Sustainable Development Goals (SDGs)

Pieter van der Hijden
Global Working Group Fablabs and UN Sustainable Development Goals (SDGs)

Fab Academy 2026
Recitation on Sustainability – March 9th, 2026

Agenda

1. Prequel: Boston 1970
2. Sustainable Development Goals
3. Designing Reality
4. Fablab SDG Profiles
5. Calling Fab Network
6. Impact-by-design
7. Power to the Network!

1. Prequel: Boston 1970

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- MIT Sloan School of Management
- System Dynamics
  1. Developing causal loop diagram
  2. Building mathematical model
  3. Simulating via computer
- Domains
  - Industrial dynamics
  - Urban dynamics

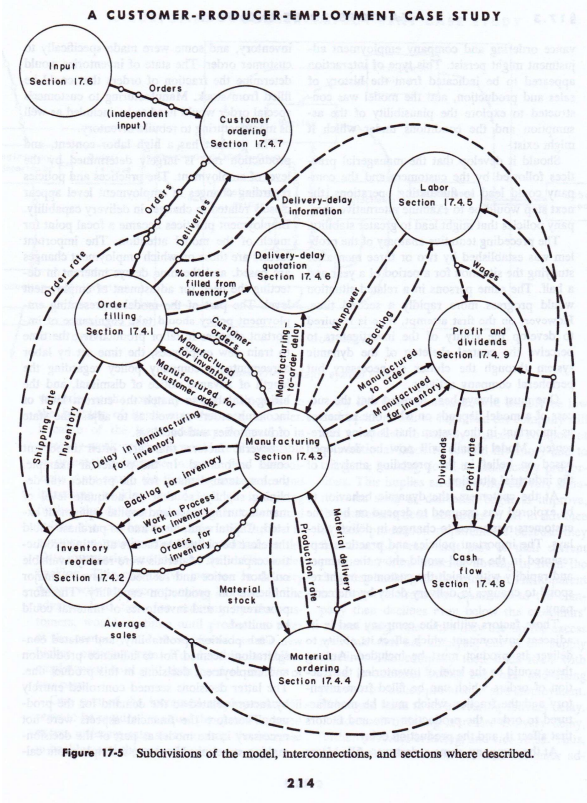
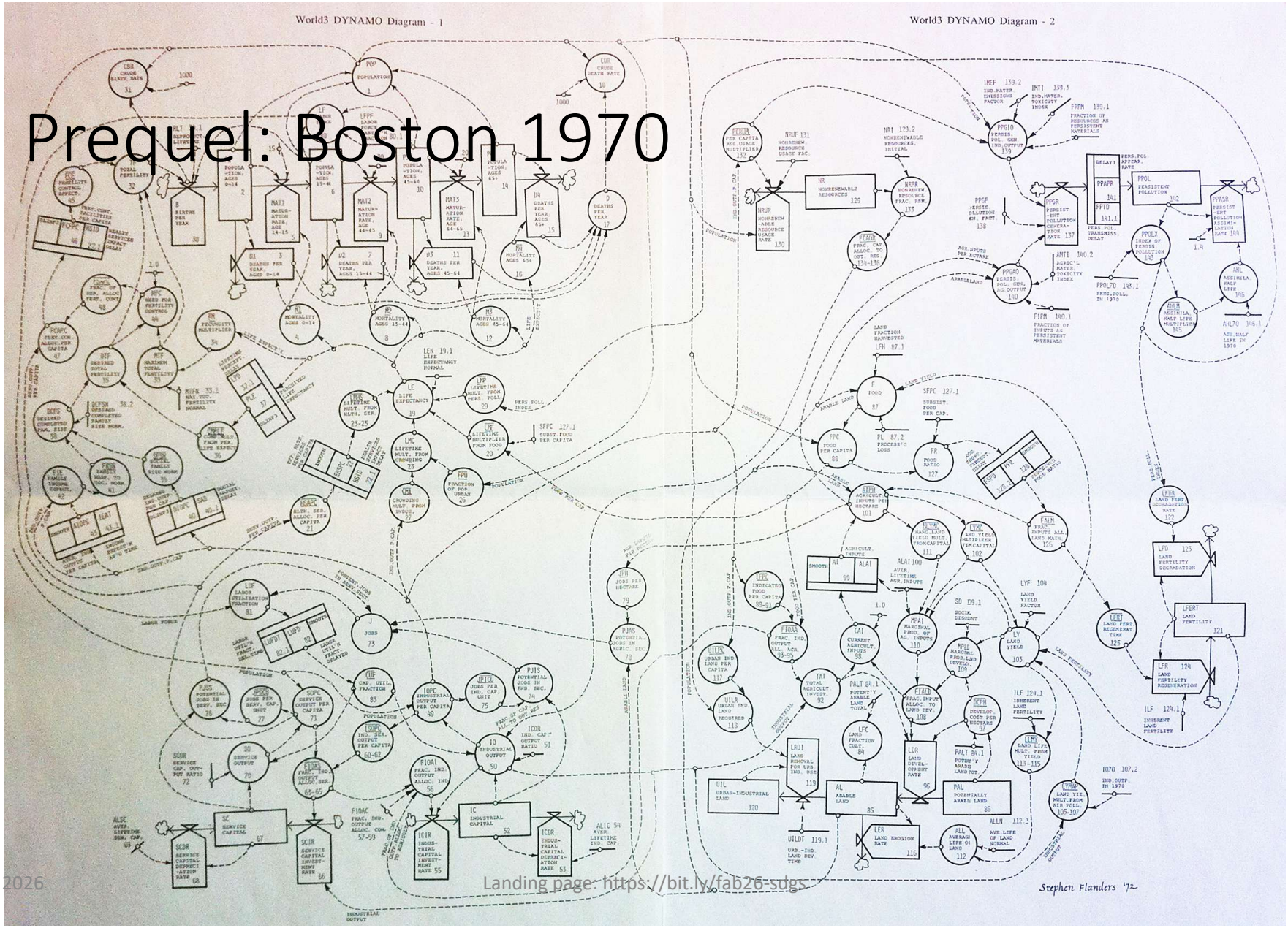


Figure 17-5 Subdivisions of the model, interconnections, and sections where described.

214

Jay W. Forrester: Industrial Dynamics

1. Prequel: Boston 1970



1. Prequel: Boston 1970

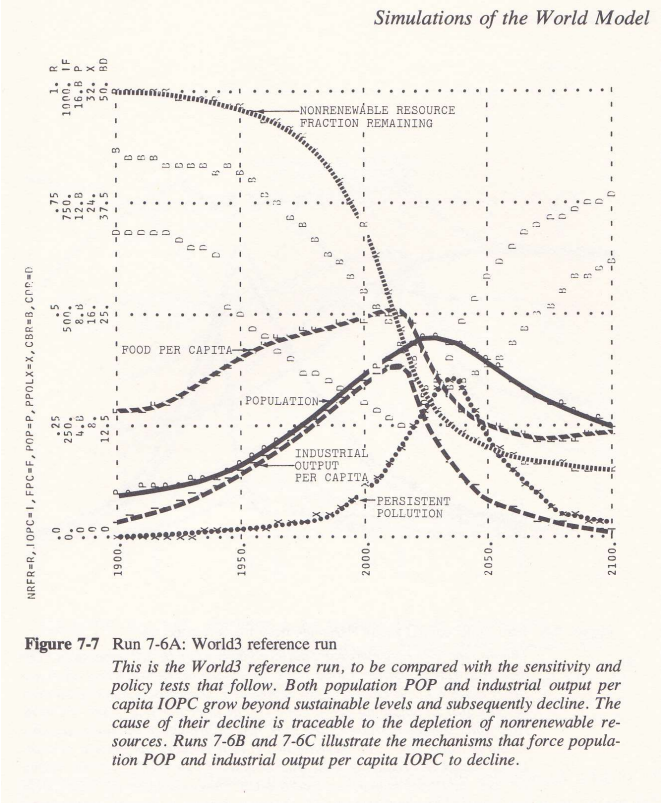
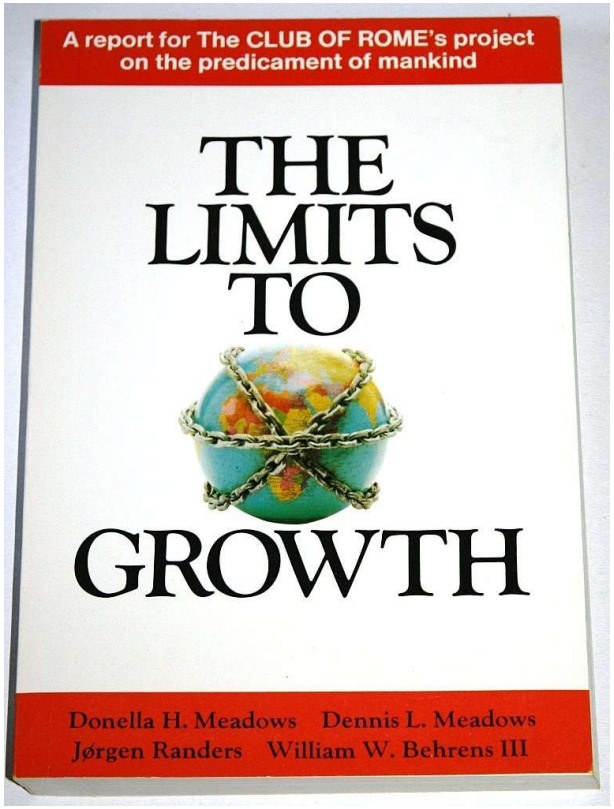


Figure 7-7 Run 7-6A: World3 reference run

This is the World3 reference run, to be compared with the sensitivity and policy tests that follow. Both population POP and industrial output per capita IOPC grow beyond sustainable levels and subsequently decline. The cause of their decline is traceable to the depletion of nonrenewable resources. Runs 7-6B and 7-6C illustrate the mechanisms that force population POP and industrial output per capita IOPC to decline.

