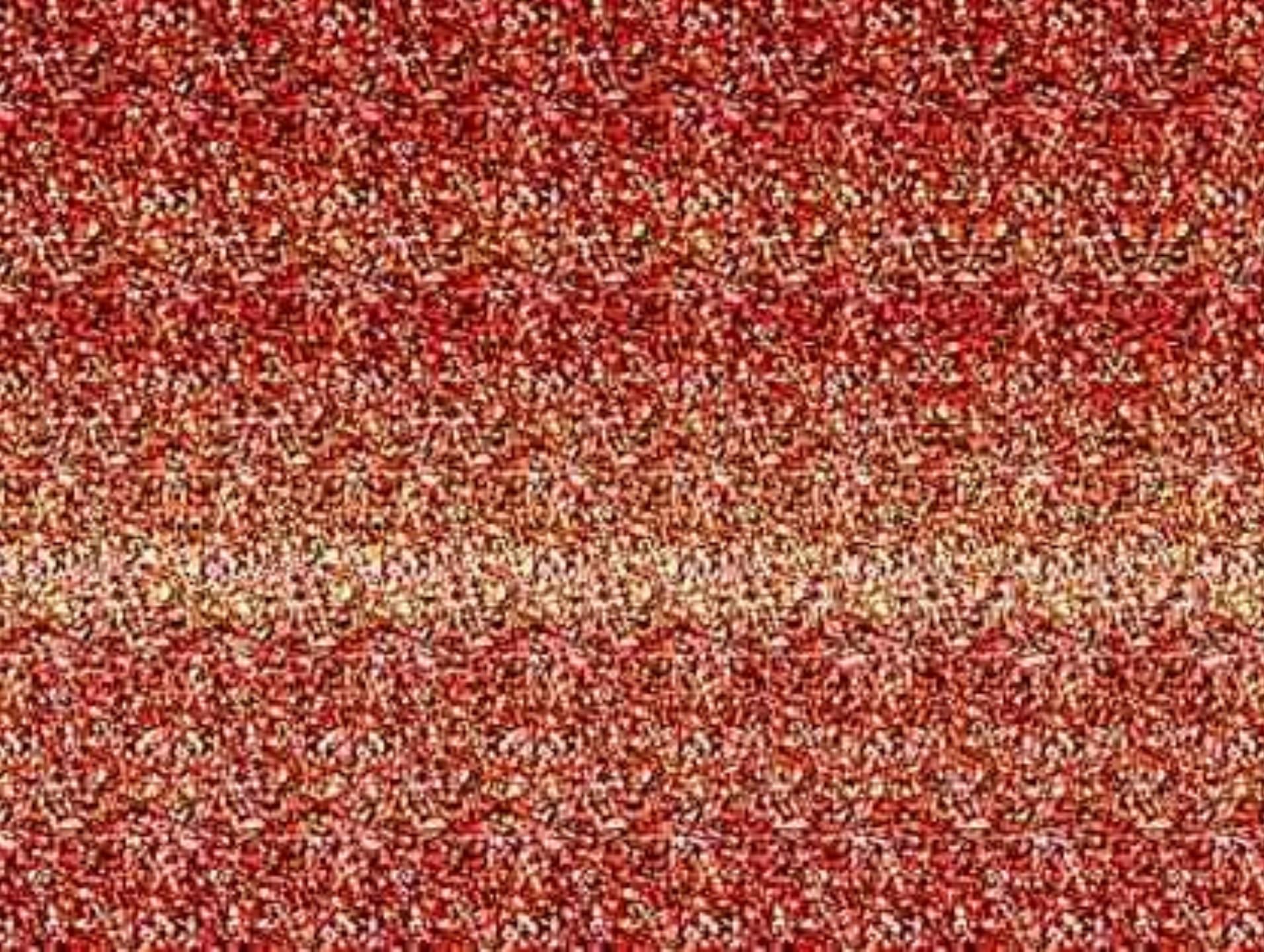


Analytical Tool Building 101

October 14, 2016

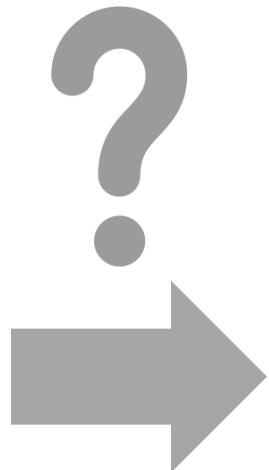




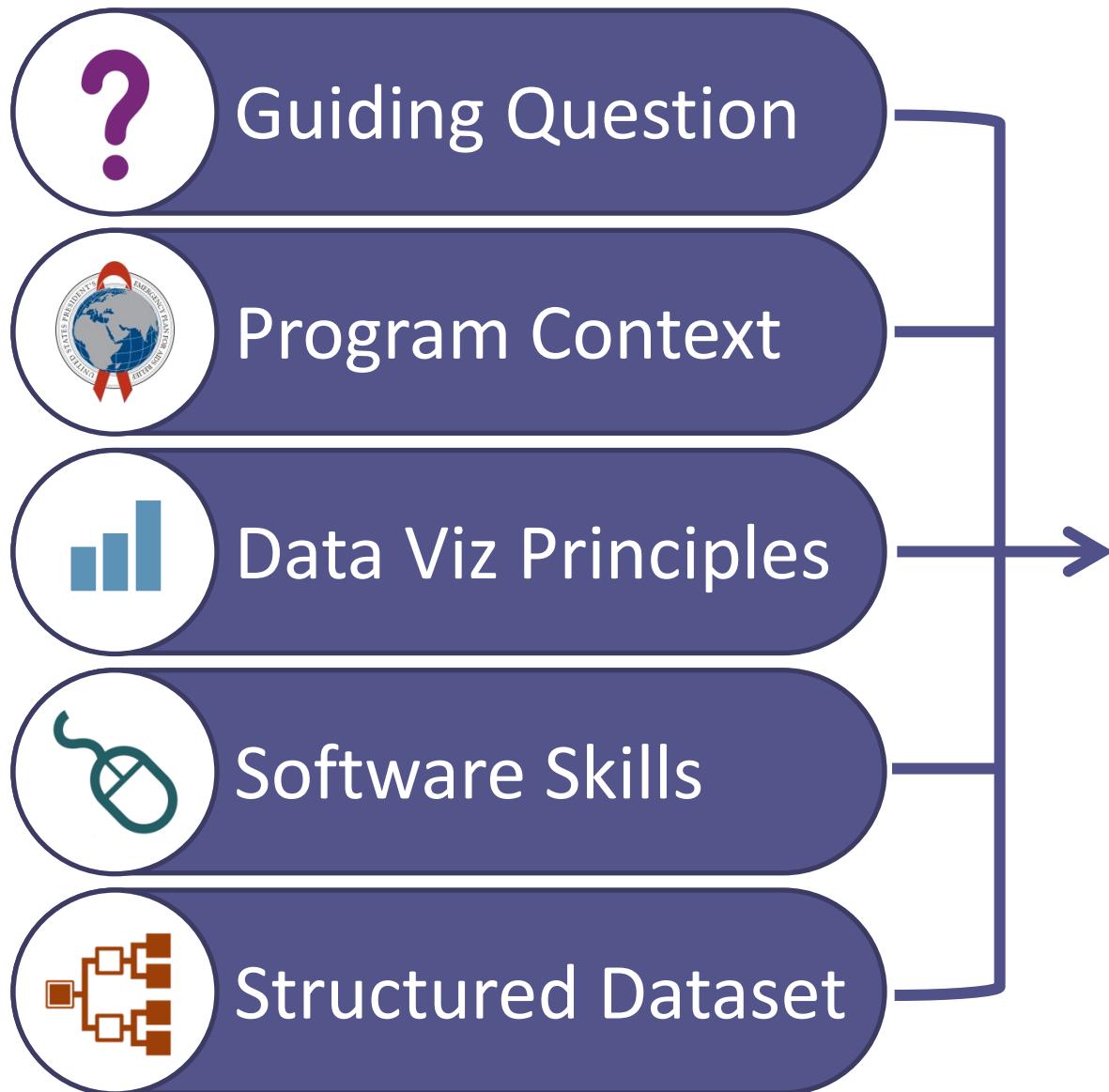
What is a tool?



How do we design an effective tool?



How do we design an effective tool?



What can we learn from a car dashboard?





How many ways can you represent....

75

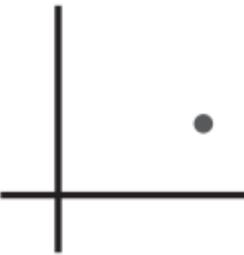
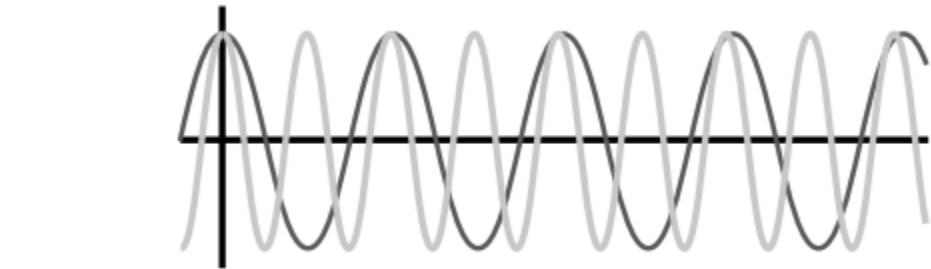
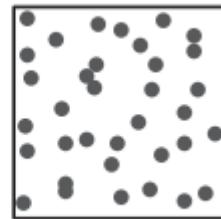
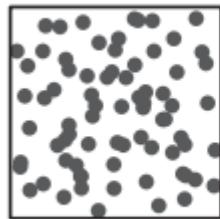
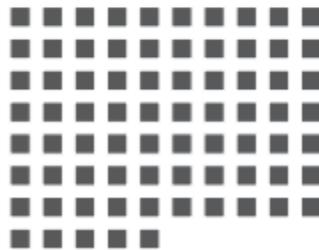
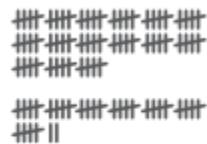
and

37



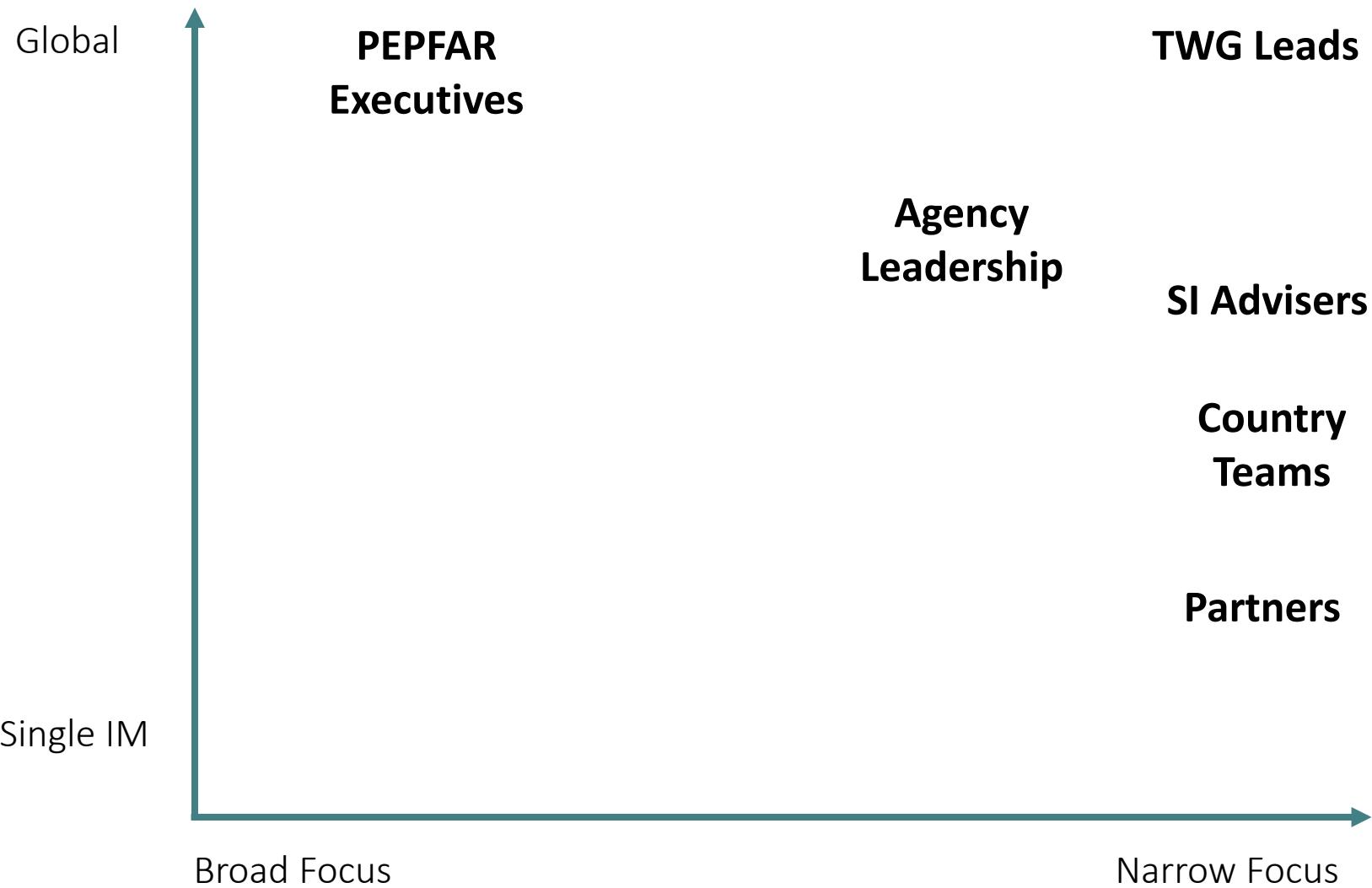
A few examples...

75, 37

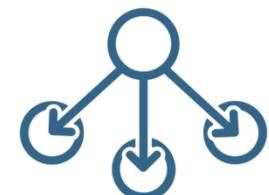
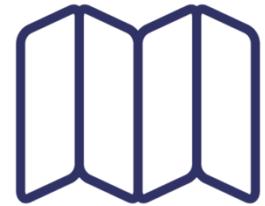
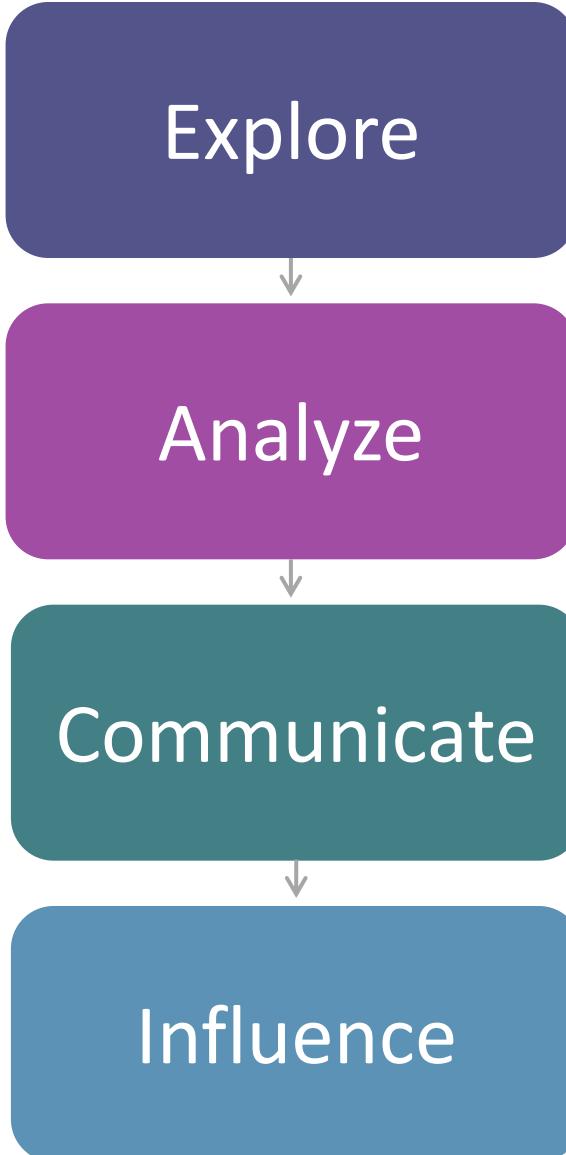




Defining an audience



A good visualization allows you to...



