

European geographic data infrastructures: The EuroRegionalMap, EuroGlobalMap projects, and a strategy towards a European Reference data Infrastructure

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1. Integrated geographic information in Europe

a) Needs

European Geographic Information is about as fragmented as Europe is. Different national traditions, legal and institutional contexts have led to different standards, priorities, scales and – to some extent – contents. As a result, depending upon the country, different bodies, public or private service, maintain different geographic information data bases. To consider only the public service mapping community, some countries rely on one or two bodies (which belong to various ministries), or even much more, as in Germany where 16 regional mapping offices are active along with a federal office and a military service. In turn, the basic scale (be it for standard paper map series, or for digital collections) quite often varies from one country to the next one, while small scales such as 1: 250 000, 1: 500 000 and the 1:1 million scale are found everywhere. As for the base scale, or resolution, the modern trend is to go for a 1 metre resolution, but with different thematic selections.

A consequence of this situation is that any user, as for now usually a corporate user, which has to deal with geographic information at a pan-European level (e.g., statistical analysis at the European level, or transportation capacity analysis), or in a cross-border area (e.g., river basin analysis, flood management), will have:

- To go to different public services, and possibly private companies, to negotiate and purchase usage rights for the needed data. In the first place, this user will have to identify, depending upon its needs and on a country by country basis, where to ask for what,
- To cope with various licensing agreements, based on different legal frameworks and expressed in different languages,
- To devise a process for importation and integration of the various purchased data sets into its information base, overcoming differences in coordinate systems, data models, etc. and possibly find ways to maintain this data base when purchasing updates from the data providers.

There are indeed some partial approaches that address these issues:

- At the very small scale of 1:1 million, some private companies market products with various contents, centred on the road and transportation theme,
- Two big data brokers have heavily invested (along the lines mentioned here above) to constitute and maintain road and touristic data bases,
- The European National Mapping Agencies, first gathered in the CERCO and in the GIE MEGRIN, maintain an administrative boundaries data base (SABE, standing for Seamless Administrative Boundaries of Europe) that can be integrated with EUROSTAT statistical data (leading to the SIRE product),
- The European Union and its member states have constituted and maintain a land cover data base (Corine Land Cover) suitable for mapping at the scale 1 : 250 000,

- Finally, a large group of countries gathered around NATO have constituted cartographic data bases at scales 1:250 000 and 1:1 million (respectively VMap 1, and VMap 0), by digitising existing military paper maps, but maintenance of these products is not part of the multilateral agreements.

This paper introduces the initiatives that are undertaken by the European National Mapping Agencies to overcome these difficulties, and how their approach is evolving.

2. PAST INITIATIVES OF NMAs

a) CERCO and MEGRIN

In order to share best practice (techniques and solutions) to commonly encountered problems, the NMAs have first created the CERCO (European Committee of Official Mapping Agencies) in 1979. This first step was so to say rather inward oriented: European NMAs were working at better knowing each other, sharing ideas and solutions. However it has proved to be an indispensable first step.

The next step has consisted in the adjunction of a GIE, named MEGRIN (standing for Multipurpose European Ground Related Information Network), to start working on creating common products, in the first half of the 90's. In other words, the NMAs, which by the time had dramatically turned to digital information, have started to further address the issues listed here above in section 1.

This GIE MEGRIN has given birth to the SABE project and product, and to the PETIT project.

b) SABE

This has been the first attempt, from the part of European NMAs, to develop a common, pan-European product. Further, it has been launched at a time when distributed geographic data bases, and maintenance of such data bases were still in the research stage.

This has resulted in a centralised organisation, by which European NMAs transform national data sets (of highly varying scales) into a common specification, and then pass it to a central project manager, the German federal mapping agency BKG¹. This central team is then in charge of integrating the national data sets, checking the result and its compatibility with EUROSTAT NUTS classification.

