



FLEXICIENCY

energy services demonstrations of demand response,
FLEXibility and energy efficiENCY based on metering data

Deliverable D2.3

Data model and interfaces

V1.1



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D2.3 – Data model and interfaces

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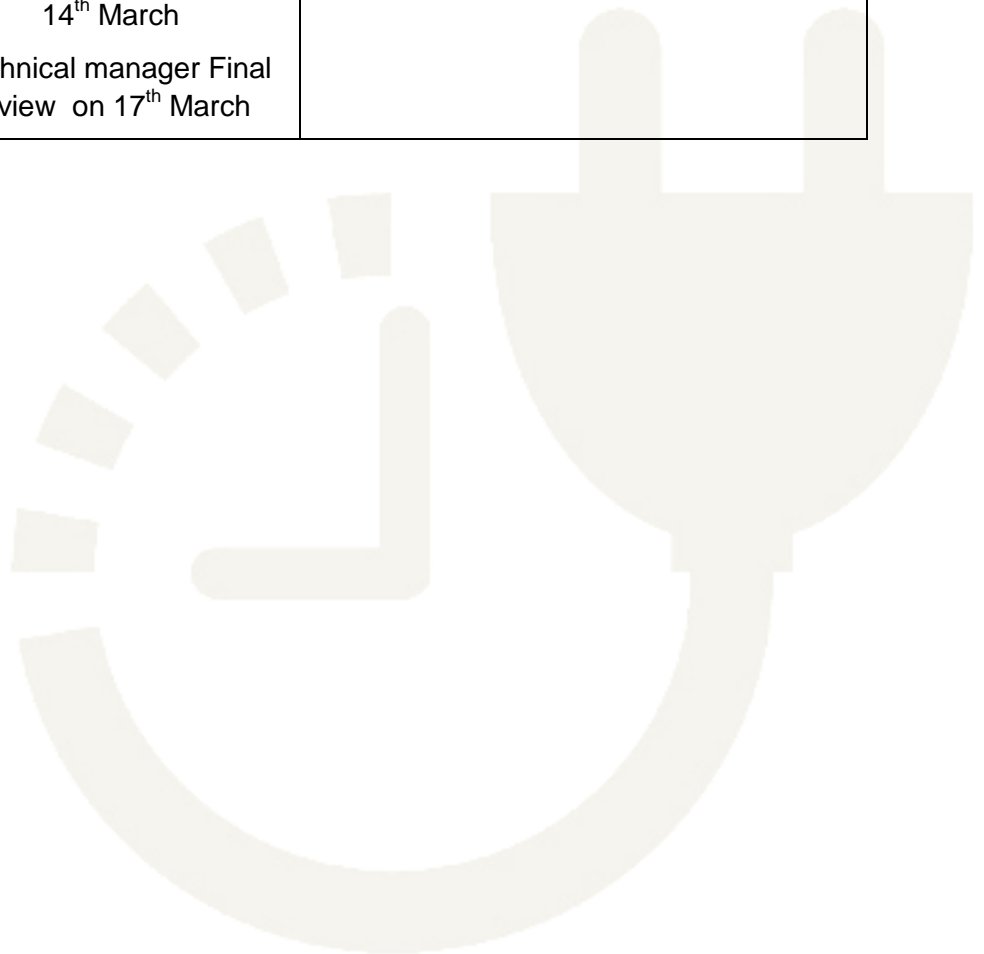
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Executive summary

Major DSOs are working together with market players and other stakeholders within the Horizon 2020 – LCE-07-2014 project FLEXICIENCY to develop a technical model in order to achieve a market place based on meter data exchange. Standardized interfaces will be developed to integrate the platforms of different players. A virtual ICT environment (called **Market Place**) will catalyze the interactions between relevant stakeholders and encourage cross-country and cross-player access to innovative energy services based on metering data. Five large-scale demonstrations will be carried out (in Austria, France, Italy, Spain and Sweden) to demonstrate the facilitation and acceleration of deployment of novel services in the electricity retail markets, ranging from **advanced monitoring** to **local energy control**, and **flexibility** participation.

Based on the elements defined in other tasks of Work Package 2 of the FLEXICIENCY project, Task 2.3 aims at defining the architecture of interactions among stakeholders of the Market Place.

Report of Task 2.3 is the purpose of the present document entitled “D2.3 – Data model and interfaces”.

The data model is divided into five data sets:

- **Market Place and Market Players:** description of the Market Place (localization, general information) and of its Market Players (roles, localizations and associated accounts).
- **Service Offer and Subscription:** publication in the Market Place of service offers by service providers and submission of service subscriptions by service requesters.
- **Customer Consent:** consent given by Customer to a data service provider for transmission of his/her individual metering data to a third party.
- **Service Activation:** service activation (data precisions and agreement validation among related parties) between Market Players.
- **Service Provision:** service provision (data exchanges and acknowledgements) between Market Players.

The three interfaces that must be supported to allow interoperability between FLEXICIENCY components are the following:

- **Market Place Interface:** interactions between Market Place and Market Players. It supports the first two data sets: Market Place and Market Players, Service Offers and Subscriptions.
- **B2B Interface:** interactions between Market Players. It supports the last three data sets: Customer Consent, Service Activation and Service Provision.
- **B2C Interface:** interactions between a Market Player and a Customer. It supports the Customer Consent data set.

Design and implementation tasks are held in work package 4 and demonstration work-packages for the interfaces of the platforms. Their deliverables will conform to this specification of the data model and of the interfaces. In particular semantic of the data will be consistent with what has been detailed in the present document, while the data syntax will depend on the solution chosen during the implementation phase.

Acknowledgments

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1. Introduction

Based on the elements provided in Tasks 2.1 and 2.2, Task 2.3 aims at defining the architecture of the data exchanges, specifying formats, standards and communication protocols to be adopted, guaranteeing privacy, safety and security of data. The way data and information are exchanged will be specified in a standardized way in order to guarantee interoperability and service accessibility to all the players in the market and the entry of new players at EU level.

Report of Task 2.3 is the object of the present document entitled “D2.3 – Data model and interfaces”. The scope of report D2.3 is recalled in section 1.1. Then, section 1.2 lists notations, abbreviations and acronyms applicable to this report. Section 1.3 recaps FLEXICIENCY motivation. Lastly, section 1.4 gives some definitions of terms used in this report.

1.1 Scope of the document

Report D2.3 together with D2.2 define the architecture of the data exchanges, specifying formats, standards and communication protocols to be adopted, guaranteeing privacy, safety and security of data, in order to guarantee interoperability and service accessibility to all the players in the market and the entry of new players at EU level.

This architecture is based on gathering the main areas (data sets) and objects to be shared within FLEXICIENCY project, in order to reach a standardization of common messages. Some attributes have been provided to illustrate the role and meaning of each object. These objects intend to reflect the main functional interactions to respond to the terms of reference of FLEXICIENCY project (cf. D2.1/SUCs, DoW). They are expected to be expended, during implementation process, by refining their internal content and sub structure (through a data format definition). It is, however, mandatory to respect this high level architecture for each main component interaction (Market Place, Service Platform, DSO Platform). In particular semantic of the data will be consistent with what has been detailed in the present document, while the data syntax will depend on the solution chosen during the implementation phase.

According to TOGAF methodology (see appendix), the structure of data is **modeled independently** from its location, allowing data models to be developed that span multiple systems without being tied to physical concerns. Logical groupings of data can be used to set **governance, security, or deployment** boundaries around data, providing a much more holistic appreciation of data issues surrounding the architecture. Looking at FLEXICIENCY main functions, the structured data set are presented in Section 2. The whole list of business objects is given in Section 3. Afterwards, interfaces are described in Section 4. Finally, a conclusion with further steps are stated at the last section.





