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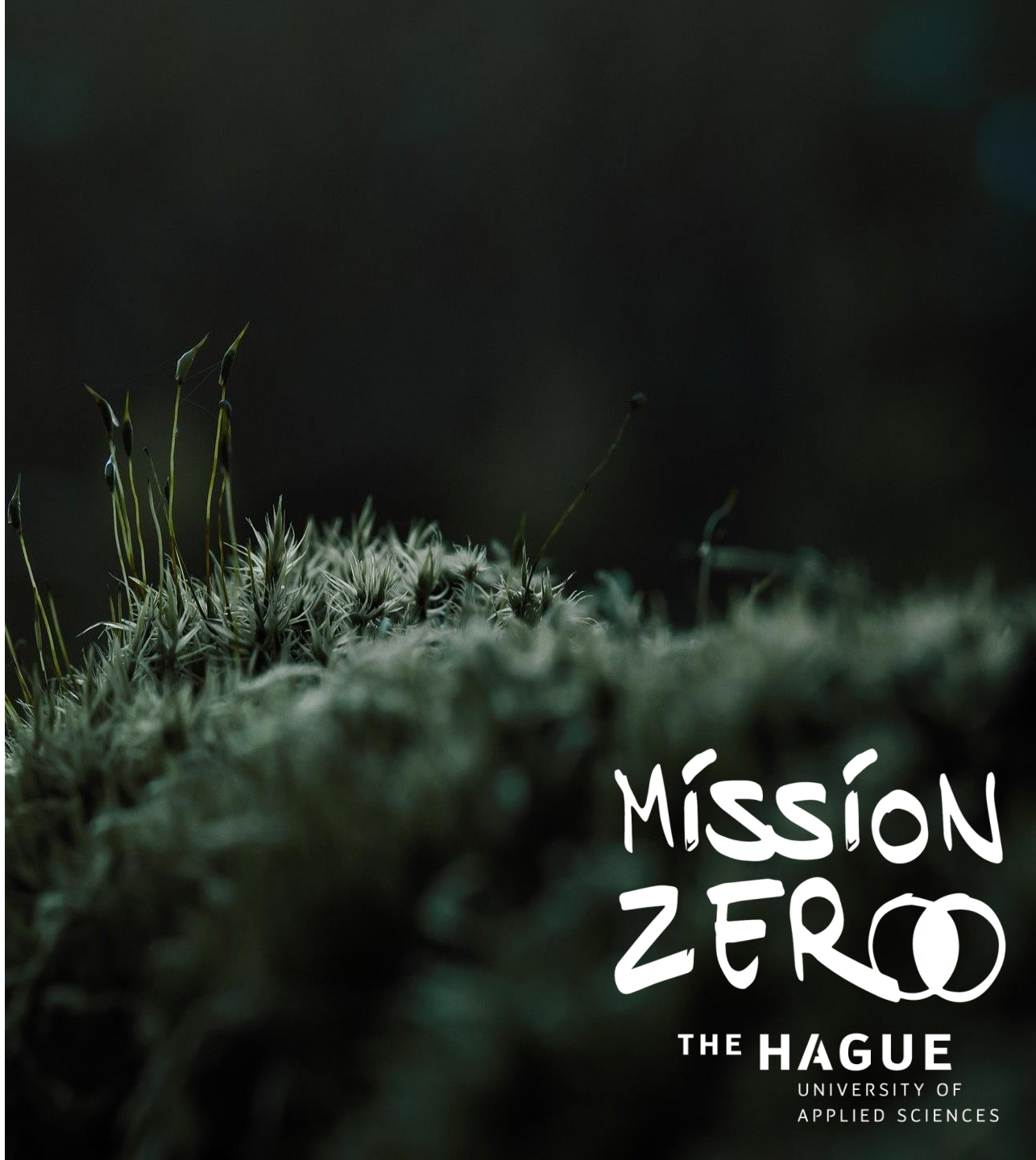
How Do (STEM) Students Navigate Uncertainty in Complex Living Wicked Problems?