This organisation has worked successfully since the first release in 1993, and its successive revisions. As for now a revised edition (2.1) of the 1997 edition is available, while a new release should be made available by the end of this year, featuring more countries and administrative boundaries that match the 1999 and 2001 census that have taken place in the European Union.

c) The GDDD (Geographical Data Description Directory) and LaClef

The GDDD (www.eurogeographics.org/Projects/GDDD/GDDD/gddd.html) has been created by MEGRIN in 1994 along lines fairly similar to those of SABE. The MEGRIN office drafted specifications for NMAs approval, set up a server, and European NMAs contributed their metadata for integration in the directory. The model for this service was originally created in National Land Survey of Finland. The GDDD has been the first pan-European geographic data catalogue to be made available, a landmark by the time, compliant with the European CEN TC 287 standard for metadata. However, the organisational process makes maintenance rather inefficient. Changes may occur in a given countries that are reflected only late in the central catalogue, or even not signalled

¹ Bundesamt für Kartographie und Geodäsie.

until they are incidentally detected and identified. This has obviously been coped with, by means of the implementation of semi-automatic procedures which facilitate updates. Over 300 products are nowadays documented in the GDDD.

A follow has been launched, the LaClef project. This INFO 2000 project has output a specification and a prototype for a new service, customisable thanks to new technologies, multilingual, providing graphic interfaces for selection, samples of data, and on-line update facilities for the NMAs. Unfortunately the implementation of an operational service has been stalled since 2001 because of the practicalities involved with procurement on behalf of a set of public services, and the need to find a host NMA willing to bear the cost of running the service.

d) *PETIT*

PETIT (standing for Pathfinder towards the European Topographic Information Template) has been an INFO 2000 project focused on specifying a common 1 : 250 000 scale pan-European data base, issuing a prototype of it, making potential users evaluate it, and finally elaborating a business plan for the prospective product. This MEGRIN project has ended in late 1999.

The chosen strategy was to elaborate from VMap 1 data sets, based on the idea that the NMAs could update the data and release the data. However, evaluation has shown that the product was not suited for the range of envisaged civilian applications, while it has turned out that many NMAs were not the holders of the national data sets, hence had not any production line able to update and output VMap 1 compliant data. In this later respect, a key issue appeared to start from NMA maintained products while aiming at convergence at the technical level, as well as marketing and distribution levels. This has led to the EuroRegionalMap project, which is introduced hereafter.

3. ONGOING PROJECTS

a) *MapBSR (Map of Baltic Sea Region)*

The countries around the Baltic Sea (or to be more precise, countries that include the drainage areas of rivers that flow into the Baltic Sea) have started in 1996 to develop a 1:1 million scale data base.



Figure 1

This MapBSR product (is managed by the National Land Survey of Finland. It covers 14 countries (completely Finland, Sweden, Norway, Denmark, Poland, Lithuania, Latvia, Estonia and Belarus and partly Russia, Ukraine, Germany, the Czech Republic and Slovakia). The first version of MapBSR database was made available in 2000, and new up-date of year 2001 was made available in early 2002. The MapBSR project has been supported by the European Union (INTERREG IIC programme).

In its content, MapBSR bears many similarities with Global Map (www.iscgm.org). In the future the MapBSR database will no longer be up-dated as it is: the MapBSR data will be incorporated into the EuroGlobalMap database (see part C below).

b) EuroGlobalMap

The EuroGlobalMap database is planned to be the European component of Global Map. European National Mapping Agencies (NMAs) have found it important to create a seamless European database, i.e. the data will be integrated at international boundaries.

