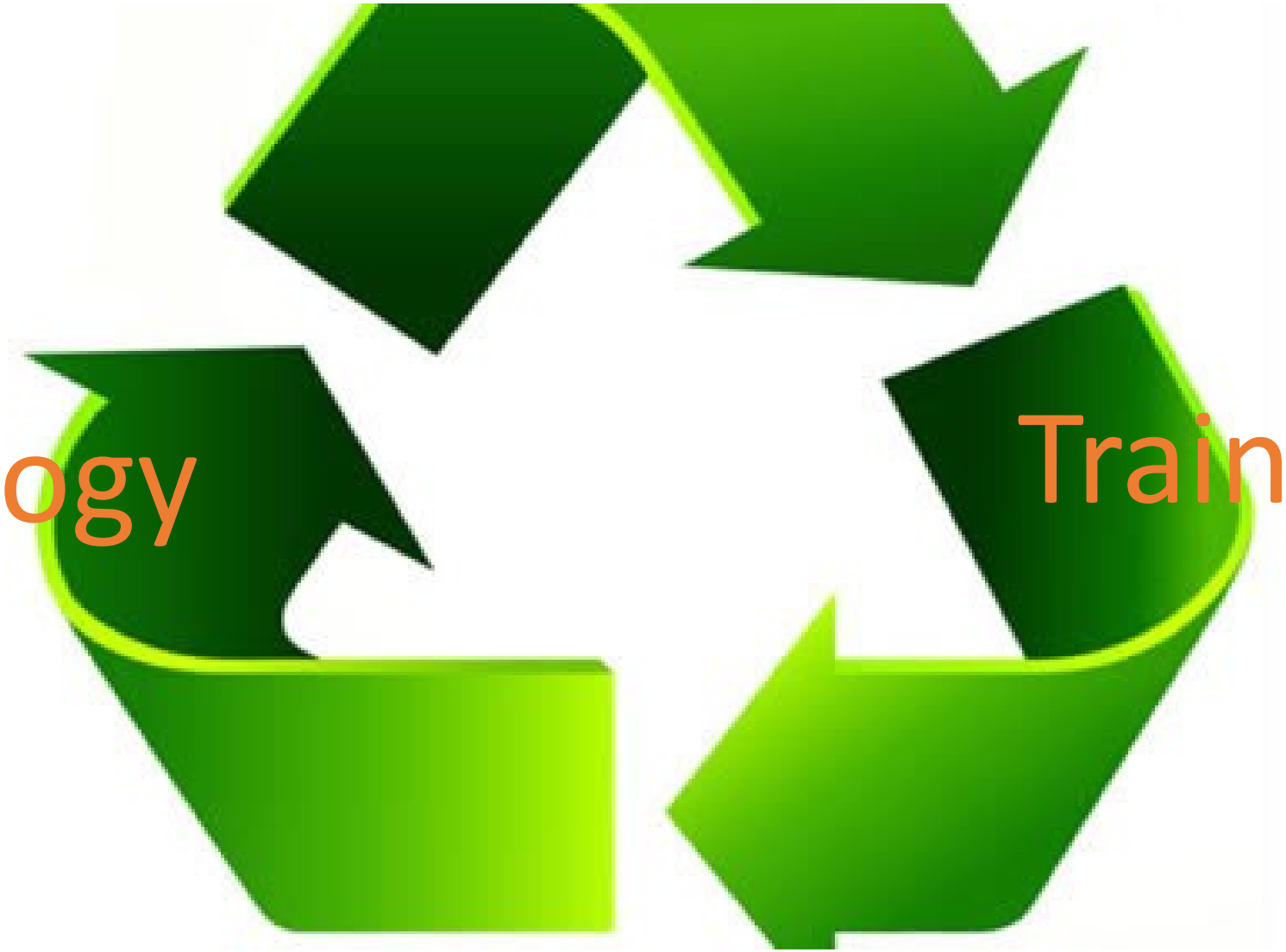
Sanitation Solutions 360



Technology

Training

Metrics

Sanitation Solutions 360 Team

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Special Thanks to Nathan Gingrich for his coding support on the IoT solution!

Our Philosophy & Goals …

- Sanitation Solutions 360 is focused on a holistic approach to improving sanitation.
- Our goal is to 1st limit the items that go to the landfill, therefore we provide recycling training and solutions to encourage recycling and composting.
- Lastly the items that cannot be recycled or used in compost, then must be dumped. The Internet of Things (IoT) solution proposes a more efficient and greener way of managing waste.

