



Decision-support system (DSS) that derives one's health condition from wearable sensors

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Determinants of Health¹

- › Physical environment
- › Income and social status
- › Education
- › Employment and working conditions
- › Social support networks
- › Personal behavior and coping skills
- › Culture
- › Genetics
- › Gender
- › Health service

Situation in the Netherlands

Factor	Sickness burden	Deaths
Behaviour	18.5 %	35700
Personal	14.5 %	26300
Work exposure	4.6 %	4100
Environment	4.0 %	12800

Data source: Volksgezondheid Toekomst Verkenning 2018
<https://www.vtv2018.nl/synthese-vtv-2018-een-gezond-vooruitzicht>

Existing DSS for Prevention

- › Focusing on supporting clinicians (CDSS):
 - Exercise program for cardiovascular patients¹
 - Optimizing nursing for pressure ulcer prevention²

- › Focussing on supporting healthies:
 - Personalised Information Platform for Health and Life Services (PIPS)³

1. Hansen et al. *European Journal of Preventive Cardiology*, 24 (10), 2017
2. Beekman et al. *International Journal of Nursing Studies*, 50 (4) ,2013
3. Dominguez, et al. *4th Workshop on Agents Applied in Health Care, ECAI*. 2006

Problems with Existing Solutions

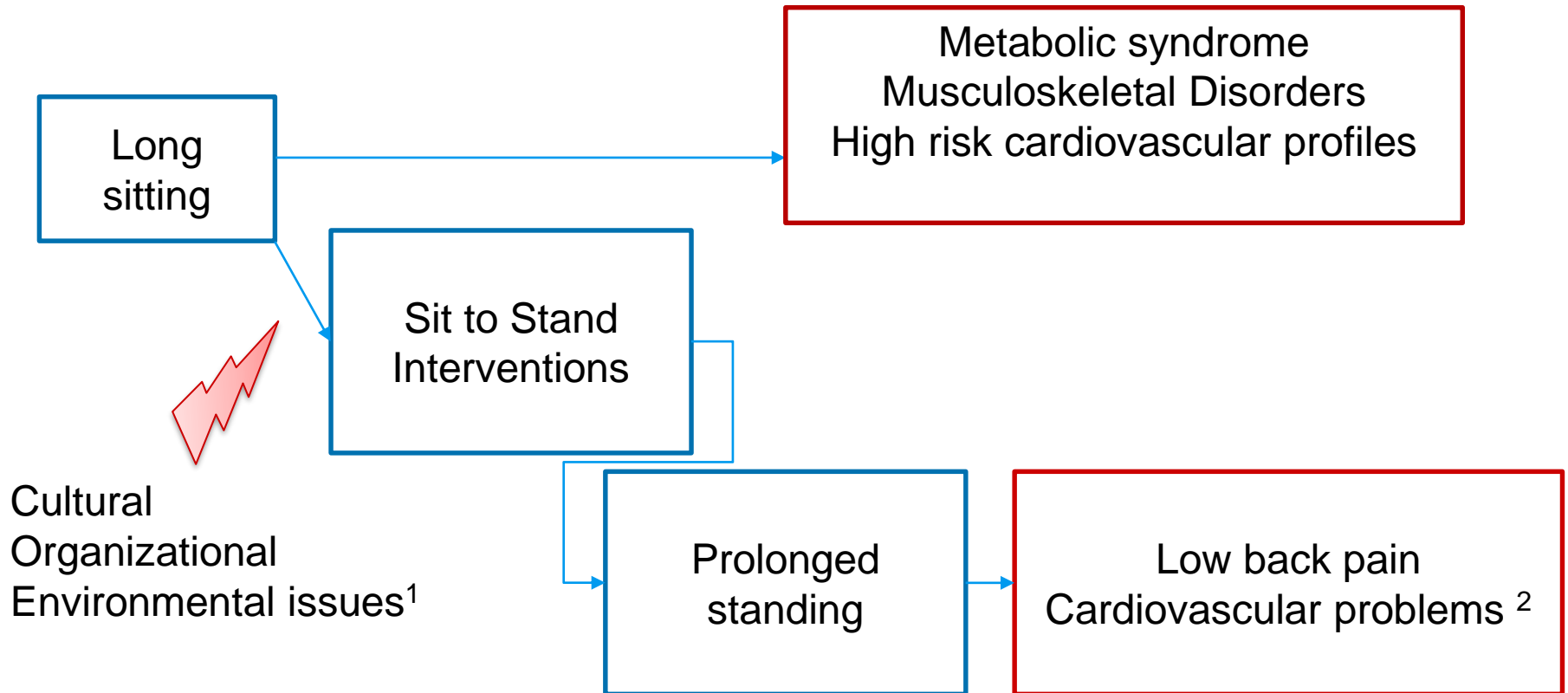
- › Often focused on one specific problem
- › Might conflict with working culture
- › Environmental variables go unnoticed

