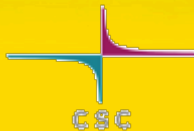




CYBERBALTIC

Concept of strategic programme for intelligent growth and development in the Baltic Sea Region based on Future Internet Technologies

CYBERBALTIC



Awakening Europe

The main priorities of Europe 2020:



- **Intelligent Development:** the development of economics based on knowledge and innovations,
- **Sustainable growth:** supporting effective economics taking full advantage of resources, more environmental friendly and more competitive,
- **Development enhancing social inclusion.**

GREAT CHALLENGES !

Europe 2020 – 7 Flagship Initiatives

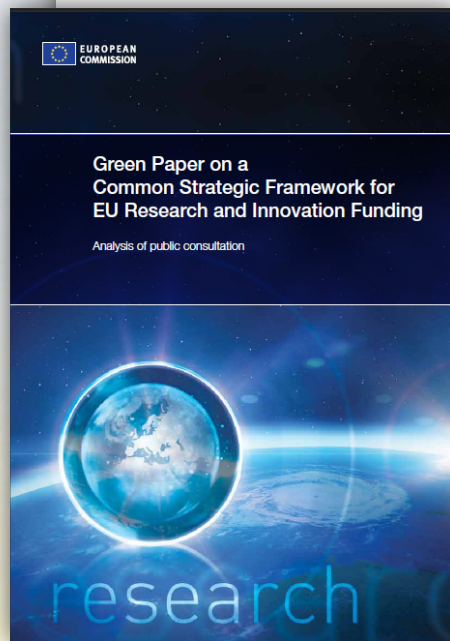
All the 7 flagship initiatives will require ICT support, and without such a support achieving success within these initiatives will not be possible.

Two of them are of particular importance: "**Digital Agenda for Europe**", directly connected with ICT research and development, and "**Innovation Union**" connected with a broad exploitation of innovative activities serving the purpose of addressing European challenges.

- „Youth on the move”,
- „Resource efficient Europe”,
- „An industrial policy for the globalisation era”,
- „An Agenda for new skills and jobs”,
- „European Platform against Poverty”.



Critical area: Financing mechanism



EN

*„This area has already been defined with precise frameworks within **Green Paper** that is ready for a public debate. **Common strategic frameworks of funding research and innovations** have been presented in this paper. The listed concepts refer not only to research and innovations, but they are also **connected with other European programmes supporting research, like cohesion funds, educational programmes, etc.** It offers a great possibility of building an **integrated financing system** supporting the future development in Europe.”*



Critical area: regional influence



„Smart specialisation will be instrumental in helping Europe’s region concentrate resources on strategic priorities and design the right policy mix to unleash smart growth. To concentrate resources on areas of comparative advantage is not only a question of more coherence and impact of the EU action, it is also vital in times of budgetary restraint.”

In this light, it can be forecasted that numerous **„regional islands”** based on smart specialization could emerge creating a critical mass for global transformation in Europe.

The Baltic Sea Region could be such an influential „regional island”.

Critical area: The role of ERA/RI and e-Infrastructure (1)

Era of science-based innovation is coming*

TOWARDS
2020
SCIENCE

Integrating theory, experiments and models leads to enormous complexity and size of problems will be a **great challenge** for this new era of science.

It refers to, among others, computational sciences, life sciences (biology, biotechnology, medicine), earth sciences, searching for new sources of energy and solutions of climate change problems.

* <http://research.microsoft.com/en-us/um/cambridge/projects/towards2020science/>;
http://research.microsoft.com/en-us/um/cambridge/projects/towards2020science/downloads/T2020S_ReportA4.pdf



Critical area:

The role of ERA/RI and e-Infrastructure (2)

The **digital world**, encompassing both research area and common heritage of mankind, **has introduced** a completely **new dimension into science** and sets new challenges for **future science e-Infrastructures**.

Revolutionary changes in science, resulting in a search for new methods and tools supporting research process, will also imply and require a **new approach toward methodology of research and education of future scientists**.

In this light, the concept of **virtual research centers**, within which participants share knowledge and work creatively, will definitely gain even more importance.

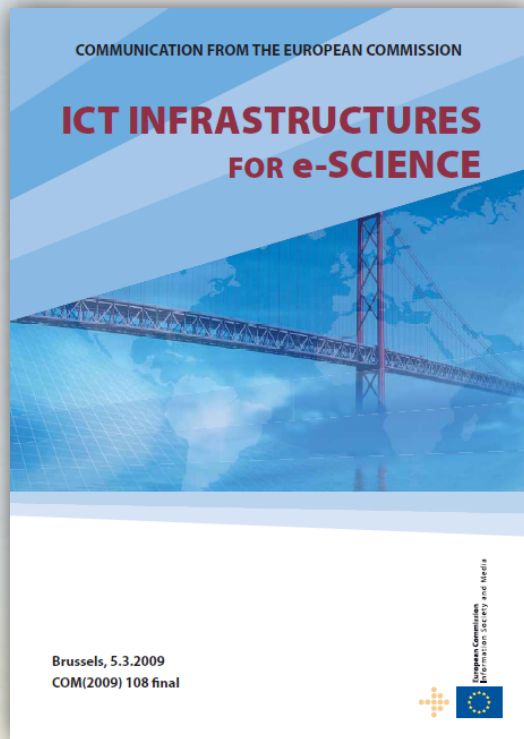
Critical area: The role of ERA/RI and e-Infrastructure (3)

The development of the humanities originate in **digitalization** of mankind heritage and currently observed reality will also become significant in a 10-year perspective.