Agenda …

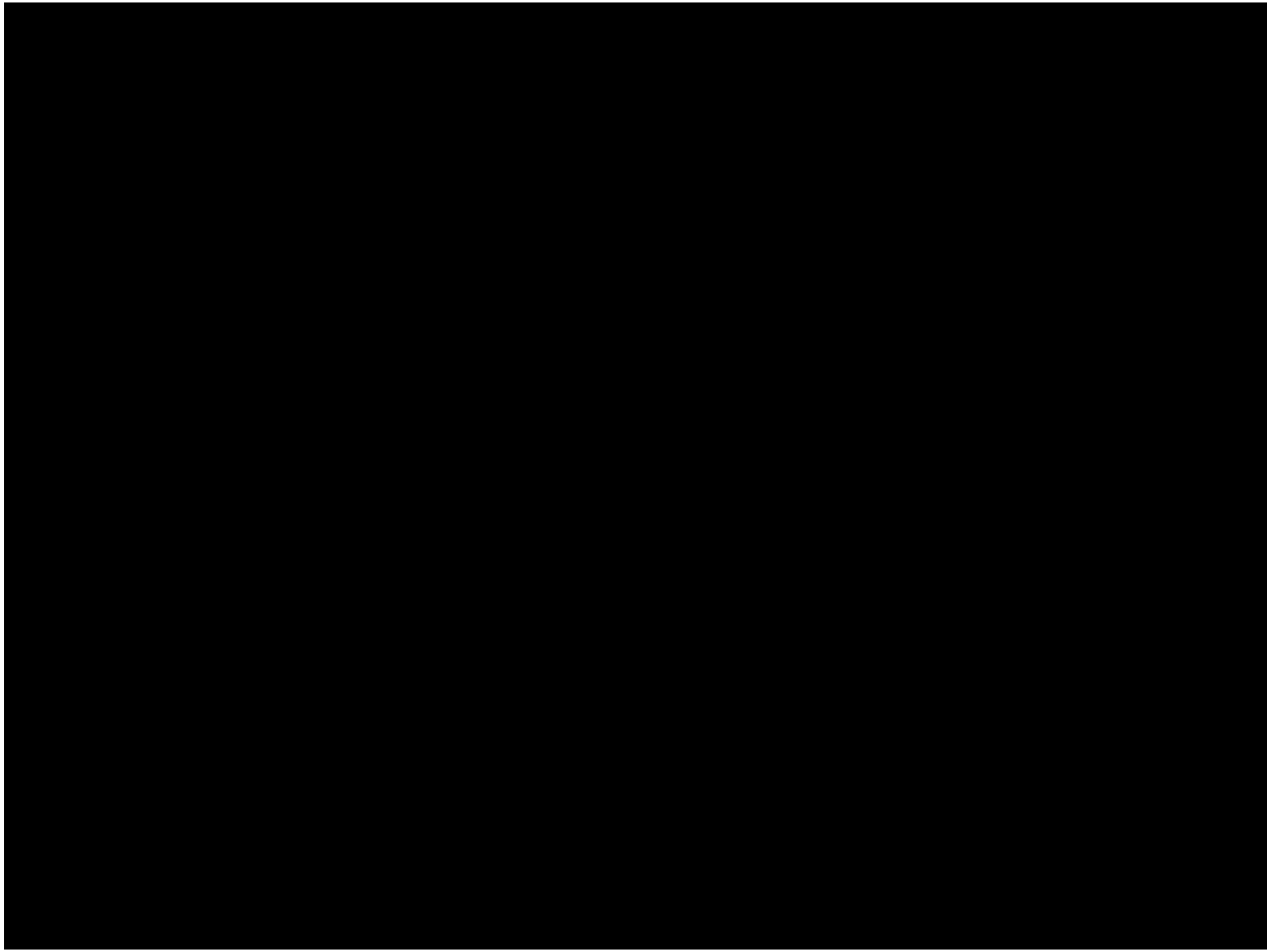
1. **In our video you will see how we will change human behavior by providing an Interactive 3D Recycling game.**

2. **Next we use technology to make waste management more efficient and green.**

3. **We believe that data talks; so we have incorporated metrics to measure the impact our solutions have and will make this data available via the Dallas Open Data website.**

Problem – people do not fully understand what or how to recycle; this leads to low recycling statistics and cost the city money!

