



from:  
Moscow, Russia  
129

to:  
London,  
United Kingdom  
N1 0AB

from:  
Zhengzhou, China  
450000

from:  
Guadalajara,  
Mexico  
44150

to:  
Halifax, Canada  
B3H 0A2

to:  
Sydney, Australia  
2000

from:  
Louisville, USA  
40215

July, 2017

## The Road to Optimization

Jack Levis – Senior Director, Engineering

 @jacklevis



WE ♥ LOGISTICS®

# Basic Facts

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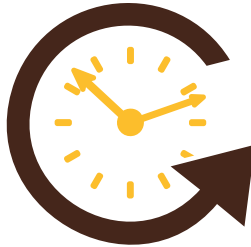
# Basic Facts



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1 mile is worth  
\$50M\*

---



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1 minute is worth  
\$14.6M\*

---



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1 minute of idle time  
is worth \$515K\*\*

---

Big savings come from attention to detail

Note: Figures are per driver per day across the US for a year

\* Small Package P/U and Delivery drivers

\*\* Small Package P/U and Delivery, Freight and Tractor / Trailer drivers



~~OR~~  
**AND**

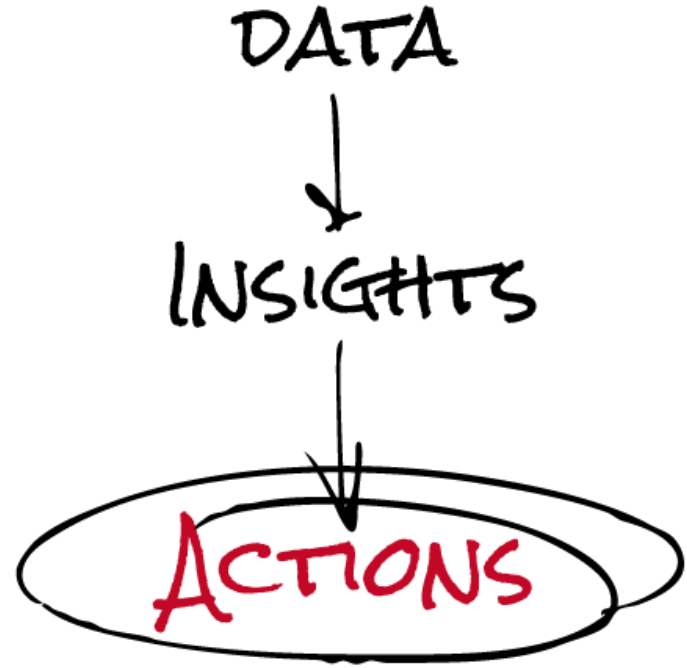
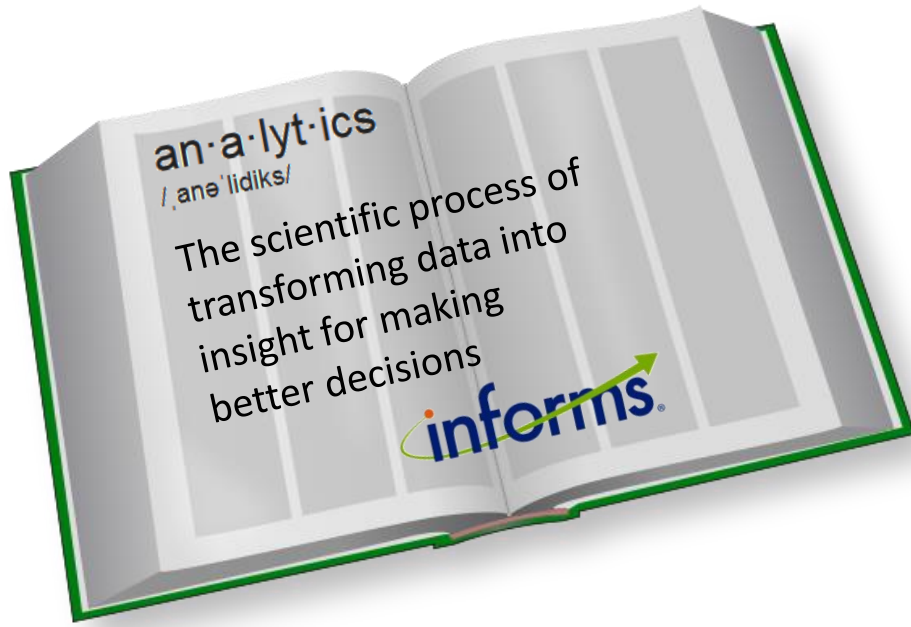
Operations Technology and Analytics  
has been key in turning **OR** → **AND**



# Analytics

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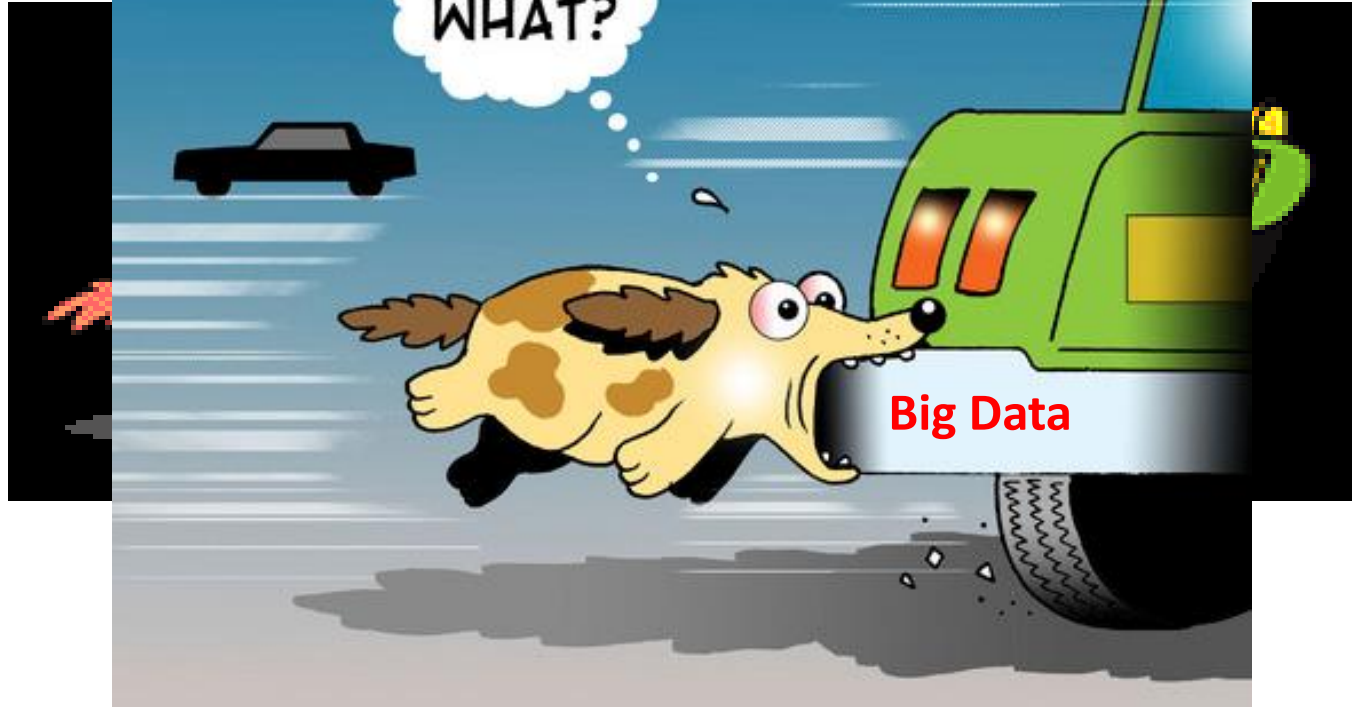




Insight that doesn't lead to a better decision is Trivia

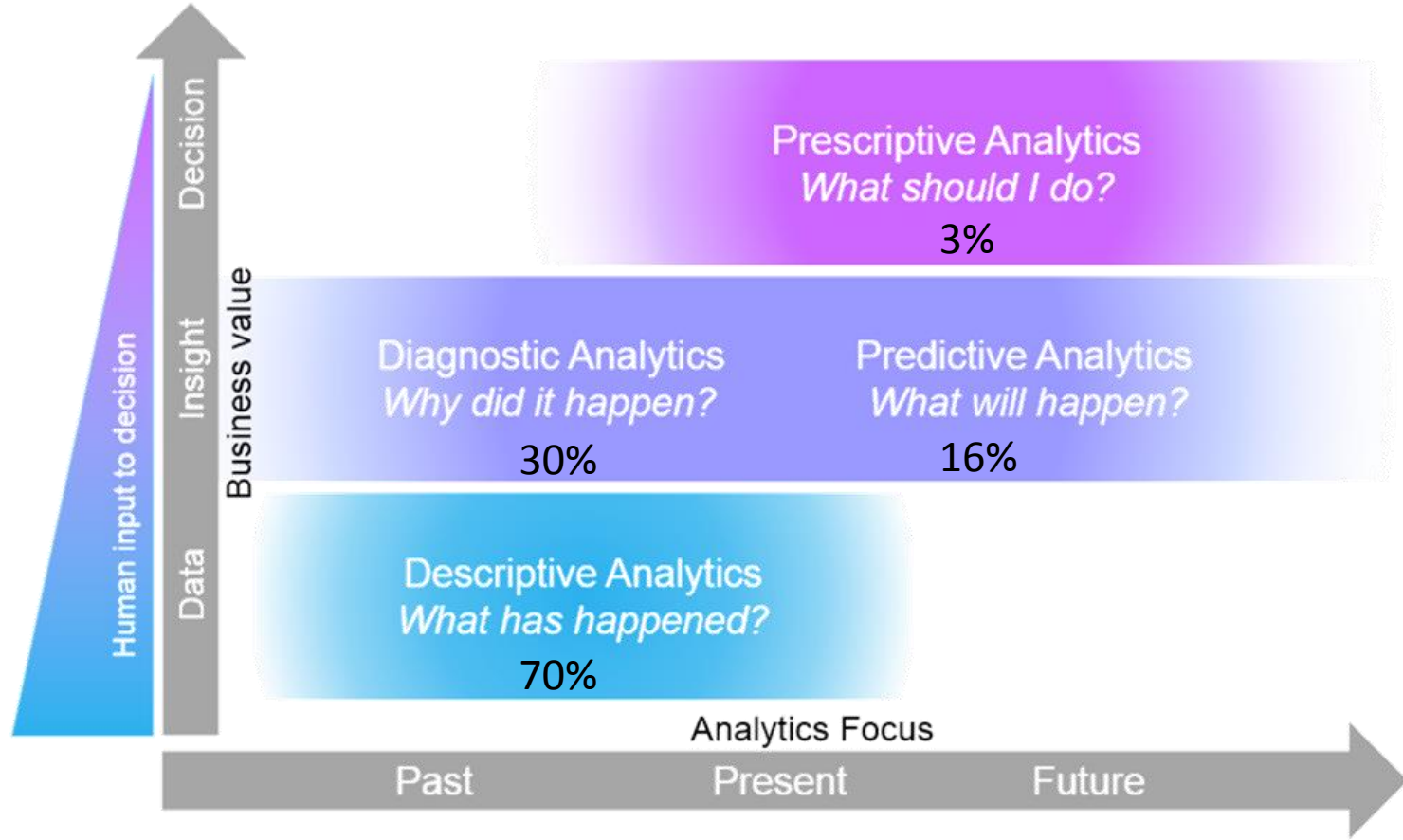


# Chasing Big Data



Big Data is a how... not a what...





