Western Digital.

# Data is the New Horse Power

## 3D NAND & Automotive

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Flash Memory Summit

# Forward-Looking Statements

## *Safe Harbor | Disclaimers*

This presentation contains forward-looking statements that involve risks and uncertainties, including, but not limited to, statements regarding our managed flash products and solid-state technologies, growth opportunities, and demand and market trends. Forward-looking statements should not be read as a guarantee of future performance or results, and will not necessarily be accurate indications of the times at, or by, which such performance or results will be achieved, if at all. Forward-looking statements are subject to risks and uncertainties that could cause actual performance or results to differ materially from those expressed in or suggested by the forward-looking statements.

Key risks and uncertainties include volatility in global economic conditions, business conditions and growth in the storage ecosystem, impact of competitive products and pricing, market acceptance and cost of commodity materials and specialized product components, actions by competitors, unexpected advances in competing technologies, difficulties or delays in manufacturing, and other risks and uncertainties listed in the company's filings with the Securities and Exchange Commission (the "SEC") and available on the SEC's website at www.sec.gov, including our most recently filed periodic report, to which your attention is directed. We do not undertake any obligation to publicly update or revise any forward-looking statement, whether as a result of new information, future developments or otherwise, except as required by law.

# The Automotive Industry is Changing

***From Performance and Horsepower . . .***



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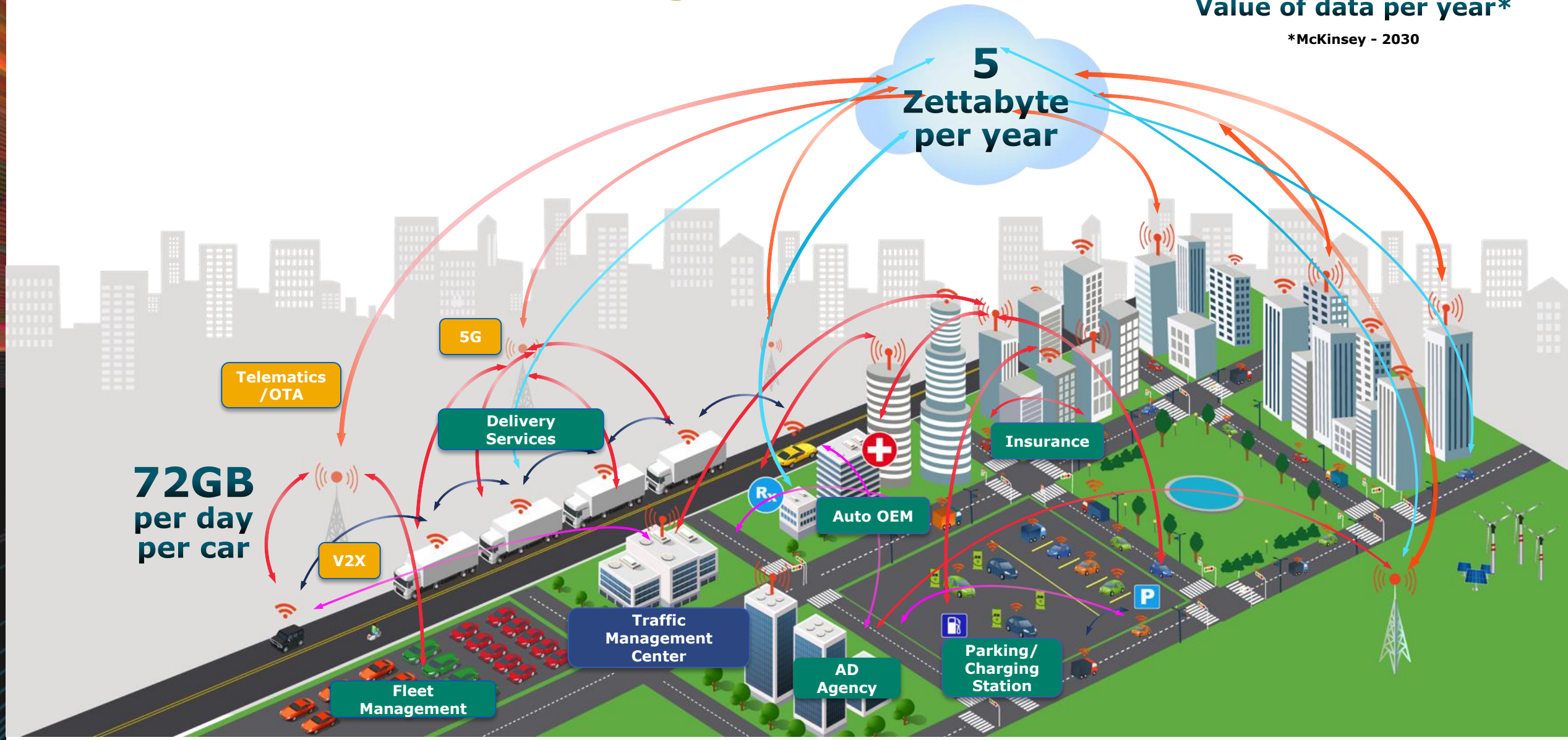
# To Connectivity, Infotainment, Service-Based Models, Autonomous Drive

