



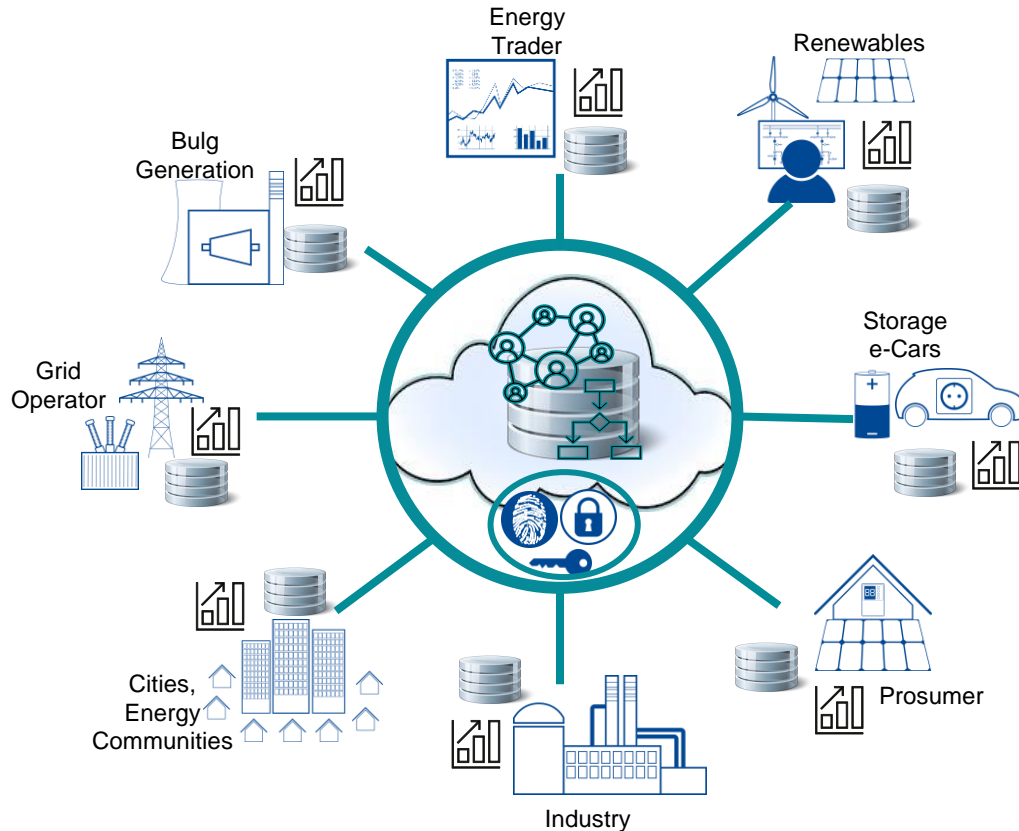
TRI 1 Webinar on Interoperability Process chain for Interoperability and testing

Angela Berger, CET Partnership



- Infrastructure for Digitalisation
- Process chain for interoperability
- Example for the process implementation
- Interoperability testing

Digitalization processes require a communication infrastructure



Central Datahub:

- Loss of data sovereignty
- No governance
- Not possible for critical infrastructure

Communication Infrastructure

- Data „only once“
 - Common governance
 - Standardized interfaces
- Data access only per defined Use Case
- Data exchange is also possible cross vertical and cross border

Process chain for interoperability

European Interoperability Framework

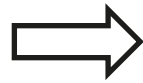
Layers of Interoperability

- **Legal Layer**
 - defines the legal basis for data exchange
- **Organizational Layer**
 - defines the business processes required for data exchange
- **Semantic Layer**
 - describes the meaning and value of exchanged data
- **Technical Layer**
 - Describes the required technical systems and standard

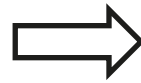


Interoperability process as cross-sector knowledge transfer

IHE Integrating
the Healthcare
Enterprise



IES Integrating
the
Energy System



IRS Integrating
the
Railway System

Health sector:

- 1989 Founding of the non-profit organization IHE
- has a governance for open cooperation
- (ISO TR 28380)

Energy sector:

- 2016-2019
- first cross-sector know-how transfer
- Adaptation of the IHE methodology (ISO TR 28380)
- Proof of Concept

Railway sector:

- 2022-2023
- Cross-sector know-how transfer
- Based on IHE / IES experience
- White Paper for standardization of the sector neutral model process