Research shows a hierarchy of impact  
through the use of analytics

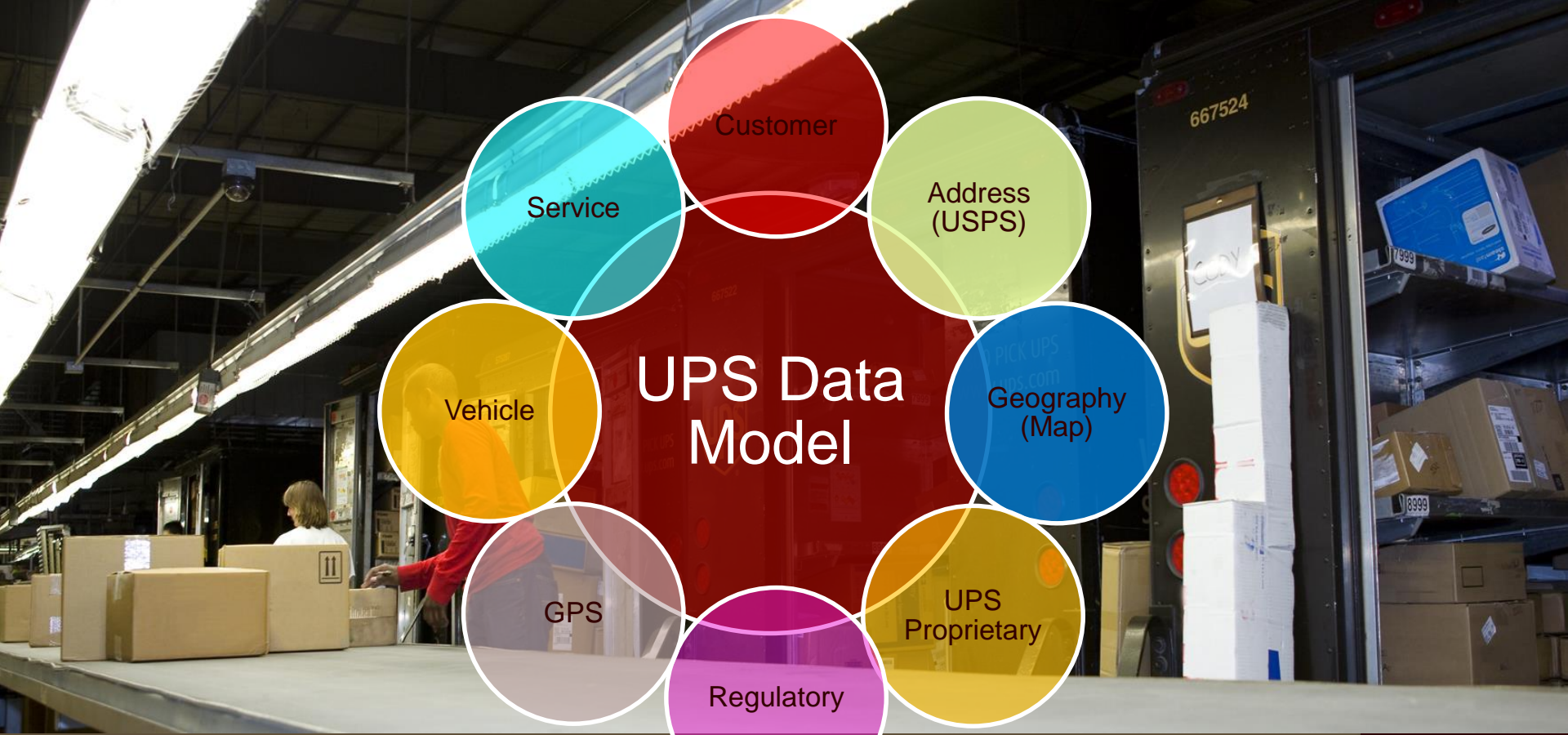




# Predictive Analytics

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**Virtual Network that describes UPS**



Dispatch Planning System - Plan: 060413\_22\_2605

File View Map Territory DIAD Plans Windows Help

Dispatch Territory List

Loops: Select... Filter: All Seqs Select Sequences: Loop: 13 Sequence: Low High Select Add To Selection

Unit	Seq	Street / Consignee	Address Range	Floors	Delivery Stops	Pkg	Pickup Stops	Pkg	EAM	PRM	SAV	STD
1311	5313	NORTHVIEW DR	1 99	●	0	0	0	0	EA1	13A	13A	13A
1311	5314	ALBRIGHT DR	1 199	●	0	0	0	0	EA1	13A	13A	13A
1310	5315	ASHLY CT	1 99	●	1	1	0	0	EA1	13A	13A	13A
1310	5318	AMANDA AVE	1 199	●	2	2	0	0	EA1	13A	13A	13A
1310	5320	ARIWCO DR	100 199	●	2	2	0	0	EA1	13A	13A	13A
1310	5322	NORTHVIEW DR	100 199	●	3	6	0	0	EA1	13A	13A	13A
1311	5324	GRANDVIEW RD	1000 1498	●	1	1	0	0	EA1	13A	13A	13A
1311	5330	GRANDVIEW RD	1001 1498	●	0	0	0	0	EA1	13A	13A	13A
1311	5332	GRANDVIEW RD	1001 1498	●	0	0	0	0	EA1	13A	13A	13A
1311	5334	BLOMIN GROUND	1001 618	●	0	0	0	0	EA1	13B	13B	13B
1311	5336	HOLE RD	1001 6599	●	0	0	0	0	EA1	13B	13B	13B
1311	5338	DEAGEN RD	200 699	●	1	1	0	0	EA1	13B	13B	13B
1311	5340	CANNERY RD	6500 6999	●	1	1	0	0	EA1	13B	13B	13B
1311	5342	SMITH STATION RD	1 1999	●	0	0	0	0	EA1	13B	13B	13B
1311	5344	PAMADEVA RD	6000 6998	●	0	0	0	0	EA1	13B	13B	13B
1311	5346	PAMADEVA RD	6001 6999	●	1	1	0	0	EA1	13B	13B	13B
1311	5348	HOPE WAY	6000 6999	●	0	0	0	0	EA1	13B	13B	13B
1311	5350	CHARITY WAY	6000 6999	●	1	1	0	0	EA1	13B	13B	13B
1311	5352	FAITH WAY	6452 6452	●	0	0	0	0	EA1	13B	13B	13B
1311	5354	SMITH STATION RD	2000 2099	●	0	0	0	0	EA1	13B	13B	13B
1311	5355	SMITH STATION RD	2100 2598	●	1	1	0	0	EA1	13B	13B	13B
1311	5356	SMITH STATION RD	2600 2600	●	0	0	0	0	EA1	13B	13B	13B
1311	5357	SMITH STATION RD	2602 2698	●	0	0	0	0	EA1	13B	13B	13B
1311	5359	SMITH STATION RD	2101 2698	●	0	0	0	0	EA1	13B	13B	13B

Selected Stops/Pkgs: Stops: 9 Pkgs: 12

Rte	Stop	Pkg	Pin	Trgt
10A	2	598	8.30	8.30
12A	137	200	8.74	8.65
12B	101	148	8.75	8.75
12C	162	255	9.94	10.0
13A	114	252	8.90	8.90
13B	135	286	8.90	8.90
3D	1	62	9.00	9.00
3E	13	59	9.05	9.05
4A	124	49	11	9.15
14B	89	212	9.00	9.10
14C	133	275	8.27	8.40
14D	97	240	8.69	8.80
15A	121	164	9.24	9.20
15B	141	284	9.06	9.05
16A	107	234	9.02	9.00
17A	125	185	9.50	9.50
18A	128	212	9.16	9.10
18B	127	352	9.41	9.50
19A	154	231	9.23	9.25
19B	134	243	9.10	9.10
FA1	1	1	0.33	0.0

Service Groups: EAM Not Dispatched, PRM Partially Dispatched, SAV Fully Dispatched, STD Consignees

Seq Actions: Undepatch, Split Bulk Stop..., Show Selected on Map

Find: Find Next Undispatched, Find...

Typical Day: View Details..., View On Map...

Legend: Not Dispatched, Partially Dispatched, Fully Dispatched, Consignees

Add in DOL Order: Add To Route, Open...