....but first you need
to start by setting
up the data



Extract



Clean



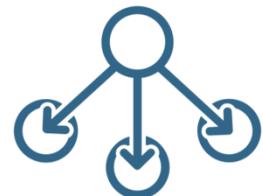
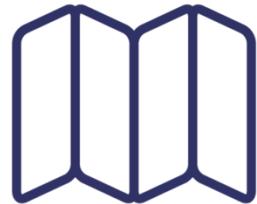
Validate

Explore

Analyze

Communicate

Influence



Tool Building Process



Extract

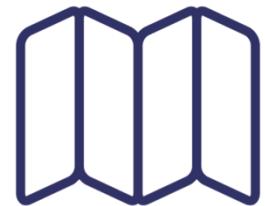


Clean



Validate

Explore



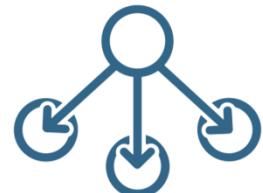
Analyze



Communicate



Influence





Where do you look for data?





DATIM
Accountability • Transparency • Impact

**UN
AIDS**



Pivot Table

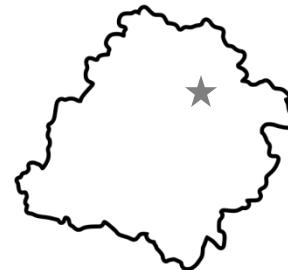
The **DHS Program**
Demographic and Health Surveys



PEPFAR
U.S. President's Emergency Plan for AIDS Relief

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Genie



We are interested in tracking the progress of the number of people on treatment by age group against the COP target set in Malawi.

- Where do we go to access and extract the data?
- What information do we need to pull the data?



Tool Building Process



Extract

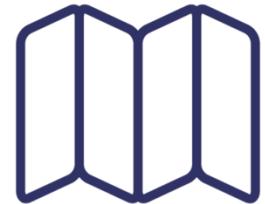


Clean



Validate

Explore



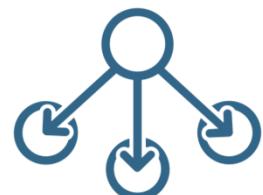
Analyze

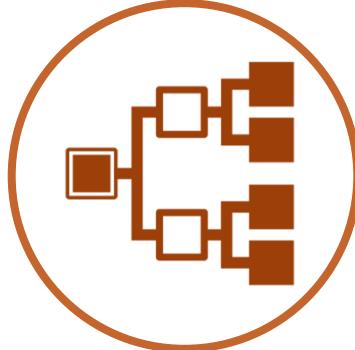


Communicate



Influence

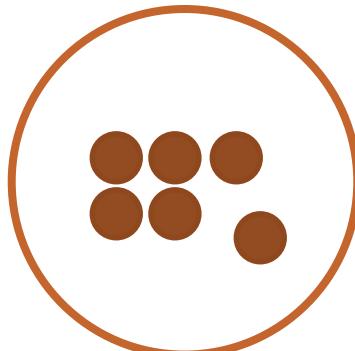




Structure



Integration



Subset



Differing structures even within PEPFAR data systems

Organisation units / Data	TX_CURR (N, DSD): Receiving ART	TX_CURR (N, DSD, Age/Sex): Receiving ART	TX_CURR (N, DSD, Age/Sex): TARGET: Receiving ART
Balaka District	13 705	13 705	
Blantyre District	62 146	57 121	
Chikwawa District	19 155	19 155	
Chiradzulu District	35 501	35 501	
Chitipa District	3 471	3 471	
Dedza District	11 353	11 353	
Dowa District	5 281	5 281	
Karonga District	9 995	9 995	
Kasungu District	10 959	10 959	
Likoma District			
Lilongwe District	69 499	69 499	
Machinga District	21 414	21 414	
Mangochi District	31 247	31 247	
Mchinji District	11 825	11 825	
Mulanje District	38 656	38 656	
Mwanza District	4 589	4 589	
Mzimba District	25 317	25 317	
Neno District	5 942	5 942	
Nkhata Bay District	5 504	5 504	
Nkhotakota District	7 620	7 620	
Nsanje District	15 869	15 869	
Ntchewi District	17 885	17 885	
Ntchisi District	2 567	2 567	
Phalombe District	23 143	23 143	
Rumphi District	4 713	4 713	
Salima District	10 800	10 800	
Thyolo District	42 872	42 872	
Zomba District	38 614	38 614	
Total	549 642	544 617	

MER Approved Data Extract							
Report Parameters							
	Mechanism OU	HQ Mechanism ID	Planning Reportin...	Period	Data Element Name	Disaggregate	Category Option C...
✓	Malawi	16678	2015 COP	2015Oct	TX_CURR (N, DSD...)	Age/Sex	20+, Male
✓	Malawi	16678	2015 COP	2015Oct	TX_CURR (N, DSD...)	Age/Sex	15-19, Female
✓	Malawi	16678	2015 COP	2015Oct	TX_CURR (N, DSD...)	Age/Sex	5-14, Female
✓	Malawi	16678	2015 COP	2015Oct	TX_CURR (N, DSD...)	Age/Sex	20+, Female
✓	Malawi	16678	2015 COP	2015Oct	TX_CURR (N, DSD...)	Age/Sex	<1, Female
✓	Malawi	16678	2015 COP	2015Oct	TX_CURR (N, DSD...)	Age/Sex	<1, Male
✓	Malawi	16678	2015 COP	2015Oct	TX_CURR (N, DSD...)	Age/Sex	1-4, Male
✓	Malawi	16678	2015 COP	2015Oct	TX_CURR (N, DSD...)	Age/Sex	5-14, Male
✓	Malawi	16678	2015 COP	2015Oct	TX_CURR (N, DSD...)	Age/Sex	15-19, Male
✓	Malawi	16678	2015 COP	2015Oct	TX_CURR (N, DSD...)	Age/Sex	20+, Male
✓	Malawi	16678	2015 COP	2015Oct	TX_CURR (N, DSD...)	Age/Sex	1-4, Female

	A	B	C	D	E	F	G	H	I	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	
1	Region	Region	-Operat	-Operat	Country	PSNU	PSNU	SNUPri	typeMi	indicat	-Tnumer	indicat	disagg	category	Age	Sex	results	otherD	coarsed	FY2015	FY2015	FY2015	FY2015	FY2015
279583	Africa	KScooTy Malawi	IzCbqyK Malawi	Military	PO2gJ9udHagA	Y	TX_CURR_N	N	DSO	Age/Sex	<1, Male	<1	Male						41	41	3			
279584	Africa	KScooTy Malawi	IzCbqyK Malawi	Military	PO2gJ9udHagA	Y	TX_CURR_N	N	DSO	Age/Sex	15-19, Femal	15-19	Female						210	210	60			
279585	Africa	KScooTy Malawi	IzCbqyK Malawi	Military	PO2gJ9udHagA	Y	TX_CURR_N	N	DSO	Age/Sex	5-14, Male	05-14	Male						140	140	154			
279586	Africa	KScooTy Malawi	IzCbqyK Malawi	Military	PO2gJ9udHagA	Y	TX_CURR_N	N	DSO	Total Nut	diff								6385	6385	4727			
279587	Africa	KScooTy Malawi	IzCbqyK Malawi	Military	PO2gJ9udHagA	Y	TX_CURR_N	N	DSO	Age/Sex	<1, Femal	<1	Female						37	37	4			
279588	Africa	KScooTy Malawi	IzCbqyK Malawi	Military	PO2gJ9udHagA	Y	TX_CURR_N	N	DSO	Age/Sex	20+, Femal	20+	Female						3527	3527	2777			
279589	Africa	KScooTy Malawi	IzCbqyK Malawi	Military	PO2gJ9udHagA	Y	TX_CURR_N	N	DSO	Age/Sex	1-4, Male	01-04	Male						97	97	30			
279590	Africa	KScooTy Malawi	IzCbqyK Malawi	Military	PO2gJ9udHagA	Y	TX_CURR_N	N	DSO	Age/Sex	15-19, Mal	15-19	Male						45	45	39			
279591	Africa	KScooTy Malawi	IzCbqyK Malawi	Military	PO2gJ9udHagA	Y	TX_CURR_N	N	DSO	Age/Sex	1-4, Femal	01-04	Female						101	101	33			
279592	Africa	KScooTy Malawi	IzCbqyK Malawi	Military	PO2gJ9udHagA	Y	TX_CURR_N	N	DSO	Age/Sex	20+, Male	20+	Male						2029	2029	1474			
279593	Africa	KScooTy Malawi	IzCbqyK Malawi	Military	PO2gJ9udHagA	Y	TX_CURR_N	N	DSO	Age/Sex	5-14, Fem	05-14	Female						158	158	153			
279594	Africa	KScooTy Malawi	IzCbqyK Malawi	Balance Disruptive	HTC	Scale-Up	Saturat	TX_CURR_N	N	DSO	Age/Sex	1-4, Male	01-04	Male						3745	4024	4024	5094	
279595	Africa	KScooTy Malawi	IzCbqyK Malawi	Balance Disruptive	HTC	Scale-Up	Saturat	TX_CURR_N	N	DSO	Age/Sex	5-14, Femal	05-14	Female						304	312	312	669	
279596	Africa	KScooTy Malawi	IzCbqyK Malawi	Balance Disruptive	HTC	Scale-Up	Saturat	TX_CURR_N	N	DSO	Age/Sex	<1, Femal	<1	Female						68	76	76	19	
279597	Africa	KScooTy Malawi	IzCbqyK Malawi	Balance Disruptive	HTC	Scale-Up	Saturat	TX_CURR_N	N	DSO	Age/Sex	1-4, Fem	01-04	Female						TRUE	3			
279598	Africa	KScooTy Malawi	IzCbqyK Malawi	Balance Disruptive	HTC	Scale-Up	Saturat	TX_CURR_N	N	DSO	Age/Sex	1-4, Male	01-04	Male						TRUE	2			
279599	Africa	KScooTy Malawi	IzCbqyK Malawi	Balance Disruptive	HTC	Scale-Up	Saturat	TX_CURR_N	N	DSO	Age/Sex	<1	<1	Male						TRUE	0			
279600	Africa	KScooTy Malawi	IzCbqyK Malawi	Balance Disruptive	HTC	Scale-Up	Saturat	TX_CURR_N	N	TA	Age/Sex	20+, Male	20+	Male						0				
279581	Africa	KScooTy Malawi	IzCbqyK Malawi	Balance Disruptive	HTC	Scale-Up	Saturat	TX_CURR_N	N	TA	Age/Sex	5-14, Fem	05-14	Female						0				
279582	Africa	KScooTy Malawi	IzCbqyK Malawi	Balance Disruptive	HTC	Scale-Up	Saturat	TX_CURR_N	N	DSO	Age/Sex	1-4, Male	01-04	Male						178	194	194	133	
279583	Africa	KScooTy Malawi	IzCbqyK Malawi	Balance Disruptive	HTC	Scale-Up	Saturat	TX_CURR_N	N	TA	Age/Sex	1-4, Femal	01-04	Female						0				
279584	Africa	KScooTy Malawi	IzCbqyK Malawi	Balance Disruptive	HTC	Scale-Up	Saturat	TX_CURR_N	N	TA	Age/Sex	5-14, Male	05-14	Male						0				
279585	Africa	KScooTy Malawi	IzCbqyK Malawi	Balance Disruptive	HTC	Scale-Up	Saturat	TX_CURR_N	N	DSO	Age/Sex	15-19, Femal	15-19	Female						385	416	416	192	
279586	Africa	KScooTy Malawi	IzCbqyK Malawi	Balance Disruptive	HTC	Scale-Up	Saturat	TX_CURR_N	N	DSO	Age/Sex	15-19, Mal	15-19	Male						82	88	88	152	
279587	Africa	KScooTy Malawi	IzCbqyK Malawi	Balance Disruptive	HTC	Scale-Up	Saturat	TX_CURR_N	N	DSO	Age/Sex	<1, Femal	<1	Female						TRUE	1			
279588	Africa	KScooTy Malawi	IzCbqyK Malawi	Balance Disruptive	HTC	Scale-Up	Saturat	TX_CURR_N	N	DSO	Total Nut	diff						11789	12665	12665	15914			
279589	Africa	KScooTy Malawi	IzCbqyK Malawi	Balance Disruptive	HTC	Scale-Up	Saturat	TX_CURR_N	N	TA	Age/Sex	<1, Male	<1	Male						0				
279590	Africa	KScooTy Malawi	IzCbqyK Malawi	Balance Disruptive	HTC	Scale-Up	Saturat	TX_CURR_N	N	TA	Age/Sex	15-19, Mal	15-19	Male						0				
279591	Africa	KScooTy Malawi	IzCbqyK Malawi	Balance Disruptive	HTC	Scale-Up	Saturat	TX_CURR_N	N	DSO	Age/Sex	1-4, Femal	01-04	Female						185	200	200	141	
279592	Africa	KScooTy Malawi	IzCbqyK Malawi	Balance Disruptive	HTC	Scale-Up	Saturat	TX_CURR_N	N	DSO	Age/Sex	5-14, Male	05-14	Male						456	279	279	673	
279593	Africa	KScooTy Malawi	IzCbqyK Malawi	Balance Disruptive	HTC	Scale-Up	Saturat	TX_CURR_N	N	DSO	Age/Sex	<15+, Male	15+	Male						16				
279594	Africa	KScooTy Malawi	IzCbqyK Malawi	Balance Disruptive	HTC	Scale-Up	Saturat	TX_CURR_N	N	DSO	Age/Sex	<15+, Femal	15+	Female						0				
279595	Africa	KScooTy Malawi	IzCbqyK Malawi	Balance Disruptive	HTC	Scale-Up	Saturat	TX_CURR_N	N	DSO	Age/Sex	20+, Femal	20+	Female						6510	6994	6994	8823	
279596	Africa	KScooTy Malawi	IzCbqyK Malawi	Balance Disruptive	HTC	Scale-Up	Saturat	TX_CURR_N	N	DSO	Age/Sex	<15+, Femal	15+	Female						34				
279597	Africa	KScooTy Malawi	IzCbqyK Malawi	Balance Disruptive	HTC	Scale-Up	Saturat	TX_CURR_N	N	DSO	Age/Sex	<1, Male	<1	Male						76	83	83	16	
279598	Africa	KScooTy Malawi	IzCbqyK Malawi	Balance Disruptive	HTC	Scale-Up	Saturat	TX_CURR_N	N	TA	Age/Sex	<1, Femal	<1	Female						0				
279599	Africa	KScooTy Malawi	IzCbqyK Malawi	Balance Disruptive	HTC	Scale-Up	Saturat	TX_CURR_N	N	TA	Age/Sex	15-19, Femal	15-19	Female						0				
279600	Africa	KScooTy Malawi	IzCbqyK Malawi	Balance Disruptive	HTC	Scale-Up	Saturat	TX_CURR_N	N	TA	Age/Sex	20+, Femal	20+	Female						0				
279601	Africa	KScooTy Malawi	IzCbqyK Malawi	Blantyre	Cmxeq3CD1	Scale-Up	Saturat	TX_CURR_N	N	DSO	Age/Sex	<1, Male	<1	Male						330	349	349	53	
279602	Africa	KScooTy Malawi	IzCbqyK Malawi	Blantyre	Cmxeq3CD1	Scale-Up	Saturat	TX_CURR_N	N	DSO	Age/Sex	<1, Femal	<1	Female						4				

Tool Building Process



Extract

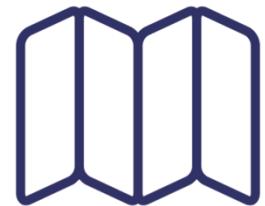


Clean



Validate

Explore



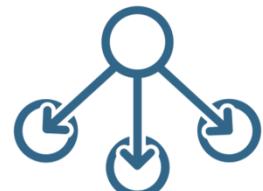
Analyze



Communicate



Influence





How complete is the dataset?

