

# Forum Privatheit

## The impact of smart wearables on the decisional autonomy of vulnerable persons

Niël Conradie, Jutta Croll, Clemens Gruber, Sabine Theis, and Saskia Nagel

GEFÖRDERT VOM



Bundesministerium  
für Bildung  
und Forschung

 **InviDas**

**stiftung  
digitale-chancen**



Institute of  
Industrial Engineering  
and Ergonomics

**RWTHAACHEN  
UNIVERSITY**



Applied  
Ethics

**RWTHAACHEN  
UNIVERSITY**

# Motivation and aim

inviDas



.stiftung  
digitale-chancen



The InviDas project is committed to the promotion of *Digital Sovereignty* through the development of autonomy-promoting user systems for interactions with *smart wearables*

The aim is to:

**conceptually consider the impact of smart wearables on the decisional autonomy of three groups of vulnerable persons to arrive at suggestions for how smart wearables can best take advantage of the former and negate the latter**

We work toward this aim by:

1. Explicating the moral importance of decisional autonomy
2. Identifying the key autonomy-impacting features and capacity of smart wearables
3. Arguing that special attention must be given to the impacts on the decisional autonomy of vulnerable groups, of which we focus on three: children, seniors, and those with non-age-related autonomy impairments
4. Presenting the four chief moral opportunities and four chief moral concerns raised by smart wearables
5. Providing a presentation of where these opportunities and concerns may be applicable to members of those three groups

# Decisional Autonomy

inviDas

Applied Ethics | RWTH AACHEN UNIVERSITY

.stiftung digitale-chancen

IAW Institute of Industrial Engineering and Ergonomics | RWTH AACHEN UNIVERSITY

## We value our ability to make our own decisions

- When we assess the moral impact of commercial wearables on decision-making itself (as opposed to its consequences), we care about: **Autonomy**
- In particular, the autonomy of our decision-making => **Decisional autonomy**
- Ensuring that such autonomy is preserved and promoted is constitutive of ensuring **digital sovereignty**

**Autonomy Priority:** Commercial entities are generally expected to, and should, prioritise autonomy in the design, development, and purveyance of their products and services.

# Decision-making

**Definition:** “Cognitive process of choosing between two or more clear to complex alternatives based on personal preferences” (APA, 2021)

Determination of preferences (Ostermann, 2010):

- Consciously (deliberatively)
- Consciously (heuristically)
- Intuitively (spontaneously)

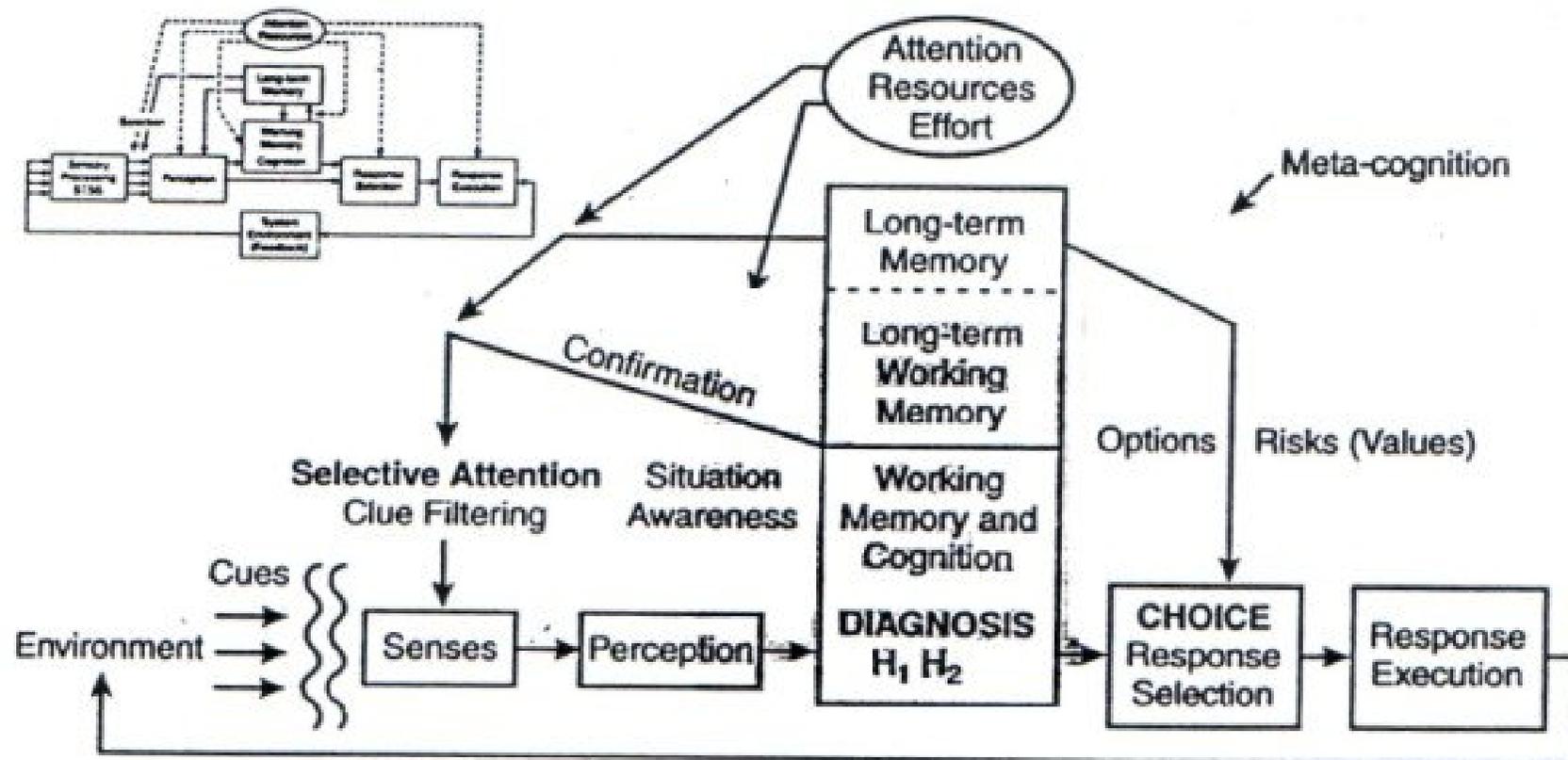
Decision characteristics (Jungermann, Pfister & Fischer, 2006):

