



# Houston, We have a P...ower BI Report

cronache di un report dal mondo reale

Riccardo Perico  
[rperico@lucient.com](mailto:rperico@lucient.com)

# Sponsors & Organizers



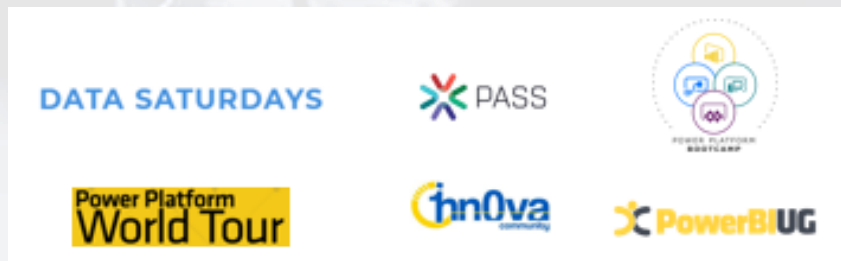
UNIVERSITÀ  
POLITECNICA  
DELLE MARCHE

# Riccardo Perico

BI & Power BI Engineer @



- More than 10 years in Microsoft “Data Realm”
- Giving my little contribution to the community
- Mail: [rperico@lucient.com](mailto:rperico@lucient.com)
- Twitter: [@R1k91](https://twitter.com/R1k91)
- LinkedIn: [riccardo-perico](https://www.linkedin.com/in/riccardo-perico)
- Blog: [medium.com/riccardo-perico](https://medium.com/riccardo-perico)
- Repository: [github.com/R1k91](https://github.com/R1k91)



Dev>Marche

# Agenda

Let's recall an ordinary work week trying to find a solution to request of a customer

# THE SCENARIO – COMPANY BIO



Insurance Multinational Group



+3K employees



+3BLN euros income



# THE SCENARIO – THE CHALLENGE

Hi Riccardo,

Our users are using **Power BI** reports to analyze **historical data** describing **active policies and accidents**.

The Company built a **ML model** hosted on **Azure ML** that exposes an **API** to **evaluate customers and prospects risks** based on some parameters (age, sex, region and past diseases) in order to **propose relevant new policies and/or additional coverings**.

