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Category:TG MTS

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This is the *category*-article for the **Technical guidance on the Model Test Suite (MTS v.2.0) for the Land Parcel Identification System.** DS/CDP/2016/04-part A. The Model Test Suite (MTS) investigates metadata and evaluates the application schema against the LPIS core model (LCM) provided by DG JRC.

- A draft guidance MSword document was distributed and presented on the DPMM on June 28th, 2016.
- Important edits since that draft are coloured in maroon colours.
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Natasa (talk) 13:30, 11 July 2016 (CET)

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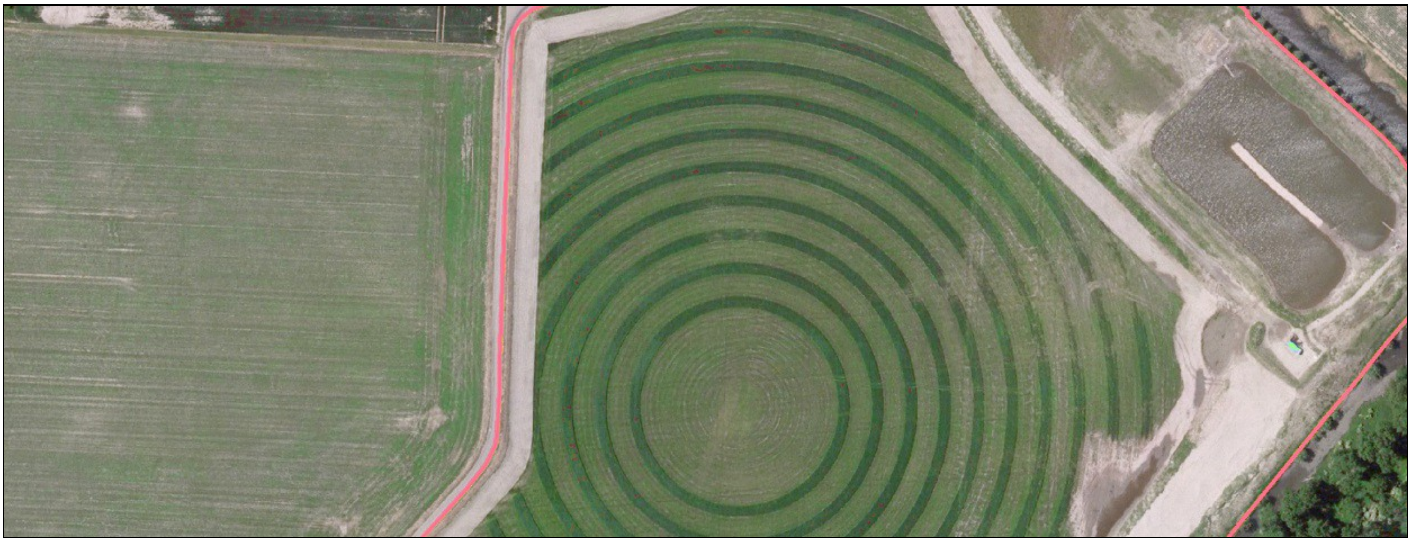
JRC VALIDATED METHODS, REFERENCE METHODS AND MEASUREMENTS REPORT



Model Test Suite v.2.0

Assessment Methodology

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2016

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Abstract

The quality assessment framework of Land Parcel Identification System (LPIS) is an integral part of LPIS management and upkeep processes. In this framework, the LPIS of a Member State or Region is regarded as a implementation under test (IUT), which is composed of two major components: the local application schema and the data records stored in the system. Both components are inspired by the methodology of conformance testing. The Model Test Suite (MTS) investigates metadata and evaluates the application schema against the LPIS core model (LCM) provided by DG JRC. The LCM is the application schema used for defining data value tests of the Executive Test Suite (ETS). The testing procedures are based on ISO standards (19105:2000) and are driven by the traditional best practice examples of the European LPIS community.

3 TG MTS

This article is the starting page of **Technical guidance on the Model Test Suite (MTS v.2.2) for the Land Parcel Identification System. DS/CDP/2016/04-part A**. The Model Test Suite (MTS) investigates metadata and evaluates the application schema against the LPIS core model (LCM) provided by DG JRC.

You can print this technical guidance on the fly.

4 TG MTS Introduction

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4.1 Release notes - July 2019

There are no changes in the MTS methodology and workflow, but in the number of executive tests (to accomodate Art. 32(2)(b) of R1307/2013). All edits are highlighted in Maroon colour.

- A set of executable test is introduced in Table 1 to test the model properties in relation to the eligible non-agricultural land cover (Art. 32(2)(b) of R1307/2013) The total number of executable test cases is changed to 47
- The name of the abstract test ?codeListEnumerationCompleteness? is changed to ?extendedCodeList? for consistency with the XML schema of the MTS log.
- Section 6.1: Footnote is added that INSPIRE metadata technical guidelines (INSPIRE Metadata Drafting Team 2013) was updated with the new version from 2017 (INSPIRE MIG subgroup for action MIWP-8 2017), but not yet implemented in the MTS.
- Links to LPIS registry were updated
- The alternative delivery of MTS-log as excel worksheet has been abolished. Section 8.3 deleted.

4.1.1 1.1 Background

This document presents the technical guidance on the Model Test Suite (MTS) for the Land Parcel Identification System.

This TG MTS is the successor of the 2010 ATS; the main differences with its predecessor are:

- Implementation decisions and choices are targeted in an explicit and structured TG IXIT.
- The LCM has been upgraded to incorporate the requirements of the 2013 CAP reform. This introduced a number conceptual elements (e.g. relating to EFA, differentiation of agriculture land), which, if not in scope of the annual data assessment, are ignored for this MTS.
- With the introduction of structured upkeep reporting in ETS v6.0, feature metadata elements have been added
- The testing environment has migrated from worksheet to a GI exchange environment. Despite the risk associated with redundancy, the worksheet is kept as an alternative.
- Relevant system metadata has been introduced, referencing to selected elements of the INSPIRE implementing rules on metadata and orthoimagery.

4.1.2 1.2 Scope

The Model Test Suite serves to document every individual LPIS implementation so that it can correctly perform and report the data value testing procedures of the annual quality assessment. It is therefore an essential part of the LPIS QA framework.

The MTS, as a TG document, covers three distinct aspects of the LPIS implementation.

- The choices made regarding source data, stakeholder role and other options implied by the CAP Regulations.
- The data model elements that relate to relevant feature data and metadata values specified in the LCM.
- The system metadata that relates to selected metadata of the INSPIRE implementing rule on metadata.

Under this scope, the document provides a comprehensive series of questions and/or tests, often based on conformity testing, to the answers necessary for a correct understanding of the various LPIS implementations, developed to address the common requirements in the CAP regulations and their supporting guidance documents.

For the data value aspects, this technical guidance sets up the abstract and executable test cases that identify all data elements necessary for the data quality assessment. It does so by describing the content and steps of the conformance testing process of the local LPIS implementation against the LCM.

The LPIS Core Model (LCM) has been designed considering the regulatory requirements, best practices and interoperability challenges in geographic information. The conformity testing verdict is not the objective of this TG MTS, the goal is to record a common and complete description, as required for the LPIS QA reporting and screening.

The modelling technique used by TG MTS is two tiered:

- It defines a standardized Abstract Tests Suite (ATS) for testing an individual application schema against the LCM. Such conformance can be claimed for any LPIS implementation and data set.
- It provides input guidelines for a series of executable test cases relevant for the LPIS QA reporting, which tests the data and concentrates on such data quality elements as completeness, thematic and temporal accuracy.

4.1.3 1.3 Terms and definitions

Term	Definition (ISO/TC211 2000)
abstract test suite (ATS)	Set of abstract test cases specifying all the requirements to be satisfied for conformance.
abstract test case	Generalized test for a particular requirement. NOTE. An abstract test case is a formal basis for deriving executable test cases. One or more test purposes are encapsulated in the abstract test case. An abstract test case is independent of both the implementation and the values. It should be complete in the sense that it is sufficient to enable a test verdict to be assigned unambiguously to each potentially observable test outcome (i.e. sequence of test events) application schema conceptual schema for data required for one or more applications [ISO19101].
basic test	Initial capability test intended to identify clear cases of non-conformance.
capability test	Test designed to determine whether an Implementation Under Test (IUT) conforms to a particular characteristic of an International Standard as described in the test purpose.
conformance	Fulfillment of specified requirements.
conformance testing	Testing of a product to determine the extent to which the product is a conforming implementation.
conformance test report	summary of the conformance to core elements as well as all the details of the testing that supports the given overall summary conforming.
implementation	Implementation which satisfies the requirements.
executable test case	specific test of an implementation to meet particular requirements. NOTE Instantiation of an abstract test case with values.
executable tests suite (ETS)	Set of executable test cases.
feature	Abstraction of real world phenomena [ISO 19101]. EXAMPLE. The phenomenon named ?Eiffel Tower? may be classified with other similar phenomena into a feature type ?tower?.

feature association	Relationship that links instances of one feature type with instances of the same or a different feature type.
feature attribute	characteristic/properties of a feature
feature catalog	Catalog containing definitions and descriptions of the feature types, feature attributes, and feature associations occurring in one or more sets of geographic data, together with any feature operations that may be applied.
non-conformance	Failure to fulfill one or more specified requirements.

