EPFL EssentialTech Centre

Development Engineering

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Session 1

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Course Team

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Today

- The EssentialTech Centre
- A case for reflection
- Introduction to the course

CELEBRATING
10 YEARS
AND SHAPING
THE NEXT 10

EPFL

EssentialTech Centre

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5 Faculties, 2 colleges… and centers

>444
Laboratories & Chairs

ENAC
Architecture
Civil Engineering
Environmental Science
& Engineering

SB
Mathematics
Chemistry
Physics

IC
Computer Science
Communication Syst.
Data Science
Cyber Security

SV
Life Sciences
& Technology
Bioiengineering

STI
Electrical Engineering
Microengineering
Mechanical Engineering
Materials Science

CDM
Management
of Technology
Financial Engineering

CDH
Human &
Social Science

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Interdisciplinary center

Interdisciplinary center

Interdisciplinary center…

Vision

A world without extreme vulnerability

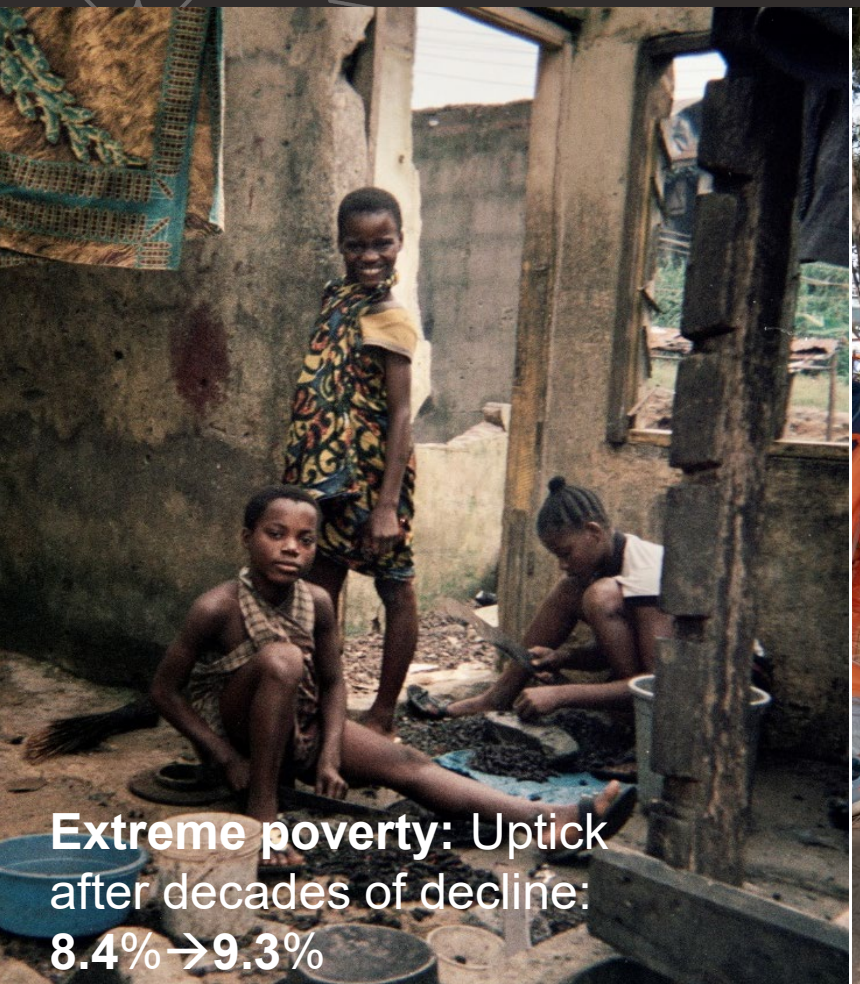
What is extreme vulnerability for you?

Menti.com

Code: 8718 8179

What do these people have in common?