Office Worker Health Condition

Musculoskeletal Disorders	53% (Italy) ¹
Dry eyes diseases	33.9% (Netherlands) ²
Metabolic syndrome	33% (Germany) ³
Sick building syndrome	27.1% (Italy) ⁴
High risk cardiovascular profiles	10.7% (Germany) ⁵
Mental health e.g. burnout	10.2% (France) ⁶

1. M. Riccò, et al. *Med. Pr.*, 67 (6), 2016
2. Bazeeret al. *Ocul. Surf.*, 17 (3), 2019
3. Strauß et al., *Diabetol. Metab. Syndr.*, 8 (1), 2016
4. Magnavita *Int. Arch. Occup. Environ. Health*, 88 (2), 2014
5. Strauss et al. *Int. J. Environ. Res. Public Health*, 17 (5), 2020
6. Metlaine et al., *BMJ Open*, 7 (1), 2017

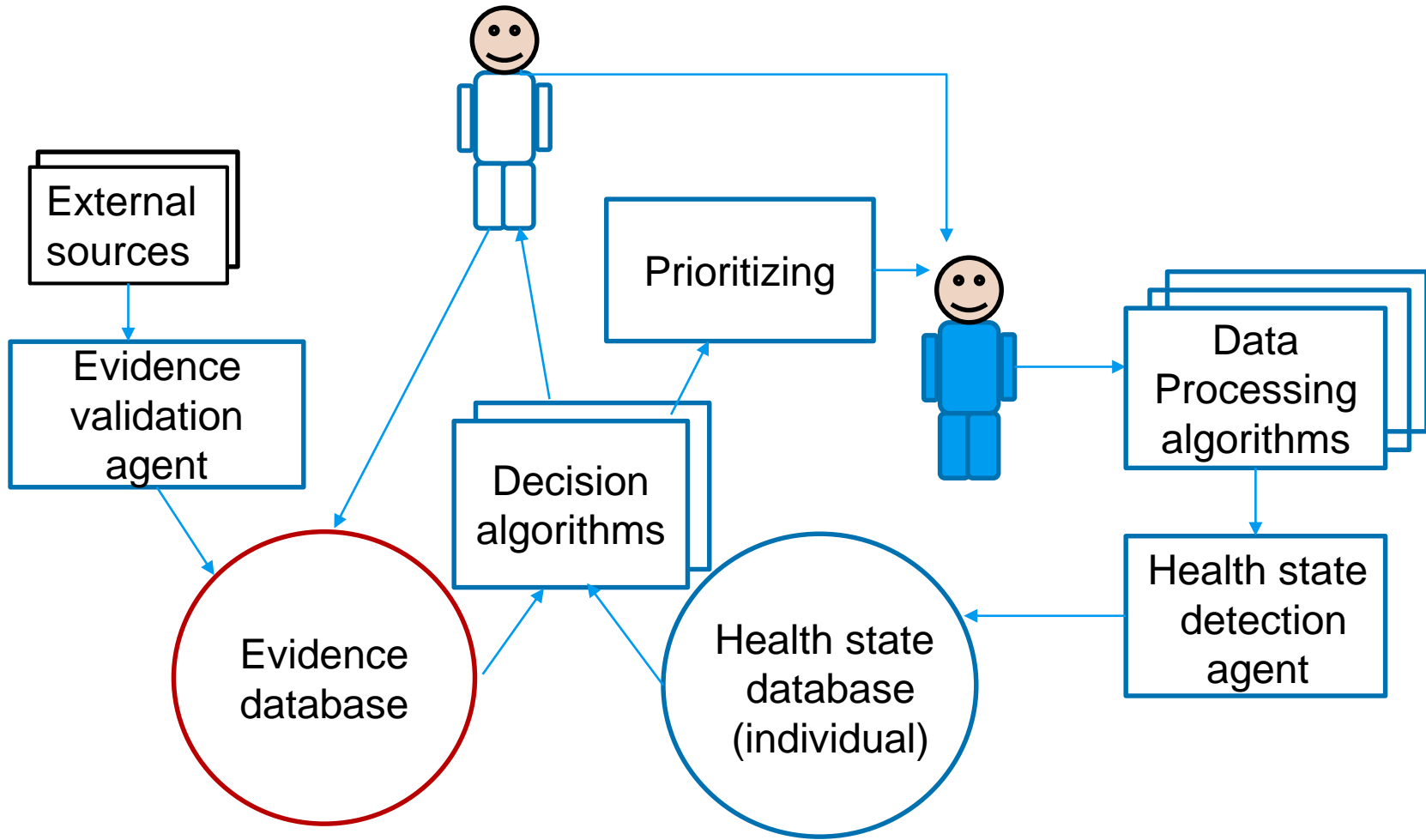
