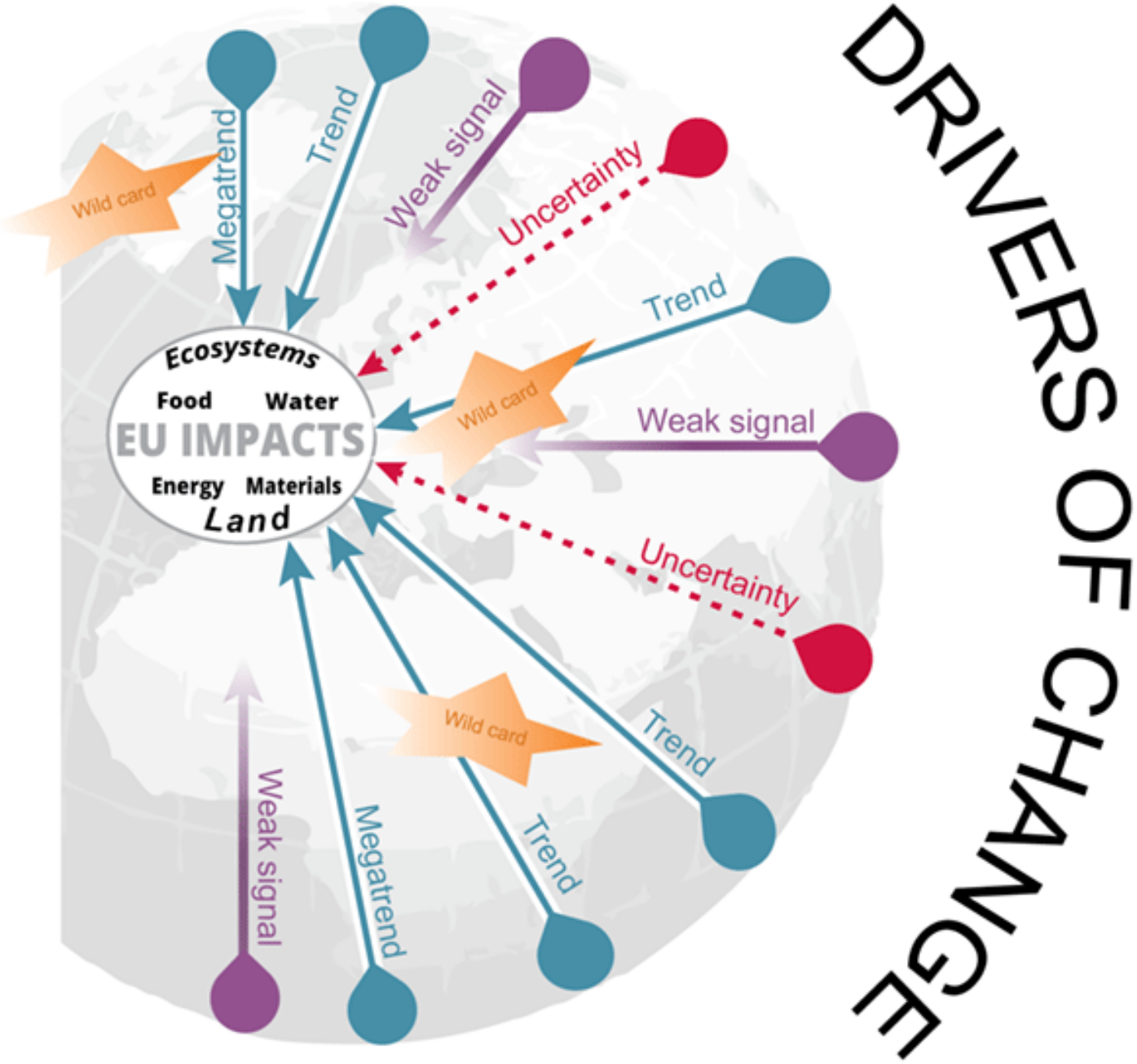

Horizon scanning for emerging environmental issues in EIONET network

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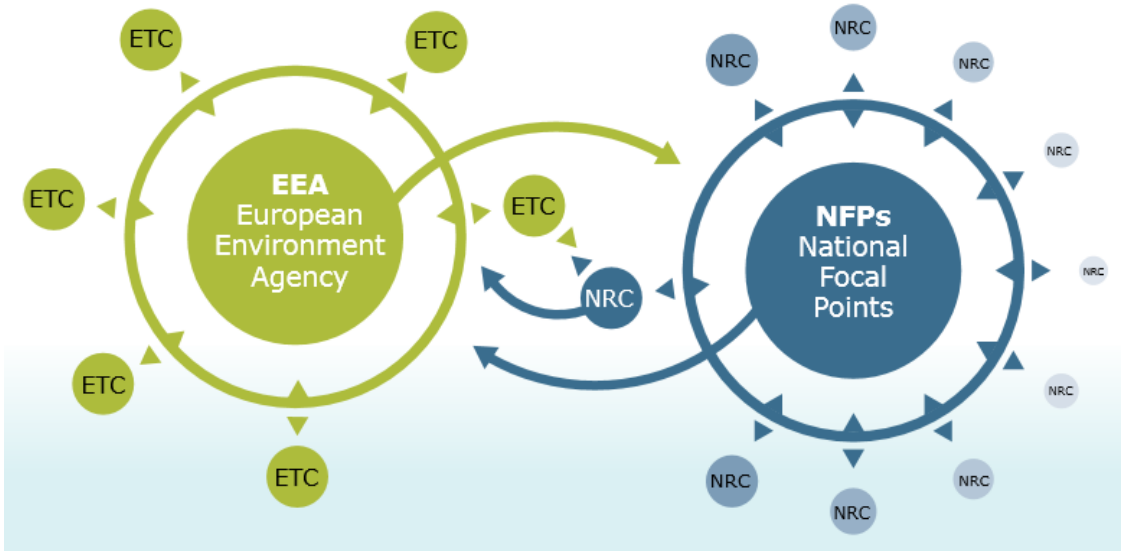
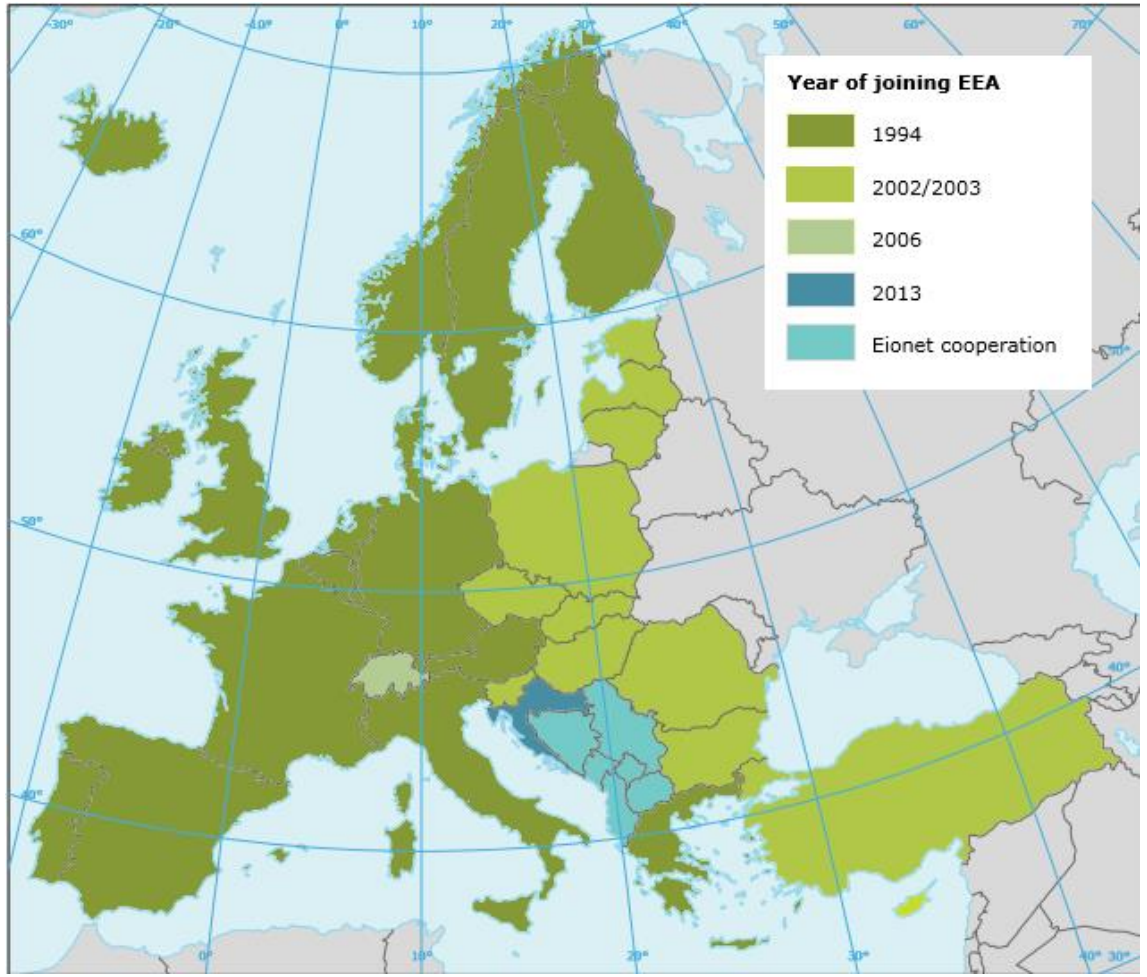
What is European environment information and observation network (EIONET)?



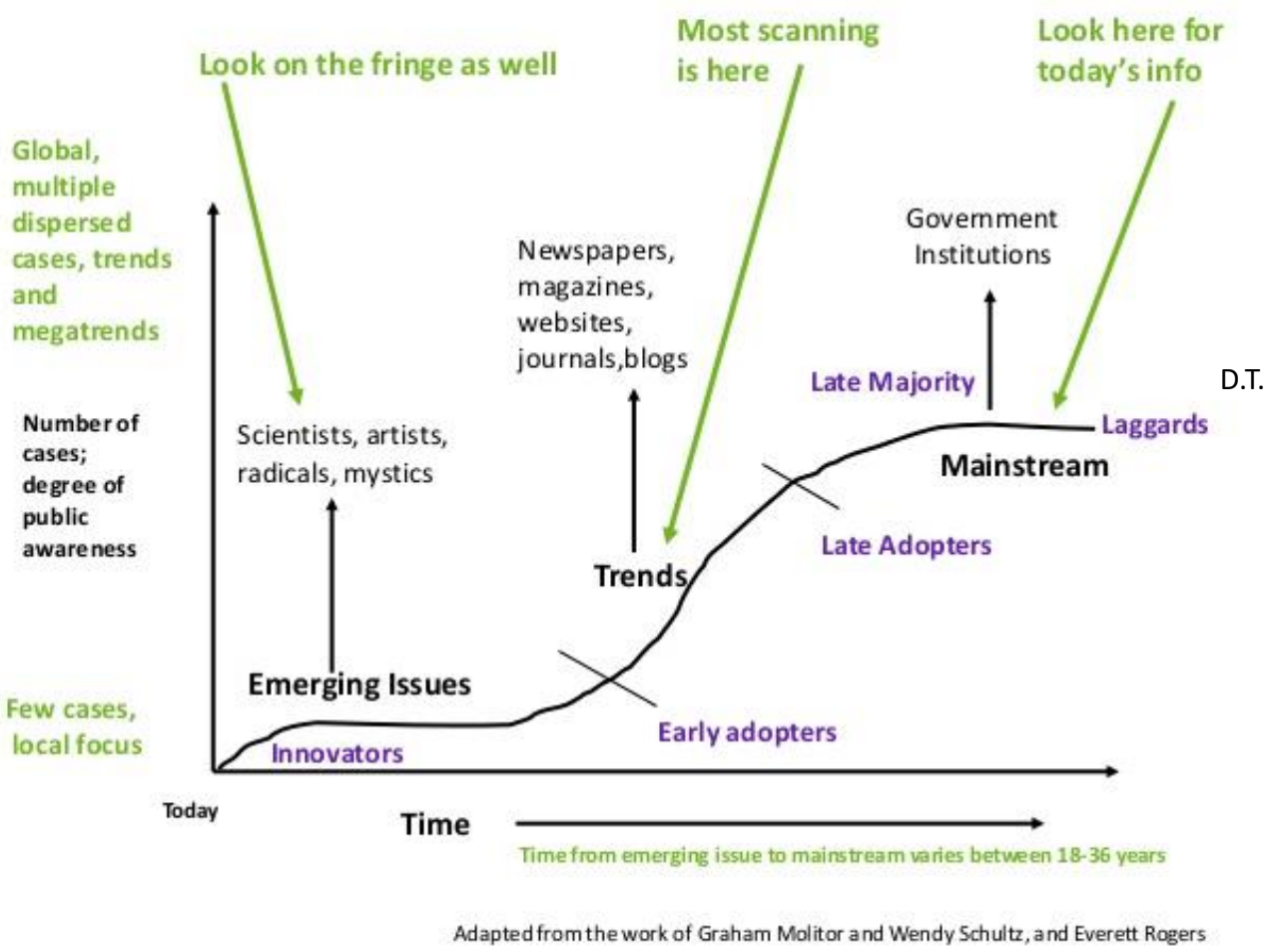


What do we mean by HS?

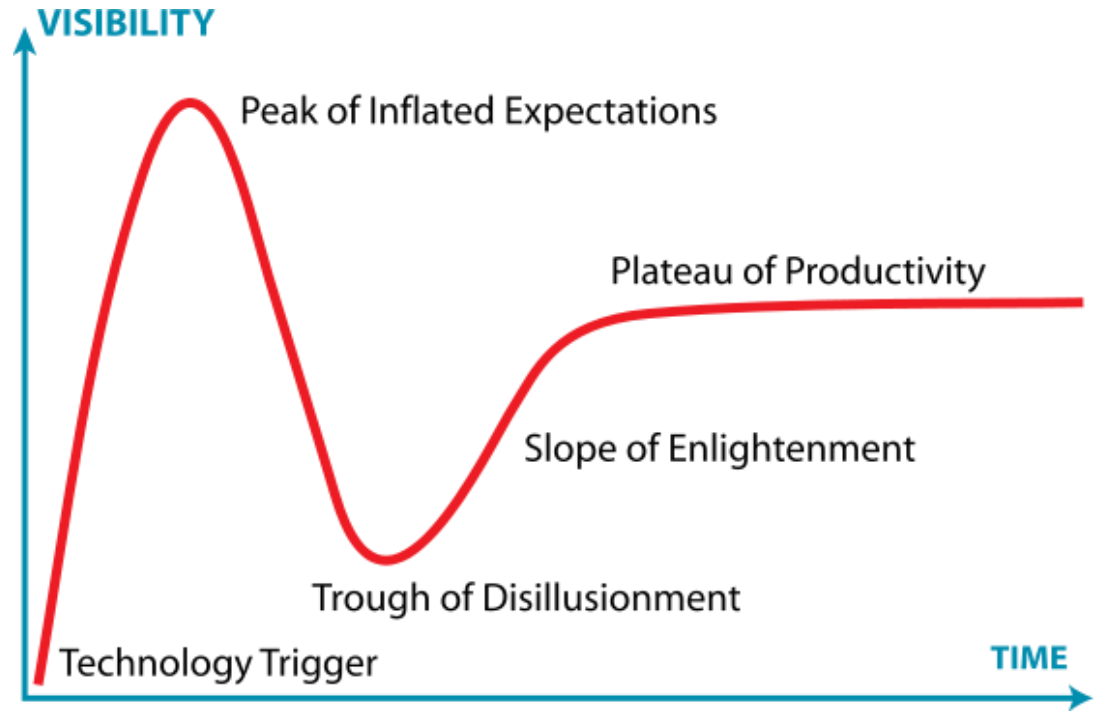
- Horizon scanning is a technique for detecting early signs of potentially important developments through a systematic examination of potential threats and opportunities, with emphasis on new technology and its effects on the issue at hand. The method calls for determining what is constant, what changes, and what constantly changes. It explores novel and unexpected issues as well as persistent problems and trends, including matters at the margins of current thinking that challenge past assumptions.
- Horizon scanning is often based on desk research, helping to develop the big picture behind the issues to be examined. Desk research involves a wide variety of sources, such as the Internet, government ministries and agencies, non-governmental organisations, international organisations and companies, research communities, and on-line and off-line databases and journals. Horizon scanning can also be undertaken by small groups of experts who are at the forefront in the area of concern: They share their perspectives and knowledge with each other so as to 'scan' how new phenomena might influence the future.
- A solid 'scan of the horizon' can provide the background to develop strategies for anticipating future developments and thereby gain lead time. It can also be a way to assess trends to feed into a scenario development process.

