

# INSPIRE Core Data

## Questionnaire for EuroGeographics Cadastre & Land Registration KEN members

### 1. Theme Cadastral Parcels

#### 1.1 Geographic extent

Q1: in your country, what is the geographic extent of cadastral data (cadastral map) that is planned in your national regulations? Please mark as many as apply.

- Full partition of land
- Land but with missing parts (e.g. public domain)
- Sea or part of it
  - o Exclusive Economic Zone
  - o Internal Waters
  - o Territorial Waters
  - o other

Comments: please provide any additional information of interest on this topic. Typically, explain what are the missing parts if answer 2 (Land) or the content of “Sea/other” if applicable.

**Denmark:** Ownerships and property objects at sea is not included in the Danish Cadastre. From 2018 buildings or technical installations at sea territory can be registered in a registry at the national cadastral agency. However, it will not be a part of the cadaster.

**Estonia:** Missing part is public sea and big public territories like lakes.

**Finland:** BTW If the sea portion is supposed to be hierarchical then Territorial waters is at least usually wider concept than Internal waters and this applies to Finland.

**Germany:** The bundeslaender Lower Saxony, Schleswig-Holstein and Mecklenburg-Western Pomerania adjoin to the sea. These bundeslaender have marine cadastre which includes estuaries and parts of the sea surface that are incorporated into local administrative units but not transferred to its property. It also includes a belt of coastal waters extending 3 nautical miles from the line represented by mean sea level.

**Iceland:** *Answer: Icelandic law on cadastral data is somewhat fuzzy, since there is no specific law on a national Cadaster. Up until recently, the concept of a Cadaster had never been addressed in Icelandic law, what so ever. The latest update of law on real property registration and evaluation included a clause on cadastral data and consequently, a generation of a full land Cadaster has become a sort of a “by product” of real estate registration. This means we have to go back in time to collect cadastral data on land property registered prior to 2013, which in deed is a bit of an “upside down” way of doing*

*things! We still have a long way to go in covering the whole of the country, but hopefully we will get a better defining law on the issue soon.*

**Latvia:** Territorial Waters and Exclusive Economic Zone will be included in the National Real Estate Cadastre Information System (Cadastre Information System) till the year 2020.

**Lithuania:** All the land in Lithuania is to be divided into cadastral parcels and included in the cadastral map. Still some areas are not recorded in the cadastral map; mainly those used for public needs, such as public use railways, parks or other public spaces; as well as water bodies of state significance, forests and roads.

**Spain:** The marine area is public domain and it is very much regulated by other departments not by cadastre

**Sweden:** In Sweden a real property could consist of both land and water; water could be both lakes and seas. This is regulated in national legislation.

**UK:** Only c.85% of England & Wales is currently registered. Technically, we do not operate a cadastral system. Land is added to the register as certain trigger events happen.

---

Q2: if your country has marine cadastre, what were the reasons for establishing it? Who will be the users? What are the envisaged use cases?

**Cyprus:** Exclusive Economic Zone Management

**Finland:** No specific marine cadastre for Finland but for the Baltic Sea there is Helcom, <http://www.helcom.fi/>, by/of Baltic Marine Environment Protection Commission

**Germany :** Enabling to monitor and to protect ecosystems, conservation areas and nature parks in coastal areas e.g. the wadden sea. Some state organizations are using these data, e.g. the Ministry for the environment and nature conservation.

**Latvia:** In Latvian there is not established Marine Cadastre. Land parcels from the sea are registered and maintained in the Cadastre Information System. Starting from 2017 the State Land Service of Latvia will register coastal areas two kilometres in width from the coast line.

The main reasons for establishing Marine Cadastre:

- it would help to ensure sustainable management of the Territorial waters and Internal waters;
- it would help to resolve the rights of ownership in the Territorial waters and Internal waters;
- it would help to accumulate complete cadastral textual and spatial data for land parcels and buildings, which are located in the sea.

The main users will be society, the relevant state authorities or local governments.

Cadastral information about marine cadastre will be used for spatial planning. Spatial data will be used for marine monitoring.

**Sweden:** *Marine cadastre is currently under consideration. Sweden has adapted the UNCLOS convention and there is now a governmental investigation about its further implementation. Sweden is also in the process with the implementation of maritime planning. Lantmäteriet also takes part in EU-initiatives in this field.*

---

Q3: if your country has marine cadastre, what is the definition of a marine cadastral parcel?

