Digitalization of HRM: designing a simulation model for HR decision making

The development of a simulation for the alignment of HR-practices

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Abstract

To aid HR practitioners in their design of firm specific HRM configurations, and contribute to the state of the art HRM knowledge, we created a simulation model. In this paper we present the simulation model, and the serious game in which it was implemented, but focus on the practical and academical implication of creating and using our initial HRM simulation model.

Deciding which HR-practices to select, and how to design them in a multiyear HRM configuration is a challenging task for any HR-practitioner due to the large number of interrelated options to pick from. In particular as, according to configurational HRM, the configuration of HR-practices needs to reflect the organizational strategy (vertical alignment) and show internal consistency (horizontal alignment). Currently, no (technological) tool aids HR-practitioners in their quest to design an aligned HRM configuration. To fill this void, we created an HRM simulation model and used it in a serious game which was played during workshops with HR-practitioners.

Configurational HRM postulates that HRM configuration need to be both vertically and horizontally aligned. However, to date, no specific information on how to make these levels of alignment happen is present. As a result, no specific hypothesis based on configurational HRM has been defined and empirical validation of this mode of theorizing is limited. Using the simulation model and serious game we aspire to specify the configurational mode of theorizing with a new level of detail enabling more precise empirical exploration of configurational HRM.

The creation of an HRM simulation model and serious game proved to be worthwhile. During the workshops, HR-practitioners stated that the simulation model and game enables them to get to grips with the complexity of designing a firm specific HRM configuration. Furthermore, the simulation model enables us to specify configurational HRM to a new level of detail enabling a wide variety of research opportunities. The simulation model, serious game, and implications are discussed in this paper.

Introduction

In this paper, we discuss the practical and academic implications for of the creation and use of a strategic HRM simulation model. Technology and digitalization have a profound effect on HRM (Stone, Deadrick, Lukaszewski, & Johnson, 2015). However, while electronic HRM systems have become increasingly sophisticated (Van den Heuvel & Bondarouk, 2017), technology has yet to make an impact on the domain of strategic HRM. To our knowledge, no digital tool aids HR practitioners in their design of a set of aligned HR-practices that make up an organization specific HRM configuration (Boon, 2008). Aspiring to create a digital tool that can aid HR-practitioners in their firm specific HRM design, while at the same time contribute to the current state of the art knowledge on strategic HRM, we have created an HRM simulation model and implemented it in a serious game titled 'InLine'.

The employee behavior needed varies amongst organizations as strategies differ (Schuler & Jackson, 1987). Upholding an innovative strategy for example triggers the need for innovative employee behavior while a market-oriented strategy brings about the need for commercial employee behavior. According to configurational HRM, to effectively shape the desired employee behavior, HR-practices should be designed, combined and implemented (Bowen & Ostroff, 2004). The configuration of HR-practices ought to reflect the organizational strategy. This *vertical alignment* guarantees that the HR-practices stimulate employee behavior that is congruent with the organizational strategy (Gratton & Truss, 2003). In addition, there is a need for alignment amongst the individual HR-practices that make up an HRM configuration. This *horizontal alignment* guarantees that a consistent message is communicated to employees; all HR-practices stimulate similar behavior and do not contradict (Gratton & Truss, 2003). According to the configurational mode of theorizing, configurations of nonlinear, synergistic HRM factors affect employee behavior through (vertical and horizontal) alignment (Delery & Doty, 1996).

HR practitioners face the challenge of designing an (vertically and horizontally) aligned HRM-configuration. However, deciding which HR-practices to select, and how to design them, is challenging; the extent to which and how specific HR-practices affect employee behavior is unclear, there is a large number of interrelated options to pick from, and there is no consensus on which HR-practices to combine. Currently there is a lack of (digital) tools that aid HR practitioners in their design of HRM configurations (Boon, 2008). A simulation model can fill this void. It can do so by capturing the complexity inherent to firm specific HRM design, provide insight into the quality of HR decisions made, and enable HR-professionals to experiment with HRM decisions and gauge the effects, before actually implementing them.

