A Serious Game for the Digital Transformation of Organizations

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Abstract: To aid human resource management professionals design a configuration of human resource management practices that facilitates the employee behaviour needed for the digital transformation, a serious game was created. The serious game challenges human resource management professionals to combine and design human resource management practices that align to the organizational strategy and optimize employee digital transformation behaviour over multiple simulated years. In this paper, the underlying rationale, design, and outcomes of the first test rounds of the game are presented. Organizational change shaped by the diffusion of technology is labelled the digital transformation (Hanelt *et al.,* 2021). Employees can accelerate or slow down the digital transformation. Hence, organizations are looking to facilitate digital transformation enhancing employee behaviours: adaptive performance and proactive agility behaviour (Collou and Bruinsma, 2022). Aligned human resource management configurations (i.e., combination of human resource management practices such as recruitment, selection, and job design) can shape that employee behaviour (Gratton and Truss, 2003; Delery and Doty, 1996). Designing such a human resource management configuration however is challenging. There are many human resource management practices that need to be designed over multiple years and effects on employee behaviour vary. Serious games are well suited tools to enhance understanding of challenges such as strategic human resource management design. They allow professionals to experiment with choices and gauge the outcomes of their selection without the need to test these decisions in real life. Prior work (Collou and Bruinsma, 2022, 2019) illustrated that a serious game can aid human resource management professionals in their quest to design human resource management configurations that align to the organizational strategy. In the current game an additional challenge was added: shaping digital transformation behaviour. Tested in multiple rounds the game shows great promise for professionals and students to experiment with human resource management configuration design. First evaluations illustrate that responders are positive in terms of their learning experience. Balancing the need to align the human resource management configuration and affecting the employee behaviour simultaneously has proven to be challenging for players of the game. Future steps are focused on this balance and empirically validating the serious game.

Key words: Strategic HRM, Digital Transformation, Serious Game

1. Introduction

In the current paper, the underlying rationale, design, and outcomes of the first test rounds of a serious game on shaping the digital transformation through human resource management (HRM) is presented. A serious game is a game in which education is the goal, rather than entertainment (Michael and Chen, 2006). How and why HRM is pivotal in shaping the digital transformation is detailed first. The building blocks of the serious game DTInLine are presented secondly. Thirdly, the flow and actual design of DTInLine, including evaluation and testing, are presented. The paper is concluded by elaborating upon the current state and future steps of DTInLine.

Organizations increasingly combine innovative technologies such as artificial intelligence (AI), augmented reality (AR), and far-reaching robotization. These technologies significantly affect the way these companies operate (Vial, 2019). The organizational changes shaped by the diffusion of these technologies is labelled the digital transformation (DT) (Hanelt *et al.,* 2021). The DT deviates from other organizational change due to (1) the malleable and combinatorial characteristics of the technologies; (2) the open technical infrastructure; and (3) the potential for changes of value propositions (Hanelt *et al.,* 2021). As organizations set out to reap the benefits of the DT however, significant challenges emerge.

One of the most important challenges that organizations face is shaping the employee behaviour needed to truly benefit from the DT. Employees can accelerate or slow down the DT trough their behaviour. Employees can, on the one hand for example, embrace new technology and shape it so the technology aids employees in their work towards organizational goals. On the other hand, employees can resist innovation and refuse to use specific technologies hindering the DT progress made within an organization. Shaping specific employee behaviour is a daunting task. HRM, defined as all management decisions and actions that affect the nature of the relationship between the organization and employees (Beer *et al.,* 1984), is the organizational domain that is concerned with shaping employee behaviour. If HRM is designed and implemented effectively, the employee behaviour needed

to truly reap the benefits of the DT is shaped and facilitated. Hence, HRM is the domain that managers call upon to shape the employee behaviour needed for the DT.

