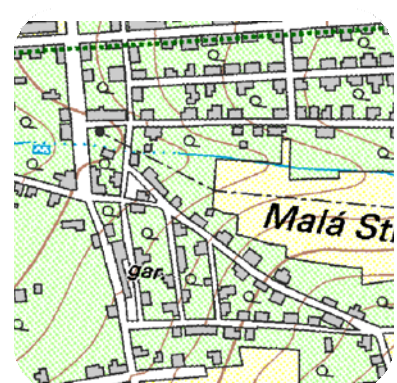
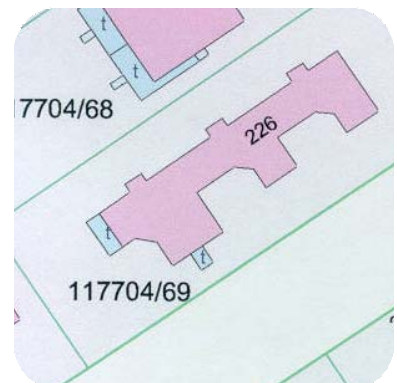
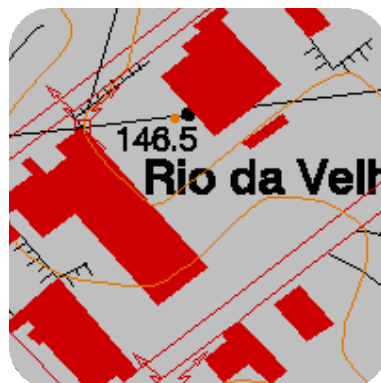
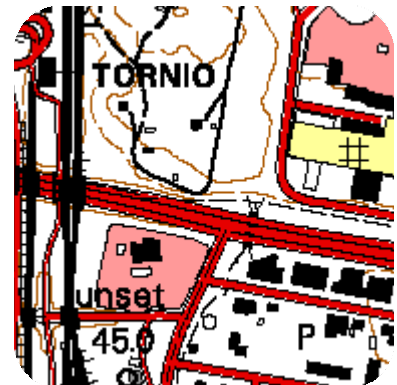
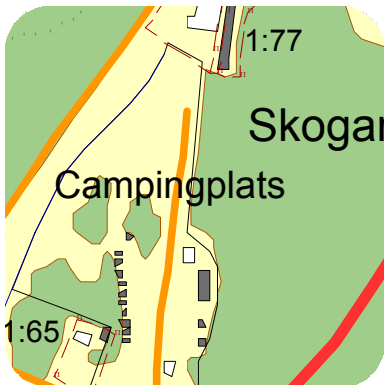


Reference Data Sets and Feature Types in Europe

Part A: Summary and Figures

Report of the Eurogeographics Expert Group on Quality





Reference:

Version	Author	Date	Comments
0.1	Antti Jakobsson	Feb 10 th 2004	
0.2	Antti Jakobsson	Mar 19 th 2004	Added address information
0.3	Antti Jakobsson	May 10 th 2004	Draft final version. Executive summary is missing and figures should be checked. The next phase is to ask countries to verify the data.
0.9	Antti Jakobsson	June 3 rd 2004	Change of version numbers to 1.0->0.1, 1.1->0.2, 1.2->1.3 and some minor changes.
0.95	Antti Jakobsson	Nov 10 th 2004	Updated data based on comments from countries. New countries added: Bulgaria, Italy, Turkey, and Iceland. Some answers from countries are not checked. Those are indicated with red colour in the Table A. Croatia has also replied but the details are not yet added.
1.00	Antti Jakobsson	Dec 30 th 2004	All comments resolved.
1.01	Antti Jakobsson	Feb 17 th 2005	Modifications and update of French details.

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Keywords	Reference data sets, Topographic, Cadastral, EuroSpec, DEM, Orthoimagery, Address, Road, Interchange, Coastline, Lake, Watercourse, Benchmark, Parcel, Interoperability, Harmonization, Europe,		
Abstract	Report on reference data sets in Europe. It is based on questionnaire sent by Eurogeographics' Expert Group on Quality to the national mapping and cadastral agencies (NMCAs) in 2003. Results were updated in 2004. It covers 33 European countries and represents data sets from 82 organizations producing 236 data sets. The report comprises two parts. Part A introduces results and summaries from the questionnaire and Part B includes the detailed information.		
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1 Executive Summary

This report gives an overview of the reference data sets in Europe. It is based on questionnaire sent by Eurogeographics' Expert Group on Quality to the national mapping and cadastral agencies (NMCAs) in 2003. Results were updated in 2004. It covers 33 European countries and represents data sets from 82 organizations producing 236 data sets. The report comprises two parts. Part A introduces results and summaries from the questionnaire and Part B includes the detailed information.

This report presents the situation of many reference themes described in a proposed directive of establishing an infrastructure for spatial information in the Community (INSPIRE) at the most accurate level nationally available. Reference themes of highest priority in the INSPIRE directive (Annex I) are co-ordinate reference systems, geographical grid systems, geographical names, administrative units, transport networks, hydrography and protected sites. This report covers geographical names, administrative units, transport networks and hydrography. From the second highest priority we cover elevation, identifiers of properties (addresses), cadastral parcels, and orthoimagery. From the third category we cover buildings and built-up areas.

NMCAs produce most of the reference themes at the national level. Other organizations produced 8% of the databases in the reference themes covered. Some of the themes were totally produced by NMCAs including hydrography, transportation and contour lines. If we include also separate cadastral agencies then administrative and cadastral parcel will be included to the list. Most of the reference themes are included in topographic or cadastral databases. Countries have begun transformation of reference databases to new technology using object-oriented databases. Majority of cadastral databases are already object-based and about 40% of topographic databases are object-based. Data content is not yet harmonised between countries and geometric interoperability at the national borders is not available. ISO TC 211 standards are not yet implemented but the issue is recognized.

Topographic data sets existed in every country but some countries didn't appear to have a common database. We inferred that a topographic database existed in 23 countries. The most typical scale was 1:10 000. Cadastral databases existed in 23 countries. Digital elevation models were produced in 26 countries with typical resolution 10 to 20 metres. Orthoimagery were available in 27 countries typically with 0.5 or 1 meter resolution.

The questionnaire investigated the availability and descriptions of some feature types. Using DIGEST FACC definitions we inquired information about roads and interchanges, administrative boundaries and areas, railways, lake/ponds, watercourses, coastlines/shoreline, named location, contour lines (land), benchmarks, buildings, built-up areas, cadastral parcels and addresses. Most feature types were available at the national level and a corresponding feature type could be described. Availability was over 60 % for all other feature types aside from addresses with 48% availability. Median availability for a feature type was 82%. We conclude that benchmarks, administrative boundaries and areas, coastlines/shorelines, named locations, roads, addresses and railways are typically covering the whole country if those are available. Update frequency is dependent of a feature type. Addresses were updated continuously by 73% of the countries. Most up-to-date feature types were addresses, administrative boundaries and areas, cadastral parcels, interchanges and roads, and buildings.





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3 Background

Eurogeographics decided to investigate the current status of reference data in 2003. The Expert Group on Quality was commissioned to execute this investigation. First draft results were presented at Eurospec workshop in Paris March 5th 2003 and the second version was presented at the second workshop in Paris July 3-4th 2003. This report serves as a basis for development of common specifications among the national mapping and cadastral agencies (NMCAs). It is also part of the Eurogeographics' programme of developing common specifications (EuroSpec).

4 Methods

This report is based on the questionnaire sent to Eurogeographics' members and all National Mapping Agencies that we had contact details. It was sent out January 17th 2003 and updated in 2004. Questionnaire consisted of 3 major parts in a word document: Organization, databases and reference themes. We used INSPIRE definitions (Inspire, 2003) for the reference data themes. The FACC data dictionary (FACC, 2003) together with EuroRegional map specification, SABE Administrative hierarchy (SABE, 2003) and GiMoDig global schema were used for the definition of feature types. ISO 19110 Feature cataloguing methodology, ISO 19115 Metadata and ISO 19131 Data Product Specification were also used as a general structure for the questionnaire. Questionnaire is represented in Annex A.

We divided Europe to regions and a regional co-ordinator was responsible for assisting NMCAs to fill-in the questionnaire. The countries covered in the questionnaire are represented in Table A and **Figure 1**. The questionnaire was sent to 42 organizations covering 37 countries in Europe and 1 country outside Europe (Armenia). Answers cover 33 countries representing data sets from 82 organizations. In total 89% countries replied and this questionnaire represents 73% of European countries (45 countries in Europe), and nearly completely the EU-countries with new members joined in 2004 (except Luxemburg).

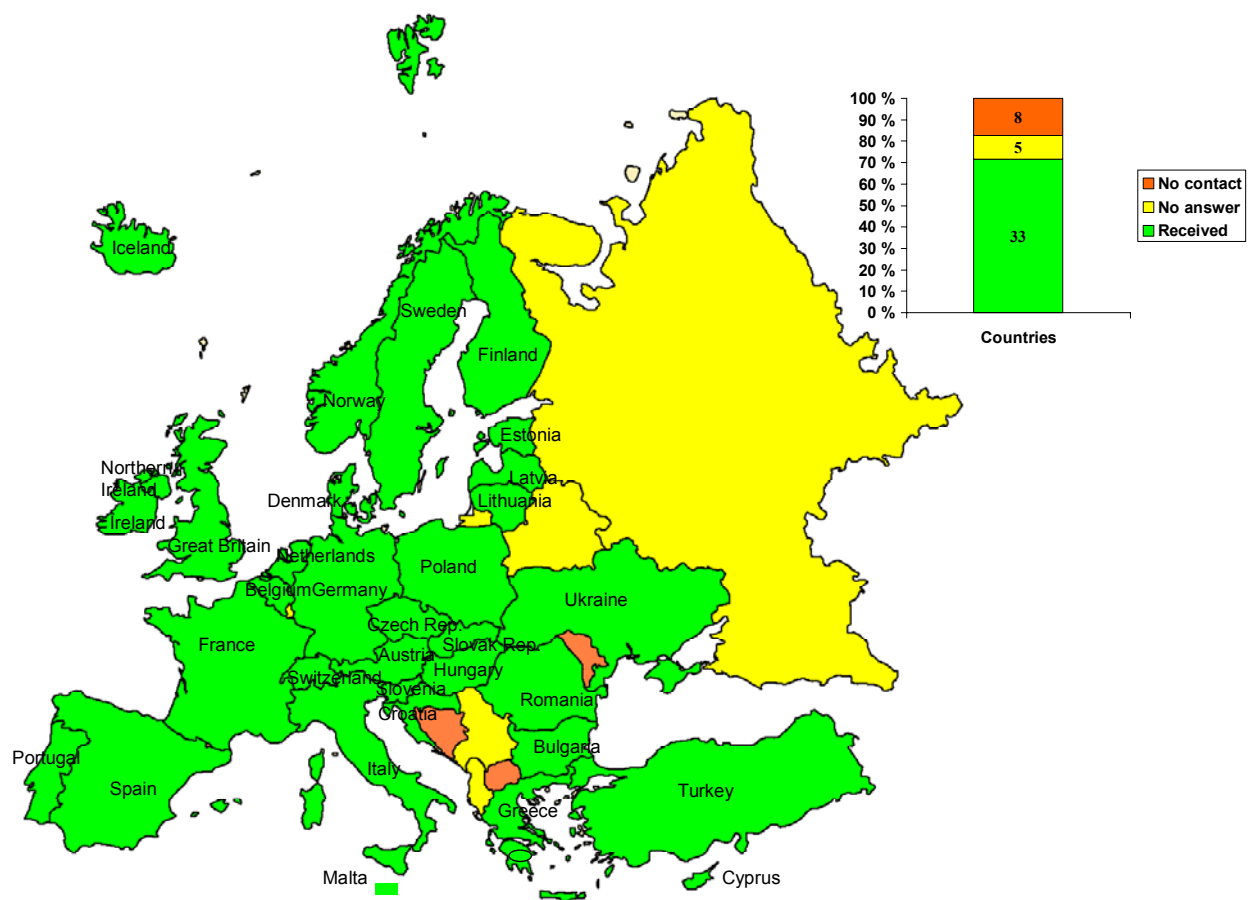


Figure 1. Countries represented in the report

Table A. Countries and organizations in the questionnaire

Country	Date Questionnaire sent	Date of the answer and revision dates	Organization receiving a questionnaire		Internet home page
	2003		English	Original Name	
Albania	Jan 17 th	No answer	Military Geographic Institute of Albania		
Andorra	No contact				
Armenia	Jan 17 th	No answer	State Committee of the Real Property Cadastre of the Government of the Republic of Armenia		
Austria	Jan 17 th	Feb 14 th 2003	Federal Office for Metrology and Surveying	Bundesamt für Eich- und Vermessungswesen	www.bev.gv.at
Austria	No direct contact		Ministry of Justice	Bundesministerium für JustizFederal	www.justiz.gv.at
Belarus	Jan 24 th	No answer	The State Committee on Land Resources Geodesy and Cartography		
Belgium	Jan 17 th	Feb 4 th 2003 Checked Aug 30 th 2004	National Geographic Institute	Institut Geographique National	www.ngi.be
Bosnia-Hertsegovina	No contact				
Bulgaria	Jan 17 th	June 30 th 2004	Ministry of Regional Development and Public Works, Cadastre Agency		http://dsk.mrrb.government.bg
Bulgaria	No direct contact		Military Topographic Service		
Bulgaria	No direct contact		Cadaster Agency under Minister of Regional Development and Public Works		www.cadastre.bg
Bulgaria	No direct contact		Ministry of agriculture and forestry Land Regulation, Agricultural Producers and Land Registrations, Information Technologies Directorate		www.mzgar.government.bg
Cyprus	Jan 17 th	Feb 7 th 2003	Department of Lands and Surveys		www.pio.gov.cy/ministry_interior_eng/lands/index.html

Country	Date Questionnaire sent	Date of the answer and revision dates	Organization receiving a questionnaire		Internet home page
	2003	2003/2004	English	Original Name	
Croatia	Jan 17 th	27 th Oct 2004	State Geodetic Administration	Državna geodetska uprava	www.dgu.hr
Croatia	No direct contact		Croatian Geodetic Institute		
Czech Republic	Jan 17 th	Feb 14 th 2003 Comments Aug 20 th 2004	Land Survey Office, Czech Republic	Zememěrický úřad	www.cuzk.cz
Denmark	January 17 th	Feb 14 th 2003, Checked Apr 30 th 2003	National Survey and Cadastre	Kort & Matrikelstyrelsen	www.kms.dk
Denmark			Kampsax A/S		www.kampsax.com
Estonia	Jan 17 th	Feb 10 th 2003, Comment Apr 29 th 2003 Comments Aug 19 th 2004	Estonian Land Board	Riigi Maa-amet	www.maaamet.ee
Estonia	No direct contact		Ministry of Internal Affairs	Eesti Vabariigi Siseministeerium	www.sisemin.gov.ee
Finland	Jan 17 th	Jan 17 th 2003 Revised Oct 6 th 2004	National Land Survey of Finland	Maanmittauslaitos	www.maanmittauslaitos.fi
Finland	No direct contact		Population Register Centre	Väestörekisterikeskus	www.vaestorekisterikeskus.fi
Finland	Jan 17 th	Comments Aug 25 th 2004	Finnish Geodetic Institute	Geodeettinen laitos	www.fgi.fi
Former Yugoslav Republic of Macedonia	No contact				
France	Jan 17 th	Apr 3 rd 2003 Comments Jul 12 th 2004 and 15 th Feb 2005		Institut Géographique National	www.ign.fr
France	No direct contact			Direction Générale des Impôts	www.impots.gouv.fr
Germany	Jan 17 th	Feb 14 th 2003 Comments June 6 th 2004	Federal Agency for Cartography and Geodesy	Bundesamt für Kartographie und Geodäsie (BKG)	www.ifag.de
Germany	No		Working Committee of the	Arbeitsgemeinschaft der	www.adv-online.de

Country	Date Questionnaire sent	Date of the answer and revision dates	Organization receiving a questionnaire		Internet home page
	2003	2003/2004	English	Original Name	
	direct contact		Surveying Authorities of the States of the Federal Republic of Germany	Vermessungsverwaltungen der Länder der Bundesrepublik Deutschland (AdV)	
Germany		Comments from Nordrhein- Westfalen Jun 14th 2004		16*Landesvermessungsamt	www.adv-online.de/mitglieder/li-stelva.htm
Great Britain	Jan 17 th	Feb 7 th 2003, Revised Mar 4 th 2003 Comments May 25 th 2004	Ordnance Survey	Ordnance Survey	www.ordnancesurvey.co.uk
Greece	Jan 17 th	No answer	National Technical University of Athens, School of Rural and Surveying Engineering, Laboratory of General Geodesy		
Greece	Jan 17 th		Military Geographical Service	G.Y.S Hellenic	
Greece		Feb 17 th 2003 Comments Sept 9 th 2004	Hellenic Mapping & Cadastral Organisation	O.K.X.E.Hellinic	www.okxe.gr
Hungary	Jan 17 th	Feb 14 th 2003	Institute of Geodesy, Cartography and Remote Sensing	FÖMI	www.fomi.hu
Hungary	No direct contact		National Cadastral Programme Non-profit Company		
Iceland	Jan 17 th	Aug 20 th 2004	National Land Survey of Iceland	Landmælingar Íslands	www.lmi.is
Ireland	Jan 17 th	Feb 28 th 2003 Comments Aug 19 th 2004	Ordnance Survey Ireland		www.osi.ie
Ireland	No direct contact		Land Registry		
Ireland	No direct contact		Irish Post Office	An Post	
Italia	Jan 17 th	Aug 23 rd 2004	Italian Military Geographic Institute	Istituto Geografico Militare	www.igmi.org
Italia	Aug 8 th 2003	No answer		Centro Interregionale	
Latvia	Jan	Mar 31 st 2003	State Land Service of the	Latvijas Republikas Valsts	www.vzd.gov.lv

