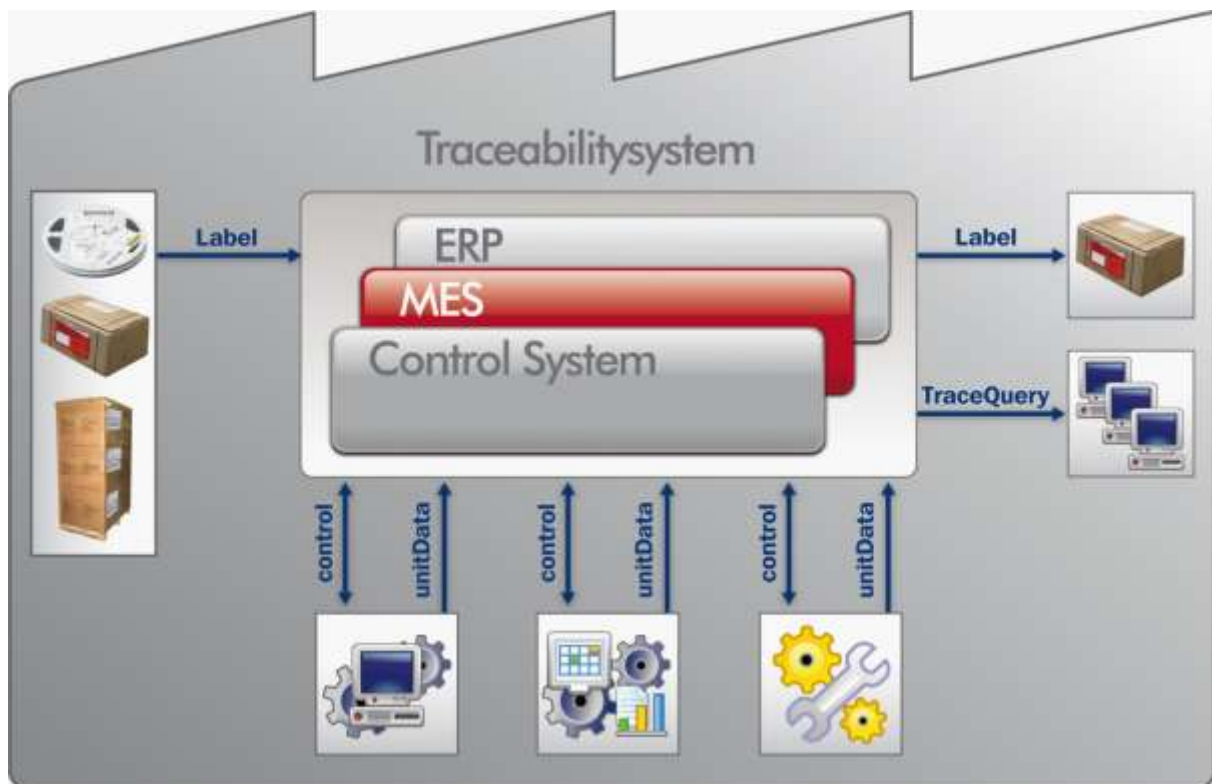


## Identification and Traceability in the Electrical and Electronics Industry



**ZVEI interface**  
**TraceQuery**

Version 1.0.1

## History/changes

XSD version	Doc version	Remarks/comments	Name	Date
1.0	1.0.0	First issue to the ZVEI "Traceability in the Electrical and Electronics Industry" guideline	ZVEI Traceability Working Committee III	9 March 2010

## Preface

In line with the ZVEI guideline for the entire supply and value chain (see MIT-1 "Guideline for Identification and Traceability"), the Technology Working Committee III also defined an interface to query traceability data - TraceQuery. At present, many systems use a webserver and browser to query data, e.g. tracing built-in batches by entering the serial number of a product.

The information obtained is normally used for internal traceability. In some cases, (e.g. extended workbenches), the data is also used as part of external traceability, i.e. to track information between customers and suppliers. Technically, this is made possible by a unique serial number which is placed on the product. In view of the intensified networking it can be assumed that this development will increase.

Due to these possibilities and the different perceptions regarding the performance of a traceability system, it seemed appropriate to provide a specific definition for TraceQuery. Describing the functional requirements turned out to be a fundamental aspect in this context. Guidelines were developed for the technical implementation only providing the basis for defining a data standard.

In other words, it was defined which query must generate which data and what properties the protocol that is used should have in order to determine a general minimum standard for traceability systems. This standard is intended to provide the future basis for detailed definitions to further simplify closer networking between the participating companies.



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## Introduction

This document provides information on the TraceQuery interface. It focuses first on the role description of the interface within the context of the overall system. In the second step, it details the requirements of this interface and it concludes with implementation proposals. Unlike other interfaces specified in related documents, the specification of the technical level is less explicit. As already mentioned in the preface, the focus is on the mutual understanding of the requirements and their implementation.

## Symbols used

Terms written in italics with an asterisk \*, e.g. *batch\** are explained in Section 4.1.

## TraceQuery interface role

Each traceability system must provide a possibility to query the stored data. In many cases this is accomplished by a webserver that uses a browser to query the data, e.g. tracing built-in *batches*\* after entering the *serial number*\* of a *product*\*.

At present, the results are normally used for *material*\* and *process traceability*\* as part of *internal traceability*\*. In addition to legal requirements, internal rules play also an important part in the definition of the data type, scope and availability.

As networking intensifies, further use of this data can be observed - normally in the case of extended workbenches or for data exchange between the different sites of a company. If, for example, a subcontractor builds assemblies for another company, which integrates these into a device, a situation may occur in which only certain failures will be detected during the integration. In this case, the option to exchange data via *external traceability*\* can be an advantage, (Appropriate filters can ensure that knowledge transfer does not take place unintentionally).

