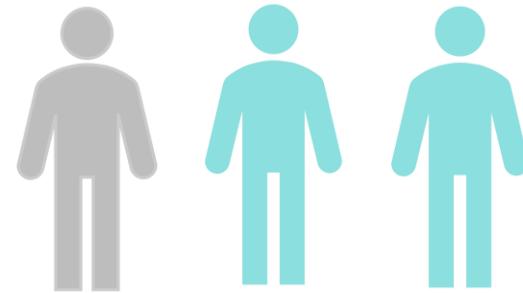


Bin.AI- Redefining the way one throws waste  
**ParamountAI**

# PROBLEM STATEMENT



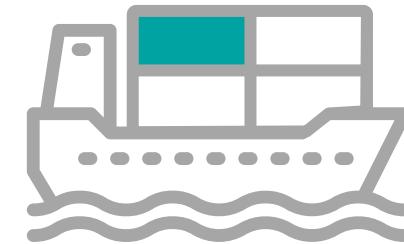
**1 in 3**

PEOPLE CONTAMINATE  
RECYCLABLE WASTE



**1 in 5**

OF THE RECYCLABLE  
WASTE IN LANDFILL



**25%**

OF THE TOTAL  
WASTE IS EXPORTED

# WASTE CRISIS

Vox

America's new recycling crisis,  
explained by an expert

For 30 years, China t

By Micaela Marini Higgs | Apr 2, 2



Canadian trash aga  
landfills

CNN

Duterte threatens war again  
over trash shipped to Philippines



EDMONTON JOURNAL

News Sports Opinion Business Arts Life

Local News

## COVID-19: More recyclables headed to city landfills due to reduction in sorting staff

Dustin Cook

April 9, 2020 • 3 minute read

were so contaminated with garbage the materials could not be recycled.

recycling wrong, and it's

ina

L POST

ers of garbage,

e labelled as recyclables but

# IMPACT OF RISING LANDFILLS ON BUSINESSES



**INCREASING  
TAXES**



**CORPORATE SOCIAL  
RESPONSIBILITY**



**GOVERNMENT  
REGULATIONS**



Reasons for the businesses to be concerned about rising landfills



# Solution

# BIN.AI DESIGN



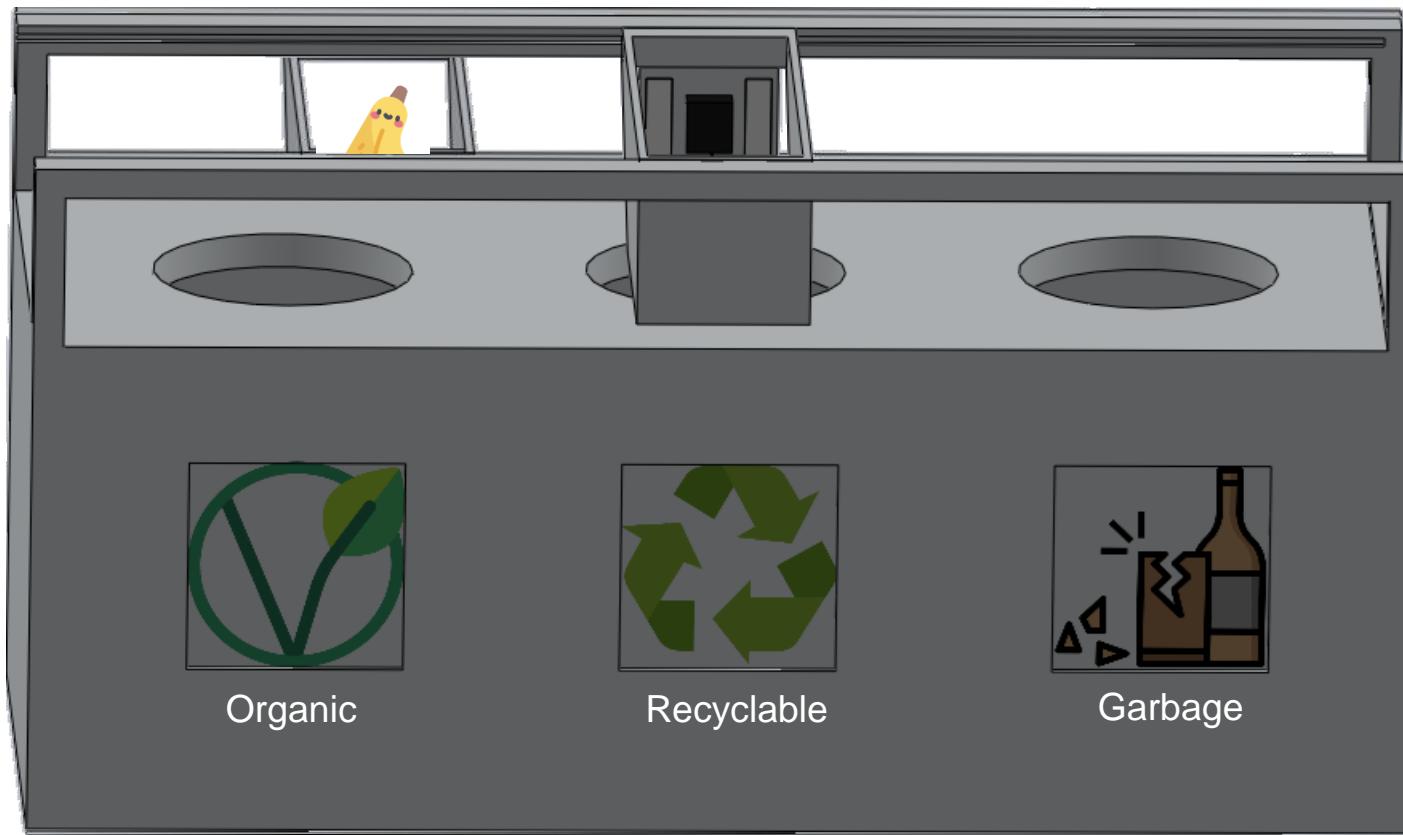
Improving waste diversion by 27% via intelligent segregation of waste

