

Bio-Commons

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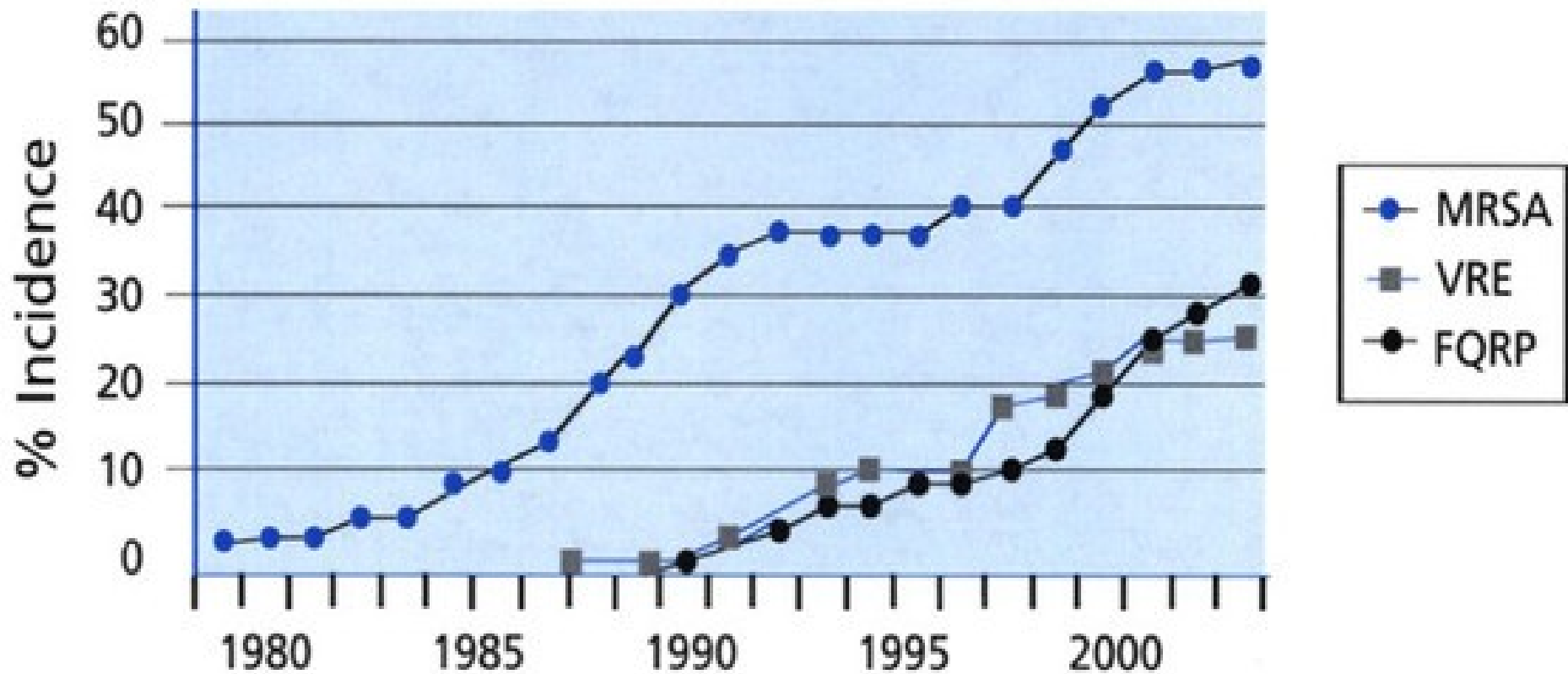
Bio-Commons

Common goods are not owned by individuals and allow for the use by everyone

Tragedy of the Commons

Individuals, acting to each one's self-interest, behave contrary to the whole group's long-term best interests by depleting

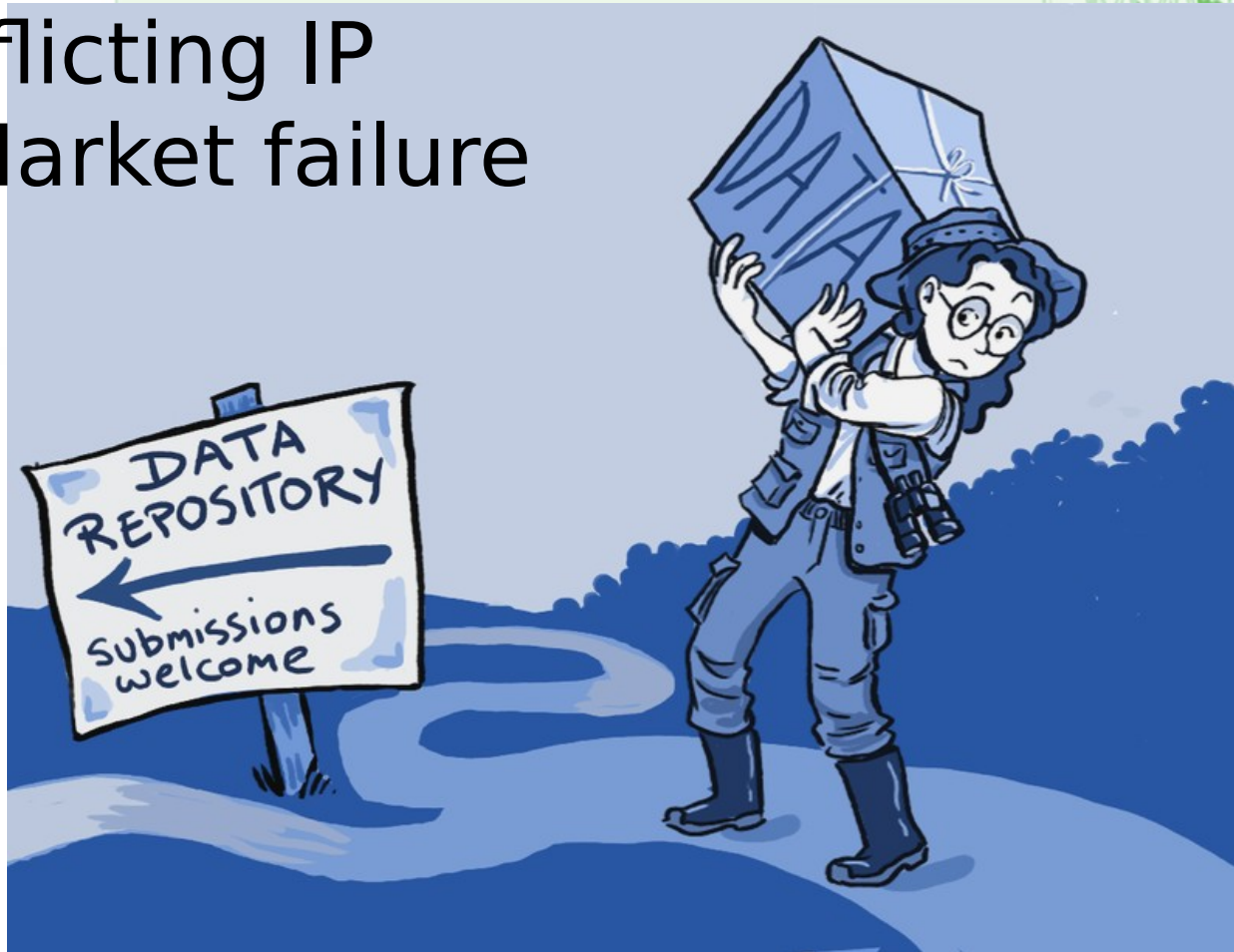
Tragedy of the Commons



MRSA = methicillin-resistant *Staphylococcus aureus*; VRE = Vancomycin-resistant enterococci
FQRP = Fluoroquinolone-resistant *Pseudomonas aeruginosa*

