



# Are information technologies and artificial intelligence going to change CPD?

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# What is CPD?

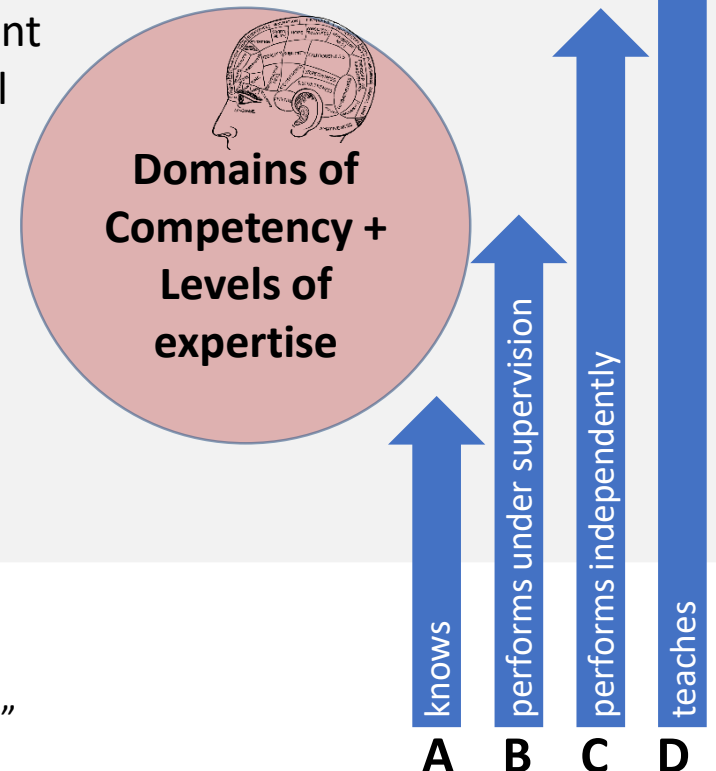
- "Any **process** or **activity** that provides added value to the capability of the professional, through the **increase** in knowledge, skills and personal qualities necessary for the appropriate execution of **professional and technical duties**, often termed **competence**."  
*(Professional Associations Research Network)*
- It refers to the process of **tracking** and **documenting** the skills, knowledge and experience that you gain both **formally** and **informally** as you work, beyond any initial training. It's a record of what you experience, learn and then apply. ([www.jobs.ac.uk](http://www.jobs.ac.uk))

