INSPIRE Extensions – Expert Workshop
Ispra – April 21st 2016

The GeoSmartCity Data model

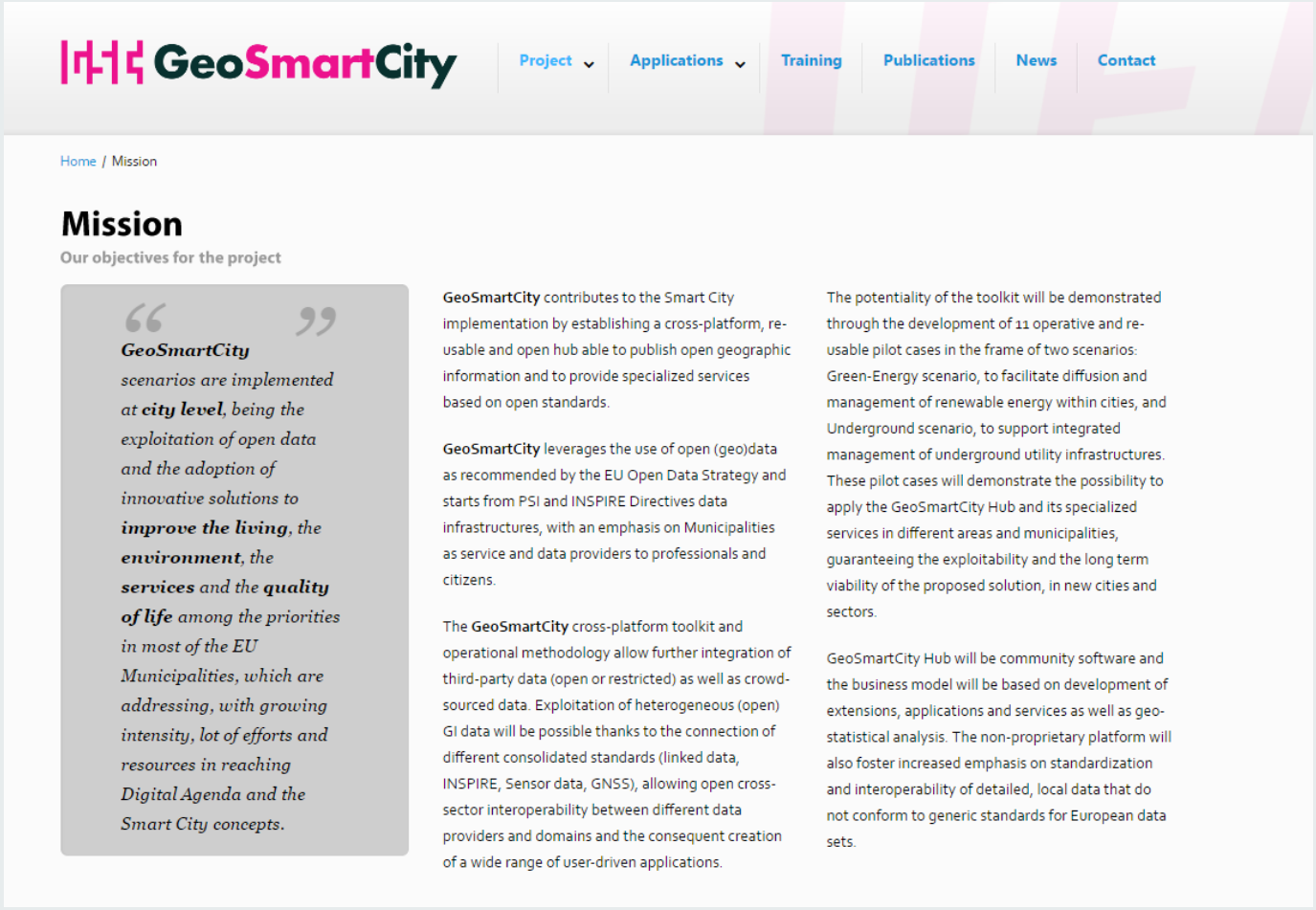
Stefania Morrone, Giacomo Martirano, Fabio Vinci
s.morrone@epsilon-italia.it, g.martirano@epsilon-italia.it, f.vinci@epsilon-italia.it

Summary

- The GeoSmartCity project
- The GSC Data models
  - Methodology for the production of the GSC data models
  - INSPIRE Data Specification extension approach
  - An insight into the GSC extended data models
  - Validation of extended schemas

The GeoSmartCity project

GeoSmartCity implements a platform for the sharing and publication of geographical open data coming from public administrations, companies, citizens.