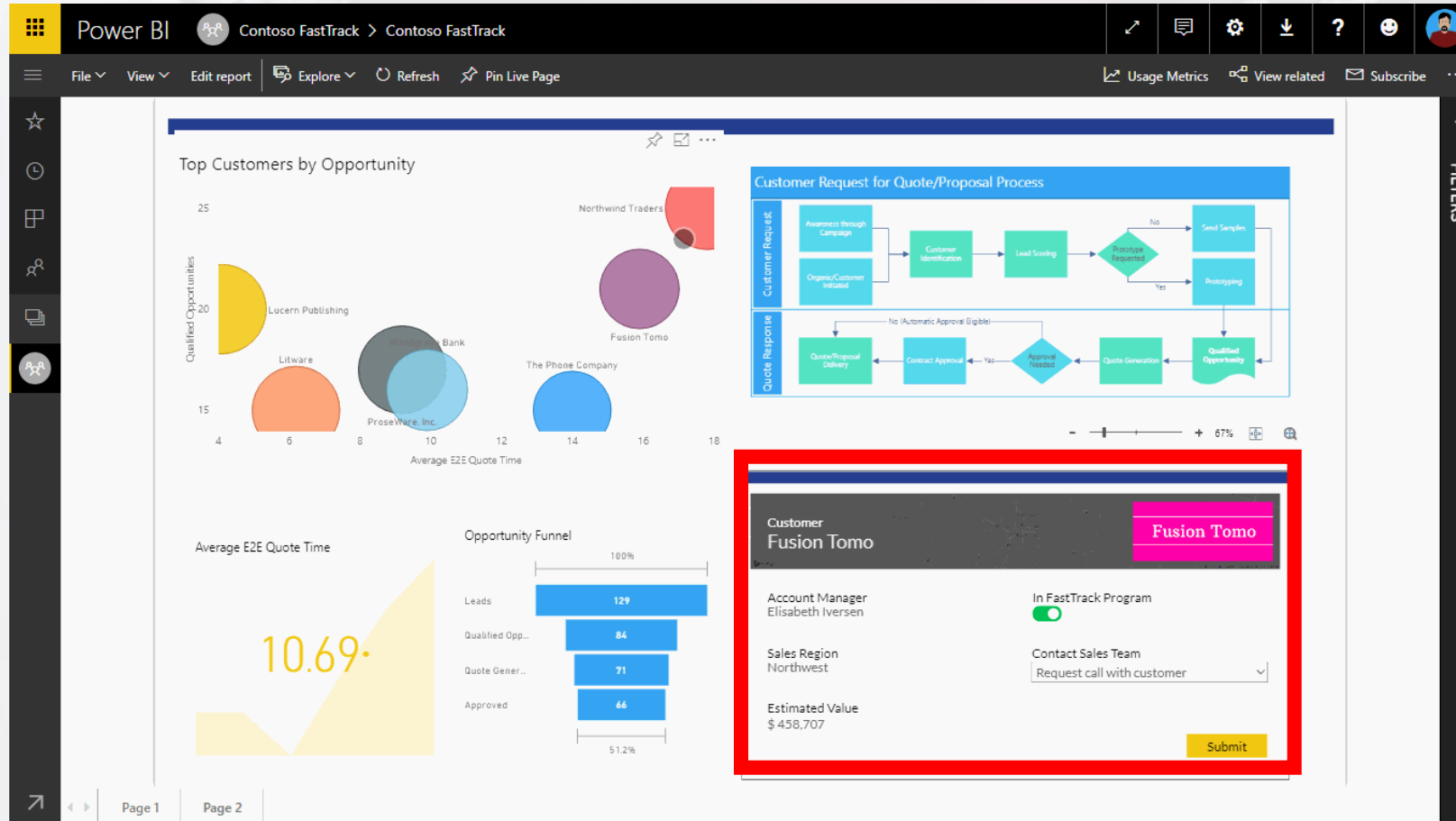
We would like our users to **query this API in real-time** while analyzing historical data in Power BI. Users must **stay in the same APP**.

Can we do it? Cheers,  
The Big Company

# THE SCENARIO – DESIDERATA

- Support for multi-users concurrency
- Power BI must be the API input interface
- Power BI must be the API output interface
- API takes 3 to 5 seconds to answer
- API accepts 4 parameters
  - Age: integer value greater than 0
  - Region: 20 Italian regions
  - Sex: Male or Female
  - Past Diseases: More than 500 distinct values

# While reading the email, my mind was like...





# SOLUTION – EMBEDDING POWER APPS

- ✓✓ Support for multi-users concurrency
- ✓✓ Power BI must be the API input interface
- ✓✓ Power BI must be the API output interface
- ✓✓ API takes 3 to 5 seconds to answer
- ✓✓ API accepts 4 parameters
  - Age: integer value greater than 0
  - Region: 20 Italian regions
  - Sex: Male or Female
  - Past Diseases: More than 500 distinct values

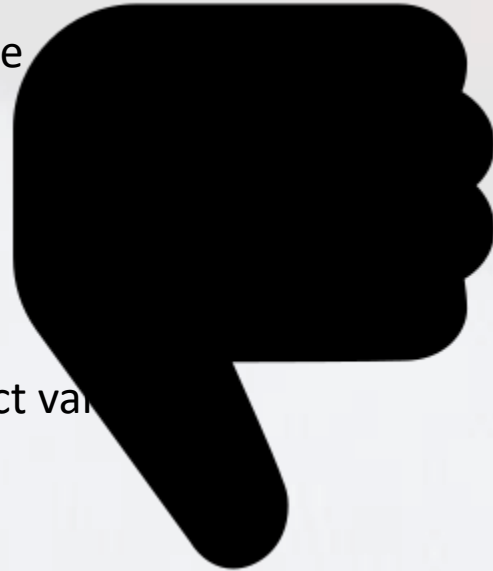
# THE SCENARIO – THE CHALLENGE... PART 2

Oh, before I forget, **Power App is not allowed** by our group policy.