# CPD in Health Care: ESA example

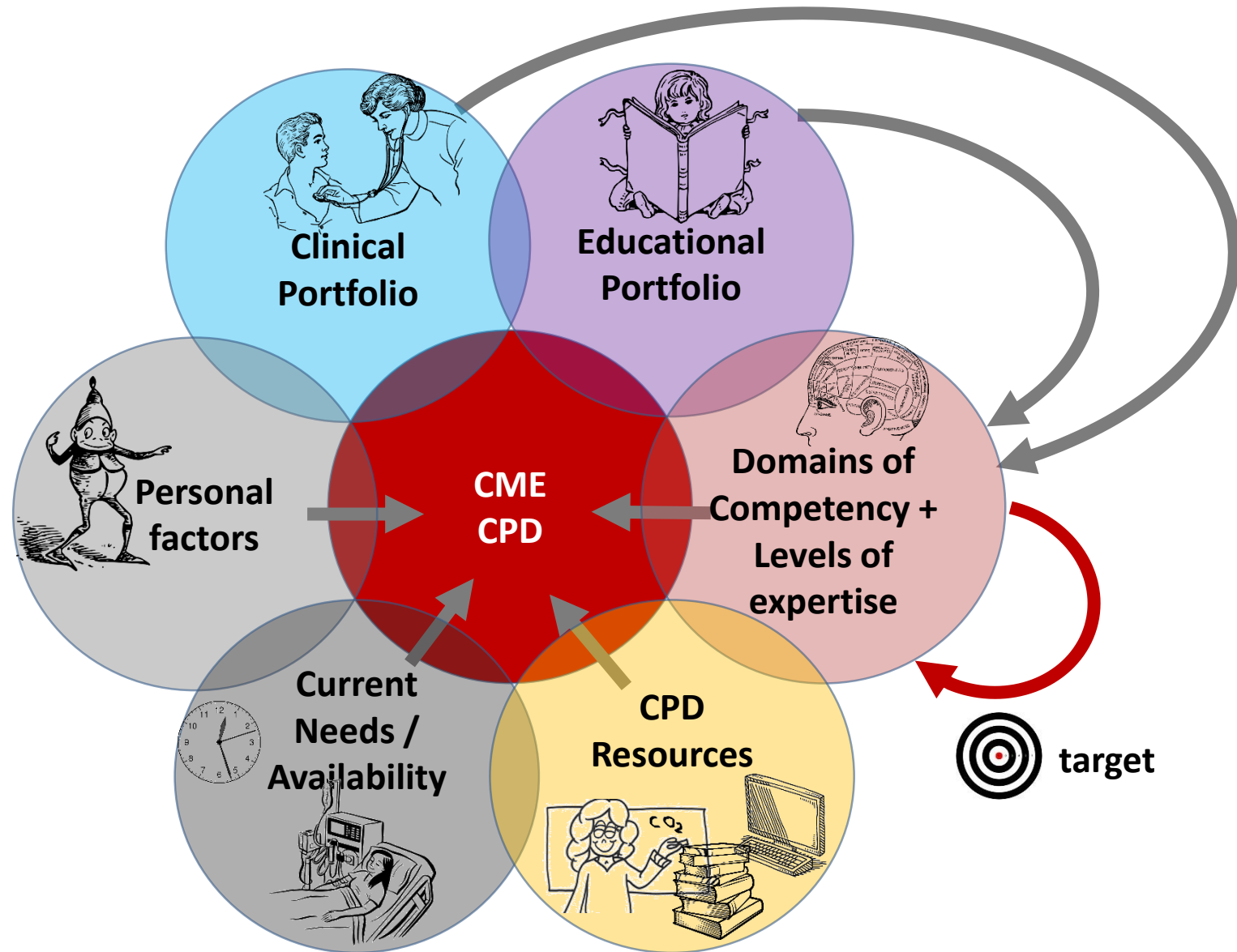
## ESA – Domains of Competency

1. Disease management, Patient assessment and preparation
2. Intra-operative patient care and anaesthetic techniques
3. Postoperative patient care and acute pain management
4. Emergency medicine: management of critical conditions including trauma and initial burn management
5. Medical and perioperative care of critically ill patients / General Intensive Care
6. Practical anaesthetic procedures / Invasive and Imaging techniques / Regional blocks
7. Quality - Management - Health economics
8. Anaesthesia Non-Technical Skills (ANTS)
9. Professionalism and Ethics
10. Education, self-directed learning, research