It will allow **wide spreading of digital techniques** of social and political phenomena **modeling** for the purpose of **forecasting** and influencing development in Europe.

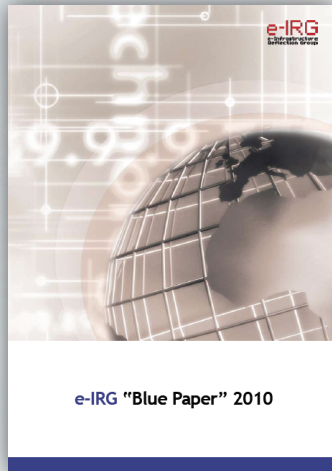
e-Humanities

Voices about new roles of e-Infrastructure (1)



One of the goals of a renewed strategy „...focuses on the innovation potential of e-Infrastructures. The **transfer of expertise** to areas **beyond science** (e.g. e-Health, e-Government, e-Learning) and the **use of e-Infrastructures as cost-efficient platforms** for large-scale technological experimentation (e.g. Future Internet, massively parallel software, Living Labs) are different dimensions to be explored.”

Voices about new roles of e-Infrastructure (2)



„...must be co-evolution of Research Infrastructures, e-Infrastructure and user requirements.

*...Collaboration between RI and e-Infrastructure should be actively supported at all levels, to their mutual benefit. This collaboration can be facilitated by the emerging focus on **service-oriented delivery models** ...”*



*„...our vision will result in the realisation of an e-Infrastructure that will help narrow the Digital divide in Europe and support cohesion by enabling improved **inter-regional digital flow of ideas and technology**”.*

Voices about new roles of e-Infrastructure (3)

NORDUnet
Nordic Infrastructure for Research & Education

Inspiration Paper:

The Role of NREN's in 2020

NORDUnet
Kastruplundgade 22
2770 Kastrup
Danmark

Dokument Publikation Date: April 4th 2011.

NORDUnet A/S
Kastruplundgade 20
2770 Kastrup

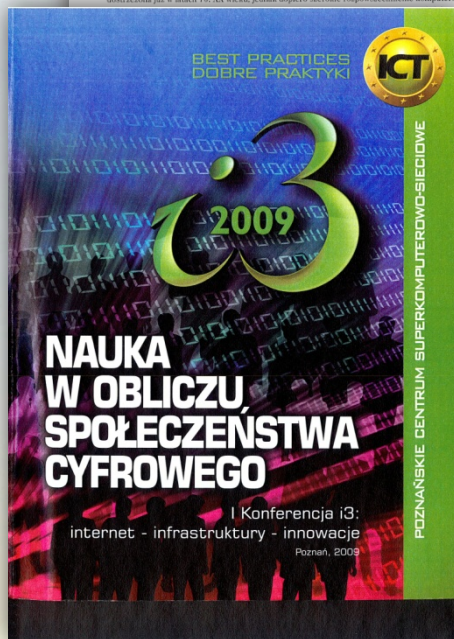
CVR 17 49 02 46
<http://www.nordu.net/>

+45 32 46 25 00
or +45 00 78 23 66
or info@nordu.net

„... it is our opinion that NRENs 2020 must provide a user centric approach that integrates the following concepts:

- *The NREN as a Global Network Service Provider,*
- *The NREN as a Community Service Provider,*
- *The NREN as the e-Science enabler,*
- *The NREN as the e-Education enabler,*
- *The NREN's as an Innovative Framework Provider.”*

Voices about new roles of e-Infrastructure (4)



NREN development paradigms

New paradigm of communication

- broadband end-to-end (first mile equal to last mile)
- access always and everywhere

New, now unattainable, very high level of human-computer communication

New global network (Future Internet) with

- Internet of Things (digital things, houses, cars, communication cities, ...)
- Internet of Contents and Knowledge (large scale digital contents)
- Internet by and for People (social networks)
- Internet of Services (concentration and personalization of Services)

New media and visualization

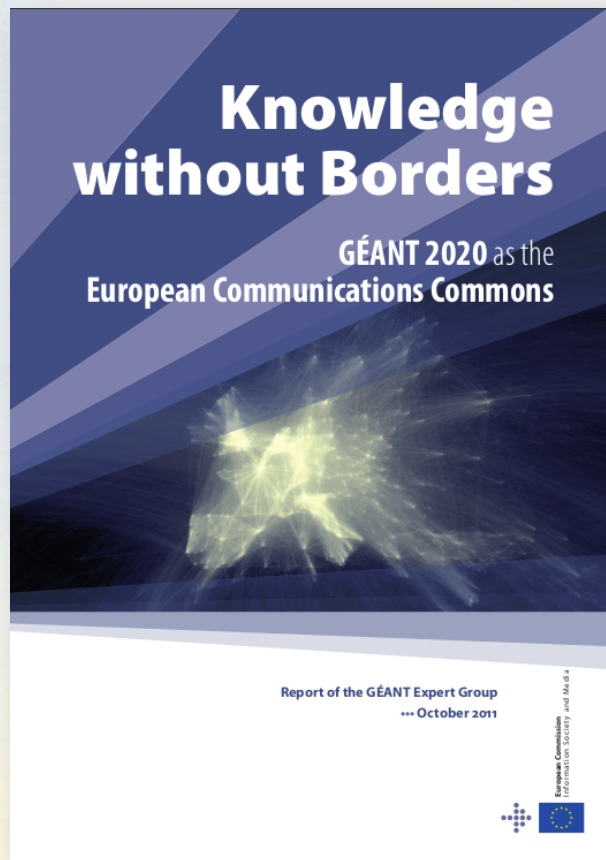
- Advanced interaction, virtual and augmented realities,
- 3D, HD, 4K, SuperHD (8K), UltraHD (8K), 16K



