

# **Innovative Patient Centric Care Management of Polychronic Conditions In the Post-COVID Era : Trends, Challenges, and Opportunities**



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# 1. Disruptive Trends of Innovations in Healthcare

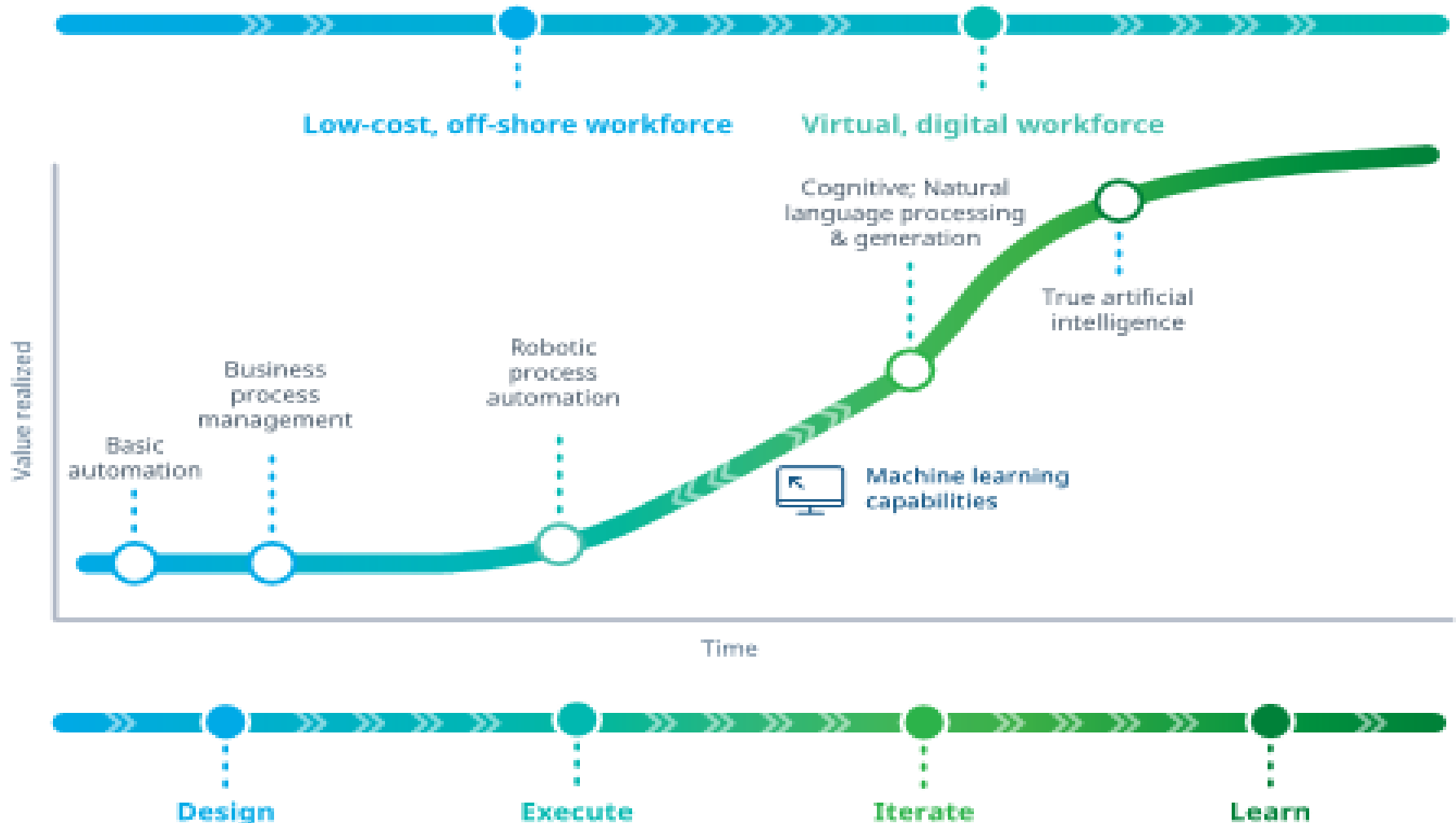
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- ⌘ Healthcare system is an adaptive complexity system as part of a social system (Sentara Health System)
- ⌘ Evolution of healthcare organizations
- ⌘ Digitalization and needs for integration
- ⌘ Technical efficiency drives quality improvement and performance
- ⌘ A missing link in population health management

