



Let's Recycle Better, Together.

How Data Analytics is Transforming Waste Collections & Recovery

In partnership with:

((SENSONEO))

May 26, 2021

Today's Panelists



Alec Cooley

Senior Advisor
Busch Systems
Charleston, SC



Mike Baxter

Director of Strategy
Busch Systems
Barrie, ON



Shantanu Pai

Interim Zero Waste Manager
Univ. of IL at Urbana-
Champaign
Champaign, IL



Ric Hobby

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Sensoneo
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Tony Genovese

Chief Technology Officer
Sensoneo
Boston, MA

Use Your Dashboard

Step 1:

Expand dashboard



Step 2:

Click button to expand

Type direct questions for panelists



A screenshot of a GoToWebinar dashboard menu. The menu items are: Audience view (100%), Sharing, Webcam, Audio, Dashboard, Attendees: 2 of 501 (max), Polls (0/4), Questions, Handouts: 1 of 5, and Chat. The 'Questions' item is circled in red. Below the menu is a section titled 'Lessons Learned for Parks & Streetscape Re...' with 'Webinar ID: 477-758-627' and the GoToWebinar logo.

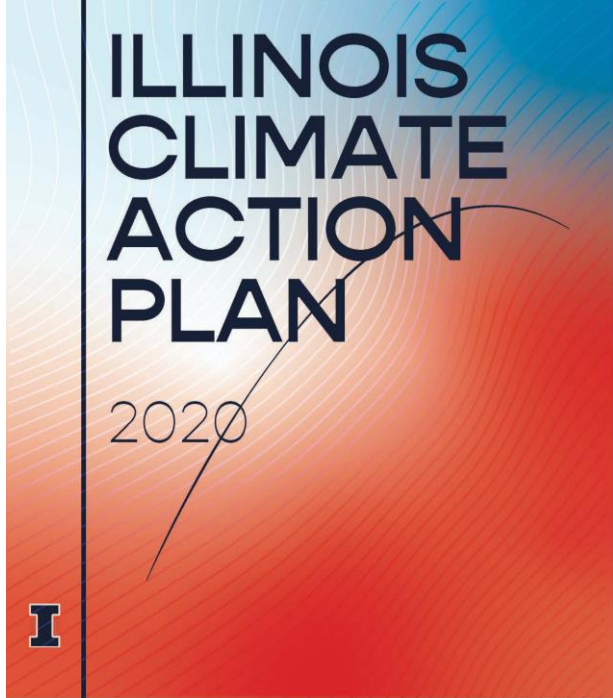


Data analytics in waste collection and recovery

May 26th

Shantanu Pai | Interim zero waste coordinator (also Assistant Sustainability Researcher at Illinois Sustainable Technology Center)

spai@illinois.edu



Reduce the total campus waste going to landfills from by at least 10% by FY24.

Develop a plan to sustainability dispose of all food scraps and other organics by FY24.



Built over 30 years ago as a dirty MRF/transfer station with 4 bunkers.

Over \$2M in deferred maintenance.



Why I need data?

Reduce landfill generation

Increase program capacity

Increase engagement

Provide Internal reports

Reduce costs

Participate in the campus as a living laboratory movement

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MY BOSS LOVES DATA

What data?

What data?



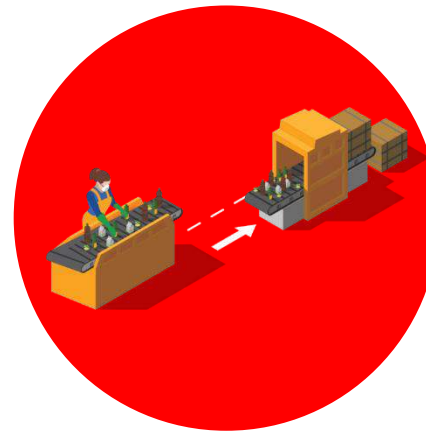
PROCUREMENT



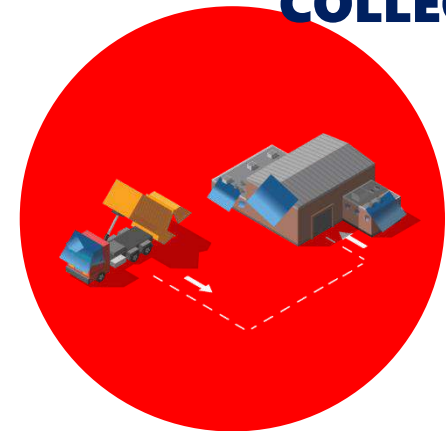
**IN-BUILDING
COLLECTION**



**ROUTE
COLLECTION**



RECOVERY



HAULING

What data?



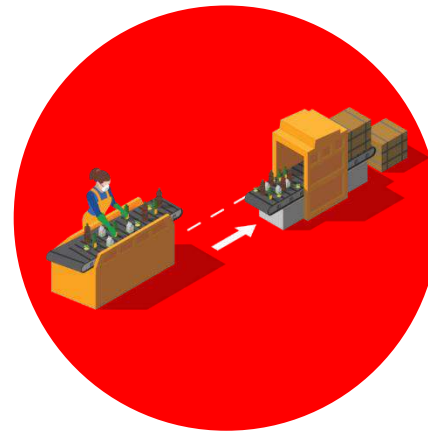
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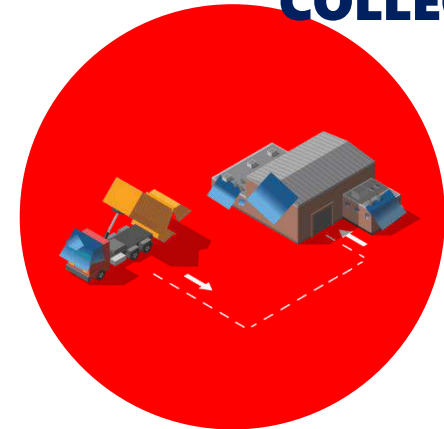
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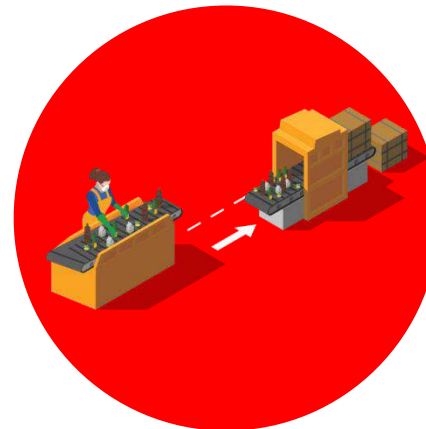
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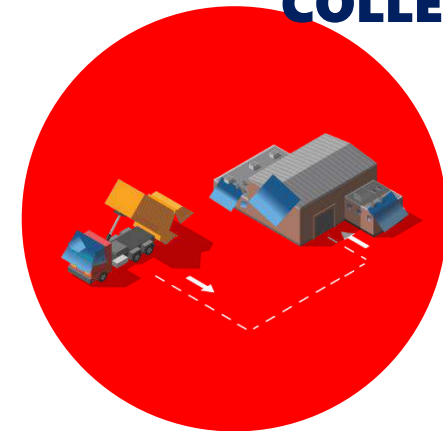
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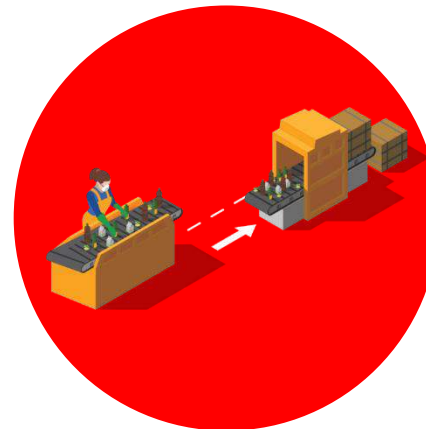
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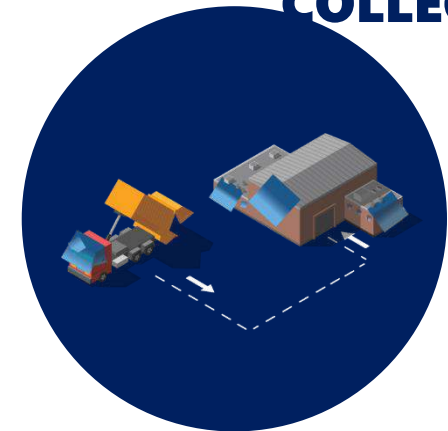
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HAULING

What data?



