

EVs and Elephants

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Engine Expo 2011



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Credits...

Thank you to Jaguar Land Rover, Pi Shurlok, and the other project partners for their kind permission to use the information in this presentation

Introduction

- EVs are still often seen as limited-performance versions of 'real vehicles'
- But sometimes it's the other way around
 - ICEVs can't do what electric vehicles can
- With growing availability of mature technology and components, we now have more powertrain options, especially for niche applications

...in 25 minutes, this can only be a quick glance...

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Limitations of ICEVs

- Noisy
- Smelly
- Need fuel infrastructure
- Need maintenance
- Poor low-speed performance



Benefits of EVs

- Quiet
- Clean
- Cheap to run
 - especially in urban applications
- Low maintenance

Urban Transport - from this...



(With thanks to www.milkfloats.org.uk)

T E C H N O L O G Y G R O W T H
A S S O C I A T E S

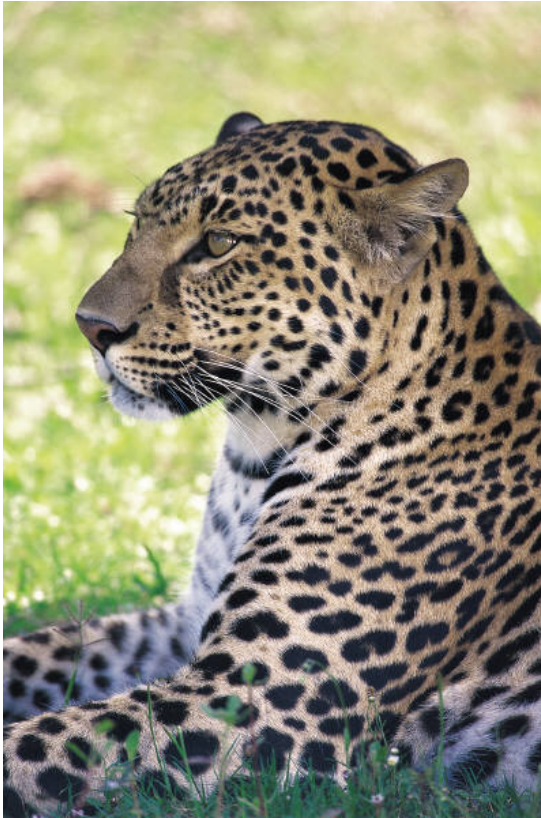
...to this?



