



Sustainability in an academic biomedical research institution

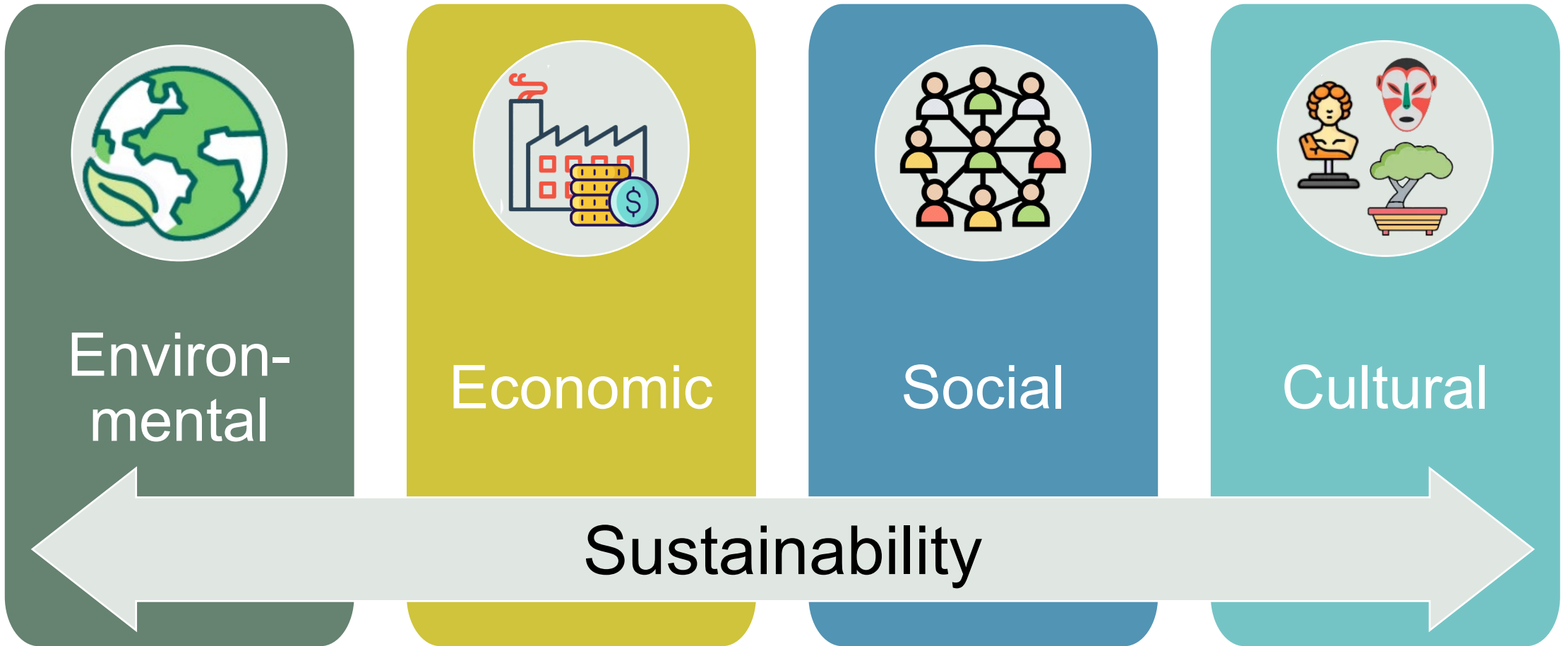
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Biotechnet Meet-Up 2024

18 January 2024, UniS, Bern



Pillars of sustainability





Environmental and economic sustainability

Aim: improve human welfare through the protection of natural capital (e.g. land, air, water, ecosystems etc.), support a desired level of economic activity for the long term.

Achieve positive economic outcomes without doing any harm, in the short- or long-term, to the environment.

Balance between meeting the needs of the present generation without the risk of compromising the needs of future generations.



Research → present & future generations



Social and cultural sustainability

Aim: ensuring fair and equitable treatment of individuals, communities and cultures, promoting social justice, and addressing social inequalities through promoting inclusivity, diversity, cultural identity, heritage, belonging and interconnectedness within communities.

Preserve future generations and acknowledge that what we do has an impact on others and on the world.