PROCUREMENT



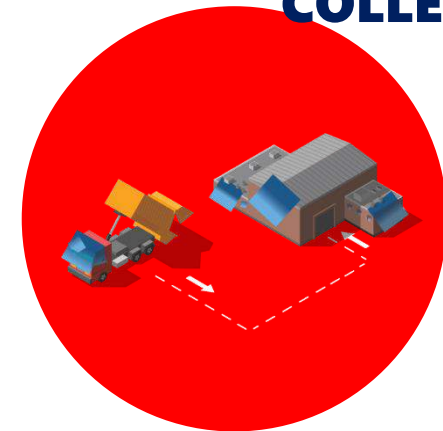
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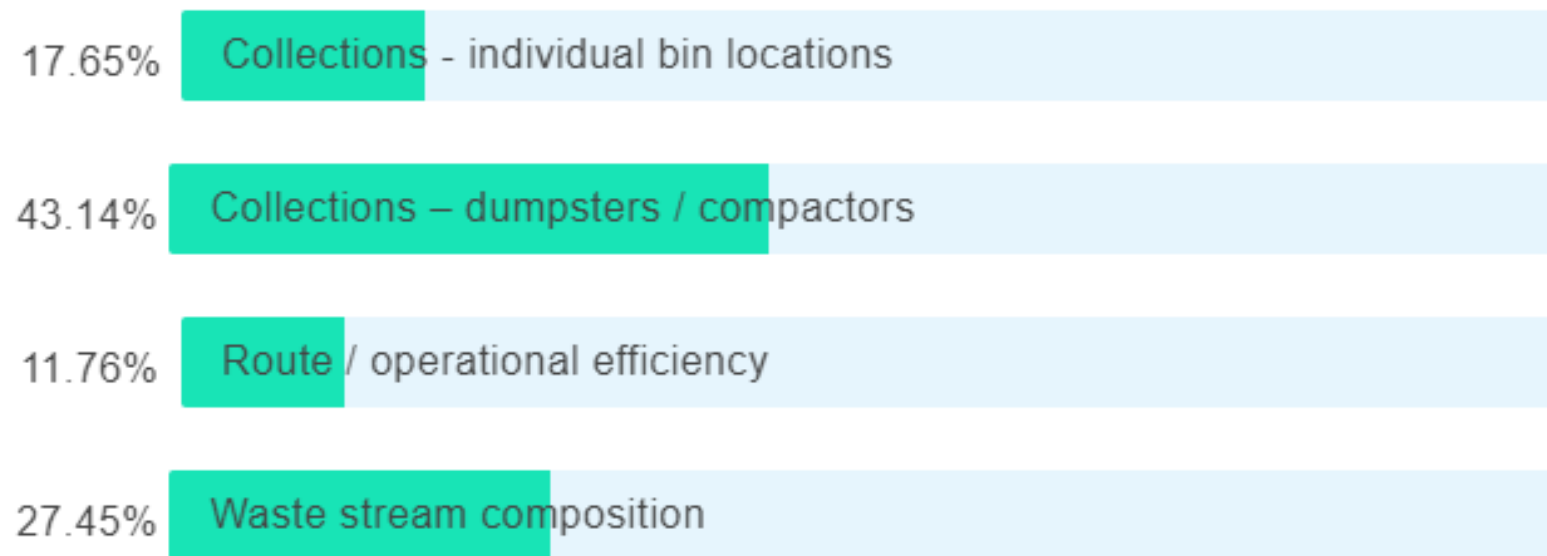
RECOVERY

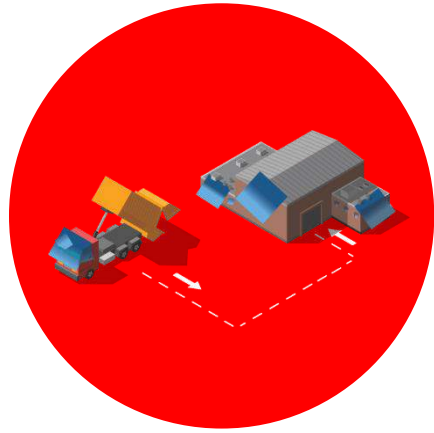


HAULING

Attendee Live Poll Results

Which areas do you currently get sufficient & reliable data to make informed decisions?





HAULING



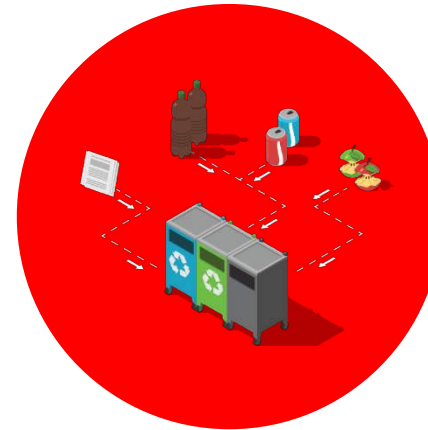
RECOVERY

Ability to influence outcomes



PROCUREMENT

Ability to collect data



**IN-BUILDING
COLLECTION**



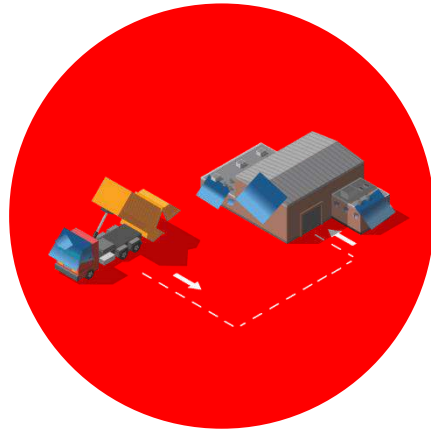
**ROUTE
COLLECTION**



**IN-BUILDING
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**ROUTE
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HAULING

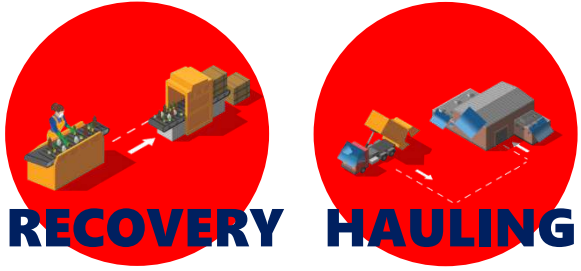


RECOVERY



PROCUREMENT

Influence on iCAP goals



Data we already had

08/25/2021 DOC/AREA DISPOSAL WORK ORDER TICKET REPORT Page 1 of 1
 08/25/2021 08:25:20 AM
 Accession #: 42-000034

42-000034 Bill: UNV OF ILLINOIS 8399132 Service: 0 OF 1 TRANSPORT - BUILDING
 PO BOX 420 10 ST MARYS RD
 SAVOYE, IL 62456 CHAMPAIGN, IL 61820

Doc Date	WJ #	WJ Status	Ticket#	Doc#	Description	Matl	Load#	Quantity	Wgt
08/17/2021	4359971	Inr Pndd	4494418	CL/OT	QDR MSW/TONE	QDRFN	CL1	18.43	TN
08/17/2021	4359971	Inr Pndd	4494419	CL/OT	QDR MSW/TONE	QDRFN	CL1	17.25	TN
08/18/2021	4359935	Inr Pndd	4494407	CL/OT	QDR MSW/TONE	QDRFN	CL1	11.78	TN
08/19/2021	4360100	Inr Pndd	4494455	CL/OT	QDR MSW/TONE	QDRFN	CL1	17.19	TN

Tickets: 4 Average per Ticket: 37.65 TN

Campus created a database



[Weight Station Tickets Admin Edit Form](#)

Data we started collecting

**FACILITIES & SERVICES
WASTE TRANSFER STATION
WEIGHT TICKET**

DATE: 4/7/21 TIME: 3:30 AM

EMPLOYEE ID: _____ VEH. ID: 33842-14

ROUTE/LOCATION: wood scarp

MATERIAL: CARDBOARD MSW
 COMPACTED PAPER
 C&D SOIL MIX
 METAL TOTES 1/P

SCHEDULED/ON-CALL (CIRCLE ONE)

WORKORDER: 10858681

TIP LOCATION: FLOOR SOUTH BAY
 NORTH LINCOLN NORTH BAY
 WALL

WEIGHT IN: 17620 lb. OUT: 16840 lb.

Please complete a separate ticket for each tip. Submit complete forms w/ dispatcher daily.