Vlado

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Case Study – Game Viewer



← This kind of game

Not this →

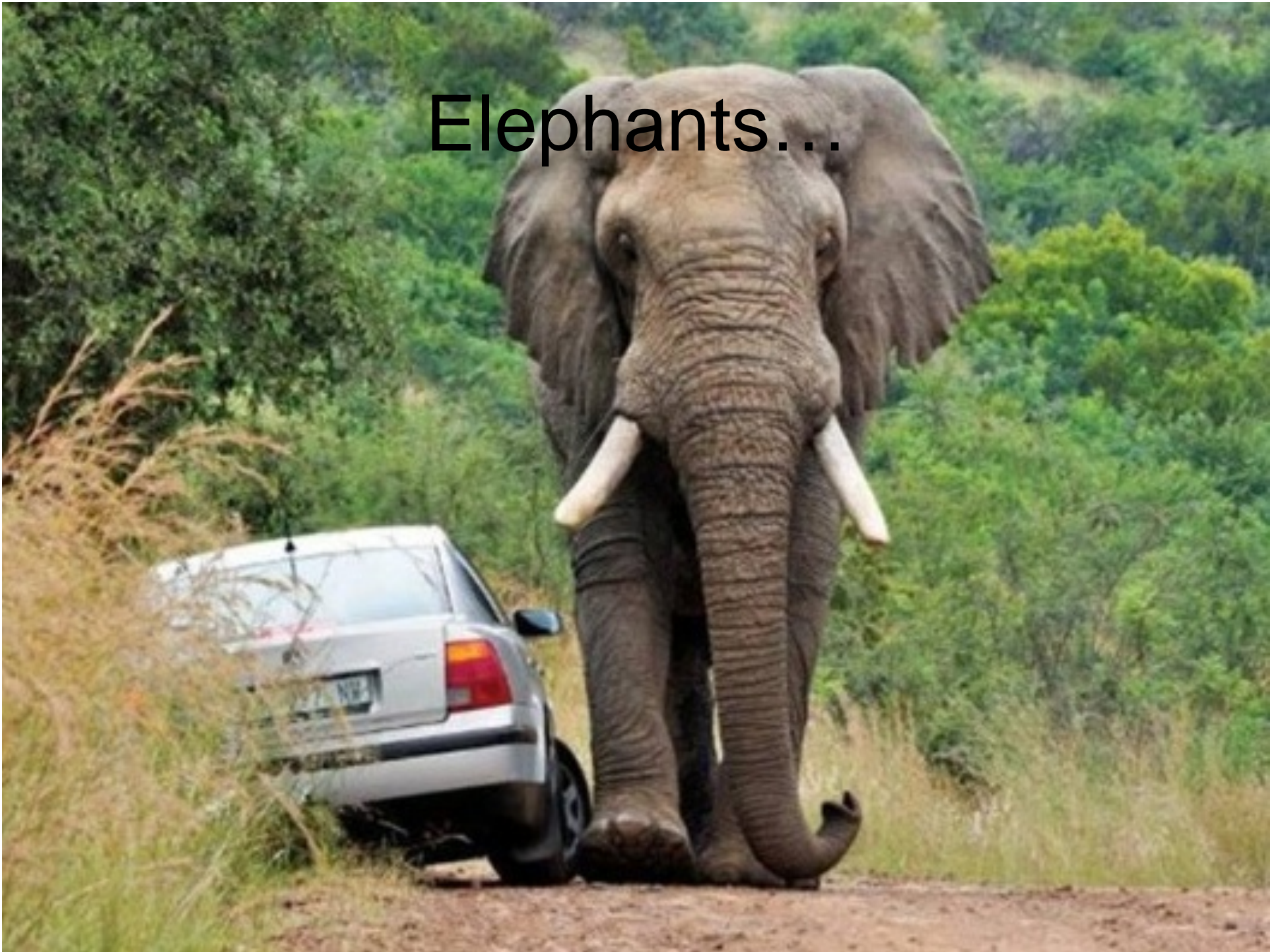




One of *these...*
a tough vehicle

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Elephants...





Requirements

- For use in South African game reserves
- Controllable slow driving on very rough off-road terrain
- Minimum acoustic noise
- Minimum environmental impact
- Low maintenance
- Easy on-site refueling

Not well-suited to diesel...

Why now?

- Game Park Operators
 - Better experience for tourists
 - Eco-tourism
- JLR
 - Consolidate domination of Game Viewer market
 - PR benefits
 - Opportunity to gain experience and data
 - High ambient temperature market
 - Arduous Usage

Multi-Partner Demonstration Project

- Vehicle integration time measured in weeks
- Team in South Africa for final 3 weeks



