



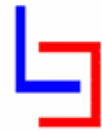
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# A Distribution Management Mobile Application for Truck Drivers in Tanzania

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MOBILE TECHNOLOGY FOR MSD DRIVERS



# Context: The usual challenges in distribution management, compounded by infrastructural constraints in Sub-Saharan Africa

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# We built an application to add visibility into the entire distribution process in Tanzania

①  
Driver leaves  
warehouse



- ②  
Driver Records Stops
- a. Facility stop
  - b. DMO stop
  - c. Other stop:
    - Overnight
    - Rest stop
    - Road problem
    - Refueling
    - Mechanical problem



③  
Driver returns to  
warehouse



## We had three main goals for the mobile application

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1. Provide delivery confirmation for shipments with GPS geo-fencing
2. Ensure that facilities are expecting delivery when it arrives
3. Enhance visibility into truck driver activities

Implementation considerations:

Reduce driver interaction with phone to minimum.

Automate when possible.

## And sought to bring these benefits to MSD's work

- Ability to analyze which activity takes the most time and why
- Reliable information to perform audits
- Real time customer feedback confirming completion of deliveries
- Data for future optimization work



# For the pilot, we aimed to answer these questions

Are we collecting the right data?

How can the information collected be used by MSD?

Stop Times

- What is the cause for long stop times?
- Can we reduce stop times via SMS alerts to facilities?

GPS accuracy

- Do GPS coordinates from tablet match existing database?
- How often does CarTrack data differ?