- Club of Rome
- World Model Simulations
- Five main sectors
  1. Population
  2. Industrial output
  3. Pollution
  4. Food production
  5. Non-renewable resources
- Time horizon: 1900 - 2100

1. Prequel: Boston 1970



- The results are still valid!
- The method shows the power of
  - Expertise from various domains
  - Systems dynamics as lingua franca
  - Process oriented
  - Counter-intuitive behavior of complex non-linear systems with closed loops

2. Sustainable Development Goals (SDGs)

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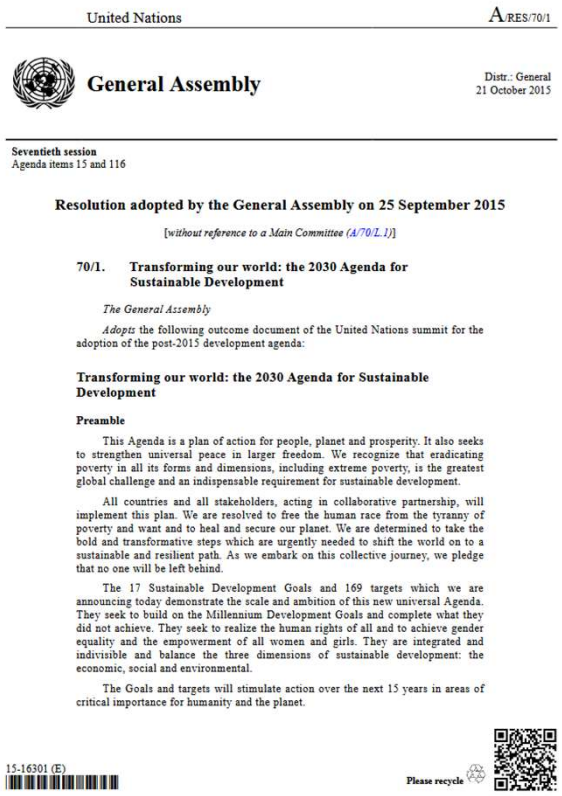


United Nations A/RES/70/1

General Assembly

Distr.: General
21 October 2015

Seventieth session
Agenda items 15 and 116

Resolution adopted by the General Assembly on 25 September 2015

[*without reference to a Main Committee (A/70/L.1)*]

70/1. Transforming our world: the 2030 Agenda for Sustainable Development

The General Assembly

Adopts the following outcome document of the United Nations summit for the adoption of the post-2015 development agenda:

Transforming our world: the 2030 Agenda for Sustainable Development

Preamble

This Agenda is a plan of action for people, planet and prosperity. It also seeks to strengthen universal peace in larger freedom. We recognize that eradicating poverty in all its forms and dimensions, including extreme poverty, is the greatest global challenge and an indispensable requirement for sustainable development.

All countries and all stakeholders, acting in collaborative partnership, will implement this plan. We are resolved to free the human race from the tyranny of poverty and want and to heal and secure our planet. We are determined to take the bold and transformative steps which are urgently needed to shift the world on to a sustainable and resilient path. As we embark on this collective journey, we pledge that no one will be left behind.

The 17 Sustainable Development Goals and 169 targets which we are announcing today demonstrate the scale and ambition of this new universal Agenda. They seek to build on the Millennium Development Goals and complete what they did not achieve. They seek to realize the human rights of all and to achieve gender equality and the empowerment of all women and girls. They are integrated and indivisible and balance the three dimensions of sustainable development: the economic, social and environmental.

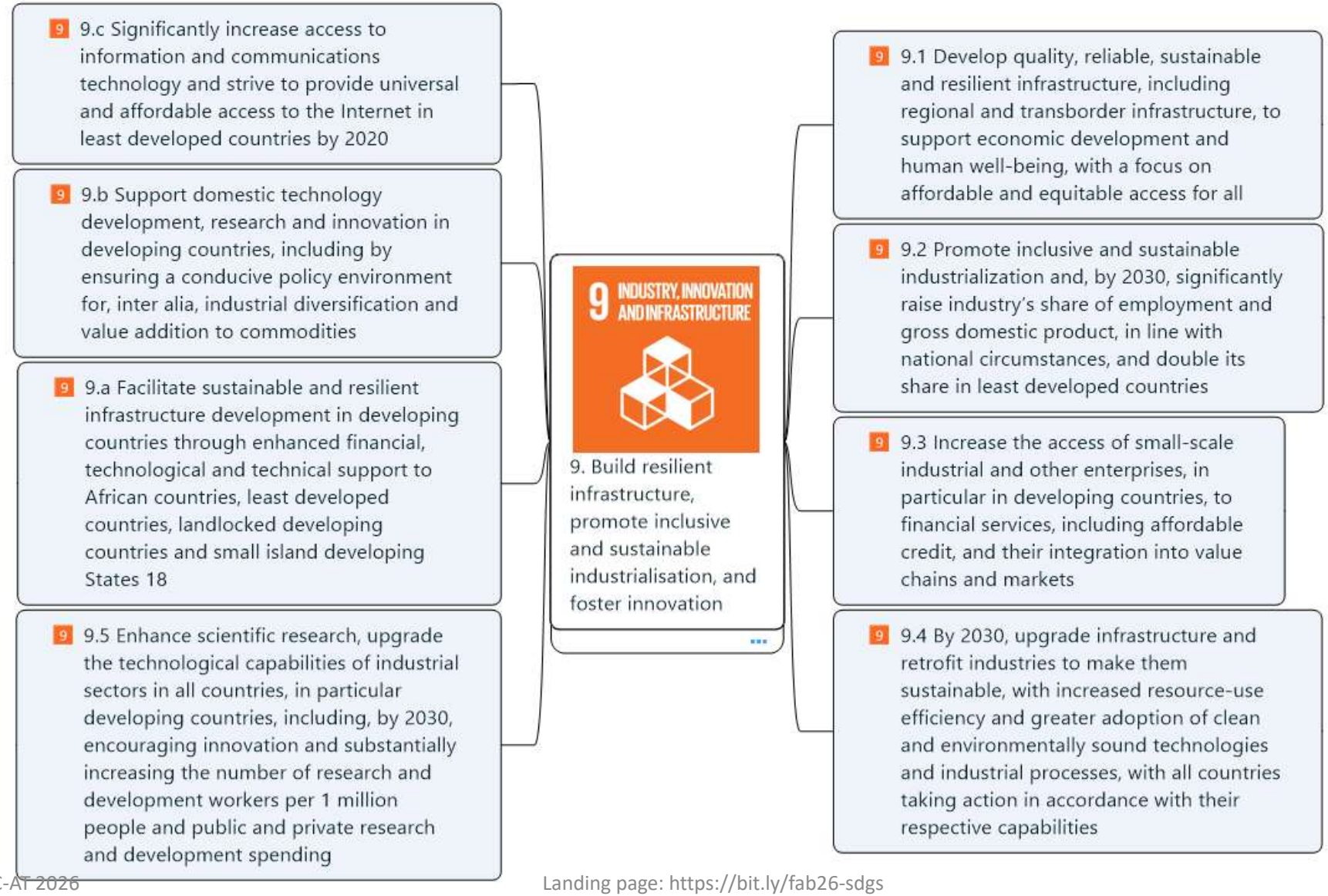
The Goals and targets will stimulate action over the next 15 years in areas of critical importance for humanity and the planet.

15-16301 (E)