Academically, we expect that both the creation and use of a simulation model enables us to explore configurational HRM with a new level of detail. A prerequisite for the creation of a simulation model is to specify HR-practices, their interrelationships and gauge potential outcomes. As such, the creation of an HRM simulation model motivates us to be specific and explicit about the configurational mode of theorizing in HRM. This level of detail is, to our knowledge, unprecedented in configurational HRM. Furthermore, we use the simulation model to explore the specifics and outcomes of a set of combined HR-practices using the solidified knowledge of HR practitioners. Based on this exploration, and simulation

model outcomes, we aspire to formulate more specific configurational HRM hypothesis using the simulation model. Practically, we expect the simulation model to provide HR-practitioners with a tool to come to grips with the complexity of firm specific HRM design. By using the simulation model HR-practitioners are provided with insight on how effective their HR-decisions are in terms of alignment over multiple years. The simulation model and serious game aim at making configurational HRM more workable from a practitioners' perspective. We expect to not only increase understanding in terms of HRM configuration design but also aspire to provide specific insight into HR-practice selection and design given an organizational strategy. First, we designed an initial approximate simulation model based on configurational HRM theory. Second, we calibrated this model using a study amongst HR-professionals. Third, we implemented the simulation model in the serious game 'InLine' and hosted workshops in which HRM professionals played the game. In this paper we present these three steps, but focus primarily on discussing the implications of this simulation model for practice and research.

Simulation model: theoretical underpinnings & functionalities

Configurational HRM theory provides the theoretical underpinnings on how HRM affects employee behavior; through alignment. Hence, the simulation model ought to assess the extent to which an HRM configuration is aligned (both vertically and horizontally), and how changes in alignment happen over time. Designing vertical and horizontal alignment requires a frame of reference to 'plot' both organizational strategy and the HRM configuration in the simulation model. The competing values model (Cameron & Quinn, 2006) provides this framework. It enables the categorization of organizations' strategy based on four competing values; internal versus external focus and stability versus flexibility. The underlying rationale being the *competing* nature of these values; an external focus, for example, excludes an organizations' ability to focus internally without sending mixed messages to employees and conflicting organizational demands (conflicting cultures, structures, etc.). Based on the competing values, four ideal type strategic orientations are defined: cooperative, adhocratic, mechanistic and market (see figure 1 for the competing values model used for the simulation model). In addition, as the simulation model needs to infer alignment between strategy and HRM, four corresponding ideal type HRM configurations were defined (Collou, Bruinsma, & van Riemsdijk, 2019; Knol, 2013; Rauf, 2015) based on prior research (see appendix 1). However, organizations most often are strategic hybrids (combining elements from the four 'ideal types') increasing the difficulty to create an effective HRM configurations. An effective hybrid HRM configuration "should deviate from the ideal type HRM configuration exactly proportional to the extent to which the organization's strategy deviates from the ideal-type strategy" (Delery & Doty, 1996, p.813). However, what specific HR-practices should be combined in order to align to a specific hybrid strategy?

To assess alignment in the simulation model, both the organizational strategy and the HRM configuration are scored based on the four competing value quadrants. The extent to which the organizational strategy and the HRM configuration scores are similar makes up the vertical alignment score. Using this method enables us to allow for alignment even when no ideal type strategy is upheld. In addition to enabling categorization of strategy and HRM configurations, the competing values model assesses organizational change. This is pivotal

for the simulation model as it aims to model changes in alignment over time. The process of organizational change proposed by Cameron and Quinn (2006) suggests a gradual shift from one quadrant to *neighboring* quadrants. Organizational change is an incremental process, when changing 'sideways' as opposed to 'diagonally', the organization can retain one competing value, which enables incremental change. Moving diagonally, both competing values must be switched simultaneously, requiring complete and therefore potentially chaotic change. One example of this pathway of organizational change is the way in which organizations mature according to Cameron and Quinn; from an adhocracy to a cooperative, from a cooperative to a mechanistic, and finally from a mechanistic to a market strategic orientation (p.55). This concept of organizational change from one quadrant to a neighboring quadrant, rather than 'across' to opposing quadrants, needs to be reflected by the simulation model (see figure 1 in which an example is presented, in this example an organization moves from the cooperative quadrant towards the market quadrant through neighboring quadrants). Furthermore, the increase in any given quadrant is limited over time as the quadrant gradually becomes more dominant. This 'diminishing returns' concept makes explicit the suggestion that as employee behavior is shaped towards the ideal, but actually reaching that ideal type employee behavior becomes increasingly difficult.
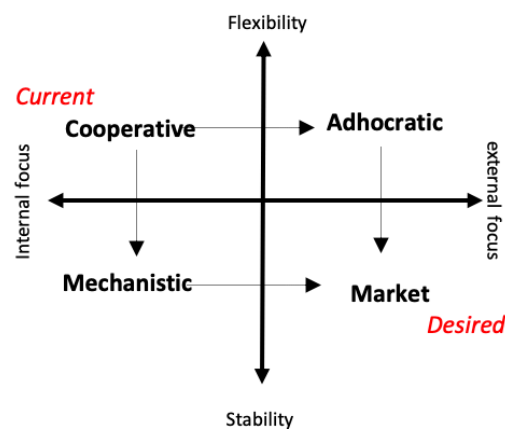

