COMPETENCY

SYSTEM THINKING COMPETENCY

KEYWORDS

- See the bigger picture
- Understand relationships
- Influence on the system

UNESCO'S DEFINITION

The ability to

- recognize and understand relationships.
- analyse complex systems.
- think of how systems are embedded within different domains and different scales.
- deal with uncertainty.

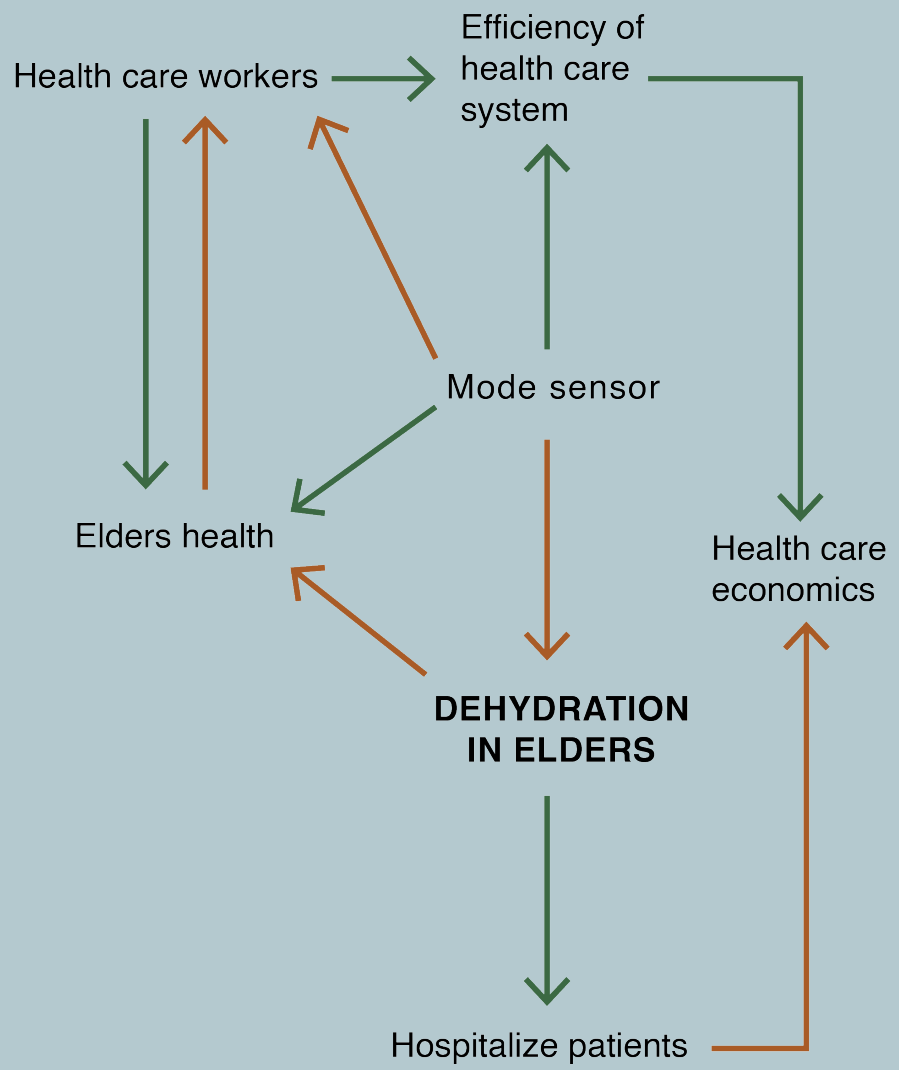
FLIP FOR EXAMPLE

EXAMPLE

Dehydration is a big problem for elders' health and the health care system because of increased hospitilization of patients, leading to high costs.

A sensor can detect when an elder is dehydrated and decrease the amount of resources needed.

Not only will the sensor better elders' health, it will also make the health care system more efficient, but can also lead to less interaction between careworker and elderly.



FLIP FOR DEFINITION

COMPETENCY

ANTICIPATORY COMPETENCY

KEYWORDS

- Future scenario
- Foresee possible problems
- Future effects

UNESCO'S DEFINITION

The ability to

- understand and evaluate multiple futures – possible, probable and desirable
- create one's own visions for the future
- apply the precautionary principle
- assess the consequences of actions
- deal with risks and changes

FLIP FOR EXAMPLE

EXAMPLE

When designing an electronic system today, it is important to keep in mind how available the resources you use will be in the future.
If you use components made of rare metals, will this be as easily accessible in the future as it is today? Are there other materials that can be more sustainable for the future?

FLIP FOR DEFINITION

COMPETENCY

NORMATIVE COMPETENCY

KEYWORDS

- Norms and values
- Trade-offs
- Conflicts of interests

UNESCO'S DEFINITION

The ability to

- understand and reflect on the norms and values that underlie one's actions
- negotiate sustainability values, principles, goals, and targets, in a context of conflicts of interests and trade-offs, uncertain knowledge and contradictions.