4.1.4 1.4 Abbreviations

Abbreviation	Definition
MTS	Model Test Suite
ATS	Abstract Test Suite
ETS	Executable Test Suite
IUT	Implementation Under Test
IXIT	Implementation eXtra Information for Testing
ICS	Implementation Conformance Statement
SUT	System Under Test
CAP	Common Agricultural Policy
IACS	Integrated Administration and Control System
MS	Member State
LPIS	Land Parcel Identification System
LCM	LPIS Core Model
MBT	Model Based Testing
UML	Model
XML	Unified Modelling Language
XSD	Extensible Markup Language
GIS	Geographic Information System
DB	Data base
RDBMS	Relational Database Management System
QAF	Quality Assessment Framework
TG	Technical Guidance
GDB	Geographical Data Base
GUID	Globally Unique IDentifier

4.1.5 1.5 Related documents

- Annex X: MTS 2.0 - TG IXIT https://marswiki.jrc.ec.europa.eu/wikicap/index.php/TG_IXIT
- INSPIRE METADATA IMPLEMENTING RULES http://inspire.ec.europa.eu/documents/Metadata/MD_IR_and_ISO_20131029.pdf
- INSPIRE Data Specification on Orthoimagery http://inspire.ec.europa.eu/documents/Data_Specifications/INSPIRE_DataSpecification_OI_v3.0.pdf
- LPIS schema registry: http://lpis.jrc.ec.europa.eu/registry/6.4.0/
- Location of the MTS test schema registry: https://lpis.jrc.ec.europa.eu/registry/6.4.0/
- TG ETS (v6.0), https://marswiki.jrc.ec.europa.eu/wikicap/index.php/LPIS_TG_ETS
- UML model of the Model Test Suite (v 2.2): https://lpis.jrc.ec.europa.eu/GTCAP/ModelTestSuite/index.htm
- UML model of the IXIT: https://lpis.jrc.ec.europa.eu/GTCAP/Ixit/index.htm
- UML model of the system metadata: https://lpis.jrc.ec.europa.eu/GTCAP/Metadata/index.htm
- Guidance on the Land Parcel Implementation system (LPIS): https://marswiki.jrc.ec.europa.eu/wikicap/index.php/Main_Page
- Guidance on aid application and payment claims: https://marswiki.jrc.ec.europa.eu/wikicap/index.php/Main_Page
- Technical guidance on management of layers in LPIS: https://marswiki.jrc.ec.europa.eu/wikicap/index.php/Category:LPIS_TG_MLL
- Technical guidance on LPIS update: https://marswiki.jrc.ec.europa.eu/wikicap/index.php/Category:TG_update

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5 TG MTS Conformance testing methodology

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An abstract test suite (ATS) has a hierarchical structure consisting of abstract test cases that may be arranged in abstract test modules. An executable test suite (ETS) is an instantiation (=operational case) of an ATS, after specific values to all implementation-dependent parameters have been assigned. Each executable test case (within an ETS) is derived from an abstract test case (within its ATS) and so formulated that it can be run on the IUT. Examples are provided in ?Example of result analysis? chapter of this document.

In the LPIS QA framework such ATS-ETS interaction is theoretically applied twice

- For the model test suite (subject of this document TG MTS), where the common model ATS may need to be instantiated by each LPIS implementation into an individual ?model ETS?.
- For the data test suite, where the data ATS was not published but a common data ETS was directly published under the name TG ETS.

To ensure continuity with the past documentation, the short name ?ETS?, whenever unspecified, always refers to the common ?data ETS? described in TG ETS.

The (conformance) assessment process involves four phases as shown in Figure 1 (ISO/TC211 2000):

- preparation for testing;
- testing campaign;
- analysis of results;
- (conformance) test report.

All phases of the testing campaign that constitute the model-based testing (MBT), and are compiled within the given Model Test Suite (MTS), are addressed in this document.

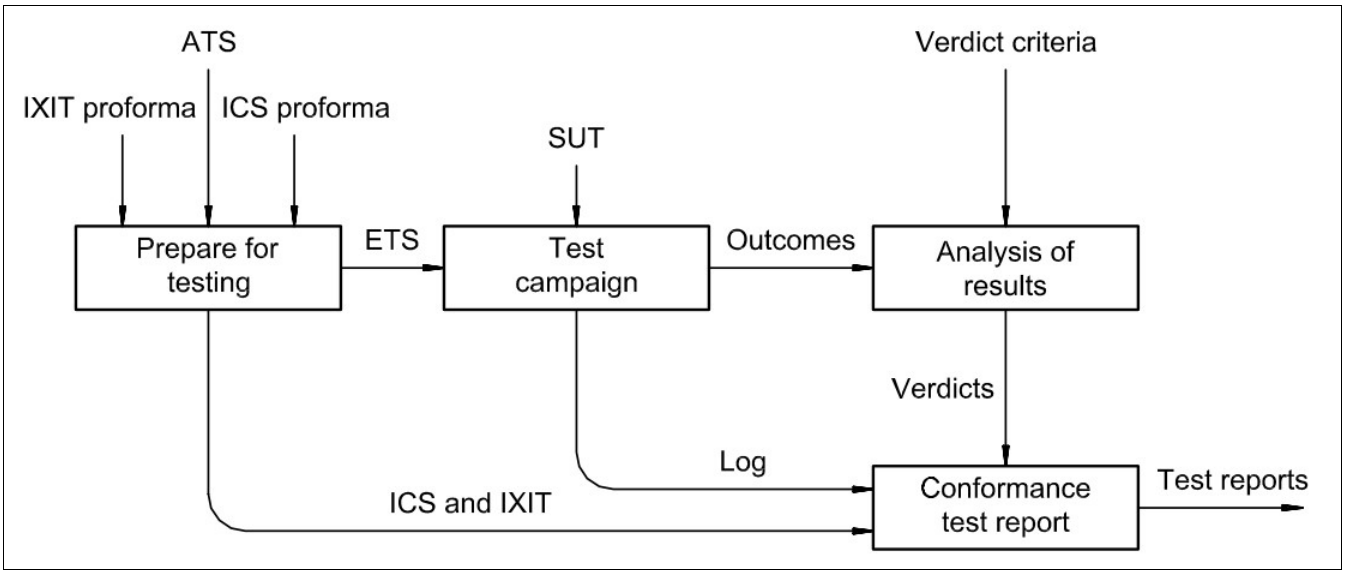

Figure 1: Conformance assessment process overview (ISO/TC211 2000)

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6 TG MTS Preparation for the testing

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6.1 3.1. Preparation for the testing

The preparation for the testing phase should involve the following activities:

- production of administrative information;
- production of ICS and IXIT for testing;
- identification of test: name, purpose, method, type, testing type and ATS (Figure 2);
- definition of executable tests adapted to the IUT by selection of initial executive test cases (see point 5.1.4) derived from the abstract test cases and assignment of parameter values based on the ICS and the IXIT;
- setting up hierarchy and unique identifiers for the abstract and executable test cases ;
- preparation of the SUT (NOTE This enables a client to run executable test cases on the IUT before presenting the IUT for the test campaign);

6.1.1 3.2 IXIT proforma

The Implementation eXtra Information for Testing is a statement containing all of the information related to the implementation under test (IUT) and its corresponding system under test (SUT) which will enable the testing laboratory to run an appropriate test suite against that IUT and perform correct analysis afterwards. An IXIT typically provides the details on the organization and storage of concepts in the SUT as well as on the means of access to and modification of the SUT.

In the context of LPIS QA, The IXIT probes into eight implementation options that any LPIS custodian must have made at one point to address the choices or options offered by the Regulations:

- The author/actor of the primary boundary of the reference parcel. The primary boundary or perimeter represents the land corresponding to the reference parcel identifier. The outcome defines the reference parcel type
- The process that lead to the delineation of the physical borders of the agricultural land to be used as maximum eligible area.
- The way the eligible landscape features, if applicable, have been adjudicated to the reference parcel
- The processing of the spatial themes above to assemble a maximum eligible area for each individual reference parcel perimeter
- The application of pro rata reduction of permanent grasslands with scattered ineligible features
- The validation and documentation of the required positional accuracy requirements.

These issues are addressed under IXIT rather than the ICS below or than metadata because the IXIT results play an important role in the inspection procedures and automatic screening of the annual data value tests.

The procedure to test, document and report these 8 choices are described in the separate document: annex X TG IXIT. Please follow the instructions of this TG IXIT in Annex X.

6.1.2 3.3 ICS proforma

The implementation conformance statement (ICS) provides a statement of the options available in the LCM which have been adopted by a particular implementation. The ICS provides a better understanding of the LPIS implementation under test (IUT) and helps to identify the boundaries of the testing domain. ICS can describe the specific options implemented in the IUT that serve as a basis for the adaptation of the initial executable test cases (see point 5.1.4). These relevant options are only those specified within the framework of requirements in the LCM.

Since the particular implementation options can be reflected in the revised executive test cases, the provision of the ICS document is optional.

6.1.3 3.4 Other IXIT/ICS-related information components

There are two other LPIS QA information components that are not in the scope of the IXIT and ICS, but are part of the MTS 2.0 since they provide other essential information on the choices and lineage regarding the IUT:

- The eligibility profile which provides an LCML -compatible catalogue of the land cover classes deemed eligible by the LPIS custodian. The eligibility profile methodology and format are described in Annex III of the TG ETS.
- Metadata on the source and reference datasets involved in the assemblage of the reference parcel with respect to perimeters and borders (see Annex X IXIT). This particular metadata is sufficiently structured by the INSPIRE implementing rules on metadata and the relevant data specifications. The selected metadata elements relevant for MTS are given in tables 2 and 3, as well as separately in Annex XI (MTS log).

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7 TG MTS Model ATS - Abstract Test Suite

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A model ETS is produced as a result of selecting abstract test cases and assigning parameter values based on the model ATS. At this point, the IUT and the scope of the conformance assessment process are fixed and cannot be changed subsequently.

