Baltic Sea Region Libraries: Leadership in Digital Competences, Solutions, Entrepreneurship

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✓ The establishment of partnerships and productive alliances across communities and institutions (scholarly community/libraries/archives/museums and private institutions) based on equality. Cooperation agreements, joint access policies, coordination of depositing rules (as regards, notably, processed data in databases and other forms of research output) are all elements that can only be tackled by the Library, Archive and Information Studies sector and research organisations together.

✓ The fostering of relevant partnerships with the private sector to contribute to innovation society and ‘smart economy’ strategies with potential to foster social and economic benefits, including market innovation.

✓ The enhancement of the networked dimension of RIs (e.g., across international digital infrastructures).
Our economy is being updated. There is no exclusively "digital economy" that acts in parallel to or in isolation from the "old economy". Rather, digitization is fundamentally transforming the conditions and behaviors throughout the economy as we know it.
The economic impact of growing a regional single digital market

✔ Baltic Sea Region is a potential digital forerunner in Europe. By estimating the economic impact based on a set of core digital indicators, the estimations show gains that can be reached within a number of years.

Source: A Digital Single Market - Growing the Baltic Sea Region, 2015
Need for Baltic sea region tech collaboration to drive growth and scale

✓ Baltic sea region tech sector is fragmented;

✓ Each Baltic sea region country is too small to offer real scale potential to high growth startups;

✓ Expertise is increasingly concentrated in specific clusters across national borders;

✓ There is a growing digital and tech skills gap in individual countries that needs collective action.

Source: A Digital Single Market - Growing the Baltic Sea Region, 2015
The modern Baltic Sea libraries landscape

- Libraries startups/investors;
- Cloud computing in libraries;
- Entrepreneur talent;
- Creative libraries;
- Smart city/libraries;
- Baltic tech expansion in libraries.

Source: A Digital Single Market - Growing the Baltic Sea Region, 2015
Data-Driven Enterprises

✓ Our economy is being updated. In line with this, a European digital single market (DSM) is essentially a technology-enabled market expansion combined with the emergence of new data-driven enterprises and consumer behaviors. With the use of ICTs, individual consumers and SMEs can access global markets that historically were restricted to larger enterprises with the means to establish themselves physically in each country to which they expanded.

Source: A Digital Single Market - Growing the Baltic Sea Region, 2015
Skills and the capacity of enterprises

✓ The efficiency in the production process increases when enterprises use digital technologies and/or recourse to online sales. The intra-sectoral allocative efficiency of resources in the economy increases when digital skills improves the capacity of enterprises to react to changes in the competitive environment.

Source: A Digital Single Market - Growing the Baltic Sea Region, 2015
The Nordic countries have had a long run as digital frontrunners with high degrees of technology adoption and a strong culture of technology-driven entrepreneurship. The Baltic countries are proving to be quick learners as well as fast movers and they are well positioned to make important leaps in technology take up and use, for instance when it comes to wireless broadband and the use of ICTs in public service.
At the same time, there is a growing demand for knowledge- and data-intensive services among both businesses and consumers. It spans a wide variety of examples, including buying content in virtual gaming worlds, leveraging big data to improve business, researching your next purchase or uploading a video podcast.

Source: A Digital Single Market - Growing the Baltic Sea Region, 2015
Libraries powering sustainable knowledge in the digital age (LIBER)

- Open Access is the predominant form of publishing.
- Research data is findable, accessible, interoperable and reusable (FAIR).
- Digital skills underpin a more open and transparent research life cycle.
- Research infrastructure is participatory, tailored and scaled to the needs of the diverse disciplines.
- Cultural heritage of tomorrow is distilled from today’s digital information.

Advocacy and communication capacity
Engagement in international projects
Connecting to international network and partners
Leadership programme and other training programs

Libraries as platform for innovative publishing
Libraries as a hub for digital skills and services
Libraries partnering in research infrastructure

Source: LIBER, 2016
ICT Think Tank “Top of digital Europe“ recommendations for the Baltic Sea Region

Four policy recommendations are put forward:

✓ to strengthen the cooperation and integrate Poland further in Nordic-Baltic co-operation,
✓ to establish a cross-border benchmarking task force to facilitate further integration bottom-up,
✓ to investigate and map the dynamics of supply and demand of digital skills over time in the region,
✓ to engage in joint efforts to expand and improve e-procurement.