*Supervisors and Drivers during training*

# How MSD drivers interact with the mobile application at the facility level

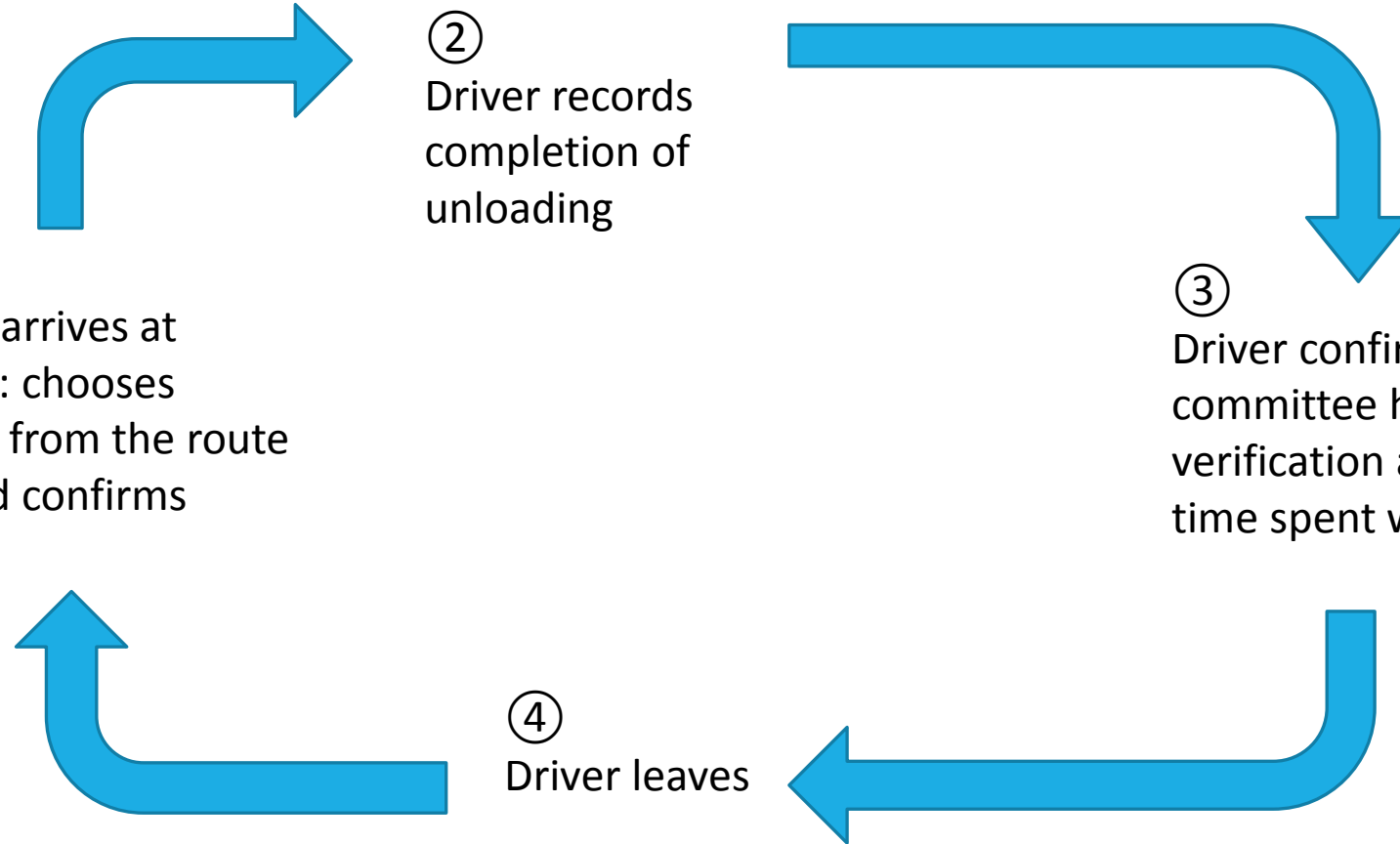


① Driver arrives at facility: chooses facility from the route list and confirms arrival

② Driver records completion of unloading

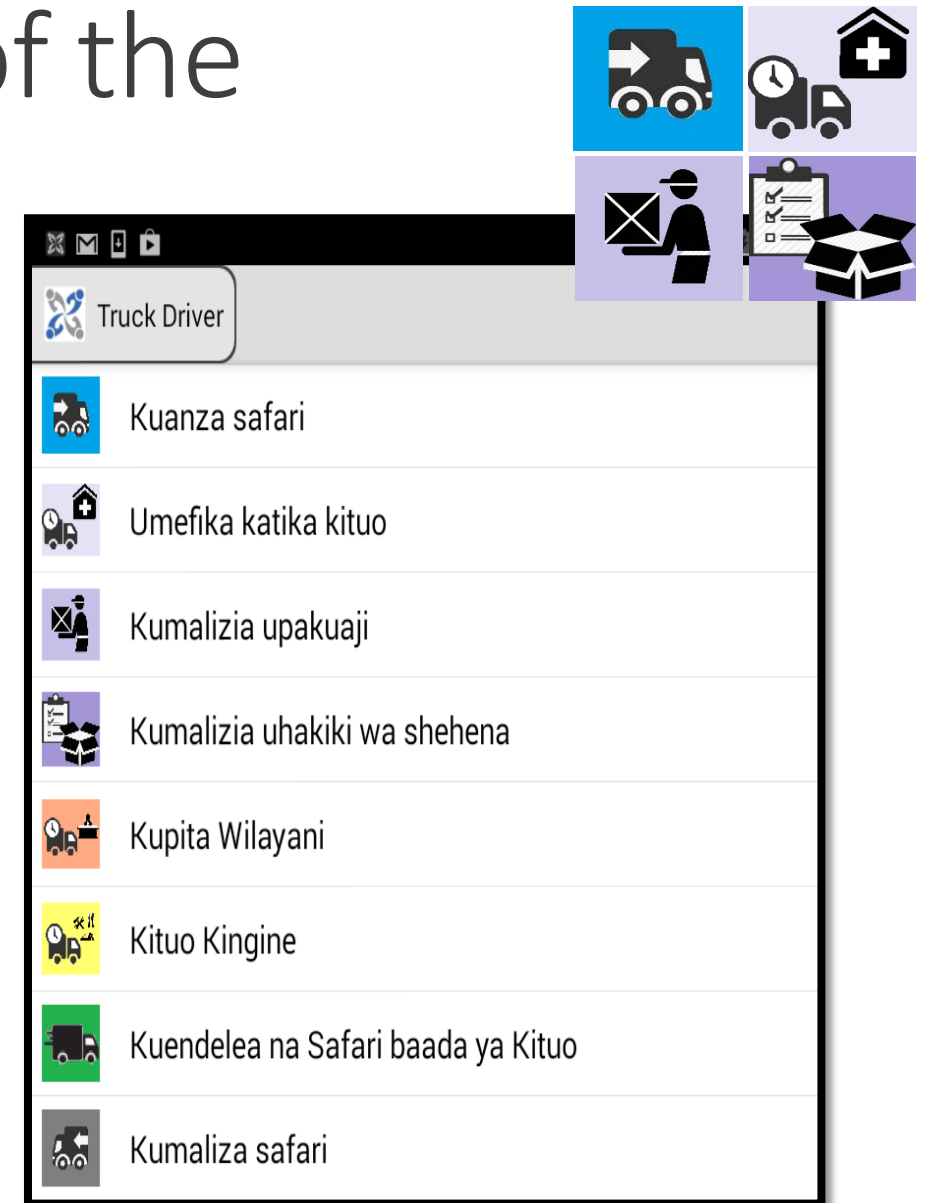
③ Driver confirms reception committee has finished verification and reports time spent waiting

