

A photograph of a large iguana perched on a weathered stone wall against a clear blue sky. The iguana is facing left, its head slightly lowered with its mouth open, showing its tongue and teeth. Its body is dark with light-colored stripes, and its tail is curved. The wall it is on is made of large stones, some of which are missing or broken, revealing the underlying concrete. The sky is a bright, clear blue.

# Canvas Apps for the Model-driven Mind

Jukka Niiranen  
Power Platform Saturday Oslo  
24.8.2019

# Agenda

- The PowerApps plan for world domination
- Current reality: Canvas vs. Model-driven apps
- Demo: what can a citizen developer build?
- Tips for building Canvas apps on CDS
- A platform for Makers or for Developers?



# Quick intro

- From Helsinki, Finland
- MS Business Applications Product Lead at Elisa
  - Finland's largest telco & Office 365 partner
  - 400 professionals in IT Services
  - 30 in MS Business Applications
- Microsoft MVP since 2013
- Blogging at [survivingcrm.com](http://survivingcrm.com)
- Tweeting at [@jukkan](https://twitter.com/jukkan)
- No-code XRM guy since 2005
- Started building Canvas apps 1 year ago



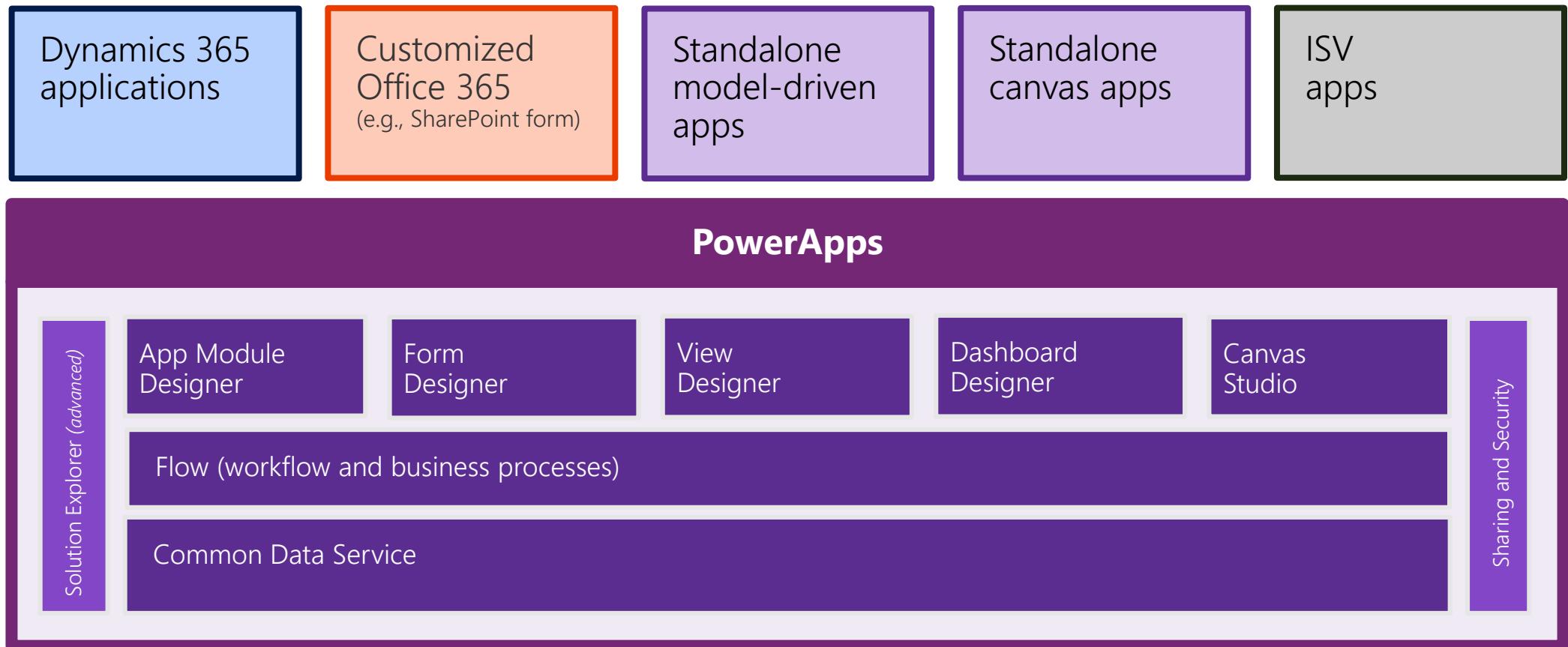
The PowerApps  
plan for world  
domination

# The story so far

- In the beginning there was MS CRM (2003)
- Which grew into XRM with custom entities (2005)
- And went into the cloud (2008)
- It learned to deliver Solutions (2011)
- Was branded as Dynamics 365 (2016)
- Started migrating to Azure (2017)
- Merged with PowerApps (2018)

# PowerApps today = aPaaS\*

\*Application Platform as a Service



## ...Or "LCAP"

(\*Low-code Application Platform)

- *"Gartner names Microsoft a Leader in Enterprise Low-Code Application Platforms 2019 Magic Quadrant"*
  - [Link](#)



# Yes, this is all just PowerApps. Trust us...

Estimate for Mario Barden

4/18/2016 10:00 AM  
Mario Barden  
15010 NE 36th Street,  
Redmond, WA, 98052

**Basic information**  
Room specifications

**Select flooring style**  
Material >

**Add photos**  
Capture photos

**Flooring material**

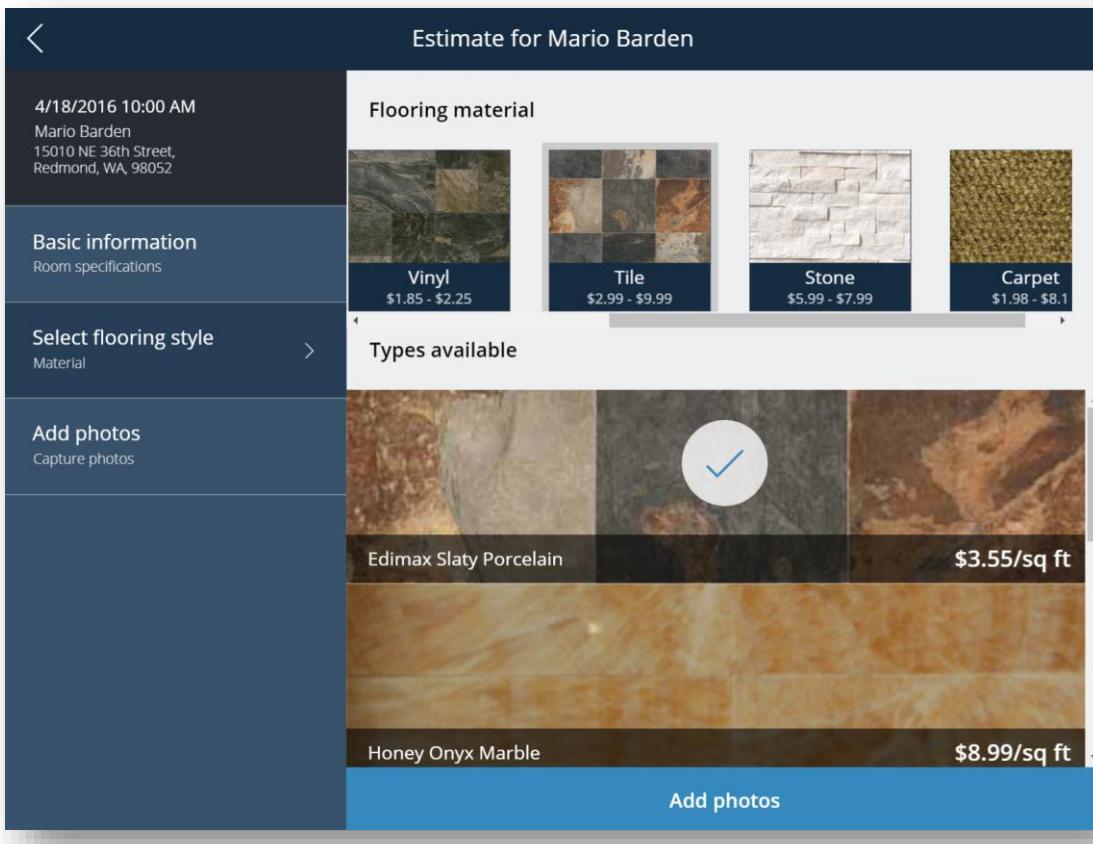
Vinyl \$1.85 - \$2.25      Tile \$2.99 - \$9.99      Stone \$5.99 - \$7.99      Carpet \$1.98 - \$8.1

**Types available**

Edimax Slaty Porcelain \$3.55/sq ft

Honey Onyx Marble \$8.99/sq ft

Add photos



PowerApps CDS App 1 cds > Accounts

Hide Chart New Delete Refresh Email a Link Flow Run Report ...

