



GreenRoad Safety Insights

Why clear BI safety insight is needed

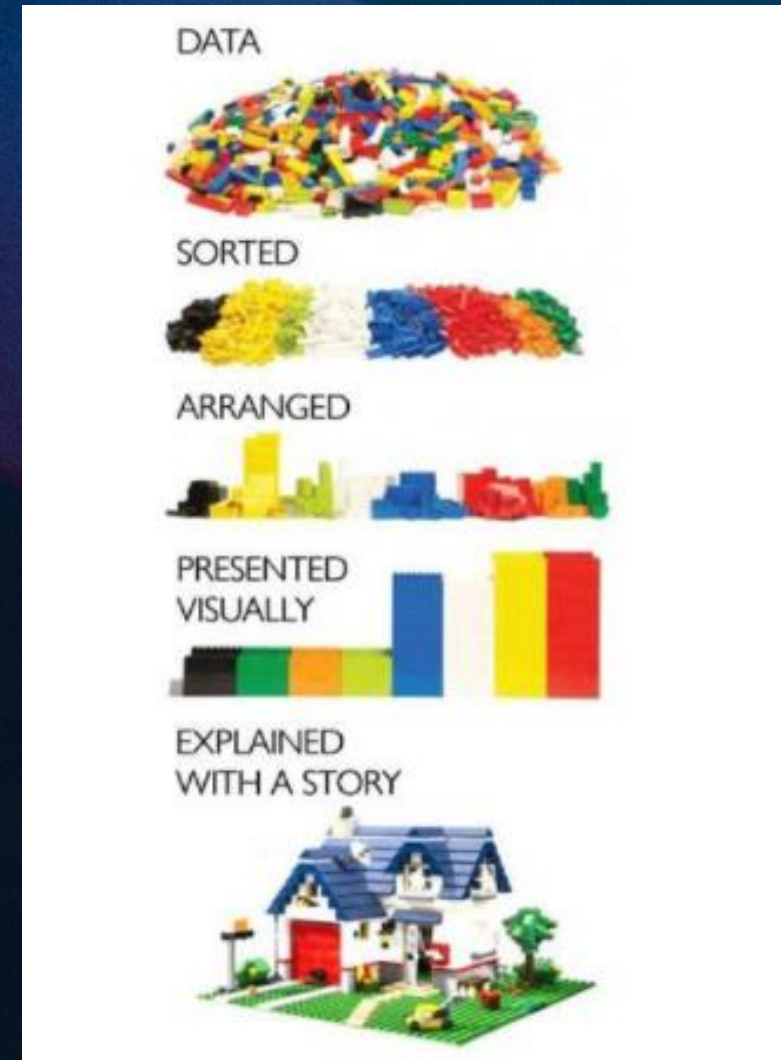
Managers not always have the resources and time to provide up to date monitoring to drivers

It is not always a systematic process

Drivers sometimes aren't aware to important information and trends regarding their driving behaviors

Unfortunately changes in drivers' behaviors are identified only after accidents (post investigations)

Managers attend to focus on their risky drivers (red /high score) and not always aware to important trends in their non red drivers





The Leader in Driver Safety

Incident Investigation

US Office: GreenRoad Technologies, Inc. ("GreenRoad"), a Delaware corporation with its principal place of business at 8900 Shoal Creek Blvd. Suite 111, Austin, TX 78757 USA

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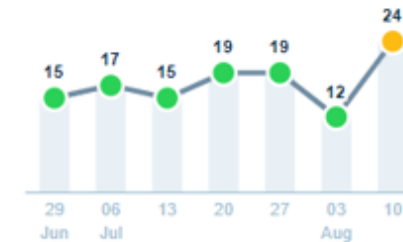
during the week of the accident, the system has detected **dramatic deterioration in his driving behavior compared to previous weeks**. This is reflected by the number of safety events captured, as can be seen in the table below:

Consist and negative trend:

Month	Events	Change
May	0	NA
June	9	NA
July	18	100%
August	20	11%

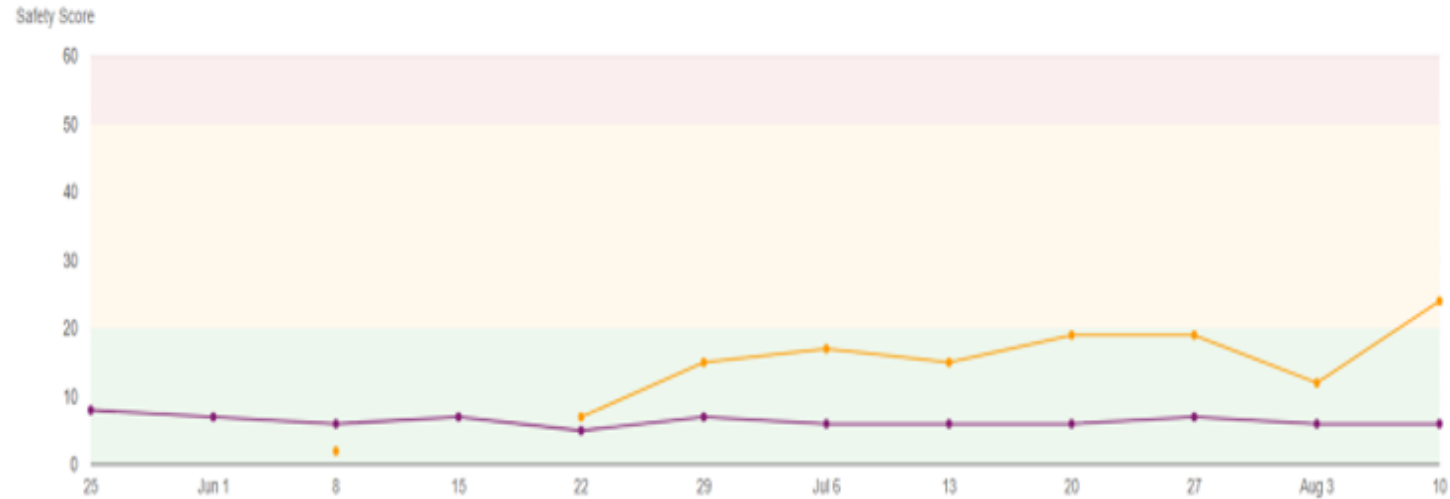
During the last weeks, there has seen a deterioration of his safety score from 12 to 24 (from 12 events in 10 hours of driving to 24 event, a 100% increase in safety events frequency) that was unique to him and was not seen in the general score for his team or the entire organization. (See chart on the right)

● Safety Score - 7 Week History



The driver safety score changed from Green (safe) to Yellow (moderate)

This driver behavior was negatively correlated to his Organizational Unit (OU) "Bus Plus". His safety score decreased while the OU safety score improved.



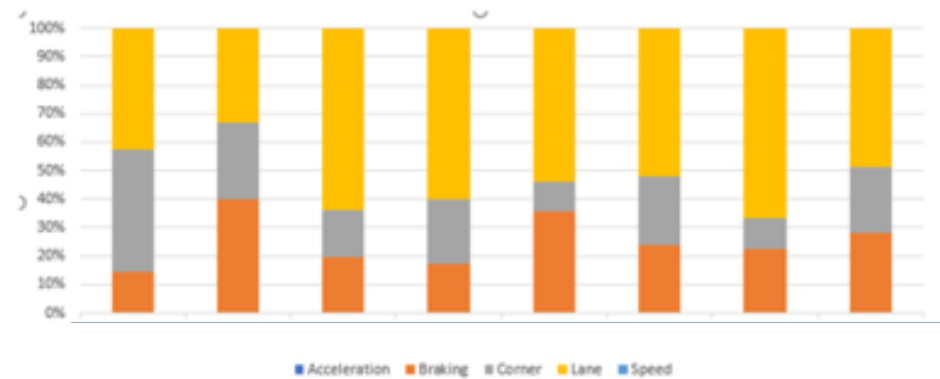
|

The driver's major driving safety challenge was: **Lane handling**. It accounted for more than 50% of all his driving errors. This is highly unusual and could indicate reckless driving behavior.