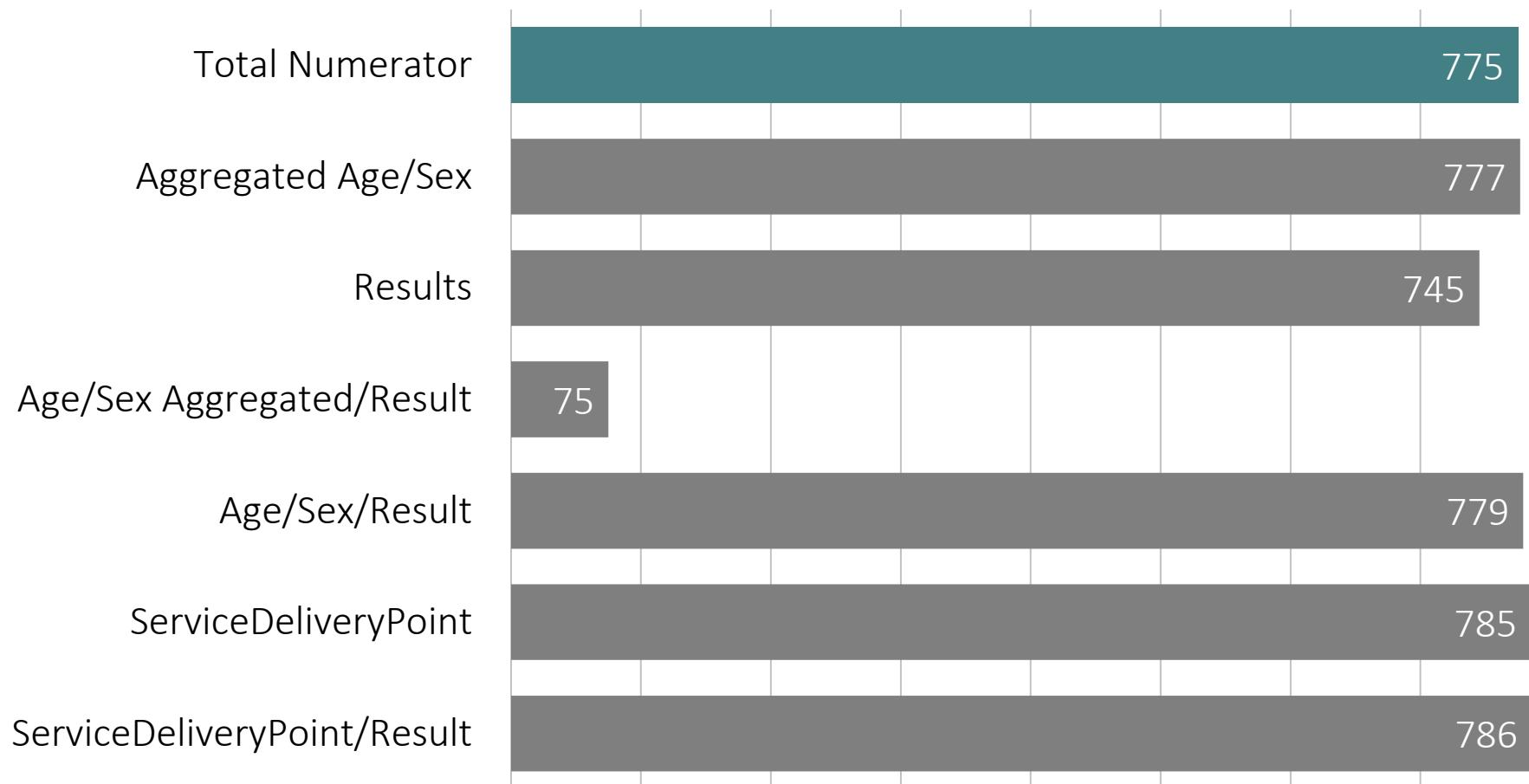
80%



Malawi Completeness Check

FY 2016 Q2 HTC_TST

thousands of people





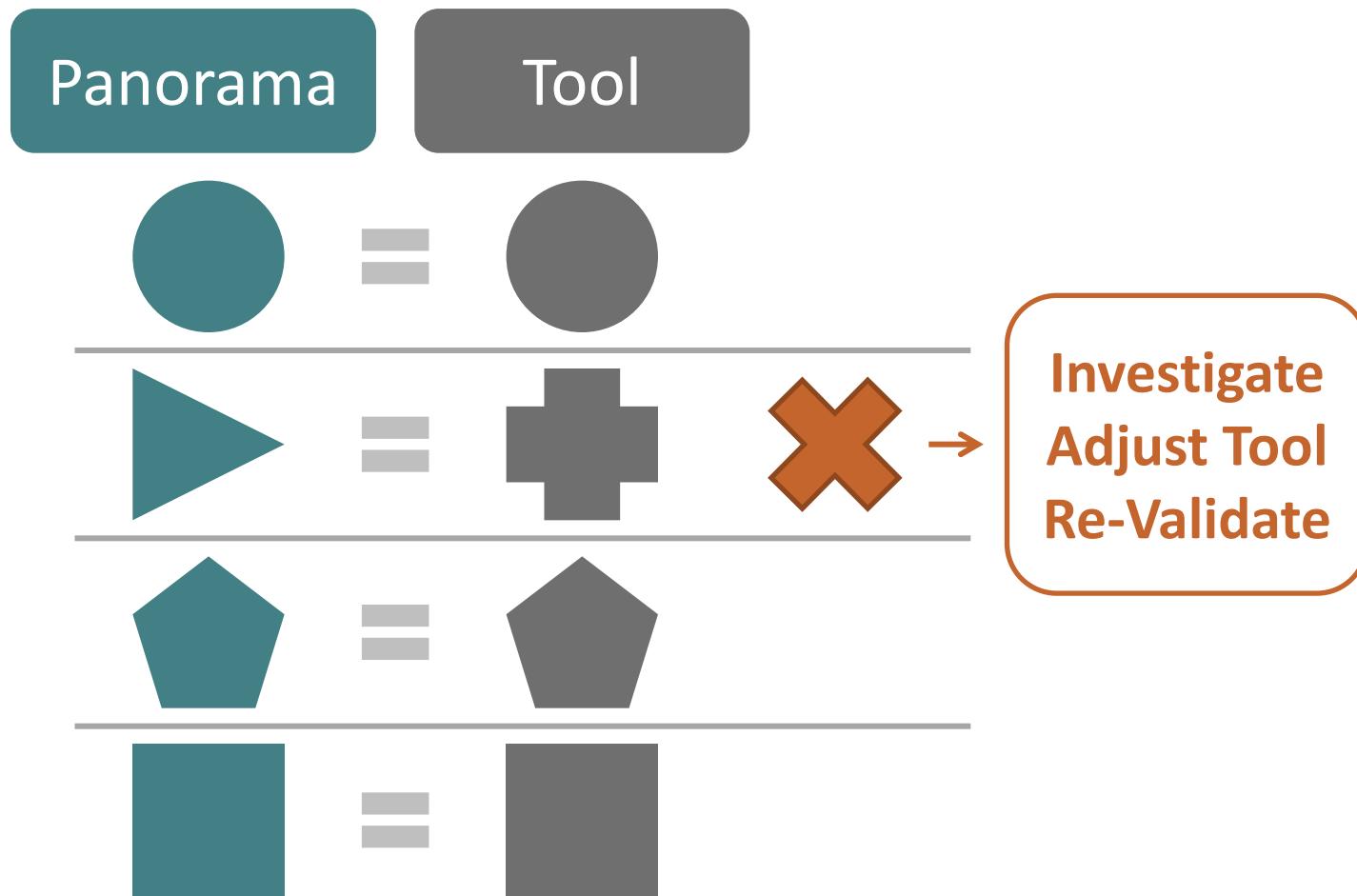
Validate the completeness of TX_CURR
for DSD for the current FY in Malawi.

- Where do we go to access and extract/view the data?
- What information do we need to pull the data?
- What disaggregates do we need to look at?





How valid is the tool?



Tool Building Process



Extract

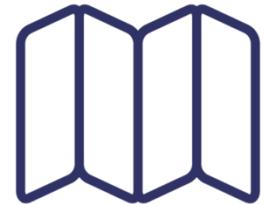


Clean



Validate

Explore



Analyze



Communicate



Influence

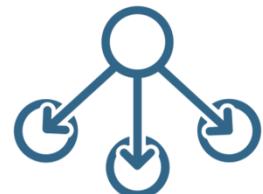
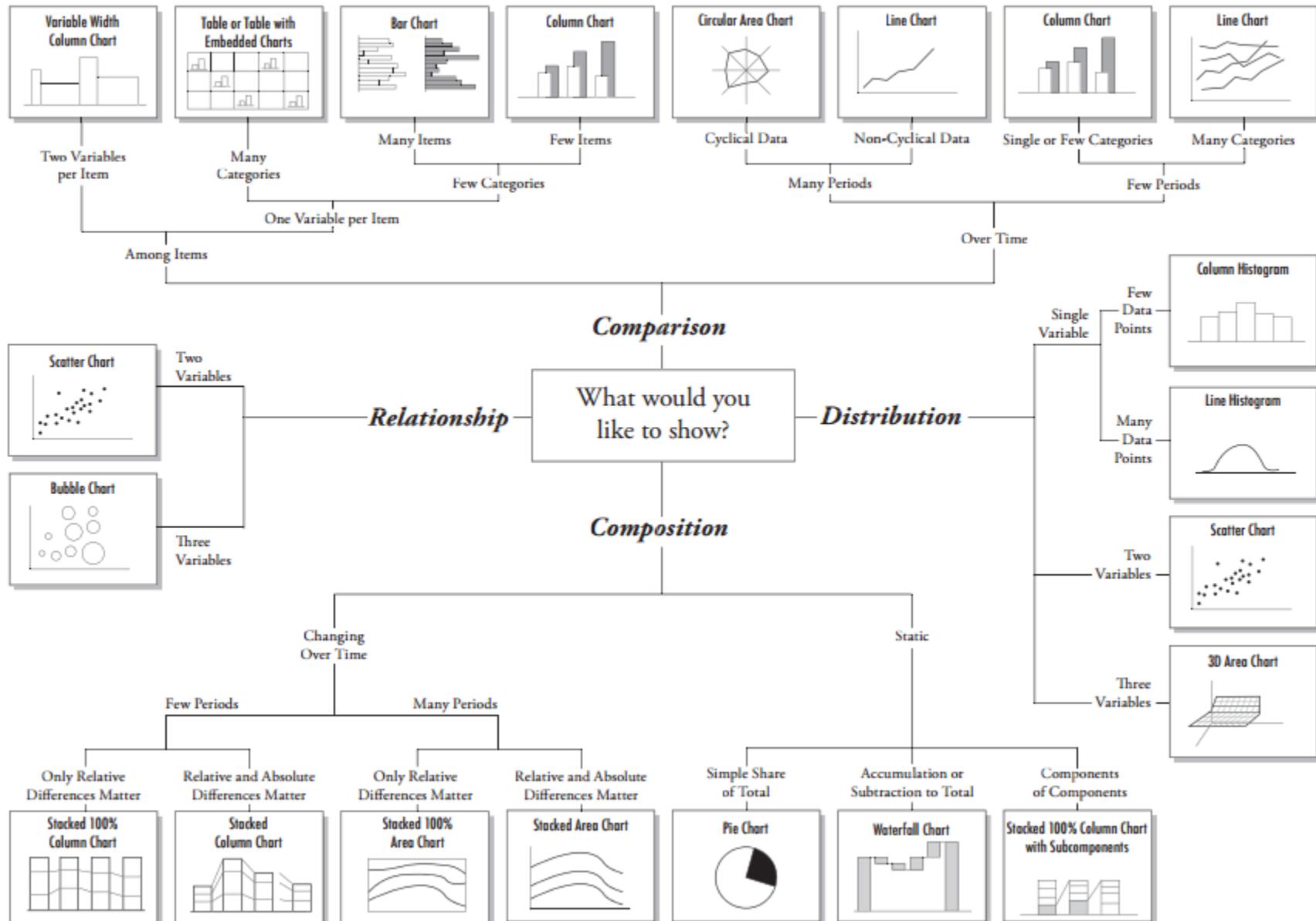




Chart Suggestions—A Thought-Starter





We are interested in tracking the progress of the number of people on treatment by age group against the COP target set in Malawi.

- How would you visualize this data?
- What story are you trying to tell with the visualization?



Tool Building Process



Extract

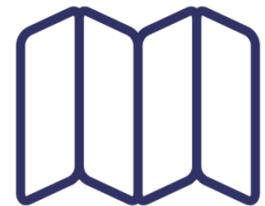


Clean



Validate

Explore



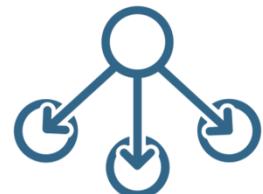
Analyze



Communicate

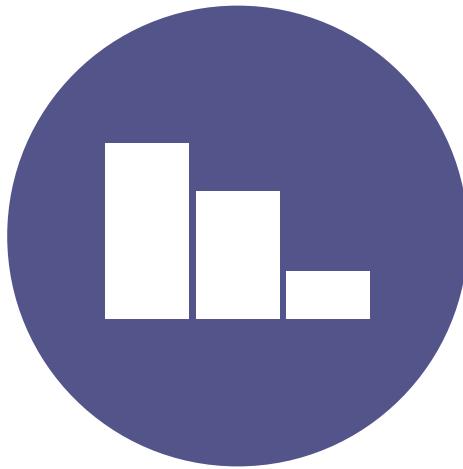


Influence



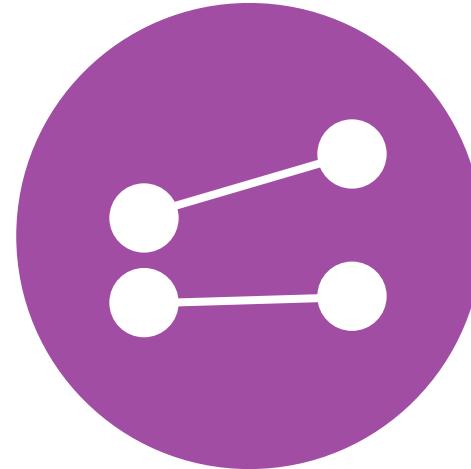


Visual Analysis to Find Stories



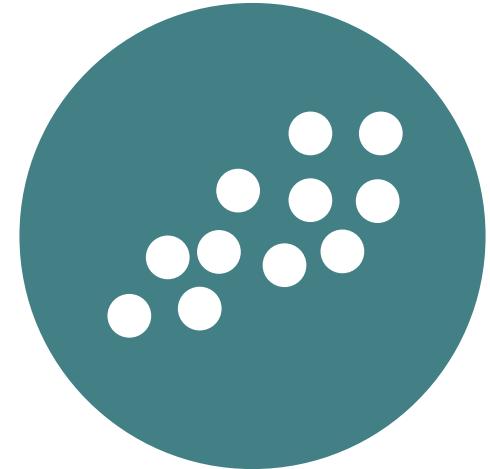
COMPARISONS

- Categorical comparison and proportions
- Ranking: big, medium, small
- Measurements/values: absolutes
- Range and distribution
- Context: Targets, forecasts, averages
- Hierarchical relationships



TRENDS

- Up and down vs flat?
- Linear vs exponential
- Steady vs fluctuating
- Seasonal vs random
- Rate of change vs steepness

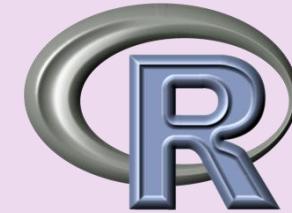


RELATIONSHIPS

- Outliers
- Intersections
- Correlations
- Connections
- Clusters
- Associations
- Gaps



Tools for Analysis





Accessing Data within Excel

Typical Reference

= SUM(X1:X439)



Not clear what is being summed in formula

Structured Reference (using a table)

= SUM(data[Value])



Table name

Column name
from table

SUMIFS Structure

=SUMIFS(sum_range, criteria_range1, criteria1,
[criteria_range2, criteria2], ...)]