The scope of this TG MTS covers 3 abstract test cases (model ATS) upon which initial executable test cases (model ETS) are proposed. These abstract test cases are strictly within the LCM scope. They are design based on the assumption that the IUT and the correspondent SUT are well documented (feature catalogue, conceptual model, system implementation and architecture, database structure, etc.). Separate ?system definition? tests, dedicated to check the availability of the relevant documentation and retrieve information about the MS?s system (unrelated to LCM), are not required for this version of the MTS (v2.0).

The naming of the 3 abstract test cases is quite self-explanatory on their intended purpose:

- featureTypeCompletness ? check for availability all required features types
- attributeTypeCompleteness ? check for the availability of all require attributes for a given feature type
- extendedCodeList ? check for availability of a complete list of values in the required code list

A set of 47 initial executable test cases has been proposed to test model properties regarding 4 LCM entities. For the purpose of the data testing of the annual quality assessment, only these four entities are relevant.

- ReferenceParcel
- AgriculturalLand, including the NonAgriEligibleLand
- LandscapeFeature
- Anomaly

A test log report template (ModelTestSuite.XML) is derived from a regular, standard application schema (ModelTestSuite.XSD), using an UML class diagram (Figure 2).

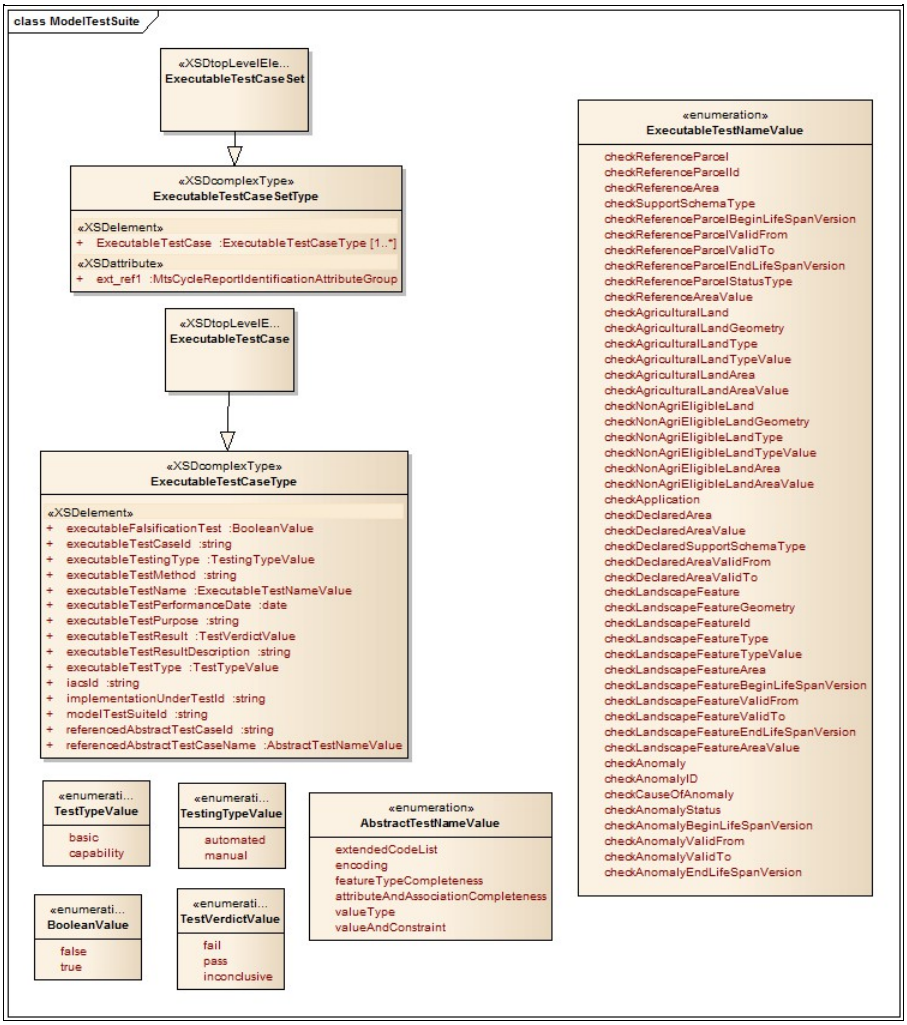

Figure 2: Application schema ModelTesSuite.XSD

These 47 executable test cases derived from the 3 abstract test cases have been prepared by DG JRC without providing a hierarchy of the tests. The specific hierarchy depends on the SUT implementation options. Although initial descriptions for each executable test case have been prepared by DG JRC, some of these descriptions can be considered as indicative. MS can adapt them depending on their system. The resulting hierarchy, IUT, identifiers, descriptions of methods and purposes together with the applicable parameters should be extensively documented by MS.

In addition to the diagram in Figure 2, all 3 abstract and all 47 executable test cases are provided in Table 1 below. The names of columns are derived from application schema (ModelTesSuite.XSD) directly. The exact element description can be retrieved by the online http://lpis.jrc.ec.europa.eu/CAP_IACS/index.htm (European Commission DG JRC 2015); simply remove the string ?check? from the mnemonic name of executable test case name below (Executable Test Case Name column).

E.g. For the executable test case name ?checkreferenceArea? the corresponding element in LCM online will be ?referenceArea?. All descriptions of each element then can be found by navigating within it in LCM.

In Table 1 there is no column ?Executable test method?. This is on purpose as to avoid redundancy in the table, as it implied by the column ?executable test type?. There is only one method for all executable test cases within TG MTS which is the capability test.

This capability test performs a source (LCM) to target (SUT) element mapping, identifies the model element in the SUT that corresponds to the specified LCM element. If a correspondence is found or if there is a documented evidence that for the given IUT this element is not applicable (case of landscape features), the test will pass and the names of corresponding element(s) or evidences shall be documented in the test result.

The feature elements expected to be present in any IUT, are the Reference parcel, the Agriculture Land (including the Non Agricultural Eligible Land), Aid Application, and Anomaly. If any of these elements is absent in the SUT, the test will fail. The presence feature elements Landscape Feature is optional, depending on the choices made by the EU Member State.

Table 1: The list of abstract and executable test cases. Each test case has its purpose, type and example of result description (in case test verdict ? ?Pass?).

ID	executableTestName	referencedAbstractTestCaseName	executableTestPurpose	executableTestType	executableTestResultDescriptio (example of a test outcome; give values should be considered not exhaustive and purely indicative
10	Group of tests related to the Reference Parcel feature type				
1210	checkReferenceParcel	featureTypeCompletness	Check availability of corresponding LCM ReferenceParcel element within SUT.	Capability test	Result description e.g. there is a class named "referenceParcel" GDB (LPIS)
1411	checkReferenceParcelId	attributeAndAssociationCompleteness	Check availability of corresponding attribute field in LCM ReferenceParcel element within SUT.	Capability test	Result description e.g. feature cl "referenceParcel" within GDB ha attribute field "RPId" (thematic identifier or GUID)
1412	checkReferenceArea	attributeAndAssociationCompleteness	Check availability of corresponding attribute field in LCM ReferenceParcel element within SUT.	Capability test	Result description e.g. feature cl "referenceParcel" within GDB ha attribute fields "BPS area", "SAP "NATURA 2000 area"
1413	checkSupportSchemaType	attributeAndAssociationCompleteness	Check availability of corresponding attribute field in LCM ReferenceParcel element within SUT.	Capability test	Result description e.g. "SupportSchema" domain in GD following values: "BPS", "SAPS a "NATURA 2000", "young farmer scheme"; "small farmer scheme given reference parcel, there is a specific maximum eligible area v each of the support schemes de
1414	checkReferenceParcelBeginLifeSpanVersion	attributeAndAssociationCompleteness	Check availability of corresponding metadata for LCM ReferenceParcel element within SUT.	Capability test	Result description e.g. "InitialDa attribute within "referenceParce in GDB.
1415	checkReferenceParcelValidFrom	attributeAndAssociationCompleteness	Check availability of corresponding metadata for LCM ReferenceParcel element within SUT.	Capability test	Result description e.g. "Efectivel attribute within "referenceParce in GDB.
1416	checkReferenceParcelValidTo	attributeAndAssociationCompleteness	Check availability of corresponding metadata for LCM ReferenceParcel element within SUT.	Capability test	Result description e.g. "EndEfectiveDate" attribute with "referenceParcel" table in GDB.

1417	checkReferenceParcelendLifeSpanVersion	attributeAndAssociationCompleteness	Check availability of corresponding metadata for LCM ReferenceParcel element within SUT.	Capability test	Result description e.g. "EndDate attribute within "referenceParce in GDB.
1418	checkReferenceParcelStatusType	attributeAndAssociationCompleteness	Check availability of corresponding metadata for LCM ReferenceParcel element within SUT.	Capability test	Result description e.g. "Status" a within "referenceParcel" table in
1519	checkReferenceAreaValue	ValueTypeCompleteness	Check availability of corresponding value type for attribute field in LCM ReferenceParcel element within SUT.	Capability test	Result description e.g. The value the maximum eligible area in att fields "BPS area", "NATURA 2000 of the feature class "RreferenceP are stored in **hectares**. The data "double". Note: The minimum information required is: (1) the t unit used for the area values; (2) data type of the attribute field, t with the precision if applicable.
20	Group of tests related to the BPS/SAPS layer feature types				
1220	checkAgriculturalLand	featureTypeCompletness	Check availability of corresponding LCM Agriculture Area element within SUT.	Capability test	Result description e.g. there is a feature class named "agriculture within GDB (LPIS)
1421	checkAgricultureLandGeometry	attributeAndAssociationCompleteness	Check availability of geometric representation for the LCM Agriculture Area element within SUT.	Capability test	Result description e.g. feature cl named "agriculture area" has/ha geometry. The geometric representation used for all classe polygon.
1422	checkAgriculturalLandType	attributeAndAssociationCompleteness	Check availability of corresponding attribute field in LCM Agriculture Area element within SUT.	Capability test	Result description e.g. "AgriculturalArea" domain assign "AgriculturalAreaType" field with feature class “ReferenceParcel”.
1323	checkAgriculturalLandTypeValue	extendedCodeList	Check the completeness of the code list for the corresponding attribute field of LCM Agriculture Area element within SUT.	Capability test	Result description e.g. "AgriculturalArea" domain in GD following values: “ArableLand”, "PermanentCrop"; "PermanentGrassland"