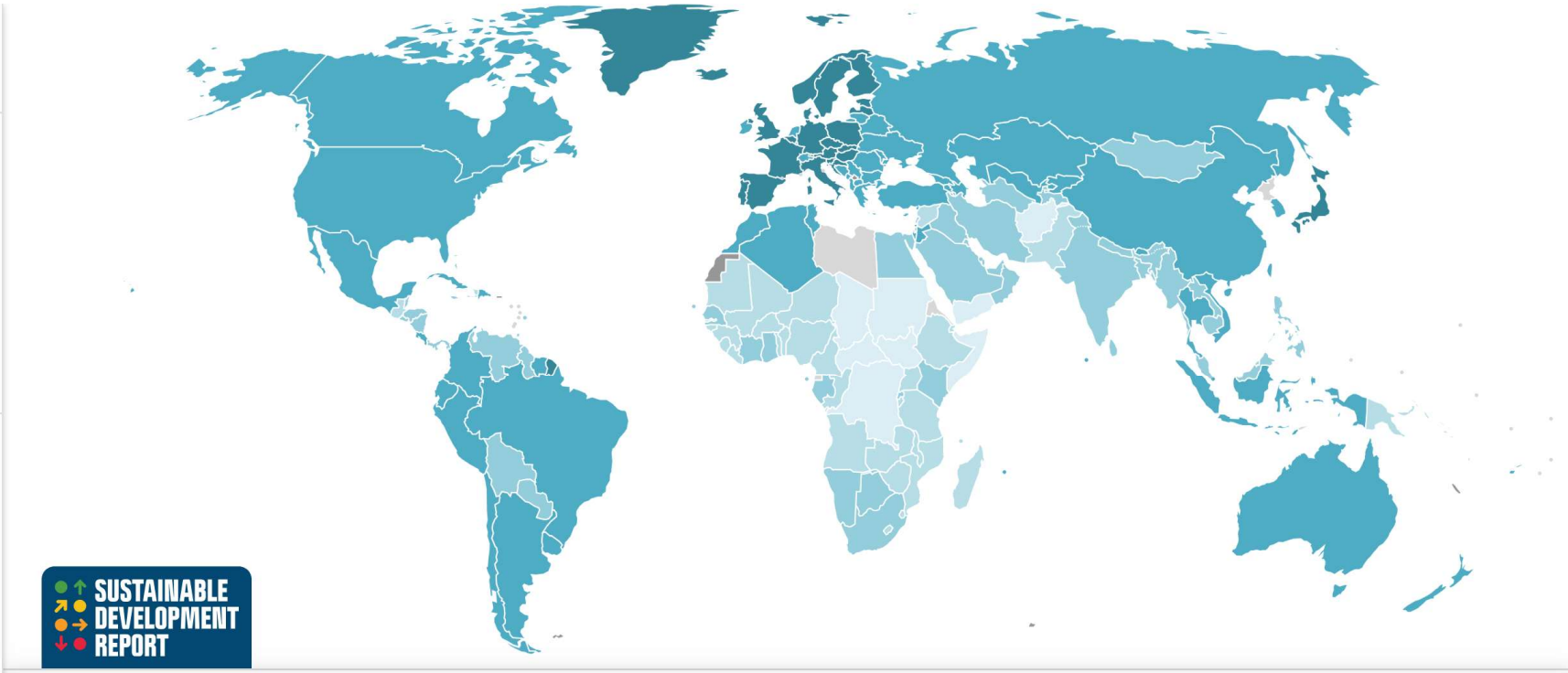
Please recycle

- Why?
  - Outcome of worldwide bottom-up process
- What?
  - Goals 17, Targets 169, Indicators 242+
- When?
  - 2016 - 2030
- Who?
  - Agreed by all 193 UN member states
- Responsible?
  - Implementation by national governments
- Costs?
  - Required budgets: trillions of US$ a year
- Bottom line:
  - LEAVE NO ONE BEHIND

SUSTAINABLE DEVELOPMENT GOALS
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


9.c Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020
9.b Support domestic technology development, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, industrial diversification and value addition to commodities
9.a Facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African countries, least developed countries, landlocked developing countries and small island developing States 18
9.5 Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending
9
INDUSTRY, INNOVATION AND INFRASTRUCTURE
9. Build resilient infrastructure, promote inclusive and sustainable industrialisation, and foster innovation
9.1 Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all
9.2 Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries
9.3 Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets
9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities

2. Sustainable Development Goals (SDGs)



Landing page: https://bit.ly/lab26-sdgs

3. Designing Reality

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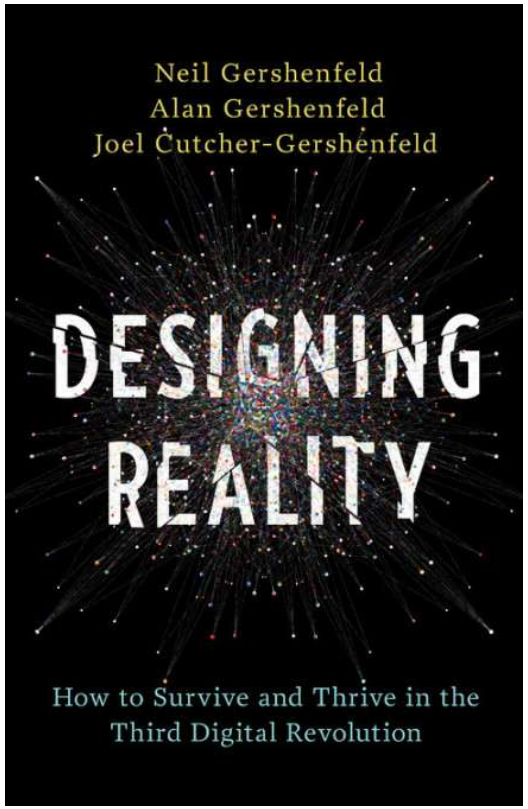
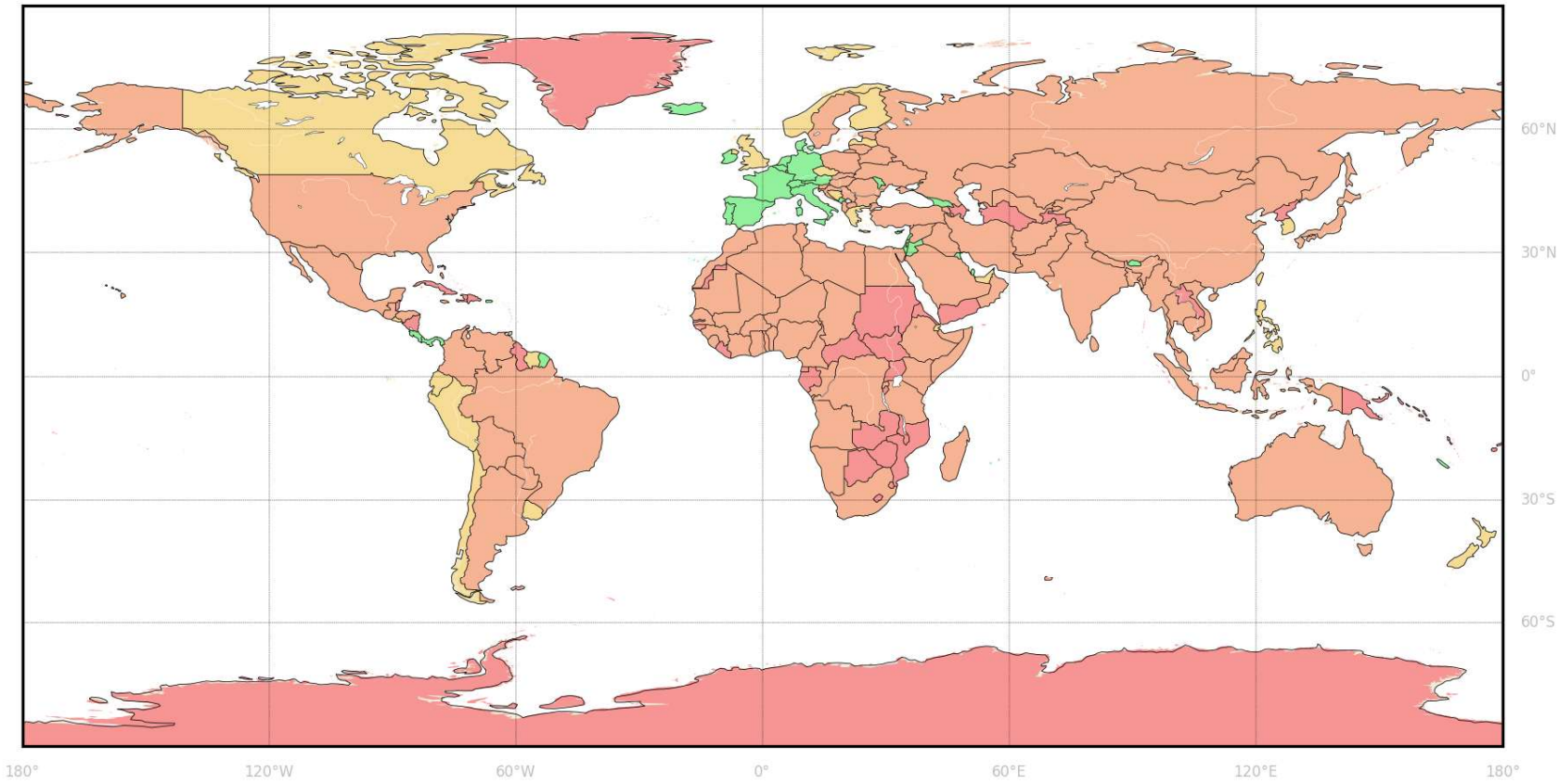


- Fablabs and SDGs
  - Social justification of fablabs requires social impact; self expression is not enough
  - SDG implementers need fablabs
  - Fablabs have a lot to offer
    - Fab network presence in many countries
    - Loosely interconnected, common values, locally grounded
    - Developing solutions in its DNA

World: Fablab Density by Country

Legend: red: no fablabs, orange: no criteria met, yellow: one criterion met, green: both criteria met
Criteria: no. of fablabs per mil inhabitants >1.0 and/or no. of fablabs per 10,000 km2 area > 1.0



World: fablabs: 2,626; countries: 250; retrieved: 2026-02-28
Sources: fablabs.io; countries: wikipedia/iso-3166; geodata: naturalearth and geonames
CC-BY 4.0 2026 - Global Working Group Fablabs and UN Sustainable Development Goals (SDGs)