We are interested in tracking the progress of the number of people on treatment by age group against the COP target set in Malawi.

- Create an Excel Table to structure your data (impattdata.xlsx)
- Use the SUMIFS function to determine the total currently on treatment



Tool Building Process



Extract

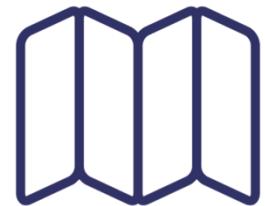


Clean



Validate

Explore



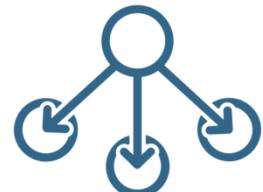
Analyze



Communicate

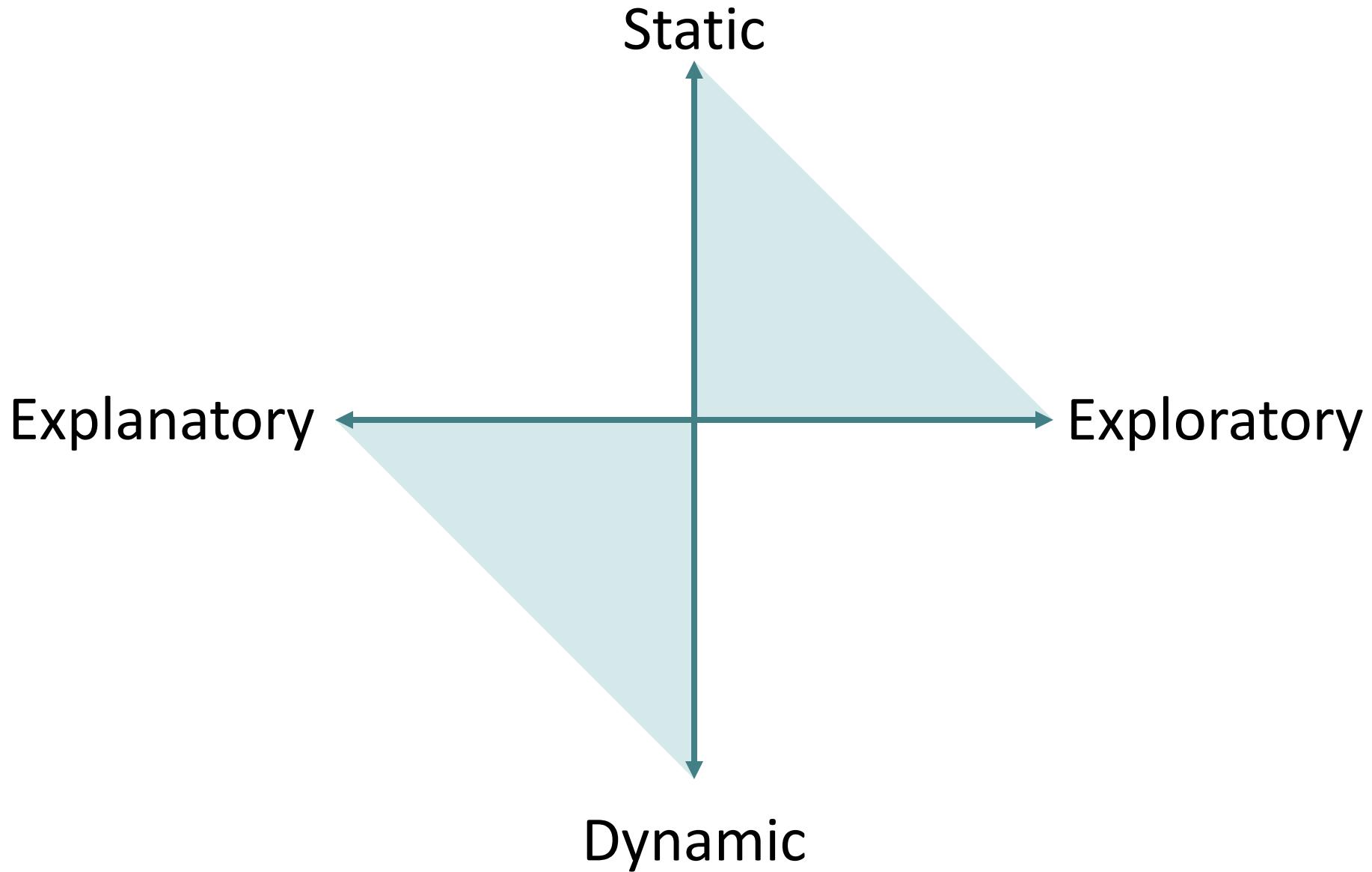


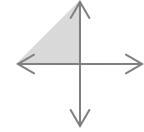
Influence





Form vs. Function



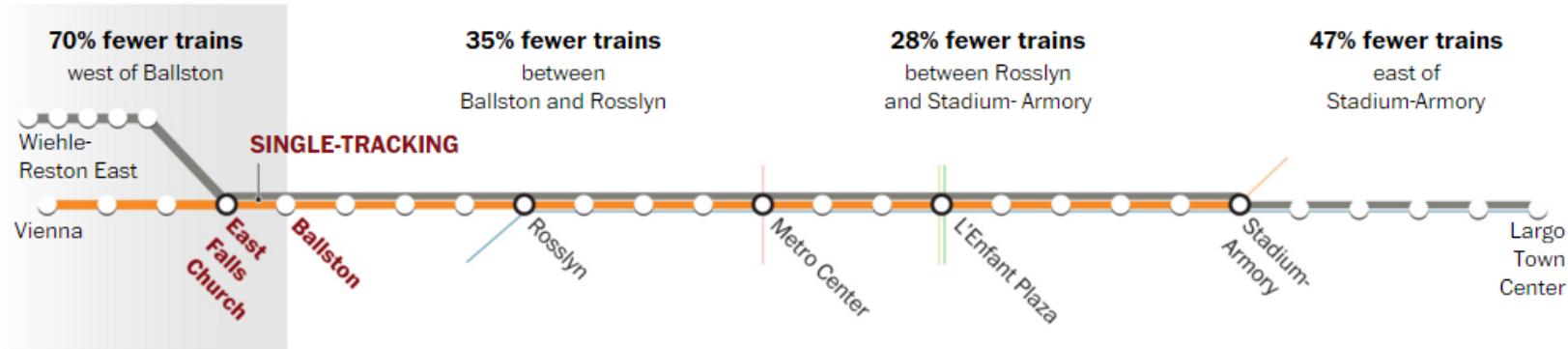


Ballston to East Falls Church

Continuous single-tracking between East Falls Church and Ballston.

Severely reduced service at all Orange and Silver Line stations.

Metro's advice: Consider alternate travel options and avoid the Orange and Silver lines at rush hour. Virginia riders should consider using Ballston for more frequent service.



The schedule

The single-tracking will last 13 days, including two weekends.

JUNE						
S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	1	2
3	4					JULY

The next SafeTrack surge will begin June 18 and last until July 3, causing reduced service at all Orange, Silver and Blue stations.

Train frequency

OR Every 18 minutes from Vienna to Ballston; additional trains from Ballston to New Carrollton.

During a normal morning rush hour, trains leave Vienna and Wiehle-Reston East every six minutes.

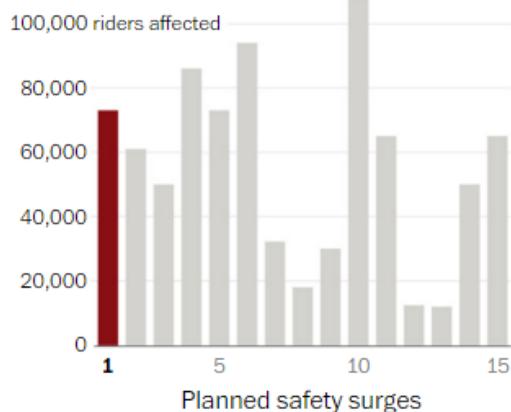


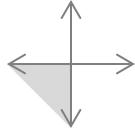
During the single-tracking, trains will leave every 18 minutes all day long. That is six fewer trains per hour on each line, but some of the impact should be lessened east of Ballston.



Number of riders affected

Metro estimates that 73,000 daily trips will be affected by the single-tracking. Of the 15 planned safety surges, this will have the fourth-highest impact on daily riders.





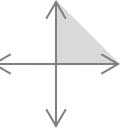
WHO IS OLDER AND YOUNGER GIVEN YOUR AGE

Everyone

Female

Male

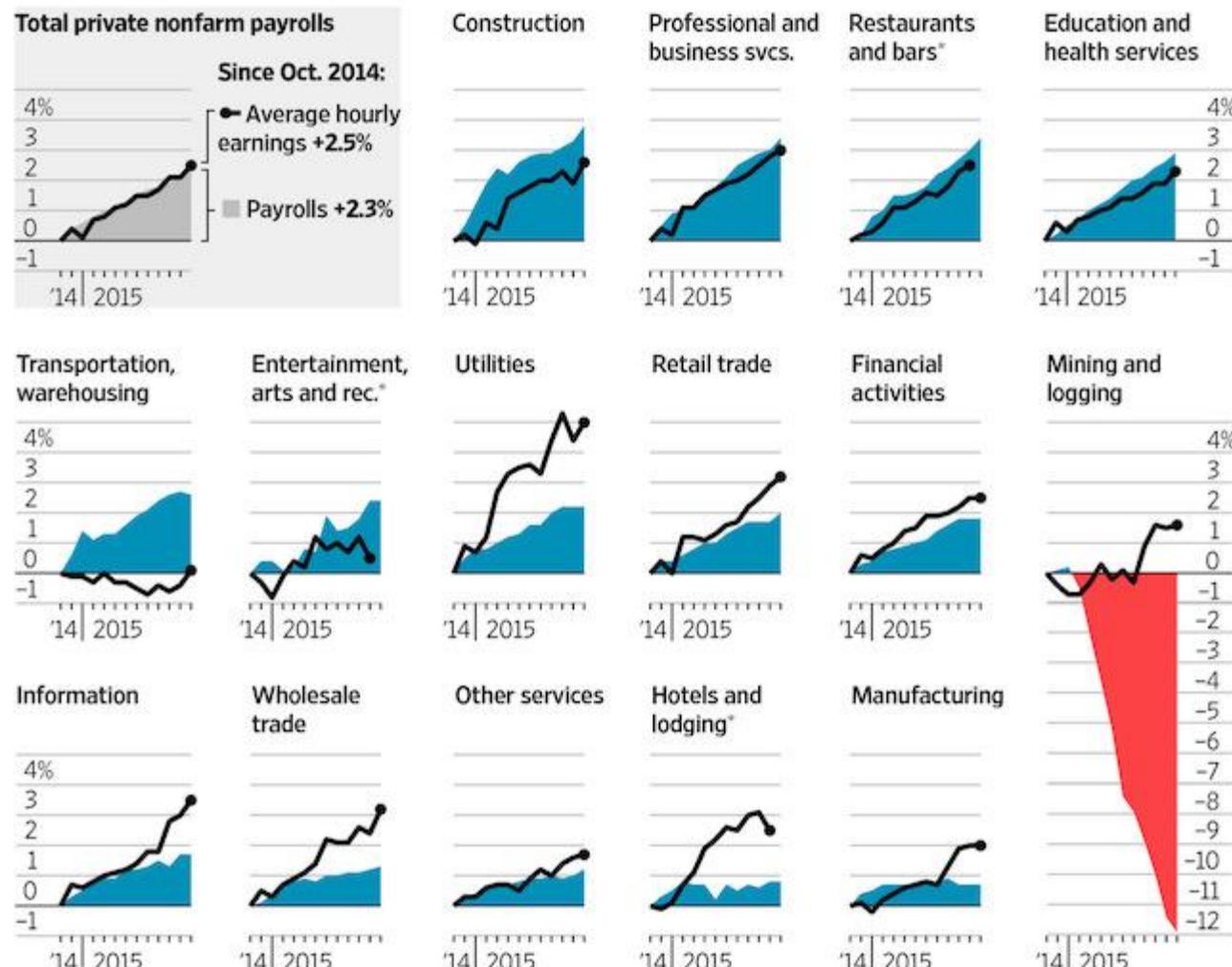




Where the Labor Market Is Tightening

Domestically focused industries such as restaurants, retail and utilities have seen strong wage gains and steady hiring. Globally sensitive areas such as mining and manufacturing have struggled.

Change over the past year in payrolls (■) and average hourly earnings (—), seasonally adjusted



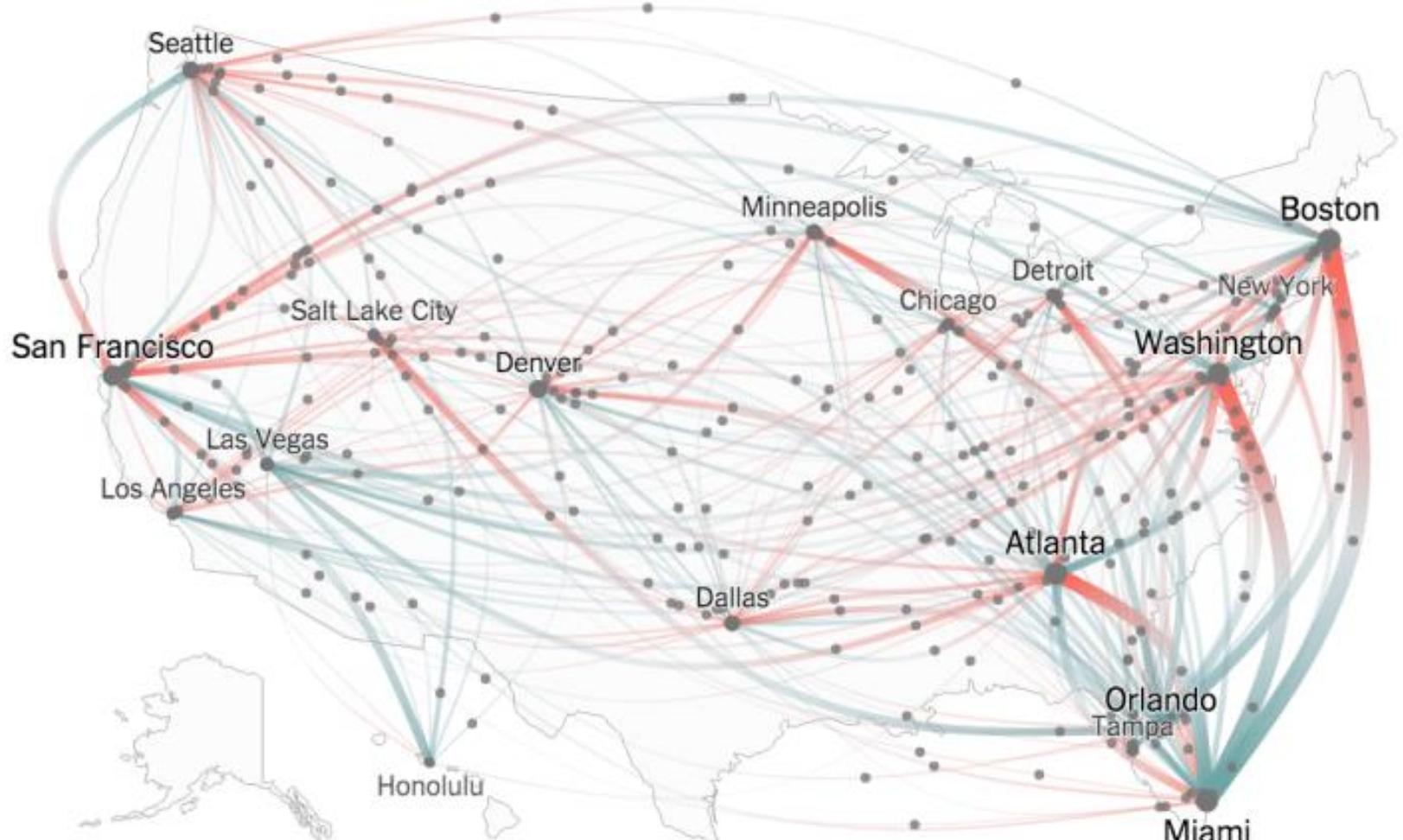
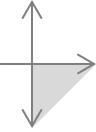
*Earnings figures are only available through September for these sectors.