CYBERBALTIC

Voices about new roles of e-Infrastructure (5)

Recent report of the GEANT Expert Group – GEANT 2020



“...The quality and efficiency of scientific research today depends on ICT infrastructure. Researchers are increasingly working in large teams, with research collaborations sometimes spanning the entire world. In that context, access to high speed communication networks is itself a powerful scientific instrument.”

Voices about new roles of e-Infrastructure (6)

U.S. UCAN

United States Unified Community Anchor Network

U.S. UCAN: An Overview



Introducing the U.S. UCAN project

The mission of the U.S. UCAN project is to provide community anchor institutions including public safety organizations, public libraries, K-12 schools, community colleges, research parks, and health care organizations with advanced broadband capabilities and services. Utilizing the Internet2 national research and education network, U.S. UCAN will enable these institutions to better serve their communities with telemedicine, distance learning and other life-changing Internet-based applications, not currently possible with consumer-grade Internet service. In doing so, these institutions will be able to dramatically improve the delivery of public services to their communities and lead to the creation of new economic opportunities for their local citizens.

At its core, U.S. UCAN is helping to bring to fruition a critical recommendation of the Federal Communications Commission's National Broadband Plan, which seeks to ensure that the advanced application and networking requirements of community anchor institutions (CAIs) are coordinated, understood, and fulfilled – such requirements had historically been ignored. U.S. UCAN aims to fill the critical gap recognized by the FCC by supporting CAIs with access to national networking and services that extend next-generation capabilities, operate with end-to-end transparency and the high levels of performance uniquely suited to the needs of these organizations.

Guided by community to build communities

The U.S. UCAN project was officially created in January 2011 by the University Corporation for Advanced Internet Development which established and has operated the Internet2 organization since 1996. As a first step in developing the project, Mark Johnson was appointed Interim Executive Director of U.S. UCAN. Johnson is on short-term assignment from his role as Chief Technology Officer and Vice President for Operations and



The USC currently is courtesy of

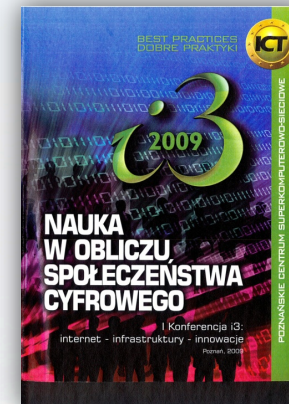
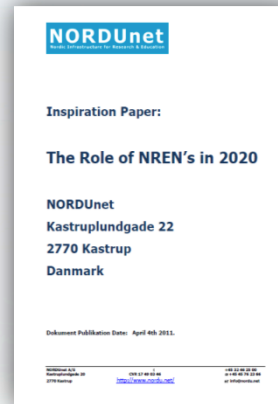
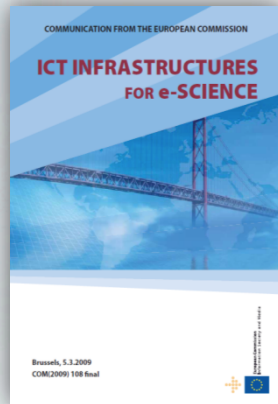
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In coll Intern non-p work t

- Cc hc or
- Pi mi co tic
- Ga de av co ne rev
- Co an ho esi pa
- to the advanced networking and services needs of CAIs across all sectors;
- Begin to develop a tangible portfolio of U.S. UCAN services.

The mission of the U.S. UCAN project is to provide community anchor institutions including public safety organizations, public libraries, K-12 schools, community colleges, research parks, and health care organizations with advanced broadband capabilities and services. Utilizing the Internet2 national research and education network, U.S. UCAN will enable these institutions to better serve their communities with telemedicine, distance learning and other life-changing Internet-based applications, not currently possible with consumer-grade Internet service. In doing

New role of e-Infrastructure



Therefore, it can be assumed that e-Infrastructure, on national, regional and European levels can form a Living Lab for the realization of all flag initiatives within the „Europe 2020” strategy.

Baltic Sea Region (1)

The Baltic Sea region has a 8000-km long coastline and its longest part lies within **8 member countries'** territories (Sweden, Finland, Estonia, Latvia, Lithuania, Poland, Germany, Denmark) with only a short part in Russia.

The Baltic Sea, a marine highway, is rather shallow (mean depth 50m), almost closed (with a complete water exchange every 30 years), its drainage area from land territory fourfold bigger than its area (residential area for almost **100 million people**) with a high contamination level.

It can be stated that in spite of many years of collaboration and common projects, the right solutions to this region's problems are yet to be found. For this reason **the European Commission has developed the European Union Strategy for the Baltic Sea Region.**

European Union Strategy for the Baltic Sea Region

Baltic Sea Region Programme 2007-2013

South Baltic Cross-Border Co-operation Programme

These programmes do not focus on ICT ⇒ ...