Contacts and co-operation of IES-Project with other projects and initiatives



Horizon 2020



ETIP SNET



VORZEIGEREGION ENERGIE



AI@TI

Alliance for Internet of Things Innovation

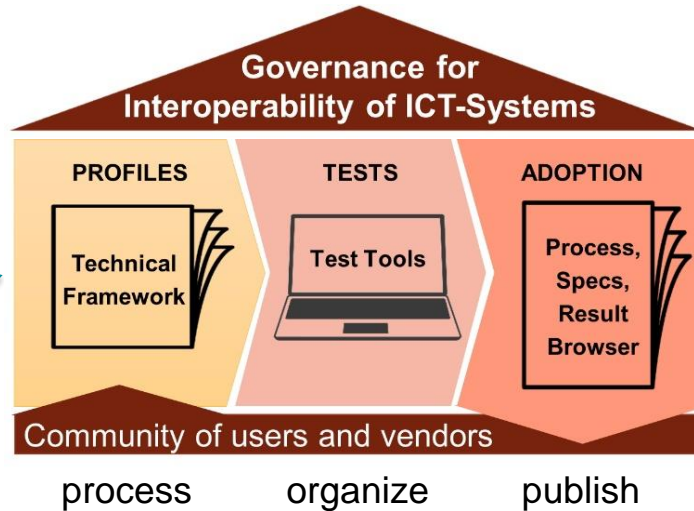
IHE
Integrating the Healthcare Enterprise

VHP
READY
Virtual Heat & Power

IES: Three pillars and Governance

Process chain to achieve Interoperability

„Profiles“
Use case based,
cooperative specification
of data exchanges
using existing standards



„Tests“ Connectathon
vendors test their prototypes in an
early stage of implementation

„Adoption“
building a
community as
process owner
and share publicly
accessible results
(profiles, tests)

Example for the process implementation

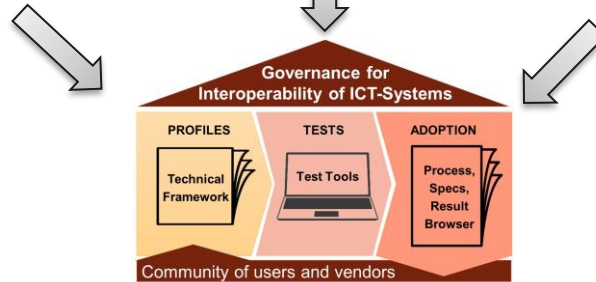
Consumption Data for Energy Communities based on Austrian legal framework



```
<!-- Mit XMLSpy v2020 rel. 2 sp1 (x64) (ht
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:cp="http://www.ebutilities.at/schema"
targetNamespace="http://www.ebutilities.at"
<xsd:import namespace="http://www.ebutilities.at"
<xsd:annotation
<xsd:documentation> schema version: 01.
MeteringReason optional? </xsd:documentation
</xsd:annotation>
<xsd:element name="ConsumptionRecord">
<xsd:annotation
<xsd:documentation>Energie-Daten-Über
</xsd:annotation>
```



```
</xsd:complexType>
</xsd:element>
<xsd:complexType name="MarketParticipant"
<xsd:complexType
```



IES-Approach a **cooperative** and **transparent** process

The Technical Framework

Introduction to the Technical Framework:
general framework conditions

Volume 1: informative description of the technical system

Chapter 1: Domain Overview: general description of Domain
e.g. data exchange according to ebUtilities processes
Description of the connection to EDA platform

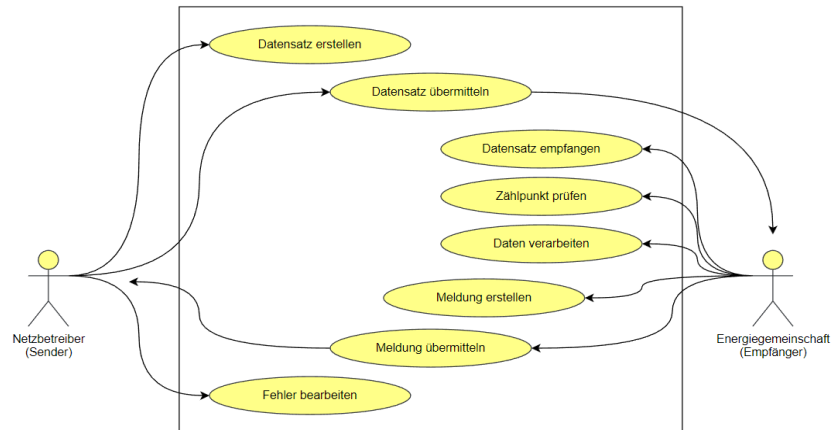
Chapter 2: Description of the use cases
e.g. sending energy data
e.g. sending the request of consumption data

