

The Future of OBD in Inspection & Maintenance Tests

Charlie Gorman
Equipment & Tool Institute

CAN is coming

- Stands for “Controller Area Network”
- Requires the use of a CAN chip set, one for each module including the scan tool
- This means existing OBD I/M programs will require hardware upgrades
 - Replace whole board
 - Replace cartridge
 - Replace lump in cable

CAN is Coming

- Messages are sent to all modules by HW.
- The transmitter sends messages bit by bit according to the CAN protocol.
- All modules, including the transmitter, will:
 - Be active in all bus activity.
 - Check for errors.
 - Force retransmit of an erroneous message.
- All modules, except for the transmitter, will:
 - Acknowledge a correct message reception.
 - Have a copy of a correct message.

This is CAN everything else is application specific

Automotive application defined

Several ISO and SAE documents define the specific use of CAN in automobiles. Most of these documents are either completed or are in the final ballot stage

These documents define the vehicle network as well as the connection to and the communication with diagnostic equipment including emissions testing equipment.

CAN implementation

- CAN is allowed in order to meet regulatory requirements beginning MY 2003
- All light and medium duty vehicles must be using it by MY 2008
- See <http://www.etoools.org/public/articles/details.cfm?id=167> for a list of car makers and when they will be implementing CAN

Why CAN?

- Faster (J1850 10.4 kb/s) (CAN 500 kb/s)
- Can handle more information due to larger buffer memory
- More robust
 - One module goes down, less likely to take whole network down
- Better error handling or control
- Will be around for more years than the chip sets it replaces.

Will CAN work? Are there risks?

- J1850, ISO 9141-2 and ISO 14230 or (KWP 2000) caused I/M testing problems because these systems were designed without any I/M testing standards or verification method.
- Standards and verification methods are on the way for CAN and older systems as well.
 - The flow chart Bernie covered is CAN ready
 - <http://www.etoools.org/public/articles/details.cfm?id=165>
 - It gives car makers and equipment mfg. something to design to

More protection from problems

- There are two other efforts that may help make sure that future OBD systems communicate well with I/M testing hardware as well diagnostic equipment (scan tools)
 - The Gold Scan Tool SAE J1699-3
 - The Modular Vehicle Communication Interface

Gold Scan Tool SAE J1699-3

- A specification for a software tool designed to verify that a particular OEM OBD implementation meets spec's
- Will be made available as source code
- Will cover CAN and older OBD Protocols
- Will use a Windows PC and J 2534 Pass through reprogramming hardware

More on Gold Scan Tool

- Test Vehicle with no malfunctions, no DTCs set
- Test Vehicle with a pending code by inducing a fault
- Test Vehicle with a confirmed code by retaining fault
- Test Vehicle with fault repaired
- Test Vehicle with No faults after 3 driving cycles completed to turn off MIL
- Test Vehicle with no faults, MIL off to verify in use performance counter function
- Test Vehicle with no faults, MIL off to verify in use counter, mode \$6, and I/M readiness function
- Hopefully testing against the I/M testing flow chart will be added.

ISO, SAE, JSAE, ASAM Standardization A Joint Step Forward

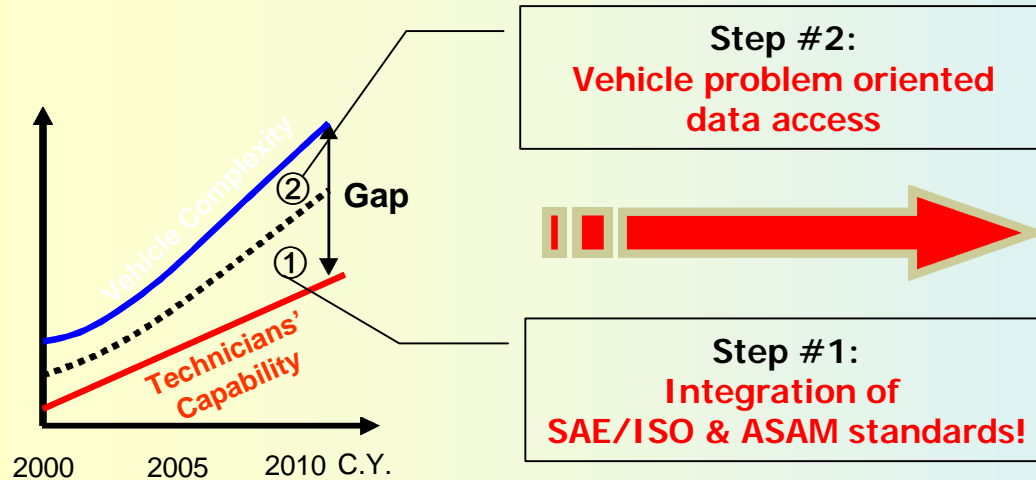
"Common Interfaces and Architecture of
Diagnostic & Programming Tools"

Franz Bodensteiner	DaimlerChrysler
Martin Blanz	DaimlerChrysler
Gangolf Feiter	GM Service Operations

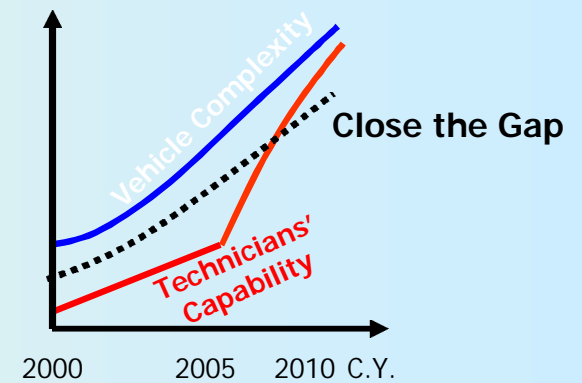
The Objective "Close The Gap"