While a vast body of research demonstrates a positive relationship between HRM and organizational performance though affecting employee behaviour (Schuler and Jackson, 1987, Jiang *et al.,* 2012), the specific details of how HRM can be designed to shape particular employee behaviour is lacking. According to literature, employee behaviour is shaped through the design and implementation of a set of HR-practices (i.e., HR-configuration). However, designing an effective HR-configuration to shape the specific employee behaviour needed is a challenge. First, the HR-practices that make up an HR-configuration ought to exactly reflect the organizational strategy (Gratton and Truss, 2003). In particular, an HR-configuration should deviate from the 'ideal type' HR-configuration (i.e., theoretically effective HR configuration given a specific strategy) exactly proportional to the extent to which the organizations' strategy deviates from the ideal type strategy (Delery and Doty, 1996). Secondly, there is no consensus on which specific HR-practices need to be combined (Boon, Den Hartog, and Lepak, 2019). Thirdly, how to design those HR-practices to achieve synergistic effects is unclear (Chadwick, 2010). Fourthly, equifinality is said to occur; the same employee behaviour may be reached from different initial conditions (Delery and Doty, 1996) using different combinations of HR-practices. As a result, HR-professionals and managers are left empty handed in their quest to design a HR-configuration that effectively shapes DT employee behaviour.

Prior work on the design and validation of the serious game InLine (Collou, 2020) has illustrated that the creation and use of a serious game has great potential to address the above-mentioned HR-configuration challenges and truly aid HR-professionals in their quest to design employee behaviour shaping HR. Not only does a serious game enable the specification of the dynamics of HR-configuration design, the element of fun inherent to games is used to challenge and invite HR-professionals to experiment with HR-decisions and gauge their outcomes. While prior work on the serious game InLine has proven to be fruitful, it does not address how to shape the specific employee behaviour needed for the DT, which has become increasingly important. As organizations are looking to reap the benefits of the DT, and the DT gives rise to the need for particular employee behaviours, creating a serious game tailored to the DT is increasingly opportune and valuable.

In the following we detail the specific buildings blocks that enable the design of DTInLine, a serious game on shaping the digital transformation through HRM. After detailing the building blocks, the design and flow of the game are presented. The paper is concluded by detailing how DTInLine is evaluated, and a description of the subsequent research steps.

2. DTInLine: Building Blocks for a Serious Game

The building blocks of a serious game compromise the most important (theoretical) elements that are included in the game. Here, the building blocks are the specific employee behaviour needed, shaping that behaviour through aligned HR-practices, and the dynamics with which it does (theoretical game model).

2.1 DT Employee Behaviour

The initial building block delineates the requisite employee behaviours for the DT. Organizations seek to cultivate these behaviours to fully leverage the benefits of DT. Derived from the perspectives of owners, managers, and employees in organizations undergoing DT, specific behaviours were identified. Findings indicate a focus on fostering adaptive performance and proactive agility among employees (Collou and Bruinsma, 2022). Employees need to maintain and even increase performance as DT technologies are combined. Through adaptive performance behaviour (Koopmans *et al.,* 2012), they can. Adaptivity involves flexibility, keeping job skills up to date, coping with uncertainty and adjusting to changes (Park and Park, 2019). In addition, organizations need employees to perceive opportunities and enact changes. By showing proactive agile behaviour (Doeze Jager, Born and van der Molen, 2021), they can. Proactive agile behaviours revolve around employees actively looking for new opportunities and following up on them, anticipating problems, and acting before they happen. Hence, adaptive performance and proactive agility behaviour are what (HR) professionals are looking to increase while playing DTInLine. They are labelled employee DT behaviour.