Green-Energy scenario
to support implementation of energy efficiency policies lifecycle, with focus on energy performance of buildings.

Underground scenario
to support integrated management of underground utility infrastructures.

Methodology for the production of the GSC data models

Collect requirements

- Create a template file in order to collect the users' data modelling requirements in a structured way.
- Request each pilot to provide the list of information (attributes, code list ..) needed to run its use cases.

Analyse & Compare

- Align different pilots' data modelling requirements (whereas feasible, group requirements into common classes)
- Compare data requirements so collected to the relevant INSPIRE Data Specifications

Extend data models

- Provide an extension of the INSPIRE data models to take into account requirements not covered by the INSPIRE DS
- Provide detailed instructions for maintenance of the schemas and the revision loop

Validate results

- Successfully validate the produced schemas against encoding requirements using desktop (Oxygen) and online (OGC CITE test Suite) tools.

The INSPIRE DS extension approach

INSPIRE
Infrastructure for Spatial Information in Europe

INSPIRE Generic Conceptual Model

Title	D2.5: Generic Conceptual Model, Version 3.4
Status	Version for Annex II/III data specifications v3.0
Creator	Drafting Team "Data Specifications"
Date	2014-04-08
Subject	Generic Conceptual Model of the INSPIRE data specifications
Publisher	Drafting Team "Data Specifications"
Type	Text
Description	Generic Conceptual Model of the INSPIRE data specifications
Contributor	Members of the INSPIRE Drafting Team "Data Specifications", INSPIRE Spatial Data Interest Communities & Legally Mandated Organisations, INSPIRE Consolidation Teams and other Drafting Teams
Format	Portable document format (pdf)
Source	Drafting Team "Data Specifications"
Rights	Public
Identifier	D2.5_v3.4
Language	En
Relation	n/a
Coverage	Project duration

Annex F
(informative)

Example for an extension to an INSPIRE application schema

F.1 Introduction

The agreement on harmonised data specifications addresses the need of users, in particular pan-European users, to combine multiple spatial data sets without repetitive manual intervention and in such a way that the result is coherent. This requires an effort to transform the existing spatial data to the new harmonised data specifications. In the long-term, it is the hope that less and less effort will be required for such transformations and that data providers start to re-use the harmonised data specifications as the basis for their spatial data sets in case they are restructured. Since national spatial data sets will in almost all cases contain information not covered by the INSPIRE data specifications, national SDIs or community SDIs will typically have to extend the INSPIRE data specification for their own purpose.

The Generic Conceptual Model has been designed to support such extensions. This annex provides an example for a simple extension.