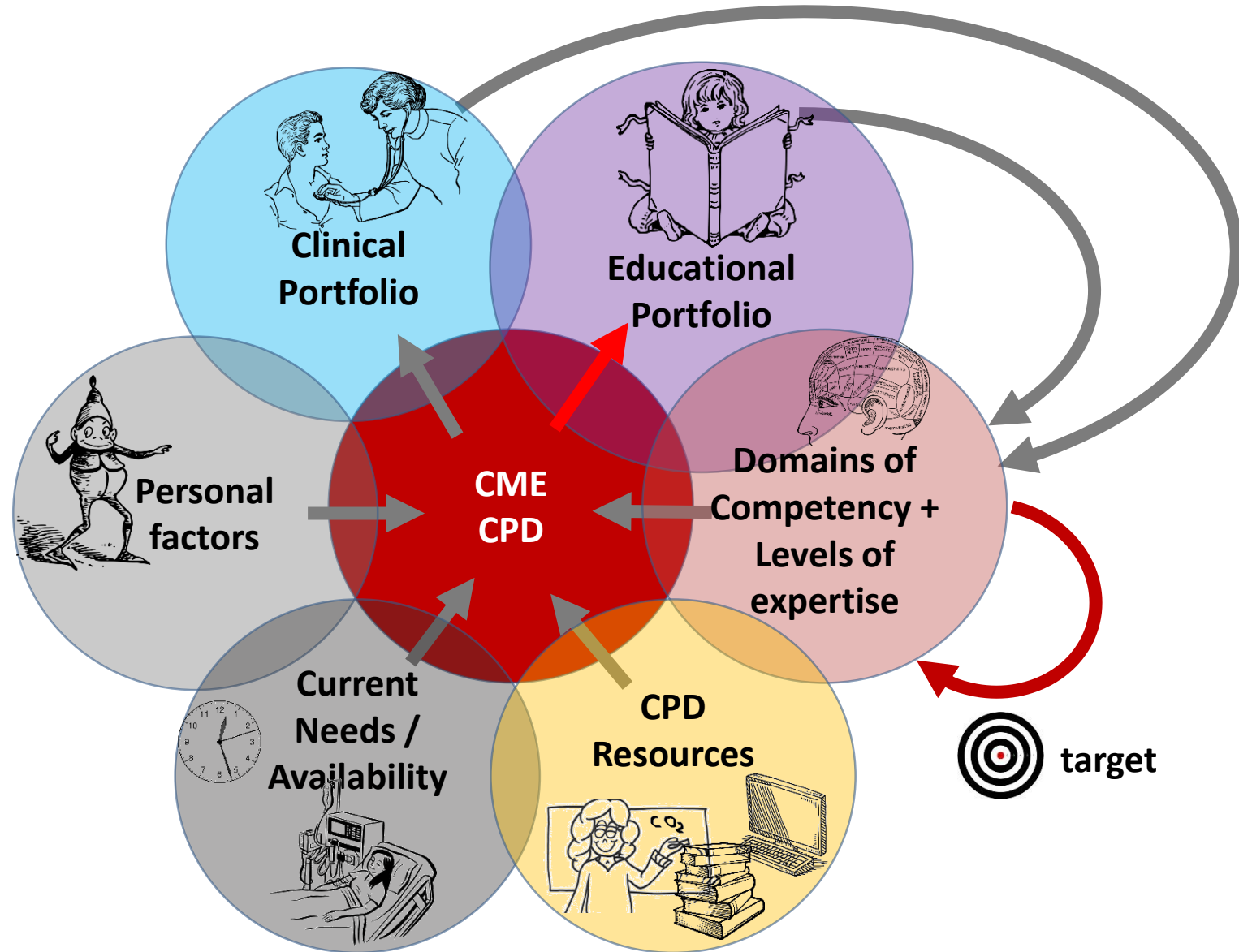
## Levels of Expertise



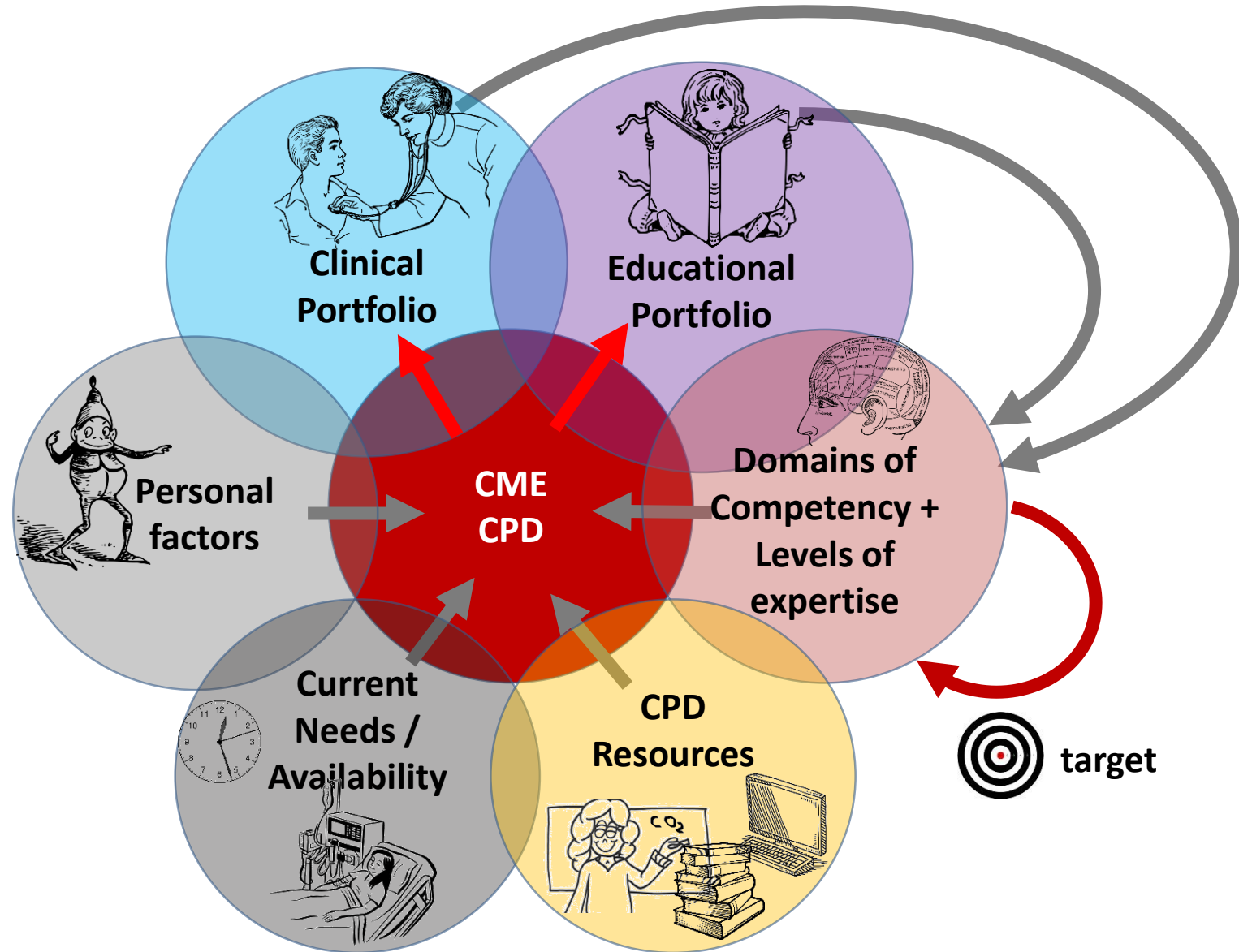