2.1.1 Strategy, HR-configuration and DT Behaviour: Alignment

The second building block details the alignment between the HR-configuration and the organizational strategy. A substantial body of literature suggests that such alignment significantly influences employee behaviour (Gratton and Truss, 2003; Delery and Doty, 1996; Schuler and Jackson, 1987). Therefore, alignment is an

important building block for the serious game at hand. This vertical alignment refers to the extent to which an HRM configuration is derived from and reflects the organizational strategy (Bowen and Ostroff, 2004; Macduffie, 1995). If it does, consistent messages are communicated increasing the clarity towards employees in terms of which behaviours are desired within the organization. To create DTInLine, this vertical alignment needs to be specified. A valid method with which organizational strategy can be assessed is the competing values framework (Cameron and Quinn, 2006; Collou, van Riemsdijk, and Bruinsma, 2018). Accordingly, the strategy of an organization can be assessed using four strategic quadrants: cooperative (strategic focus on teamwork), market (strategic focus om competition), mechanistic (strategic focus on efficiency), adhocratic (strategic focus on innovation). Similarly, the focus of an HR-configuration can be assessed using the same four strategic quadrants. Both the organizational strategy and the HR configuration at hand are provided with scores (0-100) on all four competing values strategy quadrants. The strategy score can be provided using the organizational culture assessment index (OCAI) questionnaire or using a fictive score for the game. The HR-configuration is gauged empirically, as detailed below.

A HR configuration is made up from individual HR-practices. For DTInLine, HR-practices were selected that are relevant for all organizations: recruitment, selection, job design, appraisal, compensation, development, and leadership. For these HR-practices, several design options are relevant. Development can, for example be focused on teamwork, or on individual innovativeness. To assess the extent to which these HR-practices and their individual designs align to the four strategic quadrants we use the outcomes of a prior study (Collou, Bruinsma, and van Riemsdijk, 2019); each HR-practice is assigned a score (0-100) on all four strategic quadrants by the HR-professionals. This score illustrates the extent to which that specific HR-practices aligns to the four strategic quadrants. To capture the variety in design possibilities within one HR-practice and allow for the assessment between the HR-practices and the organizational strategic quadrants, four possible designs for each HR-practice are defined. Hence, a total of (7 x 4) 28 HR-practices are used in the serious game DT-InLine. One example of the four designs options of an HR-practice: selection of new employees can be based on either (1) attraction of new customers which aligns to the market strategy, or (2) their versatility which aligns to the cooperative strategy, or (3) their innovative capabilities which aligns to the adhocratic strategy, or (4) their accuracy which aligns to the mechanistic strategy. The four designs of every individual HR-practice, that in turn all have an individual score on every strategic quadrant, allows the assessment of alignment between the HR-configuration (using the average of those HR-practices selected by players) and the strategy (see table 1).

Table 1: Vertical alignment example scores.

	Cooperative	Market	Mechanistic	Adhocratic
Strategy	30	30	30	10
HR configuration	50	20	10	20
Difference	20	10	20	10
Alignment score	(20+10+20+10) = 60			

However, as DTInLine challenges (HR) professionals to increase the DT-behaviour an additional score is needed; the extent to which the specific HR-practice designs affect the DT behaviour. Again, the solidified knowledge of (HR) professionals was collected to detail these scores. These DT behaviour scores are based on a survey distributed amongst (HR) professionals (N=47). Specifically, HR-professionals were asked to assign a 1 (low) to 5 (high) score illustrating the effect of all 28 HR-practices on DT employee behaviour. Table 2 illustrates one HR-practice and the scores used for both strategy and DT behaviour.

Table 2: HR-practice including quadrant and DT behaviour scores.

	Cooperative	Market	Mechanistic	Adhocratic	DT Behaviour
The most important characteristic of job design is that employees need to solve complex problems	23,46	43,56	23,08	9,00	3,87

2.1.2 Effects of the HR-configuration on Employee Behaviour: Theoretical Model

As the needed employee DT behaviour and methods with which (i.e., HR-practices) to facilitate that behaviour is depicted, the dynamics of how DT behaviour comes about needs to be specified. A theoretical model is needed that details how the effects of (changing) HR-practices on the behaviour of employees plays out. Hence, the final building block of the serious game DTInLine is the theoretical model that details how employee DT behaviour is achieved through HR. The theoretical model used for DTInLine describes how changes in the selected HR-practices affects the employee behaviour through alignment. The variables in the model are employee DT behaviour, the organizational strategy, the HR-configuration, and the vertical alignment between the latter two. In the figure, all these variables are defined at two points in time (T0, T1) to illustrate the changes over time. The variable 'redesign of the HR-configuration' (selecting and implementing new HR-practices to affect the employee behaviour), which explains the differences between T0 and T1, and the dynamics that detail the order in which it does, are included in the model. See figure 1.