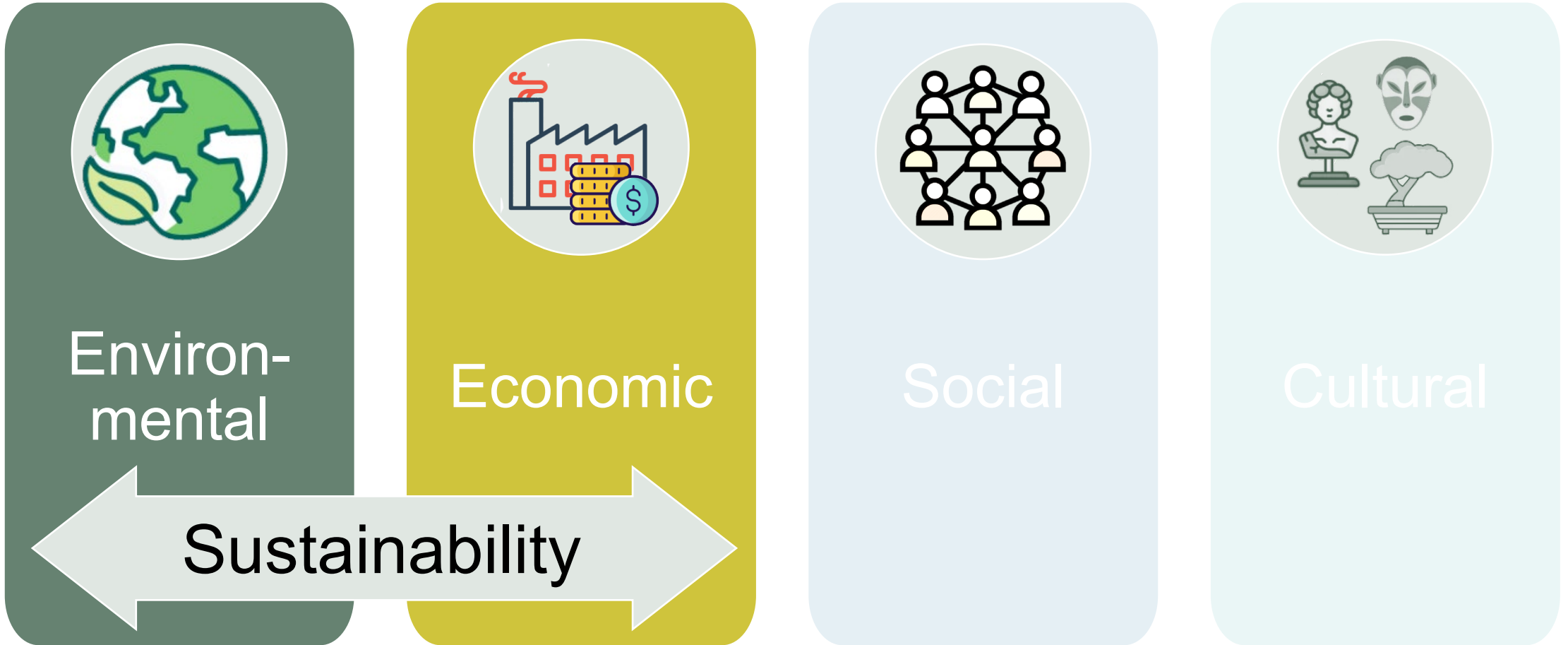


Key considerations include human rights, labor conditions, access to education and healthcare, and community well-being.

It involves supporting traditions, languages, and customs, while also adapting to changes in a way that respects cultural values.



Pillars of sustainability





Energy consumption

Research laboratory: 3-10x energy consumption compared to office space

Laboratory equipment is running without pause for extended periods

Most energy-intensive: heating and cooling equipment

- Repeated heating-cooling cycles (PCR machines):
 - Run samples in smaller volumes of reagents
 - Avoid long cooling times after run if not needed





Energy consumption

- Ultra-low temperature freezers (-80°C, -150°C):
 - Maintenance in regular (short) intervals: defrost etc.
 - Open freezers as little as possible
 - Keep samples inventory up-to-date:
 - Know where to look for samples
 - Discard out-of-date samples
 - Use Tissue Bank & Liquid Biobank

BIOBANK BERN
TISSUE



BIOBANK BERN
LIQUID





Energy consumption

Fume hoods, biosafety cabinets:

- Keep them clear: optimal air circulation
- Switch off (and close) when not in use

Energy-saving (new) buildings for research labs



Murtenstrasse 24-28

Opening end 2021

Department for BioMedical Research (DBMR) &
Institute for Forensic Medicine (IRM)

11'000 m², 7 stories above / 5 under ground

400 employees

High technological standards

Minergie-P-Eco Standard

Creates synergies: use of joint research infrastructures

Core facilities





Equipment

Maintenance: in-house service on demand or automatic

Calibration (pipettors, scales, CO₂ incubators etc.): avoid errors which may lead to results being less comparable.

