



Intelligent Waste Management

Innovation Technologies transform Cities

Natalia Panina, SAP

November, 2021

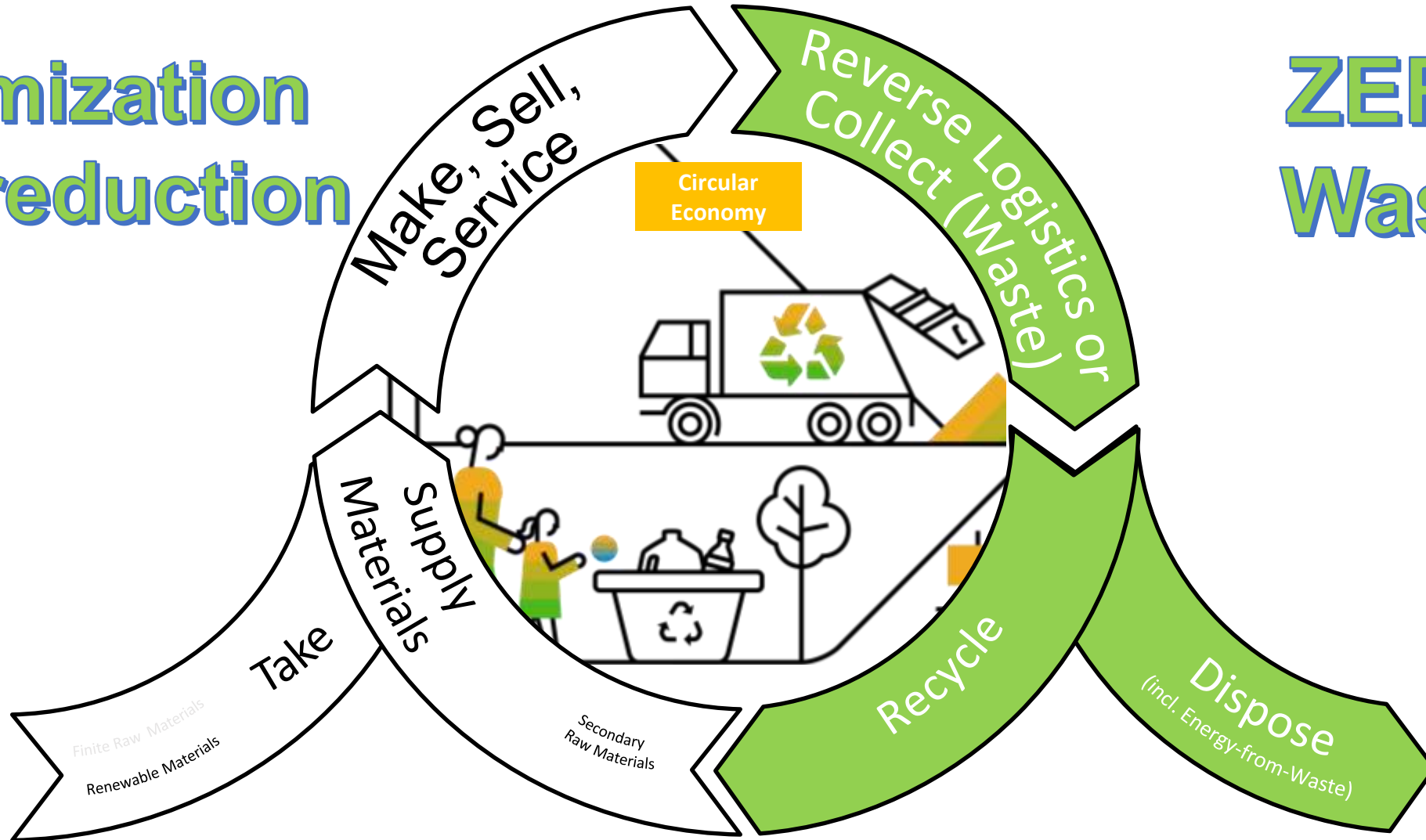
Pula



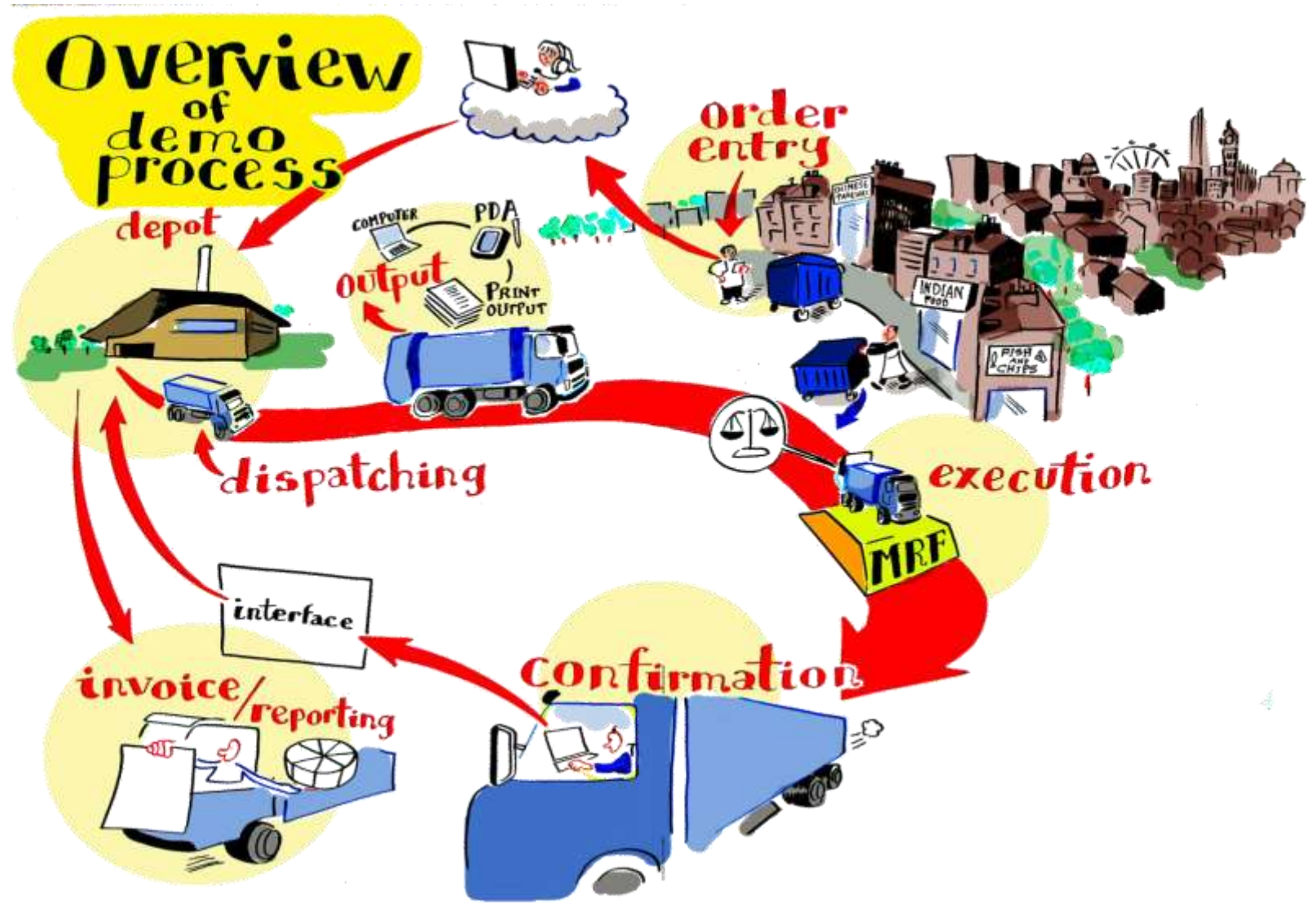
Waste Management in the Circular Economy Value Chain

