

July 21, 2021

@ The CQI Community

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Overview

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Introductions

Which tools balance requirements, cost, and complexity

Key Steps

Who are your audience, champions and partners

Prioritize potential projects

Prepare and integrate data

Build charts and dashboards

Where to host visualizations

Q & A – add to Chat

Focus: Quiver of Tactical Tools

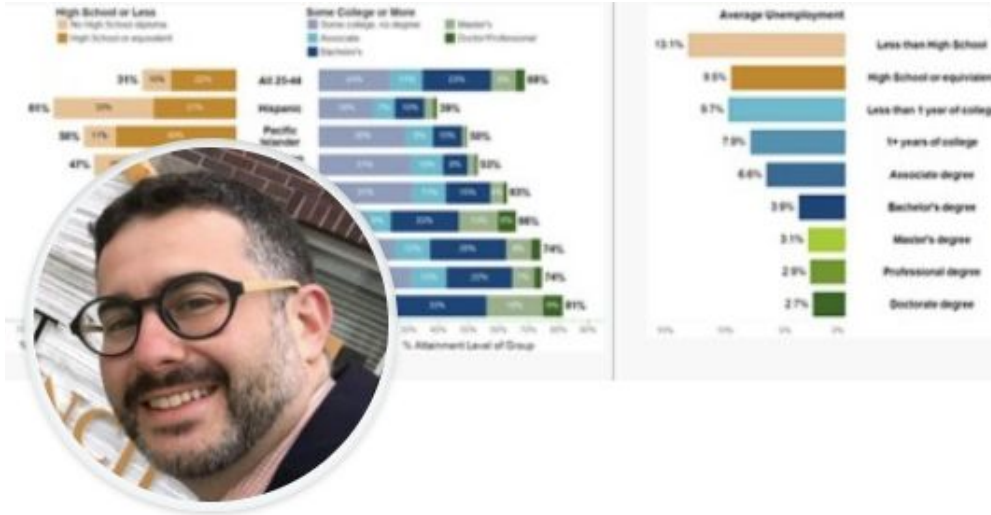
Smaller organizations

seeking to retrieve, organize,
analyze, explore, and
communicate their data, using ...

**“Approachable Data
Tools”** that can be implemented ...

“Rapidly” and **“On a
Shoestring”** for Analytical and
Strategic BI and Communication.

We're all analysts, some undiscovered



Chadd Bennett 

Data Compiler & Visualizer | Collaborative Partner |
Spaghetti-Idea Thrower | Bold Project Bootstrapper

Data Journey, Happy Accidents

1970's: Born, curious...

1980's: Loved tally's and means

1990's: Became afraid of statistics

2000's: Travel and Event Planning, ESL P&L
'05 Pivot Tables, aha!

'09-16: Accidental Analyst at Small Nonprofit
'11-'16 "Discovered" Tableau & 'Get External Data'

'16-19: State Higher Ed Agency BI
'19 Power BI + Query, powers up!

2020: Small-Project Consulting

Specific Tools for Particular Problems

Organization metrics to board and partners prior to meetings

Original

Dozens of individual source Excel and pasted database tables, each with multiple single view charts and tables.

Paste into new ad-hoc Excel or Word files.

Email file(s), but some source data exposed.

Redo process and **send new files** for updated or corrected data.

Iterate

“Master” Excel files use **“Get External Data”** from source files + ***directly from database.***

Fewer charts and tables but using **Slicers** and ***Timelines*** to customize views.

Paste into new ad-hoc...

Improve

Micro-Implement **“Hidden Public” Tableau and Power BI Dashboards** that integrate data ... with **multiple views, drill-down and filters.**

Email “Private” link(s) to partners.

One-click data refresh on dashboard backend and for users.

Why Put ^(tool)Cart Before ^(process)Horse ?