Figure 1. organizational change process trough neighboring quadrants in the competing values model.

In order for the simulation model to aid decision making, HR practitioners need to select HR-practices based on a current situation and be presented with the results of their choices over time in terms of vertical and horizontal alignment. The simulation model provides insight into the (changing) alignment using the following steps. First, the model starts by calculating the current vertical alignment by assessing the difference between the organizational strategy and the current HRM-configuration (see appendix 2 for an example). Secondly, a set of HR-practices is selected by the HR-practitioner, labeled *the HR intervention*. Thirdly, the model calculates changes in the current HRM configuration based on the HR-intervention and presents a new HRM configuration score, thus showing the effects of the HR intervention on the HR configuration to the 'player'. Finally, the model calculates the new vertical alignment by assessing the difference between the organizational strategy and the new HRM-configuration, as well as the horizontal alignment by calculating the standard deviation of the HR-practices that make up the HRM configuration thus presenting the effects of the HR intervention on the vertical and horizontal alignment of the HR configuration to the chosen strategic orientation (figure 2).
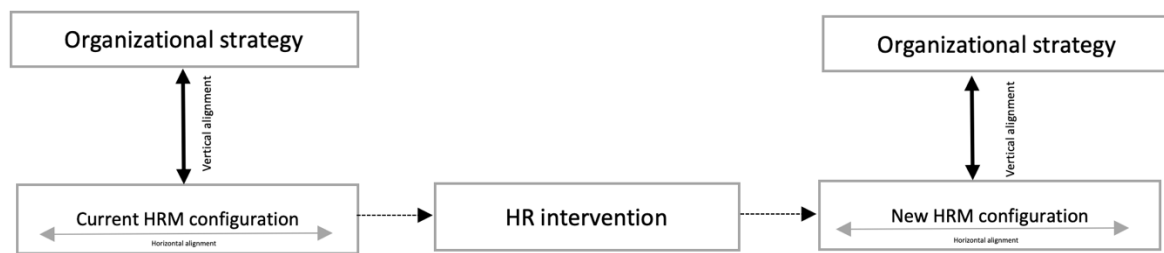
Figure 2. Functional steps in the strategic HRM simulation model

The number of HR-practices an HR-practitioner can select is potentially large. For the simulation model, six HR practices were defined that make up an HRM configuration. This selection of HR-practices was based on their relevance; arguably, job design, recruitment, selection, appraisal, compensation, and training and development are the most common HR domains (Collou et al., 2019; Knol, 2013; Rauf, 2015). However, there are multiple ways to design these HR-practices. Recruitment can for example be focused on craftmanship, commercial skills or innovative behavior. To account for the large variety of HR-practice designs, three design options per HR practice were identified and used in the simulation model. Taking the diversity in HR-practices into account, 72 HR practices have been defined (6 HR practices * 3 design options per HR-practice * 4 HRM configurations) that make up the four ideal type HRM configurations (see appendix 1).