Recycle Right!



An Interactive Recycling Training Game!

Waste Management now - Problem

Currently dump trucks are sent out on a scheduled basis (weekly). *What if the dumpster is only 25% full?* This causes WASTE in many forms and is not a green approach!

1. Human Resource Waste - Sending people out to these specific dumpsters that may not need immediate servicing,

2. Wasting $expensive, Diesel fuel, these trucks get only 5 miles per gallon!

3. Therefore, it's also a waste of Energy!

More Problems

4. adding more traffic congestion, and wear & tear to our roads,

5. Adding more miles, wear & tear/maintenance costs to the dump trucks,

6. Creating more risk and costs for insuring these expensive vehicles,

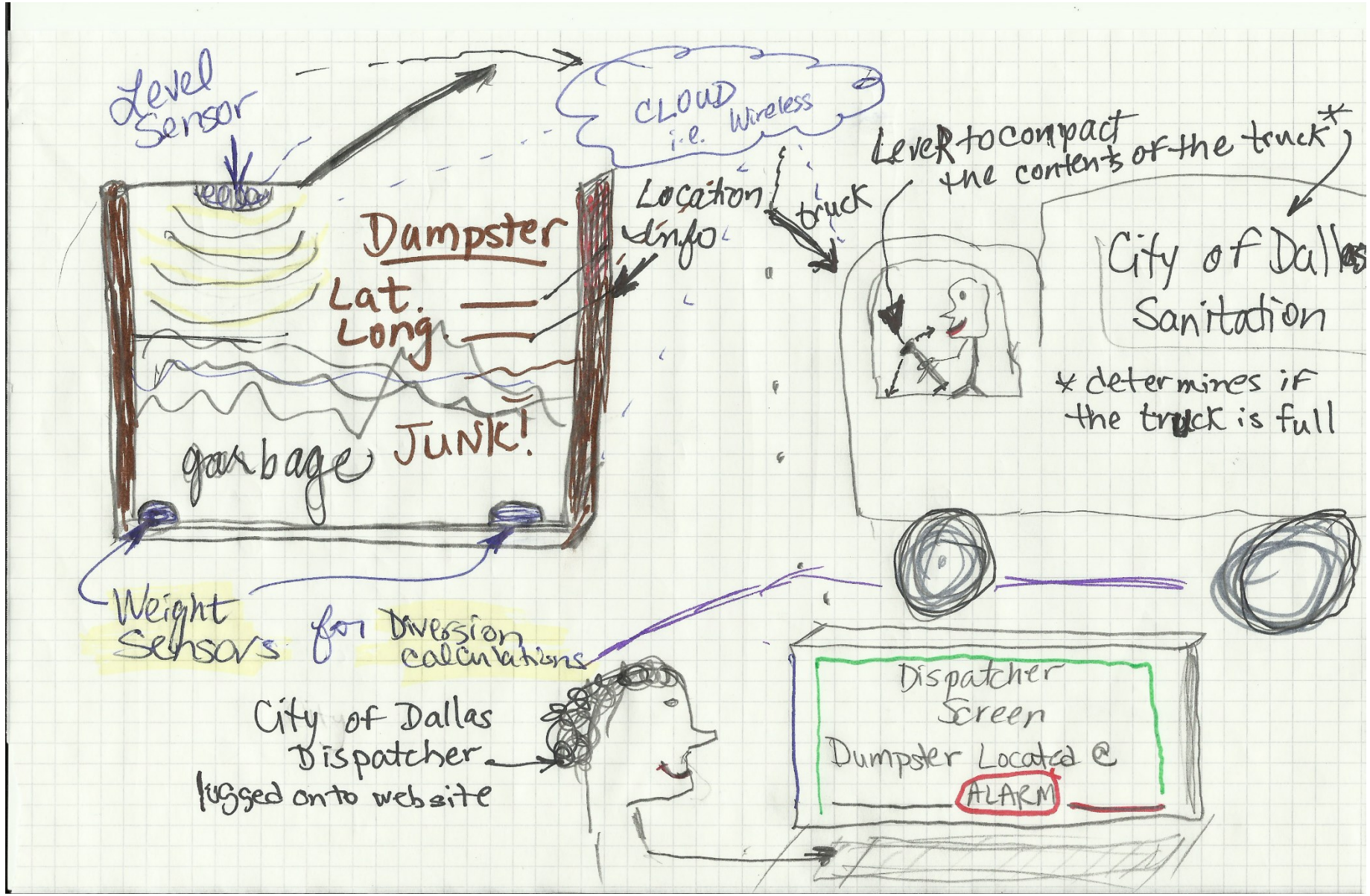
7. adding unnecessary pollution to the air

Why not collect the **MAXIMUM** amount of waste, while **saving money**, **resources** and being **GREEN**?