Tragedy of the Anti-Commons

- conflicting IP
 - Market failure



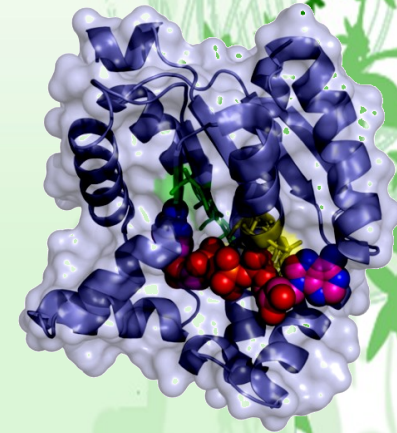
Tragedy of the Anticommons



**Digital
Biology**



**Material
dualism**



**Analog
Biology**



vs.



The background features a light green gradient with decorative floral silhouettes in various shades of green. A horizontal dotted line is positioned near the top of the page.

**Comments and
suggestions
welcome!**

**Thanks for
listening.**

Tragedy of the Commons & Anticommons



Biosphere
% vascular plant biodiversity change

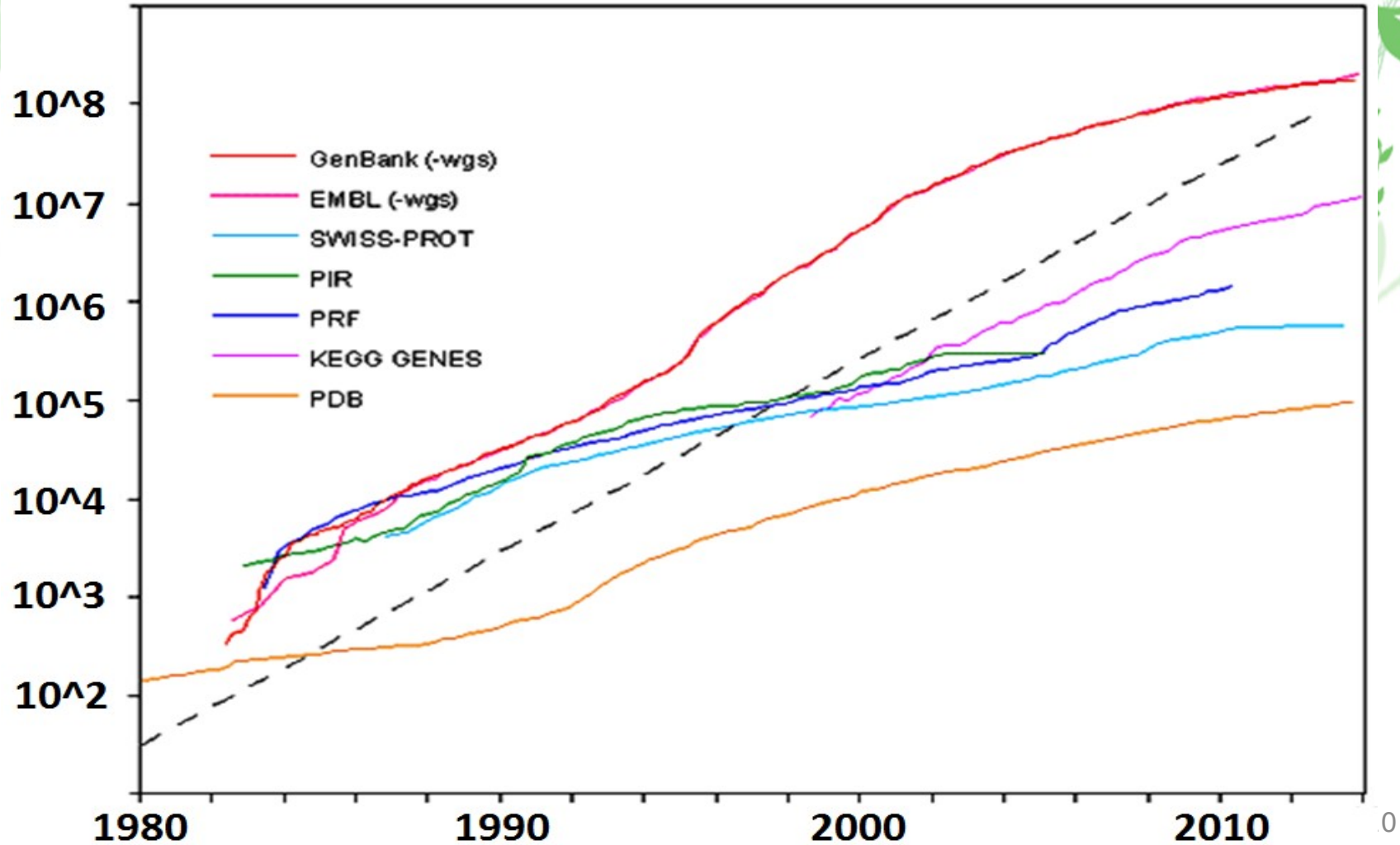
Bio-Language

AGTC

ATGCGTGCCTAGCCTGCGGATCGGCATTCGCGATCGCGCC