④ Driver leaves



# Three key functionalities of the application:

1. Delivery confirmation
2. Imminent delivery alert
3. Visibility into truck driver activities



# 1. Delivery Confirmation



- Driver confirms shipment has been delivered with geo-fencing
  - Per-item proof-of-delivery requires data from MSD's ERP system – not in pilot
- Driver reports reasons for rejected commodities or missing deliveries
- Real-time status of each shipment on website
  - Status of shipment – delivered vs in transit
  - Delivery date of last shipment
- Possibility of facility delivery confirmation via SMS – not in pilot

## 2. Imminent Delivery Alert



- Send SMS to facility reception committee when truck leaves warehouse
  - Include driver name and phone number
- Send 2<sup>nd</sup> alert when truck arrives or leaves preceding facility on route
- Driver has facility phone numbers
  - Can announce delay or indefinite cancellation of delivery

# 3. Visibility into truck activities

- Integrate facility arrival and departure data with qualitative info
  - Reasons for delays/detours
  - Problems encountered during delivery
- Potentially replicate some CarTrack functionality
  - Provide information in digestible format, integrated into ILSGateway
  - Cheaper long-term solution
  - Provide reports of outliers: stops that take the most time, routes that take the longest
- Mileage at end of each stop or at the end of the day
- Diesel or Petrol purchased: quantity and price (self-reported)



# Enabling data-driven decision-making about the distribution process

Reports > Export Cases, Referrals, and Users > Create Custom Export

TOOLS

My Saved Reports

MONITOR WORKERS

- Daily Form Activity
- Submissions By Form
- Form Completion Time
- Case Activity
- Form Completion vs. Submission Trends
- Worker Activity Times

INSPECT DATA

- Submit History
- Case List

RAW DATA

- Export Submissions to Excel
- Export Cases, Referrals, & Users
- De-Identified Export

MANAGE DEPLOYMENTS

- Application Status
- Raw Forms, Errors & Duplicates

## Export Settings

Export Name: Client: 2013-02-27

Default file type: Excel 2007

## Export Fields

Choose the fields you want to export.

You can drag fields to remove them from the list.

Include this Field?