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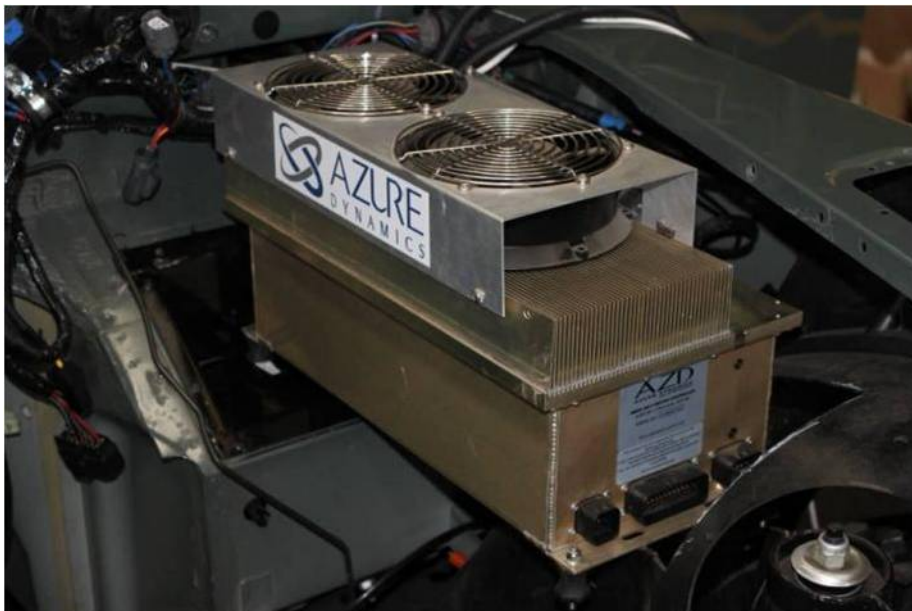
Base Vehicle

- Land Rover Defender
- De-facto standard for this type of vehicle



Drive System

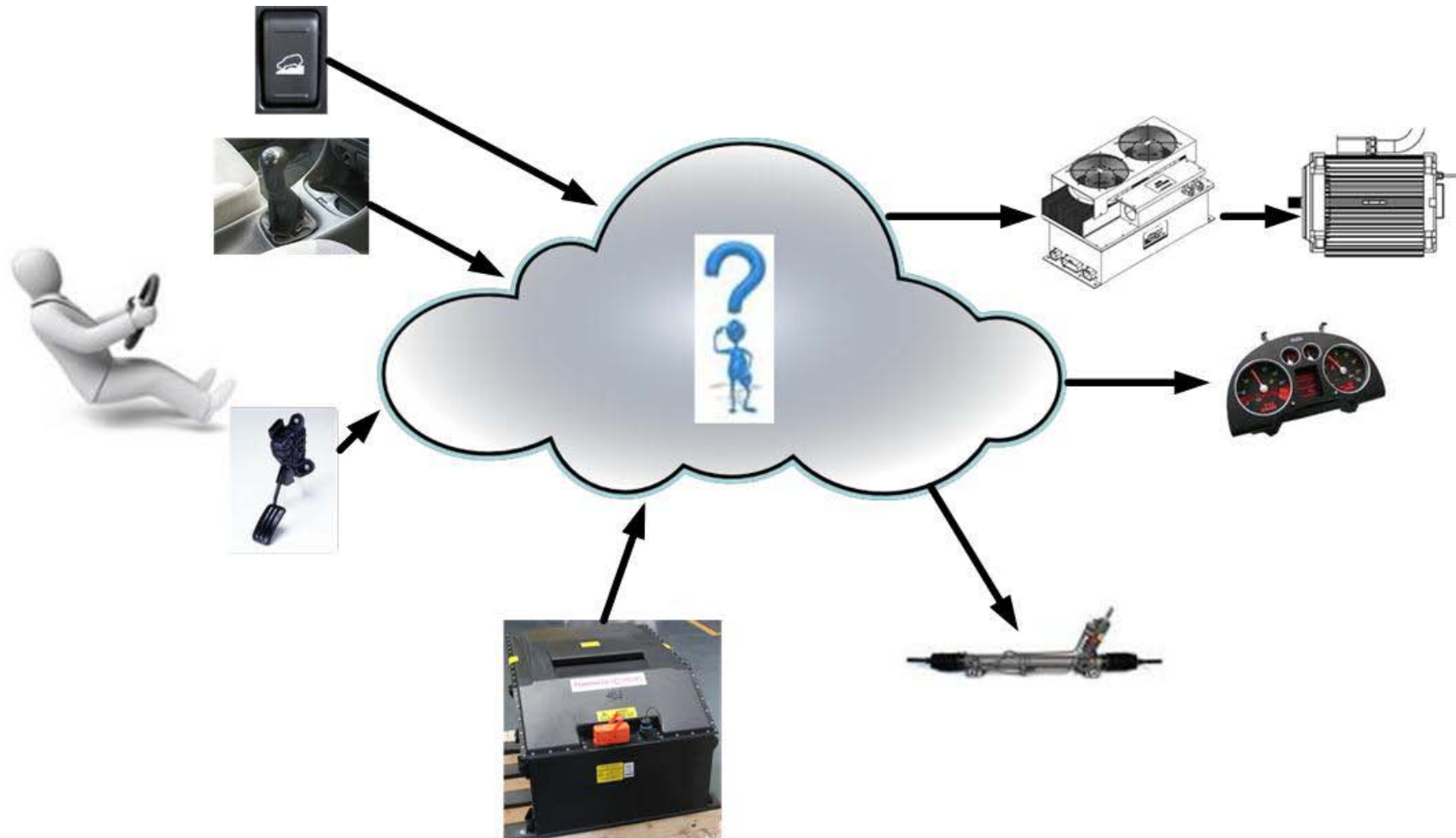
- Azure Dynamics air-cooled motor and inverter
 - Well-proven products
 - Simple integration
 - Will they work at high ambient?



