BIOECONOMY EDUCATION
IN EUROPE & WORLDWIDE

3RD COURSE ON BIOECONOMY

UNIVERSITY OF SOUTH BOHEMIA

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A FEW PREDICTIONS

Year	Name	Quote
1876	Western Union Memo	*Telephone has too many shortcomings to be seriously considered as a means of communication*
1895	Lord Kelvin President Royal Society	*Heavier than air flying machines are impossible*
1920	David Sarnoff's Associates	*The wireless radio has no imaginable commercial value*
1943	Thomas Watson Chairman IBM	*I think there is a world market for maybe FIVE computers only*
1949	Popular Mechanics Forecasting	*Computer in the future may weight no less than 1,5 tons*
1977	Ken Olson President Digital Equipment	*There is no reason anyone would want a computer in their home*
1981	Bill Gates	*640 kB ought to be enough computer memory for anyone*

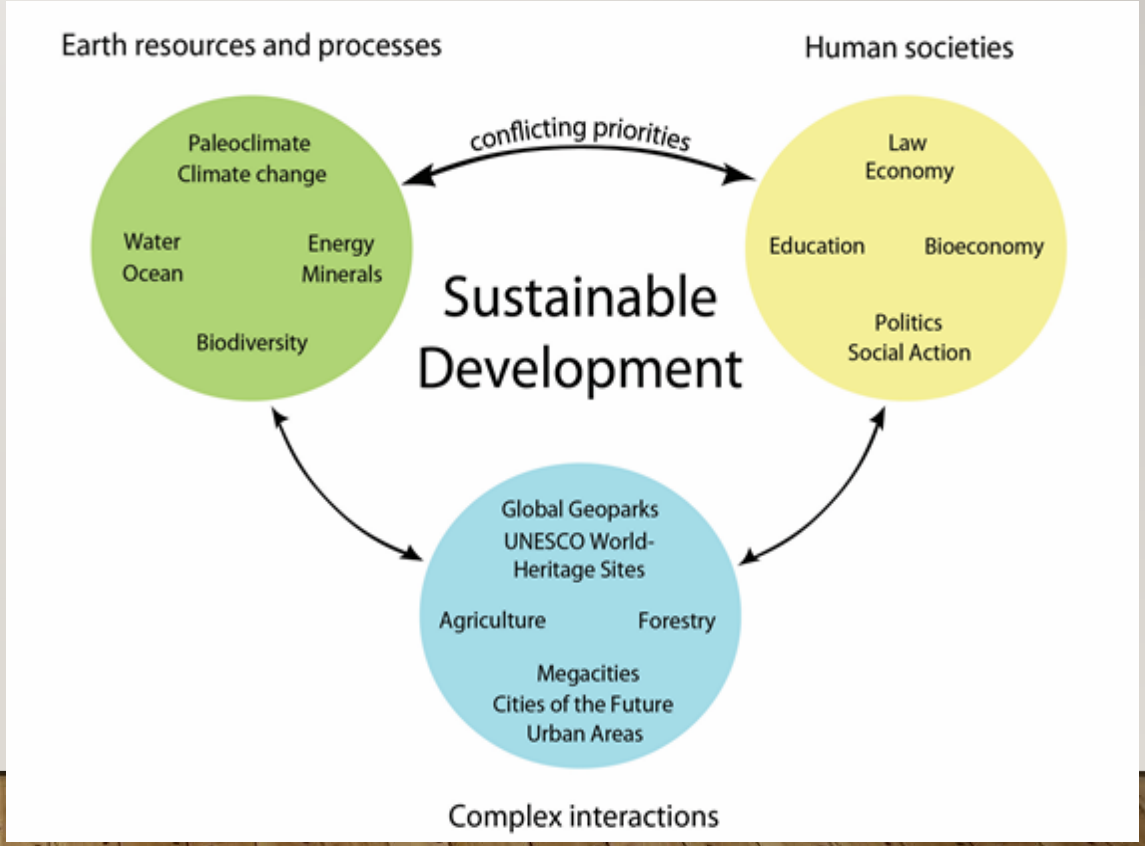
PREDICTION & INNOVATION

- Predictions are simply extrapolations of the past
- Innovation expands the *Art of the Possible*
- The best way to predict the future is to invent it
- Invention must be based on existing problems


SUSTAINABLE DEVELOPMENT GOALS
17 GOALS TO TRANSFORM OUR WORLD
1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS
SUSTAINABLE DEVELOPMENT GOALS