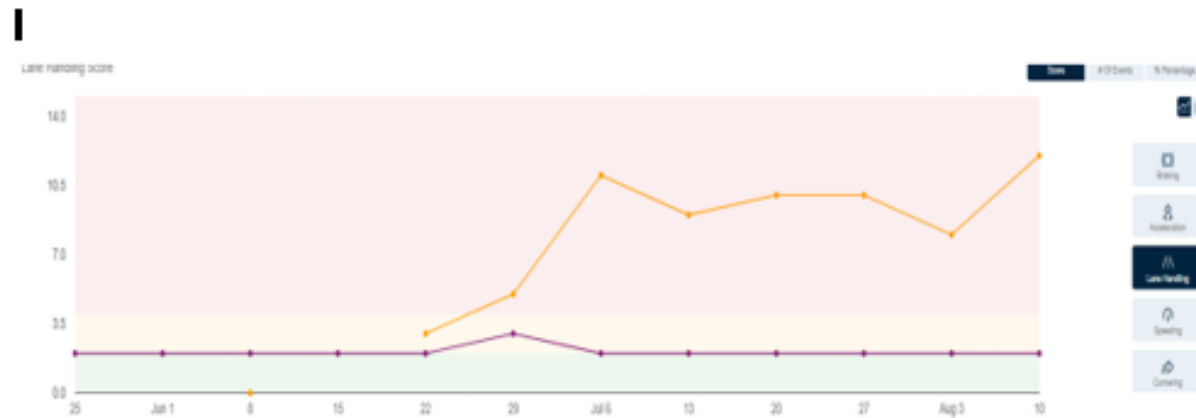
Such event also occurred about 10 minutes before the crash.

Driving Event	Number	Percent
Cornering	46	20%
Breaking	59	26%
Lane handling	122	54%
Total	227	100%

This challenge with lane handling didn't start recently. It was on-going for many weeks as we can be seen in the following chart:



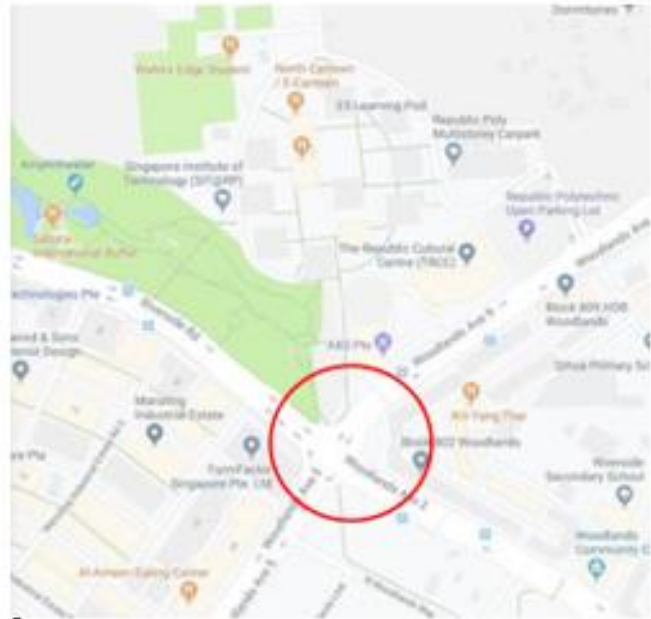
The driver Lane handling problem was unique to him and uncorrelated to his [fleet](#)



The accident time was at noon, This is the time of day that driver No 22904 has most of his safety events since June 2019, as can be seen below:



The approximate location of this event is provided in the following map:



The Involved Driver and his monitored driving behaviour – Insights

GreenRoad has been tracking and monitoring] this vehicle since the pilot in XYZ started during May 2019. His safety score is 17, which means in average the system captured 17 events per 10 hours. In GreenRoad terminology, he is a “green driver”, meaning he is considered to be a safe driver that will require less management attention in normal circumstances. See the dashboard below:



I

	Month	Red events	% <u>change</u>
1	<u>May 2019</u>	3	baseline
2	June 2019	4	+ 33%
3	July 2019	11	+175%

The table below shows that the red events captured were identified as “braking” events, usually associated with poor anticipation, and a more reactive driving, that forced him to react with aggressive breaking to unfolding events.

A	B	C	D	E	F	G	H
Unit_Id	Vehicle_ID	SessionID	SessionEventTypeID	event_name	SafetyLevel	EventStartTimeOUTime	EventStartTimeUTC
550671	436157	736396782	1	Braking	3	2019-06-17 12:46:26.000	2019-06-17 04:46:26.000
550671	436157	738661614	1	Braking	3	2019-06-25 19:35:45.000	2019-06-25 11:35:45.000
550671	436157	740755094	1	Braking	3	2019-07-03 11:59:30.000	2019-07-03 03:59:30.000
550671	436157	744091720	1	Braking	3	2019-07-16 15:41:50.000	2019-07-16 07:41:50.000
550671	436157	744854101	1	Braking	3	2019-07-18 20:37:28.000	2019-07-18 12:37:28.000
550671	436157	745548808	1	Braking	3	2019-07-21 15:21:29.000	2019-07-21 07:21:29.000
550671	436157	746909405	12	Lane change	3	2019-07-26 10:41:27.000	2019-07-26 02:41:27.000

Incident Investigation - [REDACTED]

GreenRoad Edge™ was installed in the vehicle involved in this incident, model Vellfire, registration [REDACTED] (vehicle).

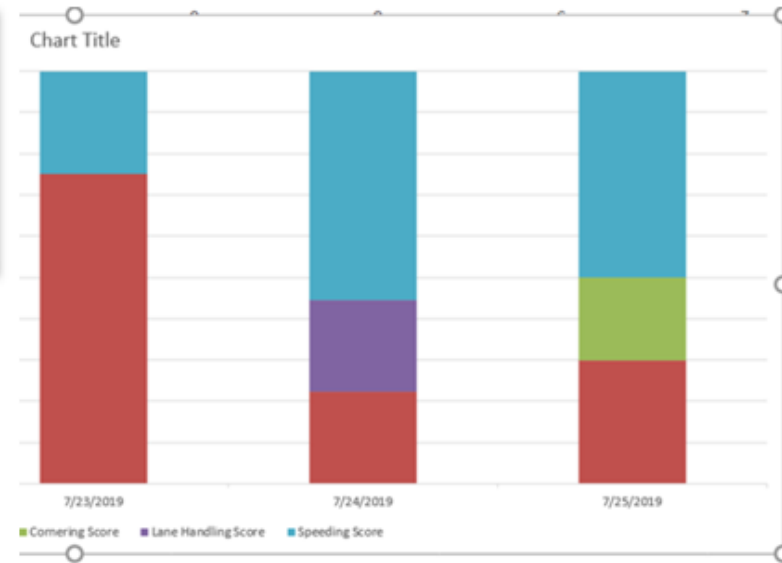
The following table presents the data captured in GreenRoad system for the incident in investigation.

