

Human Resource 4.0: A vision of a technological tool to assess and foster employee engagement

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Abstract

The digital paradigm, commonly called Industry 4.0, has led many companies to adopt technologies that support process automation. The human factor has been left behind, which is in contradiction with the recommendations evidenced in the literature. Since the creation of value in Industry 4.0 can be reached profitably through the adoption of technologies that end up placing human beings at the center of modernization and improvement, the loss of skills due to the labor turnover is something to be avoided by companies. Engagement is an employee's emotional state that manifests itself with motivation and absorption in the workplace. Currently, the only way to assess workforce engagement is by using traditional scales techniques (such as, Utrecht Work Engagement Scale, or Gallup Q12 employee Engagement scale). Therefore, there are no mechanisms in the industrial environment capable of collecting data, which, properly treated, can predict employee engagement and help in recognizing when the employee is about to leave the company. This paper aims to present a vision about an innovative technological tool that intends to assess and, at the same time, to foster workforce engagement, in order to monitor the future possibility of them remaining in the company, or leaving.

Keywords

Industry 4.0, Human Resource 4.0, Work Engagement, Vision of Technological Tool and UML

1. Introduction

The Industry 4.0 phenomenon brings the so-called intelligent systems that are capable of representing the simple and monotonous routines existing in the organization in the form of digitized mass production (Wilkesmann & Wilkesmann, 2018). In this way, these systems support the hypothesis of organizing social behavior to reproduce routines. On the other hand, cyberphysical systems are capable of reconstructing flexible, innovative, and totally new human-machine interactions that will converge in a fluid network of intelligent and innovative forms of cooperation and collaboration (Wilkesmann & Wilkesmann, 2018).

The human factor is currently devalued when it comes to the digital paradigm, since companies, after the emergence of Industry 4.0, find themselves at the forefront of digital evolution, forgetting the need to put people at the center of this innovation (Salvadorinho & Teixeira, 2021).

In addition, the globalization of the human force emerges with the technological evolution, therefore, there is a need to preserve the organizational knowledge capital and encourage the retention of people (Salvadorinho et al., 2021; Salvadorinho & Teixeira, 2021). Work engagement can be considered as a rewarding work-related state of mind, represented by an affective-motivational tool, guiding to positive job posture in employees (Gaur, 2020; Kaasinen et al., 2020).

In the literature, there is already a convergence of opinions that engagement can and should be promoted by providing employees with a better view on the real state of the organization (e.g. performance), more collaboration and knowledge sharing, greater participation in the design of the workspace (with improvement suggestion systems) and more and better targeted and contextualized training (using augmented and/or virtual reality technology) (Kaasinen et al., 2020; Schulze Kissing et al., 2019). It should be noted that the phenomenon of gamification (a technique that makes all interactions more capable of resembling a game) is closely related in the literature to the promotion of engagement in the environment of the digital paradigm (Y. Li et al., 2019; Passalacqua et al., 2020; Schuldt & Friedemann, 2017).

This paper proposes a vision of an application that can evaluate and, at the same time, promotes employee engagement. In a traditional way, the engagement is evaluated based on scales already validated. For this reason, these scales will be considered in the application, to integrate a traditional evaluation method. However, and only after an exploratory literature analysis, it was possible to identify aspects (belonging to the so-called organizational climate – supervision support, organizational practices, work attributes and social-collaborative climate) capable to promote engagement, included in the application. In this way, it is intended that, in addition to the traditional engagement evaluation, another innovative way is used including social network analysis, which will result in the culmination of the modules that relate to the vectors associated with engagement and have their origin in the interactions between everyone within the organization (from knowledge sharing, suggestions for improvements, mutual assistance, continuous feedback, information visualization).

The remainder of this work is structured in the following way: Section 2 presents a theoretical background for the concepts of engagement, the human resource 4.0, and gives a perspective of what is being done related to the fostering of operator 4.0 engagement. Section 3 presents the vision of a technological tool, i.e. the concept is exposed, as well as a brief discussion. The last section summarizes the main conclusions and some future work.

2. Literature Review

2.1 Engagement

2.1.1 Types of Engagement

Employee engagement is a state of commitment and involvement that an employee feels about his/her organization and its values. The level of participation in the organization activity and value creation will determine the engagement amount, and can be expressed in three ways - physically, cognitively and emotionally (Alshammari, 2015).