Search for records

My Active Accounts

System Views

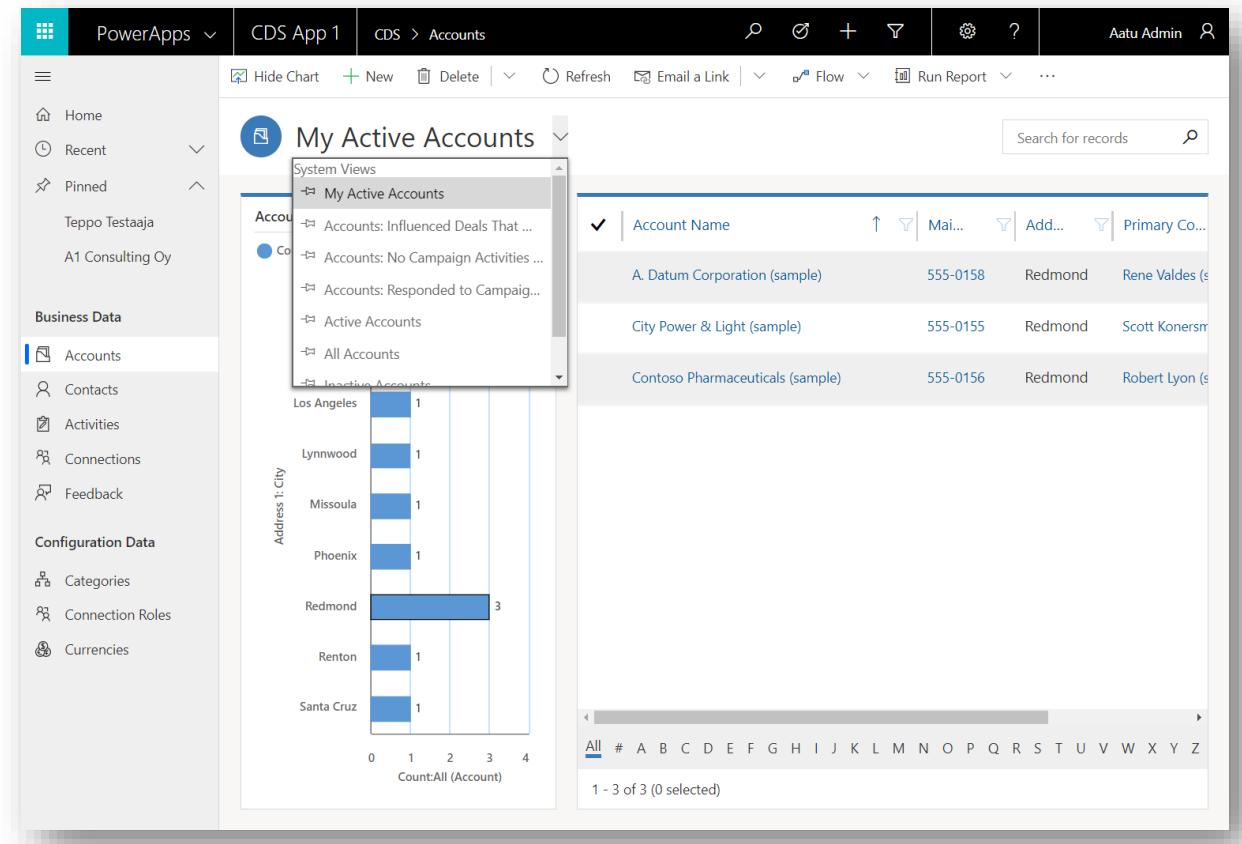
- > My Active Accounts
- > Accounts: Influenced Deals That ...
- > Accounts: No Campaign Activities ...
- > Accounts: Responded to Campaign...
- > Active Accounts
- > All Accounts

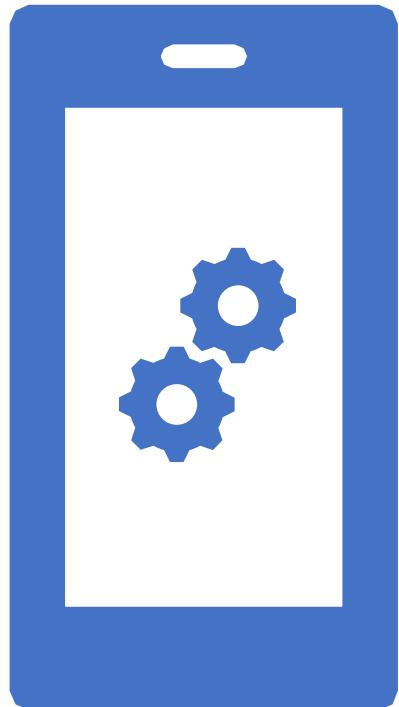
Inactive Accounts

Address 1: City	Count:All (Account)
Los Angeles	1
Lynnwood	1
Missoula	1
Phoenix	1
Redmond	3
Renton	1
Santa Cruz	1

All # A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

1 - 3 of 3 (0 selected)





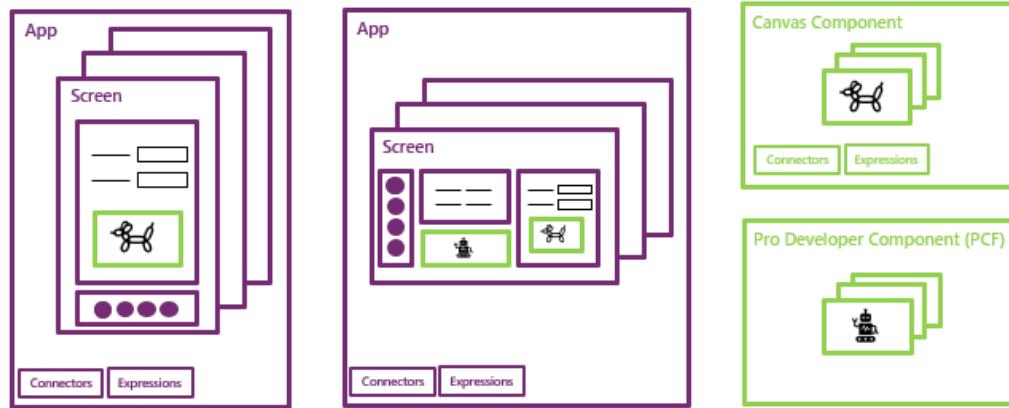
# The REAL Unified Client?

*“Artificial limitations in app features will be removed, so that choosing [File - New App] will give you model or canvas experiences and **everything** will work across both.”*

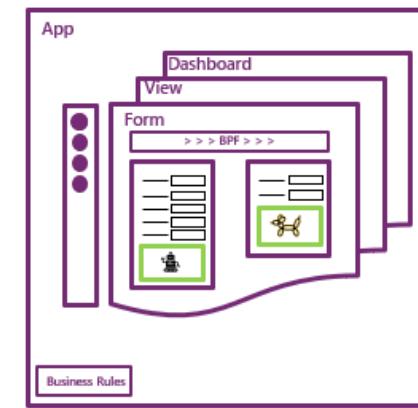
- Charles Lamanna

<https://www.nz365guy.com/power-platform-changes-and-answering-community-questions-with-charles-lamanna/>

