

Activity A.1

“Development of the project framework”

Deliverable A.1|3 “Report on the identified climate change mitigation targeted management practices on organic soils”

LIFE OrgBalt, LIFE18 CCM/LV/001158

EU LIFE Programme project
“Demonstration of climate change mitigation potential
of nutrients rich organic soils in Baltic States and Finland”

GHG emissions from organic soils in EU countries

- Total area of managed organic soils in EU is 34.5 mill. ha, including 21 mill. ha in TCM climate zone (*24 mill. ha in OrgBalt countries, including boreal region*).
- Net emissions from organic soil in EU countries in 2015 was 130 mill. tons CO₂ eq., including 31 mill. tons CO₂ eq from grassland and 38 mill. tons CO₂ eq. from cropland.
- GHG emissions from **organic soils in the project countries is 80 mill. tons CO₂ eq. yr⁻¹** (61% of GHG emissions from organic soils in EU).
- GHG emissions from organic soils ranges from 5% of the net GHG emissions including LULUCF **in Germany to 59% in Latvia and 72% in Finland.**
- In spite of similar climate conditions GHG emission factors in the project countries **differs up to 10 times for the same land uses.**

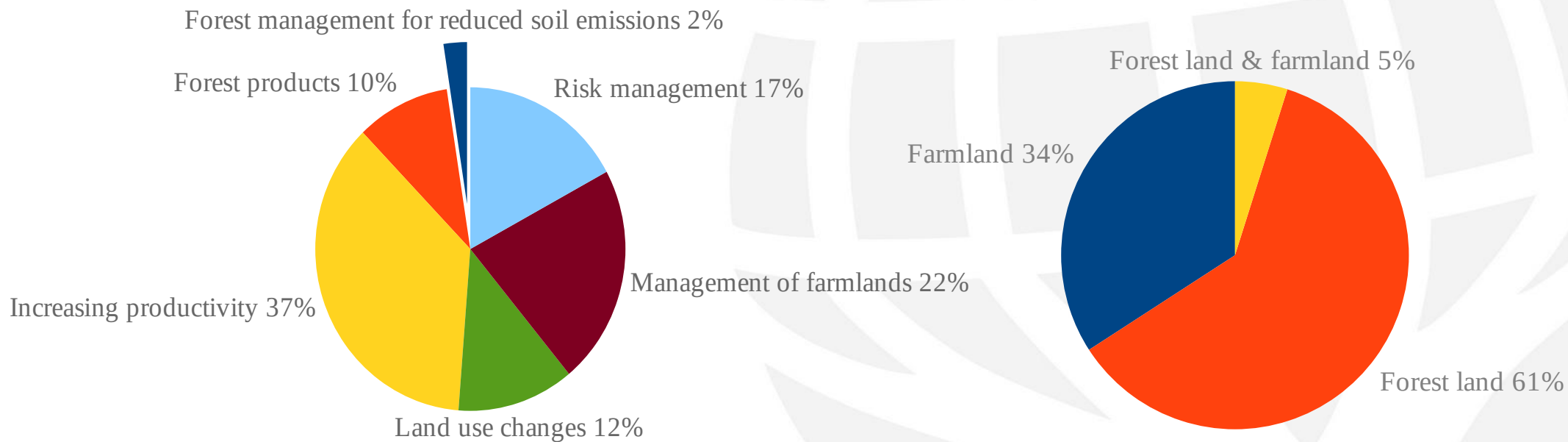
Climate change mitigation measures in national policies

- Biodiversity and nature conservation related measures:
 - Subsidies for the **conversion of arable land on organic soils** to nature;
 - Rehabilitation of moorland and **restoration of wetlands**, protection of bogs;
 - Initiatives to **limit consumption of peat in horticulture**;
 - Protection and management of the **Natura 2000 network**;
 - Maintenance of **biodiversity in grassland**.
- Nutrient, tillage, and water management:
 - Converting cropland **from annual tillage crops to perennial crops**;
 - Development and **adaptation of drainage systems in cropland**.
- Grassland, grazing land and/or pasture management:
 - **Pasture suitable for carbon storage**;
 - Preservation of **grassland with high natural value**.

