

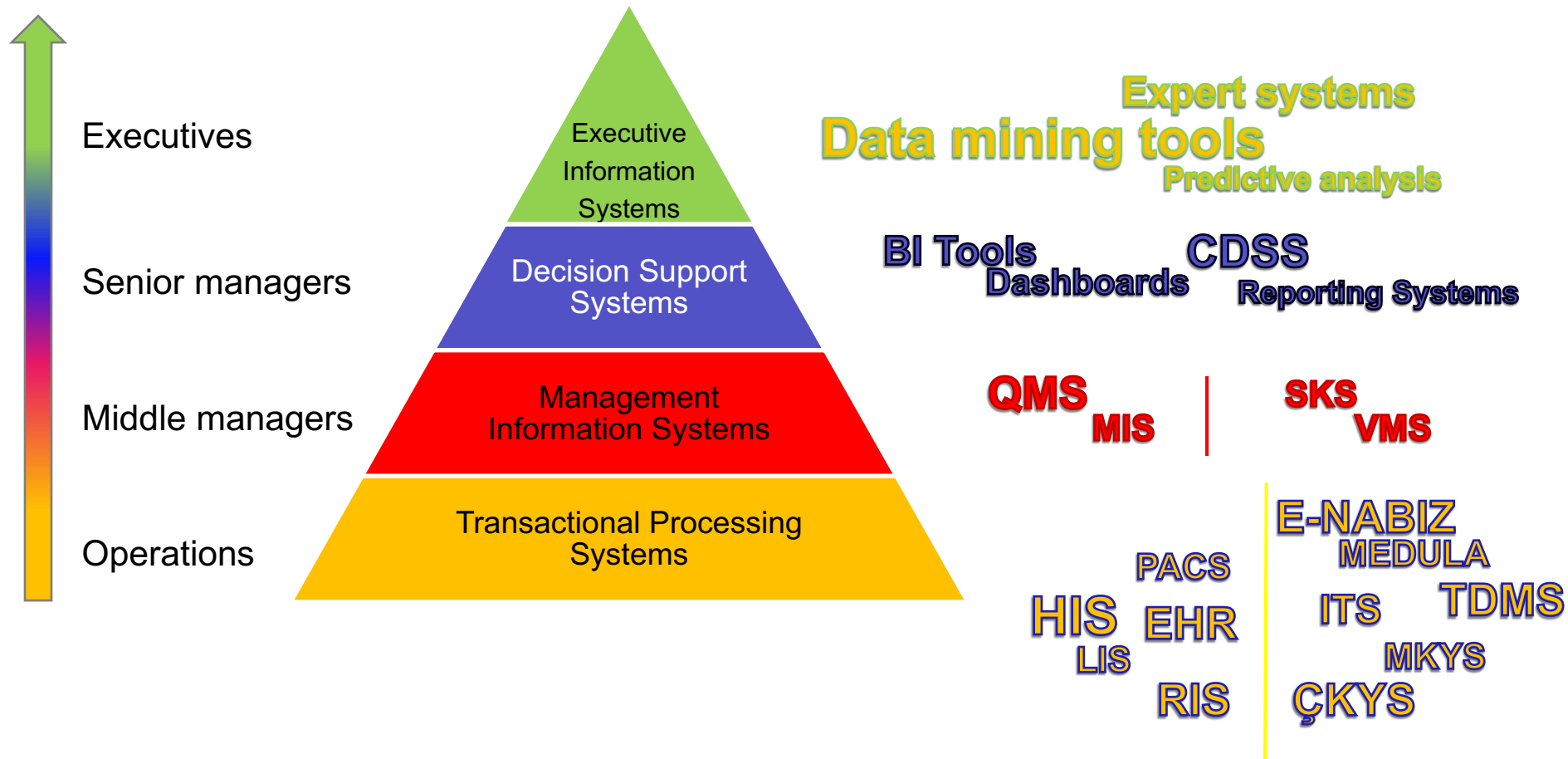
# General Perspective: From Data to Wisdom?

