



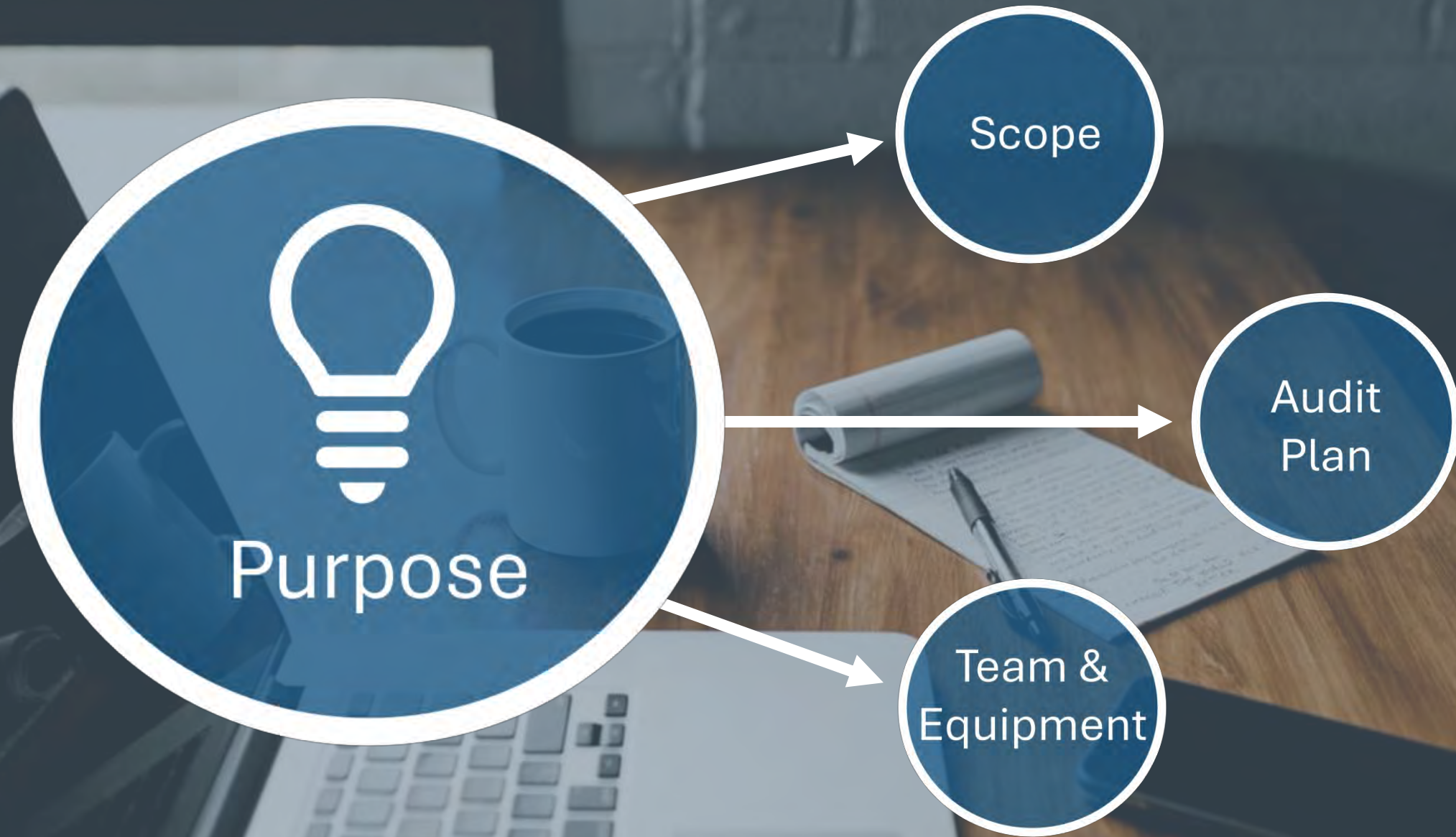
WASTE MANAGEMENT ALL-STARS

**SWANA NORTHERN LIGHTS CHAPTER
CONFERENCE 2025
WINNIPEG - JUNE 11-13**

Revealing The Value of Waste Audits
Shaun Spalding, C.E.T., EP







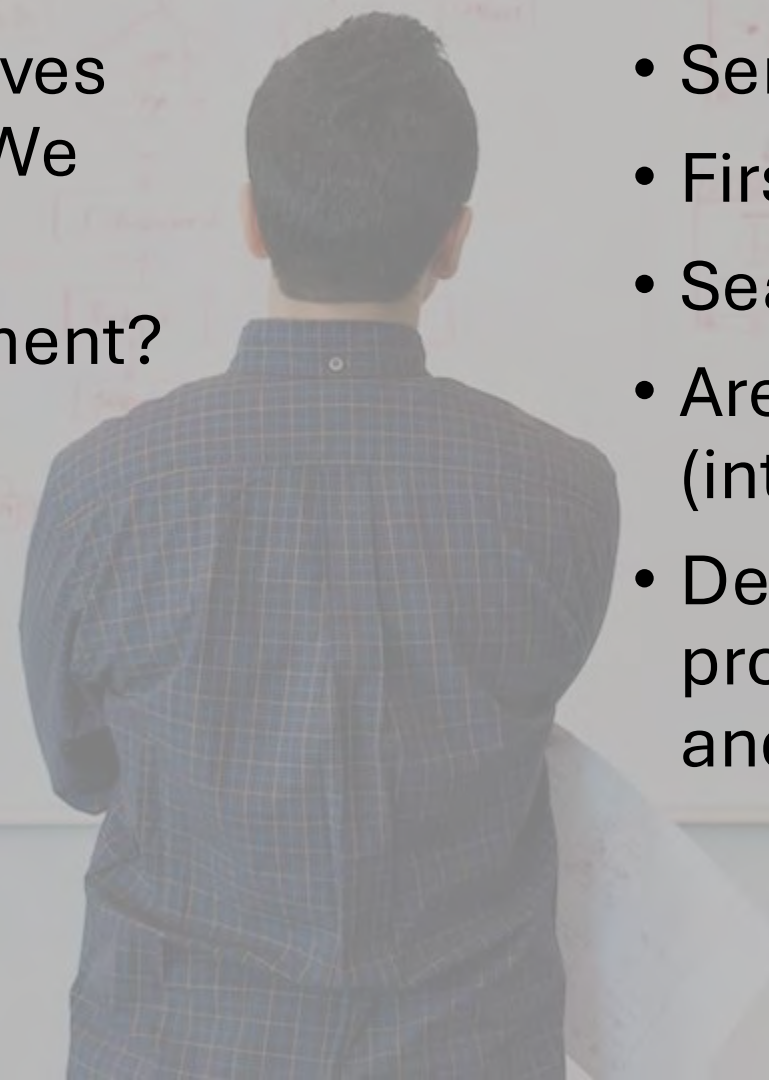
What is a Waste Audit?

- Critical Planning Tool
- Informs Active Decision-Making
 - Generation and Recovery Rates
 - Community Performance Measurement
 - Operational Assessments
 - Service Level Procurement / Contract Negotiations
 - Program Level Fiscal Analysis

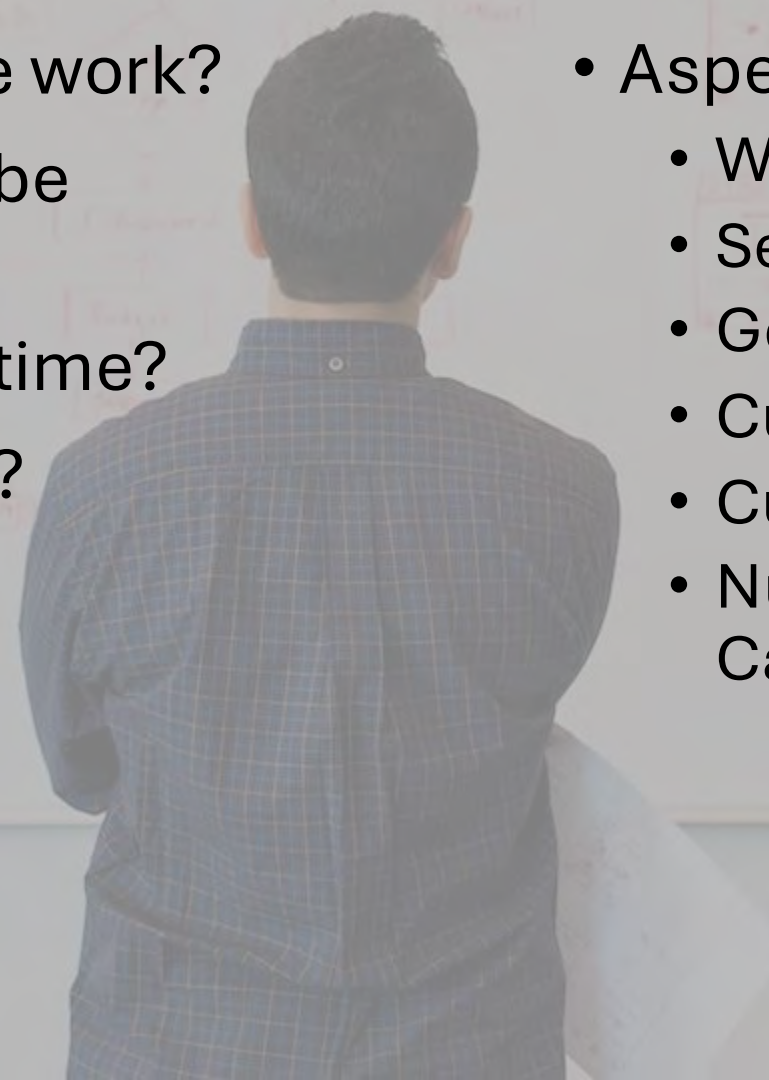
While Point-In-Time, the Information is
“More Than Just Numbers and Graphs”

Serves to Establish both a Baseline and
Evaluate Performance Over-Time

Waste Audit Scoping

- 
- Define Clear Objectives including: What Do We Want to Achieve?
 - Regulatory Requirement?
 - Generating Sectors?
 - Material Streams?
 - Costs & Timelines
 - Senior Management Support
 - First ever or Follow-up?
 - Seasonal Variations?
 - Are we comparing to others (intra or inter provincial)?
 - Definition of the current program & activities ... and what's next!

