
**Road vehicles — Standardized access
to automotive repair and maintenance
information (RMI) —**

Part 2:
Technical requirements

*Véhicules routiers — Normalisation de l'accès aux informations
relatives à la réparation et à la maintenance pour l'automobile
(RMI) —*

Partie 2: Exigences techniques



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

ISO 18541-2:2013 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 301, *Road vehicles*, in collaboration with ISO Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 3, *Electrical and electronic equipment*, in accordance with the agreement on technical cooperation between ISO and CEN (Vienna Agreement).

ISO 18541 consists of the following parts, under the general title *Road vehicles — Standardized access to automotive repair and maintenance information (RMI)*:

- *Part 1: General information and use case definition*
- *Part 2: Technical requirements*
- *Part 3: Functional user interface requirements*
- *Part 4: Conformance test*

Introduction

This set of standards includes the requirements to be fulfilled by Repair and Maintenance Information (RMI) systems as applied by the European Commission — Enterprise and Industry Directorate-General, Consumer goods — Automotive industry EC mandate M/421,^[5] dated Brussels, 21 January 2008.

This mandate relates to the EC type-approval system for vehicles falling into the scopes of Directives 70/156/EEC (replaced by 2007/46/EC^[8]), 2002/24/EC^[6] and 2003/37/EC^[7] and, in particular, to requirements for access to vehicle repair and maintenance information by independent operators.

This International Standard only covers access to automotive repair and maintenance information for light passenger and commercial vehicles (see NOTE 1) and heavy duty vehicles (see NOTE 2) based on Directive 70/156/EEC (replaced by 2007/46/EC^[8]).

The purpose of the EC Mandate M/421 is to develop a standard or set of standards which specify the requirements to provide standardized access to automotive repair and maintenance information (RMI) for independent operators.

The information included in this part of ISO 18541 derives from the legislative requirements on European level in the field of RMI and related security requirements and can be referenced by legislation in other countries.

NOTE 1 Regulation (EC) No 715/2007 of the European Parliament and of the Council of 20 June 2007 on type-approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6) and on access to vehicle repair and maintenance information and Commission Regulation (EC) No 692/2008 of 18 July 2008 implementing and amending Regulation (EC) No 715/2007 of the European Parliament and of the Council on type-approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6) and on access to vehicle repair and maintenance information and amending Commission Regulation (EU) No 566/2011 of 8 June 2011 amending Regulation (EC) No 715/2007 of the European Parliament and of the Council and Commission Regulation (EC) No 692/2008 as regards access to vehicle repair and maintenance information.

NOTE 2 Regulation (EC) No 595/2009 of the European Parliament and of the Council of 18 June 2009 on type-approval of motor vehicles with respect to emissions from heavy duty vehicles (Euro VI) and on access to vehicle repair and maintenance information, Commission Regulation (EU) No 582/2011 of 25 May 2011 implementing and amending Regulation (EC) No 595/2009 of the European Parliament and of the Council with respect to emissions from heavy duty vehicles (Euro VI), and Commission Regulation (EU) No 64/2012 of 23 January 2012 amending Regulation (EU) No 582/2011 implementing and amending Regulation (EC) No 595/2009 of the European Parliament and of the Council with respect to emissions from heavy duty vehicles (Euro VI).

Road vehicles — Standardized access to automotive repair and maintenance information (RMI) —

Part 2: Technical requirements

1 Scope

This part of ISO 18541 includes technical requirements which are related to automotive repair and maintenance information (RMI) systems in order to standardize access to RMI for independent operators.

This part of ISO 18541 specifies the minimum set of technical requirements related to a vehicle manufacturer's RMI system. These requirements will reflect the deriving needs from the use cases as specified in ISO 18541-1.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 18541-1:2014, *Road vehicles — Standardized access to automotive RMI — Part 1: General information and use case definition*

ISO 18541-3, *Road vehicles — Standardized access to automotive repair and maintenance information (RMI) — Part 3: Functional user interface requirements*

ISO 22900-2, *Road vehicles — Modular vehicle communication interface (MVCI) — Part 2: Diagnostic protocol data unit application programming interface (D-PDU API)*

SAE J2534-1, *Recommended Practice for Pass-Thru Vehicle Programming*

SAE J2534-2, *Optional Pass-Thru Features*

3 Terms, definitions, symbols and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 18541-1 apply.

3.2 Abbreviated terms

API	application programming interface
CSP	certificate status protocol
DB	database
DLC	data link cable
DLL	dynamic link library
D-PDU	diagnostic – protocol data unit
DVD	optical disc storage media format
ECU	electronic control unit
FAQ	frequently asked questions
GB	giga-byte
GHz	giga-hertz
GMT	Greenwich mean time
IO	independent operator
IT	information technology
LAN	local area network
MVCI	modular vehicle communication interface
NAT	network address translation
OBD	on-board diagnostics
OCSP	online certificate status protocol
PC	personal computer
PKCS	public key certificate status
RMI	repair and maintenance information
RS232	recommended standard 232
SERMI	security-related repair and maintenance information
TREQ-	technical requirement
TC	trust centre
USB	universal serial bus
VAT No.	value added tax number
VM	vehicle manufacturer
WWH-OBD	world-wide harmonized on-board diagnostics

4 Conventions

This part of ISO 18541 is based on the conventions discussed in the OSI Service Conventions (ISO/IEC 10731).

5 Requirements overview and principles

5.1 Basic principles for requirements definition

Basic principles have been established as a guideline to define the requirements.

- BP1: The requirements stated in this part of ISO 18541 shall not specify any implementation details.
- BP2: Requirements shall be expressed in terms of performance rather than design or descriptive characteristics. This approach leaves maximum freedom to technical development.
- BP3: A requirement is identified by a TREQ-xx, where 'xx' is the requirement number. Each requirement consists of a "Main title", "Requirement definition", "Requirement description", "Explanatory / Example" and "Classification".
- BP4: The requirements in clusters 4 and 5 in this part of ISO 18541 have been formulated with the aim of minimizing the number of IO clients (PC, Laptop, etc.) required to access different VM RMI systems.

5.2 Requirements clustering

[Figure 1](#) illustrates the technical requirements clusters. [Figure 1](#) shall provide an overview about all technical requirements clusters and the specific technical requirements. Each technical requirement is identified by the mnemonic "TREQ-" and an alpha-numeric number. The name of the technical requirement is descriptive for the area.