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CACGTCAGTCAGTAGTCAGTACTGACTACGTGTACTTTTTG
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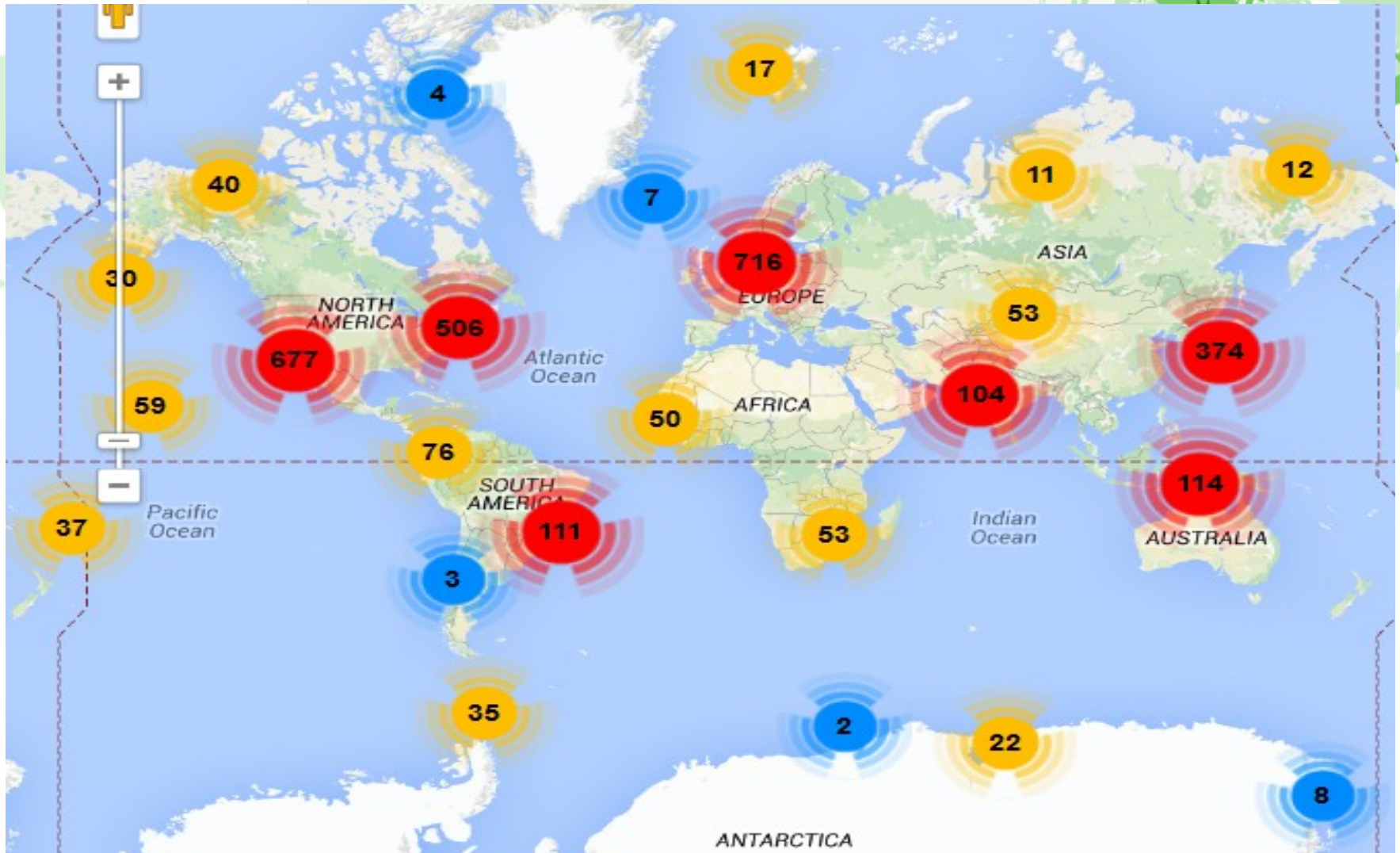
Bio-Databases

Databases



Bio-Databases

Databas
es



GOLD-Datenbank

Bio-Commons

Fixing the tragedy of the commons and
anticommons
requires a new legal mechanisms

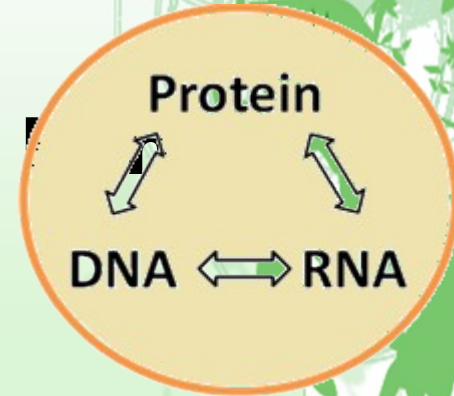


WIKIPEDIA
Die freie Enzyklopädie



Bio-Commons

A Bio-commons IP model to digital and analog biology



- allow for viral growth
- decentral collaboration
- gradual development / deviation of licences
- Encompass minimal marginal costs