Map: Wilson Ave, 111, 1030

ABC Company  
2775 Chestnut Run Road  
Suite 242  
York Pa 17402 - 2558

P:RED S:BROWN I:A14

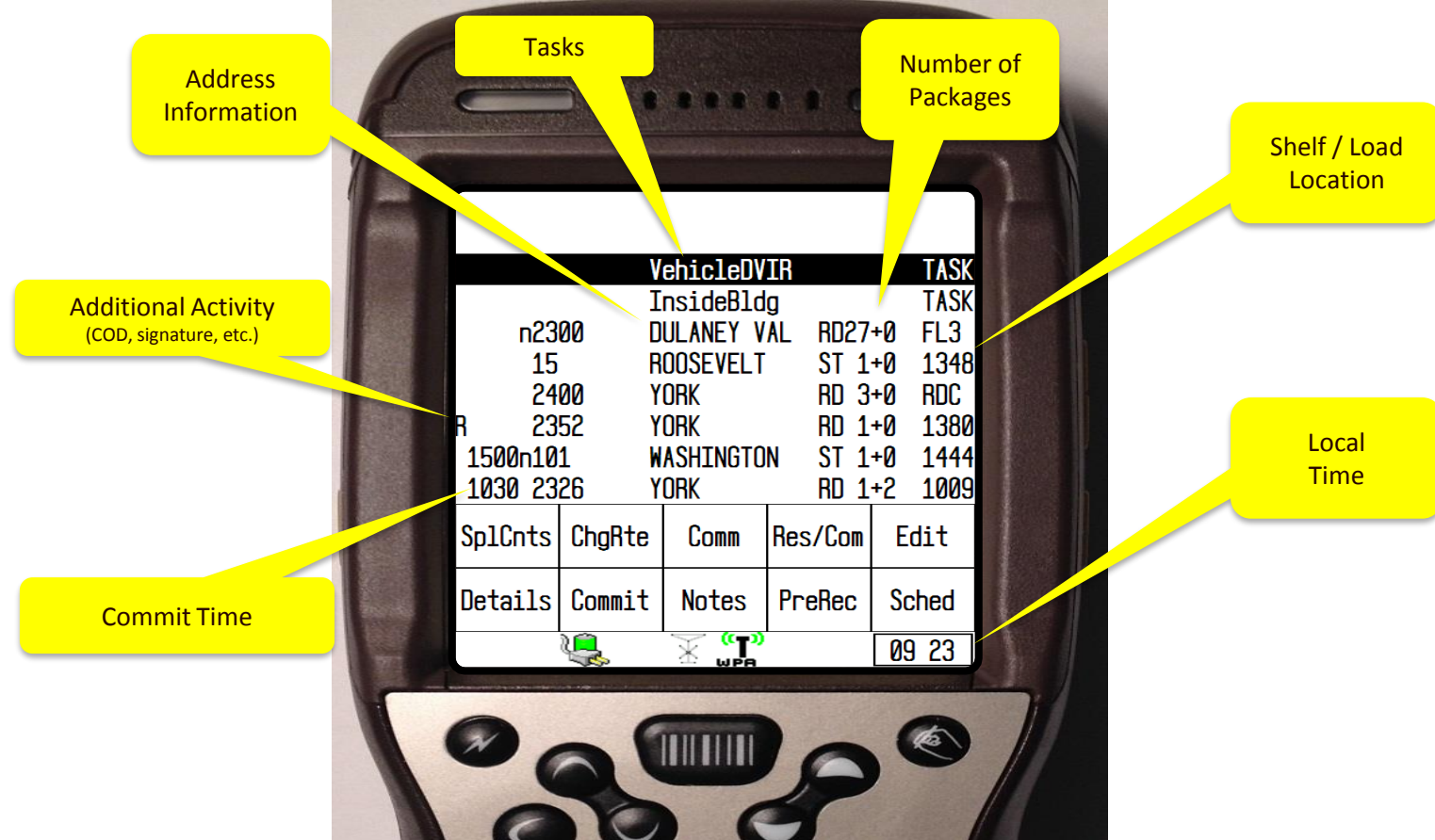
**R120-1118** x

1Z123X560312345679 1030

DEVICE# 123 STATION# 33 Nov 08 10:38:14 2000  
US 00001 HIP 1.14a INT4420

Each package planned on the right vehicle for the right day

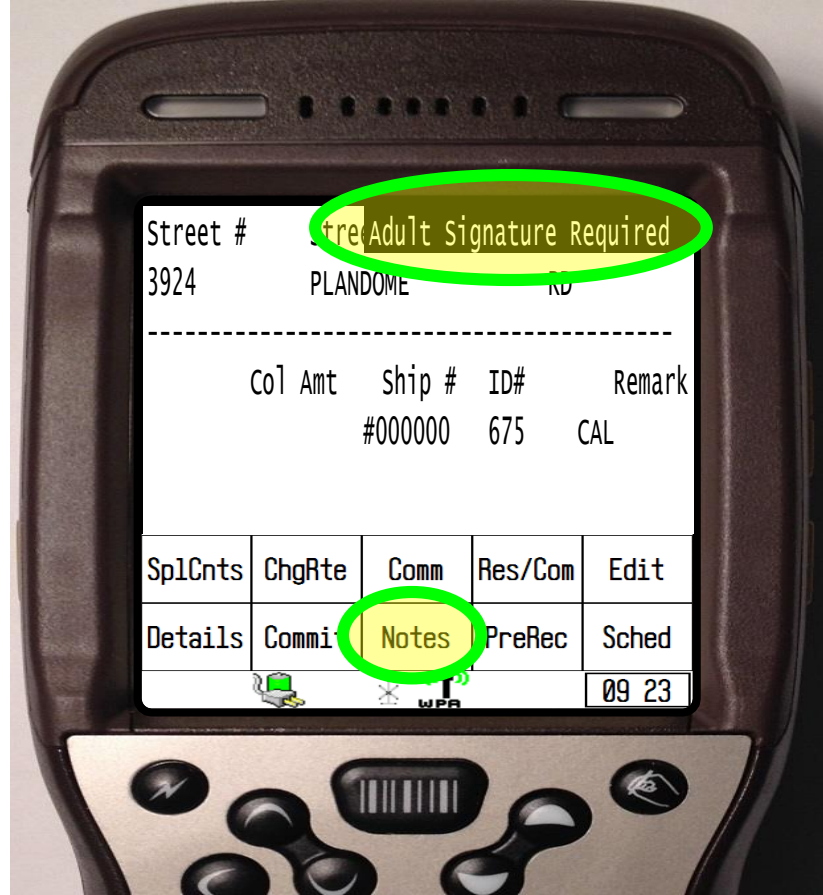




Changing the DIAD from an **Acquisition** device to a driver **Assistant** for making better decisions

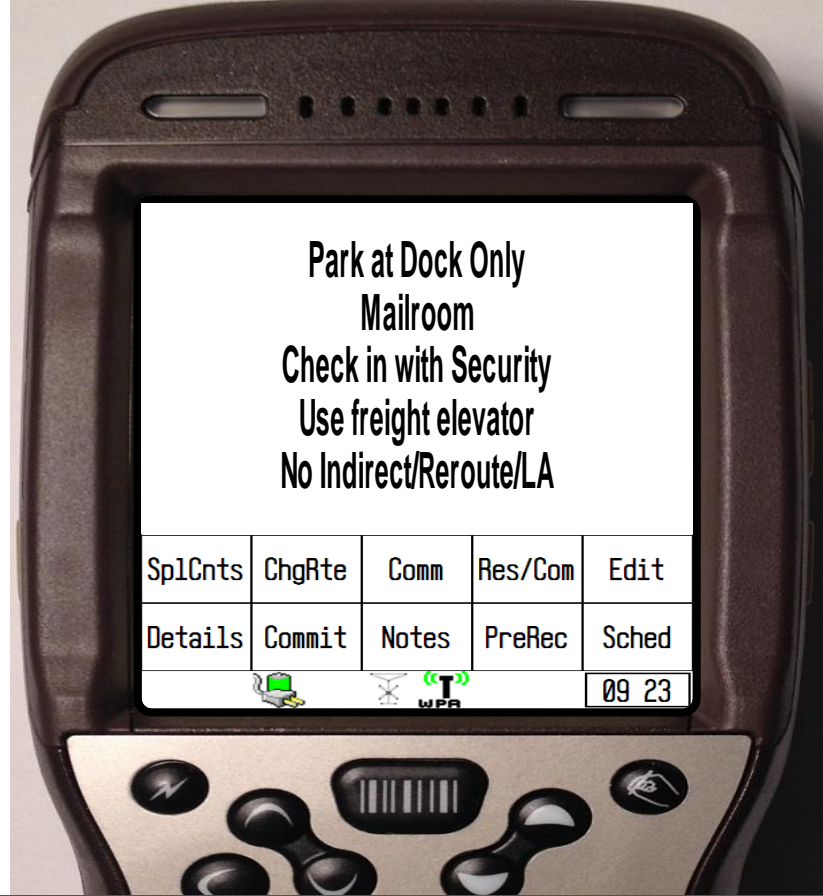






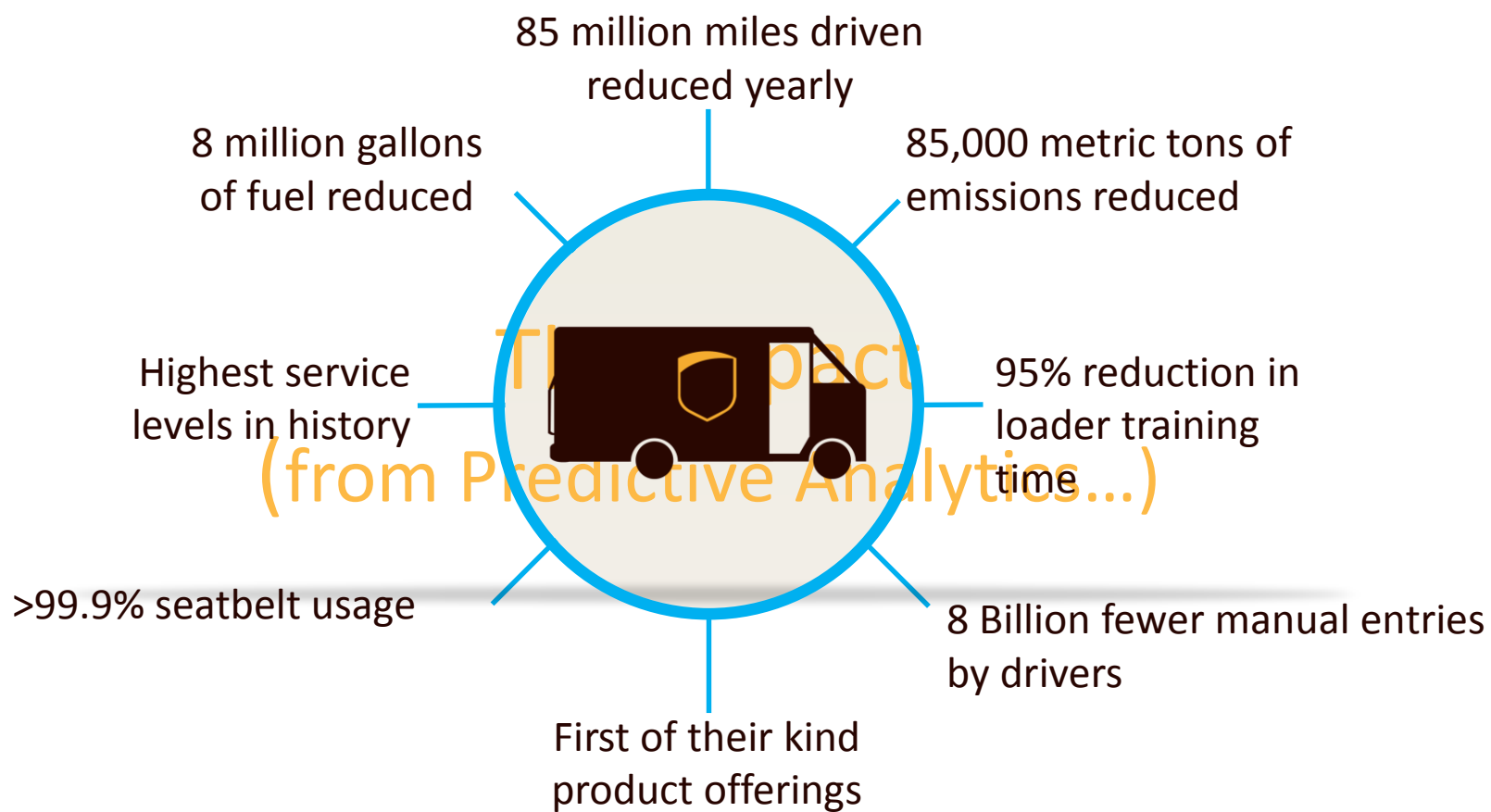
Changing the DIAD from an **Acquisition** device to a driver **Assistant** for making better decisions





Changing the DIAD from an **Acquisition** device to a driver **Assistant** for making better decisions