Waste Audit Plan – Pre Work Decision Points

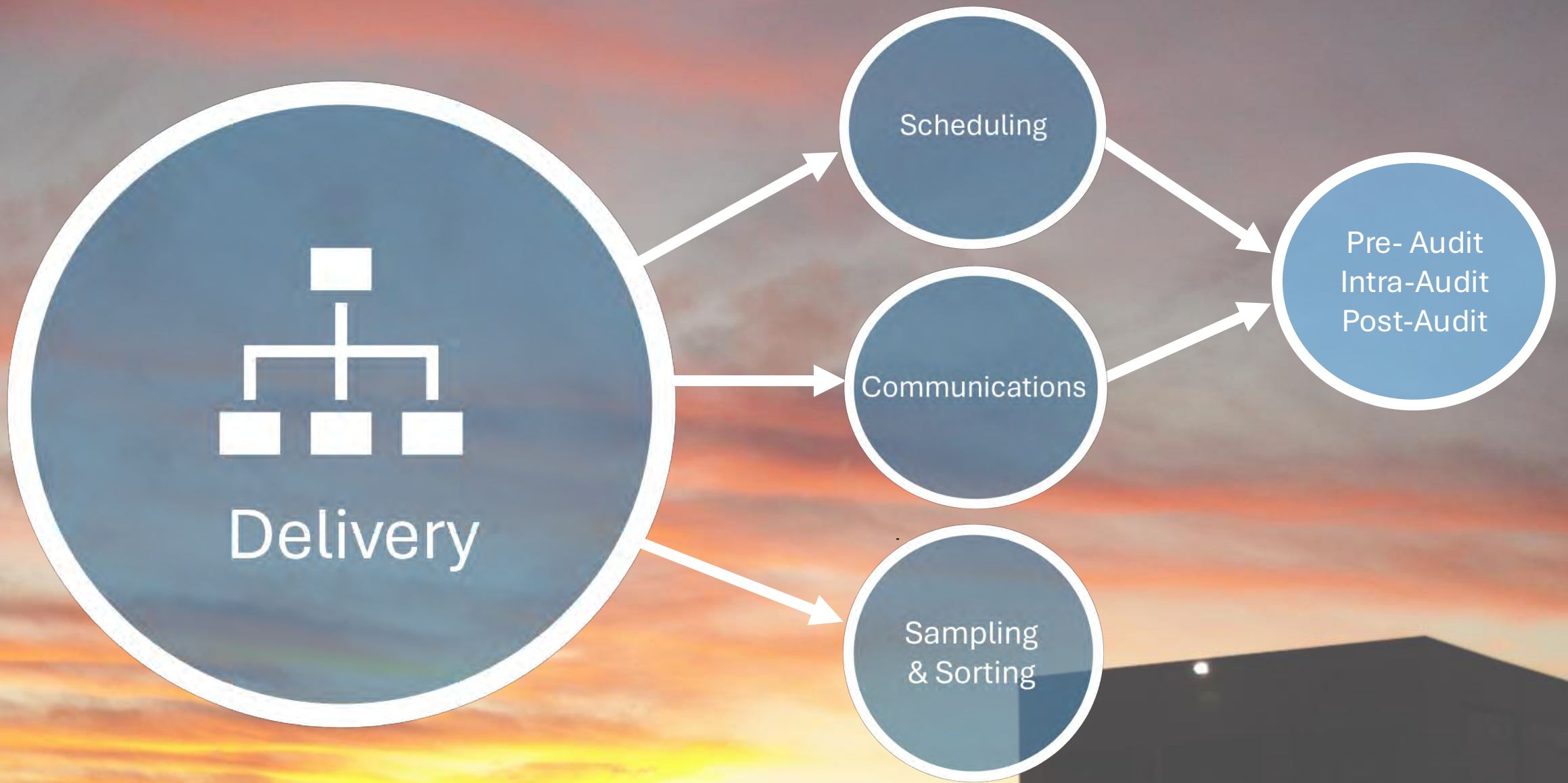
- 
- Who will perform the work?
 - Where will samples be collected from?
 - Over what period of time?
 - Number of Samples?
 - Sample Size?
 - Sampling Method?
 - Aspects to consider:
 - Weather Conditions
 - Seasonal Generation
 - Generating Sectors
 - Current Collection Frequency
 - Current Material Streams
 - Number of Material Categories

Waste Audit Team & Equipment

- Health & Safety Plan
- PPE
- Sorting Area
- Number of Staff
- Scale, Containers, Camera, Clipboard
- Pre- and Post- sort item management