Cheers,  
The Big Company

# SOLUTION – EMBEDDING POWER APPS










- ✓✓ Support for multi-users concurrency
- ✓✓ Power BI must be the API input interface
- ✓✓ Power BI must be the API output interface
- ✓✓ API takes 3 to 5 seconds to answer
- ✓✓ API accepts 4 parameters
  - Age: integer value greater than 0
  - Region: 20 Italian regions
  - Sex: Male or Female
  - Past Diseases: More than 500 distinct values
- ☠ Power Apps is not allowed by policy



# SOLUTION – USING A FILE AS PARAMETERS INPUT

Solution:

1. Save an xlsx/csv file in a shared repository (ADLS?)
2. Let users populate the input file with parameters
3. Import input file in Power Query
4. Call API in Power Query with only specified parameters
5. Save API result in Power BI dataset
6. Expose result in Power BI visual

	Database	Database	
n2	 Azure HDInsight Spark Azure	 Azure SQL database Azure	
	 SharePoint Online list Online services	 FHIR Other	
	 Web API Other	 Web page Other	

# SOLUTION – USING A FILE AS PARAMETERS INPUT



Support for multi-users concurrency

Power BI must be the API input interface

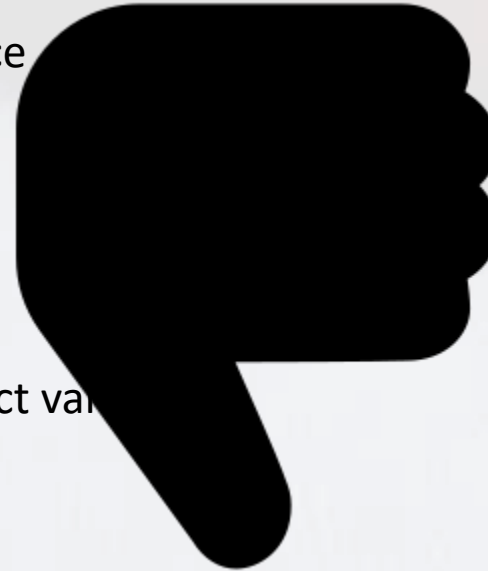
✓ Power BI must be the API output interface










✓ API takes 3 to 5 seconds to answer

✓ API accepts 4 parameters

- Age: integer value greater than 0
- Region: 20 Italian regions
- Sex: Male or Female
- Past Diseases: More than 500 distinct values

✓ Power Apps is not allowed by policy



	Database	Database	
n2	 Azure HDInsight Spark Azure	 Azure SQL database Azure	
	 SharePoint Online list Online services	 FHIR Other	
	 Web API Other	 Web page Other	

# SOLUTION – IMPORT ALL POSSIBLE COMBINATIONS

Solution:

1. Create all possible parameters combinations
2. Call API with each combination
3. Import combination and result in a star schema model
4. Mount slicers on dimensions