Select None

Field

id

Why\_

\_id

\_rev

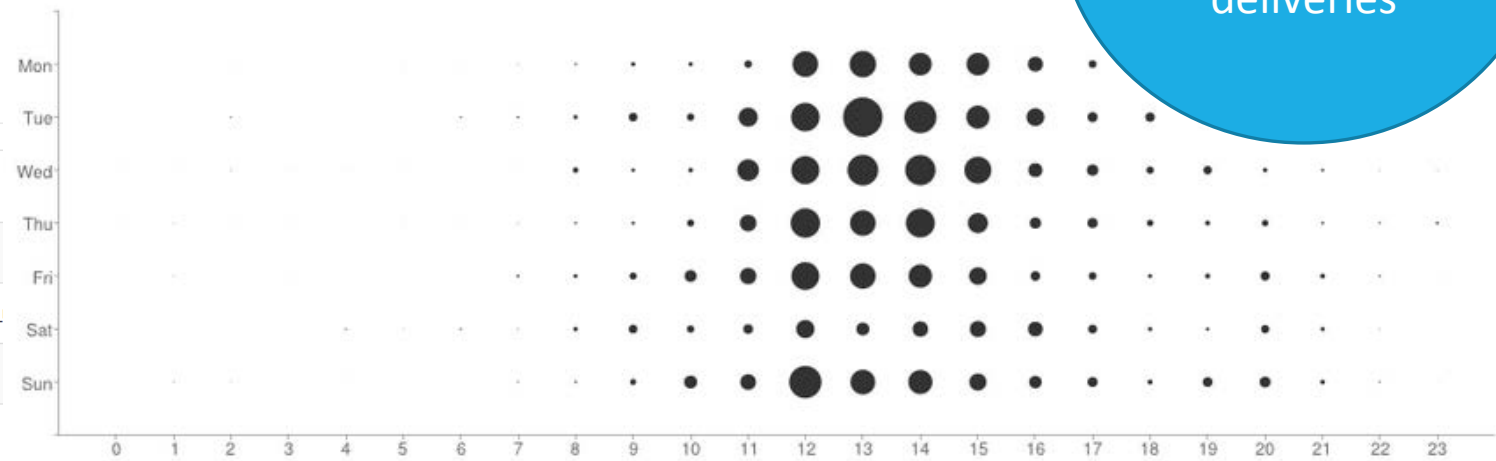
adults

after\_care

age of orphan head of

## Worker Activity Times

Hour vs. Weekday



Visibility into timing of driver's deliveries

Choice of ready-to-view reports, viewable online and downloadable in Excel

# Customized data exports (1)

	A	B	C	D	E	F	G
1	Route	Vehicle	Vehicle Status	Current Stop	driver	Driver Activity	Next Stop
2	Liwale 1	land_cruiser	at facility	Kipelele		unloading	Mlembwe
3	Liwale 2	land_cruiser	at facility	Kikulyungu		unloading	Mbondondo
4	Liwale 3	land_cruiser	in transit	Mlembwe		left facility	Ndapata
5	Masasi 1	10_ton	at facility	Mpindimbi		verifying	Kanyimbi
6	Masasi 2	10_ton	in transit	Namajani		left facility	Makata
7	Masasi 3	3.5_ton	at facility	Likombe		unloading	Barikiwa
8	Masasi 4	3.5_ton	in transit	Shaurimoyo		left facility	Lupaso
9	Mtwara 1	3.5_ton	at facility	Ufukoni		unloading	Matweke
10	Nachingwea 1	land_cruiser	at facility	Chimbendenga		verifying	Kiegei
11	Nachingwea 2	land_cruiser	in transit	Marambo		verifying	Lipalwe
12	Nanyumbu 1	land_cruiser	at facility	Kiagara		verifying	Mkundi
13	Nanyumbu 2	10_ton	in transit	Lichwachwa		left facility	Namihu
14	Nanyumbu 3	land_cruiser	in transit	Michiga		left facility	Ndapata
15	Newara 1	10_ton	at facility	Kilidu 1		unloading	Makote
16	Newara 2	land_cruiser	at facility	Mnyeu		verifying	Kilimarondo
17	Newara 3	10_ton	at facility	Chihangu		verifying	Mpigamiti
18	Ruangwa 1	10_ton	at facility	Nanganga		unloading	Chienjele
19	Ruangwa 2	land_cruiser	in transit	Mijejejele		left facility	Ndunyungu
20	Tandahimba 1	3.5_ton	in transit	Mbonde		unloading	Chiqunqwe
21	Tandahimba 2	land_cruiser	at facility	Maheha		verifying	Dinembo
22	Tandahimba 3	10_ton	in transit	Mivanga		left facility	Mahuta

