OASIS TECHNICAL COMMITTEE

FORMAT OF AUTOMOTIVE REPAIR INFORMATION

Architecture Approaches

Document Control

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Notes:
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SC1-Dx	Deliverables for sub-committee 1 – Use Cases and Requirements
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Version	Note
1.0	First version

Contents

1. Introduction

This document provides an overview of the possible architectural approaches to creating a specification for the Format of Automotive Repair Information.

Three approaches are considered:

1. Single common format for representing repair information
2. Common meta data specification for describing repair information
3. Combined approach with common meta data and common format

Each approach is assessed against the design principles that are expressed in SC2-D2:

- Functional
- Verifiable
- Achievable
- Demonstrable
- Implementable
- Extendable
- Sustainable
- Open
- Consistent
- Robust

The architectures assume that there are three types of 'actor' involved:

1. Information producers

    Are the original creators of emissions-related repair information. They are the manufacturers themselves.

2. Information consumers

    Any aftermarket organisation that requires access to emissions-related repair information.

3. Information providers

    Third parties who take origin emissions-related repair information and deliver it on to the consumers, perhaps adding some value along the way (eg by putting all information into a common format)

Some manufacturers could be both producers and providers.

2. Single common format

The approach of creating a single common format for the representation of automotive repair information is similar to the approach adopted in the SAE J2008 standard. The modern equivalent of that standard, cast into a European setting, would be to develop a set of XML Schemas that could be used to represent all of the repair information required by the after-market. Figure 1 provides a view of the XML structures created by SAE J2008 and Figure 2 shows a sample of information marked up in the common format.
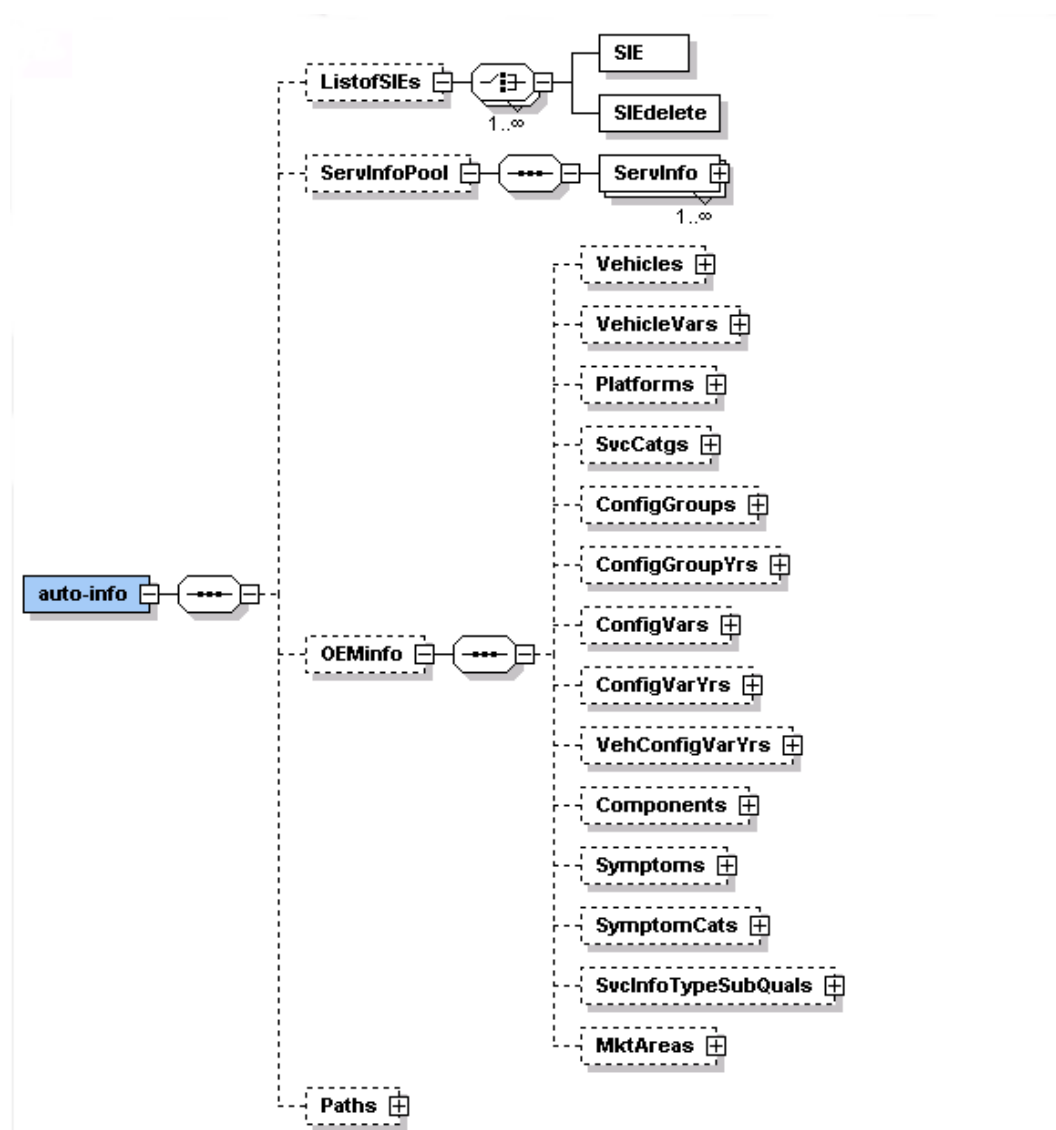
Figure 1. XML Schema for SAE J2008