**Cyprus:** A marine cadastral parcel is identified by coordinates and a unique identifier within the EEZ and is used primarily for drilling licenses, exploration and utilization.

**Germany:** Marine cadastral parcels are defined by areas of coastal waters or a river mouth.

**Finland:** Basically the same as for national cadastre to define the boundaries, real rights and burdens such as servitudes, usufructs and charges on land and between the register/cadaster entities but in Finland it is not a Napoleon cadaster for taxation.

**Latvia:** In Latvian there is not established Marine Cadastre. If Marine Cadastre would be established the definition of marine cadastral parcel would be:

Marine cadastral parcel – cartographic demarcated territory of coastal land part and territorial waters.

---

Q4: are there national requests or projects aiming to change your national regulation, regarding geographic extent of cadastral data?

- Yes
- No

Comments: if yes, please explain what changes are envisaged and why.

**Denmark:** Denmark is reforming the registration of real property data, which makes up a business case for significant efficiency improvements of the work flows between registers. This pertains both to redesigning core business processes with a view to reduce the risk of human error and to facilitate the handover to new employees who are not necessarily experts in real property and legacy IT systems. A new unique property identification called BFE number will be established and used in the four property registers - Land Cadaster, Land Registry, Building Cadaster and Property Ownership Register

**Finland:** Not the extent directly but the contents: 3D cadaster is under preparation as well as coordinate based cadaster.

(3D cadaster is under preparation as well as coordinate based/bounded cadaster, the latter at least as an auxiliary or additional one.)

**Georgia:** On August 1, 2016, NAPR launched a state project of land registration. Its implementation will significantly increase coverage of the country with high quality registration and cadastral data. The project allows citizens to register land easily and free-of-charge.

**Latvia:** There are national request to include wider information (data) in the Cadastre Information System about the sea territory.

**Romania:** *Our national legislation enforces a nationwide cadastre, no matter who the owners are.*

---

Q7 (facultative): UN-GGIM WG A envisages to recommend the availability of cadastral data on the full partition of land territory. Do you consider it as relevant idea? What might be the benefits and the difficulties?

**Austria:**The coverage of the cadastral data depends not only on regulations but depends as well on the definition of the content of cadastre, the definition of land tenure and of registration and use of land. In some countries public land is not registered as considered to be “of public ownership”. Difficulties: Depends on the missing parts, but If a country did never register parts of the land in the cadastre, the registration process can be a huge effort and costs

**Cyprus:** Yes this is a good idea. It will have direct benefits to users exploiting data of high accuracy for multiple purposes. We don't foresee any considerable difficulties

**Czech:** In case of personal data involved in the set of descriptive information (Czech case) there can be a problem of personal data protection. In case you mean solely map in connection to INSPIRE, it is OK.

**Denmark:** It is a relevant idea. For the financial sector and other key stakeholders it is important cadastral data is available from one site. Development of such a solution is easier if the cadaster has full partition of land territory.

**Estonia:** It is a reasonable idea to include marine and other big public territories (like lakes) in cadaster

**Finland:** Relevant e.g. to contribute and facilitate land use and city planning as well as land, utility and local authority management; to manage legal responsibilities for community development and maintenance, of events like temporal private use of public land/ownership and even traffic accidents etc. The difficulties might be political (i.e. for ownership and related responsibilities) as well as openness of ownership, possession and other real rights or responsibilities related. The deployment might be facilitated by crowdsourcing as this approach is gaining success in developing countries but as well for national map in US (USGS). This would also apply to rights and possessions of indigenous people (aboriginals). The issue crucial even so that cadaster could be a backbone for UN SDGs on sustainable development.

**Greece:** The actual benefits of such an effort are not obvious. Please note that a) land parcels keep changing through transaction so either there must be a continuous updating of this information, or the information may not be representing the current state of ownership, b) there might be different

definitions of land parcels in different countries, c) it will be a major effort to build a topologically correct dataset without overlaps and holes especially if point (a) is considered.

**Georgia:** In our country it is not possible yet.

**Iceland:** *Answer: Yes, it is a relevant idea, indeed. Having a functional cadaster covering the whole of land area is the basis for a successful environmental planning. The most obvious benefit is being able to plan in a local context. That is, having the access to information about surrounding land areas available when planning construction in, preservation or utilization of a specific area. The difficulties will be in keeping the data up to date, defining the desired quality level of the data, monitoring it and ensuring it. Also, it's not enough to have the data – everyone has to be able to access it and use it, so there has to be a functioning mediation ground (web service, download service).*

**Latvia:** It is a relevant idea, because of the fact society, state authorities and local governments have a possibility to get updated cadastral textual and spatial data. Information about cadastral data on the full territory of land is necessary for the real estate tax administration.

