



PROGRESS REQUIRED FOR SUCCESSFUL ADOPTION

– THERMOELECTRIC NETWORK: WORKSHOP & TRAINING EVENT

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21-04-2016 JLR Perspective & Requirements DRAFT (rgilchri) v1

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PROGRESS REQUIRED FOR SUCCESSFUL ADOPTION

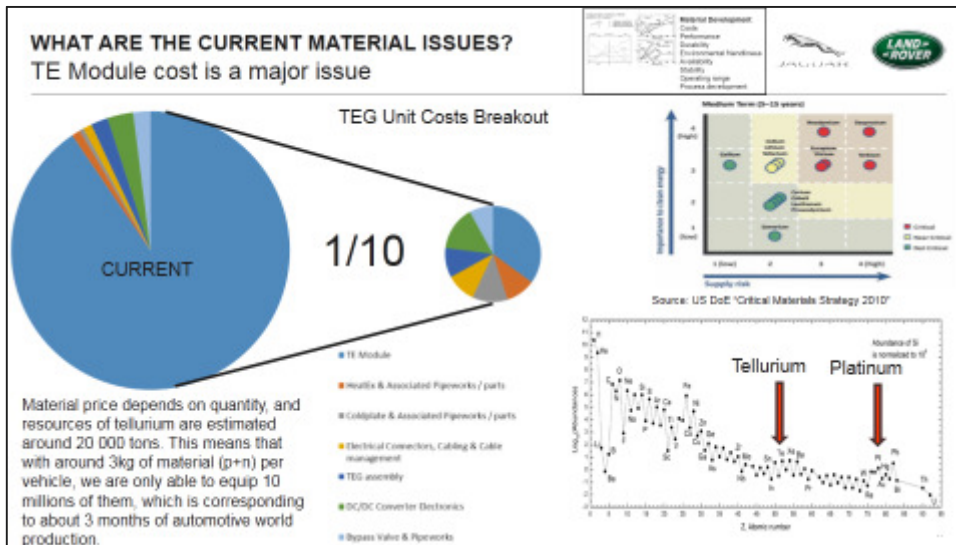
Contents



- The Business Case
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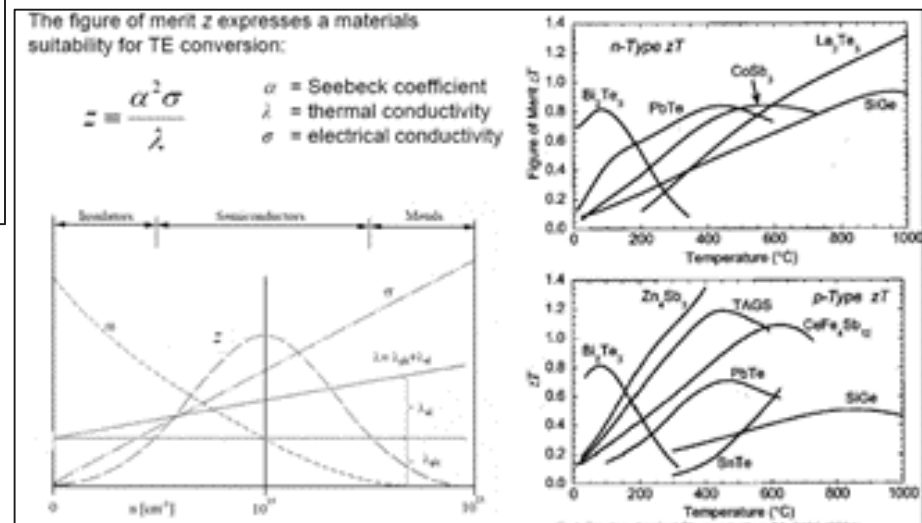
PROGRESS REQUIRED FOR SUCCESSFUL ADOPTION