Source: Labor Department

THE WALL STREET JOURNAL



Dynamic/Exploratory



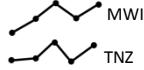
Thanksgiving increase in air travel demand

Origin

Destination



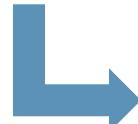
Key Principles

-  Clear purpose
-  Start with a sketch
-  Consistent color scheme
-  Consistent font family, vary size and emphasis
-  Adjust size
-  Simplify
-  Logical Order
-  Integrate text and legend



We are interested in tracking the progress of the number of people on treatment by age group against the COP target set in Malawi.

Guided walk
through for
building a
dynamic tool



MALAWI | FY16 District Profile

SNU: Blantyre District

Population: 1,383,403

PLHIV: 162,314

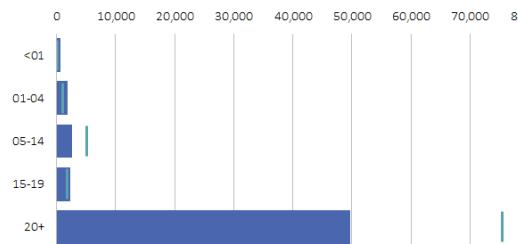
Prevalence: 12.0



4 in 10 PLHIV
are currently
on Treatment

Current on Treatment, Results (■) v Targets (|)

With 57,121 on treatment this year, Blantyre is 68% of the way towards its FY16 target of



Tool Building Process



Extract

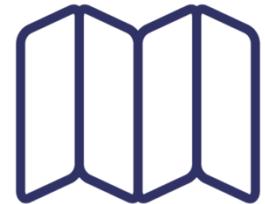


Clean



Validate

Explore



Analyze

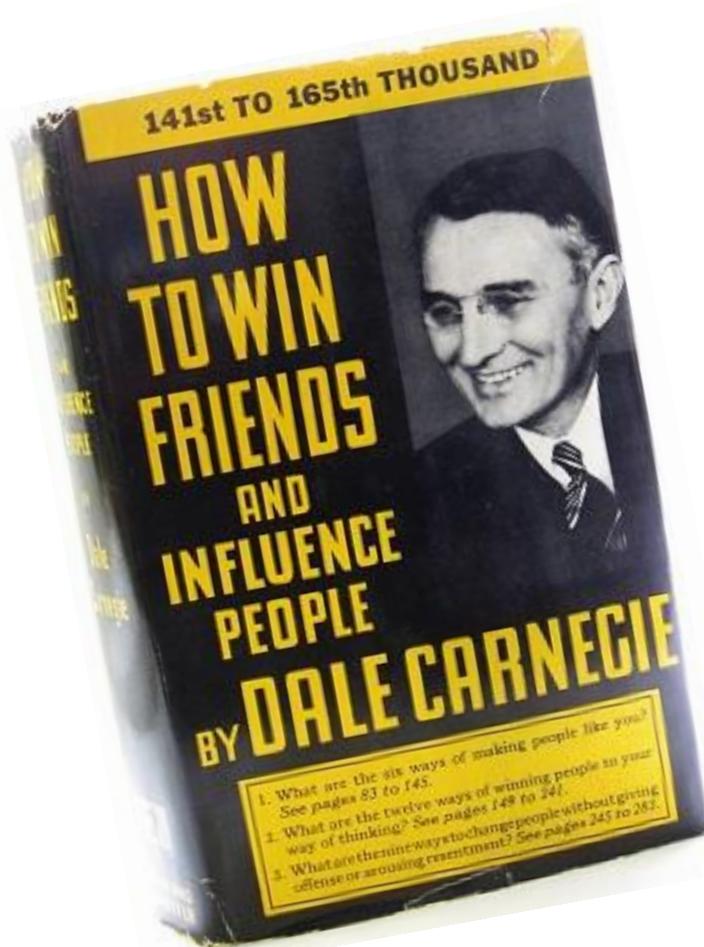


Communicate



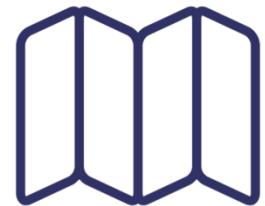
Influence





Tool Building Process

Explore



Extract

Analyze



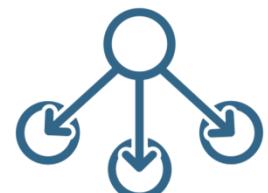
Clean

Communicate



Validate

Influence



Let's critique
some data
visualizations

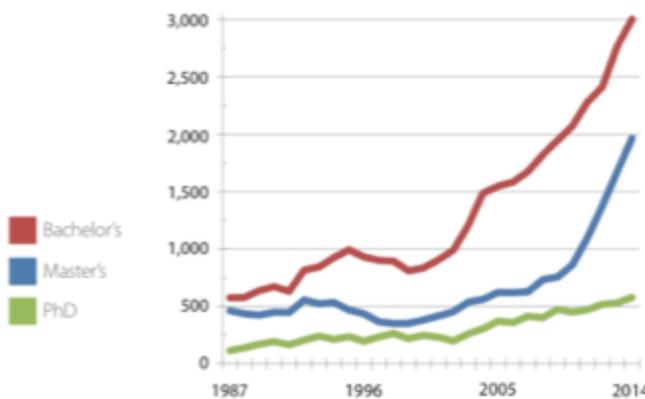
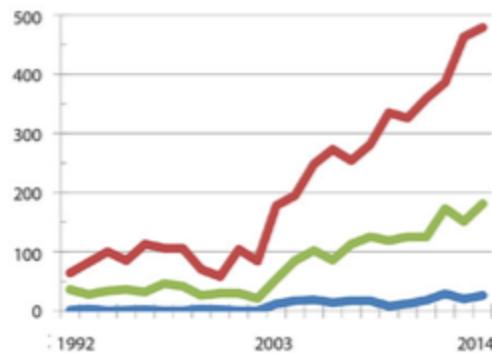
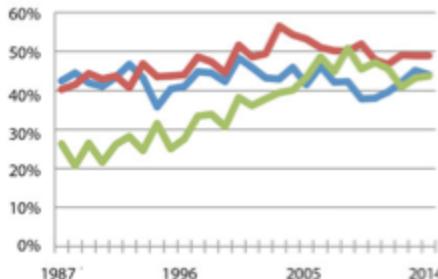
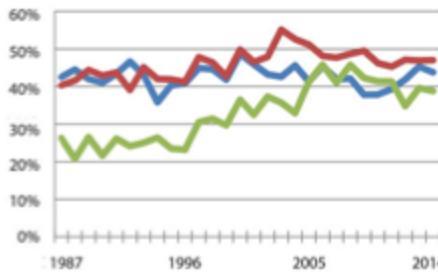
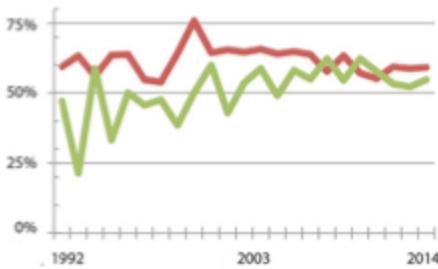
1**STATISTICS AND BIOSTATISTICS DEGREES**

Figure 1: Statistics and biostatistics degrees at the bachelor's, master's, and doctoral levels in the United States.
Data source: NCES IPEDS.

2**BIOSTATISTICS DEGREES****3****PERCENTAGE OF US STATISTICS AND BIOSTATISTICS DEGREES AWARDED TO WOMEN****4****PERCENTAGE OF US STATISTICS DEGREES AWARDED TO WOMEN****5****PERCENTAGE OF US BIOSTATISTICS DEGREES AWARDED TO WOMEN**

STATISTICS AND BIOSTATISTICS DEGREES

Bachelor's
Master's
PhD

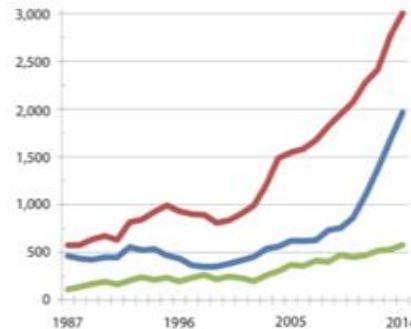
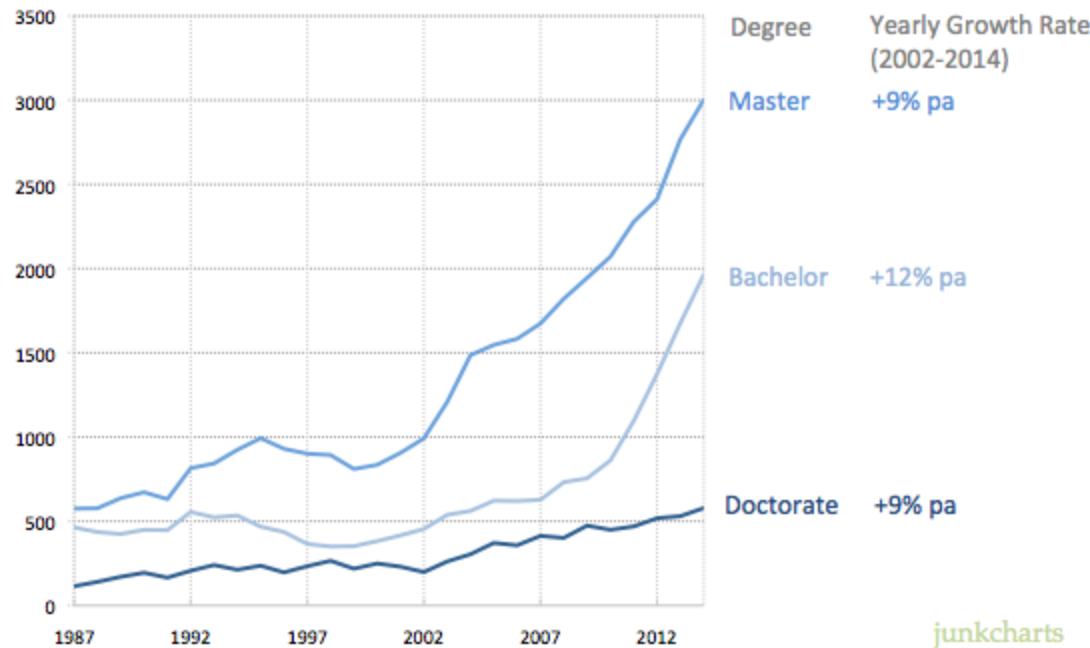


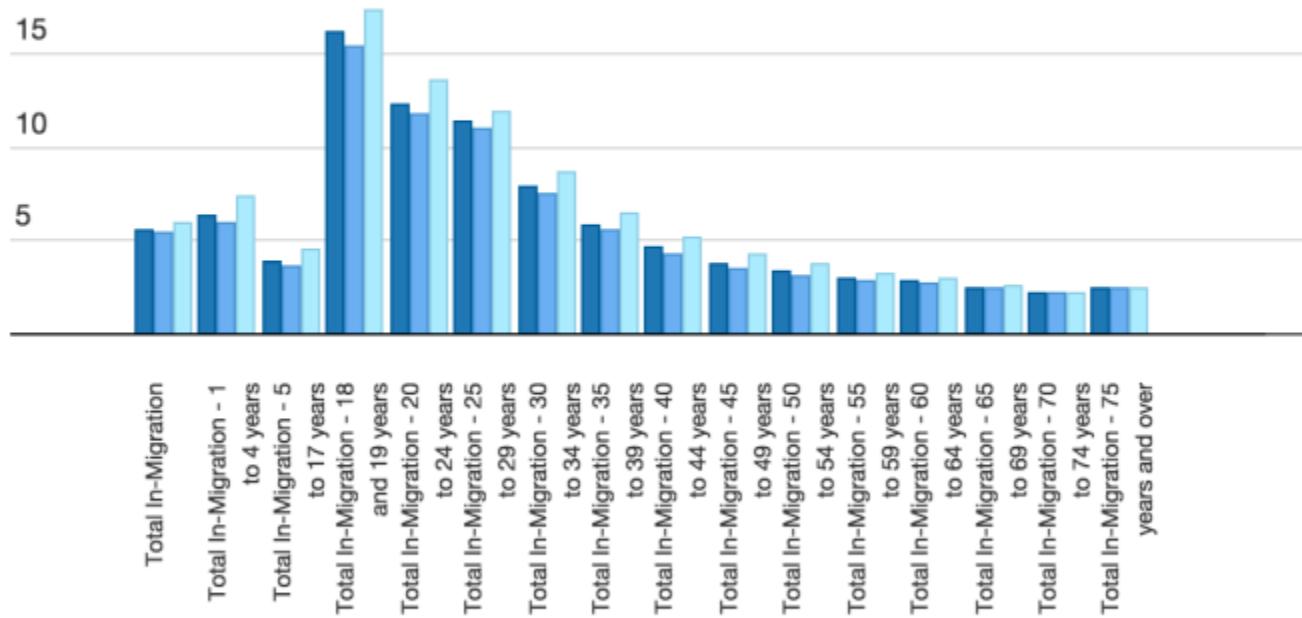
Figure 1: Statistics and biostatistics degrees at the bachelor's, master's, and doctoral levels in the United States.
Data source: NCES IPEDS.



Non-Urban Areas Receive Higher In-Migration

Annual In-Migration Rates, In-State and Interstate, 2013

■ United States ■ Urban Areas ■ Non-Urban Areas



Created with [Datawrapper](#)

Source: [U.S. Census Bureau, American Community Survey, 2013](#), [Get the data](#)

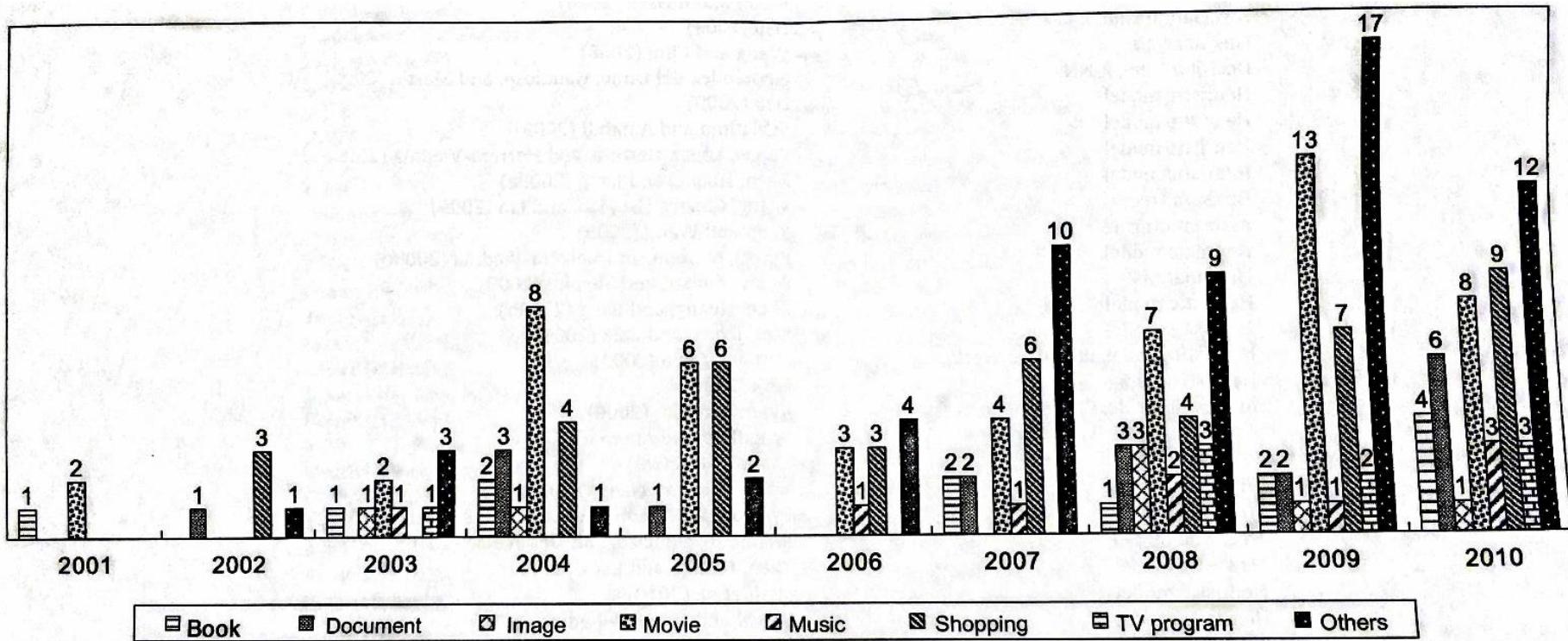


Fig. 6. Distribution of research papers by publication year and application fields.

