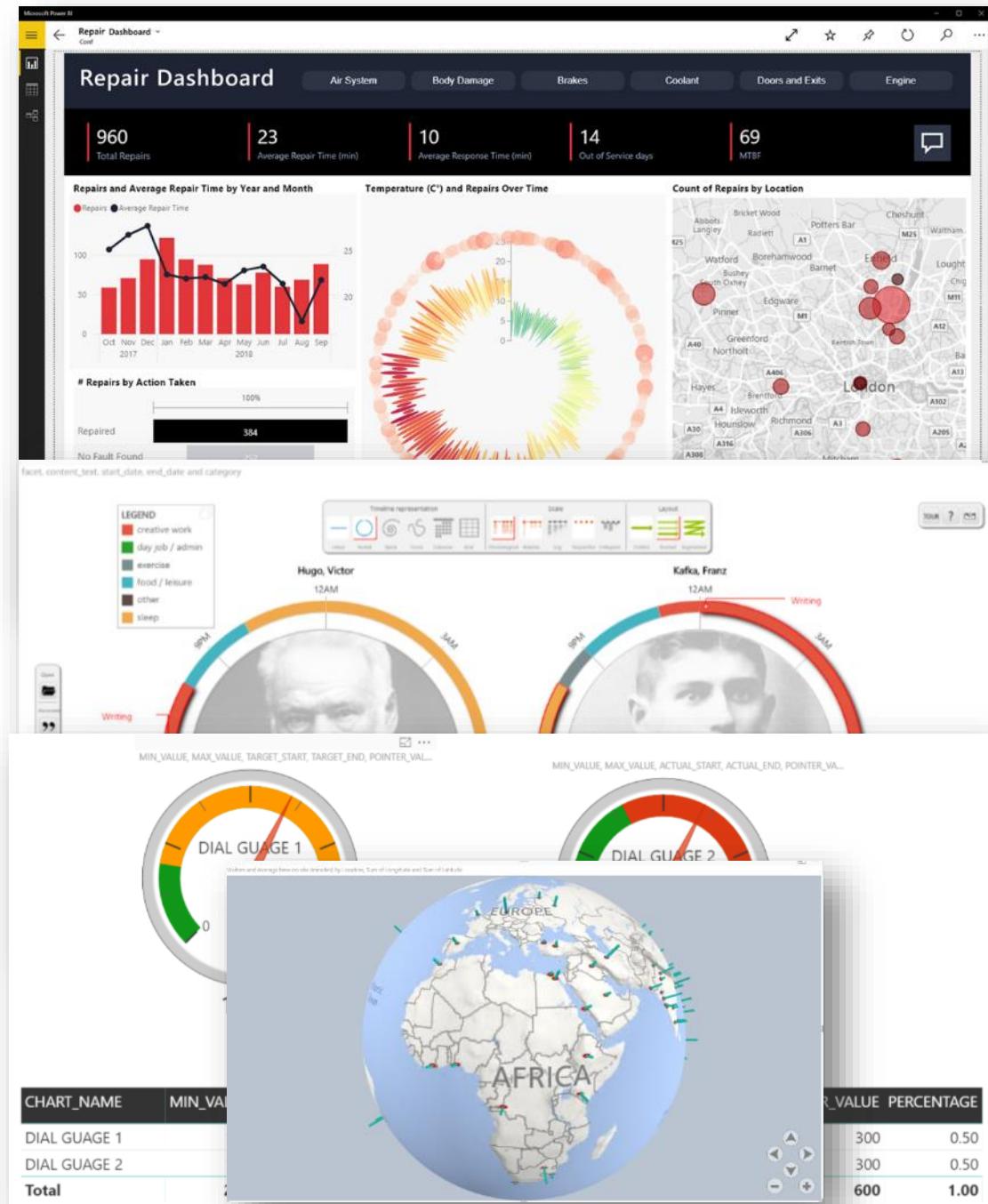
1. [Create a custom visual using developer tools](#)
(Node.JS, d3 Library, VS Code, Windows PowerShell)
2. [Test, debug](#), and package a custom visual
3. [Get a custom visual certified](#) by Microsoft
4. [Publish on AppSource](#) to share your custom visuals
or make them part of your reports and dashboards



The screenshot shows the Microsoft AppSource interface. At the top, there's a search bar and navigation links for Microsoft, AppSource, Apps, and more. Below the search bar, there are filters for 'Power Visuals' and 'Add-ins'. The main area displays 'App results (199)' with cards for various visual add-ins:

- Data Insights by MAQ Software**: By MAQ LLC. Rating: 5 stars (8). Free.
- Pulse Chart**: By Microsoft Corporation. Rating: 5 stars (17). Free.
- Aster Plot**: By Microsoft Corporation. Rating: 5 stars (15). Free.
- Tornado chart**: By Microsoft Corporation. Rating: 5 stars (40). Free.
- Candlestick by OKViz**: By OKViz. Rating: 5 stars (5). Free.
- Sunburst**: By Microsoft Corporation. Rating: 5 stars (98). Free.
- Forecast using Neural Network by MAQ Software**: By MAQ LLC. Rating: 5 stars (8). Free.
- Narratives for Business Intelligence**: By Microsoft Research. Rating: 5 stars (41). Free.
- Network Visualization and Filter**: By Microsoft Research. Rating: 5 stars (14). Free.
- Tachometer**: By Axis Inc. Rating: 5 stars (14). Free.