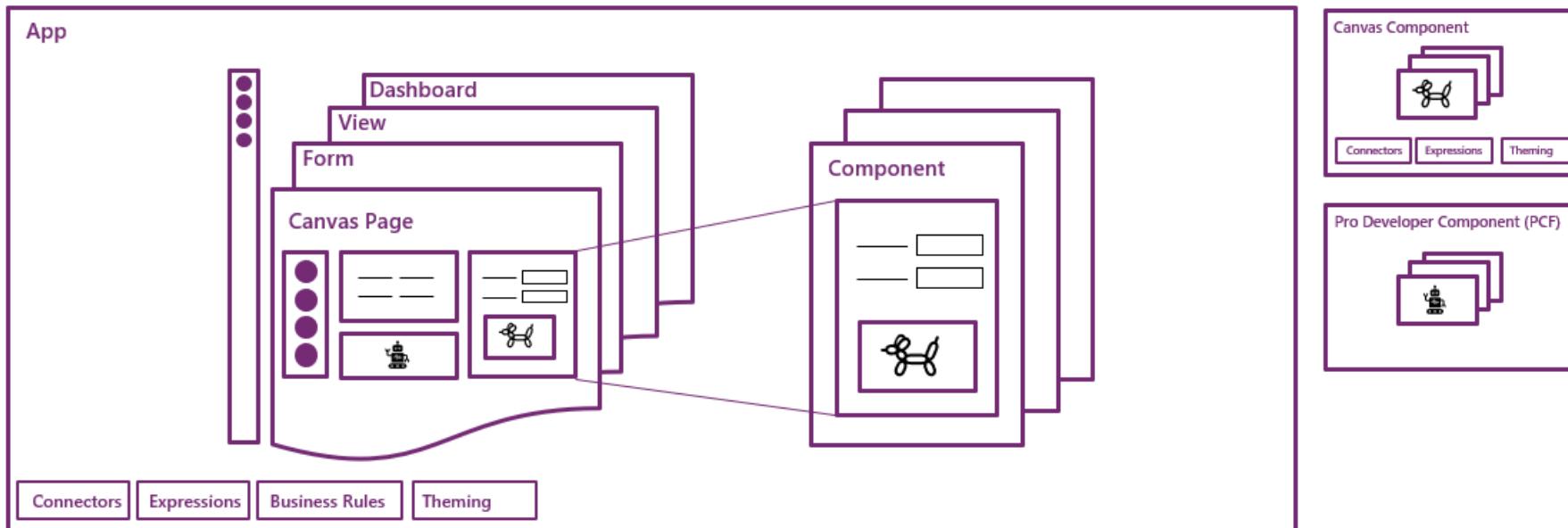
## Canvas Apps



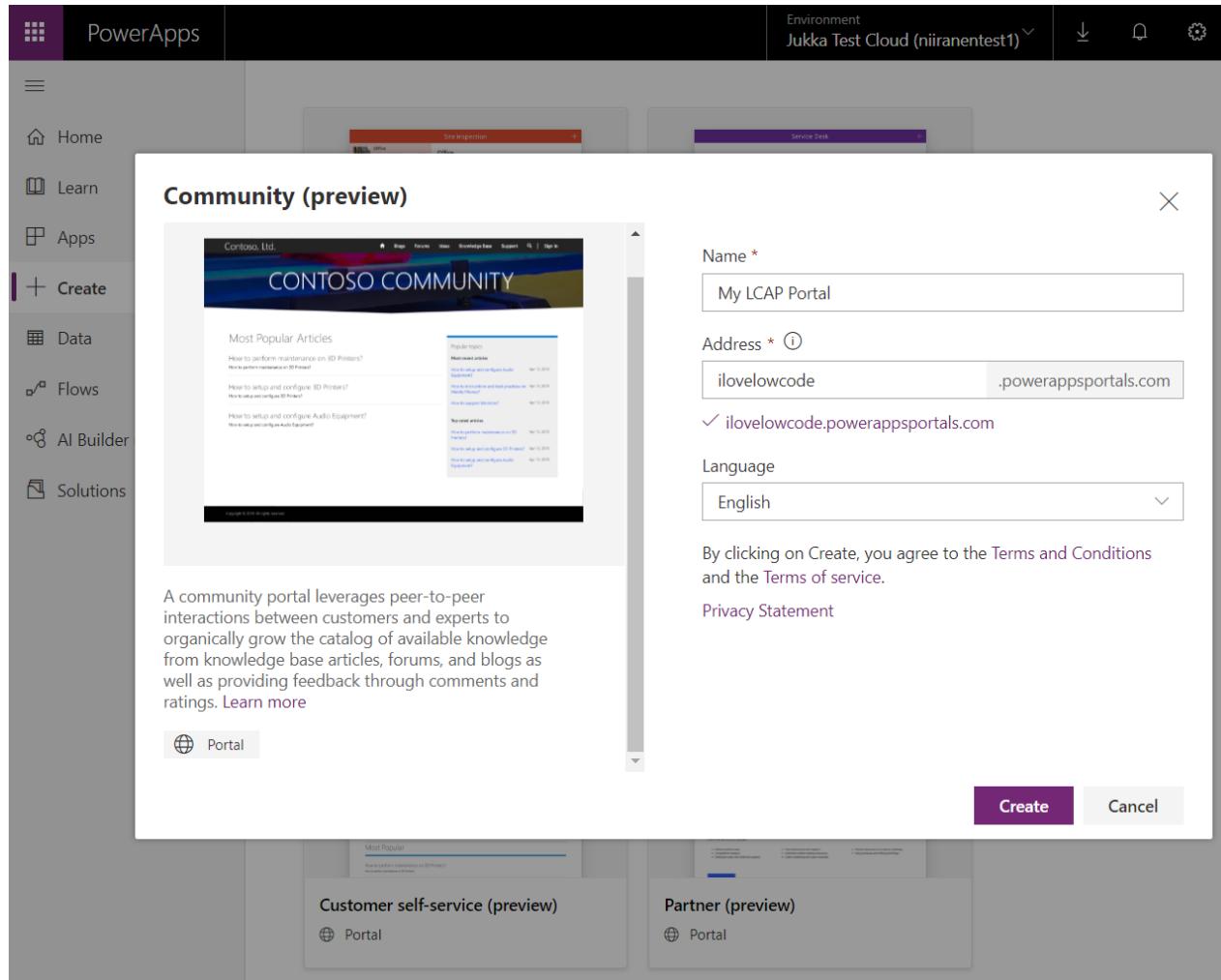
## Model Driven Apps



## PowerApps



# 1 + 1 + Portals = ...1?



- With Dynamics Portals reimaged as PowerApps Portals, we have one more app type in our LCAP
- Critical for the external app audience story, yet nothing like a public version of Canvas or Model-driven apps - today
- In the fullness of time, also Portals need to adopt common technology like PowerApps Component Framework

# Future form factors?

Taiki Yoshida @TaikiYoshidaJP · Apr 14  
AR on #PowerApps... so when can we start making Power #Hololens apps  
@clamanna ?

パパセンセイ @10mikiya  
PowerAppsでARを作った。  
コンパスの更新間隔がゆっくりだったり感度が悪いのか  
ややカクカクしてる。もう少し精度あげなきゃ。

1 5

Charles Lamanna  
@clamanna

Following

Replying to @TaikiYoshidaJP

We have a prototype to do exactly this :) - it is post-October release, but definitely something we are exploring. We think that PowerApps will support many new form factors over time (today we are web app or mobile app heavy; but the future will include MR/VR, voice, bots, etc.)

9:17 AM - 18 Apr 2019

<https://twitter.com/clamanna/status/1118760501679235072>



Current State:  
Canvas  
vs.  
Model



# What are canvas apps in PowerApps?

- Design and build a business app from a canvas in Microsoft PowerApps without writing code in a traditional programming language such as C#.
- Design the app by dragging and dropping elements onto a canvas, just as you would design a slide in PowerPoint. Create Excel-like expressions for specifying logic and working with data.
- Build apps that integrate business data from a wide variety of Microsoft and third-party sources.
- Share your app so that users can run it in a browser or on a mobile device, and embed your app so that users can run it in SharePoint, Power BI, or Teams.

# What are model-driven apps in PowerApps?

- If you don't need a custom design and your data is in Common Data Service, you can automatically generate a model-driven app from your business data and processes.
- Model-driven app design is a component-focused approach to app development. Model-driven app design doesn't require code and the apps you make can be simple or very complex.
- Unlike canvas app development where the designer has complete control over app layout, with model-driven apps much of the layout is determined for you and largely designated by the components you add to the app.

# The Real shift in thinking

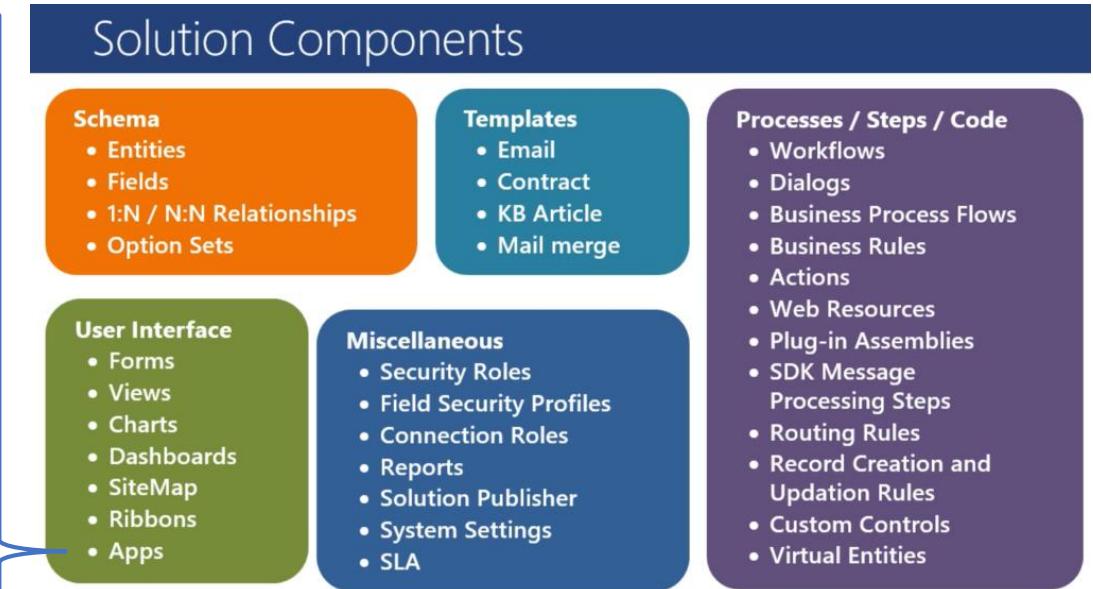
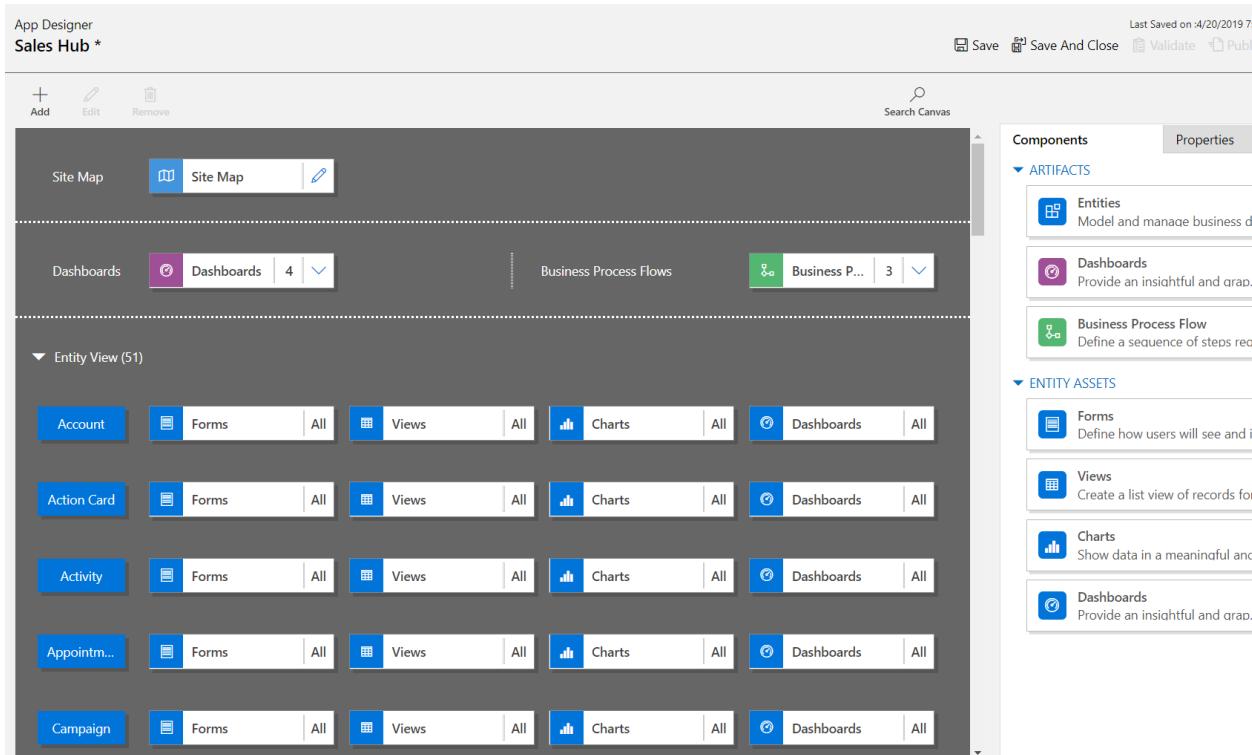
## Old world

- Apps are an afterthought
- Systems are defined primarily as a data model
- Users are trained to understand how the system works

## New world

- Apps are the sole purpose
- Data flows in & out from various different sources
- Apps are designed to fit the way how the users work