1424	checkAgriculturalLandArea	attributeAndAssociationCompleteness	Check availability of corresponding attribute field in LCM Agriculture Area element within SUT.	Capability test	Result description e.g. feature cl "ReferenceParcel" within GDB ha attribute fields " available agricu area per agriculture type"
1525	checkAgriculturalLandAreaValue	ValueTypeCompleteness	Check availability of corresponding value type for attribute field in LCM Agriculture Area element within SUT.	Capability test	Result description e.g. The value the available agriculture area in attribute fields "available agricul per agriculture type" are stored hectares. The data type is "doub Note: The minimum information required is: (1) the type of unit u the area values; (2) the data type attribute field, together with the precision if applicable.
1221	checkNonAgriEligibleLand	featureTypeCompleteness	Check availability of corresponding LCM Non Agriculture Eligible Area element within SUT.	Capability test	Result description e.g. there is a feature class named "non-agricu eligible area" within GDB (LPIS)
1425	checkNonAgriEligibleLandGeometry	attributeAndAssociationCompleteness	Check availability of geometric representation for the LCM Non Agriculture Eligible Area element within SUT.	Capability test	Result description e.g. feature cl named "non-agriculture eligible has/has not a geometry. The geo representation used for all classe polygon.
1426	checkNonAgriEligibleLandType	attributeAndAssociationCompleteness	Check availability of corresponding attribute field in LCM Non Agriculture Eligible Area element within SUT.	Capability test	Result description e.g. "NonAgriculturalEligibleArea" do assigned to "NonAgriEligibleLand field within feature class “referenceParcel”.
1324	checkNonAgriEligibleLandTypeValue	extendedCodeList	Check the availability, semantic correspondence and completeness of the codelist for the corresponding attribute field of LCM Non Agriculture Eligible Area element within SUT.	Capability test	Result description e.g. "NonAgriculturalEligibleArea" do GDB with following values: “affo agricultural land”, "wetland on f agricultural land"; "set aside for
1427	checkNonAgriEligibleLandArea	attributeAndAssociationCompleteness	Check availability of corresponding attribute field in LCM Non Agriculture Eligible Area element within SUT.	Capability test	Result description e.g. feature cl "referenceParcel" within GDB ha attribute fields "eligible area per agriculture type"
1526	checkNonAgriEligibleLandAreaValue	valueType	Check availability of corresponding value type for attribute field in LCM	Capability test	Result description e.g. The value the maximum eligible area in att

			Non Agriculture Eligible Area element within SUT.		fields "eligible area per agricultu type" are stored in hectares. Th type is "double". Note: The mini information required is: (1) the t unit used for the area values; (2) data type of the attribute field, t with the precision if applicable.
30	Group of tests related to the aid application feature type				
1230	checkApplication	featureTypeCompletness	Check availability of corresponding LCM Application element within SUT.	Capability test	Result description e.g. there is a class named "aid application" w GDB (IACS)
1431	checkDeclaredArea	attributeAndAssociationCompleteness	Check availability of corresponding attribute field in LCM Application element within SUT.	Capability test	Result description e.g. feature cl "aid application" within GDB has attribute field "Declared_Area"
1532	checkDeclaredAreaValue	ValueTypeCompleteness	Check availability of corresponding value type for attribute field in LCM Application element within SUT.	Capability test	Result description e.g. The value the area declared by the farmer attribute field "Declared_Area" a stored in hectares. The data type "double". Note: The minimum information required is: (1) the t unit used for the area values; (2) data type of the attribute field, t with the precision if applicable.
1433	checkDeclaredSupportSchemaType	attributeAndAssociationCompleteness	Check availability of corresponding attribute field in LCM Application element within SUT.	Capability test	Result description e.g. "DeclaredSupportSchema" doma GDB with following values: "BPS" "NATURA 2000", "young farmer schema"; "small farmer schema"
1434	checkDeclaredAreaValidFrom	attributeAndAssociationCompleteness	Check availability of corresponding metadata for LCM Application element within SUT.	Capability test	Result description e.g. "Effective attribute within "aid application" in GDB.
1435	checkDeclaredAreaValidTo	attributeAndAssociationCompleteness	Check availability of corresponding metadata for LCM Application element within SUT.	Capability test	Result description e.g. "EndEffectiveDate" attribute wit "aid application" table in GDB.
40	*Group of tests related to the landscape element feature type*				

1240	checkLandscapeFeature	featureTypeCompletness	Check availability of corresponding LCM Landscape Feature element within SUT.	Capability test	Result description e.g. there is a class named "Landscape elemen within GDB (LPIS)
1441	checkLandscapeFeatureGeometry	attributeAndAssociationCompleteness	Check availability of geometric representation for the LCM Landscape Feature element within SUT.	Capability test	Result description e.g. feature cl named "landscape element" has not a geometry. The geometric representation: line for the follo landscape feature types…., and for the following landscape featu types.
1442	checkLandscapeFeatureId	attributeAndAssociationCompleteness	Check availability of corresponding attribute field in LCM Landscape Feature element within SUT.	Capability test	Result description e.g. feature cl "Landscape element" within GDB attribute field "LFId" (thematic i or GUID)
1443	checkLandscapeFeatureType	attributeAndAssociationCompleteness	Check availability of corresponding attribute field in LCM Landscape Feature element within SUT.	Capability test	Result description e.g. feature cl "Landscape element" within GDB attribute field "Type"
1344	checkLandscapeFeatureValueType	extendedCodeList	Check the completeness of the code list for the corresponding attribute field of LCM Landscape Feature element within SUT.	Capability test	Result description e.g. "LandscapeFeatureType" domai GDB with following values: "pon "groupOfTrees", “hedges”
1445	checkLandscapeFeatureArea	attributeAndAssociationCompleteness	Check availability of corresponding attribute field in LCM Landscape Feature element within SUT.	Capability test	Result description e.g. feature cl "referenceParcel" within GDB ha attribute fields "Area"
1446	checkLandscapeFeatureBeginLifeSpanVersion	attributeAndAssociationCompleteness	Check availability of corresponding metadata for LCM LandscapeFeature element within SUT.	Capability test	Result description e.g. "InitialDat attribute within "LandscapeFeat table in GDB.
1447	checkLandscapeFeatureValidFrom	attributeAndAssociationCompleteness	Check availability of corresponding metadata for LCM LandscapeFeature element within SUT.	Capability test	Result description e.g. "EfectiveD attribute within "LandscapeFeat table in GDB.
1448	checkLandscapeFeatureValidTo	attributeAndAssociationCompleteness	Check availability of corresponding metadata for LCM LandscapeFeature element within SUT.	Capability test	Result description e.g. "EndEfectiveDate" attribute with "LandscapeFeature" table in GDB
1449	checkLandscapeFeatureendLifeSpanVersion	attributeAndAssociationCompleteness	Check availability of corresponding metadata for LCM LandscapeFeature element within SUT.	Capability test	Result description e.g. "EndDate" attribute within "LandscapeFeat table in GDB.
15491	checkLandscapeFeatureAreaValue	ValueTypeCompleteness	Check availability of corresponding value type for attribute field in LCM	Capability test	Result description e.g. The value the eligible area in attribute field

			Landscape Feature element within SUT.		"Area" of the feature class "Land Feature" are stored in hectares. data type is "double". Note: The minimum information required i the type of unit used for the area values; (2) the data type of the a field, together with the precision applicable.
50	*Group of tests related to the anomaly feature type*				
1250	checkAnomaly	featureTypeCompletness	Check availability of corresponding LCM Anomaly element within SUT.	Capability test	Result description e.g. there is a class named "Anomalies" within (IACS)
1451	chekcAnomalyID	attributeAndAssociationCompleteness	Check availability of corresponding attribute field in LCM Anomaly element within SUT.	Capability test	Result description e.g. feature cl "Anomalies" within GDB has attr field "ID" (Unique or thematic id
1452	checkCauseOfAnomaly	attributeAndAssociationCompleteness	Check availability of corresponding attribute field in LCM Anomaly element within SUT.	Capability test	Result description e.g. feature cl "Anomalies" within GDB has attr field “Anomaly Cause”.
1453	checkAnomalyStatus	attributeAndAssociationCompleteness	Check availability of corresponding attribute field in LCM Anomaly element within SUT.	Capability test	Result description e.g. feature cl "Anomalies" within GDB has attr field “Status”.
1454	checkAnomalyBeginLifeSpanVersion	attributeAndAssociationCompleteness	Check availability of corresponding metadata for LCM Anomaly element within SUT.	Capability test	Result description e.g. "InitialDat attribute within "Anomalies" tab GDB.
1455	checkAnomalyValidFrom	attributeAndAssociationCompleteness	Check availability of corresponding metadata for LCM Anomaly element within SUT.	Capability test	Result description e.g. "EfectiveD attribute within "Anomalies" tab GDB.
1456	checkAnomalyValidTo	attributeAndAssociationCompleteness	Check availability of corresponding metadata for LCM Anomaly element within SUT.	Capability test	Result description e.g. "EndEfectiveDate" attribute with "Anomalies" table in GDB.
1457	checkAnomalyEndLifeSpanVersion	attributeAndAssociationCompleteness	Check availability of corresponding metadata for LCM Anomaly element within SUT.	Capability test	Result description e.g. "EndDate attribute within "Anomalies" tab GDB.