- Binary vs. Multiple action alternatives
- Uniquely or iteratively decision processes
- Probabilistic nature > degree of uncertainty of consequences > risk

Types of decision-making research:

- Rational / normative decision-making
- Cognitive decision-making
- Naturalistic decision-making

# Decision-making



# Smart Wearables

## Technical characteristics:

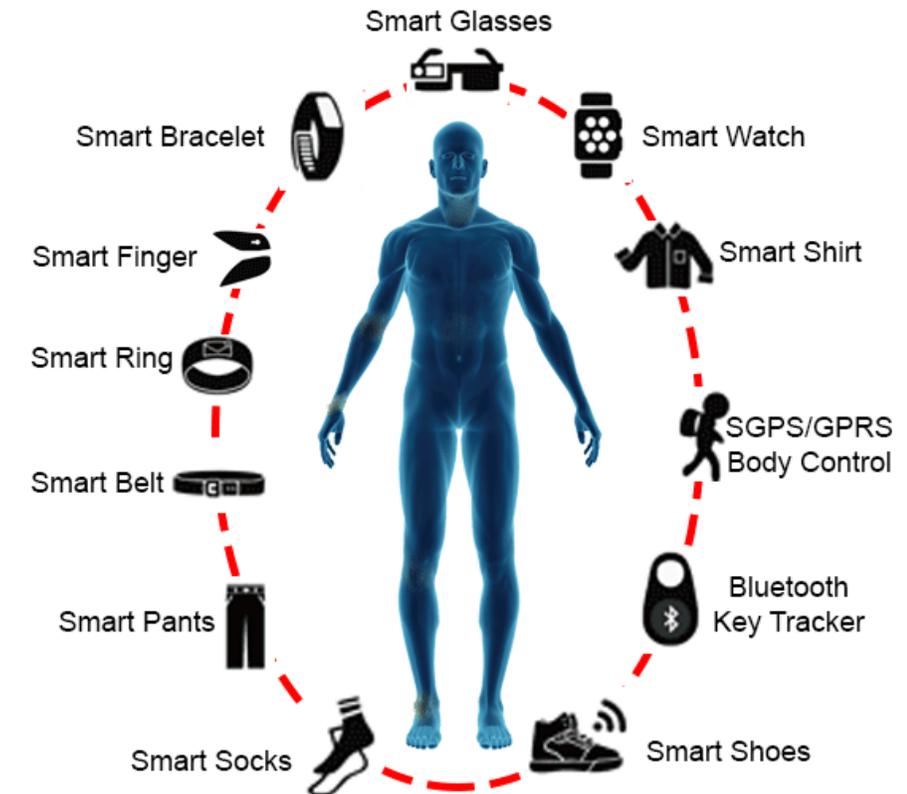
- On-body computing unit
- Connected: direct / indirect to internet / other devices (IoT)
- Continuously operation: collecting, analysing & reacting to contextual data

## Human-Computer Interaction:

- Enhancing the human, computing is not primary task
- Seamlessly integrated, human mainly unaware of computer
- Context sensitive / augmenting human reality
- Personal item

