



**SENTURUS**

# **Extending Power BI Functionality with R**

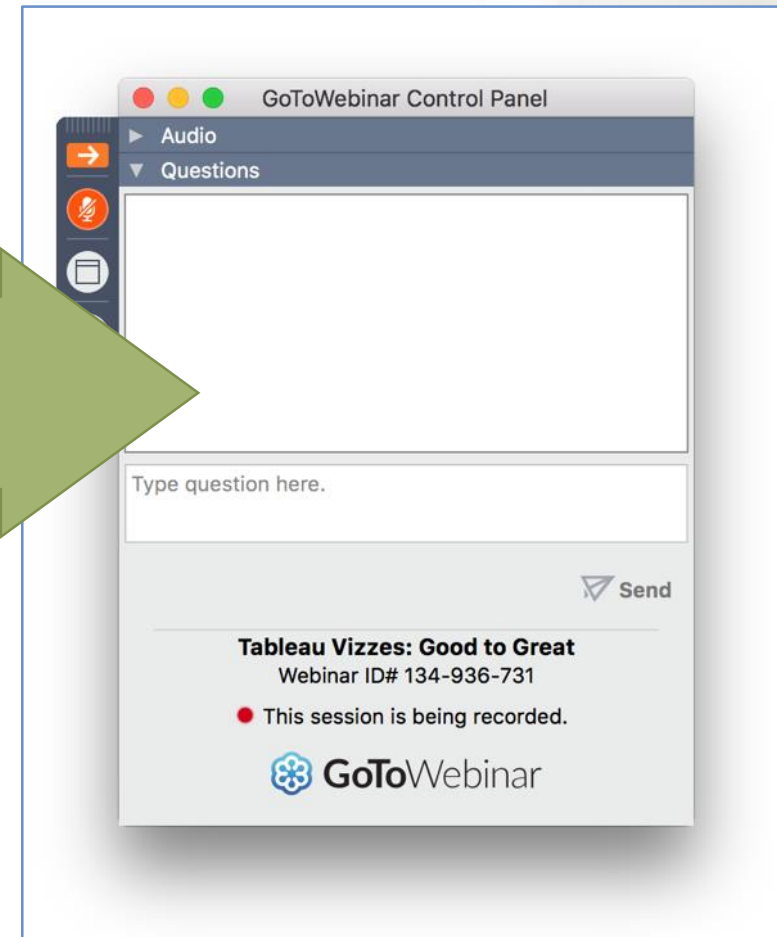


# GoToWebinar control panel

Click arrow to restore full control panel



Submit questions in this section




# To obtain this presentation

Visit the Knowledge Center on the Senturus website to download this presentation and explore other assets:


[senturus.com/resources](https://senturus.com/resources)

### Topics


- Analytics Connector
- Cross Vendor Comparisons
- Dashboards Reporting & Visualizations
- Data & Cloud Architecture
- Data Prep & Modeling
- Deployments & Performance Optimization
- IBM Analytics & Cognos
- Microsoft Azure & Power BI
- Security, governance & administration
- Snowflake
- Tableau




**Webinar**  
**6 Ways to Publish & Share Tableau Dashboards**  
How-to demo and discussion of pros, cons and considerations




**Webinar**  
**How to Successfully Implement Self-Service Analytics**  
Agile, governed self-service BI with a focus on Cognos analytics




**Webinar**  
**Creating a Power BI Report Your Boss Can Navigate**  
How to design a user-friendly nav experience



**Webinar**  
**Power BI Report Builder & Paginated Reports**  
Creating pixel-perfect reports for printing and PDF



**Webinar**  
**Using Python with Power BI**  
Learn the basics, including the software and plotting libraries



**Webinar**  
**Streamline Cognos Migrations and Consolidations**  
Automatically decode Cognos content and reduce migration time by 90%

# Agenda

- Introductions
- Discussion of R and Power BI
- Demos
- Senturus overview
- Additional resources
- Q&A

# Topics

- R basics
- Configuring Power BI Desktop
- Using R for data
- R visualizations
- Transforming data



# Introductions

Patrick Powers

Data Scientist, Consultant and Trainer  
Senturus, Inc.