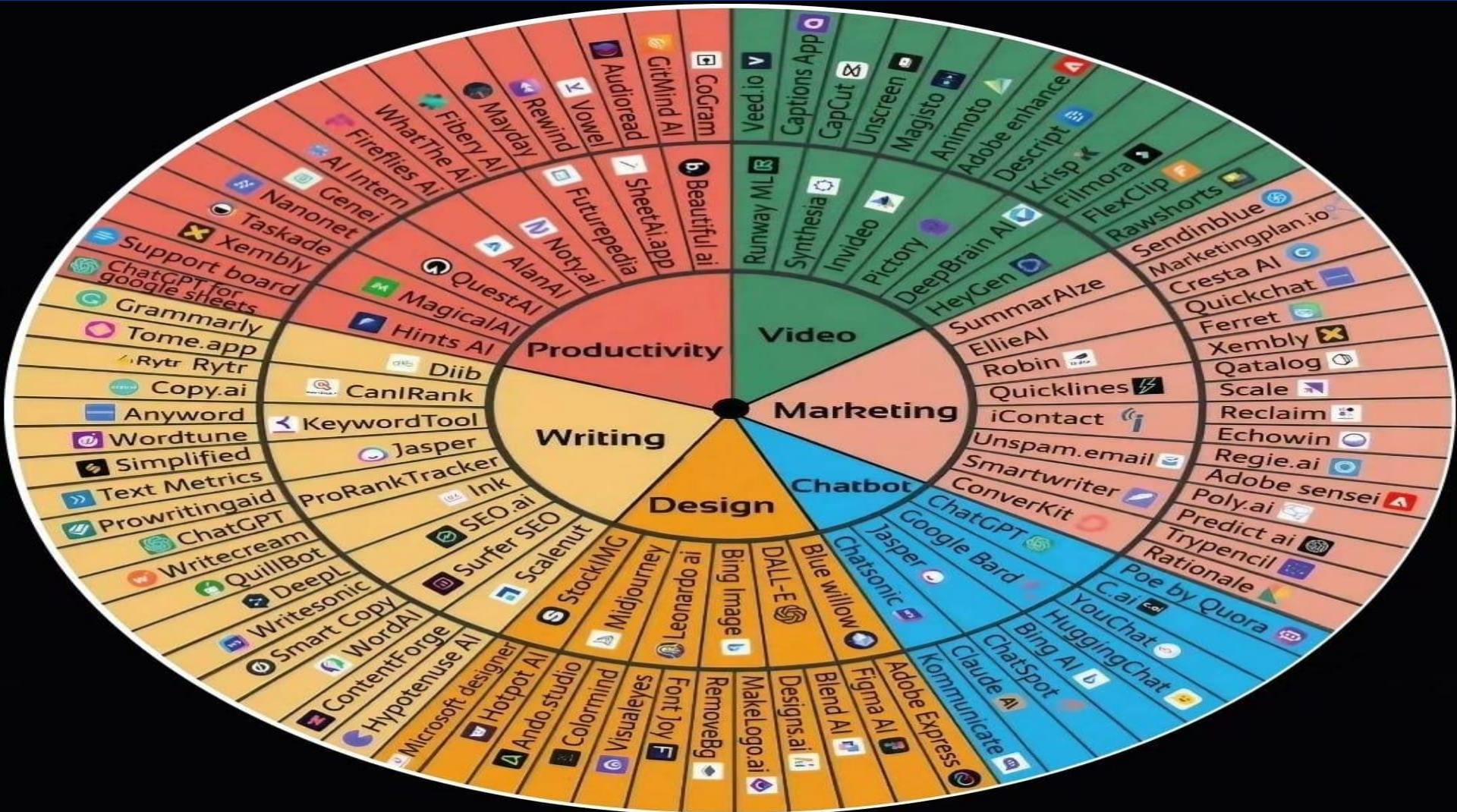
# 2. AI Applications

(William & Nadarajah (2022) IQVIA.com)