Date/Time	Event type, Severity	Speed (kph)	Event duration (seconds)	Max g Accelerating	Max g turning	Location Lat	Location Long	Heading
7/26/19 10:39:59 AM	Trip start	0.0				1.439520	103.789110	
7/26/19 10:40:29 AM	GPS Fix	8.0				1.439250	103.789010	316
7/26/19 10:41:27 AM	Lane Changing, red		1.38	0.120	0.218			
7/26/19 10:41:31 AM	Trip end	0.0				1.439590	103.788170	328
7/26/19 10:42:08 AM	GPS Fix	0.0				1.442800	103.785400	

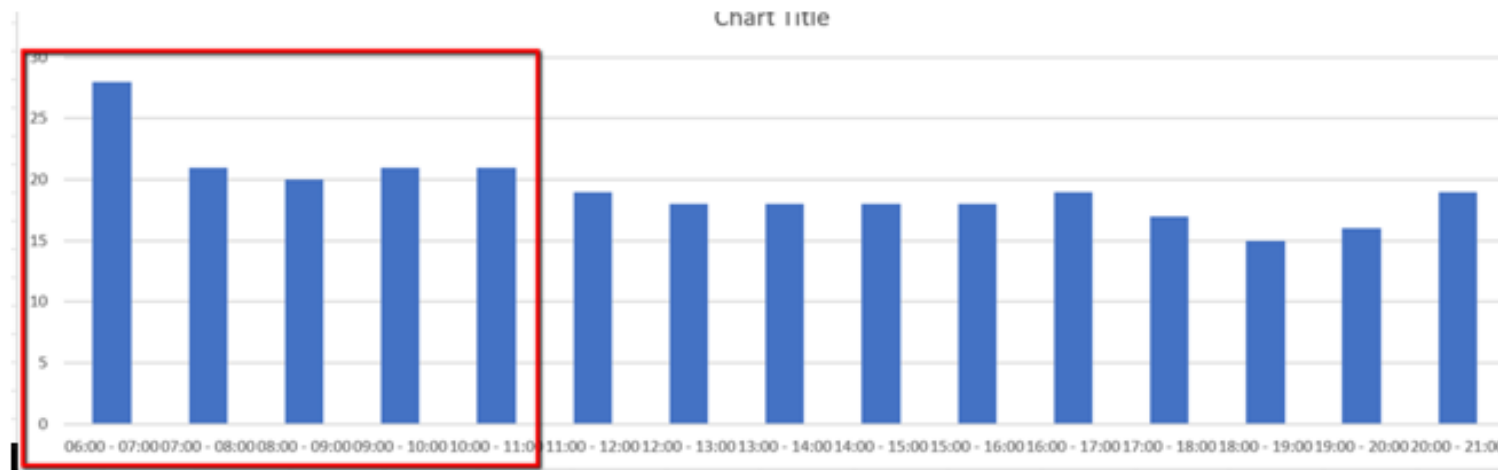
Summary and insights:

1. Trip start is recognised by the system when detecting motion.
2. GPS fix data points are made automatically by the system in variable frequency as high as 15 seconds.
3. GreenRoad system records locations as latitude and longitude pairs. The translation to street addresses in was done using Google maps.
4. Trip end is determined by the system following 10 min of no motion.
5. The entire trip was 1 minute, 32 seconds long.
6. Before and after the incident, the vehicle was travelling north-west on Woodlands Ave 2.
7. the system identified a single red lane changing event at 10:41:27 around the intersection of Woodlands Ave 2 and Woodlands Ave 9. The event lasted 1.38 seconds and brought the

During the last 3 days prior to the accident, the system captured relatively more Speeding events (marked in blue in the chart on the right). research has shown that speeding is a major contributing factor in collisions. Exceeding the allowed posted speed limit has the effect of shortening a driver response time, and for a driver that shows poor anticipation, this further increase the risk level.



The following chart shows that during the Morning time [redacted] trigger relatively more safety events than any other time of the day. The accident in review, happened during the morning time.



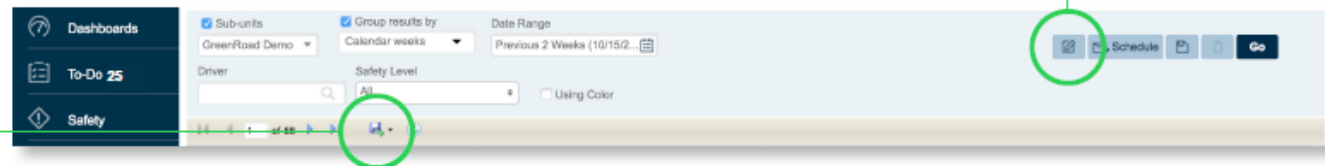
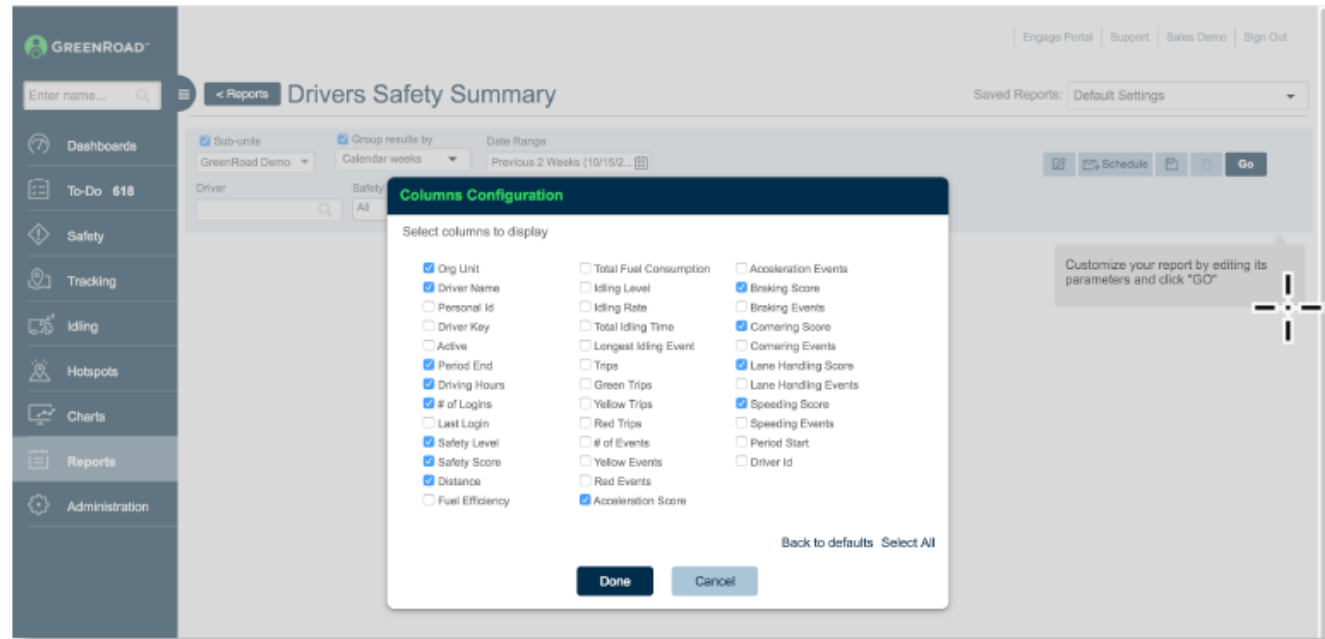
PROACTIVE

Central Reports

The report suite is divided into sections, pre-built, based on GreenRoad best practices. You can review a report, save it or schedule one to be sent to your email.

Customize reports to see the fields most relevant to managing your business.

