THE BRIGHT AND DARK SIDE OF A CONNECTED WORKPLACE FOR HEALTH AND WELL-BEING

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INFORMATION MANAGEMENT @IDHEAP

Digitalization of the public sector
Open Data
Citizen science

Digital transformation

Information Management @Idheap

Technology for health, demographic change & wellbeing
Physi-lytics

Smart Government

E-health

Big Data

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SOUNDS FAMILIAR?
THE CONNECTED WORKPLACE AS SOLUTION FOR OUR OCCUPATIONAL HEALTH PROBLEMS?

- Tracking of stress-related variables using biosensors and smartwatches
  - Environmental control devices
  - Smart clothing
  - Data analytics and interactive software
  - Motion sensing
  - Mobile applications

- Physical activity tracking in employer-sponsored health programs
- Discovering unsafe postures of construction workers
- Contextual health and well-being tips and alerts
- Detecting fatigue of truck drivers

BASIC ASSUMPTIONS UNDERLYING PHYSIOLYTICS AND SIMILAR TECHNOLOGIES OF THE CONNECTED WORKPLACE

- **PHYSIOLYTICS** = linking of smart sensing technologies with data analytics, machine-learning, and gamified systems

- **TRANSHUMANISM** = proactive stance toward obtaining information (*tracking*) and acting on it (*performance enhancement*)

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**Phisiolytics**

The first commercial EEG monitor, this wearable knowledge worker tool captures patterns of brain waves monitored with conditino.

**Transhumanism**

This wearable device brought scientific measurement out of the lab and into the athlete's hand.

**Wearables Consumer Survey 2014**

- **Fitness band**: 45%
- **Smart watch**: 35%
- **Smart clothing**: 20%
- **Smart glasses**: 19%
- **People-tracking devices**: 13%

*Note: This survey was conducted before the announcement of the Apple Watch.*
IF NOT VOLUNTARY AND PROACTIVE, THEN SUBLIMINAL

Collecting information about non-routine, complex tasks

Learning and developing responses to non-routine tasks

Changing routines and behavior to achieve desired health behavior

Physiolytics devices

Machine learning

Nudging, gamification...
WHAT ONCE WAS A TOY FOR GEEKS IS A MULTI-BILLION MARKET TODAY

27,5 million wearable health devices will be introduced in workplace health programs by 2020, compared with only 166,000 units in 2013

PARTICULARLY WORK-RELATED STRESS HAS BEEN THE CENTER OF ATTENTION


NOTE: WE ARE GOOD IN CAPTURING PHYSICAL, NOT SO GOOD WITH THE BEHAVIORAL AND MENTAL DIMENSION OF STRESS
ALL TOGETHER, STRESS HAS A HUGE IMPACT ON ECONOMY AND SOCIETY AT LARGE

<table>
<thead>
<tr>
<th>Gesundheitsbedingte Produktivitätsverluste</th>
<th>Grüner Bereich</th>
<th>Sensibler Bereich</th>
<th>Kritischer Bereich</th>
<th>Alle</th>
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<tbody>
<tr>
<td></td>
<td>Ressourcen &gt; Belastungen</td>
<td>Ressourcen = Belastungen</td>
<td>Ressourcen &lt; Belastungen</td>
<td></td>
</tr>
<tr>
<td>Absentismus</td>
<td>2,94%</td>
<td>2,92%</td>
<td>4,72%</td>
<td>3,38%</td>
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<tr>
<td>(in % der Arbeitszeit)</td>
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<tr>
<td>Präsentismus</td>
<td>5,47%</td>
<td>9,38%</td>
<td>14,74%</td>
<td>9,64%</td>
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<tr>
<td>(in % der Arbeitszeit)</td>
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<tr>
<td>Total gesundheitsbedingter Produktivitätsverlust</td>
<td>8,41%</td>
<td>12,3%</td>
<td>19,46%</td>
<td>13,02%</td>
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<tr>
<td>(in % der Arbeitszeit)</td>
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Estimated CHF 6,5 bn productivity loss per year in Switzerland caused by stress-related absenteeism
HOW DO THESE TECHNOLOGIES CHANGE THE RULES OF THE GAME?

consumer setting

individual  tech provider

business setting

organization  tech provider

organization  tech provider

devices provided by employer and used in an occupational health program
SOME PERSONAL EXPERIENCES FROM DIFFERENT RESEARCH PROJECTS
PHASE I-a: DEMONSTRATING THAT IT WORKS ON INDIVIDUAL LEVEL

A regular day at job vs just about a burnout

Left: 32 years old male scientist temporally working in a clinical environment. Engage in a hectic and clinical study day with a complex experimental procedure and sophisticated equipment. Person is highly focused for 8 hours.