Visibility into  
Each Driver's  
Status en route

# Customized data exports (2)

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Zone	Region	Route	Stop Number	Facility Name	Driver Name	Boxes	Boxes Missing	Unload Time	Verification Time	Total Time	Expected Time	Date
2	Mtwara	Lindi	Liwale 1	1	Nangano		22	3	50	53	103	85.83%	10/7/2014
3				2	Nahoro		20	1	30	48	78	70.91%	10/9/2014
4				3	Kibutuka		25	1	41	40	81	60.00%	10/10/2014
5				4	Ngumbu		15	0	52	46	98	115.29%	10/15/2014
6				5	Kiagara		17	1	45	39	84	88.42%	10/12/2014
7				6	Kipelele		13	3	35	48	83	110.67%	10/14/2014
8				7	Naujombo		24	2	31	37	68	52.31%	10/11/2014
9				8	Mirui		30	5	38	50	88	55.00%	10/8/2014
10				9	Kitogoro		13	1	49	30	79	105.33%	10/2/2014
				10	Mikunya		27	2	49	58	107	73.79%	10/15/2014
				11	Liwale		20	4	51	54	105	95.45%	10/14/2014
			Liwale 2	1	Likombora		20	0	30	48	78	70.91%	10/12/2014
				2	Mihumo		18	3	35	32	77	53.89%	10/9/2014
				3	Ngongowele		26	1	45	32	77	53.89%	10/9/2014
				4	Ngunja		26	1	40	34	74	52.86%	10/6/2014
				5	Lilombe		25	2	58	37	95	70.37%	10/3/2014
				6	Mbaya		14	4	37	58	95	118.75%	10/13/2014
				7	Nduruka		30	5	58	44	102	63.75%	10/1/2014
				8	Mtawango		22	5	44	32	76	63.33%	10/10/2014
				9	Mkutano		26	5	54	57	111	79.29%	10/10/2014
				10	Kikulyungu		17	1	55	40	95	100.00%	10/3/2014
				11	Kichonda		13	1	46	50	96	128.00%	10/4/2014
				12	Kimambi		12	2	35	31	66	94.29%	10/8/2014
24													
25			Liwale 3	1	Makata		23	1	33	45	78	62.40%	10/6/2014
26				2	Mkundi		29	4	39	41	80	51.61%	10/6/2014
27				3	Mlembwe		18	0	36	37	73	73.00%	10/3/2014
28				4	Ndapata		17	1	30	39	69	72.63%	10/4/2014
29				5	Namihu		16	1	45	37	82	91.11%	10/2/2014
30				6	Ndunyungu		29	4	51	30	81	52.26%	10/13/2014

48 (Verification Time)