4. Fablab SDG Profiles

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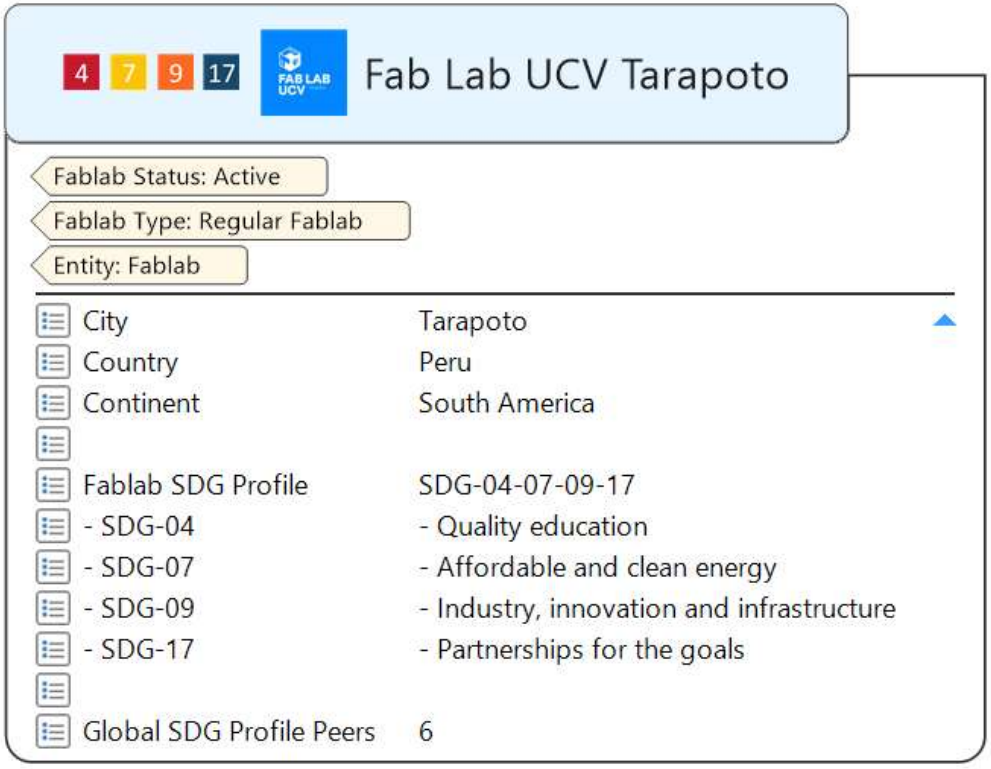
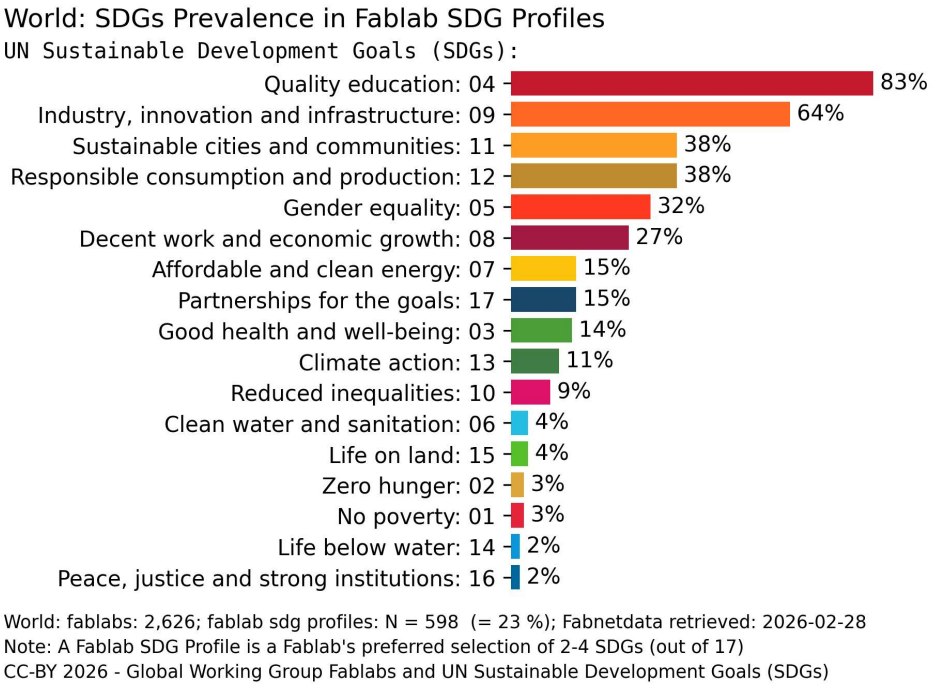
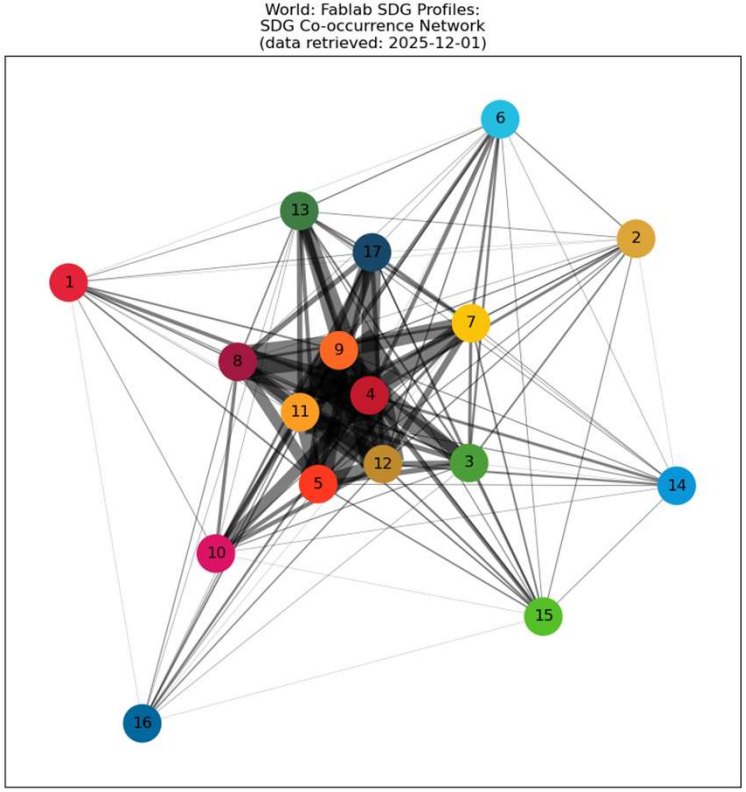


- A Fablab SDG Profile is a fablabs preferred selection of 2-4 SDGs (out of 17)
- Actual (fabnetdata 2026-02-28):
  - Fablabs: 2626
  - Fab SDG Profiles: 598 = 23%

4. Fablab SDG Profiles





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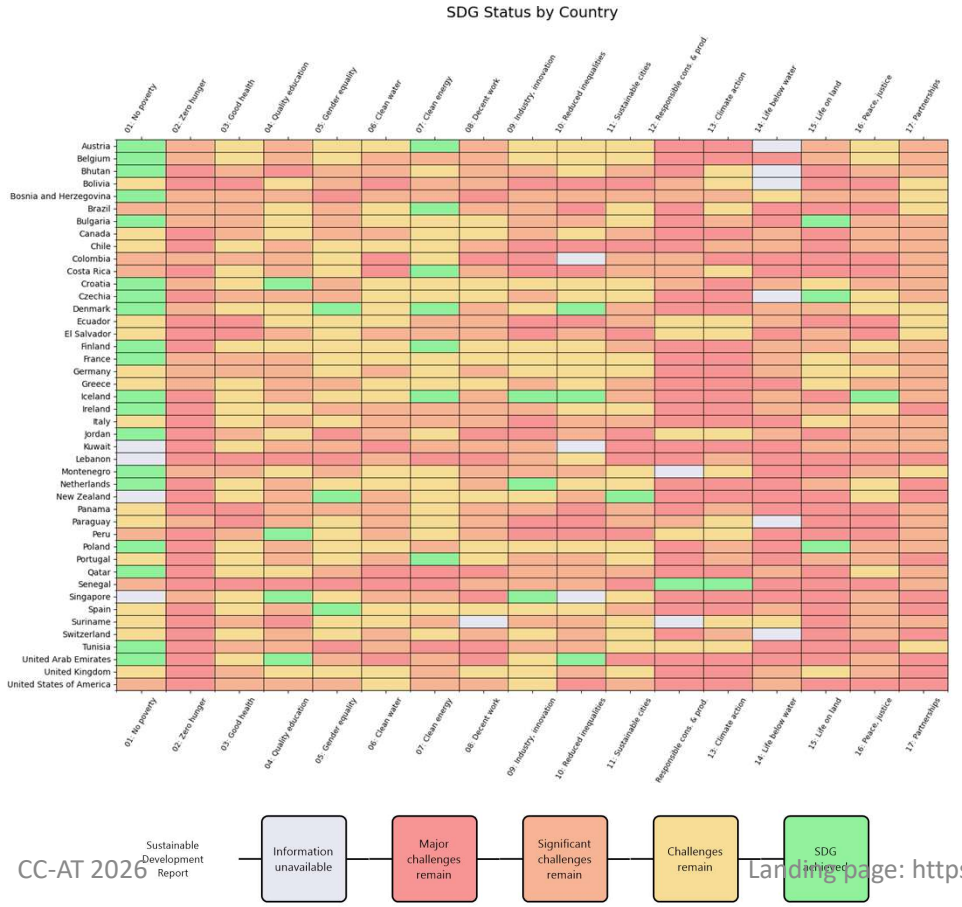
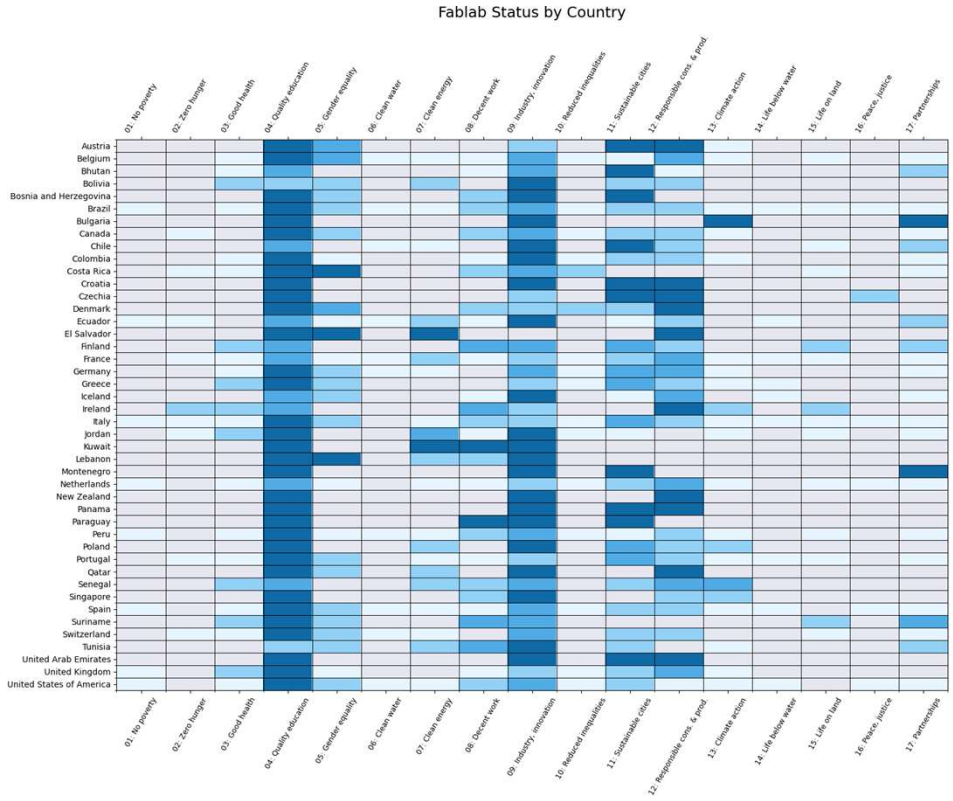