1.2 Notations, abbreviations and acronyms

Notations, abbreviations and acronyms applicable to this report are given in the following table (Table 1).

Demo	Demonstration/Trial
DR	Demand Response
DSO	Distribution System Operator
EDSO	European Distribution System Operators for Smart Grids (non-profit association)
ESCO	Energy Saving Company
ESO	Energy System Operator
EU	European Union
GA	Grant Agreement
LV	Low Voltage
MP	Market Place
MV	Medium Voltage
PAS	Publicly Available Specification
POD	Point Of Delivery
PV	Photovoltaic
SGAM	Smart Grid Architecture Model
SUC	System Use Case
SW	Software
TSO	Transmission System Operator
WP	Work Package

Table 1: Acronyms list

1.3 FLEXICIENCY

Major DSOs are working together with market players and other stakeholders within the Horizon 2020 – LCE-07-2014 project FLEXICIENCY to develop a technical model in order to achieve a vision of data exchange based on the meter data accessibility provided by DSOs.

Standardized interfaces will be developed to integrate the platforms of different players. A virtual ICT environment (called **Market Place**) will catalyze the interactions between relevant stakeholders and encourage cross-country and cross-player access to innovative energy services based on metering data.

Five large-scale demonstrations will be carried out (in Austria, France, Italy, Spain and Sweden) to demonstrate the facilitation and acceleration of deployment of novel services in the electricity retail markets, ranging from **advanced monitoring** to **local energy control**, and **flexibility** participation.

The overall concept is represented in the following figure (Figure 1: FLEXICIENCY Architecture). It consists of four building blocks: the Market Place, the DSO platforms, the service providers platforms, and the field components.

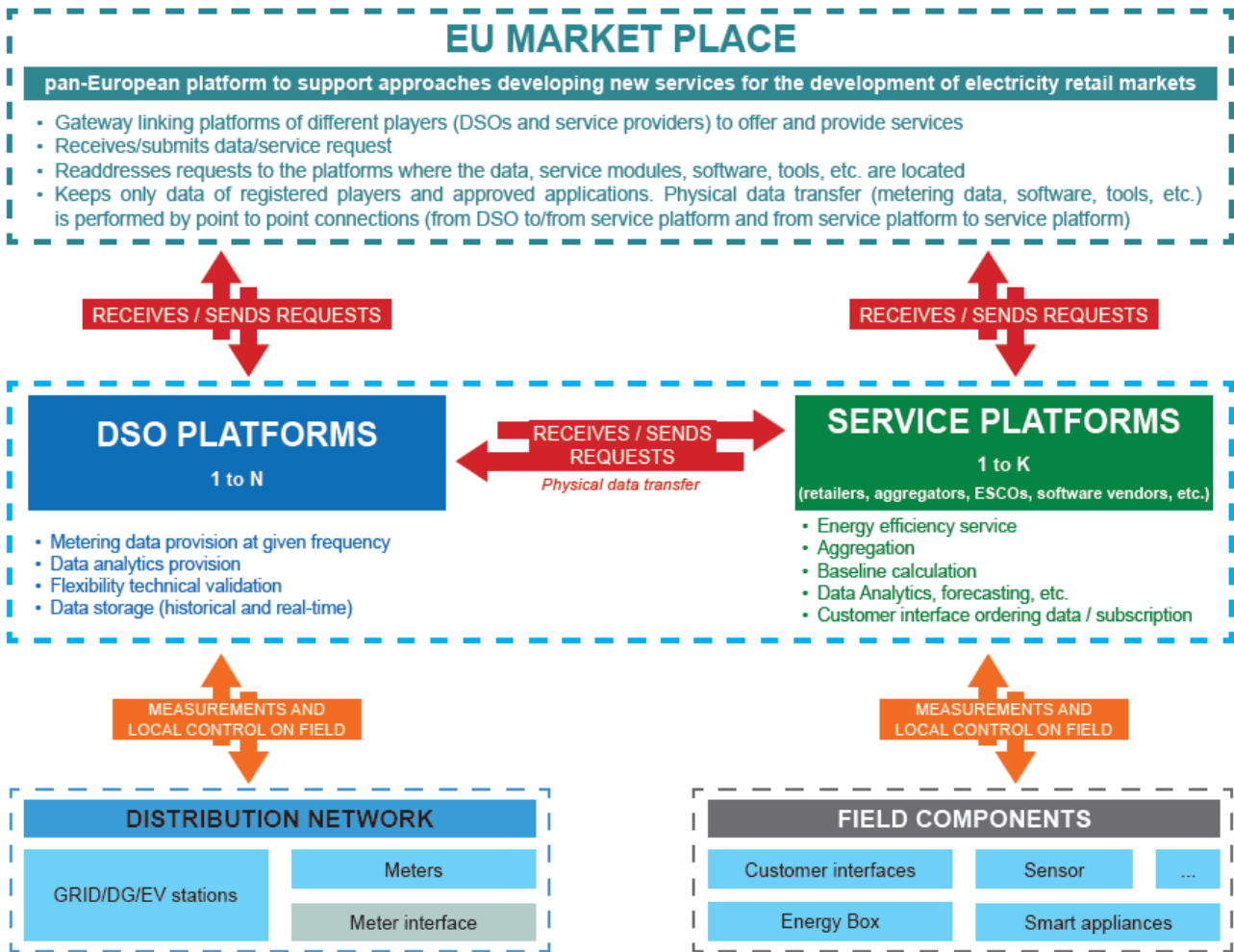


Figure 1: FLEXICIENCY Architecture

1.4 Definitions

Service: Service descriptions are made available in the Market Place. They are sent by Markets Players as elements of a Service Offer (in this case, the Market Player acts as a Service Provider) or as elements of a Service Subscription (in this case, the Market Player acts as a Service Requester). Further details are given in D2.1 document.

Role: When registering to the Market Place, Market Players indicate the list of roles they intend to play in the Market Place. Typical roles are Service Providers and Service Requesters. Further details are given in D2.2 document.

2. Data Models

The purpose of this section is to specify the target data architecture for FLEXICIENCY platforms, including the relationships between them.

Section 2.1 gives an overview of the logical data model. Then, sections 2.2 to 2.6 describes, in greater detail, the five data sets constituting the logical data model.



2.1 Overview

The logical data model is divided into five sets:

- **Market Place and Market Players:** business objects related to description of the Market Place (localization, general information) and its Market Players (roles, localizations and associated accounts).
- **Service Offer and Subscription:** business objects related to registration in the Market Place of service offers and service subscriptions.
- **Customer Consent:** business objects related to consent given by Customer for transmission of his/her individual metering data to a third party.
- **Service Activation:** business objects related to service activation between Market Players.
- **Service Provision:** business objects related to service provision between Market Players.

The following table (Table 2) gives the relationship between these five sets and the corresponding business objects of the logical data model.

Data Set	Business Objects
Market Place and Market Players	MKP-ADD – Market Place Location MKP-DES – Market Place Description MPL-REG – Market Player Registration MPL-ADD – Market Player Location MPL-DES – Market Player Description MPL-AUT – Market Player Authentication
Service Offer and Subscription	MKP-SRV-OFF – Market Place Service Offer MKP-SRV-SUB – Market Place Service Subscription B2B-SRV-SUB – B2B Service Subscription MKP-SRV-DES – Market Place Service Description
Customer Consent	CUS-CON-DES – Customer Consent Description CUS-CON-ACK – Customer Consent Acknowledgement CUS-CON-REV – Customer Consent Revocation
Service Activation	DSO-REQ – DSO Service Activation Request DSO-CNF – DSO Service Activation Acknowledgement USP-REQ – Unregulated Service Activation Request USP-CNF – Unregulated Service Activation Acknowledgement IND-DAT-SEL – Individual Data Selection AGG-DAT-SEL – Aggregate Data Selection SRV-ACT-AGR – Service Activation Agreement
Service Provision	IND-DAT-VAL – Individual Data Value IND-DAT-ACK – Individual Data Acknowledgement AGG-DAT-VAL – Aggregate Data Value AGG-DAT-ACK – Aggregate Data Acknowledgement TECH-FLEX-REQ – Technical Validation Request TECH-FLEX-RESP – Technical Validation Response

Table 2: Business Objects of the Logical Data Model

Each business object is designated both by an identifier and/or by its short name. They will be further described in the following sections. The relationships between business objects are given in the following figure (Figure 2). Detail and semantics of the relationships will also be given in the following sections dedicated to each data set of the Data Model.