Extreme vulnerability



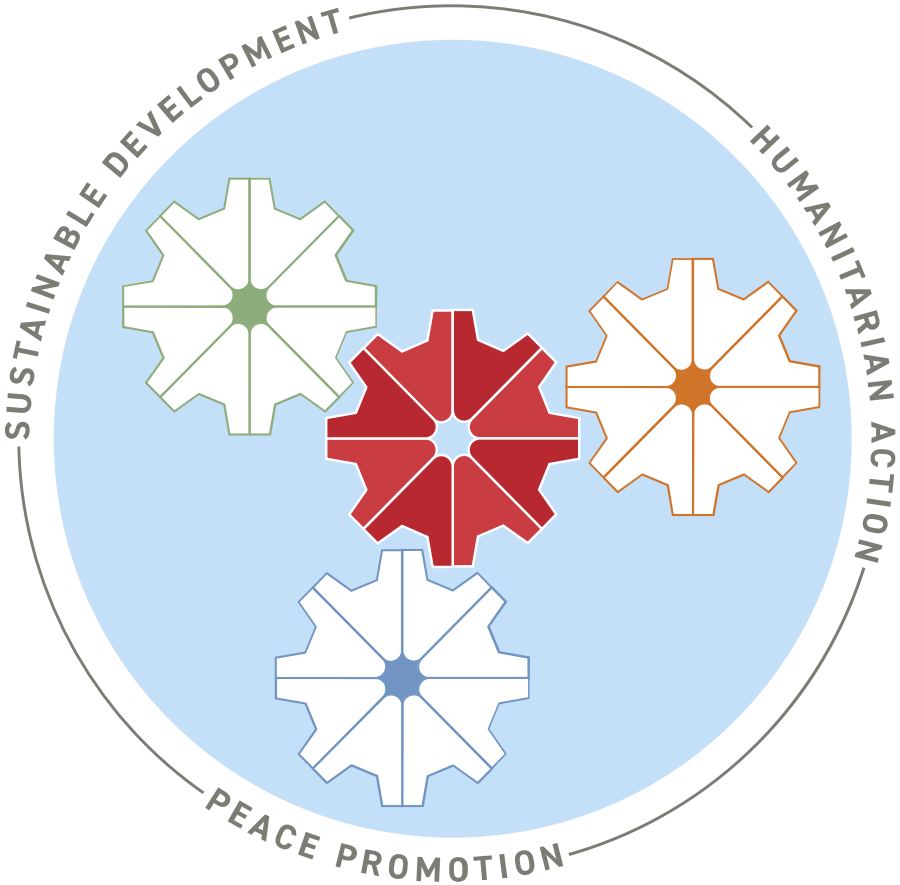
Extreme poverty: Uptick after decades of decline: **8.4%→9.3%**

Humanitarian crises
Forcibly displaced: >**120m**
Need hum.Assist.: >**362m**

Armed conflicts & violence:
84:2010→**182**:2022,
Avg. duration: **x2** in 10y.

Mission

Harnessing science and technology to drive sustainable development, humanitarian action and peace promotion.



→Ambition: sustainable impact at scale

Confusion

- Humanitarian action?
- Sustainable development?
- Peace promotion?

→What do we mean?

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Simple (simplistic) Metaphor

Family:

- **Poor, can hardly survive**
- **…but have a house**

→they are vulnerable

Crisis

“The humanitarians”

Extreme Poverty

“The Development Actors”

Conflict

“The Peace Promoters”

Humanitarian Action

Active provision of aid designed to **save lives**, **alleviate suffering**, and **restore and promote human dignity** in the wake of **disasters** and during large-scale **emergencies***.

- **Generally short-term** assistance to people who need urgent help.
- **Principled**: humanity, neutrality, independence and impartiality.
- Enshrined in **Geneva conventions** and protected under **IHL**

*Dunantist tradition

Sustainable development (this course)

"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. […] ***in particular the essential needs of the world's poor, to which overriding priority should be given****…"*

[Brundtland commission, 1987]