Baltic Sea Region (2)

... ⇒ **but!**

The **Baltic Sea region** has a big share in the **global market of developing knowledge**, in which **ICT technologies** plays a **vital role**.

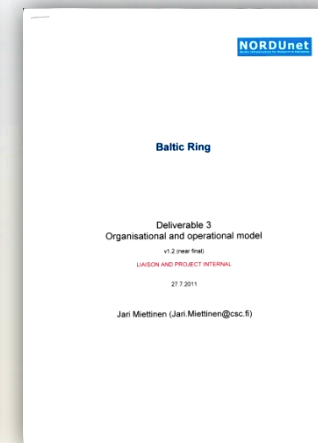
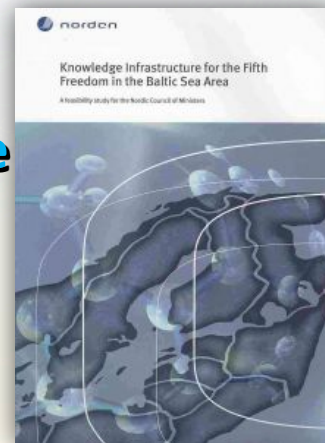
This region is open to the development driven by **ICT** and new **Future Internet technologies** (e.g. Ambient Sweden).

At least two research and educational networks of the region: **NORDUnet** and **PIONIER** belong to leading European networks.

Two scientific initiatives of nordic countries have been already proposed.



**Nordic e-Science
Globalisation
Initiative**



Baltic Ring

Baltic Sea Region - R&D ICT Region

The idea ...

We observe the concurrence of the EU Strategy in Baltic Sea Region and Europe 2020. This implies additional areas of **EU actions** in this macro region.

Therefore, due to the intelligent specialization of this region, it might be posited that the **Baltic Sea** is one of the regions **suitable for pioneering implementation in macro scale of flagship initiatives of the Europe 2020 Strategy** based on **regional science, education and e-Infrastructure** possibilities.



CYBERBALTIC

Concept of strategic programme for intelligent growth and development in the Baltic Sea Region based on the Future Internet Technologies

CYBERBALTIC

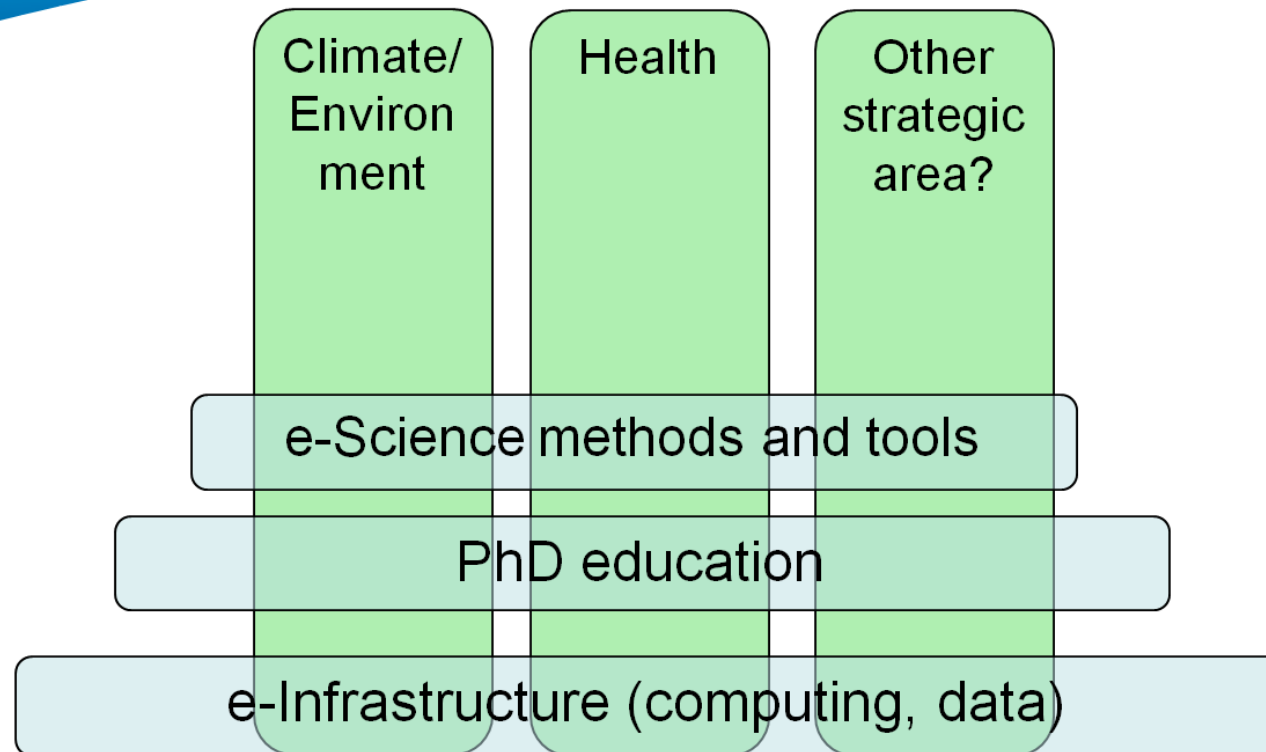
... is implementation of the idea



CYBERBALTIC

Important initiatives for CYBERBALTIC (1)