– The business case is a “given” to succeed



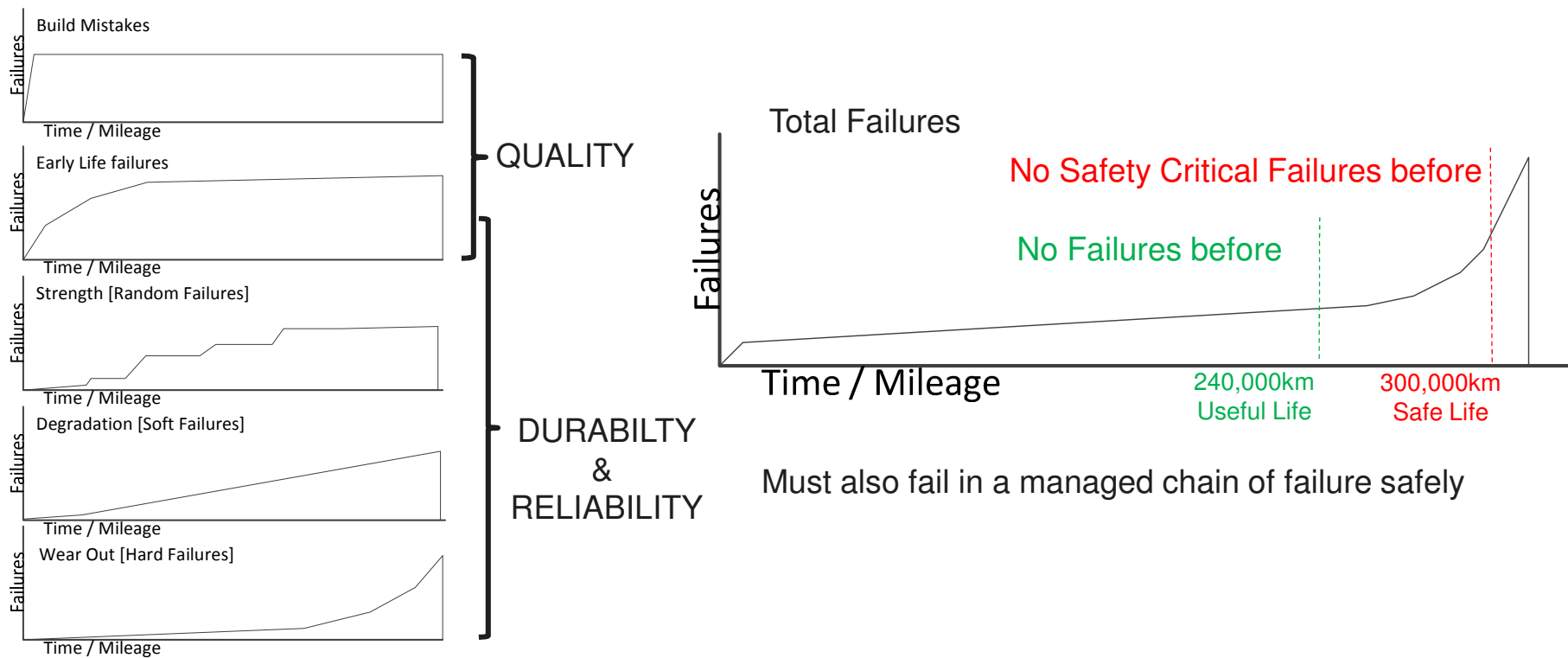
Contact resistances, performance envelope – low & high performance, maximum temps before degradation [including over time]

Volume, throughput, manufacturing process, plentiful materials, bulk supply of thermoelectric material, recovery, contact resistances



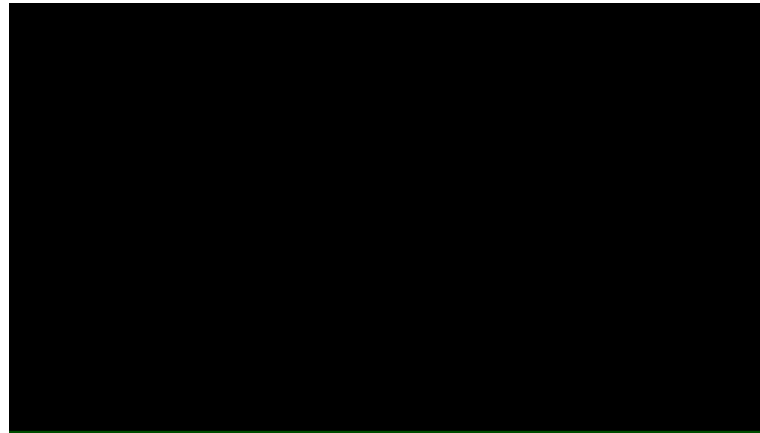
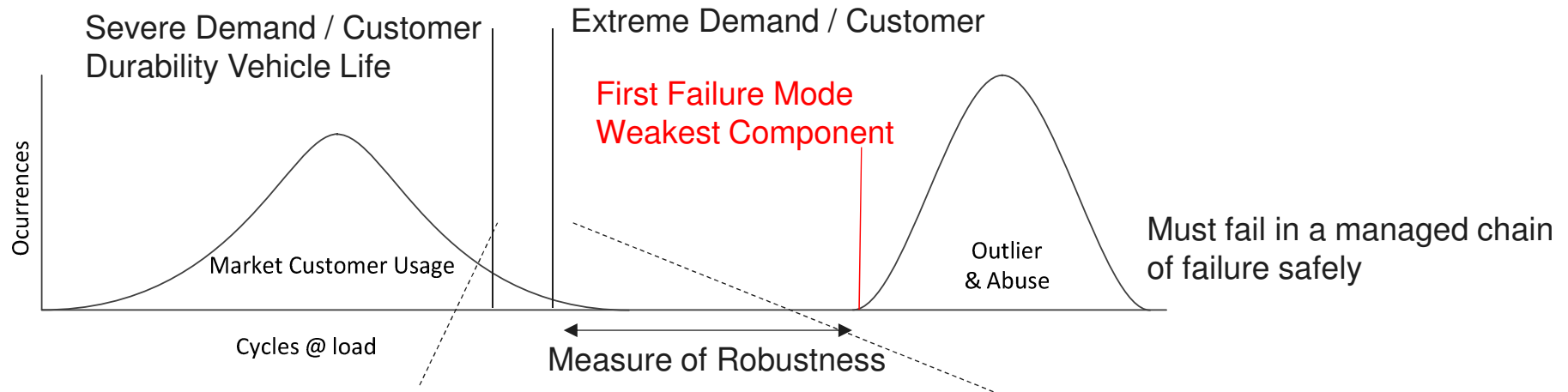
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– Parts can fail in many different ways in a vehicle life-time