Country	Date Questionnaire sent	Date of the answer and revision dates	Organization receiving a questionnaire		Internet home page
	2003		English	Original Name	
	17th		Republic of Latvia	zemes dienests	
Liechtenstein	No contact				
Lithuania	Jan 17 th	Feb 12 th , Revised Apr 29 th 2003	National Land Service under the Ministry of Agriculture of the Lithuania	Nacionalinė žemės tarnyba prie Žemės ūkio ministerijos	www.zum.lt/nzt
Lithuania	No direct contact		Institute of Aerial Geodesy Ltd	Aerogeodezijos institutas	www.agi.lt
Lithuania	No direct contact		State Enterprise "National Centre of Remote Sensing and Geoinformatics"	GIS-Centras	www.gis-centras.lt
Lithuania	No direct contact		State Enterprise "State Cadastral and Register"	Registru centras	www.kada.lt
Luxemburg	Jan 17 th	No answer		Administration du cadastre et de la Topographie	http://www.act.etat.lu/
Malta	Jan 24 th	Feb 10 th 2003 Comments August 13 th 2004	Malta Environment and Planning Authority	L-Awtorita ta' Malta Dwar l- Ambjent u l-Ippjanar	www.mepa.org.mt
Malta	No direct contact		Land Registry Department		www.mhae.gov.mt
Malta	No direct contact		Malta Maritime Authority		www.mma.gov.mt
Moldova	No contact				
Monaco	No contact				
Netherlands	Jan 17 th	Feb 14 th 2003 Comments Oct 28 th 2004		Topografische Dienst (TDN) ¹	http://www.kadaster.nl/
Netherlands	No direct contact			Kadaster	http://www.kadaster.nl/
Netherlands	No direct contact			Adviesdienst Verkeer en Vervoer (AVV)	www.rws-avv.nl
Netherlands	No direct contact			Meetkundige Dienst (MD)	

¹ Merged with Kadaster 2004

Country	Date Questionnaire sent	Date of the answer and revision dates	Organization receiving a questionnaire		Internet home page
	2003		English	Original Name	
Northern Ireland	Jan 17 th	Feb 14 th 2003 Comments Jun 17 th and August 18 th 2004	Ordnance Survey of N. Ireland	Ordnance Survey of N. Ireland	www.osni.gov.uk
Norway	Jan 17 th	Feb 20 th 2003 Comments Aug 23 rd 2004	Norwegian Mapping Authority	Statens kartverk	www.statkart.no
Poland	Jan 17 th	Feb 19 th 2003	Head Office of Geodesy and Cartography	Główny Urząd Geodezji i Kartografii	www.gugik.gov.pl
Portugal	Jan 17 th	Feb 28 th 2003	National Mapping Agency	Instituto Geográfico Português	www.igeo.pt
Romania		Feb 11 th 2003	National Office for Cadastre, Geodesy and Cartography (NMA Coordinator)		
Romania	Jan 17 th	No answer	Institute of Cadastre, Geodesy, Photogrammetry and Geodesy		www.icgfc.ro
Russia	Jan 17 th	No answer	Federal Service of Geodesy and Cartography of Russia		
San Marino	No contact				
Serbia and Montenegro	Jan 17 th	No answer	Institute of Geodesy, Civil Engineering Faculty, University of Belgrade		
Slovak	Jan 17 th	Feb 10 th 2003 Comments August 6 th 2004	Geodesy, Cartography and Cadastre Authority of the Slovak Republic	Úrad geodézie, kartografie a katastra SR	www.geodesy.gov.sk
Slovak	No direct contact		Geodetic and Cartographic Institute Bratislava	Geodetický a kartografický ústav Bratislava	www.gku.sk
Slovak	No direct contact		Research Institute of Geodesy and Cartography	Výskumný ústav geodézie a kartografie	www.vugk.sk
Slovak	No direct contact		Ministry of Agriculture of the Slovak Republic	Ministerstvo pôdohospodárstva SR	
Slovenia	Jan 17 th 2003	Feb 13 th 2003 Comments August 23 rd 2004	Surveying and Mapping Authority of the Republic of Slovenia	Geodetska uprava Republike Slovenije	www.gov.si/qu
Spain	Jan 17 th 2003	No answer	National Geographic Information Centre of Spain		
Spain	Jan	Feb 10 th 2003		Instituto Geográfico	www.mfom.es/ign

Country	Date Questionnaire sent	Date of the answer and revision dates	Organization receiving a questionnaire		Internet home page
	2003		English	Original Name	
	17 th 2003	Comments August 27 th 2004		Nacional (IGN)	
Spain	No direct contact			Dirección General del Catastro (Catastro)	www.catastro.minhac.es
Spain	No direct contact			Instituto Nacional de Estadística (INE)	www.ine.es
Sweden	Jan 17 th 2003	Feb 14 th 2003, Revised Apr 30 th 2003 Comments Jul 16 th 2004	National Land Survey of Sweden	Lantmäteriet	www.lantmateriet.se
Switzerland	Jan 17 th 2003	Feb 14 th 2003 Comments Aug 17 th 2004	Swiss federal office for topography	Bundesamt für Landestopographie	www.swisstopo.ch
Switzerland	No direct contact		Swiss federal office for statistics	Bundesamt für Statistik	http://www.bfs.admin.ch/bfs/portal/de/index.html
Switzerland	No direct contact		Swiss Post	Die Schweizerische Post	www.post.ch
Turkey	Jan 17 th	September 9 th 2004	Ministry of National Defence, General Command of Mapping		www.hgk.mil.tr
Turkey	No direct contact		General Directorate for Land Registry and Cadastre		www.tkgm.gov.tr
Ukraine	No direct contact		State Service of Geodesy, Cartography and Cadastre		www.geomatica.kiev.ua
Ukraine	Jan 17 th 2003	Feb 8 th 2003	Research Institute of Geodesy and Cartography		www.geomatica.kiev.ua
Vatican city	No contact				

In the Table A 'no direct contact' means that the information presented in this report is received from the NMCA in that country. In total, replies comprised of 35 different documents. From France we received an answer representing situation in 2003 and 2008 and from Switzerland two different documents representing data sets in two accuracy levels. Otherwise one document covers one country. Some countries have evaluated that they answers are correctly expressed in this report, which is indicated in the Table A.

5 Organizations

This part of the questionnaire included questions related to organizations producing reference data themes. For each organization, following details were inquired: Name of the organization, internet address, name of the respondent, address, phone number, fax, e-mail and e-mail address of the experts divided to reference data themes. In total, there were 82 organizations identified in 33 countries. **Figure 2** explains the conceptual model used in the questionnaire. Database is produced by an organization and can be related to a theme or combination of themes. Feature type can be then related to a theme or combination of themes. It was envisaged that a database should be reported only once using the combo 1, 2 or 3 if necessary but some respondents misunderstood it. Therefore following **Figure 3** demonstrates how many NMCAs are producing a certain theme but it can not be used inversed. Likewise number of databases listed here (294) is somewhat bigger than the actual number of databases (236).

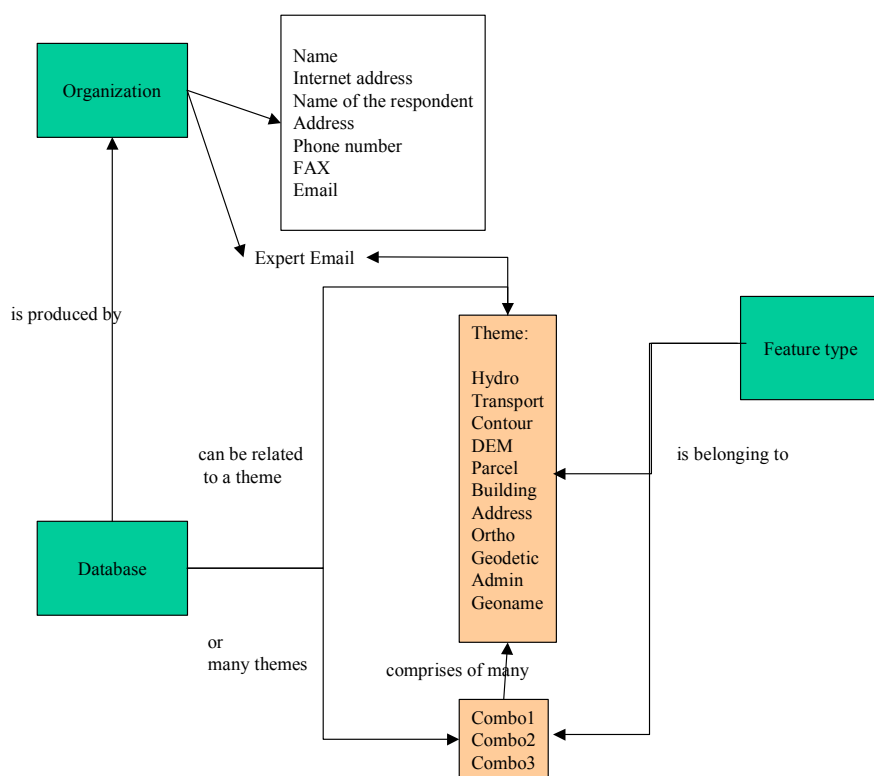


Figure 2. Conceptual model used in the questionnaire

Figure 3 illustrates the number of NMCAs producing a certain reference theme. For example 25 NMCAs produce a hydrographic theme. Other 7 may produce this theme in combination with other themes (in combo1, 2 or 3). Some may not produce this theme but this statistic does not reveal it. Typically topographic database is a combination of many reference themes. 19 NMCAs and 8 CAs produced parcel theme.

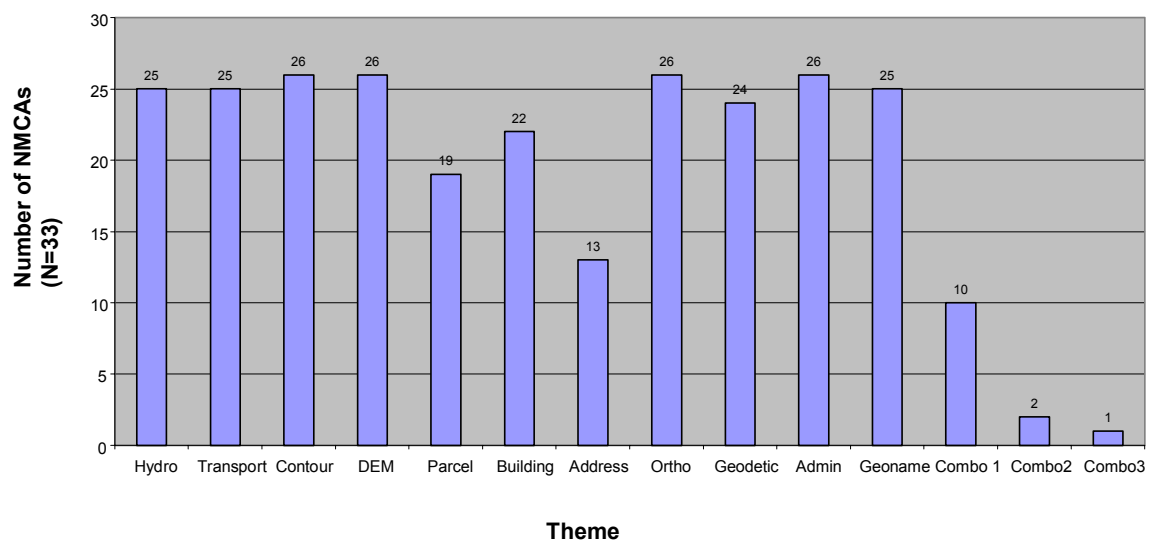


Figure 3. Number of NMCAs producing reference themes

We classified producers to National Mapping and cadastral organizations (NMCAs) and other organizations. Here an organization is classified as a NMCA if it either is a national mapping agency or it has both mapping and cadastral functions. In Germany, Greece, Romania and Slovakia there were several organizations producing reference databases, which were classified as NMCAs. Separate cadastral agencies were in Bulgaria, France, Hungary, Ireland, Malta, Spain and Turkey. Some countries didn't report a cadastral database existing (Belgium, Croatia, Germany, Iceland, Italy, Poland and Ukraine).

Ratio between NMCAs and other organizations producing reference databases in the countries are presented in **Figure 4**. There were 8% (24/294) of databases produced by other organization than a NMCA. Private organizations produced 4 databases in two countries (Denmark and Lithuania). Hydrography, transportation countour lines were produced by NMCAs. Administrative theme was produced by cadastral organization in Bulgaria. DEM was produced by a private company in Lithuania and by research institute in Ukraine. NMCAs or CAs produced cadastral parcels. Building theme was produced by a cadastral organization in Bulgaria and Hungary. A national census organization in Finland, private company in Lithuania, cadastral organization in Bulgaria, cadastral and census organization in Spain and post in Switzerland produced addresses. Orthoimagery was produced by a private company in Denmark and by cadastral and census organization in Spain. Geographic names were produced by ministry of internal affairs in Estonia and Geodetic Institute in Croatia.

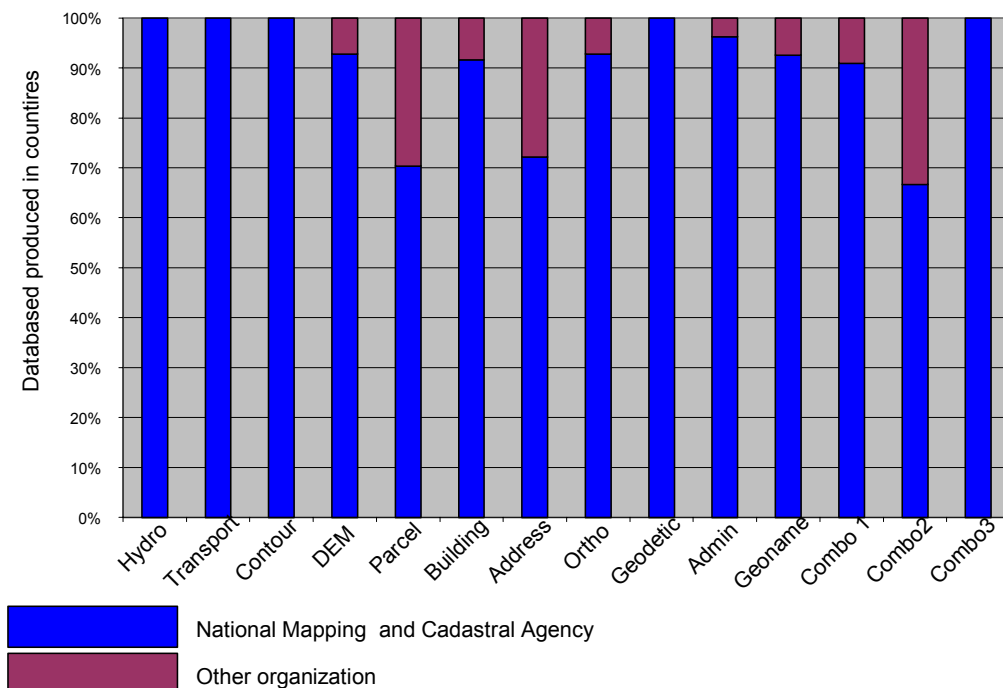


Figure 4. Producers of the reference data themes



6 Data sets

6.1 Requested information

This part of the questionnaire included a table to be filled in:

Reference mnemonic for source data was used below to connect the source data set and the feature types in the latter part of the questionnaire

Name of the source data set: The name of the data set in original language.

Producer organization: List of organizations to be selected (Organization A, B, C, D). This linked data sets to the producer organizations

Scale or resolution: List of scales (1:1000, 1:1250, 1:2000, 1:5000, 1:10 000, 1:20 000, 1:25 000, 1:50 000, 1:100 000, 1:250 000, other) or resolution (text to be filled-in). The target scale for this questionnaire was about 1:10 000 but if the organization didn't have some feature types available in that scale they could indicate the best available scale. For DEMs and Orthophotographs the best available resolution of the country. If there was a plan to improve the resolution in future, they could provide the information as additional information and give the year when it would available.

Coverage: List of percentage (National (100 %), 90, 80, 70, 60, 50, 40, 30, 20, 10, planned). National meant that the data set is covering the whole country and planned that there is no coverage at the moment put production is planned.

Data structure: List of options (Point and line i.e. cartographic database, object based i.e. a 'real-world' geodatabase, planned to convert into object based in next 2 years, other)

Edge matching: Options were (No, Technical, Content, Update process). If producer did not have agreements in place with neighbouring countries for maintaining consistency of data at the border(s) they should select No. If they had made an agreement covering specifications, content or updating procedure, they should have selected relevant options.

Conformity to published standards: If a database conformed to a national or international standard producers should have given this information.

Source: Indication of source material and methods used to compile a database.

Additional information: Option to give any relevant information (for example a link to a metadata service)

6.2 Characteristics of the data sets

In total there were 236 databases identified. Following chapters will report characteristics of the topographic, cadastral, DEMs, orthoimagery and address data sets. We don't report separately hydrographic, transportation, contour, buildings, geodetic, administrative and geonames because some are collected to topographic or cadastral data sets and some only include certain feature types (e.g. administrative boundaries). In Part B, each table that reports a certain feature type includes information about the database. If a database is not reported here, then tables include also some additional information about that database.

Object orientation is typically goal for vector data sets. We didn't specify precisely what object based means in the options. We did give an example stating that object based means i.e. a 'real-world' geodatabase and in comparison point and line i.e. cartographic database. Nevertheless NMCA's did seem to understand the options. Table B lists the structures of the databases in this study. Most data sets are not yet object based, but conversion is planned for most cadastral and topographic databases still in point-line structure.

Table B. Structures of databases

<i>Structure of the database</i>	<i>Topographic databases</i>	<i>Cadastral databases</i>	<i>DEMs</i>	<i>Orthoimagery</i>	<i>Address</i>	<i>Other</i>	<i>Total</i>
Object based	10	13				21	44
Plan to convert object based	7	5					
Point and Line	5	3					
Point and Line total	13	8				42	63
Imagery	-			27		3	30
Other		1	26		17	34	78
No information	1	1				19	21

We did try to investigate how far NMCA has proceeded in achieving interoperability. We made a question about edge matching covering technical, content and updating processes. Only few countries had made some co-operation between countries and mostly there were no agreements in place.