Vehicle Complexity versus Technicians' Capabilities

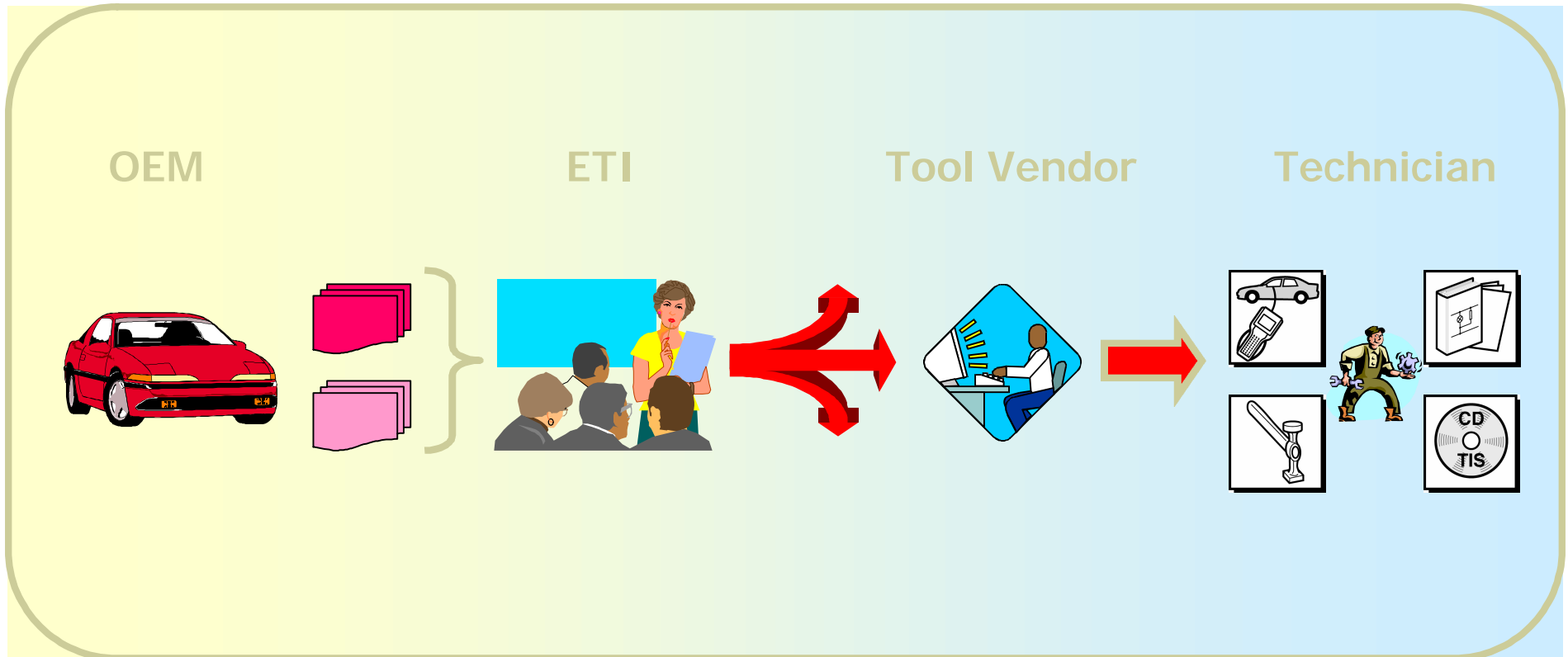
Estimated Forecast



Target

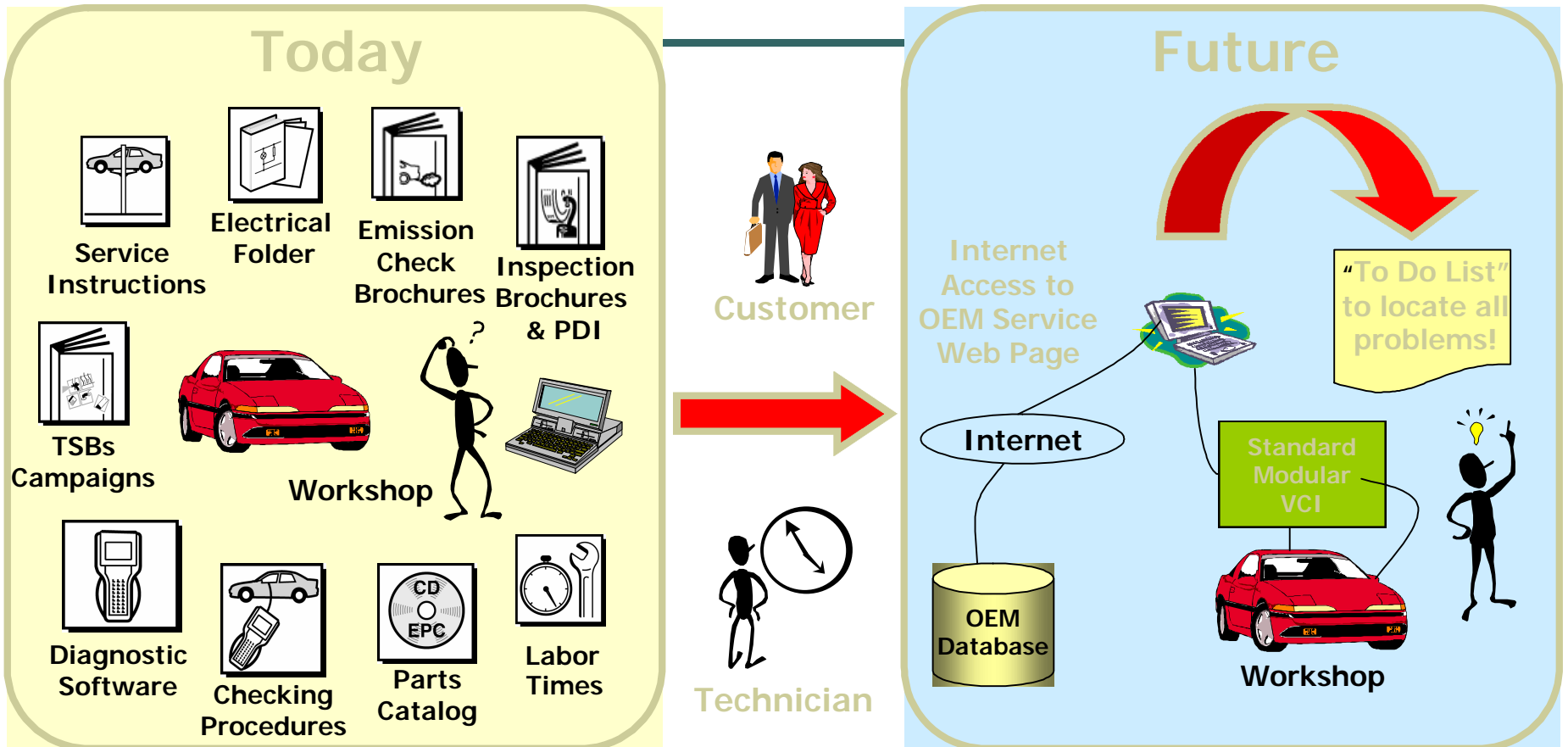


Step #1 in detail - "Today's Process"