# BIN.AI DEMO



# DESCRIPTION OF SOLUTION

3



The Bin.Waster is designed to be the Bin Master in the initial project section



# Behind the Scenes

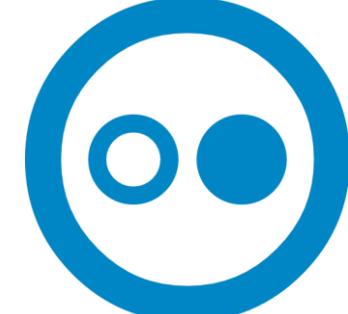
# DATASET COLLECTION



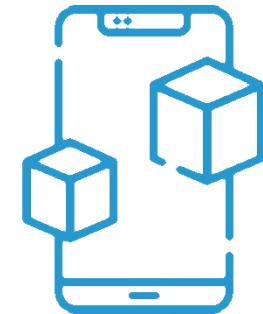
GITHUB



WEB-SCRAPING



FLICKR API

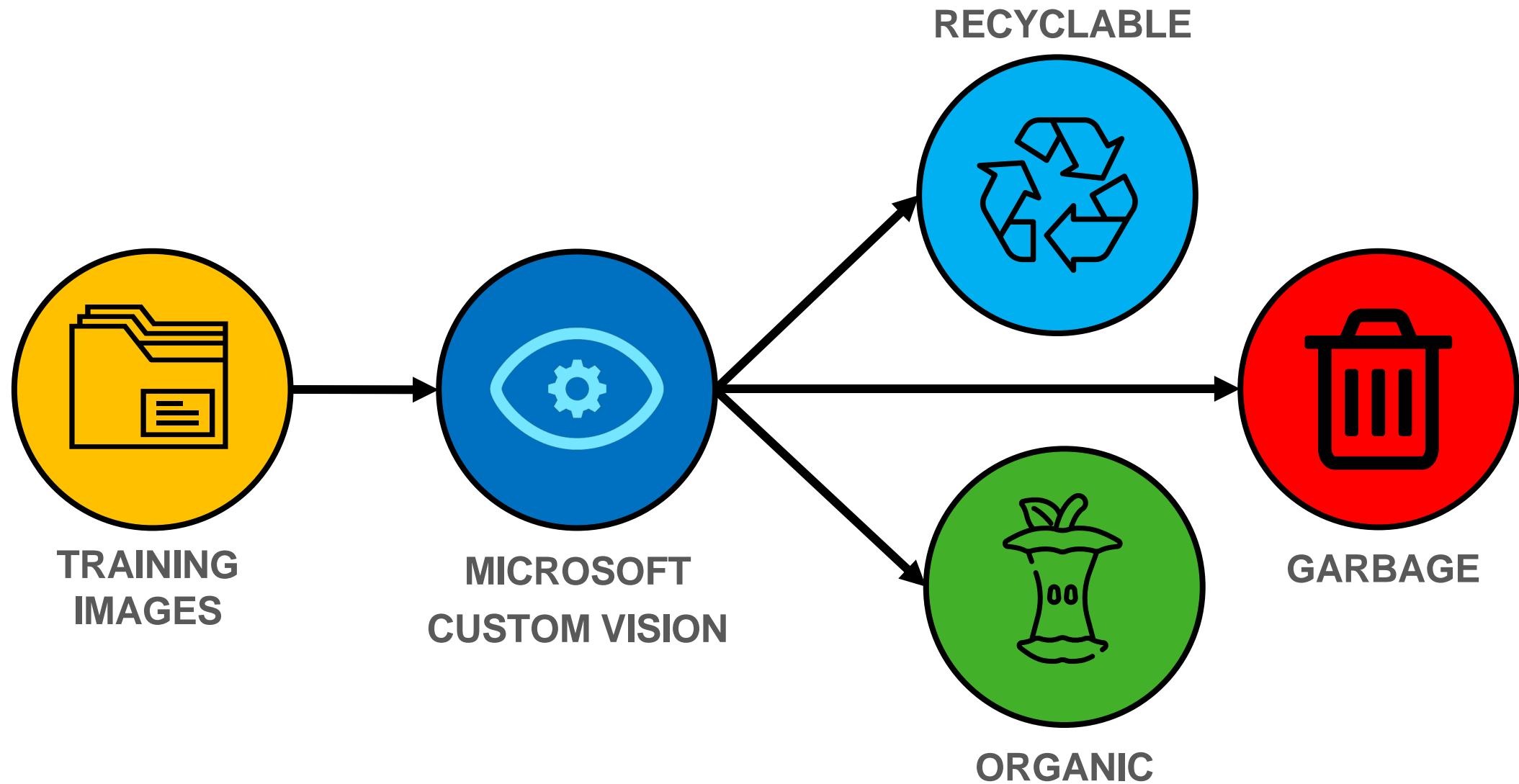


AUGMENTATION

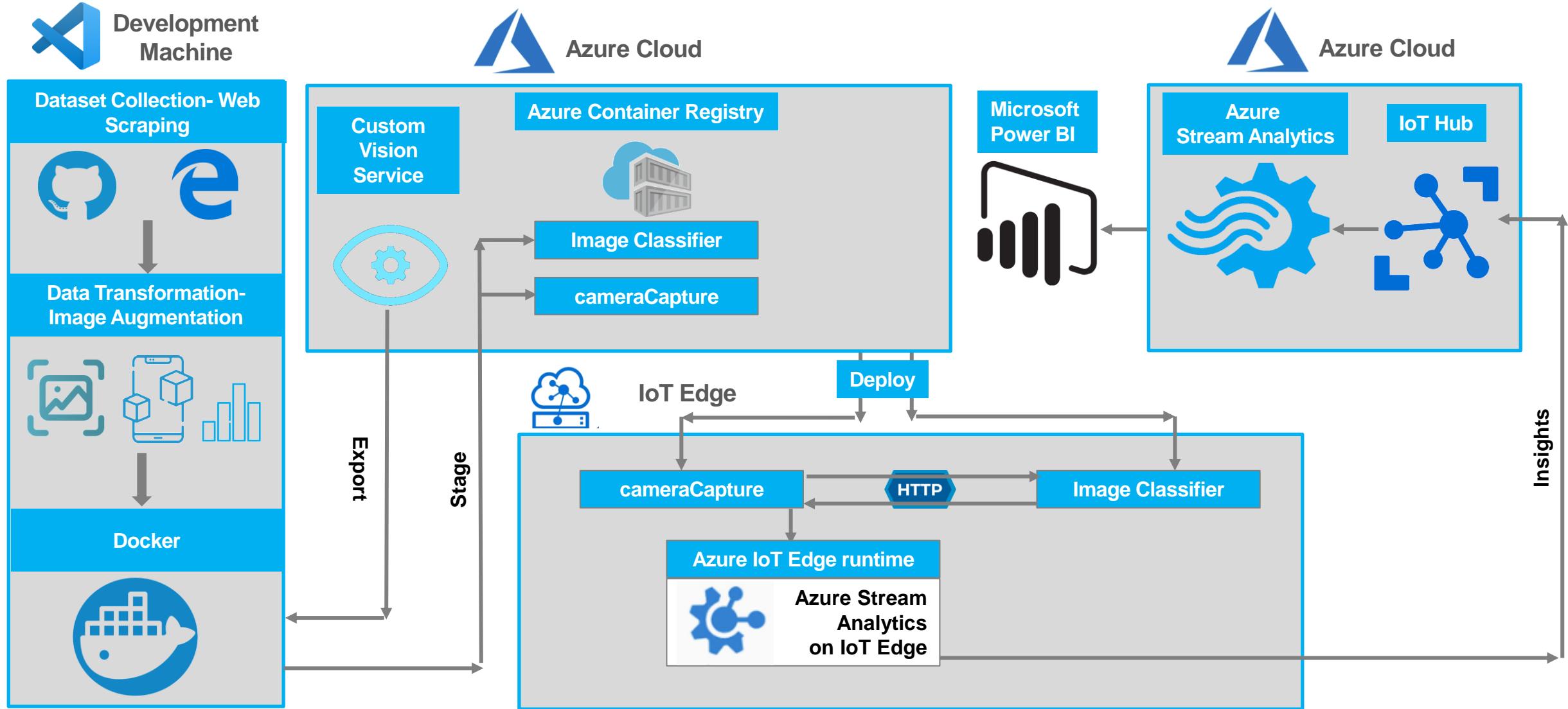
35,204

IMAGES FOR RECYCLIC,  
