

Food Security and the Bioeconomy – Perspectives for Research

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What are the main challenges in food and agriculture for the next decade in Europe and maybe in the world ?

Increase of worldwide demands for food, feed, fibre and fuels

REASONS:

- Continuously growing world population, but slowing down in the next 30 years; growing use of oil for energy, mobility, transport and other purposes
 - Growing wealth in US, Canada, Europe and BRICK countries:
increase of meat consumption, dairy products, fats, energy and water intensive food, for example vegetables, horticultural products, fruits, fish, luxury goods and services, with a strong emphasis on health
 - Growing demand for micronutrients
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Decrease of available arable land worldwide

- Areas to be cultivated per person will be reduced by 50 % until 2020 (various impact on plant and livestock production)
-> Only one third of cultivated land available per capita compared with 1950 !
 - This trend is going to continue, even worsened by continuous soil erosion, desertification and urbanization activities all over the world, including wrong soil and water management, leading i.e. to more processed food, more energy consumption and heavier losses
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The challenge: How to bridge the gap between offer and demand ?

- Sustainable increase of yield per hectare (increase in crop and livestock productivity)
 - Successfully combating plants and animal diseases, also in a preemptive way
 - Measures of **resources efficiency** along the whole **food-feed-chains**
 - Use of hitherto not usable or accessible arid or semi-arid land by plants and animals (deforestation no solution !)
 - Increased use of any kind of existing or dedicated waste based on biological resources (incl. animal's waste)
 - Increased use of existing ligno-cellulosic biomass
 - Increased use of microalgae and other ocean seas-potentials
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Conclusion:

We need not only a Sustainable Crop Production Intensification (SCPI), but also a SLPI (Sustainable Livestock Production Intensification) !

The challenge: How to bridge the gap between offer and demand ?

- Increased storage capacities for water, food, feed and fodder
 - Decrease of pre- and post-harvest losses in agriculture (60% in Russia, 35% in India etc.)
 - Decrease of other losses along the whole food chain (appr. 20% in Europe). Losses in the feed chain have not yet been seriously examined !
 - **THUS A BOUQUET OF MEASURES WILL BE NECESSARY TO BRIDGE THE GAP !**
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Conclusions

- **Decrease losses along various chains**
- **Increase yields**
- **Increase storage capacities**



But where are the limits ?

**There are inherent contradictions
and/or conflicts to be understood
and to be overcome**

Conflicts

- **Growth – higher yield of plants and livestock vs. Climate friendliness**
- **Food vs. Fuel**
- **Meat-based food vs. Non-meat-based food**
- **Climate vs. Food - Health - Well-Being**
- **Human health vs. Environment**
- **Animal welfare and animal health vs. Feeding the world vs. Consumers acceptance and sustainability**
- **Small landholders vs. intensive land use systems**

These conflicts will only be overcome by new knowledge created by research on plants and animals