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8 TG MTS Test campaign ? performing the Model ETS

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The model test campaign is the process of executing the model ETS and recording the observed test outcome and relevant information in the conformance log. Both the input to the IUT and the observed test outcome for each test case shall be recorded in the conformance test log report file (MTS - ModelTesSuite.XML). This recording and retention of all information is necessary for the analysis phase and for auditing purposes (ISO/TC211 2000).

During this testing phase, both manual and automatic testing are possible and allowed. A feature catalogue will always require manual testing while computer based testing can be possible when an application schema is available in an appropriate machine readable presentation (for example XML). DG JRC does not provide computer software for such automatic MTS tests.

Elements that are related to the environment in which the implementation shall be tested and considered important can still be collected as ?Extra Information for Testing (IXIT}. In particular, this additional information should provide the details on organization and storage in the system and on the means of access. If needed, conversion methods between the concepts of the tested LPIS implementation and the LCM have to be developed.

8.1 The testing phase involves the following loop:

- Retrieve the executable test case from the predefined (by DG JRC) list which is stored in application schema (ModelTestSuite.XSD) Table 1.
- Review whether the case has to be complemented with parameters. An executive test may be supplemented according to the specificities of the MS SUT. Where and when appropriate, document the resulting executive test case on test purpose, test method and other characteristics.
- Run the (modified) executable test case against your SUT. Each test call can be executed either manually, or automatically (with or without dedicated testing software) Figure 3.
- Document all informative messages in the test log file.

All 47 executable test cases should be conducted. A verdict should be given (assigned) to each of them.

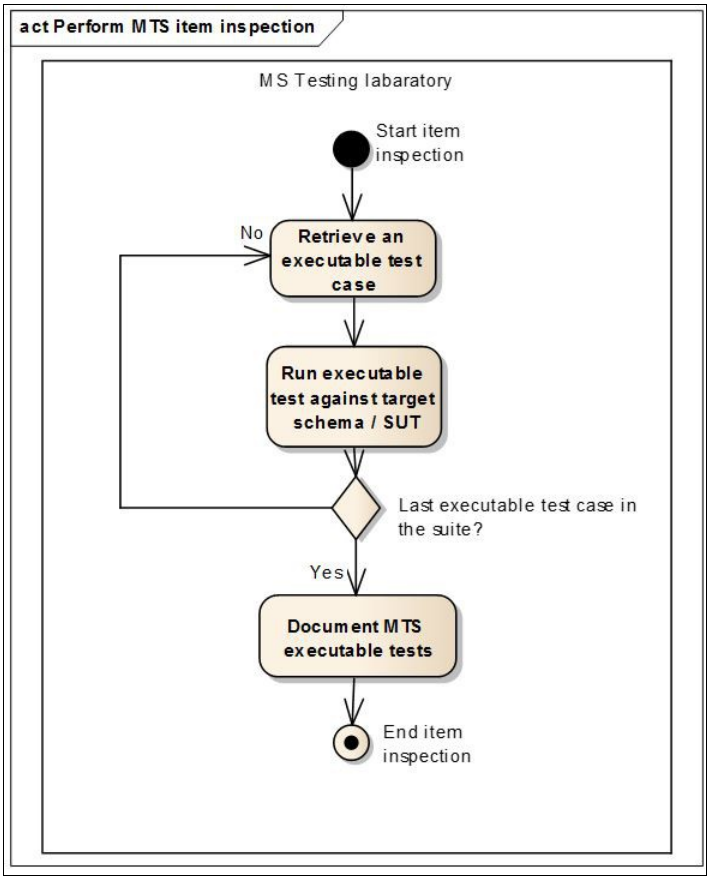

Figure 3: MTS item inspection

After all model executive test cases have been performed, the criteria and testing outcomes should be described in the (conformance) test log report file (ModelTesSuite.XML). The test log report should also hold the executable test case descriptions as informative messages for those that are defined/modified by the MS. Examples of each test are described in different documentation parts of application schema (ModelTesSuite.XSD) and the example case of Figure 4.

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9 TG MTS Test campaign ? Finding system metadata values

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9.1 6.1 Introduction

The INSPIRE metadata implementing rules set out the requirements for the creation and maintenance of metadata for spatial data sets, spatial data set series and spatial data services corresponding to the themes listed in Annexes I, II and III to Directive 2007/2/EC. It defines a number of metadata elements, their multiplicities and the value domains to be used in the metadata.

Whether the IUT is subject to above requirements depends on the Member State?s designation of its LPIS as dataset under one of the INSPIRE themes. This TG MTS merely selects the metadata elements for datasets, if these are relevant under 2013R1306 art 48.1 (Access to information) and in particular linked to 2013R640 art 6.2 (LPIS quality assessment). Only the information that is relevant for the processing and understanding of the LPIS QA activities has been selected.

One can consider the INSPIRE metadata and orthoimagery implementing rules as the reference model for a common ATS/ETS. Hence the methodology for retrieving and reporting the system metadata is identical to the methodology above used for the data value mapping (test campaign ? Model ETS). The only difference is than not the LCM but the INSPIRE metadata/orthoimagery model is referenced to. The model elements are referenced, but not duplicated here.

As a consequence, TG MTS uses two metadata reference sources:

- IR MD[1]: ?INSPIRE Metadata Implementing Rules constitute technical Guidelines based on EN ISO 19115 and EN ISO 19119? support Commission Regulation (EC) No 1205/2008 of 3 December 2008 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards metadata - http://inspire.ec.europa.eu/documents/Metadata/MD_IR_and_ISO_20131029.pdf
- DS OI: ?D2.8.II.3 Data Specification on Orthoimagery ? Technical Guidelines? describes the INSPIRE Data Specification for the spatial data theme Orthoimagery -

http://inspire.ec.europa.eu/documents/Data_Specifications/INSPIRE_DataSpecification_OI_v3.0.pdf

This TG MTS provides two types of system metadata records: one for the spatial themes in vector/grid format and one for the ortho-rectified imagery.

Although many elements of these two metadata record types match those from IR MD, TG MTS does not require the creation of the record as specified in that IR MD. However, if an IR MD record is already available, much of TG MTS system metadata can be directly extracted from there.

9.1.1 6.2 System metadata for vector/thematic datasets

Relevant vector/thematic datasets in the IUT, are the theme of reference parcels, as well as optional source datasets.

- Each LPIS must hold a theme with the assembled reference parcels, each of which holds a maximum eligible area for direct payments, as it used during the crosscheck. This theme delivers the population of reference parcels that is subject to the ETS data value inspection. It is the output of the processes identified by the IXIT qualifier ?D?.
- There may be ancillary source vector (or even raster) thematic data, applicable when identified by the IXIT; perimeters from a cadastral map, borders from a land cover inventory, a collection of land scape features. These datasets are identified respectively by IXIT qualifiers ?A?, ?B? or ?C?.

The MTS system metadata record for a vector dataset holds these values:

Table 2

Metadata element name	Xsd-element type	Reference document	Reporting instruction
resourceTitle	gmd:CI_Citation_Type		
	gmd:title	IR MD	2.2.1 Resource title
	gmd:date	IR MD	TG Requirement 23 and TG Recommendation 15
	gmd:dateType	IR MD	(publication/creation/revision)
ixitQualifier	cap:ixitQualifierType	TG IXIT	(A/B/C/D)
temporalExtent	gmd:EX_TemporalExtent_Type	IR MD	2.6.1 Temporal extent
	gml:beginPosition		
	gml:endPosition		
resourceLocator	gmd:CI_OnlineResource_Type	IR MD	TG Requirement 3 and TG Recommendation 7
identifier	gmd:MD_Identifier_PropertyType	DS CP/DS LC	8.1 Metadata elements defined in INSPIRE Metadata Regulation
	gmd:code	IR MD	TG Requirement 5
	gmd:codeSpace	IR MD	TG Requirement 6
lineage	gmd:LI_Lineage_Type	IR MD	TG Requirement 26 (statement)
spatialResolution	gmd:MD_Resolution_Type	IR MD	TG Requirement 27 (equivalent scale, denominator)
responsibleParty	gmd:CI_ResponsibleParty_Type		
	gmd:organisationName	IR MD	TG Requirement 35
	gmd:role	IR MD	TG Recommendation 24
metadataPointOfContact	gmd:CI_ResponsibleParty_Type	IR MD	TG Requirement 37
	gmd:organisationName		
	gmd:electronicMailAddress		
	gmd:role		(pointOfContact)

9.1.2 6.3 System metadata for ortho datasets

Relevant ortho image data sets are the 1/5000 or larger scale ortho-image dataset(s), aerial and/or satellite, that, as a combination covers the whole territory and provides the most recent capture for a given site. It is in use for the graphical processes (application, LPIS upkeep) of the direct payments.

- If two or more distinct datasets cover the entire territory of the IUT, a separate metadata record for each is appropriate.
- The OTSC (ortho) imagery, acquired for the annual OTSC processes and provided by JRC, is not considered.