Reports can be exported as a PDF or Excel spreadsheet



Weekly Reports

The screenshot displays a web application interface for generating weekly reports. The interface is divided into several sections:

- Header:** A2
- Form:** A date range selector with a dropdown menu and a function icon (fx).
- Table:** A table with columns A, B, and C. The first row (row 2) is highlighted. The table contains the following data:

	A	B	C
2			
3	Date Range		
4	Last Week		
5	Aug 08 2021 - Aug 14 2021		
6	Last 4 Weeks		
7	Jul 11 2021 - Aug 07 2021		
8			
9	• Safety Chart Top/Bottom		
10	• Red Events By Driver		
11	• Safety Score By Driver		
12	• Event Categories By Driver		
13	• Red Events By Org Unit		
14	• Safety Score By Org Unit		
15	• Event Categories By Org Unit		
16	• Safety Chart By Hour		
17	• Safety Chart By Day		
18			
19			
- Footer:** A navigation bar with the following tabs: **Driving Behavior Insights Pack**, Report Information, Safety Chart TopBottom, Red Events By Dri ... (+), and a back arrow.

Report Information

Safety Score

The GreenRoad Safety Score is an **objective measurement** of driver safety performance: a simple metric that makes it easy for managers to identify any risk-prone drivers and to gain an overall understanding of the safety of the entire fleet.

Each driver's Safety Score is based on the **number of each driver's recorded safety events** during the last full week. All types of safety events receive the same weight in the calculation. Therefore, the safer a driver drives, the lower their Safety Score. A score of 20 or below (meaning 20 safety events or fewer per 10 hours of driving) is considered safe/green, 21-50 events per 10 hours of driving is considered a yellow score, and a red score is received when a driver has recorded more than

1



2

3 *Note: these thresholds can be customized in GreenRoad Central*



4

Safety Charts Top to bottom



Red Events Charts Top to bottom



Sort and Color for Red Events

	A	B	C	D	E	F	G
1	Org Unit	Driver Name	Last Week Driving Time	Last Week Distance Driven	Last Week Red Events	4 Weeks Red Events	Red Events Delta
2	First Chelmsford (CHEL)	RAYMOND NORRIS	42.91	557.9	23	2	-21
3	First Chelmsford (CHEL)	Aaron Old	36.51	530	22	10	-12
4	First Chelmsford (CHEL)	PAUL TURNER	46.44	699.3	16	4	-12
5	First Chelmsford (CHEL)	Andrew Pillay	38.16	577.1	18	8	-10
6	First Chelmsford (CHEL)	PIOTR MAJKOWSKI	43.43	614.5	13	3	-10
7	First Chelmsford (CHEL)	ALEX CORNWELL	20.72	304.8	10	1	-9
8	First Chelmsford (CHEL)	ROBERT CHAMPION	36.3	570.4	12	3	-9
9	First Chelmsford (CHEL)	Paul Hambleton	34.05	472	9	1	-8
10	First Chelmsford (CHEL)	Ian Joyce	46.5	780.8	17	9	-8
11	First Chelmsford (CHEL)	Mark Challis	34.99	592	8	1	-7
12	First Chelmsford (CHEL)	KIRSTY HARDY	15.41	364.9	12	6	-6
13	First Chelmsford (CHEL)	Jane T SIMMONS	30.58	494.8	8	2	-6
14	First Chelmsford (CHEL)	Mathew Burgess	33.64	373.5	13	7	-6
15	First Chelmsford (CHEL)	Muno Gomes Da Silva	34.82	389.7	8	2	-6

Report Information |
 Safety Chart TopBottom |
 Red Events By Driver |
 Safety Score By Driver |
 ... (+)

Red Events Negative and Positive Delta

First Chelmsford (CHEL)	phillip cannon	27.18	406.7	2	7	5
First Chelmsford (CHEL)	JAMES BADCOCK	12.59	197.3	2	8	6
First Chelmsford (CHEL)	Mudith Rajapakshe	19.66	308.6	0	6	6
First Chelmsford (CHEL)	DARIUSZ NIEDZIESKI	23.21	347.6	1	7	6
First Chelmsford (CHEL)	Hossein Bayati	23.96	423	1	7	6
First Chelmsford (CHEL)	LUCIE STEVENS	42.57	621.7	1	7	6
First Chelmsford (CHEL)	ARTUR KASPERCZYK	51.96	775.3	6	12	6
First Chelmsford (CHEL)	Craig Hayne	22.49	323.5	5	12	7
First Chelmsford (CHEL)	Greg Herring	31.3	525.3	1	8	7
First Chelmsford (CHEL)	Tony Whiting	31.05	483.1	4	12	8
First Chelmsford (CHEL)	GRZEGORZ SAJ	38.52	506.7	1	9	8
First Chelmsford (CHEL)	Paulin Palaj	30	489.5	0	9	9
First Chelmsford (CHEL)	KEITH FOX	34.12	509.3	0	9	9
First Chelmsford (CHEL)	Trevor Wood	3.47	34.2	0	10	10
First Chelmsford (CHEL)	Marc Louis	35.59	591.3	2	15	13
First Chelmsford (CHEL)	Danny Smith	36.73	526.1	1	15	14
▶ ...	Report Information	Safety Chart TopBottom	Red Events By Driver	Safety Score By Driver	...	⊕

Safety Score Negative and Positive Delta

	A	B	C	D	E	F	G
1	Org Unit	Driver Name	Last Week Driving Time	Last Week Distance Driven	Last Week Safety Score	4 Weeks Safety Score	Safety Score Delta
2	First Chelmsford (CHEL)	Andrew Pillay	38.16	577.1	55	36	-19
3	First Chelmsford (CHEL)	Charlie Houghton	23.62	682.3	73	55	-18
4	First Chelmsford (CHEL)	Kris Michael	33.97	406.8	33	17	-16
5	First Chelmsford (CHEL)	ALEX CORNWELL	20.72	304.8	28	13	-15
6	First Chelmsford (CHEL)	Mariusz Czaplak	32.68	378	38	23	-15
7	First Chelmsford (CHEL)	Ricky Bell	33.3	610	20	8	-12
8	First Chelmsford (CHEL)	Sally Beilby	10.57	204.2	16	5	-11
9	First Chelmsford (CHEL)	REBECCA STORY	21.95	260	74	63	-11
10	First Chelmsford (CHEL)	TOBIAS BRADFORD	27.36	408.7	41	30	-11
11	First Chelmsford (CHEL)	Jack Rollinson	29.44	483.6	24	13	-11
12	First Chelmsford (CHEL)	Mark Challis	34.99	592	22	11	-11
13	First Chelmsford (CHEL)	Christopher David	32.88	521.5	51	41	-10