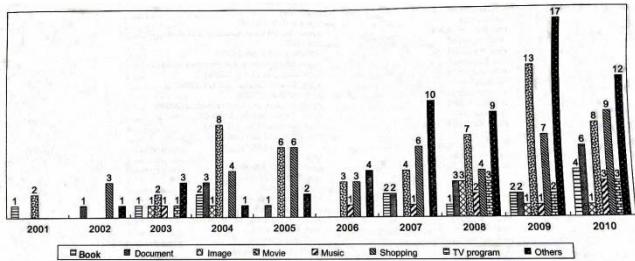
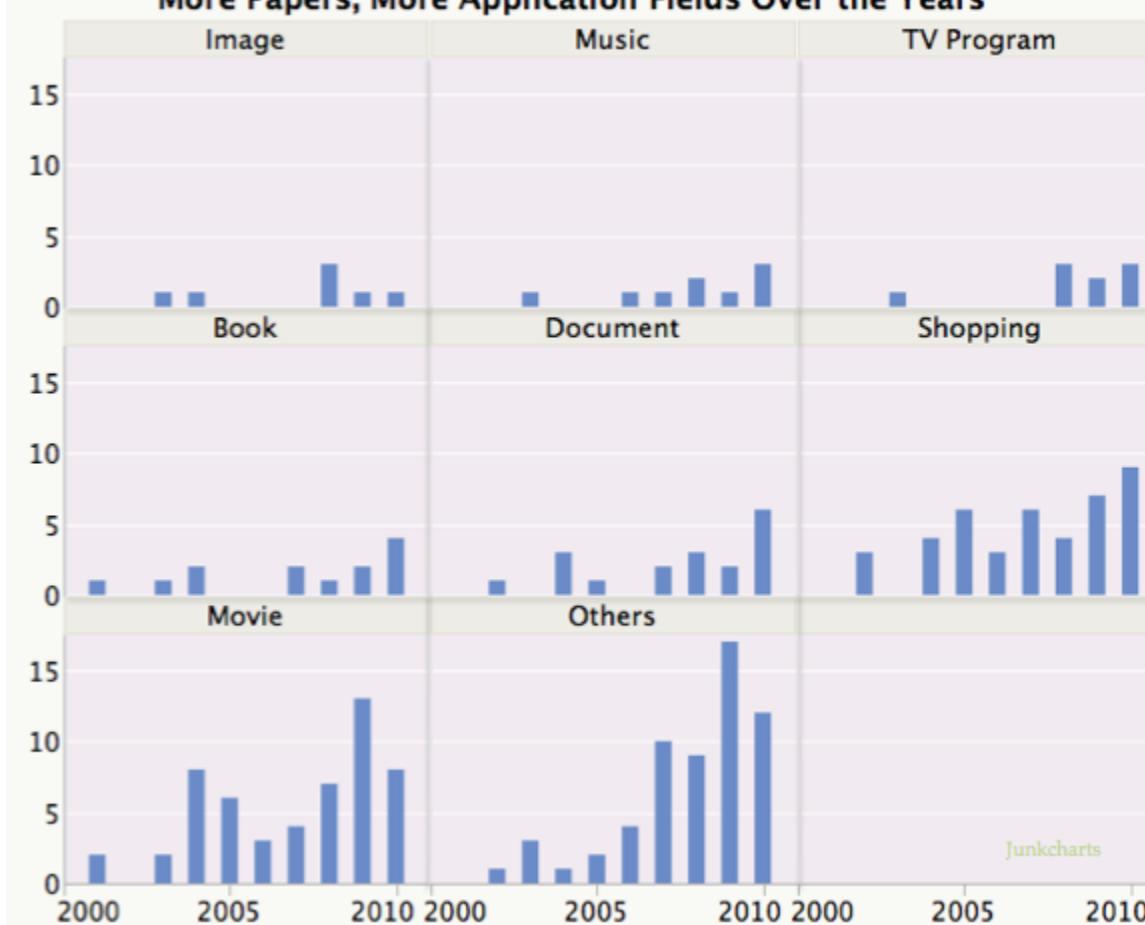


Fig. 6. Distribution of research papers by publication year and application fields.

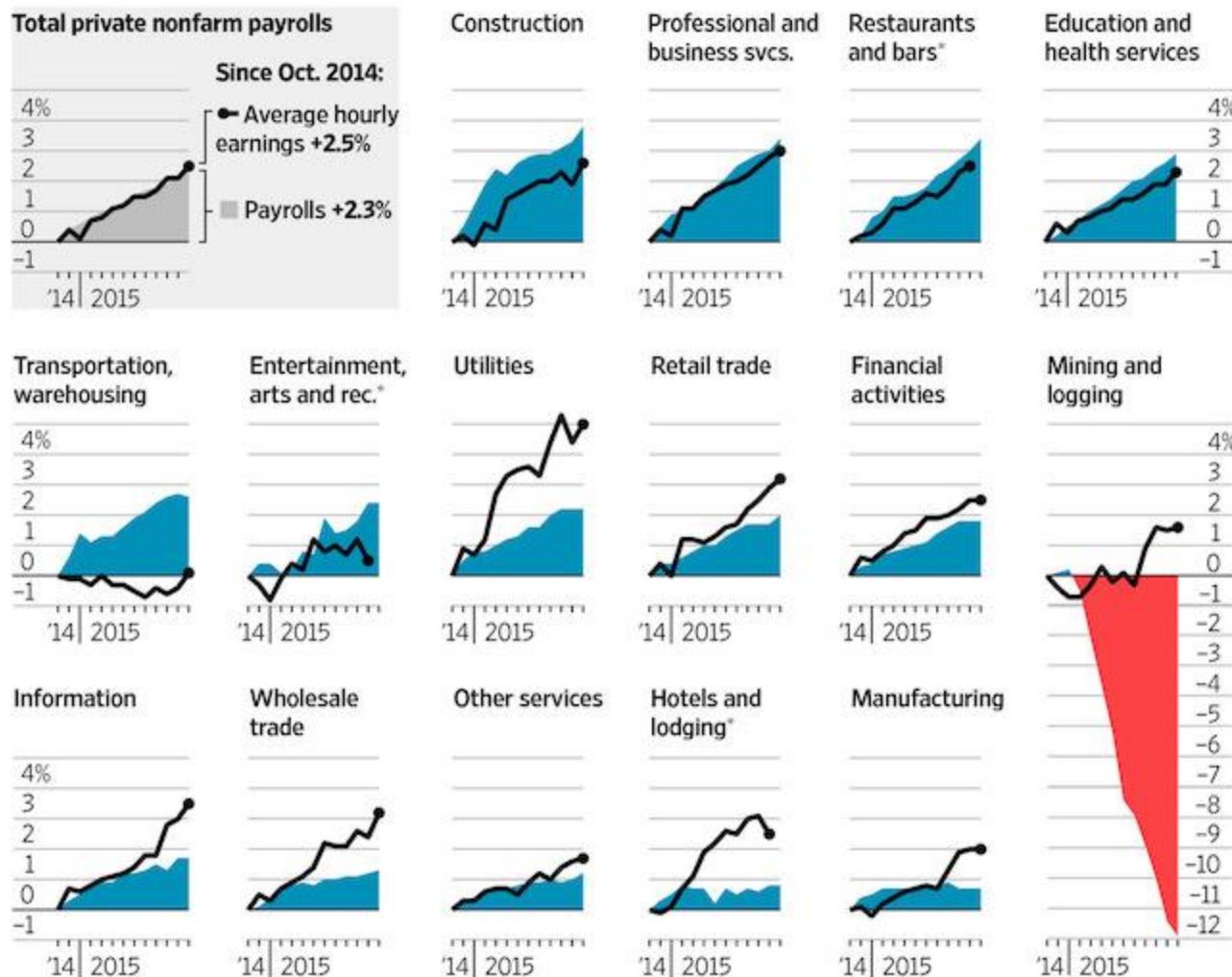
More Papers, More Application Fields Over the Years



Where the Labor Market Is Tightening

Domestically focused industries such as restaurants, retail and utilities have seen strong wage gains and steady hiring. Globally sensitive areas such as mining and manufacturing have struggled.

Change over the past year in payrolls (■) and average hourly earnings (—●), seasonally adjusted



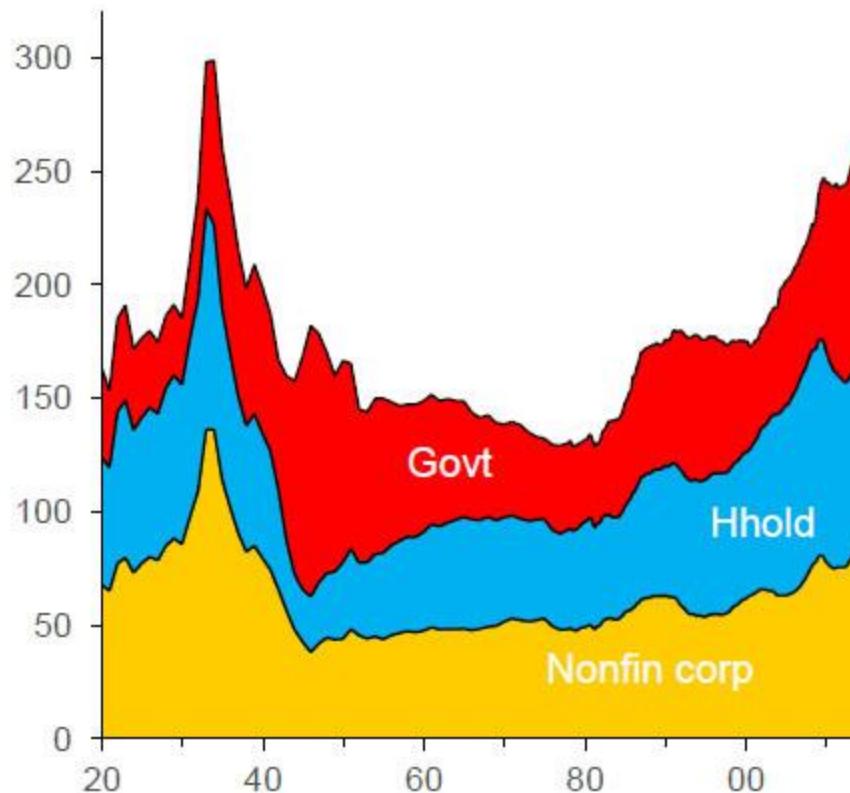
*Earnings figures are only available through September for these sectors.

Source: Labor Department

THE WALL STREET JOURNAL.

More debt = stronger wealth effects

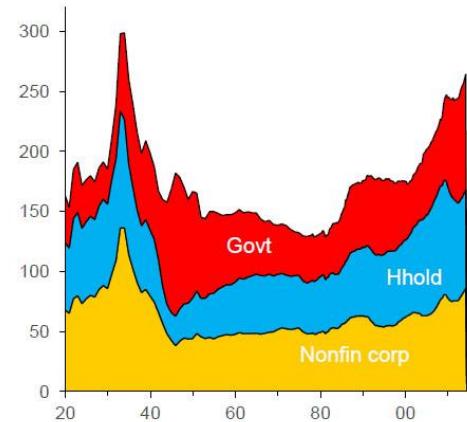
US debt across non-fin sectors, % GDP



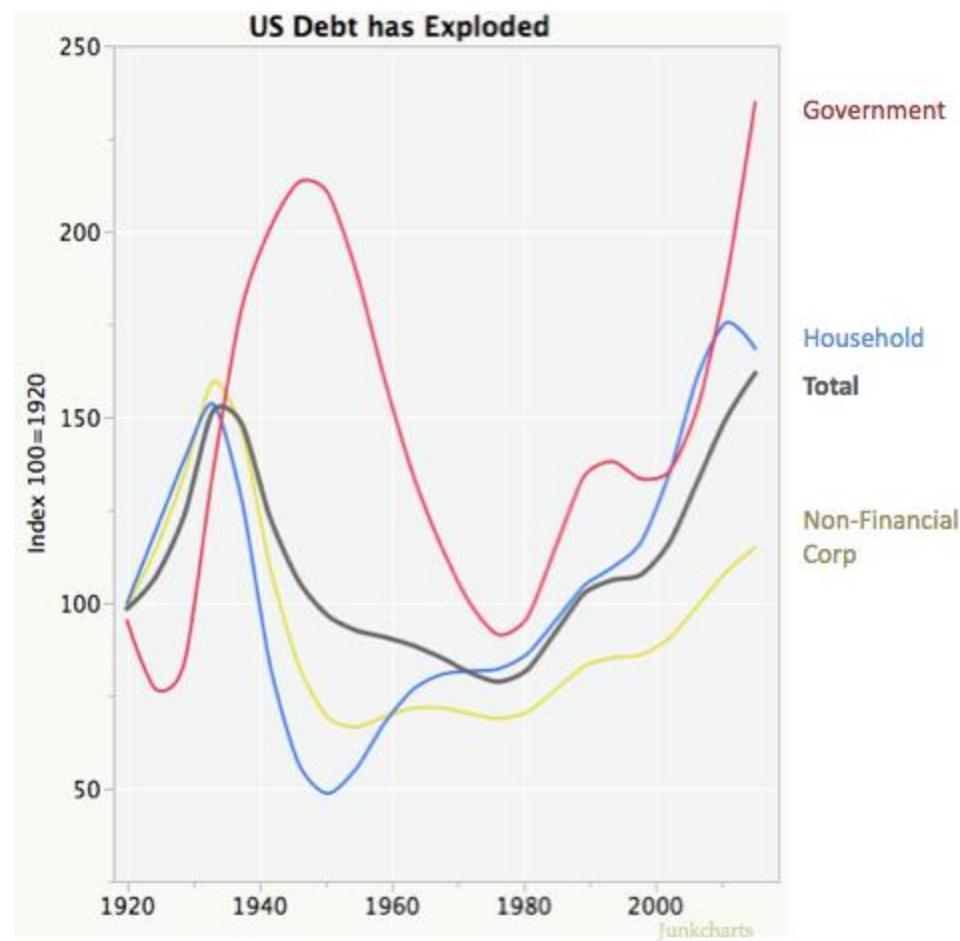
Source: Federal Reserve.