Some standards were mentioned. Mostly they were national standards or product specifications. We can conclude that harmonisation process is not yet initiated at the national level between nations and international standards in geographic information are not yet generally applied

6.3 Topographic data sets

All countries had topographic data in some format. Based on the name of the data sets, some countries didn't appear to have a topographic database. Topographic database was inferred to exist when a database comprised of several reference data themes. Based on this assumption a topographic database existed in 23 (of 33) countries. Majority of countries had already converted the databases to object-based. The database was object-based in 10 countries, point-line structure in 5 countries and a plan to convert to object-based in 7 countries, 1 country didn't report the structure. 11 countries had separate digitised themes. The coverage of the topographic databases is shown in **Figure 5**. Coverage of France is based on 1:50 000 database but they have also 1:10 000 database with 60% coverage. In Slovenia coverage is based on 1:25 000 but they have also 1:5000 database with 20% coverage. In Switzerland the coverage is based on 1:25 000, but they have also 1:1000 database with 60% coverage. Detail information can be found in Part B, Table A.

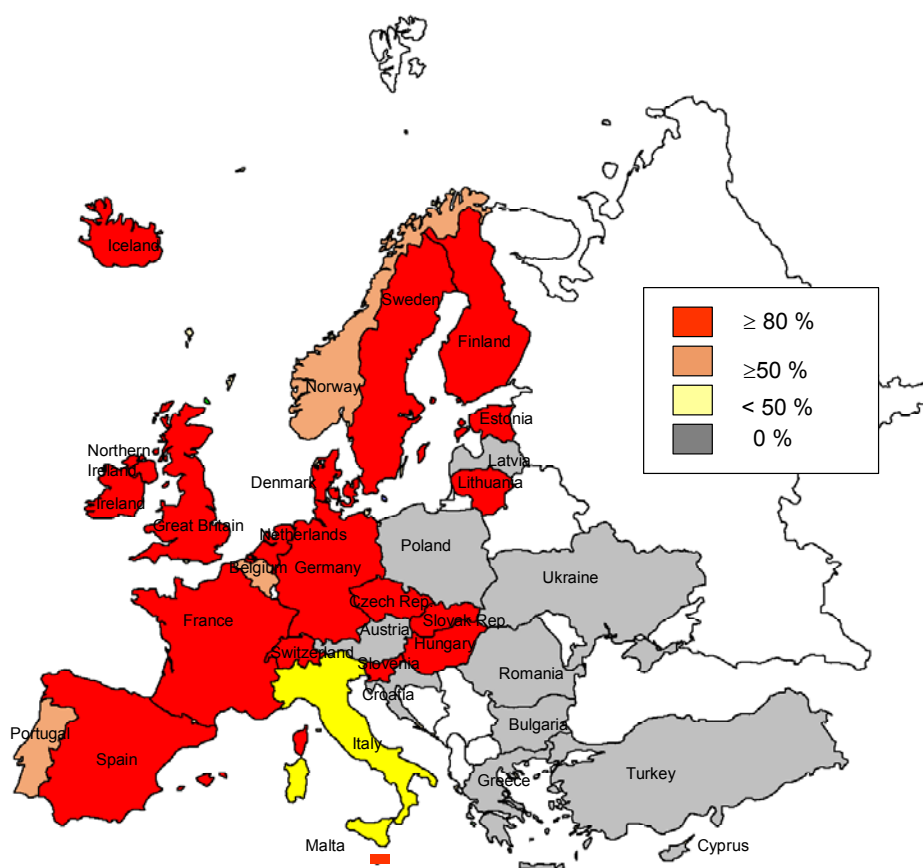


Figure 5. Coverage of the topographic databases

Scale of topographic databases is presented in **Figure 6**. It is still quite typical to use scale with topographic databases because of tradition. Every country reported scale and it still gives a good overview on the accuracy of data. Majority of topographic databases are in 1:10 000 but there is a slight trend to go to larger (and accurate) scales.

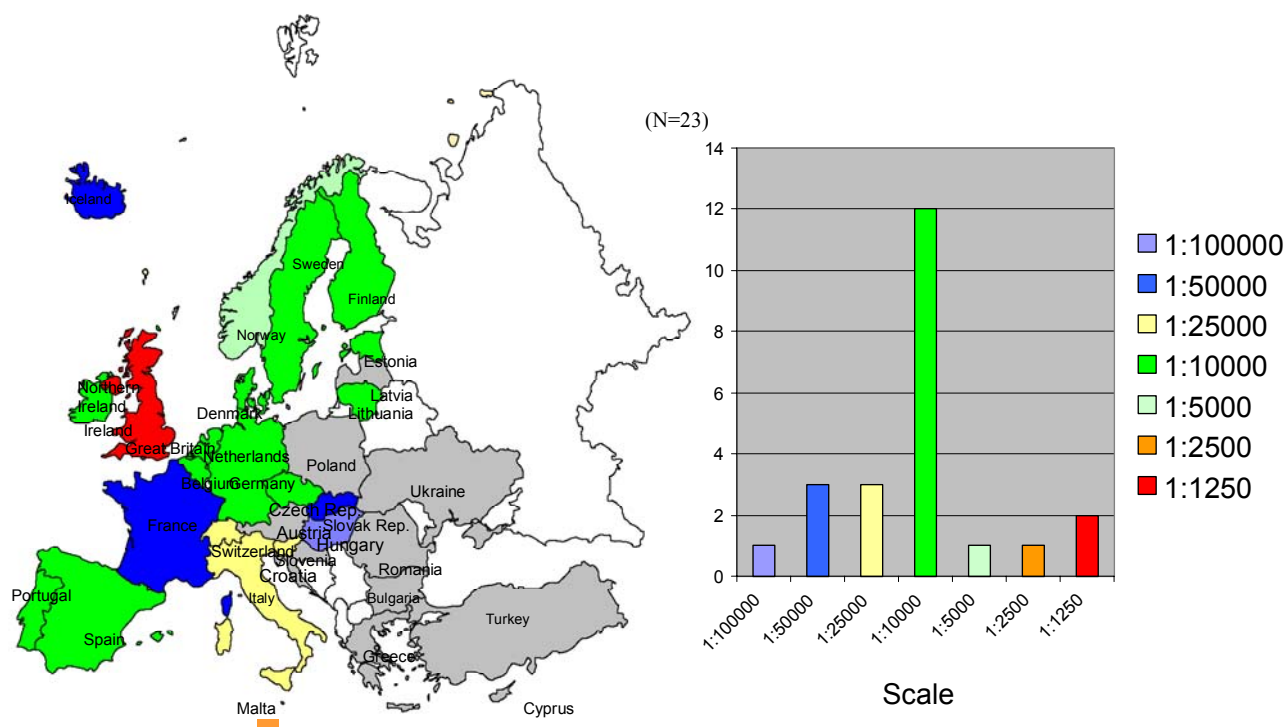


Figure 6. Scale of the topographic databases²

² Switzerland has also 60 % of data in scale 1:1000, France 62 % 1:10 000.

GB has several scales (29 % 1:1250, 68 % 1:2500, 3 % 1:10000).

Northern Ireland has also data in scale 1:2500. Slovenia has 20 % of data in scale 1:5000

6.4 Cadastral databases

Cadastral databases were identified in 23 countries, 2 countries had a cadastral map and 8 countries had no cadastral database. The structure was object-based in 13 countries, point-line 3 countries, other in 1 country, no information in 1 country and plan to convert to object-base in two years 5 countries. Detail information can be found in Part B; Table B. **Figure 7** illustrates the coverage of cadastral databases.

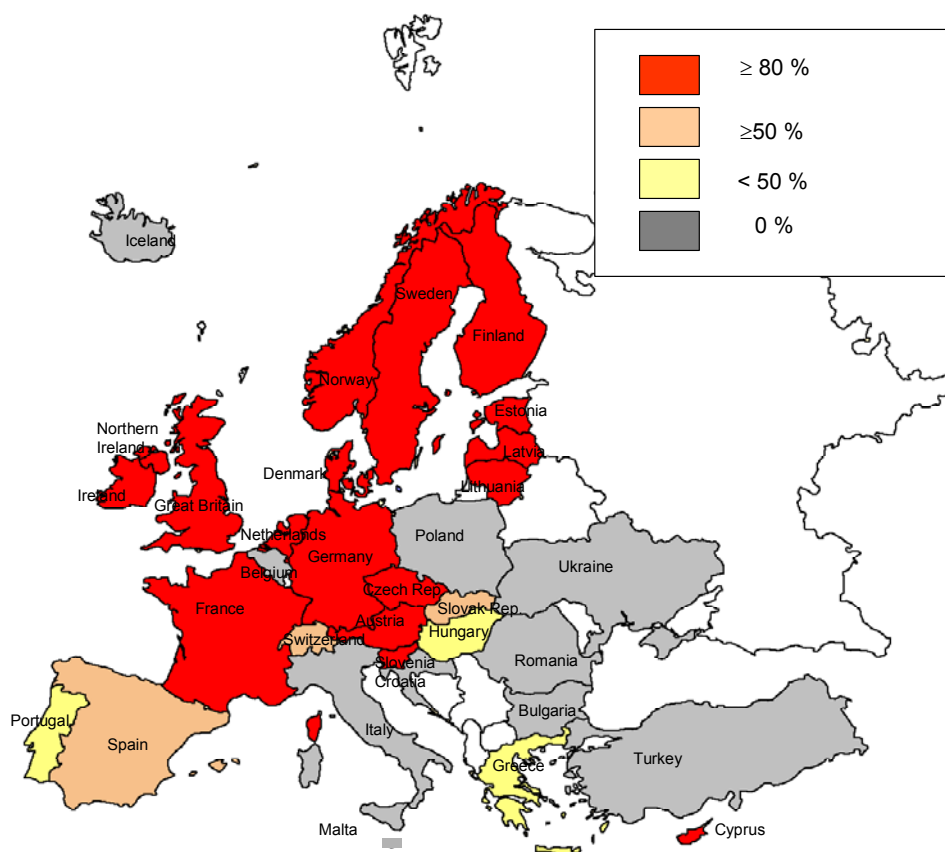


Figure 7. Coverage of Cadastral Data sets

6.5 Digital elevation models (DEMs)

Digital elevation model (DEM) existed in 26 countries (78 %). **Figure 8** illustrates the coverage of DEMs. **Figure 9** presents the resolutions of DEMs. Detail information can be found in Part B, Table C.

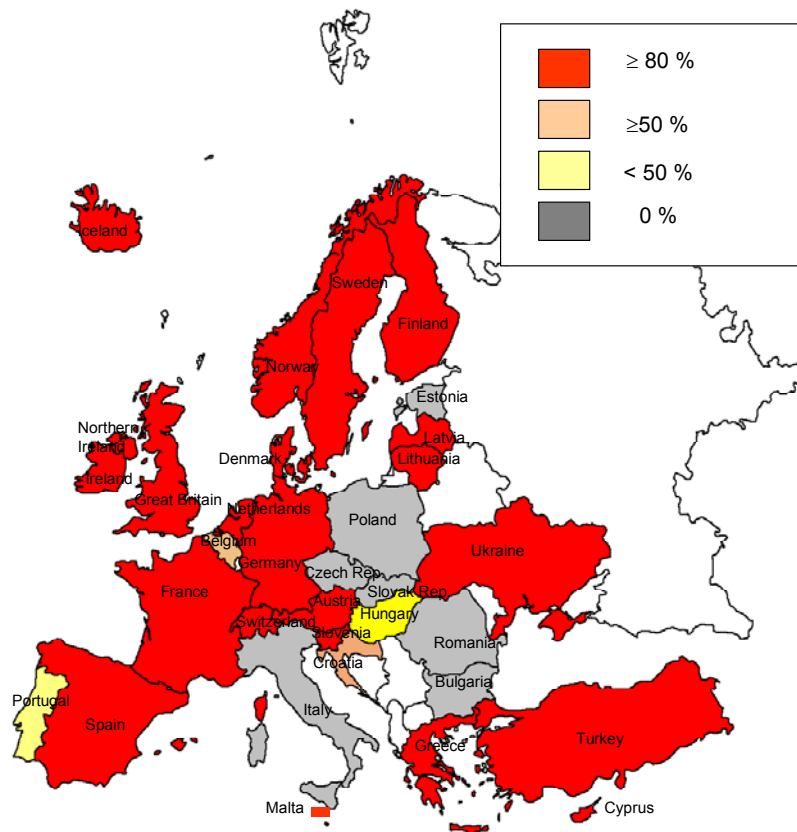


Figure 8. Coverage DEMs³

³ Italy has a DEM but no coverage information.

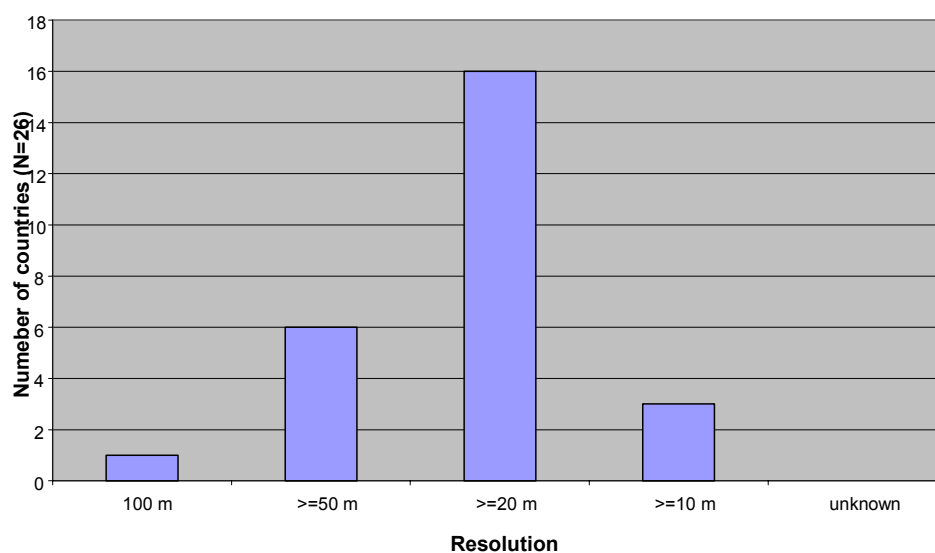


Figure 9. Resolution of DEMs⁴

⁴ Portugal has also 30 % coverage in resolution of 5 m, the Netherlands 4 m resolution and Switzerland 50 % coverage of 2 m resolution

6.6 Orthoimagery

Digital orthoimagery were produced in 27 countries (82%). **Figure 10** illustrates the coverage of orthoimagery. Most countries had 100 % coverage and those that reported less than 100 % had typically accuracy greater or equal to 0.5 m. Resolution was typically either 0.5 m or 1 m but the trend seems to move towards more accurate orthoimagery. **Figure 11** illustrates the resolution of the orthoimagery. Source to orthoimagery was aerial photographs. Two countries mentioned that some of the imagery was available in colour. Detail information can be found in Part B, Table D.

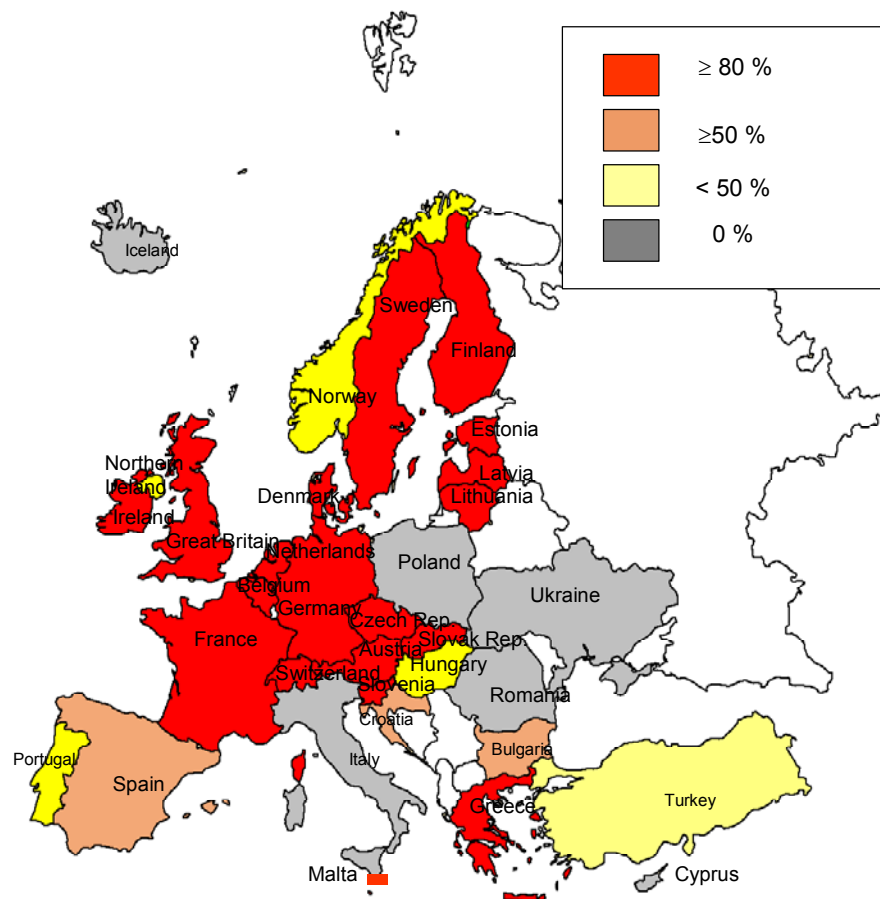


Figure 10. Coverage of orthoimagery

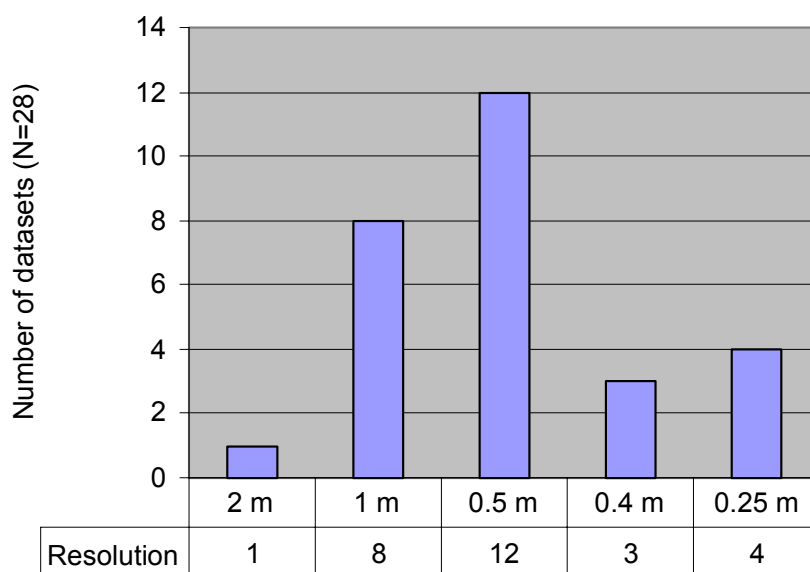


Figure 11. Resolution of orthoimagery⁵

⁵ Note Belgium reported here as 0.5 m but they also have 1 m, Czech reported as 0.5 m but also 0.6, Denmark reported as 0.4 but also has 0.1 m, France reported as 0.5 m, but also has 0.25 m for some major cities (coverage 0.8%), Germany reported as 2 m, but resolution between 0.4-2 m, Norway also has 0.2 m, Cypys does not have coverage but planned resolution of 0.5 m.