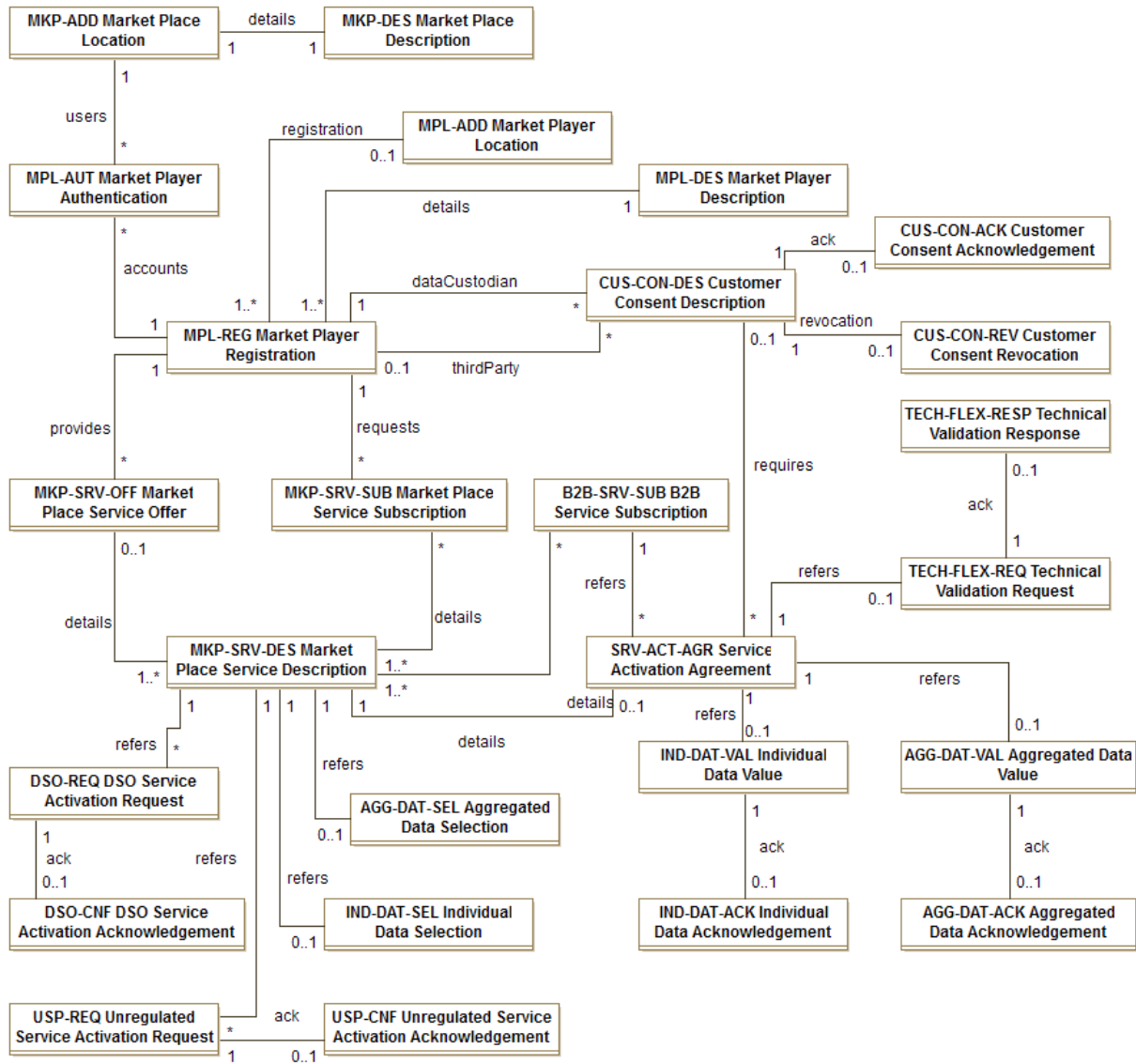


Figure 2: Logical Data Model



2.2 Market Place and Market Players

The following figure (Figure 3) provides a representation of the data model from a semantic point of view for the business objects concerned with Market Place and Market Players.

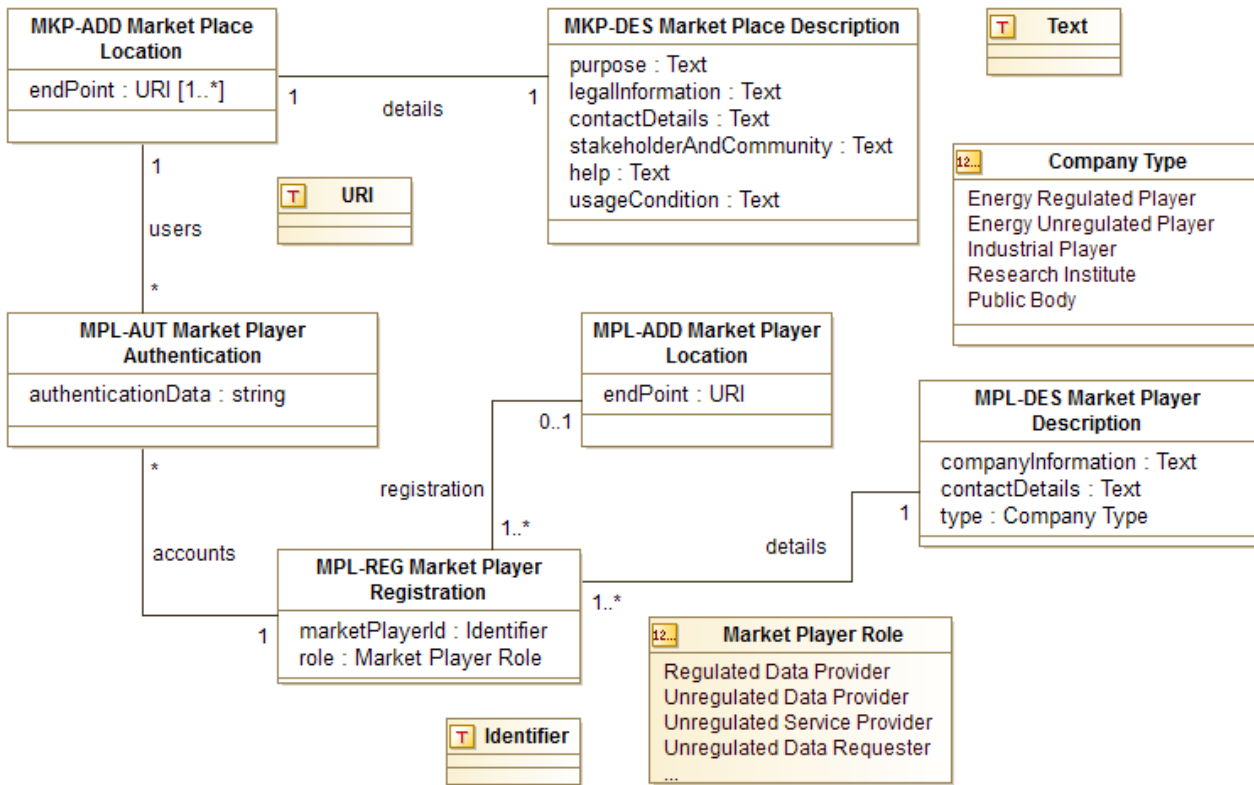


Figure 3: Market Place and Market Players

Market Place Location (MKP-ADD) is the business object representing access points to FLEXICIENCY Market Place. There may be several access points corresponding to platforms hosting FLEXICIENCY Market Place services. Addresses of these platforms are given in a standardized format (URI: Uniform Resource Identifier). MKP-ADD is linked to a standard description of the Market Place (MKP-DES) which is unique among all the platforms. Market Players enroll in the Market Place one or several contact points known as users of the Market Place (MPL-AUT).

