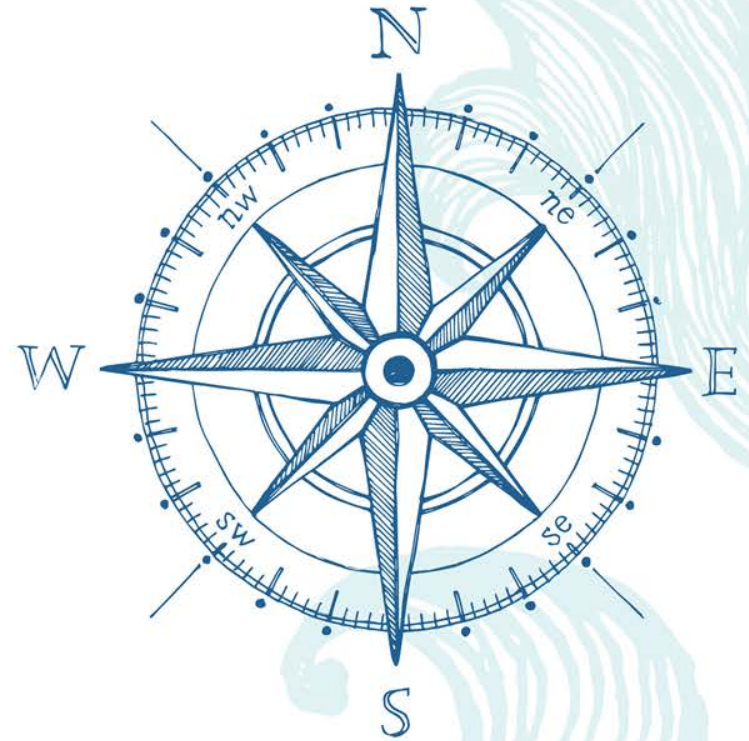
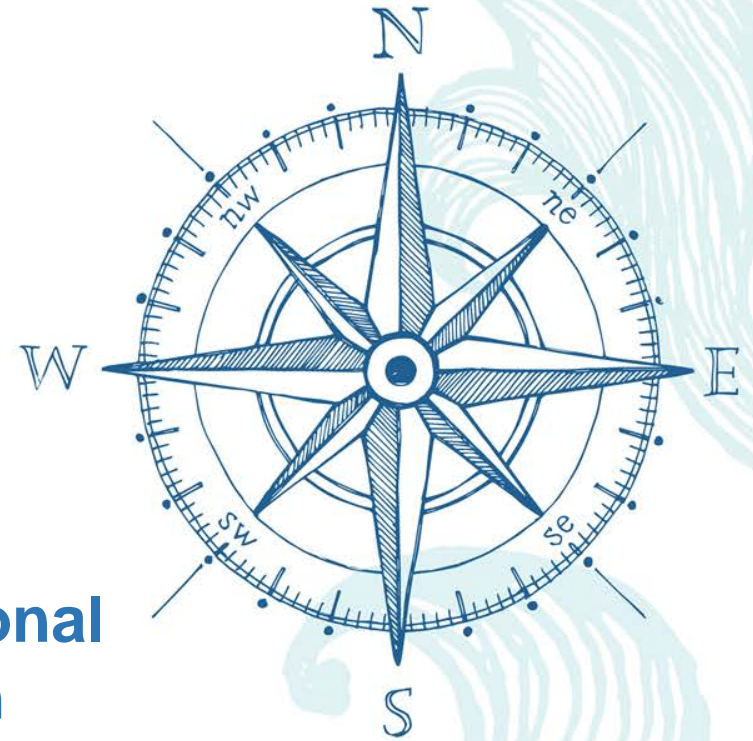


# BUILDING COLLABORATIVE COMMUNITIES

NAVIGATING CHALLENGES, CHARTING INNOVATIONS





# Data Democracy:

Amassing Data Sets into Functional Systems; CSU Facility Condition Assessments as a Case Study.

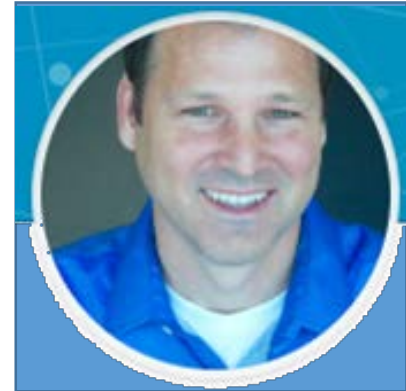
# Presenters



Brendan Aldrich  
Chief Data Officer  
CSU Office of the Chancellor



Tony Simpson  
Vice President  
ISES Corporation



Joe Verbrugge  
Facilities Program Manager  
CSU Office of the Chancellor





After attending this program, participants will be able to:

1. Share siloed data while maintaining clear ownership and necessary security.
2. Understand the difference between interesting versus useful data.
3. Use data to make deliberate and informed decisions, using deferred maintenance and renewal data as an example.
4. Explore means to use shared data to prioritize and maximize limited resources, using facility and utility infrastructure as examples.



# Data Democracy

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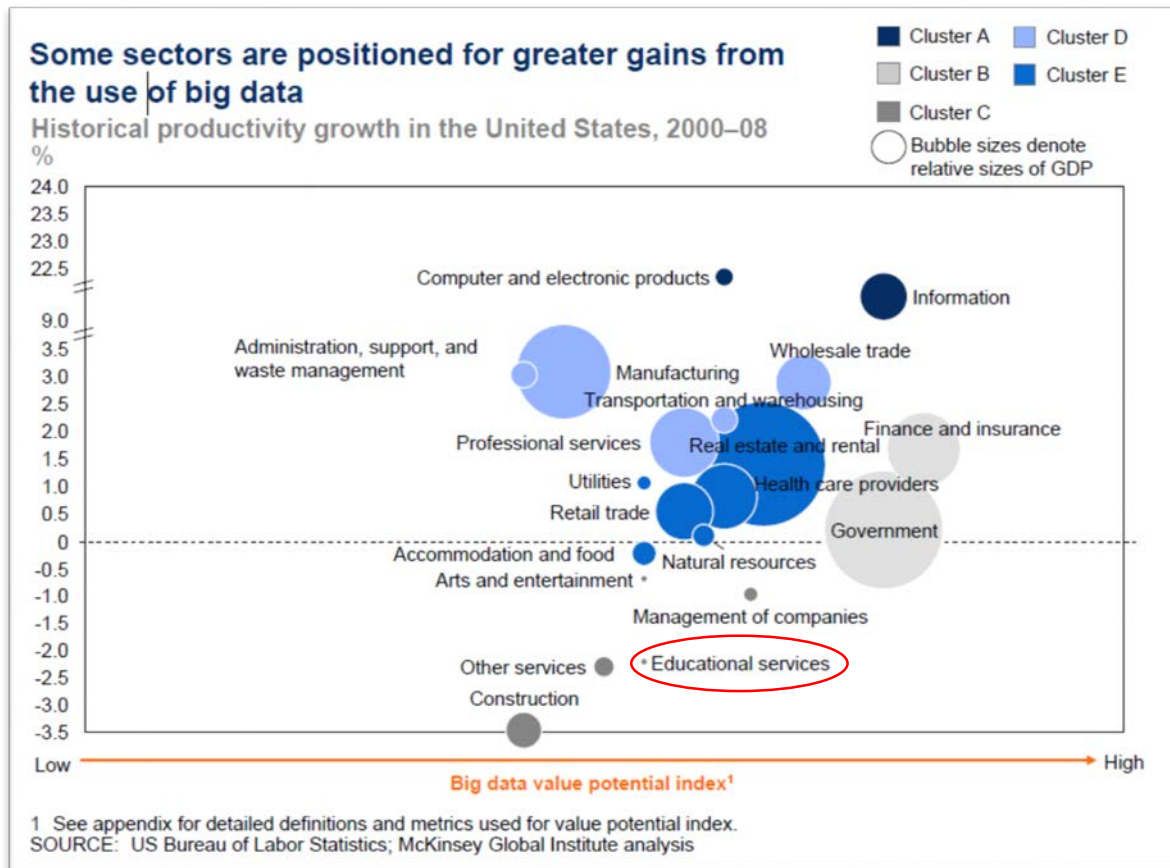
# Improving the Odds