However, when discussing the requirements resulting from this example it becomes obvious that the perceptions regarding the data to be provided by a traceability system differ greatly. Another aspect of the intensified networking between the companies are the requirements of the data recipients necessitating also a certain standardisation. TraceQuery is intended to provide a solution by defining a minimum standard that must be met by each traceability system regarding the data output.

It deals primarily with the basic functional (which input generates which output) and non-functional, (e.g. encrypted communication) requirements.

The results are designed to provide later a basis for a data standard or technical interface description.

## Requirements

TraceQuery should be able to allow a search-engine behaviour. One basic assumption is that data is stored on a server and that user interfaces run on separate clients. The requirements are designed to make it possible to extend the system to a web-based service later on.

The display of all production data relating to an individual serial number is a typical example of this interface application. The draft of the ZVEI Recommendations took into account the following requirements:

- The interface must be synchronous.  
Reason: In the event of rework being performed on an assembled *panel\**, it is necessary to perform an online query on the status without any delays.
- The optional use of this interface by closely cooperating companies should also be provided for, i.e. allow data to be called up in lesser or greater detail via a filter tool.
- The interface must be able to use an encrypted communication protocol.
- The interface must allow for the application of hypermedia systems.
- The interface should use a RESTful [MIT-2 "Fielding"] architecture with particular focus on the following:
  - Query option for every batch or material ID, serial number, etc. via the individual URI which can be determined on the basis of the supplied data (label, RFID...).
  - The protocol must be stateless in nature, (e.g. no cookies or sessions).
  - Applications should allow for late binding or loose coupling via hypermedia, i.e. reference to resources without any registration database.

Smaller enterprises should also be in a position to implement this interface with a minimum of technical equipment required for the interface query.

Implementation can best be accomplished with HTTP, if necessary using SSL (<https://...>) as a reliable and well-established technology, the more so as these interfaces are generally realised as web interfaces. It should be possible to display this data on current web browsers.

## ZVEI Recommendations

To provide a uniform understanding of the query options of a traceability system, the following minimum requirements of TraceQuery were determined:

- The entry of a *serial number*\* must provide all processes including the relevant traceability data that have been processed using this *serial number*\*.
- If the *serial numbers*\* are aligned due to the product being assembled, packed or the like, the data output *must*\* also account for the alignment.
- Upon entry of the *batch number*\*, it *must*\* be possible to determine the *serial numbers*\* of all *panels*\* that have been mounted with components of this *batch*\* or would have been mounted as a result of the *grey areas*\*.
- Upon the entry of a *serial number*\* and allowing for the *grey areas*\*, it *must*\* be possible to determine all *batches*\* that have been used for this *serial number*\*.
- Upon the entry of a *serial number*\*, it *must*\* be possible to determine all processes involved in the production of this *serial number*\* including the OK/NOK information.
- It *must*\* be possible to determine all *serial numbers*\* for predefined process or test characteristics whose values meet the specified conditions.

## Appendix

### List of relevant documents

MIT-1 "Guideline for Identification and Traceability"  
MIT-2 "Fielding"

ZVEI guideline for the entire supply and value chain  
Architectural Styles and the Design of Network-based  
Software Architectures  
DISSERTATION  
Roy Thomas Fielding  
2000



## List of relevant terms and abbreviations

Term	Description
Batch	Number of components with attached barcode (trading unit). There are two different types of batches: supplier batches and incoming goods batches. Supplier batches can be divided into smaller incoming goods batches.
Electronic assemblies	Mounted independent circuit
Trading unit	Physical combination of individual parts, e.g. roll, rod or tray per smallest packaging unit.
Grey area	In the case of continuous production of coherent batches, for technical reasons some batches may no longer be clearly assigned to the original batch. This unclear assignment is also referred to as a grey area.
Component	A component (component, assembly, bulk material) is used for a product (for example mounted, populated).
PCB	Unmounted independent circuit
MaterialLot (batch number or trading unit number)	Unique number of a batch or trading unit. The number of a supplier batch is already assigned by the supplier on delivery. The numbers of incoming goods batches can be (re)assigned in incoming goods. If incoming goods batches are combined per smallest packaging unit, this is equivalent to a trading unit.
Must	"Must" denotes absolute requirements to meet a specification of the ZVEI.
Panel	A combination of independent circuits to form a board (virtual workpiece carrier); single or multiple panels depending on the number of independent circuits.
Product	Definition according to the German Equipment and Product Safety Act/Product Liability Act Description of a material that is manufactured. Examples: Electronic flat packs Mechanical assemblies Devices
Serial number	Unique number of a manufactured part
Traceability (external/ internal)	External traceability deals with the tracing of information between the contractor and customer. Traceability is ensured by means of a unique identification number, if possible on the product itself, or on the smallest packaging unit and/or accompanying documentation of a delivered item. Internal traceability refers to the customer's product and process traceability along his value chain. Scope, parameter and documentation of internal traceability are subject to legal and internal rules and are generally not communicated externally. This allows for risk assessment without transferring knowledge.
Traceability (process/ material)	Process traceability refers to the <i>tracing*</i> of the processes involved in the production of a product. For this purpose it is necessary to record the data relevant for the process quality and link this data with the respective product identification number. This should also include test processes. Material traceability refers to the <i>tracing*</i> of material incorporated in or used for a product. This requires the recording of material data and assigning it to the respective product identification number.
Tracing	Forward traceability from elements/processing parameters to the finished product or backward traceability from a finished product to its elements/processing parameters.