Bio-Commons

AGTC

Bio-
Language



Bio-
Legislation

Databa
ses

Bio-
Commons
License

Bio-Ethics



First CRISPR-Tinkered Primates Born

Cell 30.01.2014

Bio-Commons

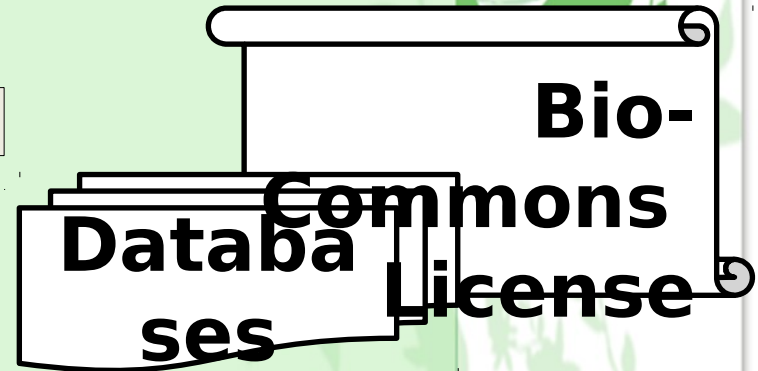
AGTC

Bio-
Language

Bio-
Ethics



Bio-
Legislation

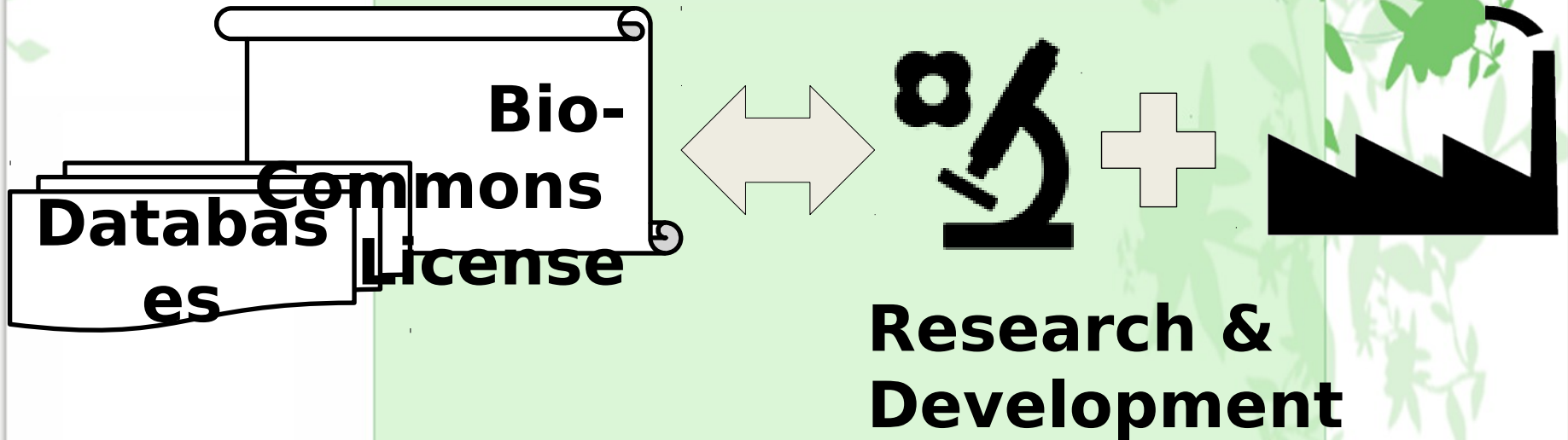


coupled to ethic guidelines

→ democratic decision making

→ Pacifist commitment of biotech

„Viral“ Bio-Commons



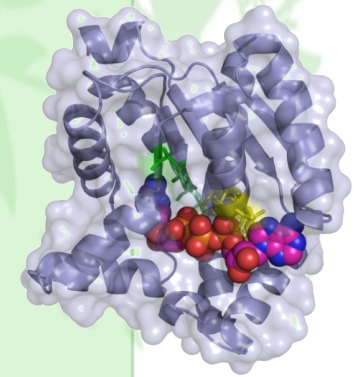
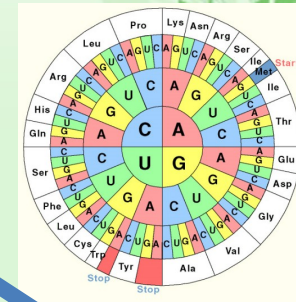
Bio-Commons management

- Avoid tragedy of the commons
- Whitelist for species and parts
 - Global standardisation
- Environmental release
 - Crowd sourced review of genetic designs prior release
- Private and public data
 - Open source and encrypted data handling
- *qualitative* Data
- *quantitative* Data
 - online monitoring of biosphere

Bio-Commons management

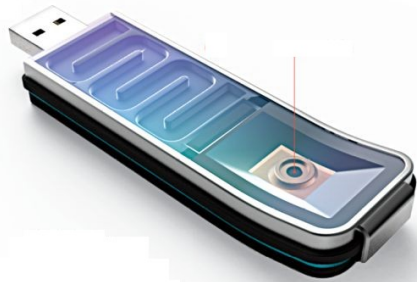
- Who governs the data and how?
- Which conditions for release of organism?
- Responsibility and Anonymity?
- Ethical reference system?
- Divisive line between fact and value based Bio-Commons?
- Legislation and ownership of biological material?

Digital Biology



Noosphere Creative Plasticity Biosphere

Digital biology



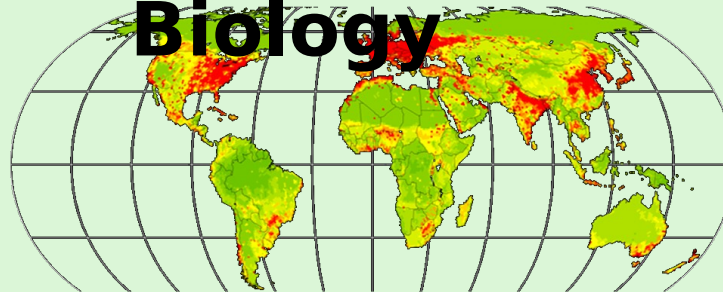
**Nanopore
Sequenci
ng**



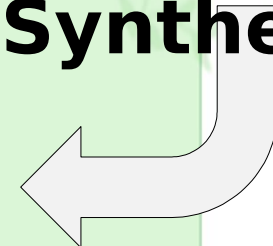
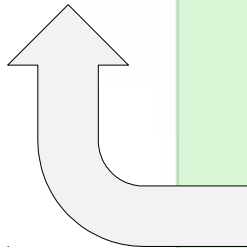
**Digital
Biology**