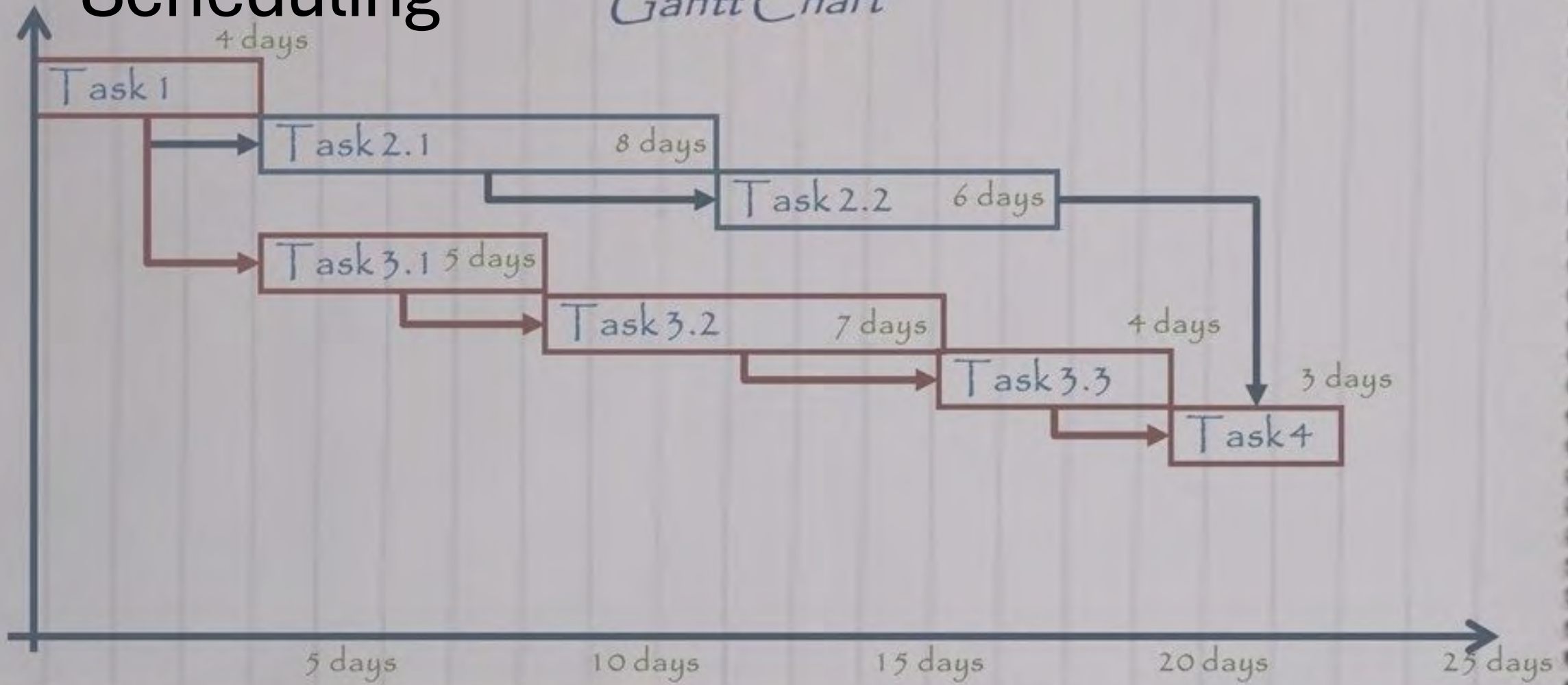
Sort Team Training (physical work, communications, etc.) is vital

Internal Resources can be used, but consider those trained and experienced professionals