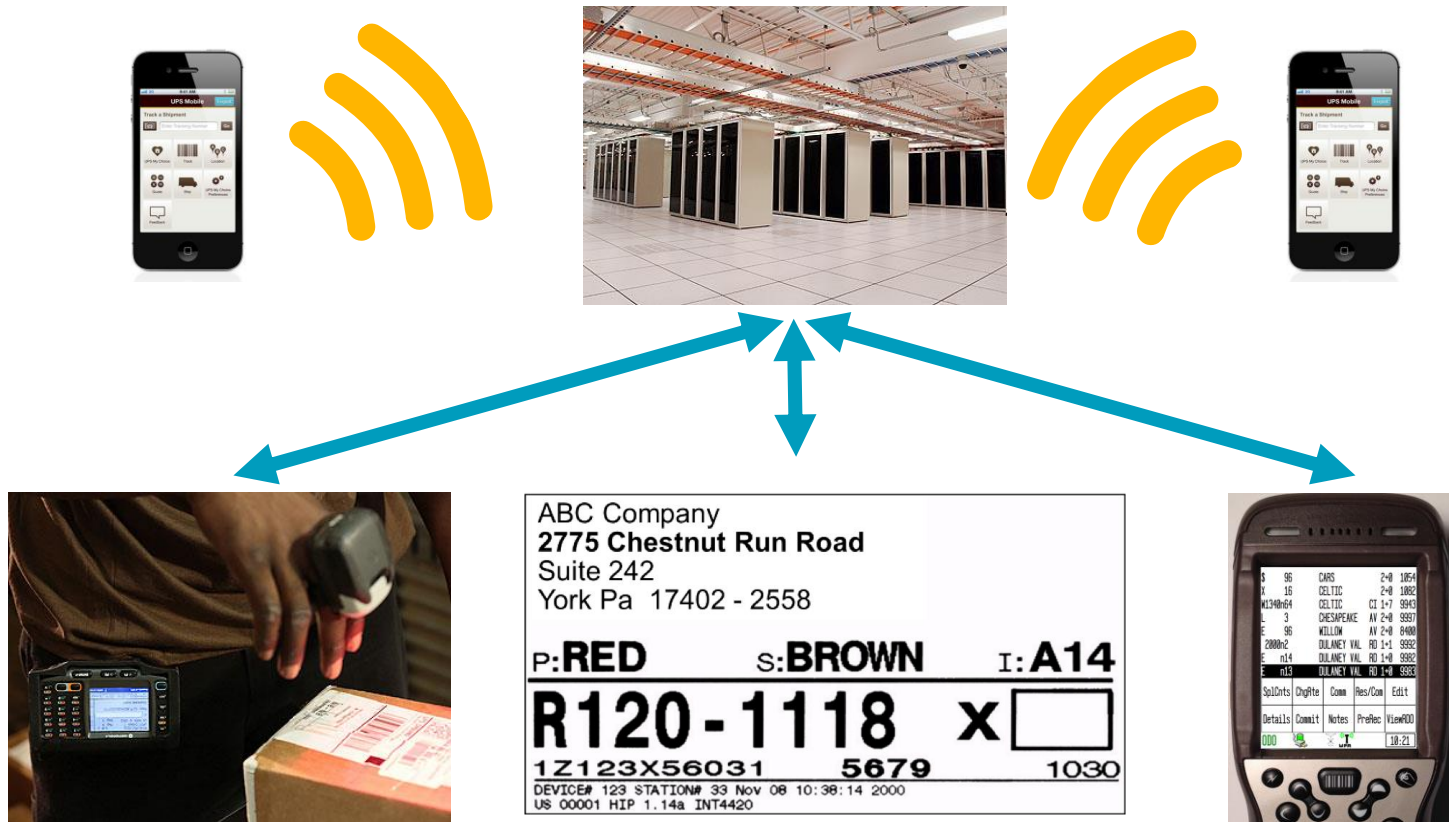




## Real world results

**E + I < E**



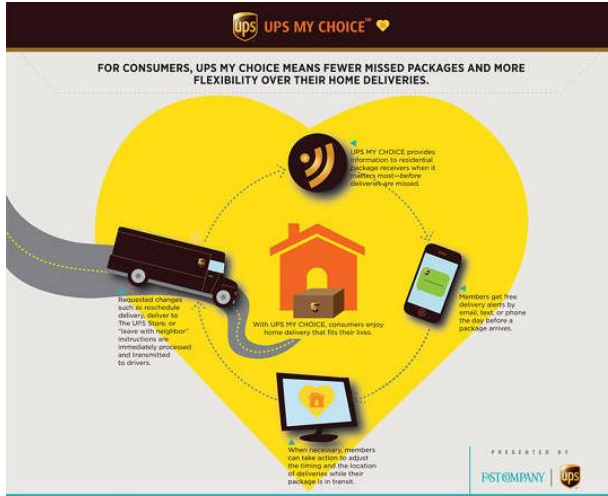


Each scan provides a  
customer connection





# Virtual and Physical Network Linkage Allows New Products



FOR SMALL BUSINESSES, UPS MY CHOICE MEANS HAPPIER CUSTOMERS, DECREASED COSTS, AND INCREASED REVENUE.



- Delivery Alerts
- Delivery Planner
- Reschedule Delivery
- Hold for Will Call
- Authorize Shipment Release
- "Leave at" Instructions (*Driver Instructions*)
- Leave with Neighbor
- Deliver to a UPS Store<sup>®</sup>
- Deliver to Another Address
- Approx. delivery time
- Confirmed Delivery Window (*2-hour*)

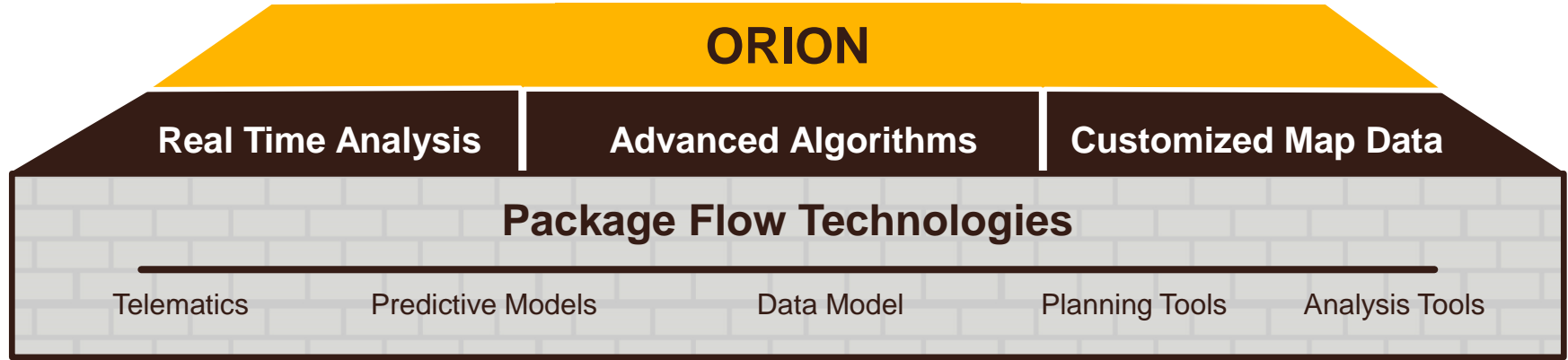


# Prescriptive Analytics ORION

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# ORION builds upon UPS's rich technology foundation