→mid/long-term perspective

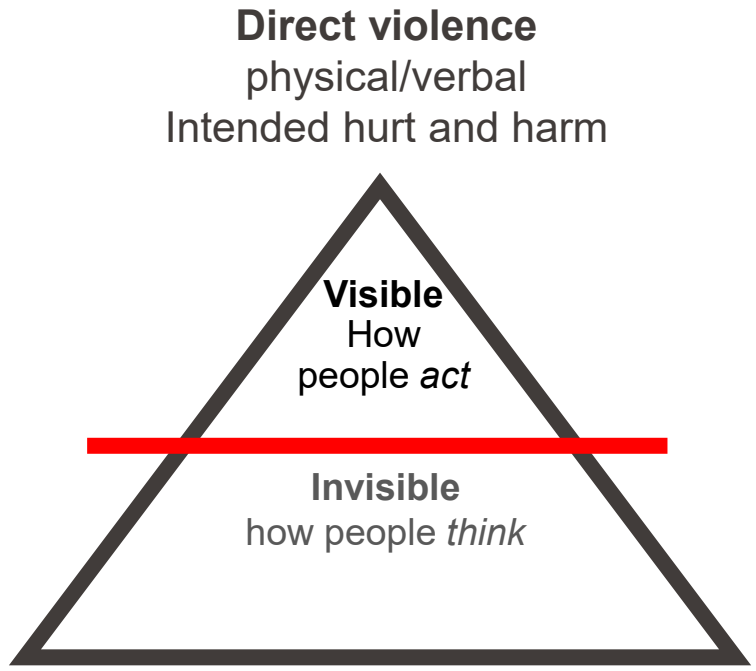
Peace promotion

Promoting and maintaining peace.

Peace??

What is Peace?

Absence of all forms of violence.
[Galtung 1964]



Cultural violence
-Culture, ideology, religion, nationalism
-Victimization, **racism**, sexism

Structural violence
-Inequality, poverty, marginalization,
-segregation, discrimination

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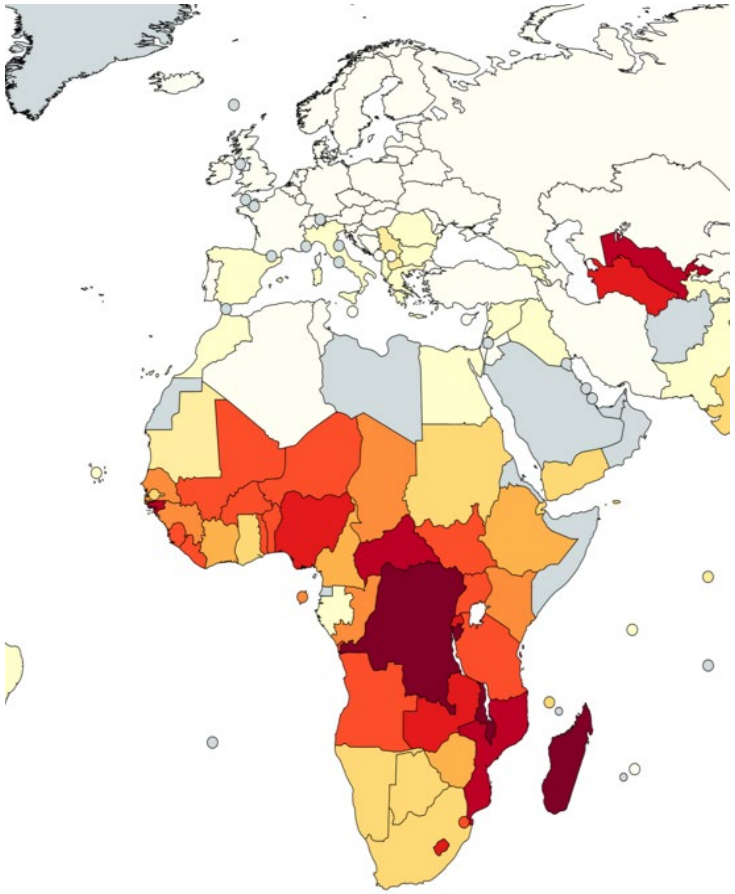
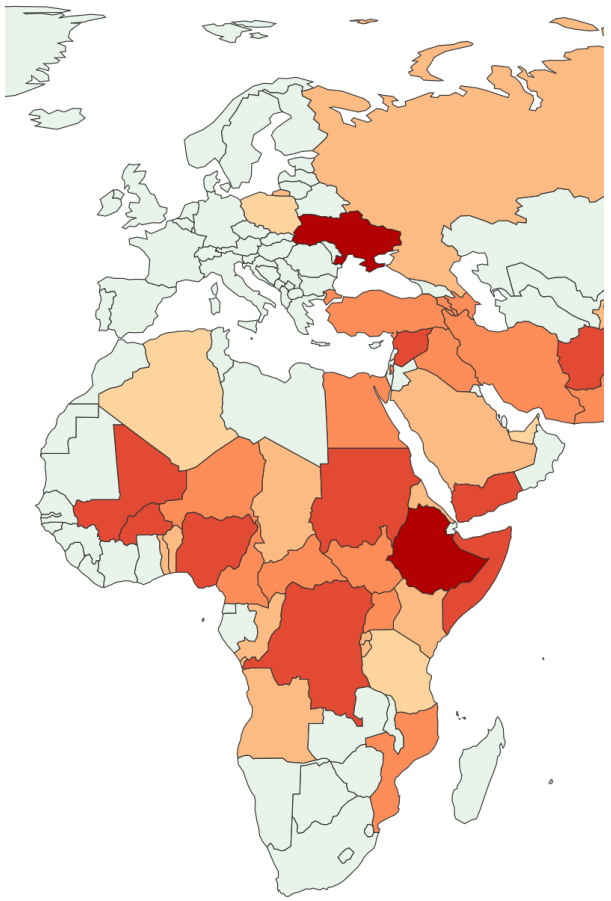
"Humanitarian-Development-Peace Nexus"