Michael Weinbauer

Director  
Senturus, Inc.



# Poll #1

What is your preferred scripting language?

- Python
- R
- Other
- Don't use a scripting language

<input checked="" type="checkbox"/>	—
<input type="checkbox"/>	—
<input type="checkbox"/>	—

# What is R?

R is a free, open-source statistical language

R allows you to perform sophisticated statistical analysis and predictive analytics

This includes:

- linear and nonlinear modeling
- statistical tests
- time-series analysis
- classification

# What is R?

R uses a command line interface primarily

However, many GUI based applications are available for download

With R, users can create variables, formulas, functions and graphs to visualize their analysis and predictions



# Basic knowledge of R

- Before attempting Power BI integration, it is helpful to have a working proficiency with R
- Terms such as data frame, working with the command line and understanding the R environment are key success factors
- A good starting point is the R Project at [www.r-project.org](http://www.r-project.org)
- *Additional resources available at the end of this presentation*

# Basic knowledge of R

- The R data frame function, `data.frame`, is the foundation for storing data within R
- Similar to pandas in Python
- Stores Power BI data in a schema for access

	Name	City	State
0	Grossman Ent.	Ft Lauderdale	FL
1	United Equipment Co.	Chicago	IL
2	Senegal Ventures Inc.	Boston	MA
3	Burlingame Enterprises LLC	Birmingham	AL
4	Clintocchio One Inc.	New York	NY
5	Clintocchio Two Inc.	Los Angeles	CA
6	Magnus Partners Ltd.	Raleigh	NC
7	Moran & Danvers LP	Charlottesville	VA
8	Joseph H Cotton and Sons	Hartford	CT
9	Frigate Six, Inc.	Columbus	OH
10	Buffalina Enterprises	Atlanta	GA
11	Captcha-Cross	Fargo	ND
12	Mirado LLC	Tucson	AZ
13	New Drexel Corp	New York	NY

# Benefits of using R

- R provides a powerful way to do statistical analysis on large sets of data
- Because it is also free, this is a compelling factor to its growth
- As an open-source product, new functions and packages are created all the time
- If you can't find a capability initially, you can search for a package that can do it or even create a package of your own

# Why R with Power BI?

- Using R in conjunction with Power BI can help with creating visualizations, cleansing data and get around limitations in Power BI
- A big advantage of using R is to connect to data sources not directly supported in Power BI currently
- With R packages, analytics not directly built into Power BI can be leveraged as well

# Installing R

- Installations available for Windows, Linux and Mac
- Many Linux distributions already include R in their package management tools
- At a minimum, the command line interface is needed
- Additional 3<sup>rd</sup> party tools are available to add a graphical front end to R
- Main download site: <http://cran.r-project.org>

**Download and Install R**

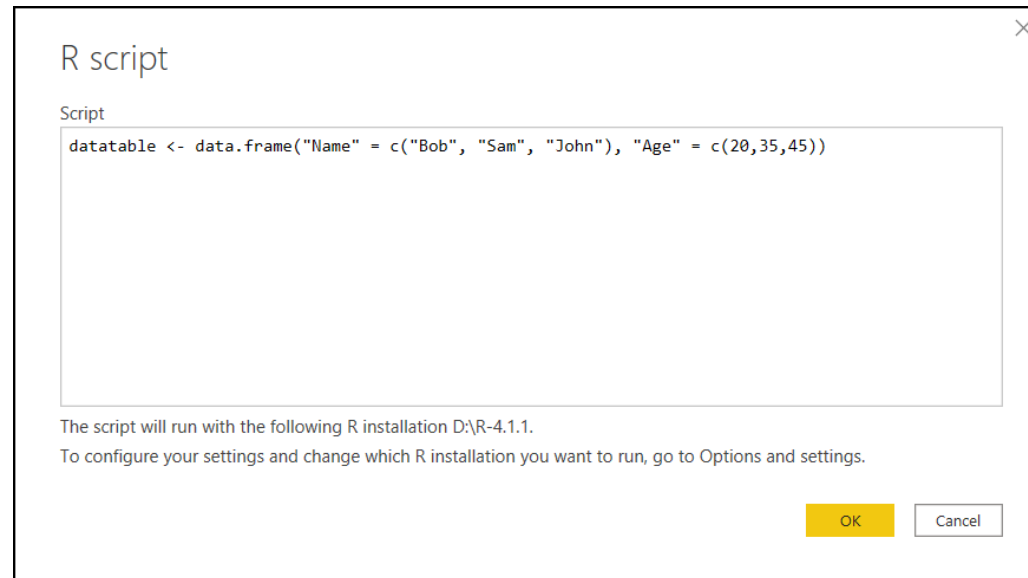
Precompiled binary distributions of the base system and contributed packages, **Windows and Mac** users most likely want one of these versions of R:

- [Download R for Linux](#)
- [Download R for \(Mac\) OS X](#)
- [Download R for Windows](#)

R is part of many Linux distributions, you should check with your Linux package management system in addition to the link above.

# Data creation

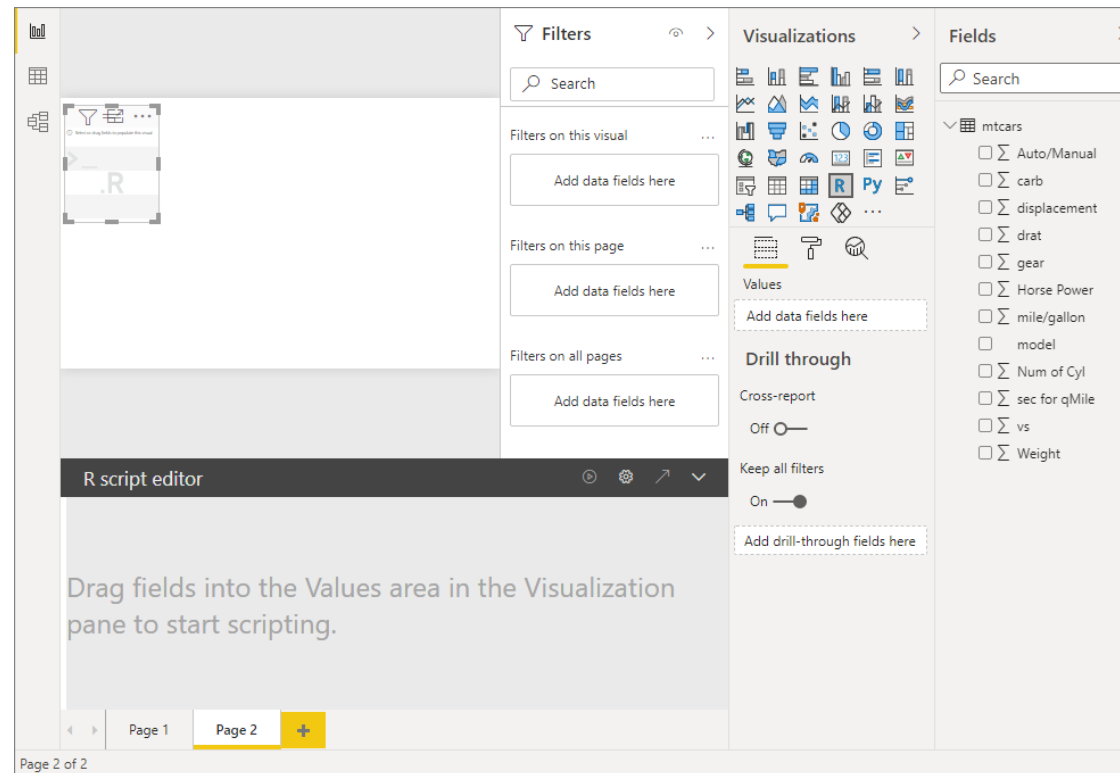
R scripts can be used to either hard code data frames or a connection script can be created to use existing data sources.