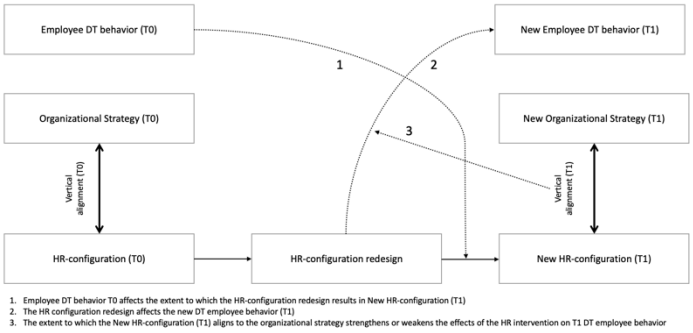


Figure 1: Theoretical model serious game DT-InLine

The following steps are depicted by the theoretical model: a T0 level of employee DT behaviour, current organizational strategy, and current HR-configuration are presented. To subsequently optimize the employee DT behaviour, a HR-configuration redesign is initiated. Professionals redesign the HR-configuration (T0) aiming to shape employee DT behaviour and optimize vertical alignment. The HR-configuration redesign results in a new HR-configuration (T1). The extent to which the redesign is effective (T1) is affected by the DT behaviour (T0). If employees are adaptative and proactive (DT employee behaviour), the redesign is more effective; employees are open to change. If the employee DT behaviour (T0) is low, employees are more resistant to change and dampen the redesign (*arrow 1*). Subsequently, the extent to which the new HR-configuration (T1) and the organizational strategy (T1) align is depicted. In turn, the HR-configuration redesign has direct effects on employee DT behaviour (T1), *arrow 2*. This is affected by the new vertical alignment (T1), *arrow 3*: If the new HR-configuration aligns to the organizational strategy (T1) employees will perceive the redesign as consistent and accept the change. Finally, the new (T1) variables serve as starting point for detailing T2; the model can be applied to continuously illustrate the effects of HR-configuration redesign (T0, T1, T2, T3…).

The building blocks described above allow the creation of DTInLine. The actual design, flow and evaluation of the game is presented below.

2.2 DTInLine: Design and Flow of the Game

The gameboard, HR-practice cards and HR manual used during the game are presented first after which the flow of the game, and how the game is evaluated, is depicted.

2.2.1 Gameboard, HR-practice Cards, HR Manual

At the start of a DTInLine session players are introduced to the organization for which they will design an HR configuration, striving to enhance the DT employee behaviour. The gameboard (figure 2) provides players with the information they need to play the game. First, the organizational strategy to which their HR configuration ought to align is depicted on the gameboard in the top right corner ('organizational strategy). Second, below the organizational strategy, is a designated area ('HR configuration') for players to lay down their HR-configuration (selection of cards to be implemented during the year). All optional HR practice cards are presented on the left side of the gameboard ('HR categories'), players can go through these options and select those HR-practices they want to see implemented. The centre of the board represents the two goals that players strive for: the

current FIT score, which is the vertical alignment score, and the DT employee behaviour score. After each round, players adjust these scores illustrating the current FIT and DT employee behaviour.