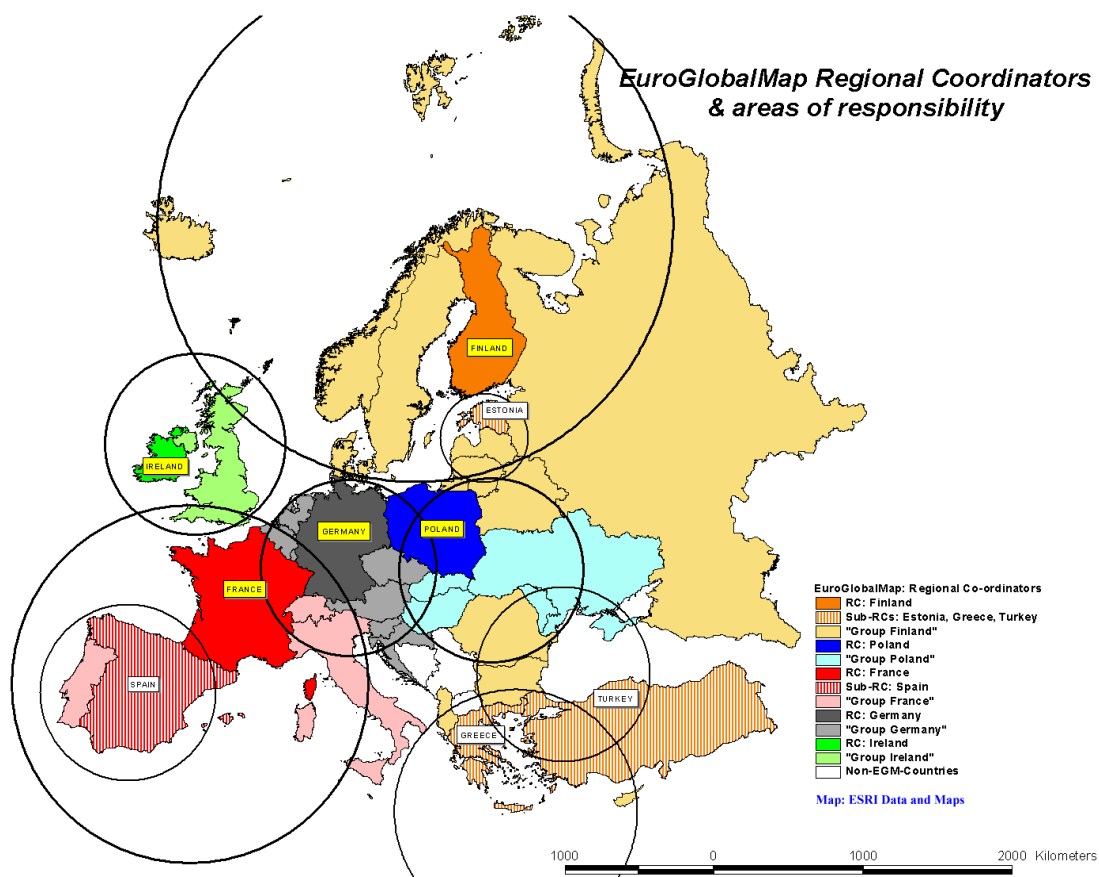


Figure 2

EuroGlobalMap project aims at providing a maintained million scale data base, based on official data from the contributing countries, and covering up to 40 European countries with harmonised data. The National Land Survey of Finland is acting as project co-ordinator.

From a technical point of view, the data set is decomposed into thematic layers (administrative boundaries, hydrography, transportation networks, settlements, place names² and elevation). The geodetic reference system is ETRS89 (data are non projected), while administrative boundaries are compatible with the EUROSTAT NUTS classification. A first release of specifications has been issued in 2001, accepted by the European NMAs.

² Bilingual: English plus national language.

Each participating country has accepted to make available its national data, harmonised by conversion into the common specification. This task is performed on the basis of national funding. The project work is coordinated by National Land Survey of Finland and regionally by so called Regional and Sub-Regional Coordinators (Estonia, Finland, France, Germany, Greece, Ireland, Poland and Turkey). The Regional Coordinators are tasked with validating the national data sets, and integrating them into regional coverages (typically 6 to 8 countries) see Figure 2.

It is expected that the European Union part of EuroGlobalMap can be made available earlier than the total database covering almost 40 countries. The full coverage is expected by October 2003. In the meantime, project participants will work on the distribution conditions (rights, pricing, and licensing common rules).

Some key points are worth noting :

- The approach taken relies on the previous identification of national borders to be used a reference by all contributing countries. This is intended to pave the way for an easy, possibly decentralised, maintenance mechanism. Details and practicalities of this maintenance, as well as national commitments will be studied during the project course,
- The project participants will draft a first common set of guidelines for licensing, and elaborate a common product exploitation plan (including common licensing, and pricing conditions, as well as e-sales facilities) to be submitted to all contributing NMAs. This is to be one of the first steps towards common data policies in the European Geographic Information arena,
- This project is supported by the European Commission, through an eContent contract.

c) EuroRegionalMap

As can be understood from the name, EuroRegionalMap aims at developing a geographical information product to be used at the European regional level. The corresponding scale is thus the 1 : 250 000. however, as opposed to EuroGlobalMap, this project is not to develop a global pan-European data base in the very short term. The expected coverage in June 2003 is to include Denmark, Germany, Belgium, Luxemburg, France, the Irish Republic, and Northern-Ireland and has to be considered as a demonstration phase (including a prototype and user testing phase) preparing the production for the extension of the EuroRegionalMap database to the rest of Europe. This demonstration phase is supported by the European Commission through the eContent program with the label EuroRegioMap. ([see http://www.eurogeographics.org/erm](http://www.eurogeographics.org/erm)), Six NMAs are taking part in this eContent EuroRegioMap project), starting in January 2002: BKG (Germany), IGN (Belgium), KMS (Denmark), IGN (France) OSI (Ireland) et OSNI (Northern Ireland), IGN-B being the project co-ordinator, and EuroGeographics a further participant.