GARBAGE AND ORGANIC WASTE

# AI MODEL



# SOLUTION'S ARCHITECTURE



# BI TOOL



LOW COST ASSET  
TRACKING



REDUCED OPERATION  
AND MAINTENANCE COST



OPTIMIZE WASTE  
COLLECTION ROUTINES



REDUCE FUEL CONSUMPTION  
AND CO2 EMISSIONS

# Business Value



# BENEFITS OF THE APPROACH

## Clientele Cost Analysis for Disney World Florida

### ANNUAL GARBAGE DISPOSAL COST SAVINGS



**\$5.3**  
**MILLION**



### ANNUAL LANDFILL TIPPING FEES SAVINGS



**\$2.5**  
**MILLION**

**~\$7.8 MILLION**

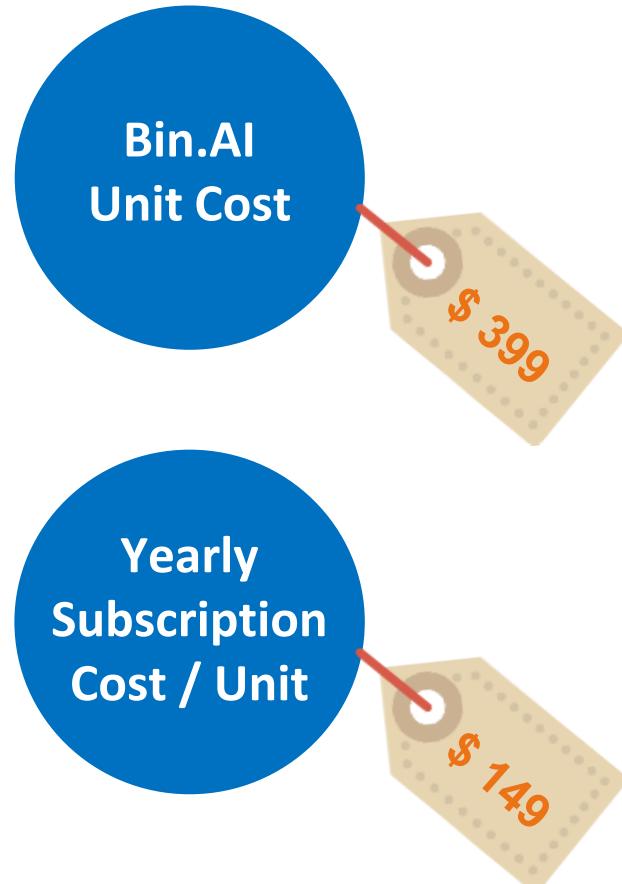
*Annual Savings for Disney World Florida*

**“Each percentage point decrease in contamination could lower recycling costs in Toronto by \$600,000 to \$1 million a year”**

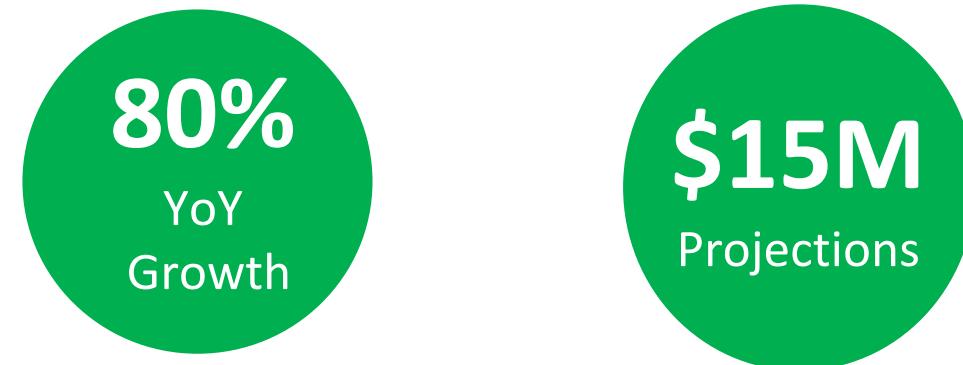
-Jim McKay, general manager of solid waste management for the City of Toronto.