Helpful to choose Core to build your quiver

1. **What platforms do you already use**
2. **Where is most of your data stored**
3. **Complexity of Viz vision**
4. **Bandwidth and resources to learn and implement**
5. **How important is mobile viewing**



Cost-Effective Viz Quiver

Data ETL	Static Viz	Dynamic Viz	Geographics	Print/Static Edits
<ul style="list-style-type: none">• Microsoft Power Query• Tableau Prep• Alteryx Data Prep	<ul style="list-style-type: none">• Microsoft Excel<ul style="list-style-type: none">• Standard Charts• Pivot Tables + Charts• Google Sheets<ul style="list-style-type: none">• Pivot Tables + Charts	<ul style="list-style-type: none">• Microsoft Power BI• Tableau Desktop + Server• Google Data Studio• <i>DataWrapper/High Charts / EverViz (.js)</i>	<ul style="list-style-type: none">• Mapping<ul style="list-style-type: none">• Tableau• Power BI• Google DS• ESRI StoryMaps• Geocoding<ul style="list-style-type: none">• Geocod.io• Excel or G'Sheets Scripts• Power BI	<ul style="list-style-type: none">• Inkscape (Free)• Adobe Illustrator <p>Paste Excel charts, or import PDF from PBI or Tableau</p>

Data Prep Quiver

Data ETL (Extract, Transform, Load)	Strengths	Downsides	NPO \$ /Yr
MSFT Power Query	Integrated extract and transform; included in Excel (Get and Transform) and Power BI; Schedules via Flow.	Only loads to Excel or Power BI; M language has learning curve	Free with Excel
Tableau Prep	Visual data extract and transform	Only loads to Tableau + Server	Free with paid desktop
Alteryx Data Prep	Powerful ETL for any in/output	Complex to learn, \$\$\$ scheduler	\$0 (\$5000)

Data Prep is 80% of the Work

Humans Read Cross-Tabulations

Donation	Jan	Feb	Mar	1Q Total
2018				
Member	\$14,275	\$9,269	\$17,419	\$266,536
Partner	\$517	\$117	\$4,975	\$75,239
Staff	\$3,382	\$2,565	\$16,332	\$128,757
2018 Total	\$18,174	\$11,951	\$38,726	\$470,533
2019				
Member	\$6,928	\$3,168	\$11,869	\$266,097
Partner	\$5,608	\$168	\$32,715	\$89,716
Staff	\$1,702	\$1,184	\$11,107	\$128,435
2019 Total	\$14,237	\$4,520	\$55,691	\$484,247

Computers Read Flat or Raw Data

Years	Month	Segment	Sum Donation
2018	Jan	Member	\$14,275
2018	Jan	Partner	\$517
2018	Jan	Staff	\$3,382
2018	Feb	Member	\$9,269
2018	Feb	Partner	\$117
2018	Feb	Staff	\$2,565
2018	Mar	Member	\$17,419
2018	Mar	Partner	\$4,975
2018	Mar	Staff	\$16,332

Donation ID	Donation Date	Amount	Category	Segment
CA-2014-100328	1/28/2019	3.928	Annual Fund	Member
CA-2014-102645	1/23/2019	40.08	Annual Fund	Member
CA-2014-103366	1/15/2019	149.95	Unrestricted	Member
CA-2014-103800	1/3/2019	16.448	Annual Fund	Member
CA-2014-105417	1/7/2019	76.728	Capital	Member
CA-2014-105417	1/7/2019	10.43	Annual Fund	Member

Static Viz Quiver

Static Viz	Strengths	Downsides	NPO \$ /Yr
MSFT Excel via O365	Integrated w/ O365; pixel-perf charts; Power Apps (Query, Pivot, BI, Flow) for data import and prep; flexible with wide data	1M row limit, fewer data backend hacks for online retrieval, encourages wide data habits	Free - \$36 (\$384-\$684)
Google G Sheets	Integrated w/ G Suite; fast and ubiquitous; great data backend hacks to CSV and JSON.	Less flexible charts and exports, difficult data prep and limited import, 1M cell limit	Free -\$96 (Free - \$300)