We would need to assume that it was the responsibility of the manufacturers to provide information in this common format, although there might be a role for independent information providers in converting from manufactures' own published formats to the common format. However, it would be difficult to mandate the use of the standard, if the responsibility for providing information in the common format did not lie with the manufacturers themselves.

Figure 2. Sample SAE J2008 XML Instance

Although manufacturers might commission independent providers to create information in the common format, the role of the providers in creating added value to the information would most likely involve additional, proprietary, formats over and above the common format, in order to create a product for the after-market which could be differentiated from the mandatory common format of repair information.

The scenario for the single common format is shown in Figure 3.
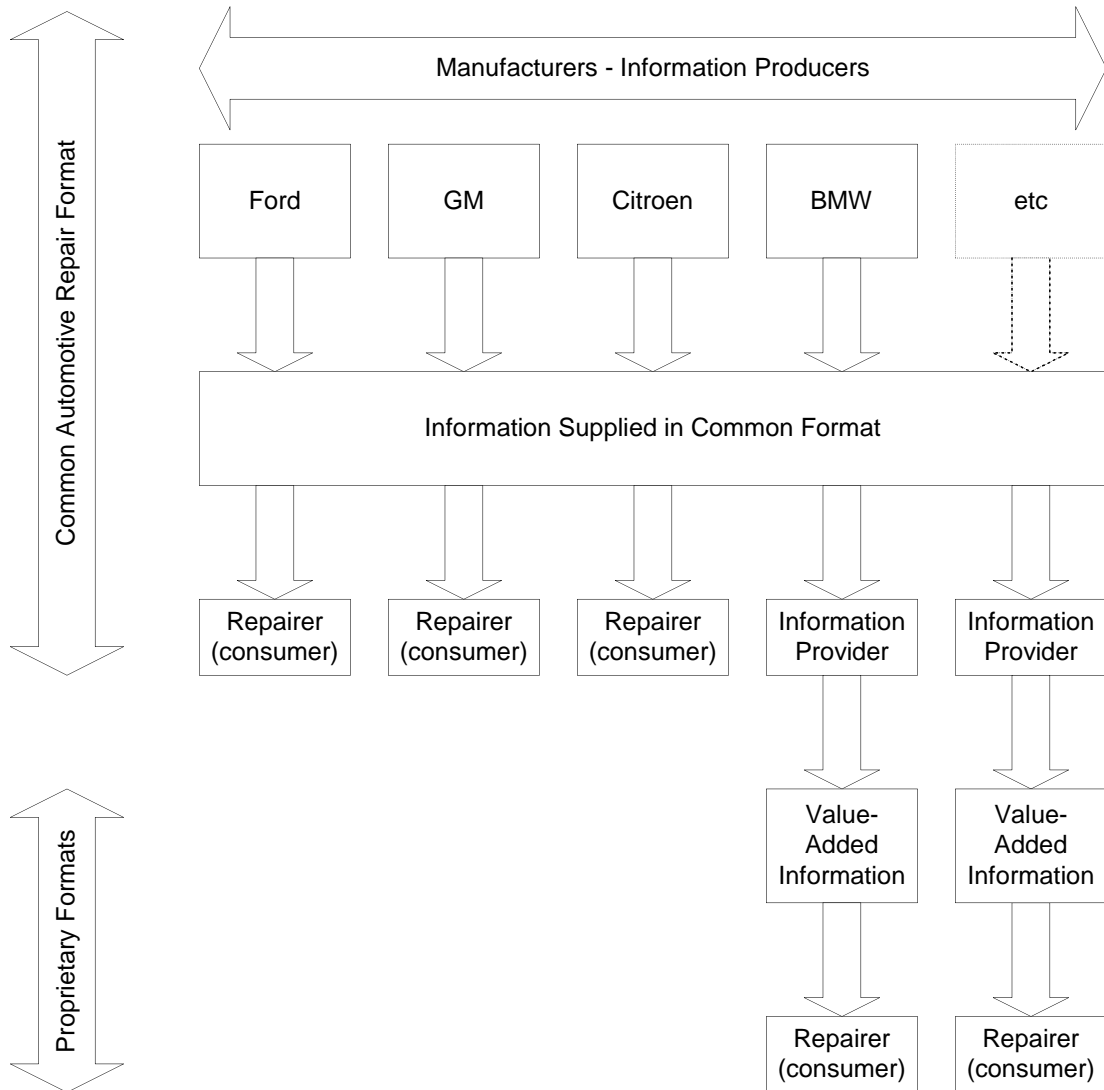
Figure 3. Architecture for Single Common Format

The common format would need to cover the scope of information decided in the requirements specification, which is likely to include:

- Read out DTC's
- Diagnostic information
- Part information
- Repair descriptions
- Wiring diagrams

Even if an existing standard, such as J2008, were used as the basis for a common XML format, it would be very difficult to develop and reach agreement on the standard within the 10 month period of the OASIS project.

If such a standard were developed, the cost of implementation by manufacturers would be high and it would take considerable time (this can probably be quantified) for all manufacturers to be able to conform to the standard.

An assessment of this design approach against the design criteria is provided in the following table.

Design Criteria	Assessment	
Functional	✓	
Verifiable	✓	
Achievable	✗	
Demonstrable	✓	
Implementable	✗	
Extendable	✓	
Sustainable	✗	
Open	✓	
Consistent	✓	
Robust	✗	

3. Common meta data format

The approach of using a common meta data format is based on agreeing a terminology and representation whereby all information within the scope of the project can be described in a common way.

Manufacturers continue to produce information in the same way they do at present, perhaps with an agreed set of formats, limited to those that can be read with commonly available tools or software packages. Information would need to be broken down into packages of a suitable size (as defined in the Requirements Specification).

Each package of information would then be described using the standard meta data specified by the Format of Repair Information. It is likely that the manufacturers themselves would need to produce this meta data.

Information consumers could then find out what information was available, and how to obtain it, by making queries to the manufacturer using the common meta data format. The common meta data descriptions from all manufacturers could be collated in a single location (eg on a web portal maintained by the manufacturers or one or more third parties) in order to make it easier for information consumers to find information (ie for any information from any manufacturer they would make queries to a single portal, using the common meta data format).