GOALS RELATED TO BIOECONOMY

- 12 of the Goals are related to BioEconomy practices in a Direct or Indirect way
- Indirect way required the necessity of :
  - Establishing and clarifying links, paths and connections
  - Considering interdisciplinarity
  - Connecting various sectors and domains
  - Addressing into a heterogeneous target



GOAL ACHIEVEMENT: BASED ON EDUCATION

- SIG — 100% FSC Labelled Packs
- Arla — 25% CO2 reduction
- Unilever — 100% sustainably sourced paper
- CocaCola — All PET bottles are bio-based
- McDonalds — Packaging from 100% certified fibre-based or recycled sources
- EC — 20-20-20 by 2020
  - 20% Reduction of greenhouse gas emissions
  - 20% Substitute of EU energy from renewables
  - 20% Improvement of Energy Efficiency

ACHIEVING THE REQUIREMENTS

In order to achieve such requirements we need a new generation of experts:

- Widely Educated in terms of conventional disciplines
  - [Life Sciences / Economy / Social Sciences / Regulation / Communication]
- Highly Specialized in terms of:
  - Domains of Application
  - Regional Consideration
  - Synergies and Cooperation
  - Public – Private Consideration

FOCUS AND DIRECTION

<table>
<tr><td></td><td colspan="2">Focus in GDP Growth</td><td></td></tr>
<tr><td rowspan="2">Individualism</td><td><u>Market Forces</u>
• Market knows best
• Inequality</td><td><u>Policy Reform</u>
• Need Planning
• Equity maintained</td><td rowspan="2">Community</td></tr>
<tr><td><u>Fortress World</u>
• Everyone for themselves
• Limited Governance</td><td><u>Great Transition</u>
• All in this together
• Governance in many levels</td></tr>
<tr><td></td><td colspan="2">Focus on Well Being</td><td></td></tr>
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THE POTENTIAL

1. Techno – Economic Evaluation
2. Market Uptake Potential
3. Social – Economic Impact
4. Efficient Regulatory Frame
5. Networking
6. Stakeholder and General Public Acceptance

Distinction: The Potential of Bioeconomy Education NOT The Bioeconomy alone

1. TECHNO – ECONOMIC EVALUATION

DOMAINS

- Biorefineries
- Biofuels for low carbon industry
- Bio-Based materials and composites
- Food industry & Lateral applications
- Materials for Nano-Cellulose
- Textile Materials
- Sensors for Increased Efficiency

ACTIONS

- Evaluate the potential / Domain
  - *Output / Added Value / Exports*
- Integration to the National Priorities
- Socio-Economic profile / Domain
- Feasibility Study
- Cost – Benefit analysis
- Communication Initiatives

2. MARKET UPTAKE POTENTIAL

FACTORS ENHANCING THE POTENTIAL

- Evidence for the lack of alternatives
- Smart Specialization
- Interpretation of the Public, Consumer, Societal needs
- Risk / Benefit Analysis
- Sustainability in all levels
- Feasibility Studies
- Efficiency Prove

↓ Products / Markets →	Existing	New
Existing	Low Uncertainty	Average Uncertainty
New	Average Uncertainty	Large Uncertainty

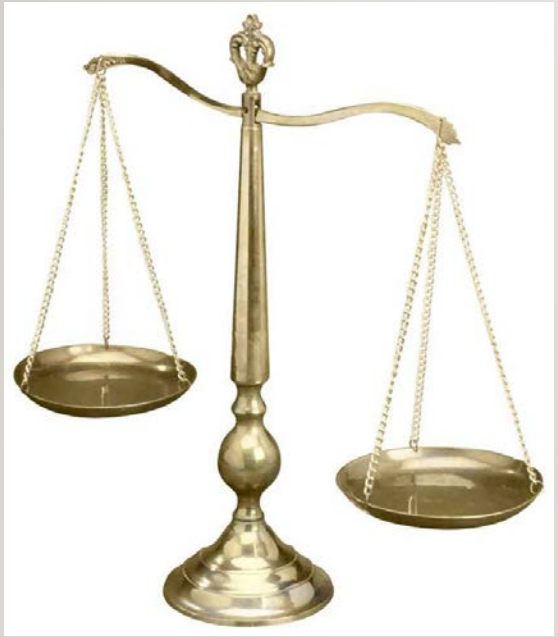
3. SOCIAL – ECONOMIC IMPACT

Preparing competitive candidates for the future job requirements

- A huge market size
- 2 trillion Euros turnover
- 23 million Employees
- 9% of the workforce in Europe