OECD

What signals (seeds of change) are we looking for?

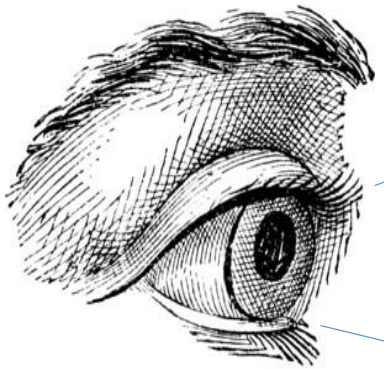


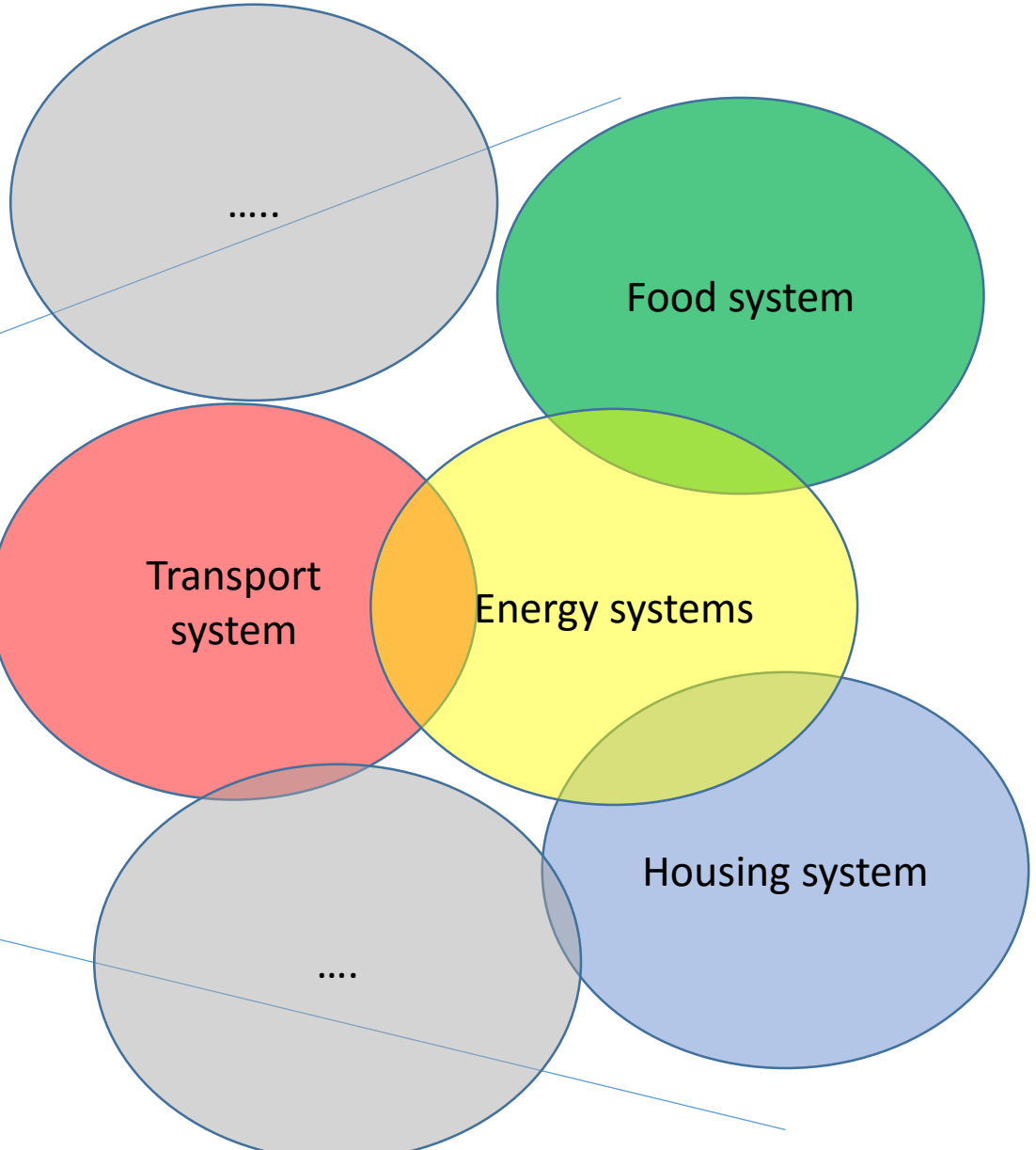
D.T.



Source: wikimediacomons

Horizon scanning, systems approach, scoping

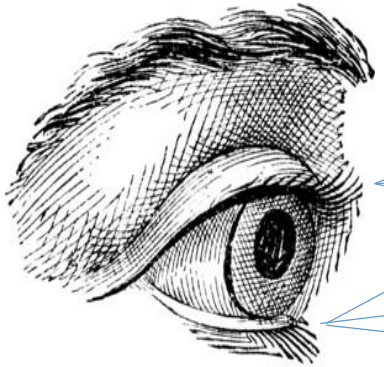




Horizon scanning focus

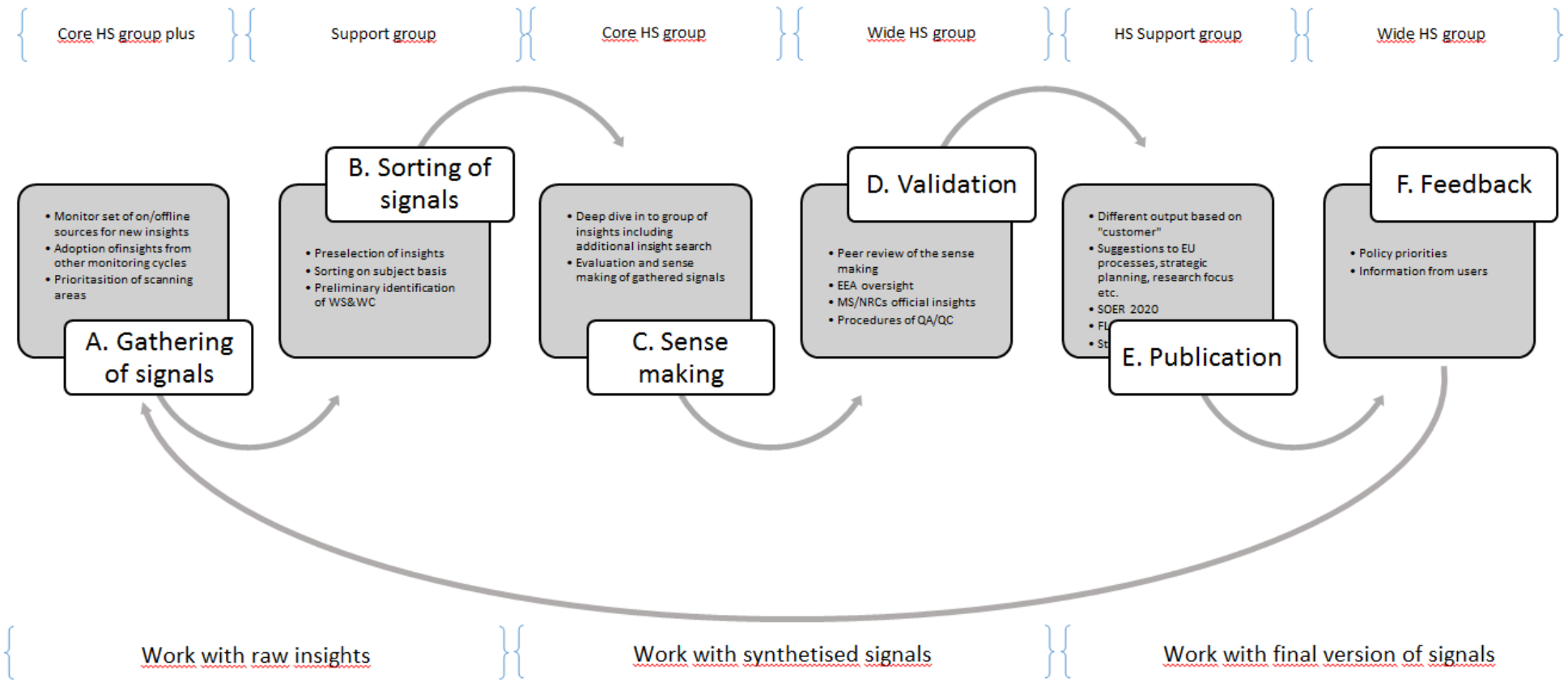
Artificial photosynthesis

Decline of pollination ES



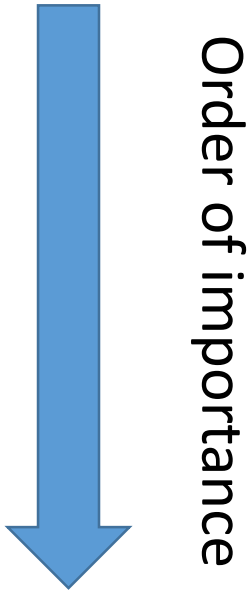
Peak phosphorus

Process of HS



Main output of HS?

- Scans (in the database)
  - For other NRCs
  - For SOER
  - For other EU institutions and authorities
  - For MS
  - ….
  - For general public



Process of scoping

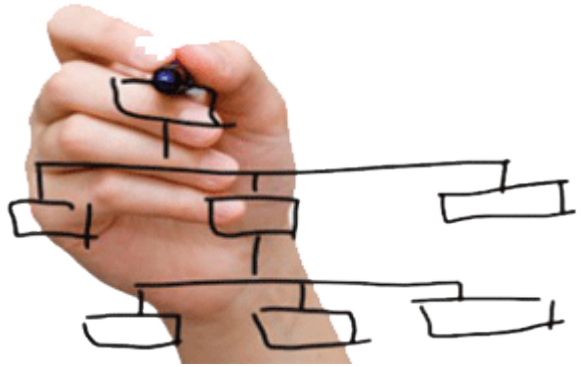
Scoping

(very slow – system modelling + weak point analysis)

(slow – MS via NRC FLIS and NFP will set the agenda)

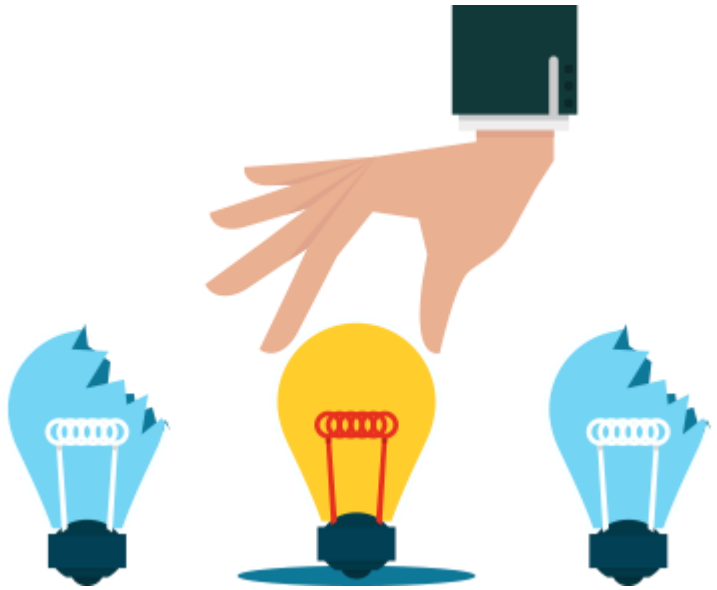
(medium - broad areas for HS set by the EEA)

(fast – just pick something)



Signal scoping and pre-selection

- Relevance for the European/Global environment
- Relevance to 11 EEA GMTs
- There is some knowledge around the signal
  - Meaning that weak signals are not that weak
- Controversial signals (normative view)



Process of scanning

Scanning

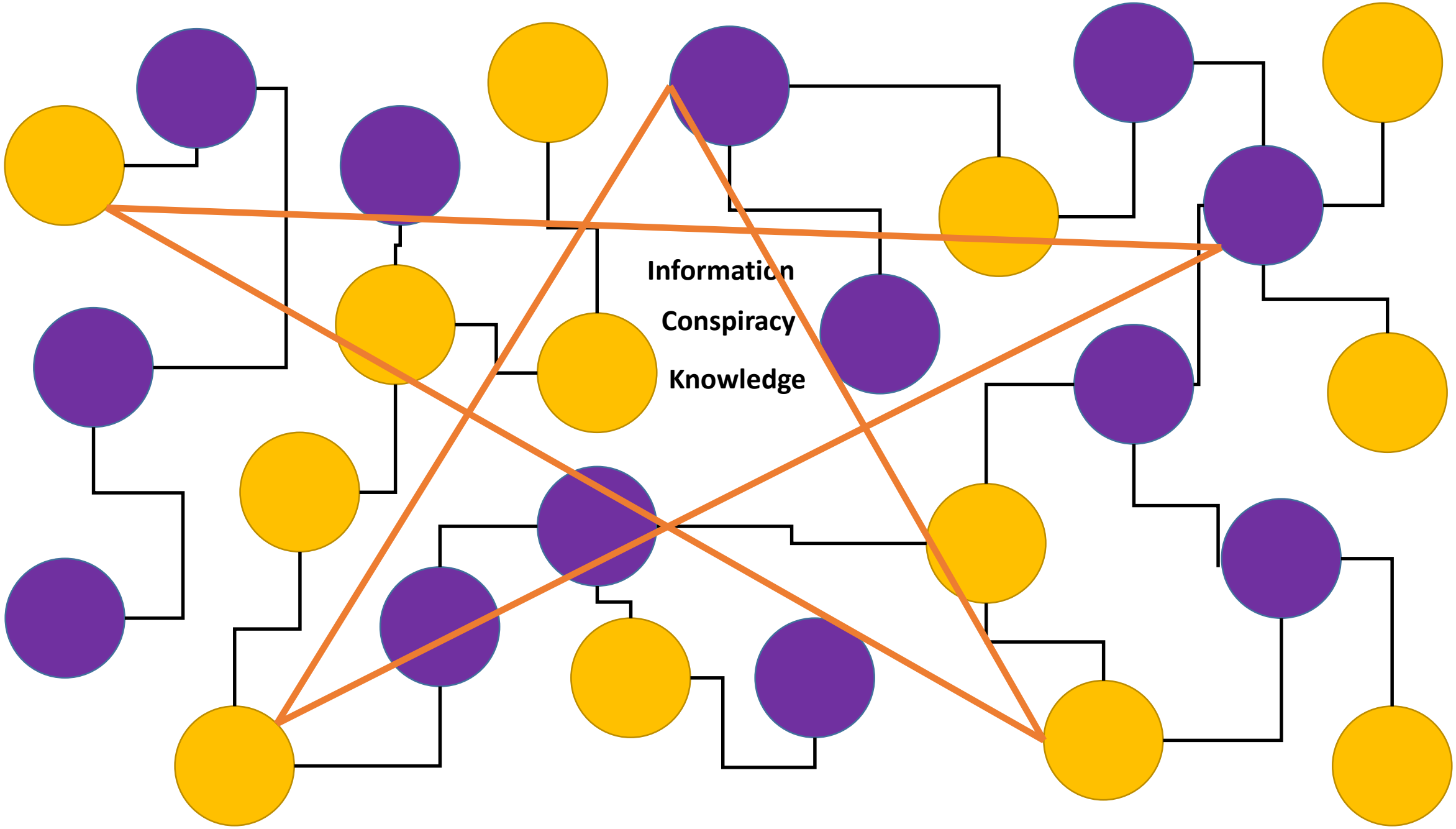
(slow – Eionet conduct the scanning)

(medium – NRC FLIS+External agents conduct the scanning)

(fast – ETC will conduct scan of scans)

What to do with selected signals?