Row: Mtwara - Lindi - Liwale 2 - 1 - Likombora - Paul - 20 - 0 - 30 -

Visibility into  
each facility's  
delivery status

# Findings

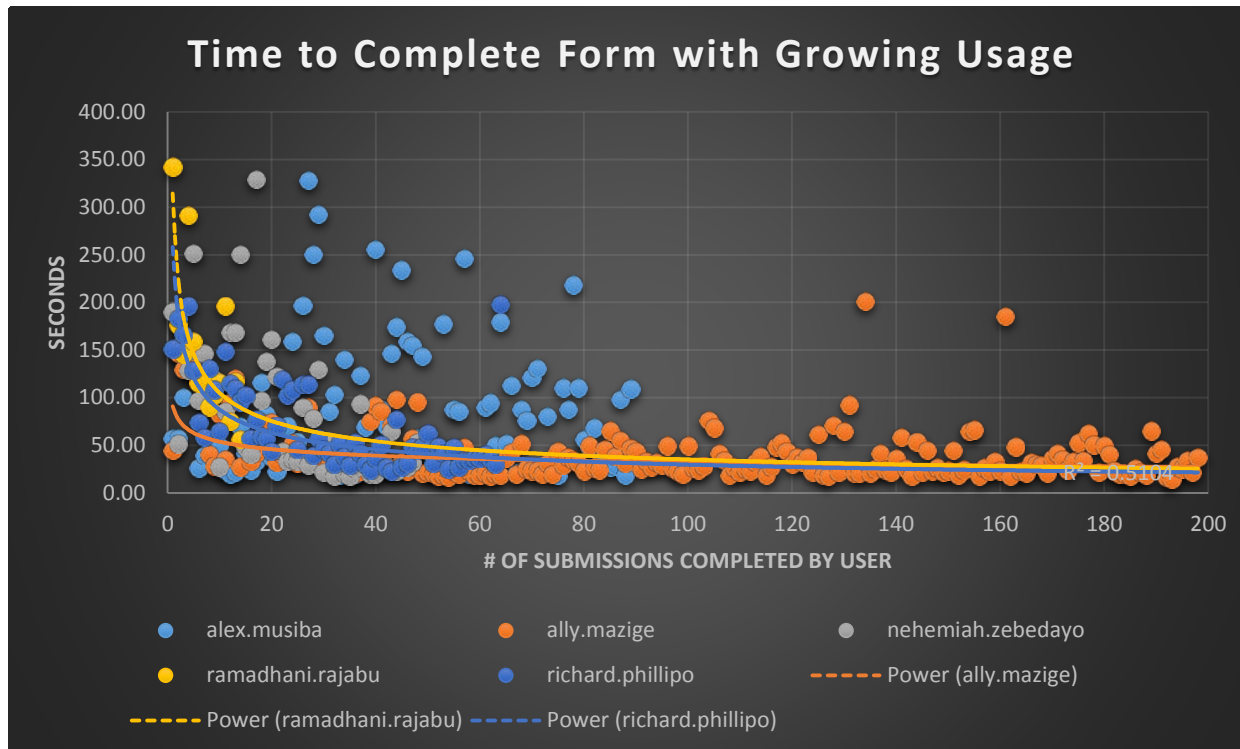
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Insight into the efficiency and structure of the distribution system

- Variability in delivery times
- Driver capacity
- Road conditions
- Communication processes

# Findings: Feasibility of the mobile application

# Findings: Feasibility of the GPS functionality



<b>Total Forms</b>	<b>506</b>	
<b>Valid GPS</b>	<b>480</b>	<b>95%</b>
<i>GPS Accuracy</i>	<i>Frequency</i>	
<b>0 to 10</b>	<b>437</b>	<b>86%</b>
<b>11 to 20</b>	<b>25</b>	<b>5%</b>
<b>21 to 50</b>	<b>9</b>	<b>2%</b>
<b>51 to 100</b>	<b>1</b>	<b>0%</b>
<b>101 to 5000</b>	<b>8</b>	<b>2%</b>
<b>No GPS</b>	<b>26</b>	<b>5%</b>
<b>GPS Match</b>	<b>96</b>	<b>19%</b>