Shuck and Reio (2014) corroborate these three forms of expression, classifying them according to three distinct levels of engagement, i.e., the **cognitive**, the **emotional** and the **behavioral** engagement. The same authors consider that in the cognitive engagement, the employee determines, by making an assessment, whether his/her job is meaningful, safe (physically, emotionally and psychologically) and whether has sufficient levels of resources to complete his/her work. This type of engagement is based, therefore, on the way employees assess the climate of their workplace, as well as the tasks in which they are involved. Passalacqua et al.(2020) clarify that cognitive engagement correlates with the consideration, investment and willingness to strive that the employee manifests. Consequently, it will lead to employee's psychological investment and effort directed to a task. Regarding emotional engagement, employees who express it, invest personal resources such as pride, confidence, and knowledge. Consequently, these feelings of positive emotions momentarily expand employee's available resources and enhance critical and creative thinking processes (Shuck & Reio, 2014). Although the incorporation of such resources seems very easy, these positive emotions of pride and confidence only appear if the evaluations made about the environment during the previous stage are adequate (for example: "this work is significant", "it is safe for me here" and, "I have the resources to complete my tasks") (Shuck & Reio, 2014). Thus, from this type of engagement, two major factors emerge - emotional excitement (interest or boredom - in opposition), and emotional valence (happiness or sadness - also in opposition) (Passalacqua et al., 2020). Behavioral involvement is related to active participation and positive conduct, and can be seen as something that we can often see someone else do (Passalacqua et al., 2020; Shuck & Reio, 2014). It is perceived as the manifestation of the combination of cognitive and emotional engagement, in which increased levels of effort directed towards the goals of the organization are revealed (Shuck & Reio, 2014)

Jha and Kumar (2016) consider three dimensions of engagement, and two of which are in line with the above, which are (i) **intellectual engagement** – the essence of which is in confluence with cognitive engagement, (ii) **emotional engagement** – with a definition like previous authors, and (iii) **social engagement** – which focuses its interpretation on the way employees communicate with team members and other colleagues about different work-related improvements and changes.

Saputra et al.(2018) argue that work engagement, in its holistic form, can be classified in **physical** terms (where there is a willingness to use health, fitness and physical resistance to do the job), **emotional** (where the individual shows a willingness to use feelings of pride, joy and dedication to perform the work), **intellectual** (individual is willing to use thought, creativity, concentration and focus to do work) and **spiritual** (individual's willingness to give of his devotion, help to others and life purpose to perform the work).

2.1.2 Constituents of Engagement

Schneider et al. (2018) explore three drivers for the engagement, namely, **organizational practices** (salary, career opportunities, performance feedback practices, communication of organization goals and job security), **supervisory support** (interpersonal and social relations, involving the support of the supervisor, as well as co-workers), and **attributes of the work itself** (clarity attributed to the functions and participation in decision-making).

Sanchez and McCauley (2006) corroborate the previous authors, although they group critical factors related to engagement in four dimensions. **The work itself**, including opportunities to develop, is the first dimension where employees are treated with respect and feel respected within the organization, work is valued for its overall contribution, there is a real opportunity to grow in each job, work is aligned with the company's success, and employees participate in job opportunities that provide development. **Confidence and trust in leadership** is the second dimension and it is related to high-level managers who act according to the expressed values of the organization, where the leadership distributes resources to sustain the strategy and following the declared values. There is also the involvement of visible and transparent management and the leadership itself makes the connections between the strategy and the process that will help employees to have an overview of what is going on in the organization. **Recognition and rewards** are the third dimension focused on recognizing employees in a tangible and immediate way, with organizational reward practices considered fair and competitive. Rewards are monetary and non-monetary, intending to recognize exceptional performance. **Organizational communication** is the last dimension where organizational culture is built on an open and bidirectional information exchange, in which communication is planned and where supervisors are active participants in the information cascade. There is a complete media mix that makes it possible to reach all levels of the organization and the supervisors themselves receive communication training.

Edwards (2012) considers, as well, four areas to improve engagement - **internal communication, management training, managing performance,** and **staff wellbeing**. Table 3 exhibits these four dimensions considering the author's perspective.

Table 1. Workforce engagement dimensions from Edwards (2012)

Dimensions	Description
Internal communication	People are kept informed with managers walk the shop floor asking questions and being accessible, creating dialogue and feedback
Management training	Managers should have training in the sense of having enough skills to achieve a targeted management
Managing performance	Engaging the workforce is essential to challenge underperformance, since employees with poor interpersonal skills regularly harm and demoralize other employees.
Staff wellbeing	Human resources are human and not just resources, so caring about employee's wellbeing is crucial

2.2 Organizational Commitment

Organizational commitment is another essential endeavor in which organizations must invest their time and effort. Although it is related to engagement, commitment refers to the intensity of an individual's identification and involvement with a particular organization, denoting a strong belief in the acceptance of an organization's goals and values, a willingness to exert considerable effort on behalf of the organization and a definitive desire to maintain organizational affiliation. These three factors are closely correlated with the concepts of normative, affective and continuity commitment. The term of organizational commitment is different from that of engagement, however, both overlap in practice, so without engagement, there is no organizational commitment, and the opposite can also be seen.