Simulation model: empirical underpinnings & serious game InLine

In order to calculate alignment, the HR-practices need to be scored in terms of the competing values quadrants. Scoring these 72 individual HR-practices was done using the solidified practical knowledge of those professionals that design, implement and experience the effects of HR-practices in practice: HR-practitioners. 187 HR professionals participated via a quantitative survey. Specifically, we asked these HR-professionals to distribute 100 points based on the extent to which an individual HR-practice shapes the employee behavior needed in one specific strategic quadrant. Table 1 provides an example of the scores of the HR-practices job design. The scores can vary from 0 to 100; the higher the score the more it is expected to shape the behavior that is needed in one specific strategic quadrant, according to the respondents. The total number of respondents was 178, the number of respondents per individual HR-practice varied as subsets of HR-practices were presented to individual respondents and some surveys were not filled out completely.

Table 1. Example scores for HR-practices job design

HR-practice	Cooperative *Flexible & internal*	Adhocratic *Flexible & external*	Market *Stabile & external*	Mechanistic *Stabile & internal*
The most important characteristic of job design is that employees are able to determine their own pace of work. (n=52)	33	31	23	13
The most important characteristic of job design is that employees need to solve complex problems. (n=52)	23	44	23	10
The most important characteristic of job design is that employees work individually. (n=52)	16	35	31	19

The most important characteristic of job design is that employees need to comply with the assigned tasks. (n=52)	14	6	12	68

The simulation created is a simplified model of the reality of designing firm specific HRM configurations. As such, it does not include all possible nuances and/or combinations of HR variables one faces when designing and implementing HRM in practice. It does however represent the *key features* (Garris, Ahlers, & Driskell, 2002) of designing HRM configurations; the large number of HR options to pick from, the interrelatedness of the individual HR options and strategy, and how alignment changes over time. By focusing on these key features, the model sets out to be a plausible model that enables HR-decision making support without troubling participants with too much detail that will not increase their HR decision making skills (Tsjernikova, 2009). To add to the plausibility of the model, we created the simulation model using configurational HRM theory, defined ideal type and hybrid HRM configuration based on prior research, and included the solidified knowledge on the nuanced effects of HR-practices on employee behavior.

After 8 trial runs, one run consisting of one round (Collou & Bruinsma (2019), the simulation model was implemented in the serious game InLine (Collou & Bruinsma, 2017). During workshops, HR practitioners, managers and/or HR students (30 workshops, N= 423) were presented with an organizational strategy and an ill-matching HRM configuration using a game board (see figure 3a). Players were subsequently asked to design an HR-intervention to increase alignment by selecting appropriate HR practices using 72 HR-practice cards (see figure 3b). These cards we derived from the ideal type HRM configuration and our previous quantitative survey amongst HR practitioners discussed above.
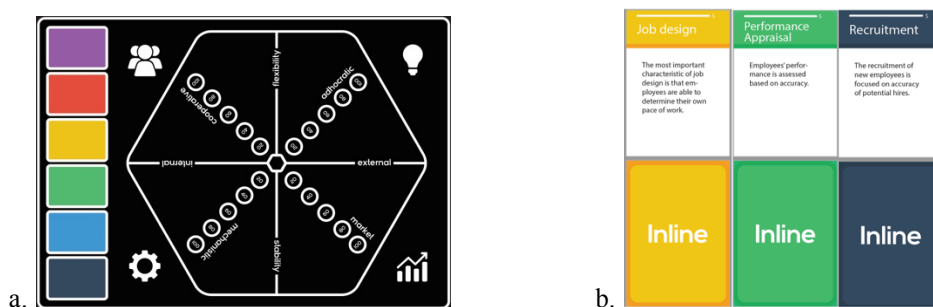

Figure 3. (a) InLine Playboard and (b) a sample of InLine cards.

After HR-practitioners selected, prioritized and specified their HR-practices, the simulation model calculated how the alignment scores changes. Subsequently, HR-practitioners are presented with an 'annual HR-report' in which the changing alignment score is presented (see figure 4). The *score item* represents the extent to which the selected HR-practices align to the organizational strategy (*vertical alignment*), 0 indicates no alignment, 100 perfect alignment. The policy score represents the standard deviation of the HR-practices that make up the HRM configuration as a proxy for the extent to which the individual HR-practices align to one another (*horizontal alignment*).

Group: 1
Year: 1

SAXION InLine

Dear HR team,

Thank you for all your effort! In this report you will find the effects of your selection of HR-practices. What changes in our selection do you recommend based on these findings?