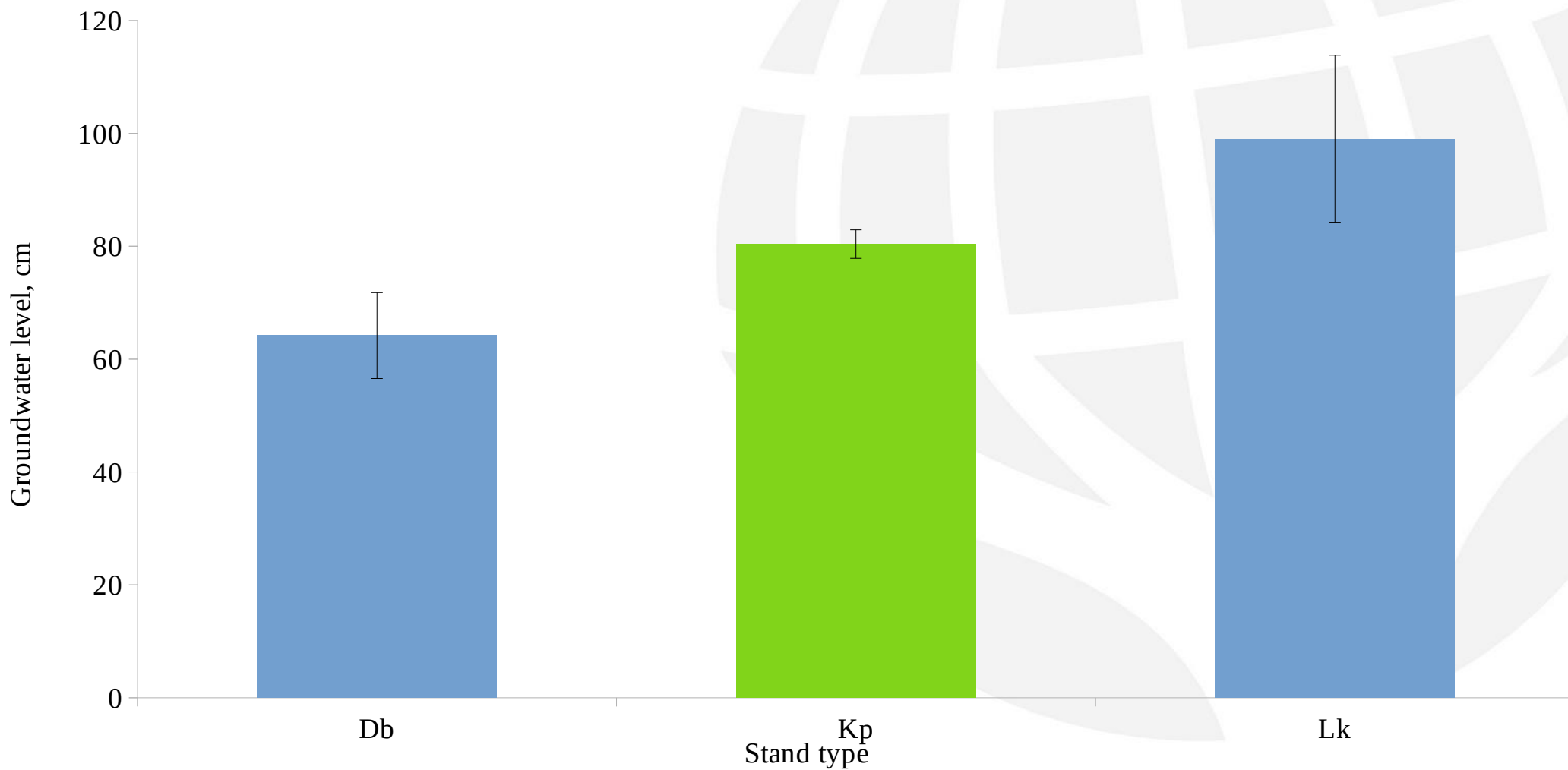
Expert judgment based evaluation of the potentially valuable climate change mitigation measures

- General information:
 - type and title of measure;
 - **substantiation** of the impact;
 - **criteria for site selection** for implementation of the measure;
 - **addressed carbon pools** and GHG emissions;
 - **applicability in other EU countries** in TCM climate zone;
 - **knowledge gaps** to be filled, uncertainties, collaboration needed.
- Country specific information:
 - **methods and models applied** for impact assessment at local and national level;
 - how existing **LPIS and other monitoring systems** needs to be improved to verify the impact;
 - **duration of impact and supplementary measures** to sustain the impact;
 - quantitative **implementation potential** at national level;
 - conformity with **sustainability criteria** listed in LULUCF regulation (EU 2018/841);
 - estimation of **cost & benefit ratio** of the measures;
 - **interferences and synergies** with other sectors, land uses and policies;
 - status in **national policies**, existing support schemes;
 - references and research projects.