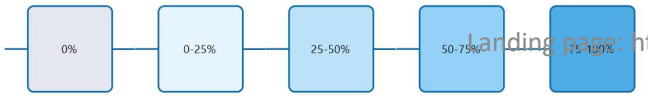
- Heatmap derived from SDG Index Report 2025
  - Lines are countries
  - Columns are SDG 01 – 17
  - Color = “heat”
    - Green is best
    - Red is worst

4. Fablab SDG Profiles



- Heatmap canvas re-used
- BLUE = Fablab SDG Profile prevalences

Fablab SDG Prevalence



Landing page: https://bit.ly/fab26-sdgs

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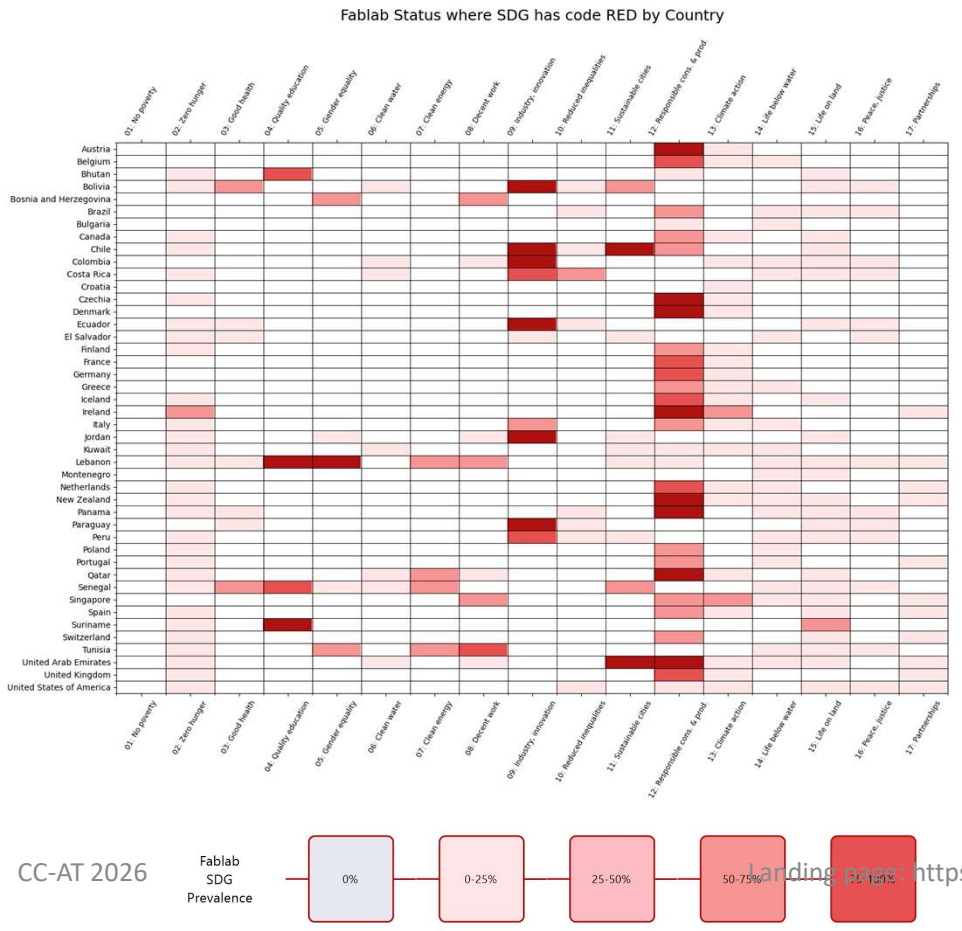
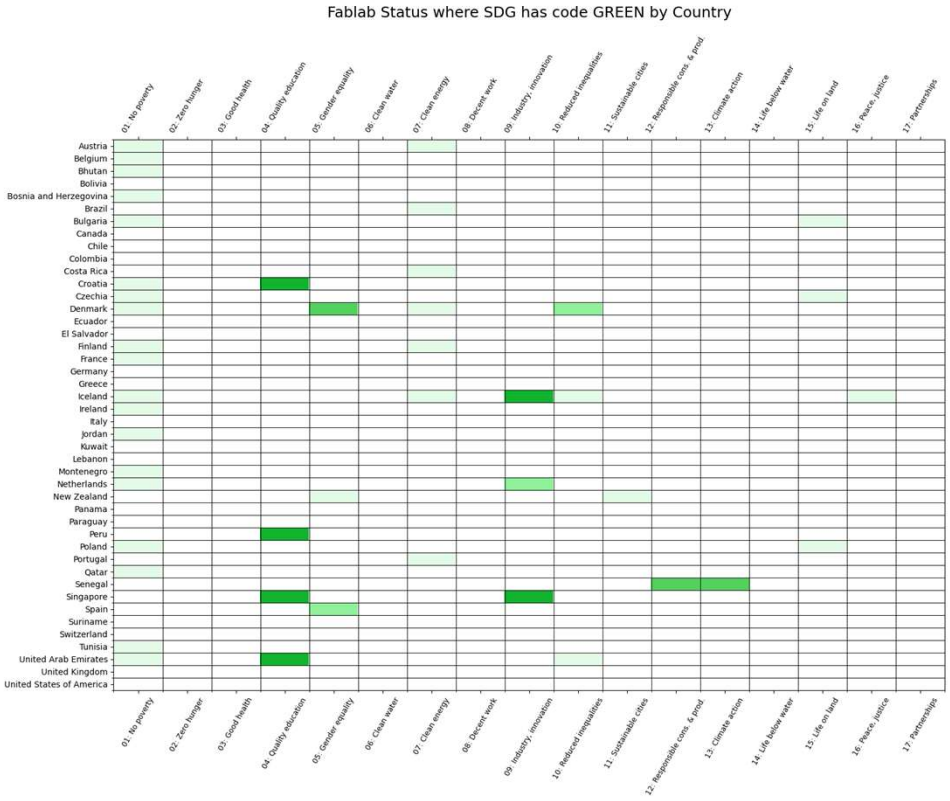
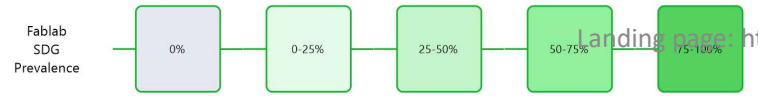


- Heatmap canvas re-used
- RED = Fablab SDG Profile prevalences for countries where code = RED
- *Fablab A in country B: as you have SDG N in your profile AND your country has code = RED for SDG N, you could have most impact by focusing on SDG N*

4. Fablab SDG Profiles



- Heatmap canvas re-used
- GREEN = Fablab SDG Profile prevalences for countries where code = GREEN
- *Fablab A in country B: as you have SDG N in your profile AND your country has code = GREEN for SDG N, you could be of valuable support for other fablabs in countries with code = RED for SDG N*



5. Calling Fab Network

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Suppose:

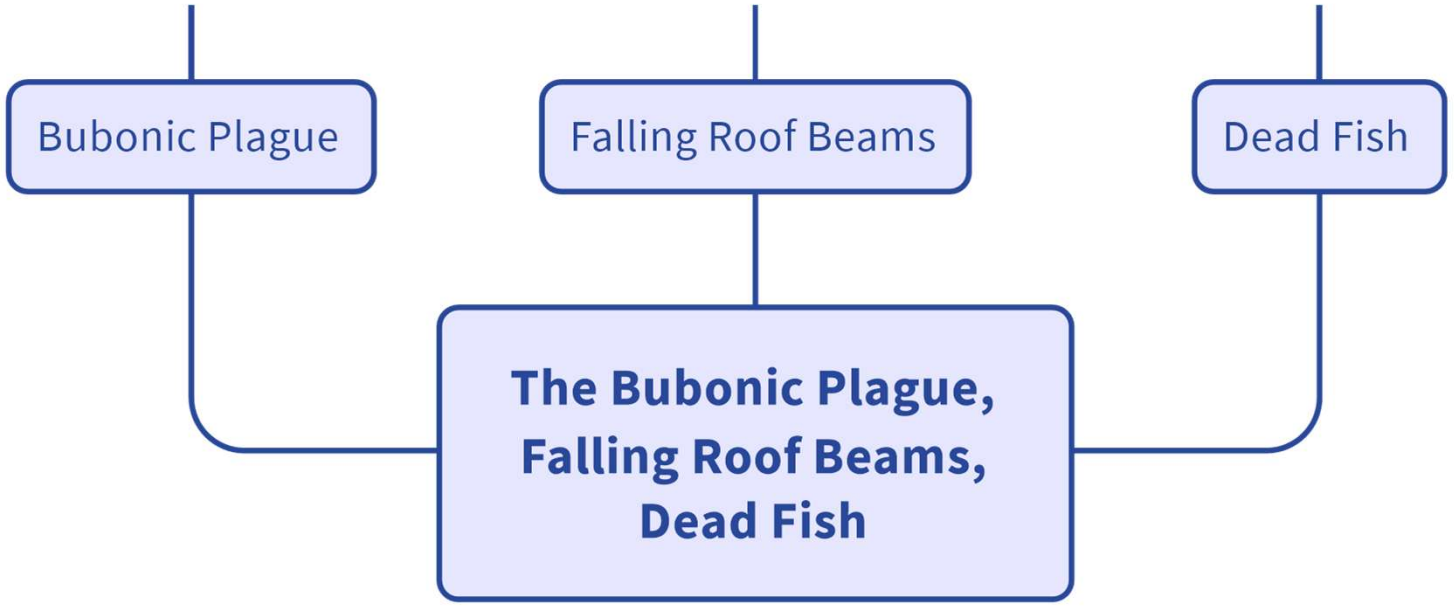
The island of Borneo, described as "a green jewel in the blue sea," has all of a sudden been beset with a multitude of seemingly unrelated problems. The villagers have begun dying of bubonic plague, the roofs of their huts have begun crashing down, and there are swarms of dead fish washing up on the banks of their rivers!