Nordic e-Science Globalisation Initiative - Contents



* „The Nordic e-Science Globalisation Initiative. An example of regional coordination/support/funding to large scale research project” – Sverker Holmgren, NordForsk



Important initiatives for CYBERBALTIC (2)

NORDUnet

Nordic infrastructure for Research & Education

Result 4 – Architecture proposal



* „Baltic Ring – blueprinting the network” - Jari Miettinen, Norden, June 8th 2011

Proposal of CYBERBALTIC Projects

Five infrastructure projects:

1. Baltic Ring Plus
2. Baltic Umbrella
3. Baltic Tier-1 Net
4. Baltic Cloud
5. Baltic network of natural environment virtual laboratories

Seven knowledge platforms:

6. Baltic Radio Astronomy Platform
7. Baltic Climate Platform
8. Repository of Baltic countries heritage & Digital Humanities Platform
9. Multimedia platform
10. Experimental facility platform for researchers
11. Open touristic Baltic platform
12. Baltic Trustworthy Platform

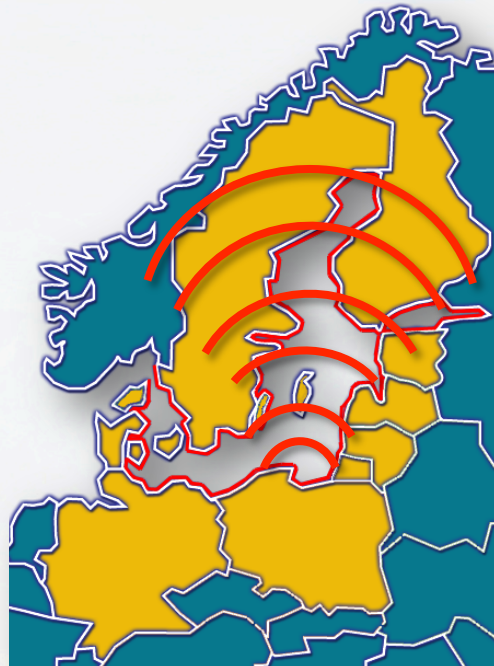
1. Baltic Ring Plus

Baltic Ring + National Baltic Sea distribution networks



2. Baltic Umbrella

Baltic broadband Internet accessible always and everywhere



**Wireless NGA (LTE?, 4G?, ...)
Co-operation with telecom industry
(Nokia?, Ericsson?, Alcatel?, Siemens?, ...)**

3. Baltic Tier-1 Net

The goal of the project is to **establish national Tier-1 centers in the Baltic Sea region** for providing **computational power required** by strategic research challenges for the region, e.g. connected with **climate changes**. Dedicated backplane networks between centers (currently 100 Gb/s and in future 1 Tb/s) established within the Baltic Ring and proper task granulation will allow opening „**virtual Baltic Tier-0**”.

Tier-1 infrastructure enables multi-scale simulations and advanced computations within the following thematic areas:

- climate changes, including global warming,
- research concerning protection of natural environment,
- visualization within crisis management systems,
- cosmological research, deposits exploration,
- research concerning renewable energy and smart grids.

Regional parts of European infrastructure projects, eg. PRACE



4. Baltic Cloud

The aim of the project is to **implement** and **support federated clouds for computations, archiving, and services required** by strategic challenges of the Baltic Sea region and Europe 2020.

Implementation areas besides scientific research include an increase in economic potential through making such an infrastructure and its services accessible for **micro** and **small enterprises**. It will enable teamwork, building environment on demand with the use of available services, telecommuting (working from home) and executing specific, advanced computations on applications available within cloud environment.

Implementing those new technologies would be much easier in small enterprises than in large businesses, hence the federated cloud can lay foundations for establishing a test laboratory for a **new type of services** and **novel approaches**.

BalticGrid, NORDUGRID, PL-Grid, PLATON, EGI, EUDAT constitute the basis for these works.



CYBERBALTIC

5. Baltic network of natural environment virtual laboratories (1)

The aim of the project is to establish the **network of virtual laboratories** of natural environment encompassing **selected marine areas** (for instance Gdansk Bay, Bothnian Bay), river mouths (in Poland: the Vistula Lagoon, Szczecin Lagoon), lakes close to the Baltic Sea (in Poland: Jamno, Lebsko), protected regions (in Poland: the Słowiński National Park, Coastal Landscape Park), forest areas (Białowieża Forest).

Functionality of these laboratories has to **facilitate their use** to a great extent, among others, **for research and control of climate model parameters**, contamination monitoring, environment protection, education and tourism purposes.

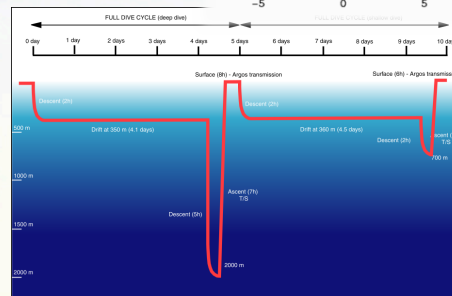
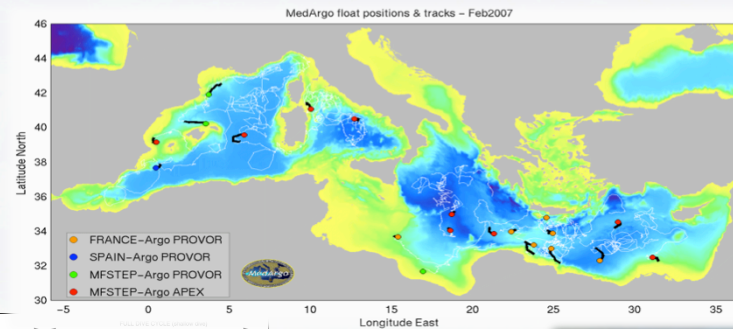
Future Internet technologies will offer a **technological base** for these laboratories.