Yours sincerely,
CEO

	Cooperative	Adhocratic	Market	Mechanistic		
Goal	40	40	10	10		
Start of year 1	10	10	50	30		
End of year 1	11	15	46	28		
End - Begin	1,1	5,1	-4,5	-1,8		
Goal - End	29	25	-36	-18	Score:	46
Policy	35	33	18	14		
Spread	13	11	7,6	4,8		

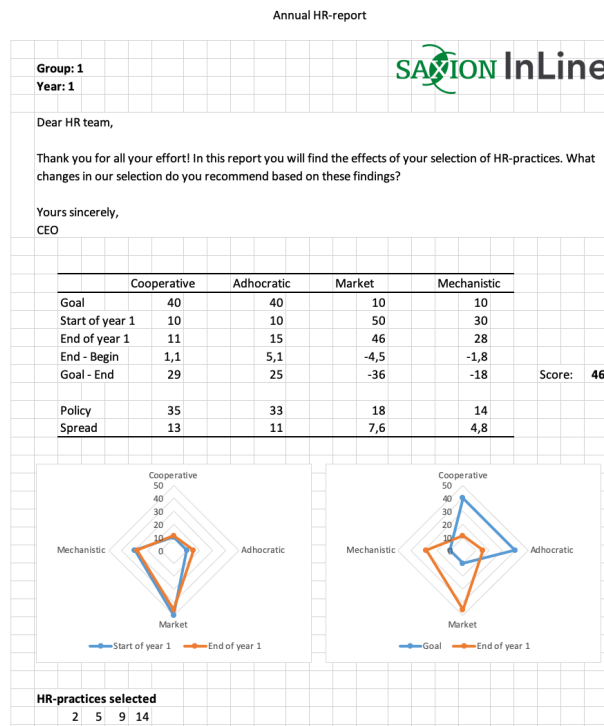**HR-practices selected**
2 5 9 14

Figure 4. Annual HR-report

Based on these scores HR-practitioners were invited to reassess their selection of HR-practices (HR intervention) and adjust their intervention as they would see fit, after which the simulation model would recalculate the alignment scores. Depending on the duration of the workshop, 2 or 3 of these iterative rounds (representing years) were played.

By playing InLine with HR-professionals, a wide variety of insights can be gained. For example, insight into the decisions of HR-professionals given an (hybrid) organizational strategy. For example, if the organizational strategy is a market strategy, the HR-practice: *employees are rewarded based on their commercial skills* was the most commonly selected HR-practice. As we asked HR-practitioners to specify these HR-practices with more detail, we can also gain insights into the specific designs of these HR-practices. The HR-practice *employees are rewarded based on their commercial skills* was specified, for example, by stating that *SMART targets need to be formulated based upon which employees will be rewarded*. This helped specifying individual HR-practices to a much higher level of precision; stimulating commercial behavior apparently can be achieved by stipulating SMART targets and rewarding achieving these targets. So *how* 'rewarding based on commercial skills' could be done using HR practices became clear. This step helped us, and the participants, to increase the practical significance of the game, by providing not only an answer to the question *what* could be done, but also *how* this could be accomplished.

In addition to many such specific outcomes (Collou, Bruinsma, & Riemsdijk, 2017), HR-professionals that attended our workshops reacted positively on InLine and the simulation model. According to them, InLine did not only provide a reminder on the importance of alignment when designing HRM, it also provided a tool to actually design a firm specific HRM configuration. Players stated that the complexity caused by the large

amount of options was recognizable from their experience in practice. It was both confronting and revealing how the game highlights this complexity; it made them more conscious and aware of the complexity of the task at hand and brought home the message that focusing on just one practice at the time would just not cut it. Even though HR-practitioners did acknowledge that not all factors were presented in the simulation model and game (no specifics on leadership, or HR analytics, for example), the outcomes were deemed plausible during the workshops. A wide variety of questions can be answered using InLine. However, as our focus in this paper is on the research and practice implications of the creation and use of the simulation model, we will not present further detailed results here.

