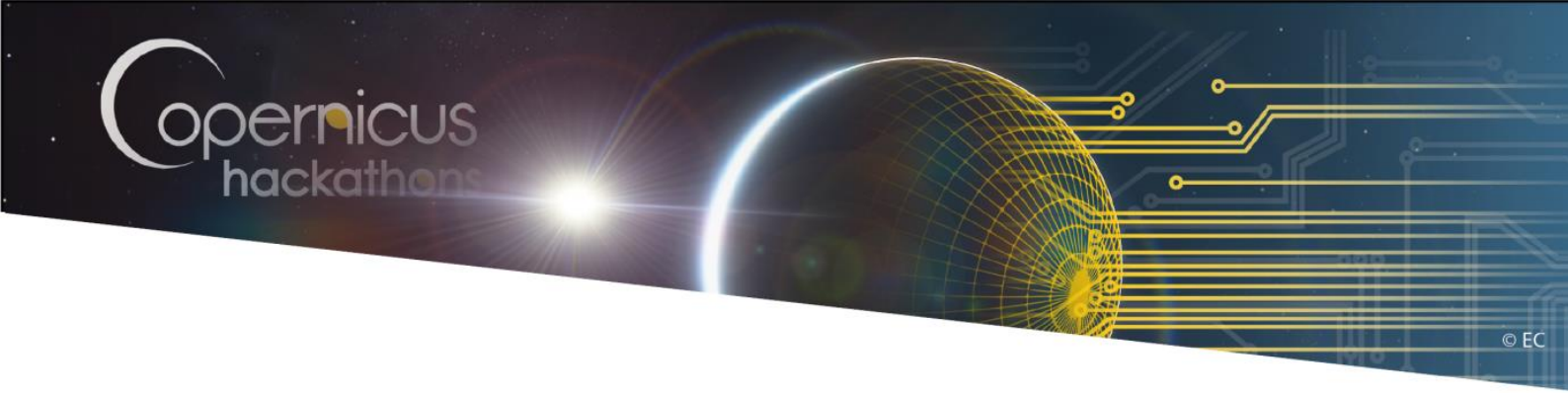

Description of challenges in Lublin:

Bioeconomy:

Bioeconomy covers many industries, mainly agri-food sector, as well as the associated sectors of forestry, chemical, biotechnology and energy. Particular significance of this specialization stems from the fact that scientific, technological, educational and economic potential of the Lubelskie Voivodeship focuses primarily on bio-innovative sciences. Bioeconomy covers all types of economic activity based on biotechnology, especially:

- crop and animal production,
- feeds manufacture and agri-food processing,
- pharmaceutical and chemical industry,
- renewable energy sources (biorefineries, biofuels),
- public health and environmental industries and services (eco-business) including:
  - the management of pollution level:
    - waste management and recycling,
    - waste water disposal,
    - air pollution monitoring,
    - environment management,
    - land recultivation and groundwater purification,
    - noise monitoring,
    - R&D services regarding environmental protection,
    - environmental monitoring and laboratory analyses;
  - management of efficiency of resource use (especially product regeneration, preservation of nature and ecological construction).

Medicine and health:

Development of medical and health-oriented services is complementary to the key specialisation (bioeconomy) of the region, especially in relation to food production chain (e.g. in the areas of functional foods, nutrition and dietetics) and bio-medical products chain based on organic resources (e.g. manufacture of pharmaceutical products and probiotics). The elements that constitute medicine and health potential of the Lubelskie voivodeship, include:

- technologies/R&D services for the purposes of telecare,
- telemedicine,

- e-health,
- pharmacogenomics,
- diagnostics and gene therapy,
- bio-informatics,
- minimally invasive surgery,
- the application of nanotechnology to human healthcare,
- tissue engineering,
- artificial organs and bio-artificial replacement organs,
- regenerative medicine,
- xenotransplantation etc.
- development of medical services sector which is now embedded in the structure of regional economy:
  - spa treatment,
  - healthy food,
  - physical activity etc.

Low emission energy:

Low-carbon emission energy sector draws on the potentials of both conventional power industry based on rich deposits of coal and gas (natural and shale) and renewable energy sources based on energy from biomass, sun, wind and water. These potentials provide a strong impetus for many investment activities in the region. The potential of the Lubelskie Voivodeship creates excellent conditions for some technologies to develop (e.g. clean fossil technologies, bioenergy production, smart energy systems). Particular areas includes in this Smart Specialization are:

- Bio-energy,
- Photonics,
- Clean fossil technologies,
- Prosumer energy,
- Smart energy systems,
- Renewable energy sources,
- Acquisition of energy resources,
- Energy production and storage,
- Energy distribution and sale,
- Mining,
- Mining support services,
- Production and supply of energy,
- R&D related to particular areas.

Information technology and automation:

The last area of smart specialisation covers information technology and automation focus upon the needs of the three previously mentioned specialisations. Information technology includes such sections as:

- network administration,
- algorithmics,
- architecture processors,
- security systems,
- computer graphics,
- languages and software engineering,
- computer hardware,
- computer systems,
- artificial intelligence,
- information theory,
- webmastering, etc.

Automatics includes:

- industrial,
- buildings and transportation systems automatics,
- biological, medical, environmental and agricultural systems automatics.