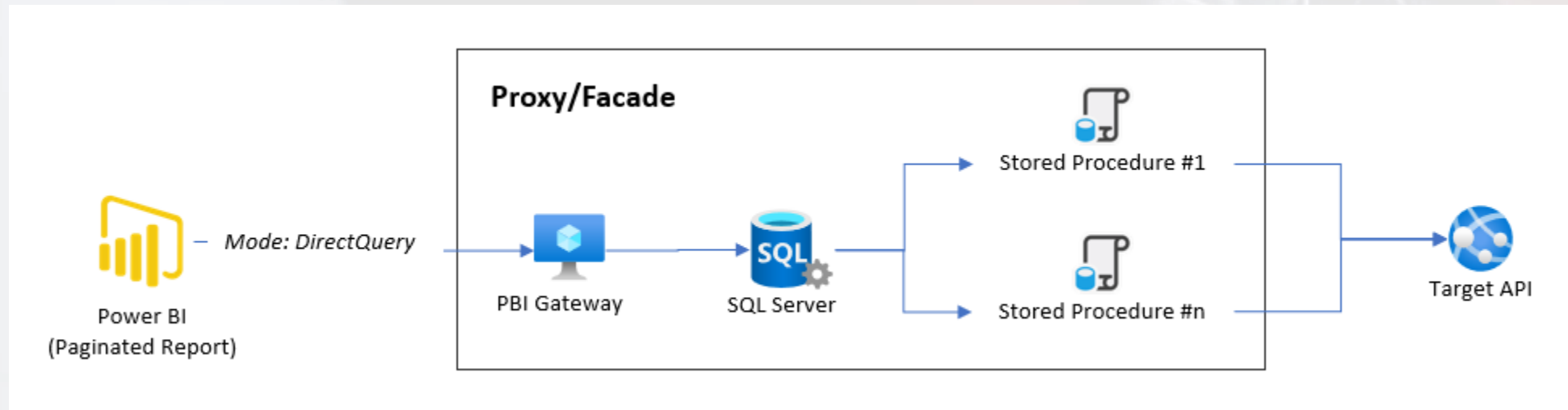
# SOLUTION – IMPORT ALL POSSIBLE COMBINATIONS

- ✓ Support for multi-users concurrency
- ✓ Power BI must be the API input interface
- ✓ Power BI must be the API output interface
- ☠ API takes 3 to 5 seconds to answer
- ✓ API accepts 4 parameters
  - Age: integer value greater than 0
  - Region: 20 Italian regions
  - Sex: Male or Female
  - Past Diseases: More than 500 distinct values
- ✓ Power Apps is not allowed by policy



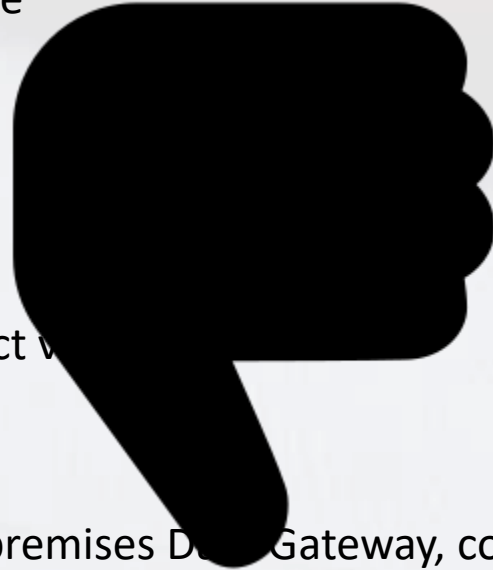
3 Past Diseases (A, B and C) yields to 7 combinations: A, B, C, AB, AC, ABC, BC  
20 Regions \* 2 Sexes \* 100 ages \* 7 past diseases combinations = 28 K API calls  
28K \* 3 secs = ... hours... many hours

# SOLUTION – USE SQL SERVER AS PROXY



# SOLUTION – USE SQL SERVER AS PROXY

- ✓✓ Support for multi-users concurrency
- ✓✓ Power BI must be the API input interface
- ✓✓ Power BI must be the API output interface
- ✓✓ API takes 3 to 5 seconds to answer
- ✓✓ API accepts 4 parameters
  - Age: integer value greater than 0
  - Region: 20 Italian regions
  - Sex: Male or Female
  - Past Diseases: More than 500 distinct values
- ✓✓ Power Apps is not allowed by policy



Come on... SQL Server on-prem, On-premises Data Gateway, complex and expensive  
In Italy we say... “Sparare ad una formica con un cannone”

# SOLUTION – R/PYTHON VISUALS

Solution:

1. Import all parameters in Power BI Model
2. Mount slicers on dimensions
3. Use R or Python visuals to call API and to render response



# SOLUTION – R/PYTHON SCRIPT

- ✓✓ Support for multi-users concurrency
- ✓✓ Power BI must be the API input interface
- ✓✓ Power BI must be the API output interface
- ✓✓ API takes 3 to 5 seconds to answer
- ✓✓ API accepts 4 parameters
  - Age: integer value greater than 0
  - Region: 20 Italian regions
  - Sex: Male or Female
  - Past Diseases: More than 500 distinct values
- ✓✓ Power Apps is not allowed by policy



Do we have a winner?