# Map Information is a Corporate Asset

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Actual Delivery Location →

You have  
arrived



*1.2 mile round trip difference*





Proprietary Geographic Algorithm

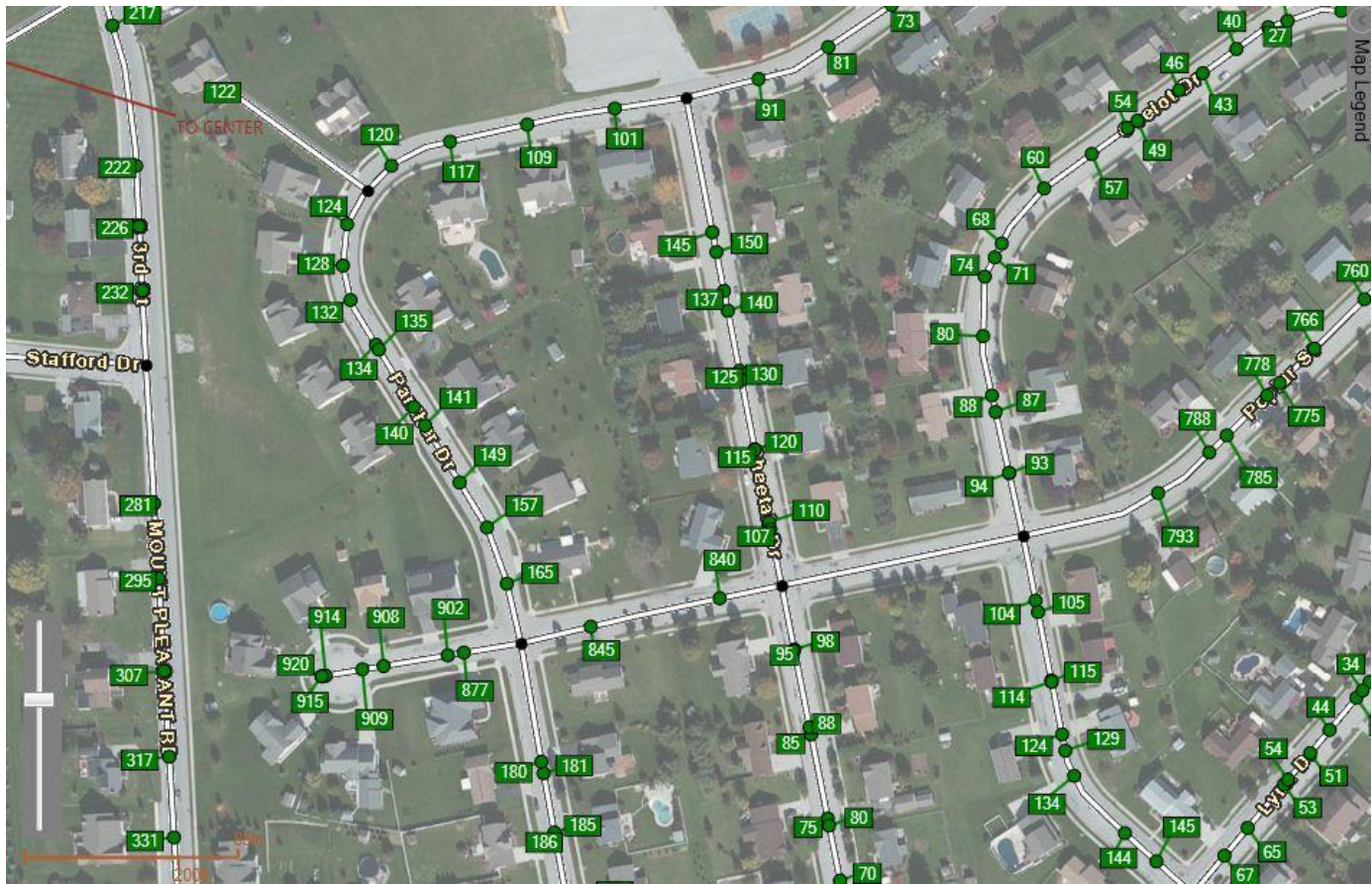




## Proprietary Geographic Algorithm



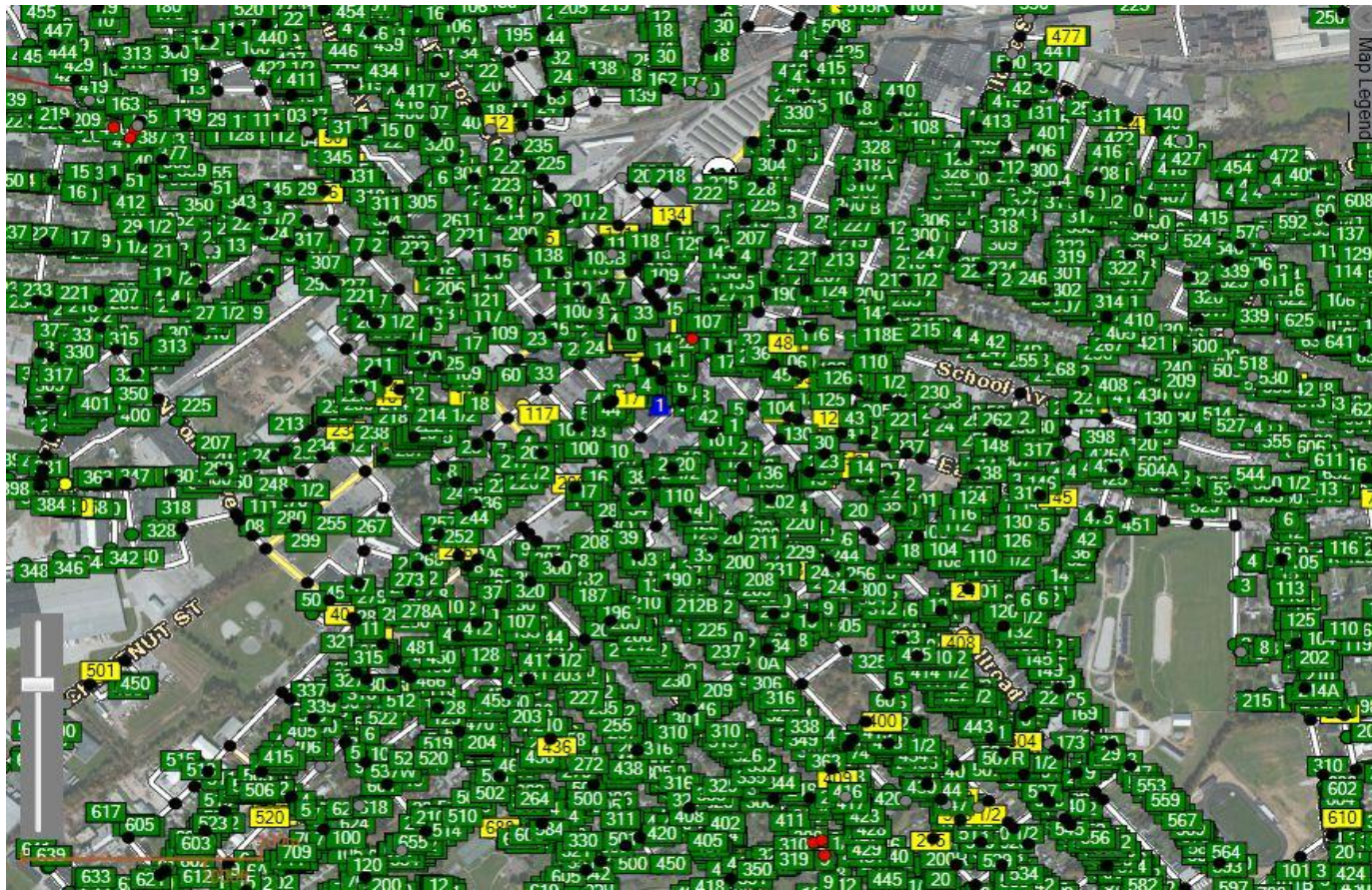




## Proprietary Geographic Algorithm







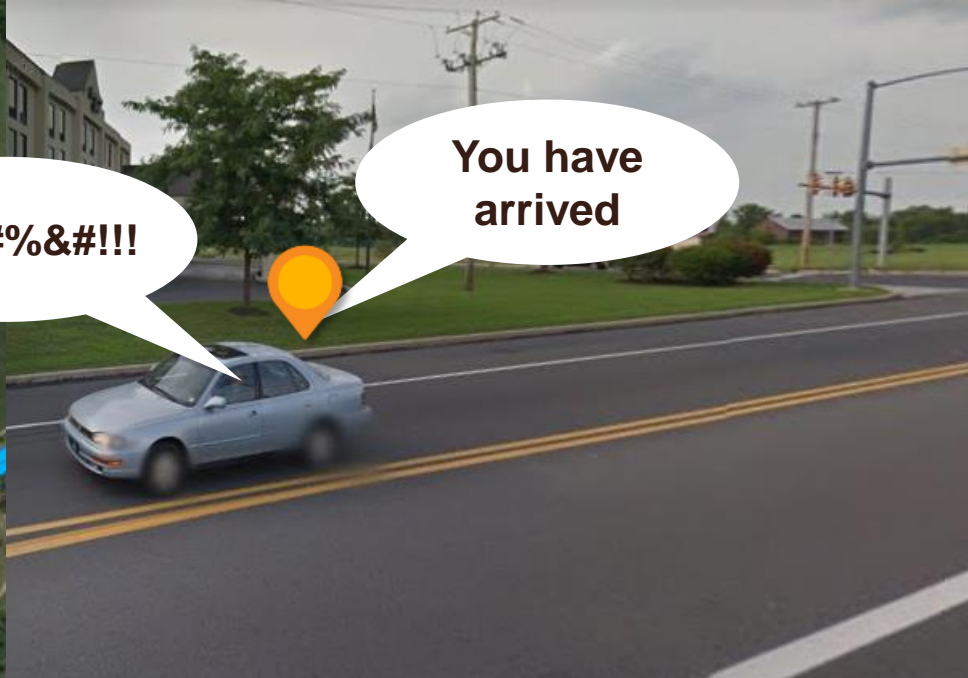
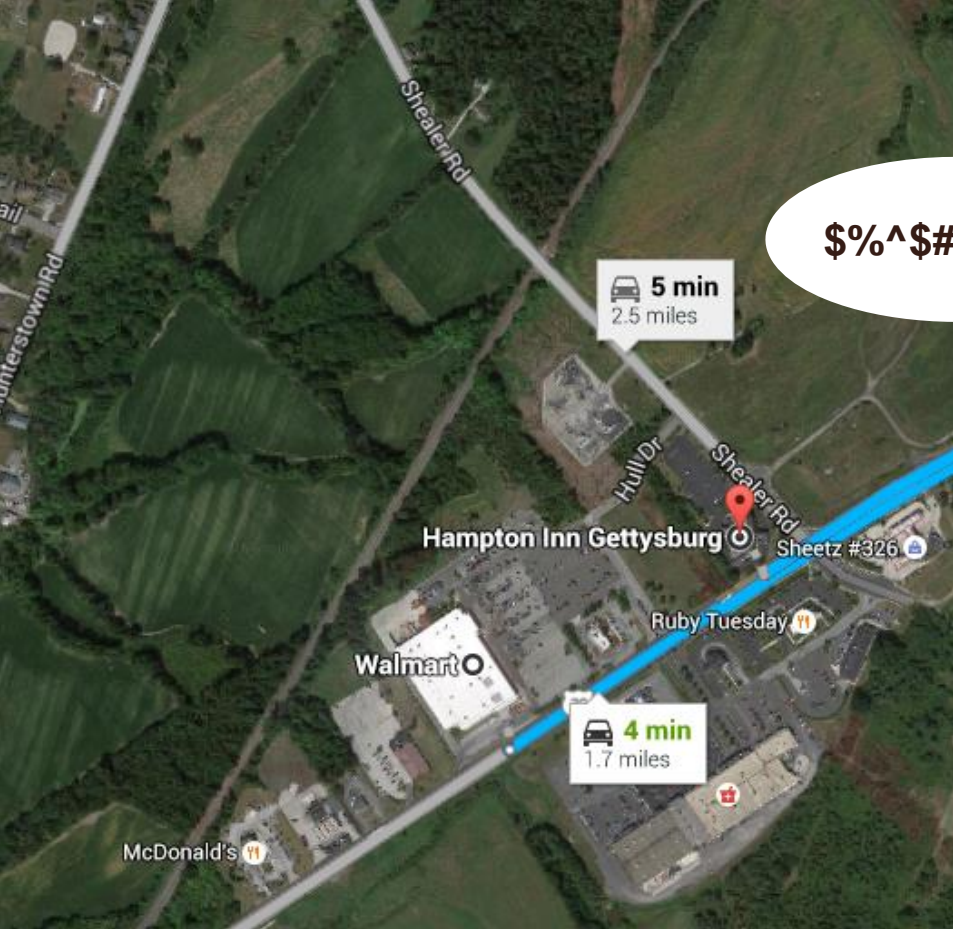
250 Million Global Data Points







*Map data greatly impacts optimizations*



*Map data greatly impacts optimizations*



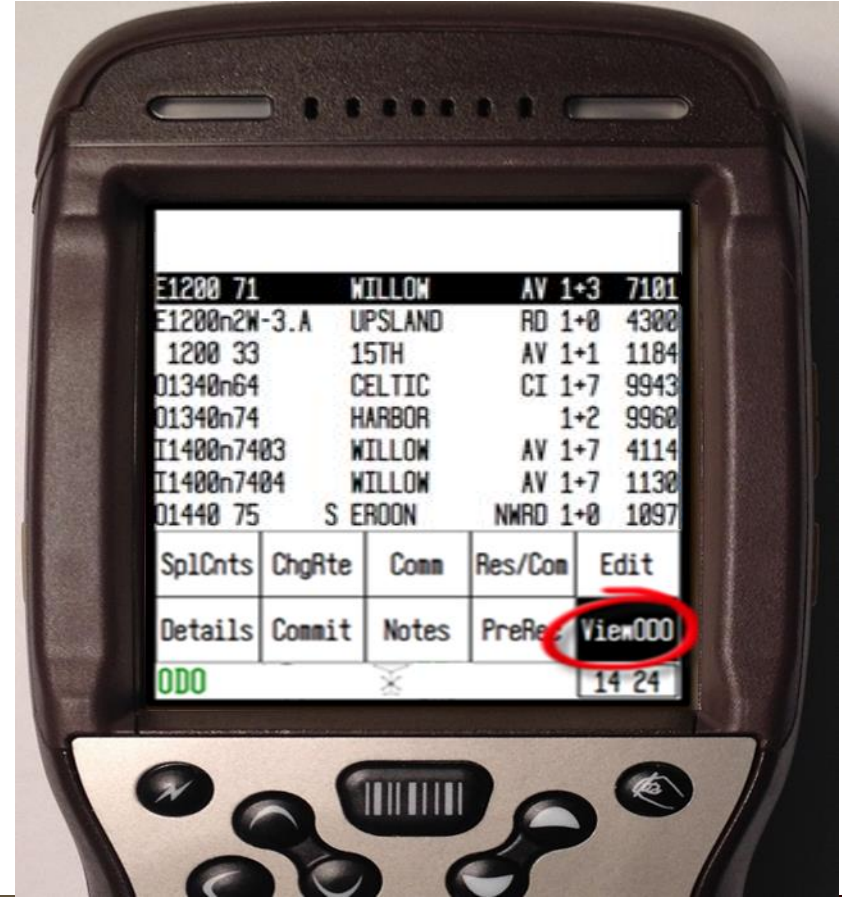






## Map data greatly impacts optimizations

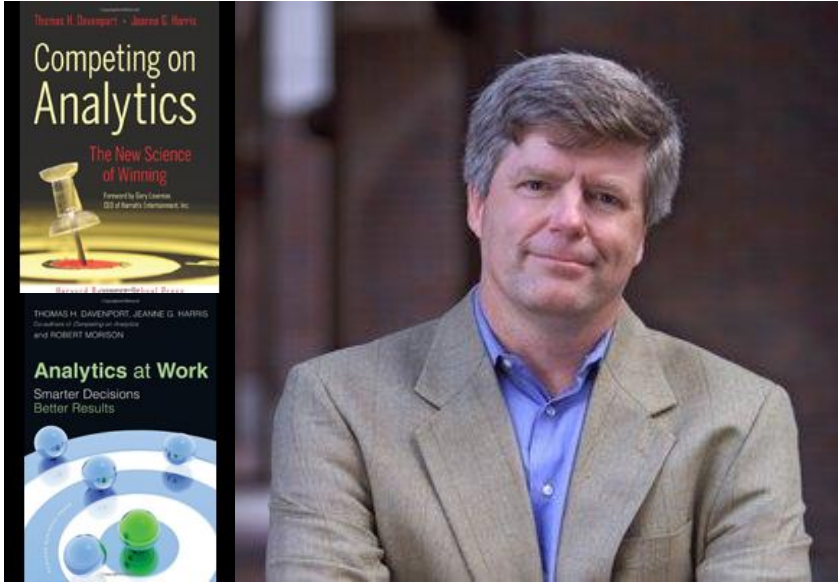
- 30 seconds from map edit to a driver's hands
- ORION optimizes delivery / pickup order accounting for:
  - Service commitments
  - Individual customer needs
  - Business rules
- Implementable cost based decisions balances all rules and constraints