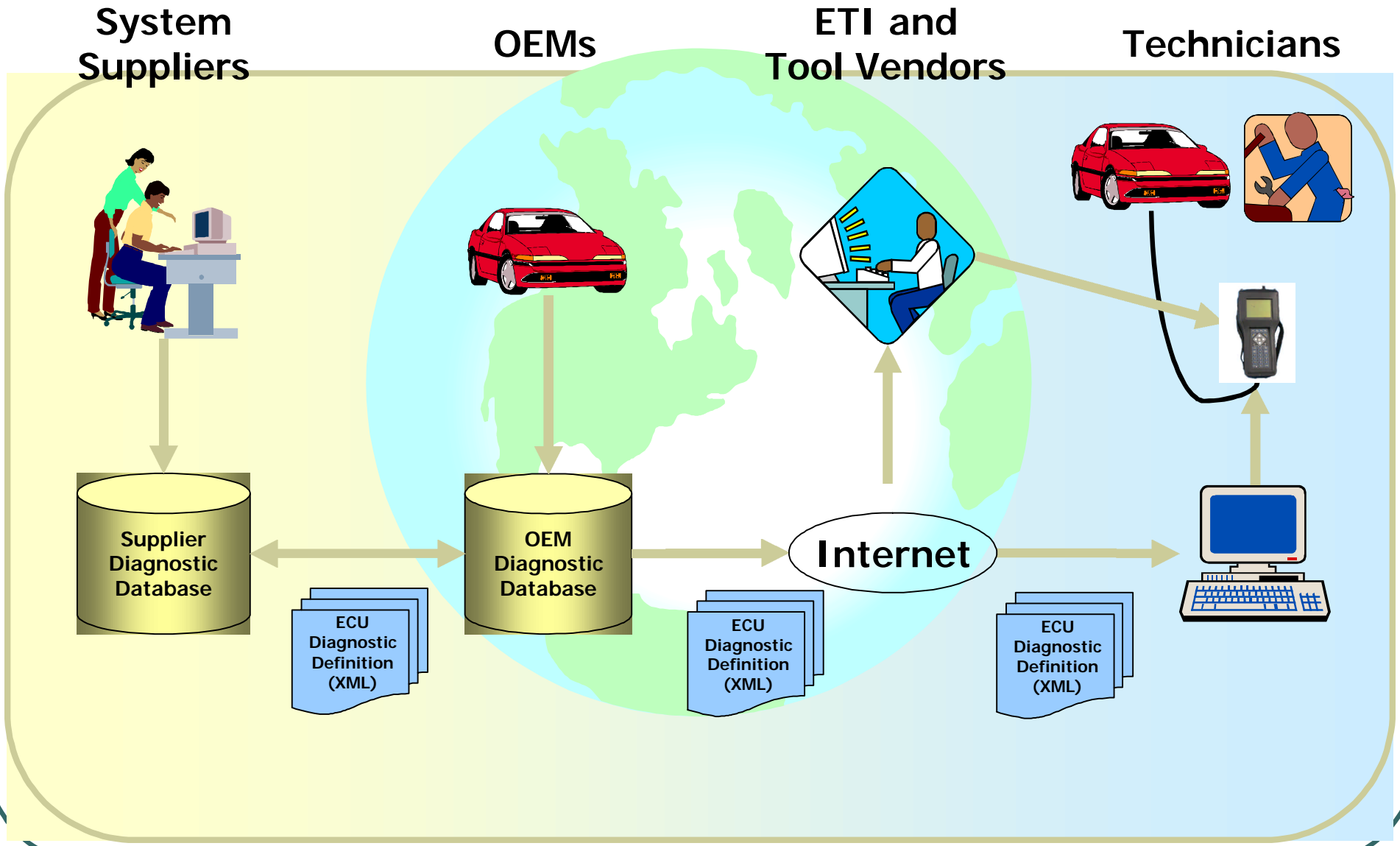


Open Loop Process!