More debt = stronger wealth effects

US debt across non-fin sectors, % GDP

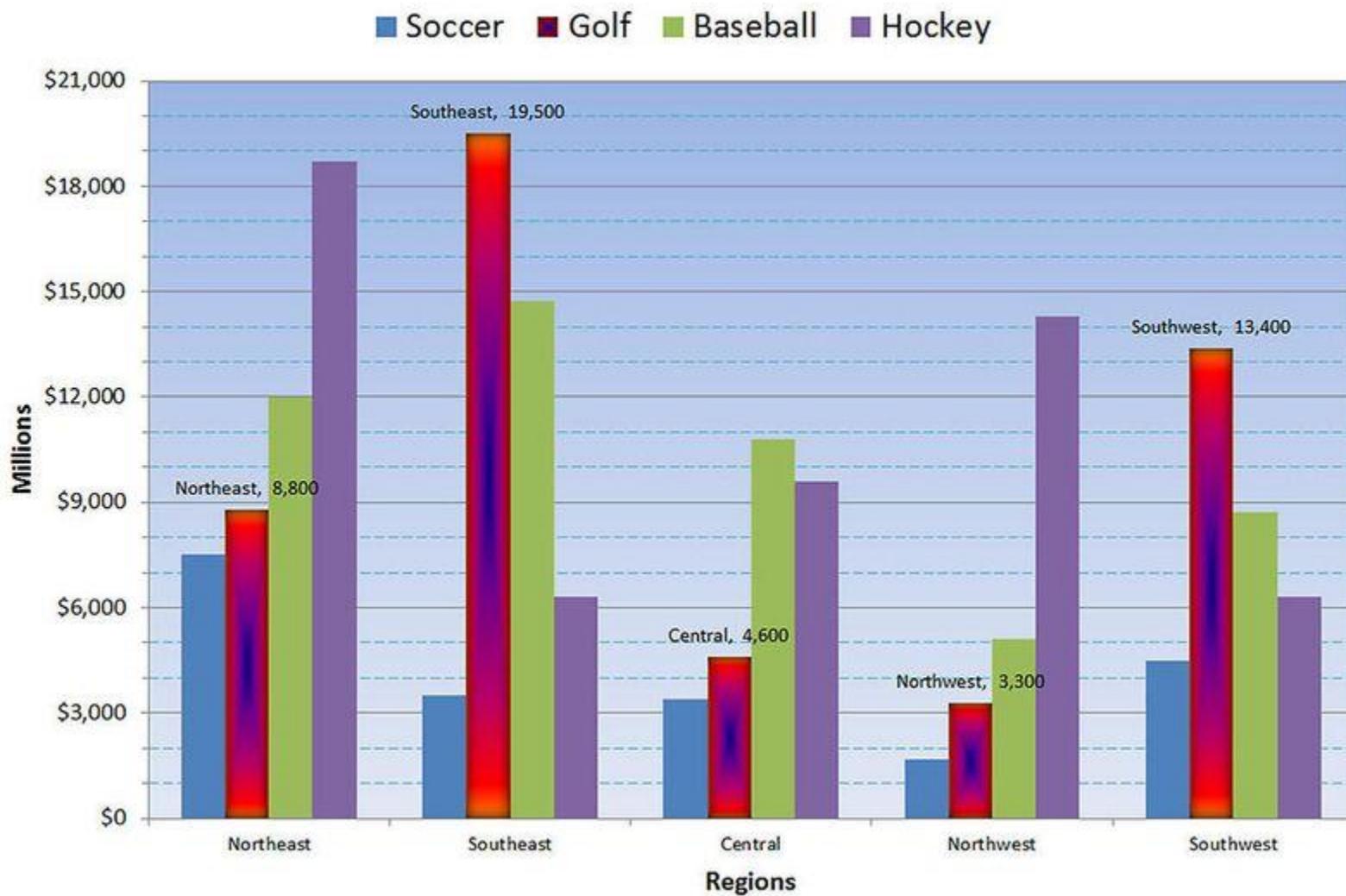


Source: Federal Reserve.



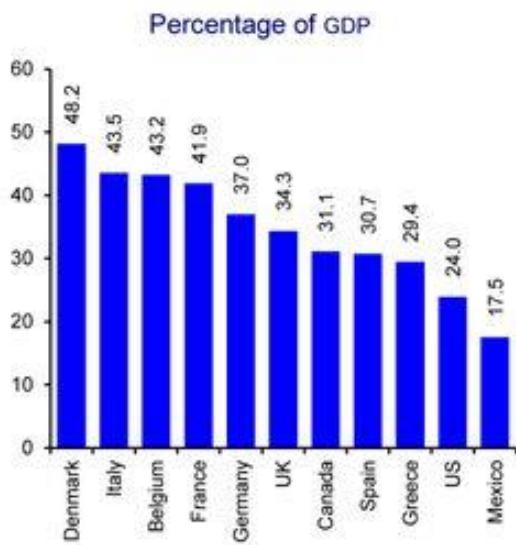
Junkcharts

Regional Sales by Products

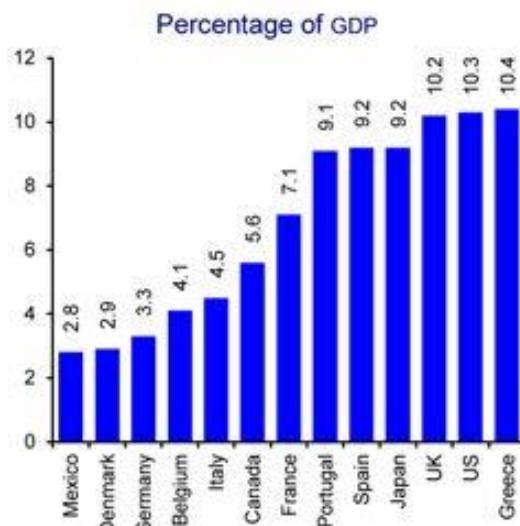


Graph 2
International comparison of public finance indicators of selected countries

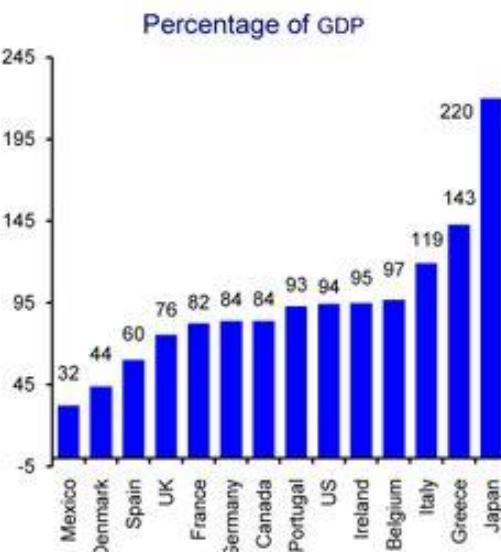
a) Tax revenue in 2009



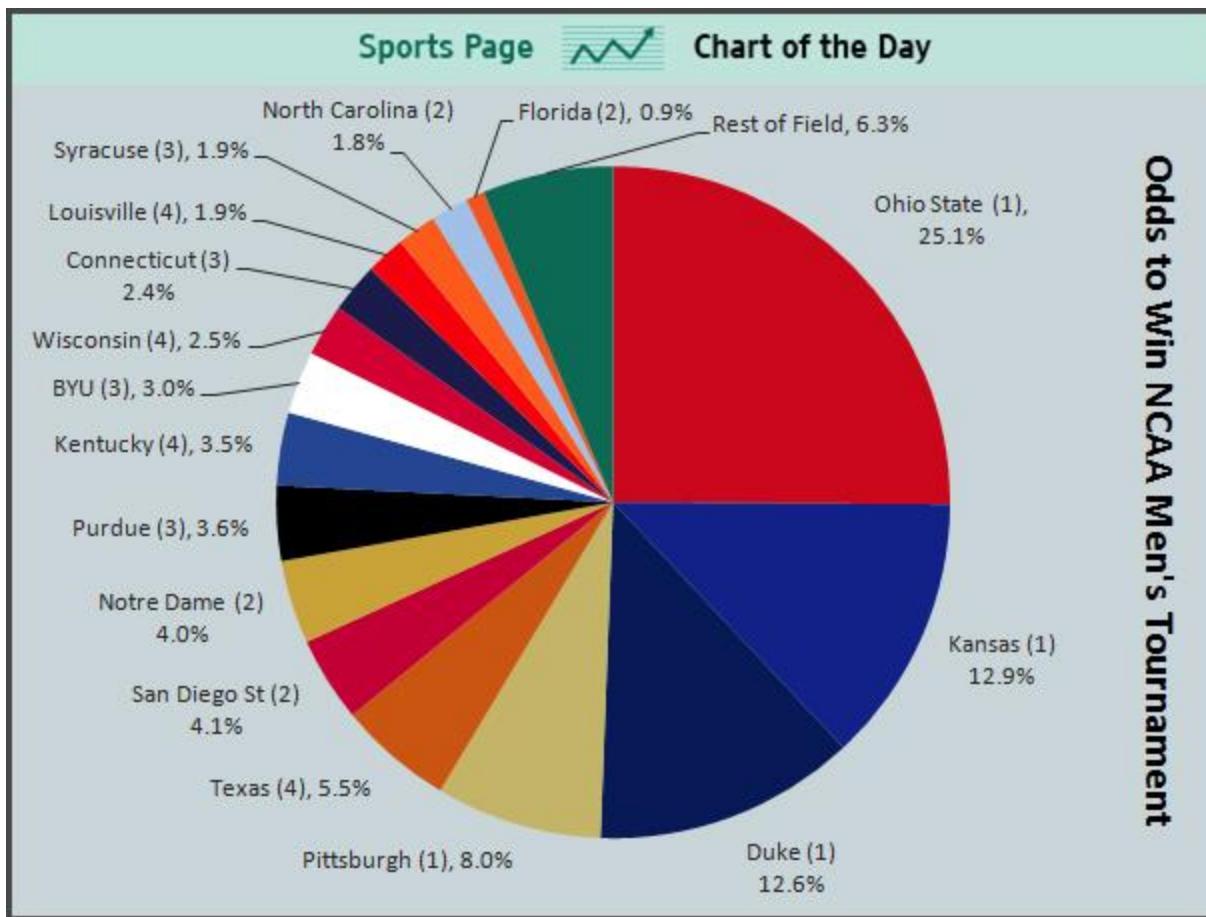
b) Public deficit in 2010



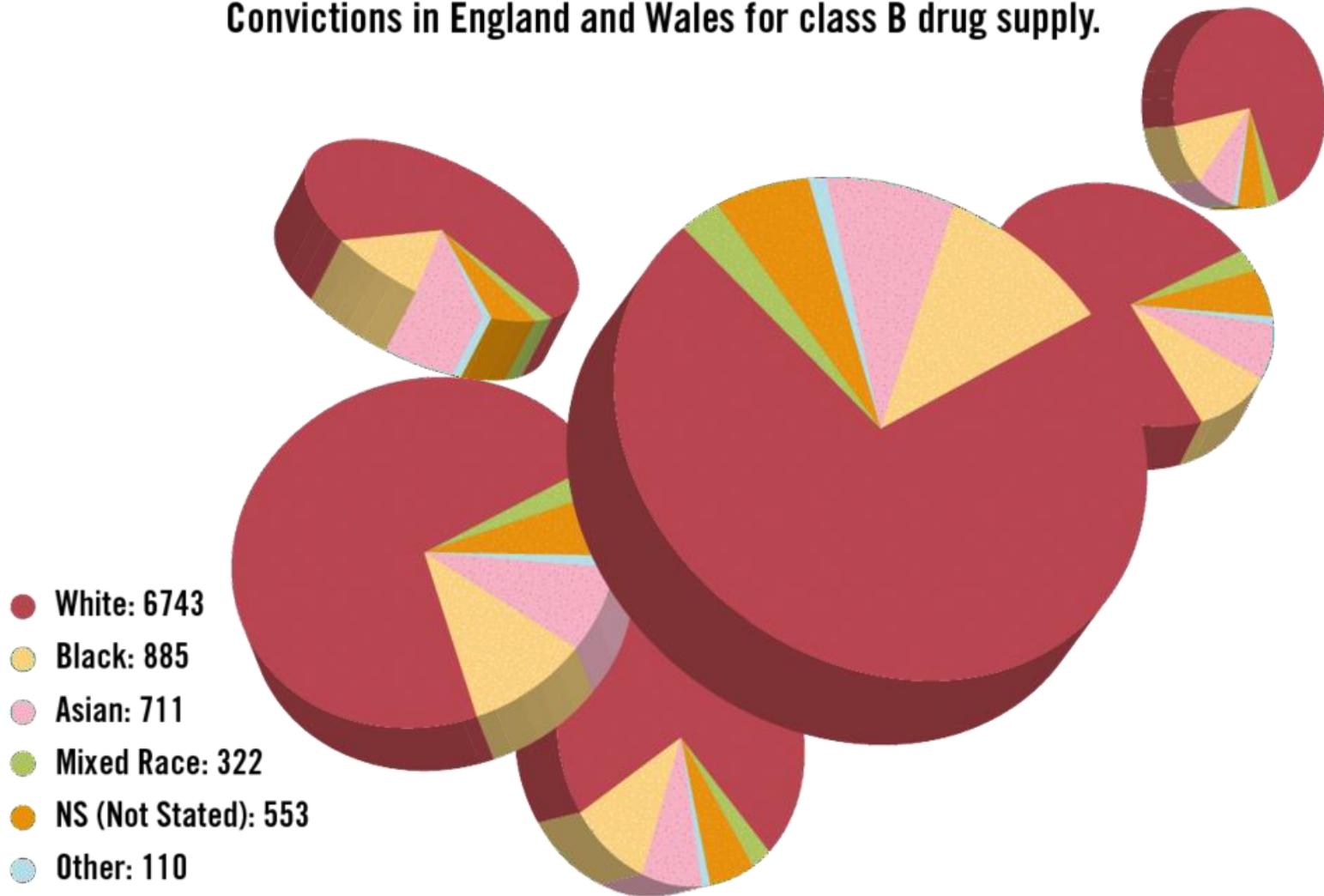
c) Public deficit in 2010



Odds to Win NCAA Men's Tournament



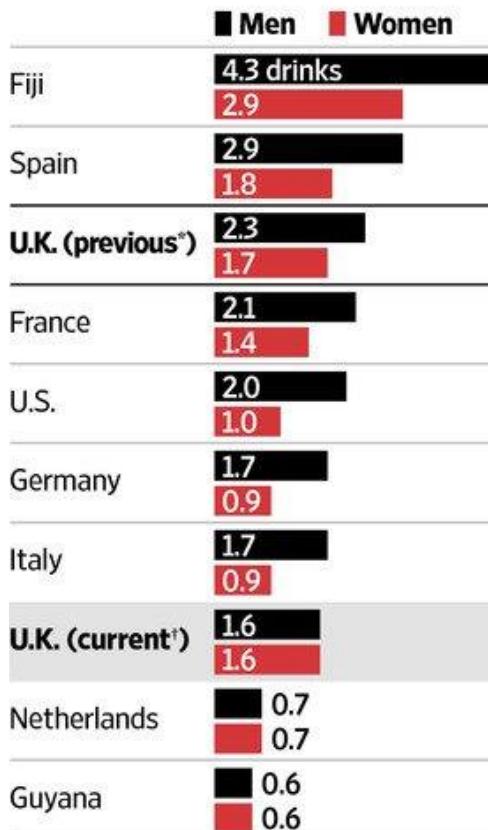
Convictions in England and Wales for class B drug supply.



Bottoms Up

Britain's new alcohol intake advice puts it among some of the world's strictest.

What other countries recommend as daily maximum alcohol consumption



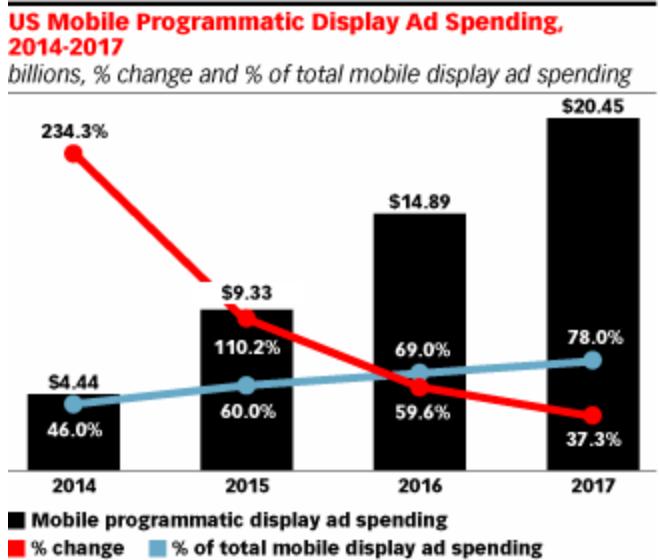
What Britain's new 14-units-per-week recommendation looks like:



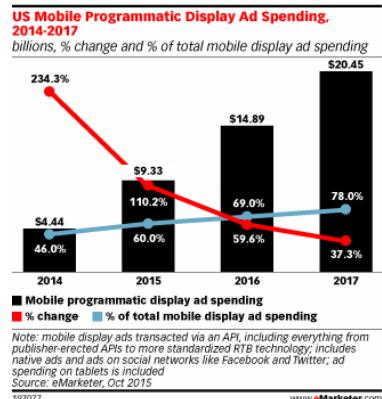
Note: 1 drink = 14 grams of alcohol, equivalent to a mixed drink with 1.5 oz. of 80-proof spirits

*Higher number of range †Weekly value divided by 5 to reflect recommended no-drink days

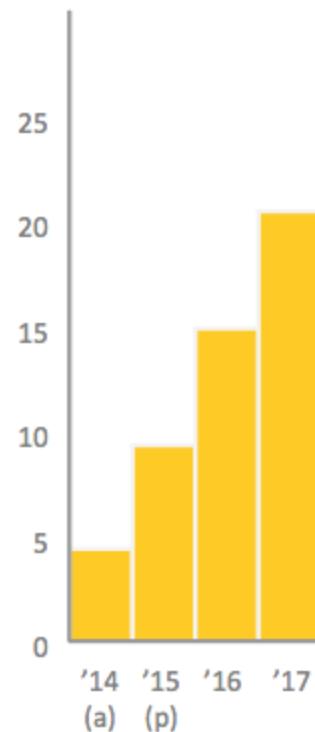
Source: International Alliance for Responsible Drinking THE WALL STREET JOURNAL.