Let's try...





# TELL ME WHY...

## Requirements and limitations of R packages

There are a handful of requirements and limitations for R packages:

- Current R runtime: Microsoft R 3.4.4
- The Power BI service usually supports R packages with free and open-source software licenses such as GPL-2, GPL-3, MIT+, and so on.
- The Power BI service supports packages published in the Comprehensive R Archive Network (CRAN). The service doesn't support private or custom R packages. Users are encouraged to make their private packages available on CRAN prior to requesting the package be available in the Power BI service.
- The Power BI Desktop has two variations for R packages:
  - For R visuals, you can install any package, including custom R packages
  - For Custom R visuals, only public CRAN packages are supported for auto-installation of the packages
- For security and privacy reasons, R packages that provide client-server queries over the web, such as *RgoogleMaps*, in the service, aren't supported. Networking is blocked for such attempts. See the following section for a list of supported and unsupported R packages.
- The approval process for including a new R package has a tree of dependencies. Some dependencies required to be installed in the service can't be supported.

[Create Power BI visuals using R - Power BI | Microsoft Learn](#)

[Learn which R packages are supported - Power BI | Microsoft Learn](#)

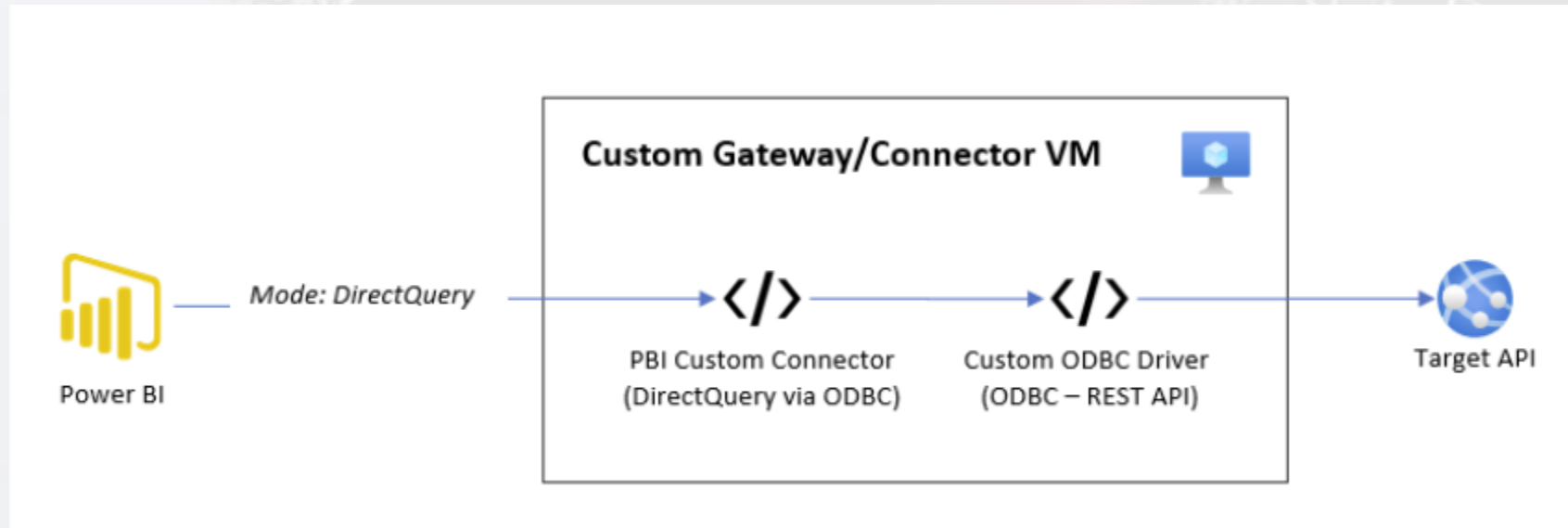
# SOLUTION – R/PYTHON SCRIPT

- ✓✓ Support for multi-users concurrency
- ✓✓ Power BI must be the API input interface
- ✓✓ Power BI must be the API output interface
- ✓✓ API takes 3 to 5 seconds to answer
- ✓✓ API accepts 4 parameters
  - Age: integer value greater than 0
  - Region: 20 Italian regions
  - Sex: Male or Female
  - Past Diseases: More than 500 distinct values
- ✓✓ Power Apps is not allowed by policy