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Tame vs. Wicked Problems

Tame problems

- Definable
- Separable
- Findable solutions

vs.

Wicked problems

- Ill-defined
- Essentially unique
- No ultimate solution

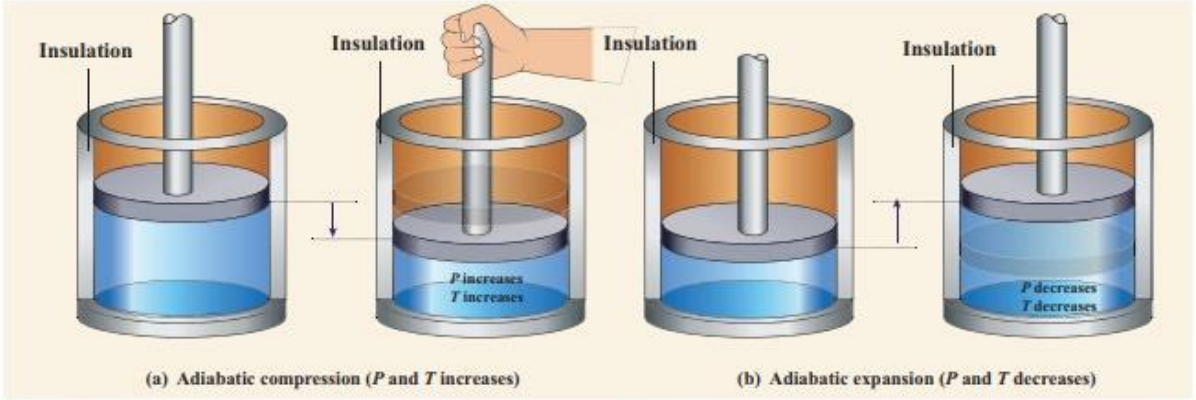

Figure 8.28 Adiabatic compression and expansion

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Tame vs. Wicked Problems

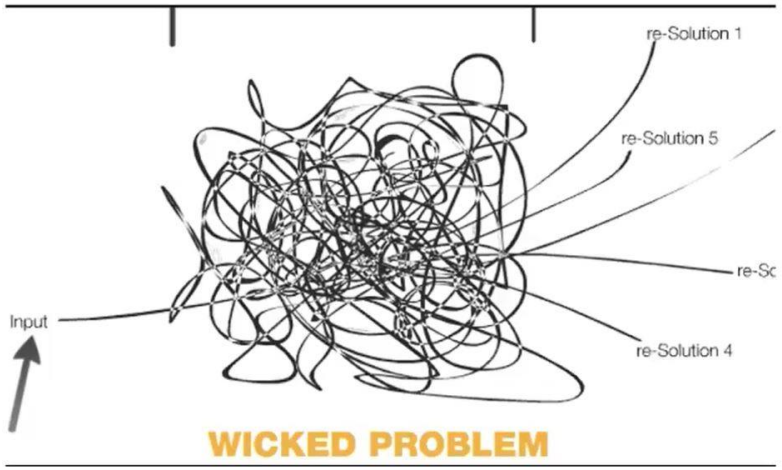
Tame problems

- Definable
- Separable
- Findable solutions

vs.

Wicked problems

- Ill-defined
- No ultimate solution
- Complex and uncertain



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Complex Adaptive Systems

Multi-level interdependencies
- Administrative levels
- Spatial scales
- Technological systems

Fragmented decision-making power
- Problem of 'many hands'
- Absence of central director
- Absence of implementation mechanisms
- Split incentives
- Tragedy of the commons

Multiple grand challenges
- Energy transition
- Climate change
  - Adaptation
  - Mitigation
- Digitization
- Population growth
- ...