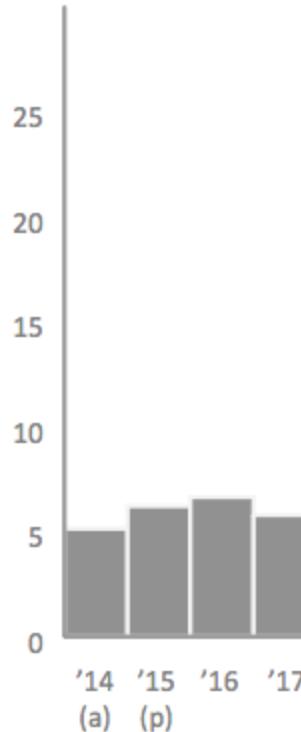
Note: mobile display ads transacted via an API, including everything from publisher-erected APIs to more standardized RTB technology; includes native ads and ads on social networks like Facebook and Twitter; ad spending on tablets is included
Source: eMarketer, Oct 2015



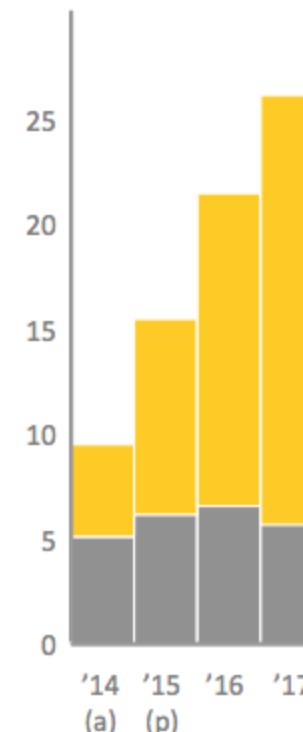
Programmatic Spend is projected to grow steadily



The rest of the market will peak in 2016 and then shrink



Total market growth is lower than the growth of programmatic spend because of substitution



What's keeping CFOs up at night?

Economic uncertainties in the U.S. are a major concern for finance chiefs.



Particularly frustrating for CFOs is the dysfunction in Congress over a bill to extend more than 50 popular tax provisions that expired at the end of 2014.



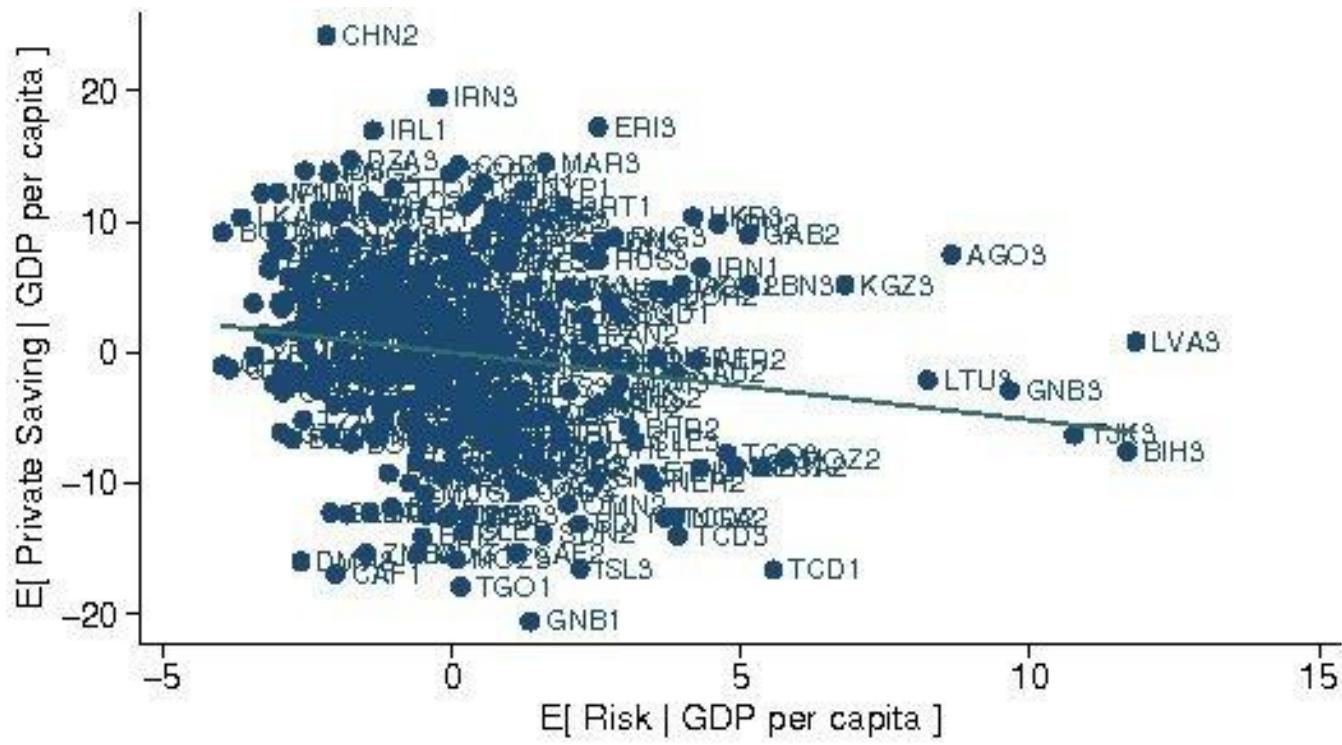
Source: Grant Thornton LLP CFO Survey, August 2015

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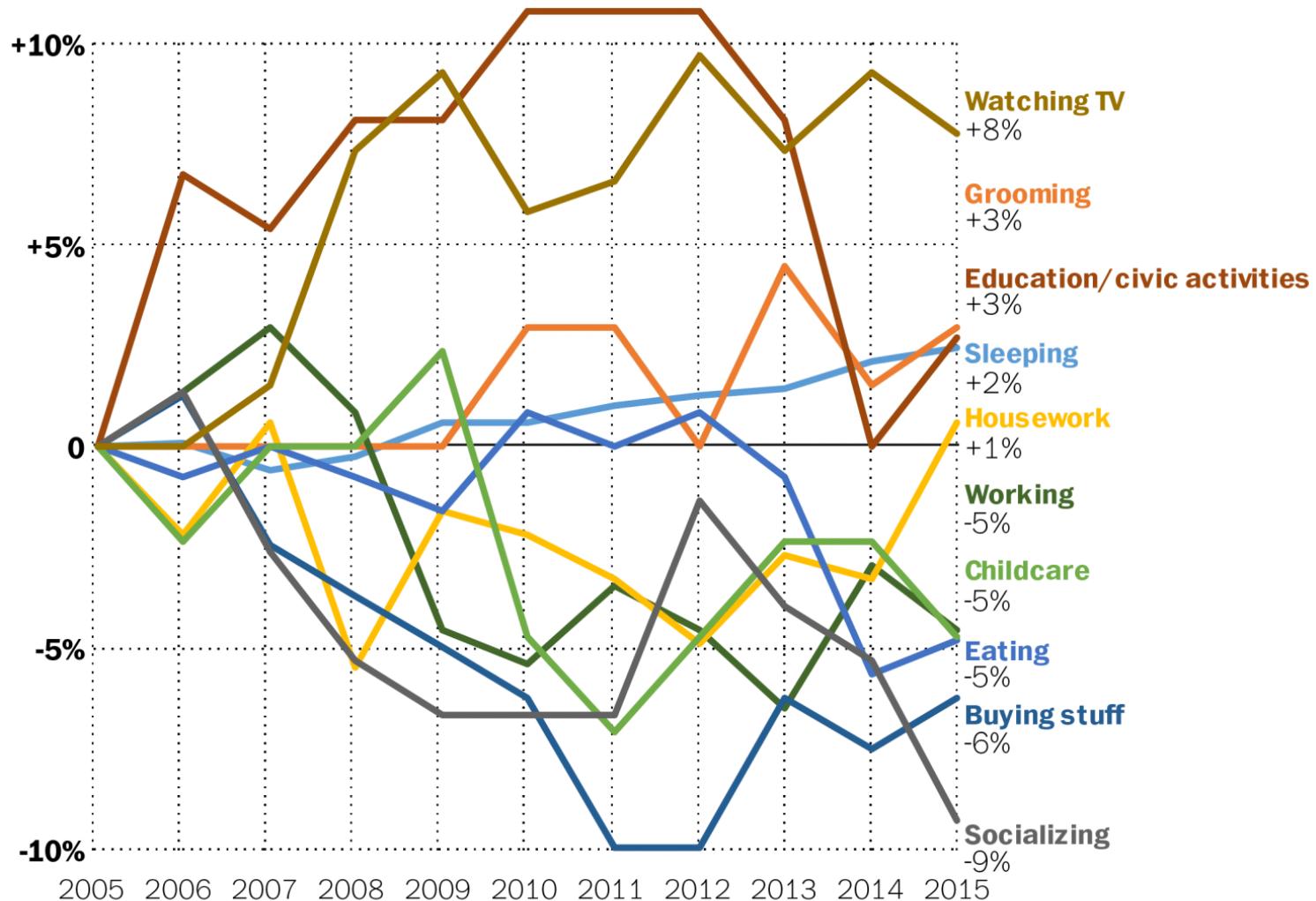


Grant Thornton
An instinct for growth™



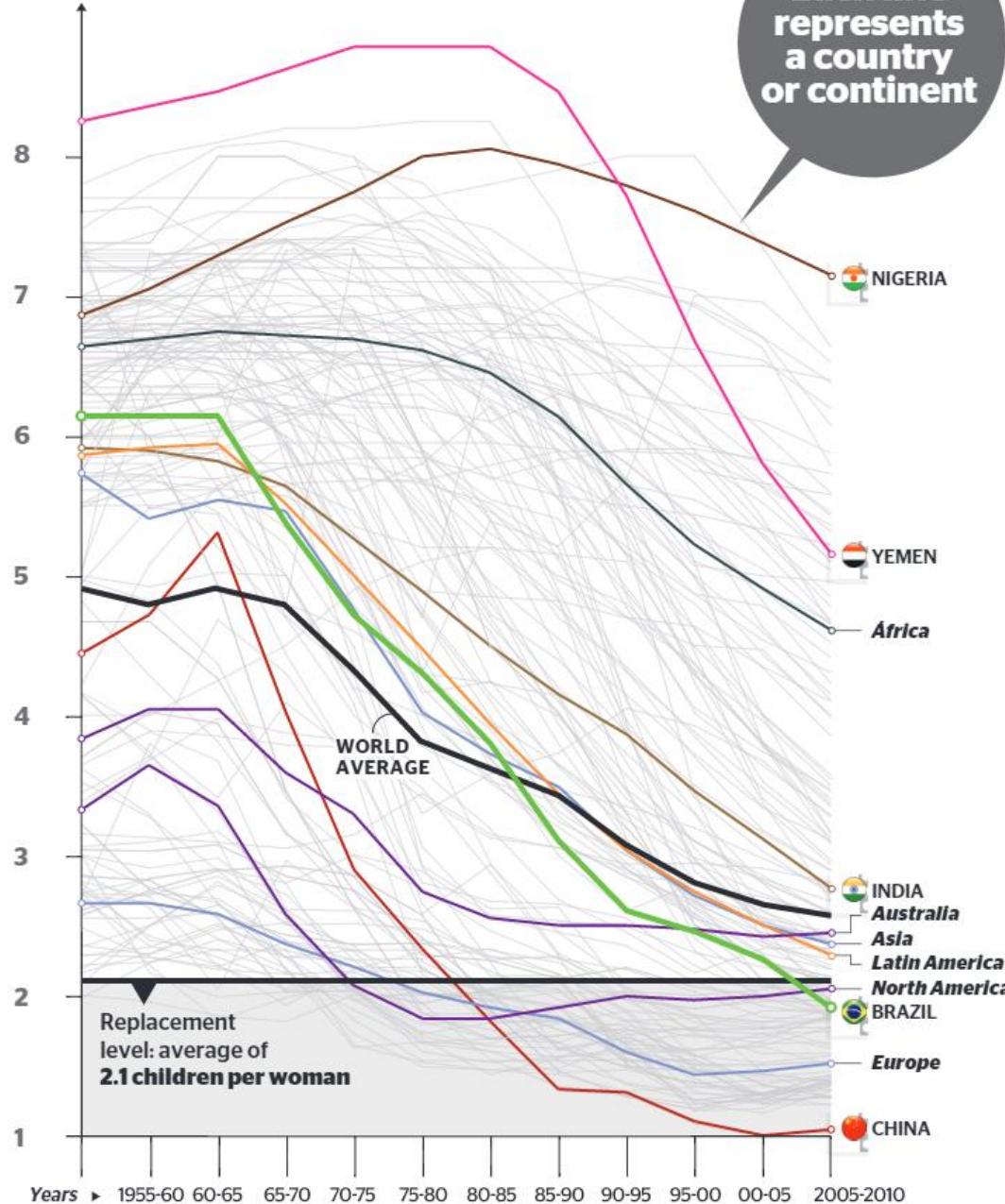
How the average American day has changed

% change in average time spent on each activity since 2005



*Number of children
per woman*

Each line
represents
a country
or continent





Notes and Attribution

- Prepared for the ICPI/CIT training, “Data Use Training” (DC), October 2016 (adapted from June 2016 version)
- Presentation material adopted from J. Schwabish (2014). “A Visualization Mapping: Form and Function” (<http://policyviz.com/a-visualization-mapping-form-and-function/>), S.Ortiz (2012). “45 Ways to Communicate Two Quantities, (<http://blog.visual.ly/45-ways-to-communicate-two-quantities>), A. Kirk (2013). Visualization WorkflowFinding Stories and Telling Stories (<http://www.slideshare.net/visualisingdata/andy-kirks-facebook-talk>) and Chafetz, Essam, Hughes, Johnson (2016). “Fundamentals of Data Analysis & Visualization Training” (<http://geocenter.github.io/StataTraining>)
- Image Sources
 - Youtube [Dashboard], Sears Auto Center
 - Unsplash, [Lake and Mountains], Justin Luebke
 - Extreme Presentation, “Chart Suggestions”
 - Icons downloaded from the Noun Project and designed by various artists: The Noun Project, [map], Ivan Colic; “Microscope”, lastspark, “Graph”, gira Park; “Influencer”, Adam Beasley; “Pickaxe”, Creative Stall, “Detergent”, Megan Mitchell, “Washing Machine”, National Parks Service, “Clipboard”, matthew hall, Phil Goodwin; [country shape], Anna Gajowiec, “Traffic Cone”, Vicons Design, “Structure”, Alexandr Cherkinsky, “simplify”, Chameleon Design, “Analytics, Syafiqah Fickle; “Pencil”, David; “Target, Franck Junker, “Mouse”, John Testa, “Wrench”, Bluetip Desig, “Power Drill” Maksim Karalevich