# CPD Cycle for Health Professionals



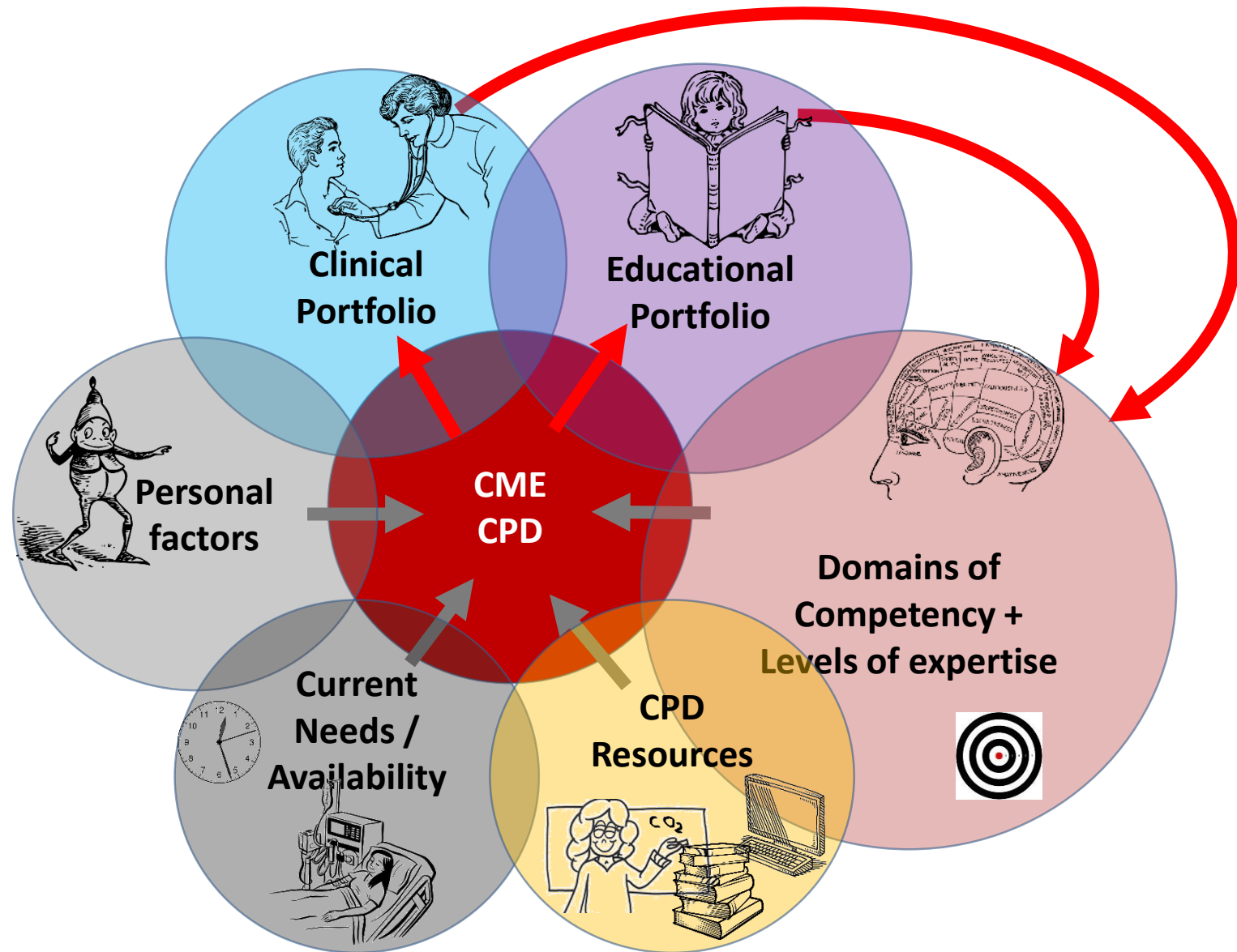