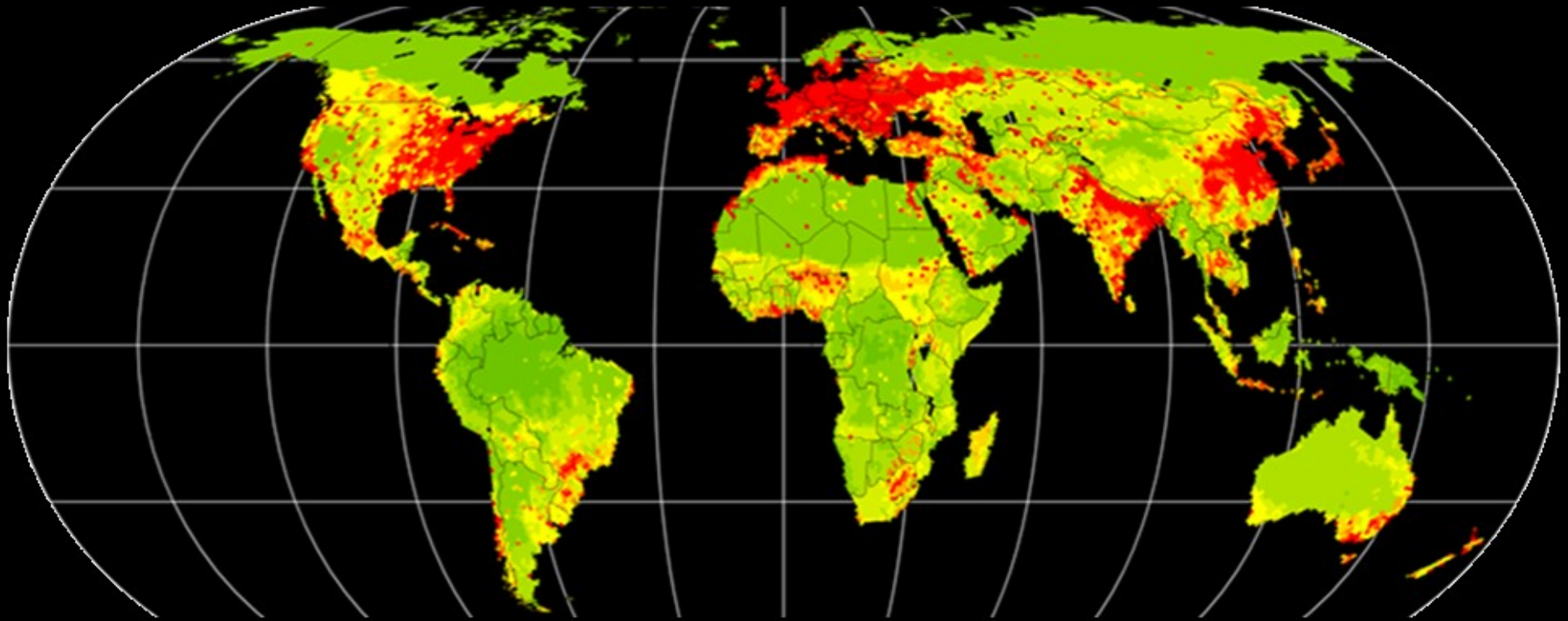
AGTC

**Analog
Biology**



**Microflui
dics
Synthesis**



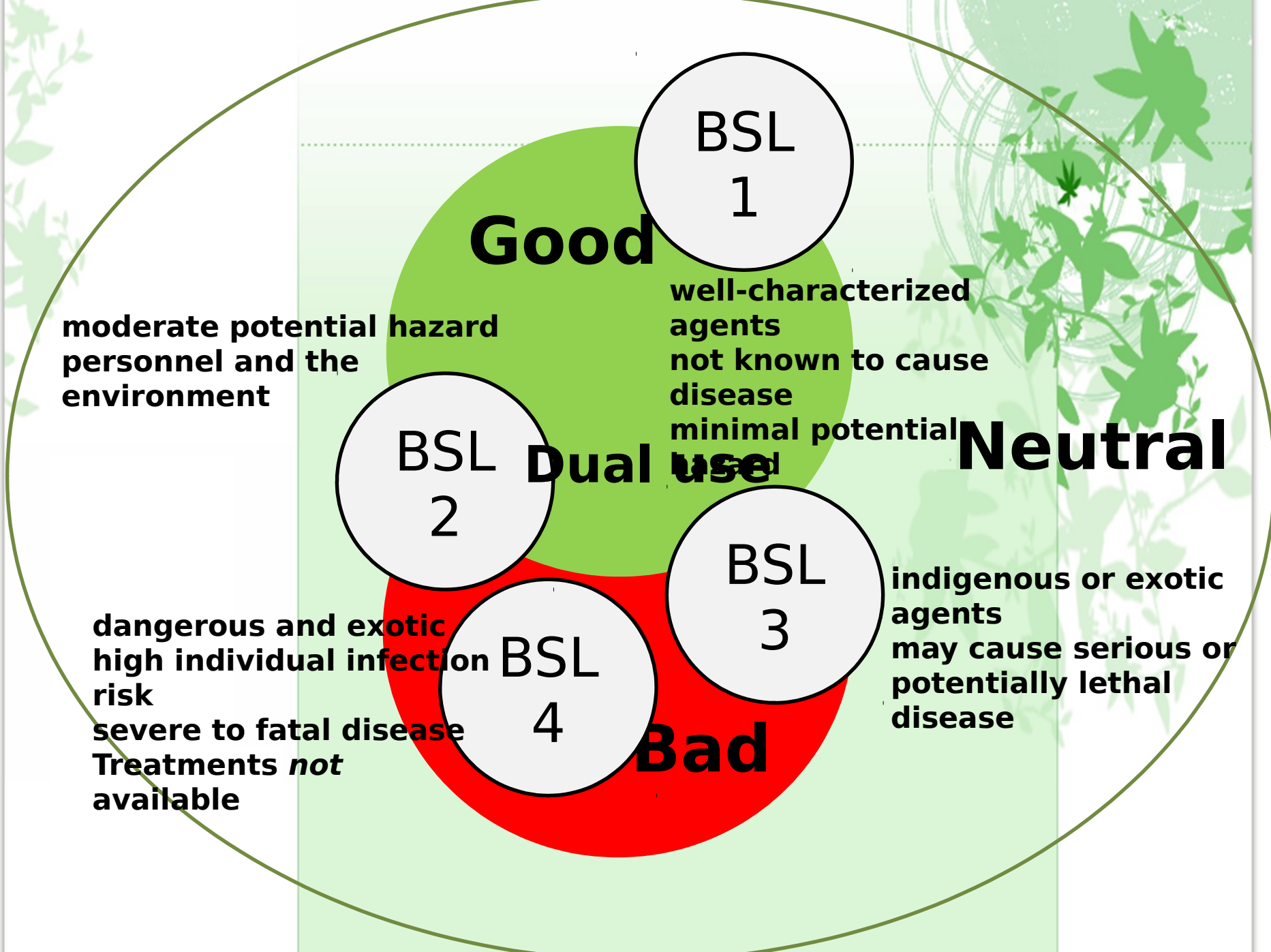


Analog Biosphere



© Facebook

Digital biosphere



**BSL
1**

Good

well-characterized
agents
not known to cause
disease
minimal potential
hazard

moderate potential hazard
personnel and the
environment

**BSL
2**

Dual use

Neutral

**BSL
3**

indigenous or exotic
agents
may cause serious or
potentially lethal
disease

dangerous and exotic
high individual infection
risk
severe to fatal disease
Treatments *not*
available