Source: A Digital Single Market - Growing the Baltic Sea Region, 2015
Digital literacies

- **Information literacy**: Find, interpret, evaluate, manage and share information
- **Media literacy**: Critically read and creatively produce academic and professional communications in a range of media
- **Digital scholarship**: Participate in emerging academic, professional and research practices that depend on digital systems
- **Communication & collaboration**: Participate in digital networks for learning and research
- **Career & identity management**: Manage digital reputation and online identity

- **Learning skills**: Study and learn effectively in technology-rich environments, formal and informal
- **ICT literacy**: Adopt, adapt and use digital devices, applications and services

Source: https://www.jisc.ac.uk/
Digital competencies

Digital competence is the set of knowledge, skills, attitudes, strategies, values and awareness that are required when using ICT and digital media to perform tasks; solve problems; communicate; manage information; collaborate; create and share content; and build knowledge effectively, efficiently, appropriately, critically, creatively, autonomously, flexibly, ethically, reflectively for work, leisure, participation, learning, socialising, consuming & empowerment.

Learning domains
Tools
Competence areas
Modes
Purpose

Source: Ferrari, 2012
Digital readiness

As opposed to digital infrastructure, digital readiness has deteriorated in most countries in the region over the past five years.

Also, at the EU level, the number of employed with specialist ICT skills has declined as a percentage of the workforce.

Source: A Digital Single Market - Growing the Baltic Sea Region, 2015
The lack of unified content market

✓ The lack of unified content market and availability inhibits online demand, but it also damages the spread, preservation and future growth of European cultural content. A regional approach to these issues would be to find better ways to promote the emergence of European intermediaries and digital platforms that can leverage and spread uniquely European content, for instance by simplifying regulations and procedures.

Source: A Digital Single Market - Growing the Baltic Sea Region, 2015
E-infrastructures

- **Research Networks**
  - High-speed hybrid communication networks

- **Distributed Computing Infrastructures**
  - Grids
  - Cloud computing

- **High-Performance Computing**
  - Petaflop Supercomputers (Tier 0-1)
  - Grid of Supercomputers

- **Digital Repositories & Data Management**
  - Digital Libraries
  - Federation initiatives & Data Mgmt

Source: Engage, 2012
European data infrastructure

**EUROPEAN DATA INFRASTRUCTURE**

**UNLOCKING THE VALUE OF BIG DATA; DIGITAL BY DEFAULT**

- Facilitate access to and re-use of data for researchers, innovators and public sector
- Work in combination with national and regional, scientific and public data and computing centres
- Reduce the cost of big data storage and high-performance analysis

1. **HIGH PERFORMANCE COMPUTING (HPC)**
   - Exascale supercomputers based on EU technology in global top 3
   - Large scale flagship to unlock the potential of quantum technologies

2. **PAN-EUROPEAN DATA AND SOFTWARE INFRASTRUCTURE**
   - Storage, preservation, access and management of big data
   - European big data centre for high-capacity cloud solutions

3. **CONNECTIVITY**
   - Seamless, high-speed, reliable and secure connectivity and big data storage for EU-wide HPC access
   - Integration of European public services networks

Source: Realising the European Open Science Cloud, 2016
EUROPEAN OPEN SCIENCE CLOUD
BRINGING TOGETHER CURRENT AND FUTURE DATA INFRASTRUCTURES

A trusted, open environment for sharing scientific data

Open and seamless services to analyse and reuse research data

Linking data

Connecting across borders and scientific disciplines

Connecting scientists globally

Improving science

Long term and sustainable

Source: Realising the European Open Science Cloud, 2016
The emerging big data stack
## Top priorities for BI, Analytics and Big Data