- Refine definition
- Deepen knowledge base
- Assessment including possible conceptual modelling
- Signal card


Information
Conspiracy
Knowledge

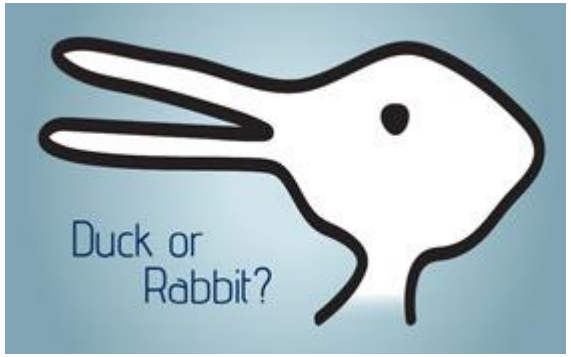
Process of interpretation

Interpreting

(slow – NRC FLIS selects and interpret the signals)

(medium – ETC&EEA will select and interpret signals)

(slow – ETC&EEA&NRC FLIS will do system modelling around the signals)



Use of scanning

Use

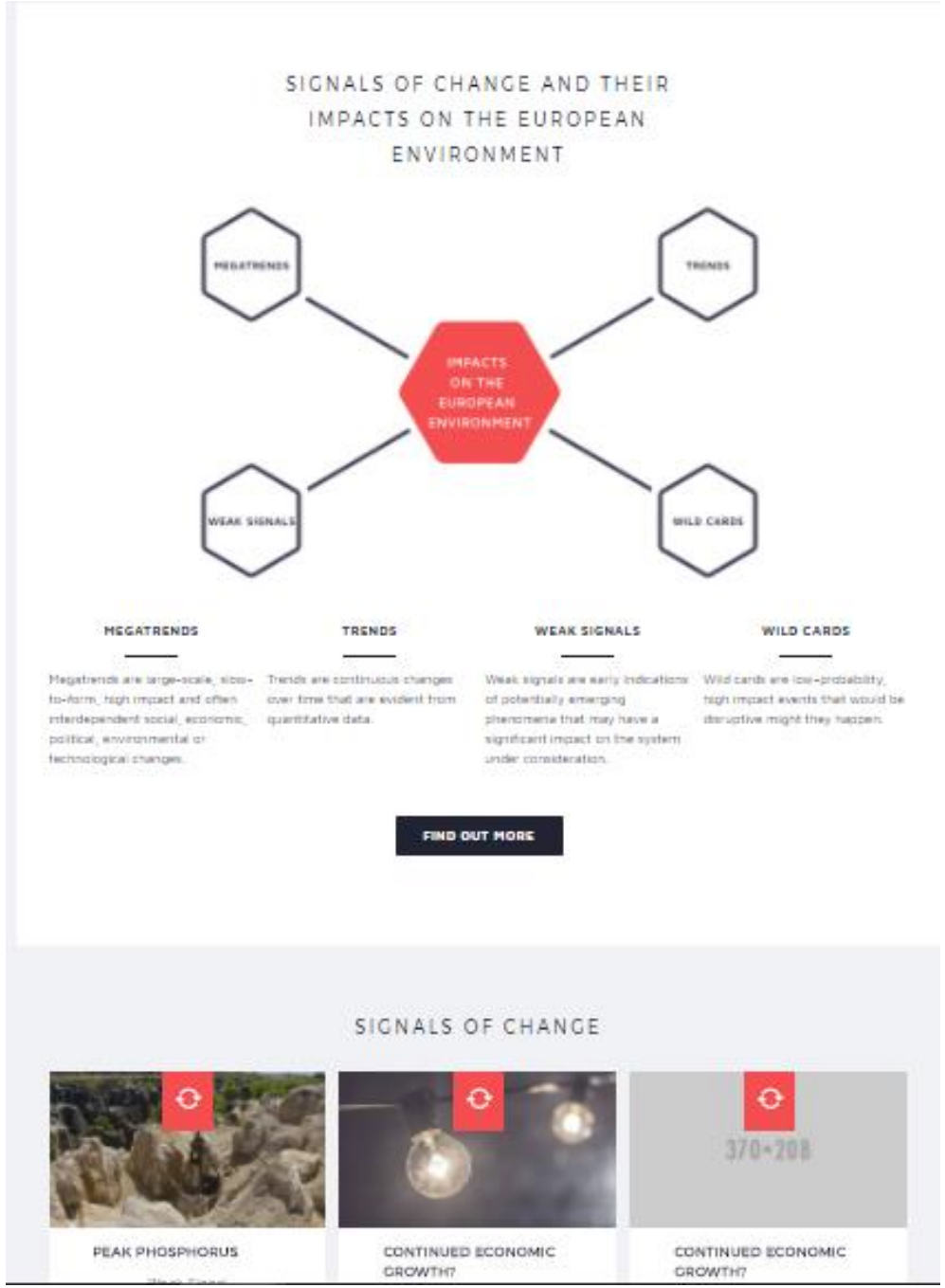
(easy – use of scans on PFLI (EEA platform for forward looking indicators)

(medium – use of scans in EEA publications e.g. SOER)

(hard – use of scans to influence strategic policy of the EU&MS)

Pitfalls

- Too vague
- Too prescriptive
- Act on low probability
- Overlap with other EU bodies
- EEA is data based institution (no data about future)



Short title: Peak phosphorus

Type of signal: Weak Signal

Geographical scope: Global

Description:

Availability of phosphorus is essential for proper plant growth. It is therefore essential for food production and in its consequences and adequate nutrition of the population. Phosphorus is among the biogenic elements necessary for life in all organisms on Earth because of its irreplaceable role in many processes in living cells. In human nutrition phosphorus it is also important for the correct growth of bones and teeth [7], [6].

Availability of phosphorus in the soil is determined by a weathering of rocks containing phosphorus, which is a very slow natural process. To improve this process people gradually learned to increase the amount of this element in the soil, incorporating organic fertilizers (animal manure, guano, etc.), From the 19th century, the use of mineral fertilizers made from inorganic sources, namely from phosphate rocks [5]. Use of industrial fertilizers to enrich the soil (except phosphorus also with nitrogen and potassium), has increased yield of agricultural production and allowed gradual increase of Earth population.

Phosphorus is an a relatively abundant element. In the form of high-quality phosphate rock, which can be cheaply processed to fertilizers, there are limited reserves, however. More than 70% of all currently known on earth phosphate is contained in the deposits in Morocco [4]. Other areas with known reserves of phosphate include Iraq, Algeria, Syria, Western Sahara and North Carolina in the United States [4].

Origin of signal: Environmental origin

Time horizon: Mid-term

Overall impact: Most likely negative

Impact on the European environment:

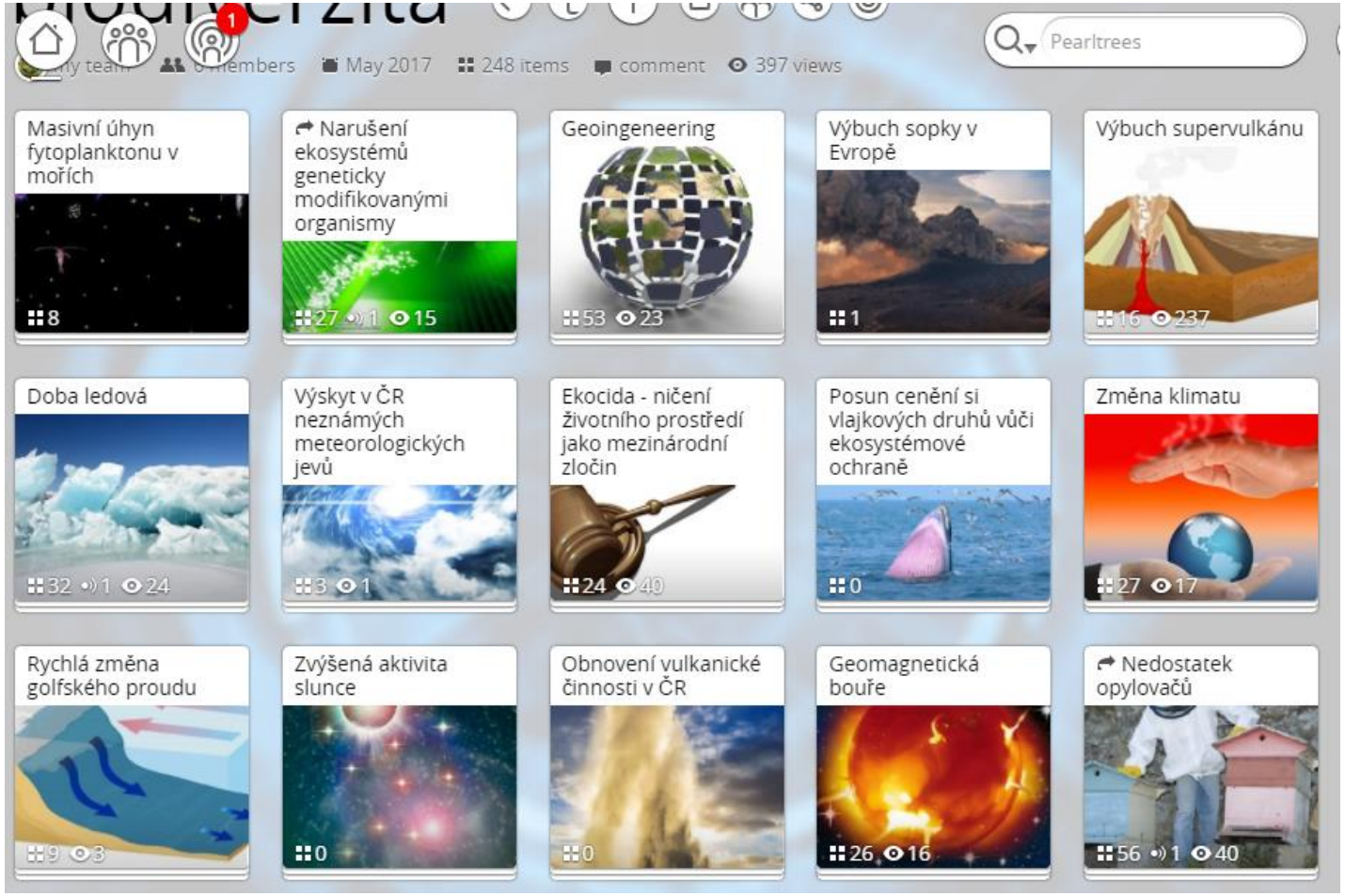
Lack of phosphorus as fertilizer would have positive impacts on the environment and negative on human society. Phosphorus from agricultural land causes a big problem with eutrophication of water and have negative impacts on natural ecosystems. Lack of phosphorus as fertilizer would therefore probably meant the reduction of phosphorus input into water and reduce eutrophication, which could be viewed as positive impact on the environment. At the same time, however, the lack of phosphate fertilizers would reduce yield of agricultural production or price of food, hence reducing food security, mainly in poorer countries. In extreme cases, the lack of phosphorus could result in insufficient supply of food and lead to hunger or famines.

Declining fossil phosphates reserves may have also significant geopolitical implications. More than 90% of the demand for phosphates in the European Union is met by importing the raw materials from abroad [5]. The only place in the EU where phosphates are mined is in Finland [5]. Other European countries with relatively small phosphate deposits are Spain, France and Belgium. Declining availability of phosphate fertilizers could therefore lead to the opening of new mines in Europe hence increase pressure on the European environment. It could also spark international tension. Important aspect is that most of the currently used reserves are in politically unstable areas like the Middle East or Western Sahara. [5]

Implications for environmental policy in Europe:

- Reduction of the total amount of phosphorus and increased efficiency of the use