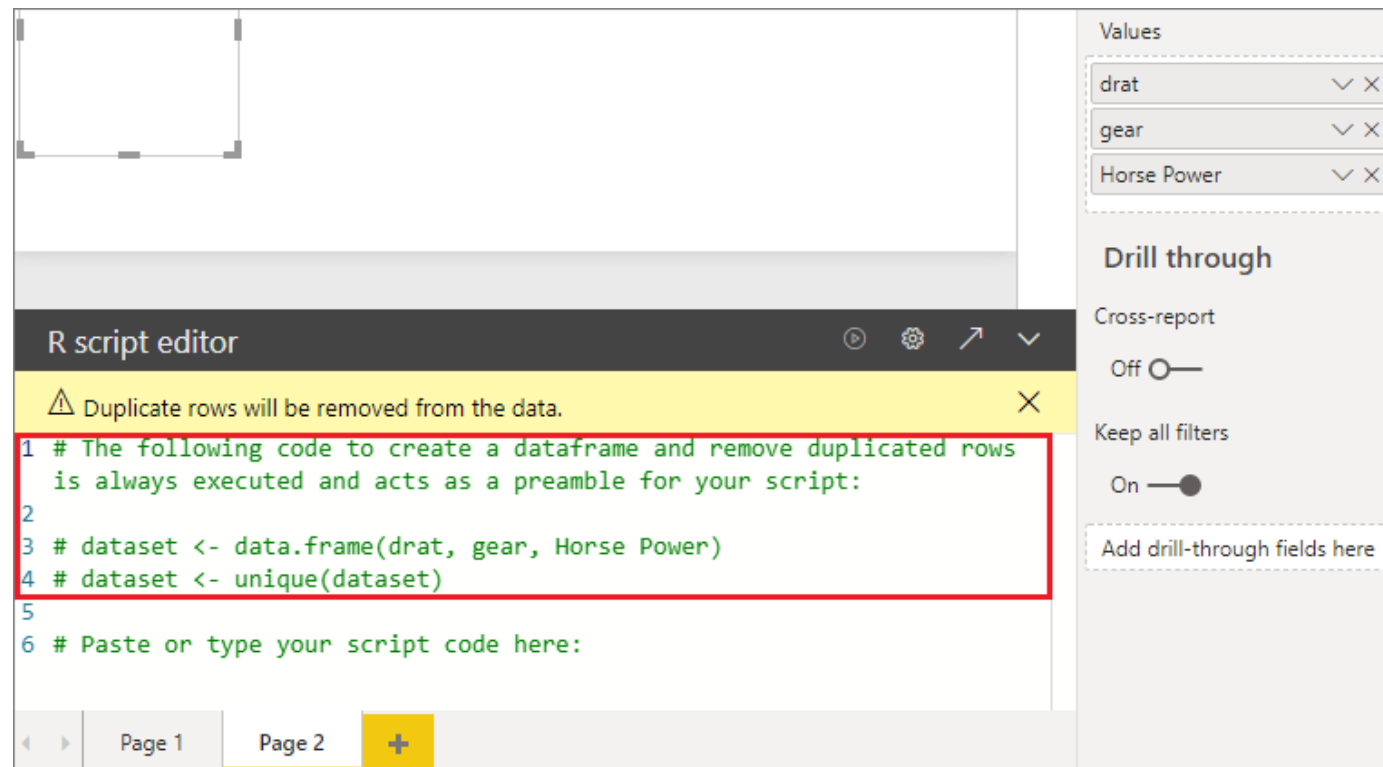
# R visualizations

To create visualizations with R, a placeholder is added to the screen and the script editor window appears.



# R visualizations

As you select fields, Power BI automatically adds them to header code which must be included in all scripts.



The screenshot displays the R script editor interface. At the top, a yellow warning banner states: "Duplicate rows will be removed from the data." Below this, a red rectangular box highlights the following R code:

```
1 # The following code to create a dataframe and remove duplicated rows  
  is always executed and acts as a preamble for your script:  
2  
3 # dataset <- data.frame(drat, gear, Horse Power)  
4 # dataset <- unique(dataset)  
5  
6 # Paste or type your script code here:
```

To the right of the editor, the 'Values' pane lists the selected fields: drat, gear, and Horse Power. Below this, the 'Drill through' section shows 'Cross-report' set to 'Off' and 'Keep all filters' set to 'On'. At the bottom of the editor, there are navigation buttons for 'Page 1', 'Page 2', and a '+' button to add more pages.

