Introducing New Technology Buses Into Your Fleet

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New Ideas

New Plan

- Many new ideas and technologies in the market
- Can benefit from thorough approach to adoption
- Processes scale for many new tech projects
  - New buses
  - New fare collection
  - New ITS
  - New anything!

Decision

Advanced Simulation

- Modern computer modeling and analytics
  - Use data to make decisions!
  - Route simulation
    - Best routes to select
    - Expected performance
    - Test "what if?" cases
  - Computing payback and benefits
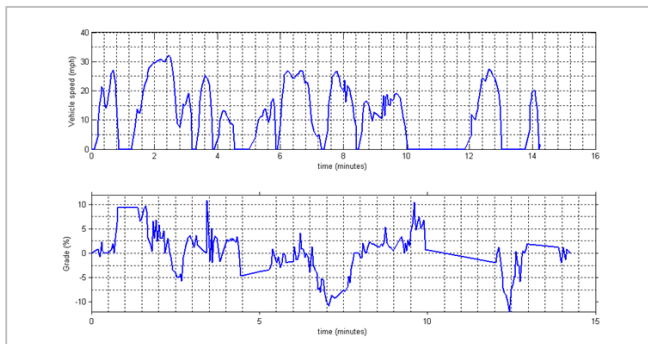 - Distributed workforce
  - Ask OEM

- Simulation of real route using real GPS data.
- Route details:

Route Name	Route 62 Purple Circuit
Distance	2.70 miles
Duration	15.25 minutes
Average Speed	11 mph
Maximum Speed	31.5 mph
Maximum Grade	~±10%

- Simulation Results:

Total Propulsion Energy	6.85 kWh
Accessory Energy	0.51 kWh
HVAC Energy	0.24 kWh
Energy Recaptured	(2.46)kWh
Net Energy Consumed	5.14 kWh
Final Battery SOC	89.52 %
Average Efficiency	1.91 kWh/mi
Charge Time Required (Inc. Dock)	3.0 min

Launch Process

PROTERRA

Plan upcoming launch and training

Proterra arrival inspection and customer inspection and acceptance

Fine tune system

Timing is important to ensure driver comfort

Drivers chance to get very comfortable. Ops chance to verify schedule

Pre-Arrival Ops Discussion

Bus Arrival and Inspection

Optimization (Proterra)

Maintenance Intro Training

Driver Training

Shadow Service/Ops Check

Maintenance Training

Revenue Launch

Post Launch Support

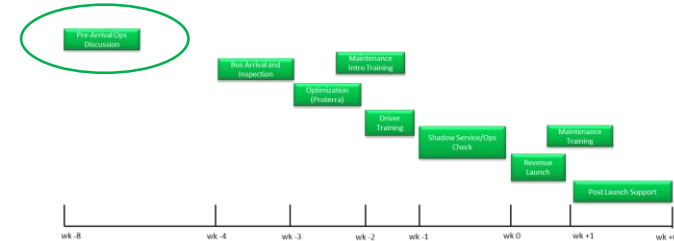wk -4   wk -3   wk -2   wk -1   wk 0   wk +1   wk +6

Pre-Plan

## Careful Planning for Success

- Onsite meeting at customer facility
- ~2 months ahead of revenue service launch
- Get ALL parties together
  - Drivers
  - Maintenance Team
  - Planning
  - Ops
  - Procurement
  - Trainers
  - OEM
- Let folks get comfortable with the technology or idea
- Develop detailed plan on launch involving lessons learned

Fine Tune

Get It Dialed-In

- OEM onsite for final testing

- Fine tuning prior to "hand-over"

- Increase effectiveness of training

- Last chance to adopt system perfectly to usage
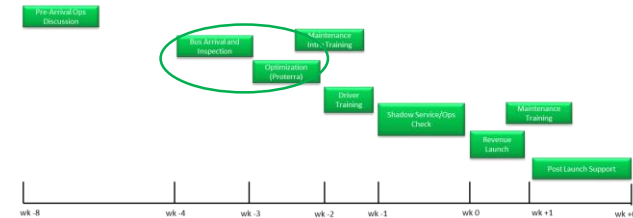
Training

- People are generally eager to learn

- Timing of training is critical

  - Minimize time between training and use

  - 2 weeks before launch for drivers

  - Shadow service testing immediately before start revenue service

- New techniques effective

  - Quick reference guides

  - Short videos

  - Block diagrams and flow charts

- Key is building confidence with people responsible for day to day operations
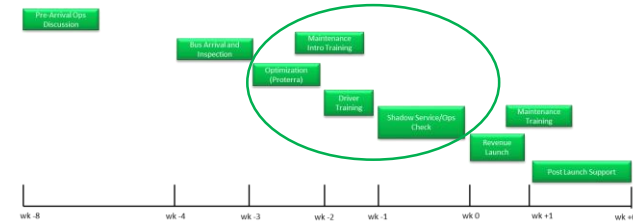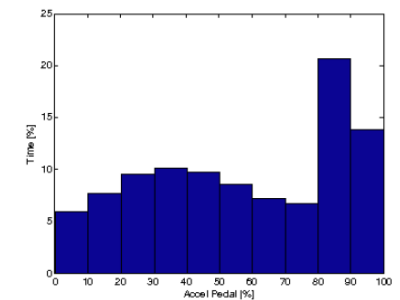
Optimization
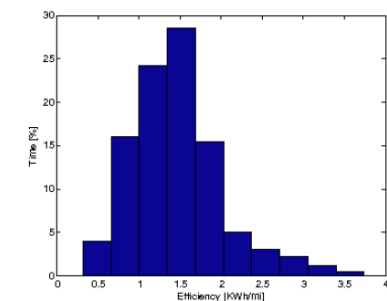
Unlocking Performance Post-Launch

- Using data again

- Reporting and review with OEM

- May find surprising impacts

  - Driver behavior

  - HVAC impact

- Maintenance optimization

  - PMI

  - Parts

- Utilize a champion

Questions

PROTERRA

- Use data to make decisions
- Bring the whole team up to speed
- Train the right amount at the appropriate time
- Optimize for new technology

QUESTIONS?