6.7 Address data sets

Address data sets were identified in 17 countries. In 13 countries it contained exactly the needed addresses, in 3 countries it could be derived and 1 country didn't give the availability. In most cases the NMCA was in charge of producing the data set (11 countries). One country had a joined responsibility with post. Post was a producer in 1 country and 1 country said other administration inside the country (Finland) and 1 identified state enterprise (Lithuania). Two countries didn't identify the producer. Coverage of address data sets is illustrated in **Figure 12**. Detail information is available in Part B, Table E.

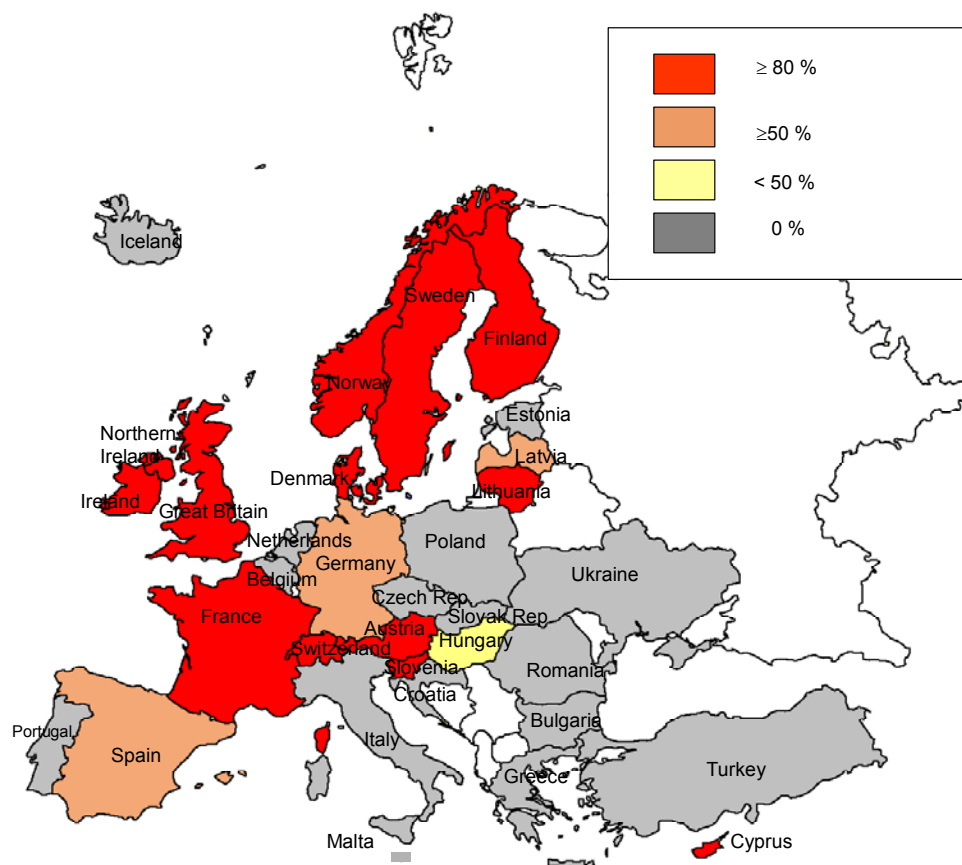


Figure 12. Coverage of address datasets

7 Feature types

7.1 Required information

First part of the questionnaire covered data sets. In this part we tried to discover the availability of the feature types. For each reference theme we selected some feature types using the FACC data dictionary and we gave a definition of that feature type using FACC definition.

The table included following questions:

- **Availability measure:** Indication if a feature type is available. List of option (Yes =equivalent feature type exists, derivable= could be derived by combining or other means, no=not at the moment). IF no was selected we asked to give an indication when this element would be available in the additional information
- **National code:** a code used in national database
- **National name:** national name of the feature type (in original language)
- **Description:** Indication if the description differs from the FACC description. (In English)
- **Attributes available:** The names of the attributes available and their descriptions. For example feature type classification. If address information was an attribute to buildings or roads then this could be indicated by ticking the appropriate box.
- **Coverage:** Select if the feature type is covering the whole country (national) or select appropriate percentage.
- **Maintenance:** Select one of the following (continual: data is repeatedly and frequently updated, biannually: data is updated twice each year, annually: data is updated every year, 2-4 years: The update frequency is 2-4 years, 5-10 years: The update frequency is 5-10 years, 11 years-: the update frequency is 11 years or more, asNeeded: data is updated as deemed necessary, irregular: data is updated in intervals that are uneven in duration, notPlanned: there are no plans to update the data, unknown : frequency of maintenance for the data is not known)
- **Positional accuracy:** Give an estimate or the positional accuracy of the feature type in metres (RMSE).
- **Reference Source data:** Select the database that has this feature type.
- **Additional Information:** Give

7.2 Availability and coverage of feature types

Availability means here that feature type exists in some of the data sets or it could be derived by some method (e.g. generalization) using the feature type indicated. Availability doesn't mean that the feature type covers the whole country. Availability of selected feature types is illustrated in **Figure 13**. For most feature types there seems to be corresponding feature type at the national level. Respondents felt that roads, administrative boundaries, watercourses, lake/ponds and contour lines were either directly available or derivable from the their data sets. Here we didn't take into account the fact that two countries don't have railways in reality and 5 countries don't have a coastline. Altogether the availability was over 60% for all other feature types except addresses that had 48% availability. Median availability

of a feature type was 82%. Non-availability of built-up areas, interchanges and addresses was 15% - 21%.

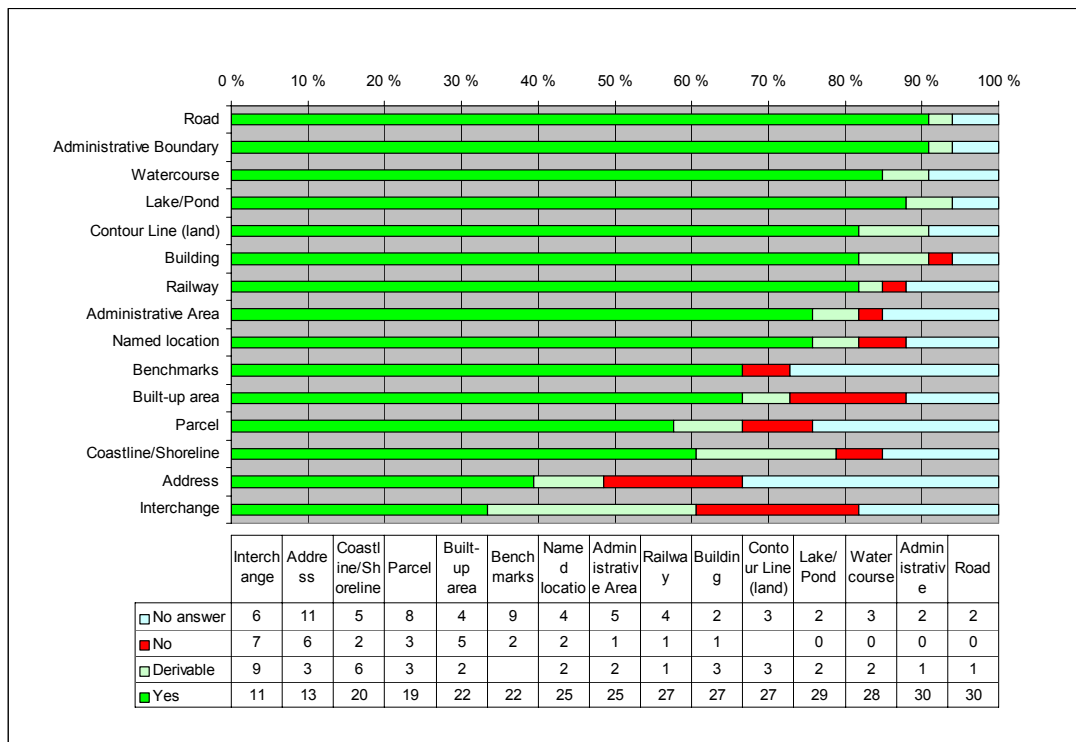


Figure 13. Availability of feature types

Coverage of the feature types in countries is presented in **Figure 14**. Typically roads, administrative boundaries, railways, lake/ponds, watercourses, coastlines/shorelines, named locations, countour lines, administrative areas, and benchmarks are covered in the whole country. Some of the countries don't have railways (Iceland, Malta, Cyprus) or coastlines (Austria, Czech, Hungary, Slovak Republic, Switzerland) in reality and here were have changed the coverage to 100% in these feature types. Coverage values typically are close to 100% or 0%. Therefore average and median values don't give a typical situation when there is considerable deviation in the values. If we delete 0% then we get average and median values in those countries that actually have feature types available. This is presented in **Figure 15**.

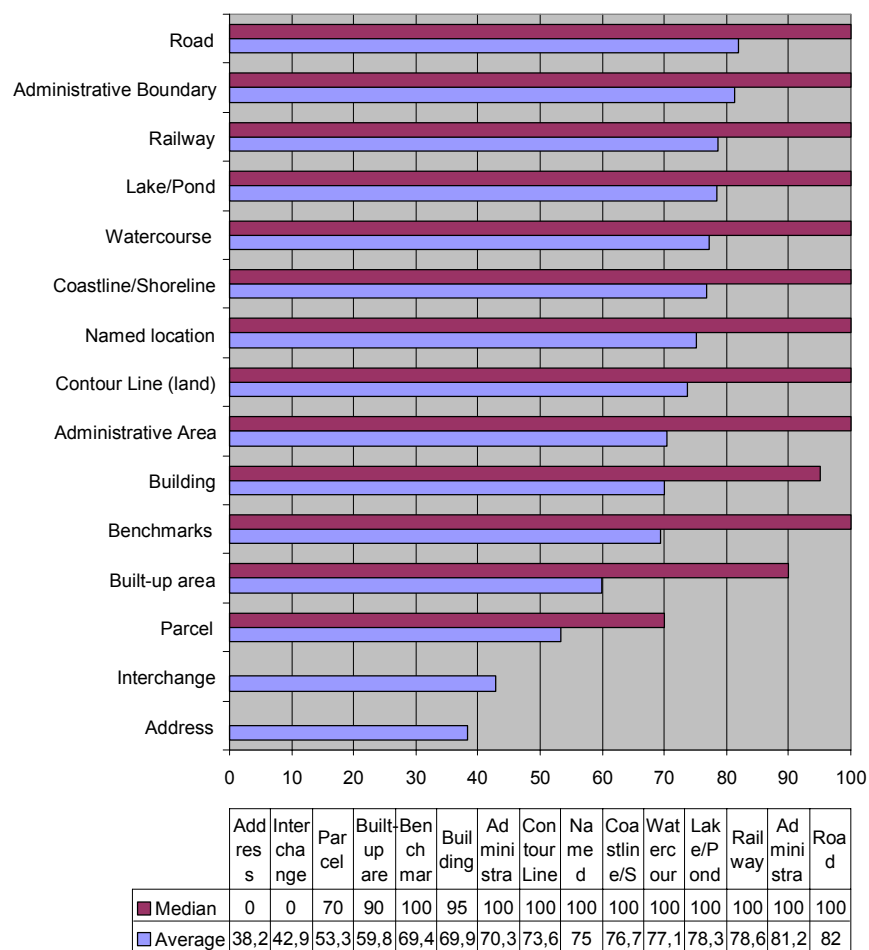


Figure 14. Coverage of feature types in countries

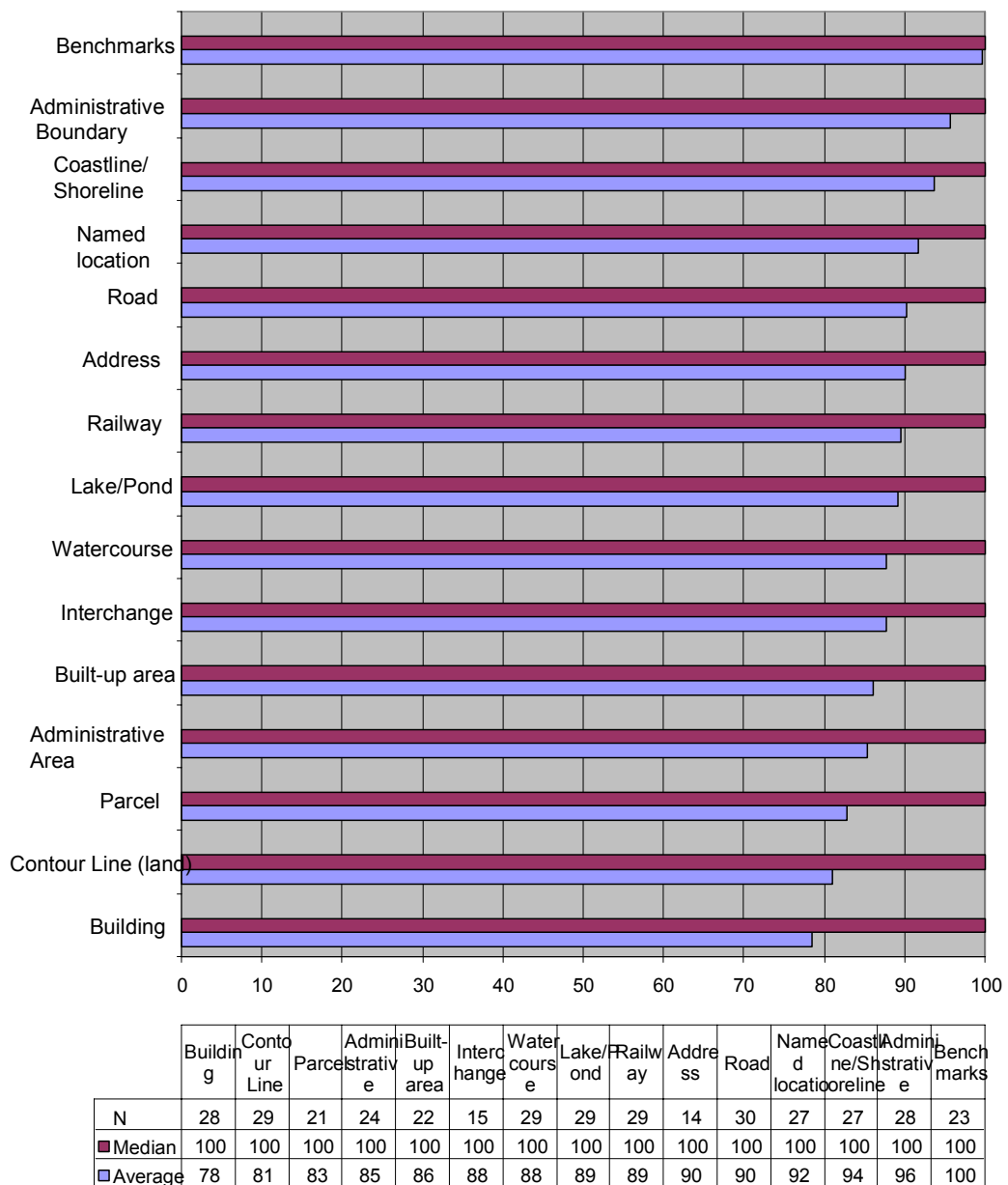


Figure 15. Coverage and median of feature types in countries where data is available



If we compare the results presented in **Figures 13, 14 and 15**, we can conclude that those countries that have feature types available have very good coverage (median 100 % in all feature types). Interestingly the order of feature types changes when 0% is not counted (see **Figure 15**). It seems that benchmarks, administrative boundaries and areas, coastlines/shorelines, named locations, roads, addresses and railways are typically covering the whole country if those are available.

Figure 16 illustrates coverage of all feature types at the national level. For topographic feature types (indicated in the figure in red) we included coastline/shoreline, watercourses, lake/pond, countour line (land), built-up areas, road, interchange and railways. Each feature type had a same weight, while in reality the importance of a feature type varies. Again when a country didn't have a coastline or railway we used 100 % coverage. Some countries didn't report information at feature type level and therefore their position is rather low.