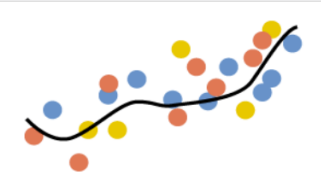
# R visualizations

The R script showcase on the Power BI community is a good starting point.

Microsoft Power BI Community > Galleries > R Script Showcase

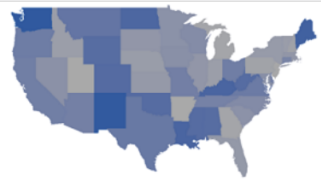
Featured Top Kudos Recently Posted All Posts

Submit your R script Options



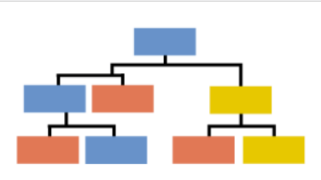
Data Smoothing with Splines

Sharon 18



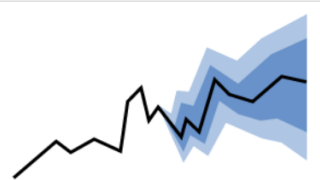
Mapping With Labels

Mike\_Carlo 16




Decision Trees

Sharon 16



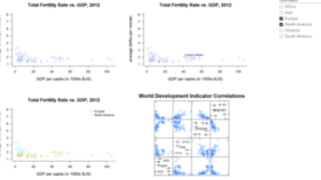
Forecasting

Sharon 15




Clustering

Sharon 14




Power BI demo - Creating Effective Graphs with Microsoft R Open

mike\_honey 11



Schedule view

fathomson 10



Map with connecting lines

ankitpatira 9

# Data manipulation

- Scripts can be used in Power Query Editor
- Data can be shaped in multiple ways:
  - completion of missing data
  - pivoting data
  - column and row removal
  - predictions
  - clustering

# Power BI demos

Creating an enterprise workbook

Configuring Power BI and libraries

Creating data

Building a visualization

Transforming data

# Power BI & R summary

Using R in Power BI allows for:

- New and exciting visualizations
- Access to more data sources and complex data connections
- Cleansing and manipulation of data
- Re-use of existing code and leveraging in place technology



# R versus Python

Which should you choose??

- A matter of which language is already in use in your organization
- R provides more statistical packages as a standard
- Python tends to have a lower entry learning curve
- Both have excellent communities with tons of examples

# R resources

- The R Project for Statistical Computing  
<https://www.r-project.org>
- R Tutorial: An R Introduction to Statistics  
<http://www.r-tutor.com>
- R Tutorial W3 Schools  
<http://w3schools.com/r/>
- R Documentation  
<http://rdocumentation.org>

# Complete BI training



Tailored group sessions



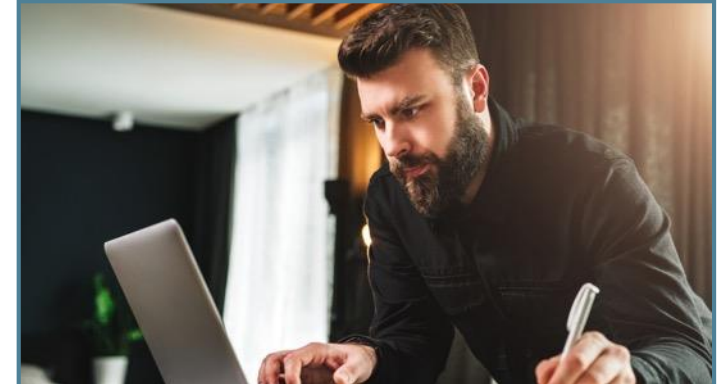
Mentoring



Instructor-led online courses



Self-paced learning



# 50% off instructor-led online training 11/29 – 12/3

## Power BI & Python

Beginning/Intermediate

Dec 13, 2021  
Jan 06, 2022  
Feb 21, 2022  
Mar 21, 2022

7:30am PT / 10:30am ET  
7:30am PT / 10:30am ET  
7:30am PT / 10:30am ET  
7:30am PT / 10:30am ET