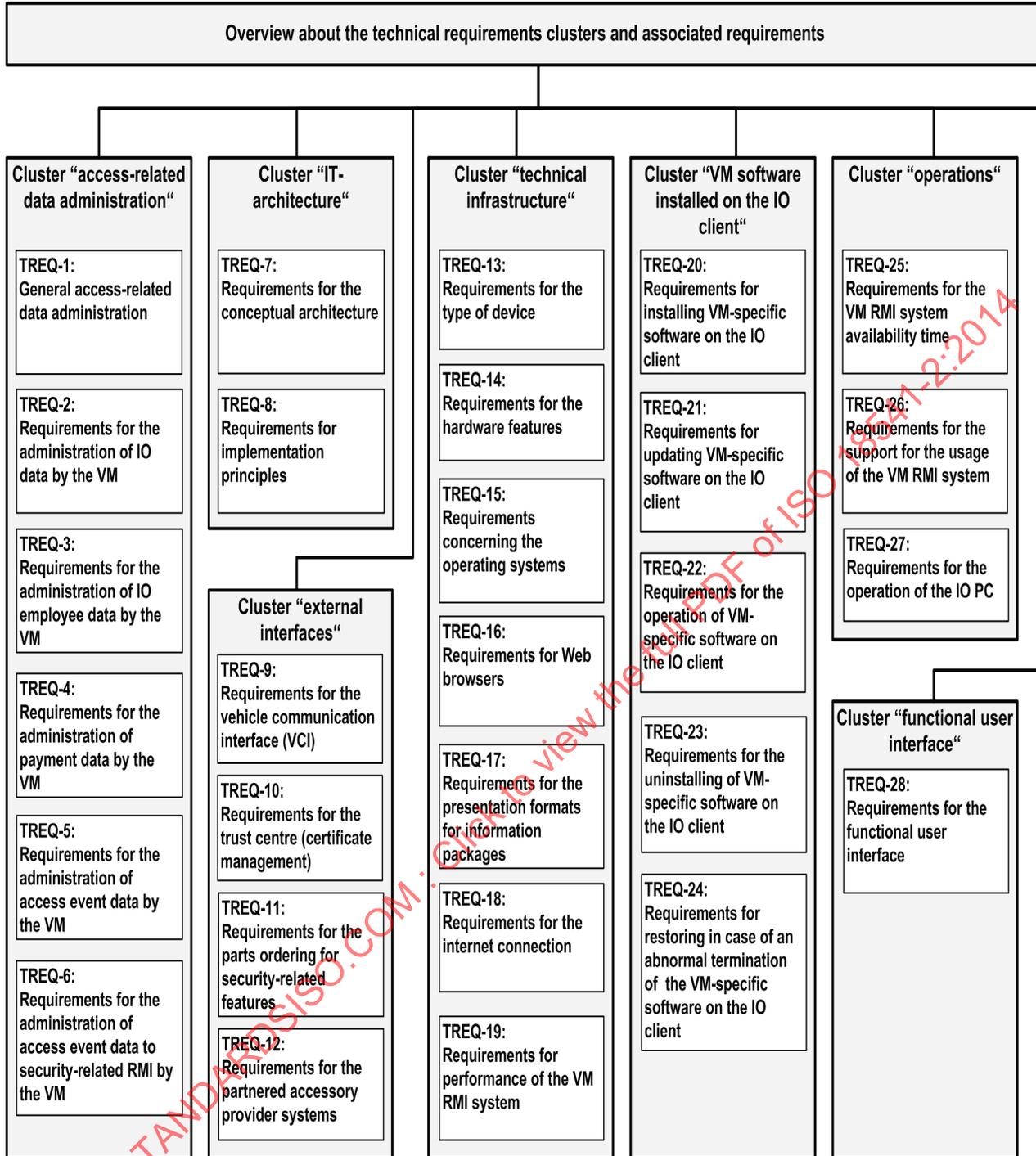


Figure 1 — Overview about the technical requirements clusters

Table 1 provides an overview of the main categories of standardized access to automotive RMI requirements. A requirement category shall have at least one requirement.

Table 1 — Main requirements clusters

# - Main title of cluster	Brief description	Technical requirements [TREQ] reference
1 – Access-related data administration	<p>Describes the main data types to be administered by the VM RMI System and the requirements for the appropriate management procedures in order to comply with the standardized access to RMI.</p> <p>RMI requirements related to cluster access-related data administration are</p> <ul style="list-style-type: none"> — requirements for the administration of IO data by the VM, — requirements for the administration IO employee data by the VM, — requirements for the administration of payment data by the VM; — requirements for the administration of access event data by the VM; — requirements for the administration of access event data to security-related RMI by the VM. 	<p>[TREQ-1] General access-related data administration</p> <p>[TREQ-2] Administration of IO data by the VM</p> <p>[TREQ-3] Administration of IO employee data by the VM</p> <p>[TREQ-4] Administration of payment data by the VM</p> <p>[TREQ-5] Administration of access event data by the VM</p> <p>[TREQ-6] Administration of access event data to security-related RMI by the VM</p>
2 – IT architecture	<p>Describes requirements for the main IT components and interfaces at the different IT architectural levels.</p> <p>RMI requirements related to cluster IT architecture are</p> <ul style="list-style-type: none"> — requirements for the conceptual architecture; — requirements for the implementation principles. 	<p>[TREQ-7] Conceptual architecture</p> <p>[TREQ-8] Implementation principles</p>
3 – External interfaces	<p>Describes the requirements for communication interfaces other than the user interface.</p> <p>RMI requirements related to cluster external interfaces are</p> <ul style="list-style-type: none"> — requirements for the vehicle communication interface (VCI); — requirements for the trust centre (certificate management); — requirements for the parts ordering for security-related features; — requirements for the partnered accessory provider systems. 	<p>[TREQ-9] Vehicle communication interface (VCI)</p> <p>[TREQ-10] Trust centre (certificate management)</p> <p>[TREQ-11] Parts ordering for security-related features</p> <p>[TREQ-12] Partnered accessory provider systems</p>

Table 1 (continued)

# - Main title of cluster	Brief description	Technical requirements [TREQ] reference
4 – Technical infrastructure	<p>Compatibility conditions, minimum requirements for components and Internet connection parameters to give an acceptable performance. This cluster intends to define minimal development guiding rules that shall be followed by the VM in order to ensure compatibility between VM RMI systems. Compatibility issues that may occur shall be managed by the Forum SERMI.</p> <p>This requirements cluster specifies the technical infrastructure recommendations which are:</p> <ul style="list-style-type: none"> — requirements related to type of device; — requirements related to hardware features; — requirements related to operating systems, runtime languages, libraries; — requirements related to Web browsers; — requirements related to presentation formats for information packages; — requirements related to internet connection; — requirements related to performance of the VM RMI system. 	<p>[TREQ-13] Type of device</p> <p>[TREQ-14] Hardware features</p> <p>[TREQ-15] Operating systems</p> <p>[TREQ-16] Web browsers</p> <p>[TREQ-17] Presentation formats for information packages</p> <p>[TREQ-18] Internet connection</p> <p>[TREQ-19] Performance of the VM RMI system</p>
5 – Co-existence of VM software on IO client	<p>This requirements cluster specifies the co-existence of VM software on the IO client.</p> <ul style="list-style-type: none"> — requirements for installing VM-specific software on the IO client; — Requirements for updating VM-specific software on the IO client; — Requirements for the operation of VM-specific software on the IO client; — Requirements for the uninstalling of VM-specific software on the IO client; — Requirements for restoring in case of an abnormal termination of the VM-specific software on the IO client. <p>The VM software shall be developed according to acknowledged quality criteria for the co-existence of VM applications installed on the client side.</p>	<p>[TREQ-20] Requirements for installing VM-specific software on the IO client</p> <p>[TREQ-21] Requirements for updating of installed VM data and applications on the IO client</p> <p>[TREQ-22] Requirements for the operation of VM-specific software on the IO client</p> <p>[TREQ-23] Requirements for the uninstalling of VM-specific software on the IO client</p> <p>[TREQ-24] Requirements for restoring in case of an abnormal termination of the VM-specific software on the IO client</p>
6 – Operations	<p>This requirements cluster specifies the RMI requirements related to the cluster operations are:</p> <ul style="list-style-type: none"> — requirements related to the VM RMI system availability time; — requirements related to the support for the usage of the VM RMI system; — requirements related to the operation of the IO PC. 	<p>[TREQ-25] VM RMI system availability time</p> <p>[TREQ-26] Support for the usage of the VM RMI system</p> <p>[TREQ-27] Operation of the IO PC</p>
7 – Functional user interface	<p>This requirement cluster includes the reference to the ISO 18541-3 functional user interface of the VM RMI system.</p>	<p>[TREQ-28] Requirements cluster 7 – Functional user interface</p>

6 Requirements cluster 1 — Access-related data administration

6.1 [TREQ-1] General access-related data administration

[Table 2](#) defines the requirements for the general access-related data administration.