F.2 General rules

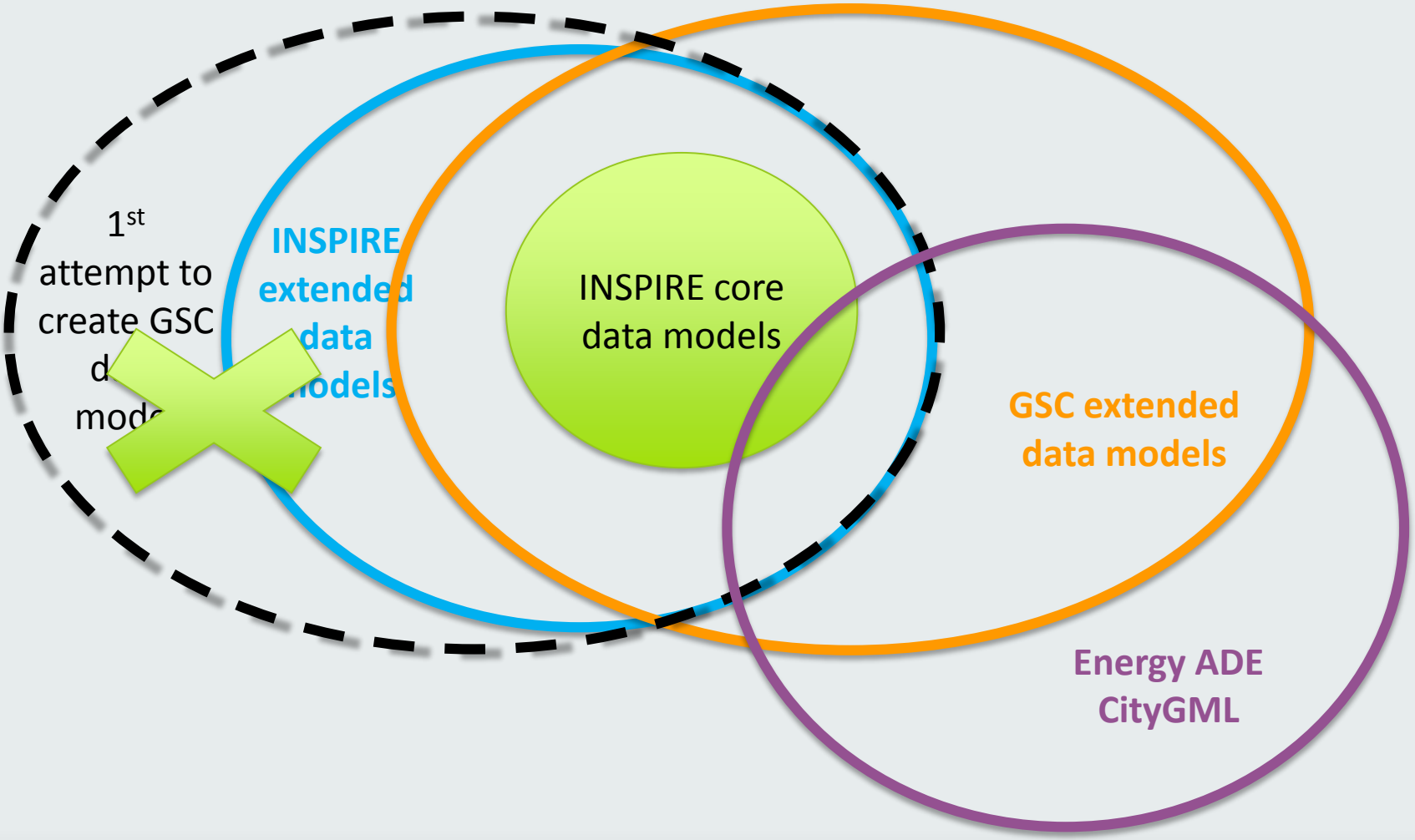
The INSPIRE data specifications have been developed through a process involving the European stakeholders. While the future maintenance of the specifications has not yet been fixed, it is reasonable to assume that this will be the case in the future, too. The INSPIRE

Extending an INSPIRE data specification would imply at a minimum that:
- the extension does not change anything in the INSPIRE data specification but normatively references it with all its requirements
- the extension does not add a requirement that breaks any requirement of the INSPIRE data specification

However, the extension may, for example, do any of the following:
- add new application schemas importing INSPIRE or other schemas as needed
- add new types and new constraints in your own application schemas
- extend INSPIRE code lists as long as the INSPIRE data specification does not identify the code list as a centrally managed, non-extensible code list
- add additional portrayal rules

In addition to these general rules that are mainly implied by the rules of UML, further harmonisation will be achieved, if the extensions conform to all requirements of this document and the document "Guidelines for the encoding of spatial data", too.

The GSC Data Model extension approach



The GSC Data Model extension approach

Starting point: relevant INSPIRE core schemas.

Steps of the development process:

- INSPIRE matching tables were used to identify the corresponding concepts (attributes, associations, code lists) between INSPIRE and GeoSmartCity data models.
- Enterprise Architect software tool was used to create the logical model using UML class diagrams and to transform them into relevant application schemas. To extend the INSPIRE schemas the relevant INSPIRE themes were imported into the GSC data model in the EA project.