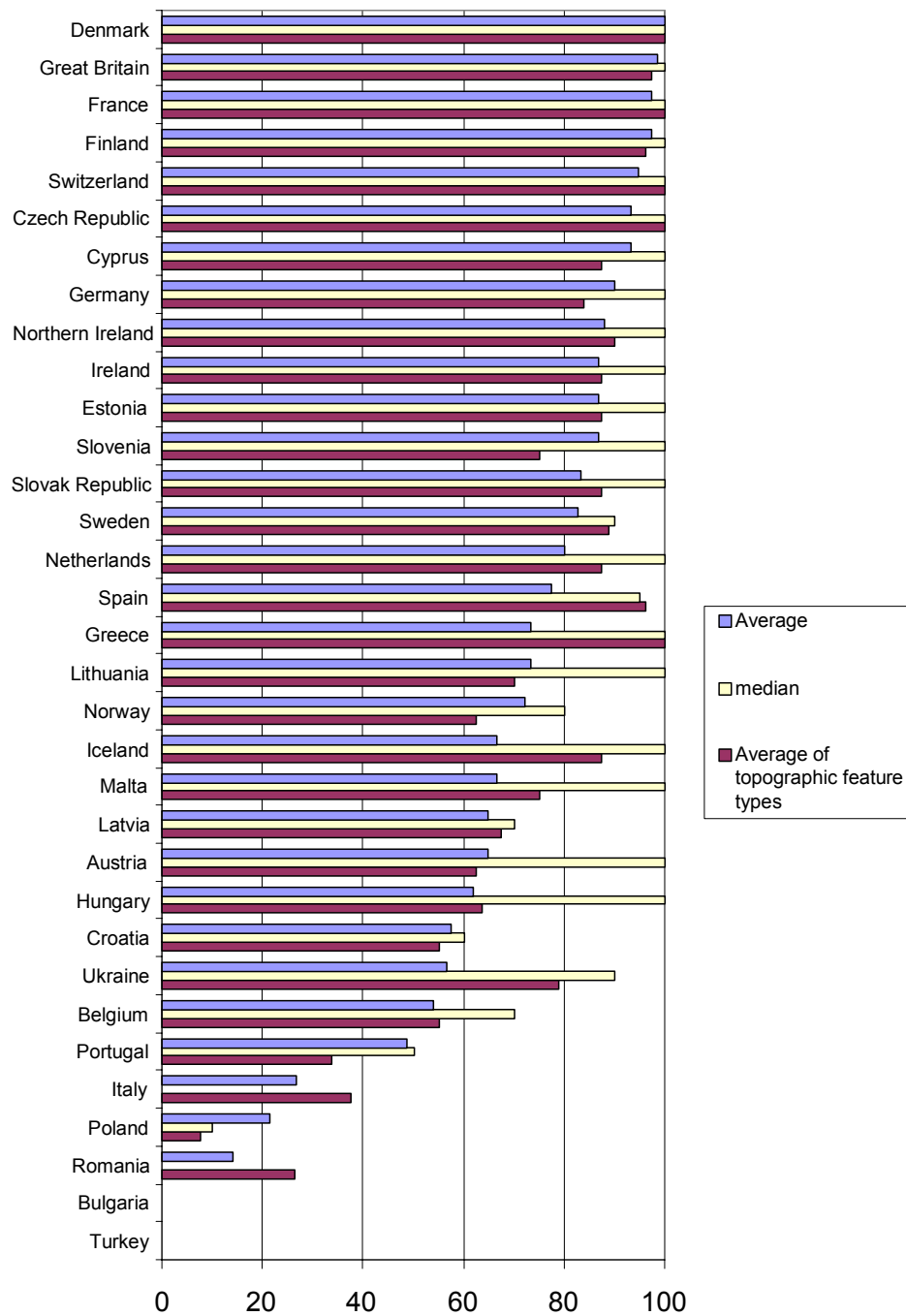


Figure 16. Coverage of all feature types at national level

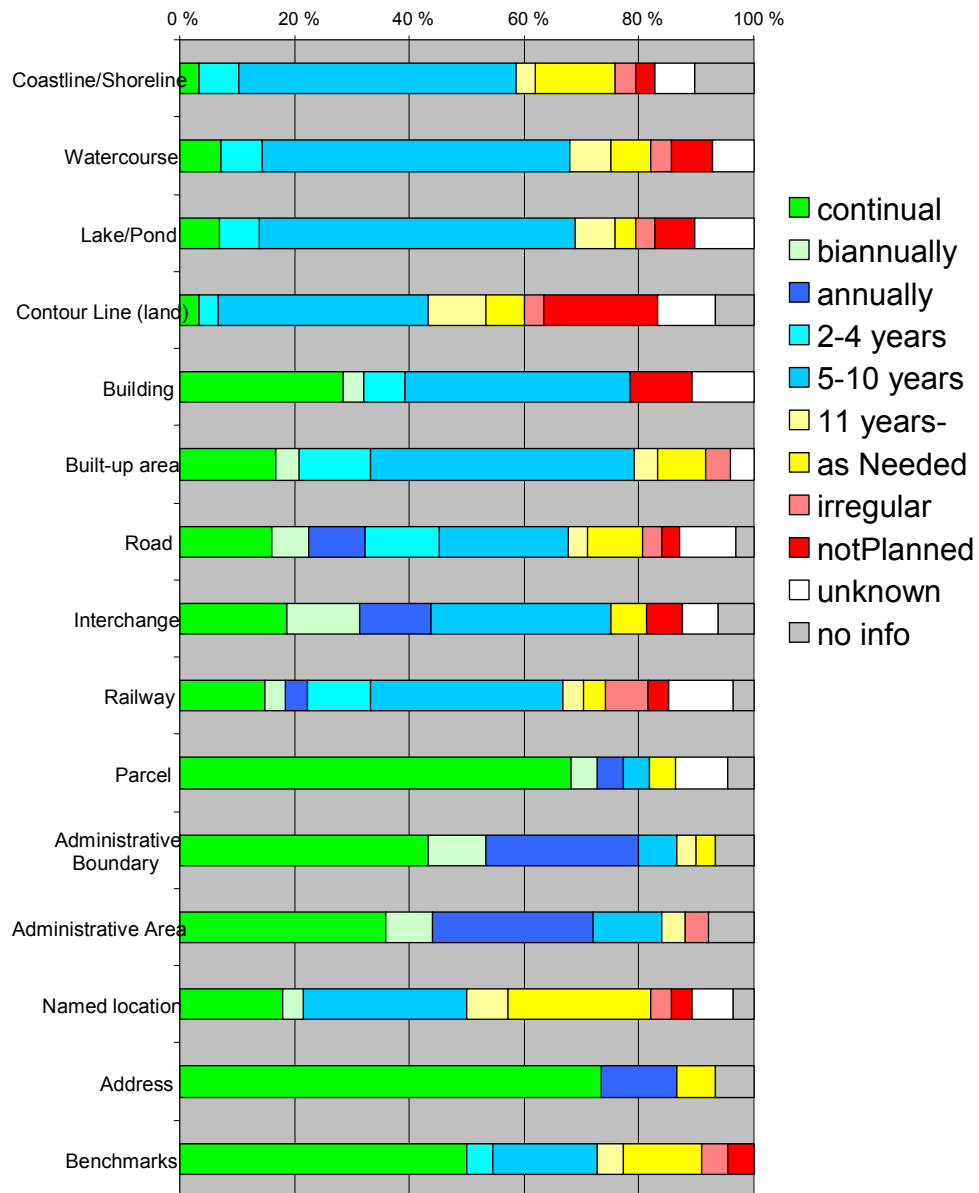


Figure 17. Maintenance of feature types



If we study the update frequency, we can notice that address information is updated most frequently in the countries. 73% of countries update it continuously. Parcels and benchmarks take the next places. If we consider also annual and bi-annual then the most updated are: addresses, administrative boundaries, -areas, parcels, interchanges, roads and buildings. Benchmarks and building are either updated very frequently or in few years' time perspective. The reason might be that those feature type either are part of the topographic or cadastral data sets. Coastlines/shorelines, Watercourses, Lake/Ponds, Contour lines, Built-up areas, Roads and railways are typically updated every 5-10 years.



7.3 Roads and interchanges

Road is defined in the FACC as an open way maintained for vehicular use. Interchange is a connection designed to provide traffic access from one road to another. Coverage of road information is illustrated in **Figure 18** and interchanges in **Figure 19**. 32% of countries maintain road information annually, biannually or continuously, which takes it to the 7th place compared to all feature types. Unique identifiers are used in Denmark, Great Britain (TOID), Ireland and Switzerland. Typically the road has some kind of class value, indication of level (above, on, below the surface) and road numbers. Some countries had address numbers as an attribute (Cyprus, Denmark, Finland, France, Lithuania, Northern Ireland and Portugal). Positional accuracy typically is about 3 m. Countries descriptions of the road seem to agree that it is presented as a central line. Source data set in majority of countries was a topographic database. Detail information is presented in the Part B, Table F.

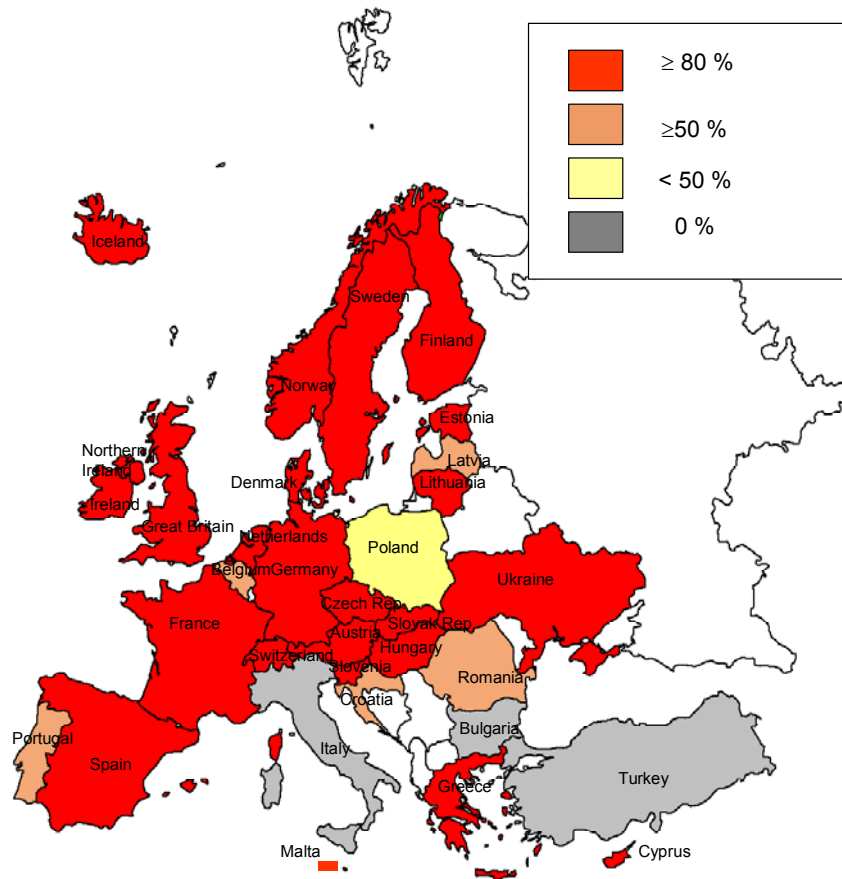


Figure 18. Coverage of road information

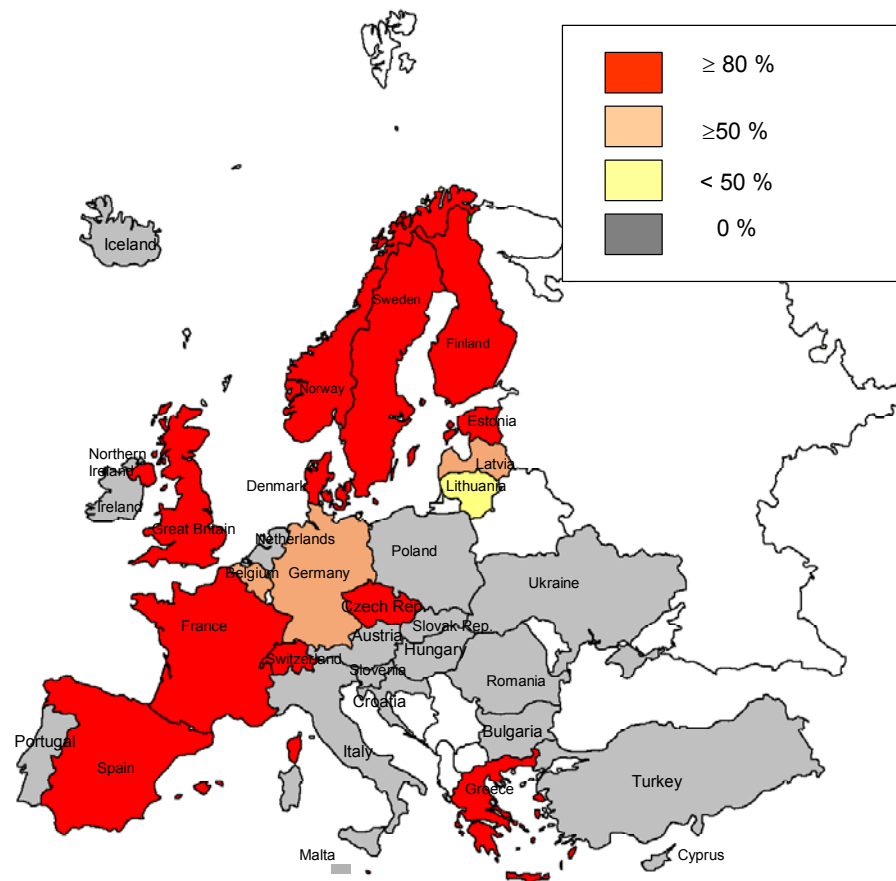


Figure 19. Coverage of interchanges



7.4 Administrative boundaries and areas

Administrative boundary is defined in the FACC as a line of demarcation between controlled areas. Administrative area is an area controlled by administrative authority. Coverage of administrative boundaries is illustrated in **Figure 20**. Administrative boundaries were maintained annually, biannually or continuously in 80% of the countries, which takes it to the 2nd place compared to all feature types. Unique identifiers are used in Denmark, Great Britain (TOID) and Switzerland. Eurostat hierarchy (NUTS 1-5) was used in 13 countries and SABE USE hierarchy (1-6) was used in 17 countries. Typically the administrative boundary has a hierarchical classification (e.g. national, regional, municipality). Administrative area has typically some kind of identification code, which can be for example a municipality code, national code or statistical code. Positional accuracy typically is about 2 m. The descriptions of the administrative boundaries seem to be quite homogenous. Source data sets were administrative data sets, topographic databases or cadastral databases. Detail information is presented in the Part B, Table G.

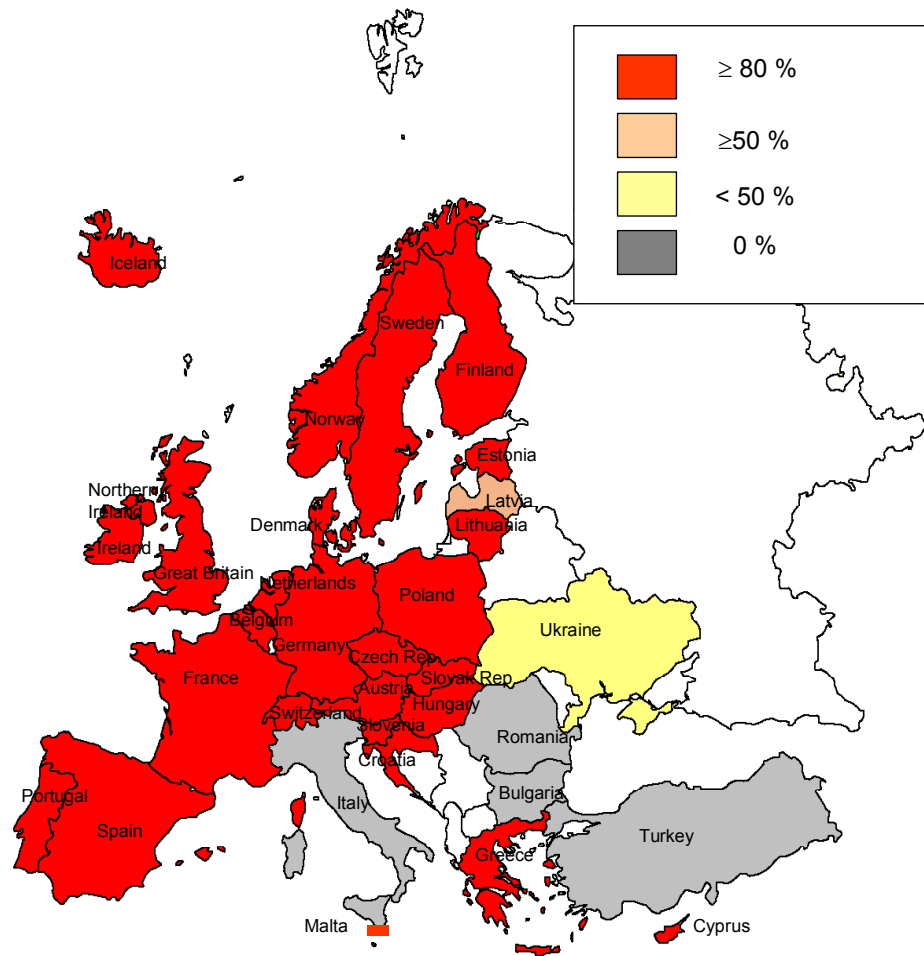


Figure 20. Coverage of administrative boundaries and areas



7.5 Addresses

Addresses are not defined in FACC. Inspire position paper on reference data and metadata defines an address as the local or officially determined designation of the position of buildings and/or parcels, which consists of a defined (unique) georeferenced location. This unique location is generally realised through the postal address (house number, street and city) and is related to coordinates. Coverage of addresses is illustrated in **Figure 21**. Address information is updated most frequently in the countries (73% of countries update it continuously). Unique identifiers are used in Denmark, Great Britain (TOID), Ireland and Switzerland. Addresses can be linked with parcels, buildings or roads. Also some countries have linked administrative codes to the addresses (e.g. municipality). Positional accuracy is typically about 1-2 m. While descriptions of the addresses seem to be homogenous, the meaning of the address probably is different depending if it is an address of a building, parcel or road. Source data sets are presented in Part B, Table E and other detail information is presented in Part B, Table H.