Market Place Description (MKP-DES) represents general information given in the home page of the platforms hosting FLEXICIENCY Market Place: purpose, stakeholder and community of the FLEXICIENCY project, legal information and usage condition of the FLEXICIENCY Market Place services and contact details and help that could be used in case of difficulties in using FLEXICIENCY Market Place services. This information is accessible on-line on the platforms hosting FLEXICIENCY Market Place (link to MKP-ADD).

Market Player Authentication (MPL-AUT) is the information attached to contact points of Market Players enrolled in the Market Place. It is characterized by authentication information. This information permits to connect to the Market Place (link to MKP-ADD) and is related to the Market Player (MPL-REG) represented by the contact point.

Market Player Registration (MPL-REG) represents enrollment information of the Market Player. It consists of an identifier globally unique in the scope of the Market Place and of the role played by the Market Player. Hence, a company playing several different roles in the Market Place will have



several different registration records in the Market Place. The Market Player is represented by several contact points (link to MPL-AUT in case of persons and link to MPL-ADD in case of systems). Further information on the company corresponding to this Market Player is given through the link to MPL-DES.

Market Player Location (MPL-ADD) is the business object representing access points to Market Player platforms if the Market Player is a Service Provider. In this case, it indicates the access point to the platform hosting Market Player services. Address of this platform is given in a standardized format (URI: Uniform Resource Identifier). MPL-ADD is linked to the Market Player Registration (link to MPL-REG).

Market Player Description (MPL-DES) contains all the information about the company that seats behind the Market Player registration. The company is characterized by some general information, contact information and its type. In particular, for companies of DSO type, contact information is important and detailed enough to support DSO Mapping function (capability of finding a DSO company based on the location of the customer). The same company should register for each role it plays in the Market Place (link to MPL-REG).

Company types identified at this time are:

- Energy Regulated Player: DSO, TSO or any Metering Data Manager.
- Energy Unregulated Player: Retailer, ESCO, Aggregator.
- Industrial Player: technology providers, manufacturers, energy asset (such as PV, sensors, etc) owners.
- Research Institute: University or any independent research body.
- Public Body: EU, Energy Regulators, Local Authorities, Energy Associations.

Market Player roles identified at this time are:

- Regulated Data Provider: provides individual metering data, aggregated data, or data analytics.
- Unregulated Data Provider: provides data records from assets, or weather data records.
- Unregulated Service Provider: provides tools, simulations, methodologies.
- Unregulated Data Requester: requests for data or services.

Other data types used in this data set are the following:

- URI (Uniform Resource Identifier): identifies a resource accessible through Internet and represented as a string in a standardized format.
- Text is a string with a free format.
- Identifier is a string globally unique in the scope of the Market Place.

2.3 Service Offer and Subscription

The following figure (Figure 4) provides a representation of the data model from a semantic point of view for Service Offer and Subscription business objects.

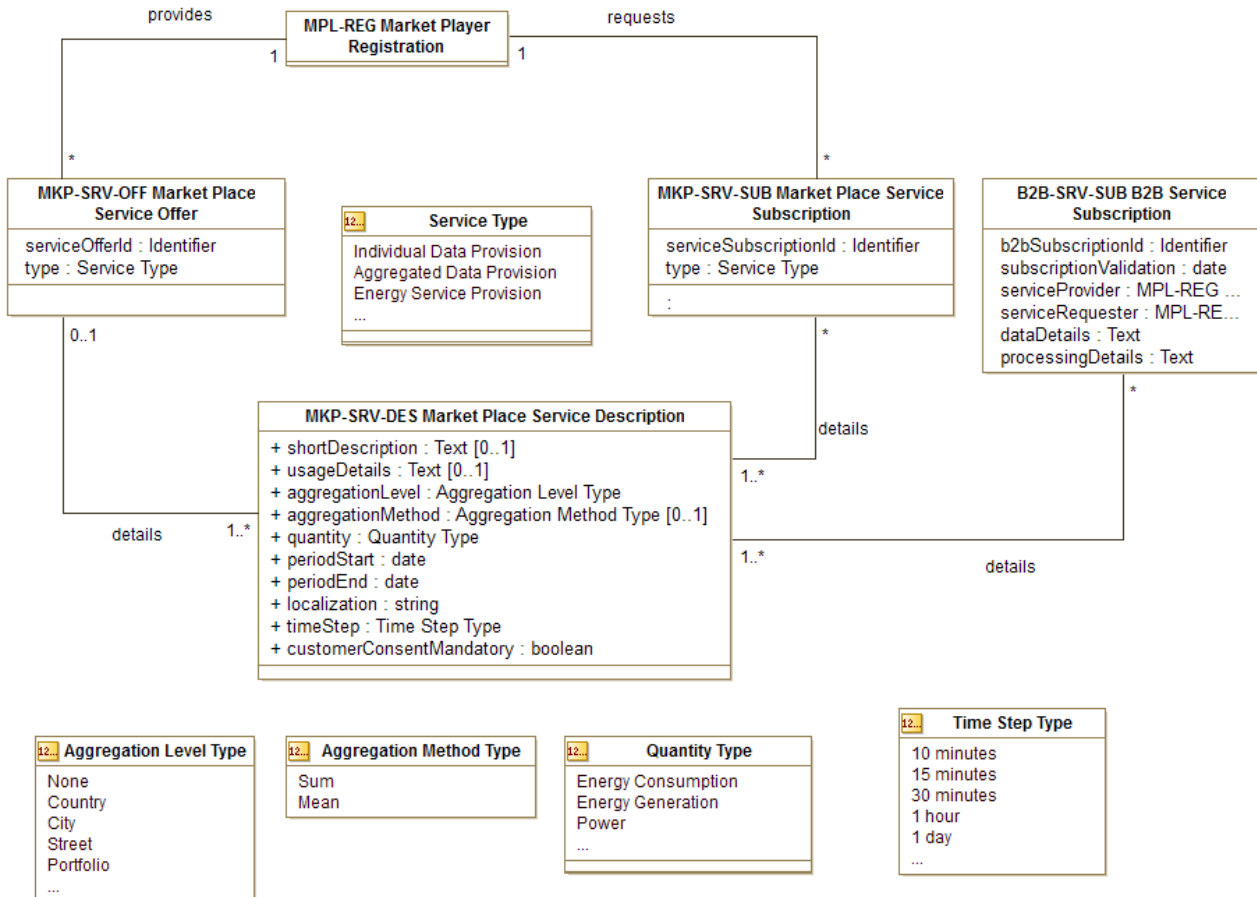


Figure 4: Service Offer and Subscription

Market Place Service Offer (MKP-SRV-OFF) gathers information about a service offer as published by a Service Provider already enrolled in the Market Place (link to MPL-REG). It is identified by an identifier globally unique in the scope of the Market Place and is characterized by a service type. Detail on the service offer is given by a set of service descriptions (link to MKP-SRV-DES).

Market Place Service Subscription (MKP-SRV-SUB) relates to a service demand as subscribed by a Service Requester already enrolled in the Market Place (link to MPL-REG). It is identified by an identifier globally unique in the scope of the Market Place and is characterized by a service type. Detail on the service subscription is given by a set of service descriptions (link to MKP-SRV-DES).