Table 2 — [TREQ-1] General access-related data administration

REQ #	TREQ-1
Main title	General access-related data administration
Requirement definition	<p>The VM allows access to the RMI system depending on the storage of some data</p> <ul style="list-style-type: none"> — for user registration, — agreement to terms and conditions, — any other data required by local legislation, — for user login and access data recovery, — for invoicing, — for physical delivery of material if needed, — for logging of any access to security-related RMI see SERMI,^[14] — for logging of any access to ECU replacing/update (in case of liability issues), — to be able to disable a user see ISO 18541-1 use case UC 1.5 Request to de-register IO employee; <p>The administration of this data shall be according to data and privacy protection legislation.</p>
Brief description	The VM has to administer data on users, on payment, on access events to security-related RMI and on access events to general RMI content.
Classification	Mandatory.

6.2 [TREQ-2], [TREQ-3] Administration of IO and IO employee data by the VM

6.2.1 [TREQ-2] Administration of IO data by the VM

[Table 3](#) defines the requirements for the administration of IO data by the VM.

Table 3 — [TREQ-2] Administration of IO data by the VM

REQ #	TREQ-2
Main title	Requirements for the administration of IO data by the VM
Requirement definition	IO data shall be administered by the VM to enable user access, access data reset and to facilitate written communication with the IO.
Brief description	<p>The following list of IO data shall be administered by the VM:</p> <ul style="list-style-type: none"> — IO name, — IO postal address, — country, — postal address for invoicing if different from IO postal address, — inter-community VAT No., — first name, family name of the IO legal representative, — e-mail address for communication with the IO legal representative in all aspects of the VM RMI system usage, — preferred language, — User ID and password of the IO legal representative (the User ID must be unique in the VM system), — optionally a confirmation of the IO approval according to the SERMI scheme if the IO wants to request access to security-related RMI.
Classification	Mandatory.

6.2.2 [TREQ-3] Administration of IO employee data by the VM

[Table 4](#) defines the requirements for the administration of IO employee data by the VM.

Table 4 — [TREQ-3] Administration of IO employee data by the VM

REQ #	TREQ-3
Main title	Requirements for the administration of IO employee data by the VM
Requirement definition	IO employee data shall be administered by the VM to enable user access, access data reset and to facilitate written communication with the IO employee.
Brief description	<p>The following list of user data shall be administered by the VM:</p> <ul style="list-style-type: none"> — IO name (see ISO 18541-1:2014, 3.1.14) — e-mail address for communication with the employee in all aspects of the VM RMI system usage, — preferred language, — User ID and password of the IO employee (the User ID must be unique in the VM system), — optionally a digital certificate ID according to the SERMI scheme if the IO employee wants to request access to security-related RMI, — optionally the access level granted for security-related RMI.
Classification	Mandatory.

6.3 [TREQ-4] Administration of payment data by the VM

[Table 5](#) defines the requirements for the administration of payment data by the VM.

Table 5 — [TREQ-4] Administration of payment data by the VM

REQ #	TREQ-4
Main title	Requirements for the administration of payment data by the VM
Requirement definition	User data shall be administered by the VM to allow the VM to invoice the user.
Brief description	The following user data shall be administered by the VM for the purposes of invoicing for use of the VM MI system. <ul style="list-style-type: none"> — Type of subscription; — Method of payment; — Subscription period; — Invoicing address; — Inter-community VAT No.
Classification	Mandatory.

6.4 [TREQ-5] Administration of access event data by the VM

[Table 6](#) defines the requirements for the administration of access event data by the VM.

Table 6 — [TREQ-5] Administration of access event data by the VM

REQ #	TREQ-5
Main title	Requirements for the administration of access event data by the VM
Requirement definition	Access event data shall be administered by the VM to monitor use of the VM RMI system and take appropriate action if necessary.
Brief description	The following access event data shall be administered by the VM: <ul style="list-style-type: none"> — User Id; — Log on and off times; — Period of non-use.
Classification	Mandatory.

6.5 [TREQ-6] Administration of access event data to security-related RMI by the VM

[Table 7](#) defines the requirements for the administration of access event data to security-related RMI by the VM.

Table 7 — [TREQ-6] Administration of access event data to security-related RMI by the VM

REQ #	TREQ-6
Main title	Requirements for the administration of access event data to security-related RMI by the VM
Requirement definition	Access event data to security-related RMI shall be administered by the VM to support enquiries in case of liability issues.
Brief description	The following access event data shall be administered by the VM: — User Id; — Log on and off times; — Type of security-related RMI accessed, — VIN of the related vehicle, — Affected ECU (if possible).
Classification	Mandatory.

7 Requirements cluster 2 — IT architecture

7.1 [TREQ-7] Conceptual architecture

[Table 8](#) defines the requirements for the conceptual architecture.

Table 8 — [TREQ-7] Conceptual architecture

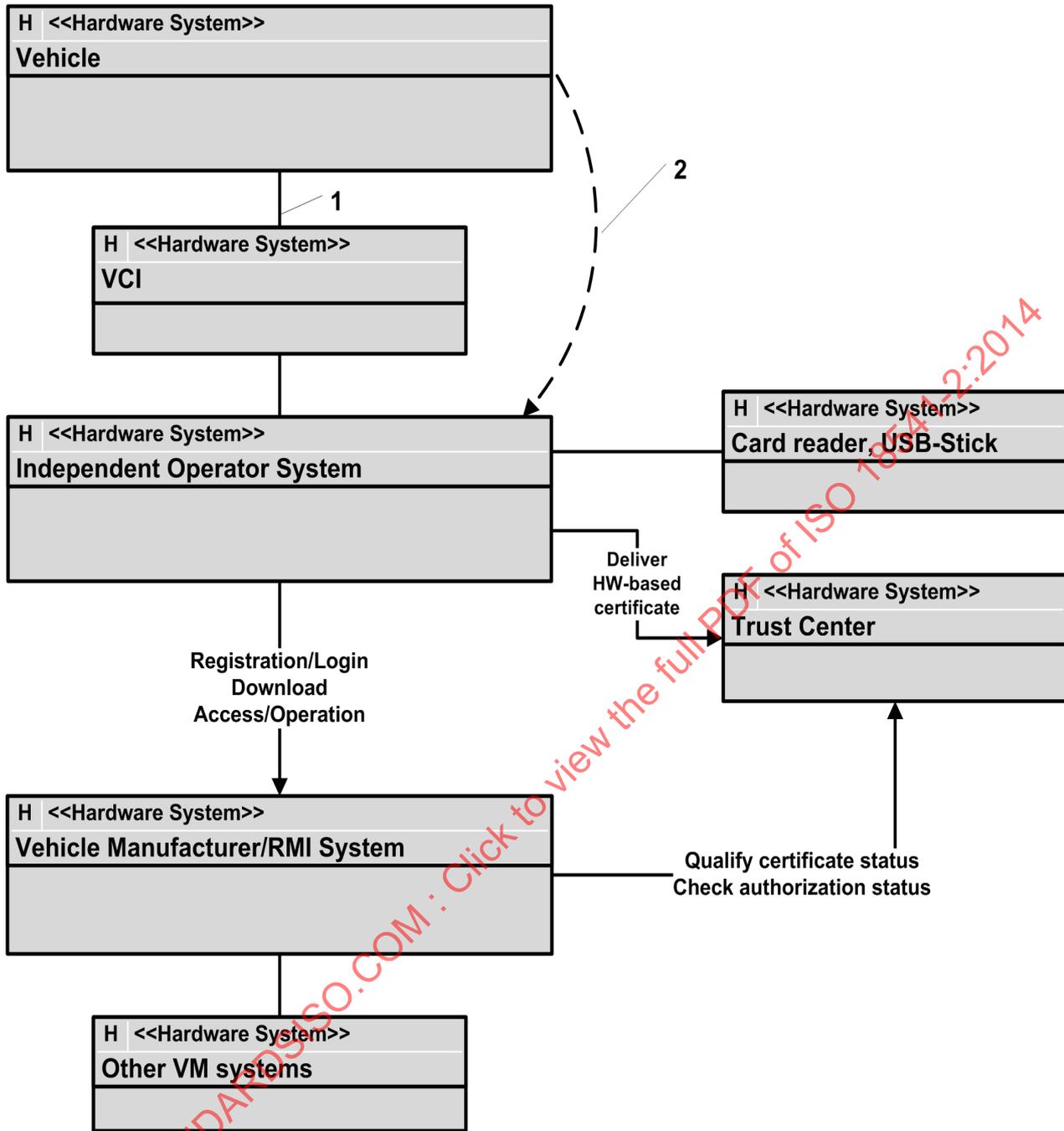
REQ #	TREQ-7
Main title	Requirements for the conceptual architecture
Requirement definition	The implementation of the RMI system shall be according to a standardized conceptual architecture.
Brief description	The standardized conceptual architecture is described in Figure 2 . The IO is responsible for the provision of client hardware (PC, Laptop, etc.) and a VCI according to the detailed requirements in clause 8 . The VM is responsible for the availability of the RMI system and the authorized/purchased software and data components. The VM shall facilitate the successful download to the IO client, once the IO has registered, logged-in and prompted the download.
Classification	Mandatory.

