J2008
EXECUTIVE
OVERVIEW

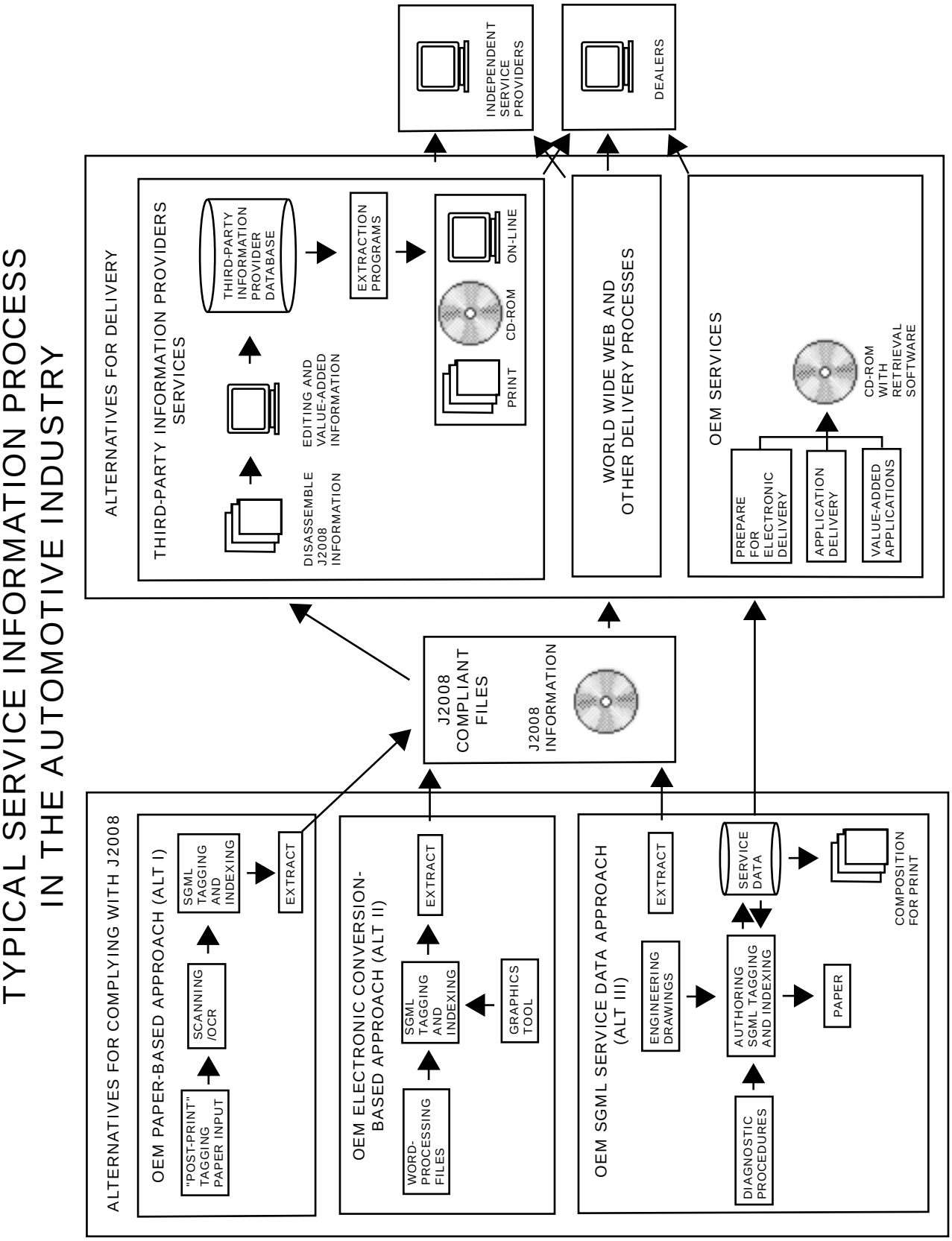
TYPICAL SERVICE INFORMATION PROCESS
IN THE AUTOMOTIVE INDUSTRY
ALTERNATIVES FOR COMPLYING WITH J2008
OEM PAPER-BASED APPROACH (ALT I)
"POST-PRINT" TAGGING PAPER INPUT
SCANNING /OCR
SGML TAGGING AND INDEXING
EXTRACT
OEM ELECTRONIC CONVERSION-BASED APPROACH (ALT II)
WORD-PROCESSING FILES
SGML TAGGING AND INDEXING
GRAPHICS TOOL
EXTRACT
OEM SGML SERVICE DATA APPROACH (ALT III)
DIAGNOSTIC PROCEDURES
ENGINEERING DRAWINGS
AUTHORING SGML TAGGING AND INDEXING
PAPER
EXTRACT
SERVICE DATA
COMPOSITION FOR PRINT
J2008 COMPLIANT FILES
J2008 INFORMATION
ALTERNATIVES FOR DELIVERY
THIRD-PARTY INFORMATION PROVIDERS SERVICES
DISASSEMBLE J2008 INFORMATION
EDITING AND VALUE-ADDED INFORMATION
THIRD-PARTY INFORMATION PROVIDER DATABASE
EXTRACTION PROGRAMS
PRINT
CD-ROM
ON-LINE
WORLD WIDE WEB AND OTHER DELIVERY PROCESSES
OEM SERVICES
PREPARE FOR ELECTRONIC DELIVERY
APPLICATION DELIVERY
VALUE-ADDED APPLICATIONS
CD-ROM WITH RETRIEVAL SOFTWARE
INDEPENDENT SERVICE PROVIDERS
DEALERS

