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Field device tool (FDT) interface specification

Part 62: Field device tool (FDT) styleguide for common language infrastructure

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National foreword

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TECHNICAL REPORT

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Field device tool (FDT) interface specification – Part 62: Field device tool (FDT) styleguide for common language infrastructure

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FIELD DEVICE TOOL (FDT) INTERFACE SPECIFICATION –

Part 62: Field device tool (FDT) styleguide for common language infrastructure

FOREWORD

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IEC TR 62453-62, which is a Technical Report, has been prepared by subcommittee 65E: Devices and integration in enterprise systems, of IEC technical committee 65: Industrial-process measurement, control and automation.

The text of this Technical Report is based on the following documents:

Enquiry draft	Report on voting
65E/442/DTR	65E/515/RVC

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Full information on the voting for the approval of this Technical Report can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

The list of all parts of the IEC 62453 series, under the general title *Field device tool (FDT) interface specification*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

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INTRODUCTION

This document is a user interface design specification for developers of FDT (field device tool) components for Function Control and Data Access within a Client/Server architecture. This document is a result of an analysis and design process to develop standard interfaces to facilitate the development of components by multiple vendors that interoperate seamlessly.

A device-specific software component, called DTM (Device Type Manager), is supplied by the field device manufacturer with its device. The DTM is integrated into engineering tools via the FDT interfaces defined in this specification. The approach to integration is in general open for all kinds of fieldbusses and thus meets the requirements for integrating different kinds of devices into heterogeneous control systems.

To ensure the consistent management of a plant-wide control and automation technology, fieldbusses, devices and sub-systems are fully integrated as a seamless part of a wide range of automation tasks covering the whole automation life-cycle. This integration also requires a consistent look and feel of device specific components.

Figure 1 shows how IEC TR 62453-62 is aligned in the structure of IEC 62453 (all parts).

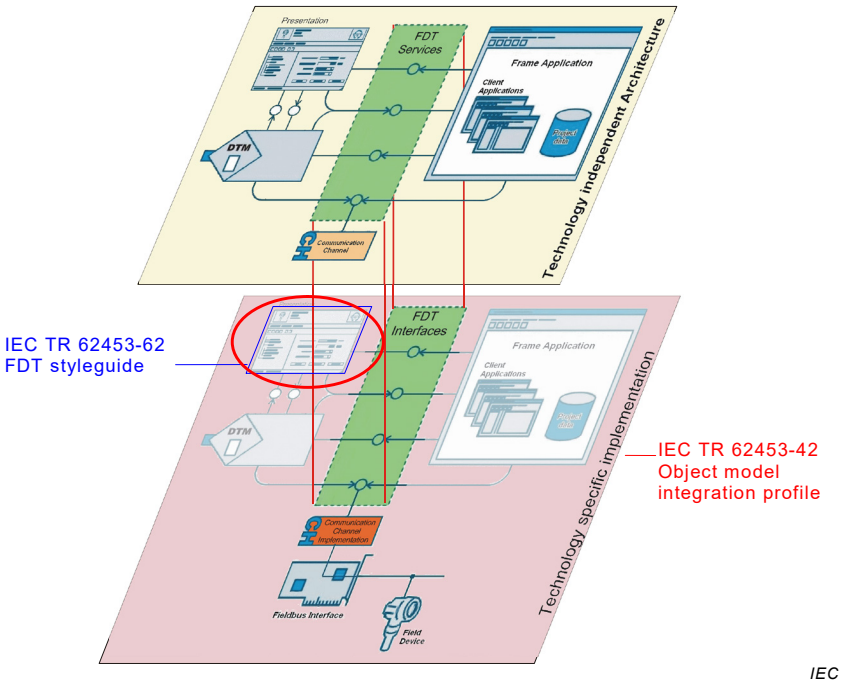

Figure 1 – IEC 62453-62 in IEC 62453 (all parts)

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FIELD DEVICE TOOL (FDT) INTERFACE SPECIFICATION –

Part 62: Field device tool (FDT) styleguide for common language infrastructure

1 Scope

IEC TR 62453-62, which is a Technical Report, explains the guidelines and rules for the CLI-based implementation of a Device Type Manager (DTM) and parts of a Frame Application with regard to the user interface and its behaviour. These guidelines and rules are part of the FDT specification (IEC TR 62453-42) and are intended to ensure that all users are provided with clear and consistent user interface functions and features across DTMs in a system.

This specification neither contains the FDT specification nor modifies it.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 62453-1, *Field device tool (FDT) interface specification – Part 1: Overview and guidance*

IEC 62453-2, *Field device tool (FDT) interface specification – Part 2: Concepts and detailed description*

IEC TR 62453-42, *Field device tool (FDT) interface specification – Part 42: Object model integration profile – Common Language Infrastructure*

3 Terms, definitions, symbols, abbreviated terms and conventions

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62453-1, IEC 62453-2, [7] and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1.1
Application
DTM UI Applications and DTM UI Functions

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3.2 Symbols and abbreviated terms

For the purposes of this specification the symbols and abbreviated terms given in IEC 62453-1, IEC 62453-2, IEC 62453-42 and the following apply.