The two XML-based standards that are most likely to be useful in developing the common meta data format are the Resource Description Framework (RDF) and the Web Services Description Language (WSDL).

Full specifications of RDF and RDF Schema are available from:

Resource Description Framework (RDF) Model and Syntax Specification	http://www.w3.org/TR/REC-rdf-syntax
Resource Description Framework (RDF) Schema Specification 1.0	http://www.w3.org/TR/rdf-schema

The key to using RDF to define a standard meta data format will be to define standard sets of meta data terms (vocabularies) that can be used to describe resources.

Figure 4 shows how an RDF fragment could be used to describe the information on a repair and replace procedure for a particular part, on a specific vehicle model.

```
<rdf:RDF xmlns:rdf="http://www.w3.org/TR/REC-rdf-syntax"
         xmlns:vehicle-id="http://autorepair-url/vehicle-id"
         xmlns:parts-info="http://autorepair-url/parts-info"
         xmlns:vehicle-info="http://autorepair-url/vehicle-info"
     >
 <rdf:Description rdf:about="http://manufacturer-url">
  <vehicle-id:manufacturer>Ford</vehicle-id:manufacturer>
  <vehicle-id:model>Mondeo</vehicle-id:model>
  <parts-info:part-id>1234</parts-info:part-id>
  <vehicle-info:procedure>Repair and Replace</vehicle-info:procedure>
 </rdf:Description>
</rdf:RDF>
```

Figure 4. RDF Used to Describe an Online Information Source

This fragment uses meta data from three standard vocabularies - `vehicle-id`, `parts-info` and `vehicle-info` to describe the fragment of information held online at the URL `http://manufacturer-url`. The scenario in which the common meta data approach might be used is shown in Figure 5.
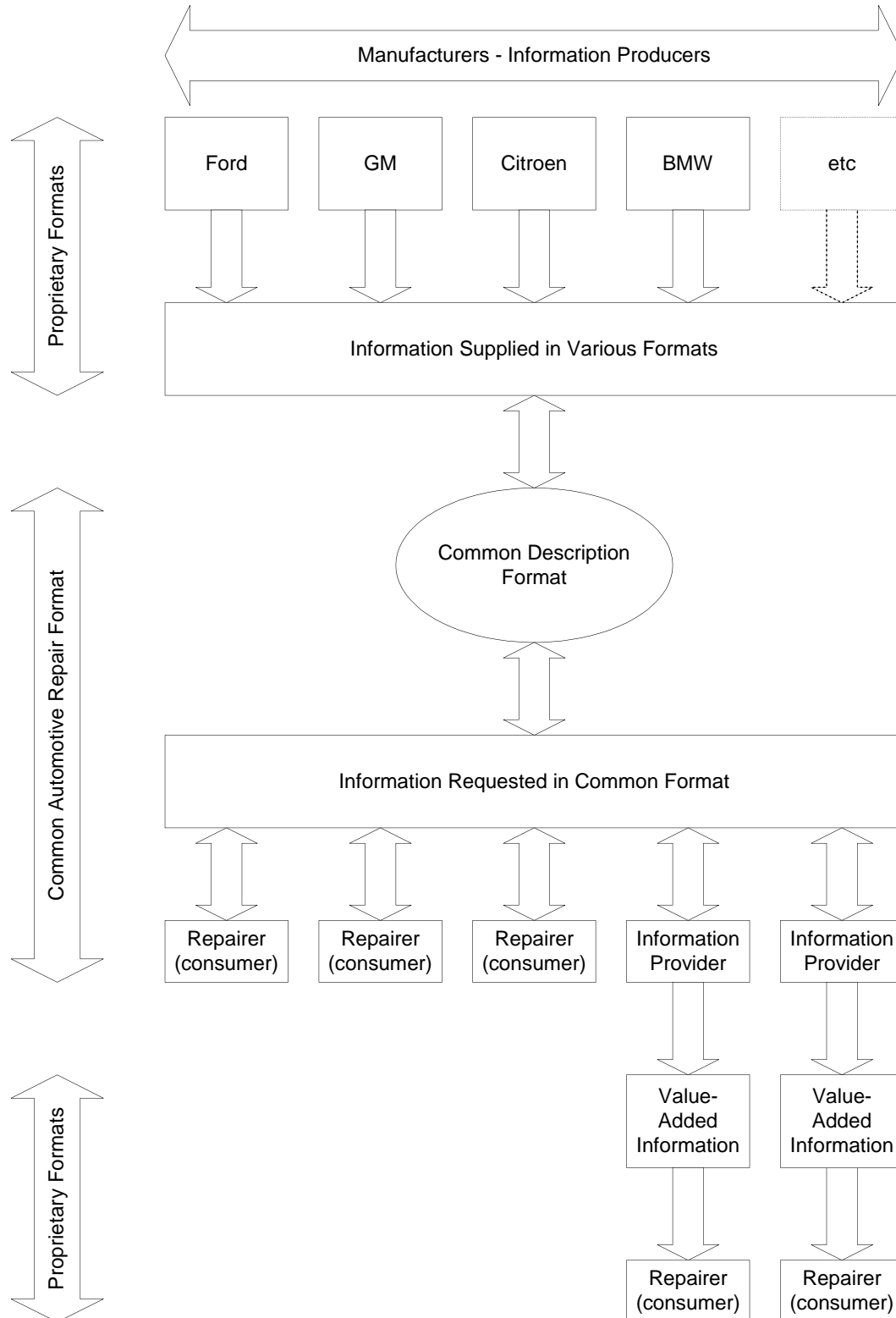
Figure 5. Architecture for a Common Meta Data Format