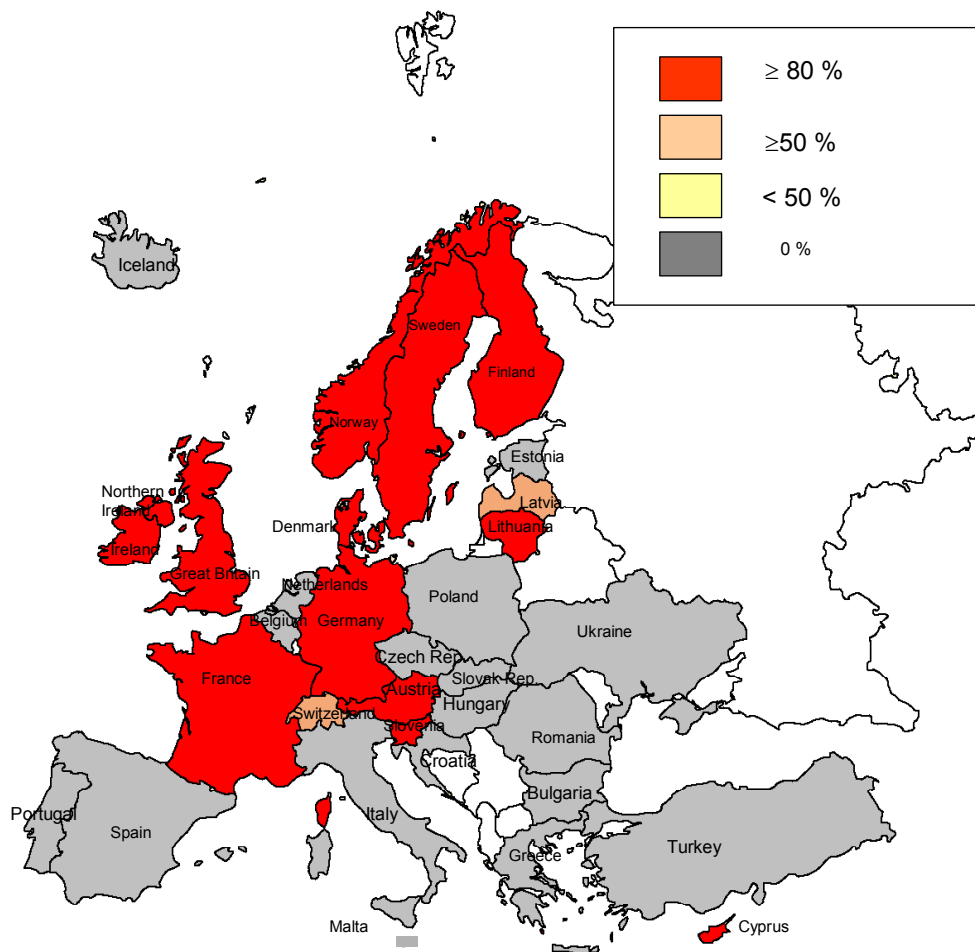


Figure 21. Coverage of addresses

7.6 Buildings

Building is defined in FACC as a relatively permanent structure roofed and usually walled and designed for some particular use. Inspire position paper on reference data and metadata defines a building as covered facility, usable for the protection of humans, animals, or things or the production of economic goods. A building is a key element to define a property. Buildings are either updated very frequently or in few years' time perspective (See **Figure 17**), and it shares the 7th position of the most updated features together with roads. Coverage of buildings is illustrated in **Figure 22**. Unique identifiers are used in Denmark, Great Britain (TOID), Hungary, Ireland, Norway and Switzerland. Here unique identifier can be also register number type. Many countries have addresses as an attribute to buildings (Cyprus, Denmark, France, Germany, Greece, Hungary, Ireland, Northern Ireland, Norway, Portugal, Slovenia and Switzerland). Typically buildings are classified by its use. Other attributes include construction year and method, height of building, state: planned, under construction, destroyed, number of floors, material, direction, name and type of the roof. Some countries have very rich attribution while majority of countries give only use information or cartographic classification. Positional accuracy is typically about 1-2 m. The descriptions of the buildings seem to be quite homogenous. Source data sets were topographic databases (16 countries), cadastral databases (4 countries) or separate building data sets. Detail information is presented in the Part B, Table I.

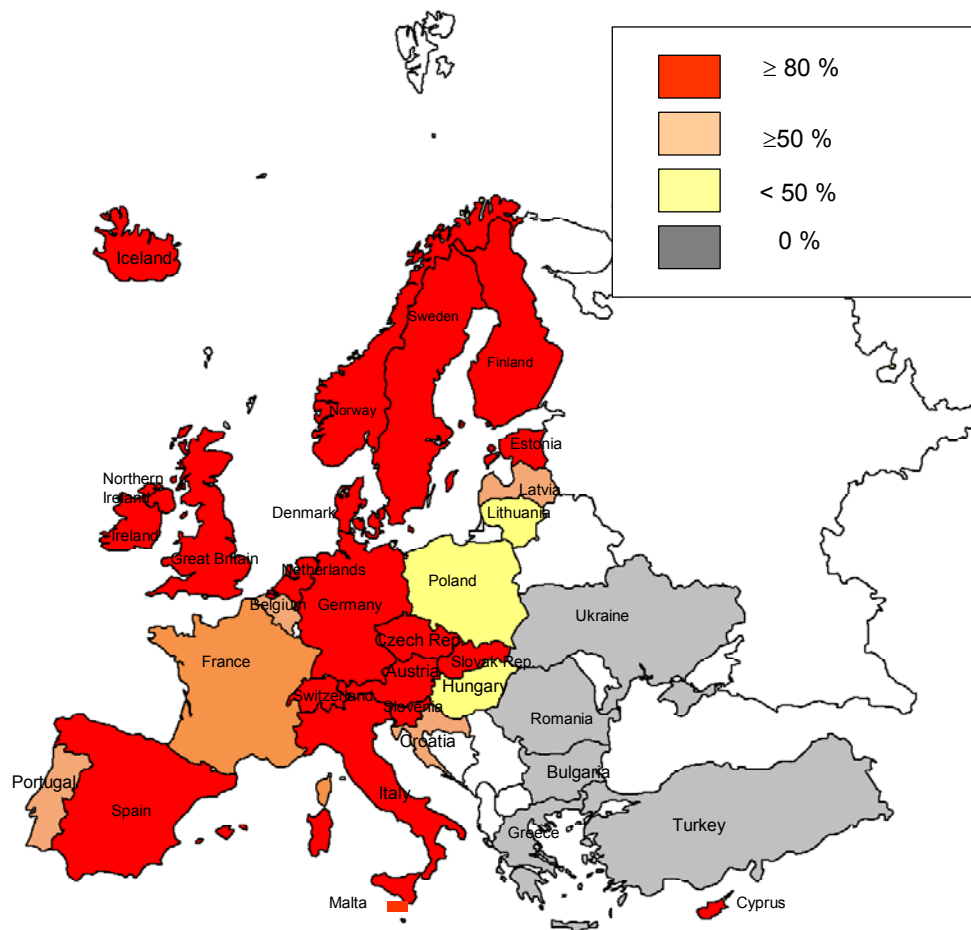


Figure 22. Coverage of buildings



7.7 Railways

Railway is defined in FACC as a rail or set of parallel rails on which a train or tram runs. In Inspire position paper on reference data and metadata, railways are part of the transportation theme. Coverage of railways is illustrated in **Figure 23**. Railways are the least frequent updated theme in the transportation. The typical updating scheme is 5-10 years. Unique identifiers are used in Denmark, Great Britain (TOID) and Switzerland. Typically attribution includes railway category, electrification, number of tracks, gauge width and status (in use, under construction, out of use). Positional accuracy is typically about 3-5 m. Countries either present the centre of an individual track or the centre of several tracks. Individual tracks are not normally presented (except in Finland, Norway and Ireland). Source data set is mostly a topographic database but also separate data sets and even one cadastral database is used. Detail information is presented in Part B, Table J.

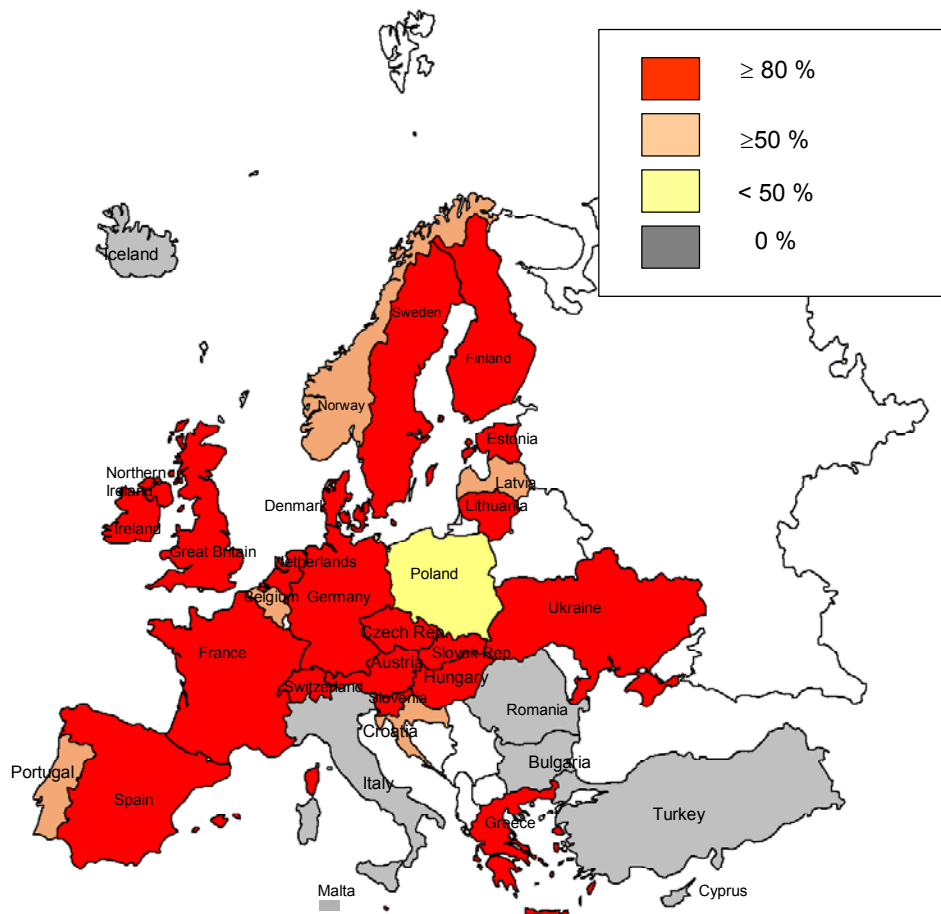


Figure 23. Coverage of railways



7.8 Lakes and ponds, watercourses, coastline and shoreline

Lakes and ponds are defined in FACC as a body of water surrounded by land. Watercourse is defined as a natural or man-made flowing watercourse or stream and coastline/shoreline as the line where a land mass is in contact with a body of water. Inspire position paper on reference data and metadata defines these feature types as part of hydrography data including surface water features such as lakes and ponds, streams and rivers, canals, oceans and shorelines. Each of these features should have the attributes of a name and feature identification code. Coverage of these feature types is illustrated in **Figures 24, 25 and 26**. All these feature types are updated mostly every 5-10 years (see **Figure 17**). Coastlines are slightly less updated compared to two other feature types. Unique identifiers are used in Denmark, Great Britain (TOLD), Hungary, Slovenia and Switzerland. Positional accuracy typically is about 3-5 m. Source data sets were either topographic databases, separate data sets or cadastral databases. Detail information is presented in Part B, Table K.

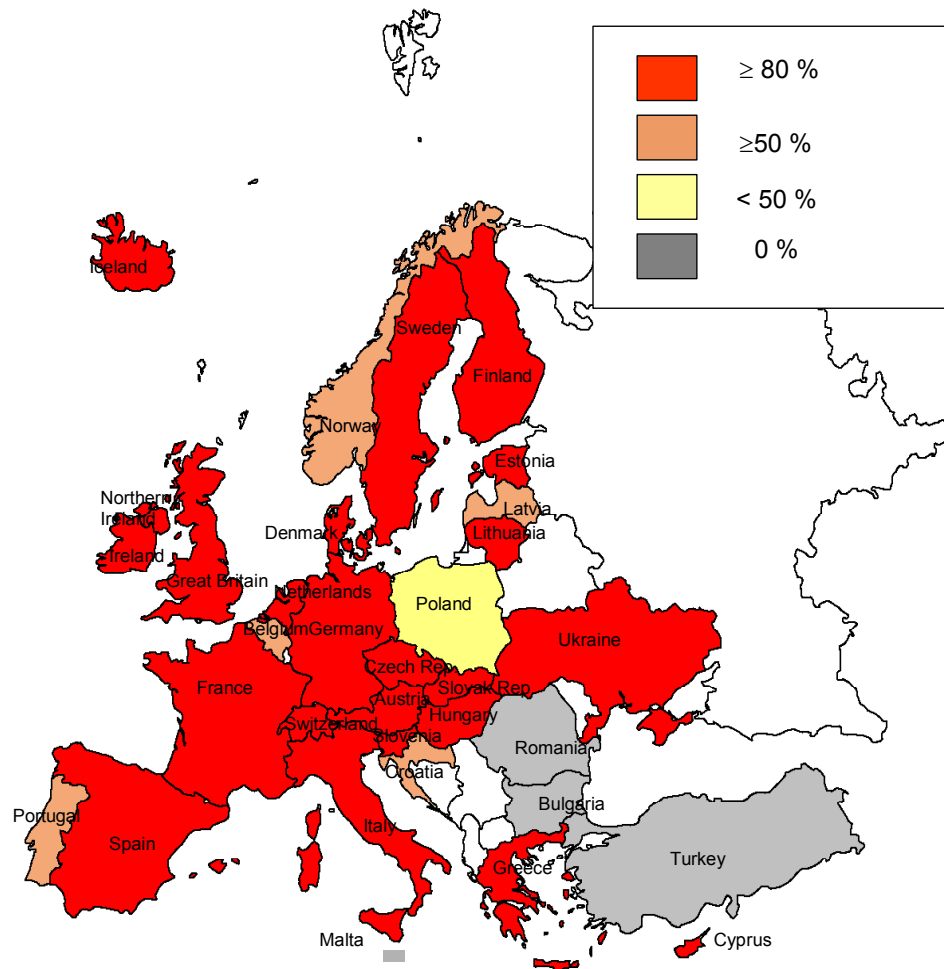


Figure 24. Coverage of lakes and ponds

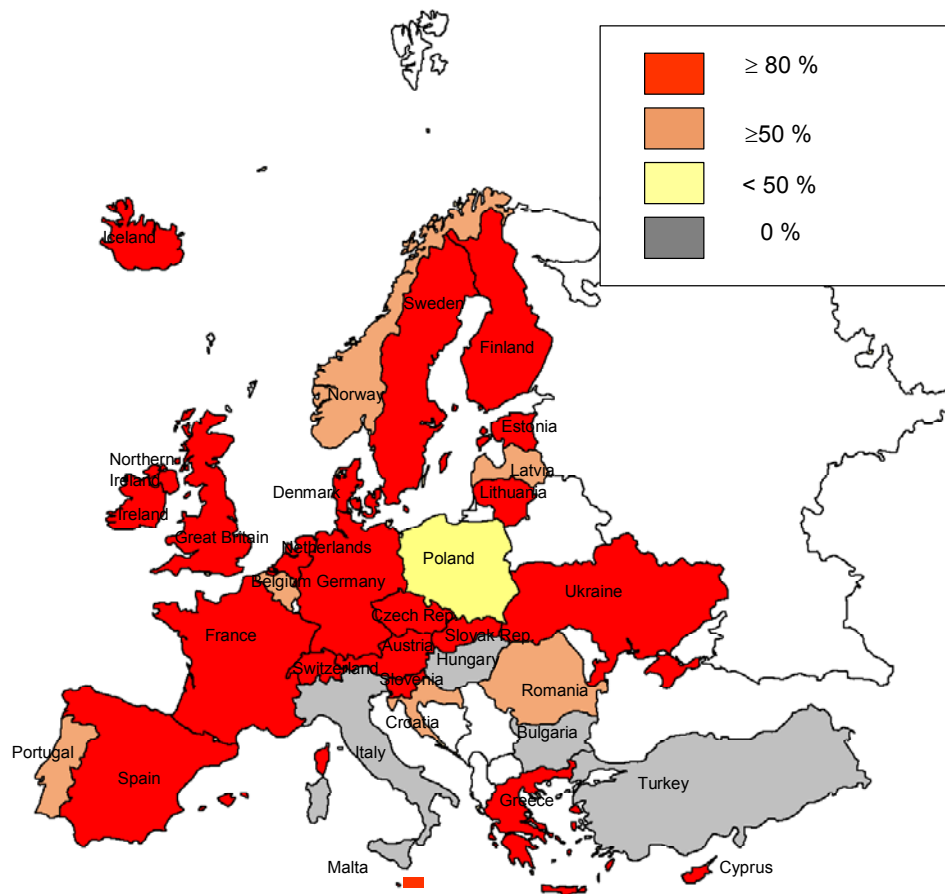


Figure 25. Coverage of watercourses

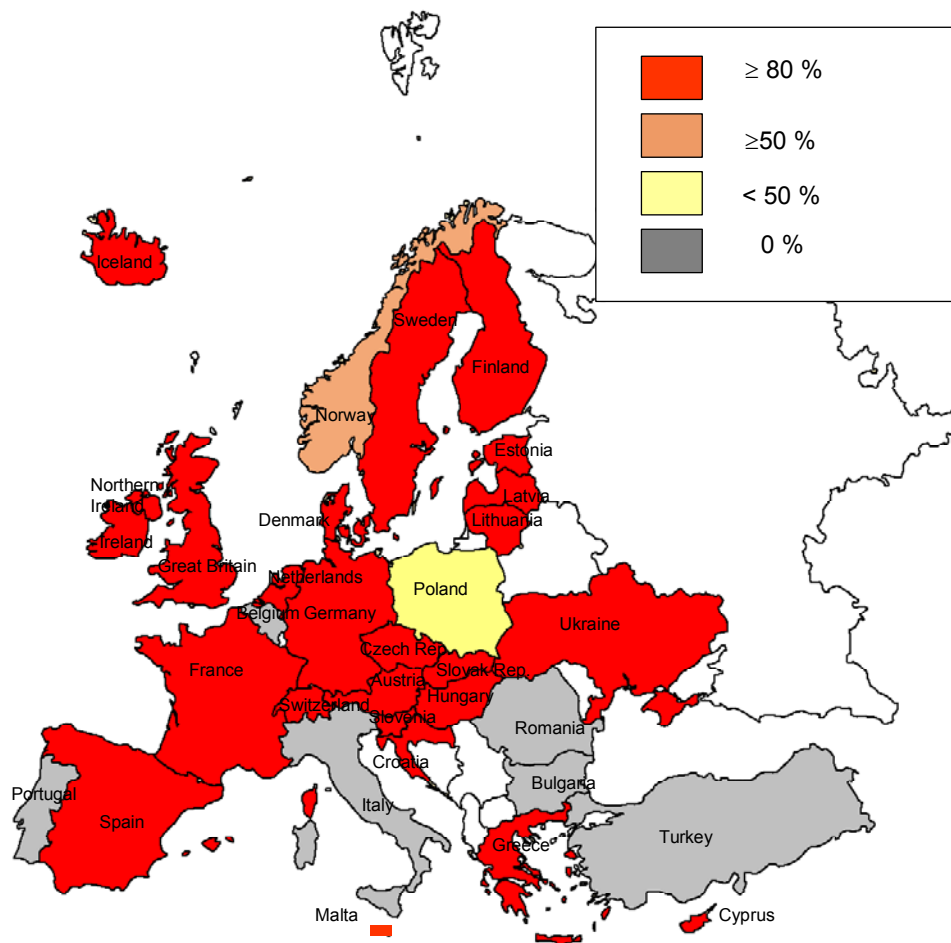


Figure 26. Coverage of coastline/shoreline



7.9 Names

Named location is defined in FACC as a geographic place on the earth, not normally appearing as a feature on a map, but having a name that is required to be placed on a map. Inspire position paper on reference data and metadata explains that Geographical names describe features on Earth. Often the term topographical name (or toponym) is used to emphasize the spatial dependency and relation to the adjacent topographical features. Coverage of named locations is illustrated in **Figure 27**. Named locations are updated either continuously, every 5-10 years or as needed (see **Figure 17**). Unique identifiers are used in Denmark, Germany, Great Britain (TOID) and Switzerland. Typically the named locations have classification of nature of the name. Positional accuracy is typically about 2- 5 m. The descriptions of the named locations seem to be quite homogenous. Source data sets were either name registers or topographic databases. Detail information is presented in Part B, Table L.