# App Designer: Model-driven world

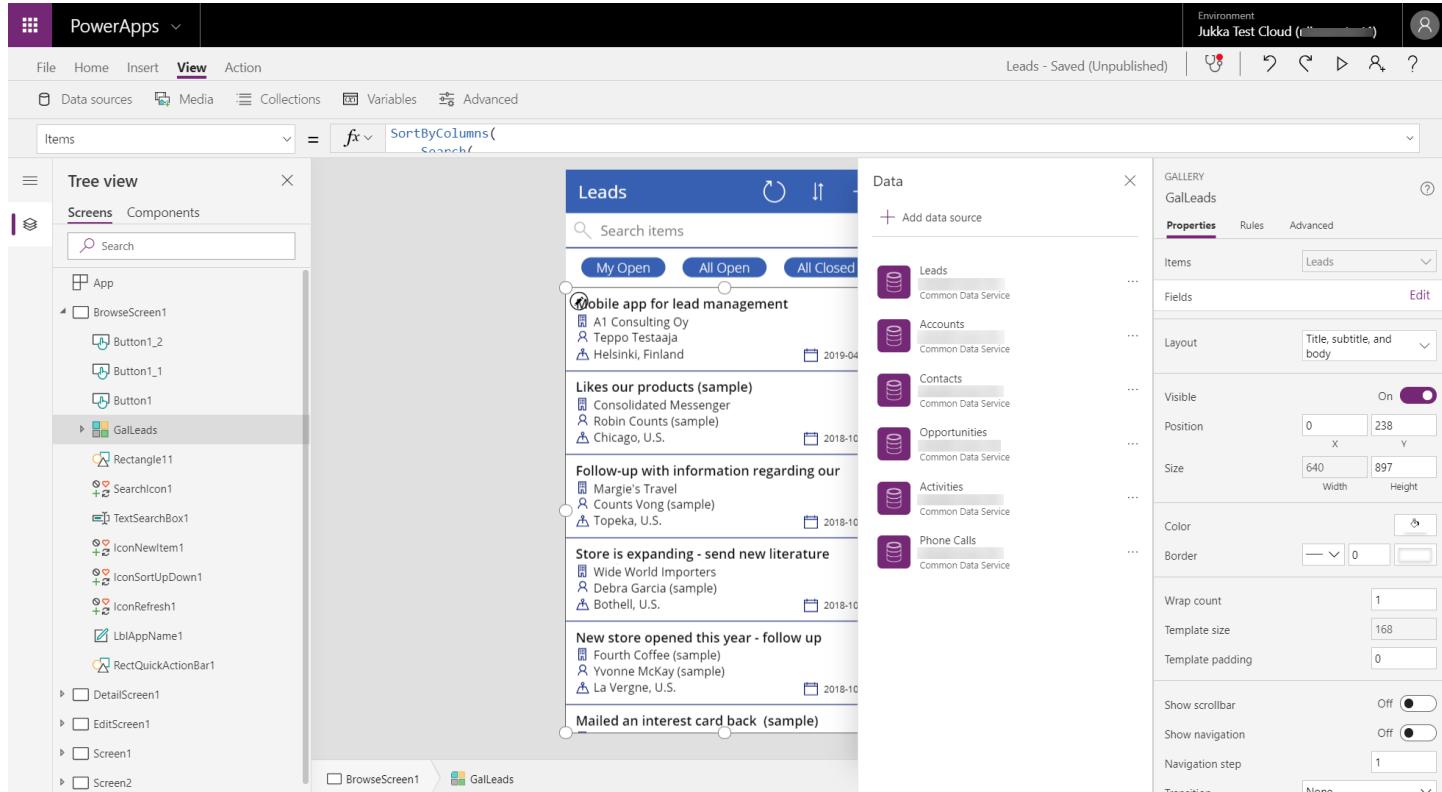


[Microsoft Dynamics 365 FastTrack TechTalks: Solution Development](#)

**App modules** are used for restricting and organizing the components that are visible to the app's target users.

Constructing the visible & invisible components that make up the complete functioning app is done inside **solutions**.

# App Designer: Canvas world



- Canvas app determines all of the client-side logic
- Multiple data sources connected to the app can all introduce their own server-side logic
- Screens contain controls
- Controls bind to data sources
- Control properties drive UI behavior
- ...via functions supported by PowerApps Canvas apps



Canvas Apps  
are like  
PowerPoint UI  
with  
Excel business logic

# Why Excel rules

- Excel is the original Canvas for information workers to paint their data on
- Structure without enforcement, logic without programming
- Immediate recalculation of the whole app (workbook) to show the effect of your tweaks
- Both Excel and PowerApps Canvas apps are “terrible”, but they support the problem solving thought process of most humans



Alan Cooper

@MrAlanCooper

Follow

It's not a coincidence that about 95% of the real work of business is done inside Excel. It's a terrible program, but it's powerful, flexible, and it allows its user to work fudgably, adaptably, in real time, while seeing most of what is happening right there on the screen. 23

6:54 PM - 11 Feb 2019

23 Retweets 93 Likes



3



23



93



Tweet your reply



Alan Cooper @MrAlanCooper · Feb 11

The biggest problem with Excel is that it presents itself as a programmer's tool, with a programmer's value system. Programmers can make Excel sing, while normal humans can just muddle through. The solution does not lie in programmer mental models. 24



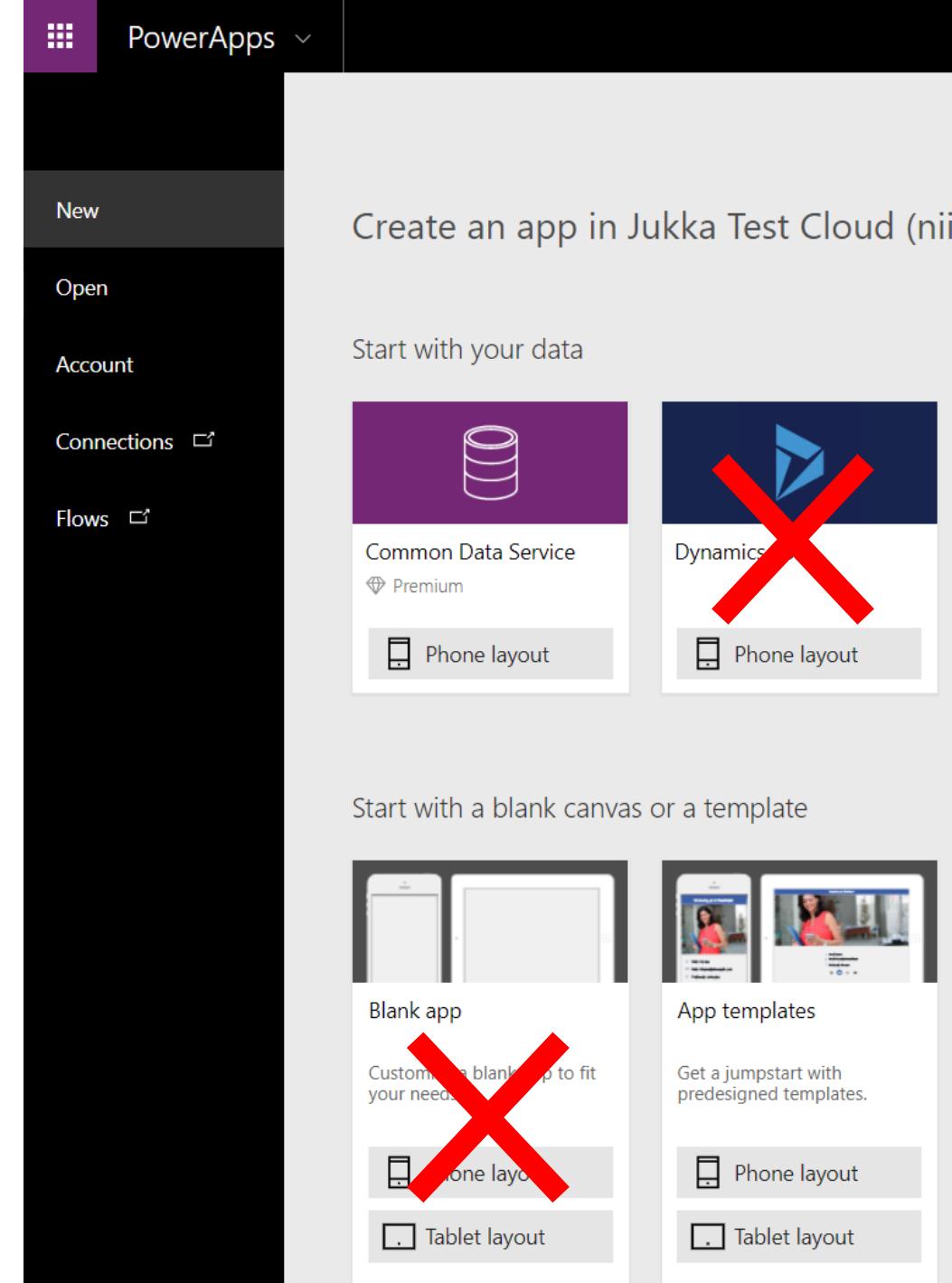
Now it's...  
**Demo time!**



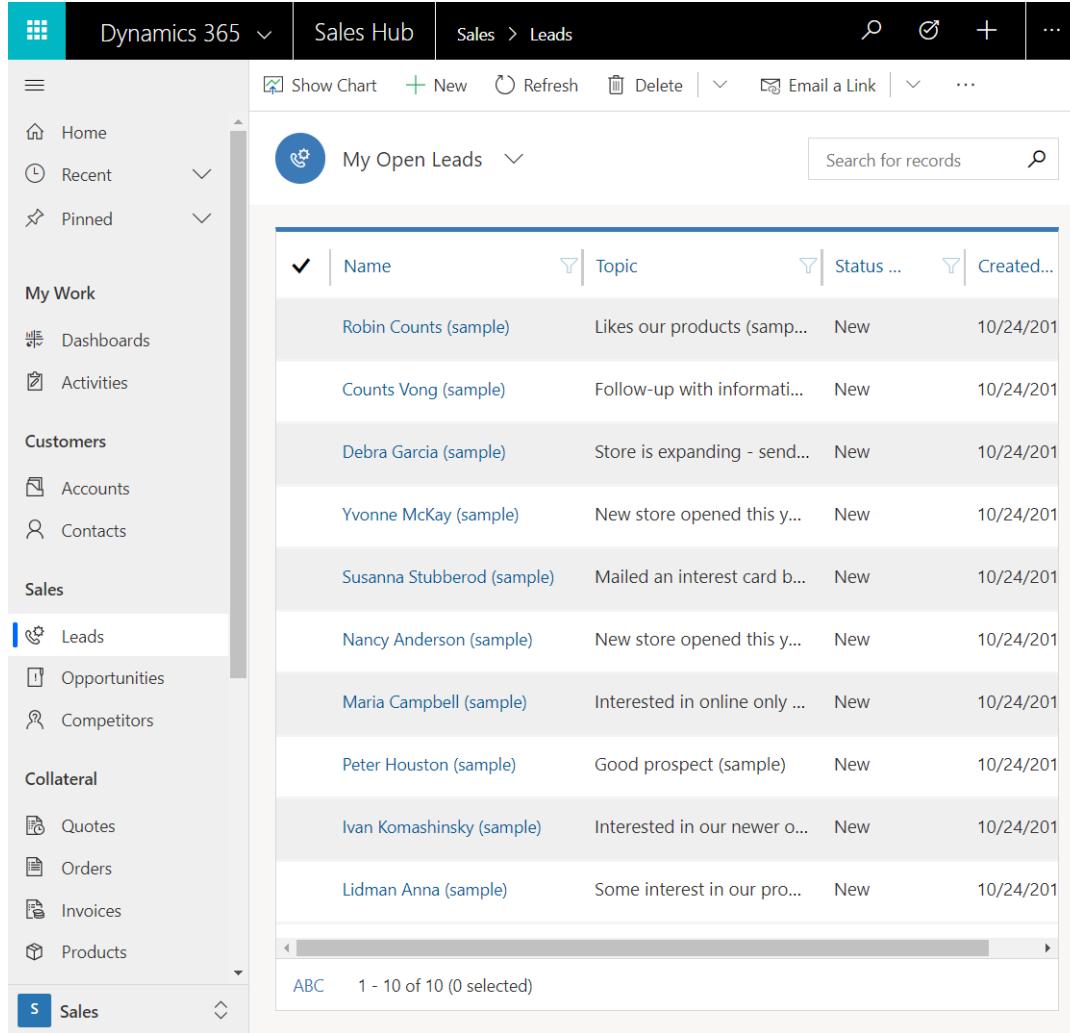
# Tips for building Canvas apps on CDS data