Extreme Poverty



Humanitarian crises

Conflicts



NB: focus on this part of the world only as an example. The point is valid worldwide

…are interlinked!

Humanitarian-Development-Peace Nexus

This course

- Interconnected & mutually reinforcing
- Often all 3 are present
- Climate change aggravates all 3

Questions? All clear?

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Development Engineering

ENV-470

Klaus Schönenberger

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Video

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discuss

Expectations/ideas

- What would you like to learn in this class?
- Please feel free to suggest topics!
- It is anonymous.

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ENV-470 Development Engineering

Objective

This course teaches the fundamentals of technologies for development.

You will learn to design

- appropriate, affordable and robust technologies
- sustainable and scalable deployment strategies

…to address **sustainable development challenges with a special focus on extreme poverty in Low-income settings**.

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Topics

- Poverty
- Sustainable development
- (Tech related) Context of LMICs
- Essential Technology domains
- Tech innovation process
- Impact
- Value chains
- Sustainable Business Models

Teaser

Wilhelm Conrad Röntgen (1845-1923)

First x-ray image

First physics Nobel laureate (1901).

1895 → 2024

2/3
OF HUMANITY HAS NO
ACCESS TO RADIOLOGY
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Why ?
©EPFL, Sylvain Liechti

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The need is great…

Trauma
Road Accidents

Tuberculosis

Pneumonia

…but how to address it?

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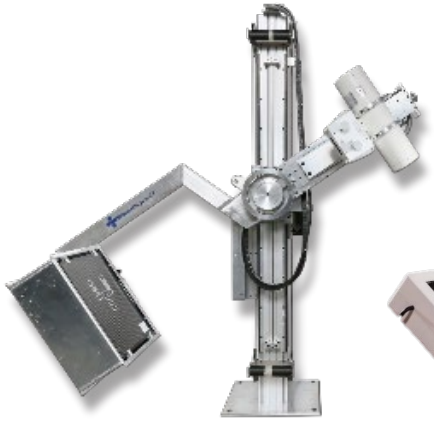
A real case study, still in process!

World Health Organization



First Xray image	WHO: 2/3 have no access	EPFL starts project GlobalDiagnostiX	First Academic Demonstrator	Final prototype, first business model, Start-up.	Full commercial solution, CE marked
1895	1974	2011	2015	2018	2022

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Where do we start?

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~2000 patients diagnosed!

→Scaling-up!