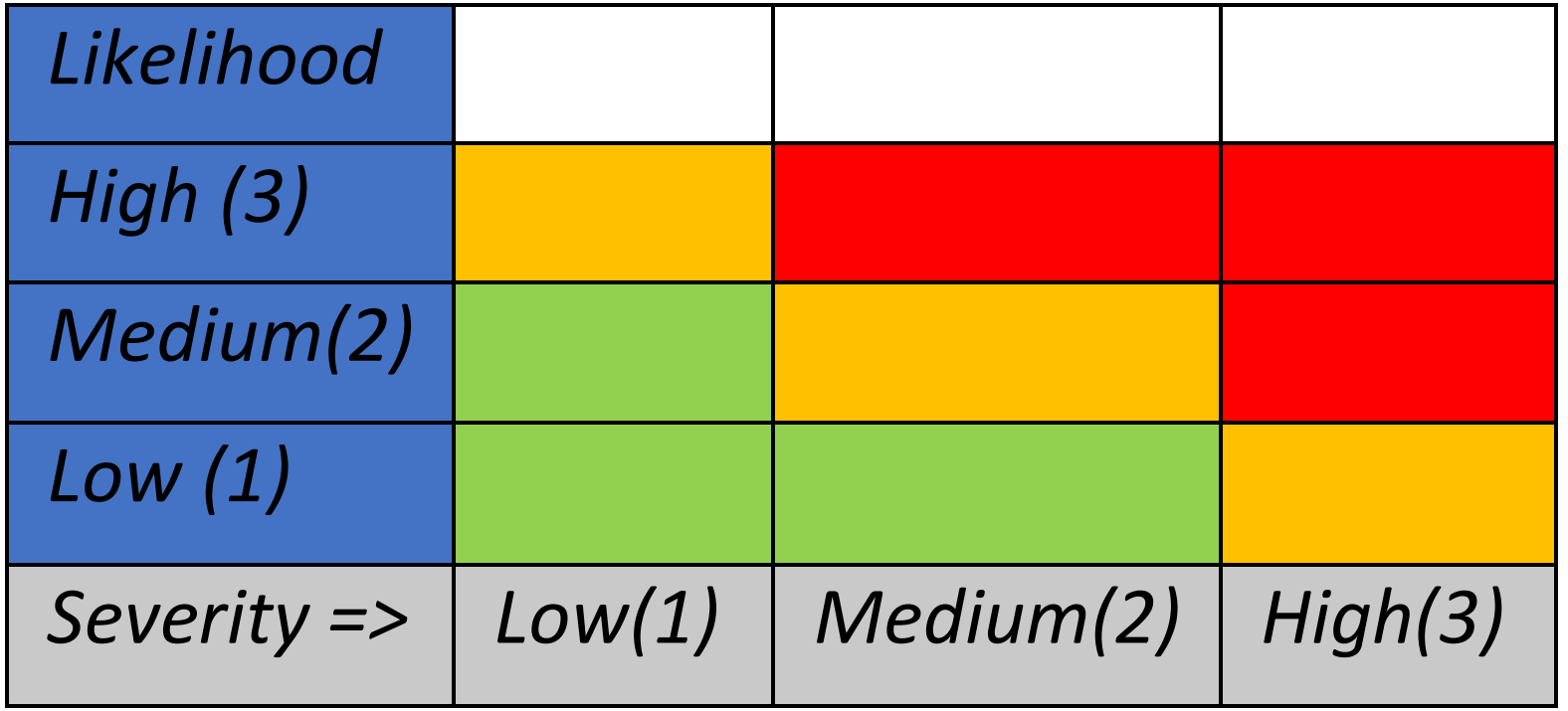
Horizont 2050 .cz



Course of the exercise

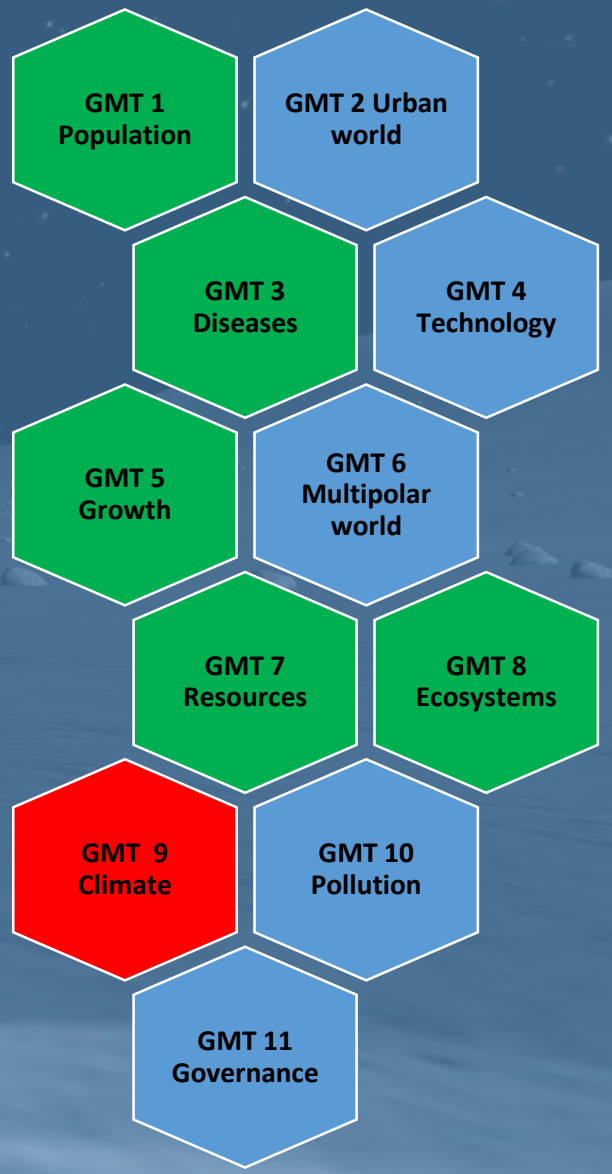
- Verbal introduction of the 30 signals
- Questionnaire filling
- Shortcut assessment
- Questionnaire filling

EU Relevance, MS relevance?



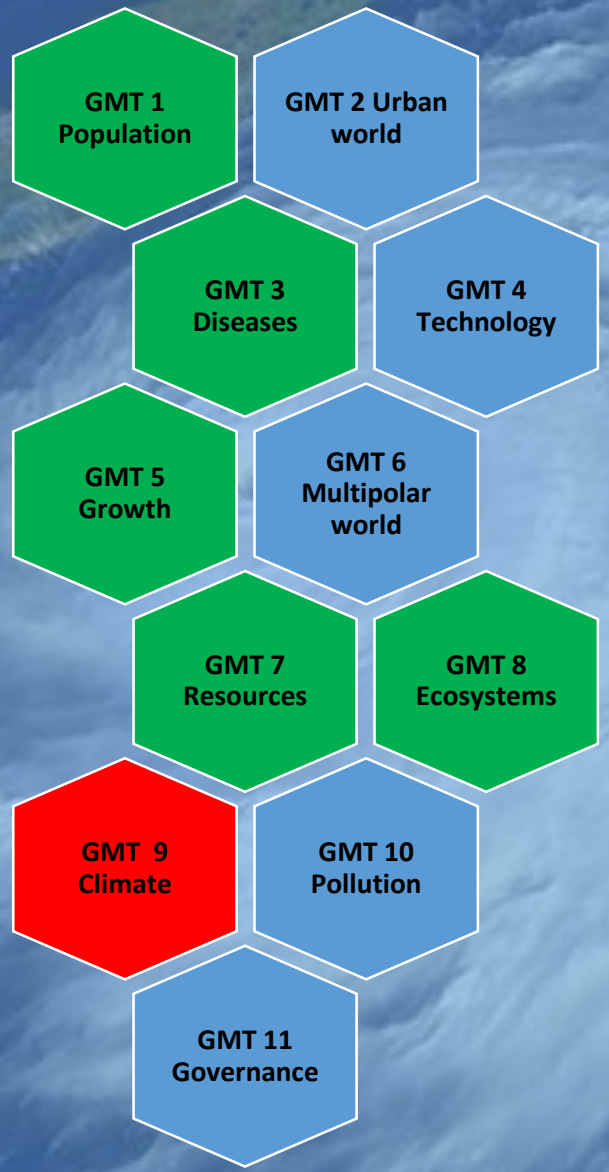
A new space age

Revolution in space travel will start new space age where private companies and corporations will play significant role.



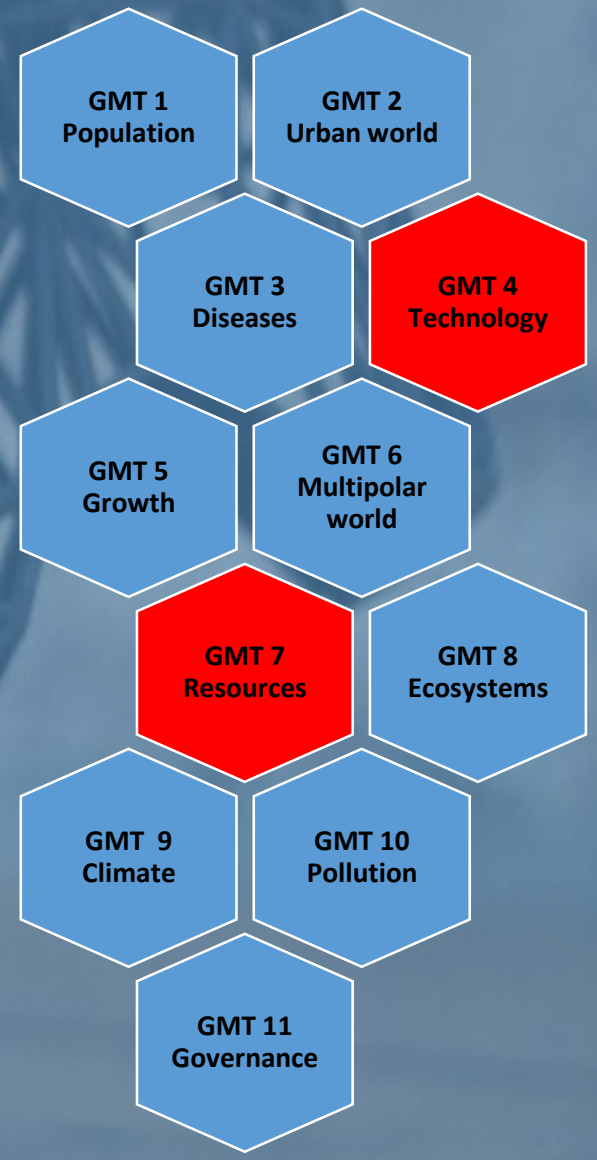
Acceleration of climate change

Climate change or climate change impacts will be much faster than anticipated and significant climate change impacts are not matter of century but matter of a few decades.



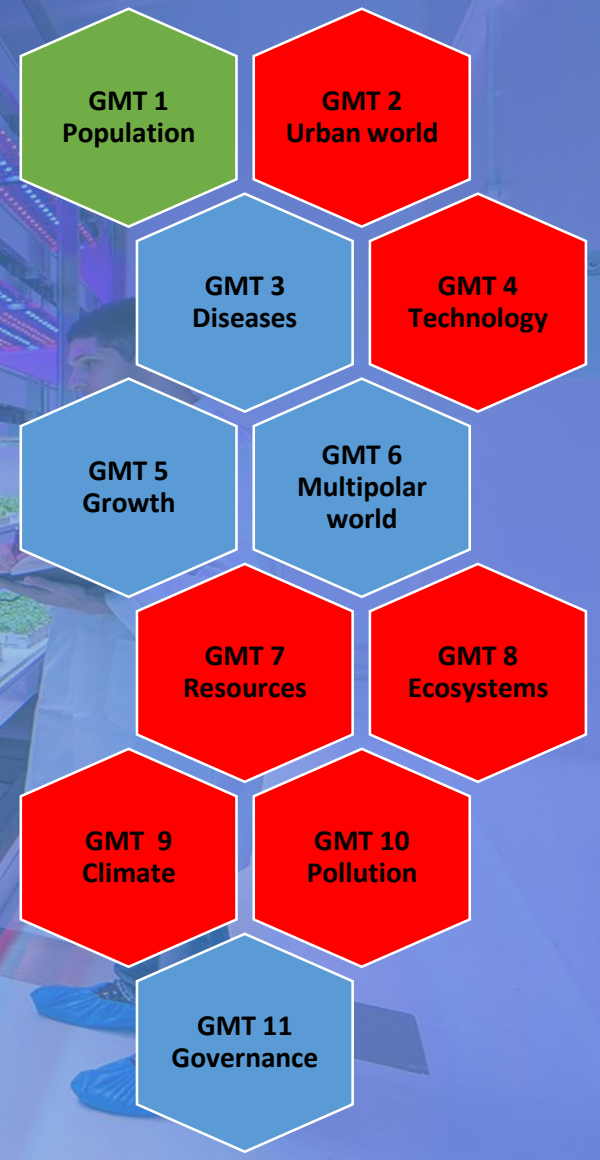
Additive manufacturing in households

Regular use of 3D printing in households will change perception of materials (goods) and services (blueprints) as well as disrupt traditional production-consumption-waste patterns.



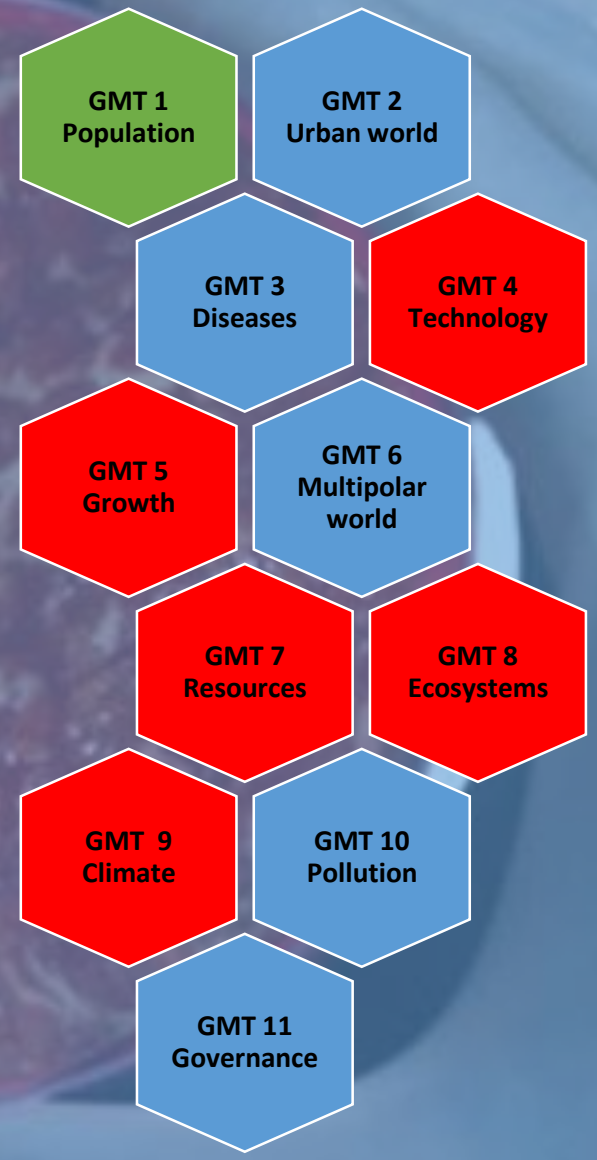
Aquaponics systems

Growing demand of food is met by introducing more aquaponics system of food production while impacting traditional land use and agricultural production and changing consumption patterns.



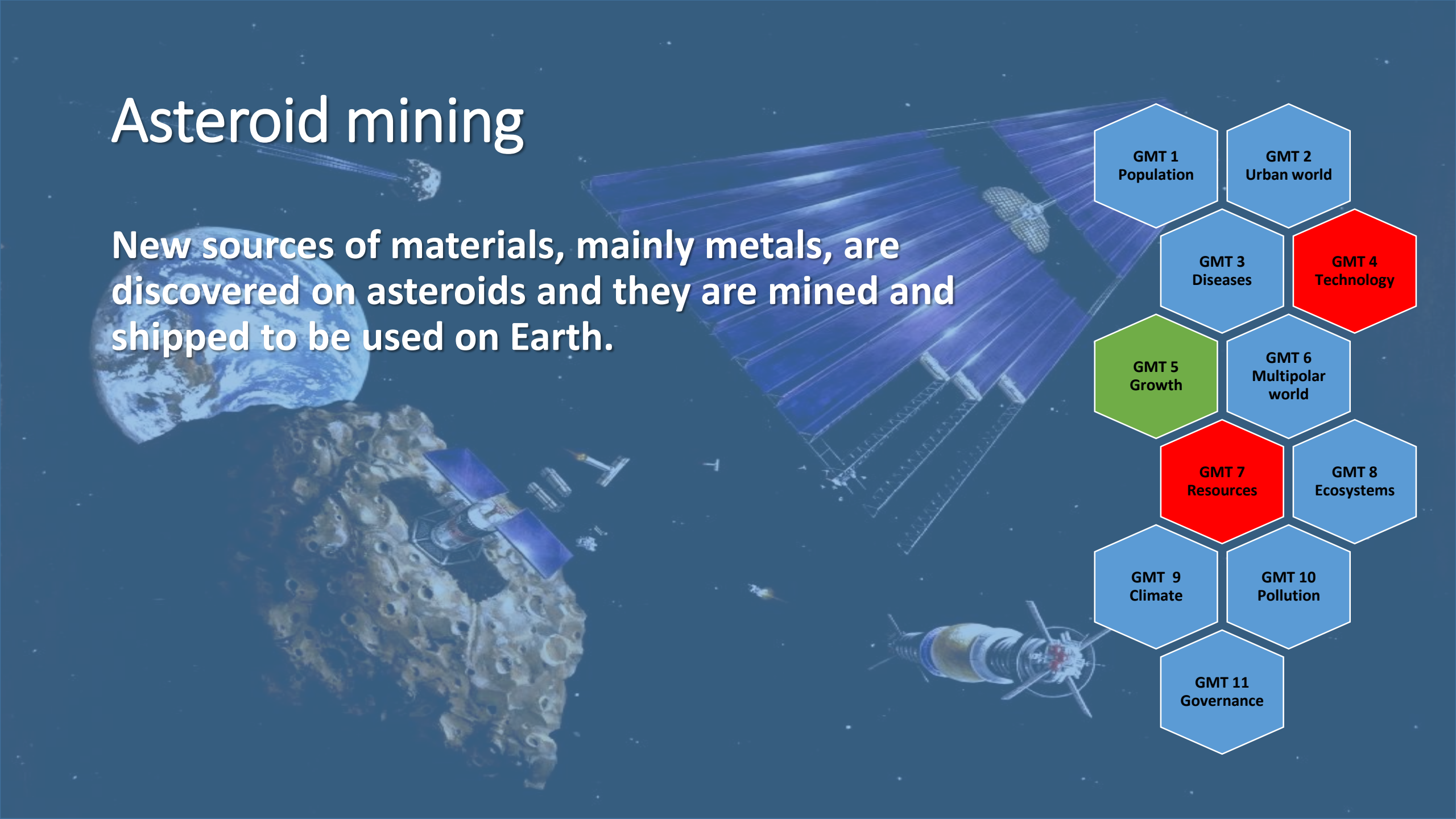
Artificial meat production

Using stem cells or other means for artificial meat production will meet growing meat demand and will change European agricultural landscape and European land use and increase pressure on European farmers.