The MTS system metadata record for an ortho image dataset holds these values:

Table 3

Metadata element name	Xsd-element type	Reference document	Reporting instruction
resourceTitle	gmd:CI_Citation_Type		
	gmd:title	IR MD	2.2.1 Resource title
	gmd:date	IR MD	TG Requirement 23 and TG Recommendation 15
	gmd:dateType	IR MD	(publication/creation/revision)
resourceLocator	gmd:CI_OnlineResource_Type	IR MD	TG Requirement 3 and TG Recommendation 7
identifier	gmd:MD_Identifier_PropertyType	DS CP/DS LC	8.1 Metadata elements defined in INSPIRE Metadata Regulation
	gmd:code	IR MD	TG Requirement 5
	gmd:codeSpace	IR MD	TG Requirement 6
lineage	gmd:LI_Lineage_Type	IR MD	TG Requirement 26 (statement)
spatialResolution	gmd:MD_Resolution_Type	IR MD	TG Requirement 27 (ground sample distance)
responsibleParty	gmd:CI_ResponsibleParty_Type		
	gmd:organisationName	IR MD	TG Requirement 35
	gmd:role	IR MD	TG Recommendation 24
metadataPointOfContact	gmd:CI_ResponsibleParty_Type	IR MD	TG Requirement 37
	gmd:organisationName		
	gmd:electronicMailAddress		
	gmd:role		(pointOfContact)
imageSource	cap:imageSourceType	DS OI	8.3.6 Data source
sensorPlatform	cap:sensorPlatformType	n/a	(aerial film/aerial CCD / satellite)
sensorDistance	gmd:MD_Resolution_Type	IR MD	TG Requirement 27
sensorOrganisationName	gmd:CI_ResponsibleParty_Type	IR MD	TG Requirement 35
	gmd:organisationName		
	gmd:electronicMailAddress		
	gmd:role		
phenomenonTime	cap:phenomenonTimeType	DS OI	5.2.7 Temporality representation; 5.3.2.1.3. OrthoimageCoverage; TG Recommendation 9
	sensorBegin		
	sensorEnd		
elevationData	cap:elevationDataType	DS OI	8.3.6 Data source
demPlatform	cap:demPlatformType	n/a	(stereorestitution/lidar/radar)
surfaceType	el-bas:SurfaceTypeValueType	DS EL	5.7.2.2.5. SurfaceTypeValue
demDistance	gmd:MD_Resolution_Type	IR MD	TG Requirement 27
demOrganisationName	gmd:CI_ResponsibleParty_Type		
	gmd:organisationName	IR MD	TG Requirement 35
	gmd:electronicMailAddress		
	gmd:role		

9.1.3 6.4 Metadata reporting requirements

For each separate spatial dataset identified or mentioned in the IXIT, whether vector, raster or imagery, an individual system metadata record is required.

By consequence, for any given IUT, at least two metadata records are expected

- One vector metadata record for the assembled reference parcels (IXIT-qualifier ?D?).
- One image metadata record for the latest image coverage.

Depending on the use of ancillary data, the state of the image coverage and the dates of the last systematic update of the datasets, additional metadata records have to be delivered.

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1. ? There is a revised version from 2017: ?Technical Guidance for the implementation of INSPIRE dataset and service metadata based on ISO/TS 19139:2007?. Implementation specification for defining metadata for INSPIRE datasets and services in ISO/TS 19139 based XML format in compliance with the INSPIRE Implementing Rules for metadata - https://inspire.ec.europa.eu/id/document/tg/metadata-iso19139. This version will be implemented, after the completion of the current work on the IACS data sharing and the finalization of DS/CDP/2019/04 Draft.

10 TG MTS Analysis of results

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The analysis of results shall be performed by evaluating the observed test outcome against the verdict criteria which are prescribed by the abstract test case. Although there is a clear conceptual distinction between the test campaign and the analysis phase, in the TG MTS context, the two may overlap in time. A test verdict is a statement of pass, fail or inconclusive. A (rare) verdict of inconclusive or failure needs a justification.

- ?pass verdict? means that the observed test outcome gives evidence of conformance to the conformance requirement on which the test purpose is focused, and is valid with respect to the relevant LCM element and with respect to the ICS (if provided).
- a ?fail verdict? means that the observed test outcome demonstrates non-conformance with respect to either a test purpose or at least one conformance requirement in the relevant element in LCM. In the LPIS context this means that the IUT doesn't fulfill a specific requirement from the LCM. This can be either a lack of required features type, or incompleteness of code list, or omission of required attribute.
- an ?inconclusive verdict? means that the observed test outcome produces neither a pass nor a fail verdict. This should occur only in very rare circumstances. EXAMPLE: ?Test-case error?.

A justification shall be given with each fail or inconclusive verdict (in a separate document); informative messages or additional log files may also be provided.

The executable test case verdict shall be assigned to a particular test outcome using the verdict criteria relevant to that particular abstract test case. The test verdicts assigned shall then be synthesized into an overall summary for the IUT (Done later by DG JRC).

For example, a particular IUT has certain commitments to record in the LPIS landscape features subject to retention (under GAEC 7). An abstract test case could therefore be formulated as ?featureTypeCompletness? test. The corresponding executable test case would be phrased as ?checkLandscapeFeature?. If the LPIS (SUT) has implemented this requirement by creating a feature class ?Landscape Feature? within its GIS/RDBMS then ?Pass? verdict should be assigned and textual description should be provided. Example table (Table 4) is provided below. The MS LPIS would be conformant to the abstract test case ?featureTypeCompletness? if the verdicts of all executable test cases within it are assigned as ?Pass?.

Table 4 Analysis and documentation. Example of executable test case Nr. 1240 of Table 1.

Executable Test Case Name	Referenced Abstract Test Case Name	Executable Test Purpose	Executable Test Method	Executable Test Type	Executable Test Case Result Description	Executable Test Case Verdict
checkLandscapeFeature*	featureTypeCompletness*	Check corresponding LCM EcologicalFocusArea element availability within SUT.	Check availability of corresponding LCM Landscape Feature element within SUT.	Capability test	Result description e.g. there is a feature class named "Landscape elements" within GDB (LPIS)	Pass

*- abstract test cases and initial executable test cases are provided by JRC.

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11 TG MTS Delivery ? MTS package

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11.1 8.1 XML-delivery of the MTS package

The MTS is an element of the LPIS quality assessment framework. The MTS precedes the data conformance testing procedures of TG ETS. The MTS procedure above shall be performed each time when a new LCM or a local LPIS implementation (new eligibility profile, new database structure) is installed. In case no system redesign or substantial system upgrade are made on the SUT, there is no need to repeat the MTS for the annual quality assessment. It is sufficient to refer to the latest MTS report. The annual data ETS report shall indicate which year the last MTS was done and what the result of conformance statement was.

The upload and update of the MTS package values is synchronous with the upload of the ETS reporting package, set to the **31st of January** following the assessment year.

Any change of the MTS or metadata values that are rather dynamic by nature (such as temporalExtent of SUT, a change of image specification / lineage / contractor or a change of third party metadata) can be reported by the 31st of January by manually updating the affected values in the MTS database. An LPIS QA portal application is available for data entry and these edits avert the need to upload a complete MTS package.

11.1.1 8.2 XML-delivery of the MTS package

The results of conformance testing are documented in a conformance test log (ModelTesSuite.XML). As documented above, this file shall provide an overview of the actual executive test cases executed in the assessment process and their verdicts (i.e. descriptions of the executable test cases and results). All necessary documents relating to the conduct of the model conformance assessment process for MTS are packaged in the MTS reporting package.

It consists of:

- The mandatory MTS conformance testing log report file (ModelTesSuite.XML). A prefilled example is provided on: http://lpis.jrc.ec.europa.eu/registry/6.4.0/examples/
- The conditional MTS application schema (ModelTesSuite.XSD). This schema becomes mandatory when the default JRC application schema of the model ETS has been extended/modified by the MS. Otherwise it is optional.

The default application schema is provided on: http://lpis.jrc.ec.europa.eu/registry/6.4.0/

- The mandatory IXIT report file (Ixit.XML). A prefilled example is provided on: http://lpis.jrc.ec.europa.eu/registry/6.4.0/examples/
- The eligibility profile in xml (EligibilityProfile.xml). A prefilled example is provided on: https://marswiki.jrc.ec.europa.eu/wikicap/index.php/ETS_Downloads.
- INSPIRE-related metadata records for the implementation and source datasets in xml (SystemMetadata.xml) is provided on: http://lpis.jrc.ec.europa.eu/registry/6.4.0/examples/
- Separate free-style document with justifications/explanations for each test case that resulted with ?fail? and ?inconclusive? verdicts
- ICS proforma (free-style document) providing more detailed information on the specific options implemented in the IUT in cases when the MTS application schema has been extended/modified by the MS.