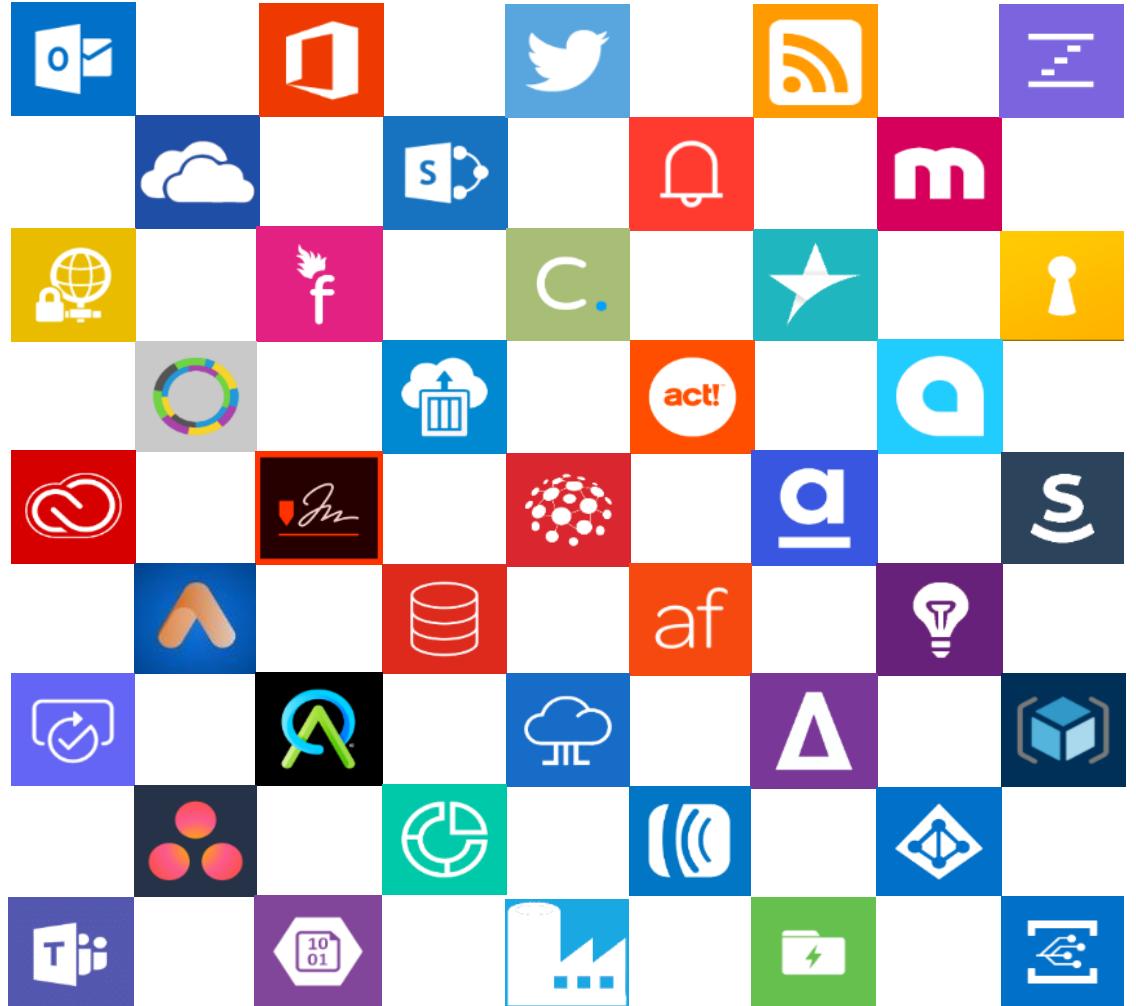
On the left sidebar, there are sections for Products (Web Apps, Add-ins, Dynamics 365, Office 365, Power BI apps, Power BI visuals, Dynamics NAV), Categories (Analytics, Filters, Gauges, Integrations, KPI, Time), and Industries (Agriculture, Education, Distribution, Financial services, Government, Health, Manufacturing, Professional services, Retail).



Connect to Data

350+ connected experiences

Connect to more than 350 1st and 3rd party services with built-in API connectors for everything from Adobe to Zendesk to on-premises solutions.



Power BI data sources

Always growing

| File | Database | Database | Online Services | Online Services | Other |
|------------------------------|---|---|---|--|--|
| Excel | IBM Netezza MySQL database PostgreSQL database Sybase database Teradata database SAP HANA database SAP Business Warehouse Application Server SAP Business Warehouse Message Server Amazon Redshift Impala Google BigQuery Vertica Snowflake Essbase AtScale cubes (Beta) BI Connector Dremio Exasol Indexima (Beta) | Jethro (Beta) InterSystems IRIS (Beta) Kyligence MarkLogic Azure SQL database Azure SQL Data Warehouse Azure Analysis Services database Azure Blob Storage Azure Table Storage Azure Cosmos DB Azure Data Lake Storage Gen2 (Beta) Azure Data Lake Storage Gen1 Azure HDInsight (HDFS) Azure HDInsight Spark HDInsight Interactive Query Azure Data Explorer (Kusto) Azure Cost Management (Beta) | SharePoint Online List Microsoft Exchange Online Dynamics 365 (online) Dynamics NAV Dynamics 365 Business Central Dynamics 365 Business Central (on-premises) Microsoft Azure Consumption Insights (Beta) Azure DevOps (Beta) Azure DevOps Server (Beta) Salesforce Objects Salesforce Reports Google Analytics Adobe Analytics appFigures (Beta) Data.World - Get Dataset (Beta) Facebook GitHub (Beta) MailChimp (Beta) Marketo (Beta) Mixpanel (Beta) | Planview Enterprise One - PRM (Beta) Planview Projectplace (Beta) QuickBooks Online (Beta) Smartsheet SparkPost (Beta) Stripe (Beta) SweetIQ (Beta) Planview Enterprise One - CTM (Beta) Twilio (Beta) tyGraph (Beta) Webtrends (Beta) Zendesk (Beta) Emigo Data Source (Beta) Intune Data Warehouse (Beta) Microsoft Graph Security (Beta) TeamDesk (Beta) Industrial App Store Quick Base Dynamics 365 Customer Insights (Beta) Entersoft Business Suite (Beta) | Web SharePoint list OData Feed Active Directory Microsoft Exchange Hadoop File (HDFS) Spark R script Python script ODBC OLE DB BI360 – Budgeting & Financial Reporting Denodo Information Grid (Beta) Paxata Qubole Presto (Beta) Roamler (Beta) Workforce Dimensions (Beta) SurveyMonkey (Beta) Tenforce (Smart)List (Beta) Blank Query |
| Power Platform | | | | | |
| Power BI datasets | | | | | |
| Power BI dataflows | | | | | |
| Common Data Service | | | | | |
| Database | | | | | |
| SQL Server database | | | | | |
| Access database | | | | | |
| SQL Server Analysis Services | | | | | |
| Oracle database | | | | | |
| IBM Db2 database | | | | | |
| IBM Informix database (Beta) | | | | | |