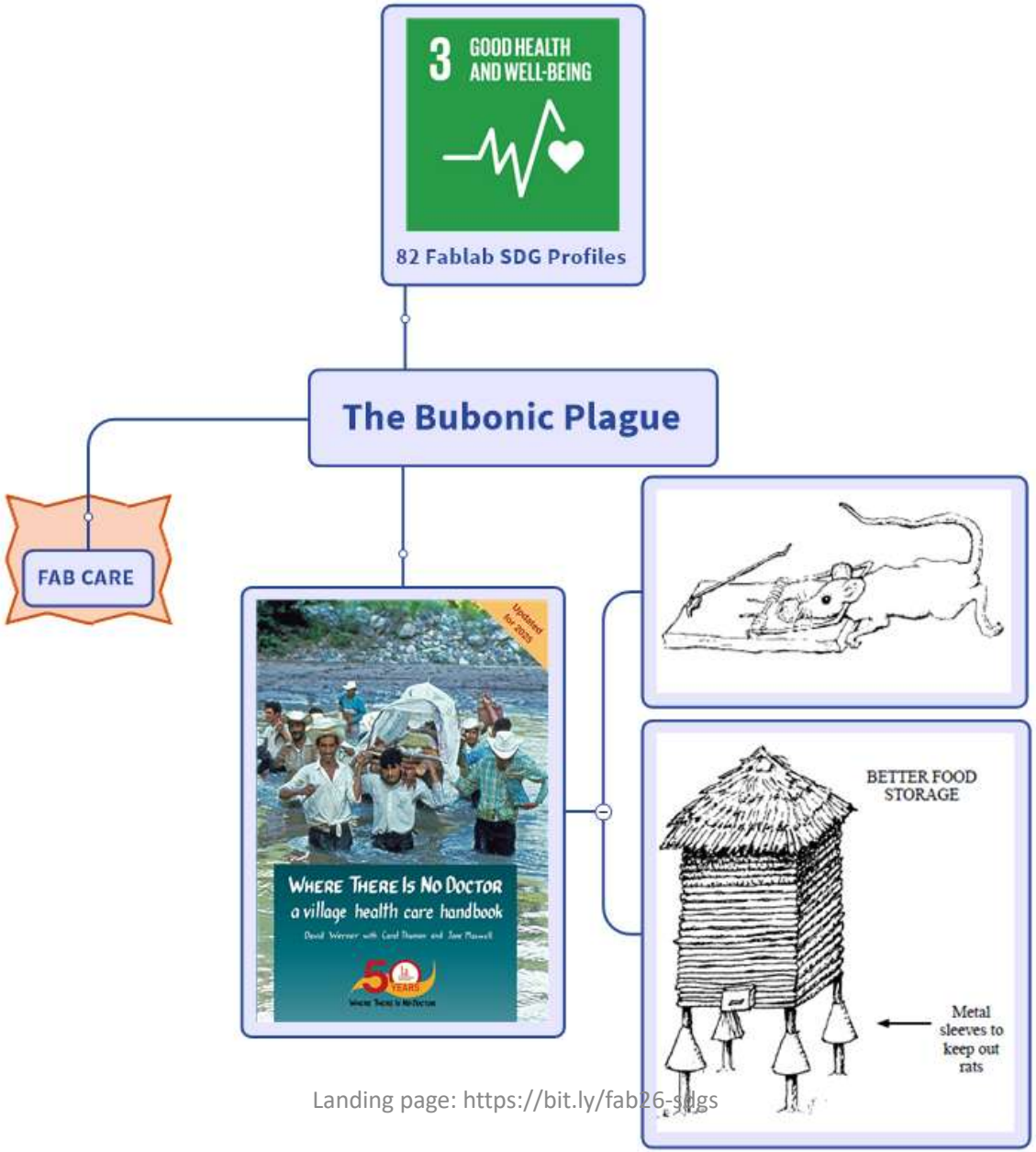
Picture left: Thunderbirds and Sustainability; temporary exhibition at Miraikan, National Museum of Emerging Science and Innovation, Tokyo, Japan during FAB8 Conference Yokohama, 2012 (coincidence?)