Figure 1.

Executive Overview
Recommended Organization of Vehicle Service Information

Background

In June 1987, the Vehicle Electronic/Electrical Systems Diagnostic Committee (E/E Committee) was formed by the SAE Motor Vehicle Council. The following statement is the mission of the E/E Committee:

> *"The committee shall increase customer satisfaction and lower product life cycle costs by investigating and recommending standards that will promote more effective diagnosis of vehicle electrical and electronic system problems."*

A number of task forces were formed to concentrate on specific tasks. One of these task forces is J2008. The mission of the J2008 task force is:

> *"Original Equipment Manufacturers (OEMs) will make emissions-related service information publicly available in a standard organization and defined structure."*
>
> *"J2008 does not require OEMs to provide presentation formats or application delivery systems."*

The J2008 task force addresses the organization of service information, not delivery issues. OEMs will generate information which they can either distribute directly to the aftermarket along with an application (viewer and search engine software) or transfer to an intermediary (someone who will repackage the information and provide it to the aftermarket) without an application. If the information is distributed to the aftermarket by an intermediary, then the intermediary will develop its own application systems for presenting service information. **See Figure 1**, "Typical Service Information Process in the Automotive Industry."

J2008 participation and progress increased significantly in September, 1991 with the release of proposed regulations based on the 1990 Clean Air Act Amendments. These regulations focused primarily on improved "On-Board Diagnostics" capabilities to detect excessive emission levels. Requirements that OEMs improve the availability of emissions-related training and service information to the aftermarket are also included.

Access to accurate service information is critical for repairing increasingly complex vehicle systems. A significant amount of vehicle service and repair is performed by aftermarket technicians. The aftermarket does not have as easy access to this information as Dealers.

The goal of J2008 is to make vehicle service information, not just emission-related information, readily available to the aftermarket to enhance the service of vehicles.

The Maintenance Council of the American Trucking Associations (ATA) created T2008, a data model for truck service information, patterned after the J2008 draft in 1996. In 1997, the J2008 task force and ATA/TMC agreed to integrate T2008 requirements into J2008, creating a single draft standard for the automotive and trucking manufacturers.

J2008 Work Plan

Key points of the consensus work plan developed by the J2008 task force include:

Electronic Format of Service Information

> Because of the difficulty of organizing information for both electronic and print delivery, the J2008 task force concentrated on the organization of service information in electronic format only. Paper service manual requirements were considered, but not incorporated during the development of the J2008 specifications.

Standardization of All Service Information

The Environmental Protection Agency's proposed regulations require a standard organization of emissions-related service information. The proposed regulations do not specify what information is emissions-related. The J2008 task force determined that most of the systems on modern automobiles can have an impact on emissions. Therefore, a recommended practice was developed to manage all service information with a consistent structure.