Custom Connectors

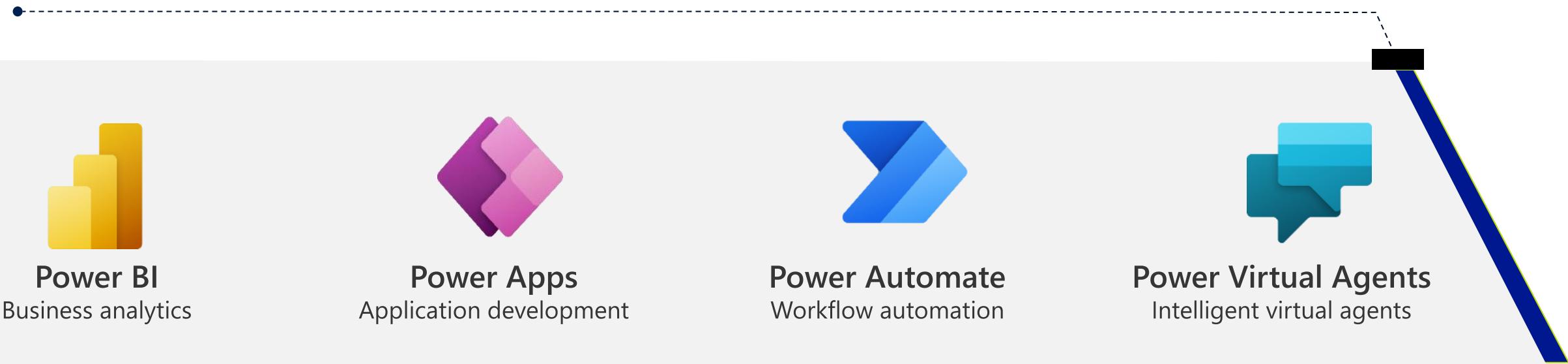
- Provide access to new data sources or customize and extend an existing data source access method.
- Common use cases:
 - Create a business analyst-friendly view for a REST API
 - Provide branding for a source with an existing connector (such as an OData service or ODBC driver)
 - Implement OAuth v2 authentication flow for a SaaS offering
 - Expose a limited or filtered view over your data source to improve usability
 - Enable DirectQuery for a data source via an ODBC driver
- What you need to install and use:
 - Power Query SDK
 - Visual Studio
 - Power BI desktop to test your connector

Certify the connector:

- Using the [Custom Connector Certification program](#)

Microsoft Power Platform

One low-code platform that spans Office 365, Azure, Dynamics 365, and standalone applications