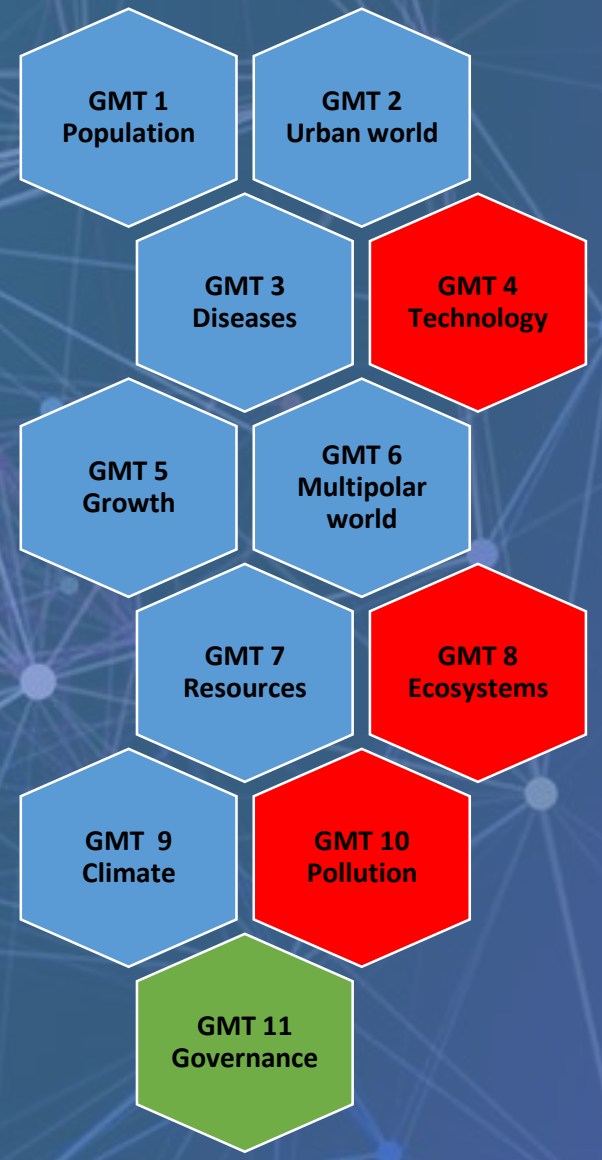
Asteroid mining

New sources of materials, mainly metals, are discovered on asteroids and they are mined and shipped to be used on Earth.



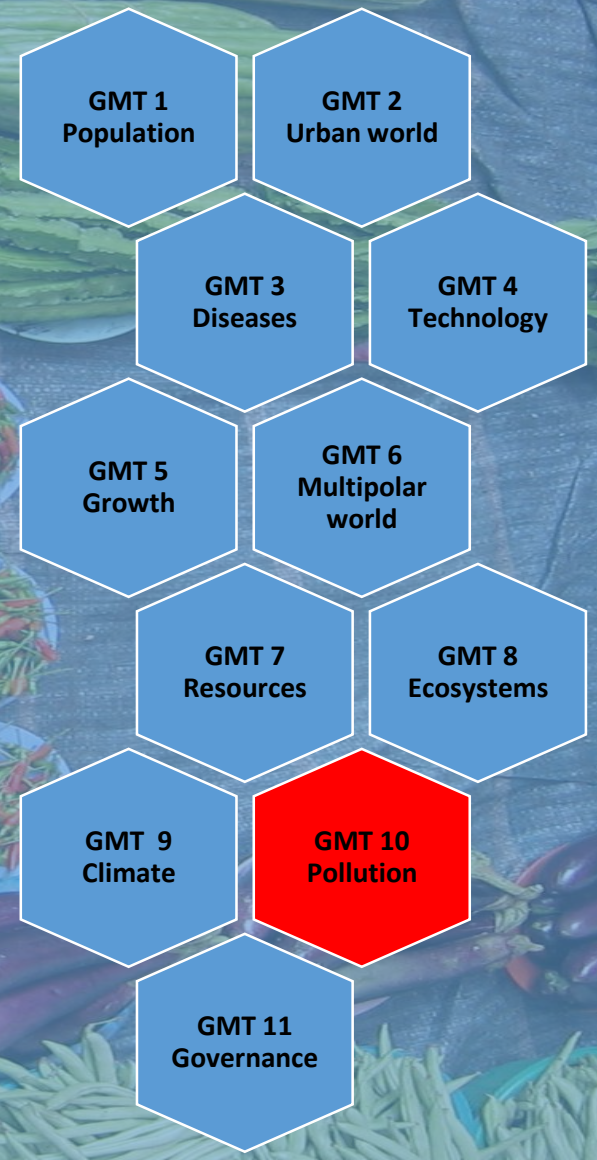
Big data in environmental domain

Use of big data in environmental domain will allow nowcasting and real time prediction of various environmental issues



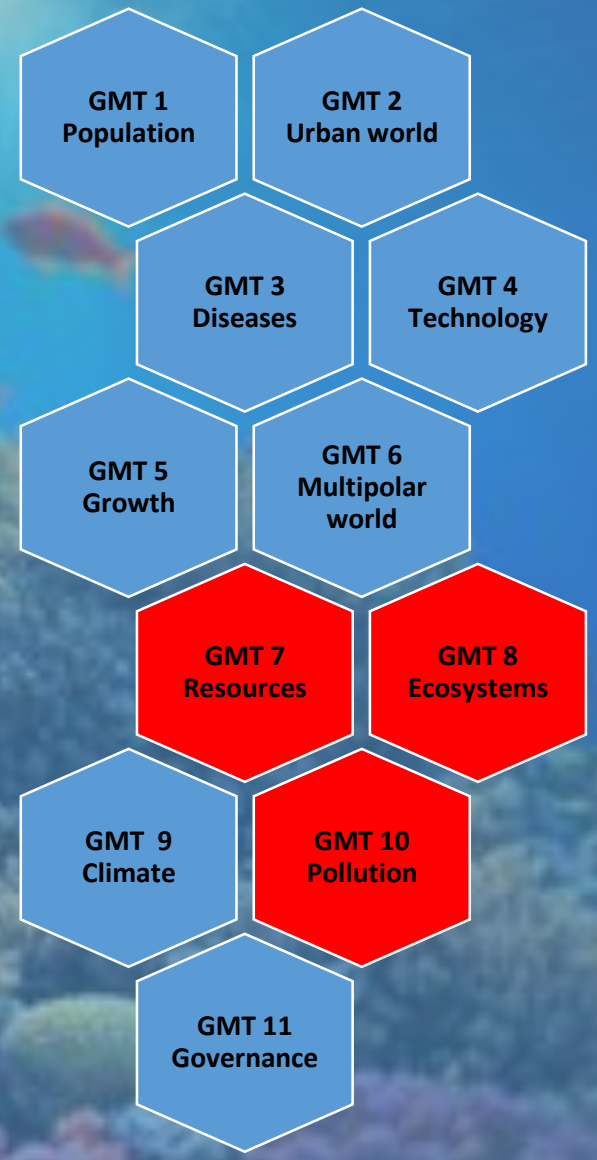
Biofood as a mainstream

Significant part of society will demand biofood as a standard food which will influence European agriculture, land use and environment.



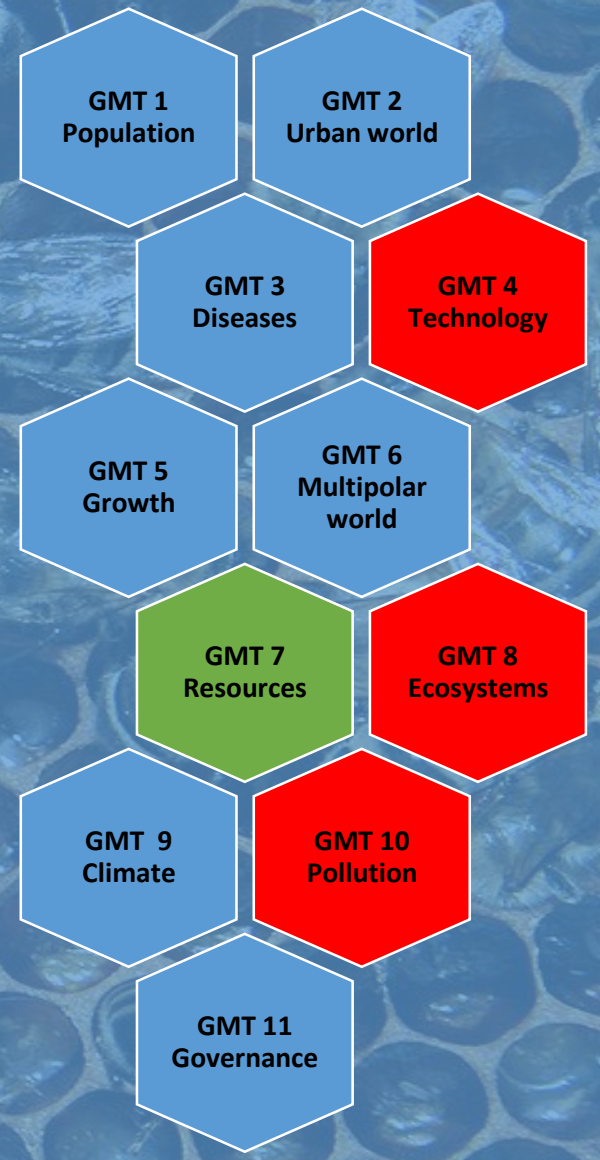
Commercialisation of common ecosystem services

Some currently free ecosystem services will become partially or fully commercialised and will be paid by consumers or by society.



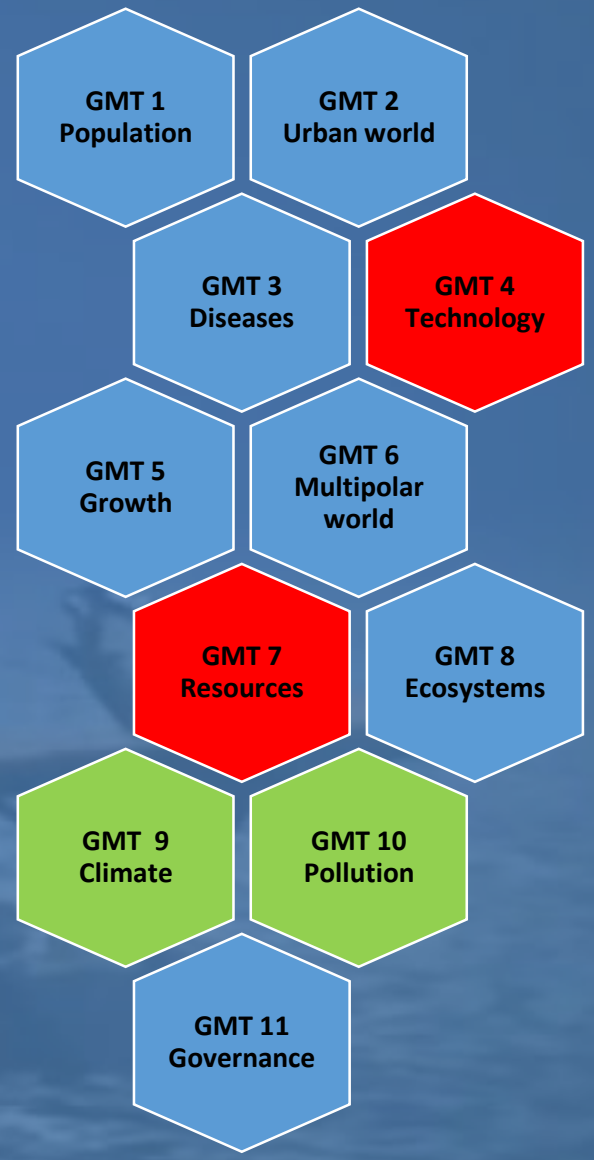
Decline of pollinators in Europe

Considerable decline of pollinators in Europe will cause lower profitability of agricultural crops that are dependent on pollination, reducing the supply of local food and rising prices, leading in possible extreme cases to the food insecurity



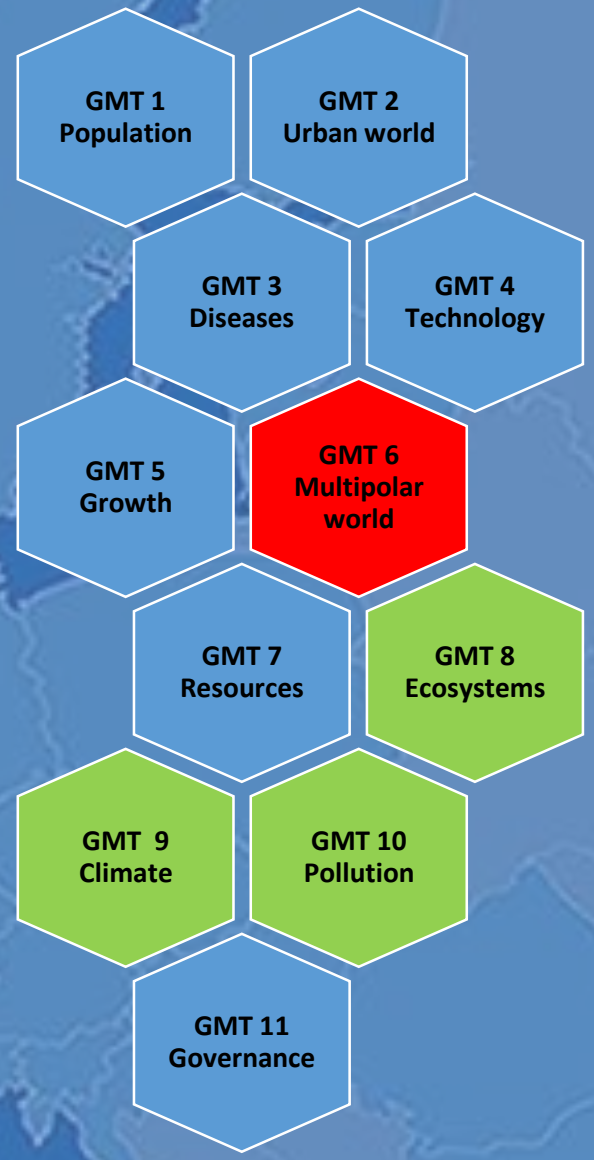
Deep sea mining

Deep sea mining will open new resource stocks for global markets while having impact on climate and marine and terrestrial environment.