J2008 Work Groups

Work groups were formed to focus on specific technical areas. Work groups operate on a consensus basis and present the results of their efforts to the J2008 task force. The J2008 task force approves the efforts of the work groups and resolves issues that cannot be resolved in work groups. The task force operates on a majority vote basis. The following technical work groups were formed:

- Data Modeling
- Graphics Standards
- Document Type Definition
- Data Interchange

Data Modeling Work Group

The Data Modeling work group created a logical data model for service information. Simply stated, a logical data model described the relationships between real things. The data model identifies all of the things, or entities, required to organize service information. Users can locate service information that is linked to a particular entity by identifying which of these entities they are dealing with on a vehicle. For example, many vehicles have an engine, and accepted methods exist for identifying both a vehicle and an engine. If users know that they need service information about the engine, they can access that information by requesting information about the engine.

An engine is a simple example, since it is a clearly defined part of a vehicle. Most people can agree what components make up an engine and can identify what engine they are dealing with. A fuel system is also a real thing, but it is much more difficult to define than an engine. Not everyone agrees exactly what components make up a fuel system. Fuel systems vary greatly among models and are constantly changing. The data model is designed to organize and provide users with access to information about both simple entities (e.g., engine) and complex entities (e.g., fuel system).

Two key data modeling objectives were to achieve a degree of standardization in service information and to provide flexibility in the access of the information. Both of these objectives were accomplished through the development of a logical relational data model. All J2008 information provided by OEMs will adhere to the standard organization outlines by the data model. Given that service information exists on a particular topic, it must be stored and exchanged in accordance with the standard. Each aftermarket intermediary can use any of the standard relationships in the design of their delivery platform that they perceive to be of value to the end users.

The logical data model is relational in the sense that the terminology used to describe and document it is relational. Implementation of the logical data model by OEMs or the aftermarket intermediary can take many different forms. A relational data base is one form of implementing the data model. There are object-oriented, hierarchical or keyed flat file data bases which all perform similar functions. Thousands of relationships are documented in the data model, but only a limited number will be delivered to the end user.

Graphics Standards Work Group

The graphics standards allow the use of either raster or vector formats. Today, most graphics for service information are in raster format. Of those raster graphics, over 90% are black-and-white (monochrome or bi-level) images, but grayscale images are becoming more prevalent.

Raster Graphics

Raster graphics (images) are stored as a series of codes describing each and every dot (pixel) within the image area. Raster images can be created by graphics software or by scanning a hard copy image. Image quality is based on two factors:

- **Resolution**-number of dots per measurement unit (i.e., dots per inch)
- **Depth**-amount of information per dot

Various data compression techniques can reduce the amount of storage space required for raster images. The specific standard selected for graphics is the Tagged Image File Format (TIFF) 5.0 Class X with additional tag support and without LZW compression. The selected standard allows four image types (Monochrome, Grayscale, RGB Color and Palette Color) and five industry-standard compression schemes. TIFF was selected because of its wide industry support, rich format, and backward compatibility.

Vector Graphics

Vector graphics are stored as a collection of geometric entities (lines, arcs, circles, text, etc.) with intelligent properties. Vector graphics provide a rich format for storage and display of diagrams and line-art, and can provide properties such as shading and line width. Vector graphics are created using CAD or Illustration software. The selected standard for vector graphics is the Computer Graphics Metafile (CGM) defined by Air Trans-port Association (ATA) Specification 2100 Digital Data Standards for Aircraft Support (Data Interchange 3.3.2 Graphics Exchange GREXV24)

ISO 8879 "Information Processing-Text and Office Systems – Standard Generalized Markup Language (SGML)"

This standard defines grammar to express the relationship between document elements. It uses DTDs to formalize the markup within the document. A DTD specifies which elements can occur in a document and the order in which they occur. ISO 8879 provides a means to identify data not defined by the standard (for example, icons). It allows for the markup in the documents to be verified according to a DTD. Generic identification is used to describe the elements of a document instead of using system specific processing instructions to describe how the elements should appear.