ORION “sorts the list” from a **General** order to a **Specific** order for the day's specific conditions



# ORION



*“This initiative, called ORION  
(On-Road Integrated Optimization and Navigation)  
is arguably the world's largest operations  
research project.”*

**Thomas H. Davenport**  
*Big Data in Big Companies*



Recognized Technology Innovation





## Approximate age of the Earth (in Seconds):

**145,065,600,000,000,000**

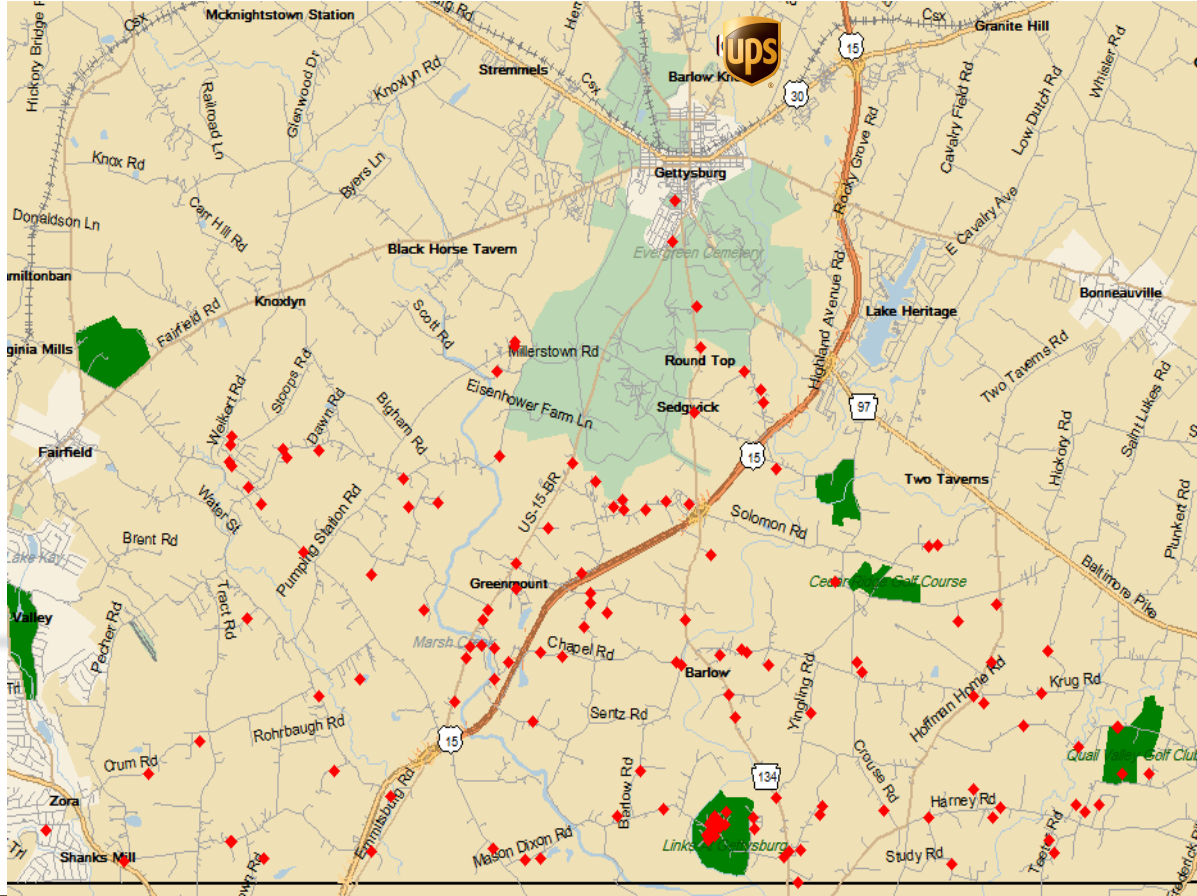
## Number of ways to deliver 120 stops:

[illegible]

# Why is this a breakthrough? Why is this so hard?

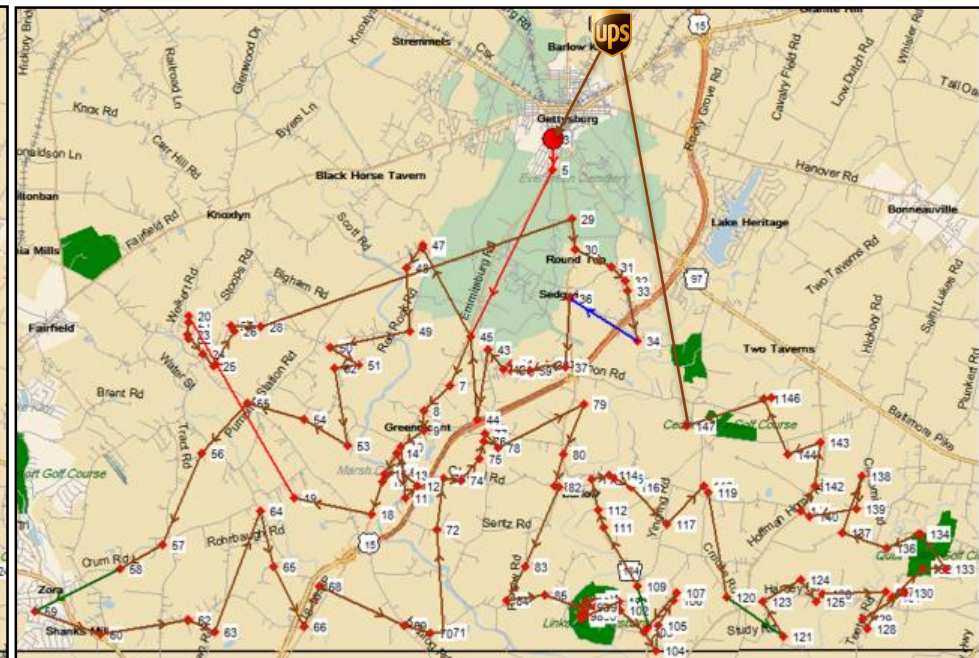
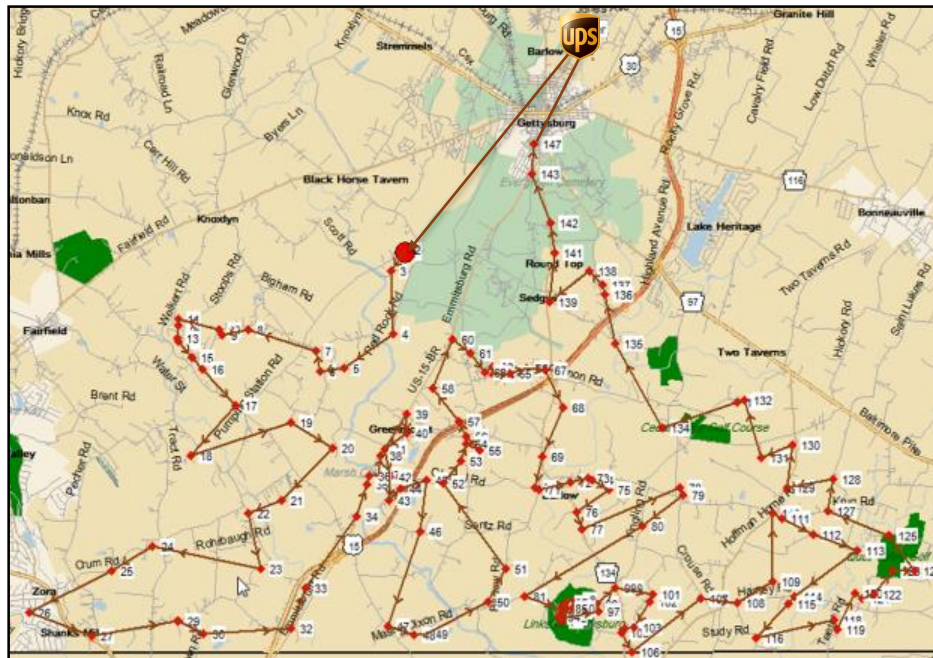






What is the most cost effective way to serve these customers?



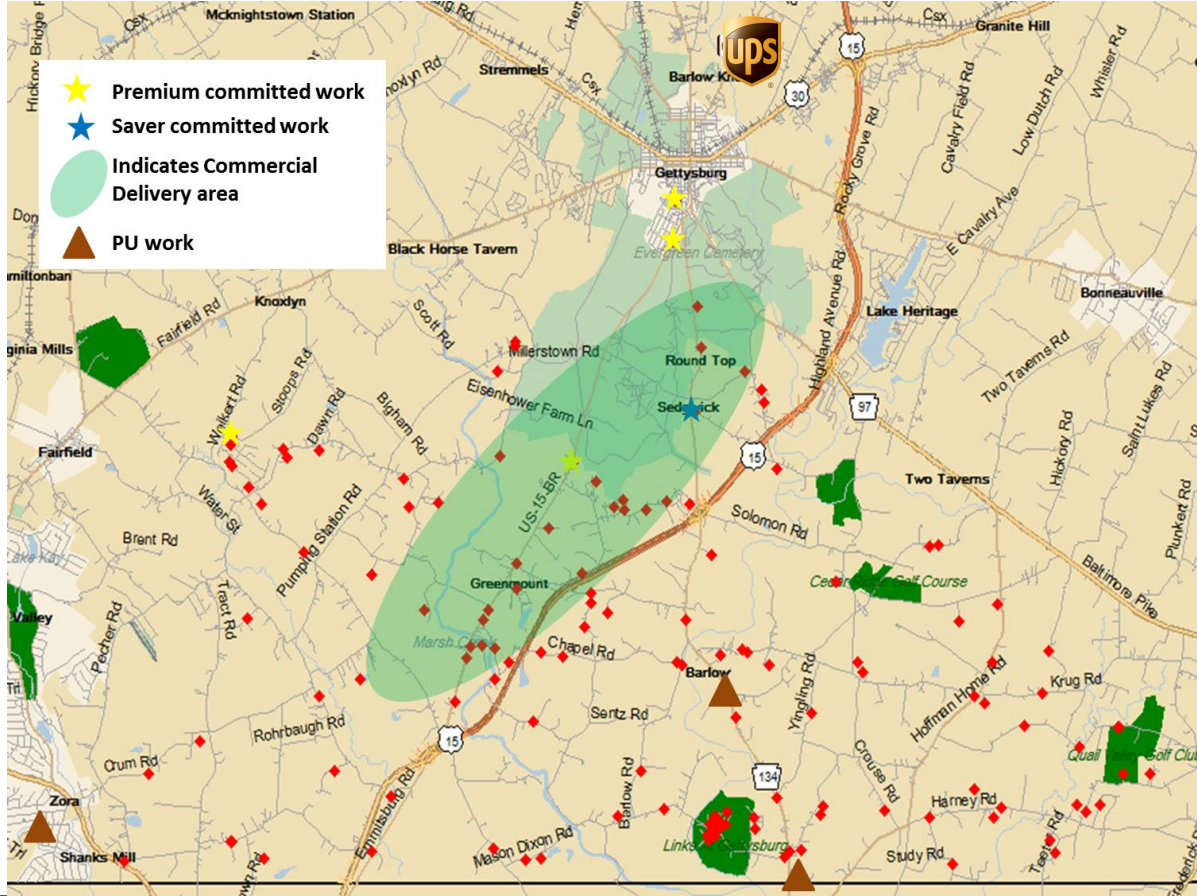


Which route has fewer miles?







