

Process for Communication of Materials Content Data

- ◆ Automotive Experiences
 - Customer Specs
 - Requirements lead systems
 - Industry Standards lacking

- ◆ IMDS

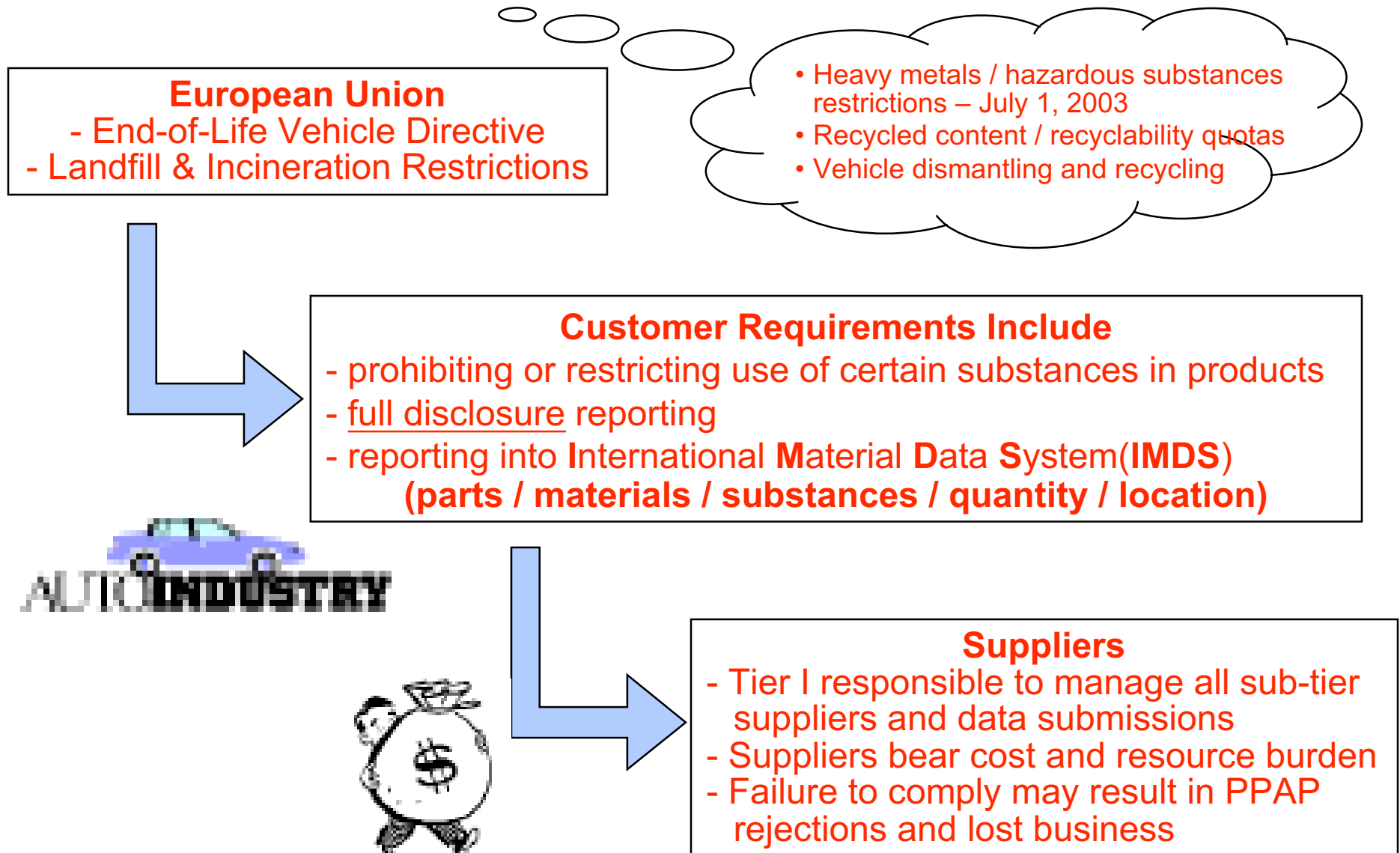
- ◆ Centor

- ◆ Material standards / Umbrella specs

- ◆ Current status of Circuit Board reporting

- ◆ Future reporting
 - Need for customer P/N specific data

◆ Customer Specifications



- ◆ Requirements lead systems

- ◆ Customer specifications require:
 - All data in IMDS (Current and Carryover Parts)
 - Full BOM / Parts Tree
 - Full Material disclosure (Supplier / Trade Names)
 - Full Chemical Ingredient Disclosure
 - Tier One Responsible for Final Delivery of Data to OEM
 - Plans for Elimination of SoC's (*beyond legal requirements*)

Delphi Approach to Customer requirements

- ◆ Maintain confidentiality and minimize reported information
 - References ELV substances
 - Flat BoM - **No full BoM disclosure**
 - Utilize reference products and generic materials
 - **No commercial information** (Supplier name, Material Trade name...)
 - **No recycled content** (metals amounts known, plastics are business info)

- ◆ Minimize resources to complete reporting!

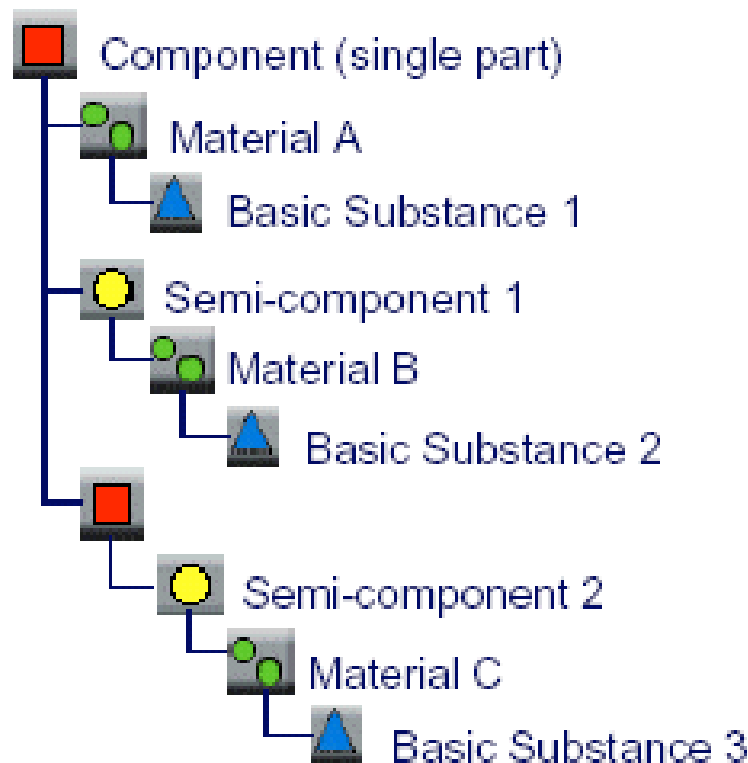
- ◆ Industry standards lacking
 - Delphi is pushing to have OEM's commonize on:
 - » Use of one substance list
 - » Use of manufacturing site DUNS code for supplier identification (instead of each OEM having a unique code to identify their suppliers)
 - There is no industry standard materials list!!!

- ◆ JUNE 10, 1999: EDS of Rüsselsheim is setting up an international electronic material data system (IMDS) on behalf of the car manufacturers Audi, BMW, Daimler-Chrysler, Ford, Opel, VW and Volvo. The system provides car manufacturers and their partners with information on the materials of which the individual components of a car are made. Starting point for the cooperation with the car manufacturers was their commitment to recycle 95 per cent of the mass of a vehicle by the year 2015.

- ◆ Went operational in March 2000

- ◆ Several enhancements were made along the way
 - User maintenance of company ID's and accounts electronically
 - Fees for upload and download reduced drastically
 - EDS created spreadsheet based upload template in 2003.

Basic MDS Structure



Note - The goal is to reduce all parts to Basic Substances.

At the moment, the system allows mixing of types at the same level - there are some OEM's and Tier One's that require all siblings be of the same type - be sure to understand your customer's requirements before expending a lot of effort.