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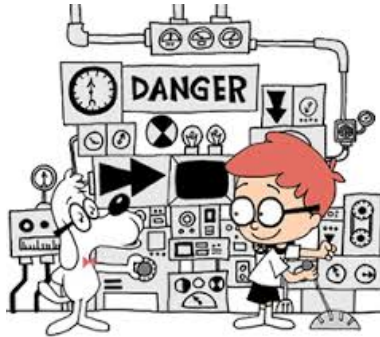
# Big Data: Systemic Barriers



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# The More Things Change...



- **1960's:** General Mills/Dartmouth College: Facts & Dimensions
- **1970's:** Technology Growth and Advancement
- **1980's:** Barry Devlin & Paul Murphy: Business Data Warehouse
- **1990's:** Ralph Kimball and Bill Inmon
- **1996 – 2010's:** Golden Age of Data Warehousing





# ...The More They Stay The Same



- Believe it or not, the vast majority of organizations are still managing their data using the same techniques they have for over 30 years.

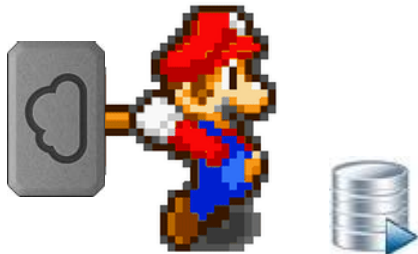


# Traditional DW and the Cloud

The traditional enterprise data warehouse copies the data it needs into a central location, transforms it into a common format, removes the noise, reconciles the inconsistencies, and creates a pristine, holistic, enterprise view that seamlessly combines information from disparate business units and third-party data brokers.

Then, just as it reached maturity, the enterprise data warehouse died, laid low by a combination of big data and the cloud.

- Ian Dudley, Enterprise Architect



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# Empowering a Data Democracy

*Intuitive  
Relevant  
Interactive*

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# CSU Facility Condition Assessments: A case study in using data

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# Collecting Objective Data

Proper management of an asset portfolio means knowing:

- What you have
- What condition it's in
- How much EUL (Existing Useful Life) is left
- How much it will cost to repair or replace

In order to better *manage* our DR backlog, we had to be able to *quantify* our DR backlog.





# Collecting Objective Data

- Establish standardized condition assessment methodology
- Use experienced architectural & engineering professionals
- Include building systems and components
- Estimate backlog and future renewal needs for each asset



# CSU Metrics

METRIC	SYSTEMWIDE	ACADEMIC	SELF-SUPPORT
Campuses	20	20	20
Facilities*	1,157	790	367
GSF	57 M	34 M	23 M
Deferred Renewal	\$3.7 B	\$3.1 B	\$0.66 B
Total 10-Yr. Needs	\$7.9 B	\$5.7 B	\$2.1 B
Average Age	1976	1972	1976
Average FCI	0.17	0.21	0.09
Average FCNI	0.36	0.39	0.29



# Outcomes

---

To date, CSU has collected data for nearly 70% of our 80 million GSF.

---

The field-verified information informs a strategy to leverage and prioritize limited campus funding to keep aging facilities in good repair.

---

Data is analyzed and guide priorities in campus funding for repairs, upgrades and replacements of building systems.

---





# Justifying Your Budget...

## ....is a Continual Process

- Loading **ADA deficiencies** data for (11) campuses.
  - Identify critical “Path of Travel”
- Approximately **\$700 million in critical infrastructure needs** was identified and reported to the Board of Trustees.
  - The deficiencies are being added to the FCA database as part of our comprehensive reporting and analysis.





# Deliberate and Informed Decisions

## Status Quo

- **List of projects to BOT/DOF**
  - Wish lists
  - Independent studies
  - Crisis reaction spending

## New Approach

- **Prioritization of Capital Renewal projects based on:**
  - Systemwide lifecycle data
- **Prioritization of Deferred Renewal projects based on:**
  - Health and Safety
  - Impact to programs
  - Cost escalation



# Scorecard of Renewal Needs

CATEGORY	NONRECURRING NEEDS (PROJECTS)			RECURRING NEEDS (COMPONENT REPLACEMENTS)												
	Immediate	Critical	Noncritical	Deferred Renewal	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	TOTAL	
ACCESSIBILITY	0	4,146,935	658,754	0	0	0	0	0	0	0	0	0	0	0	\$4,805,689	
EXTERIOR	0	74,319	295,015	3,546,171	377,412	162,440	3,785,658	1,199,349	281,447	90,588	188,954	7,997,816	438,741	288,082	\$18,725,997	
INTERIOR	0	0	0	3,356,045	465,415	859,468	299,442	682,798	960,036	305,519	3,504,293	98,618	918,385	383,637	\$11,833,657	
PLUMBING	0	0	0	2,790,100	829	4,421	603,186	34,043	27,216	27,463	116,535	73,058	42,993	864,272	\$4,584,114	
HVAC	0	0	9,649	3,930,068	24,749	609,449	204,068	233,035	182,862	6,969	80,924	435,619	328,119	789,862	\$6,835,372	
FIRE/LIFE SAFETY	4,706	70,307	3,204,704	320,662	0	445,467	0	380,307	0	0	0	13,602	64,578	674,799	\$5,179,137	
ELECTRICAL	0	0	230,247	1,861,156	112,289	0	272,676	546,702	16,900	57,188	293,142	686,219	543,088	35,024	\$4,654,634	
SITE	0	0	0	0	0	0	0	0	0	0	0	0	0	25,193	\$25,193	
VERTICAL TRANS	0	0	0	888,248	285,382	285,382	0	0	0	0	0	0	570,764	0	\$2,029,776	
HEALTH/EQUIP	0	0	62,639	0	0	0	0	0	0	0	21,012	0	0	0	\$83,651	
<b>SUBTOTALS</b>	<b>\$4,706</b>	<b>\$4,291,560</b>	<b>\$4,461,008</b>	<b>\$16,692,452</b>	<b>\$1,266,076</b>	<b>\$2,366,627</b>	<b>\$5,165,030</b>	<b>\$3,076,234</b>	<b>\$1,468,461</b>	<b>\$487,727</b>	<b>\$4,204,860</b>	<b>\$9,304,933</b>	<b>\$2,906,667</b>	<b>\$3,060,869</b>	<b>\$58,757,208</b>	
<b>TOTAL NONRECURRING NEEDS</b>				<b>\$8,757,274</b>	<b>TOTAL RECURRING NEEDS</b>											<b>\$49,999,934</b>