Safety Events Categories Mapping and Colored

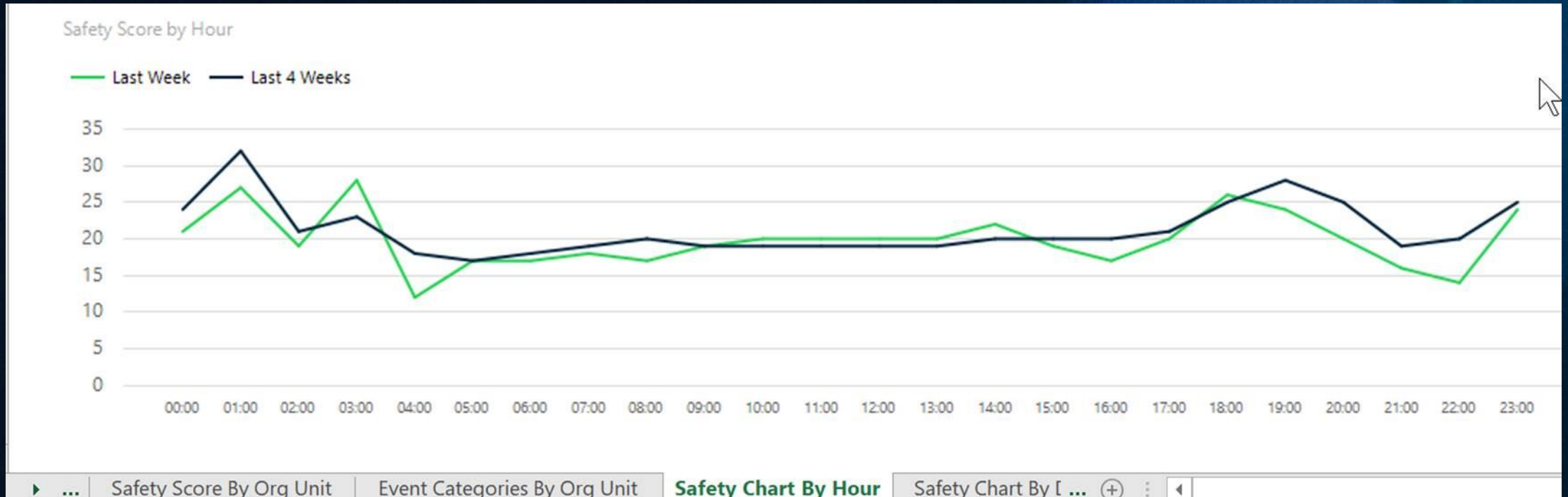
	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	Driver Name	Last Week Driving Time	Last Week Distance Driven	Last Week Acceleration Score	4 Weeks Acceleration Score	Acceleration Score Delta	Last Week Braking Score	4 Weeks Braking Score	Braking Score Delta	Last Week Cornering Score	4 Weeks Cornering Score	Cornering Score Delta	Last Week Lane Handling Score	4 Weeks Lane Handling Score	Lane Handling Score Delta
2	ROBERT CORNHILL	33.97	521.9	1	2	1	9	16	7	13	18	5	1	2	1
3	Ryan McCartney	32.54	538.4	0	1	1	4	4	0	16	9	-7	2	3	1
4	Robert Goodchild	32.83	369.8	2	1	-1	2	3	1	8	10	2	0	2	2
5	Paul BROWN	32.94	606.2	3	3	0	8	9	1	5	6	1	1	1	0
6	Neil Adams	39.32	657.7	0	0	0	3	3	0	6	3	-3	4	2	-2
7	Dave Bracegirdle	6.34	69.7	0	0	0	6	2	-4	2	4	2	3	1	-2
8	Michael Wakefield	6.43	71.4	2	1	-1	3	8	5	3	16	13	8	2	-6
9	JAMES SMITH	7.14	70.7	0	3	3	1	6	5	10	7	-3	0	2	2
10	Adam Piper	7.53	73.6	3	0	-3	3	5	2	0	3	3	0	2	2
11	Adrian Brown	7.62	182.7	0	0	0	4	6	2	13	14	1	0	1	1
12	MICHAEL JEWSBURY	9.83	262.1	0	0	0	1	1	0	1	2	1	1	1	0
13	Sally Beilby	10.57	204.2	0	0	0	5	1	-4	5	3	-2	7	0	-7
14	Gary Rolfe	11.14	154	0	0	0	4	2	-2	2	2	0	1	2	1

All insights are presented in drivers and OU's levels

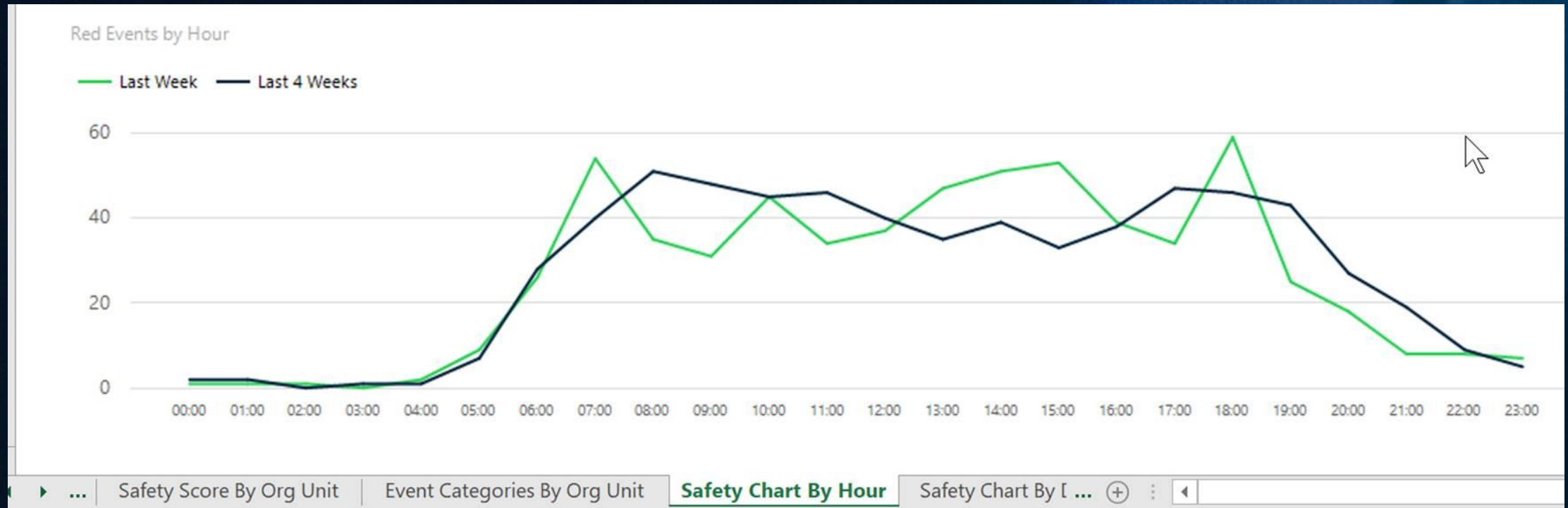
A	B	C	D	E	F
Org Unit	Last Week Driving Time	Last Week Distance Driven	Last Week Red Events	4 Weeks Red Events	Red Events Delta
First Chelmsford (CHEL)	5652.37	83528.8	547	594	47

► ... Safety Score By Driver Event Categories By Driver **Red Events By Org Unit** Safety

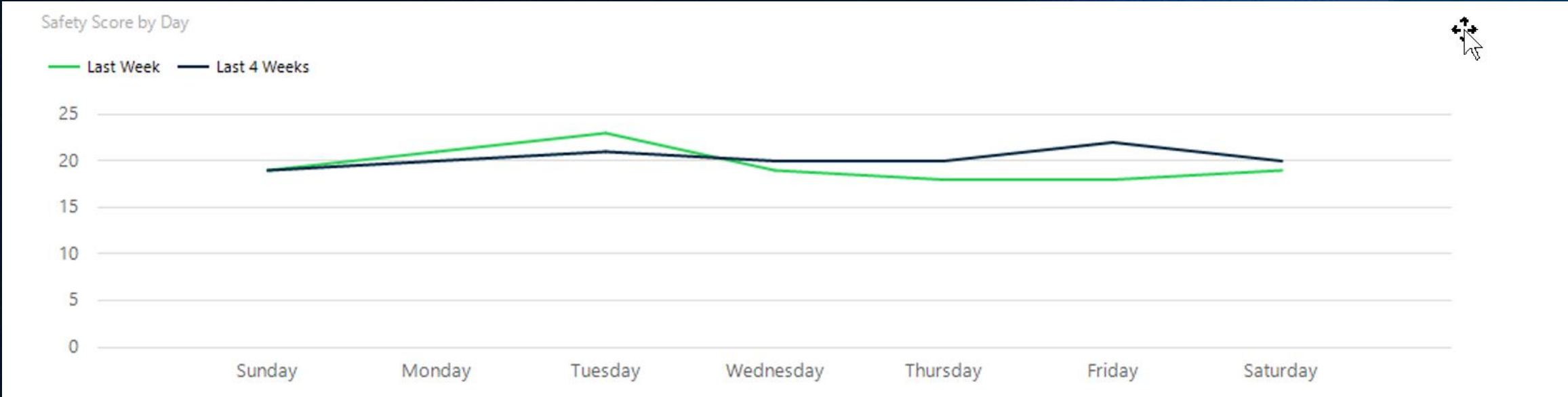
All Safety Events Score Distribution by Hours