Sharing equipment:

- Core facilities
- Inventory of instruments for general use: reservation system
- Interoperability of instruments (e.g. rotors for centrifuges, blocks for PCR machines, lenses for microscopes)



Waste management

Patient samples: limited potential for recycling of single-use plastic ware (biosafety: BSL2, incineration → environmental safety!)

Materials that are no longer used are posted on a mailing list

Reduce packaging waste:

- Bulk ordering: amount to cover demand
- minimal & recyclable/reusable packaging
- seek alternatives that can be shipped at ambient temperatures (no polystyrene, dry ice etc. needed)

Personal Protective Equipment (PPE): e.g. reuse of sterilized gowns in Central Animal Facility (only if used for mice)

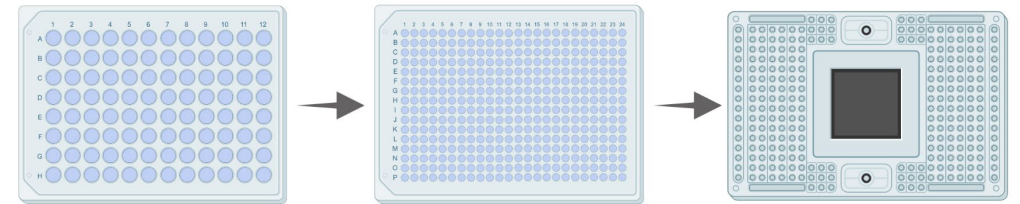




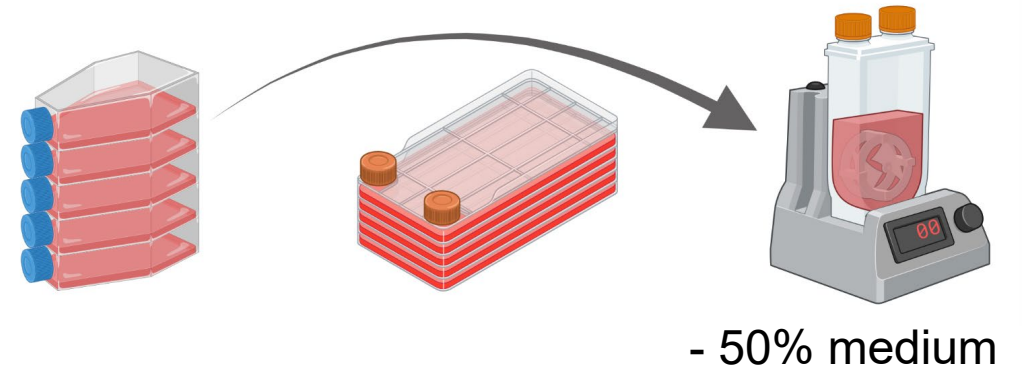
Process optimization

Employ state-of-the-art technologies to reduce resources without losing sensitivity and specificity or yield

- 384-well plates or arrays vs. 96-well plates



- Cell culture bioreactor vs. flasks



- Reduction of toxic or explosive chemicals: replacement with alternatives



3Rs of animal experimentation

Replacement:

- Finding alternatives to the use of animals in research with non-animal methods, such as in vitro (cell culture) or computer simulations that can achieve the research goal

**Establishment of core facility:
Translational Organoid Resource (TOR)**

Reduction:

Minimizing the number of animals used in experiments to fewest numbers

**Rehoming project: animals (rats)
handed over to Swiss Animal Protection**

Refinement:

- Improving experimental procedures to minimize potential pain, suffering, or distress experienced by animals. This includes animal management, housing conditions, and minimizing potential negative impact.