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# Actionable, Project Driven Strategy

California State University					
COMPONENT DESCRIPTION	2015	2016	2017	2018	Grand Total
⊕ ROOF - FLUID APPLIED (HYPALON, NEOPRENE)	\$1,415,378				\$1,415,378
⊕ ROOF - 1-PLY, UNBALLASTED	\$36,658				\$355,787
⊕ ROOF - BITUMINOUS, 2-PLY, SBS MODIFIED BITUMEN, MOP	\$1,388,924	\$1,093,931	\$371,085	\$362,913	\$4,878,290
⊕ ROOF - BITUMINOUS, 2-PLY	\$251,521	\$531,513	\$1,242,560	\$373,798	\$3,318,262
⊕ ROOF - BITUMINOUS, 4-PLY, COAL TAR PITCH	\$691,857	\$401,892	\$71,948	\$428,028	\$2,682,260
⊕ ROOF - TILE, CLAY, MISSION PAN AND CAP OR BARREL	\$369,109	\$418,296	\$61,243		\$848,647
⊕ ROOF GUTTER AND LEADER - COPPER, LEAD-COATED				\$205,172	\$205,172
⊕ ROOF - APPLIED FINISH OVER CONCRETE STRUCTURE		\$26,331		\$25,210	\$51,540
<b>Grand Total</b>	<b>\$19,583,407</b>	<b>\$13,021,417</b>	<b>\$21,702,744</b>	<b>\$26,530,804</b>	<b>\$155,785,725</b>

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# Actionable, Project Driven Strategy

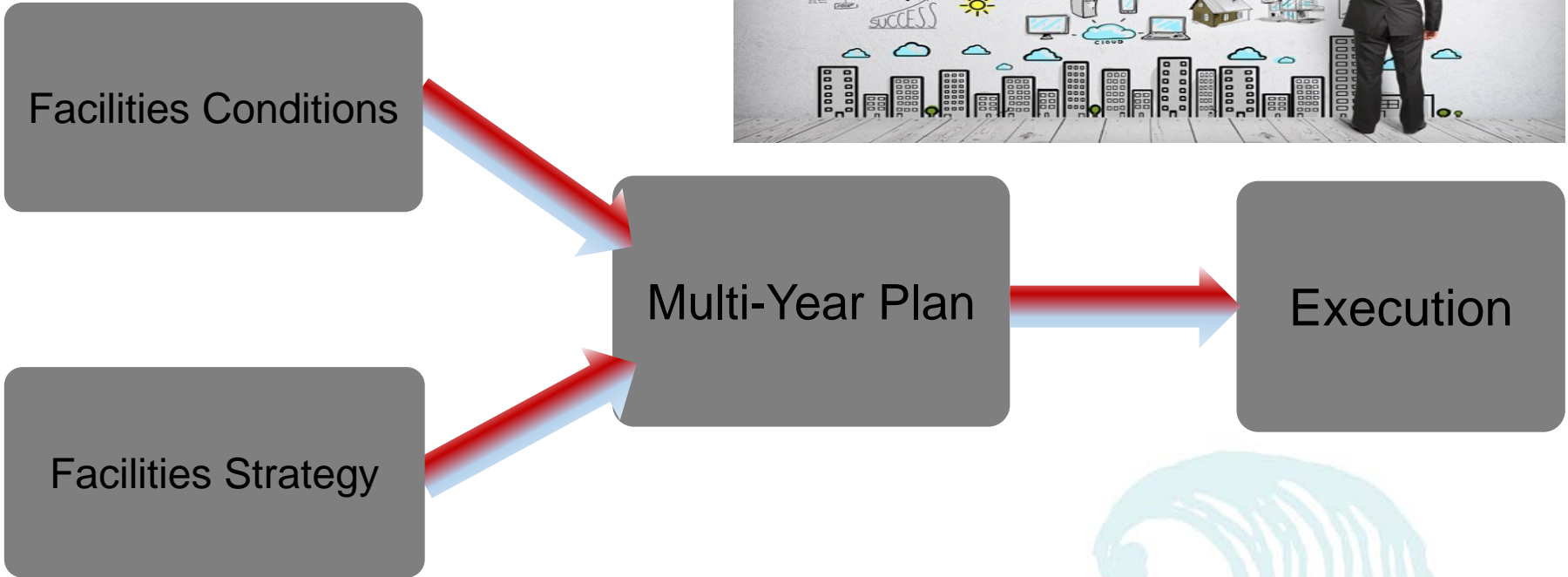
California State University				2015	2016	2017	2018	Grand Total
COMPONENT DESCRIPTION	CAMPUS	BLD NAME						
ROOF - BITUMINOUS, 2-PLY, SBS	California State University, Northridge	SAGEBRUSH HALL		\$73,627				\$73,627
		JACARANDA HALL			\$1,121,487			\$1,121,487
	California State University, Dominguez Hills	SCHOOL OF EDUCATION				\$200,063		\$200,063
		STUDENT HEALTH CENTER				\$171,022		\$171,022
		NATURAL SCIENCES AND MATHEMATICS					\$172,336	\$172,336
	California State University, Fresno	CONLEY ART		\$281,500				\$281,500
		UNIVERSITY CENTER		\$169,490				\$169,490
		MUSIC II			\$275,477			\$275,477
	Cal State Fullerton	SPORTS COMPLEX MAINTENANCE					\$2,477	\$2,477
		STADIUM CONCESSIONS					\$44,140	\$44,140
	Humboldt State University	HARRY GRIFFITH HALL				\$111,030		\$111,030
		SIEMENS HALL		\$141,644				\$141,644
		FACILITIES MANAGEMENT			\$209,772			\$209,772
		SWETMAN CHILD DEVELOPMENT LAB			\$23,911			\$23,911
	San Francisco State	RESIDENCE DINING CENTER			\$254,648			\$254,648
CENTRAL PLANT						\$121,938	\$121,938	
BURK EDUCATION BUILDING				\$271,858			\$271,858	
ADMINISTRATION			\$81,115				\$81,115	

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# Renewal Program

*Focusing on Conditions and Strategy*



# Energy & Sustainability Benefits

**Facility conditions & energy use are intimately related.**

- Inform the CPUC about more appropriate Public Sector EULs.
- Reduces expense of complete investment grade assessments.