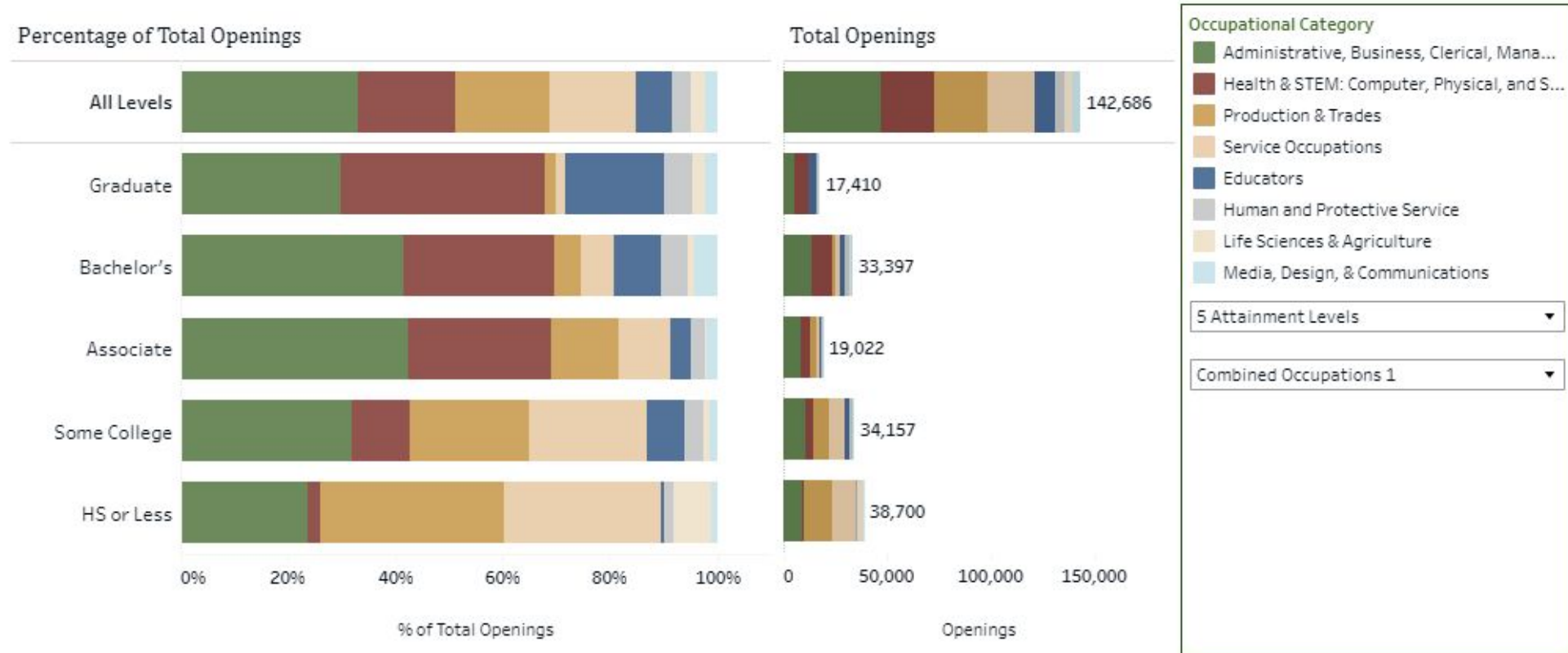
Dynamic Viz Quiver

Dynamic Viz Creation	Strengths	Downsides	NPO \$ /Yr
Google Data Studio	Integrated w/ G Suite; No desktop tool, so OS agnostic; Simple and straightforward.	Optimized for marketing data; very limited data connectors; fewer design options; limited custom mapping	Free
MSFT Power BI Desktop + Public "Server"	Very flexible with many connections; rapid evolution; powerful data modeling and analysis	Fewer design detail options; mapping has many limitations; Public server not for sensitive data.	Free
Tableau Desktop	Extremely powerful with Levels of Detail and parameters; many data connections; beautiful displays; pixel perfect visualizations; Rapid evolution.	Steep learning curve, easy to make aggregation errors; free version limited to flat files (no DB)	Free - \$28/creator (Free - \$850)
High Charts / EverViz	Fast, flexible web embeds for single, simple charts inline with content.	Not for complex datasets; updating can be tedious without data feed	\$90 - \$150

Dynamic Visualization

Educational requirements for various industries vary, but most openings will require education or training beyond high school.

Total Projected Washington Job Openings in 2020-2025 By Occupational Group and Education Level



Source: [WSAC, WTECB, SBCTC joint analysis](#) of openings in 2017 Washington ESD, Long-Term Employment Forecast and Education Levels based on analysis of the 2011-15 American Community Survey. Next Update: Fall 2019.