Figure 1: Evolution of cognitive/smart machines



# AI Tools Developed & Applicable to KM





# Evolutional Data Science and AI-based Products



- ⌘ Data segmentation and integration
- ⌘ Data warehousing (Databricks)
- ⌘ Machine learning
- ⌘ Natural language processing & large language models
- ⌘ Simulation & expert systems
- ⌘ Predictive analytics & confirmatory research
- ⌘ New and automated product design

### 3. Usefulness of Generative GPTs in Conducting AI-based Research for Chronic Care Management

- ⌘ What are fundamental drivers for conducting AI-based research on polychronic disease management? **Time-person-place trilogy**
- ⌘ What is the utility of ChatGPT in search of new knowledge on selfcare management? **Self-direct learning, learning supplement, knowledge processing, clinical documentation, summarization of reports, etc.**
- ⌘ Can ChatGPT solve the knowledge gaps in selfcare management of chronic conditions? **Partial gap filling**

# Maslow's Hammer



“If the only tool you have is a hammer, you tend to see every problem as a nail.”

Global Trends in Biopharma Innovation  
and Connected Intelligence (IQVIA  
Institute for Human Data Science:  
[www.iqvia.com](http://www.iqvia.com))



## 4. Critical Needs for searching and integrating new knowledge on selfcare management

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### The First KMAP-O Model: Terry Badger (2000)

- ⌘ Knowledge
- ⌘ Management
- ⌘ Adjustment
- ⌘ Prevention
- ⌘ Outcome.

### The Second KMAP-O Model: Water Leutz (1990): integrated care

- ⌘ Knowledge
- ⌘ Motivation
- ⌘ Attitude
- ⌘ Practice
- ⌘ Outcome

# The Third KMAP-O Model for Diabetes Care Research

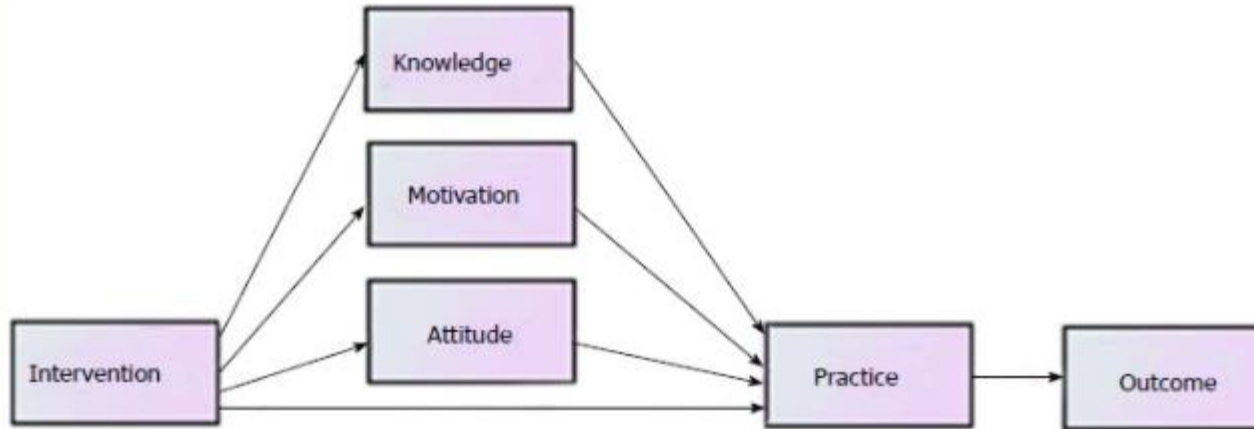


Figure 1

KMAP-O components.

Wan TT, Terry A, McKee B, Kattan W. KMAP-O framework for care management research of patients with type 2 diabetes. World journal of diabetes. 2017;8(4):165.

# **GPT-4 Assistant for Identifying KMAP-O Model in Healthcare: [www.Forefront.ai](http://www.Forefront.ai)**

The KMAP-O model can be applied to manage and leverage knowledge assets within healthcare organizations. Here's how the model can be adapted for the healthcare industry:

**Knowledge:** Knowledge refers to medical information, research findings, clinical guidelines, protocols, and patient data. It includes both explicit knowledge (e.g., medical literature, databases) and tacit knowledge (e.g., expertise of healthcare professionals).