# Energy & Sustainability Benefits

## Legislative bills to expend EPIC funds on lower carbon replacements of boilers

- Submitted testimony to support utility incentives for non-fossil heating energy.
- Circulating a framework to think about boilers through the lens of GHG emissions.
- Shape future EPIC grant funding for non-fossil heating technologies.







# Energy & Sustainability Benefits

## CEC rulemaking package for air compressor specifications

- Data provided included number of compressors past or approaching EUK and replacement costs.
- Provided incremental costs to replace the air compressors to CSU.

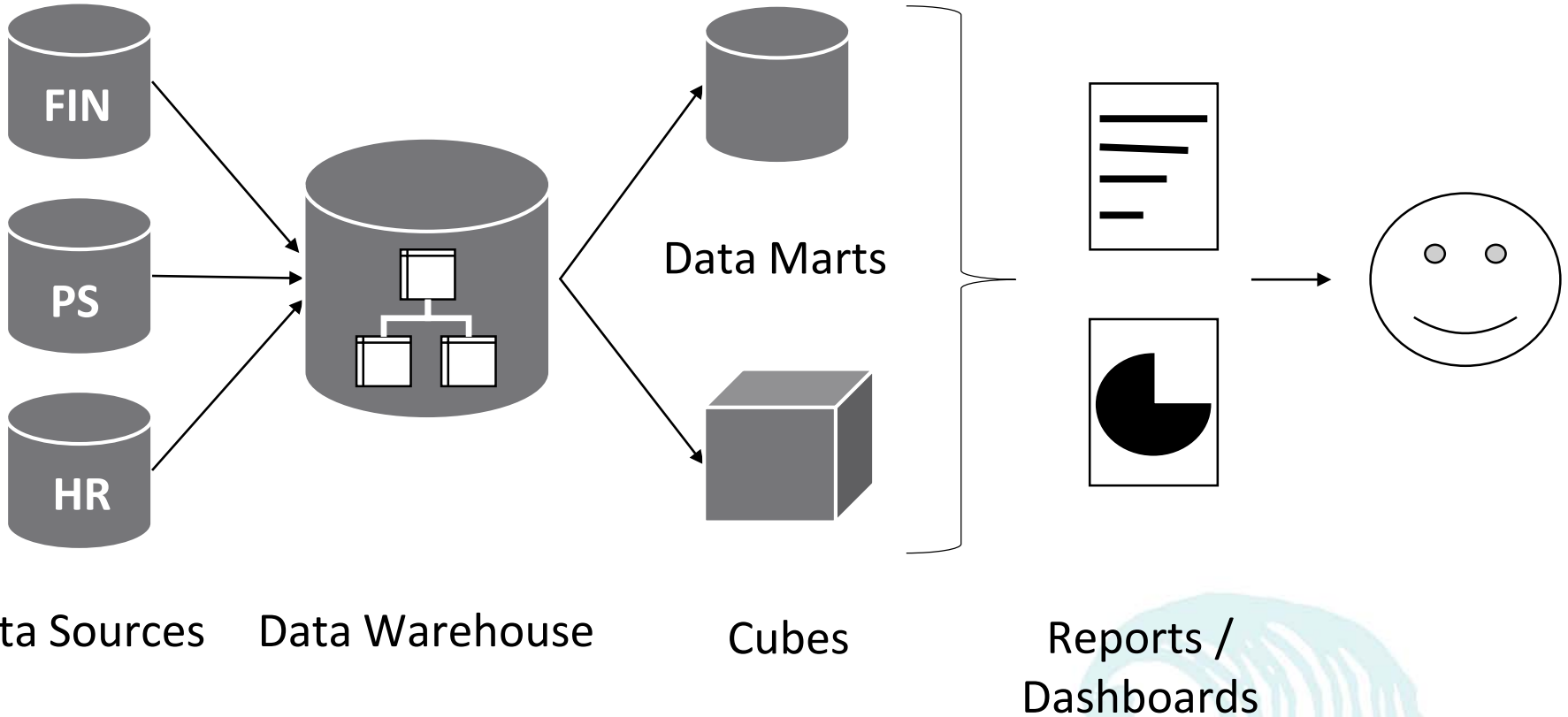


# The Data Lake Project

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# Traditional Data Warehousing





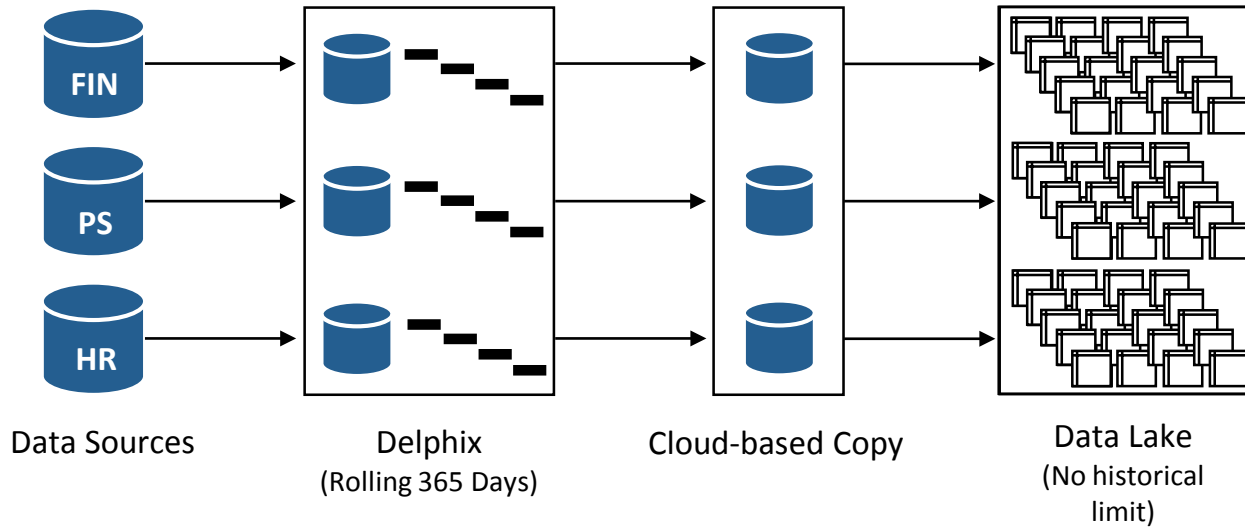
# So What Do We Do?