# Connected Cars Driving Data

**USD$450B - $700B**
**Value of data per year***

*McKinsey - 2030

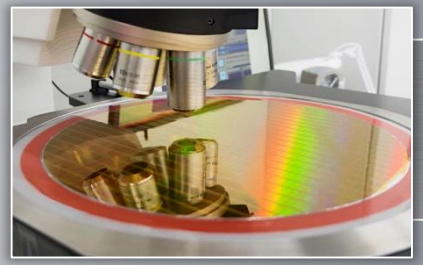


# Automotive Storage Trends

**DENSITY** needs increasing

**COST** of NAND flash decreasing

**USAGE** models also changing

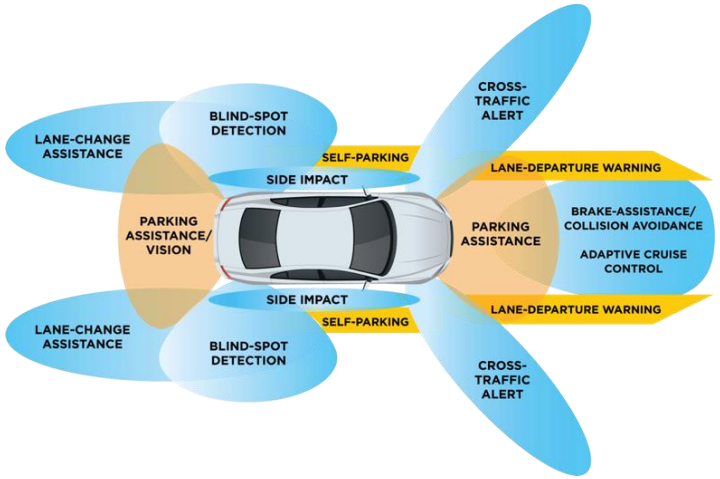


**QUALITY** targets are still ZERO dppm!

# Flash Technology in Automotive

NOR → 2D SLC → 2D MLC → 3D TLC


## *How TLC 3D NAND is Optimal for Automotive*



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2D TLC

3D TLC



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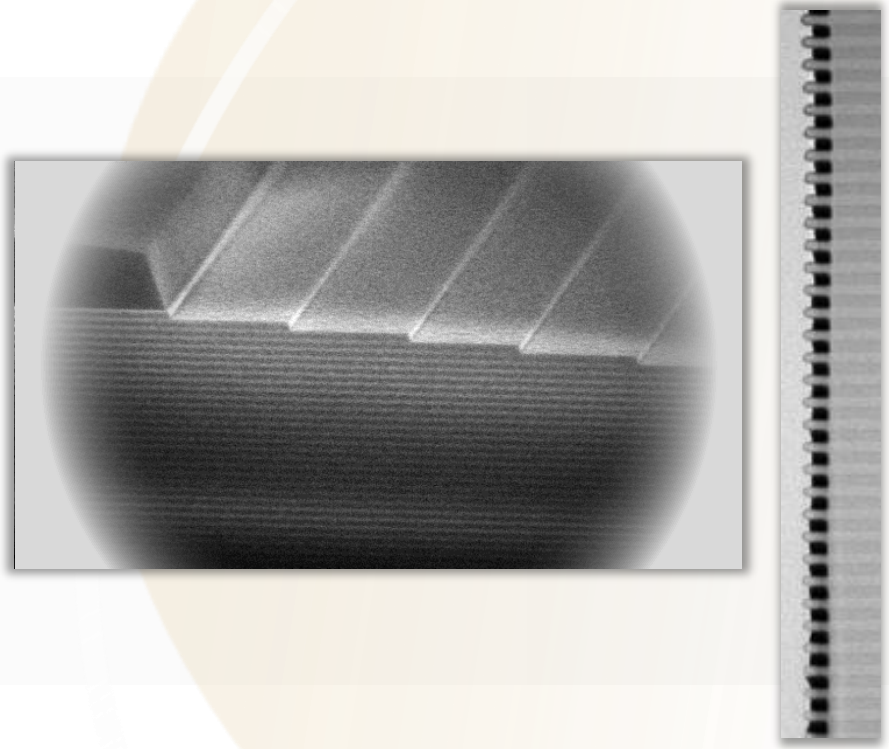
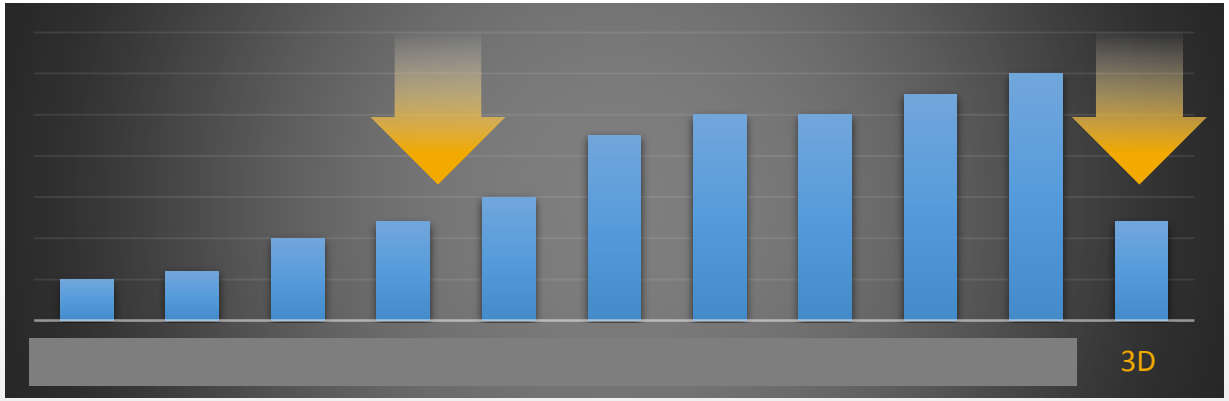
# Western Digital *3D TLC NAND* Reliability Attributes Comparable to *2D MLC* Technology