**BSL
4**

Bad

Neutral

BSL

well-characterized
agents
not known to cause
disease
minimal potential
hazard

moderate potential
hazard

Human

BSL
2

personnel and the
indigenous or exotic
environment
agents

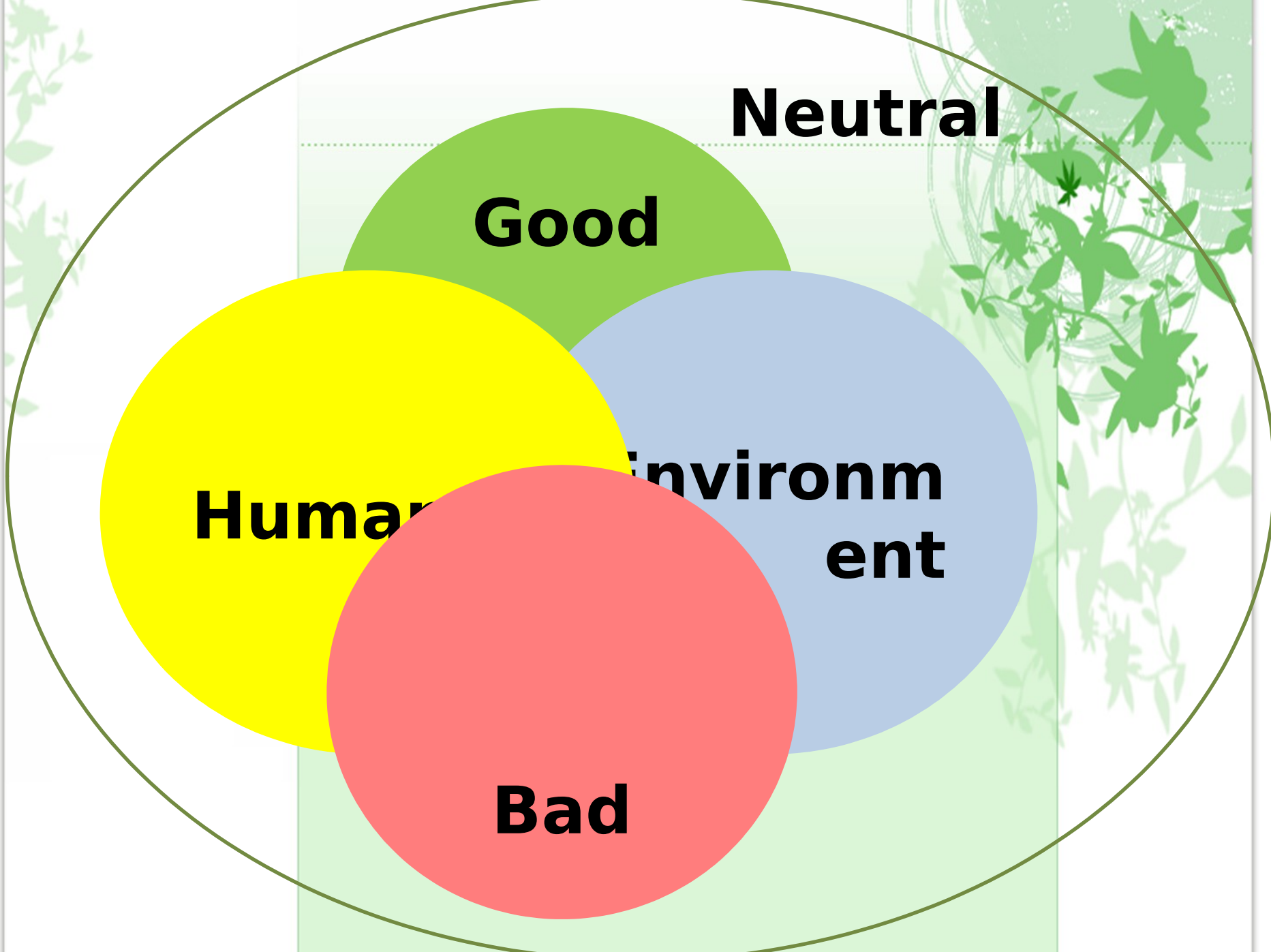
BSL
3

may cause serious or
potentially lethal
dangerous and exotic
disease
high individual infection
risk

BSL
4

Bad

severe to fatal disease
Treatments *not*
available



Neutral

Good

Human

Environment

Bad

well-characterized
agents known to
benefit health /
environment

Neutral

Good

BSL
0.5

BSL
0.5

Human

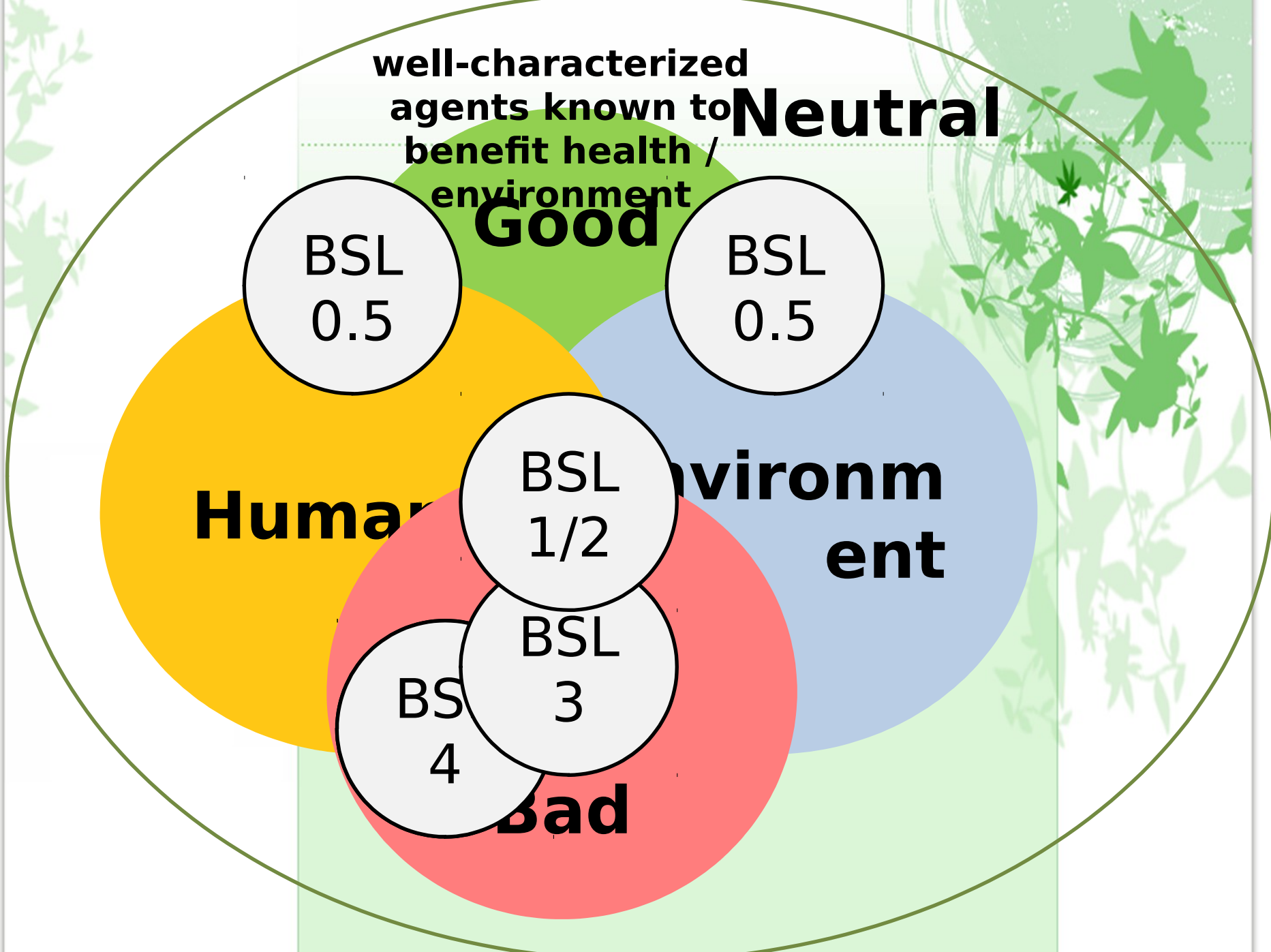
BSL
1/2

**environm
ent**

BSL
4

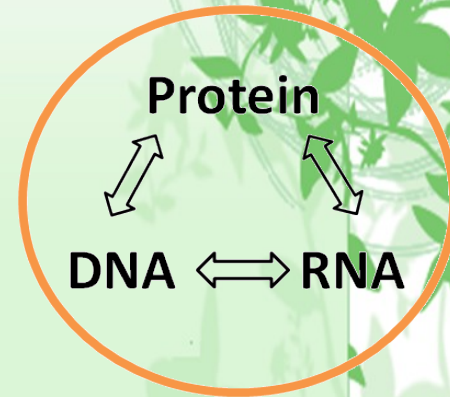
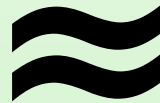
BSL
3

Bad



A Bio-Commons License ?