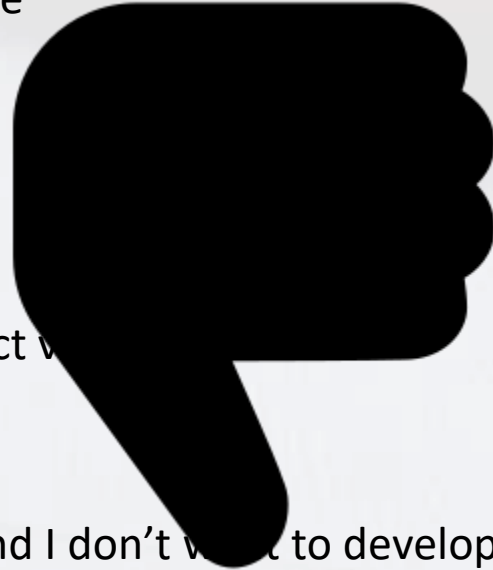
We could add Power BI desktop to use on a pc or a dedicated VM...  
oh, “sparare ad una formica con un cannone...” again...

# SOLUTION – CUSTOM DATA CONNECTOR



# SOLUTION – CUSTOM DATA CONNECTOR

- ✓✓ Support for multi-users concurrency
- ✓✓ Power BI must be the API input interface
- ✓✓ Power BI must be the API output interface
- ✓✓ API takes 3 to 5 seconds to answer
- ✓✓ API accepts 4 parameters
  - Age: integer value greater than 0
  - Region: 20 Italian regions
  - Sex: Male or Female
  - Past Diseases: More than 500 distinct values
- ✓✓ Power Apps is not allowed by policy



3<sup>rd</sup> party tools could be dangerous, and I don't want to develop anything to maintain

# SOLUTION – PAGINATED REPORT VISUAL

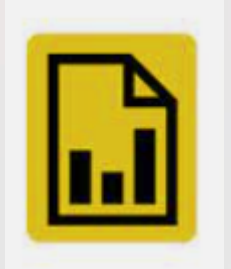
Solution:

1. Import all parameters in Power BI Model
2. Mount slicers on dimensions
3. Create a Paginated Report with a custom VB function to call the API
4. Use Paginated Report visual to pass parameters to Paginated Report and render the result



# SOLUTION – PAGINATED REPORT VISUAL

- ✓✓ Support for multi-users concurrency
- ✓✓ Power BI must be the API input interface
- ✓✓ Power BI must be the API output interface
- ✓✓ API takes 3 to 5 seconds to answer
- ✓✓ API accepts 4 parameters
  - Age: integer value greater than 0
  - Region: 20 Italian regions
  - Sex: Male or Female
  - Past Diseases: More than 500 distinct values
- ✓✓ Power Apps is not allowed by policy



If this doesn't work, I'm done...

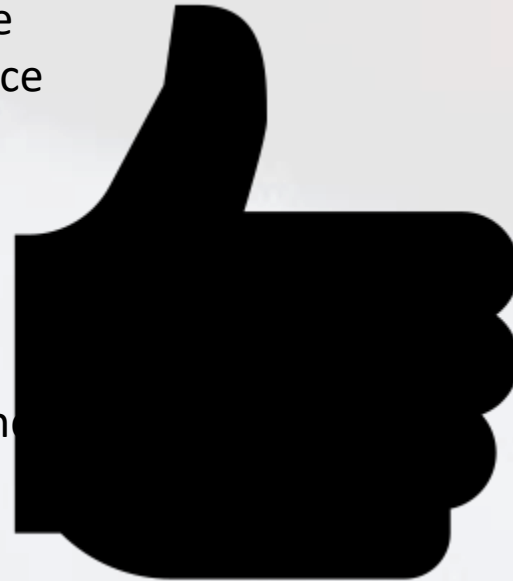


A red sports car, possibly a Ferrari, is parked on a wet, reflective street. The car is angled towards the right. The wet pavement creates clear reflections of the car and the surrounding environment. Overlaid on the left side of the image is the text "Let's try... again..." in a black, sans-serif font.