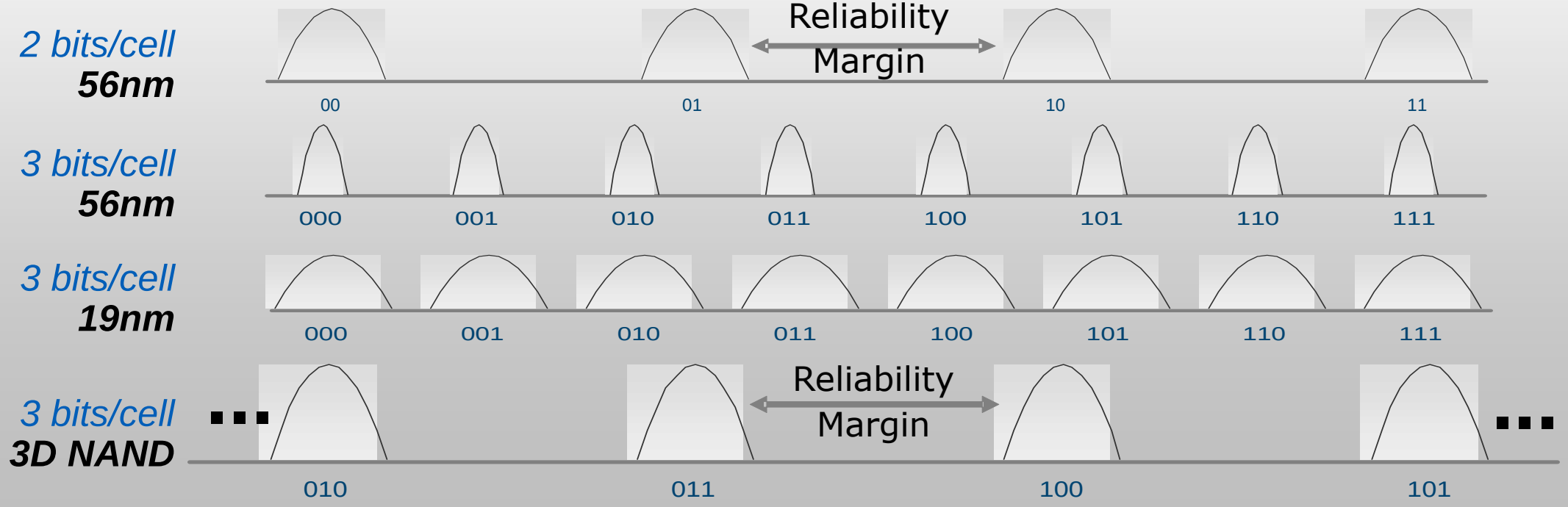
- Larger reliability margin
- Reduces cell-to-cell interference
- More electrons per charge trap layer
- Better data retention