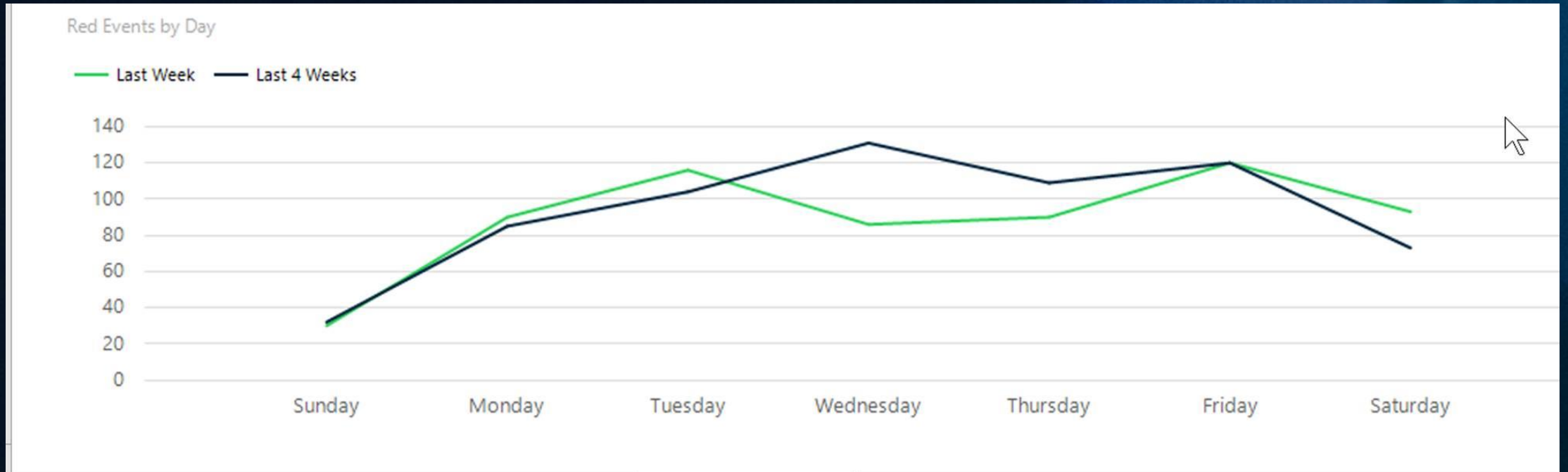
All Red Events Score Distribution by Hours

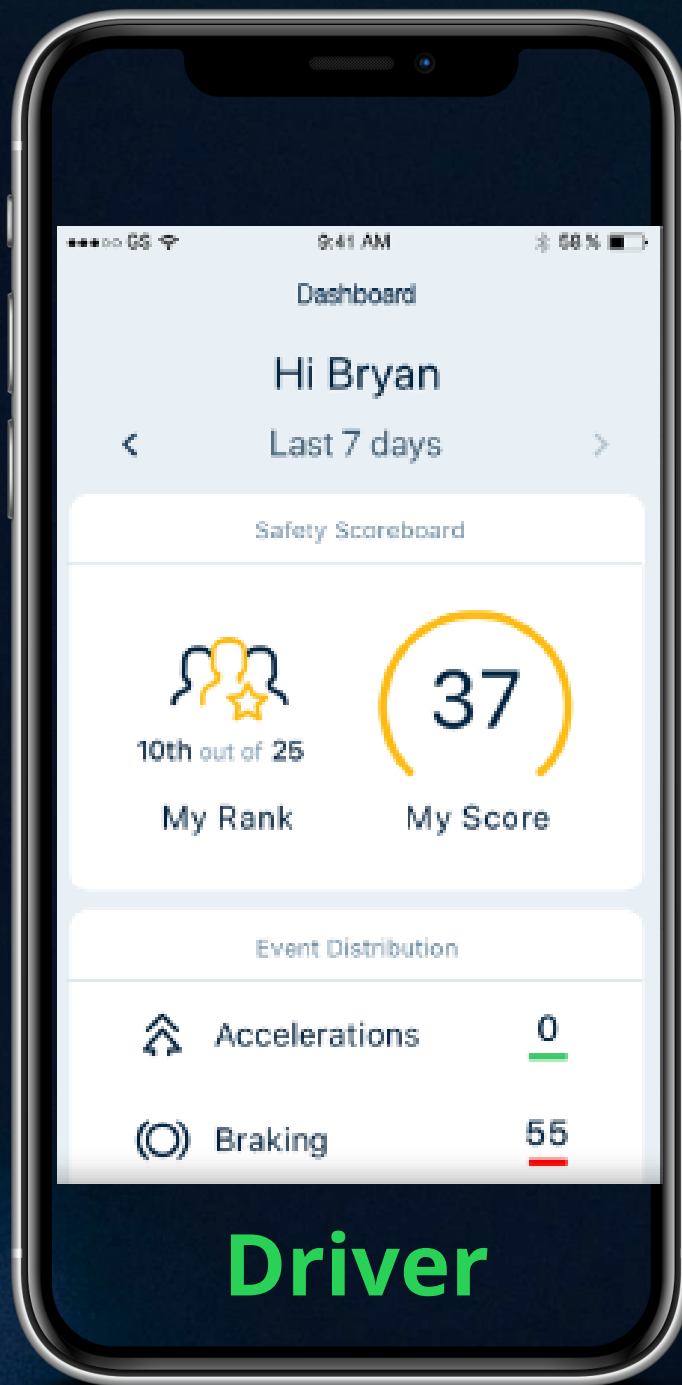


All Safety Score vents Distribution by Days



All Red Events Distribution by Days





Driver



Manager

Red events trends

Red event trend is substantial trend in the numbers of red events in the last week related to the previous 4 weeks

The minimum criteria for a driver: Weekly 2 trips, 3 hours duration, 30 km distance

Data period: Weekly- Sunday to Saturday (OU time)