The GSC Data Model extension approach

To comply with GSC requirements for which no matching attributes were found in the INSPIRE schemas:

- additional attributes were added in GSC feature types derived from the INSPIRE feature types via a generalization relationship in the application schemas (when feasible).
- new feature types – i.e. not derived from INSPIRE ones – were added to deal with concepts not present in INSPIRE
- new code lists / code list values were created only if no corresponding INSPIRE value exists. A registry has been created for GSC codelists at http://hub.geosmartcity.eu/registry/

GeoSmartCity - Underground Scenario Data Model

The GeoSmartCity Utilities and Governmental Services data model inherits the core **INSPIRE** data model for **Utilities and Governmental Services** and extends it by means of:

- **1 "New Common Types" application schema**, which contains definitions for feature types and data types which are not present in the INSPIRE core and that are common to all GSC- extended US schemas
- **6 *network-specific extended* application schemas** ,which extend INSPIRE core US feature types adding new attributes and relevant code clist / codelist values:
    - Electricity network
    - Oil, Gas & Chemicals network
    - Sewer network
    - Telecommunications network
    - Thermal network
    - Water network
- **1 *theme-specific extension*** of the Base Model "Activity Complex" application schema according to what stated by D2.10 "The types defined in the Base Model *Activity Complex* are supposed to be extended in the related thematic data specifications

Extension of INSPIRE Utilities and Governmental Services (US) - *"Utility networks"* sub-model

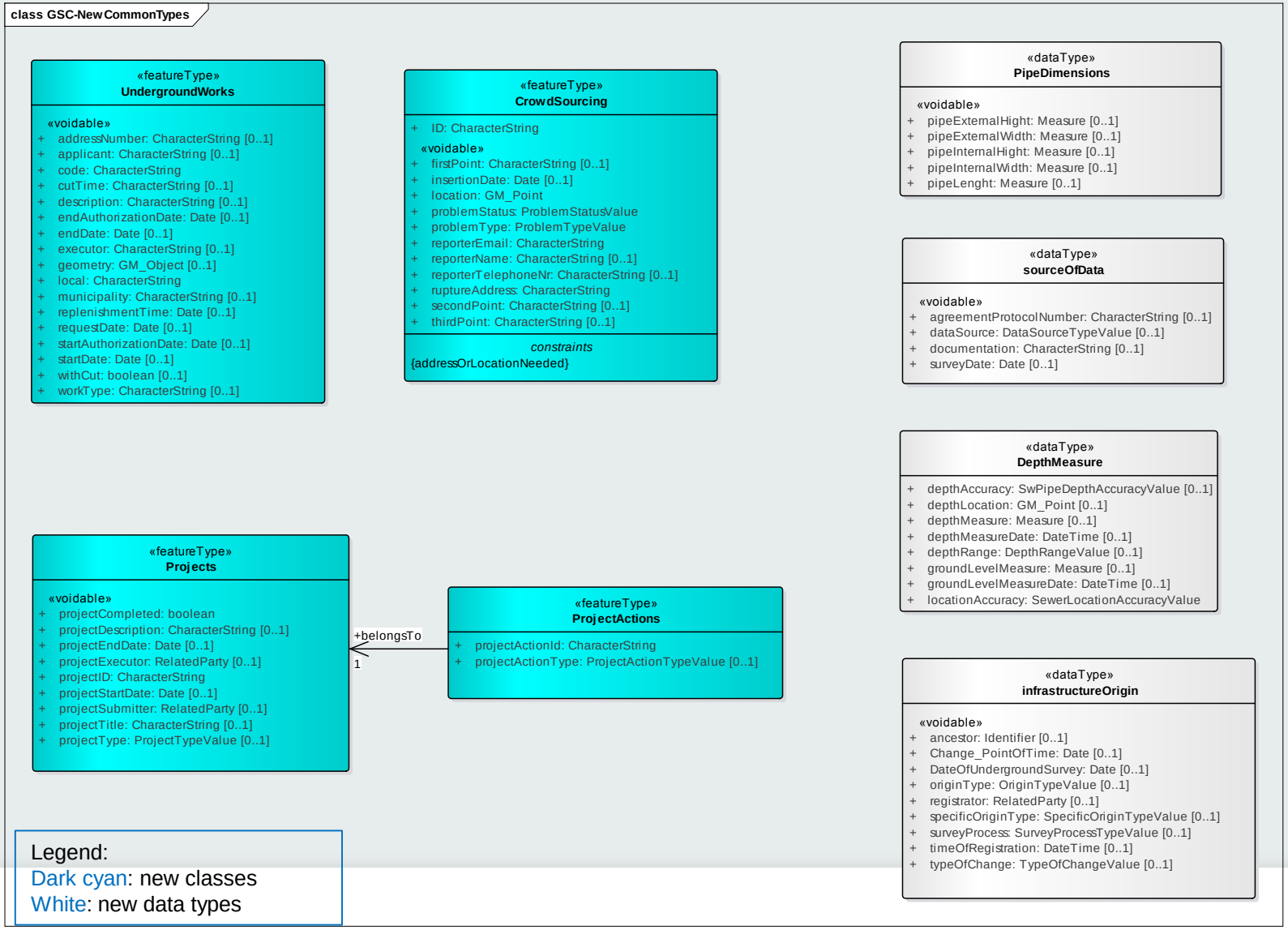
Focus on the Italian use cases:

- GSC data modelling process contributed in the studies which led to the alignment of the National Specification on Utility networks to INSPIRE Directive requirements.
- GSC extends INSPIRE so that information included in National Specifications which does not correspond to any element in the INSPIRE models is taken into account.

Focus on the Flanders Region use cases:

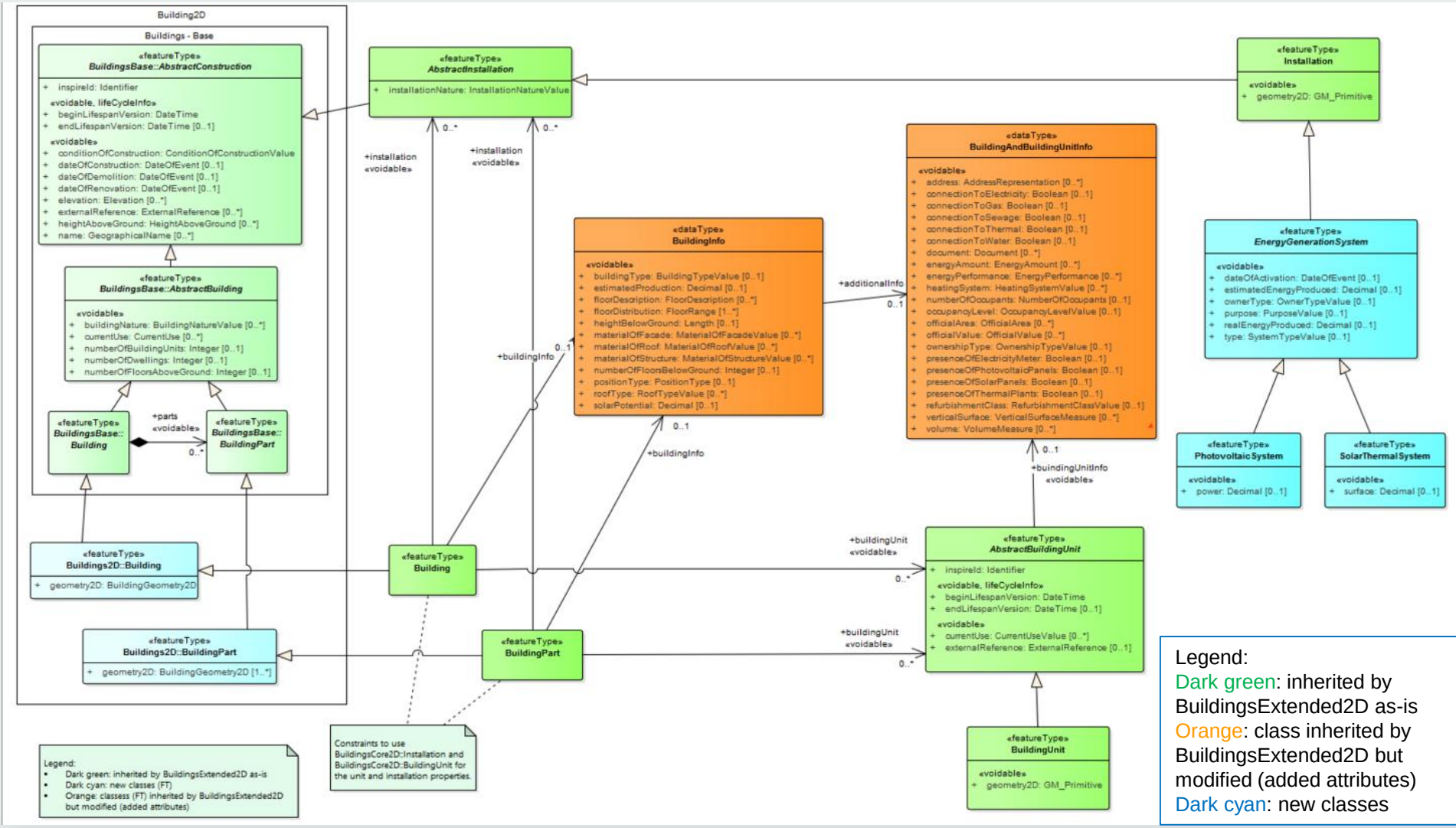
- GSC data model extends INSPIRE US data model taking into account the information needed by Flanders sewer network management (Aquafin's AQS2.0 data model which in turn is derived from IMKL)