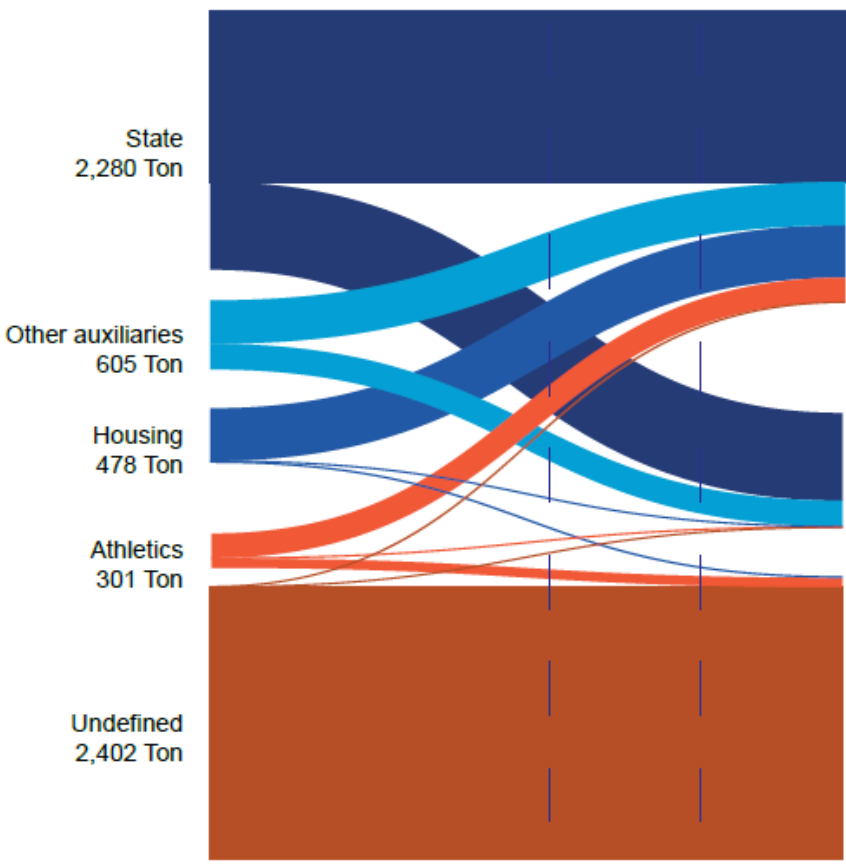
Waste Station Internal Ticket Admin Edit View - Front Loader

Export to Excel Add Edit Delete Refresh

Selected Filter: Default Quick Search: All fields

INT_ID	Record Date	Truck Type	Material	Other Material	Route	Other Route	Weight In (lbs)	Weight Out (lbs)	Net Weight (lbs)	Need Admin Review?	Review Notes
879.00	8/26/2020	Front Loader	Cardboard		1		38,640.00	36,600.00	2,040.00	N	
878.00	8/26/2020	Front Loader	MSW		2		40,700.00	36,600.00	4,100.00	N	
877.00	8/26/2020	Front Loader	MSW		1		43,060.00	36,600.00	6,460.00	N	
861.00	8/25/2020	Front Loader	MSW		2		46,340.00	36,400.00	9,940.00	N	
860.00	8/25/2020	Front Loader	MSW		1		41,600.00	36,460.00	5,140.00	N	

Save Data Entry Records



Roll-off
2,567 Ton

Swing pan
1,006 Ton

Front loader
2,493 Ton



Unsorted
2,767 Ton

Sorted
3,299 Ton

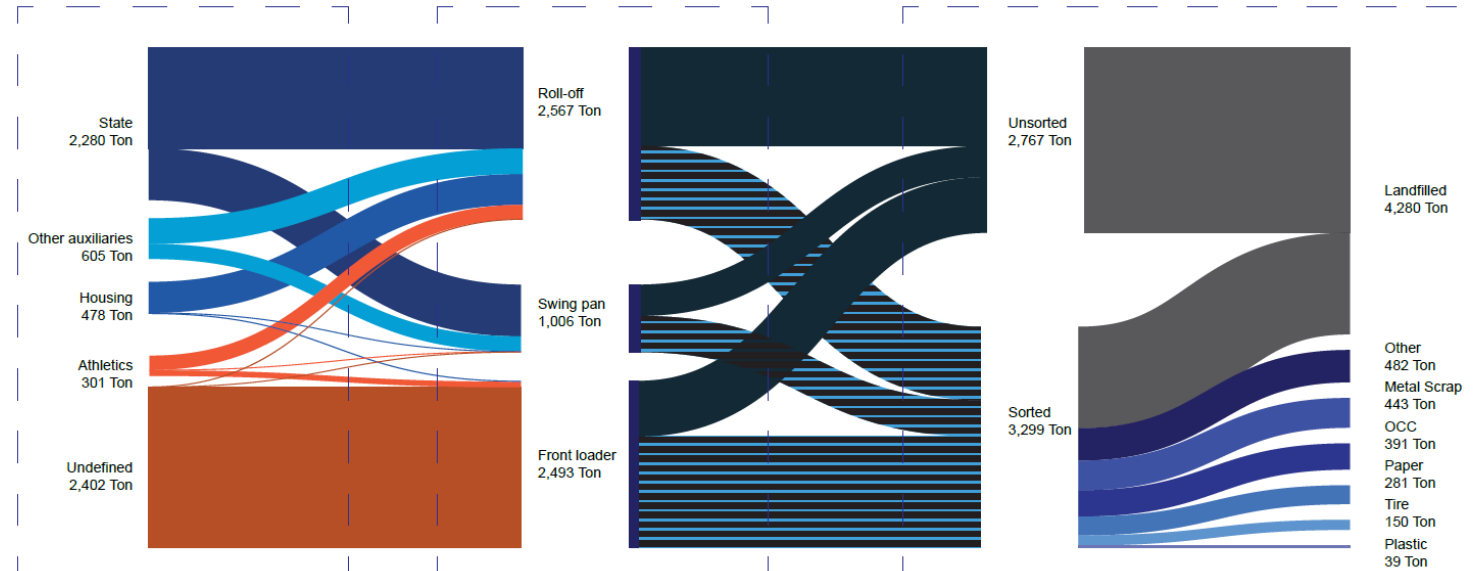


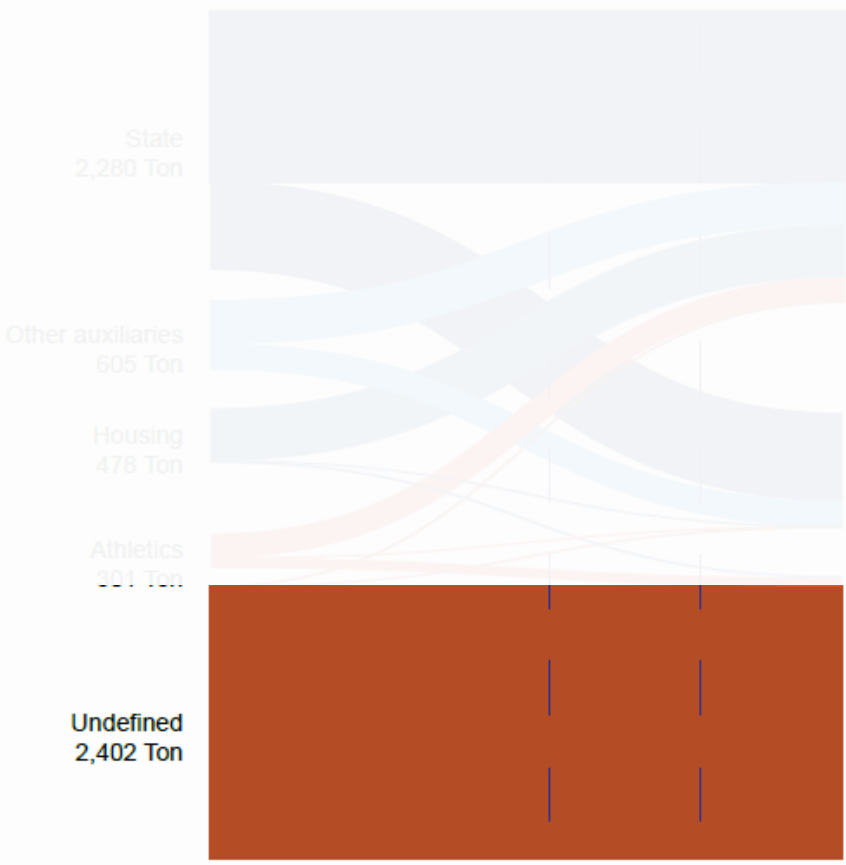
Landfilled
4,280 Ton

Other
482 Ton
Metal Scrap
443 Ton
OCC
391 Ton
Paper
281 Ton
Tire
150 Ton
Plastic
39 Ton

Outcomes

- Reduced daily route stops by about ~20%
 - *Ability to do more with current capacity*
- Identified buildings with low recycling participation
 - *Ability to provide direct assistance*
- Container rightsizing
 - *Ability to add recycling containers in buildings with limited docks*
- “This data thing isn’t all that bad”
 - *Ability to collect more data*
- Re-arranged routes to increase recycling rates.