Objectives of ISO 8879

- Marked up documents must be processable by a wide range of text and word processing systems
- No national language bias may exist
- Many data entry devices must be supported
- No character set dependency may exist
- Familiar typewriter and word processor conventions must be accommodated
- There must be no dependence on a particular data stream or physical file organization
- The marked up text must be able to coexist with other data
- The markup has to be usable by humans as well as computer programs

Document Type Definition (DTD) Work Group

The J2008 Task Force has used SGML to create an automotive industry standard for exchanging service information.

What is SGML?

Standard Generalized Markup Language (SGML) is the internationally recognized language and ISO standard for describing information structure. SGML is used as a means for transferring structured information from one computer system to another. SGML does not dictate the presentation or layout of information, but provides the means to allow the structure of information to be de-fined.

Markup languages such as XML and the existing web markup language, HTML, serve delivery purposes. SGML. as specified by SAE J2008, is the parent of the emerging markups. Any of the newer markup languages can be derived from SGML, and are therefore not excluded, but rather facilitated by the data exchange standard. If you start with SGML, you can get there from here.

The Task Force has described the interrelationships between different types of service information by using data modeling techniques and has created an industry standard for marking-up or tagging service information. This standard is contained in a Document Type Definition (DTD).

SGML was developed:

- So text can be easily exchanged
- Because computerized composition programs were difficult to learn and use
- So text could be reusable for other purposes

Some advantages of SGML are:

- Documents are always current with technology
- It is easier for the users
  - Data entry is simplified. Rather than using composition codes, the data entry operator enters generic tags
  - Editors and writers can be trained to assist with input
  - Modification of documents becomes easier
  - Documents are transportable between computer systems
  - Elements within documents become readily usable for other applications
  - The markup is usable by both humans and computers

An SGML tagged file is called a Document Instance and has no reference to formatting requirements such as typeface, indent levels, or number of columns. Structural information (e.g., service category or vehicle identification) is used in the J2008 DTD to relate both structure and meaning. Formatting and other publishing-specific considerations are omitted. Hence, the presentation of service information in electronic form or print is independent of the data exchanged between companies.

Document Analysis is a necessary step in the development of any SGML application. During analysis, the J2008 task force studied service-related documents from multiple OEMs which were analyzed for structure and content. Each content element of the documents, along with the relationships between those elements of the documents were embodied in the J2008 DTD. The implementation of a DTD ensures consistency in the information's structure. A tag set is provided as a result of defining the elements of that structure.

Figure 2, "DTD View of the Data Model", shows the primary ways a OEM may choose to use the tag definitions and rules of the J2008 DTD. For example, J2008 information is associated with a manufacturer, and to a vehicle when possible. Service information may be further divided into the Service Categories (logical divisions of service information), Configuration Groups (physical divisions of a vehicle or component), and Component related information. Each of the selected major divisions of service information must further be divided into service information types. A set of tagged service information is known as a document instance. The

DTD allows the sender and receiver of SGML tagged information to automatically verify the integrity and structure of the data exchange; thereby ensuring accurate economical and speedy delivery of service information.

Figure 3, "SGML Tagged Sample and Output" shows a portion of an SGML tagged document instance and an example of its formatted output.

```
<servinfo servinfoSGMLid="a1" update="original"
ldup="27nov1997" svcinfotypenbr="1" svinfoqualnbr="1">
<title>Battery Capacity Test</title>
<para><ptxt>To perform this test use a high rate discharge tester,
Rotunda Starting/Charging Tester 078-00005 or equivalent, in conjunc-
tion with Rotunda Digital Volt-Ohmmeter 105-00051 or
equivalent.</ptxt></para>
<s1><ptxt>Turn the control knob on the Starting Charging Tester to
the OFF position.</ptxt></s1>
<s1><ptxt>Turn the voltmeter selector switch to the 10 or 20 volt
position.</ptxt></s1></servinfo>
```

Battery Capacity Test

To perform this test use a high rate discharge tester Rotunda Starting/Charging Tester 078-00005 or equivalent in conjunction with Rotunda Digital Volt-Ohmmeter 105-00051 or equivalent.