Service types identified at this time are:

- Individual Data Provision.
- Aggregated Data Provision.
- Energy Service Provision. (which is a kind of support, called service exchange in D2.1)

B2B Service Subscription (B2B-SRV-SUB) results from the matching between Market Place Service Offers and a Market Place Service Subscription, extracting unique provider from the set of



subscriptions. B2B Service Subscription is generated by gathering the whole services related to both parties (Provider and Requester), in preparation for a B2B contract agreement. It is identified by an identifier globally unique in the scope of the Market Place and is characterized by a subscription validation date, references to concerned parties (service provider and service requester), and details on data and envisaged processing. Detail on the B2B service subscription is given by a set of service descriptions (link to MKP-SRV-DES), of multiple types.

Market Place Service Description (MKP-SRV-DES) gives detailed information on a service. It is linked to a service offer (link to MKP-SRV-OFF) if such an offer exists in the Market Place and to service subscriptions (link to MKP-SRV-SUB) if several service demands have been submitted for such an offer to the Market Place. It is characterized by a short description (a summary of what the service is about), usage details (pre-requisites that the user of the service should verify), aggregation level (level of aggregation of data provided or used in the service provided), aggregation method (aggregation method used in case of aggregated data), quantity (kind of numerical value of the data provided or used in the service provided), period (period of time covered by the data provided or of the data used in the service provided), localization (characterization of the location of the data provided or used in the service provided), time step (time interval between two values of the data provided or used in the service provided) and customer consent (determines if customer consent is mandatory or not for this service).

In order to conform the present specification, a minimum set of values will have to be supported as detailed below¹:

Aggregation level may have the following values (according to regulation and technical feasibility):

- None: individual data.
- Country: data aggregated at a country level.
- City: data aggregated at a city level.
- Street: data aggregated at a street level.
- Portfolio: data aggregated at a portfolio level (localization is a list of PODs).

Aggregation Method may have the following values:

- Sum: value of the data aggregate is the sum of values of individual data.
- Mean: value of the data aggregate is the mean of values of individual data.

Quantity may have the following values:

- Energy Consumption: data or service provision is relative to energy consumption.
- Energy Generation: data or service provision is relative to energy generation.
- Power: data or service provision is relative to power.

Time Step may have the following values:

- 10 minutes: interval of time between two values is 10 minutes.
- 15 minutes: interval of time between two values is 15 minutes.
- 30 minutes: interval of time between two values is 30 minutes.
- 1 hour: interval of time between two values is 1 hour.
- 1 day: interval of time between two values is 1 day.

¹ The implementation may define other objects and still conform to the specification as far as the minimum set of business objects described in the specification are supported. Same for data values: implementation may define additional values but at least those given in the specification must be supported.



2.4 Customer Consent

The following figure (Figure 5) provides a representation of the data model from a semantic point of view for the business objects concerned with Customer Consent.

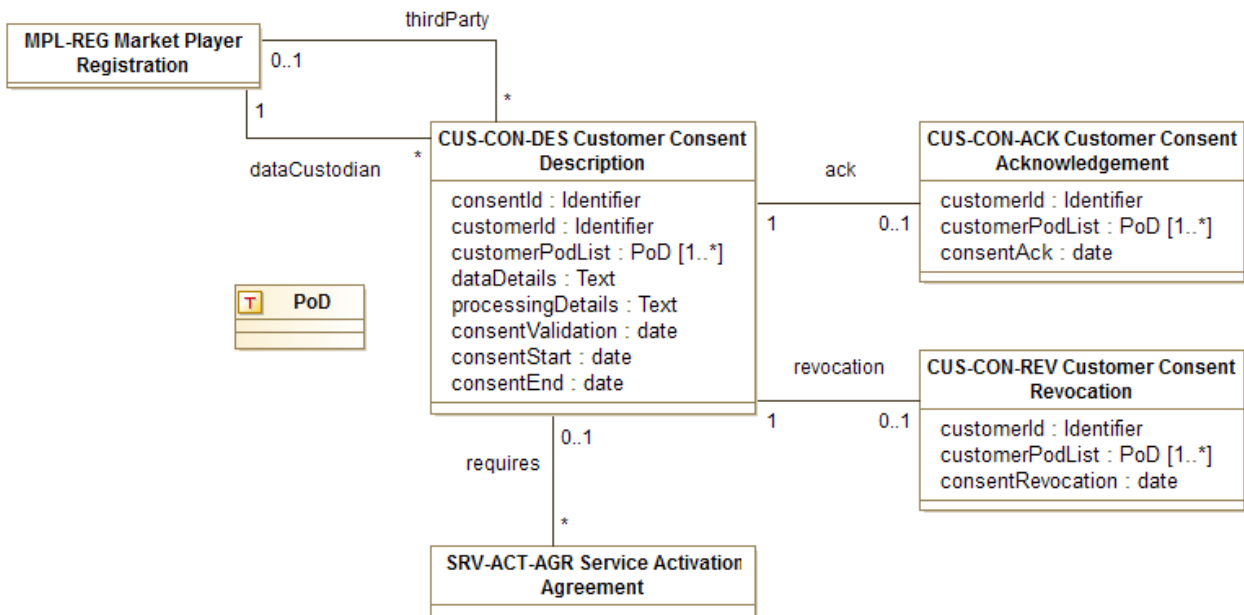


Figure 5: Customer Consent

Customer Consent Description (CUS-CON-DES) gathers the information about consent given by a customer to his/her data custodian for transmission to a third party. Both the data custodian and the third party are Market Players enrolled in the Market Place (links to MPL-REG). Customer consent may be either withdrawn (link to CUS-CON-REV) or used in one or several service activation agreement (link to SRV-SCT-AGR). Customer Consent is identified by an identifier globally unique in the scope of the Market Place and is characterized by the identifier of the customer, a list of PODs (points of delivery that are sources of data values concerned by the consent), data details (further information on data values concerned by the consent), processing details (further information about the kind of processing that will be operated on the data values), validation date (date of the validation of the consent by the customer), start date (start date of the period covered by the consent) and end date (end date of the period covered by the consent).

Customer Consent Acknowledgement (CUS-CON-ACK) is the acknowledgement of the consent previously given by a customer to his/her data custodian for transmission to a third party (referred to by the link to CUS-CON-DES). It is characterized by the identifier of the customer, a list of PODs (points of delivery that are sources of data values concerned by the acknowledgement) and by an acknowledgement date (date of the acknowledgement of the consent by the customer).

Customer Consent Revocation (CUS-CON-REV) is about revocation of the consent previously given by a customer to his/her data custodian for transmission to a third party (referred to by the link to CUS-CON-DES). It is characterized by the identifier of the customer, a list of PODs (points of delivery that are sources of data values concerned by the revocation) and by a revocation date (date of the revocation of the consent by the customer).

A new data type is used in this data set:

- PoD (Point of Delivery): Address of consumption points represented as a string in a DSO specific format. Some parts of the string may be deleted or replaced by generic characters for privacy reasons.

2.5 Service Activation

The following figure (Figure 6) provides a representation of the data model from a semantic point of view for the business objects concerned with Service Activation.