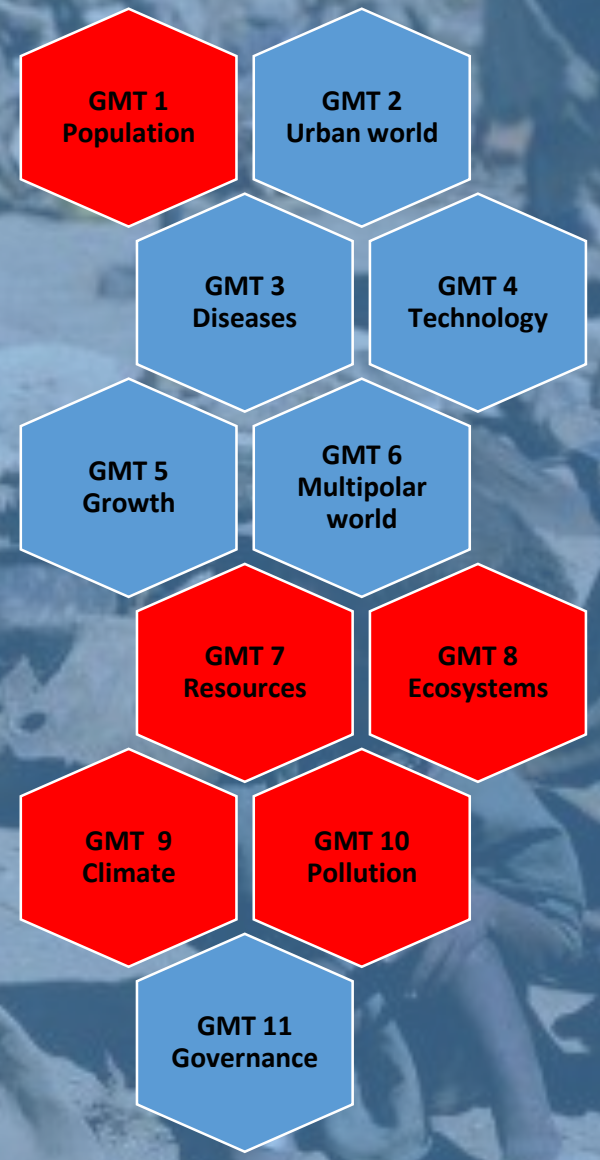
Disappearance of European Union

European union will cease to exist as a result of internal and external forces. There will be global impacts on all aspects of human society including major impacts on global and European environment.



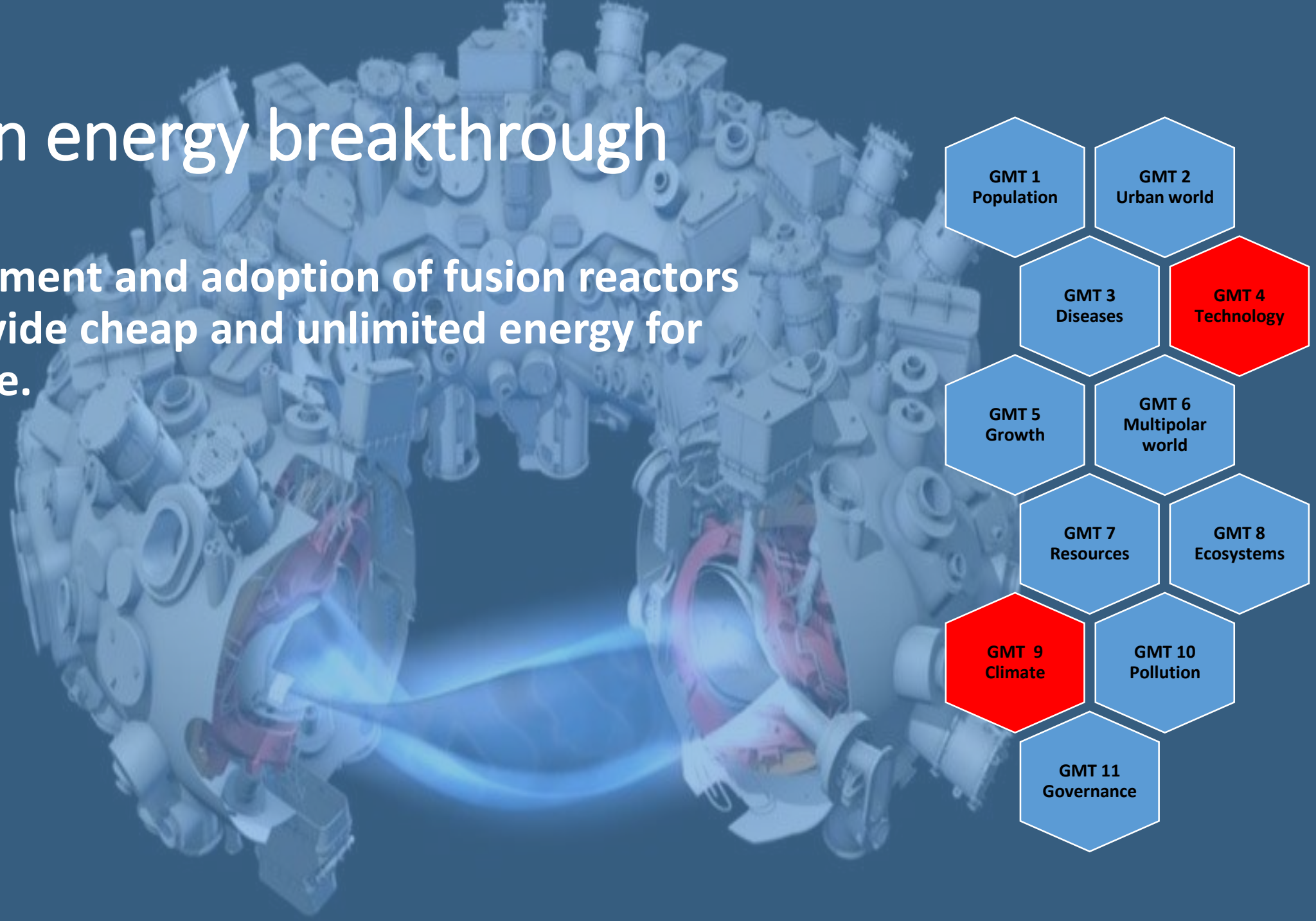
Failure to meet rising demand of food

Due to foreseen and unforeseen events global food demand will be exceeded and it will have impact on European society and environment



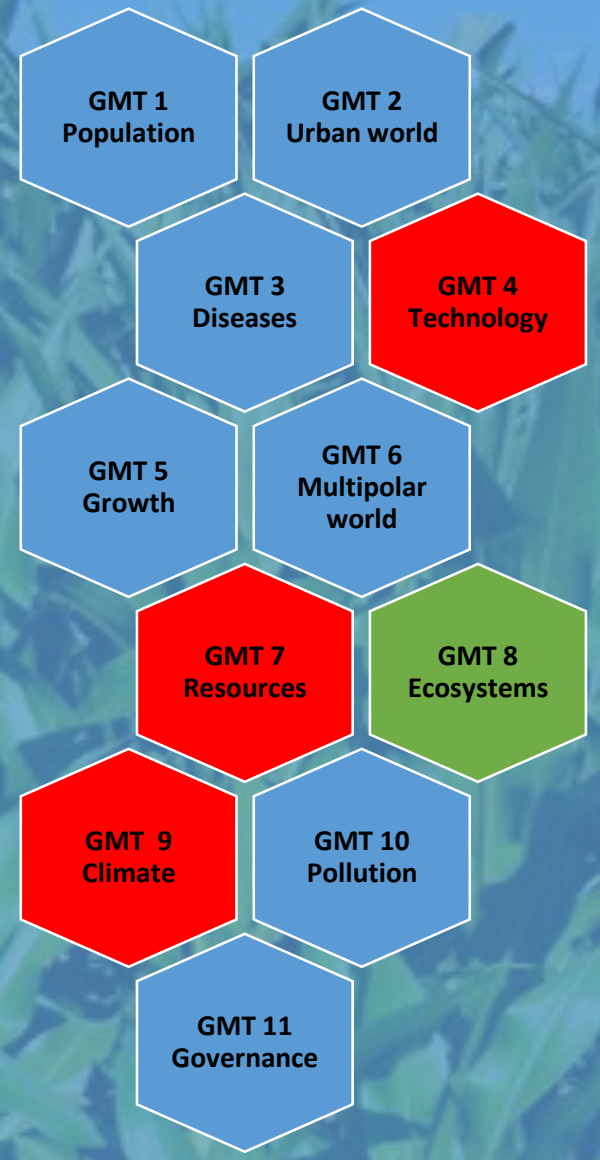
Fusion energy breakthrough

Development and adoption of fusion reactors will provide cheap and unlimited energy for everyone.



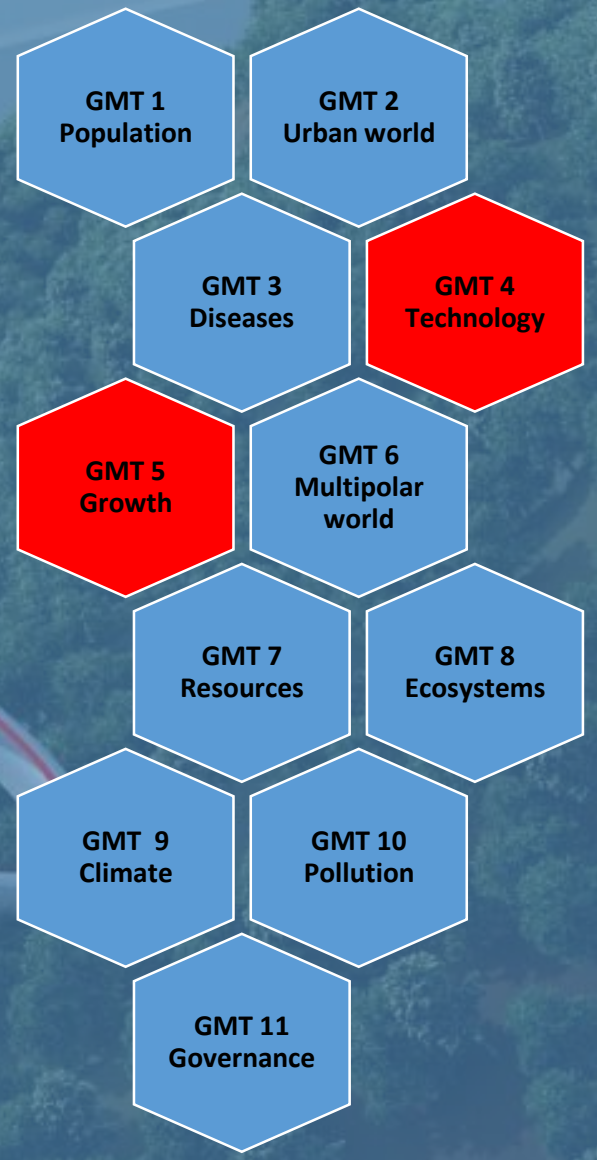
GM changes ecosystem balance

Use of transgenic plants and/or animal species will increase agricultural yield but will have severe consequences on ecosystem stability and ecosystem services



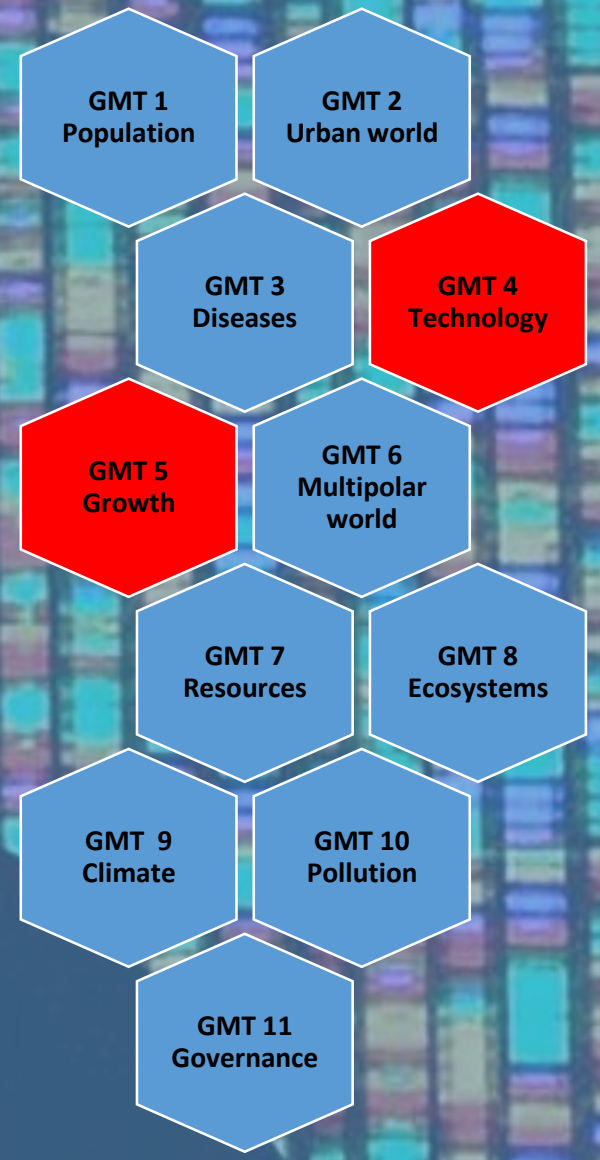
Growth of short range air transport

Technologies allowing parcel and individual air transport will become more widespread and will increase pressure on use of troposphere.