AGTC

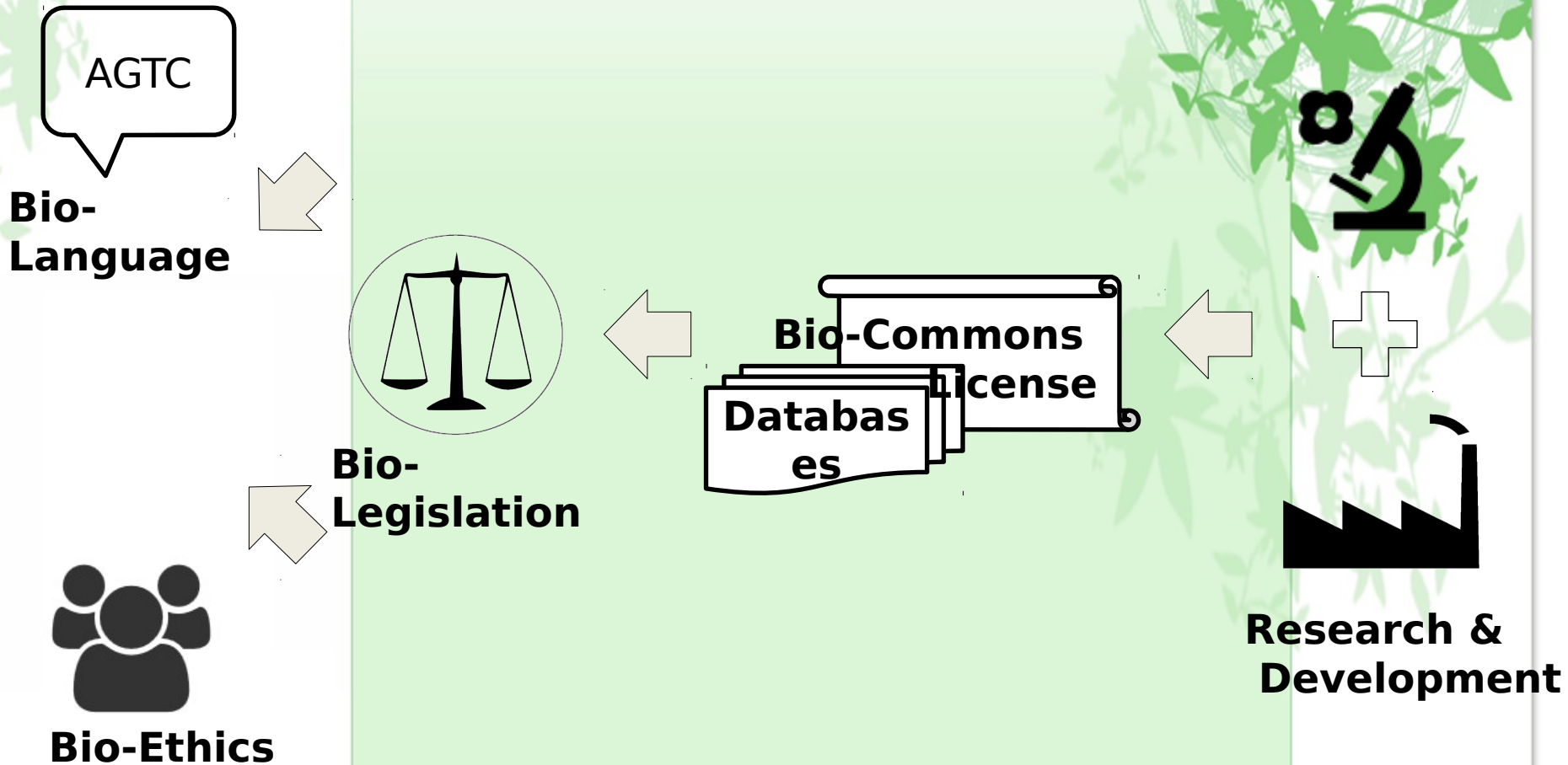


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vs.



A Bio-Commons License ?