**Lithuania:** Yes, we support your idea. It is relevant to ensure that all the land is partitioned into cadastral parcels and the use of such land is legalized. Such a task requires a lot of financial and organizational resources, since it is necessary to plan the land parcels in the spatial planning or other documents, to perform cadastral measurements before the cadastral data are recorded in the Real Property Cadastre and rights thereto are registered in the Real Property Register. However, unified recording of land (divided into cadastral parcels and registered in the Real Property Cadastre) allows using common principles for valuation, taxation, and further use for planning.

**Macedonia:** YES it is relevant idea

**Netherland:** *Assuming that the definition of cadastral data is the same as laid down in the data specifications of the INSPIRE theme Cadastral Parcels, I agree with the recommendation. In many countries, the cadastral parcel is the smallest geographical unit, very useful in many applications in which location of activities is key.*

*Difficulty, depending on the country, could be the privacy sensitive character of the cadastral information.*

**Romania:** *At this point, fees received from the provision of cadastral information are used for financing new cadastral works and cadastre maintenance. Until 2023 it is intended to complete cadastre and land registration nationwide, under the National Program for Cadastre and Land Registration.*

**Slovakia:** We consider it as relevant idea. We think that there should not be unmapped territories in a country.

**Spain:** Yes, the land cadastral database must be completed as a requirement of many users.

Yes, because this information is the basic structure over which the rest of the themes should be adjusted. Benefits are the harmonization of all datasets, and difficulties would be related with achieving integration at different scales, resolutions and update periods, as well as coordination between all agents responsible for the different themes.

**Sweden:** *There is already a cadastre implemented with full national coverage irrespective of type of land.*

**Switzerland:** It is relevant. Cadastral data are or will be part of an information system. And an information system that is not complete won't live up to its full potential.

---

Q8 (facultative): UN-GGIM WG A envisages to recommend the availability of cadastral data on sea or part of it. Do you consider it as relevant idea? Which part of the sea should be covered by marine cadaster? What might be the benefits and the difficulties?

**Austria:** Marine cadastre depends as well on definition of rights, which might be defined for public or for individuals. Also if marine cadastre is considered to be necessarily integrated into cadastre, the first priority is to geo-reference the marine state borders and the coastline in order to avoid overlaps between countries and between land/sea areas.

**Cyprus:** Yes, this is a good idea. EEZ.

**Denmark:** It is a relevant idea. Marine cadaster should cover and identify immovable objects at sea where securing ownership and property rights is required.

**Estonia:** It is relevant to include missing parts through ownership and planning issues. In Estonia, cadastre is not an environment register, cadastre is more to include ownership and planning.

**Finland:** Relevant and vital for international economic relations as marine mandates and areas have ever growing importance for economic growth/decline both locally and globally. Accordingly both territorial and exclusive economic sea zones should be covered. Difficulties are political and related to economic challenges as well as competition, regarding both national and private interests.

**Greece:** In order to be a relevant idea, marine parcels should have a common definition globally. It is not certain that the legal system of ownership of every country includes ownership or other rights at sea.

**Iceland:** *The key here is a lack of national tidal data and that's why we have recently started thinking about how a marine cadastre could be useful for Iceland. The most difficulties will probably be overcoming the cost off surveys and/or scanning of the sea floor.*

**Latvia:** Yes, it is a relevant idea. In our opinion in the marine cadaster should be included territorial waters and internal waters and exclusive economic zone.

The benefits should be ensured management, resolved the rights of ownership and accumulated text and spatial data for units of land and buildings, which are located in the sea.

The problem - sea determination between neighbour countries.

**Lithuania:** We agree that the marine cadastre should be established within the country's exclusive economic zone and the continental shelf of the Baltic Sea (in the case of Lithuania) in order to

account for the marine and coastal resources and ensure their sustainable use. The establishment and maintenance of marine cadastre and the preparation of data to be provided to the cadastre will require significant financial and other costs.

**Netherland:** The territorial part of the sea of a state/country could be part of a marine cadaster.

**Spain:** No, as I have told you, marine areas are public domain and all activities are very much regulated by other organizations.