<table>
<thead>
<tr>
<th>Top 10 Business Priorities</th>
<th>Ranking</th>
<th>Top 10 CIO Technology Priorities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increasing enterprise growth</td>
<td>1</td>
<td>Analytics and business intelligence</td>
</tr>
<tr>
<td>Attracting and retaining new customers</td>
<td>2</td>
<td>Mobile technologies</td>
</tr>
<tr>
<td>Reducing enterprise costs</td>
<td>3</td>
<td>Cloud computing (SaaS, IaaS, PaaS)</td>
</tr>
<tr>
<td>Creating new products and services (innovation)</td>
<td>4</td>
<td>Collaboration technologies (workflow)</td>
</tr>
<tr>
<td>Delivering operational results</td>
<td>5</td>
<td>Virtualization</td>
</tr>
<tr>
<td>Improving efficiency</td>
<td>6</td>
<td>Legacy Modernization</td>
</tr>
<tr>
<td>Improving profitability (margins)</td>
<td>7</td>
<td>IT Management and Cost Takeout</td>
</tr>
<tr>
<td>Attracting and retaining the workforce</td>
<td>8</td>
<td>CRM</td>
</tr>
<tr>
<td>Improving marketing and sales effectiveness</td>
<td>9</td>
<td>ERP Applications</td>
</tr>
<tr>
<td>Expanding into new markets and geographies</td>
<td>10</td>
<td>Security</td>
</tr>
</tbody>
</table>

Source: R. Kalakota, 2012
BI, Analytics or Big Data CoE needs to cover some of these functional areas:

- **Program Management**: Coordination of all information management and analytics efforts.

- **Data Stewardship & Governance**: Implementation and support for enterprise data governance effort.

- **Internal Processes**: Coordination and interaction between internal groups and functions.

- **Platform Technologies** Support and standardization of enterprise technologies.

- **Enterprise Information Management**: Coordination and support for enterprise data integration, quality, virtualization and management.

- **Information Delivery**: Using information and analytics to support business requirements.

Source: R. Kalakota, 2012
Stages of the Data Life Cycle

Creating data
- design research
- plan data management (formats, storage etc)
- plan consent for sharing
- locate existing data
- collect data (experiment, observe, measure, simulate)
- capture and create metadata
RESEARCH DATA SERVICES in European Academic Research Libraries

one hundred and nineteen libraries from 22 COUNTRIES TOOK OUR SURVEY. ALMOST ALL SAID THEY CURRENTLY OFFER CONSULTATIVE RESEARCH DATA SERVICES, OR WILL IN THE NEXT TWO YEARS.

77% of libraries discuss Research Data Services with others on campus

41% which currently have policies relating to Research Data Services

TWO-THIRDS OF LIBRARY DIRECTORS STRONGLY AGREE: LIBRARIES NEED TO OFFER RESEARCH DATA SERVICES TO REMAIN RELEVANT

WHY THIS IS IMPORTANT

Increasing amounts of scientific data are being collected, stored, analyzed and shared globally.

Solid Research Data Management is essential to ensure the transparency of scientific research, to preserve and reuse data, and to advance knowledge.

Academic libraries can help, and this LIBER survey shows what is currently being done across Europe.

91% collaborate within their institution regarding Research Data Services, and 77% collaborate with other institutions

39% provide data storage

60% of library directors say that losing data puts future scholarship at risk

“Research data is increasingly seen as an essential part of the scholarly record.”

www.libereurope.eu

Ligue des Bibliothèques Européennes de Recherche
Association of European Research Libraries

Image sources: Book by Focus Lab; Depth Of Processing by Joe Aquino, PH; Cloud Down by LAFS; Global Network by Kartiik Srinivas (CC BY 3.0).
The key policy challenge: Adapting the skills agenda to expected labor market disruptions

Source: WDR 2016 team.
Policy priorities for countries that are emerging, transitioning, or transforming

**REGULATIONS**
- that promote competition and entry
  - Remove barriers to adoption

**SKILLS**
- to leverage digital opportunities
  - Foundational skills and basic ICT literacy

**INSTITUTIONS**
- that are capable and accountable
  - Mobile phone-based services and monitoring

**EMERGING**
- Competition regulation and enforcement

**TRANSITIONING**
- Prepare for careers instead of jobs
- e-government delivery and citizen engagement

**TRANSFORMING**
- Platform competition
- Facilitate lifelong learning
- Participatory policy making and digital collaboration