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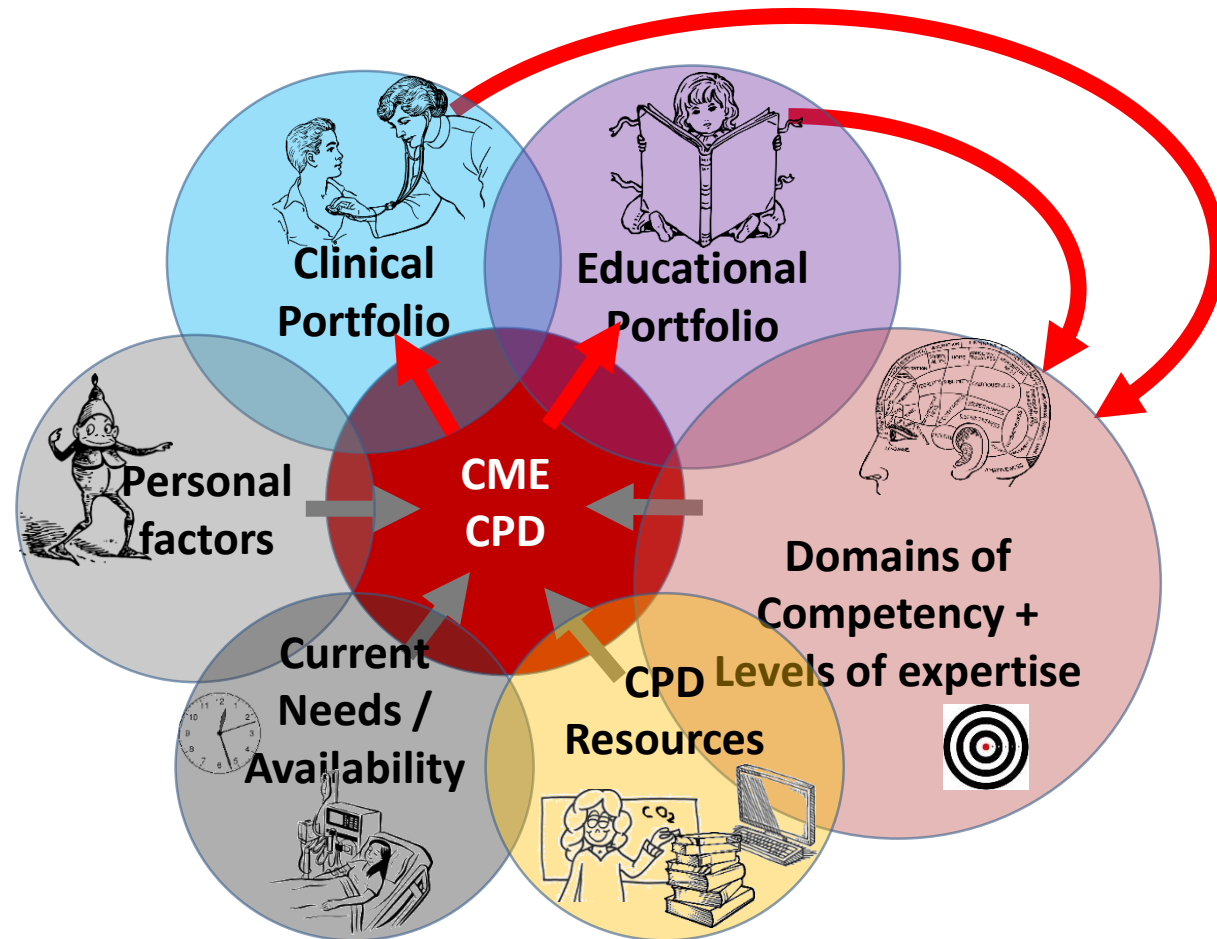
# CPD Cycle for Health Professionals