Food and Innovation Drivers

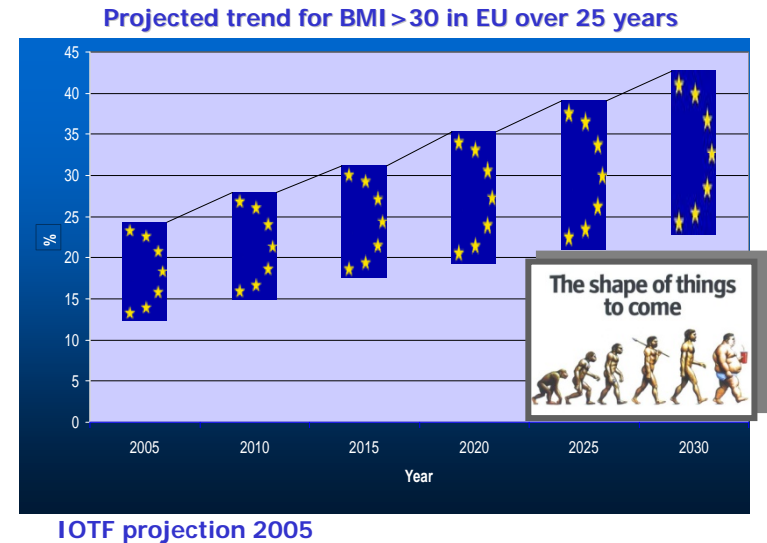


Challenge for the future Action to protect health

**Increasing world
Population
(and migration)**

**Ageing population
(cognitive decline)**

**Diet-related
diseases (metabolic
disorders, allergies,
obesity)**



**Interactive,
personalised
food**

From curative to preventive health care

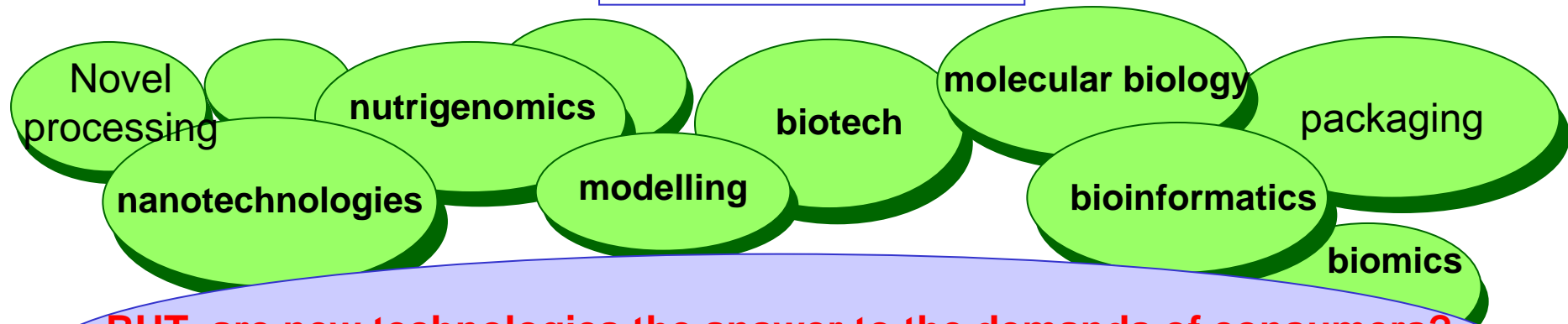
**Healthier lifestyle, fresher, healthier and
safe foods, lower on fats etc.,
incorporating new ingredients, bioactive
components, with enhanced availability**

Challenges for Future Food and Climate Issues

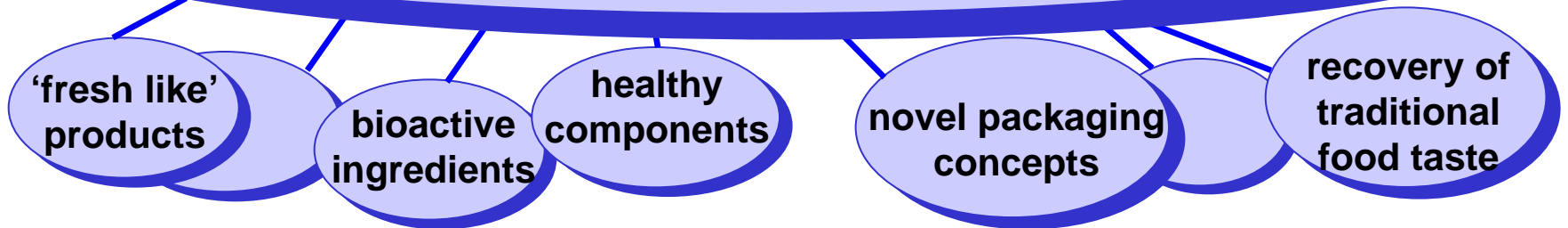
- Sustainability within the total food production chain
 - Livestock as an important climate change factor, contributing to but also suffering from climate changes (GHG emissions, CH₄ issues, increasing water and land consumption)
 - Introducing „Climate-friendly menus“: drinking barley-based beer and eating soya (not-animal) based food !
For these cases animal based products are important candidates
 - Defining and measuring of the carbon footprint, accountability, labelling, particular with respect to livestock production
 - New role for innovation ?
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Effective tools for implementation