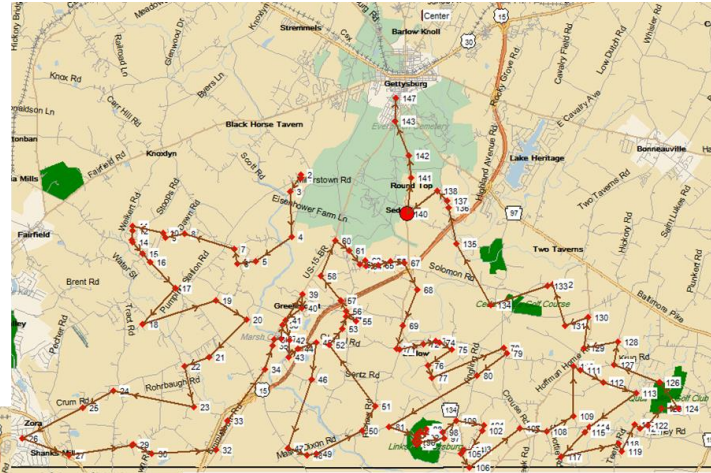
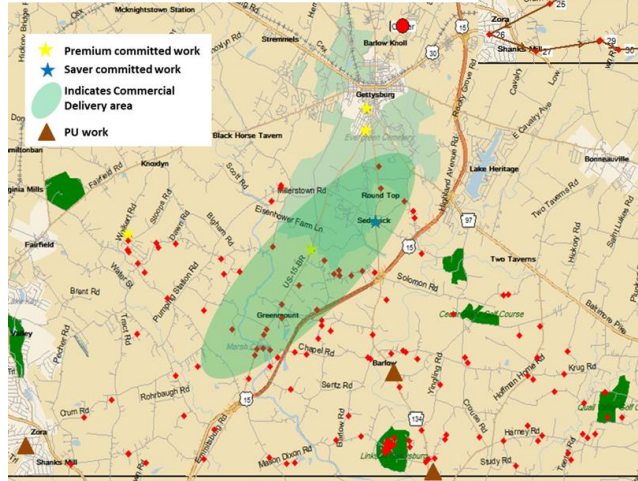


Customer needs add additional complexity **OR** AND





## David's Route Evaluation



- ✓ Delivered four out of five premium packages late
- ✓ Arrived at six businesses after they closed
- ✓ Delivered two Businesses later than Customer's need
- ✓ Two PU's were made outside the planned PU window
- ✓ Ten miles over plan

**ORION reduces cost while satisfying all customer and business needs**





**100M**

miles driven  
reduced yearly

**10M**

gallons of fuel  
reduced

**100K**

metric tons of  
emissions reduced

**\$300M - \$400M**

saved annually

# Best Practices

---





## ~~Best Practices~~

# Imperatives

- Understand the different types of Analytics and what each can and cannot do
- Understand and mitigate data limitations
- Build analytics into the process
- Do not wait for the perfect system
- Embrace change management
  - Change Conversations
- Learn from others / Network



# ORION Balancing

Leading indicators

- Data maintenance
- Plan quality
- Overrides
- Solution accuracy



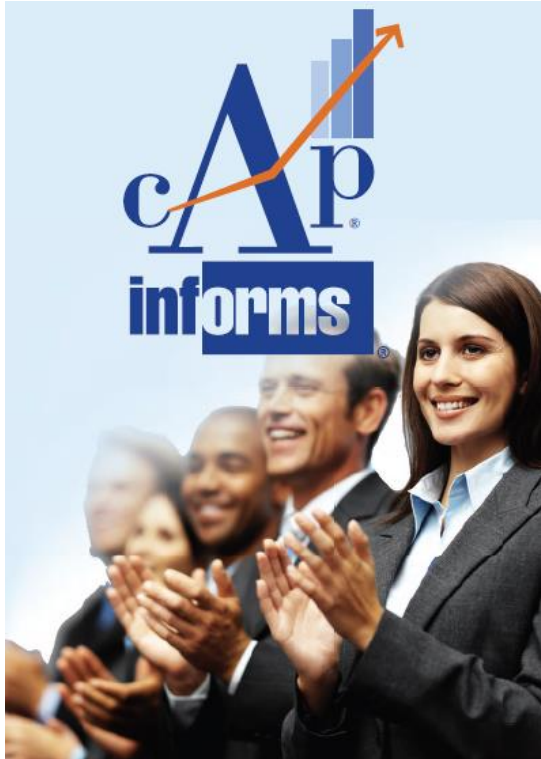
	w/e 10/3	w/e 10/10	w/e 10/17	w/e 10/24	w/e 10/31
0	100.0	94.9	95.0	100.0	98.6
2	77.8	79.9	93.6	94.4	96.3
3	85.5	98.0	97.8	97.0	94.1
0	99.5	99.6	80.6	97.0	91.5
0	89.9	90.0	100.0	98.0	90.0
5	81.0	89.8	90.4	92.7	89.9
2	83.0	82.4	75.9	92.1	89.2
9	80.3	82.7	81.9	82.6	86.9
1	86.2	72.8	77.4	84.2	86.6
9	83.7	93.9	87.9	90.6	86.6
5	86.6	88.8	89.1	91.5	85.7
1	82.2	87.0	92.6	94.8	84.8
8	83.2	75.3	85.9	92.2	82.8
9	77.1	81.1	79.0	81.3	80.3
0	100.0	89.8	88.4	84.0	80.1
2	80.0	81.0	79.1	80.4	80.0
0	75.2	64.6	55.0	86.9	76.8
2	83.0	85.1	89.5	88.6	70.8
4	86.4	90.0	86.0	76.6	70.8
4	80.7	82.4	80.6	72.8	69.6
5	80.2	82.7	70.6	56.5	68.3



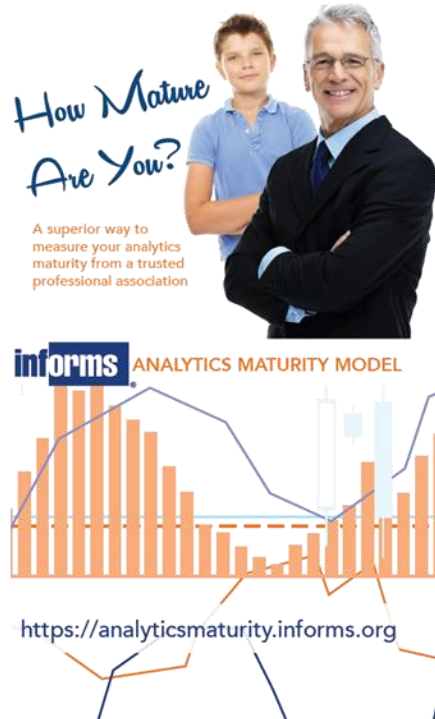
Leading Indicator Metrics can Change Conversations

# Learn from others / Network

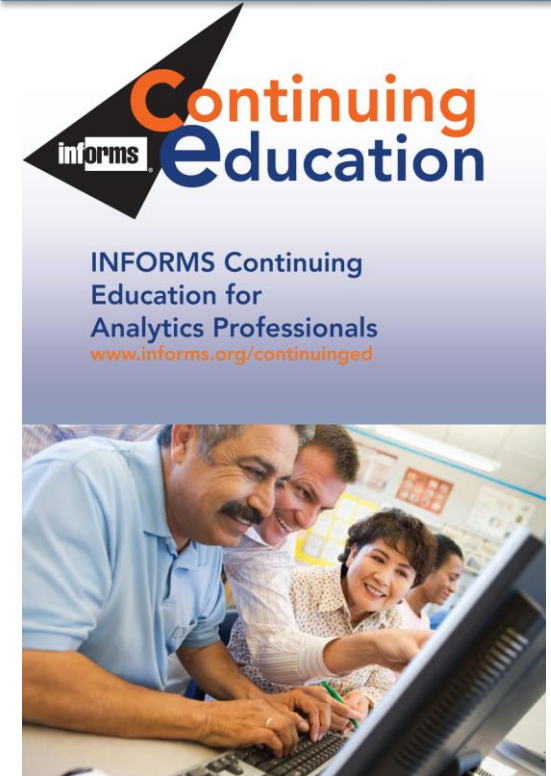
## Analytics Certification



## Analytics Maturity Model



## Continuing Education



# Learn from others / Network

## Join the Analytics Society of INFORMS!!!



### Analytics Society reviews 2016 and shares plans for 2017

The Analytics Society of INFORMS enjoyed a successful year in 2016, when it not only received society status within INFORMS, but it also again grew in membership and expanded its scope of activities, all of which were reviewed at a lively reception and business meeting at the 2016 Annual Conference in Nashville, Tenn. We are now 1,248 members strong, with 2,046 engaged with our LinkedIn Community. Especially encouraging is the growth of student members by more than 80 percent compared to 2015.

At the meeting, we transitioned leadership of the Society to Stefan Karisch of Boeing (president), Jack Levis of UPS (vice president/president-elect), Subrat Sahu of Caterpillar (secretary) and Aaron Burciaga of Accenture (treasurer). Many thanks to retiring President Jim Williams (FICO), Secretary Polly Mitchell-Guthrie (SAS) and Treasurer Erick Wikum (Tata Consultancy Services) for their service.

Attendance at the business meeting was, as in the past, excellent. We discussed



Stefan Karisch









ENCORE?



What's  
next



# What's Next

- Build out ORION
    - Dynamic, Navigation, Dispatch
  - Optimize the Network
    - Final Mile (ORION)
    - + City to City Transportation (NPT)
    - + On Property / Sortation (EDGE)
    - + Automation
- 
- = Global Smart Logistics Network



**Operations Technology and Analytics  
Has Been Key in Meeting Challenges**



The shortest distance between

## Forget Drones: This Is the Future of Delivery

↻ Scoop



From [www.businessweek.com](http://www.businessweek.com) - February 20, 1:09 AM

“Dec. 10 (Bloomberg) — Ten years in the making, a UPS system called Orion crunches data so that drivers can save a fraction of a mile. It's expected to save the world's biggest package delivery company millions of dollars a year in gas. Bloomberg goes inside the making of the mathematical model”