**Methods:** Healthcare organizations need to establish standardized methods and processes for capturing, organizing, and disseminating knowledge. This can include evidence-based medicine practices, clinical decision support systems, and protocols for knowledge sharing and collaboration among healthcare professionals.

**Applications:** Knowledge in healthcare is applied in various areas such as diagnosis, treatment, patient care, and administrative processes. The KMAP-O model can help identify the specific applications of knowledge within different healthcare domains, such as primary care, specialty care, hospital management, or public health.

**People:** It refers to those who are part of the healthcare system (e.g., patient, provider, staff, vendor, etc.).

**Organization:** It refers to the design and structure of healthcare organization .

# 5. Challenges and Solutions for Paradigm Shift in Evidence-Based Management of Polychronic Conditions

1. To develop a sociobiomedical evolutionary learning platform to predict the risk of polychronic conditions at various stages

- ☒ Theoretical specifications
- ☒ Integrated macro- and micro predictors
- ☒ Data mining or model fitting need

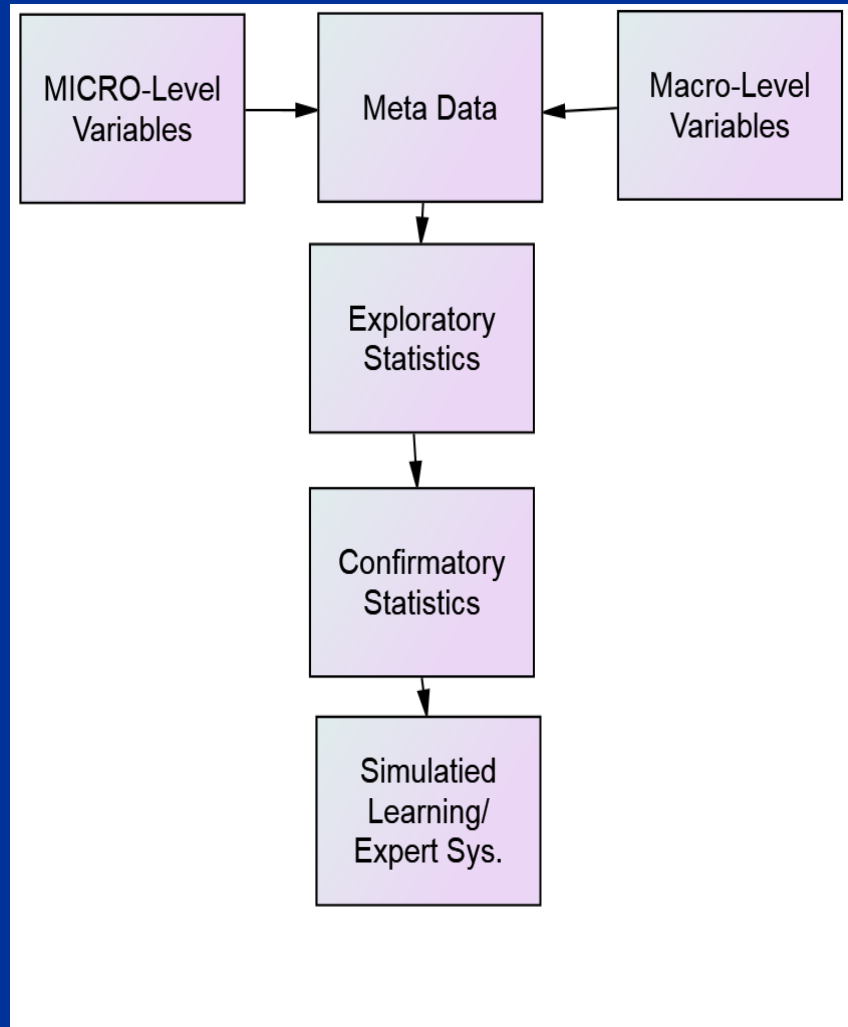
2. To formulate appropriate prescriptive intervention services for a high-risk group of patients with polychronic conditions

- ☒ Disease trajectories and progression
- ☒ Disease management strategies or toolboxes
- ☒ Efficiency and effectiveness in achieving ultimate goals of advancing quality and human dignity