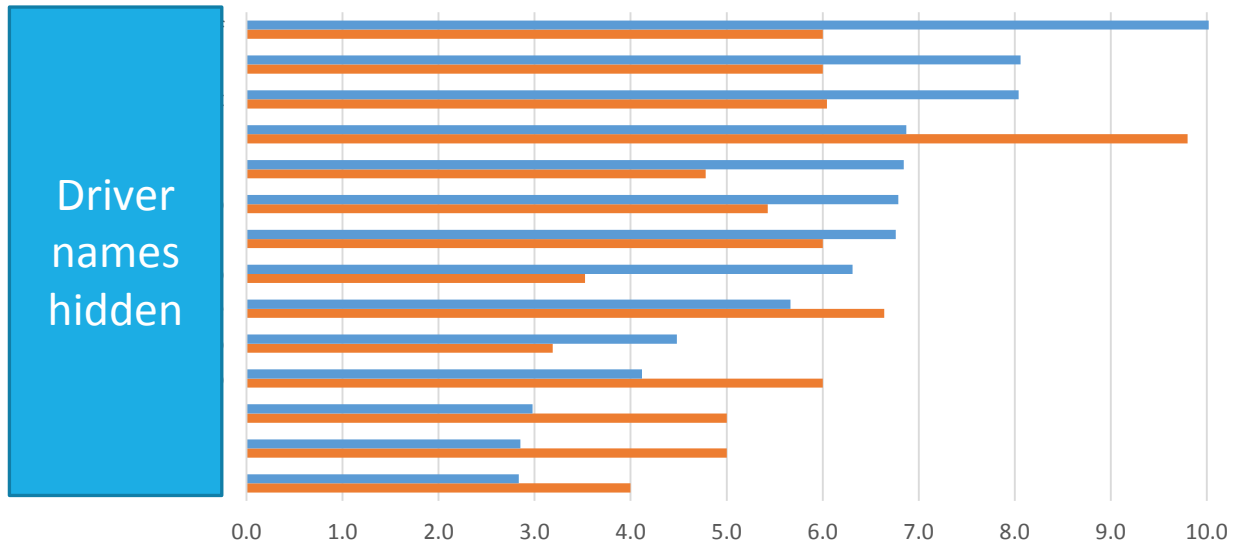


# Findings: Visibility into truck driver performance

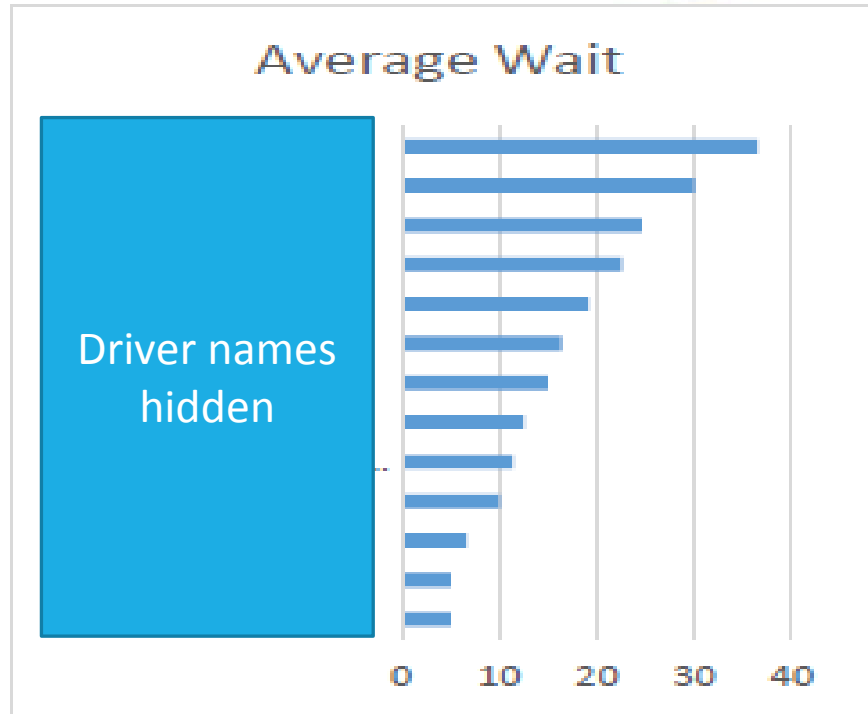
# Findings: Visibility into delivery delays

Daily Working Hours

■ Daily Working Hours ■ Deliveries Per Day



Average Wait



# Lessons learned during the implementation

- Integrating innovation into existing government priorities
- The priority of organizational change
- Understanding supervision
- Technology as more than a functional tool
- Finding a local champion

The key ingredient for a long-term, successful system now consists of integrating the application's usage as a systematic component of each driver and supervisor's responsibilities.



# Special Acknowledgements

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