Addressed land use categories and types of measures



Groundwater level in different organic soils



Forest management for reduction of **GHG emissions from soil**

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Continuous cover forestry in drained peatlands

Selective felling of shade tolerant tree species (spruce)

Strip and group harvesting of pine and other species depending from direct sunlight

Replacement of ditch maintenance with wood ash application after thinning or selective felling to avoid groundwater fluctuations and reduction of growth rate

Introduction of low impact logging technologies to avoid formation of methane hotspots and distribution of root rot and to ensure forest regeneration

Harvested wood products related measures (*not specific to organic soils*)

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Improved algorithms creating bucking instructions and laser scanning and image analysis technologies to improve output of assortments

Increase efficiency of utilization of timber – less biofuel and pulpwood and more harvested wood products with long half-life period

More efficient harvesting technologies to reduce timber damages (intelligent pressure regulation, low impact feed rollers)

Increased forest productivity

Maintenance of existing drainage systems after regenerative felling

Pre-commercial thinning to improve species composition, increase growth rate and reduce rotation length

Recycling of wood ash in forest

Reconstruction of low valued forest stands

Regeneration of forests after natural disturbances

Remedial ditching to enhance regeneration of forests on wet soils after regenerative felling

Rewetting of low valued drained forests with limited growth potential

Use of improved planting material in forest regeneration utilizing existing achievements of forest breeding

Increased forest productivity

Adaptation of drainage systems to optimal depth of groundwater and inflow to avoid CH₄ emissions and to reduce CO₂ emissions

Application of mineral fertilizers (N, P, K) and reduction of rotation length

Drainage and intensification of forest management on fertile wet organic soils

Improvement of genetic properties and adaptiveness of planting material

Intensification of management and reduction of rotation

Introduction of innovative soil scarification methods and improved planting material to reduce regeneration period

Land use change related mitigation measures

Land use changes

Afforestation of farmlands on organic soils

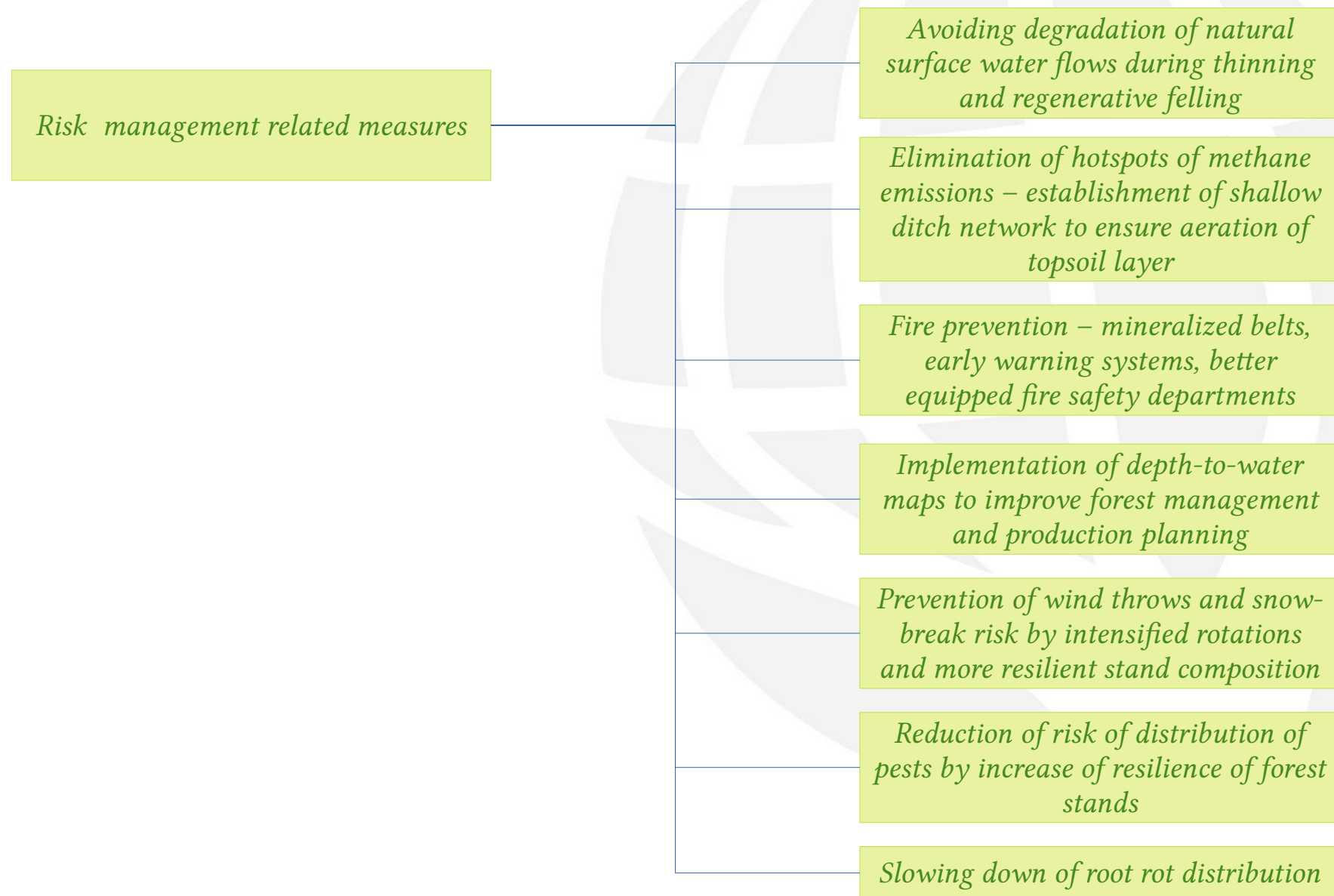
Conversion of cropland to pastures or grassland for fodder production