Source: WDR 2016 team.
Policy priorities for emerging, transitioning, or transforming countries

<table>
<thead>
<tr>
<th>Policy goals</th>
<th>Stage in the digital transformation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Regulations (competition):</strong></td>
<td>Emerging</td>
</tr>
<tr>
<td>A business environment in which</td>
<td>• Low barriers to internet</td>
</tr>
<tr>
<td>firms can leverage the internet</td>
<td>adoption (including access,</td>
</tr>
<tr>
<td>to compete and innovate for the</td>
<td>affordability, and basic</td>
</tr>
<tr>
<td>benefit of consumers</td>
<td>open and safe issues; trade</td>
</tr>
<tr>
<td></td>
<td>and basic competition issues)</td>
</tr>
<tr>
<td><strong>Skills:</strong> Workers, entrepreneurs,</td>
<td>Transitioning</td>
</tr>
<tr>
<td>and public servants who can</td>
<td>• Effective competition</td>
</tr>
<tr>
<td>take advantage of opportunities</td>
<td>regulation and enforcement</td>
</tr>
<tr>
<td>in the digital world</td>
<td>(including ease of market entry)</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Institutions (accountability):</strong></td>
<td>Transforming</td>
</tr>
<tr>
<td>An accountable government that</td>
<td>• Critical “new economy” regulation (including platform competition and the legal basis for private sector data collection)</td>
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<tr>
<td>effectively uses the internet to</td>
<td></td>
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<tr>
<td>empower its citizens and deliver</td>
<td></td>
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<tr>
<td>services</td>
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Source: WDR 2016 team.
Nonroutine skills are becoming more important over time

Source: WDR 2016 team, based on ILO Laborsta (various years). Data at http://bit.do/WDR2016-Fig2_17.
The types of skills needed in a modern economy

<table>
<thead>
<tr>
<th>Cognitive</th>
<th>Social and behavioral</th>
<th>Technical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literacy, numeracy, and higher-order cognitive skills (for example, reasoning and creative thinking)</td>
<td>Socioemotional skills and personality traits</td>
<td>Manual dexterity and the use of methods, materials, tools, and instruments</td>
</tr>
<tr>
<td>Raw problem-solving ability versus knowledge to solve problems</td>
<td>Openness to experience, conscientiousness, extraversion, agreeability, and emotional stability</td>
<td>Technical skills developed through postsecondary schooling or training or acquired on the job</td>
</tr>
<tr>
<td>Verbal ability, numeracy, problem solving, memory, and mental speed</td>
<td>Self-regulation, grit, mind-set, decision making, and interpersonal skills</td>
<td>Skills related to specific occupations (for example, engineer, economist, IT specialist)</td>
</tr>
</tbody>
</table>

Source: WDR 2016 team, adapted from Pierre, Sanchez Puerta, and Valerio 2014.
16 skills for the 21st century

Skills wanted: Key concepts

✓ Nonroutine, higher-order cognitive skills.

✓ Technical skills, including information and communication technology (ICT) skills.

✓ Nonroutine interpersonal, socioemotional skills.
Factors explaining the lower adoption of digital technologies by businesses