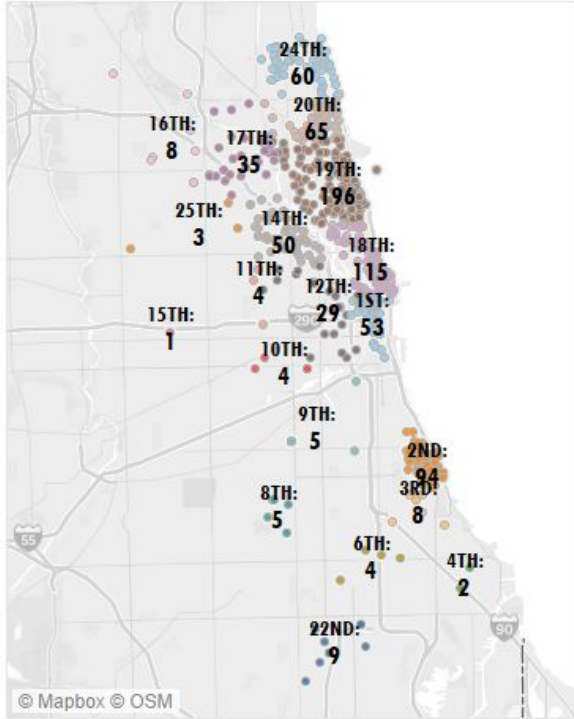
https://public.tableau.com/app/profile/chadd.bennett/viz/WSACRoadmapBenefitsandWorkforce_15756804914020/WagesandUnemployment

Geographic Quiver

Mapping			
Tableau Desktop	Can import variety of spatial files; data can be intersected with imported boundaries; custom background maps via MapBox	Steep learning curve; maps limited to two layers; free version limited to flat files (no DB)	Free - \$28/creator (Free-\$850)
QGIS	Extremely powerful, intended for professional GIS developers; takes more work to “beautify”; plenty of documentation and informal support.	Can be very confusing; informal support (but good)	Free
MSFT Power BI Desktop	Geocodes addresses in app (with tweaking), ESRI plugins	Limited very for custom maps; few spatial formats to load; can limit number of points	Free
Coding and Cleaning			
Geocod.io	Easy address cleaning to lat/long points via upload or API; many groups (political, census, school districts, etc.)	Few “local” municipal groups (wards, neighborhoods), API	Free for 2500 per day – Cheap after
Excel or G’Sheets Scripts	Address coding via API to lat/long points, distances	Requires scripting skills, difficult cleaning; no intersects with other boundaries.	
Power BI	Easy lat/long points from addresses only, integrated	Cannot intersect with other boundaries.	