Biostrike

Wetware

Hardware

Software

Toolset Development

Democratic Self-Governance

Manage Research

Manage Database

Bio-Commons License

Database

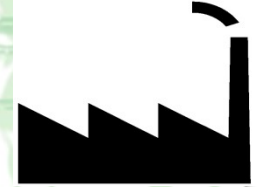
Legal obligation



Research



Discovery & Invention



Development & Production

Participation

Legal backup

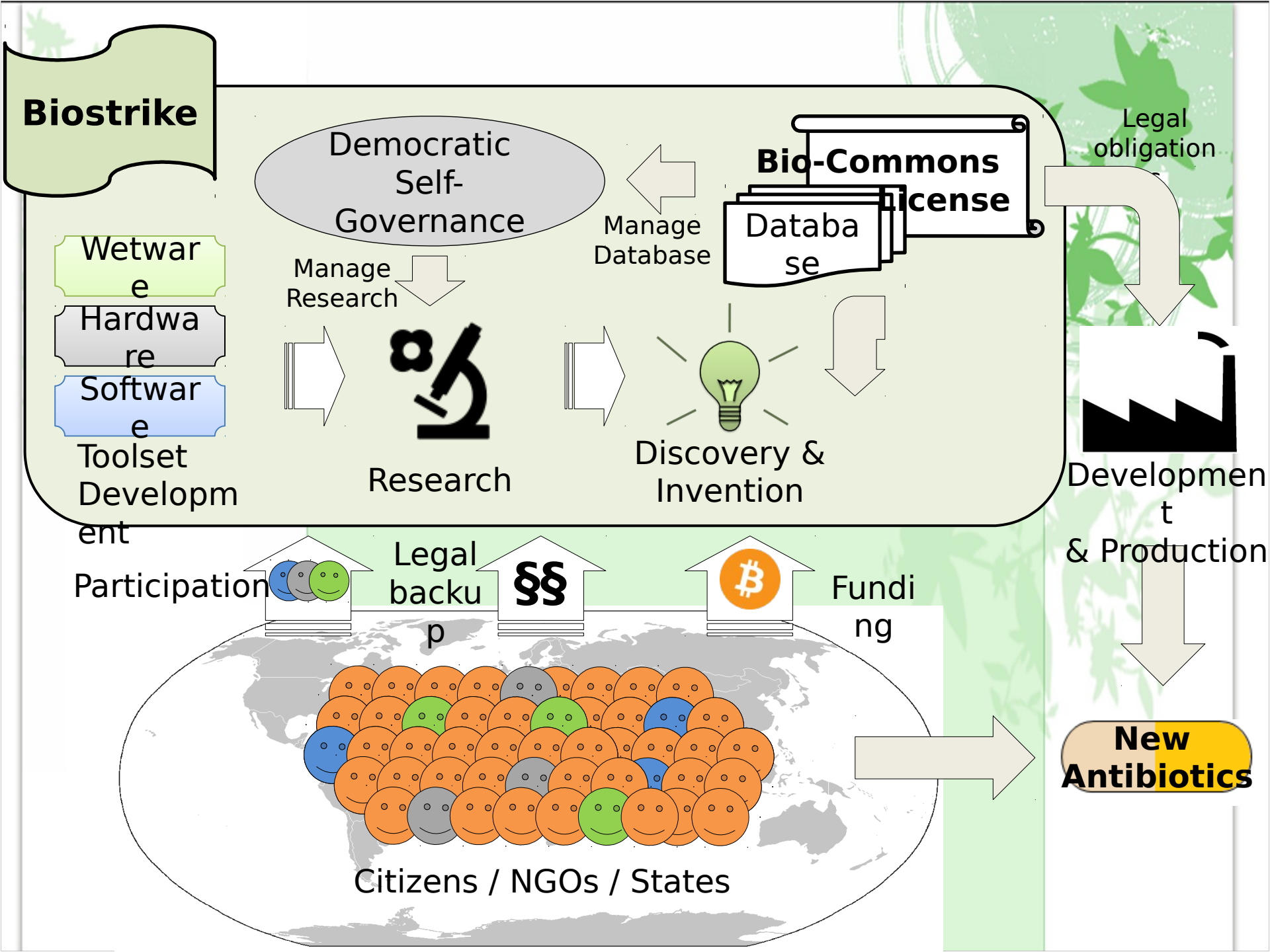


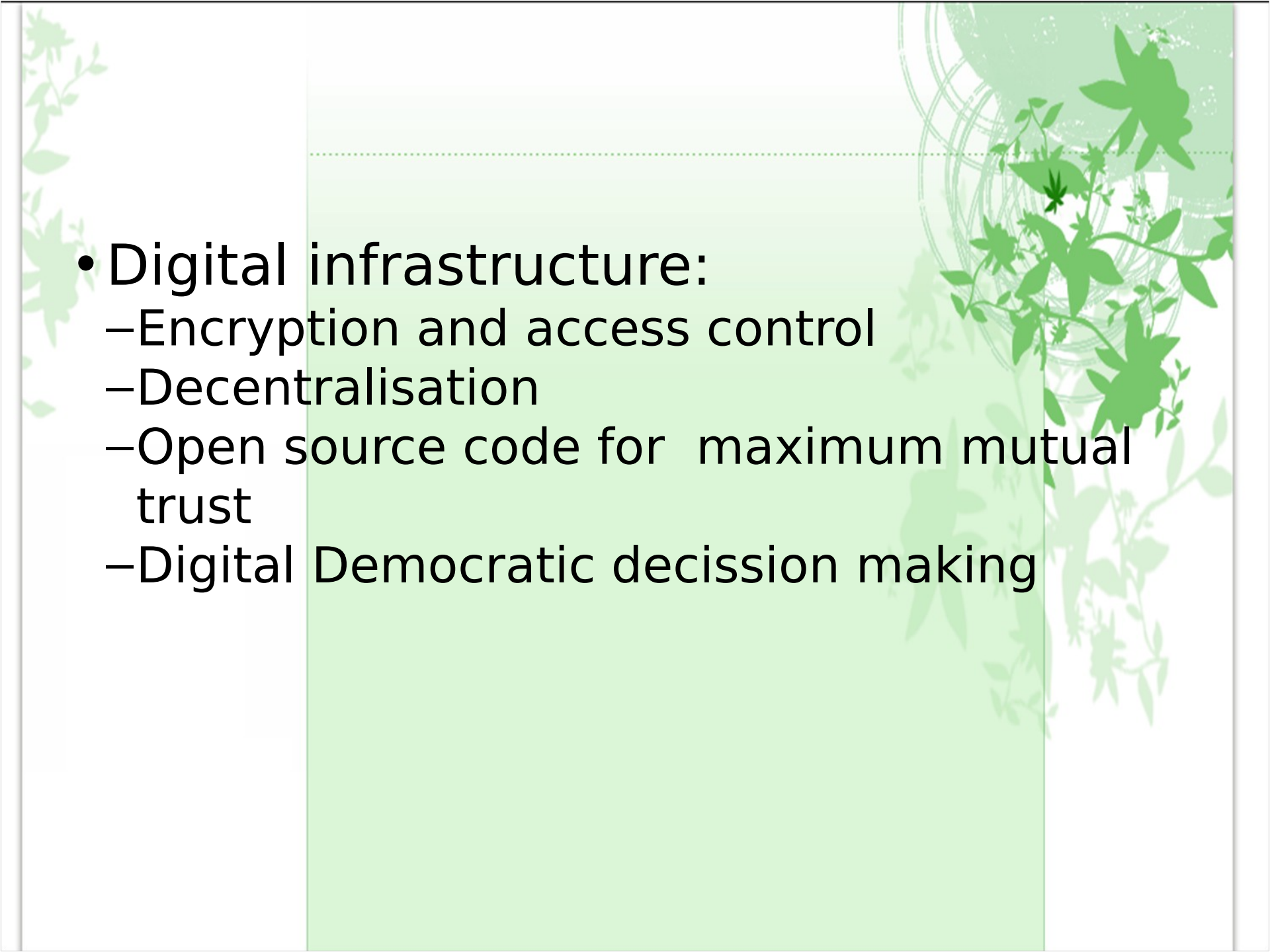
Funding



Citizens / NGOs / States

New Antibiotics



- 
- Digital infrastructure:
 - Encryption and access control
 - Decentralisation
 - Open source code for maximum mutual trust
 - Digital Democratic decision making

Tech Requirements for Bio-Commons Database

- **Network neutrality:**
 - it needs to be operable by a decentralized community of users
- **Scalability:**
 - it has be able to handle and store huge amounts of data (e.g. acquired by high throughput experimentation)
- **Universality:**
 - it has to be able to handle any type of data and code (see Biostrike scenario and Bio-language)
- **Historicity:**



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