# Don't start from blank

- When learning how to use CDS data in a Canvas app, first always generate the app from data
- You get core plumbing that will feel a lot more approachable than a blank canvas
  - You can add & delete anything you want
- Whenever possible, avoid using Dynamics 365 connector and go for CDS



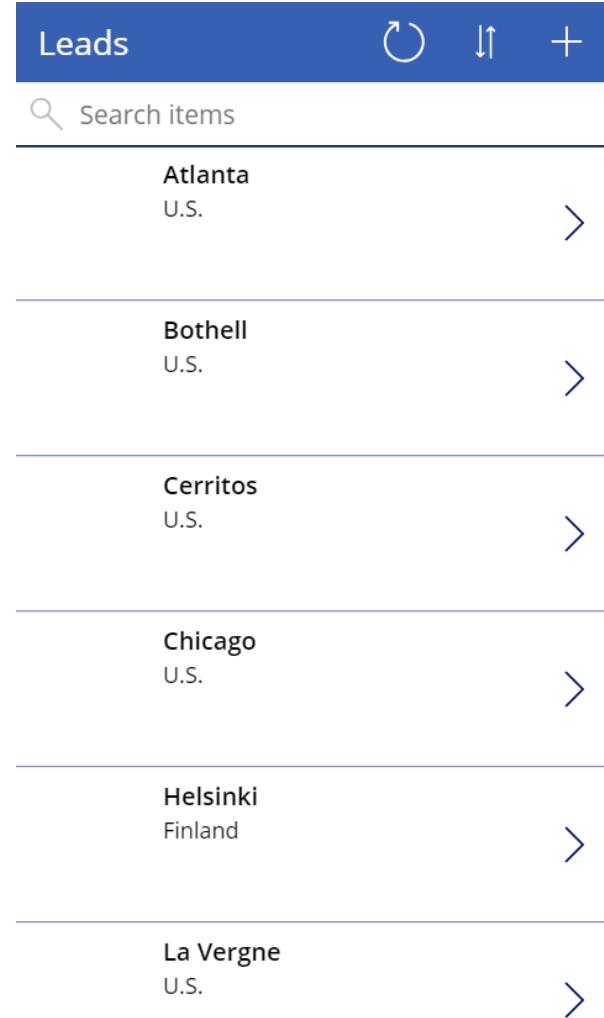
# App starting point: Model-driven vs. Canvas



The screenshot shows the Dynamics 365 Sales Hub interface. The left sidebar has a 'Sales' section selected, which includes 'Leads'. The main area displays a list of leads with columns for Name, Topic, Status, and Created Date. Each lead entry is a link to its detail page. The top navigation bar includes 'Sales Hub' and 'Sales > Leads'.

Name	Topic	Status	Created
Robin Counts (sample)	Likes our products (samp...)	New	10/24/201
Counts Vong (sample)	Follow-up with informati...	New	10/24/201
Debra Garcia (sample)	Store is expanding - send...	New	10/24/201
Yvonne McKay (sample)	New store opened this y...	New	10/24/201
Susanna Stubberod (sample)	Mailed an interest card b...	New	10/24/201
Nancy Anderson (sample)	New store opened this y...	New	10/24/201
Maria Campbell (sample)	Interested in online only ...	New	10/24/201
Peter Houston (sample)	Good prospect (sample)	New	10/24/201
Ivan Komashinsky (sample)	Interested in our newer o...	New	10/24/201
Lidman Anna (sample)	Some interest in our pro...	New	10/24/201

- “Generate from data” gives you a nice single entity experience with basic CRUD capability
- Anything you don’t see is for you to build:
  - Navigation
  - Filters
  - Actions (buttons)
  - Summaries (count)
- **EVERYTHING** you see can be customized



The screenshot shows a Model-driven app interface titled 'Leads'. It features a search bar at the top and a list of locations with arrows for navigation. The locations listed are Atlanta U.S., Bothell U.S., Cerritos U.S., Chicago U.S., Helsinki Finland, and La Vergne U.S.

Location
Atlanta U.S.
Bothell U.S.
Cerritos U.S.
Chicago U.S.
Helsinki Finland
La Vergne U.S.

# Galleries instead of views

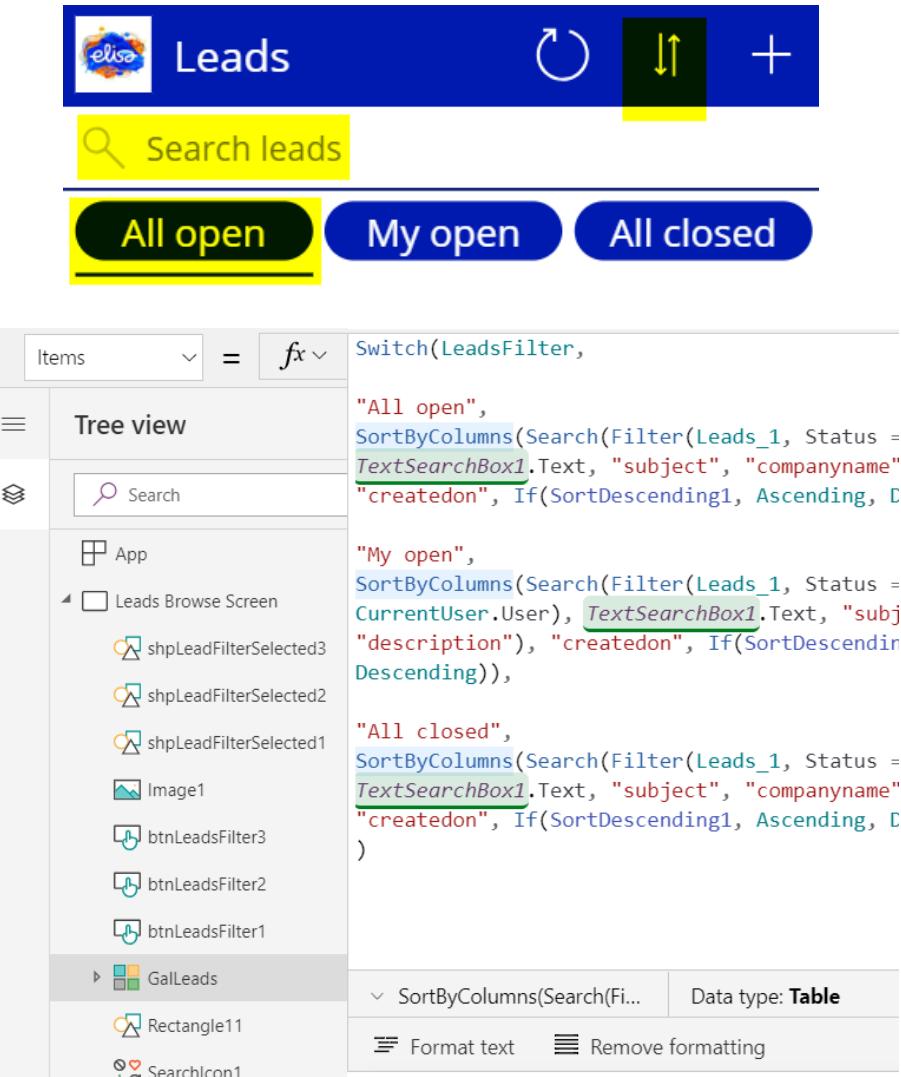
- Gallery is the most important control to master in Canvas apps
  - (There is also a control called Data Table, but you shouldn't really ever use it)
- Shows the contents of a single data source (CDS entity), just like a view would, but it's not just a database view with columns
- Presentation of data in the gallery item template is extremely flexible
  - Conditional display of fields, icons, strings, label styles, pictures
  - Append data from other sources, also other systems

The screenshot shows a Leads gallery in a Microsoft Dynamics 365 application. The top navigation bar has a blue header with the word 'Leads' and three icons: a circular arrow, an upward arrow, and a plus sign. Below the header is a search bar labeled 'Search items'. The main area displays a list of lead records, each with a title, details, and a timestamp. To the right of the list is a vertical sidebar titled 'Data' containing several dropdown menus for filtering or selecting specific fields. The fields listed are LblCityCountry, LblCompanyName, LblContactName, LblCreated, and LblTopic.