(Series B investment round open)

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Teaching Model

- Combination of ex-cathedra, flipped classroom & group-work.
- Register in the Courseware MOOC (link on Moodle)
- Viewing specific chapters **BEFORE** course is mandatory!
- No grading of exercises in MOOC (quizzes)
- Typical schedule (exact schedule → check Moodle each week):

Time	Activity
3:15 – 4pm	**Watch MOOC videos**
4:15 – 5pm	**Discussion/Guest lecture, Q&A**
5:15 – 6pm	Group work
6:15 – 7pm	

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Guest lectures (tbc)

- Humanitarian Action vs Development (Yves, ICRC)
- Governance, fight against corruption (Claudia, Basel Institute of Governance,)
- Medtech (Pristem SA, Romain)
- ICT (Sacha, Fondation Hirondelle)
- Business Models creation (Marc, EPFL)
- M&E (Nathalie, EPFL)
- Energy (Washima, Prado Power)
- Energy (Dave, Energy Peace Partners)
- Food (Dominique, FAO)
- …and more!

*Attendance is mandatory**

**(Some exam questions will be based on guest lectures)*

Dr Yves Daccord

Dr Claudia Baez-Camargo

Romain Sahli

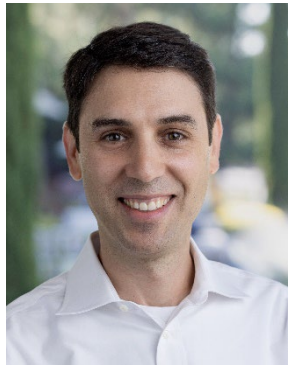
Dr Marc Laperrouza

Sacha Meuter

Nathalie Morandini-Siegrist

Washima Mede

Dominique Burgeon


Dave Mozersky

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Evaluation method

Group work 1 – Critical assessment (10%)

- Goal: Learn how to assess a technology designed for use in LMIC settings.
- Written: each group writes a *2-pager*.

"I would have written a shorter letter, but I did not have the time" [Blaise Pascal]

Group work 2 – Deployment strategy pitch (40%)

- Goal: To be able to propose a robust strategy for a technology deployment.
- Oral: short pitch (10 minutes)

Exam - (50%)

- Goal: To verify good understanding of concepts in the MOOC and guest presentations
- Written: Mix of multiple choice questions + written questions

We reserve the right to adapt individual grades if we see someone is doing all the work in the group, or on the contrary, if someone is not contributing at all.

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Group work session

- Groups will be carefully composed (for diversity of backgrounds)
- TAs available 5:15-7:00pm (except when mentioned otherwise on Moodle).
- Independent work is expected:
  - You might need to apply concepts that have not been introduced before.
  - Logical and evidence-based thinking required.
  - Be creative and imaginative.

Spoiler alert: This course is demanding and work intensive!

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Tools for the course

- **MOOC**: Courseware, link available on Moodle
- **Slides:** will be made available on Moodle.
- **email**
  - For group work, interaction with TAs on questions related to the projects. (Please do not expect instant responses from the team, except during exercise sessions).
  - For questions related to the course organization.
- **Moodle:** Formal reference for course agenda and material!

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Pictures of class

We intend to occasionally take pictures of the class, for our social media.

If you refuse to be photographed, **please email us** and we will of course respect your decision.

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Mandatory and Optional Readings

Mandatory:

- “Know your customers ‘jobs-to-be-done’”. **C. Christensen et al**. , Harvard Business Review, September 2016.

Recommended:

- “The Age of Sustainable Development” by **Jeffrey Sachs.**
- “Factfulness: Ten Reasons We're Wrong About the World – and Why Things Are Better Than You Think” by **Hans Rosling.**
- “Business Model Generation - A Handbook for Visionaries Game Changers and Challengers” by **Alexandre Osterwalder.**
- “Why Nations Fail: The Origins of Power, Prosperity, and Poverty.”by **Daron Acemoglu and James A. Robinson**
- “The Fortune at the Bottom of the Pyramid: Eradicating Poverty Through Profits” by **C.K. Prahalad.**
- “Poor Economics: A Radical Rethinking of the Way to Fight Global Poverty.” **by Abhijit V. Banerjee and Esther Duflo**

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Questions about the course?