[Figure 2](#) shows all IT systems potentially involved in the execution of the repair and maintenance use cases defined in ISO 18541-1.

- The RMI applications will be implemented as distributed software on a client device at the location of the independent operator (Independent Operator System) and a server in the VM premises (Vehicle Manufacturer/RMI system). The software distribution may follow different patterns depending on the overall design decision taken by the application builders to achieve an optimum performance (see [7.2](#)).
- Client and server communicate via internet.
- The RMI application may communicate with other applications for the execution of single use cases.
- The user is offered access to repair and maintenance information via the client device with standard navigation, communication and display facilities.
- The vehicle acts as an IT system communicating with the other systems for use cases like updating and replacing modules or integrated diagnostics.

- For the communication with the VM RMI applications, for the purposes of diagnostics and reprogramming, two alternatives are possible:
 - Alternative '1': the vehicle is connected via a pluggable, standardized, non-proprietary vehicle communication interface;
 - Alternative '2': the vehicle is connected via an in-built wireless, standardized, non-proprietary vehicle communication interface.
 - Both alternatives shall either support the ISO 22900-2 or SAE J2534 (or both) standards.
- For access to security-related RMI, additional hardware for the management of a user certificate on the IO client is required. A secure connection to the Trust Centre is required by both the IO client and the VM RMI system.

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Key

- 1 wired/wireless connection between “vehicle” and “Independent Operator System” with VCI Protocol Module
- 2 alternative means of connection as defined in TREQ-8 between “vehicle” and “Independent Operator System” without VCI Protocol Module

Figure 2 — Conceptual architecture for access to vehicle RMI

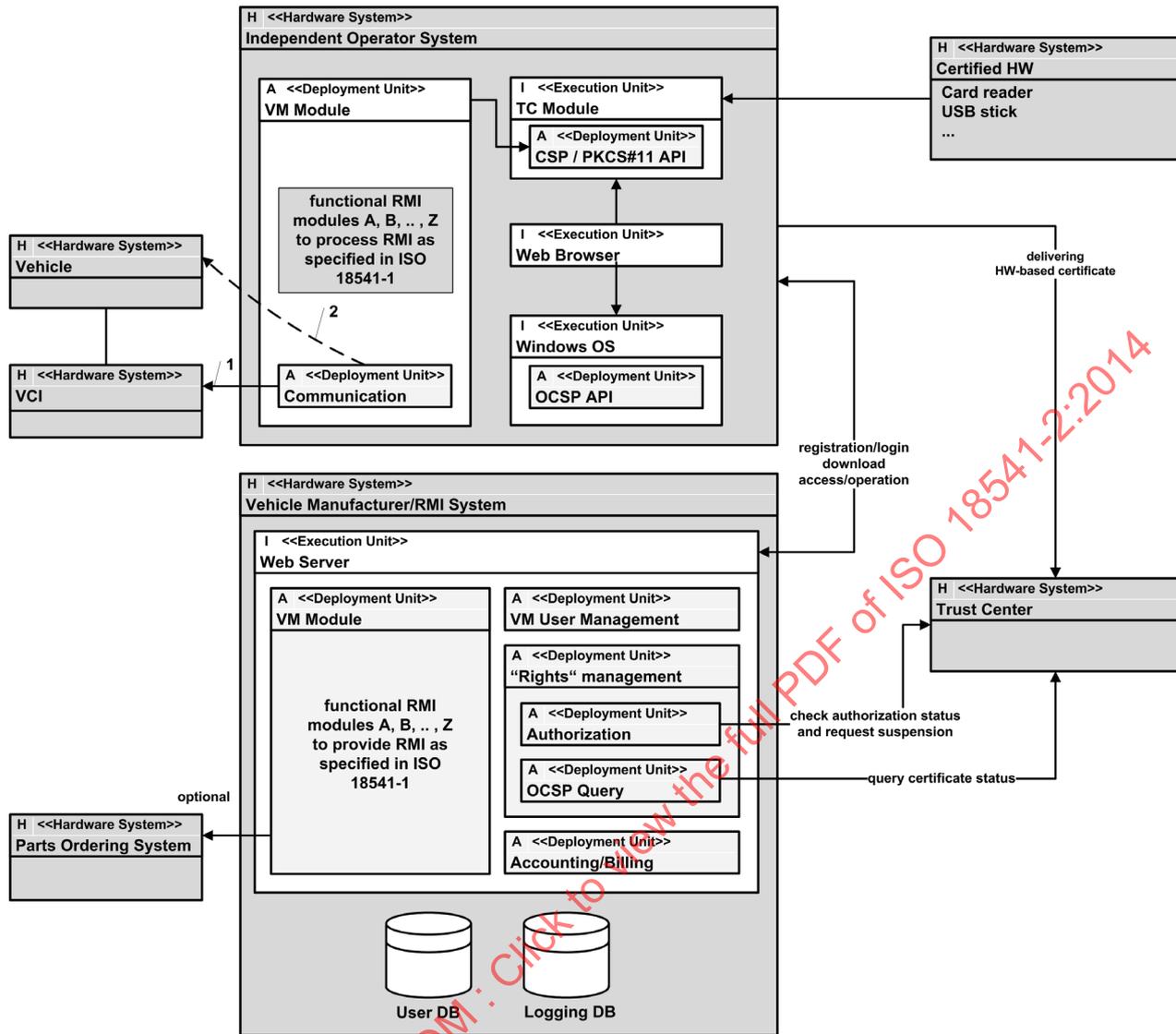
7.2 [TREQ-8] Implementation principles

[Table 9](#) defines the requirements for the implementation principles.