**Improvement of housing: bedding,
environmental enrichment;
education for stressless handling**

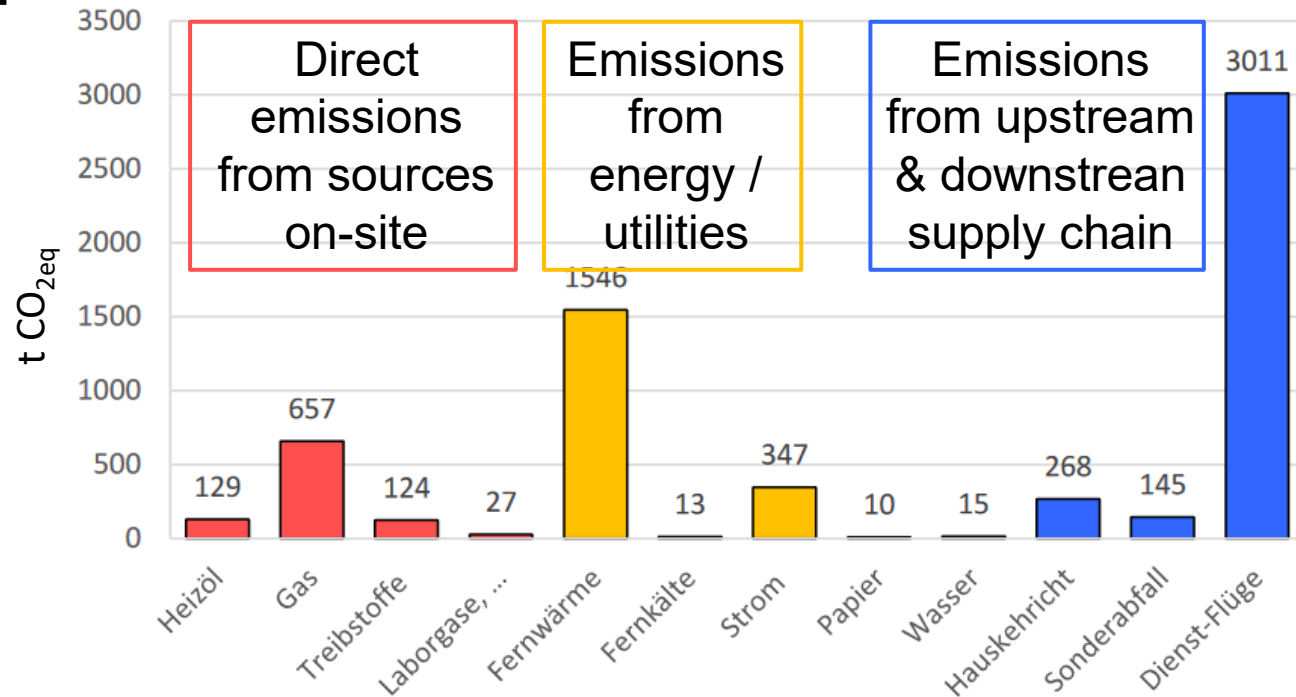



Culture of sustainability

Greenhouse gas report:

Year	FTE	t CO _{2eq} / FTE
2019	4720	1.67
2020	4854	0.98
2021	5050	0.81
2022	5076	1.24

Treibhausgasemissionen 2022 nach Scopes und Quellen




First measure: traffic light system for university business trips: Travel time calculated for destinations train vs flight → flights only allowed if significant gain of time ( 2019: 60%, 2022: 48% of emissions)




Pillars of sustainability



Environmental



Economic



Social



Cultural





Culture of sustainability

Open-access sharing of research data (incl. negative results): avoid duplication of experiments

Equal opportunities:

- Committed to promoting equal opportunities and equality between women and men and all genders
- Strives to reduce barriers to entry
- Promotes the reconciliation of work and care responsibilities
- The diverse perspectives of university members are an essential component of excellence in research, teaching and administration.
- Focus: diversity categories of gender and gender identity, sexual orientation; disability, chronic diseases and mental health; ethnic origin (language, nationality, skin color, migration experience, religion); social origin and position; age.



Challenges

(Bio-) Safety vs. Sustainability

Mindset: trained to avoid contamination

(Very) expensive experiments and analyzes: minimize risk of faulty results by «generous» use of single-use plastics and reagents

(Patient-derived) Samples are not standardized: higher risk of failure or heterogeneous results



Risk vs. benefit of stem cell research