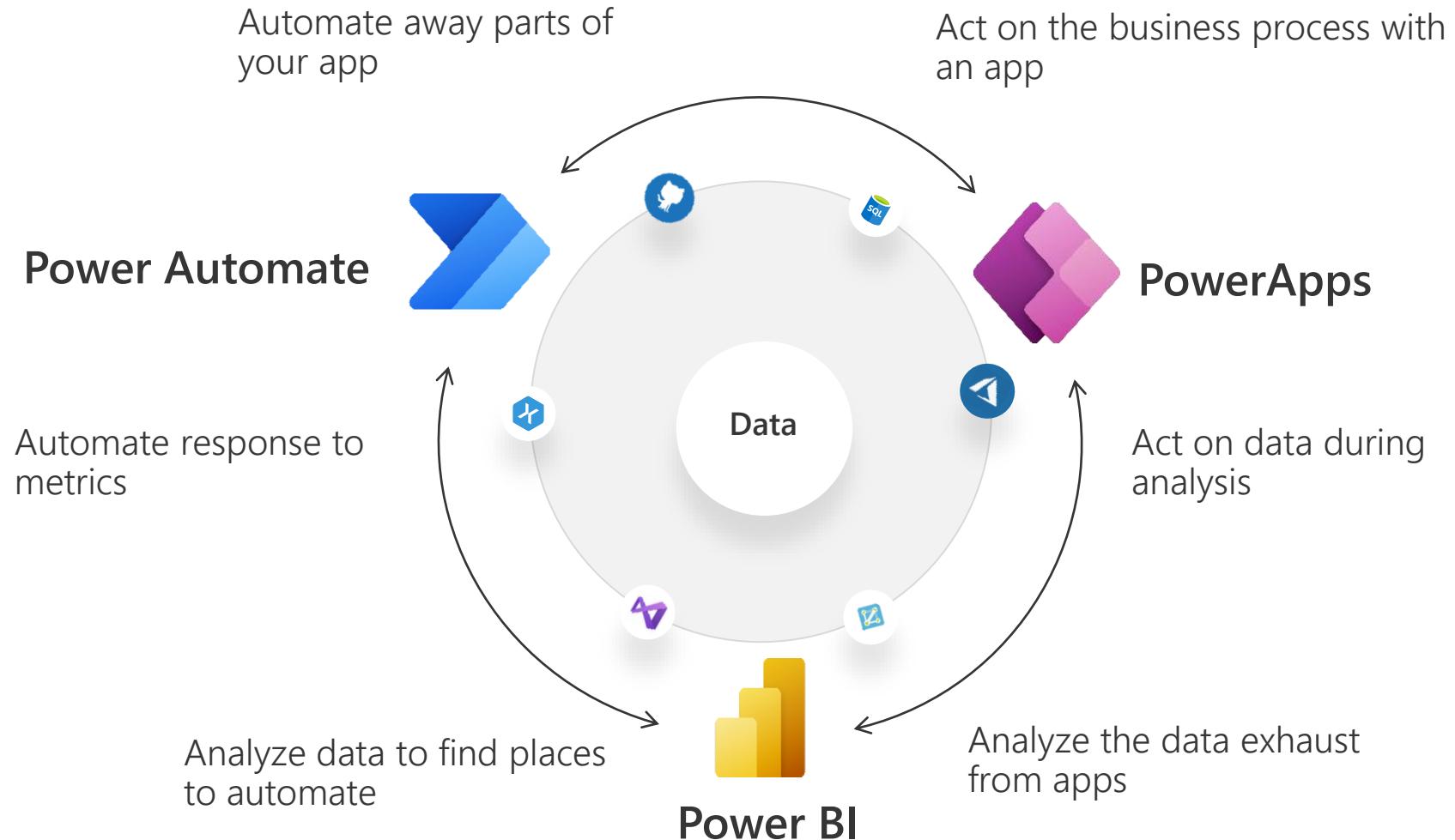


Common
Data
Service

Data
connectors

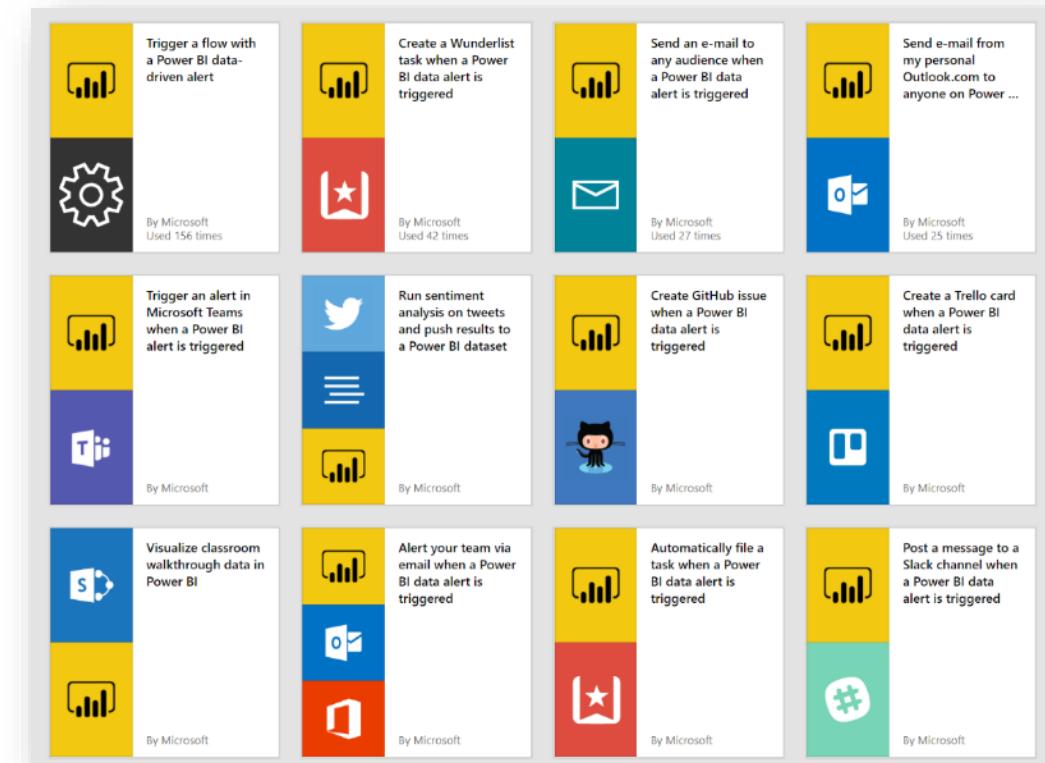
AI
Builder

Turn insights into actions



Insight to action through the Power Platform

The screenshot shows a Power BI report titled "Fleet Check Performance". The dashboard includes a bar chart of "Fleet Performance by Region", a map of Seattle with callouts for different locations, and a detailed card for a red BMW car with fields like Model, Year, Plate, Date, Root, Damage, Replacement, Follow Up By, and Argon No. A sidebar on the left lists various vehicle models and their details.

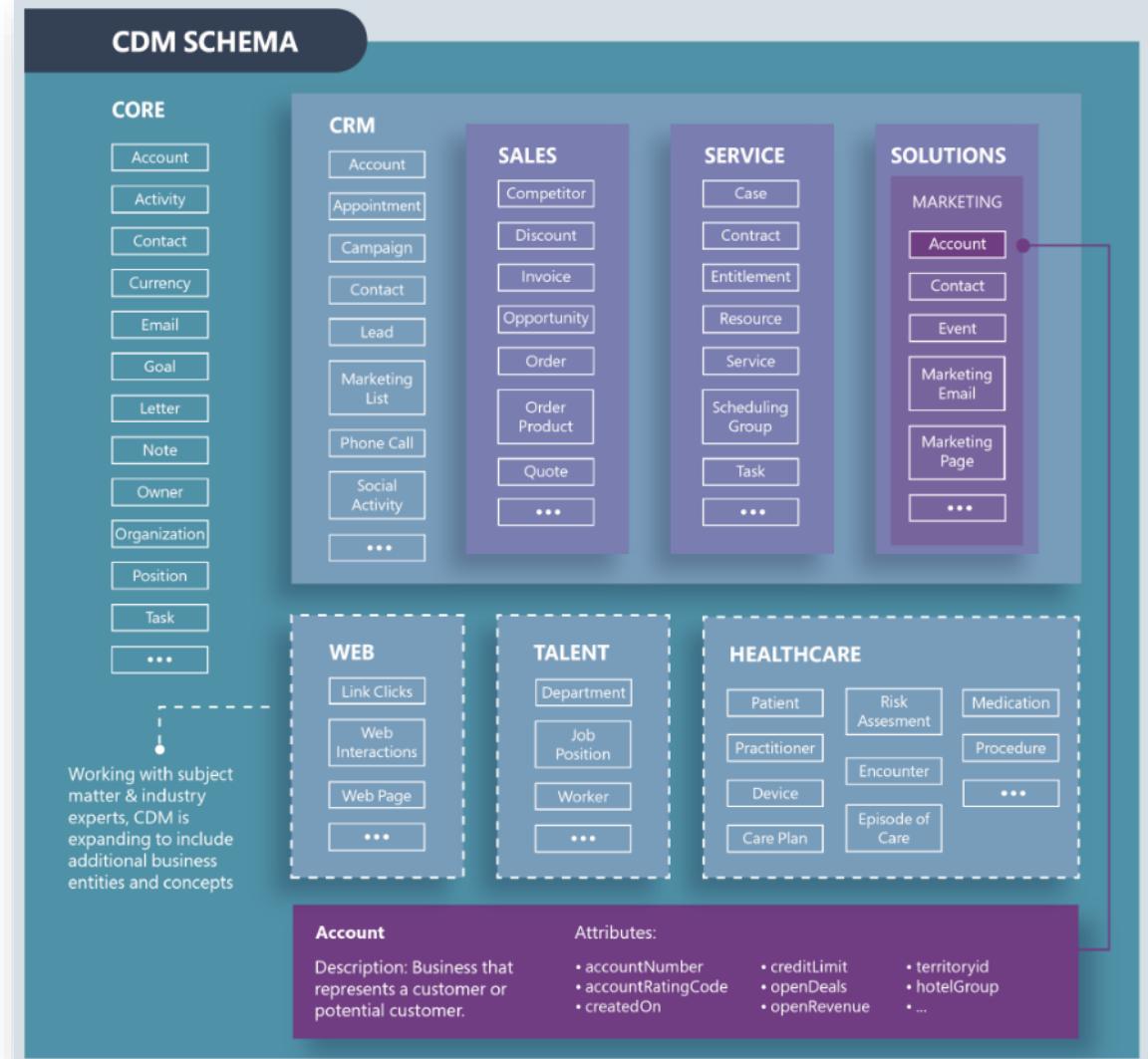


Power Apps visual in Power BI

Power Automate
flow triggers & actions for
data alerts and push data

The Common Data Model (CDM)

- Provides a well-defined, modular, and extensible business entity model (metadata + semantics)
- CDM is comprised of business entities, organized into modules (e.g. Sales, Service)
 - These entities are representations of commonly used concepts such as Account, Contact
 - Entities are extensible and new entities can be added
 - Entities may have relationships to 0-N other entities
- CDM is expanding to include entities for specific vertical industries (e.g. Healthcare, Non-profit, Education, Financial Services)
- Customers, SIs, and ISVs can build on these standard CDM definitions