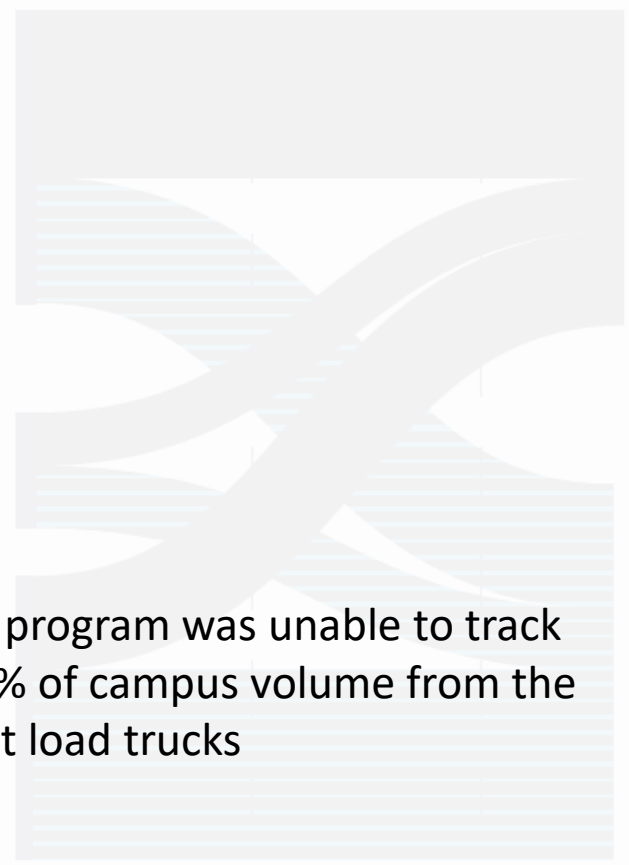


Roll-off
2,567 Ton

Swing pan
1,006 Ton

Front loader
2,495 Ton

Our program was unable to track ~35% of campus volume from the front load trucks



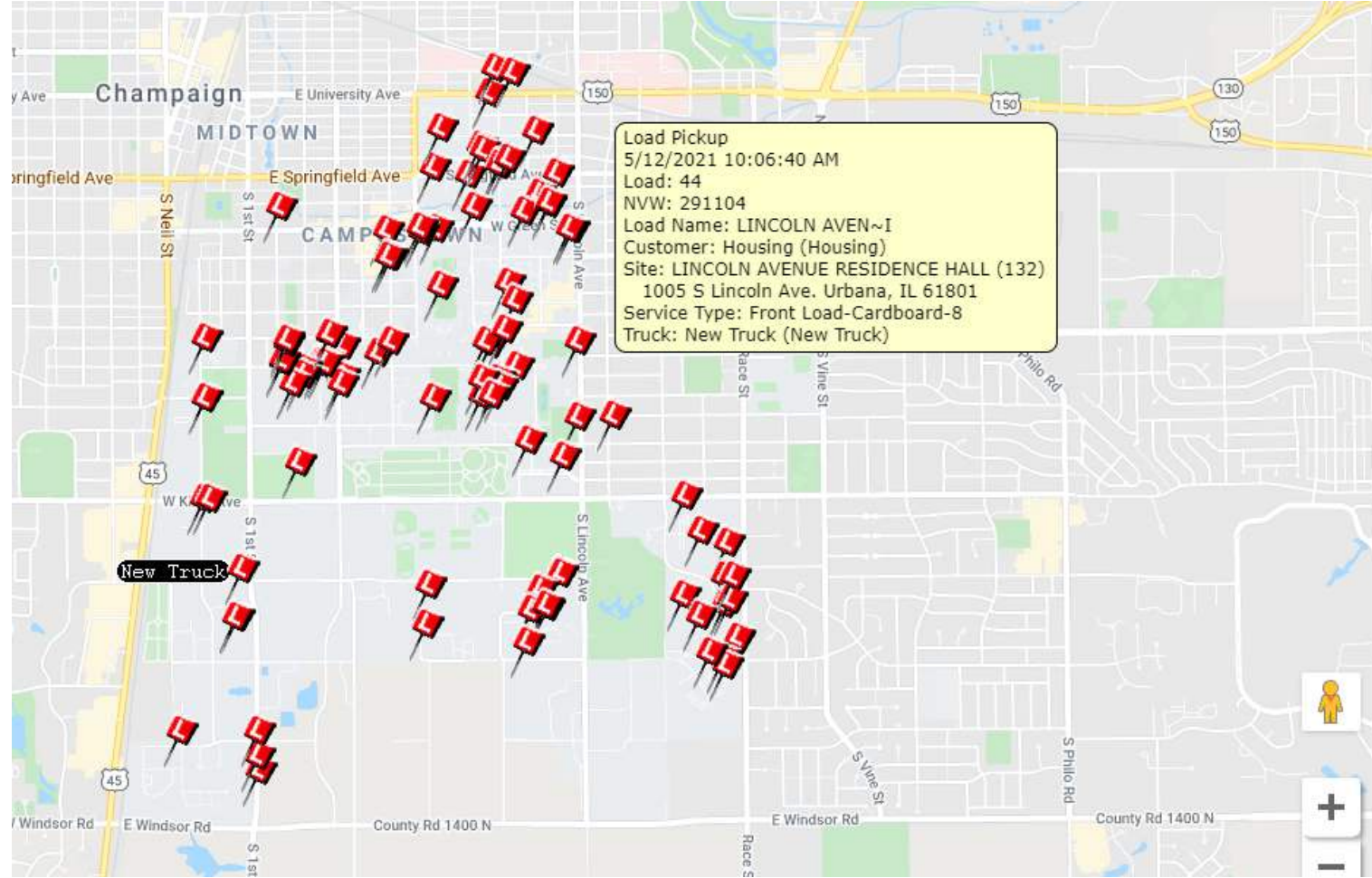
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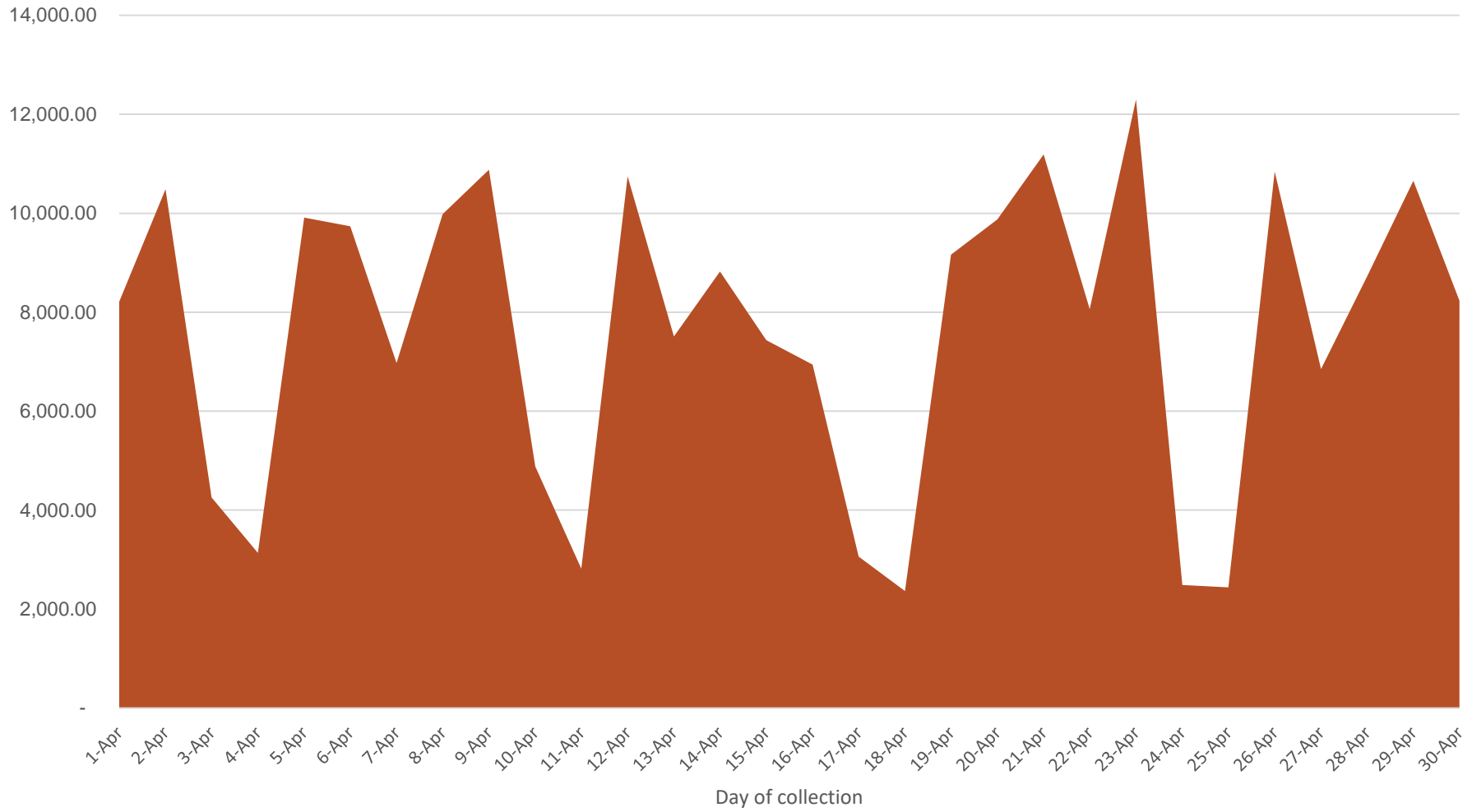
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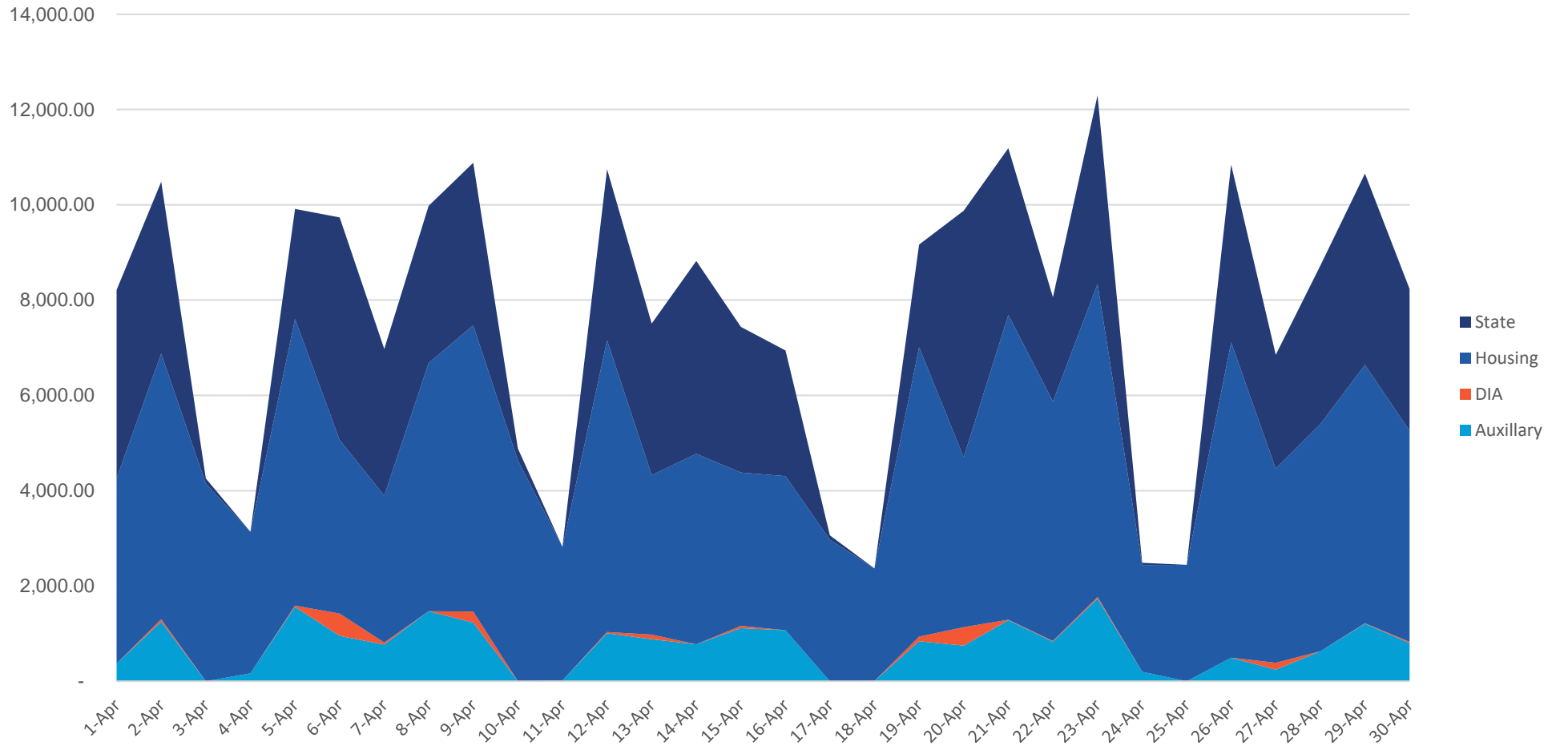