“New Common Types” application schema



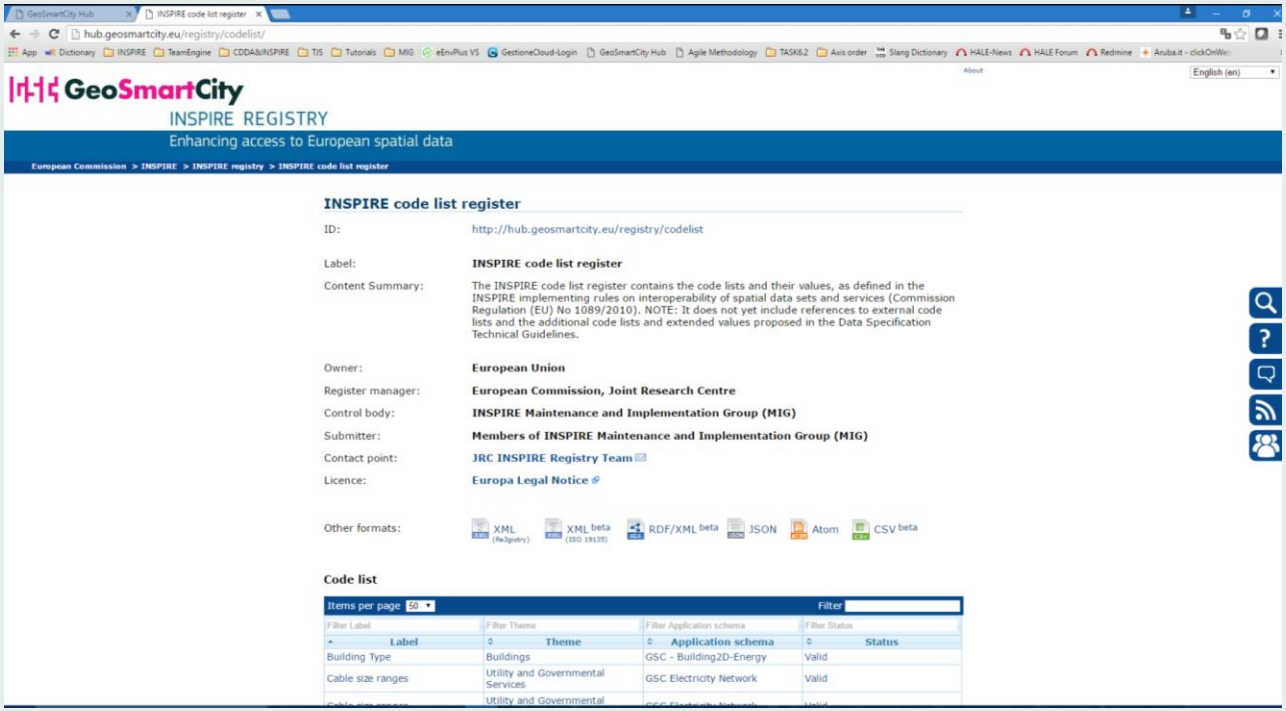
Legend:
Dark cyan: new classes
White: new data types

GeoSmartCity – Green Energy Scenario Data Model



Legend:
Dark green: inherited by BuildingsExtended2D as-is
Orange: class inherited by BuildingsExtended2D but modified (added attributes)
Dark cyan: new classes

GeoSmartCity – code lists management



The Re3gistry open source software has been reused in order to manage new code lists and/or code list values.

THANK YOU!

QUESTIONS?