We will leverage  
new cloud and big data technologies  
to establish an entirely  
new and modern data architecture  
that solves the problems  
with traditional data warehousing



# The Data Lake...

**PeopleSoft Student**  
23,000 tables  
400 student tables  
1,000's of attributes

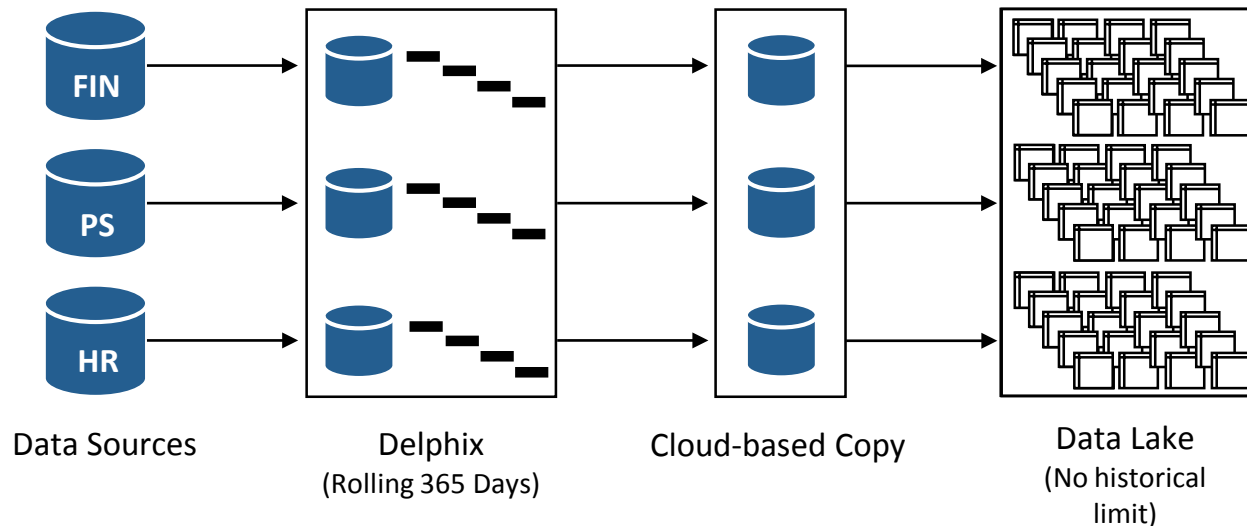


- The CSU Data Lake creates a historically stable daily copy of all tables utilized for analytics with the ability to add 365-days worth of history for any tables not already included.



# The Data Lake...

**PeopleSoft Student**  
23,000 tables  
400 student tables  
1,000's of attributes



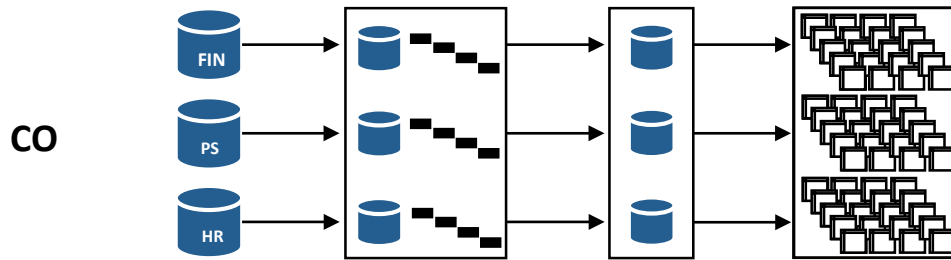
**Expected  
Completion:  
Oct/Nov  
2018**

- **Better than a traditional Data Warehouse:**

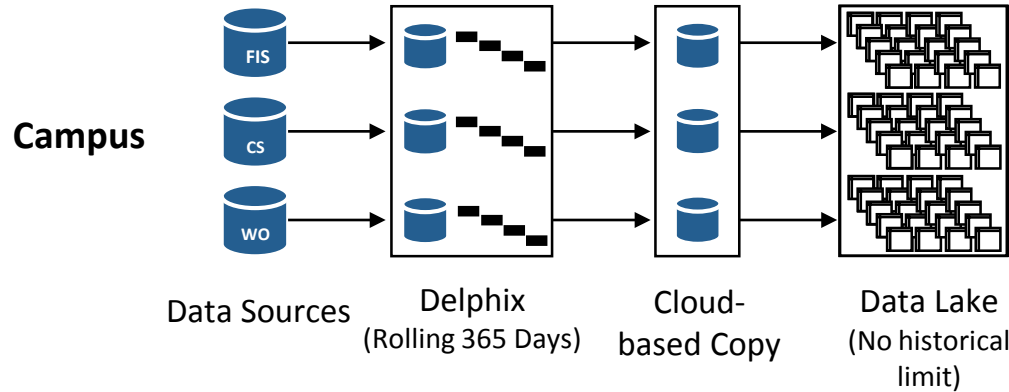
- We now create historical stability in systems that don't natively do this.
- Collecting all data means we can now answer questions that haven't yet been asked
- Data is quickly added to Data Lake and adding a year's worth of tables is done in hours



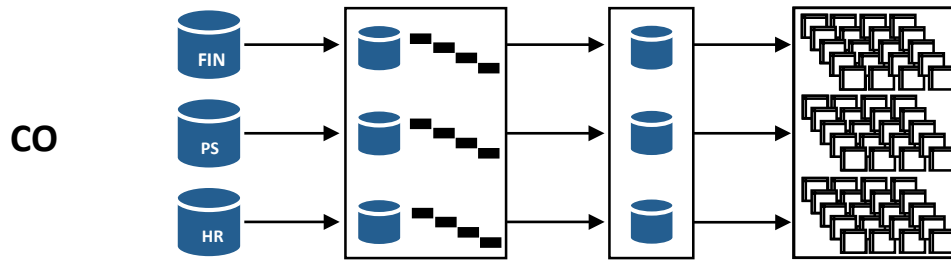
# Extending the Data Lake



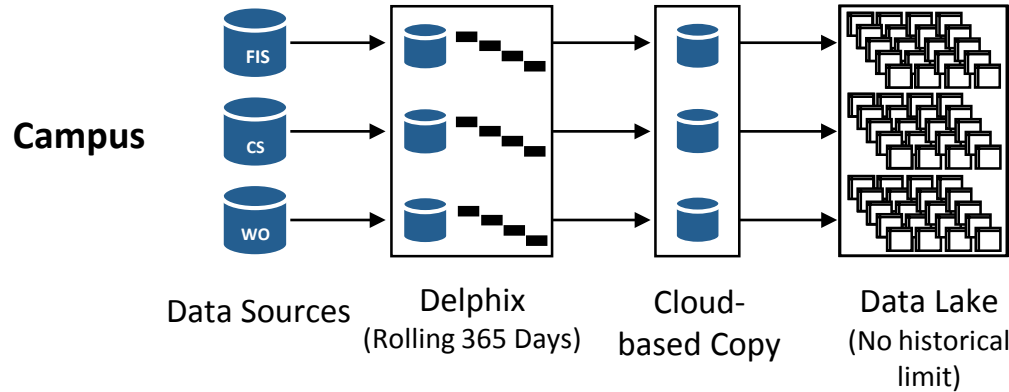
- We will coordinate with campus teams starting around Feb 2019 for training on how to build a campus data lake using this process.