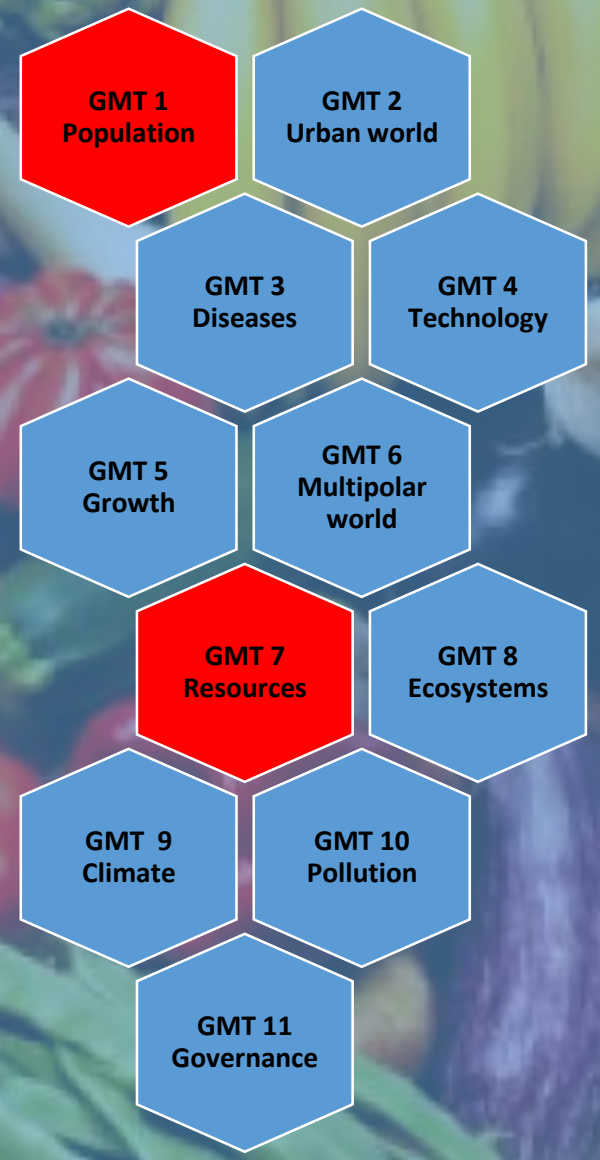
Human genome modification

Genome engineering has never been easier. Controlled and uncontrolled modification of human genome due to CRISPR 2.0 might increase health, lifespan, pollution and disease resistance of European population while posing unknown challenges to the society



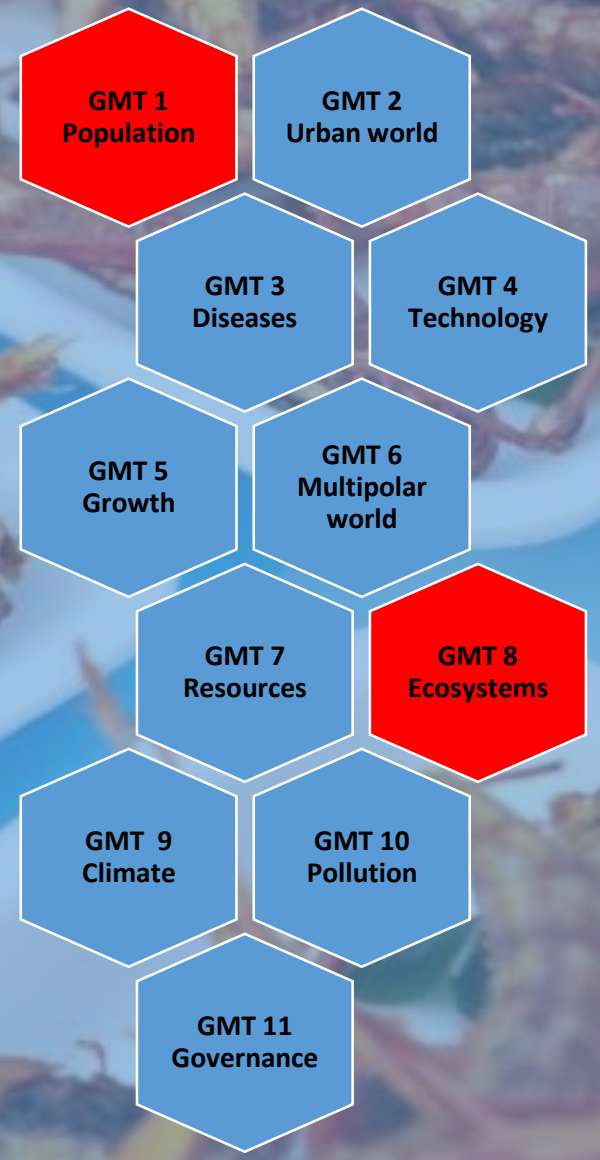
Increase of vegetarians and vegans

Mainstreaming of vegetarianism and veganism will have impact on traditional agricultural production



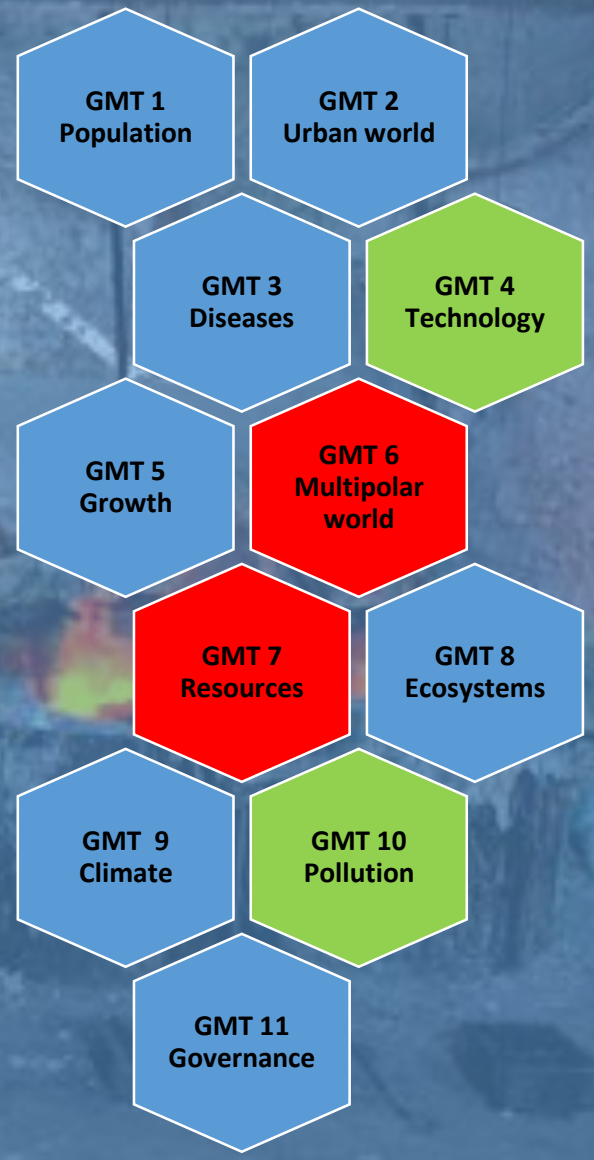
Insect as a source of food in Europe

Entomofagia (direct consumption of insect) as a new direction of food consumption becomes popular in the Europe. Alternatively insect will be used as a source of proteins for agricultural production.



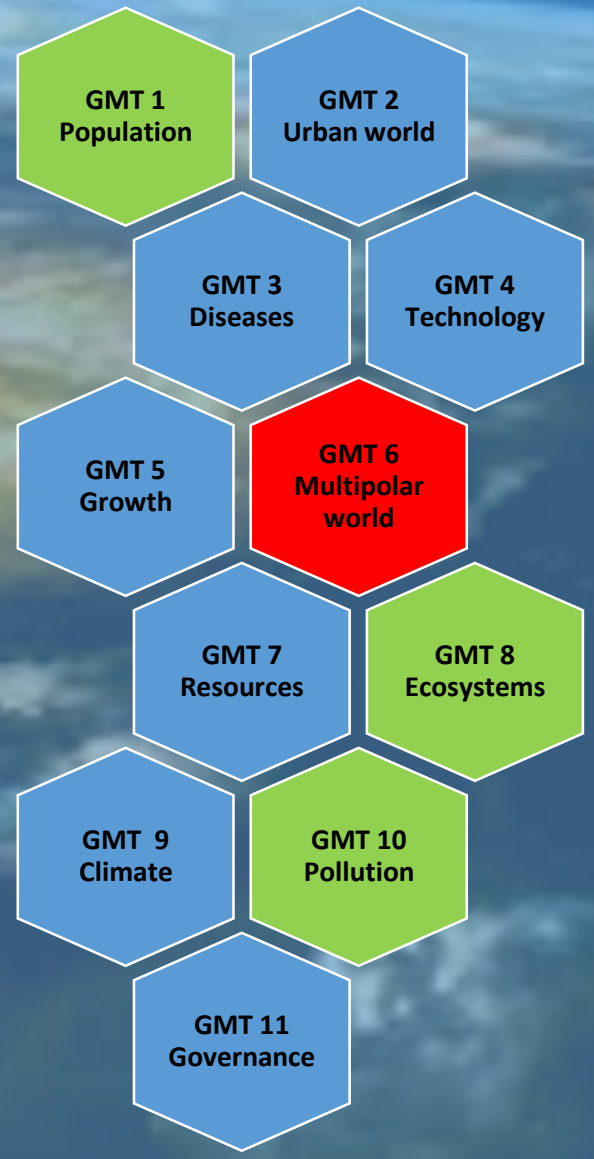
Lack of rare earth metals

Growing demand of rare earth metals and other scarce materials will endanger development of smart society and low carbon or green economy



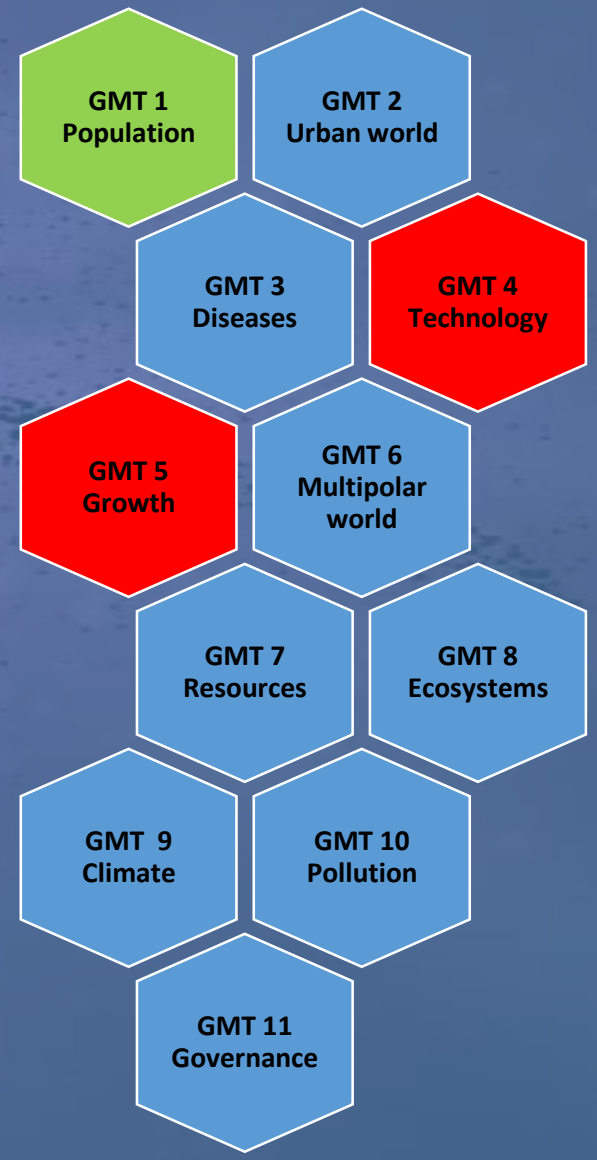
Limited nuclear exchange

Due to increasing growing pressure in geopolitical scene limited nuclear exchange between nuclear powers will influence all manners of human life



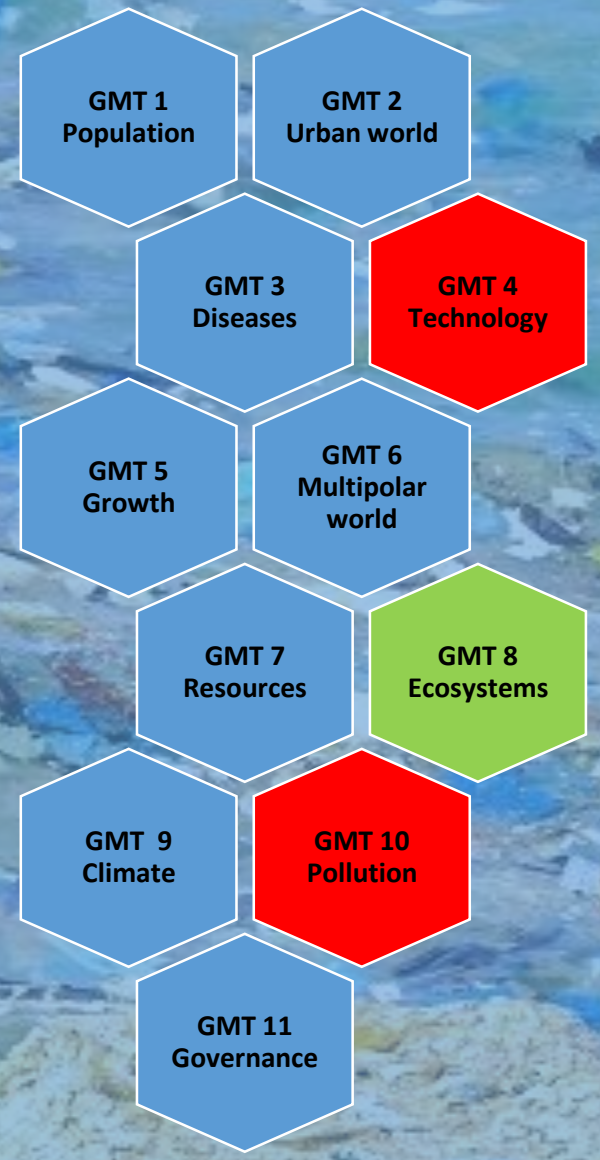
Longevity and clinical immortality

Prolonging human life beyond its normal lengths will pose challenge on social, economic, cultural and environmental pillars of human society.



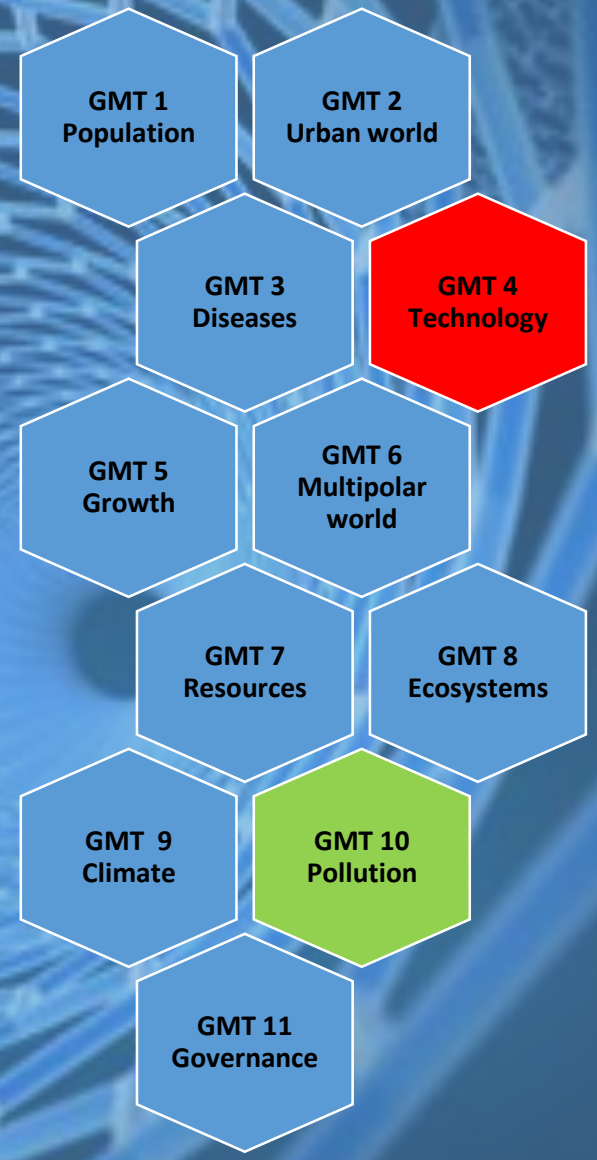
Marine micro-plastic pollution

Micro-plastic pollution of marine ecosystems will degrade marine ecosystem stability to the point where they fail produce some goods and services for the global population.