1. Turn the control knob on the Starting Charging Tester to the OFF position.
2. Turn the voltmeter selector switch to the 10 or 20 volt posi tion.

Figure 3. SGML Tagged Sample and Output

The Function of a DTD

The Document type Definition may consist of several "declarations," or necessary structural components. The **DOCTYPE** declaration identifies the DTD required for the document. The **ELEMENT** declaration defines the structure features for each element of information. It also defines the generic name for each element of information to be used in tagging. The **ATTRIBUTE** declaration defines specific characteristics of an element; attributes further qualify elements. There are two types of **ENTITY** declarations - General and Parameter. General entities contain characters that are to form part of the text of a document instance, such as math symbols or Greek characters which are not found on the keyboard. Parameter entities are sets of characters which are used as part of one or more SGML declarations. The **NOTATION** declaration allows the inclusion of non-SGML data, such as graphics.

```
<!ELEMENT  Paths  - - (Path1 | Path2 | Path3 | Path4 | Path5 | Path6 | Path7 |
                Path8 | Path9 | Path10 | Path11 | Path12 | Path13 | Path14   |
                Path15| Path16 | Path17 | Path18 | Path19)+ >

<!ELEMENT Path1  - - (ServInfo | ServInforef | SIEdeletefrompath)+>
<!--              these attributes link this path to tables in Data Model -->
<!ATTLIST    Path1    vehSGMLid              IDREF     #REQUIRED
                      vehvarSGMLid           IDREF     #IMPLIED >
```

Figure 4. Sample DTD Constructs

Figure 4, "Sample DTD Constructs" shows a piece of the SAE J2008 DTD. Note that the DTD is written in the syntax of the SGML language. This sample defines the coding for "paths" through the data model. The first element declaration (**<!ELEMENT**) tells us that "paths" consists of "**Path1**" to "**Path19**" and can optionally occur in any order (the "|" indicates this sequence) be specified any number of times in any order (the "+" indicates this frequency).

The Path 1 element is also defined by the sample portion of the DTD (**<!ELEMENT**). Path 1 is made up of "**ServInfo**" (a service information element), or "**ServInforef**" (a reference to an existing service information element) or "**SIEdeletefrompath**" (a notice to delete a service information element which as once in this path). The elements which make up "**Path1**" can be selected in any order (the "|" indicates this sequence) and can occur any number of times (the "+" indicates this frequency).

In addition attributes are declared for "**Path1**" (**<!ATTLIST Path1**). Attributes are metadata about the Path 1 element. In this case two attributes are declared. The "**vehSGMLid**" is a link to the Vehicle Table in the data model. The "**vehvarSGMLid**" is a link to the Vehicle Variation table in the data model.

Electronic Data Interchange (EDI)

EDI is the method of exchanging service information organized according to SAE J2008. An EDI transaction includes identification information to assist the receiver in interpreting and using the information included in the transaction.