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84		



Volume 1, Chapter 2: Use Case Description, informative

- Textual description of the use case process
 - Reference to ebUtilities process (Austrian legal Framework)
- Use case diagram with actors (roles)
 - Network operator, Energy Community



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Chapter 3: Integration Profiles
more "technical" description of the use cases

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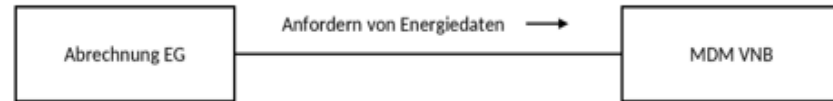


Volume 1, Chapter 3: Integration Profile, informative

- Actors:
 - ICT-Modules, that exchange data
- Transaction(s):
 - Data preparation + transmission

- Information Flow Diagram

4.1.1 Actors & Transactions



Actors - Transactions Diagram

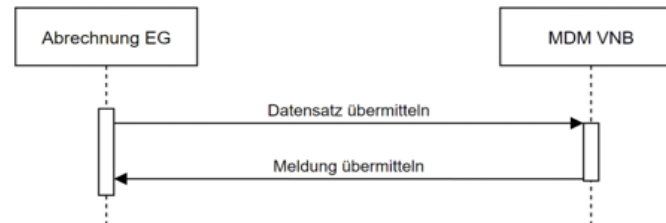


Abbildung 4: Sequenzdiagramm des Informationsflusses der Transaktion Anfordern von Energiedaten

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e.g. sending the request of consumption data

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more "technical" description of the use cases

Volume 2: normative specification of transactions

Chapter 4: Transactions

Flow of transactions, messages, ...

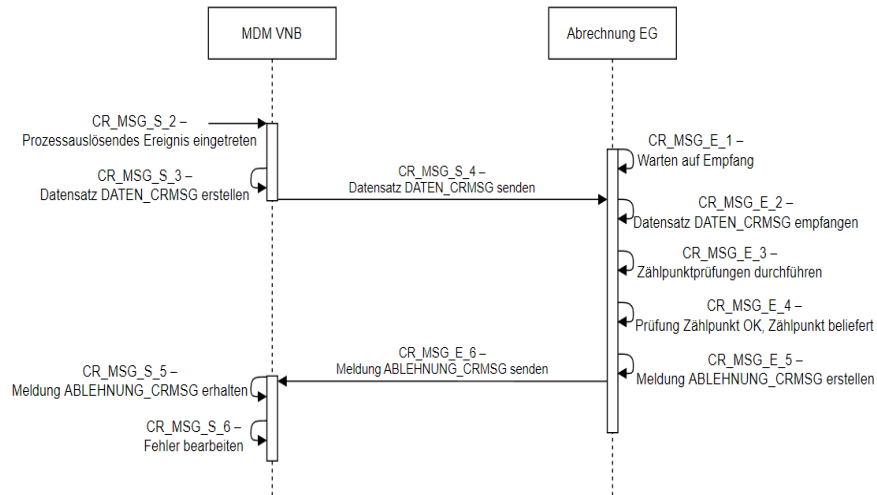
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Volume 2, Chapter 4: Transactions, normative

- normative description of the individual transactions of the use case

For each Transaction

- Scope
- Actor Roles
- Referenced Standards
 - Message <title>
 - Trigger Events
 - Message Semantics
 - Anticipated Actions
- Security Considerations



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more "technical" description of the use cases

Volume 2: normative specification of transactions

Chapter 4: Transactions

Flow of transactions, messages, ...