Going one step further from the million scale, the objectives are to:

- Develop a maintainable pan-European data set at the 1 250 000 scale, on the basis of already agreed specifications. A prototype of the product is currently under evaluation by a users panel. It is worth noting that, to cope with national differences which entail harmonisation costs higher than those at the million scale³, the specification⁴ allows for some room for flexibility in terms of data content (from minimal mandatory content, up to full content),

³ Particularly in the case of potential further data capture.

⁴ Which draws from PETIT's specification, hence VMap 1, the evaluation of the PETIT prototype, and from is available from European NMAs.

- Implement and experiment a fully distributed approach as for data harmonisation, and data maintenance. Again, it has been chosen to start with commonly agreed border lines, so that each participating NMA can create data that is to fit within the EuroRegionalMap data set and with the adjacent countries data sets. However, no regional integration is to take place, by relying instead on bilateral validations (as for adjacency), and common data validation procedures.,
- To work on a common data policy addressing a scale that is goes further on the way to more expensive products, hence has more impact on issues that decide of the balance of NMAs budgets⁵. Besides, the issue of maximising data dissemination by means of price tuning and Internet distribution will be an important component of this part of the project.

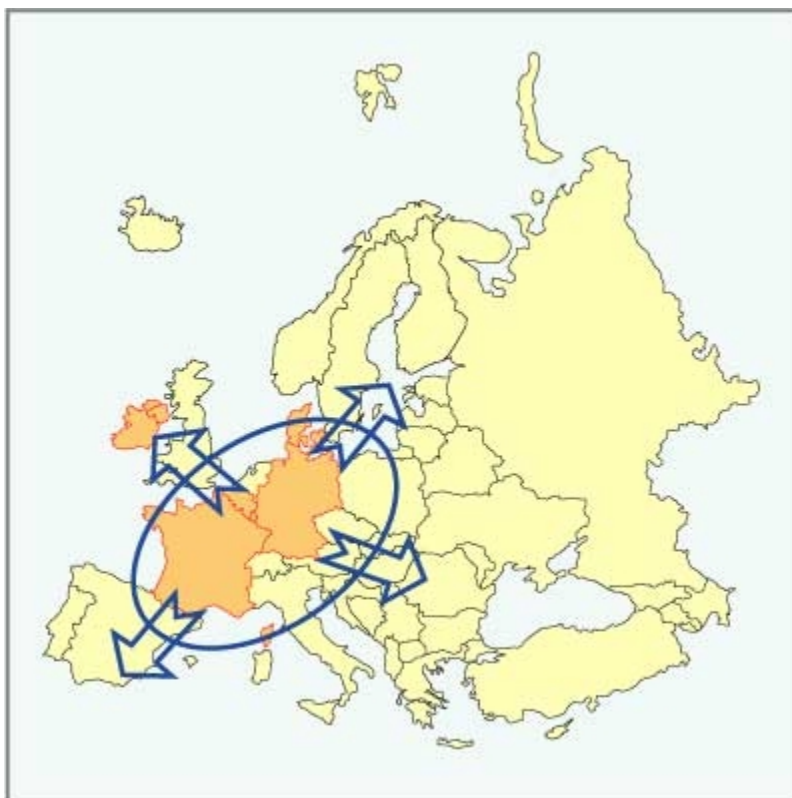


Figure 3

In addition, to address the issue of the limited coverage expected in 2003 (highlighted in orange), the project participants (including EuroGeographics) will promote the product and projects among European NMAs to reach at least an extension covering the European Community, the accession candidate countries and the EFTA countries.

d) Provisional conclusion

All in all, this project exemplifies the emerging strategy of European NMAs:

- First agree on common harmonised specifications, that elaborate on existing standards (national or international), and existing contents that potential participants hold,
- Devise a decentralised production approach that facilitates later maintenance, again decentralised,
- Promote convergence of national production and validation lines, hence of NMAs internal products, so as to ultimately make maintenance of pan-European products turned into nationally ensured maintenance of national products. This is to save

⁵ NMAs, being public service bodies, have to balance their budget on an annual basis. They rely in a proportion from 10% to 70% (average 30 to 45%), or even more, on commercial sales to achieve this objective.