Optimization
Cost reduction

ZERO
Waste

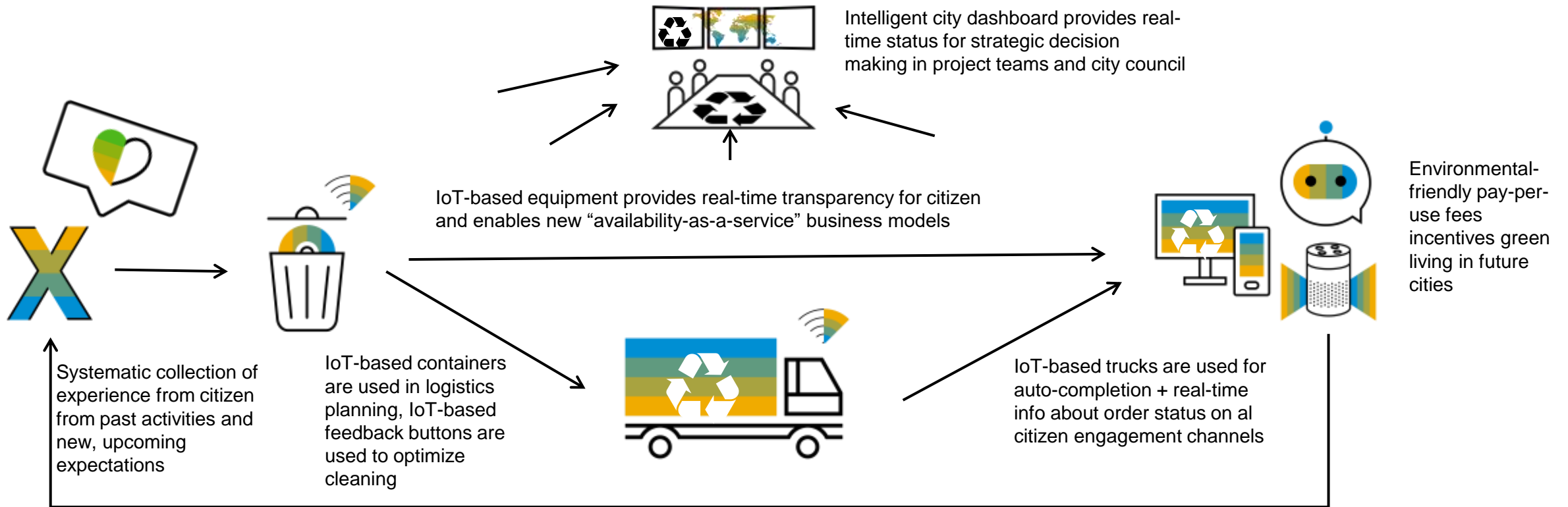


Waste management in the City

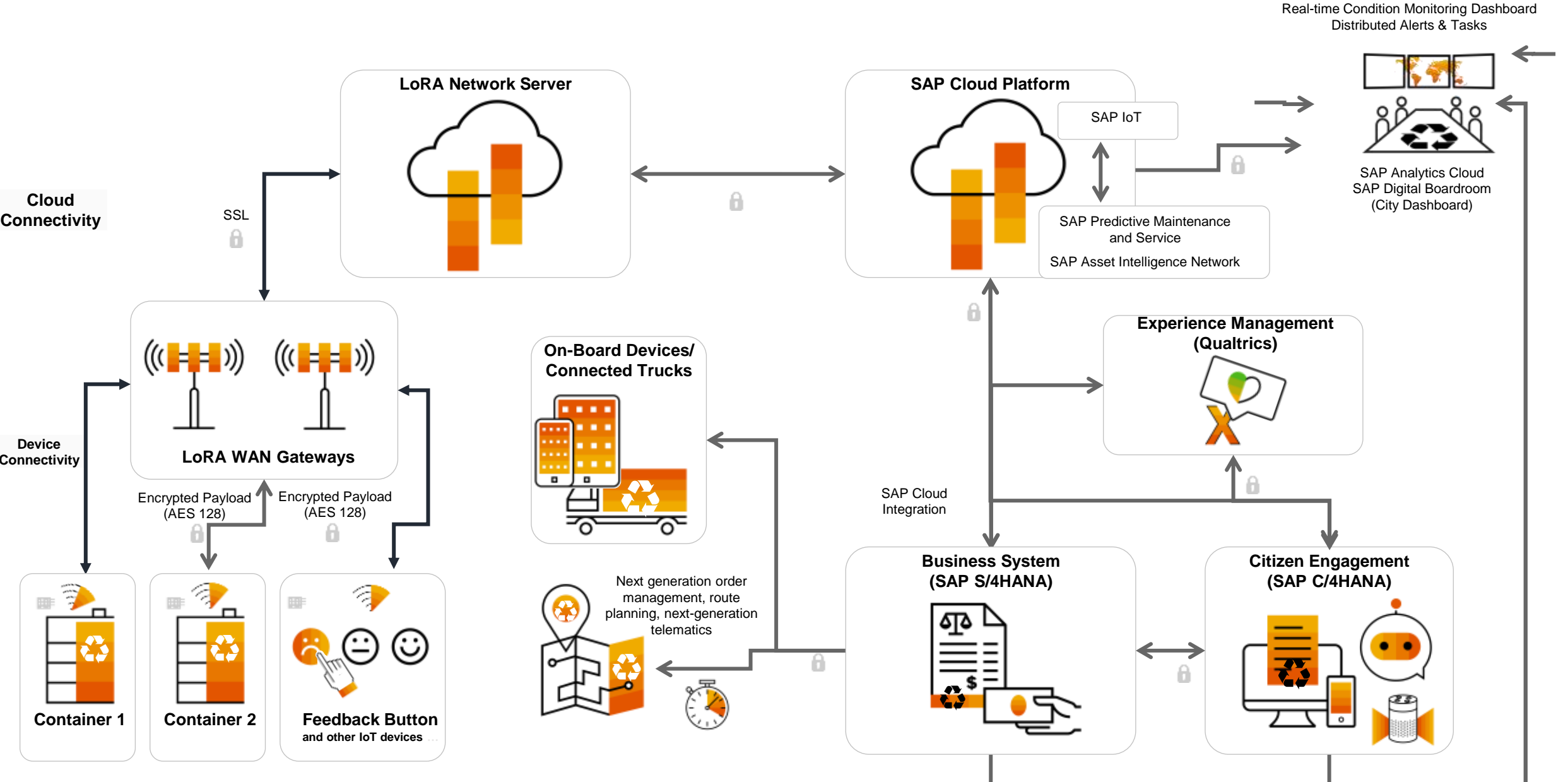


Intelligent Waste Collection

... transformed by Intelligent Technologies and Innovations



Architecture for an Intelligent Waste Management





Use case. Heidelberg City

Smart Waste Management | Project Partners & Stakeholders

Project Management
Stakeholder Management



Project Management
SAP Connected Platform Solution



Sensor Design
Manufacturing



Connectivity Management
LoRa Infrastructure



Public Services & Recycling



Waste Disposal Contractor
Solution Testing & Evaluation



My View *

Clear

Has Alerts

None 9

Active Alerts 1

Stadtteil



- 30.0% Altstadt
- 30.0% Kirchheim
- 40.0% Other

Container Type



- 60.0% Altglascontainer
- 40.0% Altkleidercontai...