Source: WDR 2016 team.
## Definitions of 21st-century skills

<table>
<thead>
<tr>
<th>Skill</th>
<th>Definition</th>
</tr>
</thead>
</table>
| **Foundational literacies**| **Literacy** Ability to read, understand and use written language  
|                             | **Numeracy** Ability to use numbers and other symbols to understand and express quantitative relationships  
|                             | **Scientific literacy** Ability to use scientific knowledge and principles to understand one’s environment and test hypotheses  
|                             | **ICT literacy** Ability to use and create technology-based content, including finding and sharing information, answering questions, interacting with other people and computer programming  
|                             | **Financial literacy** Ability to understand and apply conceptual and numerical aspects of finance in practice  
|                             | **Cultural and civic literacy** Ability to understand, appreciate, analyse and apply knowledge of the humanities  
| **Competencies**            | **Critical thinking/problem-solving** Ability to identify, analyse and evaluate situations, ideas and information to formulate responses and solutions  
|                             | **Creativity** Ability to imagine and devise new, innovative ways of addressing problems, answering questions or expressing meaning through the application, synthesis or repurposing of knowledge  
|                             | **Communication** Ability to listen to, understand, convey and contextualize information through verbal, nonverbal, visual and written means  
|                             | **Collaboration** Ability to work in a team towards a common goal, including the ability to prevent and manage conflict  
|                             | **Curiosity** Ability and desire to ask questions and to demonstrate open-mindedness and inquisitiveness  
|                             | **Initiative** Ability and desire to proactively undertake a new task or goal  
|                             | **Persistence/grit** Ability to sustain interest and effort and to persevere to accomplish a task or goal  
|                             | **Adaptability** Ability to change plans, methods, opinions or goals in light of new information  
|                             | **Leadership** Ability to effectively direct, guide and inspire others to accomplish a common goal  
|                             | **Social and cultural awareness** Ability to interact with other people in a socially, culturally and ethically appropriate way  

Source: New Vision for Education  
Unlocking the Potential of Technology, 2015
Future Work Skills 2020

While all six drivers are important in shaping the landscape in which each skill emerges, the color-coding and placement here indicate which drivers have particular relevance to the development of each of the skills.

KEY
- Green: Drivers—disruptive shifts that will reshape the workforce landscape
- Orange: Key skill needed in the future workforce

extreme longevity
Increasing global lifespans change the nature of careers and learning

computational world
Massive increase in sensors and processing power make the world a programmable system

superstructured organizations
Social technologies drive new forms of production and value creation

Sense-Making

Trans-disciplinarity

Design Mindset

Virtual Collaboration

Cognitive Load Management

Cross Cultural Competency

Computational Thinking

New Media Literacy

New Media ecology
New communication tools require new media literacies beyond text

globally-connected world
Increased global interconnectivity puts diversity and adaptability at the center of organizational operations

rise of smart machines and systems
Workplace robotics nudge human workers out of rote, repetitive tasks

Novel and Adaptive Thinking

Social Intelligence

Cognitive Load Management

new media ecology
New communication tools require new media literacies beyond text

The evolution of development aid by information needs, 1973–2010

Job Opening: Open Science Officer

Source: LIBER, 2016
Data Experts

✓ this term refers to a distinct and largely novel class of research professional. They are not traditional core computer or data scientist, but embedded data specialists that are able to support domain specific researcher throughout the entire knowledge discovery cycle.

✓ They typically do not end up with high impact factors in traditional systems but should become indispensable core partners in any modern data driven research team with a solid perspective.

Source: Realising the European Open Science Cloud, 2016
The strategic knowledge gap

Source: According Leibold M., Probst G.J. B., Gibbert M., 2002
Why digital dividends are not spreading rapidly—and what can be done

Source: WDR 2016 team.
From data to intelligence

Instrumentation
Collect (a lot of) data.

Integration
Connect and bring these data together from across the city.

Intelligence
Analyze integrated data for insights and trends to make smarter decisions.

Sensors (examples: traffic, water, energy)
Systems (example: building automation)
Satellites (example: weather patterns)
Society (example: social media)

“Internet of things”
Ubiquitous connectivity
Smart grid

Big data analytics
Predictive analytics
Data-driven optimization

Source: Adapted from Palmisano, 2008.
The principles of a strategy – focused

LIBRARIES

Mobilize Change Through Executive Leadership
- Mobilization
- Governance process
- Strategic management process

Translate the strategy to operational terms
- Strategy maps
- Balanced scorecards

Make strategy a continual process
- Link Budgets and Strategies
- Analytics and Information Systems
- Strategic learning

Align the organization to the strategy
- Corporate Role
- Business Unit Synergies
- Shared service synergies

Make strategy everyone’s everyday job
- Strategic Awareness
- Personal Scorecards
- Balanced Paychecks
Thank you for your attention.
"We’d now like to open the floor to shorter speeches disguised as questions."

Published in The New Yorker 10/18/2010 by Steve Macone