Data on undefined portion pre-truck scales



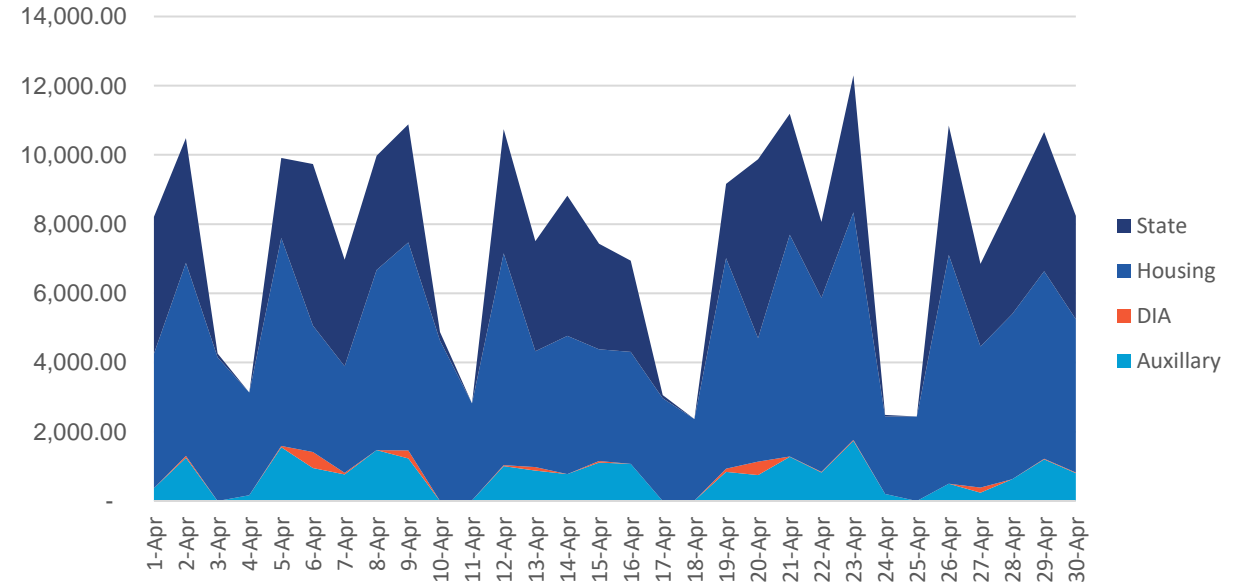


Data post-truck scales



Outcomes

- To early to tell...
- Decreased route stops by over 50%
 - *Eliminated one entire truck*
 - *Added three new specialty collections (single use masks, expanded polystyrene, plastic bags)*





HAULING



RECOVERY

Ability to influence outcomes



PROCUREMENT

Ability to collect data



**IN-BUILDING
COLLECTION**



**ROUTE
COLLECTION**



Is anyone using this?

Is my engagement working?

Are contamination rates a function of volume?

Are contamination rates a function of overflow?

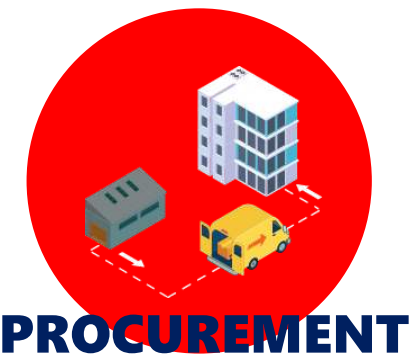
Are contamination rates a function of education and outreach?





Anticipated load to be over 30,000 students a day.
Only 14 collection stations.