As mentioned in Nazir (2016) and in this context, the organizational commitment is considered to be an affective commitment that includes the employee's attachment, their involvement and the identification with the employing organization. The affective commitment has been correlated with encouraging employee behavior, such as being less

likely to leave their job and placing an additional effort into their work. Therefore, the authors clarify that when employees are engaged, they are more likely to be committed and this is the relationship between organizational commitment and engagement.

2.3 Human Resource 4.0: The Operator's role in the digital paradigm

Cyberphysical systems, which are embedded systems with decentralized control and advanced connectivity, will transform functions into manufacturing systems, which despite the increase in computerization and automation that they bring with them, reveal that human work will be very important for the future (Stern & Becker, 2019). Thus, the academy expects the work to be less repetitive and less simple, but more qualified with a view to the use of cyber-physical systems (Stern & Becker, 2019; Teixeira et al., 2019). It is to be expected that following Operator 4.0, the factories of the future will be suitable for workers with different preferences, capacities and skills and driven by solutions that empower employees and involve the work community. There is, however, the idea that operators of the future will transition from operators to manufacturers, taking advantage of collaboration with digitized and automated production systems and using creativity to solve unexpected and unforeseen challenges (Kadir & Broberg, 2021).

Operator 4.0 converges on the intelligent and skilled operators of the future who will be assisted by automated systems (which will relieve physical and mental stress), fostering the growth of creative, innovative and improvisational skills, without compromising production objectives (Kaasinen et al., 2020). He/she is understood as an intelligent and skillful operator who performs cooperative work with robots, creating human cyberphysical systems, advanced technologies of human-machine interaction and adaptive automation to reach automation symbiosis among humans and machines (Romero et al., 2020).

Companies now realize that new people being recruited are ill-equipped in terms of skills to face the reality of modern engineering. Technical knowledge is not enough and the strong and rapid advances in technology are showing that, increasingly, engineers face challenges that involve large-scale complex systems, requiring interdisciplinary interaction. Competencies for commerciality, customer management skills, relationship and communication skills, collaboration, systemic thinking and a stronger external market focus will be fundamental in the new paradigm (Whysall et al., 2019).

Flores et al.(2020) categorize human capital 4.0 as having five major dimensions of competencies, classifying them as soft, hard, cognitive, emotional and digital workforce. The soft workforce is considered flexible and social and includes communication, teamwork and cooperation, leadership, willingness to learn, self-development, negotiating power, flexibility and/or adaptability. The hard workforce, which is professional and skillful, encompasses technical knowledge that, in the paradigm of the future, is based on competencies at the level of industrial organization, industrial processes, understanding of patterns, problem-solving techniques, software design, man-machine interactions, digital network settings, digital security and coding or programming. The cognitive workforce converges into intelligence and analytical skills, which in turn are divided into verbal aptitude, numerical aptitude, and spatial aptitude (coordination, memory, decision making, abstract and analytical thinking). The emotional competence of the workforce is revealed in the breadth of self-awareness and empathy. Characteristics of this dimension are revealed as being self-control, empathy, orientation towards achievement and motivation. The competency of the digital workforce encompasses digital literacy and interaction. And it incorporates in itself programming skills, cybersecurity, digital networks, cloud computing, database architecture and web development.

As mentioned in Kaasinen et al.(2020) and Li et al.(2020), Operator 4.0 can be differentiated in: (i) **Super-strength Operator** (due to the use of exoskeletons); (ii) **Augmented Operator** (due to the application of augmented reality); (iii) **Virtual Operator** (from the use of a virtual factory); (iv) **Healthy Operator** (using wearable devices to track employee well-being); (v) **Smarter Operator** (applying agents or artificial intelligence to planning activities); (vi) **Collaborative Operator** (through interaction with CoBots); (vii) **Social Operator** (due to knowledge sharing using a social network); and (viii) **Analytical Operator** (through the application of Big Data analysis).

Li et al. (2020), in their research, despite mentioning the previous Operator 4.0 models, funnel their characteristics in four dimensions, which are: (i) **Augmented Operator** (able to enjoy remote orientation and specialized capture, registering their work and placing it where other operators can search); (ii) **Virtual Operator** (creating ease of learning and training, such as showing availability for meetings to plan new factory layouts); (iii) **Smart Operator** (supported by artificial intelligence systems, where it is possible to create shop-floor memory, digital checklists and digital immediate transfer of information for follow-up of operators) and, finally; (iv) **Social Operator** (where social networks operate that provide knowledge sharing, advice and function as knowledge repositories).

Human resources are considered essential in smart manufacturing. In the past, it was the operator who had to adapt to processes and systems, with efficiency, productivity and cost savings being the main drivers of adaptation. With the

emergence of technologies, machines and processes are so automated that these performance measures are already guaranteed. However, exploiting the flexibility and creativity of human workers is becoming more important to gain a competitive advantage in today's business. Thereafter, the paradigm is changing, as systems must be adapted to the human operator and satisfaction in the workplace will be a key issue. The adaptation according to the human operator was developed under four dimensions: (i) adaptation to human physics with ergonomics at work, (ii) adaptation to human skills, (iii) adaptation to interaction, and (iv) adaptation to the Level of Automation (LoA) (Kaasinen et al., 2020).