More details on: <https://github.com/Microsoft/CDM/>

Open Data Initiative & the Common Data Model

One data model

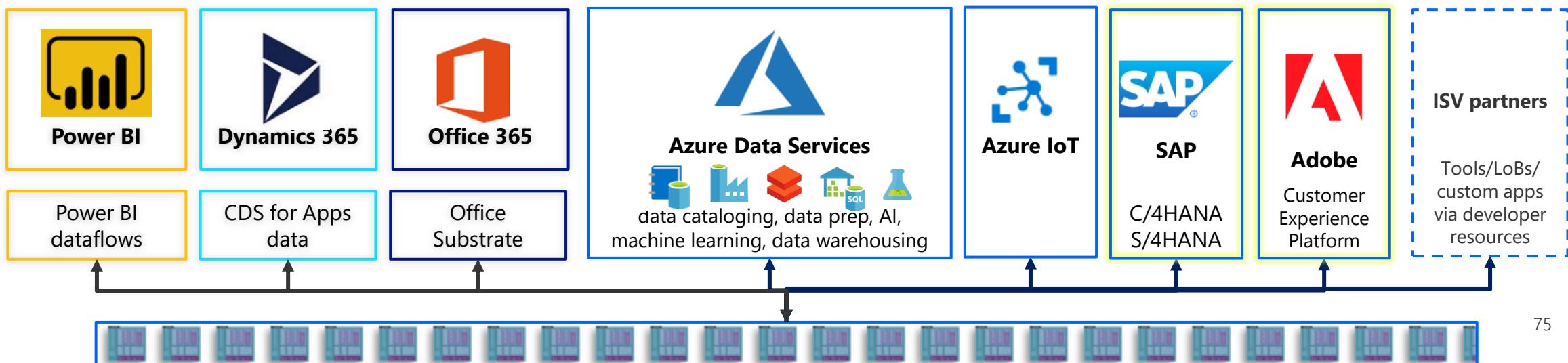
Evolving as part of the Open Data Initiative, jointly-developed by Adobe, Microsoft, and SAP.

Unified schema and semantics

The standard schema definitions and the metadata system continues to bring unified understanding and semantic meaning across data, applications and more.

Building on existing efforts

CDM is already supported in the Common Data Service, Dynamics 365, PowerApps, Power BI, and upcoming Azure data services, directly accruing value towards ODI