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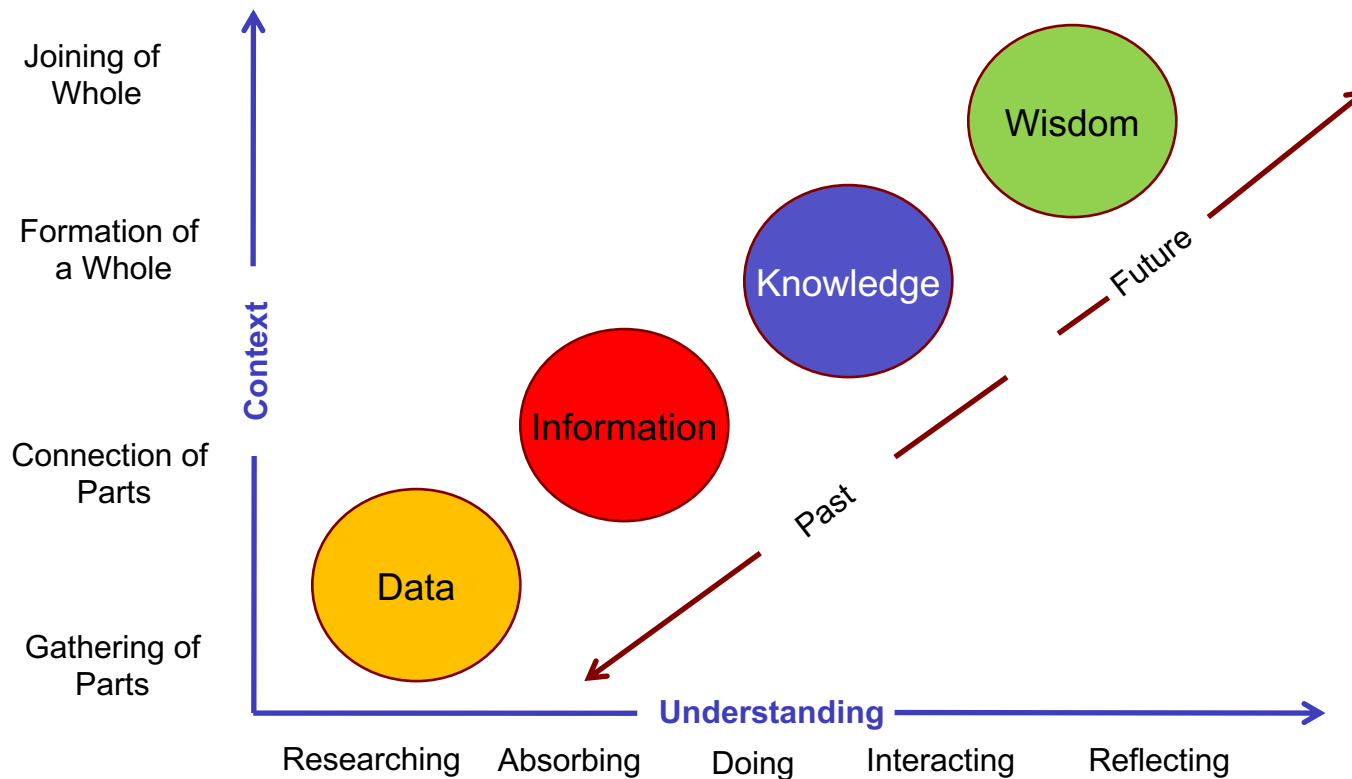
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# Information systems pyramid



## DIKW

- **Data,**
- **Information,**
- **Knowledge,**
- **Wisdom**



Wisdom

- **Healthcare data**

- Admission, referral and discharge data sets
- Anamnesis, lab and radiology results
- Consultations
- Prescriptions
- Operations,
- ...

Knowledge

- **Managerial processes**

- Resources and assignments
- Procurements, transferring and usage of consumables, med. devices, etc.
- ...

Information

- **Financial data**

- Expenses (human resources, current expenses, etc.)
- Income from SSI (SGK)
- Income from cash payments
- ...

Data

- **Data exchange**

- EHR exchange
- Claim processing
- ...

*«If you torture the data long enough, it will confess»*  
Ronald H. Coase (Essays on Economics and Economists)

# From data to wisdom

Wisdom

Knowledge

Information

Data



**"No, I don't think we're about to be swallowed  
by too much health data. Why do you ask?"**

Wisdom

- **Calculations on processes**
  - # of examinations, # of operations, # of emergency cases, etc.
  - Time period calculations (waiting time, discharge time, operation time, etc.)
  - ...

Knowledge

- **Combinations of results**
  - Referral rate, revenue per case, BMI, etc.
  - Risk assessments (fall, decubitus ulcer, pain, coma, etc.)
  - ...

Information

- **Alerts, guidelines and best practices**
  - Order set suggestions based on symptoms, lab results, etc.
  - Drug interaction alerts during drug orders
  - Drug order alerts based on lab result during orders (Potassium  $\geq 5.5$ , then don't prescribe potassium, INR  $\geq 3.5$  then don't prescribe varfarin)
  - Radiology and lab order alerts based on patient profile and previous lab results
  - Alerts based on vital signs
  - Nursing care plan suggestions based on risk assessments
  - ...

Data

*«What a culture we live in, we are swimming in an ocean of information, and drowning in ignorance»*  
Richard Paul Evans, A Step of Faith

# From data to wisdom

Wisdom

Knowledge

Information

Data



Wisdom

- **Quality indicators (JCI, TUSKA, HIMSS, etc.)**
  - Utilization rates of meaningful usage of EHR (CLMA, e-Order, eMAR, CDSS, PACS, etc.)
  - Evaluation based on the indicators of clinical guidelines (success rates of treatments, etc.)
  - Evaluation based on the indicators of quality parameters (length of stay, referrals, complications, etc.)
  - ...
- **Efficiency indicators**
  - Process efficiency
  - Resource efficiency (ambulance utilization, etc.)
  - Facility efficiency (Bed occupancy rate, facility utilization rate, etc.)
  - ...
- **Planning and management indicators**
  - Drug and equipment availability
  - ...

Knowledge

Information

Data

*«Any fool can know. The point is to understand»*  
Albert Einstein



# From data to wisdom

Wisdom

Knowledge

Information

Data



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Wisdom

- **Predictive analysis**

- What will be the chronic diseases prevalence for the next five years?
- What is the required number of physicians with respect to specialties for the next 10 years?
- What will be the next year healthcare costs?
- ...

- **Analytical processes, «What ... if...» questions**

- **What** will the total cost be **if** SSI (SGK) pays for this drug?
- **What** will the waiting time of patients in hospital be **if** we have 500 more physicians?
- **What if** I assign 5 more nurses in emergency department?
- **What if** I change the supply chain process in that way?
- **What** will the healthcare costs and quality indicators be **if** we use such homecare functions?
- ...

- **Descriptive analysis**

- How many patient, hospital, etc. profiles that we have?
- How many types of doctors in terms of prescription habits/content?
- Which cases are similar in terms of costs and diagnosis?
- What is the services frequency and coexistence ratio?
- ...

*«Where is the wisdom we have lost in knowledge?  
Where is the knowledge we have lost in information?»*

Thomas Stearns Eliot

Knowledge

Information

Data

# From data to wisdom

Wisdom

Knowledge

Information

Data



**Thanks**