- the redundant costs of either parallel maintenance of several products in each NMA, or central maintenance (by a public or private body) of a central pan-European product parallel to national data bases,
- Promote convergence of data policies through work done on these actual common products, starting with easier, small scale products, and going progressively towards more expensive, larger scale products,
- Base the implementation strategy, product by product, on progressive participation, starting with ready to go countries and expanding progressively.

4. NEW PROJECTS

a) Road Data and EuroCountryMap

The next step in addressing the need for pan-European geographic information, and ease of access to it, lies in the medium scale. In this domain, it is worth noting that:

- As the scale increases so do the costs of harmonising national data collections, and maintaining the harmonised framework,
- Private sector companies have heavily invested during the last decade to purchase geographic information from many national agencies (mapping agencies, road authorities...), the total investment amounting to dozens of millions of euros.

This has led to a new approach:

- So as to keep building step by step, in a pragmatic way, the focus is first put on road related information, in terms of gathering already available data, as opposed to merely specifying an harmonised product,
- In this respect, it makes sense to go further than the topographical or base data that NMAs maintain, so as to address the needs that relate with road information, that is to say, for instance, car navigation or road network maintenance issues. EuroGeographics members have therefore gone to road authorities and to the main private sector players to develop the step that addresses road related geographic information. This implies a broader kind of partnership, including public-public and public-private partnerships,
- Besides, owing both to the many information sources, and to the new technologies potential, the plan is to further towards a distributed/decentralise management of the targeted information system⁶,
- Extensions in terms both of data content, and coverage are to be country dependent and time dependent. That is to say the density of information, its level of detail, may vary depending upon the country, within the limits of a common specification, or within a given country, to reflect the state of best available information,
- Implementation for road information and specification for other large scale information are to be tackled to some extent in parallel.

The first step on road data gathers as for now twelve partners, NMAs (from Sweden, Great-Britain, Germany, Austria, and France), road administrations (from Sweden and Denmark), private sector companies (Navigation Technologies, TeleAtlas and Transport Verkeer AG), and two European bodies (ERTICO and EuroGeographics). The short term goal is to define a common road information infrastructure at a medium scale (1 : 10 000 to 1 : 50 000), based on what the partners know and on a requirements analysis. This infrastructure is to be understood as the system to

⁶ Which can no longer be qualified as a data base, in the sense of a single data collection, stored in one given warehouse, or a set of similar warehouses.

maintain and provide access to the needed reference data in an harmonised way (technical and contractual/commercial provisions), so that other players (public or private, including the project partners) can develop services and complementary layers on top of this infrastructure.

The private sector players can contribute their knowledge of the market, road administrations can provide their own requirements, so that the first step can quickly provide a convincing example of what can be done to develop a useful and used infrastructure. It must be understood that no agency (and above them no government) is ready to invest hugely to harmonise medium or large scale geographic information, unless the case is made that it can be done in a useful and efficient way. Reference data (public service data) is to be available to every customer without any exclusive right granted to any partner.

Beyond specification, the plan is:

- To prototype the infrastructure (reference data, maintenance and access system), in order to refine the specifications and design,
- Define the rights, licensing conditions and financial terms.

The current project plan is the result of several dedicated meetings organised in 2001, and of the elaboration of an eContent project proposal submitted to the European Commission in early 2002. Since then, the focus has been put on financing this operation, an action that is still on going. It must be understood that as the number of players increases, as well as the variety their institutional organisations, project organisation becomes a more and more complex and long to achieve task.

b) EuroSpec and participation into the INSPIRE initiative

The European NMAs share a common mission of creating and maintaining base Reference Data (at least its topography component) describing their national territories. EuroGeographics has consequently being involved in early initiative in refining the concept of Reference Data within the discussions around the ESDI (European SDI). The latest main concrete contribution was the ETemII White Paper on reference data, which has been used as the basis for the more recent work of the European Commission initiative named INSPIRE, aiming at defining a legal framework for the ESDI.