Index	Title	Details	Timestamp
1	New store opened this year - follow up	Adventure Works (sample) Nancy Anderson (sample) Atlanta, U.S.	0/24/2018 3:36 PM
2	Store is expanding - send new literature	Wide World Importers Debra Garcia (sample) Bothell, U.S.	10/24/2018 3:36 PM
3	Interested in online only store (sample)	Fabrikam, Inc. (sample) Maria Campbell (sample) Cerritos, U.S.	10/24/2018 3:36 PM
4	Likes our products (sample)	Consolidated Messenger Robin Counts (sample) Chicago, U.S.	10/24/2018 3:36 PM
5	Really into books of all sorts	Helsinki City Library Billy Bookworm Helsinki, Finland	11/5/2018 4:27 PM
6	Mobile app for lead management	A1 Consulting Oy	

# Filtering: the hard way & the easy way

- Data sources will by default bring in the whole table
- The lack of built-in view selector component means two things:
  - You're free to design beautiful preset filter options for the user
  - You have to implement every condition, search term, sorting in your formula
- "Items" may well be the most scary looking formula in your whole Canvas app
- Support for CDS views as the source for Gallery Items is [now in preview!](#)



# No context = everything is universally referenceable

---

- The biggest conceptual difference to Model-driven apps is that you're never "in" any entity or any record
- Whichever control or variable you point to in your formula is the source of record context
  - AccountGallery.Selected, CurrentUser, First(LeadsCollection)
- The whole app on every screen is recalculated after any change made by the user

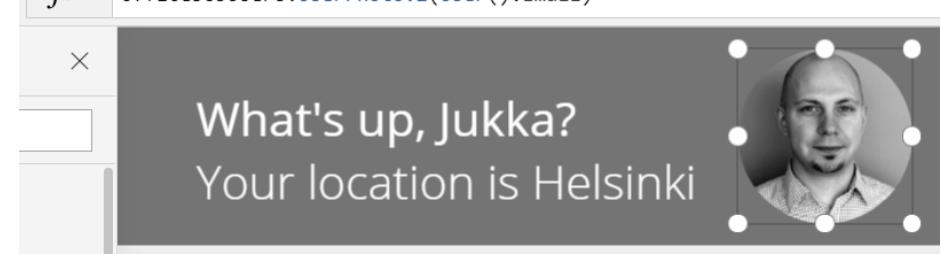
# Current CDS user: you've got email

- Because CDS is just one of many data sources, there's no concept of logged in CDS user in the app by default
- Security is of course applied to data source, but further filtering down the data or prepopulating lookups needs additional work
- You'll need to pull in the Azure AD login info, then match it to User entity based on email field
  - You could just use User().Email, but do it [like Shane Young does](#) and use Office365Users connector instead

Office365Users.UserProfileV2(User()).Email.[Jukka Niiranen](#)

city	Helsinki
companyName	
country	FI
department	
displayName	Jukka Niiranen
givenName	Jukka

fx [Office365Users.UserPhotoV2\(User\(\)\).Email](#)



# Subgrids for related records: just "dot" it!

- Earlier you had to build cumbersome Filter formulas to match 1:N record with primary & foreign key fields (GUIDs)
- Now that relational data support feature has graduated from Experimental stage, you can directly reference "parent.children"

The screenshot shows two versions of a "Car Browser" screen in PowerApps:

**Left Screen (Old Method):**

- Filter bar: `Filter(Models, Manufacturer.cr7d0_manufacturerid = ManufacturerGallery.Selected.cr7d0_manufacturerid)`
- Tree view pane: Shows categories like Audi, BMW, Mini.
- Car list pane: Shows car models grouped by series (1, 2, 3, 4) with images and file names (e.g., BMW\_1.png).

**Right Screen (New Method):**

- Filter bar: `SelectedManufacturer.Models`
- Tree view pane: Shows categories like Audi, BMW, Mini.
- Car list pane: Shows car models grouped by series (1, 2, 3, 4) with images and file names (e.g., BMW\_1.png).

A callout box on the right side of the right screen contains the following text:

Relational data, option sets, and other new features for CDS  
Enjoy deeper data type and relationship support with CDS. See the PowerApps blog for more details. If you encounter any problems please let us know through the community forum.

A toggle switch at the bottom of the callout box is set to "On".

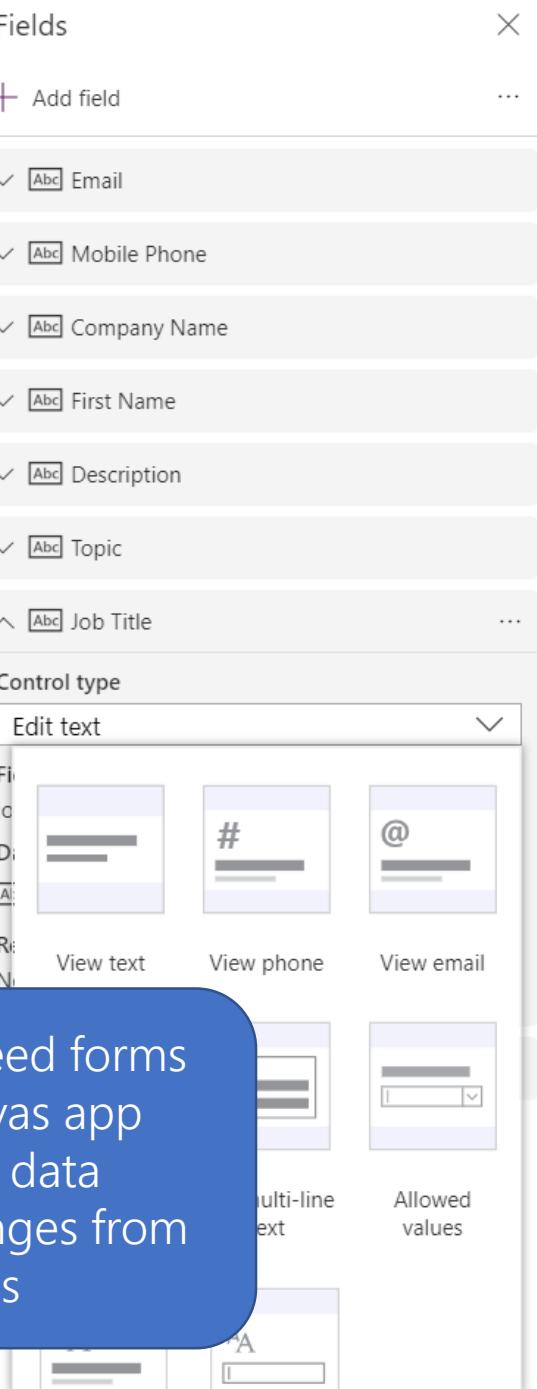
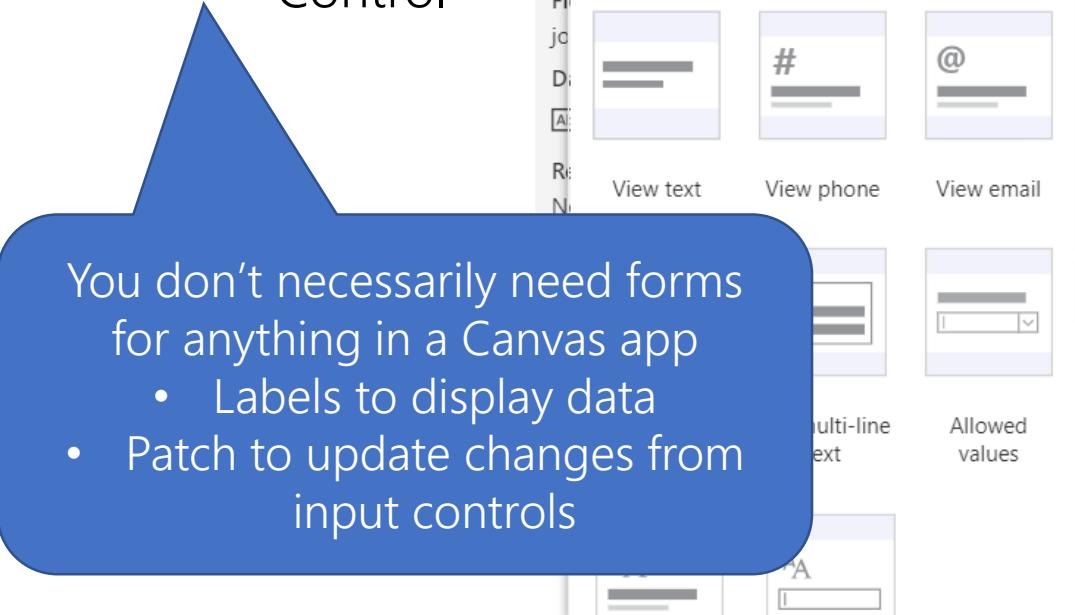
# Form vs. Form

## Model-driven

- (Command Bar)
- Header
- “Main form”
  - Tabs
    - Sections
    - Fields
    - Controls
- Footer
- Navigation (related)