2.4 Fostering the Operator 4.0 engagement

Organizations performance and competitiveness largely depend on how their employees are managed and involved in daily activities (Tortorella et al., 2021).

When it comes to measuring and tracking employee engagement, most companies still measure engagement annually, or even more sparsely, using traditional survey techniques. While these practices have provided a wide range of insights into the dimensions and impact of engagement, it is time to rethink methods and take advantage of technologies. Engagement measures are currently logging indicators and measuring them more often can help to ascertain other engagement enhancers (Burnett & Lisk, 2019).

The most contemporary way of conducting and managing the business is based on the idea of creating a friendly and pleasant environment among colleagues, motivating them to interact with each other (E. Lithoxidou et al., 2020).

Kaasinen et al.(2020) and Schulze Kissing et al. (2019) established four dimensions to increase engagement. The first dimension is based on **knowledge sharing and communication** that are shown to be essential aspects in the context of industrial work. Knowledge is created and organized by the information flow itself, anchored in the commitment and beliefs of its holders, and can thus be fostered through collaborative social platforms. Its goal is to increase knowledge sharing among workers and support them in problem-solving situations. The second concept is the **visualization of information** through augmented reality (AR) and even virtual reality (VR) glasses. The purpose of this concept is to provide context-related information in the workplace. AR glasses can be used to display interactive interfaces, pointing to alarm locations, for example. The same can be said for work instructions that are easily represented with these technologies, with promising results (in terms of time, less mistakes made and acceptance). The third concept is based on **participatory design** (involving operators) using 3D simulation software to simulate work and tasks (later 3D-PD). The purpose of this concept is to provide workers with the possibility of co-designing the workplace and planning work practices with other stakeholders, incurring benefits due to the sharing of knowledge between designers and users, knowledge that is more hidden (tacit knowledge). The last dimension involves the issue of **employee training**, with the definition of Learning Factories. The learning factories seek an action-oriented approach on-site, where the participants acquire skills through self-learning processes structured in a technological learning environment, using a training platform, with machine-learning based search and retrieval algorithms. Teaching methods have the objective of bringing teaching/learning processes closer to real industrial problems.

Organizational innovations such as game-based learning or serious games used for life-long learning will be vital for Operator 4.0 to remain competitive throughout the entire career (D. Li et al., 2020). The gamification process promises to increase engagement and motivation, since it enhances immersion, contentment and satisfaction, and can thus serve to rethink the design of interfaces and operational processes (Passalacqua et al., 2020; Schuldt & Friedemann, 2017). At least in the components that promote engagement, corresponding to training, information visualization and knowledge sharing, gamification has already been prototyped and evaluated as being useful.

Social collaboration platforms have gained popularity in industrial environments, creating online communities. Despite the difficult participation of employees, when sharing knowledge on these types of platforms, the use of gamification is, in the academic field, as being able to combat this trend. Lithoxidou et al (2020) create a collaborative platform capable of promoting interaction between co-workers, sharing knowledge and experience, requesting help with knowledge and experience, increasing knowledge, continuous access to best practices, reformulating documentation in accordance with needs, the exchange of organizational practices between departments, a means to discuss and express different opinions for best practices and a reminder mechanism to practice skills and procedures using other tools. This is done through mechanisms such as the following: Ask a question; Answer a question; Comment an answer; Vote; Documentation; Editor for video, image, text; Tags and Categories; Search engine; Training Apps; Suggestions. All these relationships converge in a system of awards for operators, who start their journey with the award of cups, ranging from Bronze, Silver and only then Gold.

Schuldt and Friedemann (2017), in turn, summarize in their work three applications of gamification, namely, assembly-line production, picking processes and autonomous vehicles in intralogistics. In short, the application

consisted of illustrating the process (promoting visibility), aided by a reward system that provided common goals and possibilities for cooperation, team play via team leaderboards, story as the basis for feeling socially integrated. In addition, operators held freedom of choice, where they should not only accept decisions, but need to make meaningful decisions, with (immediate) feedback. Autonomy is very much in demand here with the possibility to choose and specialize via avatars and choice of action via narrative frame and badges. The perception of their performance was also considered with direct feedback via points, appreciation and clear objectives via badges and feedback on team performance via leaderboards.

The application of gamification on the training platform with the use of augmented reality offers incentives for workers to follow the training regime more diligently. Performance evaluation methods for each trainee are triggered, as well as cumulative perceptions about training effectiveness. An AR game emerges, where achievements and points earned by employees are synonymous of the increase of their performance and participation in sessions (Evdoxia Lithoxidou et al., 2017).