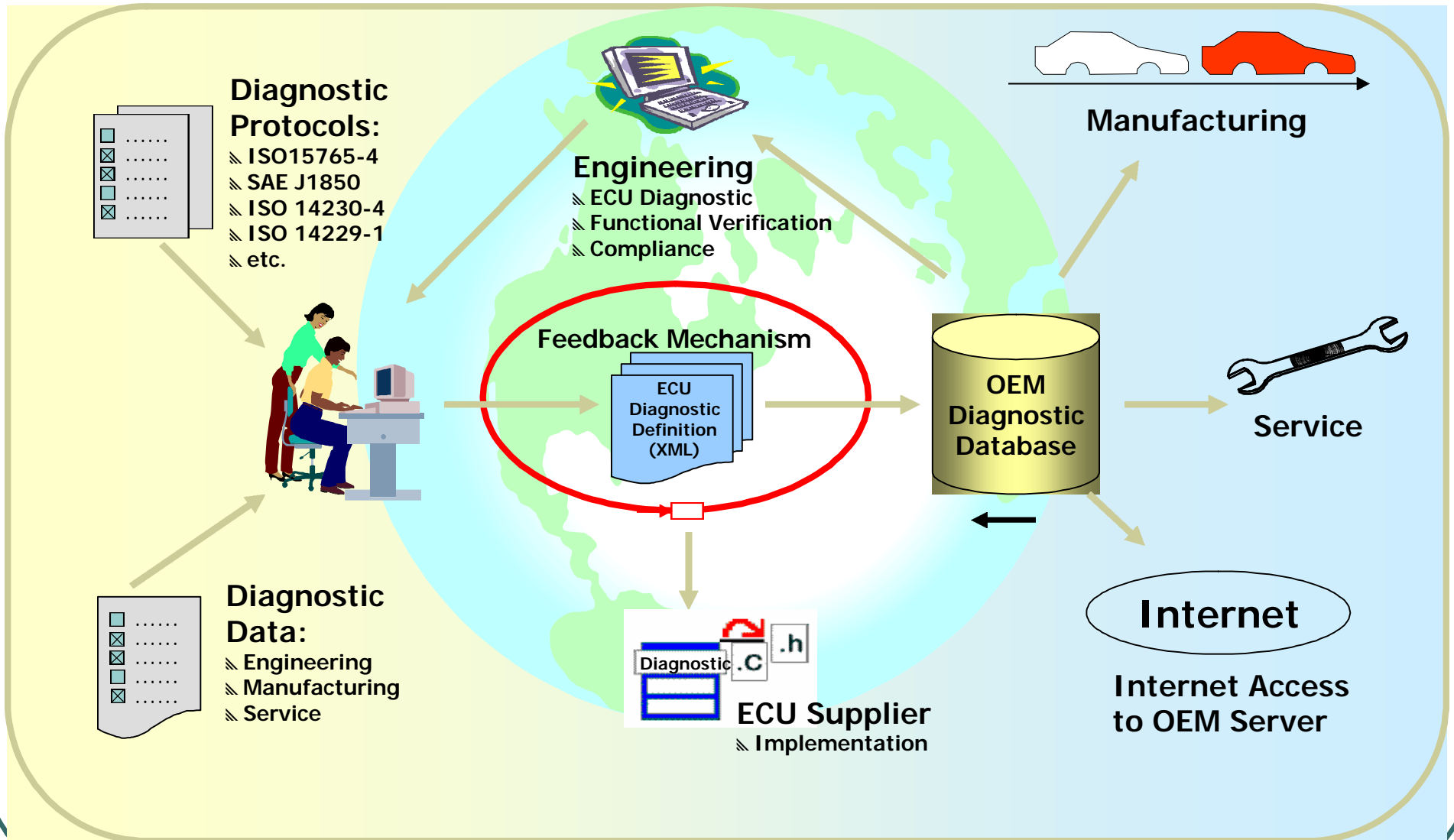
Step #2 in detail: "Vehicle Problem Oriented Data Access"



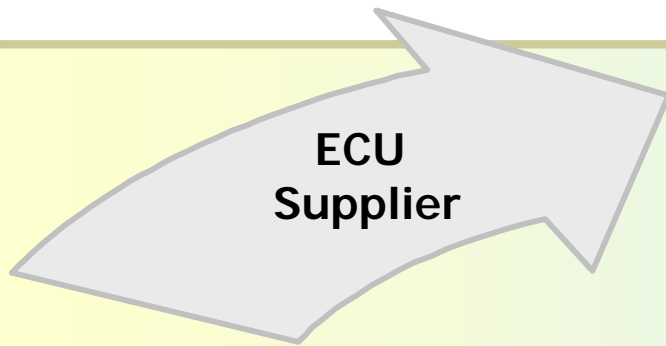
Close the gap - step #1 "Proposed Standardized Process"



"Single Source" diagnostic data stream process flow



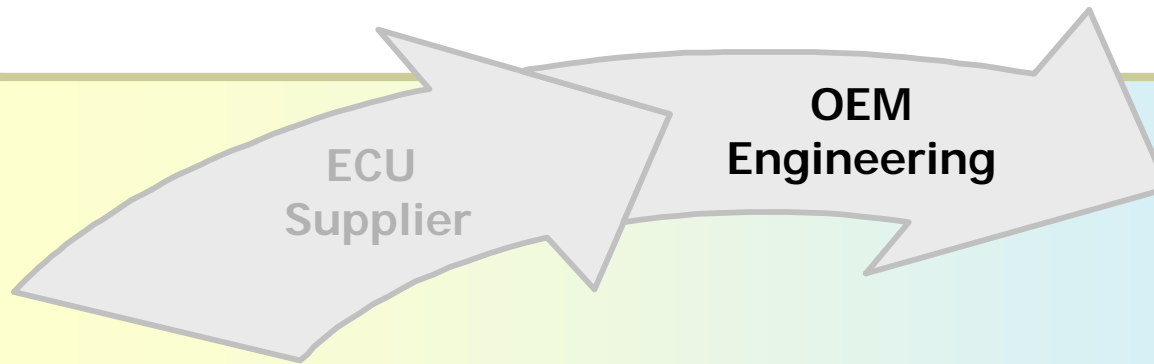
“ECU supplier” benefits of standardized process



Benefits are:

- ⌘ automatic configuration of ECU diagnostic data stream & protocol,
- ⌘ documentation is generated from XML data format (ECU diagnostic content = documentation)
- ⌘ automatic configuration of development tester to verify ECU diagnostic behavior
- ⌘ XML data format provides machine readable information to import into supplier data base
- ⌘ generation of *.c and *.h files to configure diagnostic kernel configuration

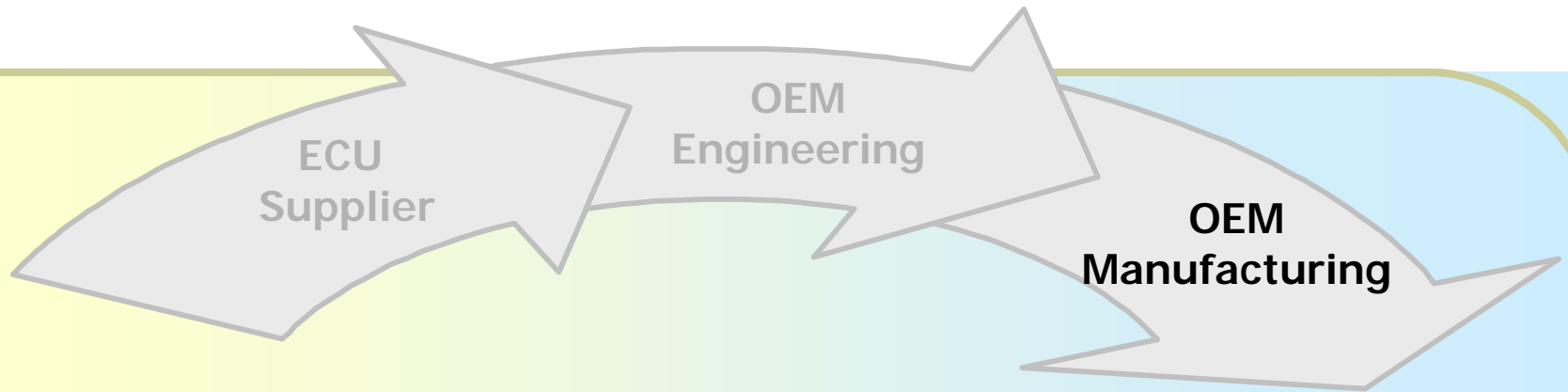
OEM engineering benefits of "standardized process"