Right: 30 years old female medical doctor in a clinical environment after a 28 hours work input including a full night shift. Systematically elevated HR and BPw with little relaxation. Mentally and physically exhausted.
PHASE I-b: DEMONSTRATING THAT IT CAN WORK ON ORGANIZATIONAL LEVEL

WORKING YES, BUT USABLE?

- **ACCURATE**: Measures and quantities have to be accurate, so that users are ensured that they can exploit the health information that is displayed.
- **EASY-TO-READ**: A visual salience between metrics is desired. Still, superfluous features (e.g. flashy colors) or unnecessary components (e.g. side illustrations) should be avoided, as it may interfere with cognition.
- **EASY-TO-UNDERSTAND**: Visualizations have to disseminate information to the general public. Users are not likely to be data scientists.
- **CLEAR AND CONCISE**: Too much information may hinder cognition.
- **LOGICAL**: Visualizations have to be organized in a simple and logical way, so that users can promptly perceive the information displayed.
- **MEANINGFUL TO TARGET AUDIENCE**: The information provided has to resonate in the context of target audience.
- **ALLOW COMPARISON**: Visualizations have to make it possible to easily compare quantities, relationships etc.
- **CONVINCING**: Visualizations should nudge users in exploiting the information.

PHASE II: FIXING SOCIAL, ETHICAL, AND LEGAL CHALLENGES

**Entry problem**
How to reduce resistance / encourage adoption of physiolytics?

**Motivation problem**
How to encourage employees to continuously use the technology and participate in the occupational health program?
ENTRY PROBLEM: FOOD FOR THOUGHT

- **VOLUNTARY VS. MANDATORY USE**: Using “security” as argument for surveillance in certain jobs (e.g. air traffic controller, firemen) → analogy to video surveillance
- **DATA OWNERSHIP**: Who owns the data? Where is it stored? What can companies do with it?
- **CONSEQUENCES OF NON-ADOPTION**: In certain countries, the employer determines if you get a health insurance or not → higher health premiums or non-coverage
- **SOCIAL PRESSURE AT THE WORKPLACE**: “everybody wears one”, “what are you hiding?”

New theories that explain technology adoption in a fuzzy private-business setting are needed
ENTRY PROBLEM: FOOD FOR THOUGHT

SOME INTERESTING PROBLEMS TO WORK ON:

- Multi-trust problem: do I trust all the ecosystem players (i.e. technology provider, employer, third-parties...)
- Social cheating: how does the organization prevent others to cheat?
- Preventive behavior: why participate when I feel healthy?
- ...

MOTIVATION PROBLEM: FOOD FOR THOUGHT

Use of preventive health apps is not a sprint, it’s rather a marathon

MOTIVATION PROBLEM: FOOD FOR THOUGHT

Use of preventive health apps is not a sprint, it’s rather a marathon.

- **Entry problem**: Sprint distance (100m)
- **Motivation problem**: Medium distance (1500m)
- **Routinization**: Long distance (42 km)

**Timeline**:
- **t₀**: Initiation
- **t₁**: Adaptation
- **t₂**: Acceptance
- **t₃**: Infusion

**Prof. Tobias Mettler, 2020**
WHAT IF GAMIFICATION DOESN’T WORK?

- WEAK EVIDENCE BASE: Only a handful of research studies that measured effects over a period longer than a couple of weeks.

- ONE-SIZE DOESN’T FIT ALL: People react differently to different cues; impossible to making everybody happy without making things too complicated.

WHAT IF NUDGING RAISES ETHICAL CONCERNS?

DIFFERENT CONCERN LEVELS:
People are not *per se* against nudging, but express concerns about the “nature” of nudges.

New (ethical) design principles and (really long-term) evidence concerning the effects of UX needed.
PHASE III: ACCOUNTABILITY OF TECHNOLOGY

Initiation
Adoption
Adaptation
Acceptance
Routinization
Infusion

$t_0$ $t_1$ $t_2$ $t_3$

1. **Entry problem**
   How to reduce resistance / encourage adoption of physiolytics?

2. **Motivation problem**
   How to encourage employees to continuously use the technology and participate in the occupational health program?

3. **Utility problem**
   What long-term impact does physiolytics have?
UTILITY PROBLEM: TECHNOLOGY AS HOLY GRAIL

Image from *Indiana Jones and the Last Crusade*
WHICH SIDE WILL PREVAIL: THE BRIGHT OR THE DARK SIDE?
THANK YOU FOR YOUR ATTENTION

Time to stand!
Stand up and move a little for one minute.
INFORMATION MANAGEMENT @IDHEAP

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