Simulation: practical and academic implications

Practically, the initial simulation model presented provides HR-practitioners with a tool to design firm specific HRM configurations. While prior studies did already acknowledge the importance of alignment when designing HRM, the simulation model (and serious game InLine) specifies the general concept of alignment to a level at which HR-practitioners can start selecting, designing and implementing HR-practices. Specifically, both tools enable HR-professionals to select HR-practices in the six most common domains, prioritize and specify them, all considering the organizational strategy. In doing so the tools provide HR-practitioners with a method to grasp and maneuver through the complexity of firm specific HRM design. Also, as the model specifies changes in alignment over time, HR-practitioners felt it provided them with the opportunity to experiment and experience the effects of a selection of HR-practices before implementing them in practice. Strategic HRM is concerned with the design of a long-term set of HR-practices that align with the organizational strategy, the simulation model and game provide a tool to do just that. HR-practitioners stated during and after the workshops that the simulation and the serious game made the complexity and challenge of designing firm specific HRM more explicit. Based on the results and positive reactions on the simulation model and game during workshops, we consider both the simulation model and serious game valuable tools for HR-practitioners designing firm specific HRM. In addition, the simulation model can be used to gauge the effects of a changing organizational strategy on HRM alignment. If the strategic orientation of an organization shifts, the HRM configuration needs to be altered to remain aligned. The specific changes that need to be made to the HR-practices at hand could indeed be specified using the simulation model, according to the professionals. Furthermore, the simulation model and serious games provided HR-practitioners and students with a tool to learn about the concept of alignment in a specified manner. Motivated by the positive reactions of HR-practitioners we strive to continuously improve and use the simulation model in the practice and teaching of strategic HRM.

Academically, the simulation model provides a method with which we can contribute to the state-of-the-art knowledge on configurational HRM. The level of detail at which the simulation model is defined does not only allow configurational HRM theory to be workable for HR-practitioners, it enables verifying the theory on a more precise level. There is considerable debate concerning the measurements of HR systems (Boon, Den Hartog, & Lepak, 2019), we aspire to further progress by defining HR-practices at multiple levels in the simulation model. Specifically, we pose that HR-practices can be defined at three levels. First, HR-practices can be defined at a *categorization* level (to what extent does an

organization use recruitment, selection, etc.). Defining HR-practices using this categorization level enables one to assess the presence of a HR-practice category, which is common in HR studies. Secondly, HR-practices can be defined on a *focus* level (what is the focus of recruitment; innovative behavior, for example). Defining HR-practices at a focus level enables one to assess if the focus of an HR-practice aligns to the strategic focus of the organization at large. Thirdly, HR-practices can be defined at an *operationalization* level. Defining HR-practices at an operationalization level enables one to assess what is actually done when using an HR-practice in daily organizational live (what are the methods that are used for recruitment; assessments for example). Our simulation model explores configurational HRM on all three levels. This enables us to specify configurational HRM with an unprecedented level of detail. How the recruitment practices, for example, could be designed to stimulate either innovative or commercial behavior became clearer, helping practitioners to select the right practice for the intended employee behavior from the different recruitment practice options.

As a result of measuring with this level of detail, a large amount of hypothesis can be generated. These hypotheses can be defined on an individual HR-practice level (HR-practice X with a focus on Y predicts employee behavior Z), which could then be empirically tested. Furthermore, using the simulation model, combinations of detailed HR-practices could be tested on their combined effect. Different reward practices have different effects on employees' behavior and combining reward practices that all stimulate the same behavior is expected to have a bigger effect on rewards induced behavior than combining practices with different stimulus outcomes, within one specific HR-practice category. Detailing and matching specific practices not only within but also between the six different HRM practices identified in this simulation, allows designing well aligned HRM configurations matching hybrid strategic orientations with a level of 'within practice' detail that is unprecedented in configurational HRM to date.

Furthermore, as the call for a more holistic view on HRM configurations continues (Hauff, 2019) and the traditional linear regression studies are complemented with studies using alternative methods, this specific simulation model adds to the methodological toolbox of the HR scholar. Simulations are powerful tools to explore complex open systems (Gilbert & Troitzsch, 2005) and HRM configurations possess open systemic characteristics (Collou, Bondarouk, & Bruinsma, 2019). The simulation model also provides the opportunity to study the holistic effects of HRM configurations longitudinally, tracking the effects of an implemented combination of HR-practices and assessing the outcomes according to the simulation model.