# Extending the Data Lake



- We will coordinate with campus teams starting around Feb 2019 for training on how to build a campus data lake using this process.

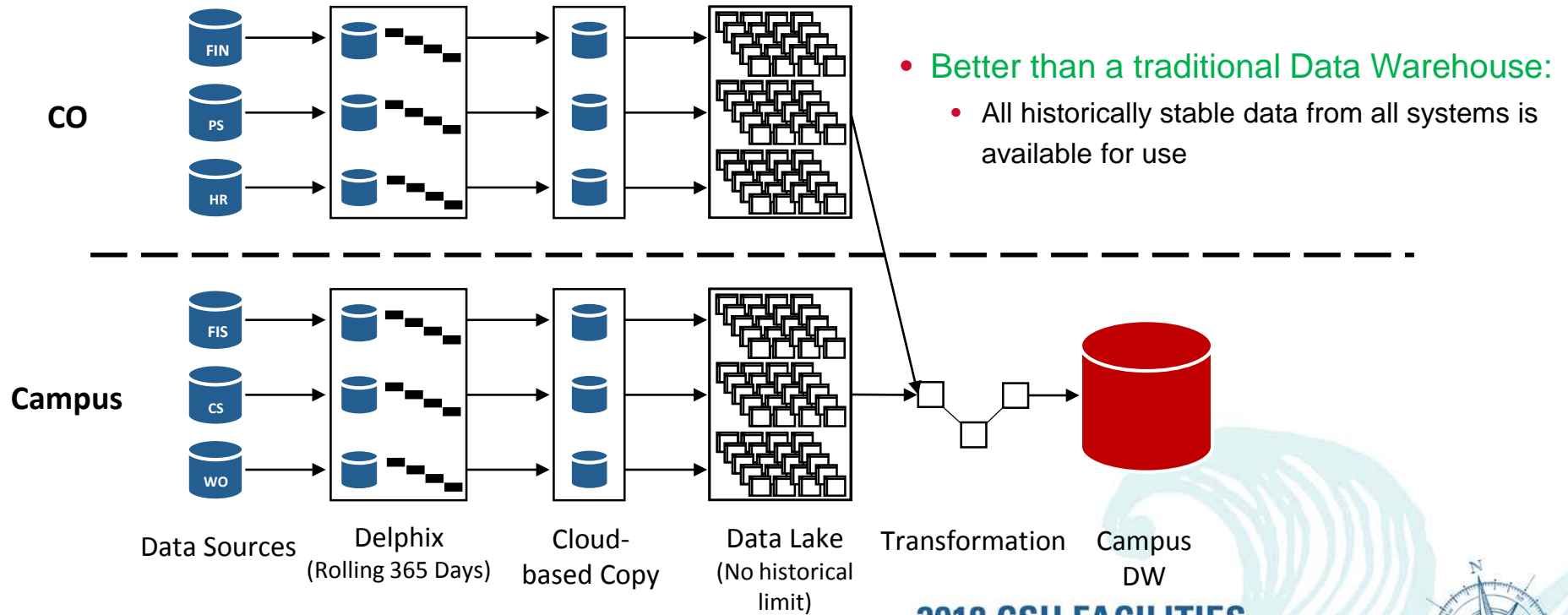


- **Better than a traditional Data Warehouse:**
  - All historically stable data from all systems is available for use

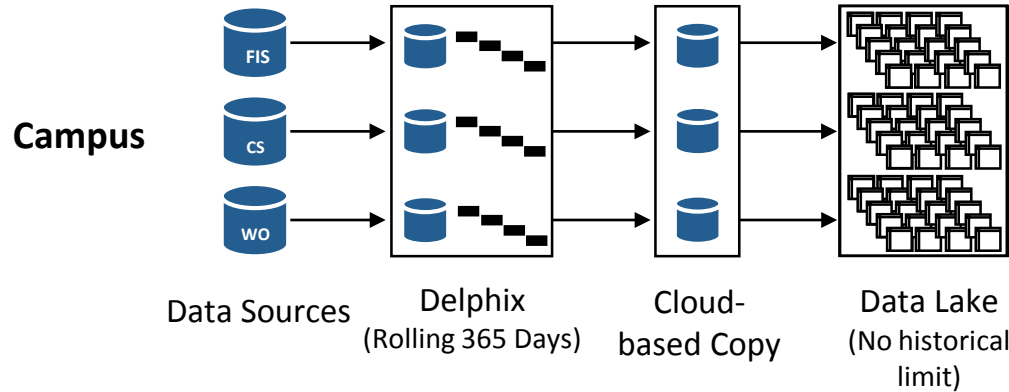
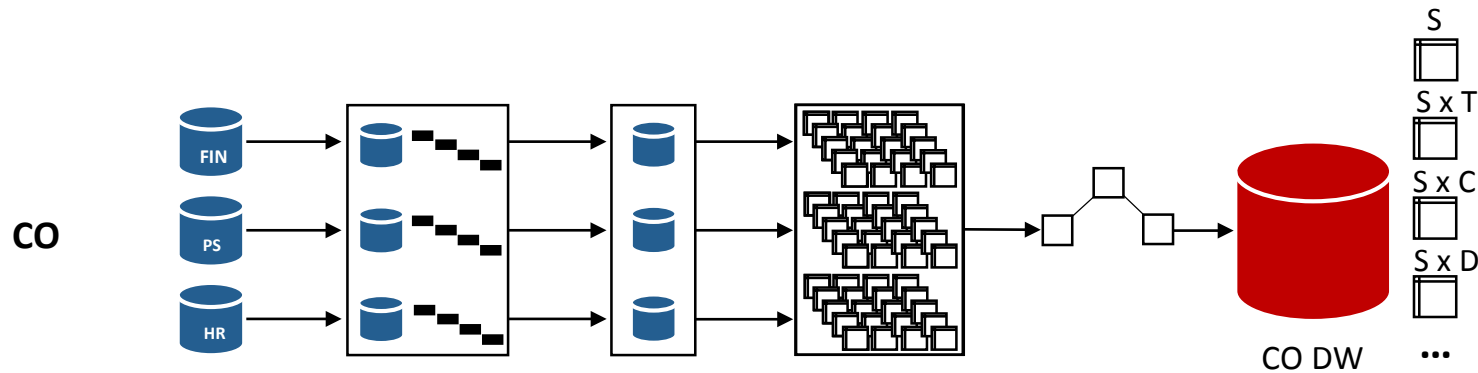