Appendix

actual data formats

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```

<!-- Mit XMLSpy v2020 rel. 2 sp1 (x64) (b
xmlns:cp="http://www.w3.org/200
targetNamespace="http://www.ebutilities.at/schema
xmlns:import="http://www.ebutilities.at
xmlns:documentation="http://www.ebutil
<xsd:documentation>
<xsd:annotation> schema version: 01.
<xsd:element name="ConsumptionRecord">
<xsd:annotation>
<xsd:documentation>Energie-Daten-Übe
<xsd:complexType>
<xsd:sequence>
<xsd:element name="MarketParticipant"
</xsd:sequence>
</xsd:complexType>
</xsd:element>
<xsd:complexType name="MarketParticipant
<xsd:complexContent>

```




Interoperability Testing

Testing: Technical Framework from specification to interoperability test

Step Index	Initiator Role	Responder Role	Transaction	Secured	Message Type	Option	Description
10	TPKInitiator_F3CH	TPKResponder_F3CH	SPS-01		SPS-01_Schedule_Units	Required	Send Unit from Schedule Interval
Input and Output Contextual Information (5 - 5)							
15	TPKInitiator_F3CH	TPKResponder_F3CH	SPS-01		SPS-01_VAASg_Unit	Required	Write the physical unit of the VAASg. Based on the number communicated in UnitId, this message SHALL be sent multiple times
Input and Output Contextual Information (5 - 5)							
20	TPKInitiator_F3CH	TPKResponder_F3CH	SPS-01		SPS-01_Number_SetVal	Required	Communicate the number of values (youths in VAASg) that are included in the schedule
Input and Output Contextual Information (5 - 5)							
30	TPKInitiator_F3CH	TPKResponder_F3CH	SPS-01		SPS-01_Schedule_SetVal	Required	Information about the schedule interval
Input and Output Contextual Information (5 - 5)							
40	TPKInitiator_F3CH	TPKResponder_F3CH	SPS-01		SPS-01_VAASg_SetVal_multipleTimes	Required	Based on the number communicated in UnitId, this message SHALL be a FC04PDU
Input and Output Contextual Information (5 - 5)							
50	TPKInitiator_F3CH	TPKResponder_F3CH	SPS-01		SPS-01_Start_SetVal	Required	Get start time
Input and Output Contextual Information (5 - 5)							
60	TPKInitiator_F3CH	TPKResponder_F3CH	SPS-01		SPS-01_IsPwr_SetVal	Required	Set start time. If 0 means no repetition of the schedule. SHALL be 0
Input and Output Contextual Information (5 - 5)							
70	TPKInitiator_F3CH	TPKResponder_F3CH	SPS-01		SPS-01_Schedule_SetVal	Required	Defines whether the schedule is reusable. shall SHALL be 0
Input and Output Contextual Information (5 - 5)							
80	TPKInitiator_F3CH	TPKResponder_F3CH	SPS-01		SPS-01_VerReq	Required	Sending the Validate Request (Opac: Type "Opac_Boolean" with cftid = true, origi origin content = "testname"; cftidm = 0, T = currentTime, Test = false, Check = >

Test Case
Definition

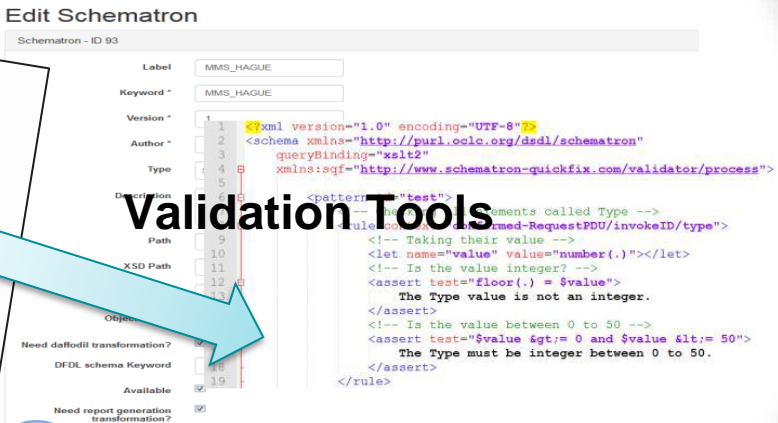


IES Integrating Energy System SÖNDER

Technical Framework
Digitale Schnittstelle für Energiegemeinschaften

Vol. 1+2

Version 00.01



Edit Schematron

Schematron - ID 93

Label: MMS_HAGUE

Keyword: MMS_HAGUE

Version: 1

Author: 2

Type: 4

Description: 5

Path: 9

XSD Path: 11

Object: 12

Need dafodil transformation?

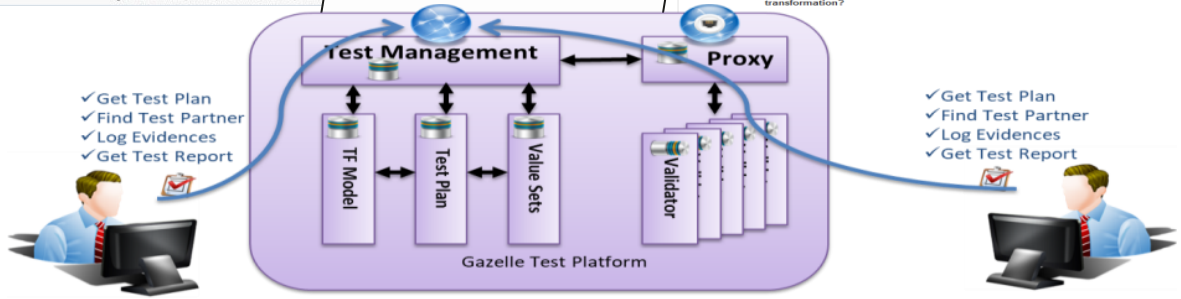
DFDL schema Keyword: 19

Available:

Need report generation transformation?