TECHNOLOGY



**BUT, are new technologies the answer to the demands of consumers?
What is the best strategy of the food industry when using technology?**



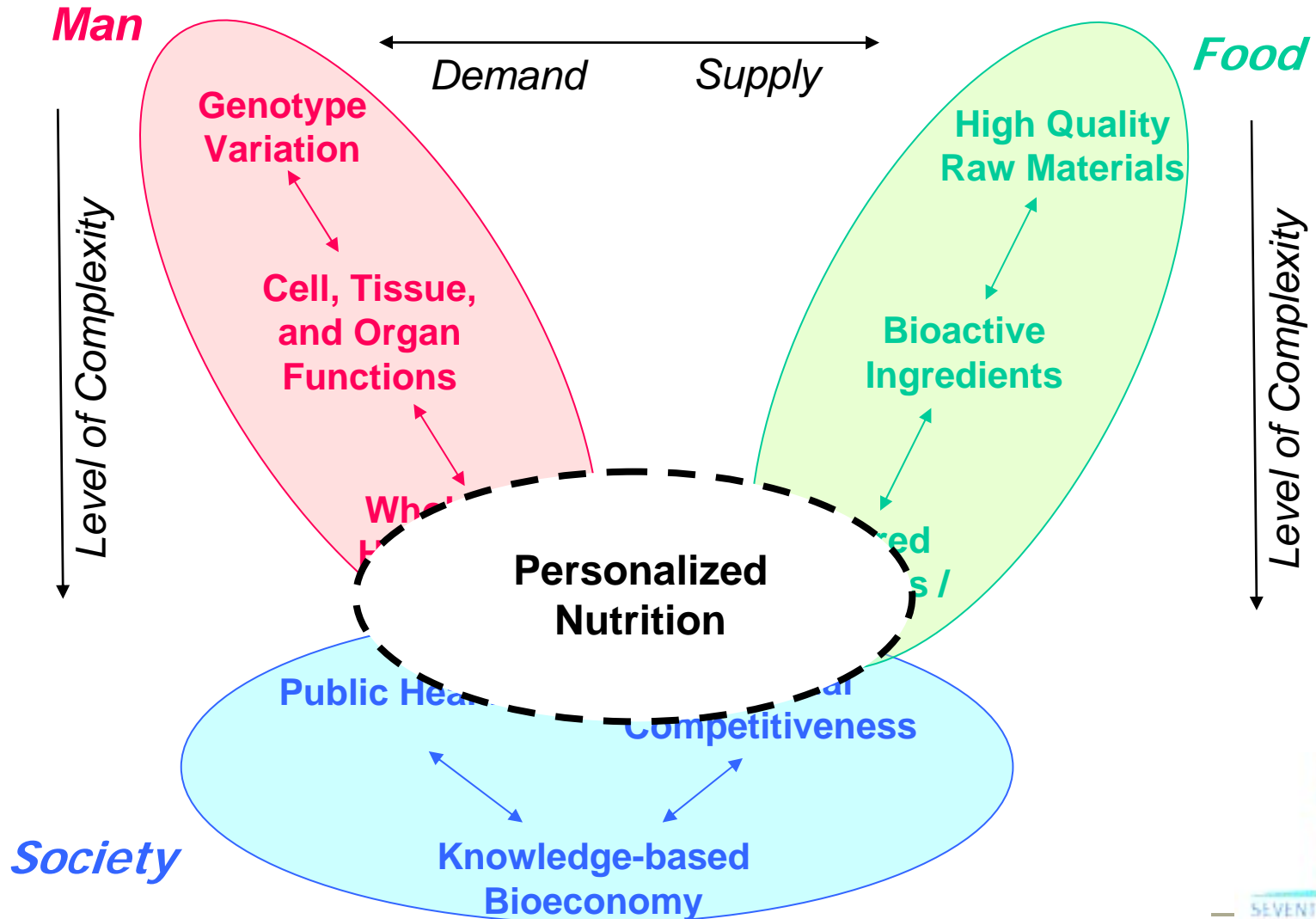
STRATEGY



'Personalized Nutrition' -

A Lead Vision for Food and Nutrition Research

Applying individual genetic profiling and systems biology knowledge in order to provide tailored food products and/or dietary recommendations as a contribution for personalized health care and disease prevention