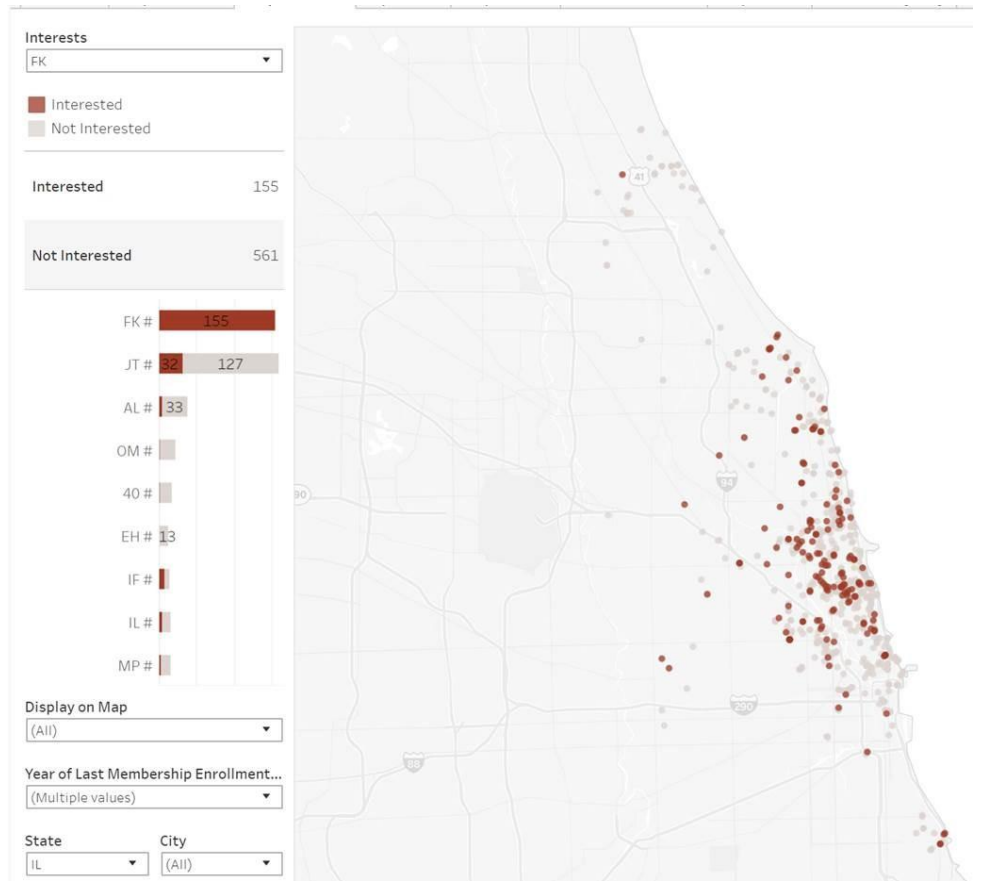
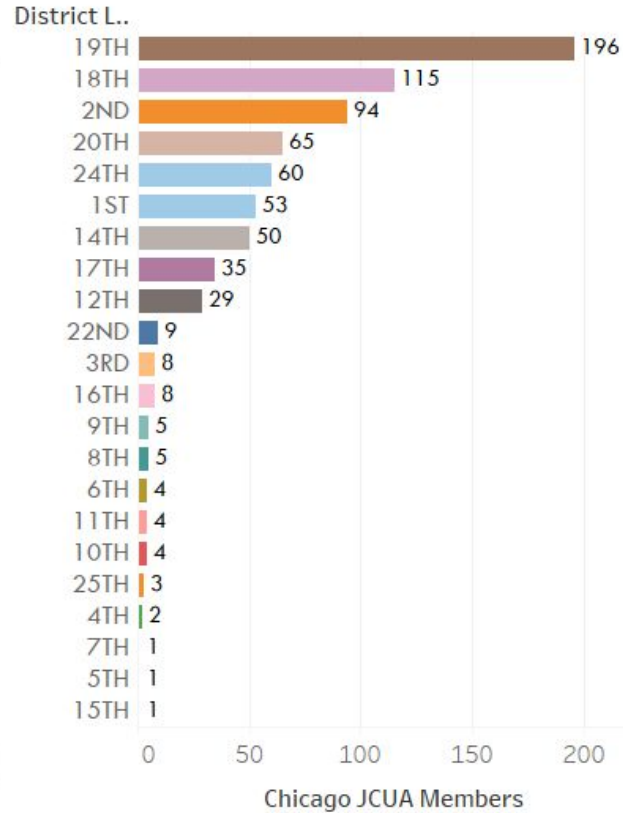
Tableau Map Examples

JCUA Members by Chicago Police District



Data as of 4/6/20, coordinates jittered for privacy
© Jewish Council on Urban Affairs & Data-Aha.com

Click districts below to highl.. Filter Di.. Multiple values



Static Editing Quiver

Print/Static Edits

Adobe Illustrator	Integrated with Creative Suite	Expensive and steep learning curve	\$250 (all CC) (\$275 - \$650)
Inkscape	Free! Similar to Illustrator	Steep learning curve with fewer resources; not integrated with others; less frequently used	Free

Dynamic Publishing Quiver

Dynamic Publishing

Power BI Pro “Server”	Inexpensive enterprise solutions with deep and broad integration w/ MSFT, Power Apps.	Implementation can be complex with many detailed options.	\$36 creator + \$36/ viewer (\$0-\$144 + \$0-\$120)
Tableau Public Server	Flexible web display with embed and export options; In-browser editing for creator; refresh through Google Sheets	Workbooks can be hidden, but not secure for sensitive data; single user only, orgs must share single credential.	Free
Tableau Online Server	Same; plus permissions, Row Level Security; data refresh options	Expensive; !!Cannot display dashboards publicly without login!!	\$850/ creator + \$2000 / 5 viewers