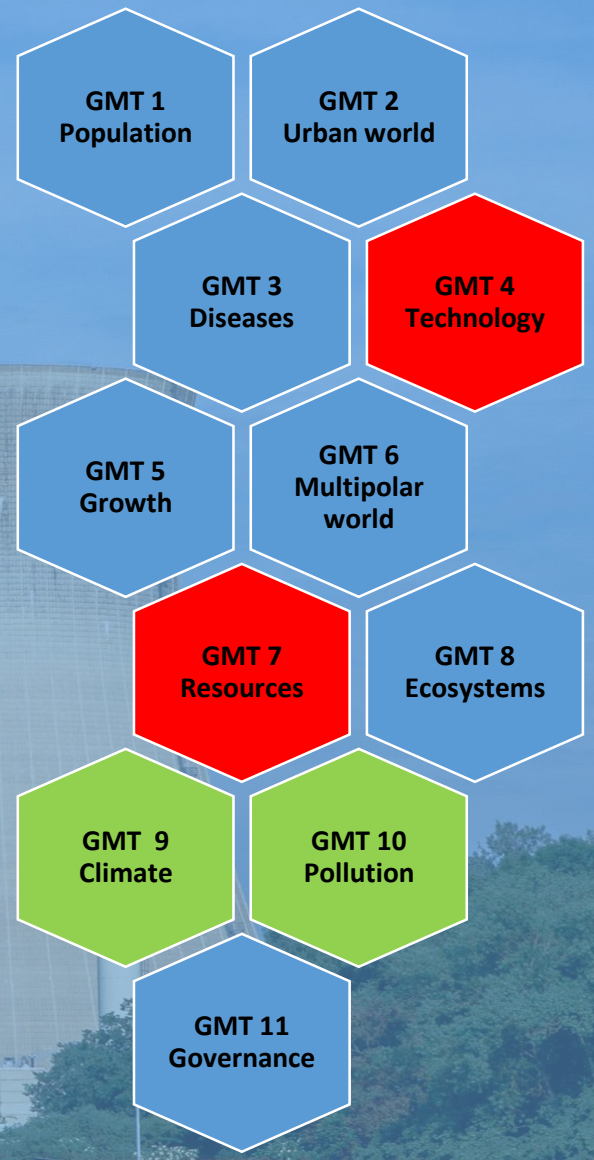
Nanomaterials in environment

Increasing use of industrial nanomaterials by population and industry will various unexpected negative effects on the environment.



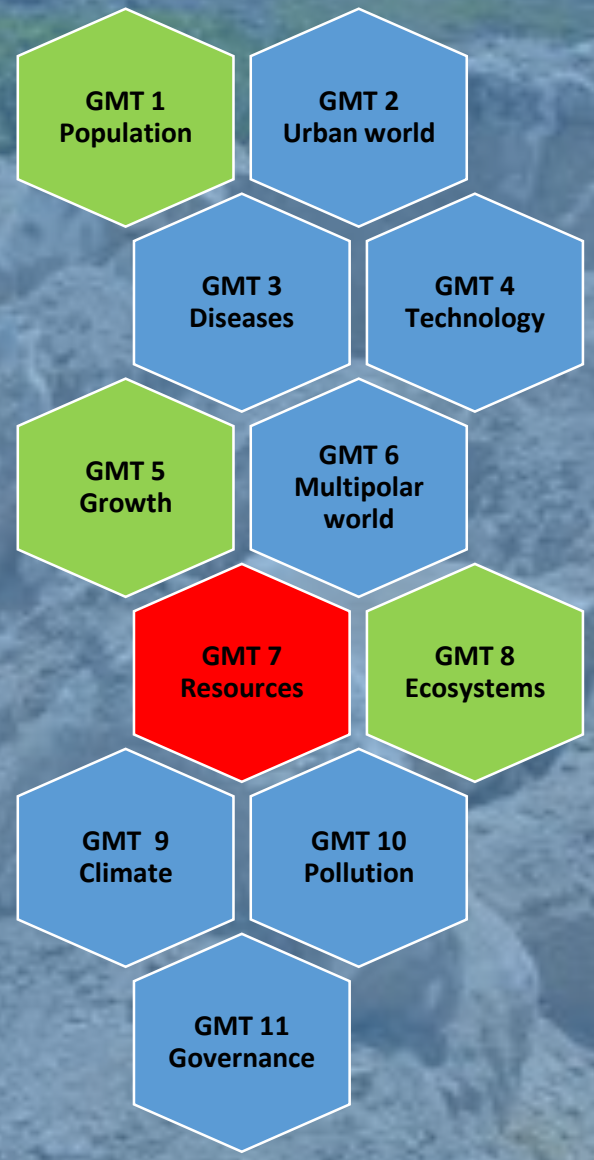
Nuclear energy renaissance

Development and adoption of fourth generation of nuclear reactors will spark worldwide nuclear renaissance and will affect transition to renewable energy society



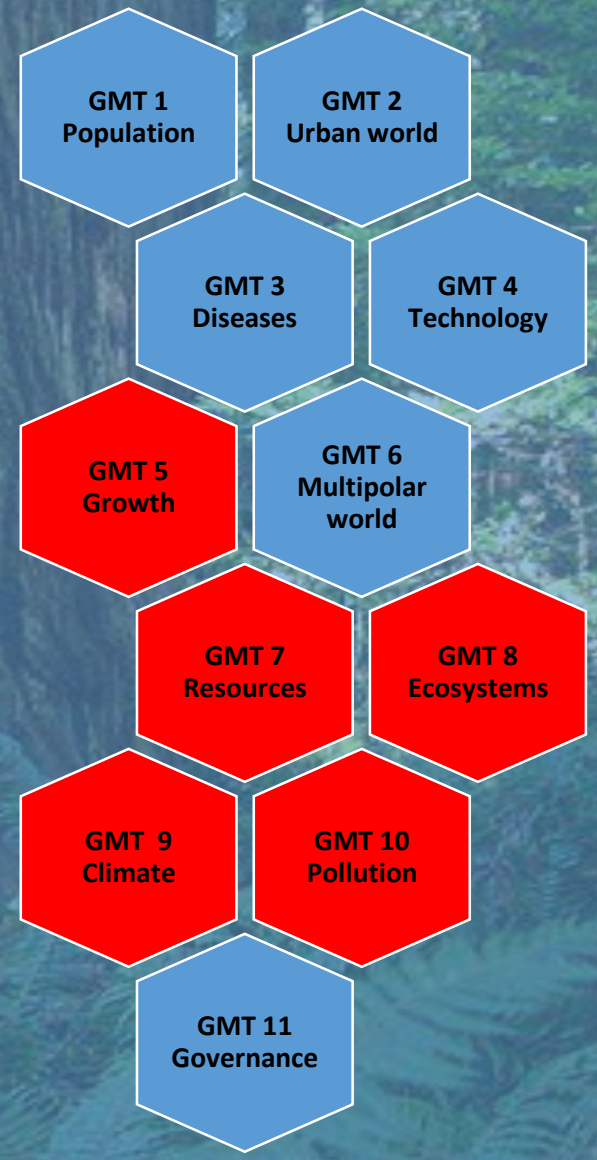
Peak phosphorus

Lack of phosphorus due to growing demand and decreasing reserves will lead to decrease of agricultural production and failure to meet global demand of food supply.



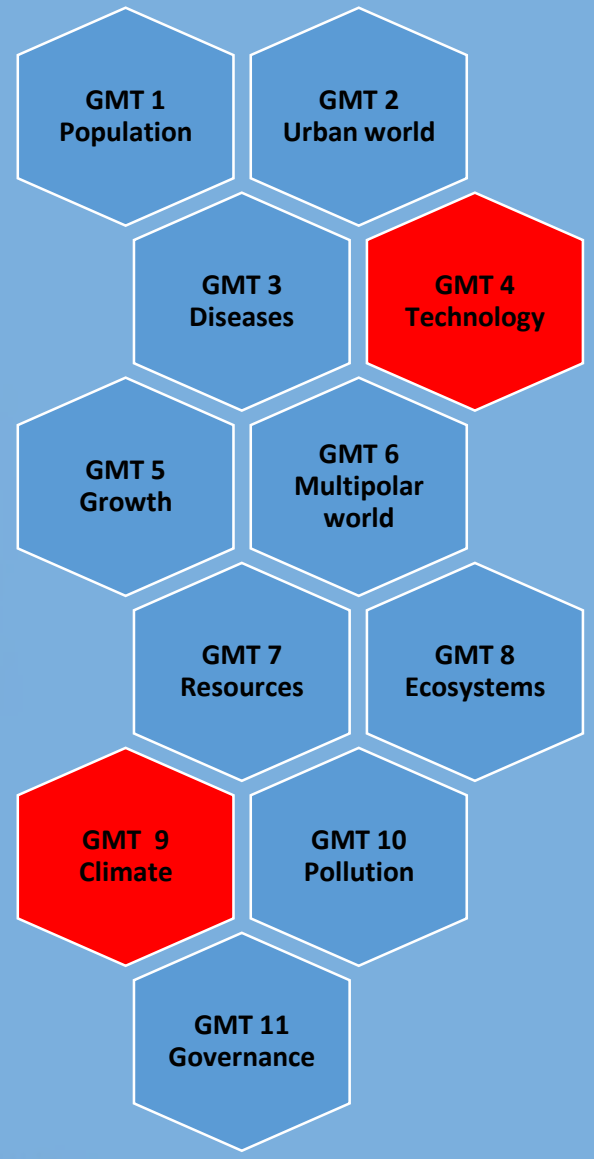
Rise of Eco-religion

Shift from traditional religion to more eco-friendly faiths (e.g. neopaganism, mother earth cult etc.) will disrupt traditional political and cultural patterns.



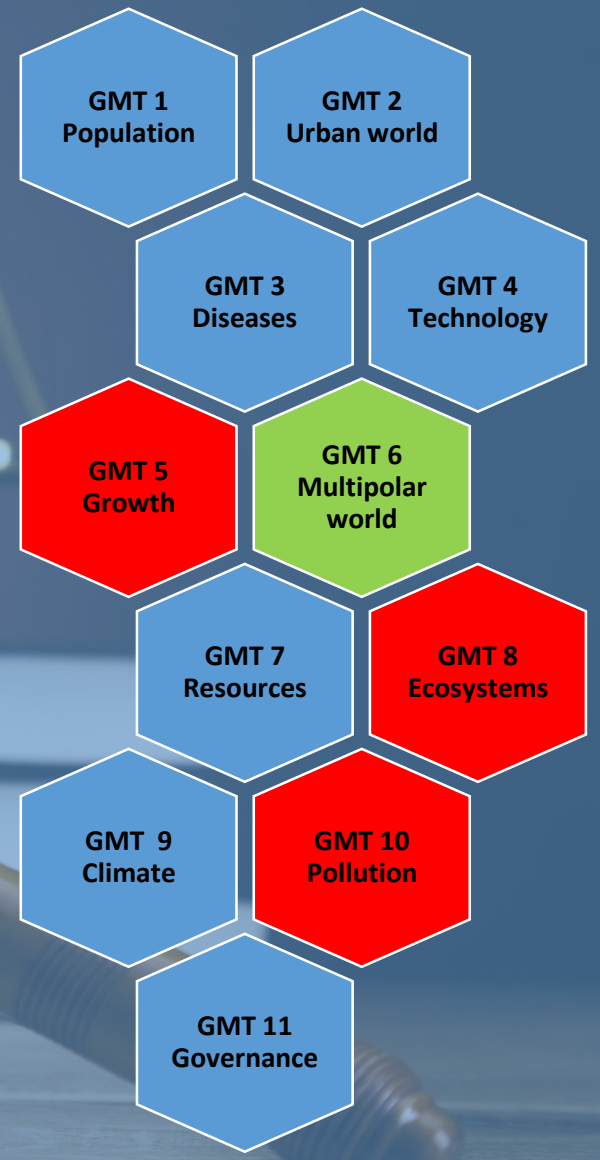
Rogue geoengineering

Growing popularity of geoengineering option to tackle climate change will bring applications that are either unilaterally beneficial or through currently unknown cascade of causality will aggravate climate change impacts.



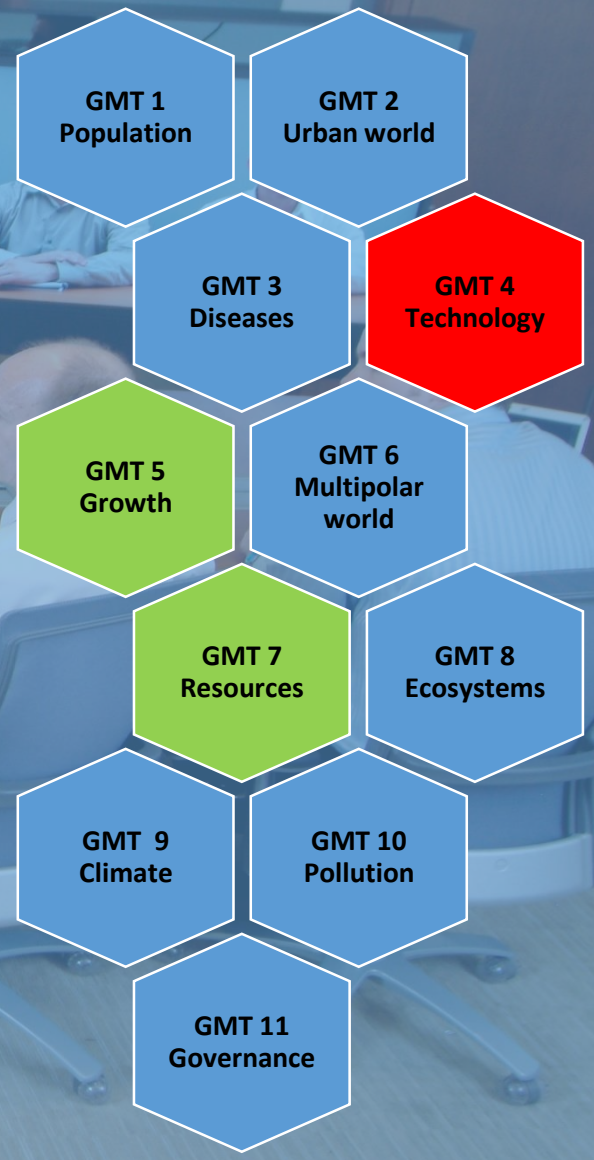
Severe pollution of the environment (Ecocide) becomes international crime

Ecocide recognition as an international crime against peace will allow for the legal enforceability of activity grossly detrimental to the environment regardless of the border or legal status.



Virtual presence

Adoption of various IT solutions will significantly reduce demand for business and work related travel impacting transport sector as well as the environment.



Results

No	Signal name	Likelihood	Severity
		Europe perspective	
23	Marine micro-plastic pollution	2,67	2,67
2	Acceleration of climate change	2,40	2,60
10	Decline of pollinators in Europe	2,67	2,33
24	Nanomaterials in environment	2,33	2,67
25	Nuclear energy renaissance	2,33	2,50
20	Lack of rare earth metals	2,17	2,67
4	Hydroponics systems	2,33	2,33
17	Human genome modification	2,33	2,33
16	Growth of short range air transport	2,67	2,00
3	Additive manufacturing in households	2,67	1,83
7	Big data in environmental domain	2,67	1,83
13	Failure to meet rising demand of food	2,33	2,00
29	Ecocida as an international crime	2,33	2,00
15	GM changes ecosystem balance	2,00	2,33
11	Deep sea mining	2,17	2,00
12	Disappearance of European Union	1,50	2,83
9	Commercialisation of common ecosystem services	1,67	2,50
18	Increase of vegetarians and vegans	1,67	2,50
21	Limited nuclear exchange	1,60	2,60
22	Longevity and clinical immortality	2,00	2,00
26	Peak phosphorus	2,17	1,83
28	Rogue geoengineering	1,33	2,83
8	Bio-food as a mainstream food	1,50	2,33
1	A new space age	1,67	2,00
14	Fusion energy breakthrough	1,17	2,67
5	Artificial meat production	1,67	1,83
19	Insect as a source of food in Europe	1,50	2,00
30	Virtual presence	2,00	1,33
27	Rise of Eco-religion	1,33	1,67
6	Asteroid mining	1,50	1,33