---

## 1.2 Quality

Q9: are you managing land registration (legal parcels) and cadastre (spatial parcels) in the same information system?

- Yes
- No

Comment:

**Austria:** In fact it is the same information system but not the same infrastructure. Since 2012 Austria has separated registers, but the synchronization process is quite effective; access to all relevant data is guaranteed; the updating process is in each responsibility of Cadastre and LR

**Denmark:** The Cadaster maintains information on parcels. The land registry registers real property rights. It contains legal data like titles, name of property owners, mortgages and easements. The land registry uses the identifications of real property – parcels - established by the cadaster. The land registry and the cadaster work very close together.

**Georgia:** The process regarding land registration (legal parcels) is conducted through specially developed system and cadastre (spatial parcels) is conducted through GIS.

**Latvia :** There are two different systems:

1. The Land Registry (legal parcels)
2. Cadastre Information System (spatial parcels)

**Lithuania:** It is the best practice when real property objects and ownership rights to them are recorded in a single system and done by a single organization. This reduces the cost of registration work, increases the efficiency of real property registration, accelerates the supply of real property information to a user, and the person concerned receives detailed and updated information about your property.

**Spain:** Reforms introduced legally in 2015 established that the description of properties in the Property Rights Registry is to be done by a geo-referenced graphical representation and we have established a mechanisms of exchange INSPIRE GML of cadastral parcels to ensure coordination.

**Switzerland:** Land registration and cadastral data are managed by two different organizations (in a federal and decentralized way). The link between the information, however, is secured by the use of unique identifiers.

**UK:** We make no distinction between legal parcels and cadastral parcels

---

Q10: is there a delay between the update of legal parcels and the update of the spatial parcels (e.g. when parcel splitting)?

- Yes
- No

Comment: please, if there is a delay, explain (shortly) why this delay and how long the delay may be.

**Austria:** Procedures allow continuous consistency in work-flows. There is a short delay of max 1-2 days!

**Denmark:** The Land Registry must verify that the changes do not conflict with any legal rights. If that's the case the Land Registry will notify the Cadastral Agency, which then reverses the changes. Normally the delay is less than 10 days. If there is a conflict the delay might be 3- 6 month, and in that period there will be different information about a property in Land Registry and the Cadaster. The cadaster and the land registry will from 2018 enhance the collaboration. A new digital process will provide a more coherent and simultaneous updating of spatial parcels and verification of legal rights.

**Estonia:** Technically update takes place every night.

**Finland:** Updates originate in two separate processes and systems.

**Germany:** There is a delay due to technical issues. Data exchange regularly takes one day. Due to law regulations cadastre and land registry data have to be consistent.

**Iceland:** *We think that it is a relevant idea. Getting the cadastral map ahead the legal registration can benefit the latter in the long term.*

**Latvia:** In most cases delay of data update is 3 days, because of the fact in Latvia there are two information systems (Land Registry and Cadastre Information System) and two institutions.

**Netherland:** *The spatial parcel is formed, at the same time as the legal parcel is registered. So there is no delay. The spatial parcel has a 'provisional' character as the final survey is done afterwards.*

**Romania:** *There is a gap of several years between the enforcement of Land Law and the registration in the real estate publicity (land book). This depends on the historical areas of Romania which were having different registration systems. Once the National Agency for Cadastre and Land Registration has been created in 2004, the cadastre and land registration activities have been unified and are managed by a single institution.*

**Slovakia:** Legal and technical registration (or update) is done within 24 hours since the decision on transfer of rights to property.



**Spain:** Registration in the Cadastre is mandatory after the contract, for example a segregation. All citizens, Notaries and Registrars, Public administrations that work in the territory, etc.. are obliged by law to submit the information about the changes in the real estate to the Cadastre.

The registration in the Property Rights Registry is not compulsory. The Property Rights Registry is a juridical register with substantive legal effects on private relationships.

Registration isn't necessary to have a contractual entitlement, but is needed to have them protected against everybody. It serves to ensure legal safety of property rights therefore all the valuable real estates are registered in the Land Registry. But this is not the case with the rural parcels.

When a seller and a buyer agree to segregate a parcel. they can choose to go to the Notary and the Land Registry or not

Because at the moment there does not exist coordinating bodies between land registration and cadaster.

**Sweden:** The textual part has the legal power and according to law should be registered before the cadastral index map.

**Switzerland:** There might be a minimal delay (maybe a few days), mainly because the process of a parcel subdivision involves two separate organizations. However, that never stood out as a problem for users.