# 3D NAND Has Lower Cell to Cell Interference

## Large reliability margin





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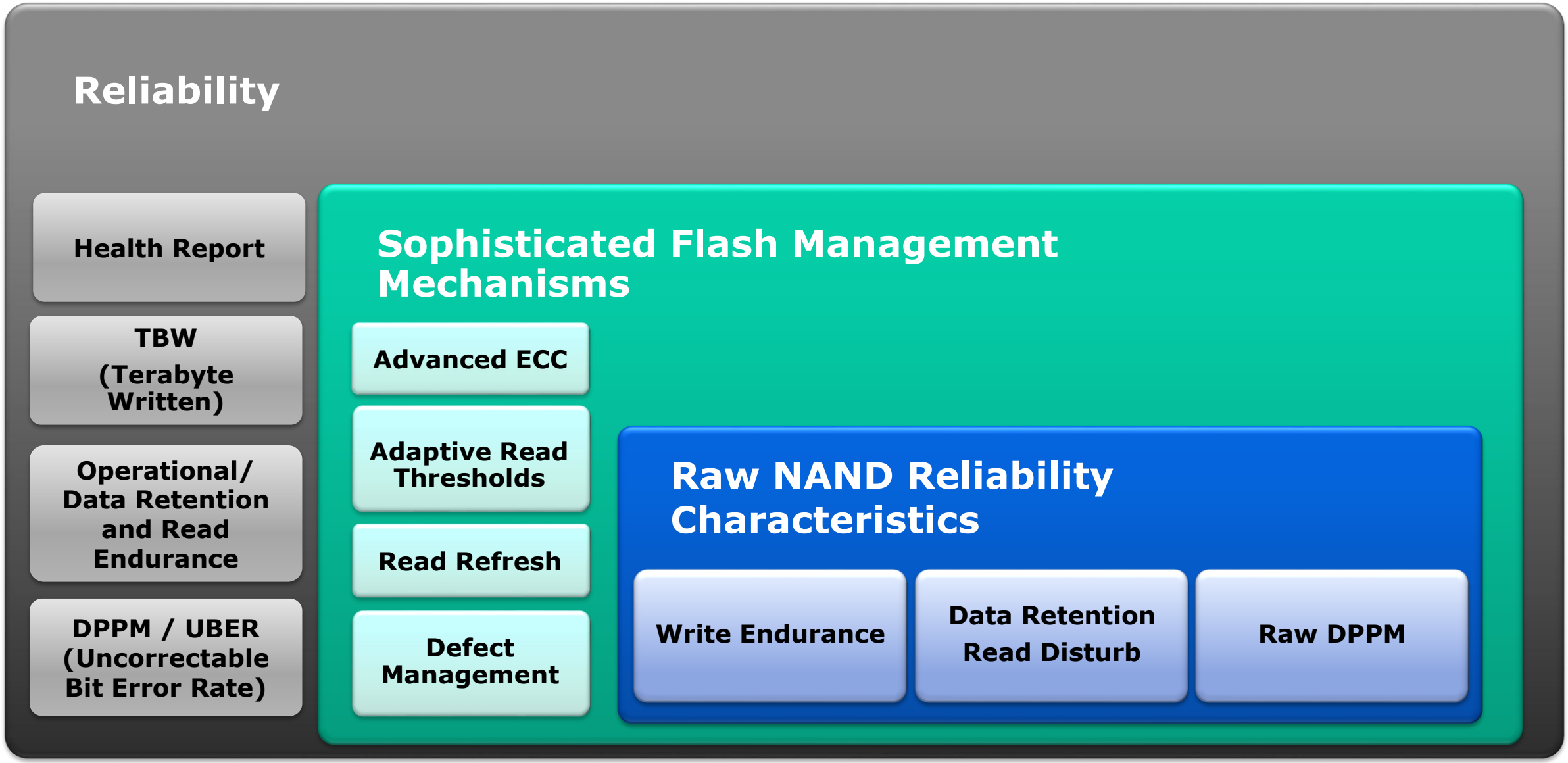
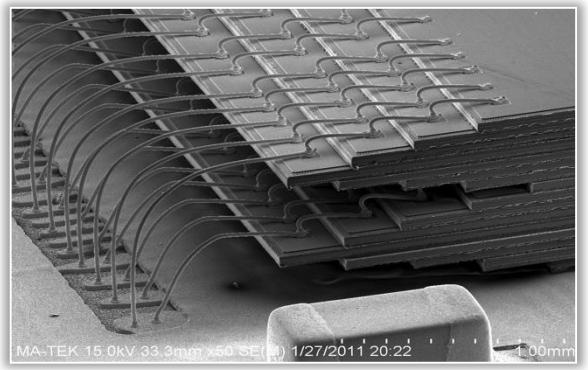
# Managed NAND Is Much More Than Just Memory



# Other Considerations




- Packaging/Assembly to meet harsh environmental requirements
- Test flows to reduce DPPM
- Design review & check — especially on usage model
- User OS like Android poses special challenges — need to monitor platform performance

# Summary

- 3D NAND is coming to Automotive!
- System level solution for automotive — it is more than just the memory!
- Engage with us early to ensure success!