- 25 million tones of Bio-Based Market Capacity *(600 the EU citizens weight)*

4. EFFICIENT REGULATORY FRAME



REGULATORY CONTRAINS

- Lack of Proactivity
- Complicated Legislation - Uncertainty on Liability
- Need of Universality – Contradiction of Regulatory Frames
- Conflicting Philosophies
- Necessity of Implementation
- Multidisciplinarity – Absence of Experts
- Involvement of the Scientific Community into the Law Making

5. NETWORKING & COOPERATION

- Bioeconomy Initiative in the European Commission
- European Federation of Biotechnology – Bioeconomy Task Force
- Europa-Bio / EFIB
- Bio TIC Consortium
- Bio-Based Industries
- EU Bioeconomy Clusters & Consortia (Danube, Bio-East, Baltic Sea, CEI, IFIB)
- Non EU Initiatives (Malaysia)

THE REGIONAL CHARACTER

How to build Research & Education infrastructures with regional funds?

Nikolai Zamfir / Director ELI-NP

Can Research, Education & Regional Programs work together?

Lambert van Nistelrooij / Member of EP – RD Committee

Facts

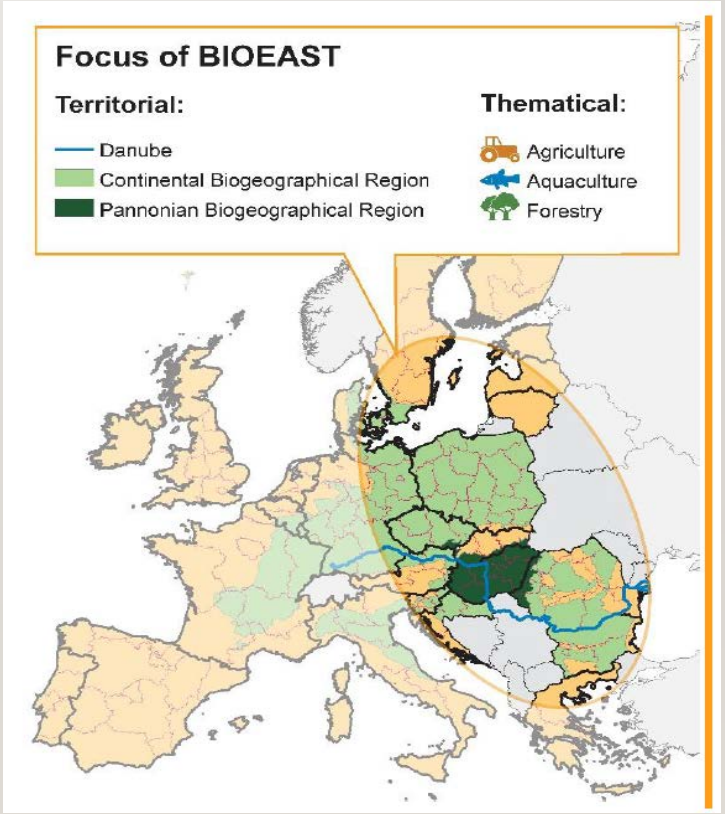
- Mixing the cocktail of funds
- Bridging the gap East – West
- Specify needs and particularities
- Train the trainers

Actions

- Coordinate the rules for funding streams
- Exempt funds from state-aid rules
- Enforce the seal of excellence
- Make smart specialization smarter
- Communicate better

OUR REGION


Praha
DEUTSCHLAND
ČESKÁ REPUBLIKA
SLOVENSKO
UKRAJINA
REPUBLICA MOLDOVA
Kishinev
Wien
Bratislava
Budapest
ÖSTERREICH
MAGYARORSZÁG
ROMÂNIA
Ljubljana
Zagreb
SLOVENIJA
HRVATSKA as of 1 July 2013
București
Beograd
BOSNA I HERCEGOVINA
Sarajevo
SRBIJA
BULGARIA
Sofiya
CRNA GORA
Podgorica