---

Q11 (facultative): UN-GGIM WG A is envisaging to recommend temporal consistency (i.e. same update frequency) between legal parcels (land registration) and spatial parcels (cadastral map). Do you consider it as a relevant idea? What might be the benefits and the difficulties?

**Austria:** Highly appreciated. Need to coordinate legal and technical part/stakeholders by appropriate procedures. Benefits are to be seen in the permanent delivery of legally liable data and of full coverage of legal data about owners, rights and obligations and thus to provide value to the users. Technical part (cadastre) is not sufficient for applications as expected from UN GGIM.

**Cyprus:** Yes this is a relevant idea. The Land Information System can provide full information regarding legal and spatial parcels at any time, with direct benefits to all interested users.

**Czech:** It has benefits only, in case it is solved in single IS as one database transaction.

**Estonia:** It is a reasonable idea.

**Finland:** Relevant but requires renovation both in legislation and processes - takes time, human resources and money (to renew the whole systems once again). However in some cases it is urgent to be able to make the Land registration right away - when the cadastral acts and measurement may take a longer time unless coordinate cadaster is employed (and already implemented). In Finland this (implementation) could be carried out with the launch of new TDB (topographic database), which accommodates 3D as well, nationally by 2030 and in its initial phase 2018.

**Greece:** Both legal parcels and spatial parcels must have temporal consistency, because there cannot be a one-to-one correspondence between the two. The greatest difficulty will be for cadastral systems that lag in the updating of one of the two, to change their working processes

**Iceland:** *As for me, I think having the topological consistency in a lower priority group is a wise choice. In Iceland we are facing a wide topological inconsistency in legal data, so if we were to figure out all that before we can map the parcels, it would take forever. But by getting the inconsistency out there for everyone to see, we encourage people to fix the legal inconsistency and hence, the cadaster gets topologically correct with time. Also, if we show what is already there we make it less likely for further errors to occur. Accuracy and topology should thus be the last quality requirements we make.*

**Latvia:** Current update frequency (3 days) is optimal.

**Macedonia:** YES it is relevant idea

**Netherland:** *The update frequency of both legal and spatial parcel must be the same.*

**Romania:** *In our opinion this would be beneficial, as it is representing the scope of cadastre.*

**Spain:** It is not possible without a legal change that makes land register obligatory and this is not envisage in a medium term.

In the case of the properties that has been coordinated (every day more and more) the data is the same in the two registers.

Yes, it is fundamental in order to make it in a simultaneous manner.

**Sweden:** *It is a relevant idea and our goal is to have simultaneous up-dates.*

Q12 (facultative): more generally, UN-GGIM WG A is envisaging to recommend the following quality criteria for cadastral parcels.

Quality	Priority	Comment
Completeness = 100%	1	INSPIRE recommendation. Necessary to get reliable information
CP spatial data consistent with cadastral legal data => <b>continuous update</b>	1	Necessary for land market use cases
Topological consistency	2	Useful for most use cases
Accuracy better than 1 m in urban areas and better than 2,5 m in rural areas	2	INSPIRE recommendation.

Do you consider these recommendations as relevant? What might be the benefits and the difficulties? Are there other quality requirements that we should include in core data specifications?

**Austria:** Yes, these absolutely relevant for providing authoritative data. If quality is inconsistent and lower, the added value of NMCA data gets lost. Difficulties might to be sought in different quality definitions in different countries. Even if common sense of quality can be found, there are still gaps between interpretation and definition in various countries. Data specification need to take care of best as possible definition

**Cyprus:** Yes, these recommendations are relevant, with direct benefits to all interested users. Usually a cadastral system has higher accuracy requirements eg. 10cm – 1m.

**Czech:** Yes. The only comment refers to the priority of topological consistency that should be also 1.

**Denmark:** The recommendations are relevant. Topological consistency is relevant in a separate independent cadastral system. As part of a digital infrastructure together with other public basic data systems topological consistency is indispensable. Accuracy requirements depend on the use of the cadaster. Multipurpose use of cadastral map requires better accuracy than 1 m and 2,5 m.

**Estonia:** Accuracy is probably too weak. We do recommend better than 0,5m in urban and 1m in rural.

#### **Finland:**

Topological data: Referring to response in Q11: “In Finland this (implementation) could be carried out with the launch of new TDB (topographic database), which accommodates 3D as well, nationally by 2030 and in its initial phase 2018.