```
<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://purl.oclc.org/dsdl/schematron"
  querybinding="xslt2"
  xmlns:sqf="http://www.schematron-quickfix.com/validator/process">
  <pattern name="test">
    <!-- Elements called Type -->
    <rule context="/*" name="Test-RequestPDU/invokeID/type">
      <!-- Taking their value -->
      <let name="value" value="number(.)"/>
      <!-- Is the value integer? -->
      <assert test="floor(.) = $value">
        The Type value is not an integer.
      </assert>
      <!-- Is the value between 0 to 50 -->
      <assert test="$value >= 0 and $value <= 50">
        The Type must be integer between 0 to 50.
      </assert>
    </rule>
  </pattern>
</schema>
```

Validation Tools

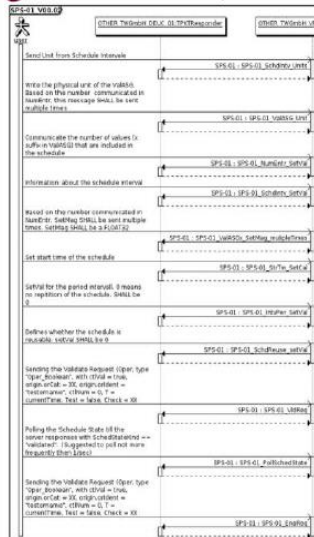


Interoperability Testing Test Platform GAZELLE

Test Progress of

OTHER_TW GmbH_VPP OP	SPS	TPKInitiator	TPKT_FSCH	T	1/0	33%	0%	50%	0%	Please Se ▼
Test		Meta test								
SPS-01_V00.02		+		R / 3	2/2	14806	14805			

Test Steps



Message Sent

Transformed Message

```

Address 0 1 2 3 4 5 6 7 8 9 a b c d e f
00000000 03 00 00 0a 02 f0 80 01 00 01 00 61 7d 30 7b 02
00000010 01 03 a0 76 a0 74 02 01 3f a5 6f a0 2e 30 2c a0
00000020 2a a1 28 1a 0d 4f 50 45 4e 4d 55 43 49 45 44 4c
00000030 44 31 1a 17 4d 52 5f 46 53 43 48 31 24 43 4f 24
00000040 56 6c 64 52 65 71 24 4f 70 65 72 a0 3d a2 3b 83
00000050 01 ff a2 22 85
00000060 6f 65 62 6c 40
00000070 39 65 6e 2e 61
00000080 60 41 8a 83 01
  
```

Test Instance

Validation Result



Validation Result

File Name: 710124...
 Validation Date: 4/16/18 12:29:06 PM (GMT+01:00)
 Model Based Validation: NA
 Schema Based Validation: NA

Validation Results

XML Validation Report: PASSED

XSD Validation Detailed Result: PASSED

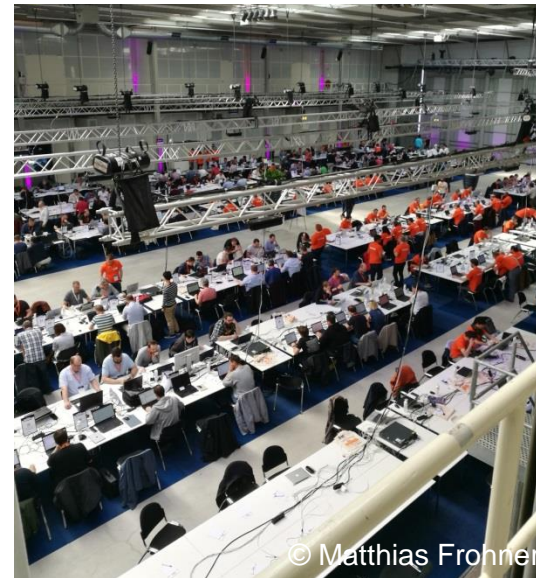
IES Interoperability Testing

What is a Connectathon?

IES Connectathon Energy Vienna, January 2019



IHE Connectathon The Hague, April 2018





Interoperability is the key to energy transition



*Be part of the
Interoperability Initiative*

Angela Berger

Clean Energy Transition Partnership, Integrated Regional Energy Systems
Lead Initiative IES – Integrating the Energy System

E: angela.berger@ffg.at

P: +43 664 883 481 54

W: www.iesaustria.at



Thank you