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Student team in Tanzania 2013

Call for students

Many project possibilities, in a variety of domains!

Master

Semester

Internships

https://essentialtech.epfl.ch

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Ingénieur·e·s du Monde

Any of you with IdM?

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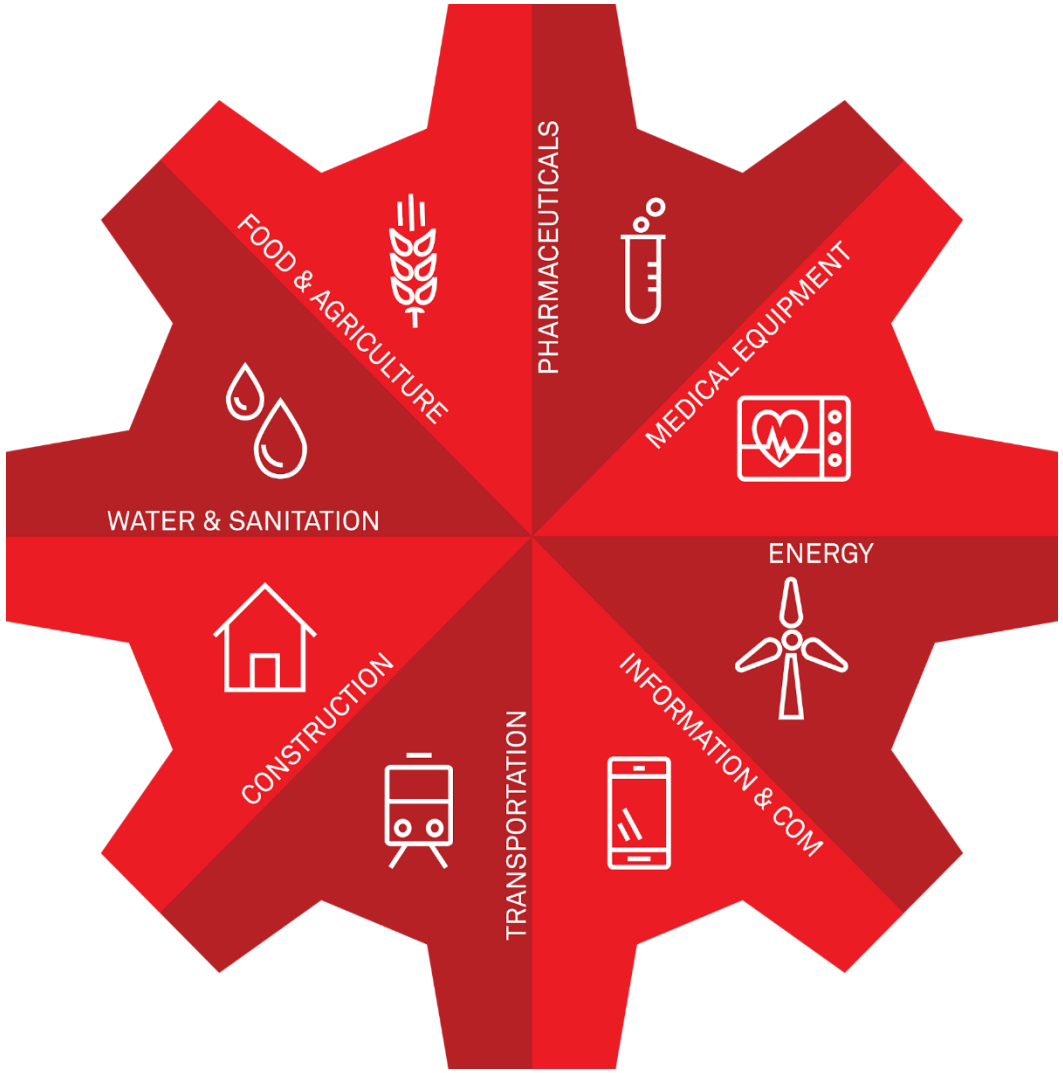
Thank you