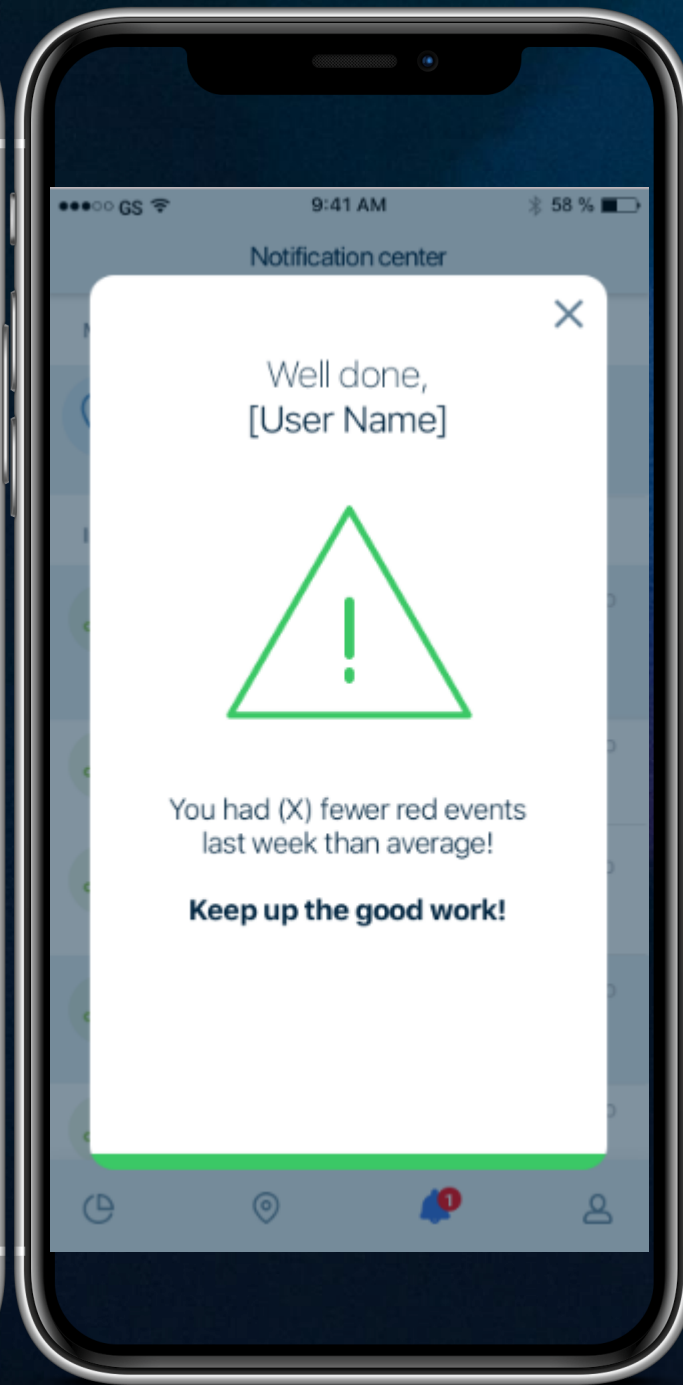
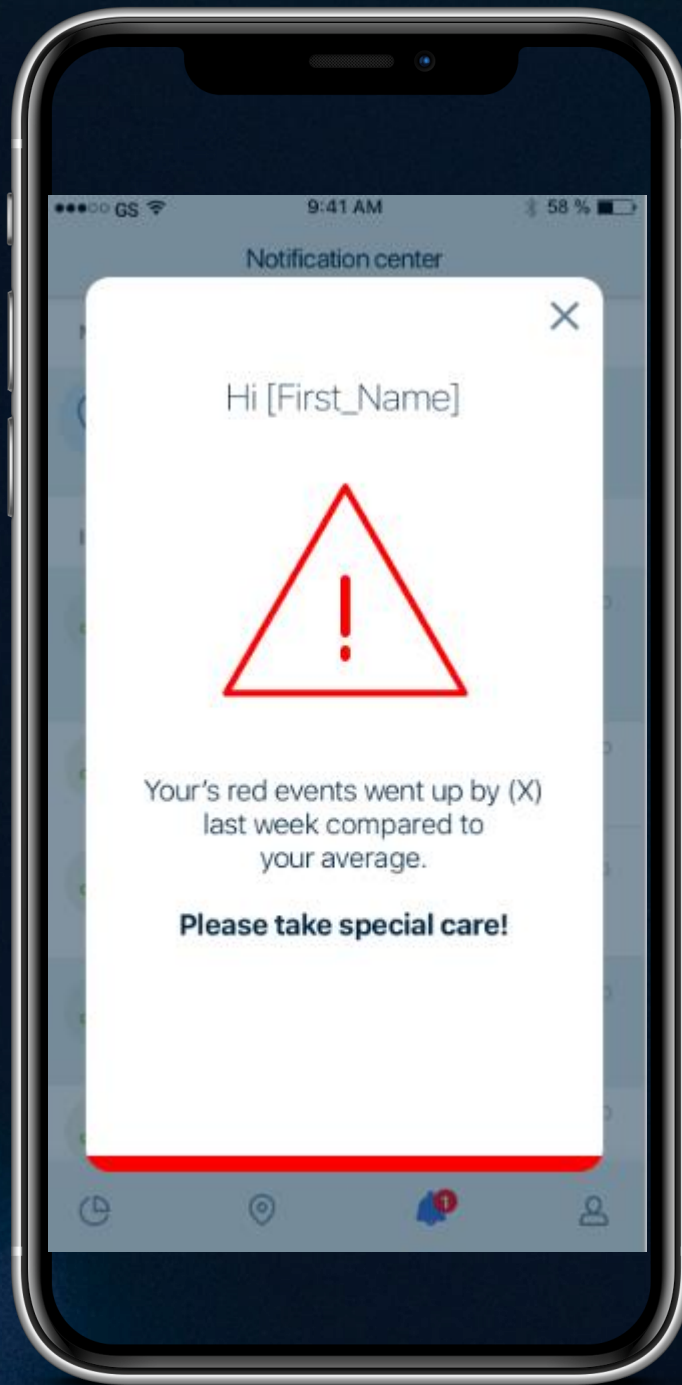
Push time: Weekly- **Monday**, 18:00 (OU time)

Calculation:

The “Delta Red Events ” is “Total Red Events (last week) per 10 hours – “Average Red Events per 10 driving hours (last 4 weeks)

IF “Delta Red Events” $> [3]$ ->It is “Negative Safety Score Trend”.

IF “Delta Red Events” $> [-3]$ ->it is “Positive Safety Score Trend”



Safety score trends

Safety Score trend is substantial trend of the safety score in the last week related to the score of the previous 4weeks

The minimum criteria for a driver: Weekly 2 trips, 3 hours duration, 30 km distance

Data period: Weekly- Sunday to Saturday (OU time)

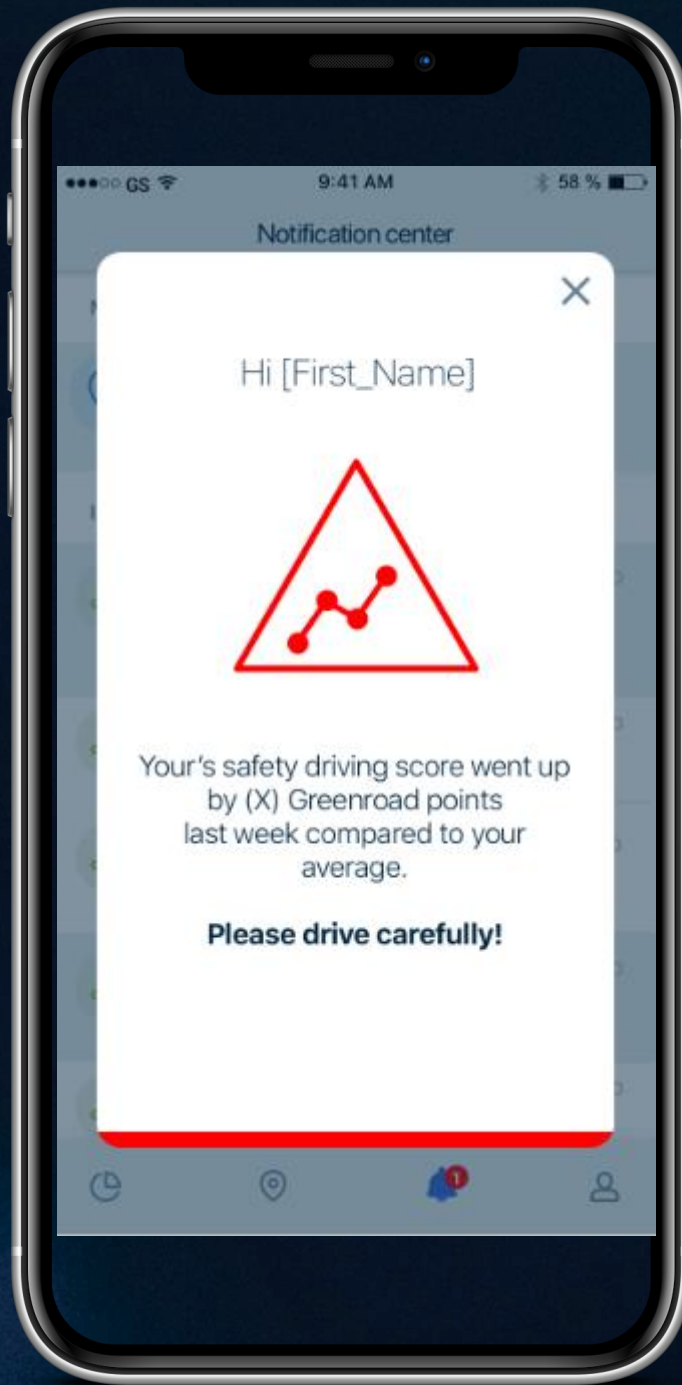
Push time: Weekly- **Wednesday** 18:00 (OU time)

Calculation:

The “Delta Safety Score” is “Total Safety Score (last week)) per 10 hours – “Average safety Score(last 4 weeks)) per 10 hours.