# BUSINESS MODEL

## BUSINESS MODEL



## REVENUE PROJECTIONS



# MARKET SIZE



bp



Ontario: \$3.4 Million

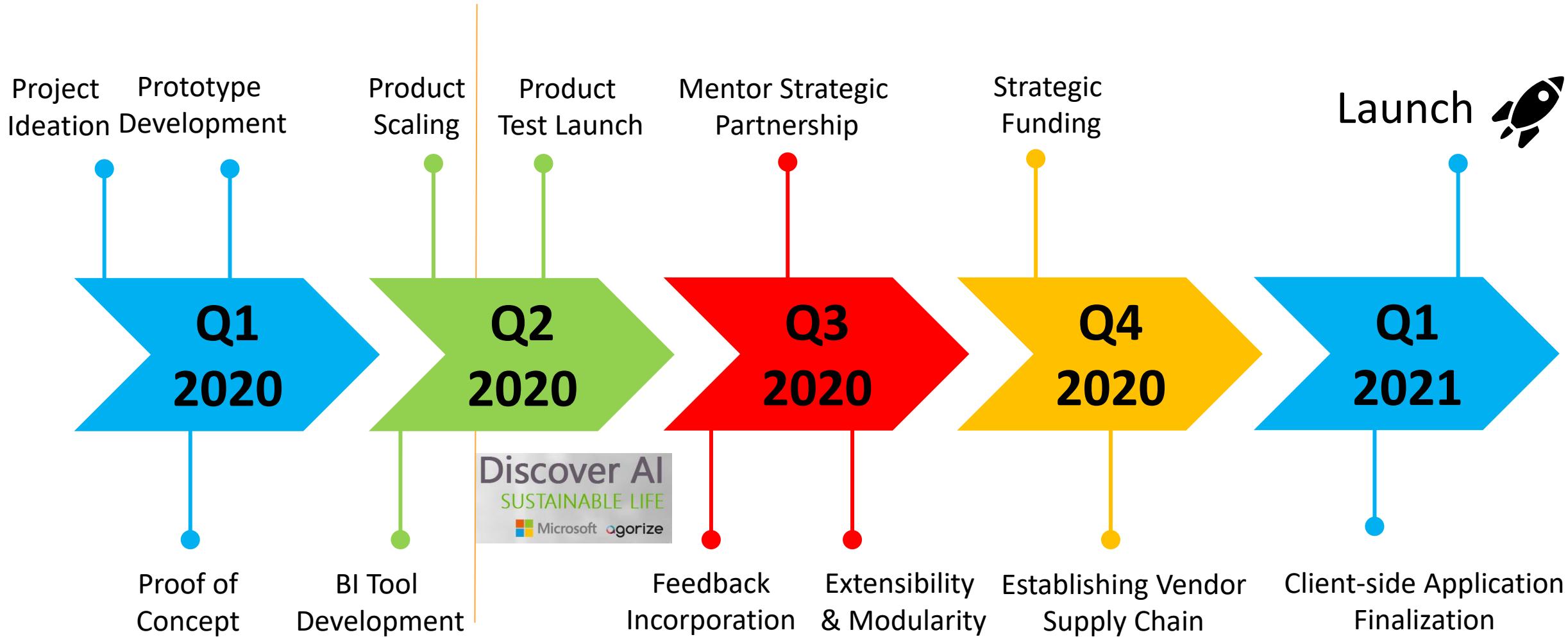


Canada: \$9.3 Million

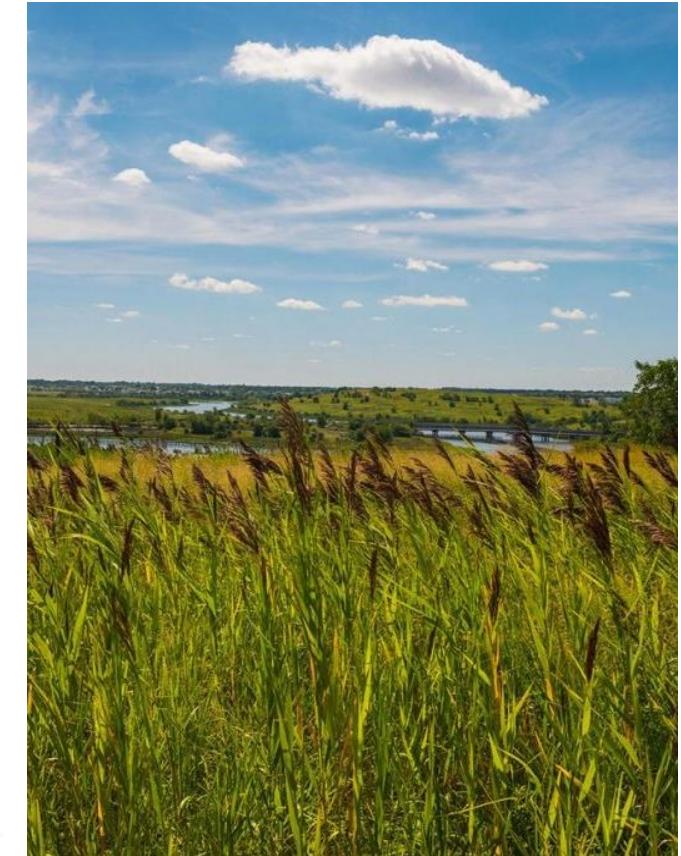
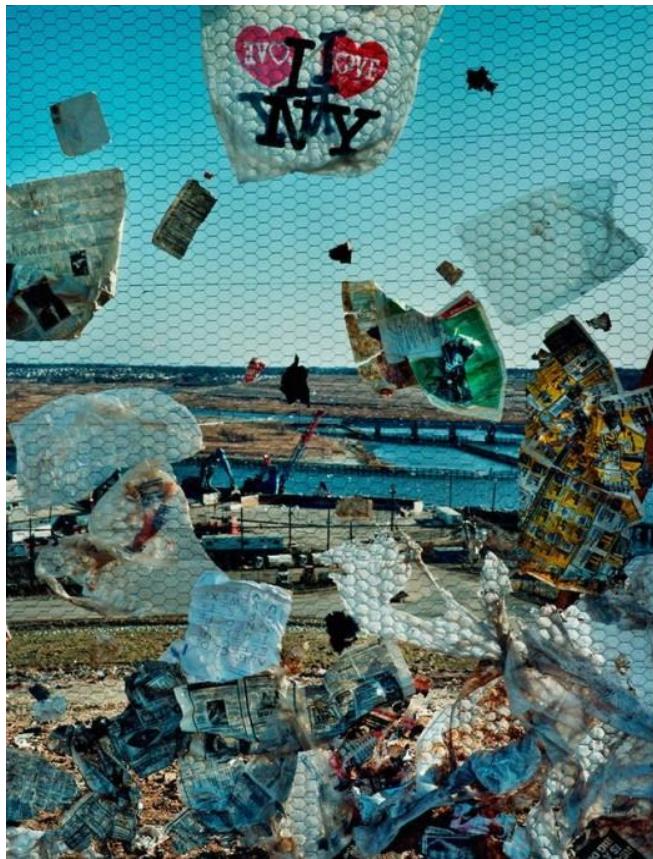


World: \$302 Million

# TIMELINE



# FUTURE IS IN YOUR HANDS



# TEAM MEMBERS



Viramgama  
Nikunj  
26

Data  
Analytics

#DataMaster



Iyer  
Aakash  
25

Finance &  
Management

#NumberCruncher



Gupta  
Vaibhav  
25

Mechatronics &  
Computer Vision

#TheTechie



Vedula  
Ganesh  
25

Advanced  
Manufacturing

#OperationsGuy

# Thank You

*Don't wait too much until we waste so much*

# APPENDIX

Disney World Florida Facts	
Area	27,258 acres
Visitors	52 million/ year
Resorts	36
Cabins	409
Hotel Rooms	30,000
Campsites	799
DVC units	3,293
Dining Outlets	300

Annual Organic Waste Generation	
4.5 million pounds	2250 tons

Total Annual Savings	
Garbage Disposal Fees	\$ 5,347,084
Landfill Tipping Fees	\$ 2,488,219

Biogas Generation 2018	
2,250	Tons
16,109	MWh
\$ 451,027	\$
28	MWh/\$

Biogas Generation 2018	
16,726	Tons
119,751	MWh
\$ 3,352,834	\$

Current Cost Incurred						
Trash Profile	Tons/ year	Garbage Disposal Fees per ton	Garbage Disposal Fees	Landfill Tipping Fees	Annual Landfill Tipping Fees	Total Cost
Garbage	61,600	189.00	\$ 11,642,400	90.00	\$ 5,544,000	\$ 17,186,400
Debree	92,400	233.00	\$ 21,529,200	90.00	\$ 8,316,000	\$ 29,845,200
Recyclable	16,800		\$ -		\$ -	\$ -
Organic	2,250		\$ -		\$ -	\$ -
Contaminated Recyclable	7,200	207.00	\$ 1,490,400	90.00	\$ 648,000	\$ 2,138,400
			\$ 34,662,000		\$ 14,508,000	\$ 49,170,000
Main Reference	Reedy Creek Improvement District Annual Report 2016, 2017, 2018					

