ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

Theoretical models of health, disability, and ageing

Ageing and Rehabilitation Engineering

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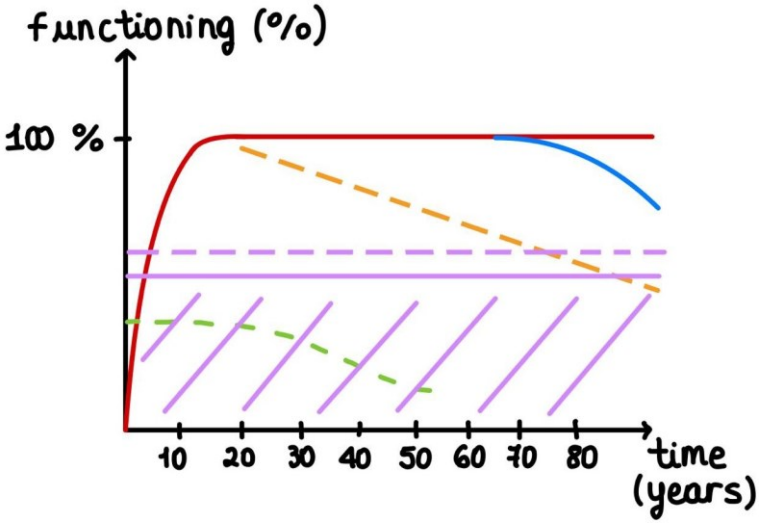
FUNCTIONING-TIME GRAPH

Functioning is the ability of an individual to perform tasks or activities in accordance with a specific purpose.



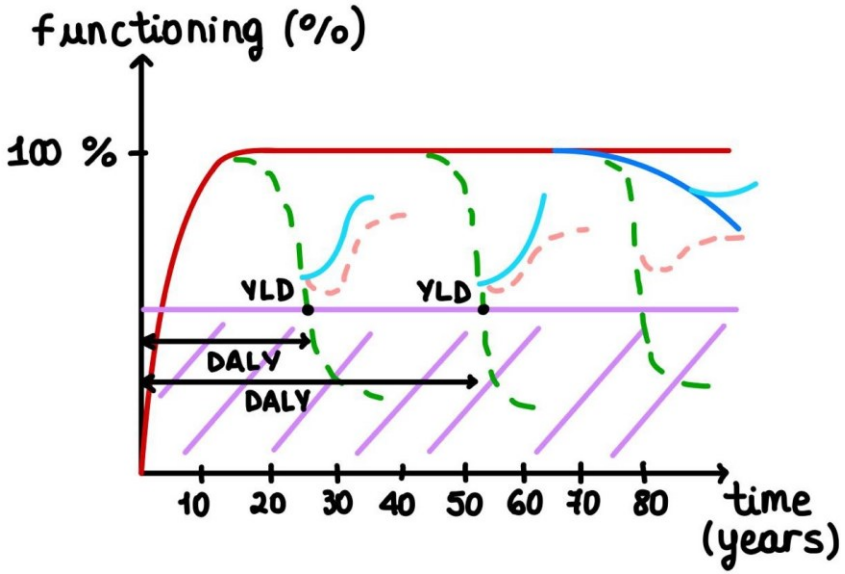
Ideal functioning: functioning should be kept at 100%.
Realistic functioning: loss of functioning due to healthy ageing (starting approximately around the age of 65). It appears as a slow and progressive decline.

But, due to diseases, additional loss of functioning can occur:

- Neurodegenerative disease: progressive, slow, and constant, like an accelerated ageing.
- Disability at birth: reduced level of functioning from birth.
- Disability area: area defined by a loss of functioning with clear consequences on quality of life. It has not a specific threshold.

SUDDEN LOSSES

At any point in life, an individual can experience accidents, with sudden loss of functioning.



Acute events: dropping in functioning due to external factors or internal failures.

A patient can recover functioning through:

1) Self-recovering: just through adaptation.
2) Rehabilitation: by reversing the decrease in functioning. This process can benefit from the usage of innovative technologies.

In the graph we can also observe:

- YLD: years lived with disability.
- DALY: disability-adjusted life years.

How can we REVERSE these trajectories?

First, we need to understand the situation acquiring a priori knowledge.

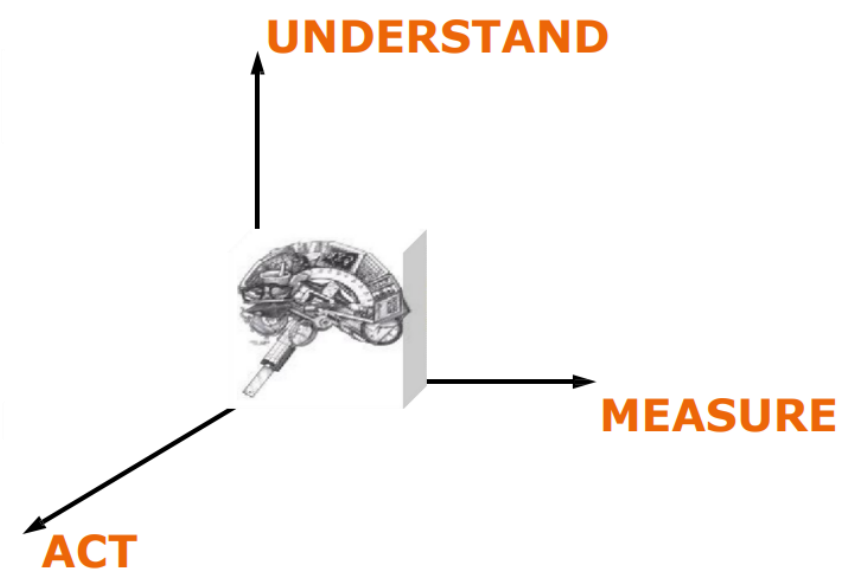
Then, two basic actions are needed to reverse the functioning decrease:

1) Design an intervention: we have to act and improve the tools with:
    a. Physical/mechanical energy.
    b. Cognitive/sensory energy (information).
2) Measure the abstract level of functioning: quantify the loss or gain in functioning. It is not easy to evaluate because we investigate the non-manifested latent variables (e.g., speech, memory, balance).

In addition, we can think about a third action: prevention. We act early to protect and avoid any loss. We should do it when the functioning is still intact.

UMA

Understand-Measure-Act (UMA) is the rehabilitation reference frame that combines technologies during recovery.



We can act using tools and paradigms but must integrate rehabilitation technologies.
We can measure with instrumental outcome assessment.
We can understand through theoretical or computational models.