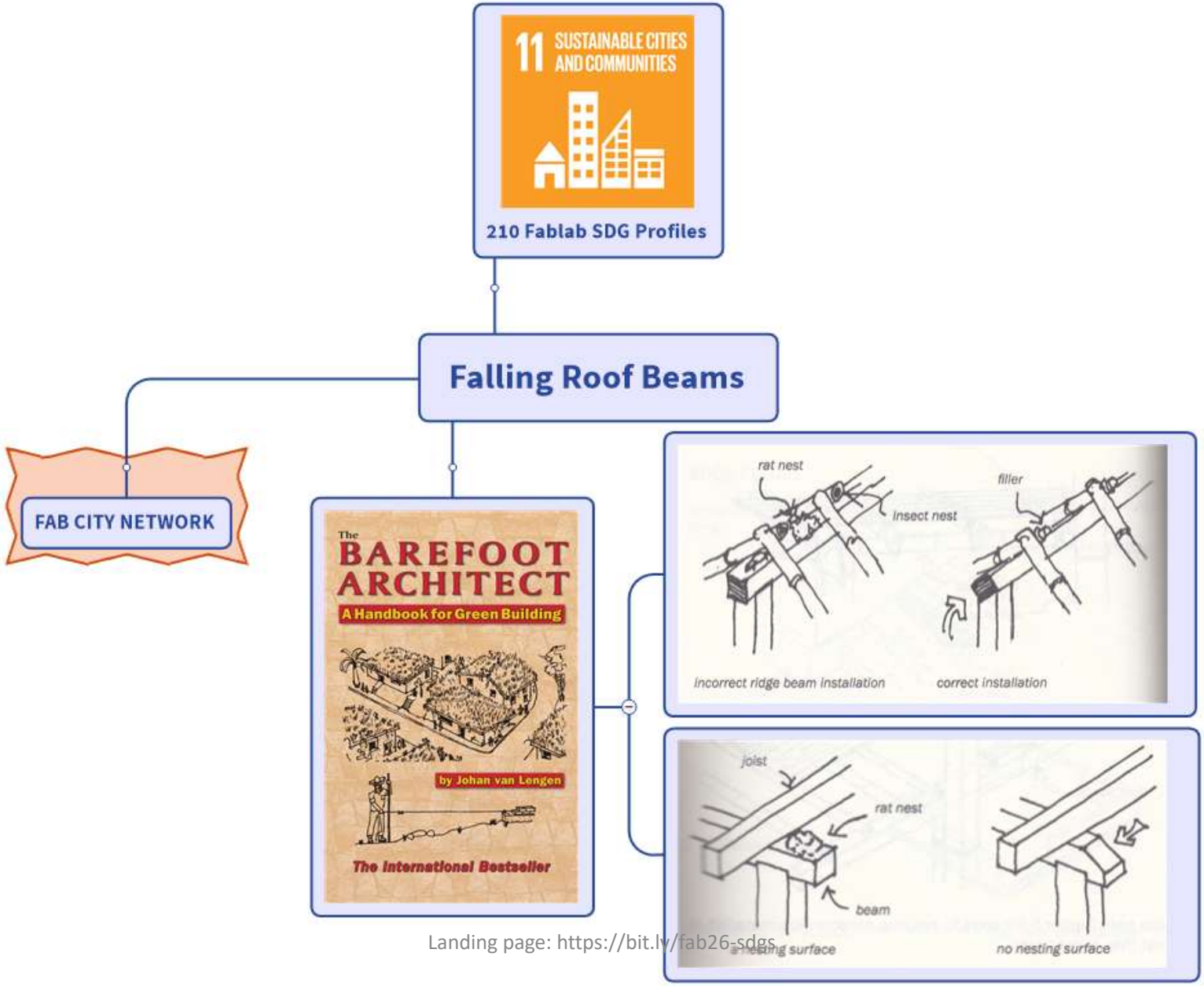
3
GOOD HEALTH
AND WELL-BEING

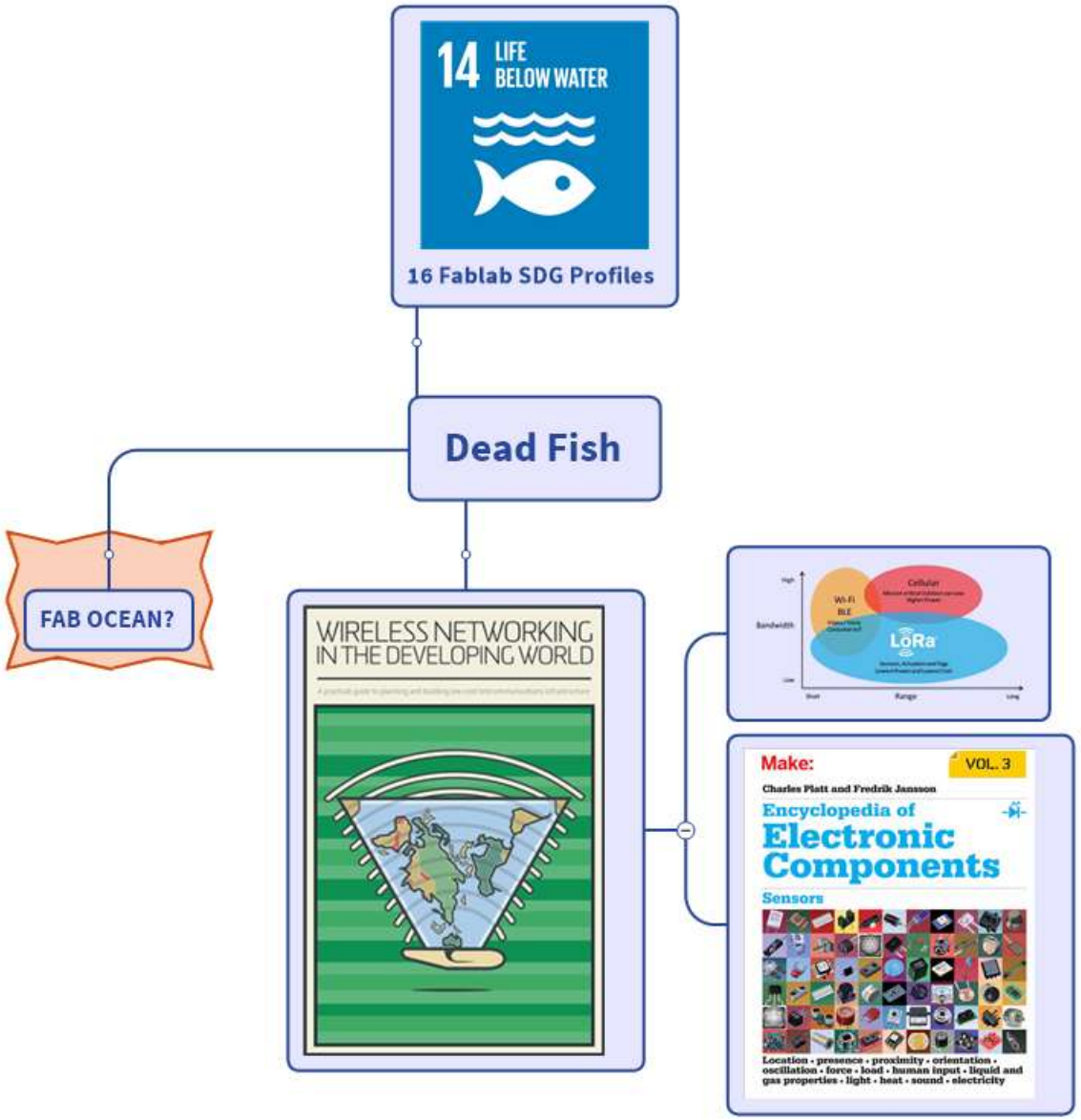
11
SUSTAINABLE CITIES
AND COMMUNITIES

14
LIFE
BELOW WATER


Bubonic Plague
Falling Roof Beams
Dead Fish
The Bubonic Plague, Falling Roof Beams, Dead Fish


3 GOOD HEALTH AND WELL-BEING
82 Fablab SDG Profiles
The Bubonic Plague
FAB CARE
Updated for 2025
WHERE THERE IS NO DOCTOR
a village health care handbook
David Werner with Carol Thuman and Jane Maxwell
50 YEARS
BETTER FOOD STORAGE
Metal sleeves to keep out rats


11 SUSTAINABLE CITIES AND COMMUNITIES
210 Fablab SDG Profiles
Falling Roof Beams
FAB CITY NETWORK
The BAREFOOT ARCHITECT
A Handbook for Green Building
by Johan van Lengen
The International Bestseller
rat nest
insect nest
filler
incorrect ridge beam installation
correct installation
joist
rat nest
beam
no nesting surface


14 LIFE BELOW WATER
16 Fablab SDG Profiles
Dead Fish
FAB OCEAN?
WIRELESS NETWORKING IN THE DEVELOPING WORLD
Wi-Fi
BLE
Cellular
LoRa
Bandwidth
Range
Make:
VOL. 3
Charles Platt and Fredrik Jansson
Encyclopedia of
Electronic Components
Sensors
Location • presence • proximity • orientation • oscillation • force • load • human input • liquid and gas properties • light • heat • sound • electricity

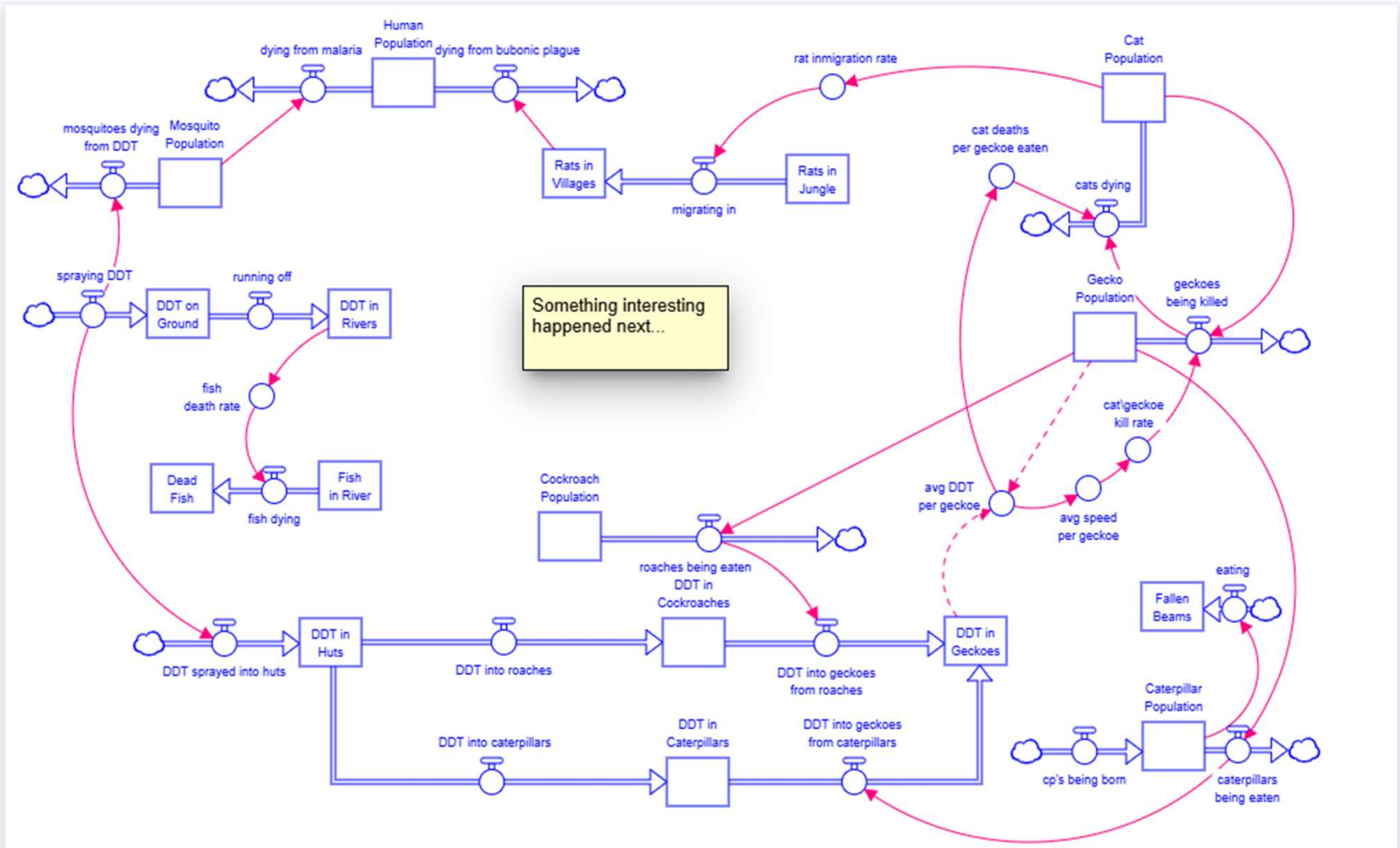
5. Calling Fab Network

THIS WAY:

- Ad hoc solutions
- Symptom control
- Silo thinking

HOW ABOUT THIS WAY

- Inclusion of local expertise
- Inclusion of a variety of disciplines (domain knowledge)
- Systems view, stocks and flows
- Structural solutions
- Qualitative model
- System Dynamics
- Gaming/Simulation


Human Population
dying from malaria
dying from bubonic plague
rat inmigration rate
Cat Population
mosquitoes dying from DDT
Mosquito Population
Rats in Villages
migrating in
Rats in Jungle
cat deaths per geckoe eaten
cats dying
spraying DDT
running off
DDT on Ground
DDT in Rivers
Something interesting happened next...
Gecko Population
geckoes being killed
fish death rate
cat\geckoe kill rate
Dead Fish
Fish in River
fish dying
Cockroach Population
avg DDT per geckoe
avg speed per geckoe
roaches being eaten
DDT in Cockroaches
eating
Fallen Beams
DDT sprayed into huts
DDT in Huts
DDT into roaches
DDT into geckoes from roaches
DDT in Geckoes
Caterpillar Population
DDT into caterpillars
DDT in Caterpillars
DDT into geckoes from caterpillars
cp's being born
caterpillars being eaten