The example of one executable test case (within ModelTesSuite.XML) within Conformance test log report file is presented in the Figure 4.

```
<cap:ExecutableTestCaseSet xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:cap="http://lpis.jrc.ec.europa.eu/registry/6.4.0"
 xsi:schemaLocation="http://lpis.jrc.ec.europa.eu/registry/6.4.0 http://lpis.jrc.ec.europa.eu/registry/6.4.0/ModelTestSuite.xsd" lpis_code="TEST-LPIS"
 lifecycle_start_year="2019">
  <cap:ExecutableTestCase>
    <cap:executableFalsificationTest>false</cap:executableFalsificationTest>
    <cap:executableTestCaseId>1210</cap:executableTestCaseId>
    <cap:executableTestingType>manual</cap:executableTestingType>
    <cap:executableTestMethod>
      Perform source (LCM) target (SUT) element mapping. If there are corresponding LCM element within SUT then test will - pass. If there is no element (s)
      within the SUT - then test will - fail. Names of corresponding element(s) shall be provided in test result description.
    </cap:executableTestMethod>
    <cap:executableTestName>checkReferenceParcel</cap:executableTestName>
    <cap:executableTestPerformanceDate>2017-04-13</cap:executableTestPerformanceDate>
    <cap:executableTestPurpose>
      Check availability of corresponding LCM ReferenceParcel element within SUT.
    </cap:executableTestPurpose>
    <cap:executableTestResult>pass</cap:executableTestResult>
    <cap:executableTestResultDescription>feature classes within GDB "Sklypai2010".</cap:executableTestResultDescription>
    <cap:executableTestType>capability</cap:executableTestType>
    <cap:iacsId>{3F2504E0-4F89-11D3-9A0C-0305E82C3301}</cap:iacsId>
    <cap:implementationUnderTestId>Test LPIS</cap:implementationUnderTestId>
    <cap:modelTestSuiteId>1210</cap:modelTestSuiteId>
    <cap:referencedAbstractTestCaseId>12</cap:referencedAbstractTestCaseId>
    <cap:referencedAbstractTestCaseName>featureTypeCompleteness</cap:referencedAbstractTestCaseName>
  </cap:ExecutableTestCase>
  <cap:ExecutableTestCase>
    <cap:executableFalsificationTest>false</cap:executableFalsificationTest>
    <cap:executableTestCaseId>1411</cap:executableTestCaseId>
    <cap:executableTestingType>manual</cap:executableTestingType>
    <cap:executableTestMethod>
      Perform source (LCM) target (SUT) element mapping. If there are corresponding LCM element within SUT then test will - pass. If there is no element (s)
      within the SUT - then test will - fail. Names of corresponding element (s) shall be provided in test result description.
    </cap:executableTestMethod>
    <cap:executableTestName>checkReferenceParcelId</cap:executableTestName>
    <cap:executableTestPerformanceDate>2017-04-13</cap:executableTestPerformanceDate>
    <cap:executableTestPurpose>
      Check availability of corresponding attribute field in LCM ReferenceParcel element within SUT.
    </cap:executableTestPurpose>
    <cap:executableTestResult>pass</cap:executableTestResult>
    <cap:executableTestResultDescription>
      Result description e.g. feature class "Sklypai2010" within GDB has attribute field "RPId".
    </cap:executableTestResultDescription>
    <cap:executableTestType>capability</cap:executableTestType>
    <cap:iacsId>{3F2504E0-4F89-11D3-9A0C-0305E82C3301}</cap:iacsId>
    <cap:implementationUnderTestId>Test LPIS</cap:implementationUnderTestId>
    <cap:modelTestSuiteId>1411</cap:modelTestSuiteId>
    <cap:referencedAbstractTestCaseId>14</cap:referencedAbstractTestCaseId>
    <cap:referencedAbstractTestCaseName>attributeAndAssociationCompleteness</cap:referencedAbstractTestCaseName>
  </cap:ExecutableTestCase>
</cap:ExecutableTestCaseSet>
```

Figure 4 An extract of one executable test case from ModelTesSuite.XML

After all conformance report log file (ModelTesSuite.XML) are filled with data then it should be validated against corresponding application schema (ModelTesSuite.XSD). Only valid ModelTesSuite.XML files with at least 47 executable test case descriptions should be sent back to DG JRC.

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12 MTS related Question and Answers v.2.0

12.1 Questions on MTS raised after the presentation on the Management Meeting

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Q	MS	Issue / reference	MS question / remark	JRC Reply
1	DE	Performing the Model ETS	We have to fill in the fields ?executable FalsificationTest (true/false)? and the field ?executabletestResult (pass/fail/inconclusive). Could you explain the meaning of these columns, perhaps with an example? What is the difference between these two columns to be filled in?	The field **?executable FalsificationTest?** aims to indicate whether the conformance testing method used in a particular executable test is based on falsification testing or not (in which case it will be a verification testing) The main objective of the Model Test Suite is to verify and document the presence of certain elements (features, attributes, properties) of the SUT (every individual LPIS implementation) so that the data value testing procedures of the annual LPIS quality assessment, laid down in the ETS, can be correctly performed. The current set-up of the MTS doesn?t yet apply methods involving rigorous proofs of correctness to conclusively and exhaustively demonstrate conformance of the SUT (or its individual elements), against local or common specifications and associated standards. In the context of ISO 19105 (2000), the approach/method for conformance testing adopted for the MTS is not based on verification testing, but on the so-called falsification testing. This setup was chosen for technical and economic reasons, since the complexity of the IACS and relevant standards makes the use of proof-of-correctness approach often impractical. The falsification test is a type of conformance testing method, not a characteristic of the SUT. Contrary to the rigorous approach of a verification test, the falsification test merely looks for errors in the implementation (SUT). If errors are found, one can reasonably deduce that the implementation does not conform to the relevant specifications and standards; however, the absence of errors does not necessarily imply the opposite. The falsification test can only demonstrate non-conformance. It cannot provide absolute assurance that the implementation conforms to the relevant specifications and standards, since it does not guarantee that a particular suite of tests provides complete coverage of their content. For that reason, for all executable tests suites in the MTS, the value of the field ?executableFalsificationTest? should be set to TRUE. The field **?executabletestResult?** aims to indicate the resulted verdict of conformance of a given executable test. The following values are possible: • Pass ? This is a test verdict of conformance of the given executable test. In the context of LPIS QA and considering that the comformance test method is falsification testing, it means that the availability (or non-availability) of a certain element (feature, attribute, value type), in accordance with the specifications of the SUT, is confirmed and can be used for the ETS. • Fails - This is a test verdict of non-conformance of the given executable test. In the context of LPIS QA and considering that the comformance test method is falsification testing, it means that the availability (or non-availability) of a certain element (feature, attribute, value type), in accordance with the specifications of the SUT, is not confirmed and cannot be used for the ETS. • Inconclusive - This is a test verdict when neither a pass verdict nor a fail verdict apply. This should occur in very rare circumstances. For example, a "pass" verdict for executable test case 1210 (checkReferenceParcel) means that there is a features type "Reference Parcel" defined in the SUT and this feature data can be used as an entry for the LPIS population and the ETS. However, it doesn't mean that the implementation of the reference parcel type in the SUT fully conforms with the relevant specifications and standards. Contrary, if there is no such feature type, the test will yield a ?fail?verdict and the SUT will be non-conforming.
2	SI	MTS log, SystemMetadata, VectorThematicMetadata	TimePeriod - at least endPosition should not be mandatory	The element ?temporalExtent? is taken as defined in the INSPIRE metadata specification (2.6.1 Temporal extent). Although this time period may be expressed as an individual date instead of an interval, the need of consistency with ISO 19155 (Geographic information ? Metadata) and ISO 19108 (Geographic information ? Temporal Schema) would require to express the time period (TM_period) as open interval bounded by beginning and end points (instants). In the case when only an individual date is available (the acquisition can be considered as instantaneous), this single value will be put in both ?beginPosition? and ?endPosition?.
3	SI	MTS log, SystemMetadata, OrthoMetadata	How to proceed when we have numerous digital orthophoto maps (for example more than 30)? Do we need to provide a record for each of them?	Point "System metadata for ortho datasets" of the TG MTS specifies that the orthoimage dataset to be reported in the system metadata is the most recent capture for a given site (area). Further in the same point, it is clarified that if two or more distinct datasets (subject to different specifications, production processes or acquired in different years) are in use for the graphical processes (application, LPIS upkeep) of the direct payments on the entire territory of the IUT, a separate metadata record for each dataset would be appropriate. In the context of the LPIS QA, the acquisition period of the orthoimage coverage is considered as key and mandatory metadata element that shall be provided through the phenomenonTime. An othophoto coverage subject to the same specifications and generated from input images captured in the same year (either calendar year or cropping season whichever is most relevant) is reported with one metadata record, even if the input images are acquired in different time during this year. The interval of time in

				which the input image was/were acquired by the sensor is reported through the phenomenonTime (for example from 2015-05-31 to 2015-07-15).
4	SI	MTS log, SystemMetadata, OrthoMetadata	elevationData maxOccurs is set to "1". Why is it not possible to have more/different options?	The elevation data required in the system metadata is the one used as an input for the production of the orthoimage coverage reported in the given metadata record. If different elevation products have been used for the generation of the given orthoimage coverage, then separate OrthoMetadata records should be provided.
5	SI	MTS log, SystemMetadata, OrthoMetadata	It would be better to separate metadata on elevation from the metadata of orthoimagery in different metadata records.	It will be considered in the next update of the TG MTS.
6	DE	MTS log, SystemMetadata, OrthoMetadata	There are several flights (possibly with different sensors) within a year to capture the photos for 1/3 of the territory. If there are 20 flights per year to capture the photos of 1/3 of the territory, should we then fill in 60 separate metadata records?	Please refer to the answer to question 7. Any orthoimagery, acquired in the same year, with the same sensor platform (aerial film, aerial CCD or satellite), resulting in the same equivalent scale, and produced with the same elevation data, can be reported under one metadata record (providing that the other mandatory metadata elements are the same). In case of orthoimagery produced from input images with different ground sampling distances, the spatial resolution of the imageSource can be expressed either by the interval bounded by minimum and maximum values (TG Recommendation 18 from IR MD), or by the smallest equivalent scale.
7	DE	MTS log, SystemMetadata, VectorThematicMetadata, TG IXIT	Will we have no ?theme?, if IXIT qualifier D delivers ?raw? (for FB, PB, AP)? Is there a vector metadata record necessary, in this case?	Qualifier ?D? of the IXIT aims to report how the MS Administration assembles the reference parcels subject to crosscheck. The value ?raw? means that the data at reference parcel required for the crosscheck, is obtained directly from the delineated production block without any additional spatial operations. Your theme is the dataset of the assembled reference parcels, and should be always available, regardless the output of qualifier D. As specified in point 7.4.2 of the MTS, at least the vector metadata record for the assembled reference parcels should be provided.
8	DE	MTS log, SystemMetadata, VectorThematicMetadata, TG IXIT	Do we need to have always an ancillary thematic dataset (or datasets) to report, such as cadastral or land cover map?	Not necessarily. It depends on the output of the IXIT. Such ancillary datasets are mostly used in LPIS based on TB or CP. Systems based on AP, FB or PB might not make use of such external data.
7	ES	TG IXIT, page 4,?polychotomy questionnaire?, part A	It is impossible to classify our LPIS given that the option SubCadastral Parcel is missing. Our LPIS uses external maps (the cadastral parcel), but later on we apply an internal IACS procedure in order to divide the cadastral parcel into homogeneous land cover units. Therefore, the reference parcel is not the cadastral parcel, it is the subcadastral parcel. The LPIS Core Conceptual Model (vs 2009) does include the SubCadastral parcel (see page 19). We do not understand why it is now missing in the current IXIT document.	In IXIT such LPIS design implementation can be reported as follows: 1.Classifier A: ?CP? ? cadastral parcel Reason: The data supplier of the graphical data for perimeter and RP ID is the cadastral institution (or other entrusted body). The polygon, used as reference parcel, represents the unit of land that was historically entered in the register. 2.Classifier B: ?dedicated? Reason: Physical borders used to ?measure the agricultural land? are derived from a systematic land cover mapping project, covering all the agricultural land of the territory. The land cover mapping project is set-up by the LPIS-custodian or the PA in isolation. 3.Classifier D: ?straightforward? Reason: The maximum eligible area is derived from a straightforward (unmodified, unfiltered) spatial intersection between only perimeter and border polygons Note: In case of more complex sequence of spatial operations involved, the output for classifier D can be also ?sub-parcelled?.