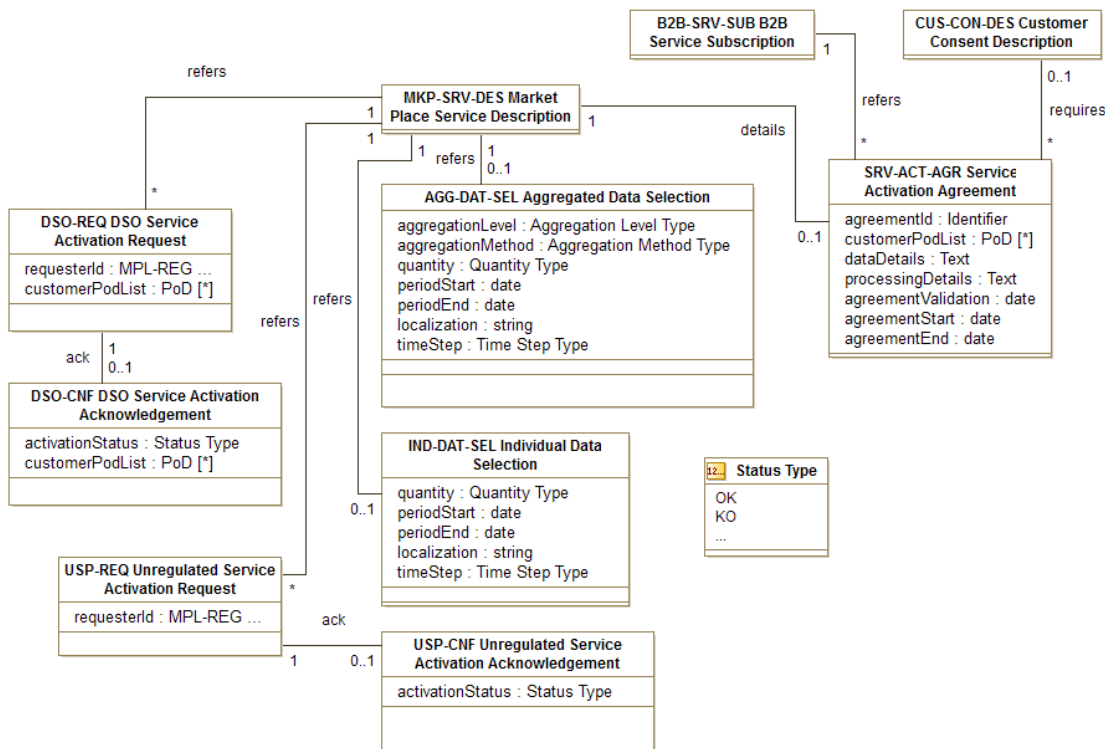


Figure 6: Service Activation

In case of the regulated part of the Market Place, DSO Service Activation Request (DSO-REQ) represents information given by the service requester to the service provider to ask for service activation and DSO Service Activation Acknowledgement (DSO-CNF) represents information given back by the service provider to the service requester to answer to the service activation request.

DSO Service Activation Request (DSO-REQ) refers to the service description as published in the Market Place (link to MKP-SRV-DES) and is characterized by service requester identification and the portfolio of points of delivery concerned by the service activation if such a portfolio exists at the time the request is submitted.

DSO Service Activation Acknowledgement (DSO-CNF) refers to the service activation request (link to DSO-REQ) and is characterized by the global status of the confirmation and the portfolio of points of delivery confirmed for the service activation if any.

In case of the unregulated part of the Market Place, Unregulated Service Activation Request (USP-REQ) represents information given by the service requester to the service provider to ask for service activation and Unregulated Service Activation Acknowledgement (USP-CNF) represents



information given back by the service provider to the service requester to answer to the service activation request.

Unregulated Service Activation Request (USP-REQ) refers to the service description as published in the Market Place (link to MKP-SRV-DES) and is characterized by service requester identification.

Unregulated Service Activation Acknowledgement (USP-CNF) refers to the service activation request (link to USP-REQ) and is characterized by the global status of the confirmation.

Status values of service activation confirmation identified at this time are:

- OK: the service has been activated.
- KO: the service has not been activated.

During service activation, selection of data provided or used by the service may be redefined. In case of individual data, Individual Data Selection (IND-DAT-SEL) defines data selection criteria specific for this activation while, in case of aggregated data, Aggregated Data Selection (AGG-DAT-SEL) is used. Both business objects refer to Market Place Service Description (link to MKP-SRV-DES).

Individual Data Selection (IND-DAT-SEL) is characterized by quantity (kind of numerical value of the data provided or used in the service provided), period (period of time covered by the data provided or of the data used in the service provided), localization (characterization of the location of the data provided or used in the service provided) and time step (time interval between two values of the data provided or used in the service provided).

Aggregated Data Selection (AGG-DAT-SEL) is characterized by aggregation level (level of aggregation of data provided or used in the service provided), aggregation method (aggregation method used in case of aggregated data), quantity (kind of numerical value of the data provided or used in the service provided), period (period of time covered by the data provided or of the data used in the service provided), localization (characterization of the location of the data provided or used in the service provided) and time step (time interval between two values of the data provided or used in the service provided).

Service Activation Agreement (SRV-ACT-AGR) represents the contractual form of the service activation. It is linked to the service description (link to MKP-SRV-DES) and, if customer consent is mandatory, to customer consent description (link to CUS-CON-DES). It also refers to the B2B Service Subscription concerned by the service activation (link to B2B-SRV-SUB). It is characterized by an identifier globally unique in the Market Place, the portfolio of points of delivery concerned by the service activation if any, details on data and on envisaged processing, date of validation of the agreement and period of validity of the agreement (start and end of the period).





2.6 Service Provision

The following figure (Figure 7) provides a representation of the data model from a semantic point of view for the business objects concerned with Service Provision.

