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The Future of Remote Diagnostics

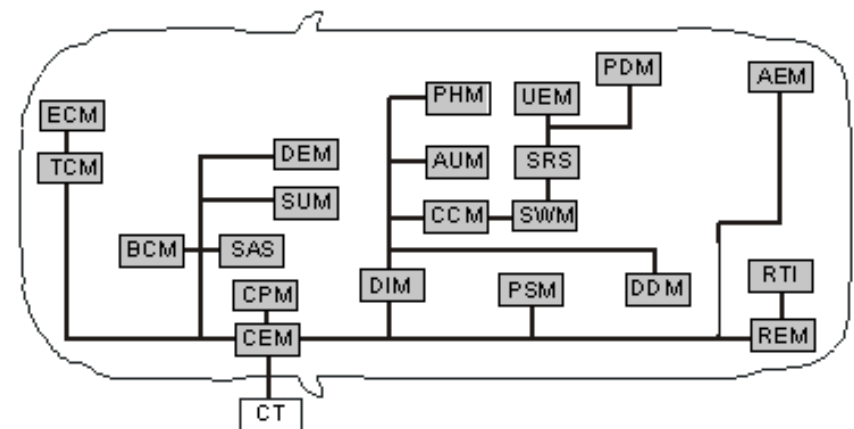
The Future of Remote Diagnostics

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- *Presentation held in various settings 2004-2006*

Modern vehicles and diagnostics

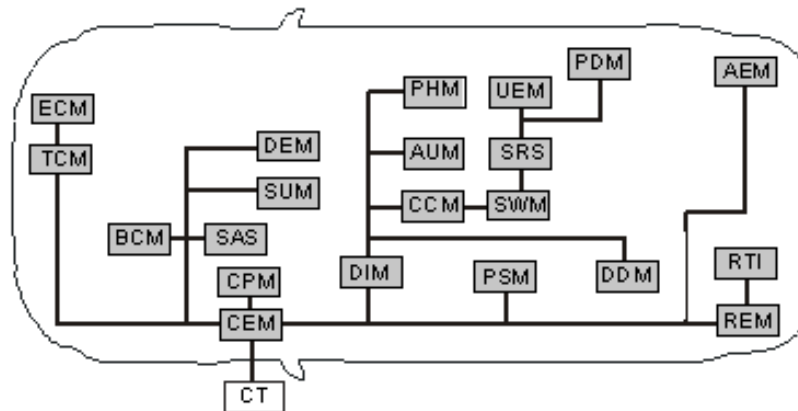
- Sensors control important functions of the vehicle
- Sensors connected to microcomputers (ECU), connected via network(s)
- ECUs run software that can be updated
- Sensor values that exceed predefined limits trigger DTCs
- DTCs can be read out by service technicians
- Diagnostic applications essential



Remote Diagnostics

- Remote Diagnostics
 - ~ Doing diagnostics but *remotely*
- A typical definition
 - “The ability to access a vehicle’s *performance parameters* and *trouble codes* in case of *malfunction* using a *wireless network*, and provide necessary *support services*.” (Frost & Sullivan 2002, p. 3)

*Diagnostics + Wireless =
Remote Diagnostics*



+



Why is this important?

- From an after sales perspective
 - Increase up-time
 - Reduce time in the repair shop
 - Prevent unnecessary warranty costs
- Useful in other business processes, for example, field tests in R&D

No a great success yet

- The vision has not been realized
- Prototypes have been developed
- ...and even more slide shows!

- What do people do when they do diagnostics?
- In what ways will diagnostics develop in the future? (long term, short term)
- What application concepts are likely to be successful?

Three related assumptions in the field

- The DTCs define the problems
- Diagnostics is about solving technical problems (the DTCs)
- The most recent software shall (always) be uploaded to the vehicle

1 The DTCs define the problems with a vehicle

- The DTC defines when a value exceeds a predefined limit
- DTCs do not necessarily imply problems
 - “Model X always shows DTCs, even when there are no problems.”
- The customer defines the problem, not the diagnostics application
- DTCs may be misleading
 - Local service technician Niklas tells us about a case where three service technicians, independently from each other, at three different occasions replaced an injection component because a DTC indicated it to be malfunctioning. The customer experienced the boat was not operating with the usual effect, i.e., not accelerating fast enough. Nicklas got confused and made a profound analysis, finding the filth in the fuel tank was the underlying cause of error, blocking the injection component.
 - Symptom: The customer experienced deviation
 - Effect: The measurable deviation
 - Cause: The underlying reason why
- → A problem is only a problem inasmuch as the customer believes it is a problem