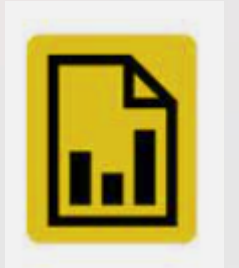
Let's try... again...

# SOLUTION – PAGINATED REPORT VISUAL

- ✓✓ Support for multi-users concurrency
- ✓✓ Power BI must be the API input interface
- ✓✓ Power BI must be the API output interface
- ✓✓ API takes 3 to 5 seconds to answer
- ✓✓ API accepts 4 parameters
  - Age: integer value greater than 0
  - Region: 20 Italian regions
  - Sex: Male or Female
  - Past Diseases: More than 500 distinct
- ✓✓ Power Apps is not allowed by policy



If this doesn't work, I'm done...



## LET'S SUMMARIZE

Solution	Breaking Point	Outcome
Power App Visual	Power App Disallowed by Policy	KO
External CSV/XLSX config file	Multi-user concurrency quite impossible	KO
Calculate all combinations outcome in advance	Too much combinations	KO
SQL Server as a Proxy	So much complicated	KO
R/Python Visual	Not working on service	KO
Custom Data Connector	So much complicated	KO
Paginated Report	Premium needed	OK

# BREAKING NEWS!

## Announcing support for paginated reports in Power BI Pro



**Cookie McCray**  
Senior Product Manager



November 14, 2022

 Share

 Tweet

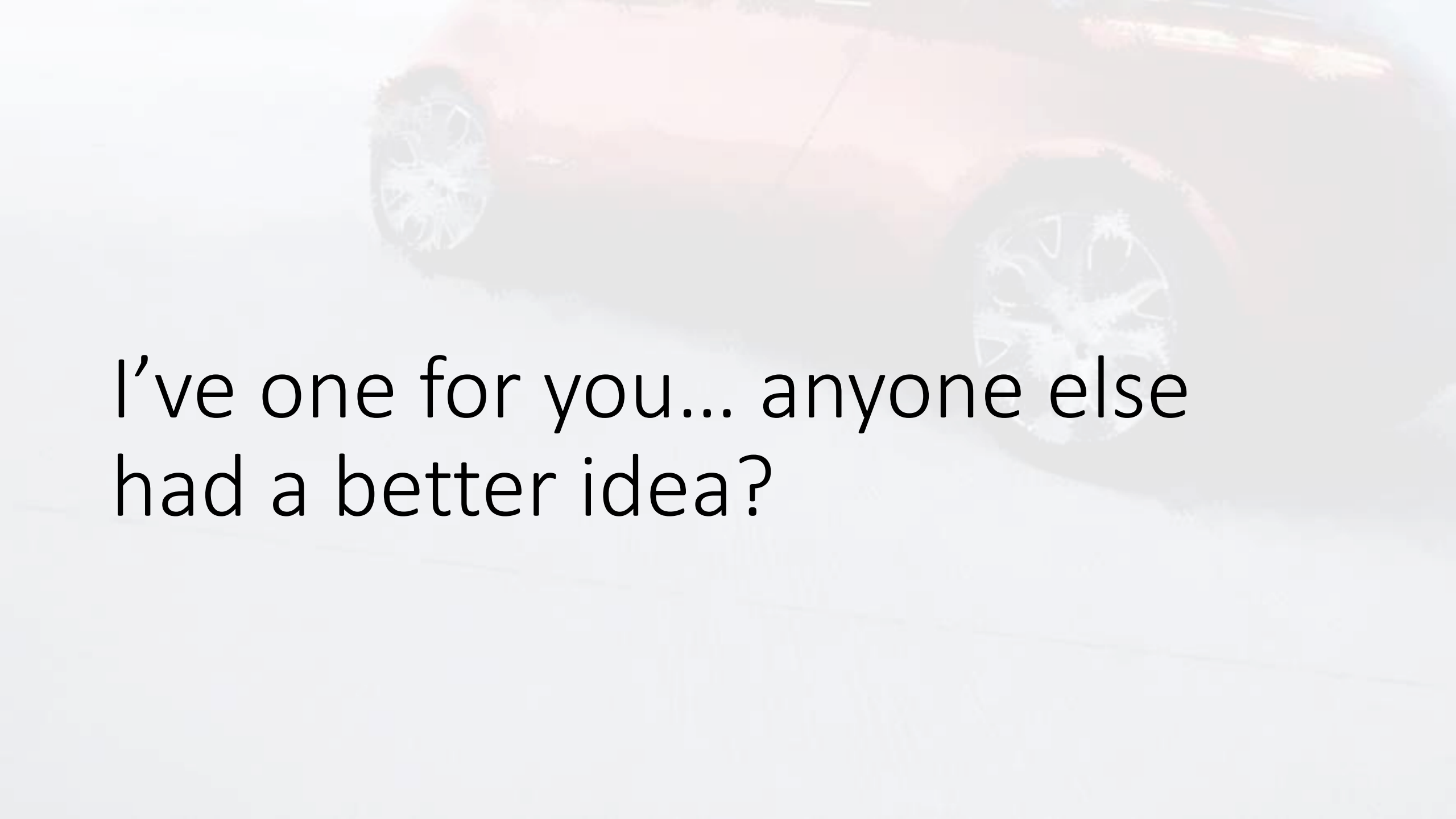
 Like

*This blog post has been edited to include an answer to the comment section about programmatic exports.*