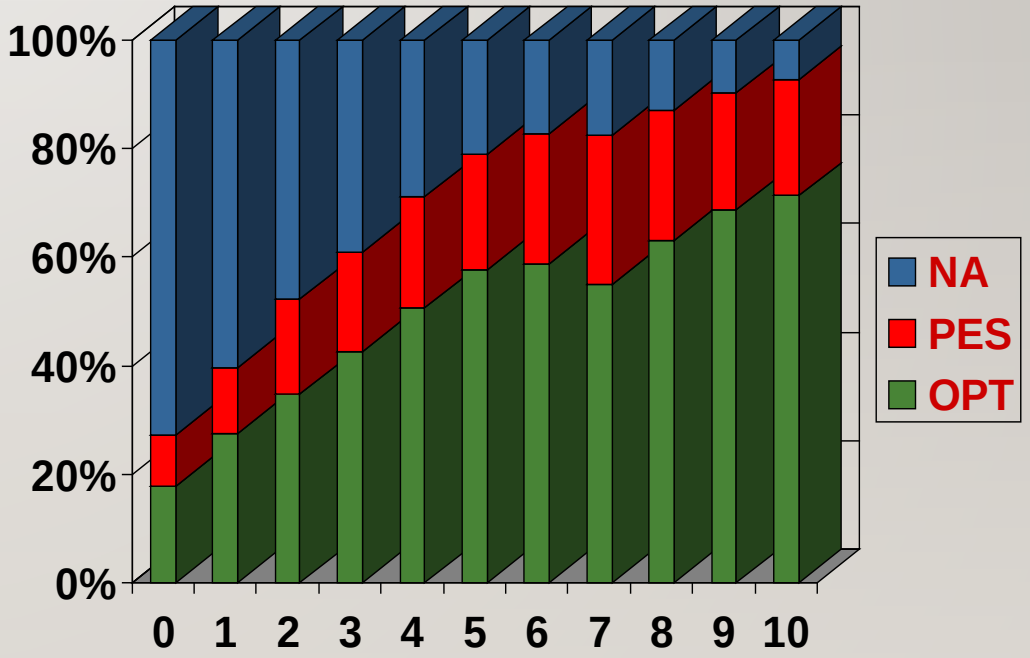

Focus of BIOEAST
Territorial:
Danube
Continental Biogeographical Region
Pannonian Biogeographical Region
Thematical:
Agriculture
Aquaculture
Forestry

6. STAKEHOLDERS & GENERAL PUBLIC ACCEPTANCE

Characterization	Supporters	Opponents	Risk Tolerant
Useful	Y	N	Y
Risky	N	Y	Y
Morally Acceptable	Y	N	Y
Should be Encouraged	Y	N	Y

PERCEPTION VERSUS KNOWLEDGE

- Do Natural Tomatoes contain genes?
  - **NO (38%)**
- GM tomatoes are bigger than the natural ones
  - **YES (52%)**
- By eating GM tomatoes my genome risk to be affected
  - **YES (24%)**



THE RISK TOLERANCE ISSUE

- Any technological Innovation contains a certain amount of Risk during its application
- No matter how high the risk is, the innovation is accepted or rejected according to its importance and to the expected benefit
- For a Rational Risk Assessment, the Risk must be considered versus the expected Benefit
- This way we may enhance the "Risk Tolerance"

ACTIONS

- Institutionalization
  - Steering Committee on Bioeconomy Education
  - Lodz Declaration on Bioeconomy Education
  - Platform on Bioeconomy Education within the EC
- Events Participation
  - Global Bioeconomy Summit - Workshop
- International Cooperation
  - USA, Malaysia
- Consortia and Projects
  - COST Proposal