Recent developments in Europe

- **Joint Programming:**

- 1. Health, Food and the Prevention of diet related Diseases**
- 2. Agriculture, Food Security and Climate Change**

- **Renaissance of Innovation in the EU as a Driver for the Future:**

„Building the Bioeconomy until 2020“ as one of the 7 European Innovation Partnerships (EIP) within the new Innovation Union in the „Europe 2020 Strategy“ replacing the Lisbon Strategy: more precisely, „Sustainability and Productivity in Agriculture“

Recent developments in Europe

- **Publication of a European comprehensive Bioeconomy Strategy in November 2011**
 - **Embedment of the Bioeconomy into various European Policies like the CAP, Environmental Policy, Industrial Policy etc.**
 - **Proposal within the new Financial Perspectives within the EU 2014-2020 to increase the Budget of the next FP for Research and Innovation „Horizons 2020“, and here to earmark 4.5 Bill. € for Food Security, Sustainable Agriculture and the Bioeconomy**
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How are we going to implement these new developments to feed our planet?

The implementation of the Bioeconomy might be an answer

What is the Knowledge-Based Bio-Economy?

The knowledge base: Advances in Life Sciences and Biotechnologies in convergence with other technologies such as nanotechnologies, chemistry, information technologies..,

The Bio-Economy: Includes all industries and economic sectors that produce, manage or otherwise make use of biological resources including bio-waste.

The European Bio-Economy has an approximate **market size** of over 2.0 trillion €, employing more than 22 million people.

→ 4 Fs: Food, Fees, Fiber and Fuel



What are the driving forces behind the Knowledge-Based Bio-Economy beyond competitiveness ?

Global challenges like :

- Growing and aging populations
 - Increased demand for high quality food and sustainable food production
 - Increased incidence of food-related disorders (cardiovascular, obesity..)
 - Increased demand for feed
 - Increase in infectious animal diseases and zoonoses
 - Danger of plant diseases, new pathogens and pesticides
 - Limited resources of raw materials and energy
 - Threat of global warming and other global changes (biodiversity loss etc)
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What is the Knowledge-Based Bio-Economy offering?

- **Improved health**
 - Food with improved nutritional value, increased food safety, new treatments, diagnosis and vaccines against human and animal diseases, improved feed...
- **Sustainability and a cleaner environment**
 - Energy and water saving production and processes in agriculture and industry ; carbon neutrality, decreased dependency of fossil resources;



What is the Knowledge-Based Bio-Economy offering?

- Resource use efficiency: “More with less”
- Innovation strategy
- Support to rural development
 - Use of “set-aside” land; cultivation of new crops; decentralised production facilities
- Increased industrial competitiveness through innovative eco-efficient bio-based products



The Knowledge-Based Bio-Economy also raises societal concerns

- New issues arise, e.g.
 - use of human tissue and cells
 - use of personal and genetic data
 - food versus fuel
 - environmental issues incl. sustainable use of biomass in countries of the third world
 - animal welfare issues, incl. animal cloning

which require monitoring and informed societal debate on its benefits and risks



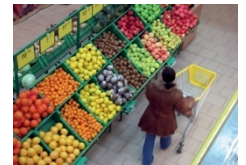
**Germany is a forerunner in this development
with its first
National Bioeconomy Research Strategy
of November 2010 with
2,4 Bill. Euros for the next 6 years**



The aims

Aims of the national strategy are:

- Securing global nutrition
- Ensuring sustainable agricultural production
- Producing healthy and safe foods
- Using renewable resources for industry
- Developing biomass-based energy carriers



**Thank you very much
for your attention**