As part of continued Power BI innovation, we're excited to announce support for paginated reports in Power BI Pro at this year's PASS Data Community Summit. Now Microsoft Power BI customers have the flexibility to create and consume interactive reports as well as paginated reports using Power BI Pro. The new capability will be rolled out gradually over the coming weeks and should be available in all regions by the end of the calendar year.



Any Questions?

A blurred red sports car, possibly a Ferrari, is visible in the background. The car is positioned horizontally across the upper half of the frame, with its front on the left and rear on the right. The image is out of focus, showing the car's distinctive shape and wheels. The text is overlaid on the lower half of the image.

I've one for you... anyone else  
had a better idea?

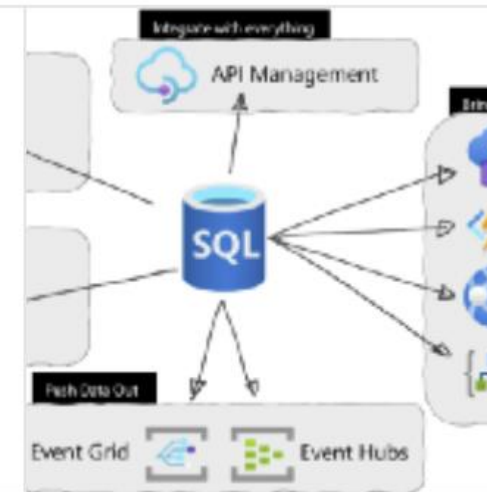


# WHY DON'T USE AZURE SQL REST CALLS?

## Azure SQL Database External REST Endpoints Integration Public Preview

Davide Mauri The ability to call a REST endpoint natively from Azure SQL Database, which was made available via an...

devblogs.microsoft.com



<https://medium.com/riccardo-perico/interactive-api-calls-from-power-bi-report-continues-590203d53e79>



# Thank you

<https://medium.com/riccardo-perico/interactive-api-calls-from-power-bi-report-3e488ca8ffb6>

<https://medium.com/riccardo-perico/interactive-api-calls-from-power-bi-report-continues-590203d53e79>