# 6. Opportunities in Conducting Transdisciplinary Research

Predictive equation of personal and social determinants of healthcare outcomes( $O_i$ )

$O_i = f$  [ personal factors, societal factors, Interaction terms + Residual]



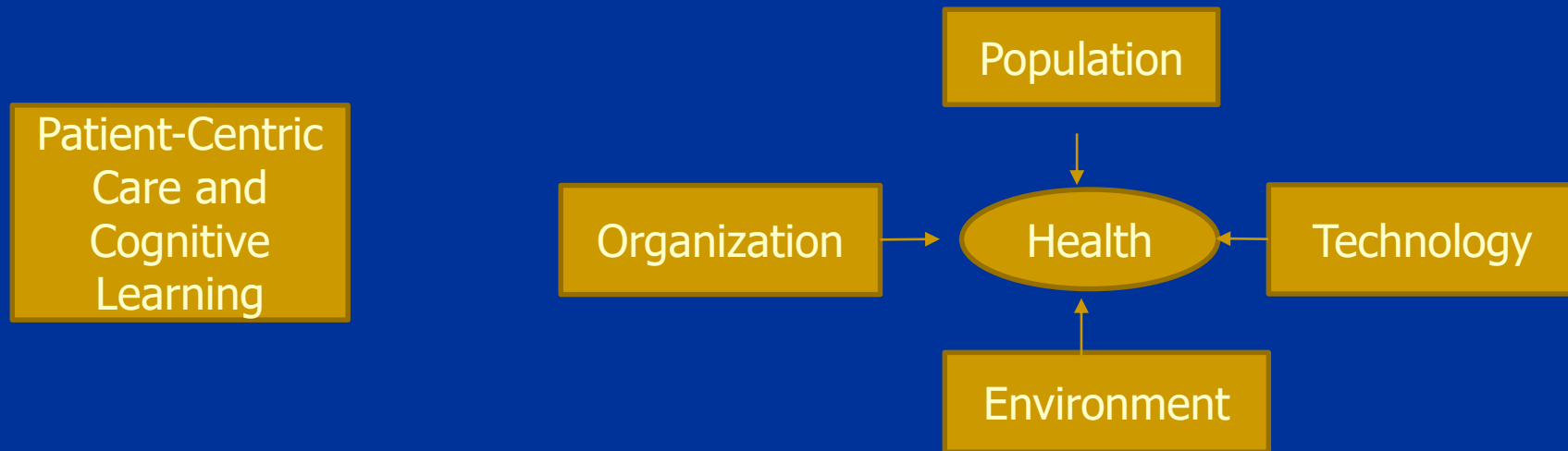
# 7. Transdisciplinary Applications of Meta-Data and Deep Learning Approaches to Confirmatory Research