3. A vision of a technological tool to assess and foster the employee engagement

3.1 A conceptual model to assess engagement

Following what was found in the literature, the **conceptual model to assess engagement** was designed (Figure 1). Thus, considering the trends pointed out by the literature, both engagement, and organizational commitment positioned at the same level (states that are less practical to be reached), strongly depend on the correct management of the four large groups (work attributes, organizational practices, social environment and supervision support) belonging to the organizational climate.

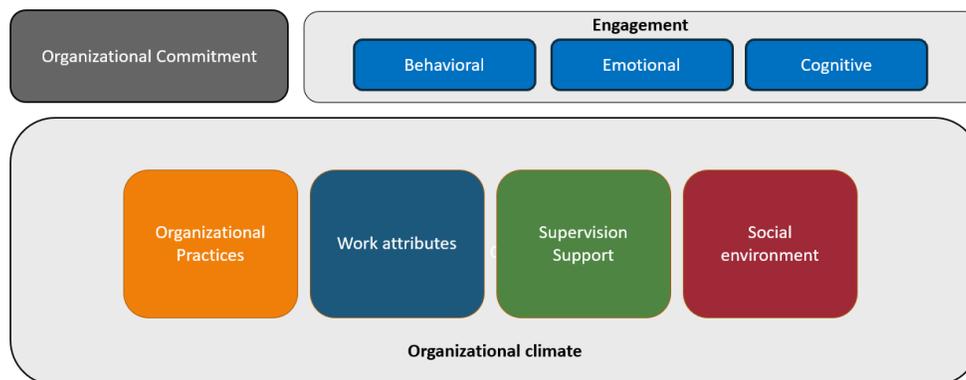


Figure 1- Engagement and Organizational Commitment Conceptual Model

In practice, the engagement and the organizational commitment are already measured quantitatively through the use of scales. The great innovation of this concept is to create an application that is not based only on scales, but on the presence and constitution of modules that take into account all the vectors previously mentioned (work attributes, organizational practices, supervision support and social environment), creating an interactive environment that provides collaboration among all in the organization. These interactions will provide points of connection which will allow the constitution of graphs which, consequently, will enable the analysis of social networks, with the estimation of a potential engagement value.

However, for the innovative solution to be valid, it is necessary to incur, in parallel, a traditional structure (using scales already available and validated) for evaluating engagement, organizational commitment and also factors that indirectly influence these two dimensions, as is the case with the characteristics of the work and the authentic climate.

In order to create the traditional method of assessing engagement and organizational commitment, to launch a set of measures aimed at promoting the two variables, the following constructs were grouped.

The scale (questionnaire) selected for the **evaluation of engagement** is that of the Gallup consultant (Gallup, n.d.), which in its questions already includes many of the dimensions inherent to the organizational climate, previously mentioned. This scale presents a Likert scale.

The survey applied to assess **organizational commitment** is cited by Vandenberg (2009). The form of evaluation falls on a scale of 1 to 5 based on the following conditions: I do not agree = 1; I slightly agree = 2; I partly agree = 3; I mostly agree = 4; I fully agree = 5).

The scale employed in the **assessment of the organizational climate** is the one presented in Rego & Cunha (2005). This model (Authentizotic Climate) is based on six factors, namely, spirit of camaraderie, credibility of the leader, open and frank communication with the leader, opportunities for learning and personal development, fairness/equity and work-family conciliation.

In order to clarify the work attributes, the English version of the Jobs Characteristics scale was adopted (Boonzaier et al., 2001).

3.2 The computational solution project

This section intends to outline a set of functional requirements that the technological tool should have, considering the study previously carried out.

The computational solution will be composed of five modules. The **first module** will be oriented towards the profiles of workers and their skills, where it will be possible for employees to update their emotional state, view the level of recognition inherent to the platform and career progression in the company and even view their skills map. The **second module** is based on social collaboration and includes the following sub-modules: knowledge repository (of organizational tasks), a collaborative platform (for knowledge sharing), a suggestion submission platform, a group progress visualization system and a platform for consulting the profiles of all employees. The **third module** concerns the interaction between employee and supervisor, where mutual evaluation and the establishment of objectives between the supervisor and the employee is possible. The **fourth module** demonstrates the interaction more oriented to the application's back office (organizational practices), through which it is necessary to feed the platform with the insertion of news about the organization, the insertion of new skills, new tasks, updating the recognition podium and workshop management (for raising skills). The **fifth module** is aimed at launching questions (in challenge mode) to employees, adopting a gamified strategy.

Regarding the functional requirements of the system, it is intended that the application to be developed considers a module that addresses the **profile of employees** (personal and professional information) as well as **competencies development** (Figure 2). This will be the **first module**.