## Canvas

- Form
  - Data Card
  - Control

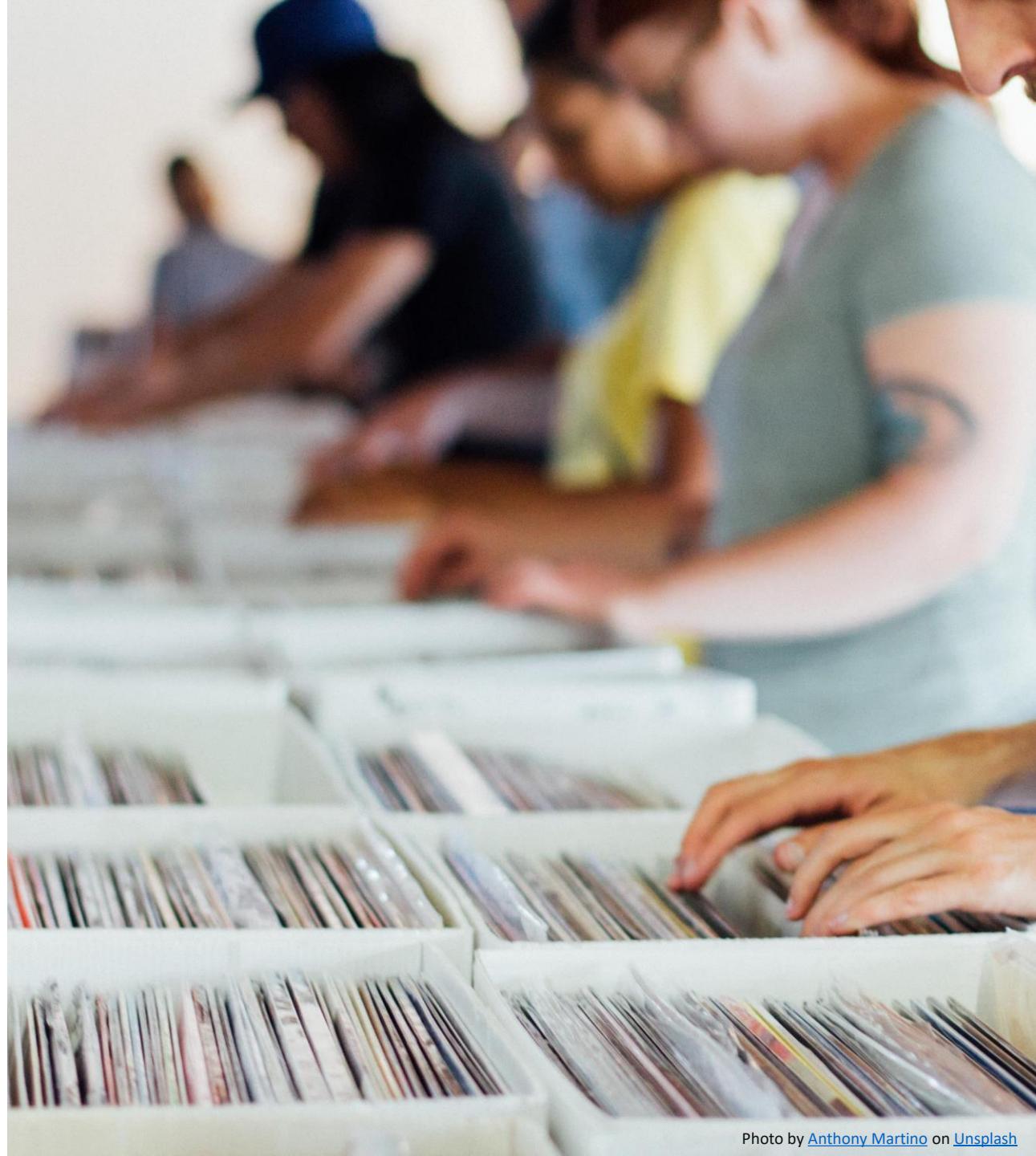


# Conditional formatting

- Compared to the static format of data inside Model-driven apps, the rich expressions of Canvas apps were born to highlight important data
- Example: change background color based on status field
  - `TemplateFill: If(Text(ThisItem.Status) <> "Open", RGBA(241, 244, 249, 1), RGBA(0, 0, 0, 0))`
- Use switch case for showing different icons for different record values to make UI even more intuitive
- Downside: you'll also need to manually handle formats like DateTime and numbers (since Canvas app doesn't follow any CDS user preferences)

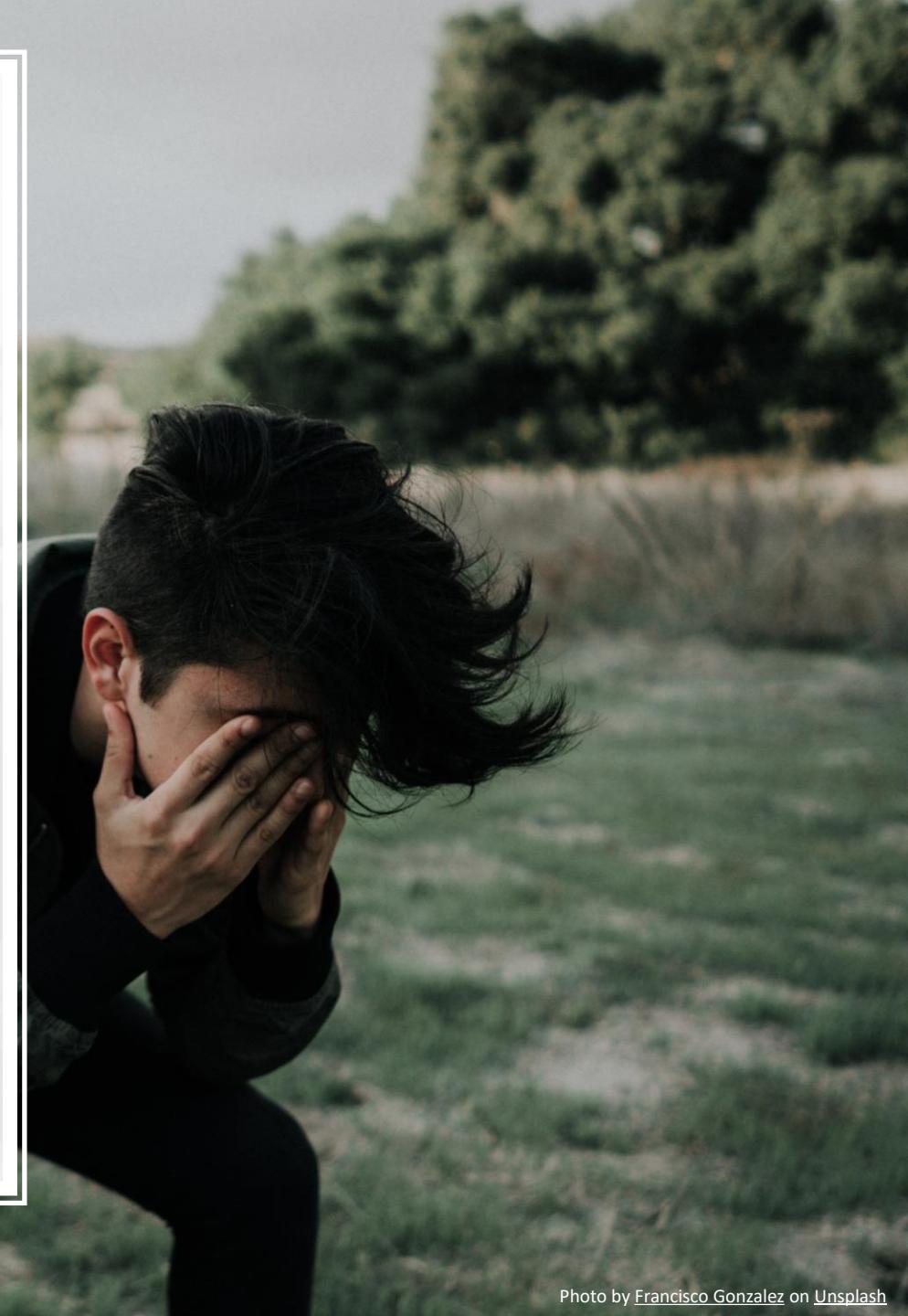
# Search is great! (except...)

- Instant filtering of gallery results once the user starts typing into the text input field
- Can match the search string with multiple fields concurrently
- Combine text search with filters set in other controls
- Except: you can't search from complex lookups like "Customer"
  - Dirty hack: copy lookup values to shadow text fields on CDS side



# XRM pain points that can be addressed in Canvas apps

- Unaware of user's context: every entity & command is shown all the time
- Flat navigation structure: everything app area is seemingly of equal importance
- Pain of reducing choices: hiding actions from the user is laborious
- Lack of guidance: hard to take users through a predetermined path (RIP Dialogs)



# Price of pixel perfection

- In Model-driven apps you could always blame the platform for not displaying things in the most usable way
- With Canvas apps, every pixel imperfection and UX gap is now squarely YOUR fault👉
- Logical navigation experience is the first priority you need to deliver in your app
- The more complex you make the UI, the more time it will take to polish



# Remember to play around with your apps

- Use temporary labels, galleries to see your data change as your formulas evolve
- Store stuff in variables, collections to reach your final composition
- Use a tablet layout for more side-by-side screen estate, even if you're targeting phone screens in final app
- Keep a proper text editor like Notepad++ available at all times to copy & paste the pieces together
- Have the PowerApps Formula Reference documentation page on a browser tab





A platform  
for Makers  
or for  
Developers?



We also included Microsoft and Netcall's MatsSoft, which we previously evaluated as low-code platforms for business developers. This change recognizes changes in those vendors' strategies, both now focused on AD&D pros as their primary audience.

Each of the 13 vendors in this Wave:

- **Offers a comprehensive declarative development approach.** Declarative tools allow AD&D pros to define data, logic, flows, forms, and other application artifacts without writing code. Our assessment emphasizes model-driven development and visual configuration of mobile apps; user interfaces and web pages; data; integrations; workflow and business process; content and collaboration; reporting and dashboards; security permissions; app scaling; change management; and application deployment.
- **Designs its product/services to serve the needs and preferences of AD&D pros.** The vendors in this evaluation target professional developers as their primary customers and address other participants in development as secondary audiences.
- **Provides a low-cost-of-entry commercial model.** Customers value low-code development platforms they can adopt at will for a very low cost — without requiring formal paid training courses to build business apps.

• “The vendors in this evaluation target professional developers as their primary customers and address other participants as secondary audiences.”

# No-code or Low-code? Forrester's take:

## Strategic Planning Assumptions

By 2024, three-quarters of large enterprises will be using at least four low-code development tools for both IT application development and citizen development initiatives.

By 2024, low-code application development will be responsible for more than 65% of application development activity.

No-code or Low-code?  
Gartner's take:

- "A low-code application platform (LCAP) is an application platform that supports rapid application development, one-step deployment, execution and management using **declarative, high-level programming abstractions**, such as model-driven and metadata-based programming languages."
- "Gartner views "no-code" application platforms as part of the LCAP market. **"No-code" is a marketing and positioning statement**, implying that the platform requires text entry only for formulas or simple expressions, all other aspects of application development being enabled by visual modeling or configuration."

# Low-code = more accessible way to write code

The screenshot shows a Power Platform Unpacked interface. On the left, there's a code editor with the following M language code:

```
UpdateIf(collection, condition, item, ...)

On select
item: A replacement item.

ClearCollect(colPatch,Filter(colContacts,_isEdited=true));
ForAll(colPatch,
UpdateIf(Contact,contactid=colPatch[@contactid],
{
    firstname:colPatch[@firstname],
    lastname:colPatch[@lastname],
    'Entity Image':colPatch['Entity Image']
});
UpdateIf(
    colContacts,
    true,
    {_isEdited:false}
);

Format text Remove formatting
```

Below the code editor is a data grid with three rows of contact information. The first row has a photo of a woman, the second has a photo of a woman with glasses, and the third has a photo of a man.