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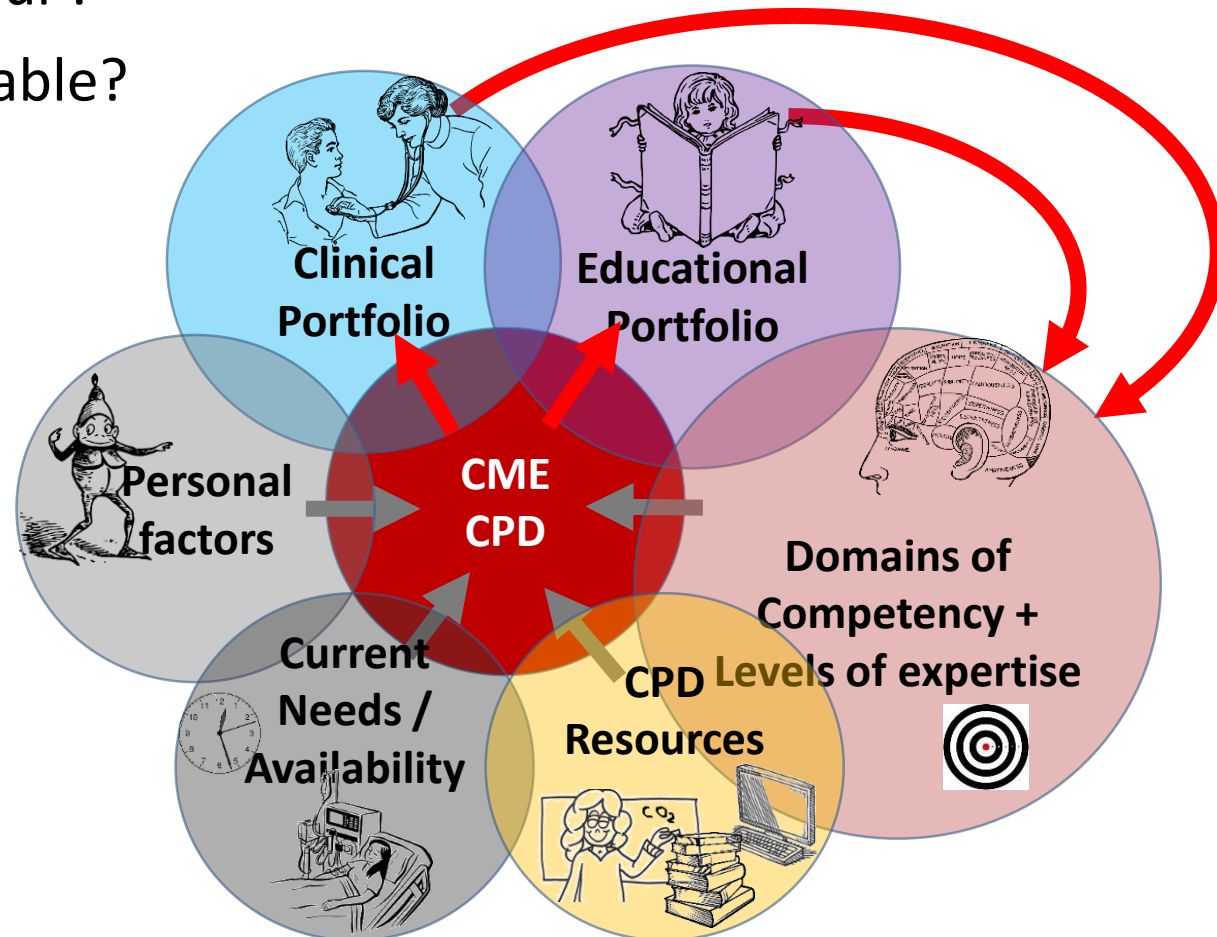
# Can data and technology improve this cycle?