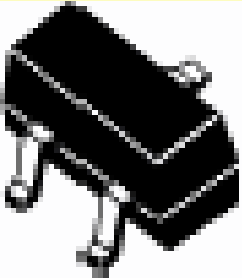
◆ Centor Software Company

- Beginning in 1999, several Fortune 1000 firms engaged Centor in their research projects aimed at exploring the use of the Internet and intranet infrastructure to provide correlation database capabilities. In 2000, Centor partnered with those customer's and developed business insight applications that leverage the power of rapidly correlating unstructured and structured information.
- Delphi contact Centor in 2001 about their relational database and possibilities for use to upload product data into IMDS and to capture supplier data. We worked through the AIAG to create a common Automotive Supplier template.

✂ **Compliance X-Sight**TM allows companies to assess, manage, and improve performance of regulatory *compliance and conformance processes* by aggregating and analyzing relevant information for a diverse set of compliance requirements. In particular this application focuses on restricted substances and recycled content and the management of this critical information

- ◆ The AIAG ELV spreadsheet is a free download from the AIAG website. One can create an AIAG ID for free.
- ◆ The AIAG ELV spreadsheet is essentially IMDS in an excel spreadsheet mode.
 - Uses the IMDS substances
 - Requires suppliers to create materials
 - By cutting and pasting can reuse materials, parts, etc...
 - Allows for several tiers of part structure
- ◆ The spreadsheet is transformed into an XML file which can be uploaded into a companies web application – Xsight.
- ◆ Centor envisioned that a using company could upload their BOMs with associated suppliers and use the tool to determine which suppliers need to provide data. Once all data for a BOM exists, it can be exported in a variety of formats.

- ◆ There is no industry standard material list
- ◆ There is however:
 - SAE metals specs
 - ISO materials
 - DIN specs
 - EIA Material Template (common substance list)
- ◆ ZVEI – European electronics organization presenting idea of umbrella specs for component types. Example:

	SO23	
	Weight:	8 mg
	Number:	16

Name of Material	Percentage	1)
Iron	19.5	
Nickel	13.3	
Lead	0.4 - 0.8	
Sb2O3	1.0 - 1.5	
Silicon	1.0 - 1.6	
SiO2	45.0	
Tin	2.0 - 3.5	
...	...	

- ◆ Delphi, Bosch, Seimens, & Pioneer along with ZVEI worked with Volvo and BMW of the IMDS Steering Committee to develop a interim compromise position with respect to reporting of circuit board assemblies. There will be summary reporting at this juncture of 3 types: standard laminate, hi density laminate, & hybrid. A predefined mix of standard materials will be used. Example:
 - **PVC** IMDS ID: XXX IMDS Name: PCB-PVC
 - **Ceramics** IMDS ID: XXX IMDS Name: PCB-Ceramics
 - **Epoxy components** IMDS ID: XXX IMDS Name: PCB-Epoxy
 - **SN/PB-alloys (Solder)** IMDS ID: XXX IMDS Name: PCB-Solder
 - **Copper alloys** IMDS ID: XXX IMDS Name: PCB-Copper
 - **Organic materials** IMDS ID: XXX IMDS Name: PCB-Organic
 - **Aluminum alloys** IMDS ID: XXX IMDS Name: PCB-Aluminium
 - **Noble metals** IMDS ID: XXX IMDS Name: PCB-Metals
 - **Inorganic** IMDS ID: XXX IMDS Name: PCB-Anorganic
 - **Epoxy for PCB** IMDS ID: XXX IMDS Name: PCB-Epoxy for PCB

- ◆ The reporting of automotive circuit board assemblies will probably continue in a simplified mode for the next 2-3 years.
- ◆ Automotive electronics suppliers will need part specific data.
- ◆ Electronics suppliers will likely need part specific data, therefore

SUPPLIERS must be able to **PUSH** data to customers by P/N rather than anticipate the ability to place in storage and have customers **PULL** the data.

- ◆ Best efforts will revolve around standardizing
 - Level of detail required
 - Supplier codes
 - Method of sending / receiving data