In this scenario, manufacturers continue to provide produce information in the formats they currently support, but make each package of information available on a URL (the URL may contain a description of how to access the information, or it may contain the information itself).

For each information package, the manufacturer provides an RDF fragment that describes it. The RDF fragment uses the common meta data specification (format and vocabularies) defined by the Format of Automotive Repair Information.

Information consumers can specify the information they are seeking using the same RDF format and this can be matched with the manufacturer's description to locate the information package and (if necessary) further instructions on how to access it.

One way that this scenario could operate would be for the manufacturers to supply their meta data descriptions to a central portal which the consumers could use as a single point for requests for information.

Third party information providers could use the same RDF meta data descriptions to point to their own variations of the same basic information. It is assumed in this scenario that each information provider would use their own proprietary format for repair information.

Design Criteria	Assessment	
Functional	✓	
Verifiable	✓	
Achievable	✓	
Demonstrable	✓	
Implementable	✓	
Extendable	✓	
Sustainable	✓	
Open	✓	
Consistent	✓	
Robust	✓	

4. Combined meta data and common format

The combined approach is to create an OASIS specification in two parts:

1. a common meta data format

and

2. a single common format for the representation of automotive repair information

Such a standard could be developed in two stages, with the meta data format developed first. This would allow the first stage to be completed (probably) within the intended timescale of the current OASIS TC.

The scenario of a combined meta data and common format is shown in Figure 6. It is the same as the scenario for a common meta data format, except that the third party information providers could supply information from all manufacturers in the common format specified by the OASIS TC.