Identify Visibility, Audiences, Subject

Choose Visibility and Audience

- Internal vs External
- Implementors vs Decision Makers

Choose Subject

- Program participants
- Alumni
- Donors
- Community Stakeholders

Find Partners and Champions

1. Supervisor
2. Team and Colleagues within programs, divisions and organizations.
3. Decision makers with
4. IT and Marketing
 - Often tricky conversation
5. Other similar organizations
6. Learning and networking groups

Prioritize Projects and Measures

- 1. Existing Measures**
- 2. Frequently Asked**
- 3. Shared Frameworks**
- 4. Anticipated**
- 5. Aspirational**

What's Being Measured and Why

Choose Data Freshness

- Frequency of source updates
- Frequency of updated analysis

Balance Level of Detail

- High level aggregations may hide nuance
- Granularity adds complexity, privacy concerns, noise

Specific Tools for Particular Problems

Agency Research Analysts Inundated with Data Requests

Original

400+ measures published but any adaptation needed **custom data requests**.

Colleagues, legislators and media waited **1-2 weeks** for **2-3 FTE analysts** to process.

MSSQL Report Server had limited abilities to customize, chart, or query.

Improvement

Triaged to 80 key measures by analyzing past data requests, defunct annual [Key Facts print report](#), and surveying stakeholders.

Micro-Implemented 40+ **Tableau Public Dashboards** for public facing self service (\$1400/yr as we used Pro Desktop to query MSSQL Server) in 2016-2019.

Started planning for transition to Power BI to allow for both external and internal permissions-based reporting.

Identify and Inventory Measures

Category	Indicator	Measure/Sub	RM	Slice / C	Data Source	WSAC Le	QC Lea	QC Status
Context	Educational Attainment	WA 25-44 res	Yes		ACS	IK	IK	
K12 Success	1 HS Course Completion	9th Grade Failure rate	Yes		OSPI	CB	KL	QC Complete, Need Corrections
K12 Success	2 SBAC Scores	Math and English (#, %, both?)	Yes		OSPI	CB	KL	QC Complete, Need Corrections
K12 Success	3 HS Graduates	# and %, 4-Year & 5-Year	Yes		OSPI	CB	KL	QC Complete, Need Corrections
K12 Success	4 HS Graduates	# of Alternate HS Diplomas	Yes		SBCTC	LS	LS	
PS Access	3 CBS	CBS Eligible at graduation vs. e	Yes		WSAC	LS	KL	QC Complete, Need Corrections
PS Access	4 Apprenticeship	Apprenticeship enrollments	Yes		L&I	LS	ML	
PS Access	5 Enrollment	Fall Enrollment by Sector	Yes	Total and De	IPEDS	CB	ML	
PS Success	4 Awards Conferred	Apprenticeship awards	Yes		L&I	LS	ML	
PS Success	3 Awards Conferred	Cert, 2-, 4-, and advanced awa	Yes	Total and De	IPEDS	CB	ML	
PS Success	5 Completion Rate	FT/1T IPEDS Grad Rate	Yes		IPEDS + SBCTC (fc	LS	ML	
PS Success	6 Completion Rate	Completions / FTE Efficiency	Yes		IPEDS + SBCTC (fc	LS	ML	
PS Success	1 Enrollment Intensity	Average enrollment intensity a	Yes		IPEDS	CB	ML	
PS Success	2 Enrollment Intensity	HC/FTE Ratio	Yes		IPEDS		ML	
PS Affordal	1 Costs	RUG tuition rates, 2007-17 (pu	Yes		IPEDS or WSAC ?	MW	?	
PS Affordal	2 Costs	Unmet Need Net Price: COA - C	Yes		IPEDS or WSAC ?	MW	KL	QC Complete, Need Corrections
PS Affordal	3 Aid/Financial Support	Total need-based aid by type	Yes		WSAC URR	MW	KL	