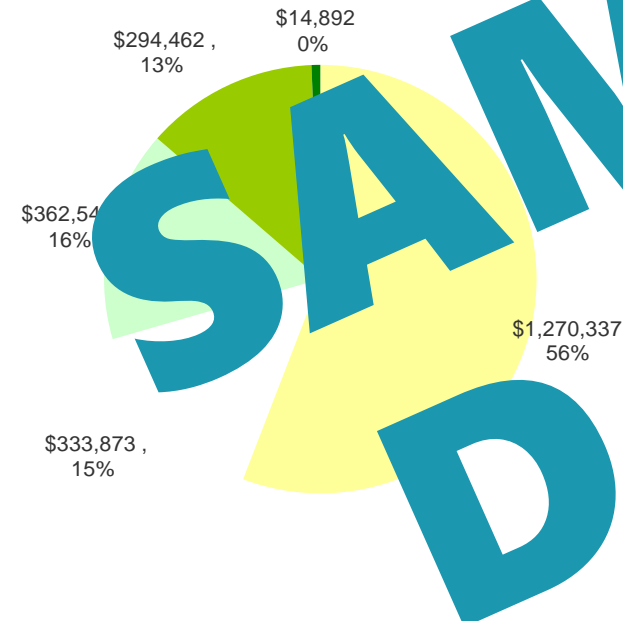
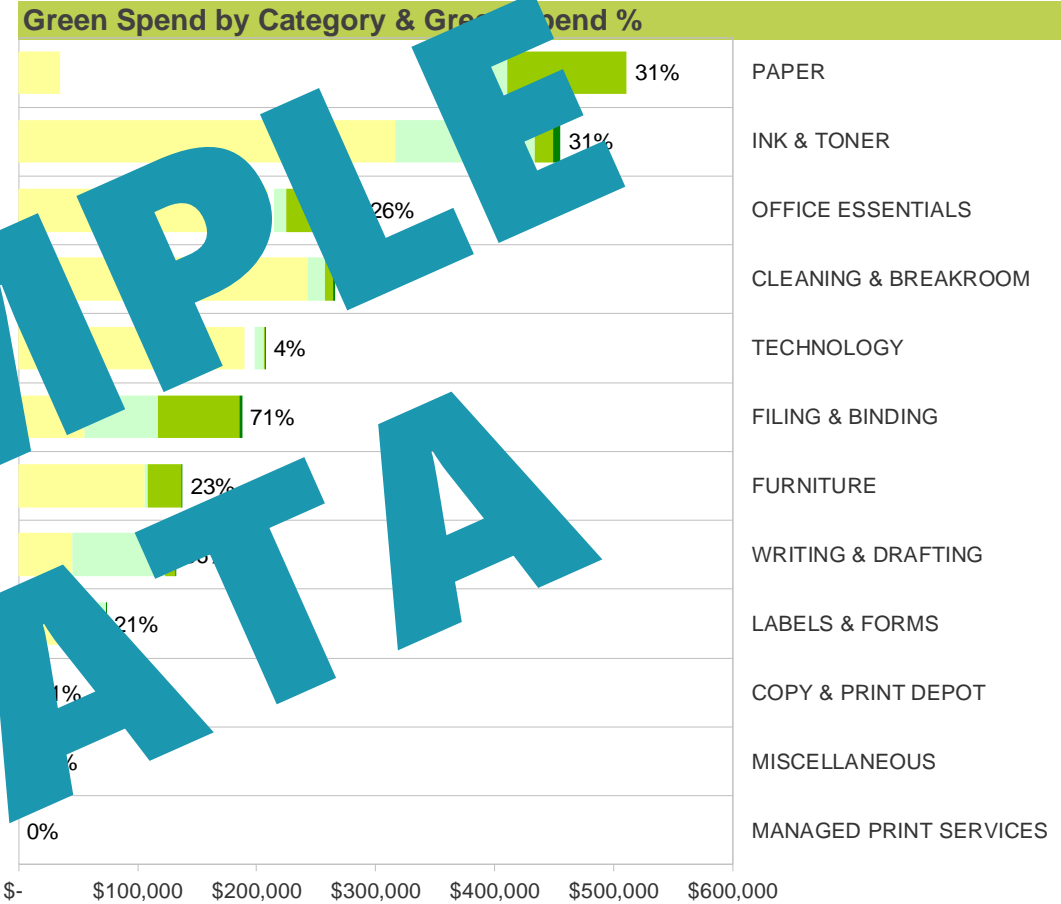
What is campus buying that could be recovered?

What are we buying that can be replaced with something that is reusable or recyclable?

Who is already buying the good stuff?

Lots more....

Green Spend		
Total Green Spend (Light to Dark)	\$671,898	30%
Mid to Dark Green Spend	\$309,354	14%
Dark Green Spend	\$14,892	1%
Total Spend	\$2,276,107	100%



SAMPLE DATA

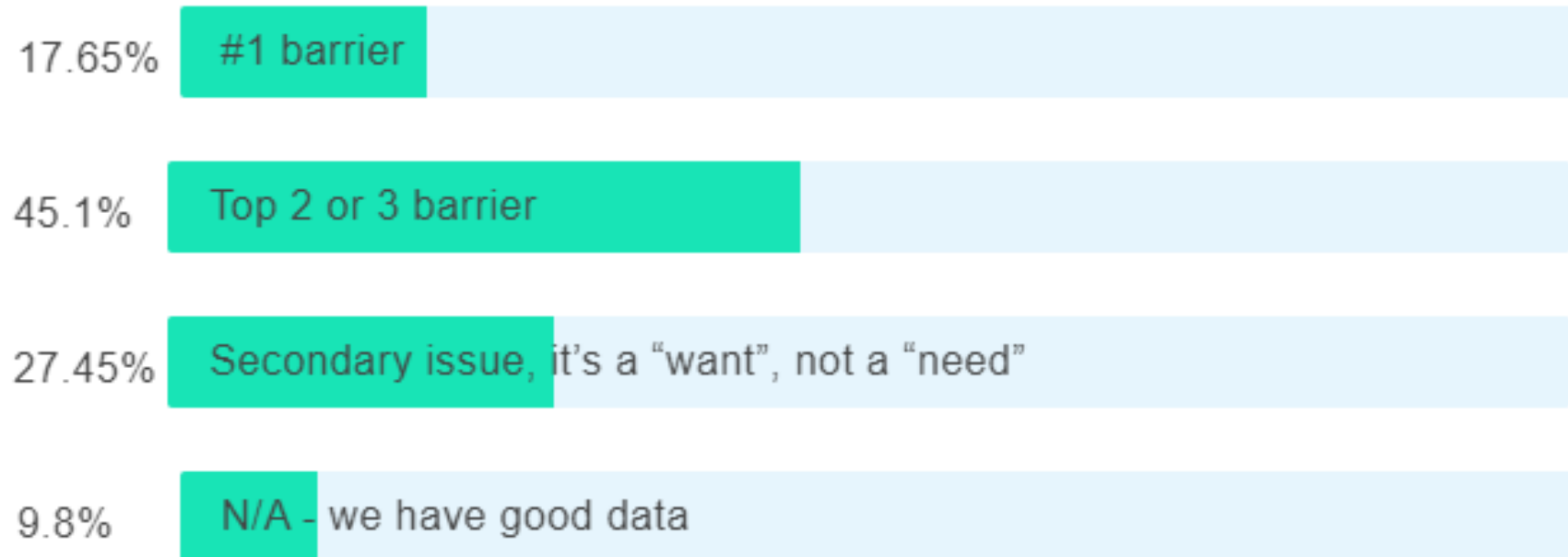


Thanks!

Shantanu Pai
spai@illinois.edu

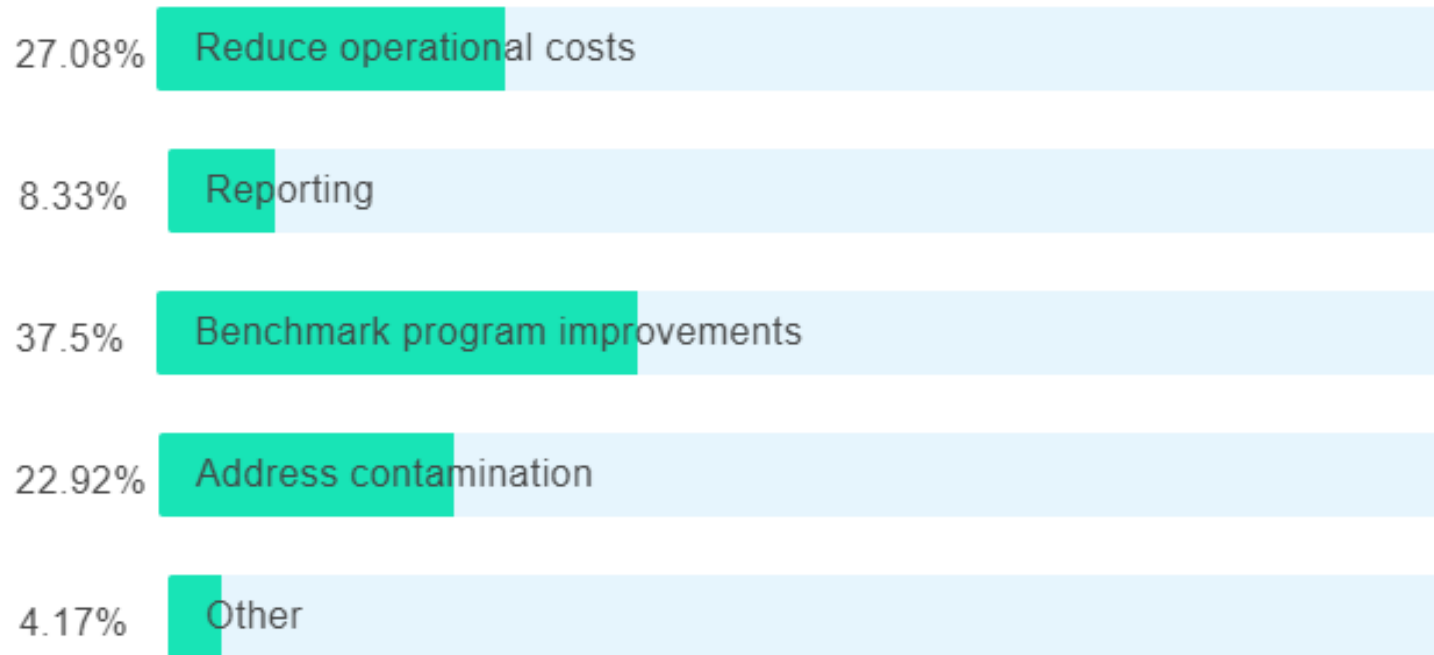
Attendee Live Poll Results

How significant would you rate lack of accurate data to reaching your objectives?



