

# The Inclusive Enterprise: Vision and Roadmap

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**Abstract.** For companies across the globe, building and sustaining a talent pipeline has become top priority. *Job satisfaction* is a core reason for employee retention and has shown to be more dependent on the organisational climate, which includes aspects such as working conditions, leadership and *inclusion*, than on variables such as structure, size, and pay, which are easy to quantify and control. This paper presents a vision of an “Inclusive Enterprise”, and elaborates on how a computer science approach can help to sense and foster inclusion and well-being in enterprise environments.

## 1 Introduction

For companies across the globe, building and sustaining a talent pipeline has become top priority. An estimated 65% of executives report a lack of top talent in the ranks of their top 300 leaders and only 10% say that their companies retain most of their high performers [1]. Consequently, in the 21st century, a “war on talent” became a reality, with organisations competing with one another to hire and retain scarce human capital.

**Job satisfaction** (the “degree to which individuals like their jobs”), **inclusion** (“a sense of belonging: feeling respected, valued for who you are; feeling a level of supportive energy and commitment from others so that you can do your best work” [2]), and, in general, *well-being* have been shown to be a core reason for employee retention, leaving to *extrinsic factors*, such as salary and payment, a secondary role [3].

This paper presents a vision of an “Inclusive Enterprise”, advocating **well-being** and **inclusion** as core properties of next generation enterprises.

To achieve this vision, we take a computer science angle, by asking ourselves the question: *how can computer systems help to foster inclusion and well-being in the enterprise?* Indeed, variables such as organisation structure and size, and salary can be easily quantified and controlled; on the other hand, well-being and inclusion are difficult to capture and influence. The scientific challenge lies in the creation of methods and tools able to sense and affect the organisational climate, to benefit its employees. In the remainder of this paper, we discuss our vision and report on the ongoing initiative within IBM Benelux, pursued with TU Delft.

## 2 The Vision

At the heart of our vision is an automated system that senses and influences the working environment of an employee.

We aim to address both the *physical* and the *personal* environment. The former concerns sensing of environmental properties like the level of noise and light intensity; but also work-related properties such as proximity of other people and the features of the current workstation. The personal environment includes less tangible factors, such as one's background, expertise, (cultural) bias, emotions, mood and satisfaction itself. All together, these properties can provide a snapshot of the current status of an employee, which can be in turn used to create a more inclusive and personalise work experience.

In order to be effective, we advocate for inclusive enterprise systems to comply with the “**Primum non nocere**” (first, do no harm) principle. While such a requirement is common to all personalised systems, the enterprise environment, and the fundamental role of work for human beings, puts major emphasis on the trust relationships that should be established between the employer, the system, and the employee. This leads to the following fundamental design properties:

**Integration and Transparency:** an inclusion system should seamlessly integrate with existing workflows and tools. To be effective, the system should not add cognitive burden to the user, while learning and adapting to short- and long-term changes in the user satisfaction and working conditions.

**Engagement by Design:** inclusion and well-being should be achieved without user intervention. When, however, interaction is required (e.g. for data provisioning or environmental sensing purposes), it should occur on a voluntary basis, and in an engaging context. The system may never rely on mandatory interactions and additional workload for employees.

**Trustworthiness and Privacy by Design:** the system deals with both work-related and personal information. Its functions and purposes should be transparent to the employee, and personal data should be managed with full supervision and consent of the user.

**Reuse:** the system should rely as much as possible on existing infrastructure, such as building management systems, enterprise collaborative work tools, and enterprise social media. This requirements is to safeguard existing investments in technological infrastructures, but also to support transparency.

The properties reflect our current understanding and experience in enterprise workforce engagement, and represent the pillars of our research efforts.

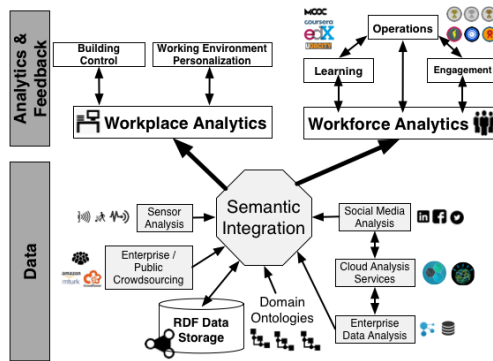
## 3 Building Blocks of Inclusive Enterprise Systems

Figure 1 summarises the main building blocks of an inclusive enterprise system. We envision a data-driven technical platform.

*Data play a key role* to fuel the sensing and interpretation activities required to understand and influence job satisfaction. The data will ideally be collected from

existing infrastructure, such as Building Management Systems and (Enterprise) Social Media.

*Online social media* such as Facebook, Twitter and LinkedIn are used more and more by companies as a way to support business processes, marketing, and for competitive intelligence purposes. Web social data can provide precious information about the personal, working, and social dimensions of employees. For instance, in a previous work [4], we showed how online social media could be used as a vehicle for a better understanding of the internal and external corporate dynamics. Supported by the analytical capabilities of platforms such as IBM Bluemix and Watson, Web social data can give better insights about the background, expertise, skills, and values of employees, thus enabling personalised interaction and working experience.



**Fig. 1.** High-level architecture of the data-driven inclusive workforce platform.

Physical enhancements provided by *smart devices* are helping to bridge the digital and physical worlds. Wearable technology is now collecting more data via sensors, communicating more information via displays, and truly augmenting a person's physical capabilities. Leveraging wearable devices allows companies to equip their employees with the technology they need to do better work, while improving operational efficiency and safety.

To cater for issues related to data sparseness, veracity, and sense-making, we envision a central role for *crowdsourcing* and *human computation*. Human can act as sensors for on-demand data creation, cleansing and linkage; we envision broad adoption of enterprise crowdsourcing techniques, including social sensing applications and pervasive human computation mechanisms.

*The Role of Semantics.* Thanks to state-of-the-art semantic technologies (best exemplified by cognitive computing initiatives like IBM Watson), we are working on creating a *semantic integration* layer for heterogenous environmental and social data. We plan to capitalise on existing standardisation efforts for semantic data representation, while integrating enterprise specific and domain-specific knowledge about the company, its organisation and structure. The semantic

integration layer fuels the *workplace* and *workforce* analytics components, providing an unified and updated view on the current status of the company and its employees.

*Elements of Inclusion.* We stress the importance of *adaptation* and *engagement* as driving forces for inclusion, and as a main tool to influence satisfaction on the workplace. *Learning* is a fundamental right and duty of a modern workforce. Technological advances and quickly evolving societal (and work-related) challenges demand for continuous learning path, integrated (and driven) by both the duties, ambitions, and expectations of employees. To this end, *games with a purpose* and *gamification* techniques can be a main tool to drive engagement. In a recent work, we gathered strong evidence that a gamified experience can foster learning and social behaviour in employees.

## 4 The Path Ahead

While the research line is just at its beginning, we can already feature promising results. Our current focus is on exploring principles and methods from fields like psychology of work and behavioural economics, to devise worker modelling features, and personalised engagement and retainment strategies.

We are conducting several exploratory studies aiming at understanding to which extent existing enterprise data sources can help framing the status of an employee. To this end, we are investigating how social media can be used to elicit expertise profiles, or characterising personality traits of employees. The next step is to investigate how environmental and working conditions aspects can be inferred from data produced by employees. Whenever existing data are not sufficient, we will develop methods for (enterprise) social sensing aimed at data collection and enrichment.

Finally, we plan to experiment with ways to influence engagement and satisfaction. We are undergoing experiments aimed at providing better understanding of the fundamental principles of computer-mediated engagement mechanics in the enterprise.

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