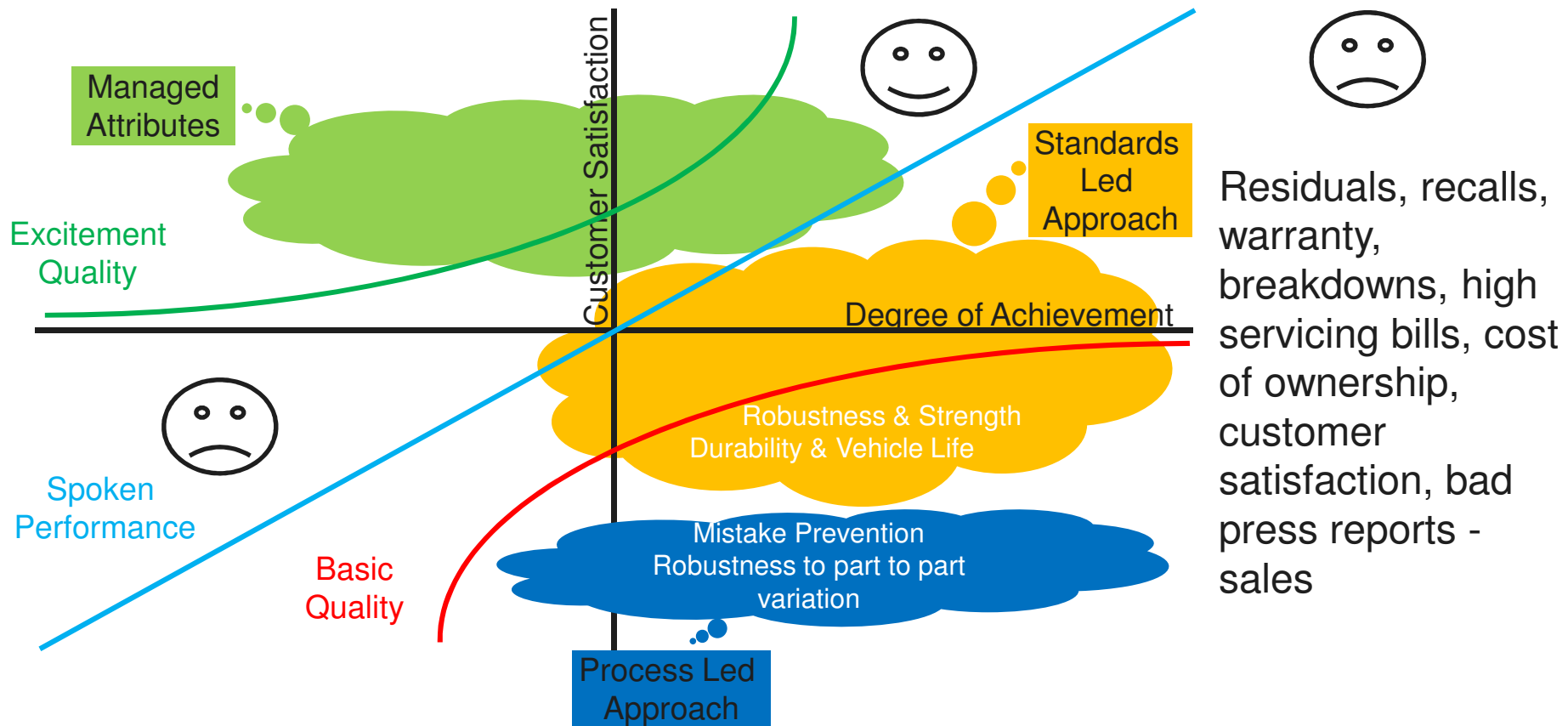
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– Environmental / Customer Variation has to be Catered for