Technological uncertainty
- Alternative technologies
- Uncertain costs and benefits
- Path dependency and lock-ins
- Human and institutional behaviour influence technological opportunities and uncertainties

Attuning solutions to local challenges and opportunities
- Learning by doing
- Innovation, experimentation entrepreneurship

TU Delft

Mission Zero

AMS Amsterdam Institute for Advanced Metropolitan Solutions

The Hague University of Applied Sciences

Image: van Bueren, 2021

Higher Education as a Catalyst

Integration of

1) external transitions
2) internal transformation

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Sailing the Seas of Complexity

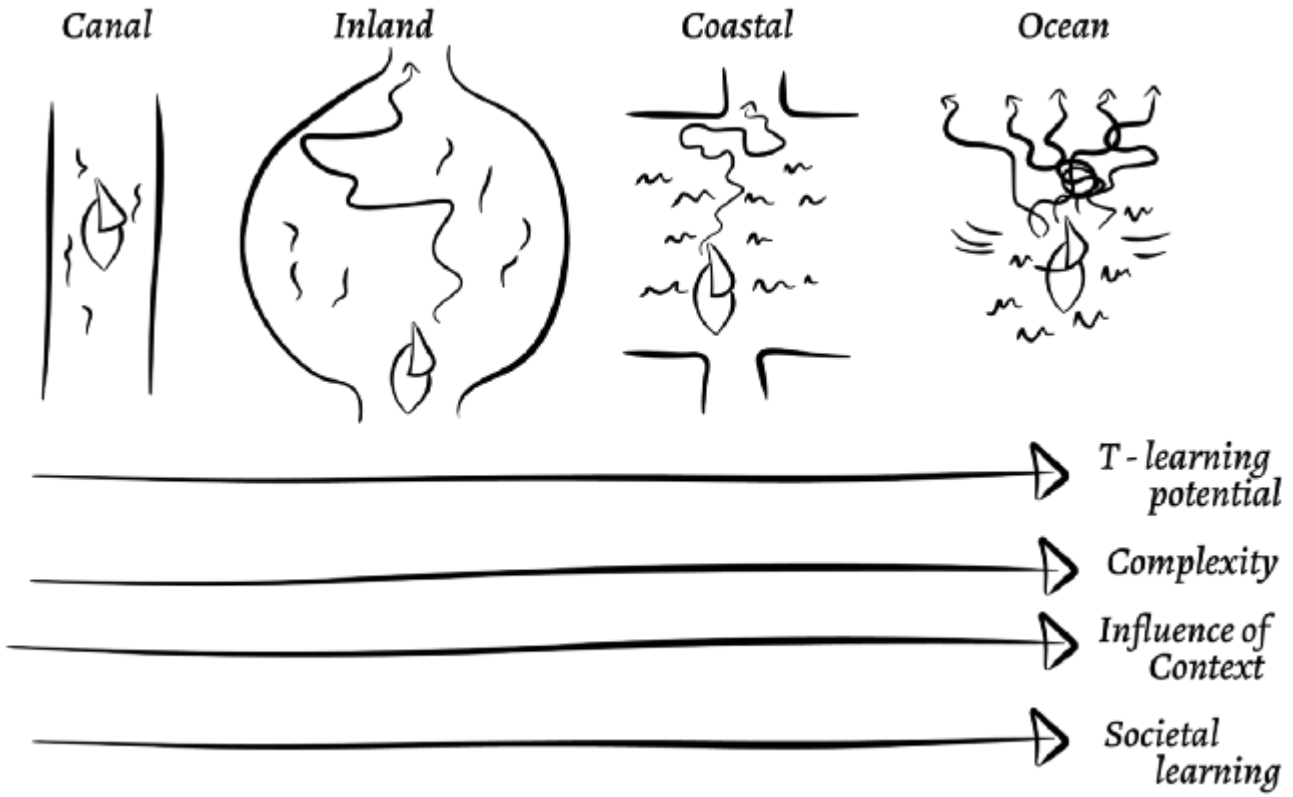

Image: van den Berg, 2021

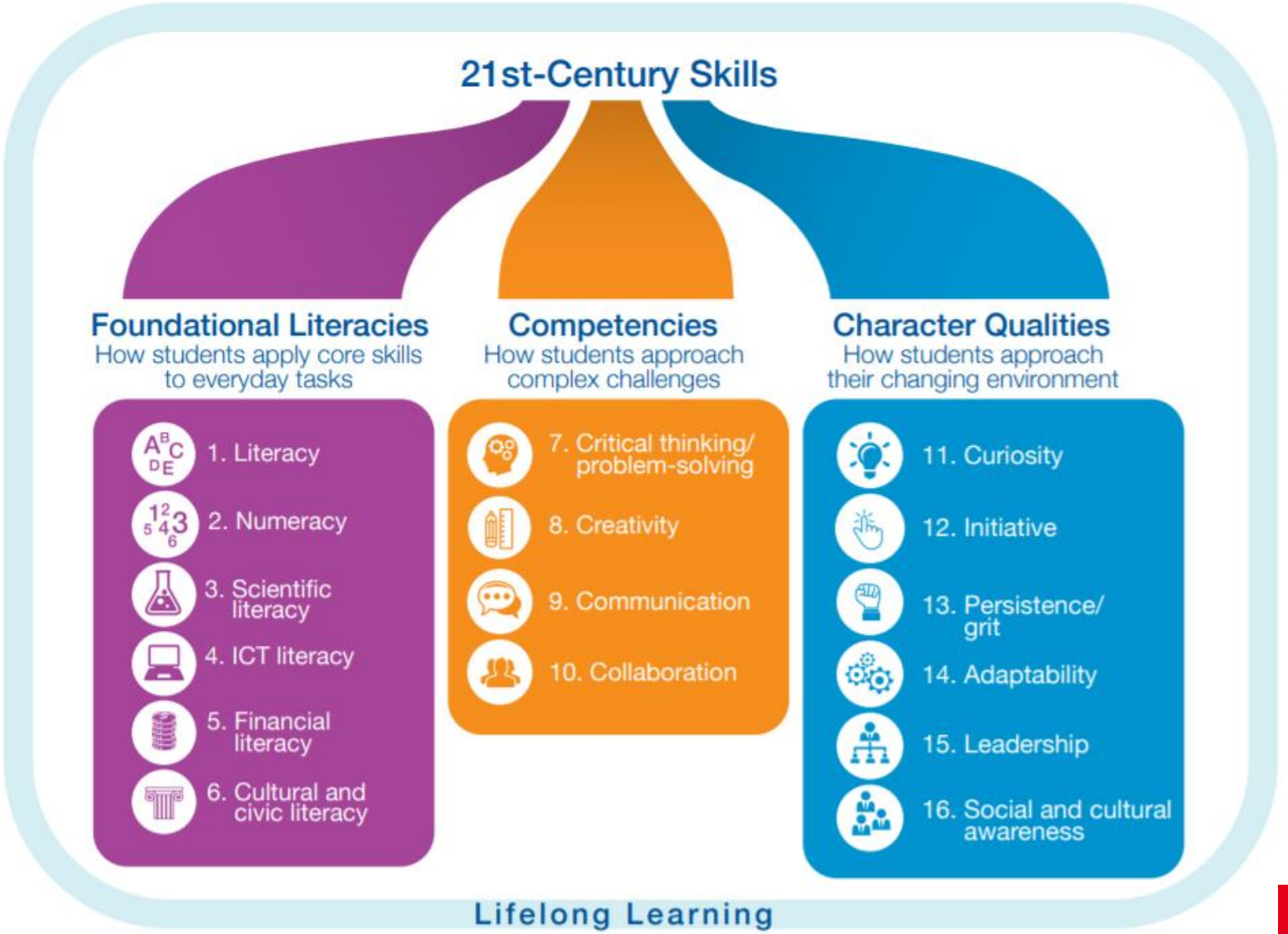

Image: World Economic Forum, New Vision for Education (2015)