# Extending the Data Lake



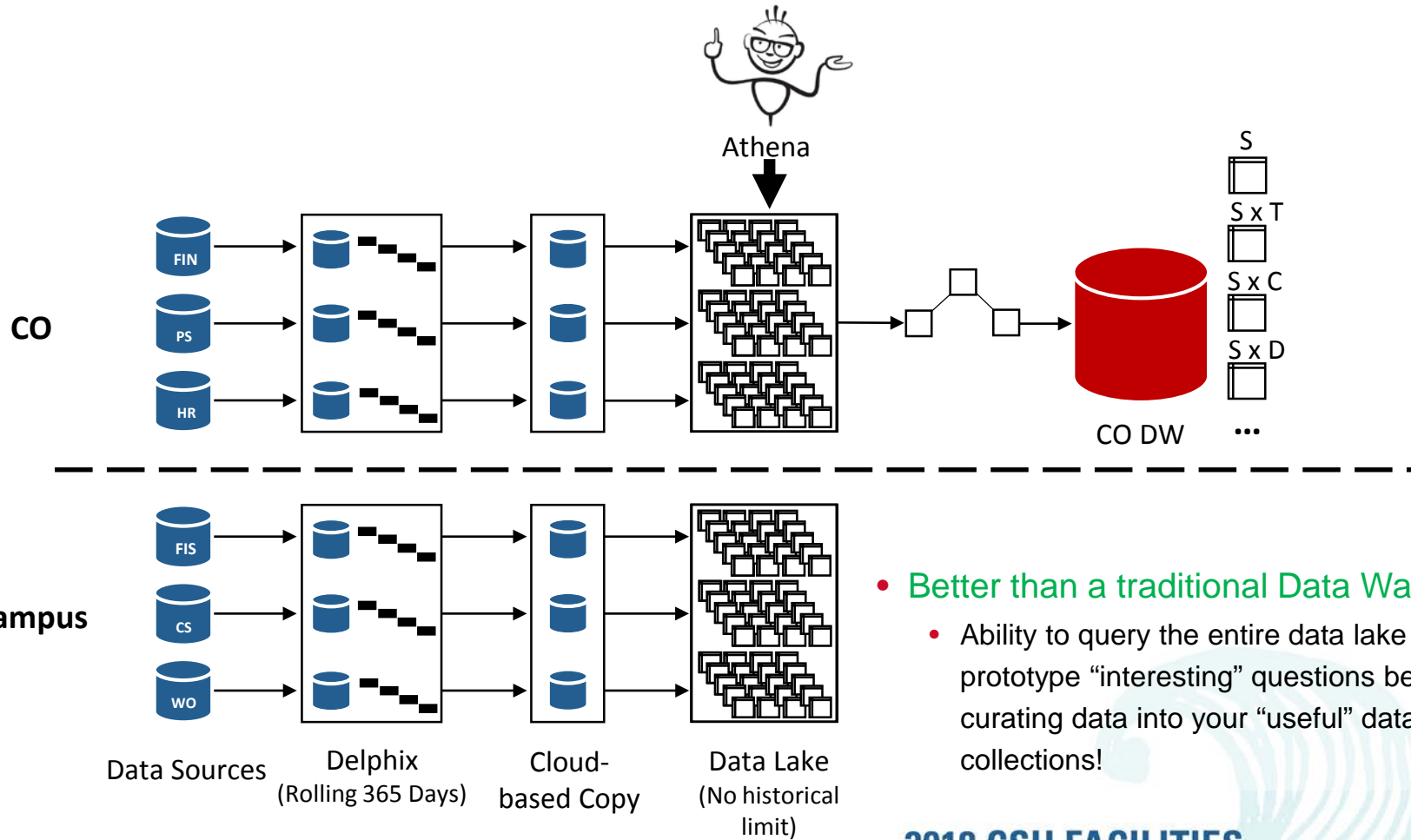
# Capitalizing on the Data Lake



- **Better than a traditional Data Warehouse:**
  - Data will be validated (not cleansed) and I will help work with your teams to build exception reports for data entry teams.



# Capitalizing on the Data Lake



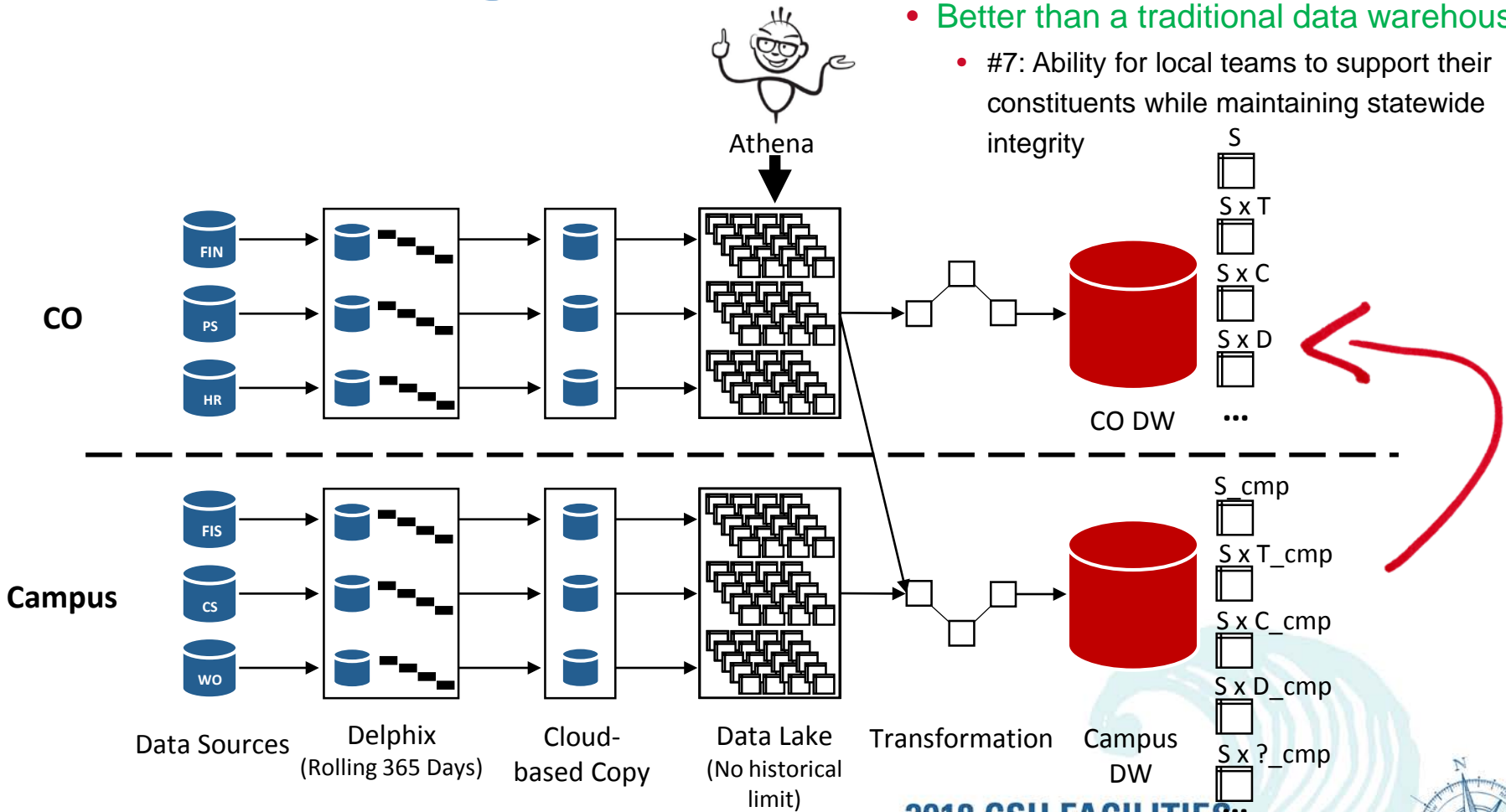
- **Better than a traditional Data Warehouse:**
  - Ability to query the entire data lake to prototype “interesting” questions before curating data into your “useful” data collections!