Scheduling

Gantt Chart



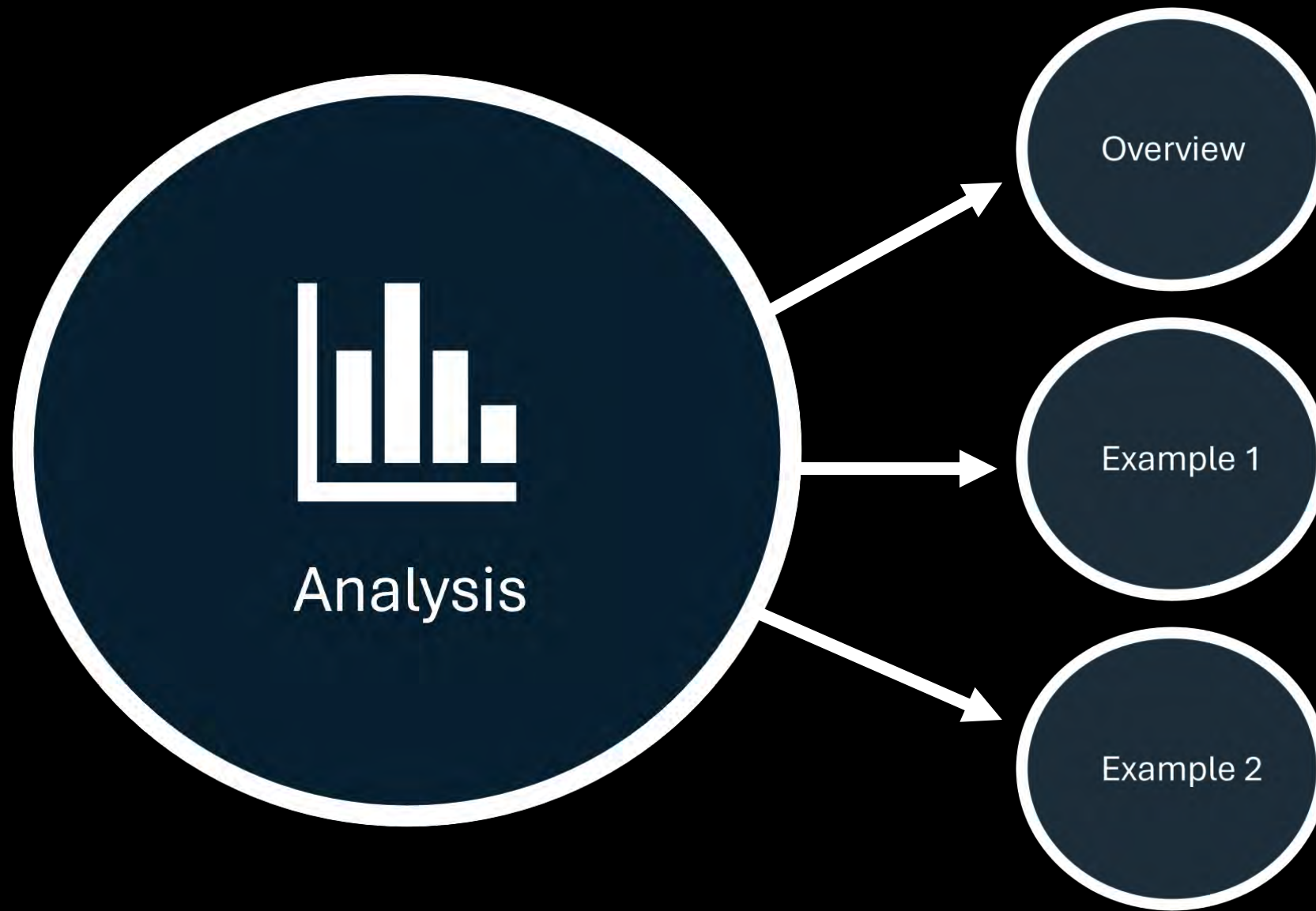
Communications

- Essential Aspect of all Audits / Composition Studies
- Pre-Audit discussions and alignment with all persons involved
 - Council, Collection Staff (with equipment), Auditing Crew
 - If undertaking at “*source*”, a handout / communique for inquiring minds 😊
- Day-to-Day Instructions
 - Audit site access, emergency preparedness
 - Post-sort material disposition
- Reporting
 - Formal and Informal discussions with Staff and Council
 - Written document, presentation of results / analysis / next steps



Sampling & Sorting

- Sampling: at curbside (source) or at the tip face
- Ideally 100kg per sample from each defined source
- Sort location protected from the elements
- Pre- and post-weigh samples and each constituent
- Sorting needs to adhere to H&S protocols for worker safety
- Ideally, standardize material categories (replicability and comparison)
- Effectively document samples before, during, and after sorting (e.g., photographic and written)
- Always consider post-sort material type disposition



Analysis



- Composition Audit Data is a Powerful Tool
- Each Audit provides Point-In-Time information ... useful, sure but when repeated, provides trends and insights from which effective decision-making can be made
- Whether your audit objective is to establish a baseline or measure performance of an existing (or new) program, analysis is critical

Waste management planning starts with Compositional Audit Data ...
Waste management changes are based on Compositional Audit Data ...

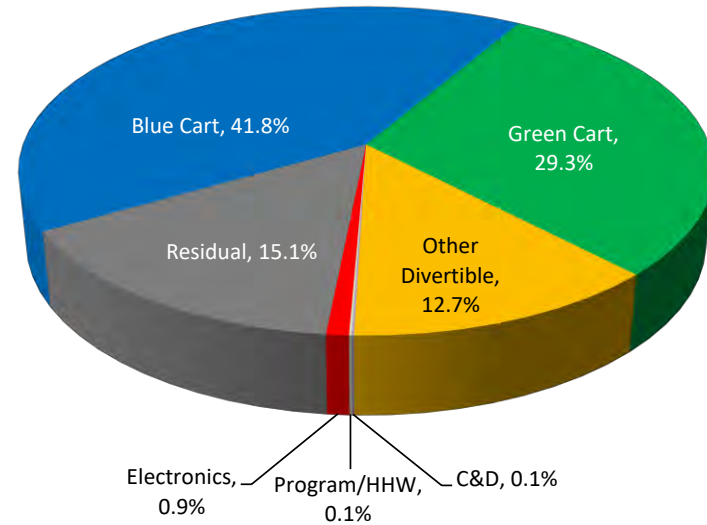
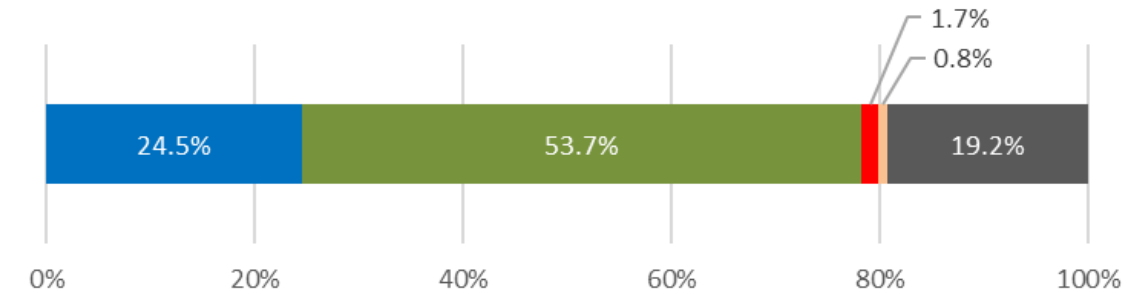
Hard facts and figures determined by Compositional Audit Data are difficult to ignore ... when accepted, they can and do lead to social habit change, informed contract negotiations, and better investment decisions