FLIP FOR EXAMPLE

EXAMPLE

When planning wind turbine parks, there are many aspects to evaluate. There are differences in values and norms between developers, owners and people living close by. This leads to conflicts concerning wildlife and renewable energy production. Developers need to reflect to find the most ethical compromise.

FLIP FOR DEFINITION

COMPETENCY

STRATEGIC COMPETENCY

KEYWORDS

- Long-term planning
- Develop goals
- Collective actions

UNESCO'S DEFINITION

The ability to

- collectively develop and implement innovative actions that promote sustainability at the local level and further afield.

FLIP FOR EXAMPLE

EXAMPLE

The department of electronic systems is planning to integrate sustainability in the curriculum at their studies. This requires strategies and concrete goals. Some strategies are already developed, but the strategic focus area on sustainability must be used by all parts of the department, in different parts of the curriculum, to together educate students on sustainability. Continuous goals must also be made.

FLIP FOR DEFINITION

COMPETENCY

TRANSDICIPLINARY COMPETENCY

KEYWORDS

- Cooperation
- Respect different fields
- Deal with conflicts

UNESCO'S DEFINITION

The ability to

- learn from others and to transcend the traditional boundaries of one's own discipline or profession
- understand and respect the needs, perspectives and actions of others (empathy)
- understand, relate to and be sensitive to others (empathic leadership)
- deal with conflicts in a group
- facilitate collaborative and participatory co-creation for problem solving

FLIP FOR EXAMPLE

EXAMPLE

In order to develop new medical technology, the stakeholders must work together. The patients, health care workers and the municipality must cooperate to understand the needs and communicate them to the engineers. The engineering company will also have needs that must be fulfilled, which the engineer must take into consideration in order to obtain a satisfying result.

FLIP FOR DEFINITION

COMPETENCY

CRITICAL THINKING COMPETENCY

KEYWORDS

- Analyze problems
- Questioning
- Reflection on pros and cons

UNESCO'S DEFINITION

The ability to

- question norms, practices, opinions and established theories
- reflect on own one's values, perceptions, perspectives and actions
- take a position in the sustainability discourse.

FLIP FOR EXAMPLE

EXAMPLE

Electrical cars and bikes are seen by many as the most sustainable choice for transport. However, this is not always the case. Even though they are driven by clean energy in Norway, it may not be the case in other countries as fossil fuels may be used to produce electricity. In addition, they contain batteries which are difficult to recycle or reuse. You must consider pros and cons and compare with other means of transport to find the most sustainable choice.

FLIP FOR DEFINITION

COMPETENCY

CREATIVITY COMPETENCY

KEYWORDS

- Think outside the box
- Innovation
- Complex problem solving

UNESCO'S DEFINITION

The ability to

- combine anticipatory, transdisciplinary collaborative and critical thinking competencies to be innovative and to think creatively about solutions to complex problems.

FLIP FOR EXAMPLE

EXAMPLE

In the future resources will become more scarce. This might mean that we need to move away from ownership to sharing goods. As engineers, this shift forces us to find creative solutions for offering functionality rather than products, like transport or cleaning instead of a car or vacuum cleaner. As an example, one can design an app which makes it possible to share things like a car, a vacuum cleaner and tools between neighbours.

FLIP FOR DEFINITION

COMPETENCY

SELF-AWARENESS COMPETENCY

KEYWORDS

- Your impact
- Your contribution
- Evaluate actions

UNESCO'S DEFINITION

The ability to

- reflect on one's own role in the local community and (global) society.
- continually evaluate and further motivate one's actions.
- deal with one's feelings and desires.

FLIP FOR EXAMPLE

EXAMPLE

You must be aware of how you can take actions to contribute to sustainable development such as:

- using your smartphone for 5 years instead of 1
- starting recycling initiatives
- consider the values of the company you work at, and how they work towards a sustainable development
- reflect on how your innovations may affect society and the world

FLIP FOR DEFINITION

COMPETENCY

INTEGRATED PROBLEM-SOLVING COMPETENCY

KEYWORDS

- Complex problems
- Combining competencies

UNESCO'S DEFINITION

The overarching ability to

- apply different problem-solving frameworks to complex sustainability problems and develop viable, inclusive and equitable solution options that promote sustainable development, integrating the other eight competences.

FLIP FOR EXAMPLE

EXAMPLE

In Mo i Rana industrial park, there is a future vision to succeed on circular economy. In order to make this happen they must think alternatively and innovatively. One of the suggestions is to utilize the waste heat and CO_2 from the industry and the nutritious waste water from the fish farms in order to grow vegetables. There are several things to think about when projecting the new greenhouse, and a strategic plan must be made. For example one must reflect on how this facility will affect the city, and maybe integrate a meeting place (like a restaurant) in order to contribute to a more social sustainable city. One also has to be critical and figure out how these vegetables can compete with imported vegetables in the stores. Will the facility be economical beneficial for the company so they can afford a fair wage to its workers?

FLIP FOR DEFINITION