Benefits are:

- ≡ specification and exchange of diagnostic data in standardized format
- ≡ avoids redundant data stream authoring
- ≡ various development testers are supported with „single source“ data

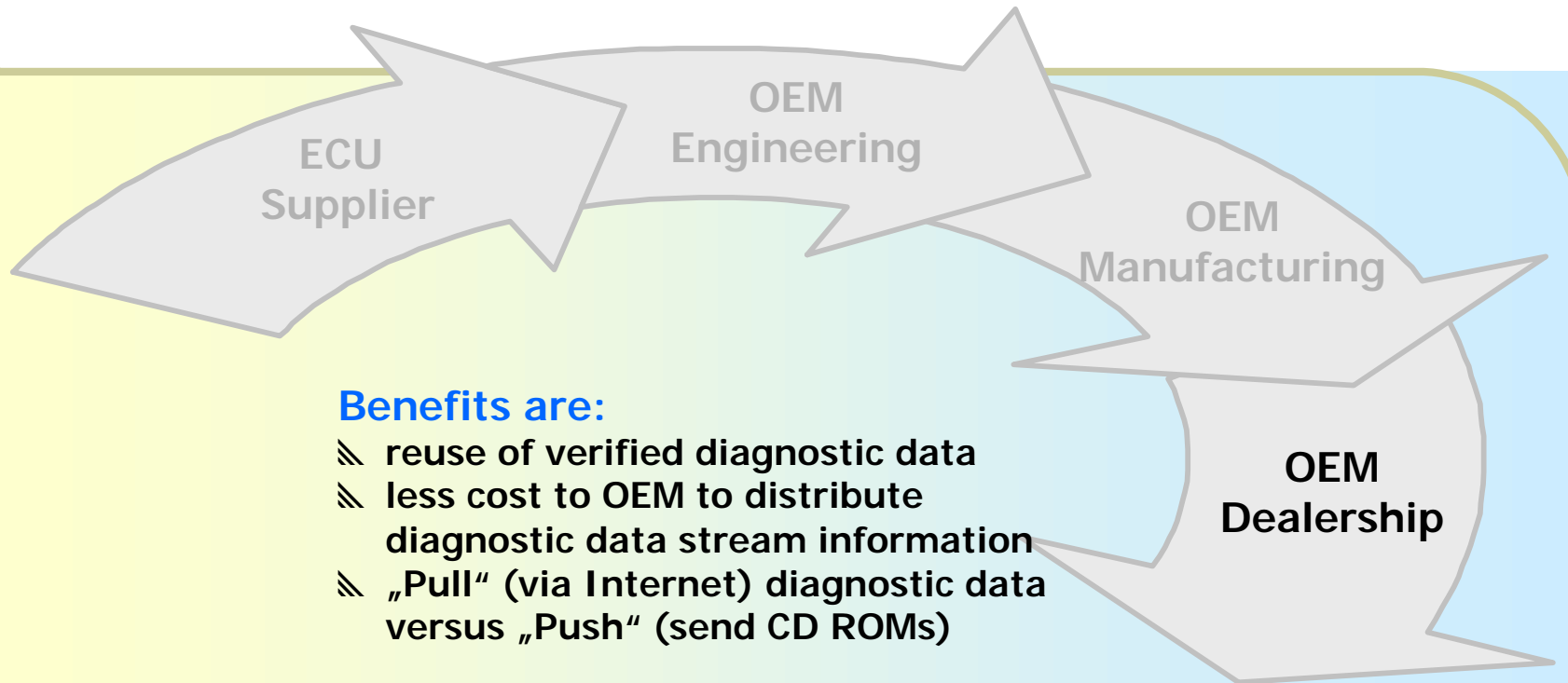
OEM manufacturing benefits of "standardized process"