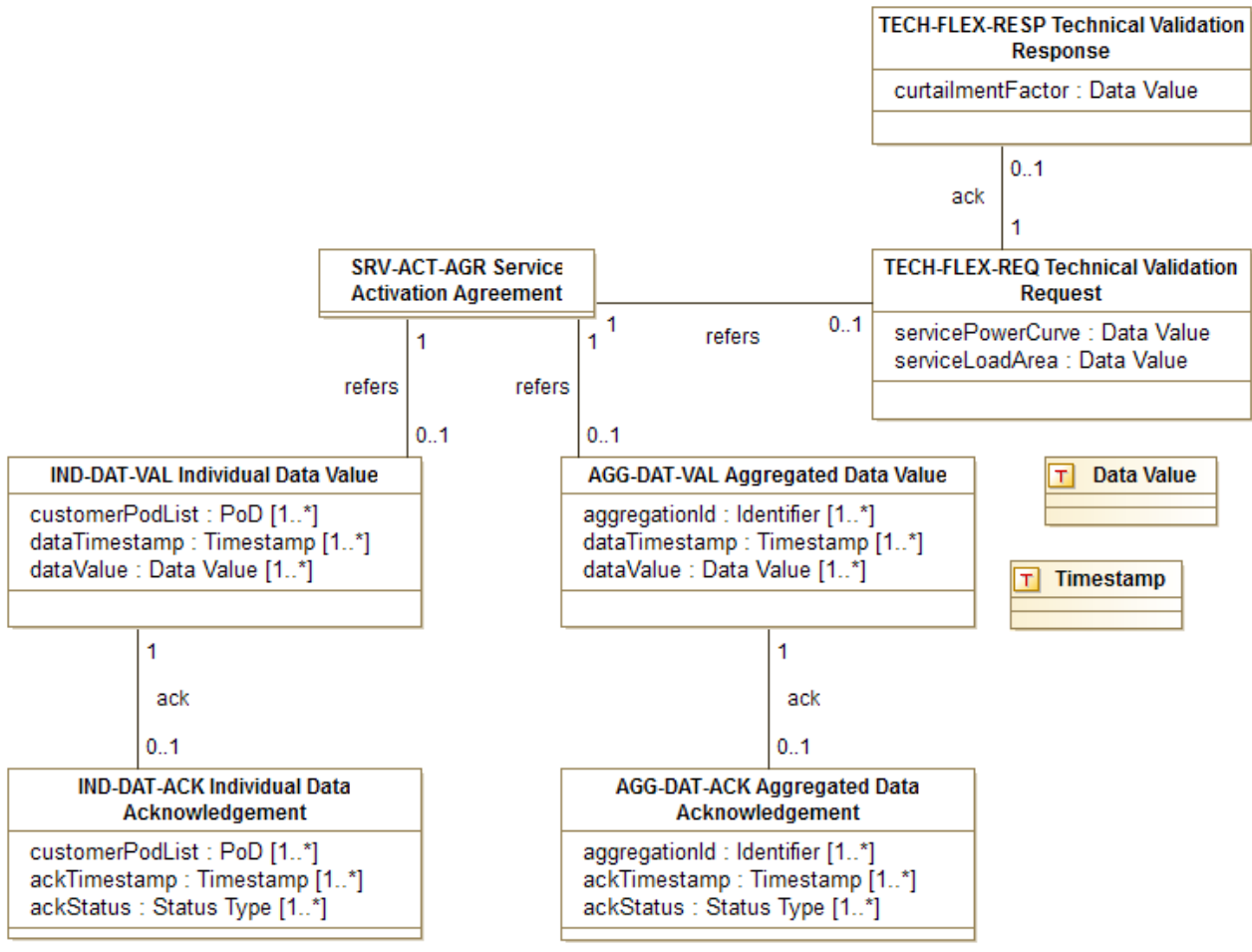


Figure 7: Service Provision

During service provision, data transfer is represented by Individual Data Value (IND-DAT-VAL) in case of individual data values and by Aggregated Data Value (AGG-DAT-VAL) in case of aggregated data. Acknowledgement of data reception data transfer is represented by Individual Data Acknowledgement (IND-DAT-ACK) in case of individual data values and by Aggregated Data Acknowledgement (AGG-DAT-ACK) in case of aggregated data. Request of technical validation is represented by Technical Validation Request (TECH-FLEX-REQ) and acknowledgement by Technical Validation Response (TECH-FLEX-RESP).

Individual Data Value (IND-DAT-VAL) is composed of time-stamped values originating from a list of points of delivery.

Individual Data Acknowledgement (IND-DAT-ACK) is characterized by the list of points of delivery acknowledged and, for each, time-stamped status.

Aggregated Data Value (AGG-DAT-VAL) is composed of time-stamped values gathered in a list of aggregates.



Aggregated Data Acknowledgement (AGG-DAT-ACK) is characterized by the list of aggregates acknowledged and, for each, time-stamped status.

Technical Validation Request (TECH-FLEX-REQ) is characterized by the power curve and the load area.

Technical Validation response (TECH-FLEX-RESP) is characterized by the curtailment factor.

New data types used in this data set are the following:

- Timestamp: string representing a UTC date in a standard format.
- Data Value: numerical value of the measured data in a standard format.

3. Business Objects

The purpose of this section is to give the complete list of all the Business Objects used by FLEXICIENCY components (Table 3).

BO ID	BO Short Name	BO Description
MKP-ADD	Market Place Location	Information needed to localize Market Place: - URI of platforms - Details (MKP-DES) - Users (MPL-AUT)
MKP-DES	Market Place Description	Information needed to describe Market Place: - Purpose - Legal Information - Contact Details - Stakeholder and Community - Help - Usage Condition - Location (MKP-ADD)
MPL-REG	Market Player Registration Data	Information needed to enroll to Market Place: - Market Player Identifier - Role (regulated data provider, unregulated service provider...) - Market Player Location (MPL-ADD) - Market Player Description (MPL-DES) - Accounts (MPL-AUT) - Service Offers (MKP-SRV-OFF) - Service Subscriptions (MKP-SRV-PUB)
MPL-ADD	Market Player Location	Information needed to localize Market Player: - URI of platform - Market Player Registrations (MPL-REG)



MPL-DES	Market Player Description	Information needed to describe Market Player: - Company Information - Contact Details - Company Type (energy regulated player, energy unregulated player ...) - Market Player Roles (MPL-REG)
MPL-AUT	Market Player Authentication Data	Information needed to connect to Market Place: - Authentication Data - Market Player Ref (MPL-REG)
MKP-SRV-OFF	Market Place Service Offer	Information needed to offer a Market Place service : - Service Offer Identifier - Service Type (individual data provision, aggregated data provision ...) - Service Supplier (MPL-REG) - Service Details (MKP-SRV-DES)
MKP-SRV-SUB	Market Place Service Subscription	Information needed to request a Market Place service : - Service Subscription Identifier - Service Type (individual data provision, aggregated data provision ...) - Service Requester (MPL-REG) - Service Details (MKP-SRV-DES)
B2B-SRV-SUB	B2B Service Subscription	Information needed to describe a B2B service subscription : - Service Subscription Identifier - Subscription Validation date - Service Provider (MPL-REG) - Service Requester (MPL-REG) - Data details - Processing details - Service Details (MKP-SRV-DES)
MKP-SRV-DES	Market Place Service Description	Information needed to describe Market Place service : - Short Description - Usage Details - Aggregation Level Type (Country, City, Street, ...) - Aggregation Method Type (sum, mean) - Quantity (energy consumption, energy generation, power, ...) - Period - Localization - Time Step - Customer Consent Mandatory (true, false) - Offer Ref (MKP-SRV-OFF) - Subscription Refs (MKP-SRV-PUB)





CUS-CON-DES	Customer Consent Description	Authorization given by Customer to DSO to transmit individual data to ESO <ul style="list-style-type: none"> - Consent ID - Customer ID - list of PoDs - Data details - Processing details - Consent validation date - Consent start date - Consent end date - DSO ref (MPL-REG) - ESO ref (MPL-REG)
CUS-CON-ACK	Customer Consent Acknowledgement	Acknowledgement of authorization given to DSO to collect or transmit individual data. <ul style="list-style-type: none"> - Customer ID - list of PoDs - Acknowledgment date - Consent Ref (CUST-CON-DES)
CUS-CON-REV	Customer Consent Revocation	Revocation of authorization given to DSO to collect or transmit individual data. <ul style="list-style-type: none"> - Customer ID - list of PoDs - Revocation date - Consent Ref (CUST-CON-DES)
DSO-REQ	Regulated Data Service Provider (as DSOs) Service Activation Request	Service activation request sent to Regulated Data Service Provider (as DSOs) : <ul style="list-style-type: none"> - Service Description Ref (MKP-SRV-DES) - Requester ID (MPL-REG) - Customer ID (PoD) set
DSO-CNF	Regulated Data Service Provider (as DSOs) Service Activation Confirmation	Service activation confirmation sent by Regulated Data Service Provider (as DSOs): <ul style="list-style-type: none"> - Activation Status (OK/KO/Partial) - Customer ID (PoD) set for service delivery (if Partial) (=> Not applicable for aggregated data)
USP-REQ	Unregulated Service Provider Service Activation Request	Service request sent to Unregulated Service Provider: <ul style="list-style-type: none"> - Service Description Ref (MKP-SRV-DES) - Requester ID (MPL-REG)
USP-CNF	Unregulated Service Provider Service Activation Confirmation	Service confirmation sent by Unregulated Service Provider: <ul style="list-style-type: none"> - Activation Status (OK/KO/Partial)
IND-DAT-SEL	Individual Consumption/ Generation Data Selection	Criteria defining the scope of individual data selection <ul style="list-style-type: none"> - Quantity type (Energy in kWh, Power in kW) - Period (Start date, End date) - Localization (Customer ID, POD) - Time step - Service Ref (MKP-SRV-DES)