Example: Interaction of risks



1. Mansfield et al. *PloS one*, 13 (6,) 2018

2. Waters et al. *Rehabilitation Nursing* 40 (3), 2015

DSS Individual Layers

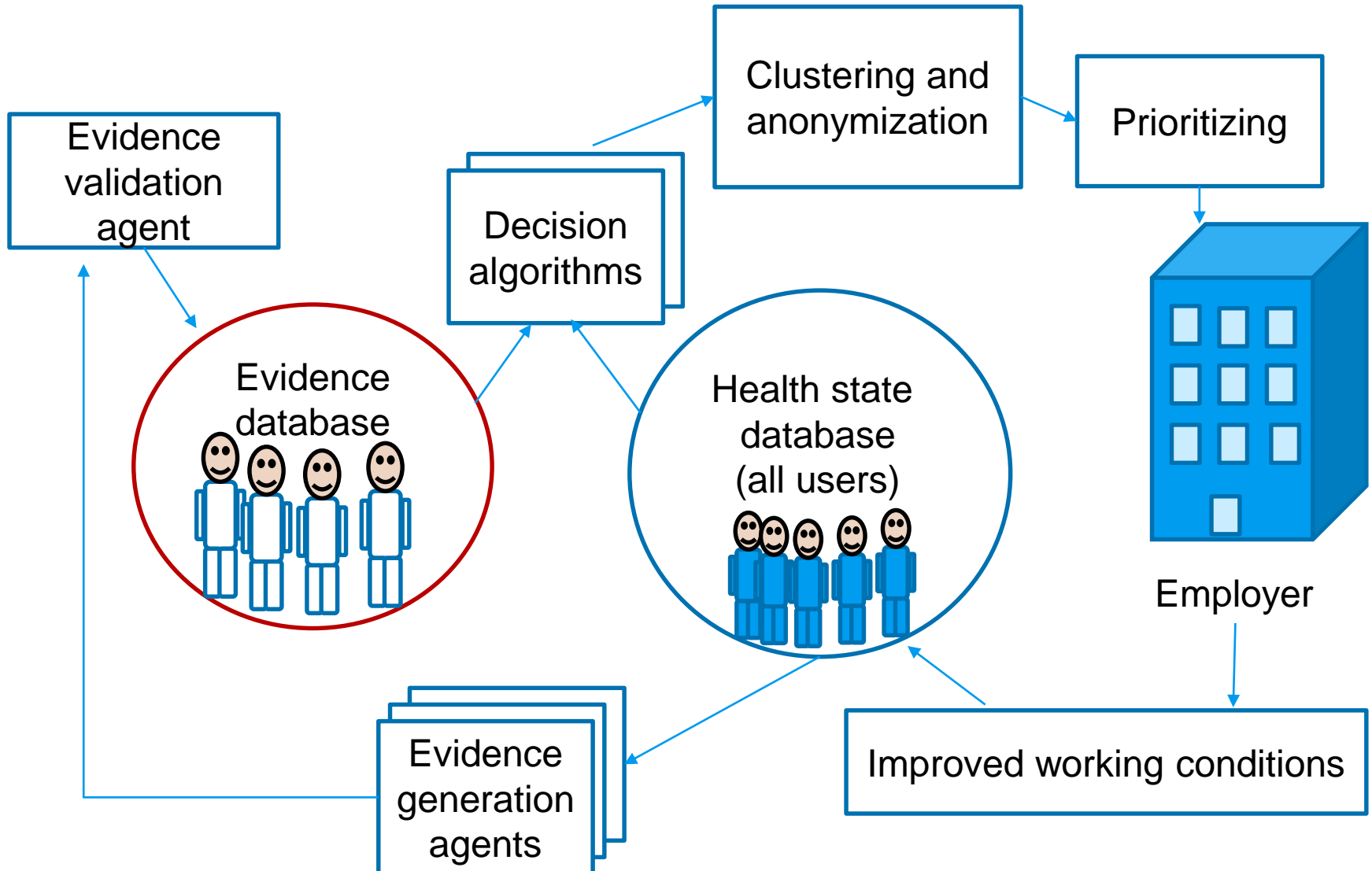


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DSS Global Layers



Outlook

- › Select adequate sensors
- › Build-up an evidence based database
- › Program detection and decision algorithms
- › Do a field test among office workers
 - Research question:
Can a DSS that relies on data from wearables improve life quality and productivity of office workers?



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Thank you for your attention!