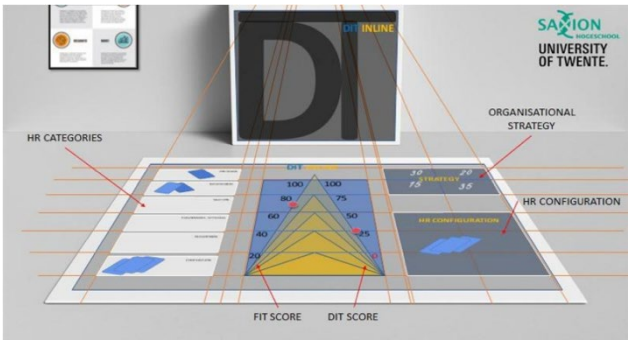
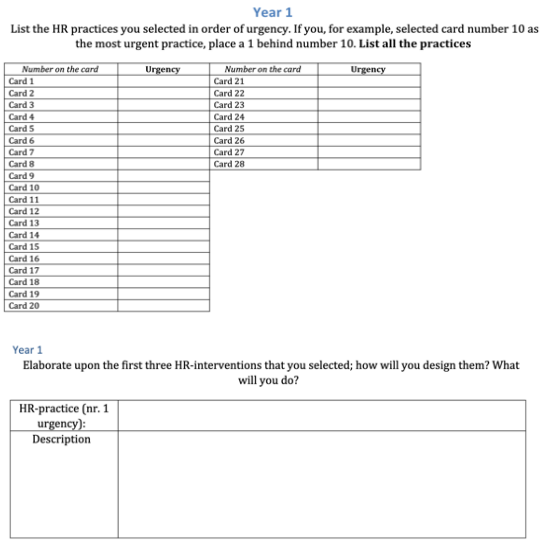


Figure 2: DTInLine gameboard

The HR-practices that players can select are presented to player by the means of play cards. Figure 3 depicts a sample of the play cards used for DTInLine. During the game sessions players shift through these cards selecting those they deem effective in terms of alignment to the organizational strategy and enhancing DT employee behaviour.

Figure 3: Sample play cards.

Finally, as players make their selection of HR-practices they document and detail the HR-practices selected in a HR manual. The manual is made up by two tables. One allows players to select and prioritize HR-practices, one allows players to detail the HR-practices selected. See figure 4.



Year 1

List the HR practices you selected in order of urgency. If you, for example, selected card number 10 as the most urgent practice, place a 1 behind number 10. **List all the practices**

Number on the card	**Urgency**	*Number on the card*	**Urgency**
Card 1		Card 21	
Card 2		Card 22	
Card 3		Card 23	
Card 4		Card 24	
Card 5		Card 25	
Card 6		Card 26	
Card 7		Card 27	
Card 8		Card 28	
Card 9			
Card 10			
Card 11			
Card 12			
Card 13			
Card 14			
Card 15			
Card 16			
Card 17			
Card 18			
Card 19			
Card 20			

Year 1

Elaborate upon the first three HR-interventions that you selected; how will you design them? What will you do?

HR-practice (nr. 1 urgency):	
Description	

Figure 4: HR-manual: HR-practices selection (left) and specification of HR-practices (right)

2.2.2 Flow of the Game

DTInLine represents the key mechanisms relevant for professionals that set out to align the HR practices to the organizational strategy and affect DT behaviours, without being challenged by too much detail (Tsjernikova, 2009). Players are divided into teams of up to six professionals and play two to three rounds (e.g., years) of DTInLine sitting around the gameboard. During a game session players go through the following steps.

1. **Step 0:** players are introduced to the organization that they need to select and design HR practices for. This introduction includes a specification of the competing values strategy of the organization that the HR activities need to be aligned to, and an introduction of the CEO in which the need for DT behaviour is made explicit and urgent.
2. **Step 1:** Once the players are familiar with the organization they start selecting HR practices out of the list of 28 HR practices as a team.
3. **Step 2:** After discussing and comparing the selection made between groups plenary, supervised by a game host, players are challenged to prioritize their list of HR practices.
4. **Step 3:** Subsequently players are challenged to specify to a practical level of detail what they will start doing in terms of the selected HR practices.
5. **Step 4:** The final step in a round constitutes the evaluation of their HR practice selection based on the outcomes in terms of DT behaviours and alignment. See figure 5.