AGG-DAT-SEL	Aggregated Consumption/ Generation Data Selection	Criteria defining the scope of selection of aggregated data - Aggregation Level - Aggregation Method - Quantity type (Energy in kWh, Power in kW) - Period (Start date, End date) - Localization (Customer ID, POD) - Time step - Service Ref (MKP-SRV-DES)
SRV-ACT-AGR	Service Activation Agreement	Agreement between ESO and DSO about service activation: - Agreement ID - POD set - Data details - Processing details - Agreement validation date - Agreement start date - Agreement end date - Service Ref (MKP-SRV-DES)
IND-DAT-VAL	Individual Consumption/ Generation Data Value	Individual consumption/generation data value: - POD - Timestamp - Consumption/generation data value
IND-DAT-ACK	Market Player Acknowledgement of Individual Data	Market Player confirmation after receiving individual data from DSO: - POD - Timestamp - Status
AGG-DAT-VAL	Aggregated Consumption/ Generation Data Value	Aggregated consumption/generation data value: - Aggregation ID - Timestamp - Aggregated consumption/generation data set
AGG-DAT-ACK	Market Player Acknowledgement of Aggregated Data	Market Player confirmation after receiving aggregated data from DSO: - Aggregation ID - Timestamp - Status
TECH-FLEX-REQ	Technical Validation Request	<ul style="list-style-type: none"> • Power curve of the service <ul style="list-style-type: none"> ○ Start time of service deployment. ○ List of power-time values defining the shape of the service to be deployed. ○ End time of the service deployment. • Topological information: load area
TECH-FLEX-RESP	Technical Validation Response	Curtailed factor (The curtailed factor is a fraction of the proposed flexibility exchange (also: ratio of the allowed flexibility exchange to the proposed one). It will be a non-negative number not greater than one) of DSO and TSO

Table 3: Business Objects (detailed view)





4. Interfaces

The purpose of this section is to specify the interfaces between FLEXICIENCY components.

Section 4.1 describes the interface for the Market Place System, section 4.2 the interface for the B2B interactions, and section 4.3 the interface for the B2C interactions.

4.1 Market Place Interface

The following table (Table 4) gives the list of the Business Objects exchanged with the Market Place System and the direction for these objects.

Data Set	Business Objects	Direction
Market Place and Market Players	MKP-DES - Market Place Description	Market Place -> Market Player
	MPL-REG - Market Player Registration	Both directions
	MPL-ADD - Market Player Location	Market Player -> Market Place
	MPL-DES - Market Player Description	Market Player -> Market Place
	MPL-AUT - Market Player Authentication	Market Player -> Market Place
Service Offer and Subscription	MKP-SRV-OFF – Market Place Service Offer	Both directions
	MKP-SRV-SUB – Market Place Service Subscription	Both directions
	B2B-SRV-SUB – B2B Service Subscription	Market Place -> Market Player
	MKP-SRV-DES – Market Place Service Description	Both directions

Table 4: Business Objects used in the Market Place interface

4.2 B2B Interface

The following table (Table 5) gives the list of the Business Objects exchanged in the B2B interactions and the direction for these objects.

Data Set	Business Objects	Direction
Customer Consent	CUS-CON-ACK – Customer Consent Acknowledgement	DSO-> Market Player
	CUS-CON-REV – Customer Consent Revocation	DSO-> Market Player
Service Activation	DSO-REQ – DSO Service Activation Request	Market Player -> DSO
	DSO-CNF – DSO Service Activation Acknowledgement	DSO-> Market Player
	USP-REQ – Unregulated Service Activation Request	Market Player -> DSO
	USP-CNF – Unregulated Service Activation Acknowledgement	DSO-> Market Player
	IND-DAT-SEL - Individual Data Selection	Both directions
	AGG-DAT-SEL - Aggregate Data Selection	Both directions
	SRV-ACT-AGR – Service Activation Agreement	Both directions
Service Provision	IND-DAT-VAL - Individual Data Value	DSO-> Market Player
	IND-DAT-ACK - Individual Data Acknowledgement	Market Player -> DSO
	AGG-DAT-VAL - Aggregate Data Value	DSO-> Market Player
	AGG-DAT-ACK - Aggregate Data Acknowledgement	Market Player -> DSO
	TECH-FLEX-REQ – Technical Validation Request	DSO-> Market Player
	TECH-FLEX-RESP - Technical Validation Response	Market Player -> DSO

Table 5: Business Objects used in the B2B interface

4.3 B2C Interface

The following table (Table 6) gives the list of the Business Objects exchanged in the B2C interactions and the direction for these objects.



Data Set	Business Objects	Direction
Customer Consent	CUS-CON-DES – Customer Consent Description	DSO-> Market Player
	CUS-CON-REV – Customer Consent Revocation	DSO-> Market Player

Table 6: Business Objects used in the B2C interface

5. Conclusions

The present document entitled “D2.3 – Data model and interfaces” reports the work produced in Task T2.3 of the FLEXICIENCY project.

We have introduced FLEXICIENCY motivation and the main definitions used in the project scope. The data model is divided into five sets, which describe the main parts of business interactions:

1. Market Place and Market Players,
2. Service Offer and Subscription,
3. Customer Consent,
4. Service Activation
5. Service Provision.

From those main data sets, 26 Business Objects have been generated. Detailed descriptions have been given of each of those objects. Finally, interfaces that must be supported between FLEXICIENCY components have been described.

The objects defined in this document represent guidelines to respect by the market place and the different demos in their interactions, in order to reach a standardization of common messages. WP4 and demo WPs designers and implementers will use this specification, together with the requirements listed in D2.2 document, to further refine data models and interfaces. Design and implementation choices must conform to this specification. This document may be amended during the implementation process, in case of adaptation issues to the technical environment.

6. References

6.1 Project Documents

FLEXICIENCY – DOA
 FLEXICIENCY – D2.1 - Definition of services and use cases description
 FLEXICIENCY – D2.2 - Definition of project overall system architecture

6.2 External Documents

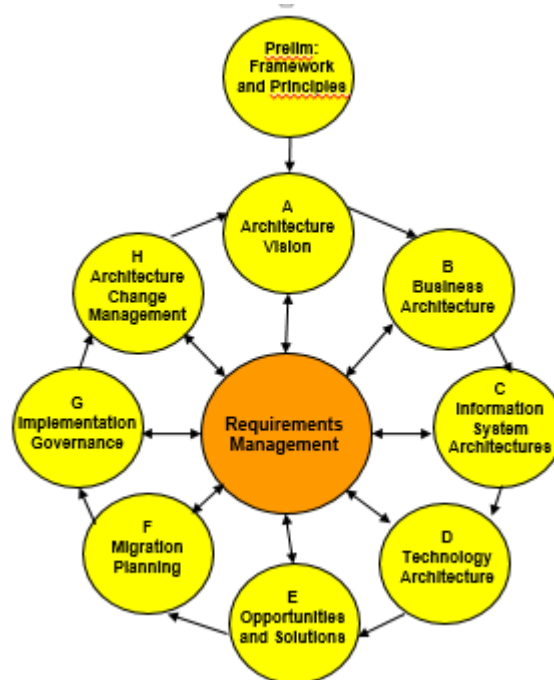
TOGAF®



Appendix

TOGAF Methodology

Data model and interfaces described in this document are defined according to the TOGAF methodology. TOGAF®, an Open Group Standard, is a proven enterprise architecture methodology and framework used by the world's leading organizations to improve business efficiency. It is the most prominent and reliable enterprise architecture standard, ensuring consistent standards, methods, and communication among enterprise architecture professionals. Enterprise architecture professionals fluent in TOGAF standards enjoy greater industry credibility, job effectiveness, and career opportunities. TOGAF helps practitioners avoid being locked into proprietary methods, utilize resources more efficiently and effectively, and realize a greater return on investment.



TOGAF Methodology

The core model of the system architecture provides a **data entity** concept (**business object**) which supports the creation of **data components**. Data components form a logical or physical encapsulation of abstract data entities into units that can be governed and deployed into applications.

The structure of data is **modeled independently** from its location, allowing data models to be developed that span multiple systems without being tied to physical concerns. Logical groupings of data can be used to set **governance, security, or deployment** boundaries around data, providing a much more holistic appreciation of data issues surrounding the architecture.