TECHNOL
ASS

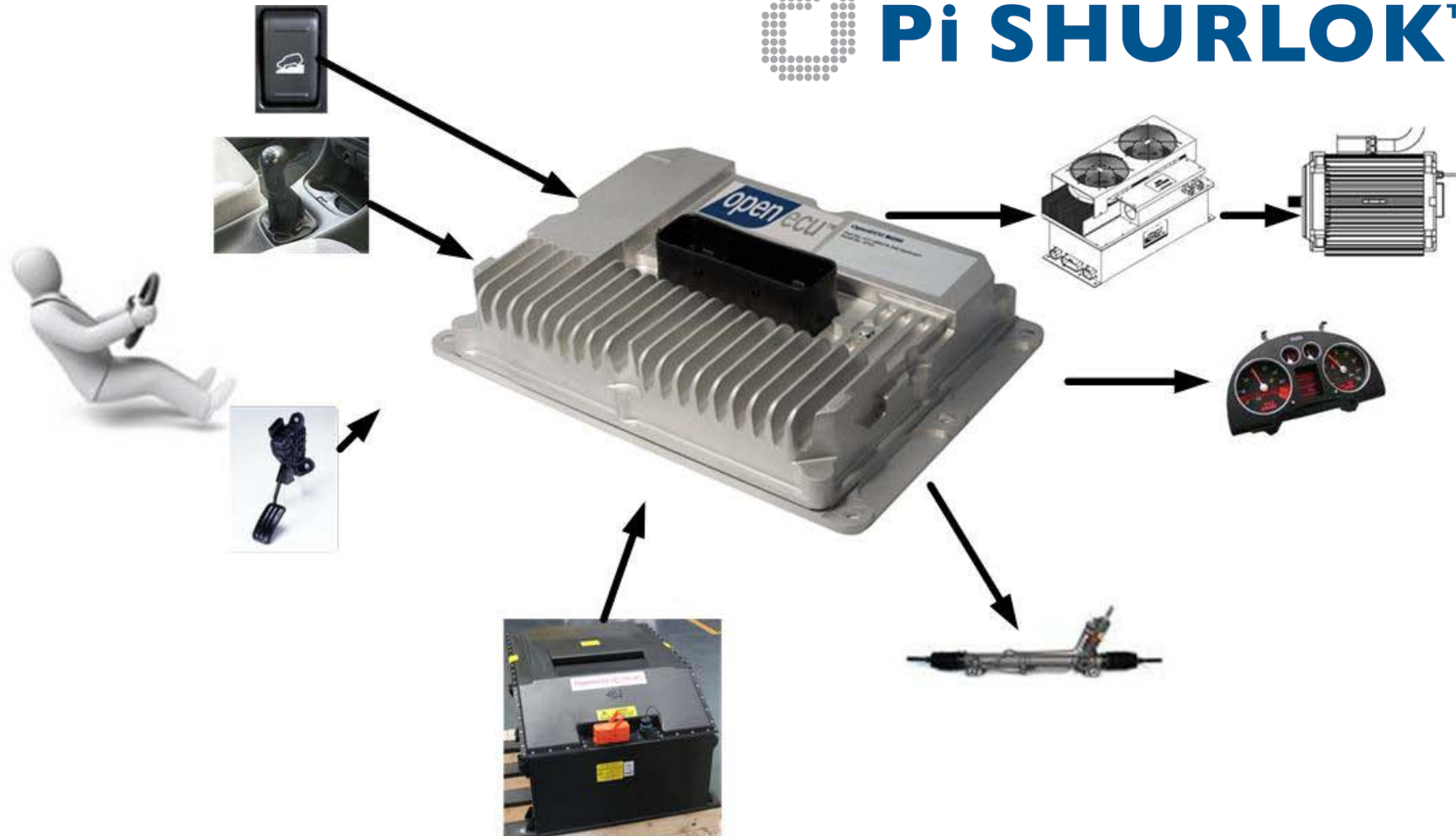


How do we link it all together?