Conversion of wet grasslands into woody paludicultures for HWP and biofuel production

Intensive cultivated short rotation forests (SRF) in nutrient rich organic soils

Rewetting of grassland – conversion to wetlands, to avoid CO₂ emissions

Forest management risks related climate change mitigation measures



Management of cropland and grassland related climate change mitigation measures

Introduction of agroforestry systems to increase carbon storage

Non-woody energy crops, e.g. reed canary grass, in cropland and grassland

Optimize grassland management (species introduction, increase of lifespan of grasslands, increase of productivity)

Reduced tillage to avoid GHG emissions and carbon losses due to wind erosion

Management of farmlands related climate change mitigation measures

Adaptation of drainage systems to optimal depth of groundwater and outflows to avoid CH₄ emissions and to reduce CO₂ and DOC emissions

Adjust fertilizer application rates and timing in croplands to reduce N₂O emissions

Application of nitrification inhibitors to reduce N₄O emissions

Buffer zones alongside to drainage systems to compensate CO₂ emissions, to reduce nutrients leaching and DOC emissions

Increase of use of legumes to reduce N₂O emissions

Conclusions on the results of evaluation of the climate change mitigation measures

- The **potential role of the organic soils in GHG emission reduction is identified by scientific community in multiple publications and research reports**; however, controversial results, e.g. on rewetting or land use change to grassland or forest land, highlights significant regional differences and knowledge gaps.
- National **policies recognizes the potential role of organic soils in the reduction of GHG emissions**; however, only few measures are considered in policies, e.g. regulation of water regime and restoration of peat extraction sites in Finland and Estonia. The most of the measures, e.g. afforestation and conversion of cropland to grassland, may have indirect impact on GHG emissions organic soils.
- **National mitigation policies lacks quantitative assessment**, particularly, no quantitative targets in terms of the reduction of GHG emissions are set for organic soils in the National reports on progress of implementation of LULUCF action plans.
- Expert questionnaire based evaluation identified 41 measure; most of them can be applied in areas with organic & mineral soils; however, the impact may differ for mineral and organic soils. **The uncertainty rate of quantitative assessment impact is high and knowledge about the impact on GHG emissions is limited.**
- National **LPIS systems and modelling tools should be improved to ensure ability to estimate the impact of the climate change mitigation measures**. Country specific methodologies verifying the impact of the proposed climate change mitigation measures should be developed.

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The project "Demonstration of climate change mitigation potential of nutrients rich organic soils in Baltic States and Finland" (LIFE OrgBalt, LIFE18 CCM/LV/001158) has received funding from the LIFE Programme of the European Union and the State Regional Development Agency of Latvia.  www.orgbalt.eu

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