Municipality XYZ - Data Summary by Generating Source															
Material Category	Accepted in Diversion Programs	Potentially Divertible	Divertable Via PRO Programs	Date		Date Range		Date Range		Date Range		Date Range			
				Samples #	Source	1 & 2		3 & 4		5 & 6		7 & 8		9 & 10	
						Public Drop Off		ICI		COMM		Residential Curbside		Multi Family	
				Waste		Waste		Waste		Waste		Waste			
				kg	%	kg	%	kg	%	kg	%	kg	%		
1.PAPER															
Newspaper - Dailys, Weeklys and Other	✓		✓	1.77	0.42%	8.09	1.65%	3.17	0.70%	3.92	0.73%	1.53	0.32%		
Mixed Paper	✓		✓	14.98	3.56%	17.26	3.52%	29.85	6.62%	33.85	6.27%	24.70	5.13%		
Office Paper	✓		✓	0.95	0.23%	5.95	1.21%	6.15	1.36%	1.62	0.30%	2.27	0.47%		
Total Recyclable Paper				17.70	4.20%	31.30	6.39%	39.17	8.69%	39.39	7.30%	28.50	5.92%		
Total Non Recyclable Paper				0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%		
Total Paper				17.70	4.20%	31.30	6.39%	39.17	8.69%	39.39	7.30%	28.50	5.92%		
2.PAPER PACKAGING															
Corrugated	✓		✓	20.77	4.93%	6.98	1.42%	39.93	8.86%	6.93	1.28%	7.97	1.66%		
Boxboard / Cores	✓		✓	9.23	2.19%	13.46	2.75%	4.66	1.03%	7.16	1.33%	13.44	2.79%		
Composite Cans	✓		✓	0.48	0.11%	1.07	0.22%	0.17	0.04%	0.56	0.10%	0.38	0.08%		
Gable Top Cartons	✓		✓	0.52	0.12%	1.05	0.21%	0.97	0.22%	0.40	0.07%	0.94	0.20%		
Aseptic Containers	✓		✓	0.54	0.13%	1.12	0.23%	0.63	0.14%	0.81	0.15%	1.23	0.26%		
Laminated Paper Packaging		X	X	0.00	0.00%	0.00	0.00%	3.06	0.68%	0.00	0.00%	0.00	0.00%		
Total Recyclable Paper Packaging				31.54	7.49%	23.68	4.83%	46.36	10.29%	15.86	2.94%	23.96	4.98%		
Total Potentially Divertible				0.00	0.00%	0.00	0.00%	3.06	0.68%	0.00	0.00%	0.00	0.00%		
Total Non Recyclable Paper Packaging				0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%		
Total Paper Packaging				31.54	7.49%	23.68	4.83%	49.42	10.97%	15.86	2.94%	23.96	4.98%		
3.PLASTICS															
#1 PET (all types, all colours)	✓		✓	8.51	2.02%	14.59	2.98%	7.67	1.70%	6.81	1.26%	11.14	2.31%		
#2 HDPE Natural	✓		✓	1.82	0.43%	2.45	0.50%	0.79	0.18%	1.28	0.24%	2.45	0.51%		
#2 HDPE Coloured	✓		✓	2.26	0.54%	2.10	0.43%	1.81	0.40%	1.56	0.29%	3.02	0.63%		
#3 PVC		X	X	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%		
#4 LDPE (rigid)	✓		✓	0.42	0.10%	0.21	0.04%	0.03	0.01%	0.06	0.01%	0.12	0.02%		
#4 LDPE and #2 HDPE (film)		X	X	3.48	0.83%	5.32	1.09%	28.14	6.24%	10.35	1.92%	8.52	1.77%		
#5 PP	✓		✓	1.25	0.30%	3.39	0.69%	5.88	1.30%	1.84	0.34%	2.26	0.47%		
#6 PS foam		X	X	1.36	0.32%	1.09	0.22%	3.06	0.68%	0.88	0.16%	0.70	0.15%		
#6 PS rigid		X	X	0.09	0.02%	0.72	0.15%	2.77	0.61%	1.13	0.21%	0.88	0.18%		
#7 Other		X	✓	0.02	0.00%	0.00	0.00%	0.28	0.06%	0.25	0.05%	0.06	0.01%		
Other Rigid Plastic Packaging		X	Maybe	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%		
Durable Plastic Products		X	Maybe	5.39	1.28%	8.69	1.77%	1.78	0.39%	3.78	0.70%	5.82	1.21%		
Total Recyclable Plastics				14.26	3.39%	22.74	4.64%	16.18	3.59%	11.55	2.14%	18.99	3.94%		
Total Potentially Divertible				5.41	1.29%	8.69	1.77%	2.06	0.46%	4.03	0.75%	5.88	1.22%		
Total Non Recyclable Plastics				4.93	1.17%	7.13	1.45%	33.97	7.54%	12.36	2.29%	10.10	2.10%		
Total Plastics				24.60	5.84%	38.56	7.87%	52.21	11.59%	27.94	5.18%	34.97	7.26%		
4.METALS															
Aluminum Food and Beverage	✓		✓	4.03	0.96%	5.48	1.12%	3.40	0.75%	4.07	0.75%	7.36	1.53%		