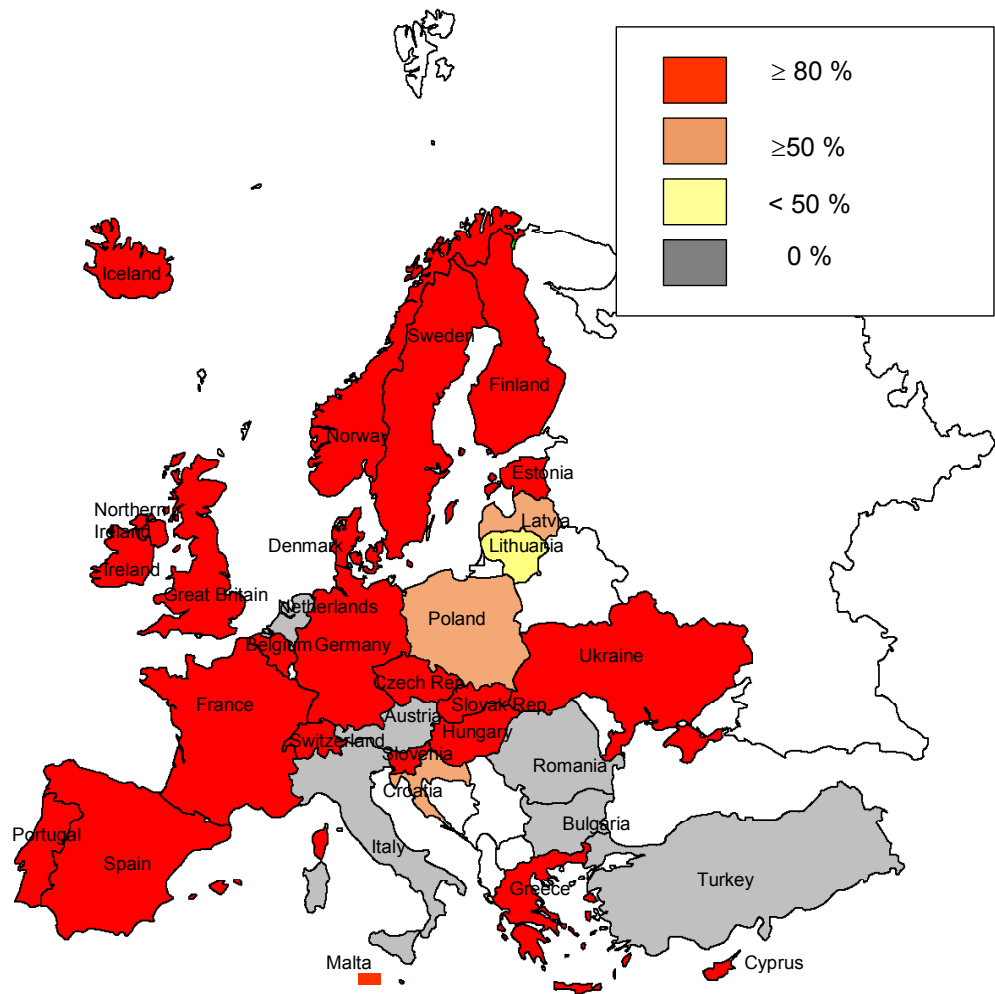


Figure 27. Coverage of named location



7.10 Contour lines (land)

Contour line is defined in FACC as a line connecting points having the same vertical datum value. INSPIRE position paper on reference data and metadata requires that height data should be available in two forms; Contours and Digital Elevation Models. Contour data is showing heights by isolines, and including within the same data set spot heights, high and low water lines, breaklines, and bathymetry. Coverage of contour lines is illustrated in **Figure 28**. Contour information is updated mostly 5-10 years or not planned. This might indicate the swift to capturing DEM instead of countour lines in some countries. Unique identifiers are used in Denmark and Great Britain (TOID). Positional accuracy typically is about 2-5 m. The descriptions of contour lines appear to be quite homogenous and typical attribute is elevation value. Source data sets were either separate data sets or topographic databases. Detail information is presented in Part B, Table M.

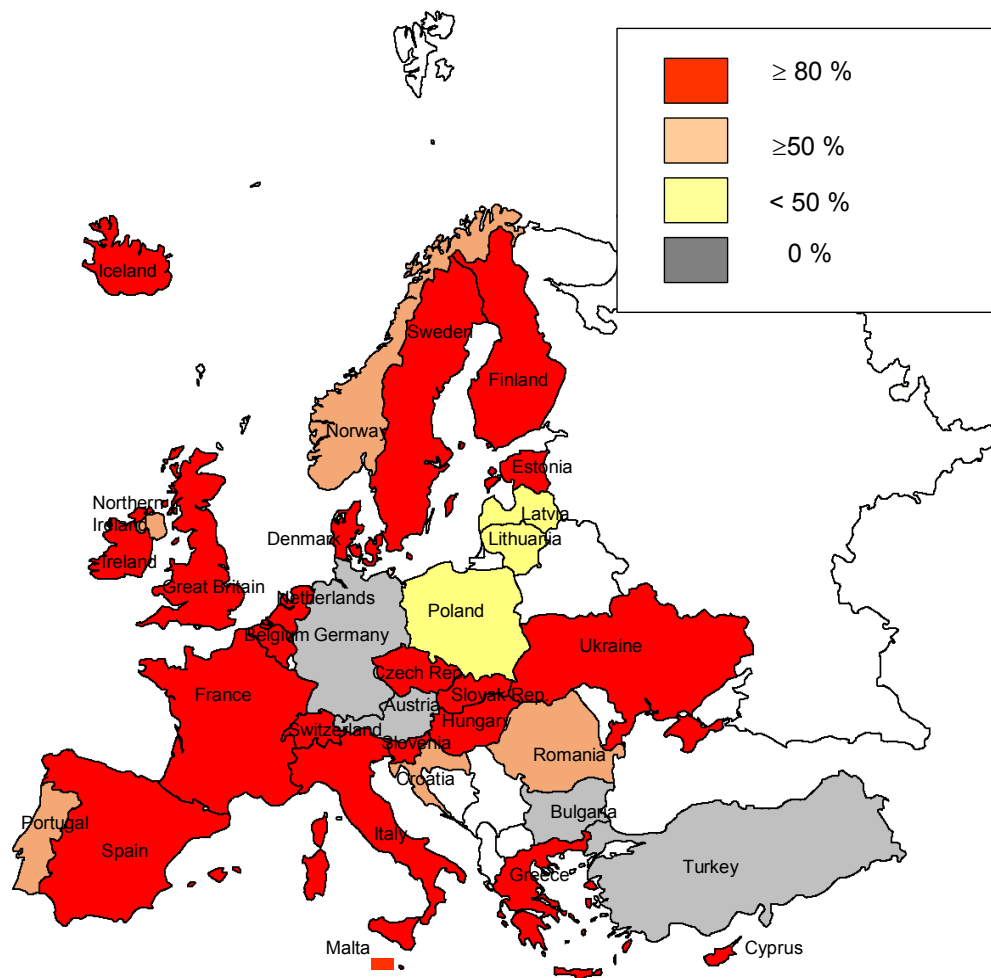


Figure 28. Coverage of contour lines

7.11 Benchmarks

Benchmarks are not defined in FACC. Coverage of benchmarks is illustrated in **Figure 29**. Benchmarks are mostly updated continuously. Unique identifiers or some other identification are used at least in Denmark, France, Finland, Germany, Great Britain (TOID), Hungary, Lithuania and Sweden. Positional accuracy typically is about 0,1-0,3 m. Source data sets are mostly separate registers. Detail information is presented in Part B, Table N.

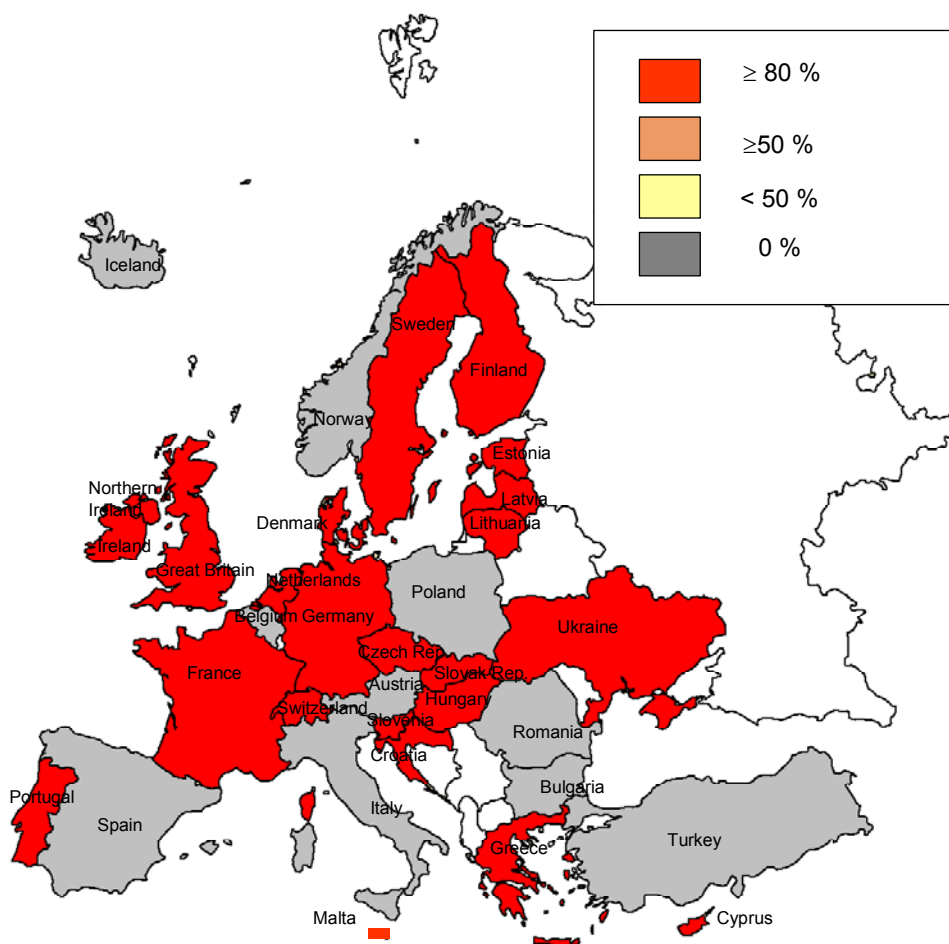


Figure 29. Coverage of benchmarks

7.12 Cadastral parcels

Parcels are defined in FACC as land use and/or land property. Inspire position paper on reference data and metadata defines a parcel as a piece of land with defined boundaries, on which a property right of an individual person or a legal entity applies. Parcels, as the fundamental features of the cadastre (or land administration system), give reliable and complete information of the legal situation of land by providing

- basic information for planning institutions, for economic development, for transparency of administration activities,
- information for taxation,
- a basis for planning and real estate regulations,
- a proof for the scope of any kind of rights on real properties.

Coverage of parcels is illustrated in **Figure 30**. Cadastral parcels are among most frequently updated feature types in the countries (68% of countries update it continuously). Unique identifiers or identification codes are used at least in Cyprus Denmark, Finland, Germany, Great Britain (TOID), Greece, Hungary, Norway, Romania, Slovenia and Switzerland. Positional accuracy typically is about 0,3-2,5 m. Source data sets are presented in Part B, Table B. Detail information is presented in Part B Table O.

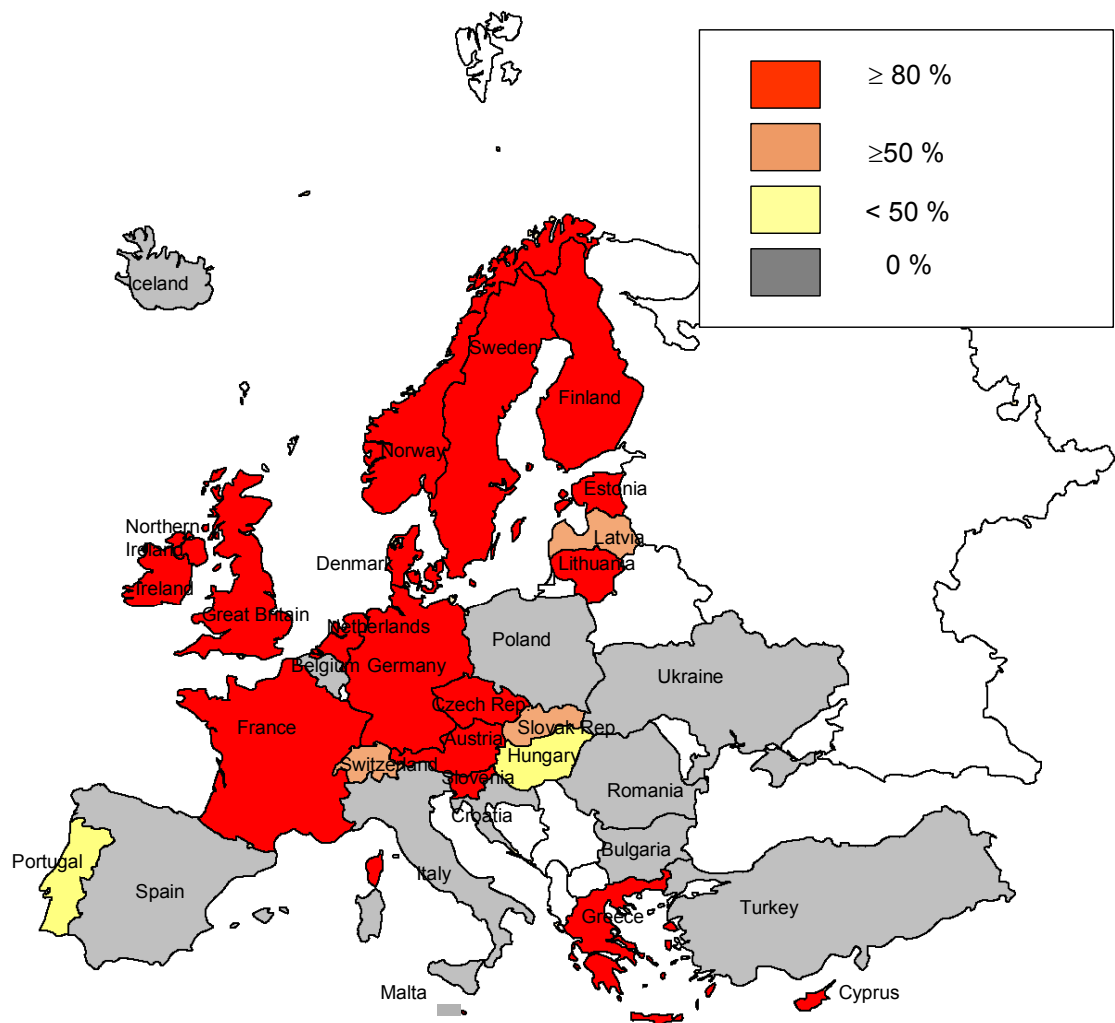


Figure 30. Coverage of cadastral parcels

7.13 Built-up area

Built-up area is defined in FACC as an area containing a conception of buildings and other structures. It is not directly mentioned in the Inspire position paper on reference data and metadata. Coverage of built-up areas is illustrated in **Figure 31**. It is mostly updated every 5-10 years in the countries (see **Figure 17**). Unique identifiers are used in Denmark, Great Britain (TOID), Hungary and Switzerland. In Hungary the identification is based on administrative sub units (which may be identical to the built-up areas?). Some countries give food definitions on what is classified as a built-up area and give also selection criteria. Positional accuracy typically is about 3-5 m. Source data sets were mostly topographic data sets but also separate data sets and cadastral data sets were used. Detail information is presented in Part B, Table P.