Cost incurred after Bin.AI deployment						
	Tons/ year	Garbage Disposal Fees per ton	Annual Garbage Disposal Fees	Landfill Tipping Fees	Annual Landfill Tipping Fees	Total Cost
Garbage	40,721	189.00	\$ 7,696,292	90.00	\$ 3,664,901	\$ 11,361,192
Debree	92,400	233.00	\$ 21,529,200	90.00	\$ 8,316,000	\$ 29,845,200
Recyclable	29,971		\$ -		\$ -	\$ -
Organic	16,726		\$ -		\$ -	\$ -
Contaminated Recyclable	432	207.00	\$ 89,424	90.00	\$ 38,880	\$ 128,304
			\$ 29,314,916		\$ 12,019,781	\$ 41,334,696

Trash profile change by Bin.AI			
Problem	Percentage	Tons per year	Tons/year Removed by Sorting Bin
Contaminated Recyclable	30%	7200	6768
Recyclable in Garbage	22%	13552	12738.88
Organic in Garbage	25%	15400	14476

# MARKET COMPETITION ASSESSMENT

	Automated Waste Segregation	Sorting At Source	Price	Customizable Design	Smart Monitoring
 <b>BIN.AI</b>	✓	✓	✓	✓	✓
 <b>Bigbelly</b> SMART SOLUTIONS FOR CITIES	✗	✗	✗	✗	✓
 <b>smartbin™</b>	✗	✗	✓	✓	✓
 <b>intuitive</b>	✗	✓	✓	✗	✓

# KEY REQUIREMENTS



**MAXIMUM ACCURACY  
IN WASTE  
SEGREGATION**



**FOCUS ON  
USER PRIVACY**



**EASY TO USE**

# CONCEPT ARCHITECTING

## ROBUSTNESS



Works under all lighting conditions and orientation

## GROWTH CAPABILITY



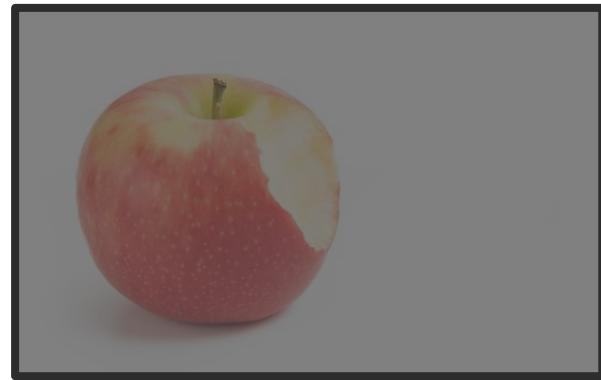
Scope of adding additional features and extensibility

## VISIBILITY



Prediction lights

# DATA PREPROCESSING PIPELINE



INPUT IMAGE



REGION OF  
INTEREST



HISTOGRAM  
EQUALIZATION



AUGMENTATION

# REFERENCES

- <http://jwilson.coe.uga.edu/EMAT6450/Class%20Projects/Major/Teacher's%20Guide%20ROI.pdf>
- <https://archive.epa.gov/wastes/conserve/tools/rogo/web/pdf/amrguide.pdf>
- <https://link.springer.com/article/10.1057/rlp.2010.10>
- <https://www.theguardian.com/sustainable-business/2014/oct/17/disney-world-biogas-food-waste-energy-clean-tech>
- [http://www.teaconnect.org/images/files/TEA\\_268\\_653730\\_180517.pdf](http://www.teaconnect.org/images/files/TEA_268_653730_180517.pdf)
- <https://www.expertmarket.com/commercial-waste/costs>
- <https://www.toronto.ca/services-payments/recycling-organics-garbage/non-residential/fees-set-out-for-businesses/>
- <https://www.theecoexperts.co.uk/trade-waste/recycling>
- <https://www.irbnet.de/daten/iconda/CIB21562.pdf>
- <https://www.thestar.com/news/queenspark/2017/10/04/too-much-of-ontarios-waste-going-to-landfill-enviro-watchdog.html>
- <http://www.themeparktube.com/tpt-channels/rob-plays/how-much-garbage-does-walt-disney-world-produce/>
- <https://www.wastecare.com/Waste-Recycling-Equipment-Applications/Shopping-Centers-Waste-Recycling.htm>
- <https://www.theecoexperts.co.uk/trade-waste/prices>
- [https://www.torontoenvironment.org/toronto\\_and\\_ontario\\_need\\_to\\_broaden\\_thinking\\_on\\_recycling\\_toronto\\_star](https://www.torontoenvironment.org/toronto_and_ontario_need_to_broaden_thinking_on_recycling_toronto_star)
- [https://www.torontoenvironment.orginspectors\\_to\\_help\\_torontonians\\_figure\\_out\\_complicated\\_recycling\\_rules](https://www.torontoenvironment.orginspectors_to_help_torontonians_figure_out_complicated_recycling_rules)