2 *Diagnostics aims at solving all DTCs*

- In general, only the DTCs experienced by the customer should be resolved
- Technicians know this
- Some technical problems should always be handled, e.g., security issues

- → *The objective is, generally speaking, to resolve those DTCs experienced by the customer*

3 The most recent software shall (always) be uploaded to the vehicle

- Make sure the vehicle has the most recent software, download automatically when a problem occurs.
- This may imply changing the properties of the vehicle
- The customer came to fix a problem

- → *The most recent software is not necessarily desirable for the customer*

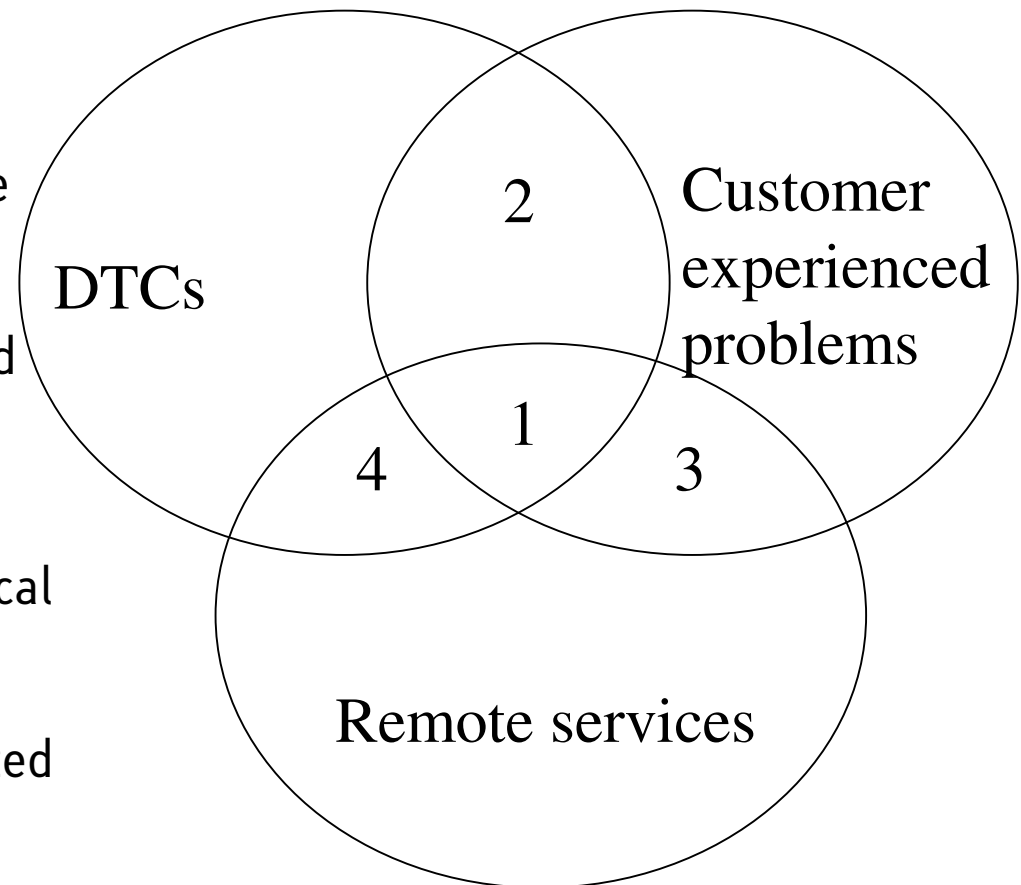
DTCs, experienced problems and offers

1 Remote service for tech problem experienced by the customer

2 Technical problem experienced by the customer, but no service available

3 Remote service for non-technical problem

4 Remote service for unrecognized technical problem



Summing up

- A problem is only a problem in as much as the customer believes it is a problem
- The objective is, generally speaking, to resolve those DTCs experienced by the customer
- The most recent software is not necessarily desirable for all customers

The future of remote diagnostics?

- Complement
 - Remote Diagnostics will be a complement to “traditional diagnostics,” e.g., read out DTCs remotely or book services
- Workshop focus
 - Remote Diagnostics will be an additional tool for workshops mainly
- Technicians essential
 - Technicians will not be replaced in the short run
- Few remote solutions
 - Straight forward campaigns may be resolved remotely (for example), but virtually all solutions will require a workshop visit