Solution 1: Just In Time Dumping

– an Internet of Things Integrated Solution for more efficient waste management!

Solution 1: Just In Time Dumping in Action!



JIT Dumping Prototype

Just In Time Dumping Solution 1 slide 1

- Implement & Integrate a **Level Detecting sensor** in all of the City of Dallas's dumpsters that can detect when the dumpster is at 80% (or other specified amount) full. This sensor will also indicate a time stamp of when this event occurred. [Sensor 1]

- Implement & Integrate a wireless **GPS/location sensor for all the dumpsters**, this can tell the sanitation dispatch employees and dump truck drivers where the dumpsters are located; also useful if these dumpsters are ever moved or stolen. [Sensor 2]

- These two sensors will provide the **location of the dumpster and the time and date that the sensor triggered that the dumpster is xx% full.**

- The Dumpster xx% full sensor will send an Alert to the CoD sanitation dispatch team, so that they can schedule a dumpster servicing.

Just In Time Dumping Solution 1 slide 2

- By using the **GPS sensor in the dump trucks**, the Sanitation dispatcher can determine which dump truck currently out in the field, is closest to that Alarmed Dumpster location. [Sensor 3]
- The dump trucks used by the CoD have a lever that the operator pushes/pulls to compact the contents of the trash receptacle. When the range of motion of this lever becomes less, this indicates that the trash receptacle is becoming fuller. There can be a **range of motion sensor on this lever** that can detect if the CoD dump truck has enough room available to hold the contents of another dumpster. [Sensor 4]
- If the range of motion sensor indicates that the dump truck has room, and that CoD dump truck is close to the dumpster, then the dispatcher can contact that crew and tell them to go to that dumpster for emptying.
- If the closest CoD dump truck is too full to accommodate another dumpster load, then the CoD dispatcher can check the next nearest dump truck.

Solution 2: - Diversion Scoreboard - Intro

- Diversion is a sanitation term which describes how much “waste” is diverted from a landfill. This is a percentage that’s calculated using weight.
- The City of Dallas plans to have two types of diversion calculations here in Dallas, one will be for recyclables, and the other will be for “organics” used to create compost.
- Three types of dumpsters will be used, one will be for things that the city of Dallas can recycle, one will be for organic waste such as spent coffee grounds, and parts of veggies you remove before you eat them and the last dumpster will be for items that truly need to go to the landfill for disposal. Here is how the diversion rates will be calculated:

Solution 2: - Diversion Scoreboard - Calc

- Add the weight of all 3 types of dumpsters, notice the load sensors on the bottom corners, TotalDisposedWeight = Recyclables + Organics + Trash

Recycle Diversion % = (Weight of Recyclables ÷ TotalDisposedWeight) x 100

Compost Diversion % = (Organic Waste ÷ TotalDisposedWeight) x 100

Solution 2: - Diversion Scoreboard

Each dumpster will have:

1. an indicator saying what type of contents it will contain
2. load sensors located at the bottom, near each corner to calculate the weight of the contents of this dumpster,
3. its latitude and longitude and associated with a business or manager of the dumpster

Solution 2: - Diversion Scoreboard

1. The final weight reading will be saved and the diversion calculations completed and uploaded to a database (as well as a timestamp & the owner and address of this dumpster) right before the dumpster contents are taken.

   - To detect this event we can use the fact that the weight measurement within 15 minutes of this emptying timestamp will be much lower than the previous weight reading 15 minutes earlier.

Solution 2: - Diversion Scoreboard, Open Data

2. These calculated diversion rates and their associated dumpster owners will then be automatically uploaded to the Dallas Open Data portal, https://www.dallasopendata.com Companies that do say they're green and want to show users confirmation of this, can link to this site.
3. Since Diversion calculations are based on percentage, a small company can have better diversion numbers than a big company. This shows that the management and employees care about the city that they're located in and truly practice "green" & sustainable methods.