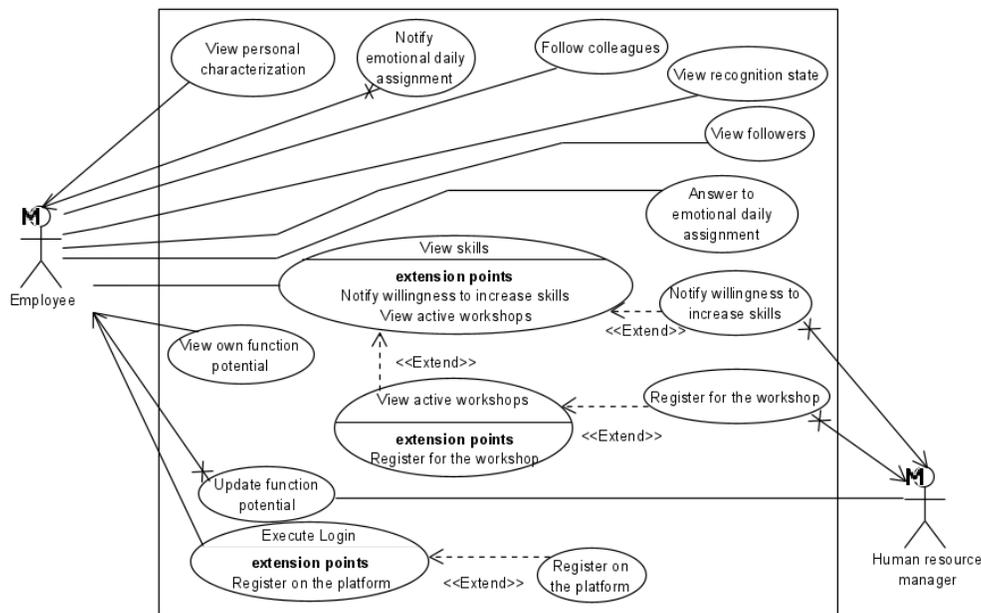


Figure 2- Employees Profile and Competencies Development

The employee will be able to answer the daily emotional state (with the use of emojis), and he/she will be capable of visualizing his/her state in terms of recognition (due to the interaction with the application and the highlighted evaluation). As in a social network, the employee will be able to follow the activity of his/her closest colleagues (followers' system). Their skills can also be viewed, and the employee can present the desire to increase them (with a

notice for human resources management). It is intended that there is a system in the application that promotes the possibility of creating opportunities for companies to make people versatile. There is already a technique in Lean Philosophy based on the creation of workshops and making them available for employees. In this way, the employee can register for the workshops and even consult their status. Regarding employee's function, they will be able to see their evolution as envisioned by the company, and whenever there is a change, the employee is notified.

The **social collaboration module** (Figure 3), which is the **second module**, consists of the sub-modules of suggestions for improvement, employee profiles, discussion forum, tasks (repository) and progress (group).

In the discussion forum, sub-module employees will be able to request help from their colleagues in tasks, and they will also be able to answer requests for help and vote on questions.

In the suggestions for improvement sub-module, employees can submit suggestions to improve the company's processes (submission that leads to a notification to human resources), vote on suggestions submitted by other colleagues, as well as commenting on these same suggestions (in the sense of, for example, add value). Furthermore, they can see (in "kanbanize" style) how the suggestions already submitted are (if they are new, if they are in the evaluation process, if they are being implemented and if they have already been implemented).

In the sub-module of employee profiles, employees can consult the profiles of their co-workers and recognize (with the attribution of points) their work.

In the tasks sub-module, employees can consult the work instructions, see the experts associated with them and submit explanation videos to illustrate them. Beyond this, they can supervise the departments/areas' podium regarding their performance and recognition (of collaboration) and constitute discussion working groups.

It should be noted that almost all the features specified here have a direct connection to a recognition system, which adds points, thus showing which employee is more interactive with the application/organization.