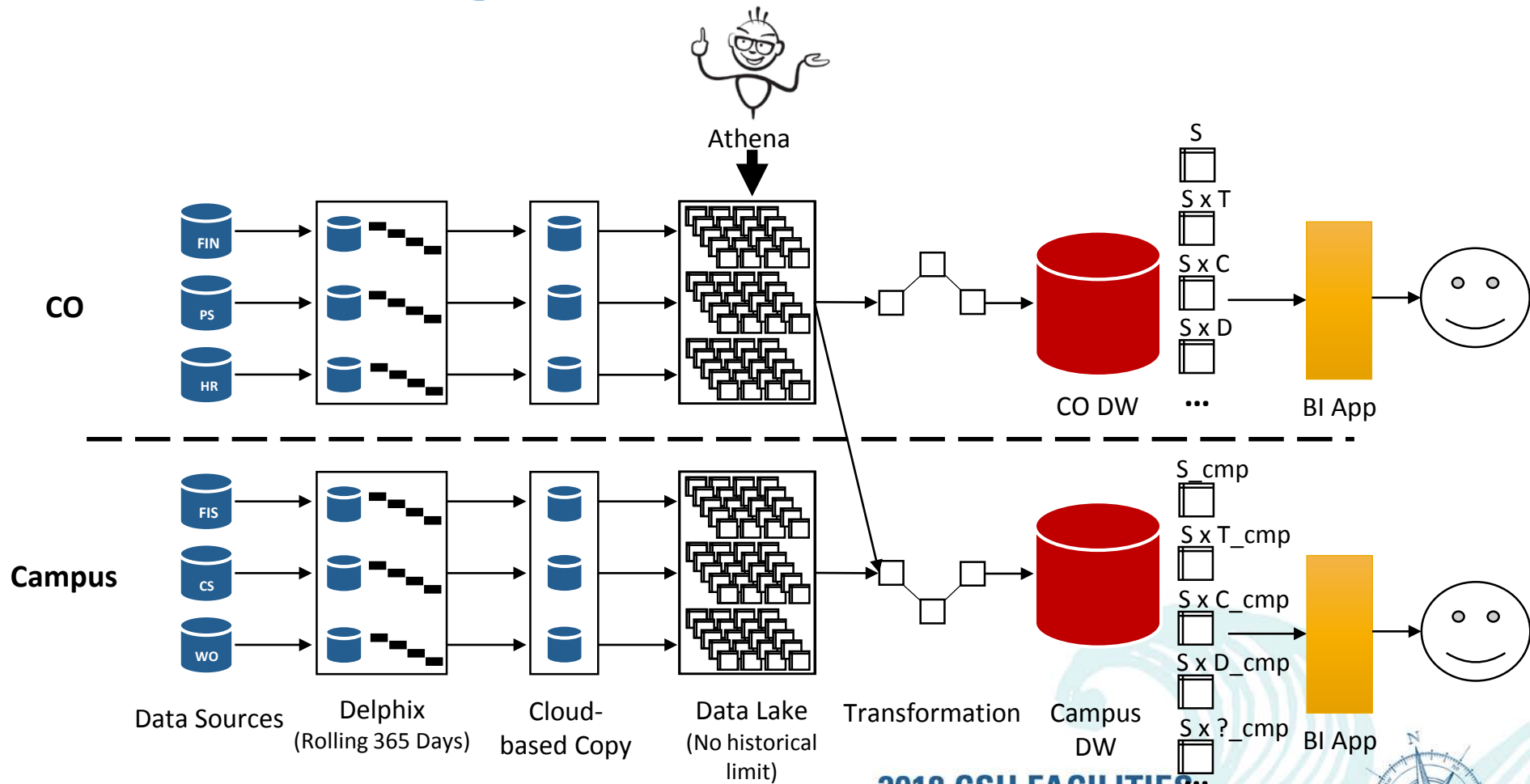
# Capitalizing on the Data Lake

• Better than a traditional data warehouse:

- #7: Ability for local teams to support their constituents while maintaining statewide integrity



# Capitalizing on the Data Lake





After attending this program, participants will be able to:

1. Share siloed data while maintaining clear ownership and necessary security.
2. Understand the difference between interesting versus useful data.
3. Use data to make deliberate and informed decisions, using deferred maintenance and renewal data as an example.
4. Explore means to use shared data to prioritize and maximize limited resources, using facility and utility infrastructure as examples.



# Please fill out session evaluation using Guidebook.

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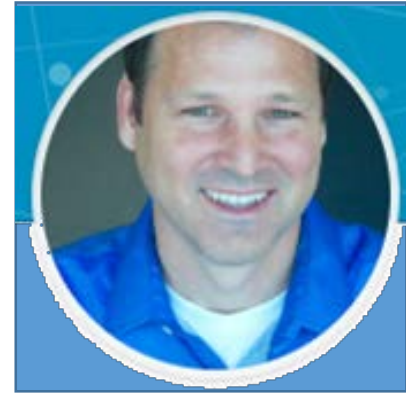
# Questions? Please contact us.



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