The simulation model presented and discussed here is an initial simulation model. We did use ideal and hybrid HRM configuration based in prior research, and the specification of HR-practices according to HR-professionals, to calibrate our model. However, no empirical validation has taken place yet. It will be a major research challenge to do so. One could envision a null measurement of the alignment within an organization using the game InLine, whilst simultaneously measuring employee behavior on targeted behavior variables. Subsequently management and the HR practicioners could be asked to design a better aligned HR configuration using our simulation. The outcomes of the simulation should then be implemented in the organization. Allowing the changes to take effect, a second

measurement (post intervention) of employee behavior should be conducted measuring differences between the two measurements on the targeted variables to test if predicted outcomes can indeed be observed. In this way the predicted effects of the simulated configuration could be empirically tested. Of course, full cooperation of an organization would be required and other potentially interfering factors should be controlled or controlled for.

Implementing the simulation model in a serious game and hosting workshops proved to be worthwhile. The expectations with which we set out were met; the simulation model and serious game provide valuable outcomes and new opportunities both practically and academically. In addition, the tools enabled us to study the decision-making process of HR practitioners in a playful manner. HR-practitioners enjoyed playing the game which resulted in multiple companies and professional HR-communities inviting us to host workshops with the game, which in turn enabled us to gather data amongst a large group of HR-practitioners. The tools enabled opening the 'black box' of HRM practices to a much deeper level of detail and 'how to' knowledge. It allowed 'players' to get a much deeper understanding of the intricacies of strategic HR design and sensitized them to the complexity of their work. At the same time, it gave them more understanding of the interrelatedness of all six HRM domains and a tool to experiment and try, without jeopardizing the work reality of employees.

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Appendix 1: Ideal type HRM configurations

Table one presents the ideal type HRM configuration based on prior research (Knol, 2013; Rauf, 2015). These ideal type HRM configurations are used to specify the 72 HR-practices (6 x 4 x 3).

Table 1. Ideal type HRM configurations

Cooperative HRM configuration	Adhocratic HRM configuration
Recruitment & selection Based on accuracy, versatility, craftsmanship	**Recruitment & selection** Based on specific expertise, ability to find new solutions to problems, and ability to solve complex problems
Job design Pace of work determined by employees themselves, employees cover other employees' work, quality enhancement over speed	**Job design** Employees solve complex problems, employees are part of (multiple) project teams, employees create unique products/service for customers
Training & development Increase job specific knowledge, increase collaboration amongst colleagues, quality enhancement	**Training & development** Deepening expertise, learning how to operate in project teams, finding new solutions
Appraisal & compensation Based on accuracy, collaboration, craftsmanship	**Appraisal & compensation** Based on ability to innovate, specific capacities, contribution to project teams
Mechanistic HRM configuration	**Market HRM configuration**
• Recruitment & selection Based on efficiency, ability to quickly start at the job, ability to quickly start producing • Job design Employees comply with assigned tasks, have clear instructions, and do routine work • Training & development Increase efficiency, increasing job execution speed, sustainably job execution • Appraisal & compensation Based on speed, productivity, getting the job done on time	• Recruitment & selection Based on candidates being able to attract new customers, result orientation, commercial drive • Job design Employees acquire own assignments, work on individual basis, determine their own way to get the job done • Training & development Increase personal results, commercial skills, getting better at things employees are already good at • Appraisal & compensation Based on commercial skills, personal targets and autonomy

Appendix 2

Table 2. HR configuration made up of 4 HR-practices, the related HR practice scores, vertical and horizontal alignment score

	Cooperative	Adhocratic	Mechanistic	Market
Organizational strategy	50	20	20	10
HR configuration score *Average of the 4 HR-practices that make up the HRM configuration*	24	14	17	45
- Recruitment based on craftmanship	40	22	19	19
- Selection based on accuracy	22	12	10	56
- Appraisal based on commercial skills	17	8	23	52
- Training and development based on efficiency	18	12	17	53
Vertical alignment score *Sum of differences between strategy and average HR-practices score*	(50-24) 26 + (20-14) 6 + (20-17)3 + (45-10) 35 = **70**			
Standard deviation *Of HR-practices*	9	5	5	15
Horizontal alignment score *Sum of the standard deviation of the HR-practices that make up the HRM configuration*	(9 + 5 + 5 + 15) = **34**			