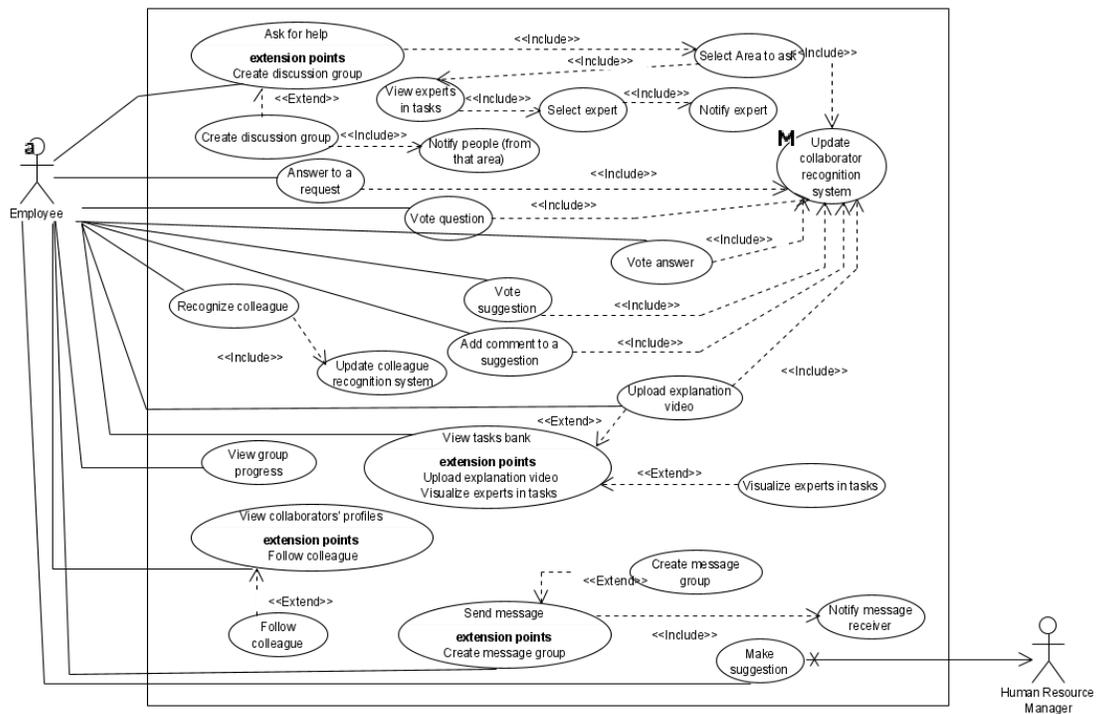


Figure 3- Social Collaboration Module

As can be seen in Figure 4, in this module the supervisor/leader can establish OKR's (objectives) for his/her team members (being notified of them), and send feedback on these objectives. The employee receives all feedback notices and can also, in messenger mode, question the leader and answer questions posted in the forum by his/her superior. Supervisors can recognize their employees for their performance, having a direct impact on the employees' points system, making them grow. In addition, the employee is notified every month to assess his/her supervisor, and the assessment is sent to his/her leader.

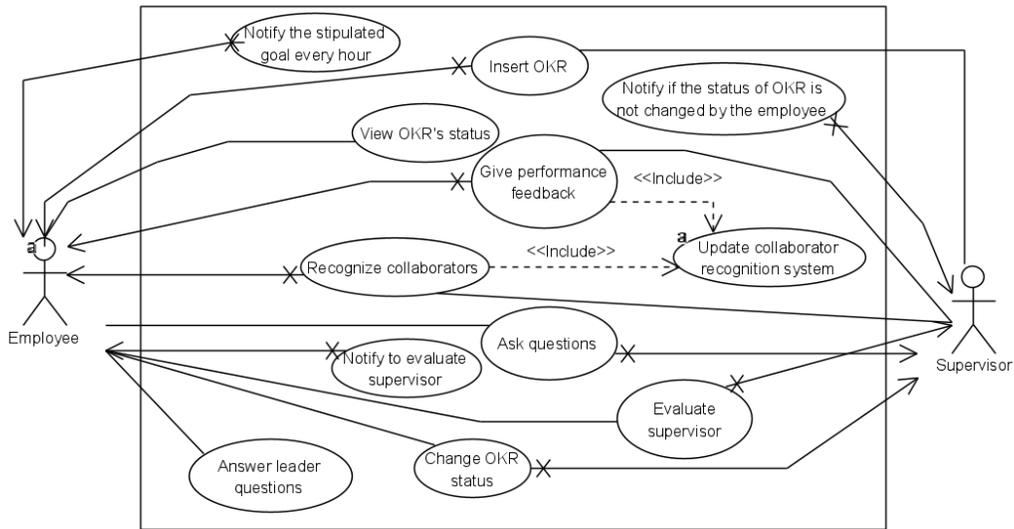


Figure 4- Supervision Support Module

In the **organizational practices module** (Figure 5), the marketing manager can update the system with news from the organization, with operators receiving these notifications. The human resources manager can update the podium status of the areas in the organization (regarding their performance and collaboration), can also evaluate the suggestions given by employees (whose assessment has an impact on the staff recognition system) and insert new skills acquired by employees. The area manager has permission for the latter option as well, while he/she can create workshops (the human resources manager can also perform this task/functionality) and associate employees for their leaderships. The insertion of new task instructions is also dependent on the action of the area manager/responsible (who is usually engineering personnel).