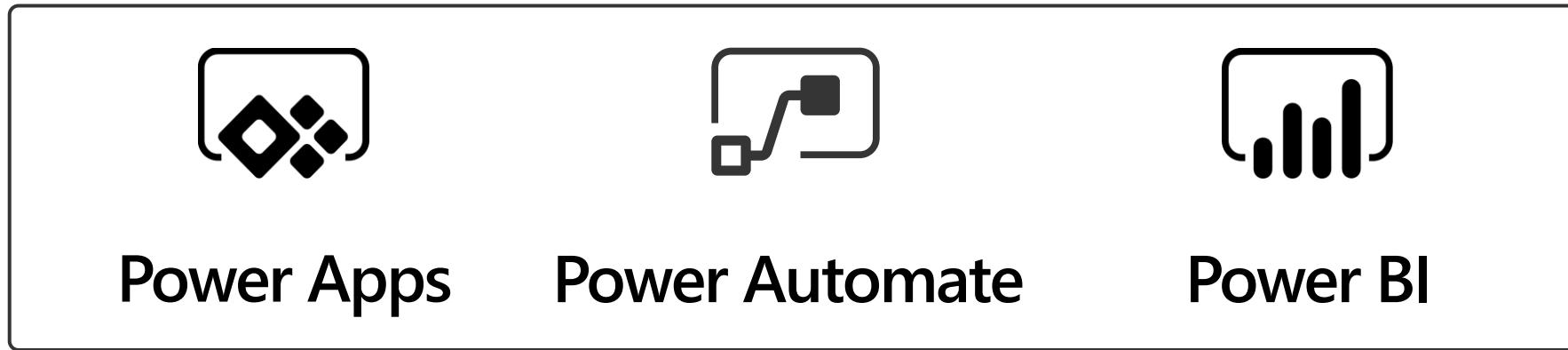
Microsoft Power platform

Dynamics 365

Office 365

Mobile Apps

Web Apps



Common
Data Service

Data
connectors

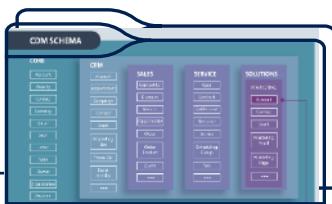
CDM Folders

On Azure Data Lake Storage G2

Operational



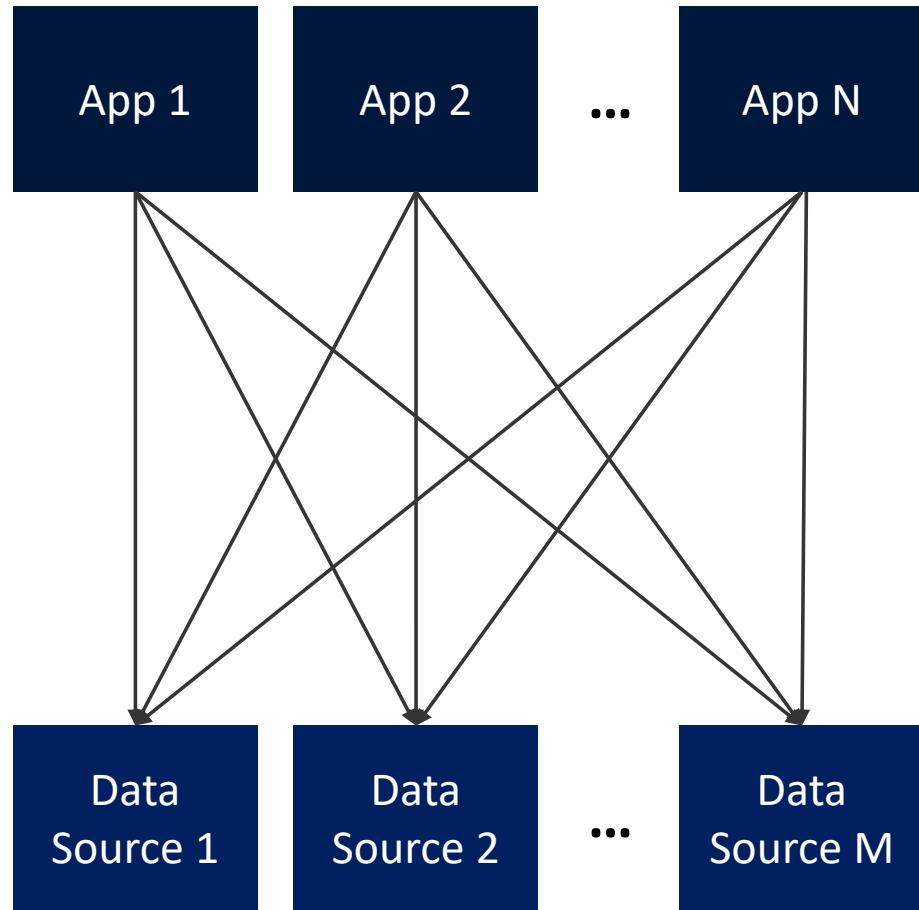
CDM - Common Data Model
Azure



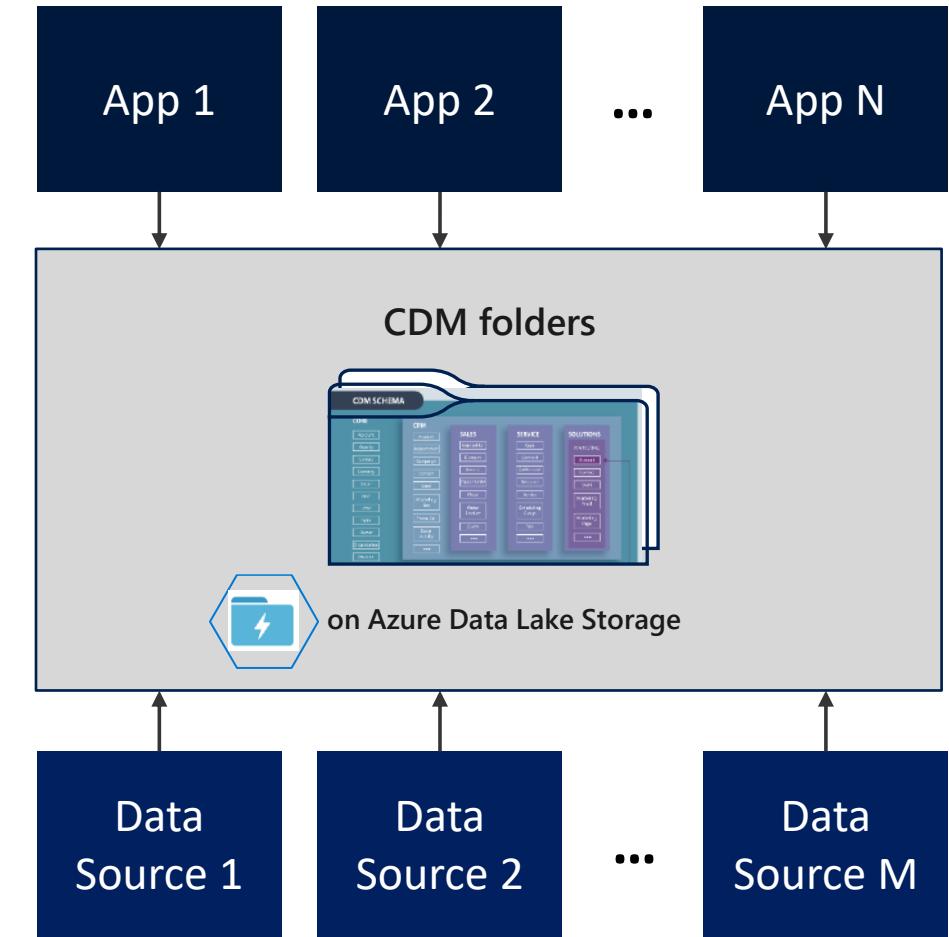
Analytics

N Apps * M Data Sources

New data source requires integration per App, and vice versa.



N Apps built over CDM entities + M Data Integrations to CDM entities
Enabling reuse, data abstraction and decoupled development