# Can data and technology improve this cycle?

- Which data are helpful ?
- Which data are available?
- Which technology is appropriate?
- Artificial Intelligence
  - machine learning
  - semantic technologies



**Recommender systems**

# Recommender systems

- Predict "rating" or "preference" a user would give to an item
- Increasingly pervade our daily life, recommending books, news, movies, music, research articles, professionals, restaurants, garments, online dates, financial and insurance services etc. tec.
- Much of what large IT companies call "Artificial Intelligence" is basically recommender system technology based on machine learning

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## The White House is meeting execs from Facebook, Amazon, and other tech companies this week to talk about artificial intelligence



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# Popular Recommender Systems – Examples

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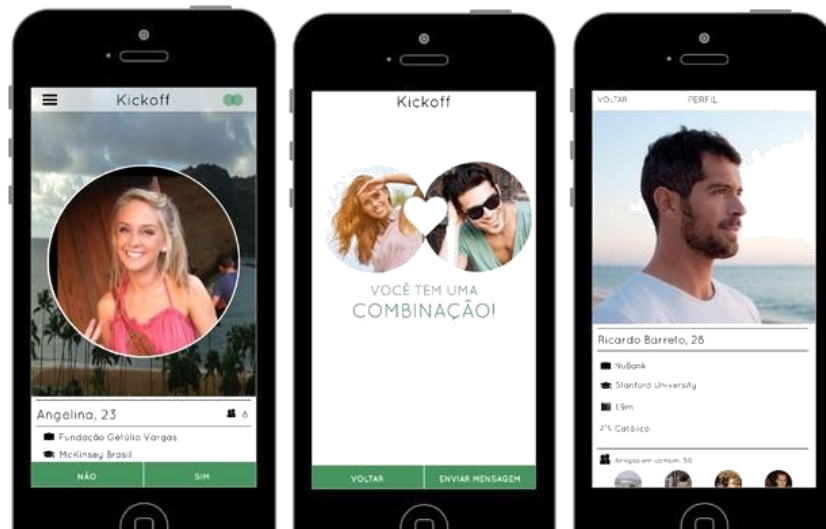
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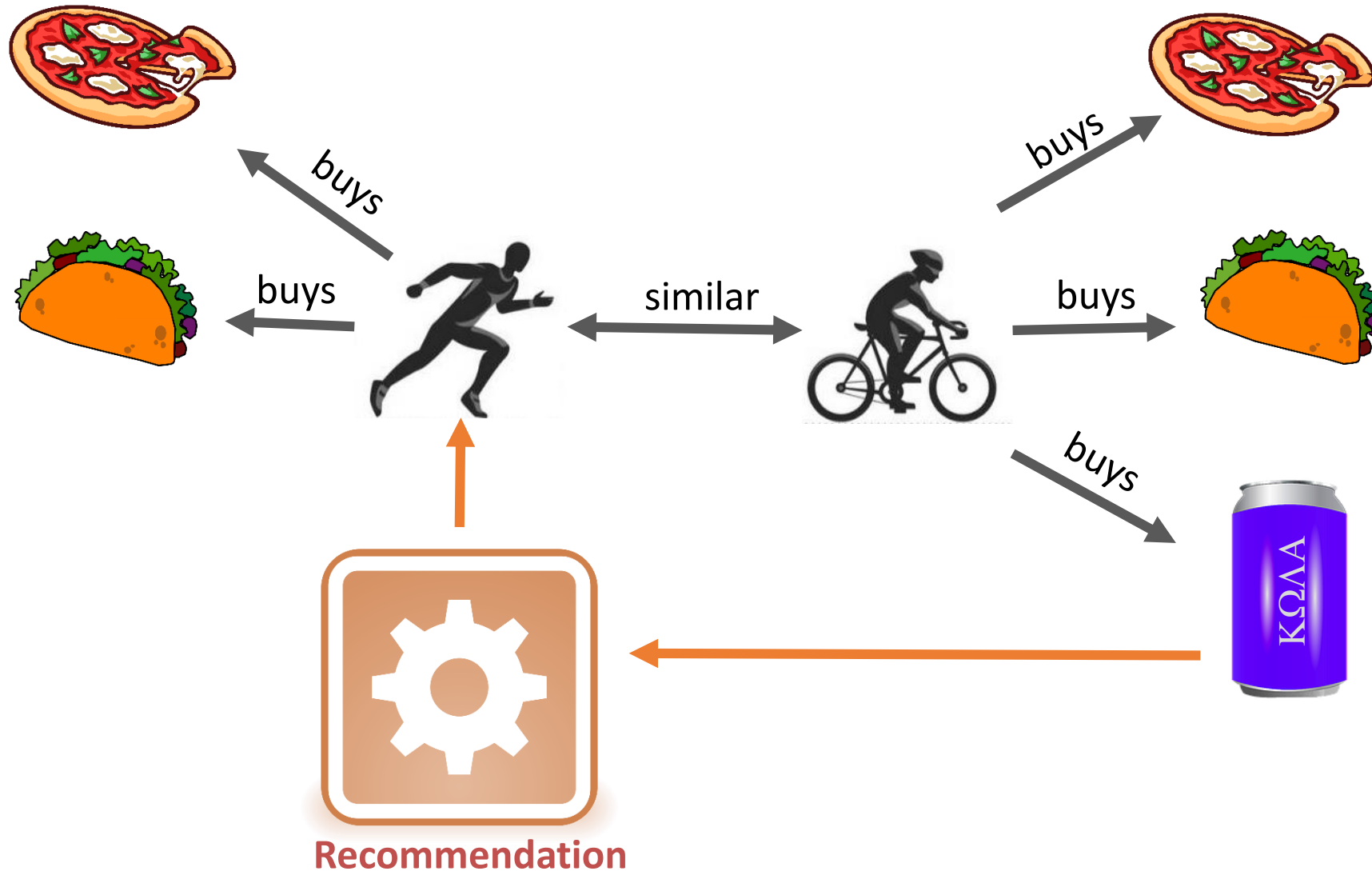
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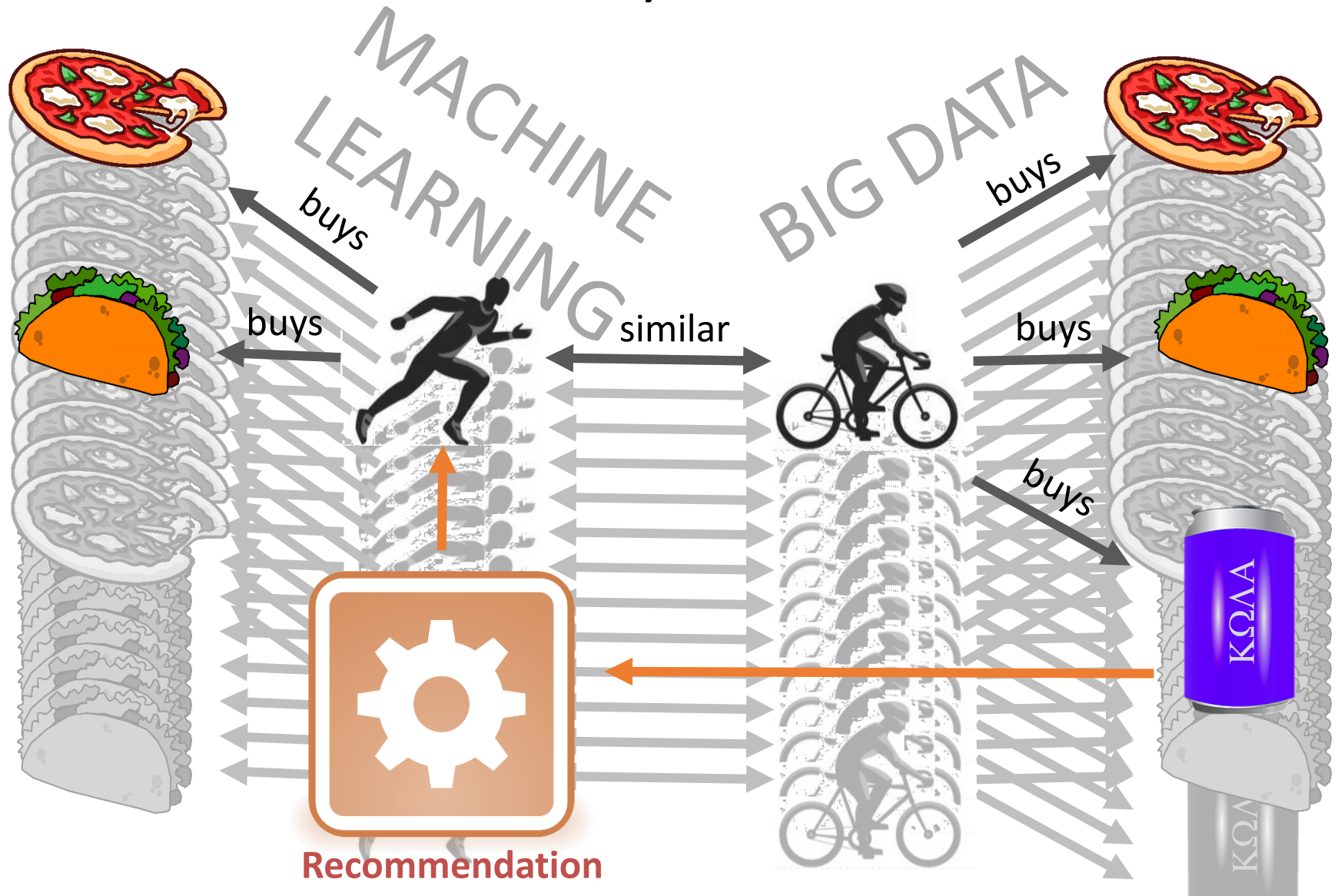
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# How Recommender Systems Work - Example