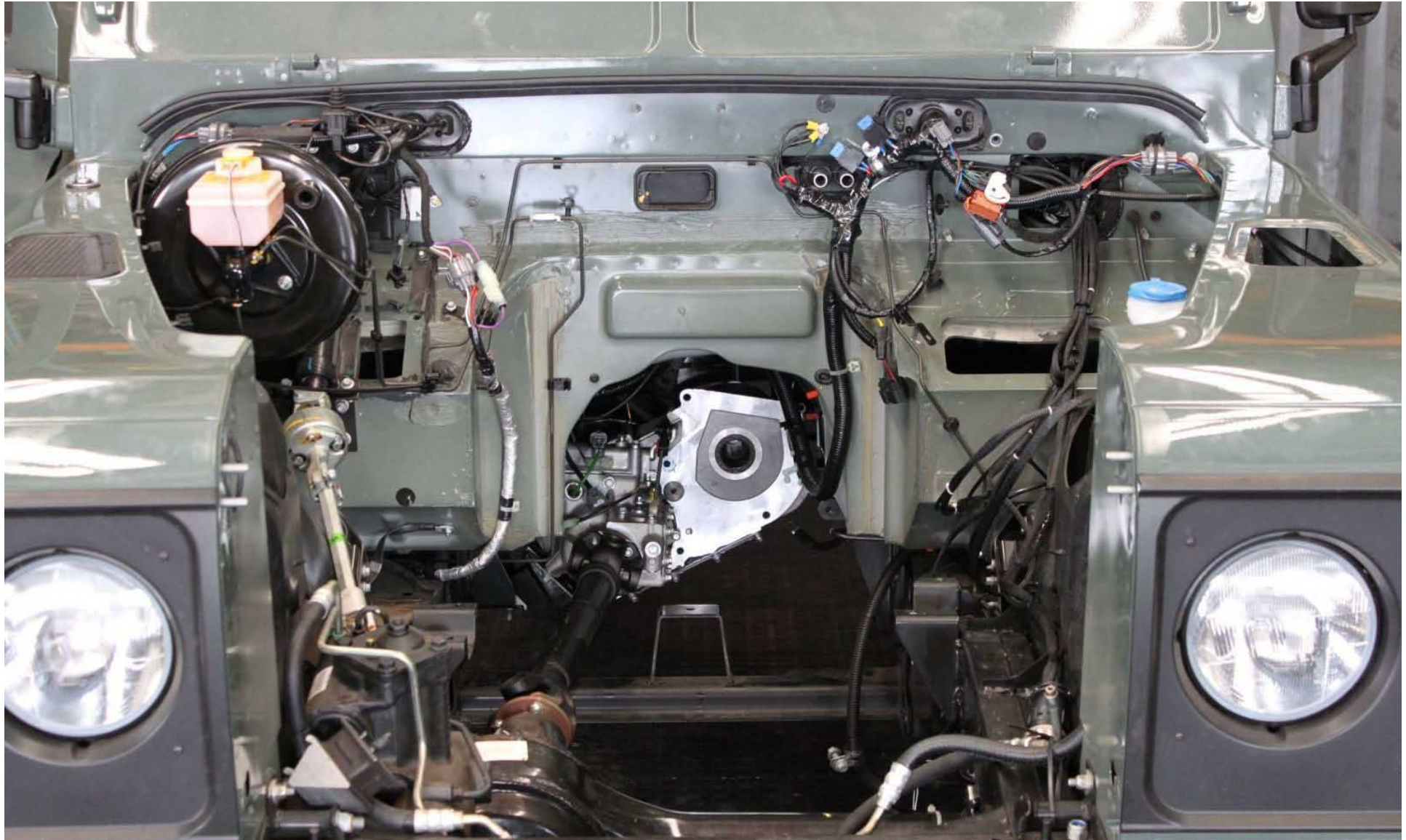
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With OpenECU