Accuracy: Proposed accuracy is poor and outdated in both or all cases, could be divided by 2 or even 5 with the up-to-date technology and remote sensing with laser and employing UAVs - which is cheaper in general too. I.e. for agricultural purposes and applications the current required accuracy is already around 0.5 m globally and for EU subsidies even more precise in practice sometimes.

+ Accessibility: To consider which data should be open with or without fees. To add recommendation or arrangements for service interfaces and availability - or - UN to carry this as necessary.

**Georgia:** Yes. However, for instance, to achieve **full** coverage/completeness is difficult for Georgia as registration&cadastre is not mandatory. The recently launched state project of land registration will contribute to significant increase of coverage.

**Greece:** The first three recommended quality criteria seem relevant and can be universally applied. The accuracy criterion can be a recommendation and not a pass fail criterion because there are cadastral systems that do not satisfy this criterion at present.

**Latvia:** In Latvia quality requirements for data accuracy are different – in urban areas data accuracy is better than above mentioned (25 cm). In rural areas data accuracy is worse (20 m).

**Lithuania:** We agree that the quality criteria indicated above are relevant for cadastral parcels. More accurate and comprehensive data on real property object allows calculating its average market value and taxes in a more accurate way.

**Macedonia:** YES they are relevant

**Slovakia:** We consider these recommendations as relevant. However, we would change the priority for Topological consistency to no.1. We would also recommend increasing the accuracy. We are not sure if the proposed values are socially acceptable.

**Spain:** ...yes,. very relevant. It is the only way to have a reliable cadastre. Without completeness and update cadastre the cadastre lost all its value.

If some countries have problems with continuous update....at least daily or weekly update must be required.

Higher accuracies should be achieved in the last element of the list (accuracy), and hence a higher priority should be assigned to this topic.

**Sweden:** We agree on completeness and continuous up-dates. In Sweden we have a cadastre implemented with full national coverage. However, a cadastre can be well-functioning even if completeness is not 100%.

Topological consistency is of importance for use cases, but not a requirement for cadastral parcels.

	Austria	Belgium	Czech	Cyprus	Denmark	Estonia	Finland	Georgia	Germany	Greece	Iceland	Latvia	Lithuania	Macedonia	Netherlands	Romania	Slovakia	Spain	Sweden	Switzerland	UK	Comments	
Geographic extent	partition of land	1		1	1	1	1	1	1	1	1	1	?		1	1	1	1	1	1	1	1	Czech: The following answers are not
	land with missing part		1			1	1		1						1	1	1	1	1	1	1	1	1
	EEZ				1							1			1								
	internal waters								1			1			1								
	territorial waters						1		1			1											
other								1											1			Sweden: lakes and sea	
Why marine cadastre?	N/A	N/A	N/A			N/A		N/A		N/A	N/A		N/A	N/A		N/A	N/A	N/A		N/A	N/A		
Definition of marine parcel	N/A	N/A	N/A			N/A		N/A		N/A	N/A		N/A	N/A		N/A	N/A	N/A		N/A	N/A		
Changes in national regulation	no	no	no	no	yes	no	yes (3D)	yes	no	no	no	yes	no	no	no	no	no	no	no	no	no	no	
core : full partition of land?				yes	yes		yes	no	?	yes				yes	yes	yes	yes	yes	yes	yes	yes		
marine CP in core?					yes		yes		?	yes?	yes			N/A	yes			no	yes		yes		
cadastre and LR in same IS?	no	yes	yes	yes	no	no	no	no	no	yes	yes	no	yes	yes	yes	yes	yes	no	yes	yes	yes		
Delay in update	no	yes	no	no	yes	yes	yes	no	yes	no	no	yes	no	no	no	yes	no	yes	yes	?			
Temporal consistency as core?	yes			yes		yes	yes?			yes	yes			yes	yes	yes	yes	no/yes	yes	yes	?		
Quality criteria	completeness	yes		yes	yes	yes	?	?		yes	yes?	?	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	
	continuous update	yes		yes	yes	yes	?	yes		yes	yes?	?	yes	yes	yes	yes	yes	yes	yes	yes	yes		
	topology	yes		better	yes	yes	yes?	yes		yes	yes?	?	yes	yes	yes	yes	better	yes	?	yes			
	accuracy	yes		yes	better	better	better	better	yes		?	yes?	no	yes	yes	yes	yes	better	better				