Attendee Live Poll Results

Where do you see the greatest potential gain from better collection data? *(choose 1)*



((SENSONEO))



City of Seattle
18-May-2018 09:05

View 2018

Volume: 1,331,143 m³

Apr

Volume: 142

98.7%

36.2%

Material	Bin	Volume	Weight
Aluminum 20	1	10.0	10.0
Aluminum 20	2	10.0	10.0
Aluminum 20	3	10.0	10.0
Aluminum 20	4	10.0	10.0
Aluminum 20	5	10.0	10.0
Aluminum 20	6	10.0	10.0
Aluminum 20	7	10.0	10.0
Aluminum 20	8	10.0	10.0
Aluminum 20	9	10.0	10.0
Aluminum 20	10	10.0	10.0
Aluminum 20	11	10.0	10.0
Aluminum 20	12	10.0	10.0
Aluminum 20	13	10.0	10.0
Aluminum 20	14	10.0	10.0
Aluminum 20	15	10.0	10.0
Aluminum 20	16	10.0	10.0
Aluminum 20	17	10.0	10.0
Aluminum 20	18	10.0	10.0
Aluminum 20	19	10.0	10.0
Aluminum 20	20	10.0	10.0
Aluminum 20	21	10.0	10.0
Aluminum 20	22	10.0	10.0
Aluminum 20	23	10.0	10.0
Aluminum 20	24	10.0	10.0
Aluminum 20	25	10.0	10.0
Aluminum 20	26	10.0	10.0
Aluminum 20	27	10.0	10.0
Aluminum 20	28	10.0	10.0
Aluminum 20	29	10.0	10.0
Aluminum 20	30	10.0	10.0
Aluminum 20	31	10.0	10.0
Aluminum 20	32	10.0	10.0
Aluminum 20	33	10.0	10.0
Aluminum 20	34	10.0	10.0
Aluminum 20	35	10.0	10.0
Aluminum 20	36	10.0	10.0
Aluminum 20	37	10.0	10.0
Aluminum 20	38	10.0	10.0
Aluminum 20	39	10.0	10.0
Aluminum 20	40	10.0	10.0
Aluminum 20	41	10.0	10.0
Aluminum 20	42	10.0	10.0
Aluminum 20	43	10.0	10.0
Aluminum 20	44	10.0	10.0
Aluminum 20	45	10.0	10.0
Aluminum 20	46	10.0	10.0
Aluminum 20	47	10.0	10.0
Aluminum 20	48	10.0	10.0
Aluminum 20	49	10.0	10.0
Aluminum 20	50	10.0	10.0
Aluminum 20	51	10.0	10.0
Aluminum 20	52	10.0	10.0
Aluminum 20	53	10.0	10.0
Aluminum 20	54	10.0	10.0
Aluminum 20	55	10.0	10.0
Aluminum 20	56	10.0	10.0
Aluminum 20	57	10.0	10.0
Aluminum 20	58	10.0	10.0
Aluminum 20	59	10.0	10.0
Aluminum 20	60	10.0	10.0
Aluminum 20	61	10.0	10.0
Aluminum 20	62	10.0	10.0
Aluminum 20	63	10.0	10.0
Aluminum 20	64	10.0	10.0
Aluminum 20	65	10.0	10.0
Aluminum 20	66	10.0	10.0
Aluminum 20	67	10.0	10.0
Aluminum 20	68	10.0	10.0
Aluminum 20	69	10.0	10.0
Aluminum 20	70	10.0	10.0
Aluminum 20	71	10.0	10.0
Aluminum 20	72	10.0	10.0
Aluminum 20	73	10.0	10.0
Aluminum 20	74	10.0	10.0
Aluminum 20	75	10.0	10.0
Aluminum 20	76	10.0	10.0
Aluminum 20	77	10.0	10.0
Aluminum 20	78	10.0	10.0
Aluminum 20	79	10.0	10.0
Aluminum 20	80	10.0	10.0
Aluminum 20	81	10.0	10.0
Aluminum 20	82	10.0	10.0
Aluminum 20	83	10.0	10.0
Aluminum 20	84	10.0	10.0
Aluminum 20	85	10.0	10.0
Aluminum 20	86	10.0	10.0
Aluminum 20	87	10.0	10.0
Aluminum 20	88	10.0	10.0
Aluminum 20	89	10.0	10.0
Aluminum 20	90	10.0	10.0
Aluminum 20	91	10.0	10.0
Aluminum 20	92	10.0	10.0
Aluminum 20	93	10.0	10.0
Aluminum 20	94	10.0	10.0
Aluminum 20	95	10.0	10.0
Aluminum 20	96	10.0	10.0
Aluminum 20	97	10.0	10.0
Aluminum 20	98	10.0	10.0
Aluminum 20	99	10.0	10.0
Aluminum 20	100	10.0	10.0

Value Proposition



Quality

- Avoid overflows
- Track pick-up times



Efficiency

- Optimize pick-ups
- Stop paying to “haul air”



Safety

- Dumpster fire detection
- Reduce truck traffic



Sustainability

- Accurate sustainability data
- Reduce CO2 emissions

How to Calculate Diversion?

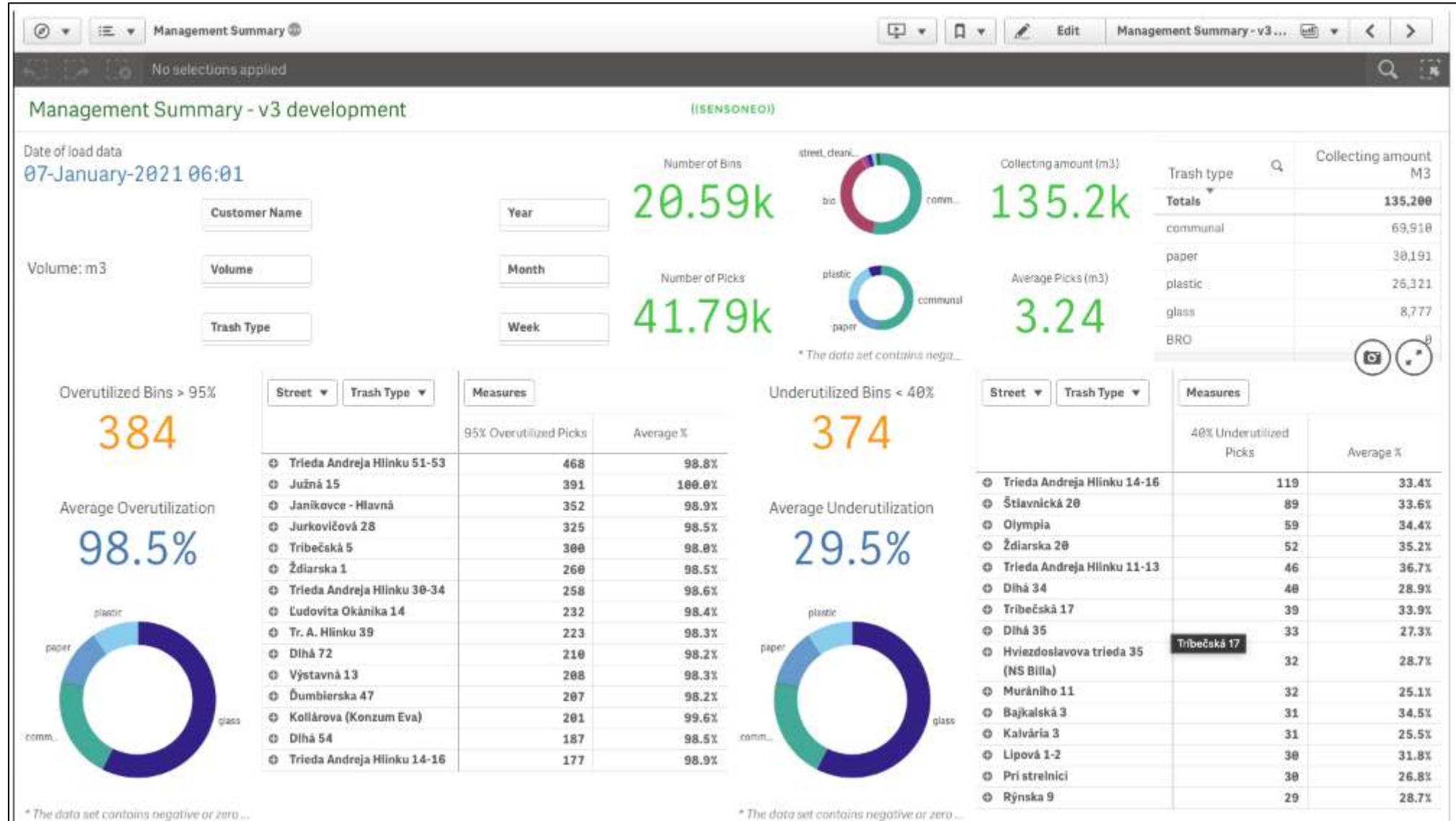
INACCURATE Diversion Calculation

WASTE Counted as 100% FULL EVERY Pick-up	RECYCLABLES Counted as 100% FULL EVERY Pick-up	UNKNOWN Diversion Rates (NO SENSORS)
		✗ = 50%
		✗ = 32%
		✗ = 20%