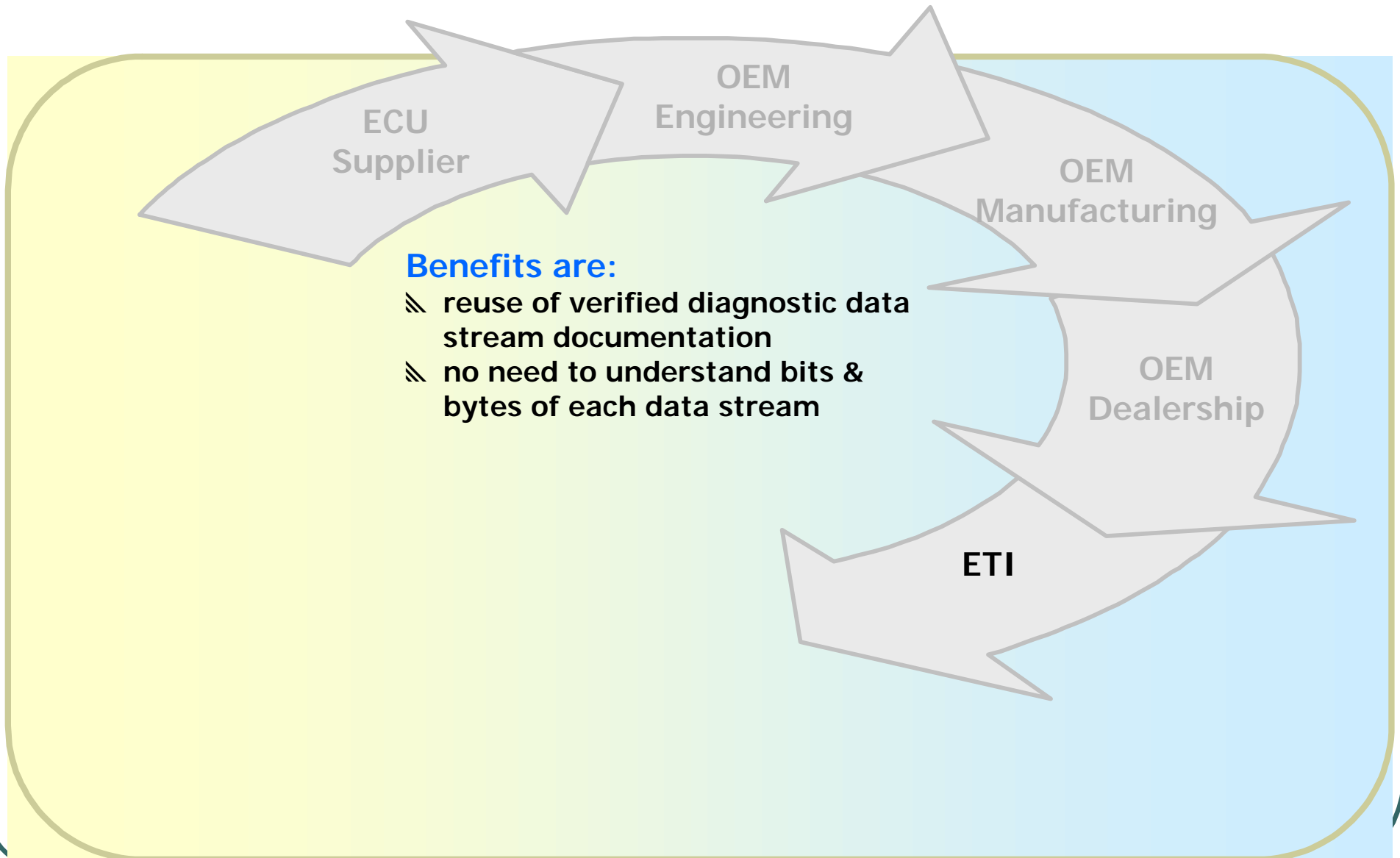
Benefits are:

- ≡ reuse of verified diagnostic data
- ≡ End-Of-Line tester uses the same diagnostic data stream configuration data as engineering diagnostic tester

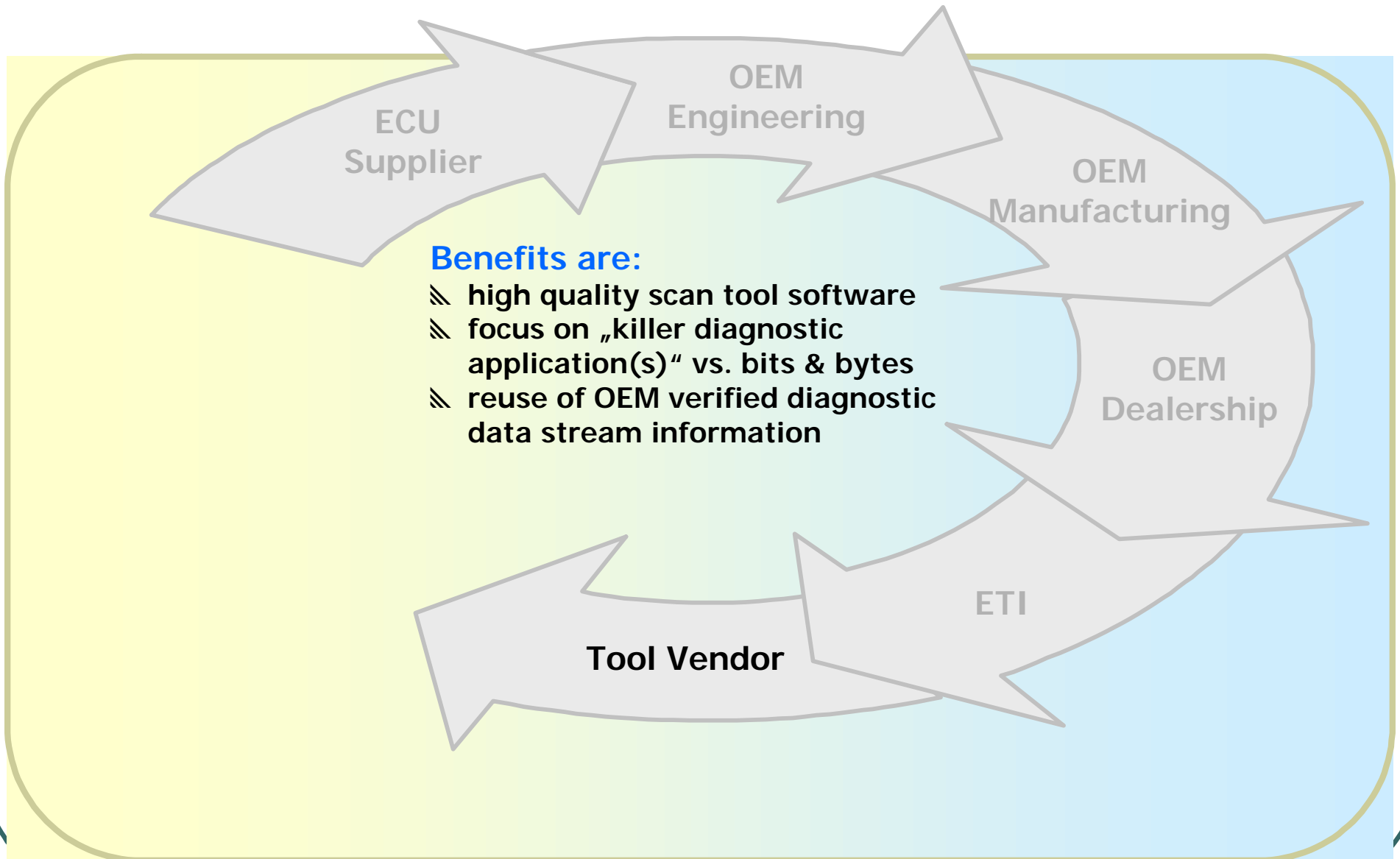
OEM dealership benefits of "standardized process"