5. Baltic network of natural environment virtual laboratories (2)

A distributed repository of climatic and environmental data comprising both historical and current **observational data** and network laboratory **research results** should be a very important component of the virtual laboratories network.



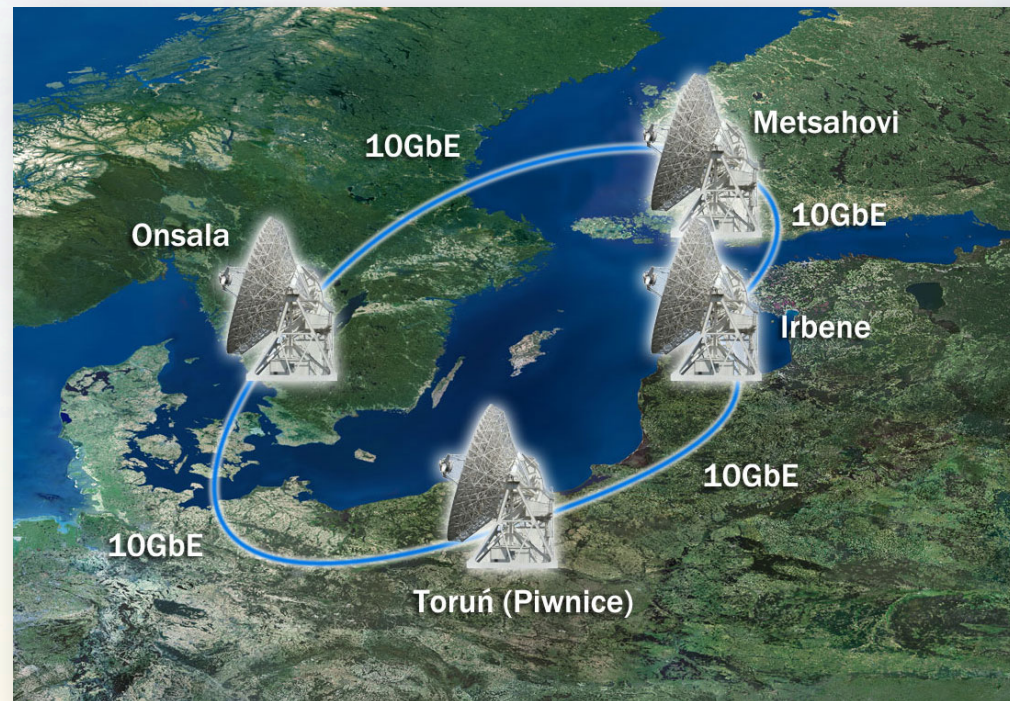
RINGrid, DORII, BALTRAD, COHIBA, Ocean Observatories Initiative constitute the basis for these works.

6. Baltic Radio Astronomy Platform

The goal of this project is to create European Baltic **subnetworks of e-VLBI and LOFAR observations enabling the implementation of regional research and observation programmes**. Content-related aspects of the research are yet to be identified. With respect to the first subnetworks, it may include observatories in

- Piwnice near Toruń (Poland),
- Onsala (Sweden),
- Metsahovi (Finland),
- Irbene (Latvia).

With respect to the second subnetworks, it may include observatories in Wieliczka, Olsztyn, Borowiec near Poznań (Poland), Effelsberg, Potsdam, Garching, Tautenburg, Jülich (Germany), and Onsala (Sweden).