IF “Delta Safety Score” > [10] ->It is “Negative Safety Score Trend”

IF “Delta Safety Score” >- [10] -> it is “Positive Safety Score Trend”



Event categories trends

Event categories trend is substantial trend in the numbers of events in each categories: Breaking/Acceleration/Cornering/Speeding/Lane Handling in the last week related to the previous 4 weeks

The minimum criteria for a driver: Weekly 2 trips, 3 hours duration, 30 km distance

Data period: Weekly- Sunday to Saturday (OU time)

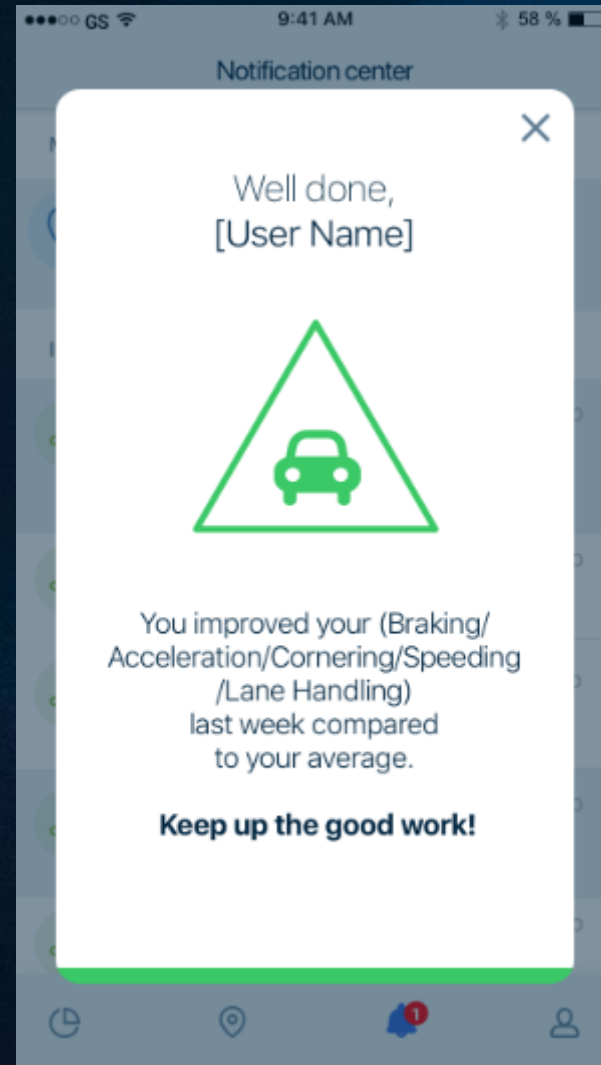
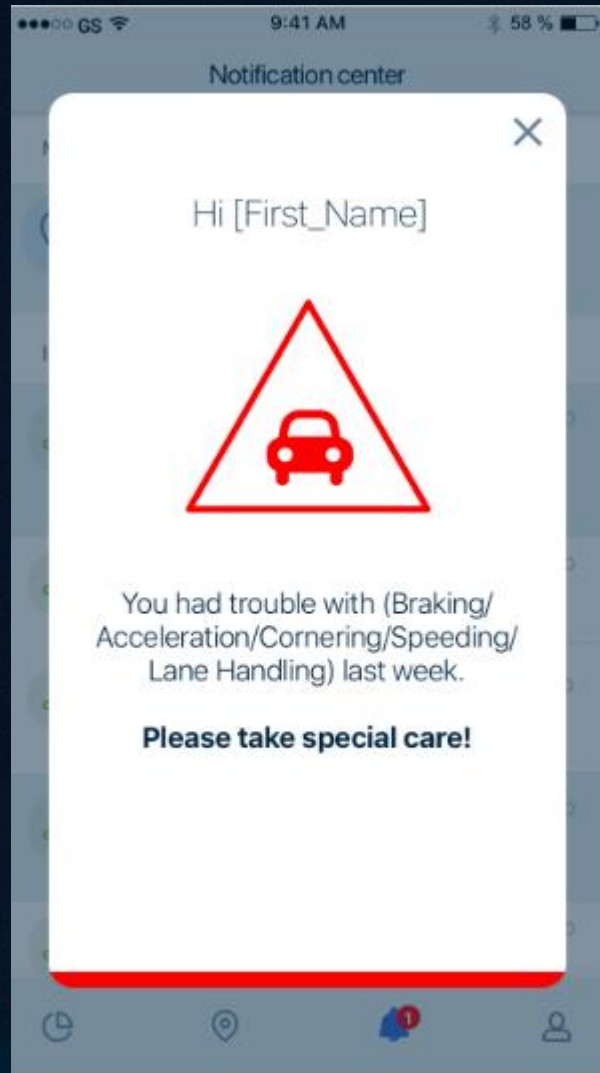
Push time: Weekly- **Friday** 18:00 (OU time)

Calculation:

The “Delta of Breaking/Acceleration/Cornering/Speeding/Lane Handling (last week) per 10 driving hours – “Average relevant categories 10 driving hours (last 4 weeks)

IF “Delta Category Events” $> [5]$ -> It is “Negative Safety Score Trend”.

IF “Delta Category Events ” $> - [5]$ -> it is “Positive Safety Score Trend”.



Location - [REDACTED]

The following figure shows that the accident area was identified previously as a safety “Hot Spot” area [REDACTED], with the highest number of safety events captured.

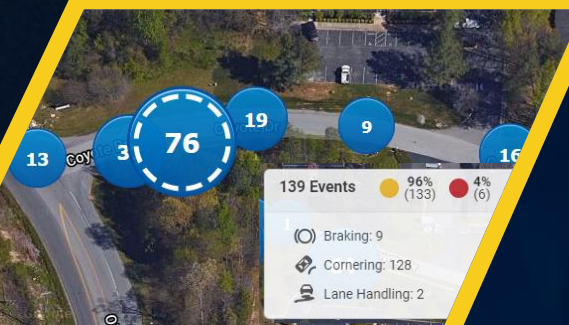


The most advanced AI to manage risk areas

- **Automatic Alerts** are sent when approaching a risky area or hotspot
- **Personal Risk Zone Alerts** are sent when approaching an area where the driver has had multiple safety events
- **Customisable local risk areas** with in-cab audio notifications

Careful:
Approaching
risky area

Hotspots



BI as Professional Services



GreenRoad Overview

17 April 2020

Prepared for:



Ron Levin, Chief Technology Officer
Nir Yaffe, VP Product
Richard Hemming, VP Customer Success



GREENROAD™ | www.greenroad.com



**3 LEADING BUS COMPANIES
BI REPORT FOR THE YEAR 2019**

Nir Yaffe, VP Products



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Thank You