Table 9 — [TREQ-8] Implementation principles

REQ #	TREQ-8
Main title	Requirements for implementation principles
Requirement definition	The implementation of the VM RMI architecture may vary as long as it remains within the conceptual architecture.
Brief description	<p>The VM will decide on the option for implementation to follow:</p> <ul style="list-style-type: none"> — ‘thin’ client; — ‘thick’ client, or — any other implementation strategies following state-of-the-art software technology. <p>There are minimum requirements for the software infrastructure to be supported by the implemented application. See requirements cluster 4 clause 9 for detailed specification.</p> <p>Figure 3 shows an example for ‘thick’ client architecture.</p> <p>Figure 4 shows an example for ‘thin’ client architecture.</p>
Classification	Mandatory.

[Figure 3](#) illustrates an example for the implementation of a VM RMI application following a so-called “thick client” software distribution pattern. Substantial parts of the application software is downloaded to the client system and executed there. Some use cases are executed completely in the client system; others are executed in cooperation between the client and the server application software parts.

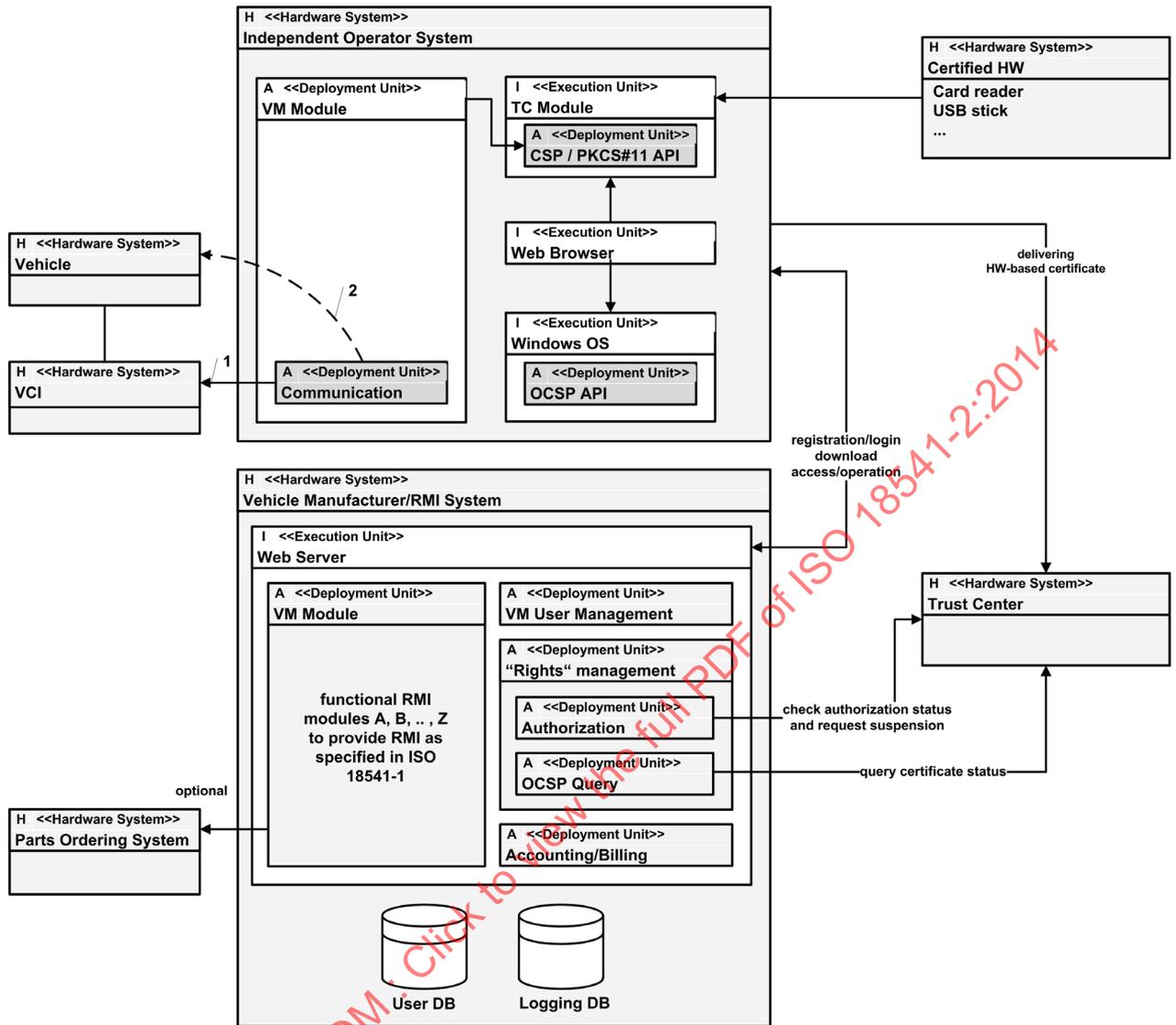


Key

- 1 wired/wireless connection between "vehicle" and "Independent Operator System" with VCI Protocol Module
- 2 alternative means of connection as defined in TREQ-8 between "vehicle" and "Independent Operator System" without VCI Protocol Module

Figure 3 — Example for thick client architecture

Figure 4 illustrates an example for the implementation of a VM RMI application following a so-called "thin client" software distribution pattern. The application software resides only on the server and is not downloaded to the client. In the client system only modules for web-based navigation, display and communication with the server, the vehicle, the certificate hardware and the trust centre are implemented. All use cases are executed using the server application software.



Key

- 1 wired/wireless connection between “vehicle” and “Independent Operator System” with VCI Protocol Module
- 2 alternative means of connection as defined in TREQ-8 between “vehicle” and “Independent Operator System” without VCI Protocol Module

Figure 4 — Example for thin client architecture

8 Requirements cluster 3 — External interfaces

8.1 [TREQ-9] Vehicle communication interface (VCI)

Table 10 defines the requirements for the vehicle communication interface.

Table 10 — [TREQ-9] Vehicle communication interface (VCI)

REQ #	TREQ-9
Main title	Requirements for the vehicle communication interface (VCI)
Requirement definition	<p>The vehicle shall be connected to the diagnostics or programming application via a vehicle communication interface (VCI) either compliant to the Modular Vehicle Communication Interface (MVCI) according to ISO 22900-2 (D-PDU API), or SAE J2534 Pass-Thru according to SAE J2534-1 and SAE J2534-2 for diagnosis according to use case 6.3 and updating and replacing modules according to use cases in cluster 7 of ISO 18541-1:2014.</p> <p>The diagnostic and programming application may be integrated in the RMI system or run separately.</p>
Brief description	<p>The VM RMI website shall inform the user about the VCI standards supported under the relevant use cases.</p> <p>When the VM RMI system supports the ISO 22900-2 standard then the VM RMI system will support the D-PDU API as specified in the ISO 22900-2 standard (D-PDU API), so that different MVCI providers can communicate via this API with the VM RMI system application for updating and replacing modules and integrated diagnostics. A software driver for the specific MVCI shall be provided by the MVCI tool manufacturer and shall be installed in the IO PC in addition to the VM RMI system software. Figure 5 illustrates the ISO 22900-2 structure, components and interfaces.</p> <p>When the VM RMI system supports the SAE J2534 Pass-Thru standard then the VM RMI system will support the Pass-Thru API as specified in the SAE J2534-1 and SAE J2534-2 recommended practice, so that different Pass-Thru VCI providers can communicate via this API with the VM RMI system application for updating and replacing modules and integrated diagnostics. A software driver for the specific SAE J2534 Pass-Thru VCI shall be provided by the Pass-Thru device tool manufacturer and shall be installed in the IO PC in addition to the VM RMI system software. Figure 6 illustrates the SAE J2534 structure, components and interfaces.</p> <p>There may be many MVCI/Pass-Thru VCI providers for the vehicles and RMI system of one VM. It is up to the IO to make a provider choice.</p> <p>NOTE It is the VCI tool manufacturer's decision which vehicle communication protocols are implemented in the VCI.</p> <p>In addition to the above interfaces Ethernet, serial cable or LAN interface and alternative media like CD, DVD or memory stick may also be used for infotainment systems (e.g. navigation systems, telephone) but on the condition that no proprietary communication software (e.g. drivers or plugins) and hardware is required.</p>
Classification	Mandatory.