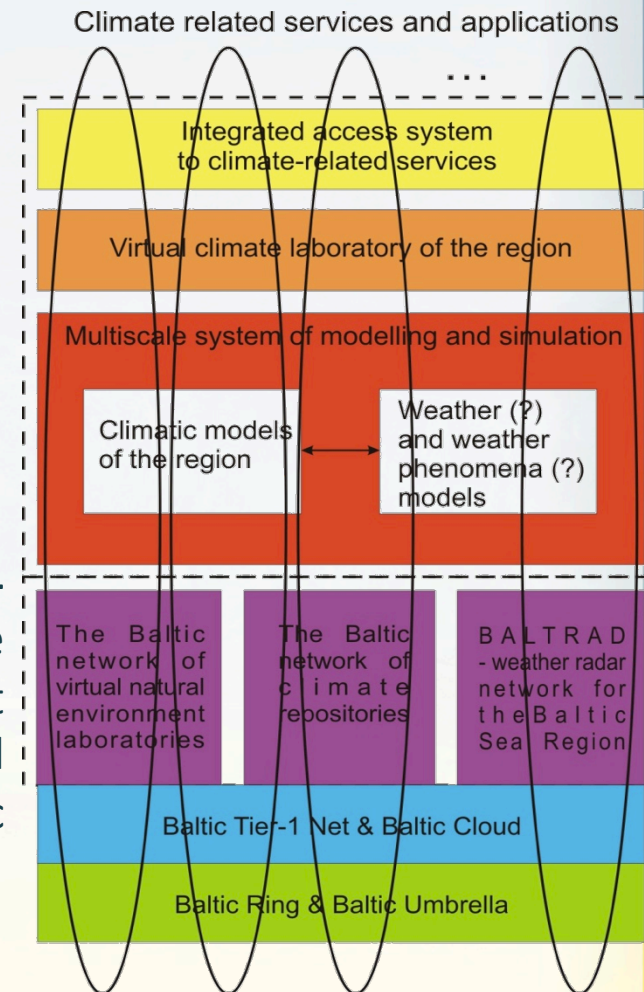


7. Baltic Climate Platform

- The Baltic natural environment virtual laboratories network,
- The Baltic network of climate repositories being a part of the Baltic natural environment virtual laboratories network and providing access to the BALTRAD project's repositories,
- Advanced Feather radar network for the Baltic Sea Region developed within the BALTRAD project (which will be continued as BALTRAD+).

The system of **multiscale modeling** and **multi-parameter simulations** of relations and climate changes is an essential component of the platform. It will enable **experiments** allowing research into and design of proper strategies of adapting to climatic changes in short- and long-term perspective.

Virtual Climate Observatory





8. Repository of Baltic countries heritage & Digital Humanities Platform (1)

Baltic countries participate in development of digital resources by operating within, among others, the Europeana project, Baltic projects: Baltic Sea Library, Vifanord and by realising national initiatives (for instance, the **Digital Libraries Federation within the PIONIER network**).

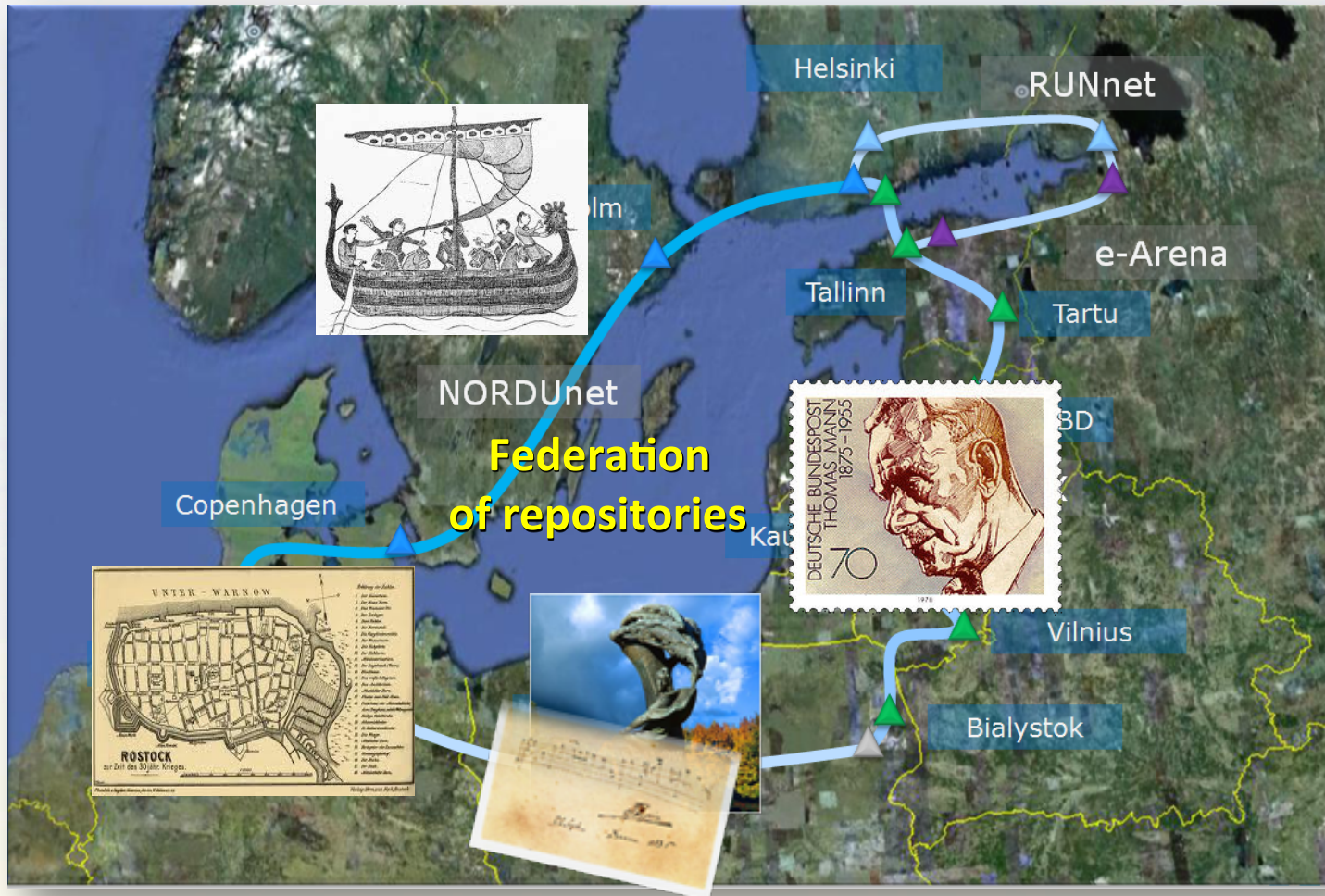
At the same time, it can be noted that it is **becoming more difficult** to gain **access to documents** concerning social life, press and other printed materials, archival internet information, etc.