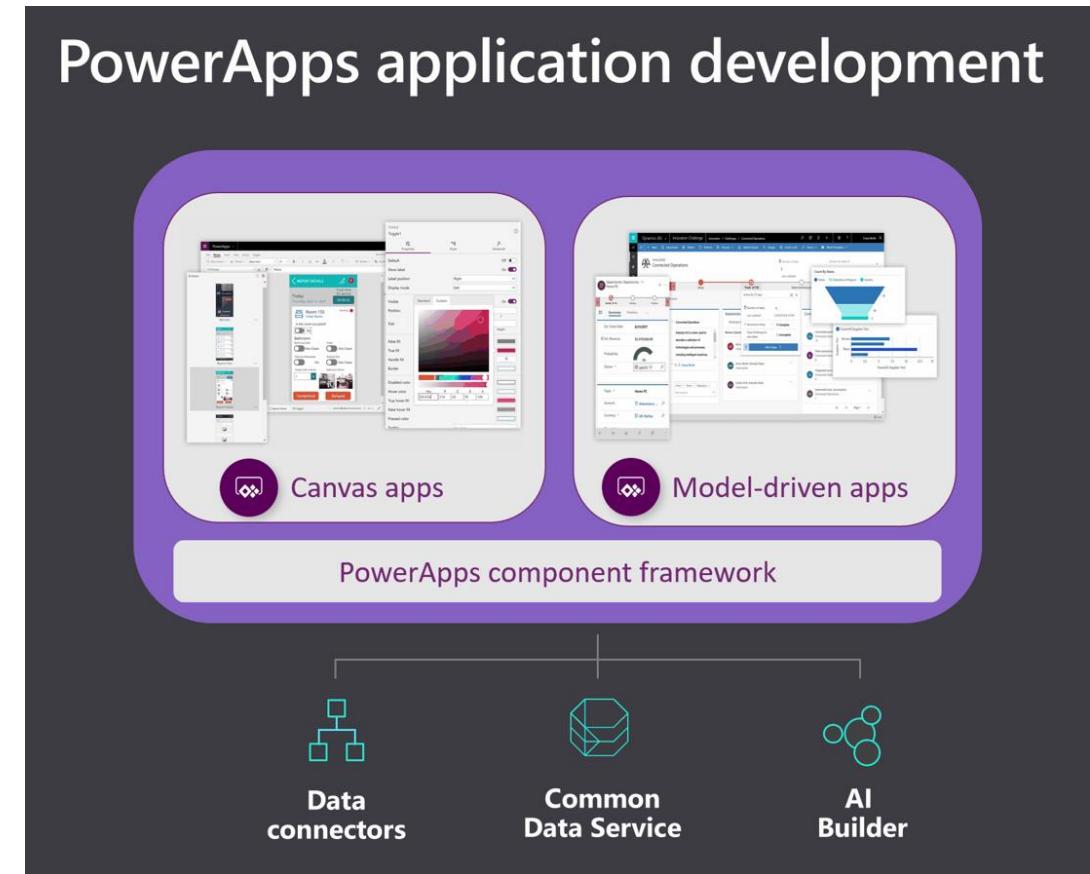
A blue speech bubble points from the text in the code editor towards the right side of the slide, containing the following quote:

*This does look a little bit "cody", but it's actually not that complicated when compared to doing it in "classic code".*

- Developers can go further with Canvas apps than functional consultants ever would try
  - ...But first you have to get them to try, too
  - *"Canvas apps are easy but not necessarily simple"*
    - [\(Quote source\)](#)

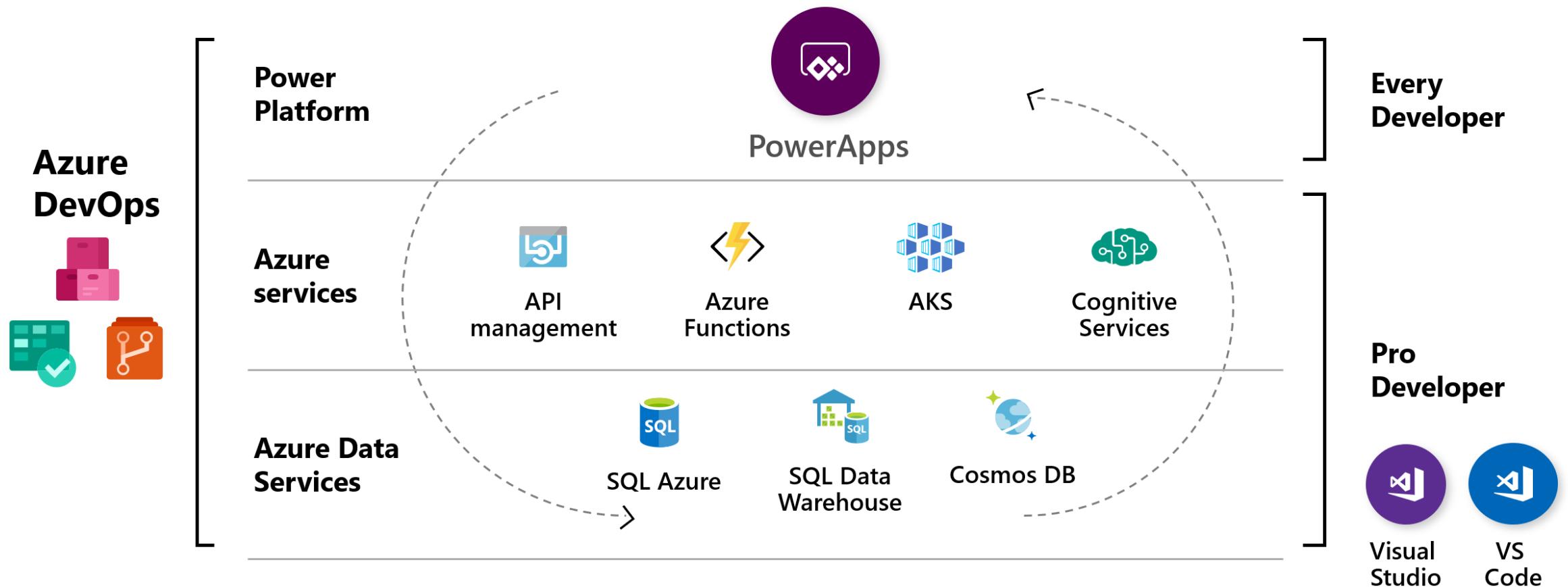
# PCF = making UI extensions scalable

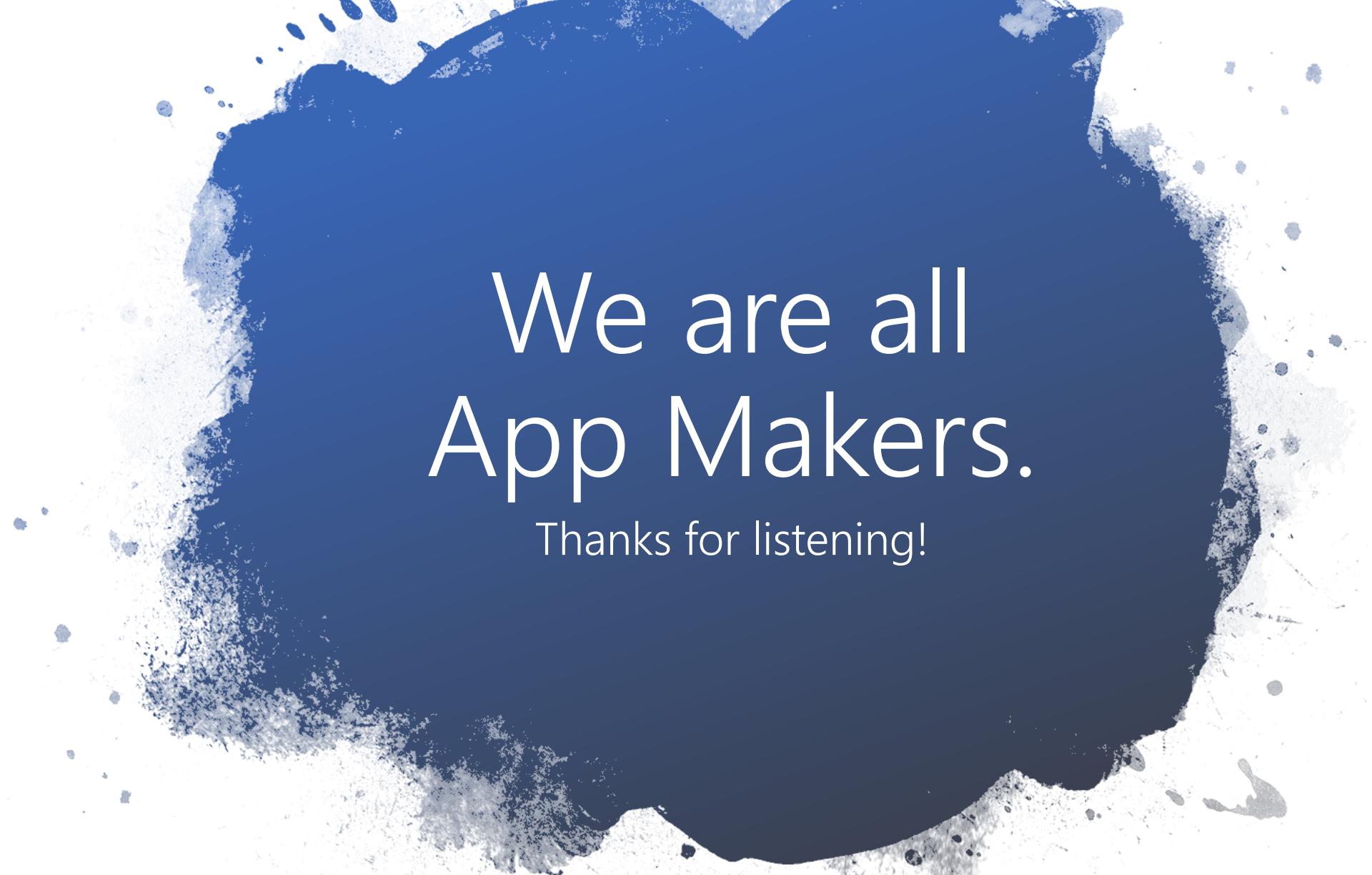
- Every new control in PowerApps (Canvas or Model-driven) is already a component from MS
- PowerApps Component Framework (PCF) components is what every developer should be creating
- So that every maker with access to that component could put it into their application
- For every user to interact with



<http://aka.ms/PCFdemos>

# DevOps = shipping enterprise scale PowerApps





We are all  
App Makers.

Thanks for listening!