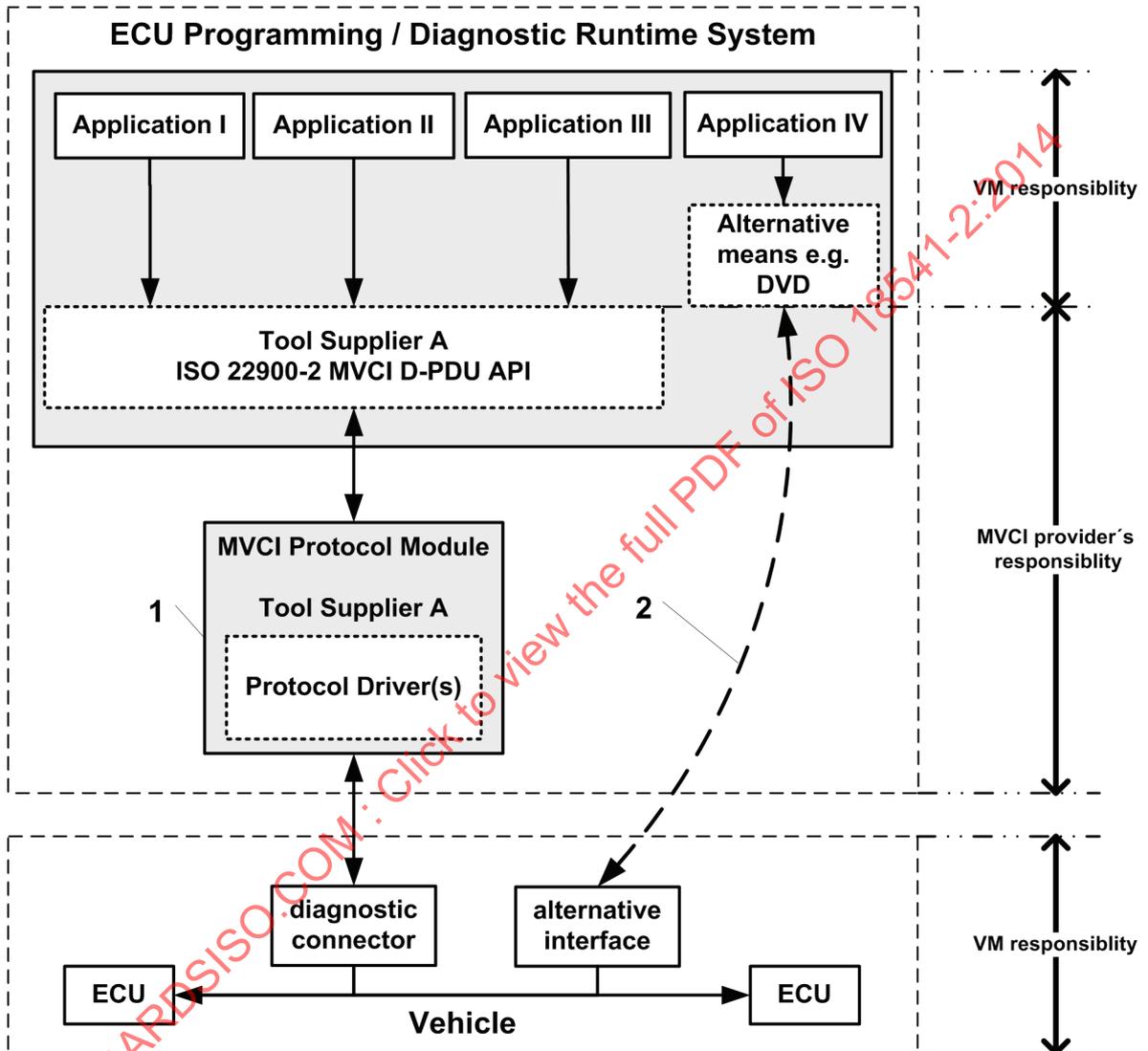
Figure 5 illustrates the ECU programming/diagnostic runtime system as part of the VM's RMI system with support for the ISO 22900-2 MVCI D-PDU API-compatible VCI.

The ECU programming/diagnostic runtime system consists of:

- at least one application e.g. ECU programming,
- an ISO 22900-2 MVCI D-PDU API compatible Microsoft Windows™ DLL provided by the VCI tool manufacturer,
- Alternative '1':
 - an MVCI Protocol Module with vehicle communication protocols (see NOTE in Table 10) provided by the VCI tool manufacturer,
 - an MVCI Protocol Module with a standardized diagnostic connector to connect to the vehicle. The standardized diagnostic connector shall be according to the requirements specified in the

country-specific legislation, e.g. the ISO 15031-3 compatible diagnostic connector as used for light passenger cars.

- Alternative '2':
 - alternative means of connection as defined in TREQ-8 between “vehicle” and “Independent Operator System” without VCI Protocol Module.



Key

- 1 wired/wireless connection between “vehicle” and “Independent Operator System” with VCI Protocol Module
- 2 alternative means of connection as defined in TREQ-8 between “vehicle” and “Independent Operator System” without VCI Protocol Module

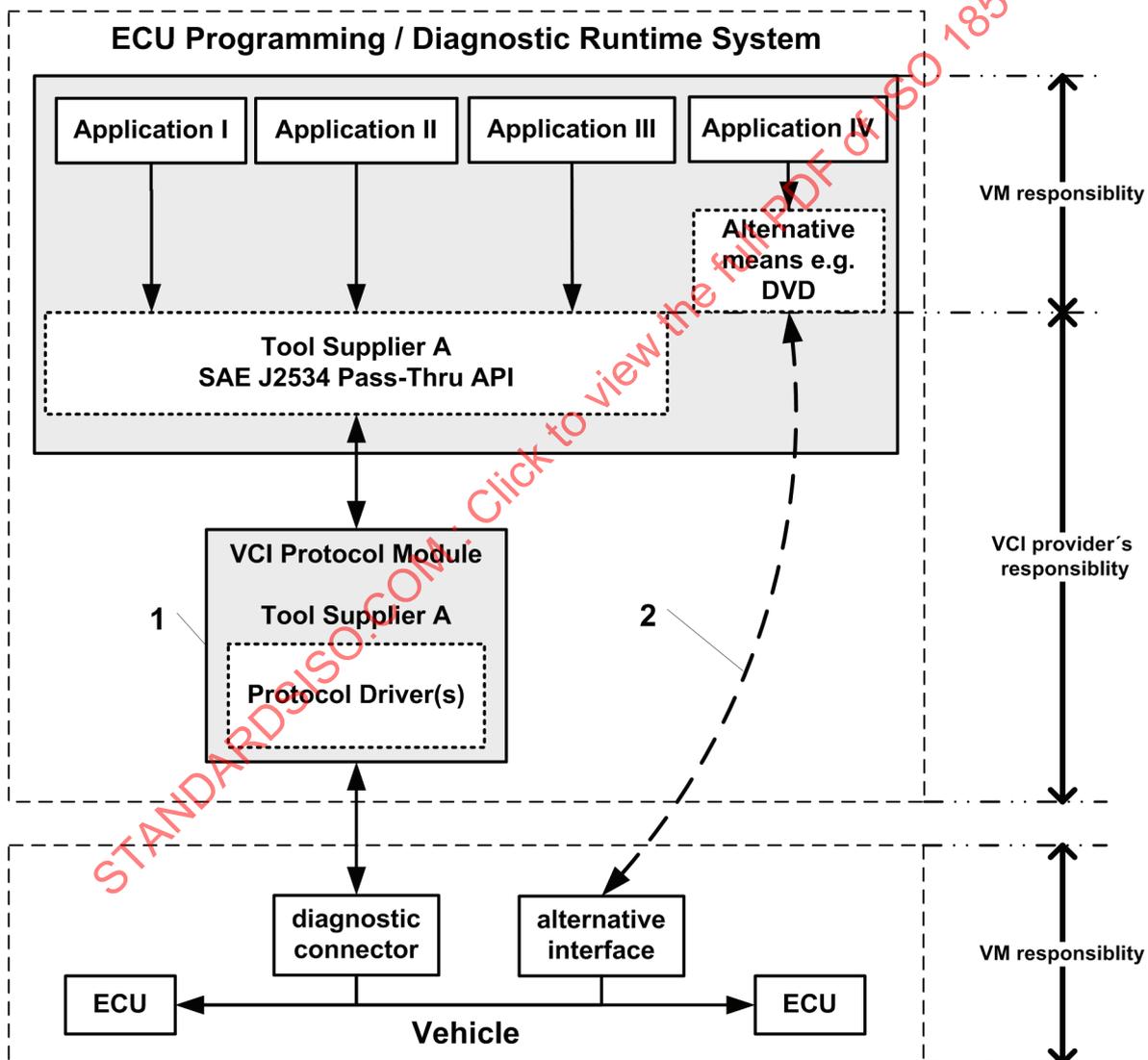
Figure 5 — ISO 22900-2 MVCI D-PDU API-compatible VCI