Solution 2: - Diversion Scoreboard, *Why?*

- Consumers base their buying decisions on many things and if companies do embrace keeping our environment as healthy as possible, as well as taking action towards that goal (not just rhetoric), when this information is posted to the Dallas Open Data portal, consumers view this and can decide which shops and businesses they want to support.

- Businesses and organizations who participate in this Open Data Diversion Scoreboard postings can use it in their marketing to attract more business, funding and win awards.

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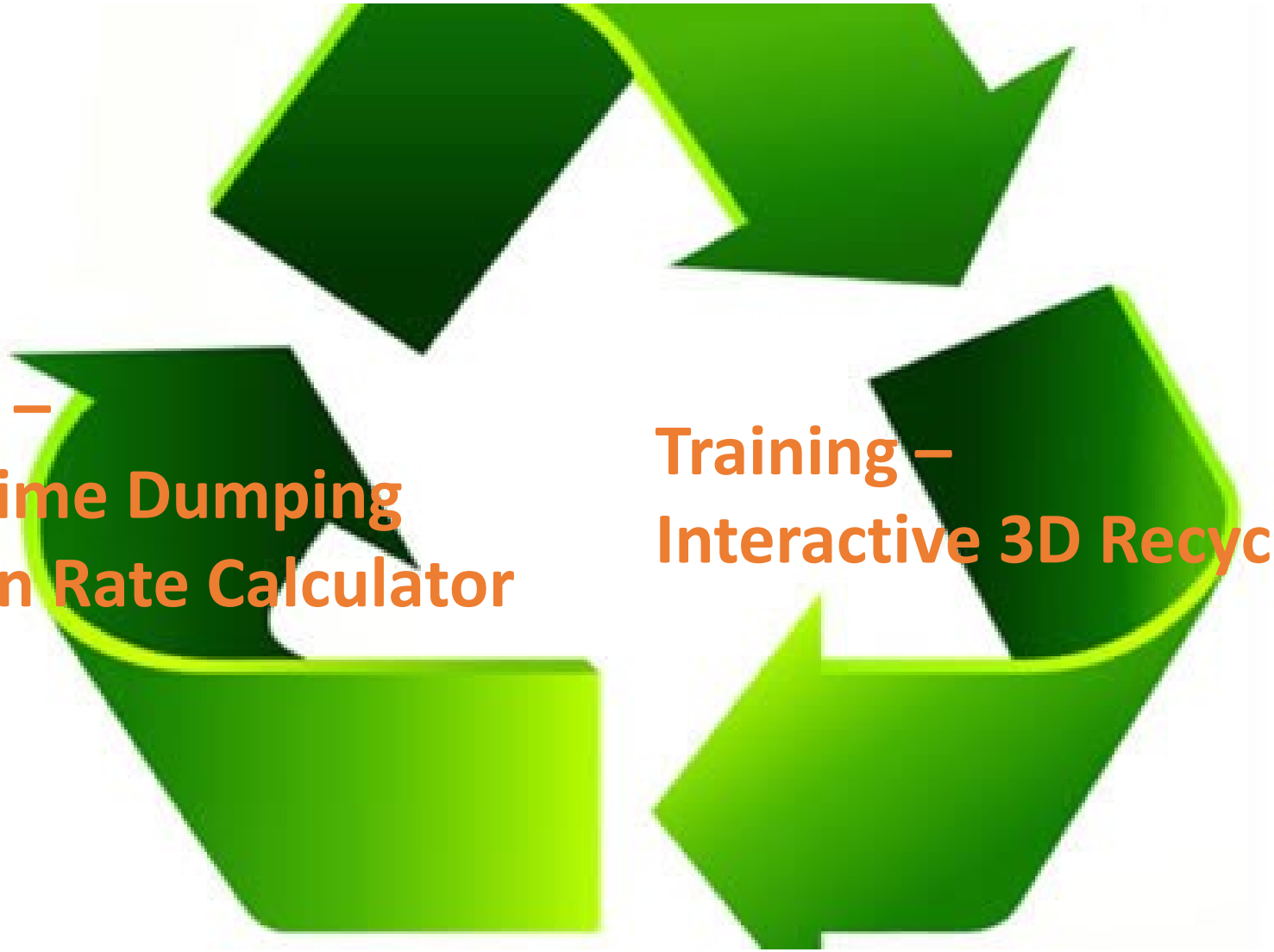

Technology –

1. **Just In Time Dumping**
2. **Diversion Rate Calculator**

Training –
Interactive 3D Recycle Game

Metrics