TECH 11/01/2013 @ 1:27PM | 16,660 views

Meet ORION, Software That Will Save UPS Millions By Improving Drivers' Routes



Alex Konrad  
Forbes Staff

FOLLOW

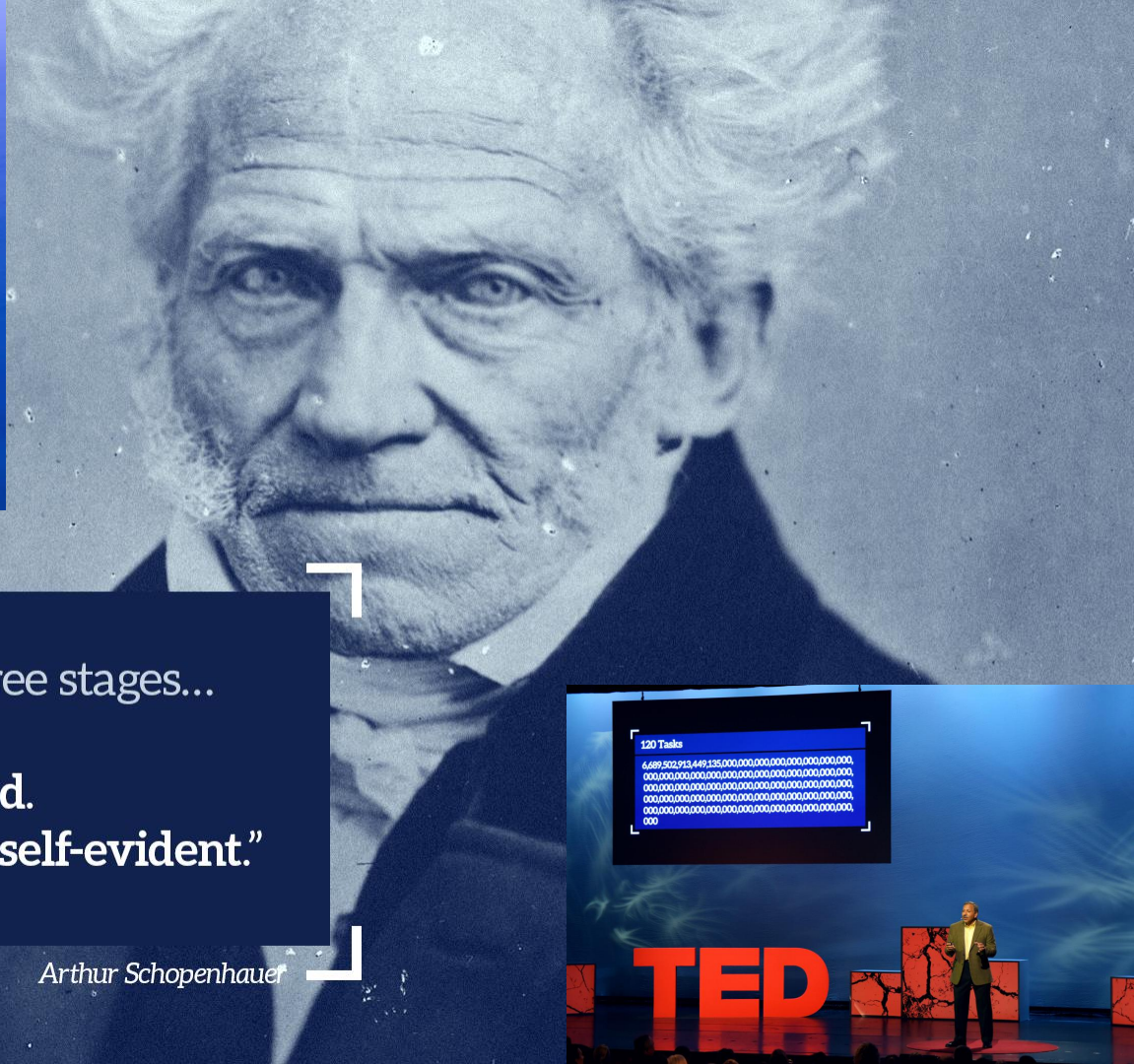
+ Comment Now + Follow Comments

cut delivery time and save fuel









“All truth passes through three stages...  
First, it is **ridiculed**.  
Second, it is violently **opposed**.  
Third, it is accepted as being **self-evident**.”

## Arthur Schopenhauer

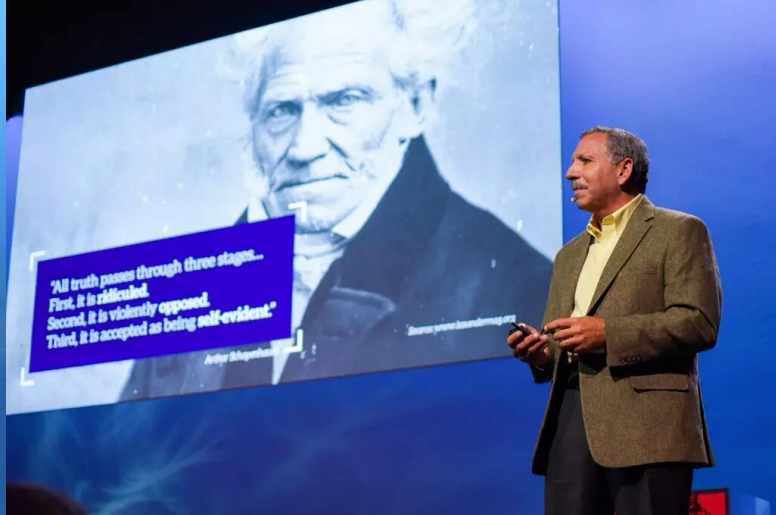




**120 Tasks**

6,689,502,913,449,135,000,000,000,000,000,000,000,  
000,000,000,000,000,000,000,000,000,000,000,000,  
000,000,000,000,000,000,000,000,000,000,000,000,  
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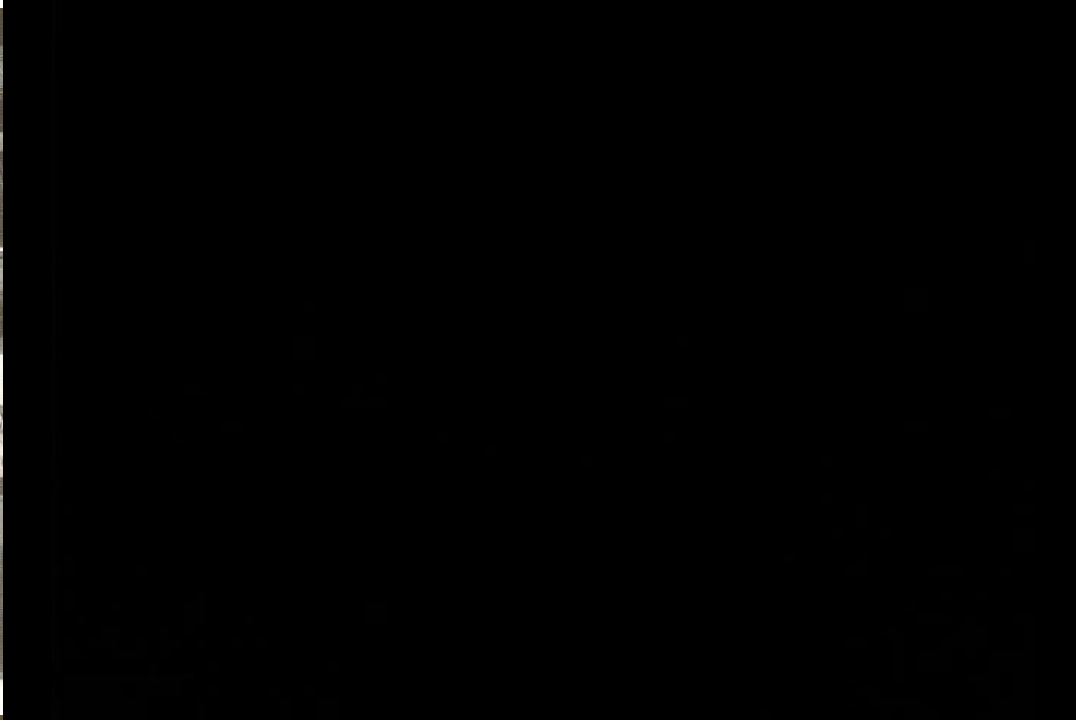
6,689,502,913,449,135,000,000,000,000,000,000,000,  
000,000,000,000,000,000,000,000,000,000,000,000,  
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000,000,000,000,000,000,000,000,000,000,000,000,  
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000

 @jacklevis

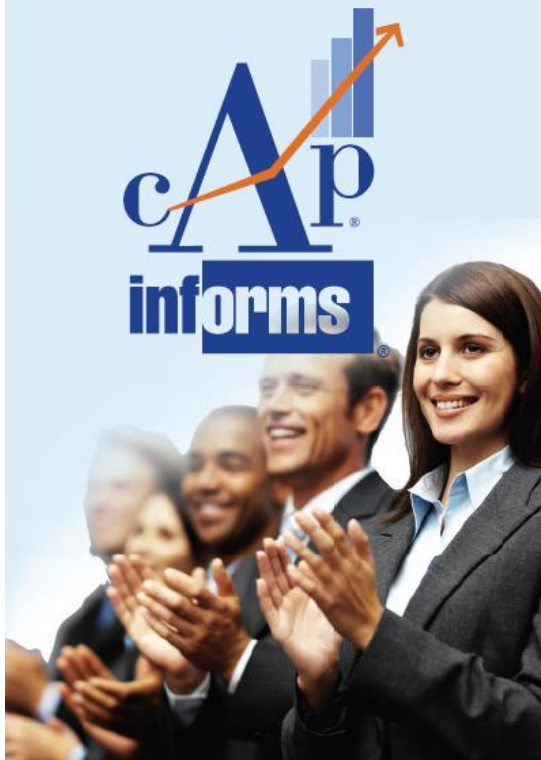


# Creating Vision is Hard

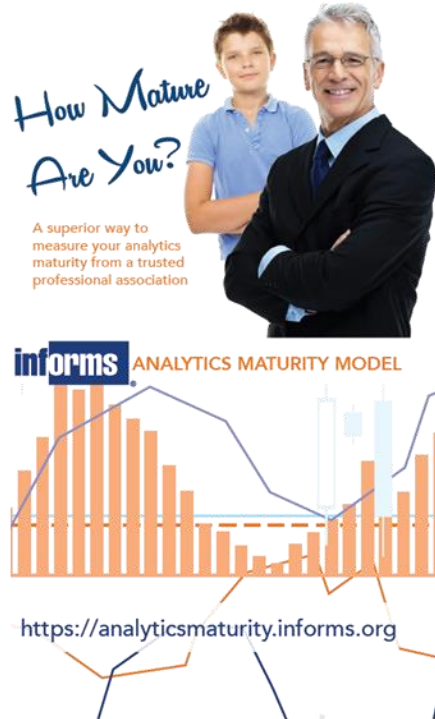
## Executing Vision is Harder



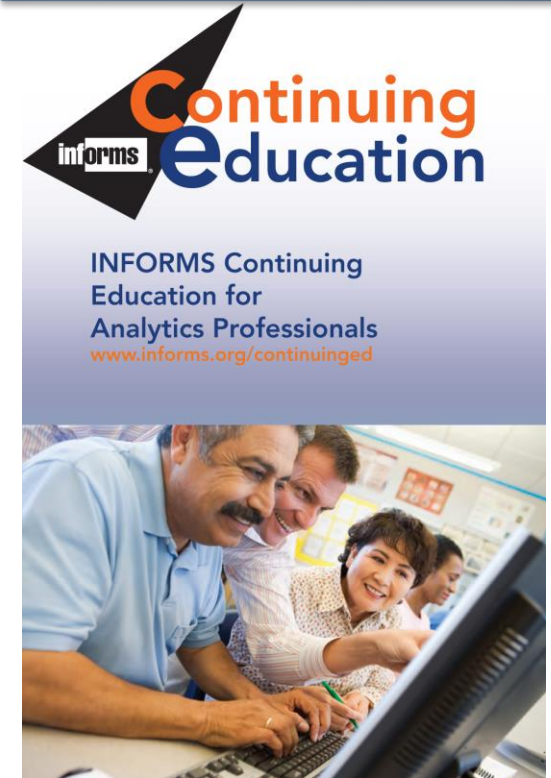
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ENCORE?