12.2 Questions on MTS raised after the 22nd MARS conference in Lisbon

Q	MS	Issue / reference	MS question / remark	JRC Reply
8	ES	TG IXIT-phrasing of qualifier A	Although our initial perimeter is derived from the cadastral parcel, Both ID and the spatial extent of the land corresponding to the reference parcel ID is defined as the outcome of qualifier D, not as the outcome of qualifier A. Please confirm that this is correct, and reprase Annex X-point 4.2 to ?The primary boundary or perimeter represents the spatial extent of land corresponding to the reference parcel identifier.?	Your possition is corrects, starting the RP creation process with a cadastral parcel does not imply that initial identifiers or point coordinates should be inherited by the resulting RP. To clarify this viewpoint, we rephrase the q2 expression in the IXIT data structure from • "the data supplier of the graphical data for perimeter and RP ID is? to • "the supplier of the graphical data for defining this perimeter and, if applicable, the initial alphanumeric data for the construction of the RP ID is? Furthermore, please interpret the correspondent line in IXIT Data Scope, where for choice A the phrase • "The primary boundary or perimeter represents the spatial extent of land corresponding to the reference parcel identifier" should be read as • "The primary boundary or perimeter represents the spatial extent of the unique unit of land.?
9	ES	Data Model Testing	Please confirm that conditional, or non-mandatory elements of the LPIS Core Model (LCM), when not found in the SUT:	The assumption is correct; the Abstract Test Suite stipulates that ?..If a correspondence is found or **if there is a documented evidence that for the given IUT this element is not applicable (case of landscape features), the test will pass** and the names of corresponding

			• when performing the capability tests, the value of the field executableTestResultDescription is ?mapping is not applicable? • when performing the executable test, the value of the field Result is ?pass?.	element(s) or evidences shall be documented in the test result. For non-mandatory element indeed: • The value of the field <executableTestResultDescription> should be filled in with the following text ?mapping is not applicable, because???, which means that some further explanations should be provided. • The value of the field <Result> is ?pass?. So, in general, we expect all MTS-related executable tests should pass, Resulted verdicts in MTS can be only: pass, fail or inconclusive (very rare and only if technical error occurs). **Note**: although MTS and ETS are standalone tests, the correct and complete conduction of the ETS depends on the outcome of the MTS. It is clear that any xml/gml delivered in ETS can only be validated if there is a ?pass? outcome from the element/feature mapping, **resulting from a meaningful description of a corresponding SUT element in <<executableTestResultDescription> in the MTS**. This will ensure the integrity between the data model applied in the SUT and the related observations collected during the ETS inspection, to allow correct inpterpretation LPIS QA results in the local context. The integral link between the MTS and ETS is illustrated with two examples given below: 1. If the MTS reveals that the element <landscape feature> is not present in the SUT (by running the executable test ?checkLandscapeFeature?), then the ETS operator will not delineate and take into account as eligible, the area of any landscape feature during the ETS inspection. In other words, the quality measures RP landscape features (10104) and RP landscape features area (10104_2) from ETS Annex I will not be applied. 2. If the MTS reveals that the element <anomaly> is not present in the SUT (by running the executable test ?checkAnomaly?), then the ETS operator will not be able to assess whether a change of the reference parcel data from the information provided at the time of the LPIS population upload (LPISpointzerostate) is made in ?in tempore non suspecto?. As a consequence, he/she will not be able to take this update into account in the ETS (see point 1.18 of ETS Annex II)
10	LU	System Metadata	In the Excel version of the MTS log, there are several sheets dedicated to the reporting of the thematic, vector and orthoimage metadata. Are they the same entries that have to be reported in the SystemMetadata.xml?	Yes, they are identical. Please check the clarifications made in Table 5 of TG MTS Delivery ? MTS package
11	-	System Metadata - Orthoimagery	Do we correctly presume that the values of spatial Resolution and sensor Distance are the same, since the reporting instructions for both of them refer to INSPIRE TG reguirement 27?	TG requirement 27 of the INSPIRE IR MD specify only the value format of the reported spatial resolution. Please take into account also this spatial resolution (MD_Resolution) refers to the resulted orthoimage dataset only. The spatial resolution of the source image is not explicitly required in IR MD, although it can be reported in LI_Lineage. However, we explicitly require it for the MTS.
12	LU	System Metadata - Orthoimagery	For this campaign (2017), we?ll use orthos of 2016 flights as well orthos of 2017 flights. But these last images (2017) are not yet published. Should we describe the 2017 ortho metadata if they are not yet available for the LPIS ? Indeed, do you need metadata of data available at the data extraction date for ETS, or matadata of all data used for the 2017 campaign, including orthophotos that are not yet available ?	Orthophoto metadata should be reported in the system metadata file of the MTS if they have been implemented in the LPIS (for the upkeep). If you used this ortho data set to update any reference parcel (within the LPIS population as submitted on the LPISQA Portal), than please report the metadata of the orthos, if you still didn't use them, than wait until they are used and than report.

12.3 Questions on MTS raised after the LPISQA Workshop in Varese

Q	MS	Issue / reference	MS question / remark	JRC Reply
13	LT	MTS log, SystemMetadata, Vector ThematicMetadata	How should we interpret a whole dataset and its temporal extent? Do we have to consider the update date of the oldest feature in the dataset as the begining? Or if there are unupdated features in the dataset, what date should be considered: creation or revision? We are also confused about the definition the end position. If we understand correctly as it was responded to Slovenian question in Q&A section of MTS TG, we should specify the same value for the end postion as for the begining if the majority of features are still valid?	Practice showed that the vector dataset can be updated in a single revision project, or is being updated dynamically at parcel (polygon) level each time an anomaly triggers an update. If at least one parcel (polygon) is updated in a dataset on a specific date, that date (the last date in a dataset level) is the date of revision of the whole dataset. It is also important to understand that the revision of each parcel on a specific date should be registered even if the parcel data remain unchanged. This date is evidence of the last verification by the Administration for particular parcel and these dates are than taken as the begin and the end position of the dataset. Begin date is the "oldest" while the end date is the "youngest" date registered for creation/revision of parcels (polygons) within one dataset.
14	PT	SystemMetadata, Vector ThematicMetadata	Do we have to upload MTS every year if we updated LPIS reference parcel layer that will have a new temporal extent (begin and end position)?	According to the structure of the SystemMetadata.xml file, and with reference to INSPIRE, begin and end date of each product valid in the system should be reported. If any of data sets - vector and/or raster, changes due to the LPIS update procedure, **and stay within the same specification**, please use 'Update system metadata' edit function of the LPIS QA Portal. You can check this under MTS>Update system metadata page. Once you open the page, you will see the system metadata already reported for previous years. Edit function is editing time extent of selected record. Please follow this document on how to use this

				functionality.
15	Generic	TG IXIT - Qualified C (Integrating eligible area from GAEC LANDSCAPE FEATURES)	Could you please further clarrify the meaning of the options "inclusive" and "complementary"?	The purpose of this IXIT qualifier is to provide information on the way the landscape features subject to retention (GAEC 7) are handled in the LPIS. Two modalities are possible: (1)**Inclusive**: their presence and area is accounted alphanumerically (as RP attribute) or spatially in dedicated spatial dataset, BUT they are not defined as reference parcels with their own RP ID; (2)**Complementary**: they represent individual reference parcels with their own RP ID.
16	Generic	TG IXIT - Qualified A (Authoring the reference parcel PERIMETER)	Could you please clarrify how to interpret correctly this clarifier in the context of the applicable RP typology?	This IXIT qualifier deals with the ?boundary? of the spatial object assigned to the unique reference parcel identifier. This is the property of the reference parcel most closely associated with the RP topology applicable in LPIS context, and which: (1) Identifies the actor whose role is indispensable. In most of the cases, this is the ?initiator? of the RP update. (2) Defines the level of detail (granularity) of the unit of management. For example, the AP is a sub-unit of FB, while the CP can be sub-unit of BPU.

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13 TG MTS Downloads

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13.1 Schemas and examples for the MTS reporting package v.6.4 - NEW

Name	Reporting package	Description	Schemas/Templates for v.6.4	Example	Date*
Ixit	MTS reporting package	Application schema describing IXIT	Ixit.xsd	Ixit.xml	2019-06-17
Model test suite	MTS reporting package	Application schema describing LPIS QA MTS conformance testing log report	ModelTestSuite.xsd	ModelTestSuite.xml	2019-06-17
System metadata	MTS reporting package	Application schema describing vector and ortho metadata	SystemMetadata.xsd	SystemMetadata.xml	2019-06-17

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