# REFERENCES

- <http://desotobocc.com/department/landfill/landfill-tipping-fees>
- <https://www.hillsboroughcounty.org/en/residents/property-owners-and-renters/trash-and-recycling/trash-and-recycling-fees>
- <https://www.charlottecountyfl.gov/services/solidwaste/Pages/Landfill-Tipping-Fees.aspx>
- <https://www.rcid.org/doing-business/utilities/rate-schedules/>
- <https://magicguides.com/disney-world-statistics/>
- <https://publicaffairs.disneyland.com/environment/waste-reduction/>
- <https://www.wastedive.com/news/what-chinese-import-policies-mean-for-all-50-states/510751/>
- <https://newsroom.carleton.ca/archives/2017/09/21/university-centre-food-court-receives-new-food-choices-and-revamped-recycling-program/>
- <https://www.scientificamerican.com/article/earth-talk-waste-land/>
- <http://www.harvestpower.com/disney-worlds-biogas-facility/>
- <https://www.theguardian.com/sustainable-business/2014/oct/17/disney-world-biogas-food-waste-energy-clean-tech>
- <https://www.sfexaminer.com/news/waste-from-san-franciscos-public-trash-cans-goes-straight-to-the-landfill/>

# REFERENCES

- [https://www.torontoenvironment.org/lot\\_of\\_money\\_could\\_be\\_made\\_diverting\\_organics\\_from\\_landfill\\_torontostar](https://www.torontoenvironment.org/lot_of_money_could_be_made_diverting_organics_from_landfill_torontostar)
- [https://www.torontoenvironment.org/new\\_organics\\_report\\_city\\_stop\\_dumping\\_green\\_energy\\_and\\_money](https://www.torontoenvironment.org/new_organics_report_city_stop_dumping_green_energy_and_money)
- [https://d3n8a8pro7vhmx.cloudfront.net/toenviro/pages/1775/attachments/original/1465851365/Organics First - TEA Report - June 2016.pdf?14658513659](https://d3n8a8pro7vhmx.cloudfront.net/toenviro/pages/1775/attachments/original/1465851365/Organics_First_-_TEA_Report_-_June_2016.pdf?14658513659)
- [https://www.torontoenvironment.org/toronto\\_high\\_rises\\_get\\_low\\_scores\\_on\\_recycling\\_cbc\\_news](https://www.torontoenvironment.org/toronto_high_rises_get_low_scores_on_recycling_cbc_news)
- [https://d3n8a8pro7vhmx.cloudfront.net/toenviro/pages/1636/attachments/original/1496696780/TEA - Zero Waste Toronto Report - 2017 update - V2.pdf?1496696780](https://d3n8a8pro7vhmx.cloudfront.net/toenviro/pages/1636/attachments/original/1496696780/TEA_-_Zero_Waste_Toronto_Report_-_2017_update_-_V2.pdf?1496696780)
- <https://www.toronto.ca/wp-content/uploads/2019/03/8d0c-2018-Solid-Waste-Rates-and-Fees.pdf>
- [https://www.torontoenvironment.org/torontonians\\_making\\_mistakes\\_with\\_their\\_trash](https://www.torontoenvironment.org/torontonians_making_mistakes_with_their_trash)
- <https://www.icsc.org/news-and-views/sct-magazine/a-lot-of-rubbish>
- <https://newsroom.carleton.ca/archives/2017/09/21/university-centre-food-court-receives-new-food-choices-and-revamped-recycling-program/>
- <http://pandaenvironmental.com/Waste-Disposal-Services-Cost-Analysis-of-Waste-vs-Waste-Recycling-Program.htm>
- <http://westlondonwaste.gov.uk/about-us/trade-customers/>
- <https://minnesota.cbslocal.com/2014/04/17/good-question-what-happens-to-all-the-trash-at-the-mall-of-america/>
- Icons Credit: Flaticon