6. Impact-by-design

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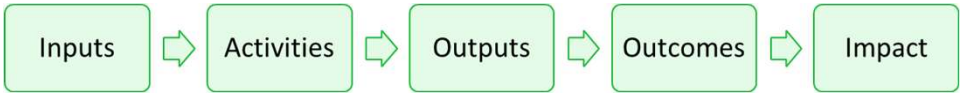
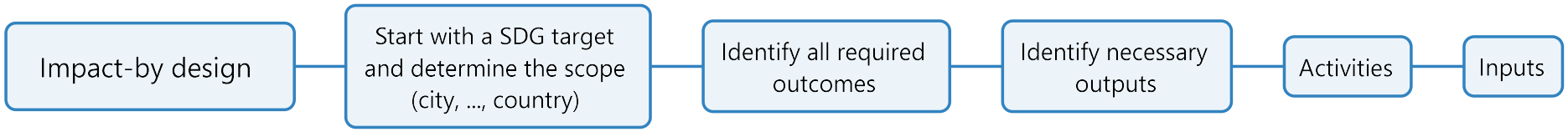


Inputs	The financial, human and material resources used in a programme or policy. For example, training materials produced.
Outputs	The immediate effects of programme/policy activities, or the direct products or deliverables of programme/policy activities. For example, the number of vaccines administered.
Outcomes	The likely or achieved short-term and medium-term effects of a programma or policy's outputs, such as a change in vaccination levels or key behaviours.
Impact	Positive and negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly, intended or unintended. (OECD-DAC definition, 2010)

- The SDG targets describe the intended impact
  - Within the scope of a neighborhood, a city, a region, a country
- The best way to realize this impact is start your planning with it: impact-by-design

6. Impact-by-design



6. Impact-by-design

Fablabs and SDGs is a process passing various “maturity” stages. Fablabs decide themselves how they develop and at what speed. The last stage is “Accountability”; it implies committed to impact, which is accomplished by impact-by-design.

7. Power to the Network!

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- Understanding our world
  - Perhaps a small step for a tech nerd, but a giant leap for those who've never worked with computers before. Keep it up!
  - Find a balance between planned operations and unexpected opportunities

Zaplab, Canada LEAF, final meeting Klaaskreek, Suriname, 2026

7. Power to the Network!

- Developing solutions
- Start generating ideas for SDG target related projects

7. Power to the Network!

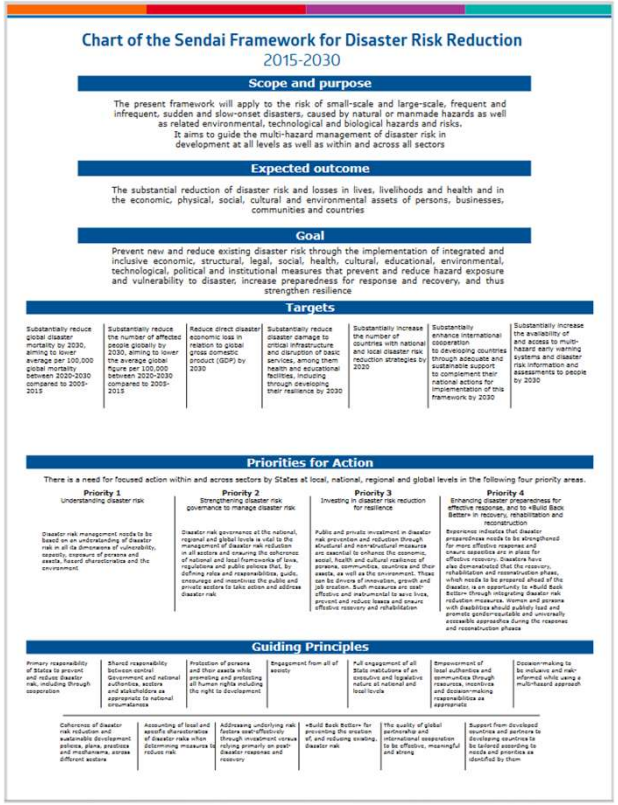


Chart of the Sendai Framework for Disaster Risk Reduction
2015-2030

Scope and purpose

The present framework will apply to the risk of small-scale and large-scale, frequent and infrequent, sudden and slow-onset disasters, caused by natural or manmade hazards as well as related environmental, technological and biological hazards and risks.
It aims to guide the multi-hazard management of disaster risk in development at all levels as well as within and across all sectors

Expected outcome

The substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries

Goal

Prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience

Targets

Substantially reduce global disaster mortality by 2030, aiming to lower average per 100,000 global mortality between 2020-2030 compared to 2005-2015

Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 between 2020-2030 compared to 2005-2015

Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030

Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030

Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020

Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of this framework by 2030

Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to people by 2030

Priorities for Action

There is a need for focused action within and across sectors by States at local, national, regional and global levels in the following four priority areas.

Priority 1
Understanding disaster risk

Disaster risk management needs to be based on an understanding of disaster risk in all its dimensions of vulnerability, capacity, exposure of persons and assets, hazard characteristics and the environment.

Priority 2
Strengthening disaster risk governance to manage disaster risk

Disaster risk governance at the national, regional and global levels is vital to the management of disaster risk reduction in all sectors and ensuring the coherence of their implementation within relevant frameworks and public policies that, by defining roles and responsibilities, guide, encourage and incentivize the public and private sectors to take action and address disaster risk

Priority 3
Investing in disaster risk reduction for resilience

Public and private investment in disaster risk prevention and reduction through structural and non-structural measures are essential to enhance the economic, social, health and cultural resilience of persons, communities, countries and their assets, as well as the environment. These can be drivers of innovation, growth and job creation. Such measures are cost-effective and instrumental to save lives, prevent and reduce losses and ensure effective recovery and rehabilitation

Priority 4
Enhancing disaster preparedness for effective response, and to «Build Back Better» in recovery, rehabilitation and reconstruction

Experience indicates that disaster preparedness needs to be strengthened for more effective responses and ensure capacities are in place for effective recovery. Disasters have also demonstrated that the recovery, rehabilitation and reconstruction phase, which needs to be prepared ahead of the disaster, is an opportunity to «Build Back Better» through integrating disaster risk reduction measures. Women and persons with disabilities should publicly lead and promote gender-equitable and universally accessible approaches during the response and reconstruction phases

Guiding Principles

Primary responsibility of States to prevent and reduce disaster risk, including through cooperation

Shared responsibility between central Government and national authorities, sectors and stakeholders as appropriate to national circumstances

Protection of persons and their assets while promoting and protecting all human rights including the right to development

Engagement from all of society

Full engagement of all State institutions of an executive and legislative nature at national and local levels

Empowerment of local authorities and communities through resources, incentives and decision-making responsibilities as appropriate

Decision-making to be inclusive and risk-informed while using a multi-hazard approach

Coherence of disaster risk reduction and sustainable development policies, plans, practices and mechanisms, across different sectors

Accounting of local and specific characteristics of disaster risks when determining measures to reduce risk

Addressing underlying risk factors cost-effectively through investment versus relying primarily on post-disaster response and recovery

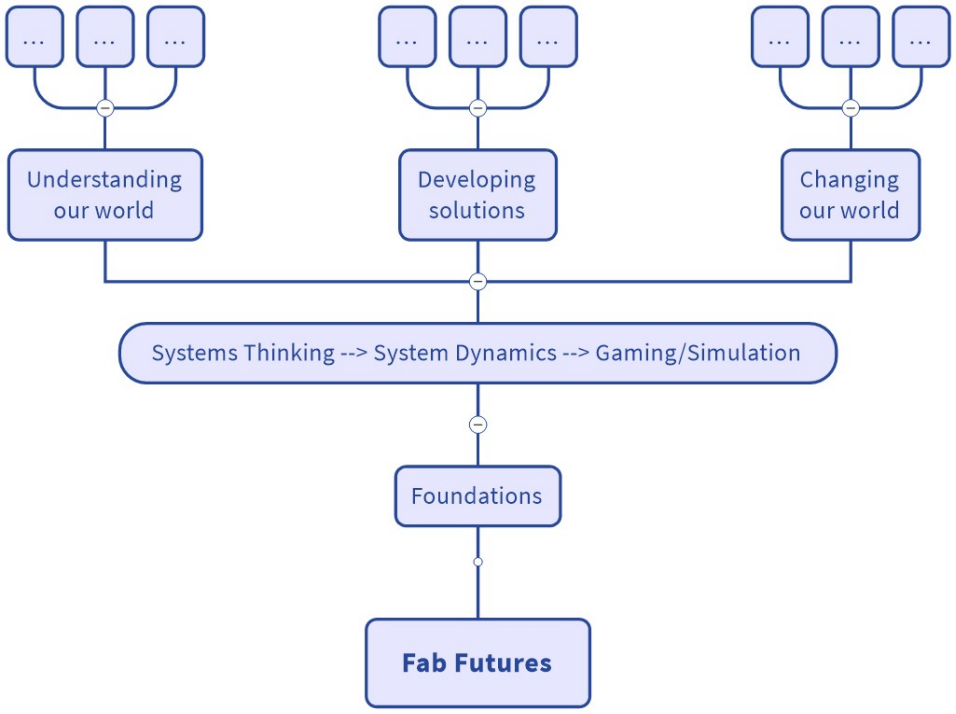
«Build Back Better» for preventing the creation of, and reducing existing, disaster risk

The quality of global partnership and international cooperation to be effective, meaningful and strong

Support from developed countries and partners to developing countries to be tailored according to needs and priorities as identified by them

- Changing our world
- Go forth and multiply your organization, not time 2, but times 50!

7. Power to the Network!



Recommendation:

- Give Fab Futures three pillars:
  - Understandig our world
  - Developing solutions
  - Changing our world
- Add Systems Thinking → System Dynamics → Gaming/Simulation to its foundation courses

Thank You!

These slides plus references and links will be added to our landing page at

https://bit.ly/fab26-sdgs

Global Working Group "Fab Labs and UN Sustainable Development Goals (SDGs)"

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