## Micro-level predictors

- ⌘ KMAP-O Model
- ⌘ CREATION Model

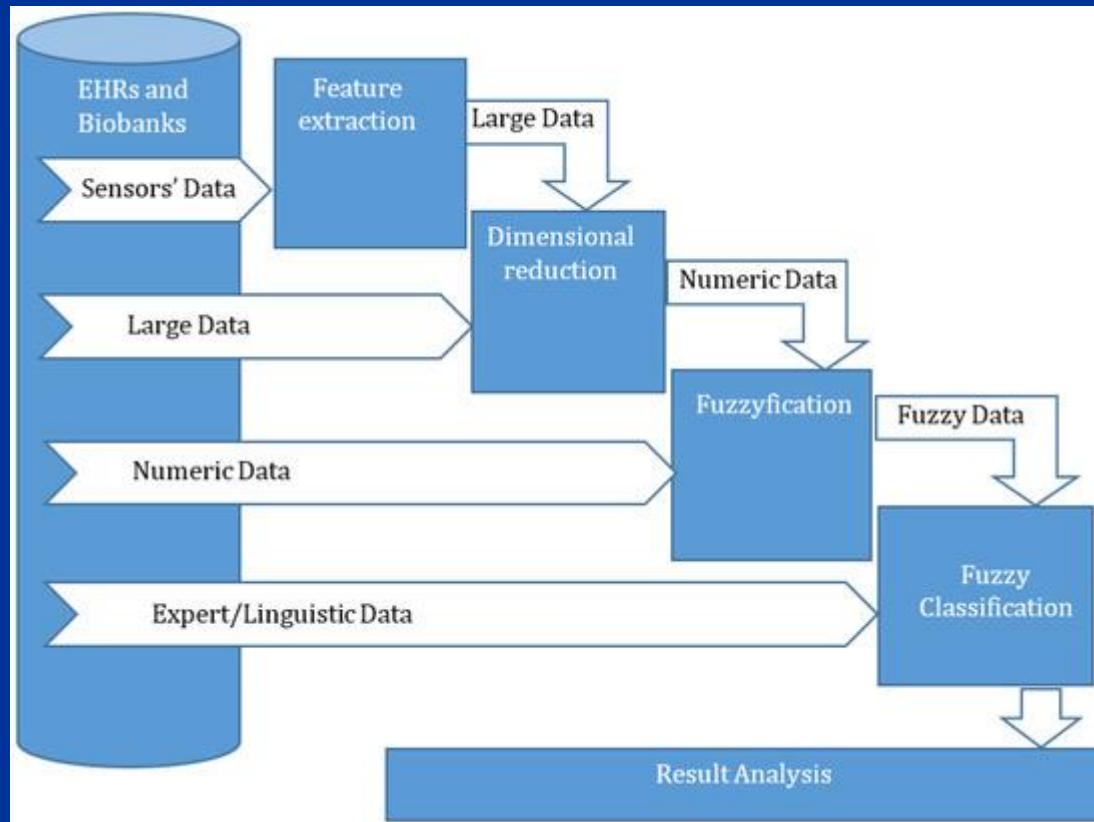
## Macro-level predictors

- ⌘ POET or Ecological Complex Model:





Zaitseva, E. et al. (2023). A New Fuzzy-Based Classification Method for Use in Smart/Precision Medicine. *Bioengineering*, 10(7), 838.



# Future AI Research



## Convergence of Knowledge: Connected Intelligence in R&D

- ⌘ New CKMO (Chief KM Officer)
- ⌘ Teamwork
- ⌘ Multicriteria Optimization

## Predictive analytics

- ⌘ Classification-Fuzzification-Prediction
- ⌘ Simulation, Digitalization, and Visualization
- ⌘ Confirmatory Research

# References

- Wan, T.T.H. (2018)/ Artificial Intelligence Research in Primary Care Management. *Quality in Primary Care*, 26(4): 114-116/
- Wan, T.T.H. (2002). *Evidence-Based Health Care Management: Multivariate Modeling Approaches*. Boston: Kluwer Academic Publishers.
- Wan, T.T.H., Terry, A., McKee, B. Kattan, W. (2017). A KMAP-O framework for care management research of patients with type 2 diabetes. *The World Journal of Diabetes*, 8(4): 165-171. DOI: 10.4239/wjd.v8.i4.165.
- Wan, T.T.H., Terry, A., Cobb, E., McKee, B., Tregerman, R., Barbaro, S.D.S.(2017). Strategies to modify the risk of heart failure readmission: A systematic review and meta analysis. *Health Services Research-Managerial Epidemiology*, 4: 1-16.
- Wan, T.T.H. (2018). *Population Health Management for Polychronic Conditions: Evidence Based Research Approaches*. New York: Springer.
- Wan, T.T.H. (2022). Convergence of Artificial Intelligence Research in Healthcare: Trends and Patterns. *Journal of Integrated Design and Process Science* (January 1) prepublication, 1-14, DOI: 10.3233/JID200002.
- Wan, Thomas T. H., and Hunter S. Wan. 2023. Predictive Analytics with a Transdisciplinary Framework in Promoting Patient-Centric Care of Polychronic Conditions: Trends, Challenges, and Solutions. *Artificial Intelligence*, 4 (3): 482-490. DOI:10.3390/ai4030026.
- Zaitseva, E., Levashenko, V., Rabcan, J., & Kvassay, M. (2023). "A New Fuzzy-Based Classification Method for Use in Smart/Precision Medicine." *Bioengineering*, 10(7), 838.

**Thank You**

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