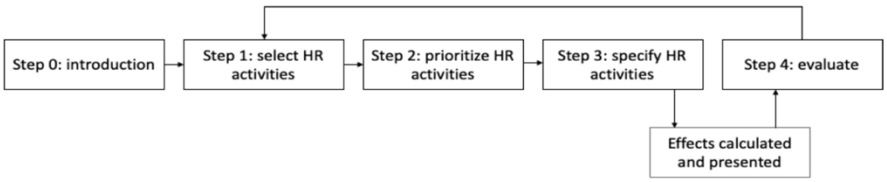


Figure 5: steps (flow) of a DTInLine game session.

Game sessions are finalized by reflecting on the HR practices selected during the years, how these practices changed and a reflection of the systematic manner with which players focused on attaining an increase in DIT and alignment scores, all hosted by a game master.

2.2.3 Evaluations of the Serious Game DTInLine

As players interact with DTInLine, their experiences provide valuable input to improve the serious game. Furthermore, setting out to create a serious game that allows (HR) professionals to experiment and gauge the effects of HR decisions necessitates an evaluation to assess if the serious game actually does. Hence, the game DTInLine evaluated. The focus of DTInline is creating a learning experiment, the extent to which players value their learning experience is therefore vital. Hence, a quantitative approach is used to evaluate DTInLine. At the end of gaming sessions, players are asked to fill out a questionnaire.

The questionnaire consists of a total of items on the topics perceived learning effectiveness, functional fidelity, and satisfaction of the learners. Learning outcomes revolve around the extent to which respondents perceive that they learn by playing DTInLine and the extent to which that learning is effective (perceived learning effectiveness). Functional fidelity refers to the degree of realism within the level of content and functional mechanics and inner workings (Hays and Singer, 1989) of, in this case, DTInLine. Satisfaction of learners (Chou and Liu, 2005) relates to the extent to which learners are satisfied with the learning experience that DTInLine provides. See appendix 1 for the complete questionnaire.

Preliminary outcomes of the first test workshops done with students business administration and HRM (n=37, 3 workshops) illustrate that students evaluated DTInline positively. On the learning outcomes items (for example *I have learned in terms of selecting HR-practices that fir the strategy*, or *by practicing with DT-InLine I discovered errors that I was previously unaware of*) scores ranged between neutral and agree (or learned somewhat and learned quite a lot) with an average score of 3.31 (scale 1 – 5). In terms of satisfaction with the learning experience (for example *I am satisfied with the learning experience I gained from DT-InLine*) the average score of students was between neutral and agree with an average score of 3.98. In addition to the survey students were asked to prove feedback on the game after the session. Students described the DTInLine as fun, an intuitive and quick way to discuss HR content, and as a competitive enjoyable game. When asked what the most significant challenge was students stated that the time taken during the workshop for an introduction in the OCAI framework was limited, similarly students would like more time to select HR-practices during a workshop. Furthermore, the effects of their decisions on HR alignment and employee DT behaviour were perceived as small in the first year. Finally, some students stated that it was a challenge to focus both on selecting HR-practices that match the organizational strategy and increase DT behaviour.

3. Conclusion & Discussion: Evaluations and Future Research

The design and first tests of the serious game DTInLine were presented in this paper. Now, concluding remarks are presented including opportunities for HR practice, research, and education. The paper is concluded by detailing the next steps in the development of DTInLine.

3.1 Concluding Remarks

Similar to prior work on the design and validation of the serious game InLine (Collou, 2020), DTInLine has the potential to enable HR-professionals to experiment with HR decisions and gauge their effects on employee behaviour. By focussing on DT employee behaviour, DTInLine is tailored to those organizations that aim to embrace the opportunities of the DT. Facilitating specific employee behaviour, however, is a complex challenge in which multiple variables can affect the outcomes. DTInLine is designed with a focus on functional fidelity; the fundamental choices and underlying mechanics of how HR-practices contribute to the shaping of employee behaviour is depicted in the serious game. By playing, (HR) professionals are invited to learn which and how HR-practices shape employee behaviour without being overloaded with all details that come into play when shaping employee behaviour.