In parallel EuroGeographics was working on a project “EuroSpec”, a common framework for European Specifications for Reference Data, to address the needs that go beyond small scale data, or road. This project has been put in standby owing to the launch of the INSPIRE initiative, in order to allow the implementation in its terms of reference of the relevant findings of INSPIRE. The technical preparation of the INSPIRE legal framework being concluded, EuroGeographics and the European NMAs will consider now the re-launch of a EuroSpec initiative.

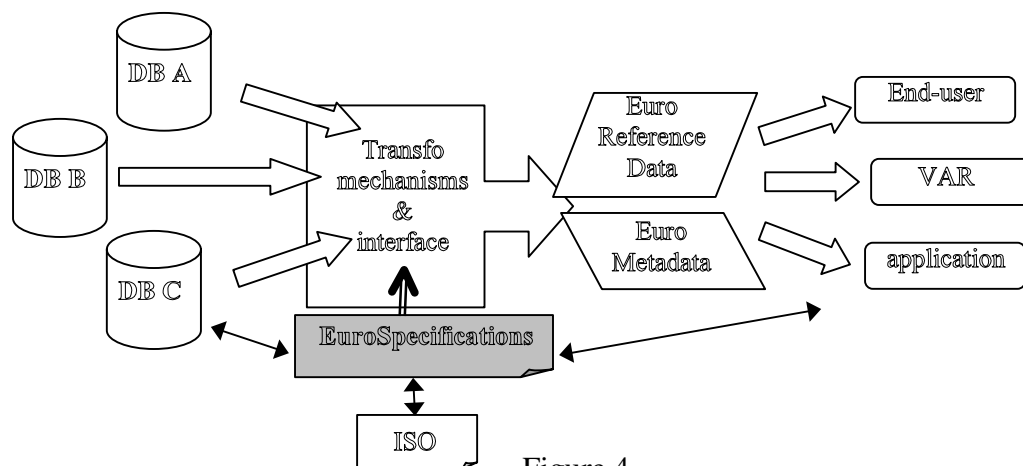


Figure 4

The EuroGeographics and EuroSpec vision is basically the same as what has emerged from INSPIRE working groups, and based on the principle of a common specification (data catalogue and data model) to be used as the transparent interface between the national and local databases, and the end-users or application and service providers (see Figure 4). This is a further formalising of the decentralised approach that we are developing.

More details on this topic can be found in a paper presented at this GSDI conference by Claude Luzet. What is to be understood here is that the approach taken is still along the lines explained above: Go progressively towards larger and larger scales, first agree on specifications, based on recognised user requirements and on what can actually be made available from member countries, define the rights, licensing and financial conditions, and then proceed to implementation.

5. Conclusion

For centuries, geographic information, for long maps, has been managed in a pretty isolationist way, in each country. Experts used to exchange views on techniques, academics on scientific issues, but standards, and reference terms used to change from one country to the next one. Even the graphical appearance used to depend upon national traditions.

Mapping agencies have started to organise their exchanges in a multilateral way about a quarter century ago. They have then developed some common standards : A common European geodetic reference in the first place, and since then, progressively, product standards. This process is now evolving in many respects:

- The information categories which are under concern include progressively more and more themes, from administrative boundaries to topographical reference features, to complementary information, because of an increase in scale, and of a beginning integration with other players' reference data. We are now reaching medium scale, and starting the design of what to do for larger scales,
- As we progress, we turn from national contributions to a globally managed data base to developing common specifications, and implementing and maintaining at the national level the national component of the resulting common infrastructure,
- Harmonisation is addressing access conditions (licensing terms, and financial conditions) and making progress. As partners work to define common terms to distribute the developed common products, they share ideas and definitions, and progressively converge towards common terms. A common reference for licensing conditions is already close to be made available,
- Further, such projects are no longer run within the circle of NMAs, but need to be shared with other public service agencies and with private sector players, at the national level and at the European level.

It will still take many years before we can enjoy a geographic large scale reference data framework available at the European level. Many tasks and difficulties are ahead, a lot of perseverance will be needed. However the road is open for us to do the journey. The most important is to progress pragmatically without losing sight of the direction.