# How Recommender Systems Work - Example



# How to leverage AI / recommender system technology for CPD ?

- Survey (2015)
  - Main tasks: find items, item sequences, courses, find peers, suggest activities
  - Tendency from pull (IR) towards push interaction
  - User model
    - attributes of user preferences, history, associations
    - tendency from manual attribution of values to automated learning
  - Domain model: attributes / metadata
  - Personalization → from content-based filtering toward collaborative and hybrid filtering
  - Trends: semantic technologies (e.g. natural language processing), context-awareness, visualization, explanation, sharing of datasets

# Clinical data as important resource for learner profiling / personalization

- Aspects

- Track of clinical actions performed and documented by the learner (electronic health record (EHR) extracts of patients treated, procedures performed)
- Current clinical context (information need)
- EHR extracts as supplementary educational resources: images, summaries

- Challenges

- Privacy: de-identification
- Semantics: mostly free text, mapping to standard terminologies and information models adds complexity
- EHR technology: data exports difficult (no function "dump all data I created")



# Educational data as important resource for learner profiling / personalization + resource characterisation

- Learner profiling
  - Track of educational activities performed
  - Classification of individual competencies
  - Educational goals pursued
- Resource profiling
  - Rating of quality / appropriateness, relative to rater (junior, senior, educator) and learner's educational goals
- Problems
  - Management of portfolio of training materials up to learner
  - Semantics: missing metadata, only text / image / video,

# Outlook

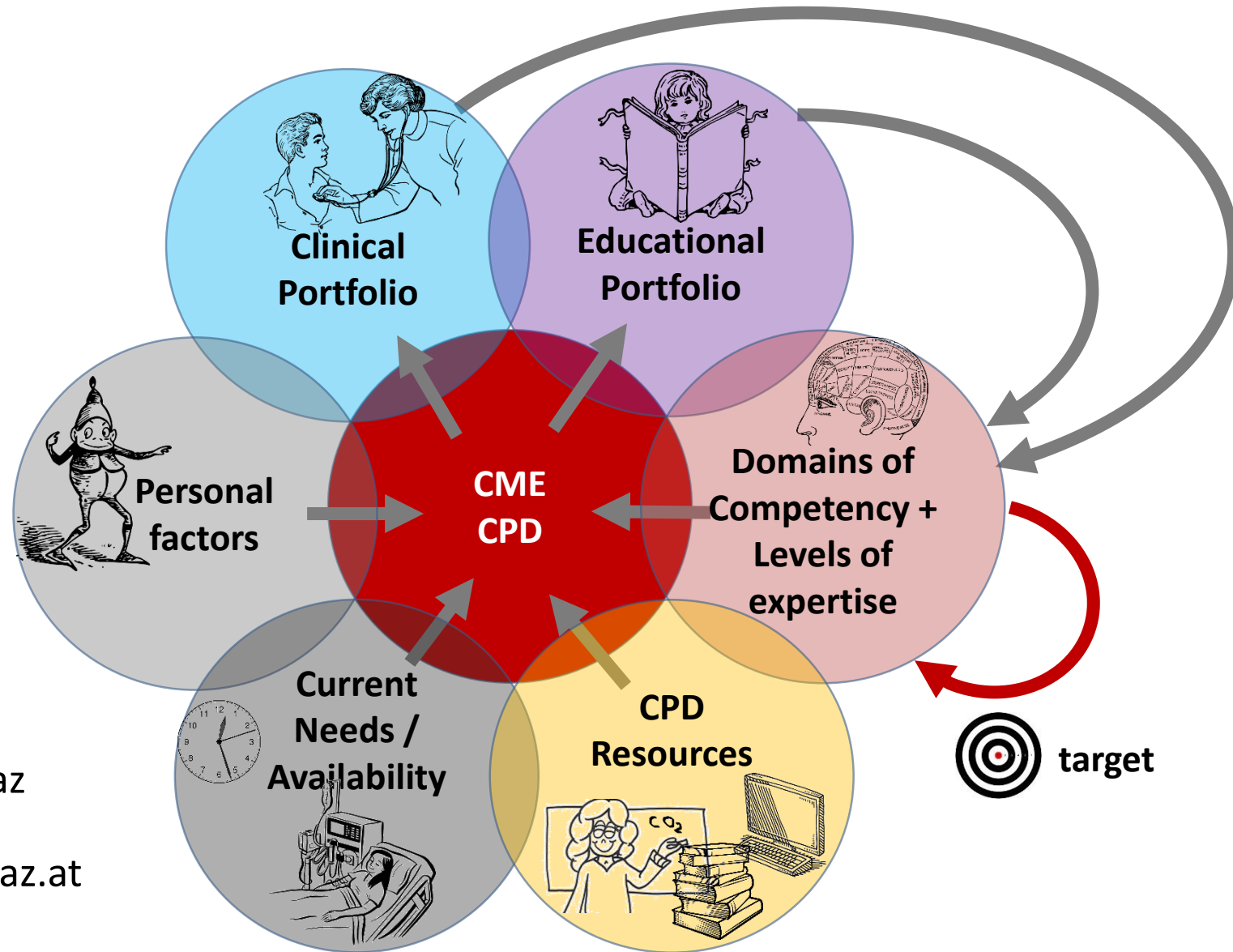
- Recommender technology is everywhere, why not leverage it for CPD in order to present health professionals optimal learning resources tailored to what they need for specific tasks in specific contexts
- Technology increasingly elaborated, much open-source recommender system software
- Bottlenecks: valuable data for profiling exist, but...
  - Difficult data access, ethical issues
  - Difficult data interoperability / re-usability
  - Shared metadata / terminologies standards
- Desideratum: application of FAIR principles for medical education

# FAIR principles – also for educationally valuable resources? ?

Manifesto for sustainable use of scientific research objects (data, workflows, algorithms) by humans and digital agents

- **F – Findable** – Enriching datasets with metadata and annotation to support high quality content retrieval
- **A – Accessible** – Facilitating access to the data according to clear regulation regarding licenses of use and ethical considerations
- **I – Interoperable** – Using machine-readable and internationally compatible standards for semantic annotations and metadata
- **R – Reusable** – Using exhaustive semantic annotations and metadata to reliably repurpose data, by preserving provenance, data production, and other contextual information.

# Thanks!



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