

# IMPACT OF NEW INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) ON FATIGUE. WHAT'S THE LINK WITH BURNOUT ? THE ICT COGNITIVE EXHAUSTION

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## Introduction and methodology

### Introduction

In our pilot work using The Preventing Burnout test ©, Job chronic stress early warning system Part 1 (PBT1) we found that despite a certain symptomatic similarity, the **overload due to ICT** use do not generally lead to burnout (BO). It is rather connected to a **specific ICT cognitive fatigue** which could be prevented by a more appropriate use of ICT. Pilot Group - N = 30/153 employees from enterprises and institutions, 12 are males and 17 are females. Average age ranging from [28-59].

### Methodology

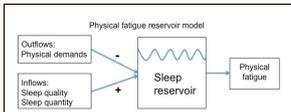
- 1) Defining and clarifying 8 concepts : ICT – Information overload and multitasking - Technostress – Stress and Exhaustion - Burnout - Fatigues
- 2) Existing tools and previous research related to fatigue and ICT.
- 3) Discussion of our findings and Conclusions

## Academic concepts & definitions

- **ICT** refers to any electronic device or technology that has the ability to gather, store, and send information Steinmuller (2000) .
- **Information overload** refers to « an overwhelming volume of information from different communication channels that ICT users are subject to. This **techno-overload** leads to **multitasking** with several applications and accomplishing different information-processing tasks simultaneously. Excessive multitasking leads to hurried and ineffective information processing... Multitasking leaves insufficient time and attention for accomplishing organizational tasks in any but the most simplistic and unimaginative ways, little time for exploring creative and new work processes, and sometimes not even enough time to effectively perform existing processes, thus impairing end-user performance » (Tarafdar, Tu, & Ragu-Nathan, 2011). The **overflow cognitive syndrome**: « The environment is predominant with a multitude of cognitif attractors presented in the disorder... the employee can not accomplish objectives which are for him with an high value, especially those demanding reflexion » (Lahlou, 1999).
- **Technostress** can be defined as an adaptation caused by an inability to cope with the new computer technology (Brod, 1984) with psychological, emotional components through, e.g., frustration, fears (Wang, Shu, & Tu, 2008), anxiety or physiological concomitants including increasing of both adrenaline and noradrenaline (O' Driscoll, Brough, Timms, & Sawang, 2010).
- **Stress and exhaustion**: the General Adaptation Syndrome (GAS) (Selye, as cited in Gray, 1998) model states that « in response to a stressor, an « initial alarm reaction » is followed by a « stage of resistance » in which resistance to the original stressor builds up, but ability to resist new stressors is lowered. Eventually a stage of exhaustion sets in which ends in catastrophic inability to cope with any form of stress ».
- **Burnout** is a « prolonged response to **chronic emotional and interpersonal stressors on the job and is defined by the three dimensions of exhaustion (EXH), Cynism (CYN) and efficacy (EFF)** » (Maslach, Schaufeli, & Leiter, 2001). « Burnout is described by an psychological fatigue status characterised by an almost total of emotional energy which affects physical vitality » (Maslach, & Leiter, 1997/2011).
- **Exhaustion, the key component of Burnout, is linked to emotional and physical fatigue.**

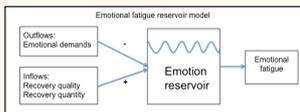
« Despite many studies on fatigue, it is remarkably difficult to get a grip on mental fatigue and the cognitive processes underlying its behavioural manifestations » (Van der Linden, Frese, & Meijman, 2003)

### PHYSICAL FATIGUE



SAFTE MODEL DE HURSH  
(Barnes & Van Dyne, 2009)

### EMOTIONAL FATIGUE



SAFTE MODEL DE HURSH  
(Barnes & Van Dyne, 2009)  
State of feeling overwhelmed, drained and used up based on emotional demands imposed by others (Maslach, as cited by Barnes & Van Dyne, 2009)

### COGNITIVE / MENTAL FATIGUE

- Mental fatigue and **executive control** on cognitive process : cognitively fatigued persons → performance deficit on **flexibility tasks** and **planning tasks**. (Van der Linden, et al., 2003)
- **Mental fatigue is often characterised by reduced motivation for cognitive effortful activity and impaired task performance.** (Hopstaken, Van der Linden, Bakker, & Kompier, 2014)

## Results and Discussion

In the specific case of malfunctioning of the IT system (external control of the worker) the link with BO could be a fear of not attempting the GOAL (Salanova & Schaufeli, 2000). Furthermore, we found that an IT malfunctioning as e.g. ruptures in a long work in a software with workflows (WF) or incompatibility between IT systems, could lead to a frustration between the goal of the action and the aborted action itself and accordingly, this is also in line with BO and emotional EXH.

Our PBT1 findings with a qualitative sample of employees, who had both a good appraisal on ICT which is a resource (JD-R) & immediate access to IT helpdesk and who had positive emotional competences and job control we can suggest that :

**ICT overload → cognitive EXH ↗ Searching physical EXH ↗**. Despite the fact that they feel no more capable to do any cognitive effort, the employees are often in request for physical fatigue at the end of the working day.



After having multitasked with ICT on an emergency mode all the day, employees run again on a treadmill in the evening...

In the mean time any additional cognitive effort e.g. to give assistance to children's homework cannot be performed. As this is a multifactorial situation, we also take into account the other indicators of ICT COG EXH such as GSM & DECT microwaves vs landline & Wi-Fi vs ethernet cable and other factors cumulating the ICT overload e.g. working in a multilingual environment. Noise in an open space may also contribute to this type of EXH.

The cognitive ICT fatigue could be prevented by a more appropriate use of ICT which takes into account individual and organisational risks, and concentrates on what could be improved, e.g. e-mail & software management. Specific wellness exercises are very useful.

## Conclusions

Our findings are not in disagreement with earlier studies but the definition need a slight amendment.

**ICT overload with (+) appraisal & + emotional competences**

→ ICT Cog EXH + Emotional & Physical EXH → BO

As BO is defined by Maslach et al (2001) as a depletion of emotional and physical resources, we would like to specify that **ICT cognitive fatigue** is defined by a depletion of cognitive resources which is in accordance with Vanderlinden (2003) and Hopstaken (2014) definitions.

**The ICT cognitive fatigue (ICT cog EXH) can be measured by the number of ICT devices, interconnections (multitasking and link between professional and private life), time and frequency, facts & perceptions of the techno and information overload,... It can lead to a cognitive saturation, request for a physical fatigue and a rejection of any cognitive effort.**

This measure work is in progress with our PBT2 first Spin-Off project. It includes data from authors quoted above.

EMOTIONAL EXH → PHYSICAL EXH  
Battery is empty  
BURNOUT



ICT COGNITIVE EXH → Search for a PHYSICAL EXH  
Memory is full  
ICT COGNITIVE FATIGUE



## What does the existing research say about EXH and ICT ?

**ICT (time and freq.) ↗ → Appraisal ↗ → EXH (Emotional) →**  
(Salanova & Schaufeli, 2000)

**ICT overload (information, quantitative, qualitative) focused on Cognitive load (Kallimo 1999) ↗ → EXH ↗**  
(Kouvonen et al., 2005)

**ICT demands ↗ → BO (i.e. Emotional & Physical EXH and Cynicism ↗ and Efficacy ↘)**  
**ICT hassles ↗ → BO (i.e. Emotional & Physical EXH and Cynicism ↗ and Efficacy ↘)**  
**Lack of ICT control ↗ → BO (i.e. Emotional & Physical EXH and Cynicism ↗ and Efficacy ↘)**  
(Day A. et al, 2012)

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