Figure 6 illustrates the ECU programming/diagnostic runtime system as part of the VM’s RMI system with support for the SAE J2534 Pass-Thru API-compatible VCI.

The ECU programming/diagnostic runtime system shall consist of:

- at least one application e.g. ECU programming;

- an SAE J2534-1 and SAE J2534-2 Pass-Thru API compatible Microsoft Windows™ DLL provided by the VCI tool manufacturer;
- Alternative ‘1’:
 - a Pass-Thru Protocol Module with vehicle communication protocols (see Note in [Table 10](#)) provided by the VCI tool manufacturer;
 - an SAE J2534 Pass-Thru API-compatible VCI with a standardized diagnostic connector to connect to the vehicle. The standardized diagnostic connector shall be according to the requirements specified in the country-specific legislation, e.g. the ISO 15031-3 compatible diagnostic connector as used for light passenger cars.
- Alternative ‘2’:
 - alternative means of connection as defined in TREQ-8 between “vehicle” and “Independent Operator System” without Pass-Thru Protocol Module.



Key

- 1 wired/wireless connection between “vehicle” and “Independent Operator System” with VCI Protocol Module
- 2 alternative means of connection as defined in TREQ-8 between “vehicle” and “Independent Operator System” without VCI Protocol Module

Figure 6 — SAE J2534 Pass-Thru API-compatible VCI

8.2 [TREQ-10] Trust centre (certificate management)

[Table 11](#) defines the requirements for the trust centre (certificate management).

Table 11 — [TREQ-10] Trust centre (certificate management)

REQ #	TREQ-10
Main title	Requirements for the trust centre (certificate management)
Requirement definition	The VM RMI system shall support an online interface to the trust centre. Via this interface the VM shall check the validity status of the digital certificate presented by the IO and shall verify the IO's authorization status to obtain access to security-related RMI.
Brief description	See report of the SERMI ^[14] Annex IV.
Classification	Mandatory.

8.3 [TREQ-11] Parts ordering for security-related features

[Table 12](#) defines the requirements for the parts ordering for security-related features.

Table 12 — [TREQ-11] Parts ordering for security-related features

REQ #	TREQ-11
Main title	Requirements for the parts ordering for security-related features
Requirement definition	In cases where ordering of security-related parts is needed, this ordering shall be facilitated either online or offline where appropriate.
Brief description	<p>If and only if security-related parts (pre-programmed or programmable e.g. keys and ECUs) can be ordered online then an interface from the VM RMI system shall be provided to facilitate the ordering.</p> <p>This interface shall only be accessible for an IO with a digital certificate and authorization according to the SERMI^[14] scheme.</p> <p>The ordering process to be followed will be VM-specific. Some VMs may provide access to an online parts ordering system, other VMs may require this ordering process to be conducted via the authorized repair network.</p> <p>There are different ways and concepts for the implementation of security-related features so that the repair doesn't require the ordering of pre-programmed or programmable parts e.g. keys and ECUs.</p>
Classification	Mandatory.

8.4 [TREQ-12] Partnered accessory provider systems

[Table 13](#) defines the requirements for the partnered accessory provider systems.

Table 13 — [TREQ-12] Partnered accessory provider systems

REQ #	TREQ-12
Main title	Requirements for the partnered accessory provider systems
Requirement definition	The VM RMI system shall support an interface or offer a link to a system of the accessory provider for RMI for the accessories.
Brief description	For the purposes of meeting the requirement a minimum interface would be a relevant URL.
Classification	Mandatory if the information is not contained in the VM RMI system.

9 Requirements cluster 4 — Technical infrastructure

9.1 [TREQ-13] Type of device

[Table 14](#) defines the requirements for the type of device.

Table 14 — [TREQ-13] Type of device

REQ #	TREQ-13
Main title	Requirements for the type of device
Requirement definition	The VM RMI system shall support IO PCs and laptops which fulfil TREQ-13, TREQ-14 and TREQ-15 as client interfaces that are connected to the Internet.
Brief description	The devices shall be able to communicate via Internet. Other types of devices may be considered in the future depending on the overall technological evolution.
Classification	Mandatory.

9.2 [TREQ-14] Hardware features

[Table 15](#) defines the requirements for the hardware features.

Table 15 — [TREQ-14] Hardware features

REQ #	TREQ-14
Main title	Requirements for hardware features
Requirement definition	The VM RMI system shall support a “fit for purpose” commercially available PC.
Brief description	As a “fit for purpose” commercially available PC, laptop, etc. a configuration is considered to be equivalent to at least the specification as detailed in Annex A .
Classification	Mandatory.

9.3 [TREQ-15] Operating systems

[Table 16](#) defines the requirements for the operating systems.

Table 16 — [TREQ-15] Operating systems

REQ #	TREQ-15
Main title	Requirements concerning operating systems
Requirement definition	The VM shall ensure that the VM applications running on the IO client are able to run on at least one of the operating systems listed in Annex A . The application shall be able to support at least the minimum version of the runtime languages and libraries as specified in Annex A .
Brief description	Annex A is maintained by the association SERMI.[14]
Classification	Mandatory.

9.4 [TREQ-16] Web browsers

[Table 17](#) defines the requirements for the Web browsers.

Table 17 — [TREQ-16] Web browsers

REQ #	TREQ-16
Main title	Requirements for Web browsers
Requirement definition	The VM RMI system shall support at least one web browser in at least the minimum version capable to run on the operating systems specified in Annex A with a major usage level in the market place.
Brief description	A major usage level is considered sufficient when the browser has a yearly average market share of more than 15 % according to the acknowledged publisher of statistical usage data, e.g. "StatCounter GlobalStats", "W3Counter" The supported web browser version must be freely available and downloadable from the web browser supplier site.
Classification	Mandatory.