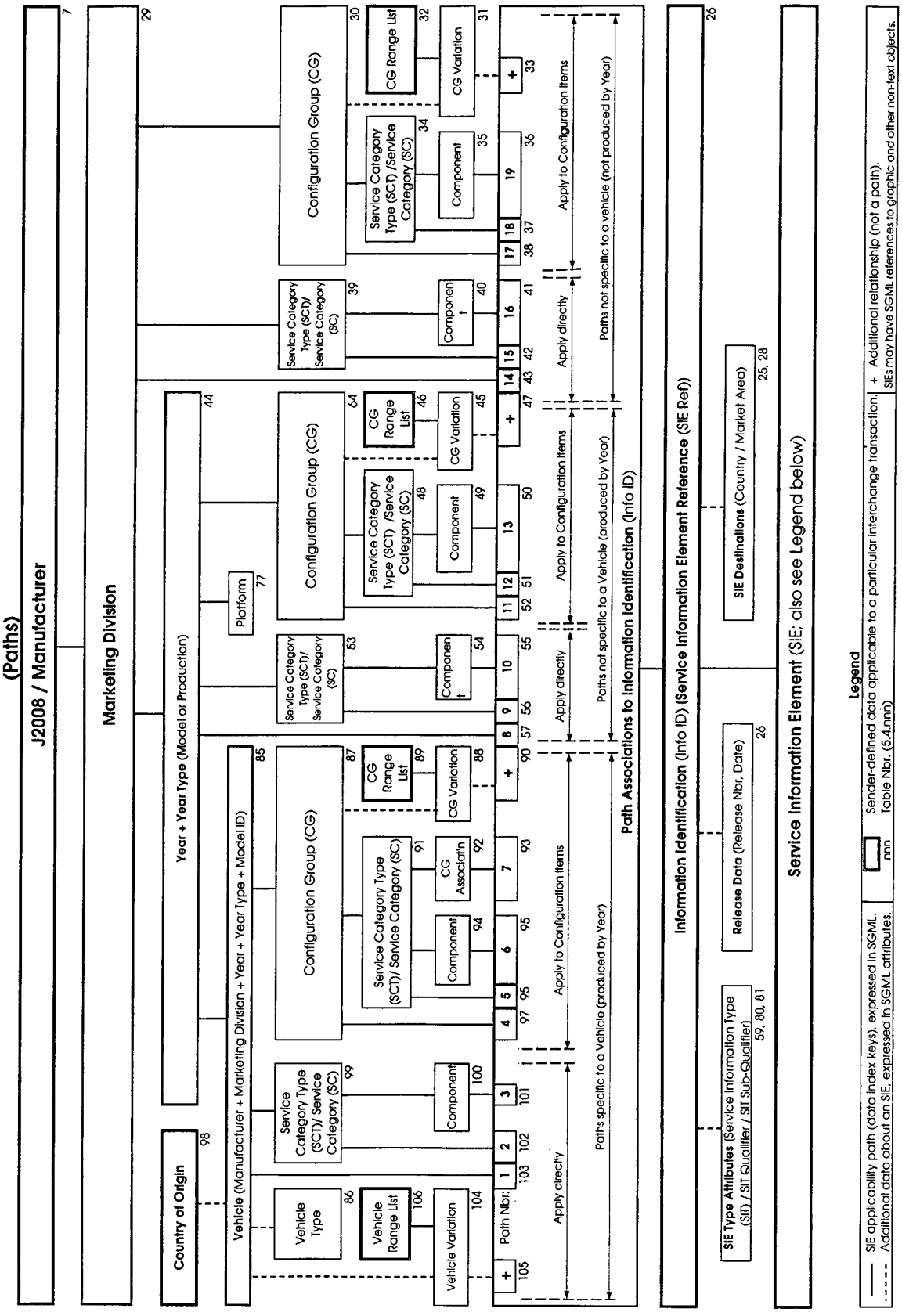
SAE J2008: DTD VIEW OF DATA MODEL (v2.3g)
(Paths)
J2008 / Manufacturer
Marketing Division
Country of Origin
Year + Year Type (Model or Production)
Vehicle (Manufacturer + Marketing Division + Year + Year Type + Model ID)
Vehicle Type
Vehicle Range List
Vehicle Variation
Service Category Type (SCT)/ Service Category (SC)
Component
Configuration Group (CG)
Service Category Type (SCT)/ Service Category (SC)
Component
CG Association
CG Variation
CG Range List
Platform
Service Category Type (SCT)/ Service Category (SC)
Component
Configuration Group (CG)
Service Category Type (SCT) /Service Category (SC)
Component
CG Variation
CG Range List
Service Category Type (SCT)/ Service Category (SC)
Component
Configuration Group (CG)
Service Category Type (SCT) /Service Category (SC)
Component
CG Variation
CG Range List
Path Nbr:
Apply directly
Apply to Configuration Items
Paths specific to a Vehicle (produced by Year)
Paths not specific to a Vehicle (produced by Year)
Path Associations to Information Identification (Info ID)
Information Identification (Info ID) (Service Information Element Reference (SIE Ref))
SIE Type Attributes (Service Information Type (SIT) / SIT Qualifier / SIT Sub-Qualifier)
Release Data (Release Nbr, Date)
SIE Destinations (Country / Market Area)
Service Information Element (SIE; also see Legend below)
Legend
SIE applicability path (data index keys), expressed in SGML
Additional data about an SIE, expressed in SGML attributes.
Sender-defined data applicable to a particular interchange transaction.
Table Nbr. (5.4.nnn)
+ Additional relationship (not a path).
SIEs may have SGML references to graphic and other non-text objects.