Other Aluminum	✓		✓	0.50	0.12%	1.88	0.38%	0.86	0.19%	0.71	0.13%	0.63	0.13%		
Steel Food and Beverage	✓		✓	1.46	0.35%	4.59	0.94%	1.08	0.24%	2.43	0.45%	1.97	0.41%		
Other Steel		X	✓	0.33	0.08%	1.73	0.35%	0.91	0.20%	0.89	0.16%	1.12	0.23%		
Other Metal		X	✓	0.62	0.15%	1.86	0.38%	0.23	0.05%	1.87	0.35%	1.36	0.28%		
Total Recyclable Metals				5.99	1.42%	11.95	2.44%	5.34	1.19%	7.21	1.34%	9.96	2.07%		
Total Potentially Divertible				0.95	0.23%	3.59	0.73%	1.14	0.25%	2.76	0.51%	2.48	0.52%		
Total Non Recyclable Metals				0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%		
Total Metals				6.94	1.65%	15.54	3.17%	6.48	1.44%	9.97	1.85%	12.44	2.58%		
5.GLASS															
Clear and Coloured Glass, Beverage and non-Beverage	✓	✓	✓	4.94	1.17%	19.27	3.93%	2.31	0.51%	6.24	1.16%	10.40	2.16%		
Other Glass		X	X	0.65	0.15%	2.52	0.51%	0.36	0.08%	0.37	0.07%	0.82	0.17%		
Total Recyclable Glass				4.94	1.17%	19.27	3.93%	2.31	0.51%	6.24	1.16%	10.40	2.16%		
Total Potentially Divertible				0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%		
Total Non Recyclable Glass				0.65	0.15%	2.52	0.51%	0.36	0.08%	0.37	0.07%	0.82	0.17%		
Total Glass				5.59	1.33%	21.79	4.45%	2.67	0.59%	6.61	1.22%	11.22	2.33%		
6.HOUSEHOLD HAZARDOUS WASTE															
HHW		X	✓	25.95	6.16%	0.00	0.00%	0.07	0.02%	0.00	0.00%	1.18	0.25%		
Sharps		X	✓	0.00	0.00%	0.03	0.01%	0.00	0.00%	0.00	0.00%	0.00	0.00%		
Other		X	✓	0.57	0.14%	4.07	0.83%	5.60	1.24%	0.28	0.05%	0.10	0.02%		
Total Potentially Divertible				26.52	6.30%	4.10	0.84%	5.67	1.26%	0.28	0.05%	1.28	0.27%		
7.WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT															
Computer / IT / Appliances		X	✓	8.52	2.02%	9.90	2.02%	0.55	0.12%	0.26	0.05%	0.03	0.01%		
TV & Audio Equipment		X	✓	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.43	0.08%	1.01	0.21%		
Total Potentially Divertible				8.52	2.02%	9.90	2.02%	0.55	0.12%	0.69	0.13%	1.04	0.22%		
8.ORGANICS															
Edible Food Waste		X	✓	112.91	26.82%	112.04	22.86%	168.33	37.35%	123.33	22.85%	187.29	38.91%		
Non-Edible Food Waste		X	✓	18.73	4.45%	84.85	17.31%	51.30	11.38%	46.06	8.53%	35.59	7.39%		
Non-Food Organic Waste		X	✓	16.27	3.86%	38.02	7.76%	24.11	5.35%	174.98	32.42%	55.97	11.63%		
Yard Waste		X	✓	0.34	0.08%	13.31	2.72%	3.08	0.68%	1.22	0.23%	1.02	0.21%		
Other		X		11.18	2.66%	0.84	0.17%	0.34	0.08%	0.00	0.00%	0.74	0.15%		
Total Potentially Divertible				159.43	37.87%	249.06	50.82%	247.16	54.85%	345.59	64.03%	280.61	58.29%		
9.OTHER MATERIALS															
Rubble, Aggregate and Ceramics		X	✓	0.00	0.00%	0.31	0.06%	0.00	0.00%	0.24	0.04%	1.17	0.24%		
Other Waste		X	X	140.17	33.29%	95.89	19.56%	47.31	10.50%	93.17	17.26%	86.19	17.90%		
Total Potentially Divertible				0.00	0.00%	0.31	0.06%	0.00	0.00%	0.24	0.04%	1.17	0.24%		
Total Other Materials				140.17	33.29%	96.20	19.56%	47.31	10.50%	93.41	17.26%	87.36	17.90%		
Total All Materials															
Total Recyclable Materials				74.43	17.68%	108.94	22.23%	109.36	24.27%	80.25	14.87%	91.81	19.07%		
Total Potentially Divertible				200.83	47.70%	275.65	56.24%	259.64	56.94%	353.59	65.51%	292.46	60.78%		
Total Non Recyclable Materials				145.75	34.62%	105.54	21.53%	81.64	18.12%	105.90	19.62%	97.11	20.17%		
Total All Materials				421.01	100.00%	490.13	100.00%	450.64	99.32%	539.74	100.00%	481.38	100.00%		