Devices (10)

Export to Excel



Name	Address	Device Type Description	Device ID
Altglas HD 02	Untere Neckarstraße 70, 69117 Heidelberg, Deutschl...	Altglascontainer	AG643HD02
Altglas HD 19	Sandgasse 12, 69117 Heidelberg, Deutschland	Altglascontainer	AG105HD19
Altglas HD 28	Stiftweg 32, 69118 Heidelberg, Deutschland	Altglascontainer	AG961HD28
Altglas HD 32	Schwetzingner Straße 61, 69124 Heidelberg, Deutsch	Altglascontainer	AG224HD32

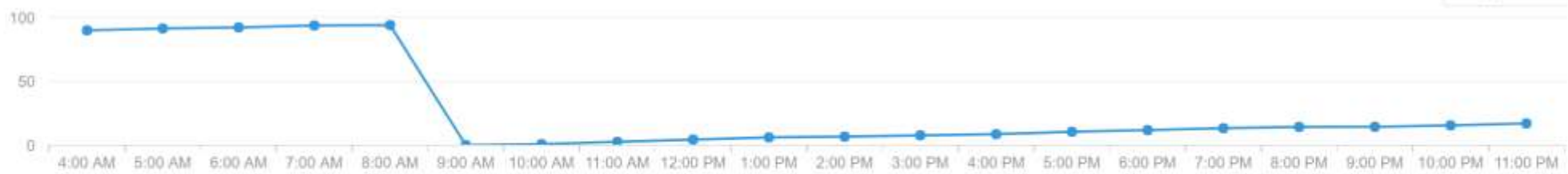
10/17/2017 9:58:00 PM

Current Fill Levels



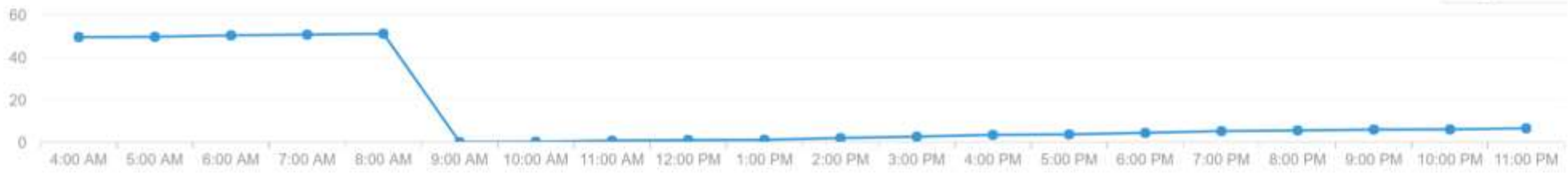
See More

Average Fill Level - Grünglas (%)



Hourly

Average Fill Level - Braunglas (%)



Hourly

Average Fill Level - Weißglas (%)



Hourly

Stiftweg 32, 69118 Heidelberg, Deutschland



Last Updated : No Data Available

NEARBY DEVICES

- AG643HD49 598 m
- AG518HD56 2708 m
- AG105HD19 3167 m



AK674HD11

Altkleidercontainer [Message](#)

Latest Fill Level

92%

2 minutes ago

ALERTS (23)

- Waste Disposal Order 7705 was triggered and completed successfully
- High Fill Level has been detected for the device AK674HD11
- Waste Disposal Order 7705 was triggered and completed successfully

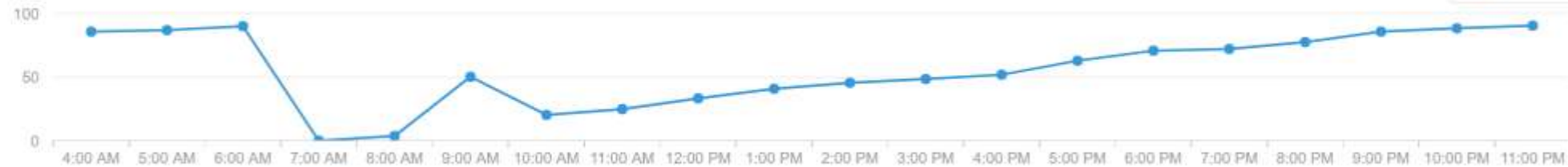
25 seconds ago

2 minutes ago

16 hours ago

[See All](#)