Figure 2.

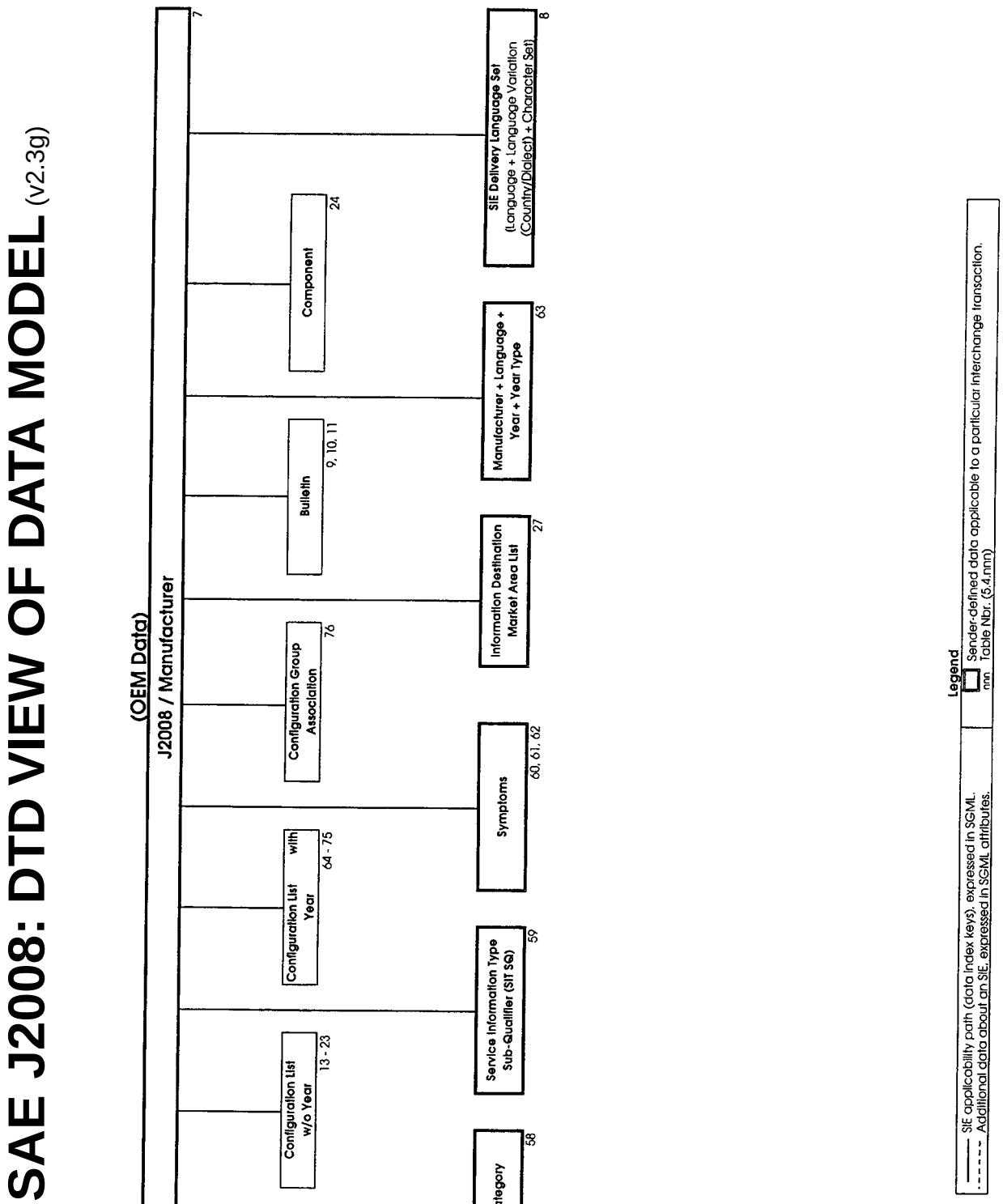

Figure 2. (continued)