ACCURATE Diversion Calculation

WASTE Fill Levels	RECYCLABLES Fill Levels	TRUE Diversion Rates (With SENSORS)
60%	60%	📶 = 50%
60%	40%	📶 = 40%
60%	20%	📶 = 25%

Data Analytics





>\$4,100 savings on 12 bins

>30% bins needed rightsizing

74% service validation

20% increase in Diversion Rate

Sensoneo Case Study: University Pilot

The Goal

To right size waste collection on campus and increase efficiency.

The Scope

Performed an initial evaluation using 12 sensors on different sized outdoor waste and recycle bins.

Implementation

Analysis showed

- SAVINGS: ~\$4,160 yearly savings opportunity on 12 pilot bins
- PICKUPS: >17 eliminated per month
- BINS: >30% bins required service adjustment
- SERVICE VALIDATION: 74% waste collected on scheduled day
- DIVERSION RATE: 20% increase by using actual data

Conclusion

- University collected valuable data for use in ongoing sustainability efforts.
- The university will see cost savings by adjusting service on just a few containers.
- Due to pilot, university is deploying sensors campus wide.



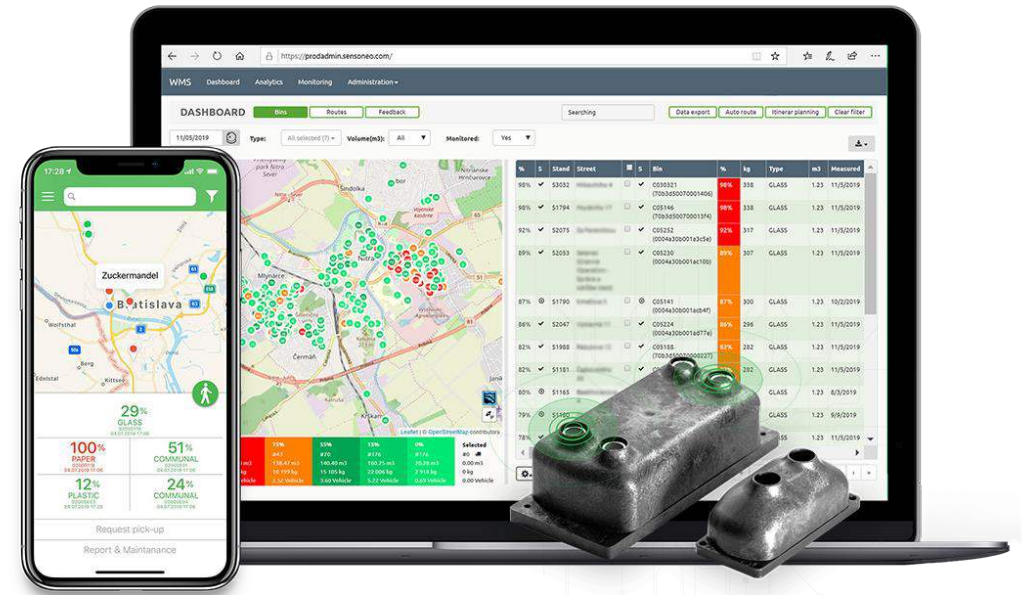
Thanks for listening to the presentation.

For questions, please contact:

Tony Genovese

agenovese@sensoneousa.com

(508) 284-4689



((SENSONEO))

Manage waste smarter

www.Sensoneo.com

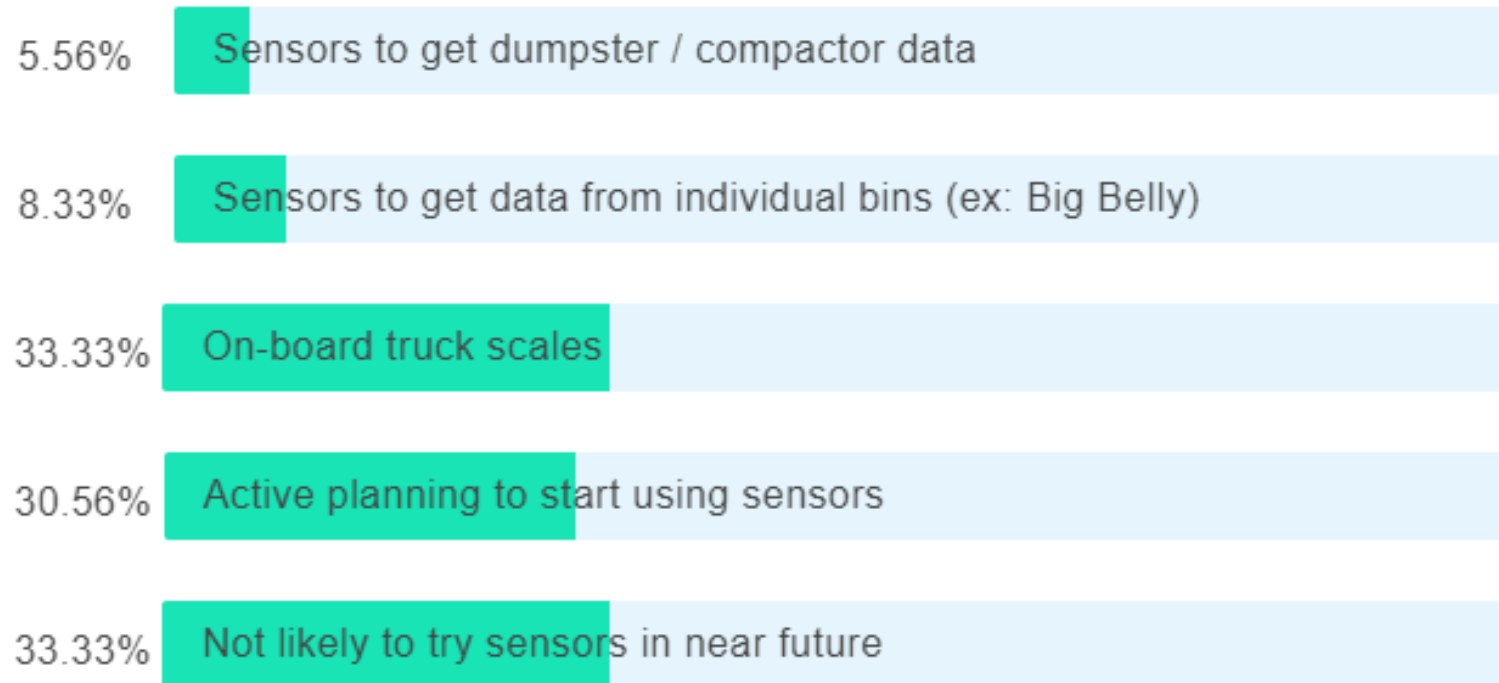
Attendee Live Poll Results

What's the biggest roadblock hindering advancements in waste collection efficiency?



Attendee Live Poll Results

What technology are you currently using to get waste data?



Use Your Dashboard to Submit Questions

Step 1:

Expand dashboard



Step 2:

Click button to expand

Type direct questions for panelists



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Thank You to Our Panelists



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Busch Systems



Mike Baxter
Busch Systems



Shantanu Pai
Univ. of Illinois at
Urbana- Champaign



Ric Hobby
Sensoneo



Tony Genovese
Sensoneo

Thank You to

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Busch Systems Resources

Advancing Recycling Blog Series

Recent Posts



Improving Data To Advance Campus...

MAY 18, 2021



Review Of Signage Studies – Pt 1: Purdue...

MARCH 16, 2021

Other Topics:

- Creating Uniform Bin Standards
- Reducing Contamination in Parks
- How COVID is impacting Campus Recycling Programs
- Implementing Centralized office collections