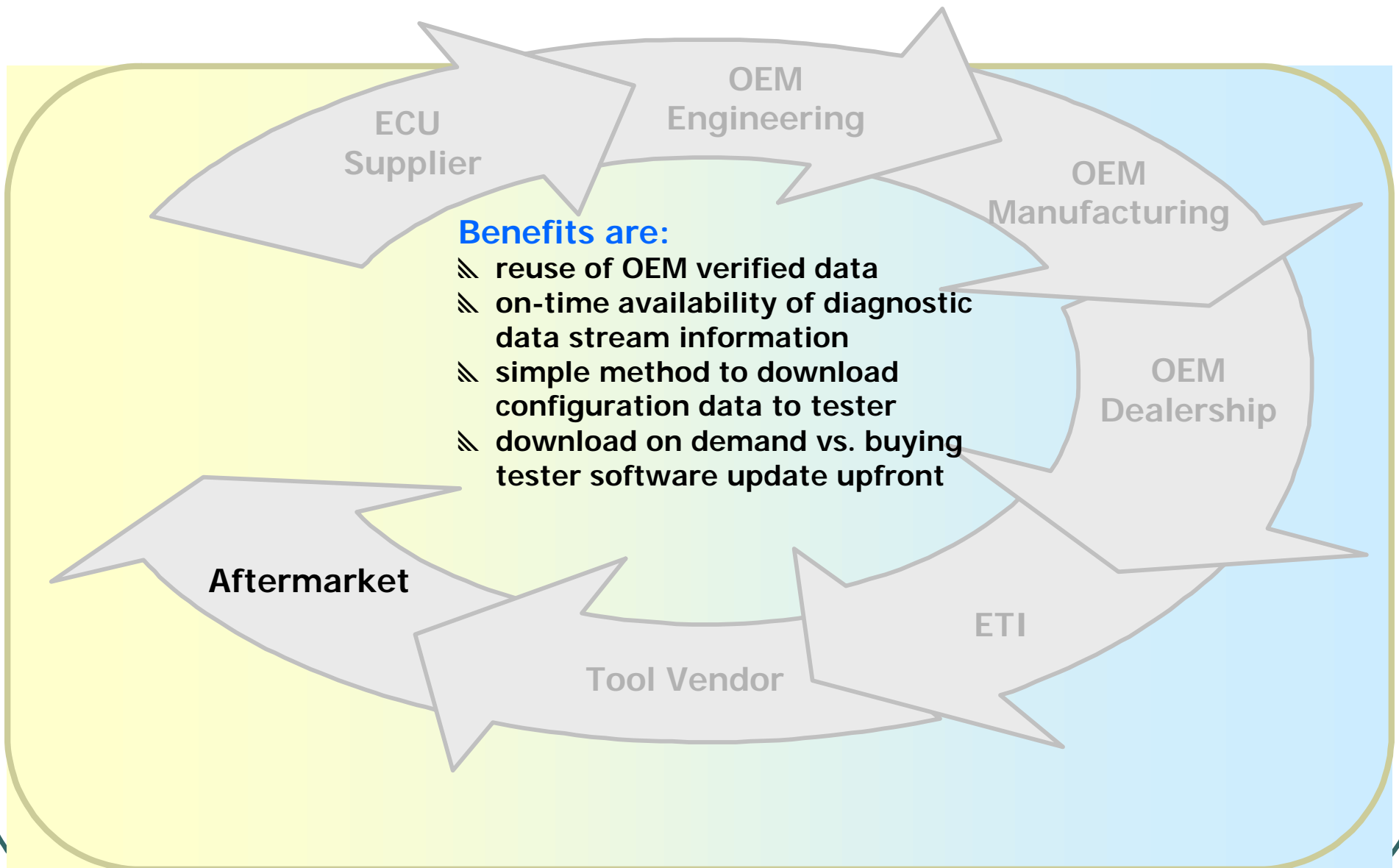
ETI benefits of "standardized process"