As such, DTInLine holds great educational potential. InLine allows players to directly witness the consequences of their decisions in relation to alignment and DT behaviour, empowering them to infer the real-world operational dynamics and thereby preparing them for real-world HR challenges. Thus, it holds promise as a valuable resource for educational purposes in configurational HRM at multiple educational levels.

Furthermore, DTInLine facilitates the study of configurational HRM. Firstly, by requiring HR professionals to evaluate the alignment of individual HR practices with four distinct strategies DTInLine adds a layer of detail and specification that enriches the examination of configurational HRM. Analysing whether a set of HR practices theoretically aligned with a particular organizational strategy is indeed aligned according to HR professionals allows for an initial test of configurational HRM. Secondly, DTInLine serves as a valuable tool for scrutinizing decision-making processes and observing player (HR-professionals) behaviour. By documenting the decisions made by HR professionals over multiple iterations, we can evaluate the practical applicability of configurational HRM.

3.2 Future Steps

DTInLine shows promise both as a research tool for studying configurational HRM and DT, and as a learning tool for HRM design. DTInline allows players to engage in hands-on experimentation with HRM concepts in a fun and interactive way. Next important steps in the development of DTInLine revolve around balancing, optimizing and validating DTnLine. During the test rounds, players have expressed that they were challenged by their focus needed on both HR alignment to strategy and employee DT behaviour, and the extent to which their decisions affected both. Hence, in follow up workshops the underlying (theoretical model) mechanics will be rearranged to allow for a somewhat more significant impact from the selected HR-practices on both the alignment and the employee DT behaviour score. This will provide a more wholesome reward for players selecting effective HR-practices and incentives a thorough selection in the next years. In addition, given the feedback collected thus far, more time will be allocated during the DTInLine game sessions for a elaboration on the OCAI framework.

Finally, as DTInLine is optimized through redesign based upon the feedback provided during the game sessions, validation needs to be undertaken in practice. DTInline provides specific outcomes in terms of HR and strategy alignment, and employee DT behaviour, over multiple years. These outcomes can be validated empirically by assessing changes in alignment and employee DT behaviour in practice. Based on this validation the simulation model can be specified. Furthermore, the actual transfer of knowledge and skills from DT-InLine to a real-world setting can be assessed. The extent to which the transfer of alignment and employee DT behaviour knowledge from the game to actual organization specific HRM design takes place, has not been verified yet.

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Appendix 1. Evaluation survey

	I have learned in term of...	**Learned nothing**	**Learned a little**	**Learned somewhat**	**Learned quite a lot**	**Learned a tremendous amount**
4	Selecting HR practices that fit the strategy					
5	Selecting HR practices that improve employee DT behavior					
6	Combining HR practices that fit together					
7	Detailing HR practices					
8	The multi-year design of HR practices					
9	Reflecting on the outcomes of HR practices					
10	Adjusting HR practices					

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
11	During DT-InLine it was possible for me to connect new knowledge and insights with my previously acquired knowledge and insights					
12	By practicing with DT-InLine I discovered errors that I was previously unaware of					
13	Practicing with DT-InLine makes it easier for me to perform my job (not for students)					
14	I find DT-InLine useful for my performance as a professional in my work (not for students)					
15	Using DT-InLine allows me to work more effectively in the real world					
16	Thanks to DT-InLine, I am better able to understand the dynamics between HR and the digital transformation					

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
17	The decisions I make during the DT-InLine workshop correspond with the practice of HR (not for students)					
18	The complexity of aligning HR with the company's strategy and the desired DT behavior of employees is represented by DT-InLine (not for students)					
19	The results presented during DT-InLine are realistic (not for students)					

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
20	DT-InLine is fun					
21	I am satisfied with the learning experience I gained from DT-InLine					
22	Overall, I think DT-InLine is good for practice					