Sources and Data to Use

Databases

- CRM
- Donor
- Event

Surveys

- Quantitative
- Qualitative

Financial/ Operating

- Budgets
- Timetracking

Community

- Demographic studies

Informal or Unstructured

- Spreadsheets for printing
- PDF or Word documents with embedded tables

Preserving Privacy

- **Who is it:** ID, Name, Birthday
- **Identity:** Gender/Sex, Race/Ethnicity
- **Where:** Address -> roll up to block or Zip
- **Quantity:** Minimum counts for aggregates

Numerical Measure or Metric

- **How Much:** Price, Donation Amount
- **How Many:** Quantity or Frequency
- **How Long:** Duration or Distance
- **Where Exactly:** Lat/Long Point

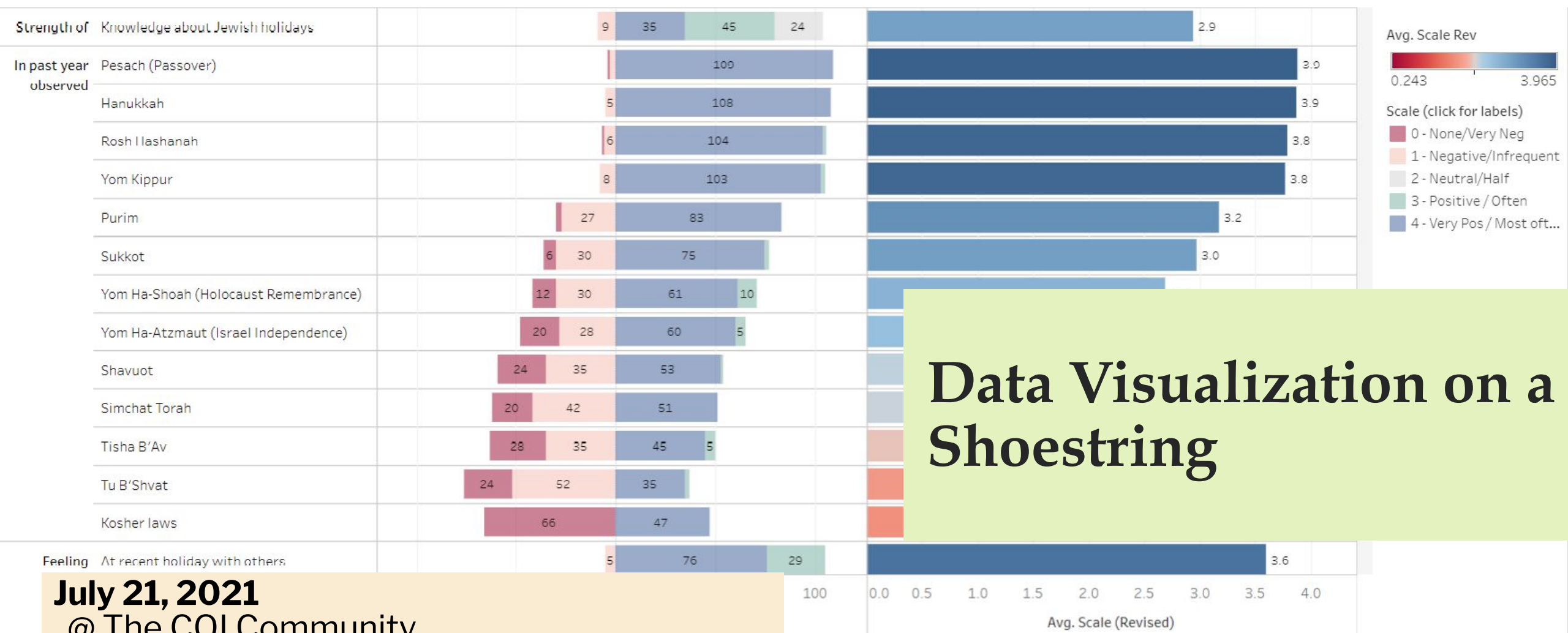
Key Steps

Who are your audience and partners

Prioritize potential projects

Prepare and integrate data

Build charts and dashboards



Data Visualization on a Shoestring

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