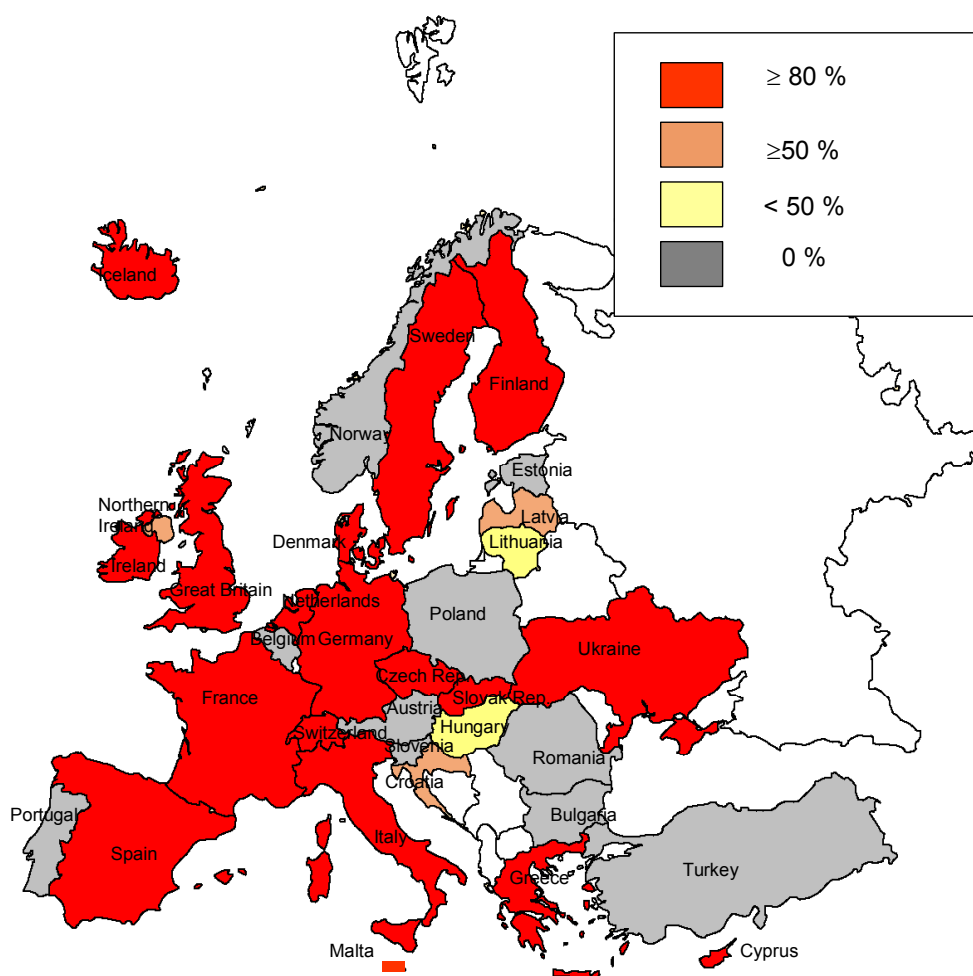


Figure 31. Coverage of built-up area



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- Ireland: Bernard Farrell
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- Latvia: Edvīns Kāpostiņš
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- Poland: Wiesław Wolniewicz
- Portugal: Henrique Botelho, Paulo Patrício
- Romania: Marian Csaki, Mihaela Cuceriaev, Marius Trinca



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- Sweden: Maria Andersson, Susanne Jansson
- Switzerland: Christoph Käser, Robert Balanche, Kurt Spaelti, Urs Gerber
- Turkey: Osman Alp
- Ukraine: Mykola Triukhan

9 References

INSPIRE position paper on reference data and metadata

http://inspire.jrc.it/reports/position_papers/inspire_rdm_pp_v4_3_en.pdf

FACC data dictionary <http://www.digest.org/DownloadDigest.htm>

EuroRegional map specification <http://www.eurogeographics.org/ERM/index.htm>

SABE Administrative hierarchy for all SABE countries

http://www.eurogeographics.org/Projects/SABE/UserGuide/SABE97_V21_AnnexH_dec2001.pdf

ISO 19110 Feature cataloguing methodology

ISO 19115 Metadata

ISO 19131 Data Product Specification

GiMoDig Global Schema

Reference:

Questionnaire/ Template for EuroSpec data specification

File name: *ref_data_ver10.dot*

Version	Author	Date	Comments
1.0	Antti Jakobsson	Nov 19 th 2002	
1.1	AJ	Dec 3 rd 2002	Modifications based on comments by Andreas Illert and Ulf Sandgren
1.2	AJ	Dec 12 th 2002	Some general questions added (input from Claude Luzet and Nick Land)
1.3	AJ	Jan 13 th 2003	More elements and modifications based on the December meeting
1.4	AJ	Jan 16 th 2003	Some modifications
1.5	AJ	Jan 17 th 2003	Final version

10 Background

This questionnaire investigates the current status of reference data sets among EuroGeographics' members. The template uses following documents as basis for the investigation:

- INSPIRE position paper on reference data and metadata
http://inspire.jrc.it/reports/position_papers/inspire_rdm_pp_v4_3_en.pdf
- FACC data dictionary <http://www.digest.org/DownloadDigest.htm>
- EuroRegional map specification <http://www.eurogeographics.org/ERM/index.htm>
- SABE Administrative hierarchy for all SABE countries
http://www.eurogeographics.org/Projects/SABE/UserGuide/SABE97_V21_AnnexH_dec2001.pdf
- ISO 19110 Feature cataloguing methodology
- ISO 19115 Metadata
- ISO 19131 Data Product Specification
- GiMoDig Global Schema

The results will be used in the EuroSpec project, which is investigating the possibility to make a harmonised reference data set specification in Europe at the most detailed level (scale range about 1:10 000). EuroSpec will be developed in phases. During 2003 a draft specification for the priority layers will be created and supported by a demonstrator. The specification will be advanced by a series of workshops and workgroups who will take forward key tasks between the workshops. The first workshop will be organised in Paris, 5-7th March 2003 and the second workshop tentatively 23-25th June 2003. The results of this survey will be used in this process. While we have used FACC data dictionary as a starting point for this investigation, it does not mean that specification will be based on this. **Figure 1** shows the idea behind the project.

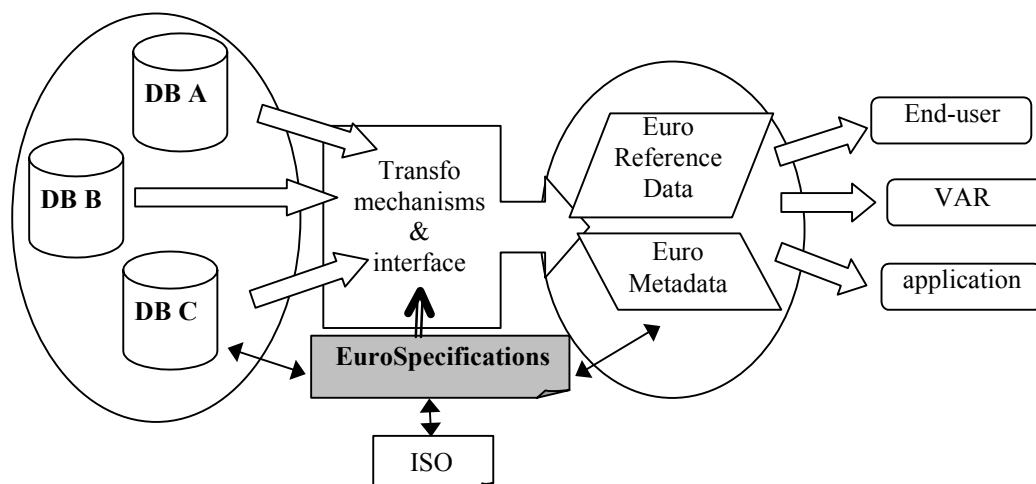


Figure 32 Concept of the Eurospec

The themes for the EuroSpec include following:

- Geodetic reference data
- Units of administration
- Units of property rights (parcels, buildings)
- Addresses
- Selected topographic themes (hydrography, transport, height)
- Orthoimagery
- Geographical names

We have used the themes described in the INSPIRE position paper on reference data and metadata. For each theme we have selected some feature types using the FACC data dictionary. These would be the base feature types in the EuroSpec data specification. We would like to know, if these feature types are available in your country.

The reference data components (as described in INSPIRE position paper on reference data and metadata):

Units of administration

Each national territory is divided into administrative units. The administrative units are divided by administrative boundaries.

The administrative division forms an indirect spatial reference system. The reference to an administrative unit provides a spatial dimension to data without using coordinates.

On the national level, data sets of administrative boundaries are available in most European countries. The national data sets differ with respect to resolution, data model and geometry of international boundaries. Harmonisation can be achieved in the mid term.

Consistency of administrative boundaries with other topographic reference data is a difficult issue. It can be solved only in the long term.

Administrative boundaries are the key to horizontal interoperability between the products of national data custodians. Neighbours should agree on international boundaries with shared geometry at the best possible resolution.

The semantic models of other units for territorial management such as the statistical division, the post code division and the areas of restricted use (e.g. national parks) equal the model of the administrative units. The concept of the reference data component might be expanded to cover the other units of territorial division

Units of property rights

Parcels A parcel is a piece of land with defined boundaries, on which a property right of an individual person or a legal entity applies.

Parcels, as the fundamental features of the cadastre (or land administration system), give reliable and complete information of the legal situation of land by providing

- basic information for planning institutions, for economic development, for transparency of administration activities,
- information for taxation,
- a basis for planning and real estate regulations,
- a proof for the scope of any kind of rights on real properties.

In this context parcels (as part of the cadastre or land administration system) are only applicable at the local level.

Buildings

A building is covered facility, usable for the protection of humans, animals, or things or the production of economic goods. A building is a key element to define a property.

This elements are requested on the local and regional level for many property related applications. Scale (s)/resolution (s) are different with respect to the source (cadastre/national mapping).

Therefore it is recommended to have this kind of data available on the medium term view.

Addresses

An address is the local or officially determined designation of the position of buildings and/or parcels, which consists of a defined (unique) georeferenced location. This unique location is generally realised through the postal address (house number, street and city) and is related to coordinates.

The address is the fundamental navigation instrument to find a location. It could be used to connect information of other non-geometrical data sets, e.g. owners, land value, taxation.

Addresses will be very important for future Location Based Services (LBS) applications.

Therefore it is recommended to have this kind of data available in the medium term.

Hydrography

Hydrography data include surface water features such as lakes and ponds, streams and rivers, canals, oceans and shorelines. Each of these features has the attributes of a name and feature identification code.

Transport

The transport component should comprise an integrated transport network, and related features, that are seamless within each national border. Transportation data includes topographic features related to transport by road, rail, water, and air. It is important that the features form networks where appropriate, and that links between different networks are established i.e. multi-modal nodes, especially at the local level, in order to satisfy the requirements for intelligent transport systems such as location based services (LBS) and telematics.

Height

Height data should be available in two forms; Contours and Digital Elevation Models. Contour data – showing heights by isolines, and including within the same data set spot heights, high and low water lines, breaklines, and bathymetry.

DEM data - showing spot heights in a regular grid. DEMs can be of two types DTM and DSM (see glossary). National/Cross-border and local level grids should be DTMs but the pan-European could be DSM.

Orthoimagery

Ortho-imagery is airborne or spaceborne image data of the surface of the earth
is rectified to fit to a defined coordinate reference and cartographic projection system at a defined accuracy
should be presented in digital format at a defined pixel resolution
should be acquired by optical sensors with different spectral characteristics, i.e. panchromatic, true-colour, infrared
can be used to extract reference data components
should allow for multi-temporal analysis, implying the supply of images with different acquisition dates

Apart from the potential use as background layer, ortho-imagery is playing an important role in change detection and updating, both of reference data components and thematic information components.

Remote sensing imagery is available at different resolutions: with low and medium resolution to be used in applications at regional, national and European level and very high resolution being generally more adapted for local use. Remote sensing imagery is available with different spectral bands (including e.g. infrared), each of which may have its importance for specific environmental application fields.

The remote sensing requirements on resolution, accuracy, and spectral characteristics - specifically for environmental monitoring users - are currently tackled specifically by the GMES initiative. This activity might contribute for example to the differentiation between common reference layer, common thematic layer or thematic layer.

There is in all the Member States a strong operational use of digital aerial photography and intense activities in the production of orthophotographs.

Regarding orthoimagery, there are no significant problems of data availability but it is suggested to pay particular attention to data policy and data pricing issues.

Geographical names describe features on Earth. Often the term topographical name (or toponym) is used to emphasize the spatial dependency and relation to the adjacent topographical features.

Geographical names can be associated to different kind of spatial features:

Areal features (e.g. geographical regions, lakes, forests...).

Linear features (e.g. rivers, railways, shipping lines, boundary lines...).

point features (e.g. spot heights, monuments, villages, buildings...).

Gazetteer – definition:

According to the definition in ISO 19112 a gazetteer provides a master record of all location instances for a particular location type or types. Therefore gazetteers are not just geographical names' indexes but may be records of any kind of feature type or types. The positional information may include a coordinate reference, but it may be purely descriptive.

The gazetteer shall as a minimum include all the names that are part of the reference data.

Attachments:

Please attach a copy of each feature type specification from original documents and example picture(s) illustrating the database (preferably from all your border areas).

11 General questions

1. Country name:

2. Producers of reference data themes

Fill in the details of the organizations, which are responsible for the production the reference data themes. If there are more than 4 organizations fill in several forms.

	Organization A	Organization B	Organization C	Organization D
Name of the organization:				
Internet address				
Name of the respondent:				
Address:				
Phone number:				
Fax:				
E-mail				
Email(s) of the expert(s) in the following themes:				
1. Geodetic				
2. Units of administration				
3. Units of property rights				
4. Addresses				
5. Topographic features				
6. Orthoimagery				
7. Geographical names				

12 Databases for reference data themes

Reference mnemonic for source data set	Name of the source data set (in original language)	Producer organization	Scale or resolution	Coverage (National, percentage)	Data structure of the database	Edge matching between countries				Does your database conform to any published standards? If yes, please list	Source (digitised, scale of aerial photographs etc.)	Additional information (example: link to a metadata service)
						No	Technical	Content	Update process			
Hydro		Select	Select	Select	Select	☐	☐	☐	☐			
Transport		Select	Select	Select	Select	☐	☐	☐	☐			
Contour		Select	Select	Select	Select	☐	☐	☐	☐			
DEM		Select	Resolution (m)	Select		☐	☐	☐	☐			
Parcel		Select	Select	Select	Select	☐	☐	☐	☐			
Building		Select	Select	Select	Select	☐	☐	☐	☐			
Address		Select	Select	Select	Select	☐	☐	☐	☐			
Ortho		Select	Resolution (m)	Select		☐	☐	☐	☐			
Geodetic		Select		Select		☐	☐	☐	☐			
Administrative		Select	Select	Select	Select	☐	☐	☐	☐			
Geoname		Select	Select	Select								
Combo1		Select	Select	Select	Select	☐	☐	☐	☐			
Combo2		Select	Select	Select	Select	☐	☐	☐	☐			
Combo3		Select	Select	Select	Select	☐	☐	☐	☐			

13 Questions related to feature types

FACC Code	FACC Name	FACC description	Availability measure	National Code	National Name	Description	Attributes available Name(s) and description(s)	Coverage	Maintenance	Positional Accuracy (m)	Reference source data (see above)	Additional information (example: link to a metadata service)
BA010	Coastline/ Shoreline	The line where a land mass is in contact with a body of water	Select					Select	Select		Select	
BH502	Watercourse	A natural or man-made flowing watercourse or stream.	Select					Select	Select		Select	
BH080	Lake/Pond	A body of water surrounded by land	Select					Select	Select		Select	
CA10	Contour Line (land)	A line connecting points having the same vertical datum value.	Select					Select	Select		Select	
AL015	Building	A relatively permanent structure roofed and usually walled and designed for some particular use.	Select				☐ Address	Select	Select		Select	
AL020	Built-up area	An area containing a conception of buildings and other structures.	Select					Select	Select		Select	
AP030	Road	An open way maintained for vehicular use	Select				☐ Address numbers	Select	Select		Select	

FACC Code	FACC Name	FACC description	Availability measure	National Code	National Name	Description	Attributes available Name(s) and description(s)	Coverage	Maintenance	Positional Accuracy (m)	Reference source data (see above)	Additional information (example: link to a metadata service)
		vehicular use.										
AP020	Interchange	A connection designed to provide traffic access from one road to another.	Select					Select	Select		Select	
AN010	Railway	A rail or set of parallel rails on which a train or tram runs.	Select					Select	Select		Select	
IA010	Map Boundary	A line which encloses all water, streets, parcels and buildings.	Select					Select	Select		Select	
IA040	Parcel	Land use and/or land property.	Select				☐ Address	Select	Select		Select	
FA000	Administrative Boundary	A line of demarcation between controlled areas.	Select				☐ EuroStat hierarchy (NUTS1-5) ☐ SABE USE hierarchy (USE1-	Select	Select		Select	

FACC Code	FACC Name	FACC description	Availability measure	National Code	National Name	Description	Attributes available Name(s) and description(s)	Coverage	Maintenance	Positional Accuracy (m)	Reference source data (see above)	Additional information (example: link to a metadata service)
							6)					
FA001	Administrative Area	An area controlled by administrative authority.	Select				☐ EuroStat hierarchy (NUTS1-5) ☐ SABE USE hierarchy (USE1-6)	Select	Select		Select	
ZD040	Named location	A geographic place on the earth, not normally appearing as a feature on a map, but having a name that is required to be placed on a map.	Select					Select	Select		Select	
	Address		Select					Select	Select		Select	
	Benchmarks		Select					Select	Select		Select	

Instructions

This questionnaire is designed to be filled in using the Microsoft Word.

Reference mnemonic for source data is used below to connect the source data set and the feature types

Name of the source data set: Give the name of the data set in original language.

Scale or resolution: Select appropriate scale. The target scale for this questionnaire is about 1:10 000 but if you don't have some feature types available in this scale you can indicate the best available scale. For DEMs and Orthophotographs give the best available resolution of the country. If you will have improve the resolution in future provide this information in additional information and give also the year when this is available.

Coverage: Select if the data is covering the whole country (national) or select appropriate percentage.

Edge-matching: If you do not have agreements in place with neighbouring countries for maintaining consistency of data at the border(s) tick box No. If you have made an agreement covering specifications, content or updating procedure click relevant options.

Conformity to published standards: If your database conforms to a national or international standard, please give this information.

Source: Indicate a source material and methods used to compile your database.

Additional information: Give any relevant information that you find useful.

Availability measure: Indicate if this feature type is available

yes=equivalent feature type exists,
derivable= could be derived by combining or other means,
no=not at the moment

IF you select no, give an indication when this element would be available in the additional information.

National code: Give a code used in your database.

National name: Give national name (in original language)

Description: Please indicate if the description differs from the FACC description. (in English, please)

Attributes available: Please give the names of the attributes available and their descriptions. For example feature type classification. If you have addresses as an attribute to buildings or roads, tick the appropriate box.

Coverage: Select if the feature type is covering the whole country (national) or select appropriate percentage.

Maintenance: Select one of the following:

continual: data is repeatedly and frequently updated.

biannually: data is updated twice each year.

annually: data is updated every year.

2-4 years: The update frequency is 2-4 years.

5-10 years: The update frequency is 5-10 years.

11 years-: the update frequency is 11 years or more.

asNeeded: data is updated as deemed necessary.

irregular: data is updated in intervals that are uneven in duration

notPlanned: there are no plans to update the data

unknown : frequency of maintenance for the data is not known

Positional accuracy: Give an estimate or the positional accuracy of the feature type in metres (RMSE).

Reference Source data: Select the database that has this feature type.

Additional Information: Give any relevant information that you find useful.