Introducing Power BI Dataflows

Data Visualizations

Reports & Dashboards

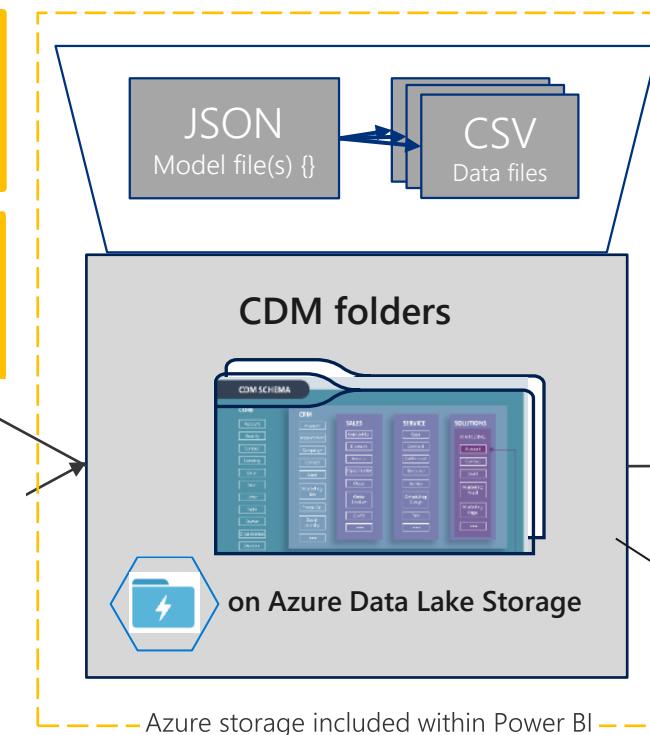
BI Models with Data

Datasets

Power Query

Data Connectivity

Connectors and Gateways



Power BI External Dataflows

Data Visualizations

Reports & Dashboards

BI Models with Data

Datasets

Unified Data Prep

Dataflows

Compute

Data Connectivity

Connectors and Gateways

Attach an external CDM folder to a new dataflow

Name *

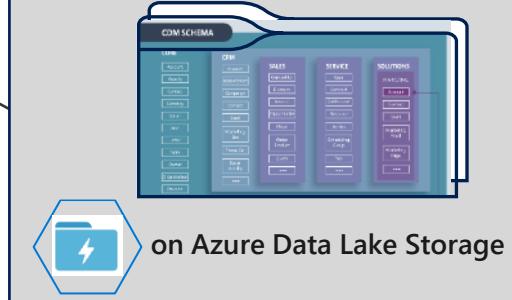
Enter a name for your dataflow

Description

JSON
Model file(s) {}

CSV
Data files

CDM folders



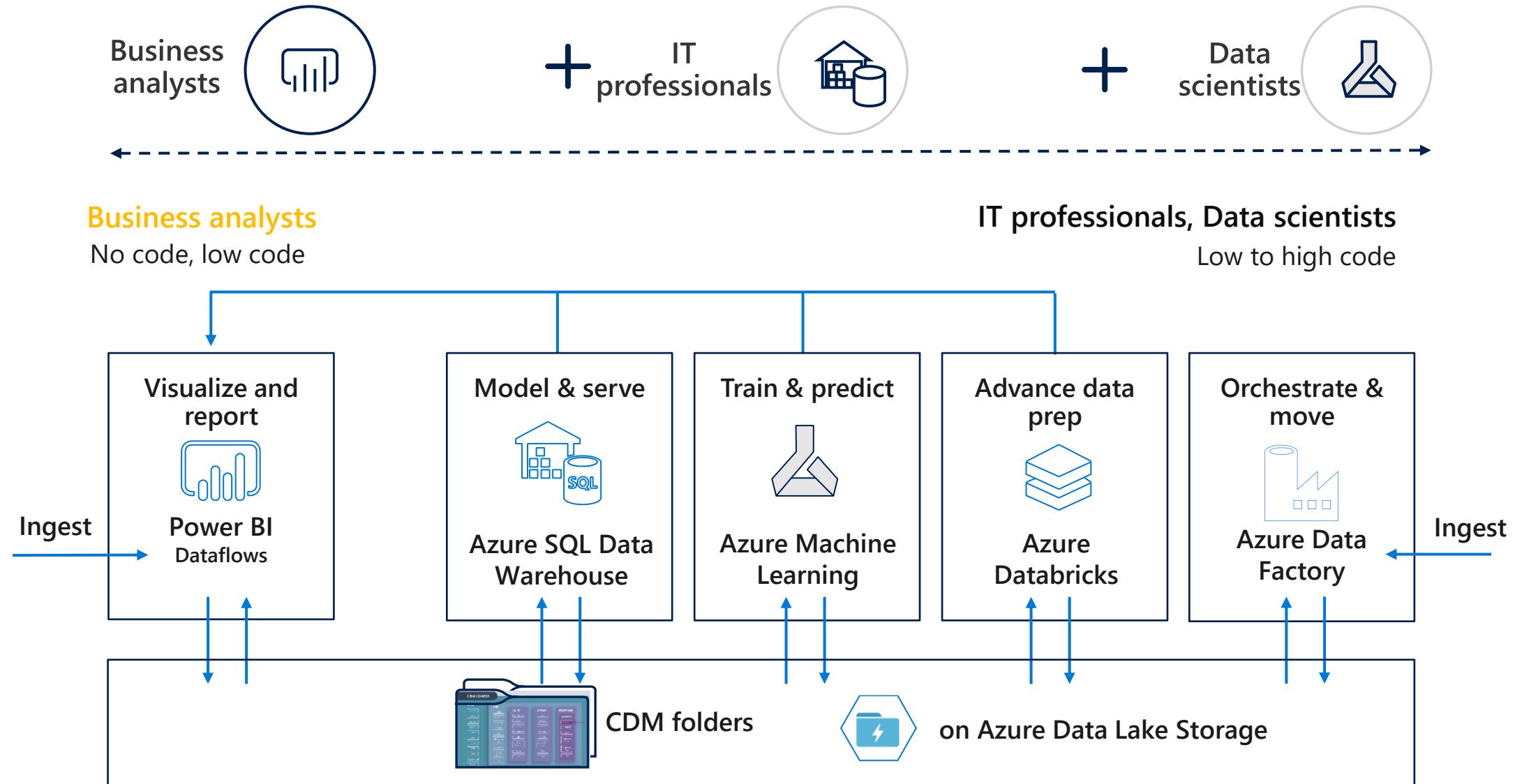
on Azure Data Lake Storage

An external tool or application

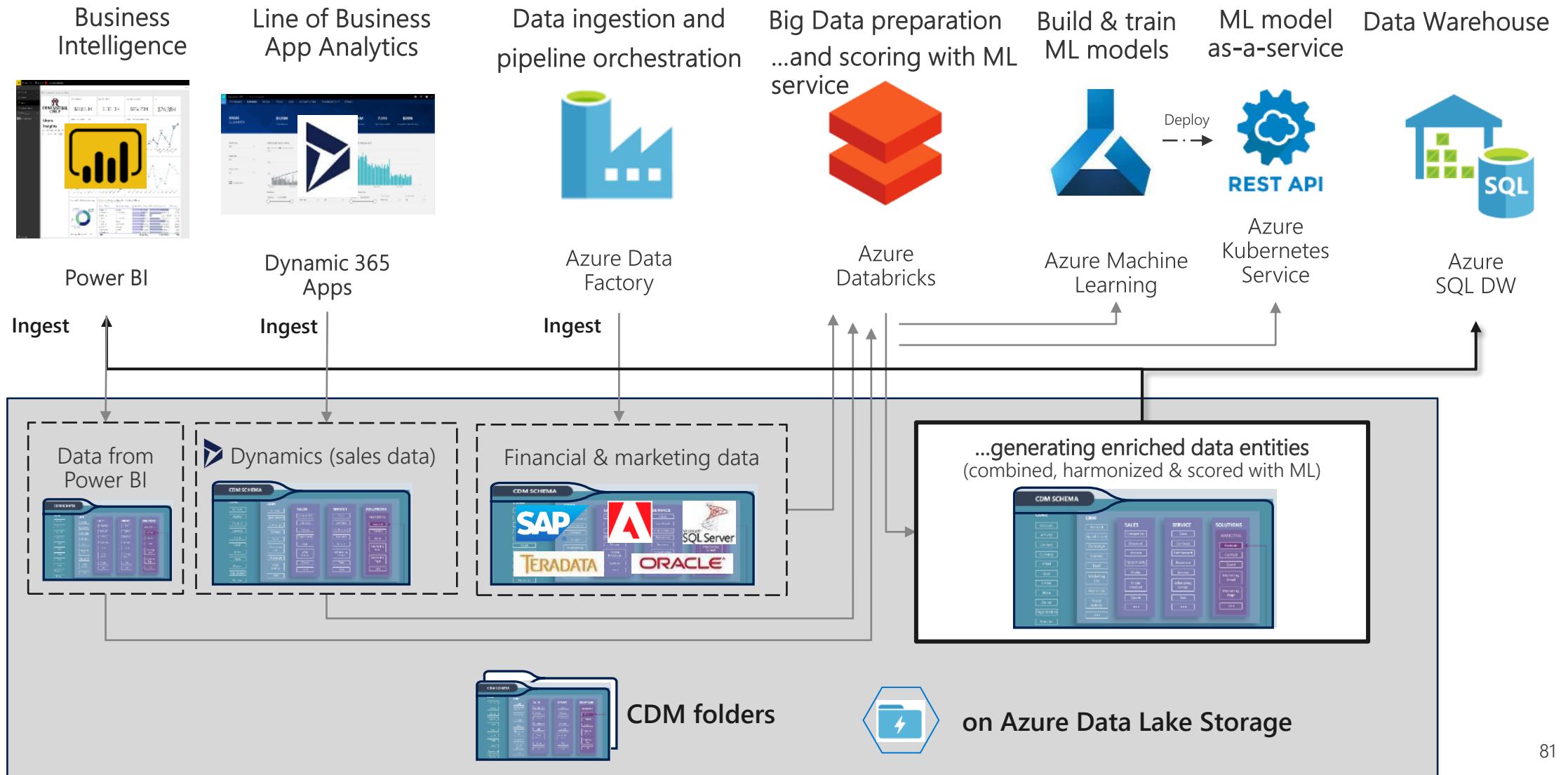
Data prep Logic

Data Ingestion

Data collaboration with seamless integration, everywhere



Share and Process Big Data In Azure with CDM Folders





Vision and Roadmap

Capacity Planning & Monitoring

- Planning:
 - [Capacity planning in Power BI embedded analytics](#)
 - Use [premium calculator](#) to roughly estimate the needed Premium capacity for a solution
 - To be more precise once the solution builder have implemented the PBI solution - they can use the [load testing framework](#) (which is explained in this [blog post](#))
- Monitoring:
 - [Monitor dashboards and reports](#)
 - [Monitor Premium \(dedicated\) capacities](#)
 - [Monitor capacities in the Admin portal](#)