“any body-worn computer that is designed to provide useful services while the user is performing other tasks”

(Stamer, 2014)  
“wearables are machine to human interfaces”  
(Holdowski, Mahto, Raynor & Cotteleer, 2015)



# Smart Wearables

inviDas



.stiftung  
digitale-chancen



**Smart wearable:** wearable technologies that incorporate the means for the collection and algorithmic processing of data in order to produce aim-guided and corrective output

Morally significant qualities

- 1. Proximity**  
The physical closeness of the technologies.
- 2. Ubiquity**  
The “ever present” quality of wearables, always ready to hand
- 3. Convenience**  
Wearables are intended to be as easy to use and access as possible

These are *normatively expected qualities* of wearables

Makes *unreflective use* of the technology more likely

Increased the effectiveness of impacts on decision-making – as reflection is our first line of defence against this sort of influence

# Smart Wearables

inviDas



stiftung  
digitale-chancen



## Morally significant capacity: the **facilitation of cognitive offloading**

- **Cognitive offloading: the delegation of control over the performance of a cognitive task (including the making of a decision) to some device or system.**
- These tasks might be ones that you would otherwise have done yourself, or ones that you would have done if you could – e.g. counting your steps or measuring changes in heartrate
- **Source of benefit *and* concern – not something to “design away”**
  - We can cede control in order to secure greater autonomy – example of the tennis player
  - But we can also have autonomy diminished through poor choices in delegation or through delegation that we do not know is occurring

# Opportunities

inviDas

Applied Ethics | RWTH AACHEN UNIVERSITY

.stiftung digitale-chancen

IAW Institute of Industrial Engineering and Ergonomics | RWTH AACHEN UNIVERSITY

## 1. Freeing cognitive capacity

If we offload cognitive tasks we have more cognitive resources to expend on what really matters to us, i.e. we are better able to focus on our authentic aims and responding to the reasons relevant to them

## 2. Informational input

The outputs of wearables provide us with information we might otherwise not have access to, which can result in improved responsiveness to reasons, and thus to an improved ability to achieve our authentic aims.

## 3. Extending the range of agency

When the wearable makes directly possible options that were previously unavailable, i.e. expanding the range of possible choices

## 4. Nudges toward authentic aims

# Concerns

inviDas

Applied Ethics | RWTH AACHEN UNIVERSITY

stiftung digitale-chancen

IAW Institute of Industrial Engineering and Ergonomics | RWTH AACHEN UNIVERSITY

## 1. Overchoice

Mere provision of information can work against autonomy. Not only a matter of “more” choices – impact on agent must be considered. *Usability* as the necessary criteria – how to assess this?

## 2. De-skilling and dependency

Overreliance on the technology can result in the loss of autonomy-promoting (or even sustaining) skills or capacities. Two ways this can occur:

## 3. Sludging and overnudging

Sludge: nudges that nudge an agent against their interests. Given our account of decisional autonomy, such sludges are autonomy reducing as they work against an agent achieving their aims

Overnudging: the use of systemic nudging to such a degree and coordination that, though no single nudge is autonomy reducing, the combination over time is

# Three groups of vulnerable persons

inviDas

Applied Ethics | RWTH AACHEN UNIVERSITY

.stiftung  
digitale-chancen

IAW Institute of Industrial Engineering and Ergonomics | RWTH AACHEN UNIVERSITY

Three groups of vulnerable persons for whom the impacts of smart wearables on decision-making raise unique opportunities and concerns:

- Children, Seniors, Persons with non-age related autonomy impairments
1. **These groups are especially vulnerable to harms and manipulations and have a reduced ability for recourse in the face of such**
  2. **As a society, we often permit violations of the decisional autonomy of those in these groups in the name of utility or other values where such violations would be intolerable for outside these groups**
    - Vulnerable groups are frequently "protected" by excluding them from technology
    - This is not to imply that the three groups are treated equally in this regard, but being overprotective is a commonality in their treatment

**These trends work against the decisional autonomy of these people, and is also in violation of:**

UN Convention on the Rights of the Child <https://www.ohchr.org/EN/ProfessionalInterest/Pages/CRC.aspx>

UN Convention on the Rights of Persons with Disabilities <https://rwth.zoom.us/j/91916231355?pwd=cVpBa2YxeW5ZbUpBUVcwNHpYNVVVZz09>

	Freeing cognitive capacity	Informational input	Extending the range of agency	Nudging	Overchoice	De-skilling and dependency	Sludging and overnudging
Children	+	+	++	-	-	---	- / 0
Seniors	++ (+)	+	+	0 / +	-	0	--
Persons with non-age related autonomy impairments	++	0 / +	+++	+	- (-)	-	--