Fill Level (%)



Hourly

Empty Count



Daily

Mozartstraße 4, 69121 Heidelberg, Deutschland



Last Updated Today at 5:31:21 AM

NEARBY DEVICES

- AG643HD02** 496 m
- AK081HD24** 807 m
- AG105HD19** 1847 m



Use case. Krasnodar City

Waste removal service: Statistics of waste volume per site



Krasnodar administration

Statistics of waste volume

ср 17, 2020 - Sep 24, 2020



Projection of actual waste volume to the standard quota%

360%

Average waste volume at disposal time%

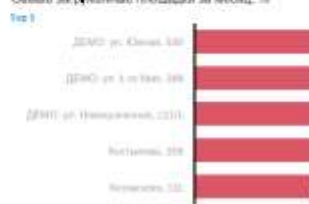
92%

*В среднем за последний месяц укомплекнования площадок в момент вывоза отходов

Топ площадок по заполняемости
Less intensive sites



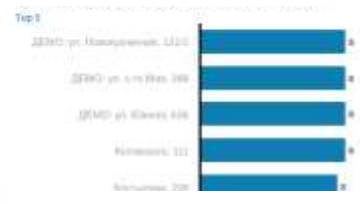
Топ интенсивных площадок по количеству
Top intensive sites



Самая высокая
Highest filling rate



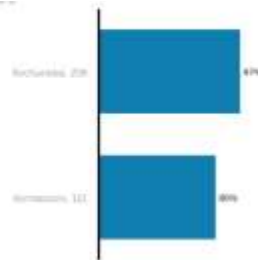
Самая низкая
Lowest filling rate



Volume of removed waste per date/site

Наименование	Видовые	Тип площадки	Дата	Количество	Уровень заполнения	Уровень заполнения	Количество вывозов	Количество вывозов	Количество	Процент вывозов
Котловая, 209	ООО Букас мусора	Открытая	Sep 17, 2020	4	94.15	---	4	---	4	100%
			Sep 18, 2020	4	110.00	---	4	---	4	100%
			Sep 19, 2020	4	110.00	---	4	---	4	100%
			Sep 20, 2020	4	110.00	---	4	---	4	100%
			Sep 21, 2020	4	110.00	---	4	---	4	100%
Котловая, 111	ООО Букас мусора	Открытая	Sep 22, 2020	4	100.00	---	4	---	4	100%
			Sep 23, 2020	4	100.00	---	4	---	4	100%
			Sep 24, 2020	4	100.00	73.20	4	3	75%	
			Sep 17, 2020	4	100.00	---	4	---	4	100%
			Sep 18, 2020	4	100.00	80.40	4	3	75%	
			Sep 19, 2020	4	100.00	80.40	4	3	75%	
			Sep 20, 2020	4	100.00	80.40	4	3	75%	
			Sep 21, 2020	4	100.00	81.60	4	3	75%	
			Sep 22, 2020	4	85.20	81.20	4	3	75%	
Sep 23, 2020	4	100.00	81.80	4	3	75%				
Sep 24, 2020	4	100.00	---	4	---	4	100%			