The main advantage of this approach is that the meta data specification and implementation could be completed relatively quickly, allowing a longer time for the common format to be developed and implemented by information providers.
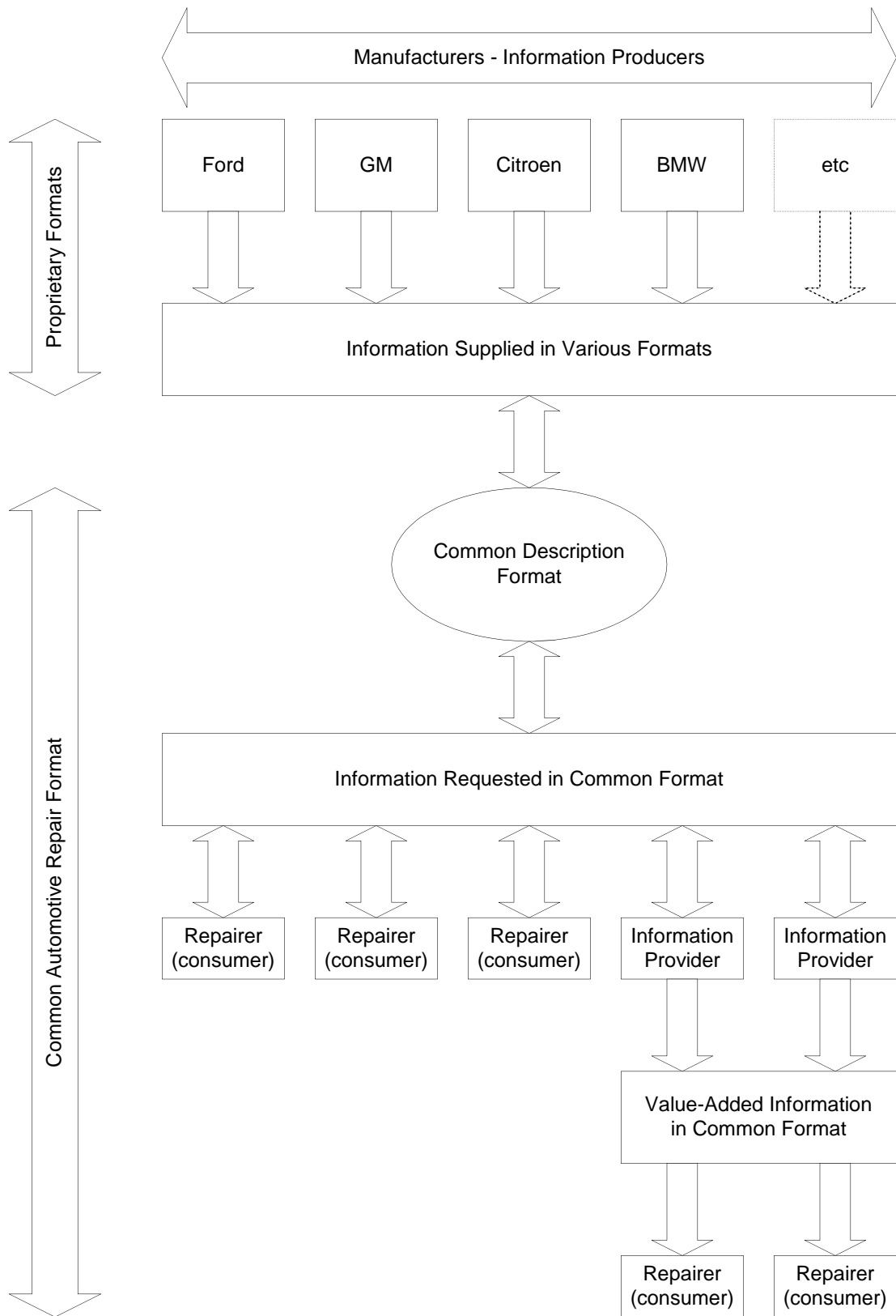
Manufacturers - Information Producers

Proprietary Formats

| Ford | GM | Citroen | BMW | etc |

Information Supplied in Various Formats

Common Automotive Repair Format

Common Description Format

Information Requested in Common Format

| Repairer (consumer) | Repairer (consumer) | Repairer (consumer) | Information Provider | Information Provider |

Value-Added Information in Common Format

| Repairer (consumer) | Repairer (consumer) |

Figure 6. Architecture for Combined Meta Data and Common Format

Design Criteria	Assessment	
Functional	✓	
Verifiable	✓	
Achievable	✗	
Demonstrable	✓	
Implementable	✗	
Extendable	✓	
Sustainable	✓	
Open	✓	
Consistent	✓	
Robust	✓	