UI	user interface
NAMUR	User Association of Automation Technology in Process Industries
WPF	Windows Presentation Foundation (Microsoft user interface library)

3.3 Conventions

3.3.1 Data type names and references to data types

The conventions for naming and referencing of data types are explained in [7].

3.3.2 Vocabulary for requirements

The following expressions are used when specifying requirements.

Usage of "shall" or "Mandatory"	No exceptions allowed.
Usage of "should" or "Recommended"	Strong recommendation. It may make sense in special exceptional cases to differ from the described behaviour.
Usage of "can" or "Optional"	A DTM may provide the function or behaviour depending on the task and type of the DTM. If a function or behaviour is provided, it shall follow the style guide.

3.3.3 Specific formatting

The following formatting is used to describe specific context.

CAPITAL LETTERS	Names of keys on the keyboard – for example, SHIFT, CTRL, or ALT
[Button text]	Button with the specified text
ClassName::PropertyName or InterfaceName::MethodName	Name of property or method according to definition in FDT 2.0 Technical Specification

4 Fundamentals of designing DTM user interfaces

The design of UIs for DTMs is based on the ten general principles for user interface design accepted in general public [3], [4]. They are called "heuristics" because they are more in the nature of rules of thumb than specific usability guidelines. The heuristics should give the DTM developer some general hints on how to implement a DTM. For additional fundamentals of user interface design, please see the available literature (e.g. [5], [6]). The ten general principles are the following.

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Visibility of system status
The system should always keep users informed about what is going on, through appropriate feedback within an acceptable time limit (dependant on the task, e.g. 1 sec.).

Match between system and the real world
The system should speak the users' language with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.

User control and freedom
Users often choose system functions by mistake and need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.

Consistency and standards
Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions.

Error prevention
A careful design, which prevents a problem from occurring in the first place, is even better than good error messages.

Recognition rather than recall
Make objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.

Flexibility and efficiency of use
Accelerators – unseen by the novice user – may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users tailoring of frequent actions.

Aesthetic and minimalist design
Dialogue should not contain information, which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.

Help users recognize, diagnose, and recover from errors
Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.

Help and documentation
Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focus on the user's task, list concrete steps to be carried out, be context sensitive and not be too large.

5 Benefits from the FDT user's point of view

Using DTMs compliant with this style guide enables a user to operate more efficiently and more safely. The user is able to parameterize and manage the data of devices from various manufacturers in a uniform way. Therefore, the user is presented with a clearly structured concept regardless of the manufacturer or the type of the device. Details or requirements for developers of a DTM are given within the following clauses.

Guideline and rules are defined for:

- Uniform user guidance: DTM user interfaces are used and displayed in engineering systems and stand alone tools in the same manner regardless of the device or DTM manufacturer or communication protocol employed.
- Uniform behaviour of a DTM.

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- Clear identification of the DTM and the assigned device.
- Ensuring users will be updated on the status and the parameterization of the configuration constantly. All changes of the configuration are marked.
- Informing users, whether UI input affects the device directly or the offline configuration.
- Executing plausibility checks of the configuration on a lexically (e.g. only certain characters are accepted), syntactically (e.g. a limited number of characters) and semantically (e.g. given value is below upper limit) correct basis.

6 DTM user interface

6.1 Objective

The user interface of a DTM application shall be designed to provide a user with a software component that is easy to use and self-explanatory. The user interface assists the user to be able to concentrate on his/her main tasks. Novel user interface elements or features should not detract the user.

6.2 Appearance

6.2.1 General

In general, a DTM user interface is divided into the following areas:

- Identification Area: contains information about the device that is handled by the DTM;
- Application Area: contains all necessary UI elements for the selected function.

These areas shall be arranged as described in the following subclauses.

In addition, the two following DTM related areas are displayed and controlled by the Frame Application:

- Action Area that contains buttons to initiate the user's choice;
- Status Area that contains status information of the DTM.

Icons of the FDT icon library should be used for all FDT tools and states that are described in this document.

6.2.2 DTM user interface categories

6.2.2.1 General

Three categories of DTM user interfaces are specified.

- Standard layout, where one presentation object displays one application with no or only with limited navigation capability.
- Advanced layout, where one presentation object displays one application with advanced navigation capability.
- Wizard layout, where one presentation object displays a guided input user interface.

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6.2.2.2 Standard user interface

Figure 2 describes the required areas for the Standard user interface of a DTM.