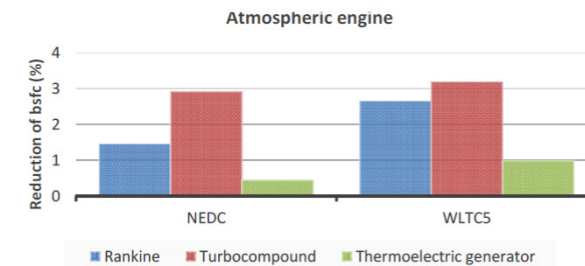
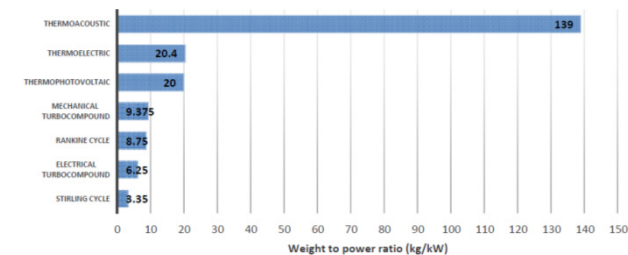
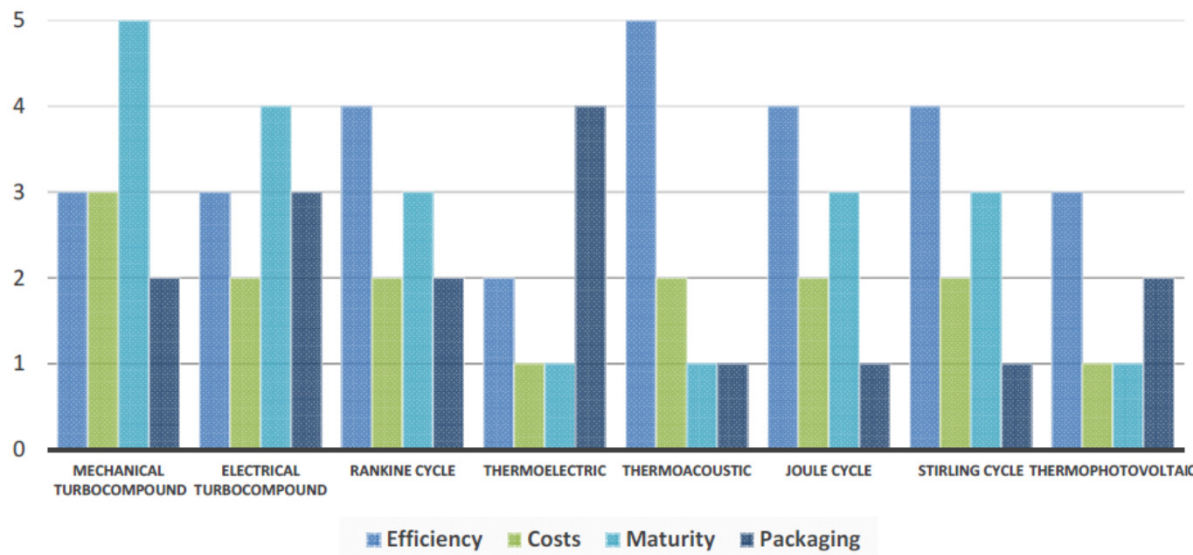
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– The KANO model describes necessary attributes



PROGRESS REQUIRED FOR SUCCESSFUL ADOPTION

– There are Other WHR Technology Threats Making Great Gains



Legros Arnaud, Guillaume Ludovic, Diny Mouad, Zaïdi Hamid and Lemort Vincent, "Comparison and Impact of Waste Heat Recovery Technologies on Passenger Car Fuel Consumption in a Normalized Driving Cycle", *Energies* 2014, 7, 5273-5290; doi:10.3390/en7085273, ISSN 1996-1073 www.mdpi.com/journal/energies

PROGRESS REQUIRED FOR SUCCESSFUL ADOPTION

– In Summary: What do we need to happen to succeed in business



- Low costs – scalable consistent process, non-toxic, recyclable, recoverable, plentiful materials, bulk supply
 - High performance – contact resistances, low / predictable degradation over time, performance envelope, low and high temp performance
 - Consistently & early tested physical data to allow successful stress / heat rejection analyses, DC-DC load balancing, heat exchanger balancing, pin dimension choices, system optimisation for cost performance weight
 - Consistent / reliable and early performance data to process in simulations to make early system design decisions
 - Consistent & predictable module performance
 - Consistent & controlled geometric tolerances of all module components
- We need standards & processes for:
 - Measuring pellet & module performance
 - Measuring physical properties
 - Testing: degradation, fatigue, thermal shock, vibration
 - Fast screening tests
 - This needs to happen
 - Throughout the supply chain at every stage and engaged in quality testing & analysis
 - Very quickly
 - Or
 - The Thermoelectric Generator will miss its opportunity in Automotive OEM's!



THANK YOU

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