GLOBAL BIOECONOMY SUMMIT 2018

IOWA STATE UNIVERSITY
Bioeconomy Institute

BIO ECONOMY MALAYSIA

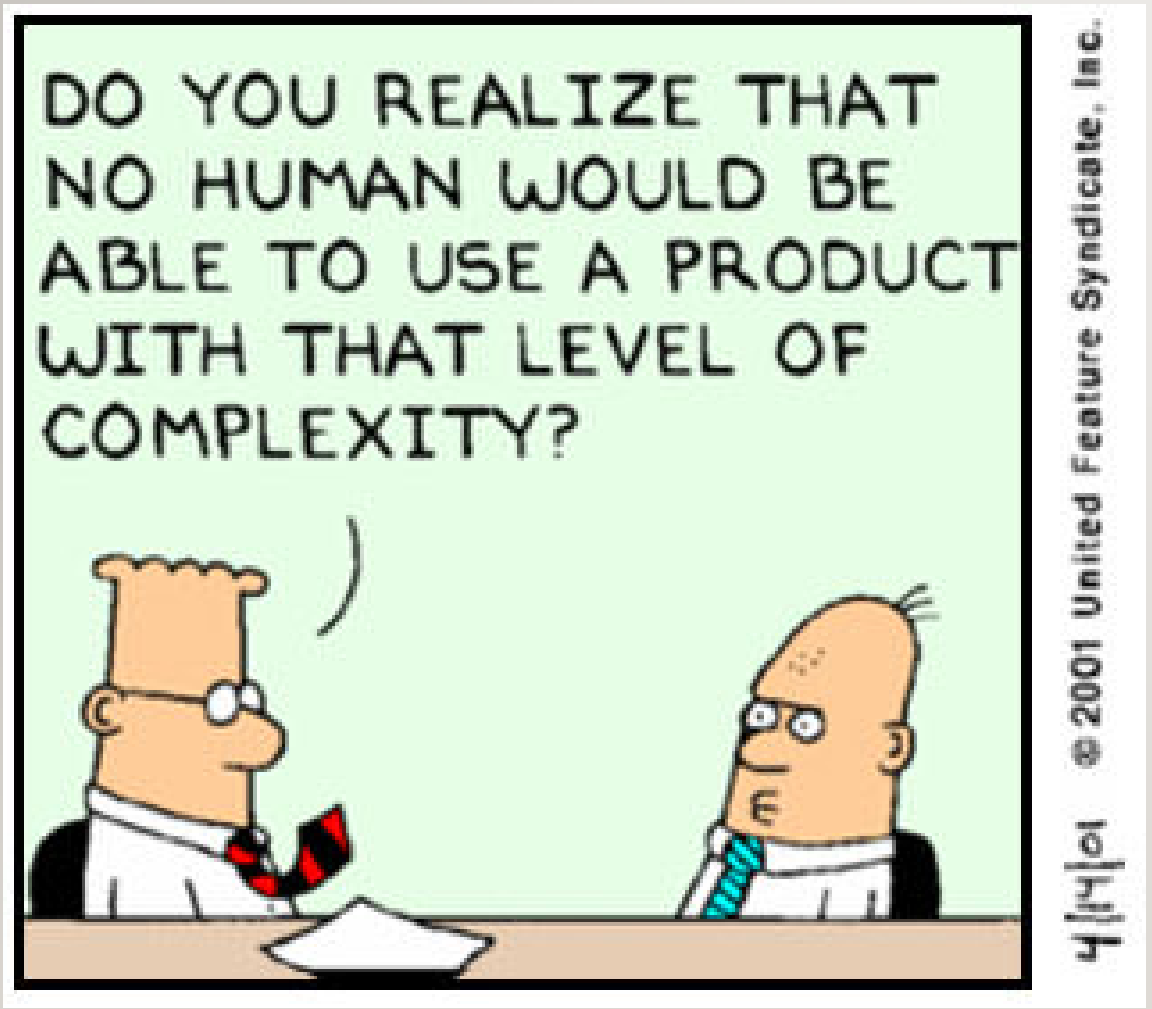
cost
EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY

COST PROPOSAL CONSORTIUM

- Countries Participating 23 (Among them 9 Inclusiveness Target Countries – ITC)
- Institutions 39 (Among them 37 Higher Education & Associated Organizations)
- Gender Distribution 61.5 % M / 38.5 % F
- Domains:
  - Industrial Biotechnology 28.5%
  - Biological Sciences 19.4%
  - Agriculture, Forestry 14.3%
  - Economy 9.7%
  - Social Sciences 4.3%
  - Other 23.8%
- Coordinator USB

COST PROPOSAL ON BIOECONOMY EDUCATION

- Data Collection and Mapping
  - Stakeholders, Initiatives, Objectives, Target Audiences, Contents, Funding
- Methodologies
  - Educational & Teaching Activities, Good Practices, Learning Outcomes, Case Studies
- Regional Character
  - Homogeneity, Susceptibility, Importance, Funding Mechanisms, Infrastructure
- Enabling the Potential
  - Impact on SME's, Technology Transfer
- Institutionalization
  - Platform on Bioeconomy Education
- Biologisation & Digitalization of Bioeconomy Education


DO YOU REALIZE THAT NO HUMAN WOULD BE ABLE TO USE A PRODUCT WITH THAT LEVEL OF COMPLEXITY?
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GOOD POINT. I'D BETTER ADD "EASY TO USE" TO THE LIST.

Thank you !!