Perf Best Practices & Capacity Management

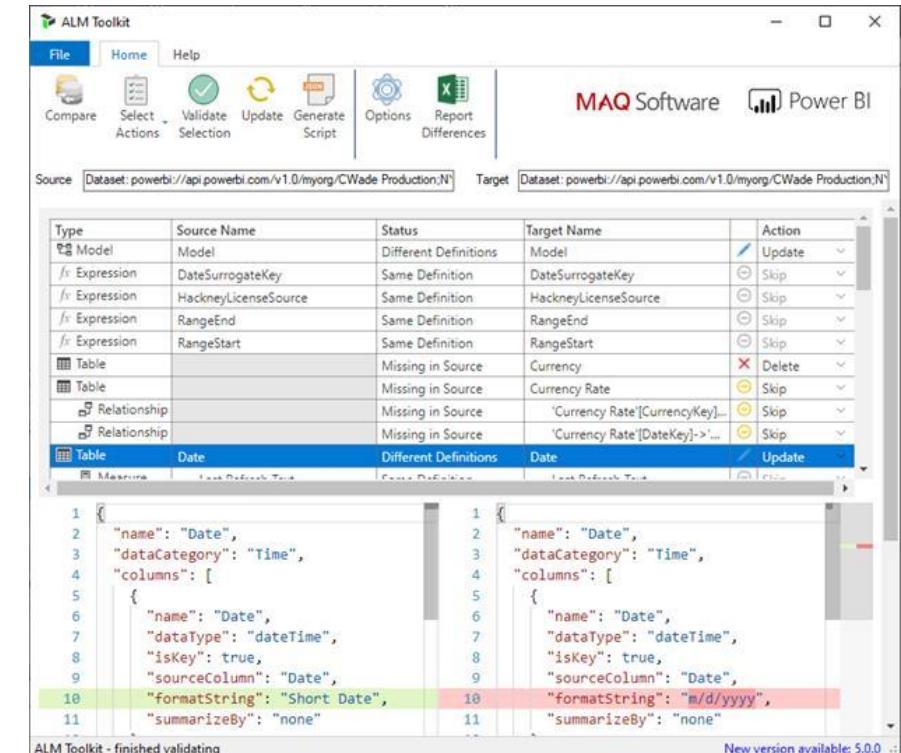
- [Power BI Embedded performance best practices](#)
- Managing capacities (of Premium or Embedded offerings) in Power BI
 - [Managing premium \(dedicated\) capacities](#)
 - [Configure and manage capacities](#)
 - [Configure workloads in a premium capacity](#) (premium workloads in a dedicated capacity)
 - [Optimizing capacities](#)
- Manage PBIE capacities in Azure
 - [Create PBIE capacity in the Azure portal](#)
 - [Manage capacity location](#) (Multi-Geo support for PBIE)
 - [Scale capacity in the Azure portal](#)
 - [Pause and start PBIE capacity in the Azure](#)

Automating Power BI administrative tasks

- Zero Downtime Capacity Scaling
 - to automate Power BI Embedded capacity scales up or down ([in Azure portal](#) or using ARM API),
the [Zero-Downtime-Capacity-Scale](#) PowerShell sample script, calls the Power BI API and ARM REST API
to programmatically scale capacity resource with no downtime. This means all embedded content is
available during the scaling process
 - Power BI Embedded Azure Resource Manager (ARM) REST API reference is documented [here](#).
- See also other automation scripts in [Power BI PowerShell samples repository](#):
 - manageRefresh.ps1 - triggers scheduled refresh and check refresh history
 - rebindReport.ps1 - clones a report in the Power BI service and rebinding it to a different dataset
 - copyWorkspace.ps1 - duplicates a workspace in the Power BI service
 - bindtogateway.ps1 - binds a dataset to a new gateway.
 - takeover-dataset.ps1 - takes ownership of a dataset to your account.

Application Lifecycle Management (ALM) for Power BI

- Separation of environments (dev/test/prod) and moving artifacts between these environments is covered by the [Enterprise Deployment Whitepaper](#).
- Deployment pipeline - develop, test, and deploy workspace content:
 - Power BI Premium feature to maintain development, test, and production environments and incrementally transition artifacts between them, reconfiguring them with the appropriate connections and security settings.
(Preview : May 2020, GA: Aug 2020)
- The ALM Toolkit - free, open source tool which performs schema comparisons on Power BI datasets and semantic models



Developer resources

Home page

<http://azure.com/powerbiembedded>

Developer center

<http://dev.powerbi.com>

Developer blog

<http://blogs.msdn.com/powerbidev>

Samples

<http://github.com/PowerBI>

Open source visuals

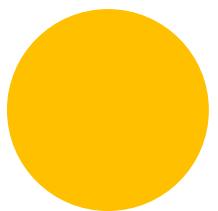
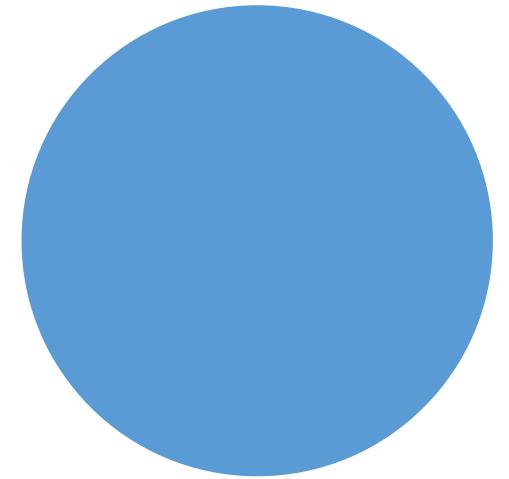
<http://github.com/Microsoft/PowerBI-visuals>

Visuals gallery

<http://visuals.powerbi.com>

Ask us questions

<http://stackoverflow.com/questions/tagged/powerbi>



QnA

|