## Power BI & R

Beginning/Intermediate

Dec 10, 2021  
Jan 07, 2022  
Feb 24, 2022  
Mar 25, 2022

7:30am PT / 10:30am ET  
7:30am PT / 10:30am ET  
7:30am PT / 10:30am ET  
7:30am PT / 10:30am ET

# Additional resources

## Unbiased product reviews



## Technical tips



## Insider viewpoints



## More on this subject



## Product demos



## Upcoming events





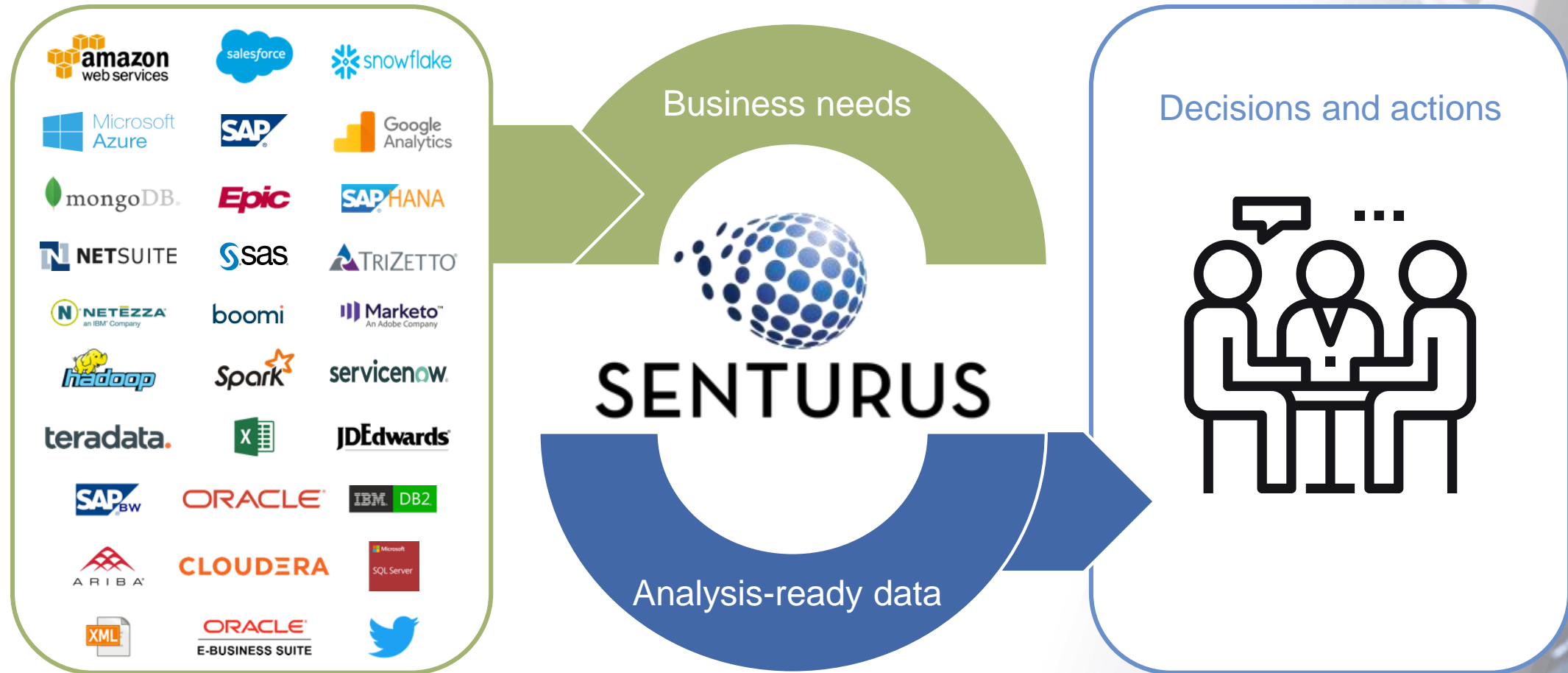
# Your path to modern BI

Accelerating self-service analytics for the enterprise





# Bridging the gap



# Full spectrum of BI services

- Data preparation and modern data warehousing
- Dashboards, reporting and visualizations in Power BI, Cognos and Tableau
- Hybrid BI environments (migrations, security, etc.)
- Software to accelerate bimodal BI and migrations
- BI services and support retainer (expertise on demand)
- Training and mentoring

# A long, strong history of success

20+ years