Average disposal to the standard capacity %



Waste removal service: City example



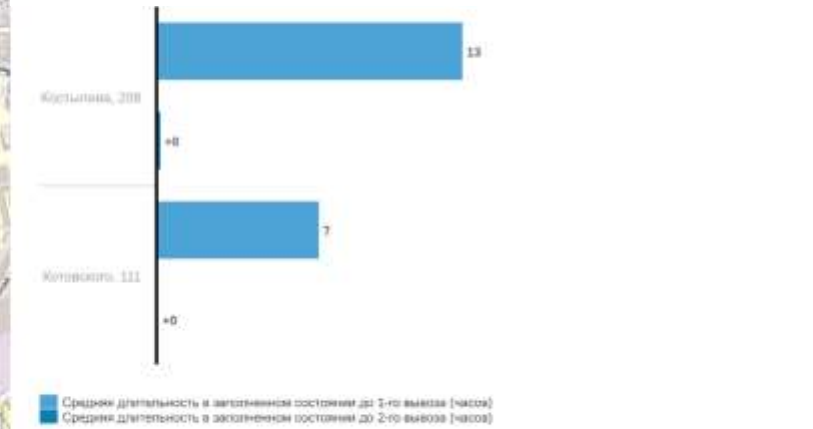
Krasnodar administration

Waste disposal status and waiting time

Sep 17, 2020 - Sep 24, 2020



Waiting time of waste disposal last month, hours



Waste disposal history: waiting time per data/site

Наименование площ.	Владелец	Тип площадки	Дата	Время первого вывоза	Время второго вывоза	Overfilling time before 1 st removal, hours		Deviation from the norm, hours			
						Overfilling time before 1 st removal, hours	Deviation from the norm, hours	Overfilling time before 1 st removal, hours	Deviation from the norm, hours		
Костылова, 208	ООО Вывоз мусора	Открытая	Sep 17, 2020	Sep 17, 2020 6:23:11 AM	(Null)	17	1.35	-	-		
			Sep 18, 2020	Sep 18, 2020 7:01:03 AM	(Null)	16	-0.15	-	-		
			Sep 19, 2020	Sep 19, 2020 6:51:02 AM	(Null)	16	-0.20	-	-		
			Sep 20, 2020	Sep 20, 2020 6:10:36 AM	(Null)	10	0.07	-	-		
			Sep 21, 2020	Sep 21, 2020 6:27:58 AM	(Null)	18	-0.55	-	-		
			Sep 22, 2020	Sep 22, 2020 6:56:19 AM	(Null)	17	-0.28	-	-		
			Sep 23, 2020	Sep 23, 2020 6:41:32 AM	(Null)	17	-0.24	-	-		
			Sep 24, 2020	Sep 24, 2020 9:27:37 AM	Sep 24, 2020 8:03:33 AM	13	0.24	0	-		
			Kotovskogo, 111	ООО Вывоз мусора	Открытая	Sep 17, 2020	Sep 17, 2020 1:31:29 PM	(Null)	17	-6.42	-
			Sep 18, 2020	Sep 18, 2020 6:53:42 AM	Sep 18, 2020 12:15:19 PM	8	0.21	0	-0.14		
Sep 19, 2020	Sep 19, 2020 7:06:23 AM	Sep 19, 2020 11:02:50 AM	11	-0.18	0	-1.79					
Sep 20, 2020	Sep 20, 2020 7:32:53 AM	Sep 20, 2020 1:48:16 PM	10	-0.59	1	-1.89					
Sep 21, 2020	Sep 21, 2020 7:59:27 AM	Sep 21, 2020 2:55:09 PM	11	-0.86	0	-2.66					
Sep 22, 2020	Sep 22, 2020 6:46:09 AM	Sep 22, 2020 11:39:35 AM	8	1.22	0	-1.41					
Sep 23, 2020	Sep 23, 2020 7:44:41 AM	Sep 23, 2020 11:36:00 AM	3	0.25	0	1.47					
Sep 24, 2020	Sep 24, 2020 7:41:51 AM	(Null)	16	0.36	-	-					

COTS benefits versus long development project

- **Budget savings – business case is available**
- **Pre-integrated solution for all participants (from the service request to the financial settlements)**
- **Embeded analytics**
- **Further project extension**
 - **Roll out to any services**
 - **“In depth” (IoT scenarios with sensors of electricity, water, gas etc)**
- **Citizens engagement leading to the increased satisfaction and loyalty**
- **New subscription based business model**

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