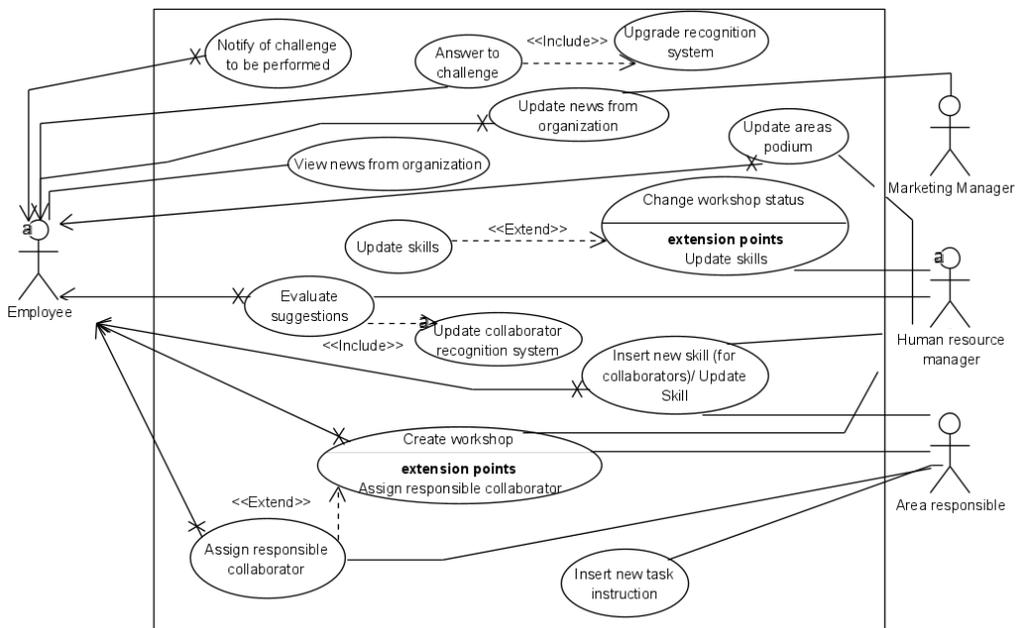


Figure 5- Organizational Practices module

The surveys module (daily challenges- Figure 6) is only intended to launch notifications to workers that have to respond to that specific challenge at a certain time. When they respond, the recognition system is updated, with the addition of points.

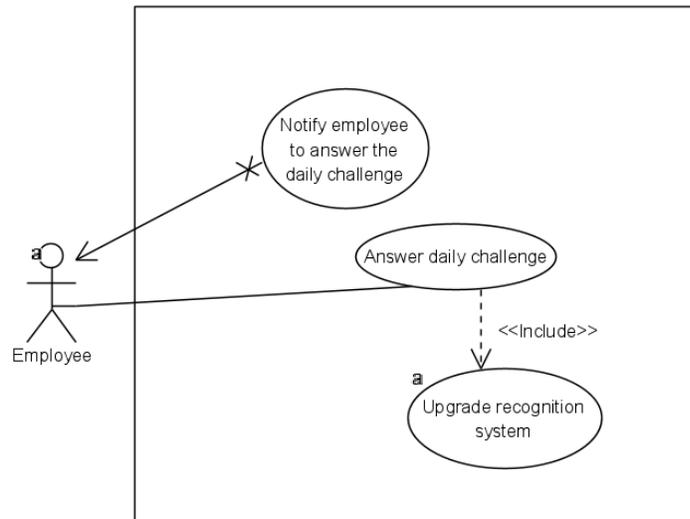


Figure 6- Surveys module

4. Conclusion

Operator 4.0 is the worker who will operate in the digital environment, which will require a whole new curriculum. Moreover, digitization brings volatility and employees are more able to easily switch jobs, which compromises organizational knowledge. The employee retention, achieved through the monitoring and promotion of engagement, are processes to be considered and which may constitute a solution for a better adaptation of workers to the technological environment and a consequent better preparation of the company.

According to what literature suggests, it is only possible to evaluate engagement using scales that are already validated, which are operated in the form of questionnaires. Thus, any technique designed to assess engagement, outside of what is standard, requires validation.

Thus, this work intends to use one of the techniques most associated with engagement (within the scope of the digital paradigm), currently, being gamification, which is based on the characteristic of making the visualization of devices and their interaction settled on games, with associated recognition methods. This way, it is intended that the scales related to engagement and the vectors of the organizational environment that influence it (model presented that arises from a group of constructs) are triggered by the system as daily challenges that employees must answer, earning points (recognition) with that, combining everything in a kind of individual and team competition. Additionally, to this method, it is intended to create an application that fosters collaboration between employees, feedback with the leader/supervisor, fostering skills (with conscious progression at work) and that is constantly updating organizational information, regarding competition by individual and group recognition. These interactions with the system and the monitoring of the application of the recognition technique will be further processed with analysis of social networks, since a potential engagement value must be achieved that will be constantly confronted with the traditional method (use of scales).

The intention of further studies to be carried out is to validate the concept built, in the industrial scope, using three pilot companies and the technological tool prototype.

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