Due to an increasing significance of digital contents within the Future Internet Technology, it seems reasonable to act with the purpose of establishing a **federated structure of repositories**, concerning both heritage and current information coming from the Baltic countries. This will be one of key goals in this platform.



CYBERBALTIC

8. Repository of Baltic countries heritage & Digital Humanities Platform (2)



9. Multimedia Platform

The one of the most popular method of dissemination of research results is **streaming of audio and video** content from seminars, conferences or other interesting events.

Researchers are the precursors of the newest technologies for media production, distribution and visualisation: e.g. codecs, 4K, 8K and 16K technologies, video walls, etc. The popular initiatives have been taken by communities base on organising and streaming in internet radio station or broadcasting academic television (e.g. Nordunet TV or PLATON HDTV in Poland).

The synchronisation of various initiatives in Baltic region allows to setup possibility to create **multi-language content** with translation and transcoding the content and IPR checking.

The new generation of **Content Delivery Network** distributed in Baltic region could be an example of collaboration with immediate access to requested content.



10. Experimental facility platform for researchers

The most of **Baltic countries** are developing national programs/projects focused on **Future Internet research**, e.g. Ambient Sweden, Future Internet SHOK in Finland, G-Lab in Germany or Future Internet Engineering in Poland, to mention a few.

Research teams from Baltic countries are participating actively in many **research projects** in Future Internet area funded by the European Commission, e.g. FEDERICA, GEYSERS, BonFIRE, NOVI, TEFIS and others. In result of above projects Baltic countries have unique experimental equipment installed in laboratories and experienced teams of researchers.

The integration of existing resources and research teams allows to achieve much better quality of Future Internet research. This facility should be also available for **commercial partners** and provide a shortest way to deployment achieved results.

11. Open touristic Baltic platform

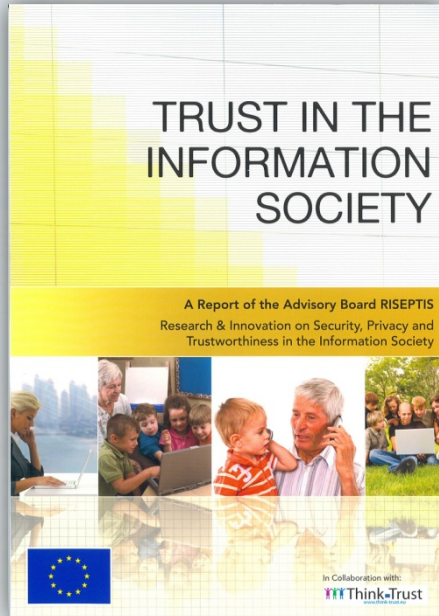
The concept of the platform implies establishing an **open programming environment** in which **new services and applications** might be **freely deployed**. Distinguishing features of this platform should be: the social-network approach (for instance Web 2.0/3.0), the „**service for everybody**” approach (and thus taking into account users with some perceptive difficulties, like the elderly or the blind), a possibility of a constant and personalized connection to selected media in accordance with specific personal profiles, etc.

This platform should be connected to new Future Internet technologies enabling interaction with environments and objects. Moreover, **user-friendly interfaces** should be available (voice interfaces, gesture, multi-touch, etc.).

Among services and applications (virtual bicycle routes, virtual pedestrian routes, virtual roads) it should be possible to provide **interactions on demand**.



12. Baltic Trustworthy Platform



IS CRITICAL IN THE CONTEXT OF
FUTURE INTERNET TECHNOLOGIES

**The goal of the platform will be to establish
the Future Internet security and trustworthy
laboratories networks**

- The scope of research will include, among others, such issues as better protection of the Future Internet Technology network, services and application safety, the Future Internet Technology multiparameter system of users' identification and intelligent systems of monitoring and managing critical infrastructure. Within this platform **intelligent control systems** of selected coastline and marine areas should be developed.
- The creation of a „**Virtual Baltic Police Station**” as a supporting system for Police and Border Guard, and for collaboration within the area of counteracting cyber crimes, could be another concrete action conducted within the platform.

The Baltic Trustworthy Platform conception is inspired by the Polish Platform for Homeland Security and INDECT.

Examples of other platforms

All the concepts presented in the previous slides are simply illustrations of possible platforms, services and applications in the Baltic Sea region.

A variety of other areas which should be allowed in the FIT strategy for the Baltic region can be identified, including :

- **Open Platform for Smart Local Communities,**
- **Open Platform for Health,**
- **Baltic Platform for Smart Energy,**
- **Baltic Network of Innovative Relationship for FIT,**
- ...

Conclusion (1)

- The list of infrastructure projects and platforms is far from being complete and it requires creative works as well as a lot of feedback from external experts in order to make it complete.
- The CYBERBALTIC concept has been created as a result of reflections upon projects of the Baltic programmes, the 6th and 7th Framework Programmes.
- By developing and integrating Future Internet Technologies it will be possible to achieve the intelligent growth anticipated within the strategies. Research, innovations and e-Infrastructure will play the key roles to deal with great challenges behind the Europe 2020 strategy.

Conclusion (2)

CYBERBALTIC concept is an invitation for further discussions and comments

Progress on the concept will be presented during next conferences organized by Danish and Lithuanian EU Presidency



Contributors

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CYBERBALTIC

Thank you for your attention