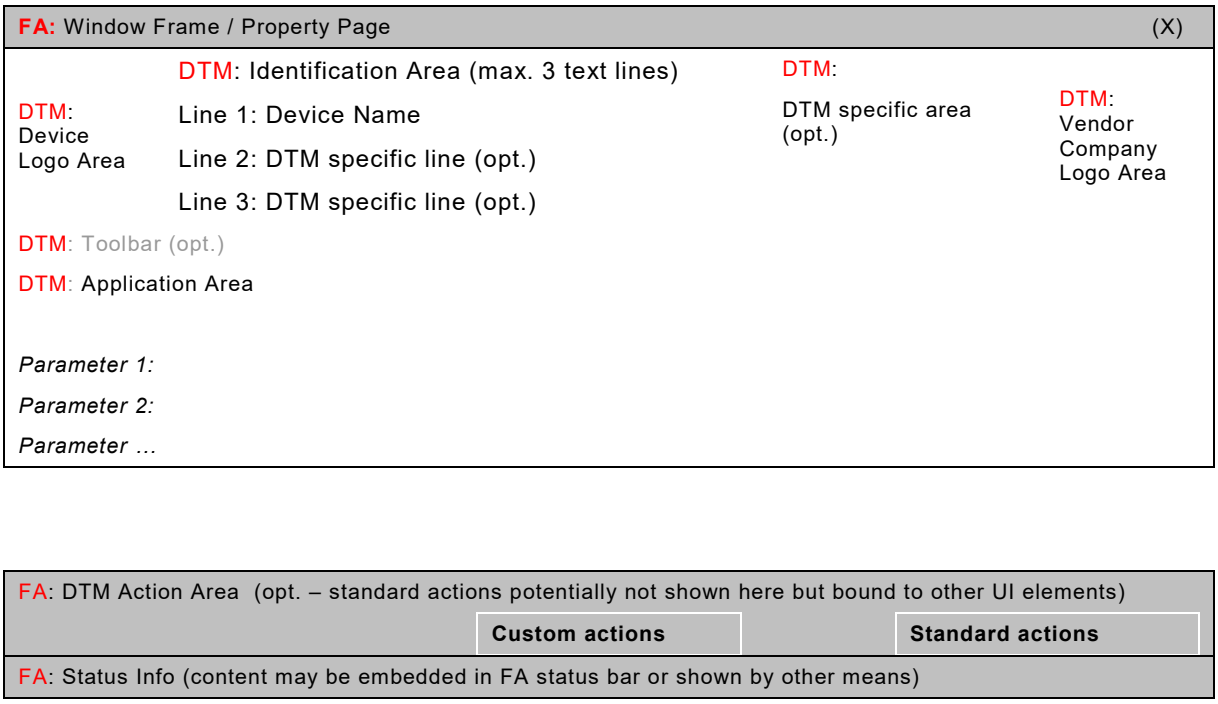

Figure 2 – Areas of a Standard user interface

Additional to the mandatory elements (Identification Area, Application Area), the UI may contain a toolbar.

All areas marked with a red DTM label are controlled and displayed by the DTM itself. The areas marked with the red label FA are related to a certain DTM but controlled and displayed by the Frame Application according to its rules. The DTM provides interfaces and actual values that are used by the Frame Application in order to present the correct buttons and status information.

A description of Custom actions and Standard actions can be found in 6.2.3.6.

6.2.2.3 Advanced user interface

Depending on the complexity of a device and the required functionality, the DTM user interface may additionally provide navigation.

The Navigation Area as showed in Figure 3 provides an access to applications and/or the parameter subsets that are related to the current application. The Navigation Area is described in detail in chapter 6.2.3.4.

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<table>
<tr><td colspan="4">FA: Window Frame / Property Page (X)</td></tr>
<tr><td>DTM:
Device Logo
Area</td><td>DTM: Identification Area (max. 3 text lines)
Line 1: Device Name
Line 2: DTM specific line (opt.)
Line 3: DTM specific line (opt.)</td><td>DTM:
DTM specific area (opt.)</td><td>DTM:
Vendor Company Logo Area</td></tr>
<tr><td colspan="4">DTM: Toolbar Area (opt.)</td></tr>
<tr><td colspan="2">DTM: Navigation Area
Settings Group A
Page A.1
Page A.2
Page A.3
Settings Group B
Page B.1
Page B.2
Page B.3
…</td><td colspan="2">DTM: Application Area

Parameter 1:
Parameter 2:
Parameter …</td></tr>
<tr><td colspan="4">FA: DTM Action Area (opt. – standard actions potentially not shown here but bound to other UI elements)
Custom actions Standard actions</td></tr>
<tr><td colspan="4">FA: Status Info (content may be embedded in FA status bar or shown by other means)</td></tr>
</table>

Figure 3 – Areas of an Advanced user interface

Additional to the mandatory elements (Identification Area, Navigation Area, Application Area) the UI may contain a toolbar.

All areas are controlled and displayed by the DTM and Frame Application as described for the standard user interface.

6.2.2.4 Wizard user interface

Wizard user interfaces are used to guide the user step by step through a sequence of actions. A Wizard UI shall be implemented as DTM modal dialog.

The Wizard user interface shall have the structure showed in Figure 4.

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