Example Analysis

Municipality Aggregate Waste Stream

■ Recyclables
 ■ Organics
 ■ HHW
 ■ Electronics
 ■ Waste





Example 1- Conserve LF Space

- Audit Objective: Decrease Divertibles into Landfill
- Baseline Audit: PPP 25%, Organics, 50%, Other 10%
- Waste Planning Next Steps:
 - Enact SWM Planning to Identify Options to address Divertible items
 - Evaluate Options for probability of success & cost (include P&E efforts)
 - Budget for Option(s) implementation
 - Implement Option(s)
 - Conduct Follow-up Audits to measure and report on impact (success)

Example 1 - Continued



- Local Landfill with 5-years remaining air space
 - Option 1: Increase PPP recovery by 25-75% over a 3 year period
 - Option 2: Implement Organics program to recover 50% by year 3
 - Support Options with expanded P&E outreach and audits
- Each Option requires specific actions and budget
- Ideal Outcome / Scenario:
 - Diversion achieves 50% reduction in landfilled tonnes
 - No new costs to Municipality as PPP covered by Provincial EPR
 - Organics program Capx and Opx requires funding, but costs offset by landfill airspace savings
 - Landfill life extended by +2 years... plus environmental and social benefits



Example 2 – Transfer Hauling

Same Aspects as Example 1

- Audit Objective: Quantify Divertible Items Currently Being Transferred out-of-Municipality into Landfill
- Baseline Audit: PPP 25%, Organics, 50%, Other 10%
- Waste Planning Next Steps:
 - Enact SWM Planning to Identify Options to address Divertible items
 - Evaluate Options for probability of success & cost (include P&E efforts)
 - Budget for Option(s) implementation
 - Implement Option(s)
 - Conduct Follow-up Audits to measure and report on impact (success)



Example 2 - Continued

Same Aspects as Example 1

- Option 1: Increase PPP recovery by 25-75% over a 3 year period
- Option 2: Implement Organics program to recover 50% by year
- Support Options with expanded P&E outreach and audits
 - Each Option requires specific actions and budget
- Ideal Outcome / Scenario:
 - Diversion achieves 50% reduction in “waste” tonnes requiring transfer
 - Thus, 50% reduction in haulage and out-of-Municipality tipping fees
 - Organics program Capx and Opx requires funding, but costs offset by lower haulage and disposal charges
 - Plus, environmental and social benefits



Waste Audit ROI Example

Item	Description	Value	Unit
A	"Source" Waste Stream	1,000	MT / yr
B	Hauling Cost (to landfill)	\$ 100	per MT
C	Disposal Cost (at landfill)	\$ 100	per MT
D = (A*B) + (A*C)	Annual Cost to "Source"	\$ 200,000	Baseline yr
E	Baseline Waste Audit Cost	\$ 40,000	2x / yr
F	Waste Stream Analysis: PPP % in Waste Stream	25%	Baseline yr
G	PPP Landfilled	250	Baseline yr
H = (B*G) + (C*G)	PPP Landfilling Cost to "Source"	\$ 50,000	Annual
I	PPP Recovery Option Implementation by "Source"	\$ 20,000	Baseline yr
J = (E+I)	Baseline Cost to "Source"	\$ 60,000	Baseline yr

Option(s) Implemented to Increase PPP Recovery from Waste Stream				
K	Low Recovery:	25% Recovery of PPP	63	MT / yr
L	Medium Recovery:	50% Recovery of PPP	125	MT / yr
M	High Recovery:	75% Recovery of PPP	188	MT / yr
N	Maximum Recovery:	100% Recovery of PPP	250	MT / yr

Haulage & Disposal Cost Savings to "Source" Implementing Option(s) to Increase PPP Recovery				
O = (B*K)+(C*K)	Low Recovery	\$ 12,500	Annual	
P = (B*L)+(C*L)	Medium Recovery	\$ 25,000	Annual	
Q = (B*M)+(C*M)	High Recovery	\$ 37,500	Annual	
R = (B*N)+(C*N)	Maximum Recovery	\$ 50,000	Annual	

Conducting Waste Audits, ROI Calculation				
S	Year 2 Follow-up Waste Stream Analysis	\$ 40,000	2x / yr	
T = (J+S)	Baseline Year + Year 2 Costs to "Source"	\$ 100,000	2-year Cost	
U = (T/O)	ROI, Low Recovery	8.0	Years	
V = (T/P)	ROI, Medium Recovery	4.0	Years	
W = (T/Q)	ROI, High Recovery	2.7	Years	
X = (T/R)	ROI, Maximum Recovery	2.0	Years	

Using this Fictitious Scenario, the capital outlay to perform a Waste Audit would be recoverable within 2 – 8 years

Incorporating the recovery rate of other materials from the Waste Stream into the calculation would lower the ROI



**CHANGE
AHEAD**

Change is Inevitable

- Waste Audits have historically, perhaps, been viewed as simply a cost item in an annual budget; or a “nice-to-do”
- Regulations, GHG Management, Environmental Stewardship
- Waste Audits are a fundamental component of the planning process and necessary for informing all aspects of effective and efficient design and delivery locally, provincially, and federally
- When viewed within the context of short- and long-term business planning, Waste Audit data is invaluable including quantifying Return-On-Investment

Change is Inevitable

- As the expression goes, *“if it’s not measured, it can’t be managed”*
- By developing a comprehensive understanding of your waste streams, informed and fiscally responsible actions can be taken
- Waste Audits are not a cost item: they lower costs, reduce risks, improve efficiencies, increase educational awareness, and contribute to the circular economy

Thank You

Shaun Spalding, C.E.T., EP
Senior Waste Management Specialist
1.204.399.0140
sspalding@enviro-solutions.ca