1350+ clients

3000+ projects





# Join the Senturus team

We're hiring talented and experienced professionals

- Senior Microsoft BI Architect
- Senior Azure Architect
- Modern Analytics Solution Architect
- ETL Developer
- And more

See job descriptions: <https://senturus.com/why-senturus/careers/>

Send your resume to [jobs@senturus.com](mailto:jobs@senturus.com)

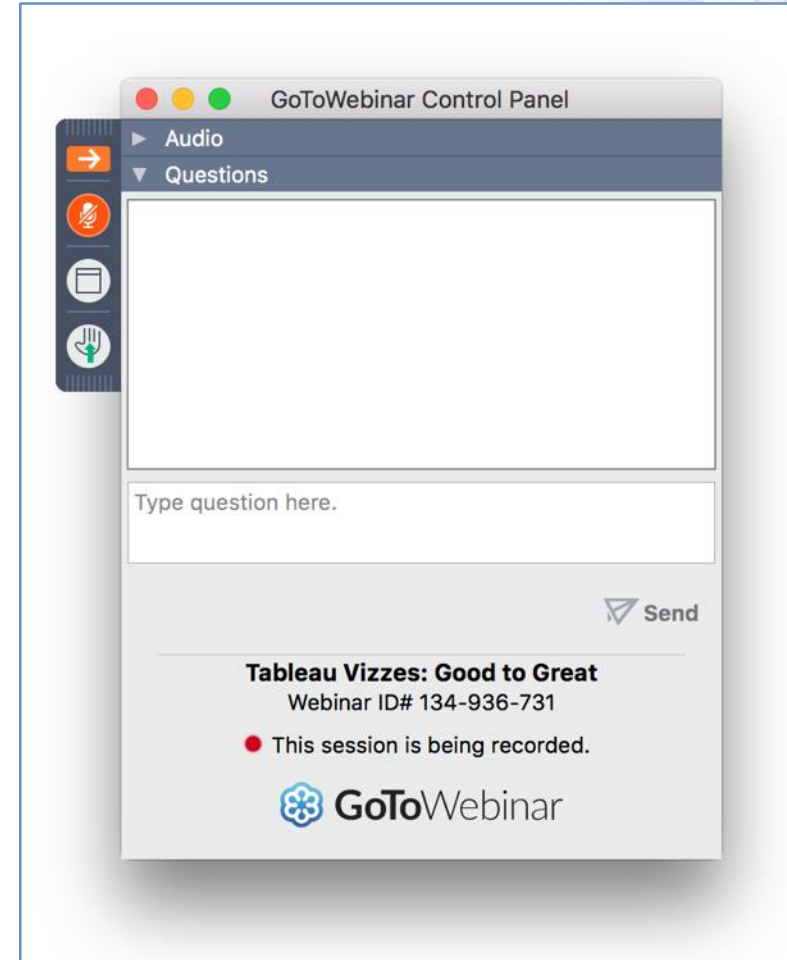


# Q & A

If your question or issue is broader than what we are able to answer today, contact us at:

[info@senturus.com](mailto:info@senturus.com)

and we will set up a free consultation.



# Thank You



## SENTURUS

---

[www.senturus.com](http://www.senturus.com)

888 601 6010

[info@senturus.com](mailto:info@senturus.com)

© 2021 by Senturus, Inc. This presentation may not be reused or distributed without the written consent of Senturus, Inc.