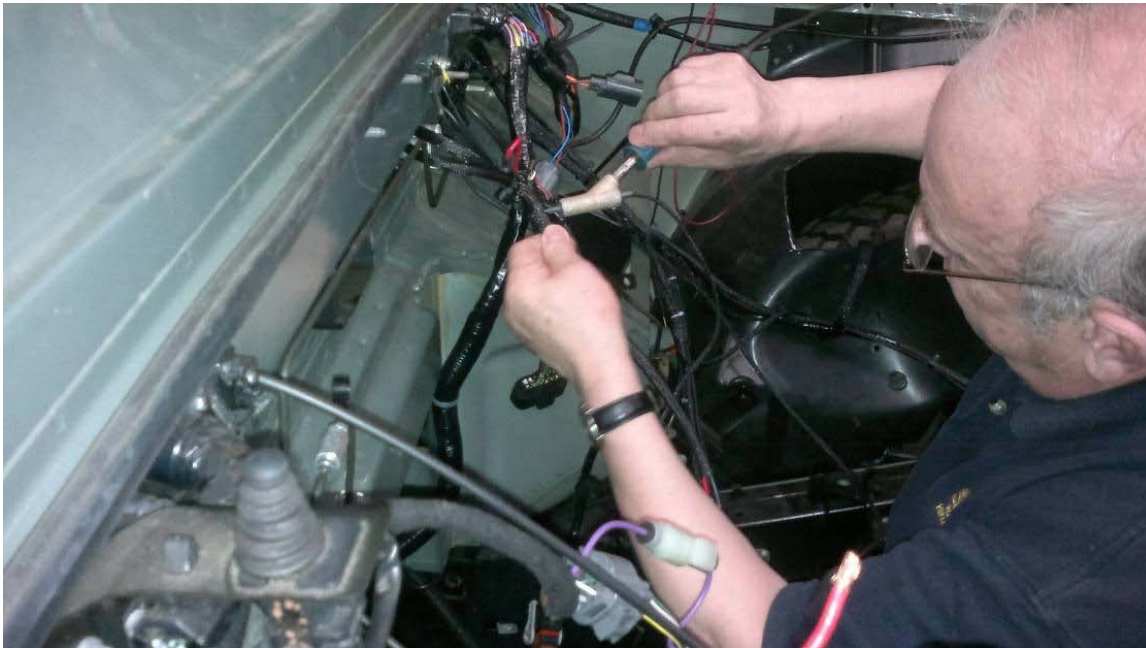
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Battery Compartment