9.5 [TREQ-17] Presentation formats for information packages

[Table 18](#) defines the requirements for the presentation formats for information packages.

Table 18 — [TREQ-17] Presentation formats for information packages

REQ #	TREQ-17
Main title	Requirements for the presentation formats for information packages
Requirement definition	The information packages shall be presented using open text and graphic formats or formats that can be viewed and printed using only standard software plug-ins that are freely available, easy to install, and that run under computer operating systems, as listed in Table 16 .
Brief description	PDF, HTML, JPG, PNG are examples of open text and open graphic formats as implied by the requirements.
Classification	Mandatory.

9.6 [TREQ-18] Internet connection

[Table 19](#) defines the requirements for the internet connection

Table 19 — [TREQ-18] Internet connection

REQ #	TREQ-18
Main title	Requirements for the internet connection
Requirement definition	VM recommendations for Internet connection parameters shall be published by each VM. The VM application shall use known standard communication ports for any standard external protocols used within the application, e.g. http (80), https (443), ftp (21); for reference see ports up to 1023 in the standard ports list (RFC1700). For internal communication local to the IO Client any port above 1023 can be used. VM software shall work with NAT (Network Address Translation) if the IO uses NAT.
Brief description	See requirement definition.
Classification	Mandatory.

9.7 [TREQ-19] Performance of the VM RMI system

[Table 20](#) defines the requirements for the performance of the VM RMI system.

Table 20 — [TREQ-19] Performance of the VM RMI system

REQ #	TREQ-19
Main title	Requirements for the performance of the VM RMI system
Requirement definition	The performance of the VM RMI system for an IO shall be equivalent to the performance for an AR taking into account the performance implications of using the internet connection and the specification for the PC (see Annex A).
Brief description	See requirement definition.
Classification	Mandatory.

10 Requirements cluster 5 — Co-existence of VM software on IO client

10.1 [TREQ-20] Requirements for installing VM-specific software on the IO client

[Table 21](#) defines the requirements for installing VM-specific software on the IO client.

Table 21 — [TREQ-20] Requirements for installing VM-specific software on the IO client

REQ #	TREQ-20
Main title	Requirements for installing VM-specific software on the IO client
Requirement definition	<p>If any VM-specific software is to be installed on the IO client it shall act in such a way that the functionality of the IO PC/Laptop is unaffected when the VM software is not running, except for VM installed software files.</p> <p>In cases where the VM software installations on the IO client side cannot be performed without IO cooperation, the IO shall take the necessary steps to facilitate the installation following the instructions from the VM.</p>
Brief description	<p>The VM has to check at least the following properties for the support of their software (if there's no specific VM software to be installed, VM has only to check for support of a standard operating software as listed):</p> <ul style="list-style-type: none"> — If connected devices (card reader, MVCI, Pass-Thru VCI, etc.) are used, they have to be applied with the tool manufacturer's driver unit. — If runtime-languages/script languages are used, which can be installed in different versions in parallel, these different runtime-languages versions can be installed. Configurations shall be made per application. Global configurations shall not be overwritten. — If runtime-languages/script languages are used, which cannot be installed in all version levels at the same time, the minimum version (see Annex A) shall be used. Configurations shall be made per application. Global configurations shall not be overwritten. — If additional standard software packages are installed which need general PC resources (e.g. Operating System services, Apache Web server), they have to be set up in order to be used by several applications (e.g. the Task Scheduler: existing configurations shall not be overwritten but adjusted). — No system libraries/runtime environment modified, except for the update to a newer version. — No system initialization files modified. — No autorun entries added without user's confirmation. — The installation shall be contained either in a single folder named uniquely or follow the platform recommendation (e.g. Microsoft, Java). — If the VM application requires registry keys' modifications, these shall be done either in the local user section or follow the platform recommendation (e.g. Microsoft, .NET).
Classification	Mandatory.

10.2 [TREQ-21] Requirements for updating of installed VM data and applications on the IO client

[Table 22](#) defines the requirements for updating VM-specific software on the IO client.

Table 22 — [TREQ-21] Requirements for updating of installed VM data and applications on the IO client

REQ #	TREQ-21
Main title	Requirements for updating VM-specific software on the IO client
Requirement definition	<p>Installed VM data and applications on the IO client shall be maintained by checking the validity of the data and application when the application is running, and, where necessary, providing updates to the application but only with user consent. In addition to the actual VM applications web browser plugins or further base software components might be updated by the VM.</p> <p>Updates of the VM-specific software on the IO client shall follow the same requirements as installation of software onto the IO PC as set out in TREQ-20.</p>
Brief description	<p>The following installed VM data and applications and optionally also plugins and other base software components at the IO site shall be administered by the VM based on:</p> <ul style="list-style-type: none"> — Installed application version at the IO site; — Current version information available; — Downloaded data validity. <p>In cases where the VM software installations and updates on the client side cannot be performed without IO cooperation, the IO shall take the necessary steps to facilitate the installation or update following the instructions from the VM.</p>
Classification	Mandatory.

10.3 [TREQ-22] Requirements for the operation of VM-specific software on the IO client

[Table 23](#) defines the requirements for the operation of VM-specific software on the IO client.

Table 23 — [TREQ-22] Requirements for the operation of VM-specific software on the IO client

REQ #	TREQ-22
Main title	Requirements for the operation of VM-specific software on the IO client
Requirement definition	Any VM-specific software on the IO client shall be responsible for resetting the PC/Laptop system configuration to the same state as it was before it started, excepting the VM-specific software configuration and general purpose services and processes.
Brief description	<p>If changes are made to the configuration of the IO PC/Laptop, these changes shall be reset at the end of the execution of the VM-specific software. E.g. screen resolution, disabling of browser functions.</p> <p>Used resources shall be released when the VM-specific software completes execution and is closed wherever possible, unless the user agreed otherwise during the application installation or via user specific configuration. E.g. connection to VCI device, communication port, use of libraries:</p> <ul style="list-style-type: none"> — VM application specific processes and services shall not be running once the actual VM application's execution is terminated; — The VM application shall not terminate generic processes and services in the IO client (e.g. TOMCAT, Apache, antivirus); — TCP/UDP ports for VM specific processes and services shall not be in use once the VM application is terminated; — no system libraries/runtime environment modified, except for the update to a newer version; — no system initialization files modified.
Classification	Mandatory.

10.4 [TREQ-23] Requirements for the uninstalling of VM-specific software on the IO client

[Table 24](#) defines the requirements for the uninstalling of VM-specific software on the IO client.

Table 24 — [TREQ-23] Requirements for the uninstalling of VM-specific software on the IO client

REQ #	TREQ-23
Main title	Requirements for the uninstalling of VM-specific software on the IO client
Requirement definition	The VM-specific software is responsible for removing VM installed software files, data, registry entries and folders when the user requests to uninstall the VM software.
Brief description	<p>The VM-specific software shall include a procedure for a complete removing of VM installed software files, data, registry entries and folders when the user requests to uninstall.</p> <p>User specific data shall only be removed if confirmed by the user except VM RMI-specific adjustments or preferences of the VM RMI-specific software.</p> <p>If additional standard software packages were installed which need general PC resources (e.g. Operating System services, Apache Web server), they shall not be removed if required by other applications.</p>
Classification	Mandatory.

10.5 [TREQ-24] Requirements for restoring in case of an abnormal termination of the VM-specific software on the IO client

[Table 25](#) defines the requirements for restoring in case of an abnormal termination of the VM-specific software on the IO client.