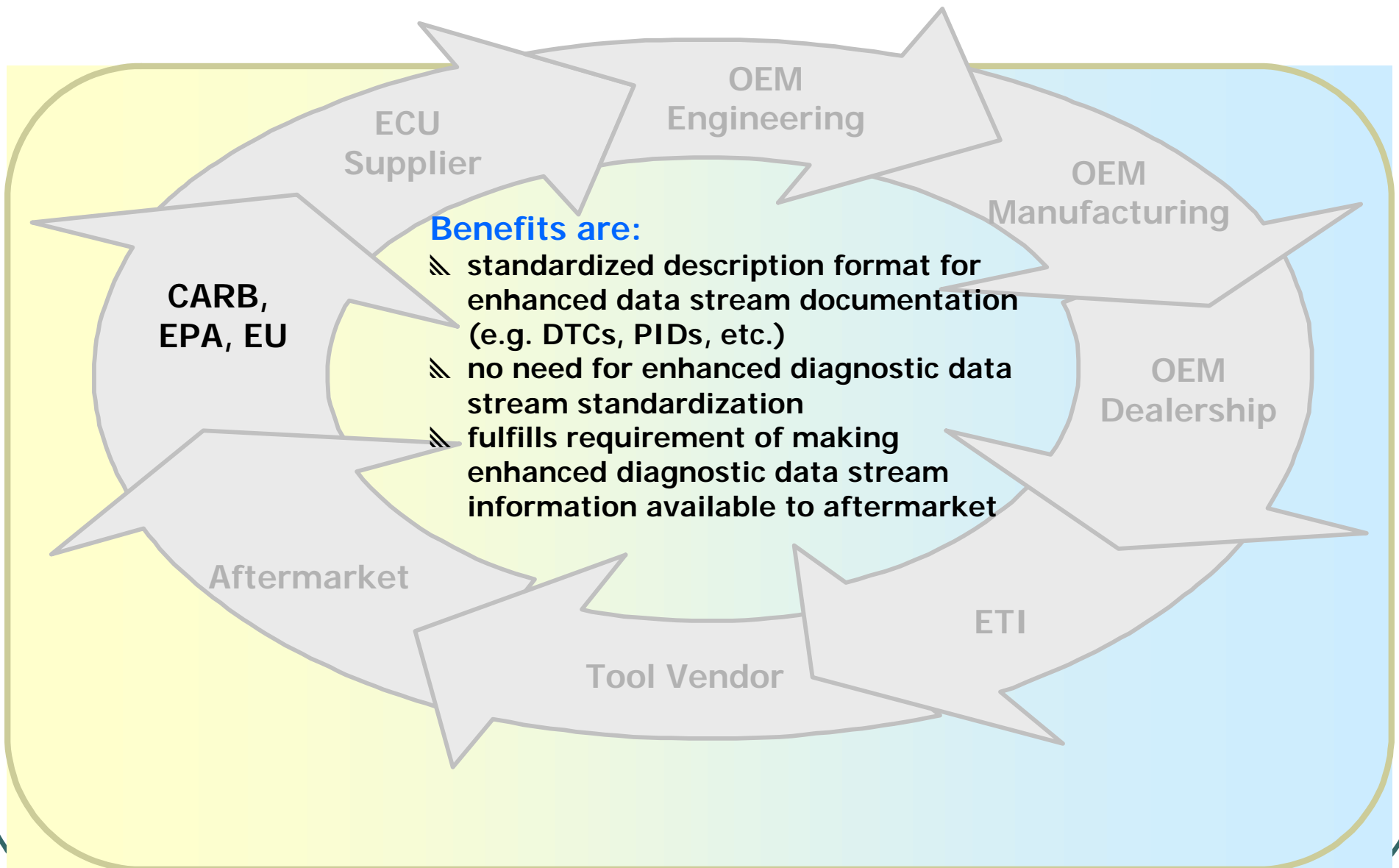
Tool vendor benefits of "standardized process"



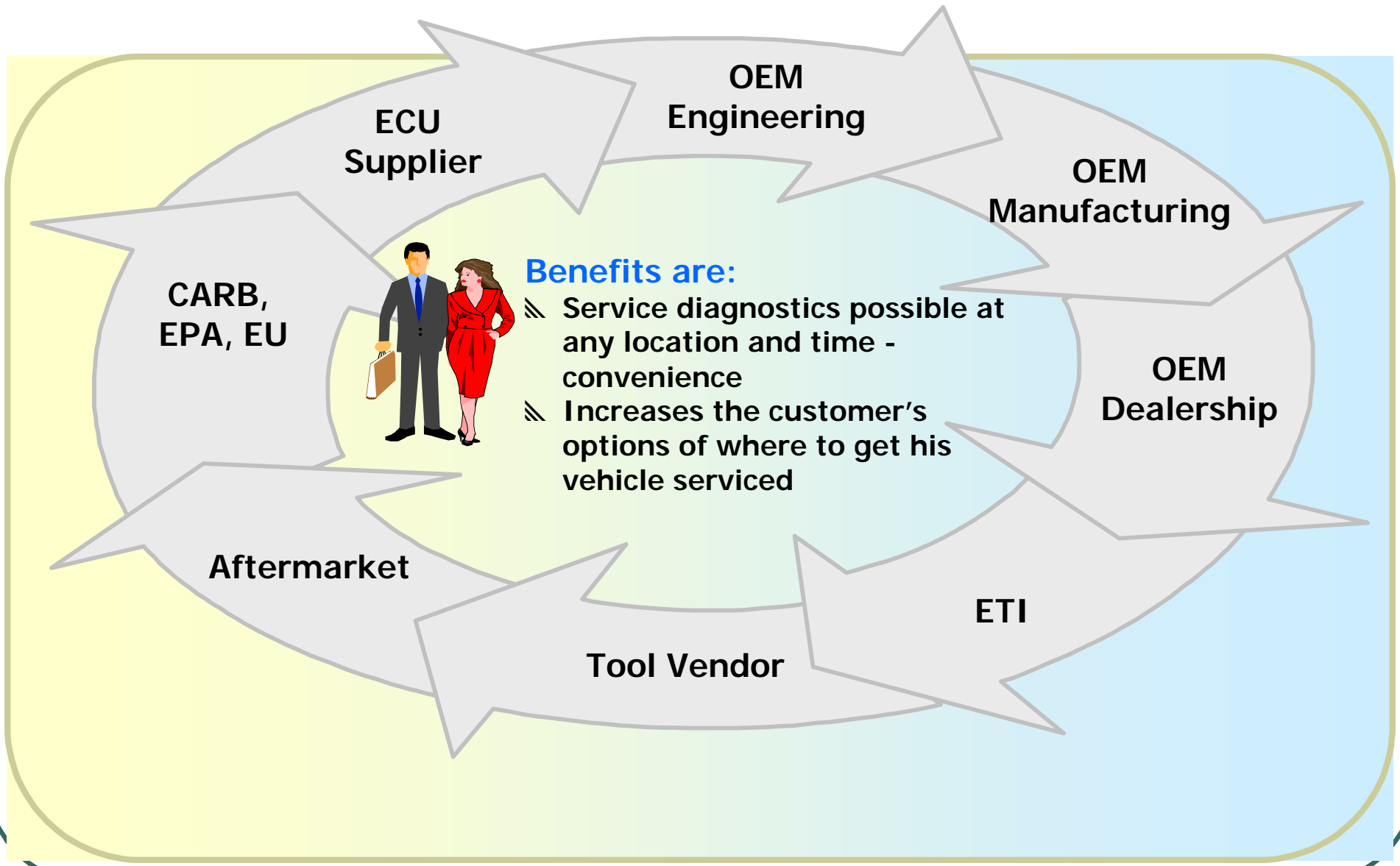
Aftermarket benefits of "standardized process"



CARB, EPA, and EU benefits of "standardized process"



Customer benefits of "standardized process"



Conclusions

- Errors were made in the past because I/M testing using OBD was not properly anticipated.
- Future OBD systems will be more robust and will meet a common specification better than in the past
- Tools will exist that will insure success