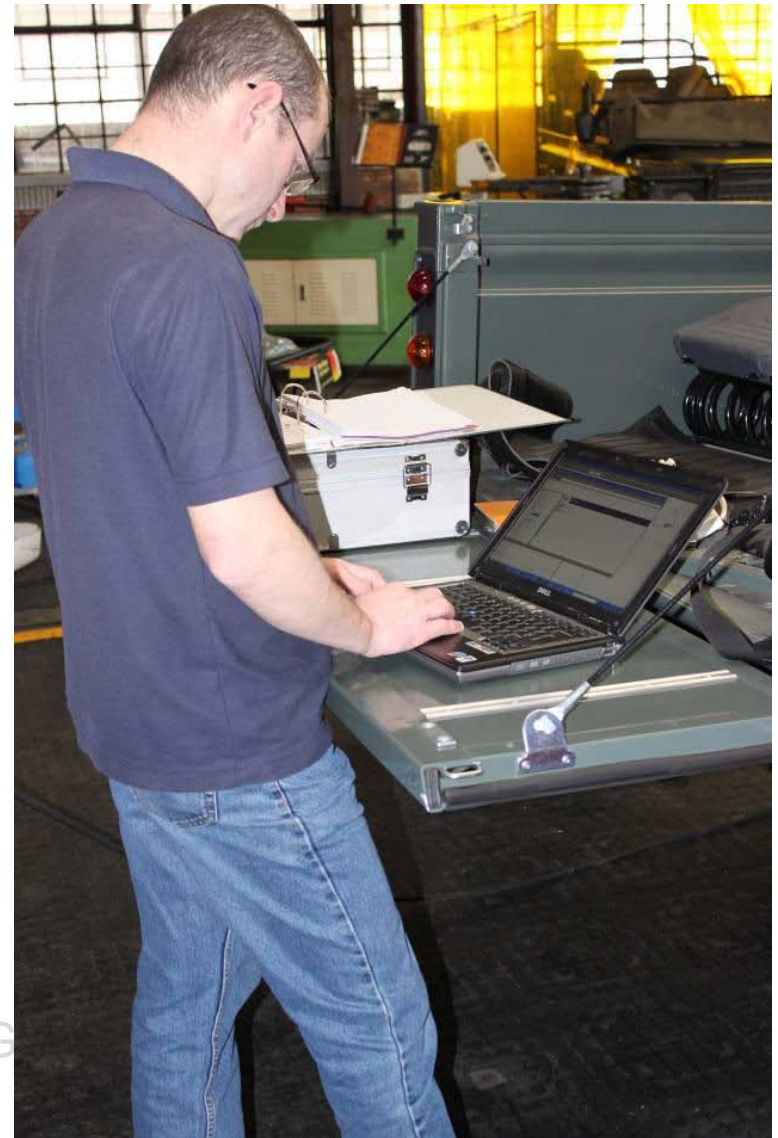
Wiring

- Included re-worked instrument cluster



Software

- Control strategy and calibration could be edited as needed



Success! Working in 2 weeks



Performance Testing



Hill Start Tests



Test at Sidiba Game Park



Test Results

- Achieved 4 hr drive on 29% battery
 - 8kWh
- Battery temperature remains at or below ambient!
- 34C ambient, no problems.
- Off-road capable
 - “It’s a Defender!”

Trade Show Launch



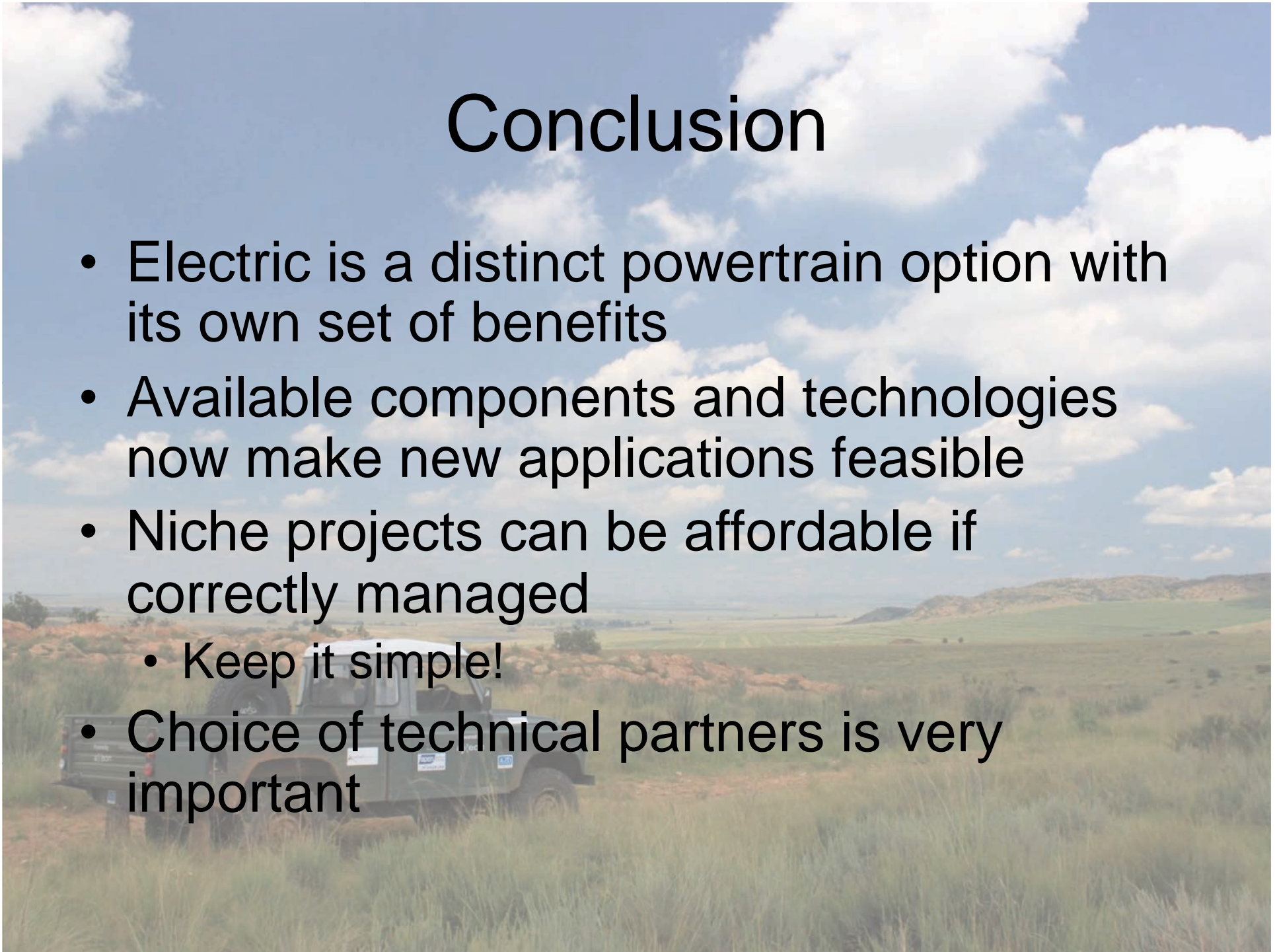
Feedback

- Excellent customer response
- Very good reviews
- Test results vindicated design choices

SOMEONE has at last built an all-electric vehicle that makes sense, right here and right now.

Conclusion

- Electric is a distinct powertrain option with its own set of benefits
- Available components and technologies now make new applications feasible
- Niche projects can be affordable if correctly managed
 - Keep it simple!
- Choice of technical partners is very important



Questions?

