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The "3P Challenge" - Gaming and Reflecting on Partnership Meaning within Long-Term Infrastructure Contracts

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THE “3P CHALLENGE” - GAMING AND REFLECTING ON PARTNERSHIP MEANING WITHIN LONG-TERM INFRASTRUCTURE CONTRACTS

ABSTRACT

This paper introduces the “3P challenge”, a serious game on the dual position of public and private managers as members of temporal and permanent organizations that incorporates the conceptualization of multi-level governance structure of temporal organizing from a critical realist perspective. Its gaming cycle aims at activating participants reflexivity to consider competing demands in PPP contexts. In this regard, the game can serve as a research tool for capturing insights into adversarial and collaborative interactions in the ex-post phase of PPPs, as well as a space for reflecting on governing issues and activity in the ex-post phase of PPP. Based on two gaming sessions with Dutch practitioners and civil engineering students, we discuss how the game provides insights into the creative enactment of PPP clauses in the Netherlands, the need to better understand how collaborative relationships emerge from the creative enactment of contractual penalties as well as a situational dimension of opportunism.

KEY WORDS

Public-Private Partnerships, serious gaming, ex-post governing, reflexivity, Critical Realism

INTRODUCTION

The popularity of Public-Private Partnerships (PPPs) around the world paradoxically contrasts to the disputed assessment of their success, and fierce critics (Hodge & Greve, 2017). PPPs are not immune to traditional conflicts due to risk misallocation (Hoezen, 2012), displaced-agency problems (Volker & Hoezen, 2017) and role ambiguity (Anastasopoulos, Haddock, & Peeta, 2014). Controversial outcomes and interactions seem to emerge from the constitutive definition of public and private roles and priorities in PPP contracts (Hodge, Boulot, Duffield, & Greve, 2017), and not only the misfit due to its transplantation to other contexts (Matos-Castaño, Mahalingam, & Dewulf, 2014; South, Eriksson, & Levitt, 2018). Part of the controversy is related to the deliberative use of “partnership” as a positive word to introduce private financing and management in the delivery of public infrastructure (Hodge & Greve, 2010). In the light of disputed outcomes, policymakers should carefully assess ex-ante PPP as governance choice, avoiding, by all means making decisions based on taken-for-granted promises not-fully supported such as

Value for Money (Hodge & Greve, 2007, 2010, 2017). On the other hand, the expectations of managers executing PPP agreements have been less discussed, even when managerial relationships mediate contractual impact on performance (Benitez-Avila, Hartmann, Dewulf, & Henseler, 2018; Klijn & Koppenjan, 2016). Task-compliance rather than choice characterizes project activity (Lundin & Söderholm, 1995), as managers are simultaneously accountable to organizational needs and contractual obligations in the execution of the agreement (Benitez-Avila, Hartmann, & Dewulf, In press; DeFillippi & Sydow, 2016; Söderlund & Borg, 2018). Therefore, the development of “good” relations cannot ignore the objective degree of contradiction between contractual obligations and organizational stakes, which might force managers to live with diverse identities and competing values (Benitez-Avila et al., In press; Marrewijk & Veenswijk, 2016). However, managers can develop innovative working relations and even re-shape ex-ante governance structure in place upon the creative enactment of their objective positions (Donati & Archer, 2015; Sanderson, 2012). This argument is relatively unexplored and there is little insights into the ex-post phase of PPP and the agency of project managers, who must comply a dual role as members of temporary and permanent organizations (Bakker, DeFillippi, Schwab, & Sydow, 2016; DeFillippi & Sydow, 2016; Sydow & Braun, 2017).

Elaborating upon critical realism insights into human agential powers to consider and re-shape objective predispositions from competing social roles, this paper introduces the serious game “3P Challenge”. On the one hand, this study uses the game as a vehicle to get insights into the synergies or tensions between contractual and organizational mandates over managers along the PPP life-cycle of project delivery, as well as how people assuming managerial positions confront them by their practice. On the other hand, this study aims at discussing how the “3P Challenge” game provides a space for practical and theoretical reflection on the roots of conflict and collaboration in the ex-post phase of PPPs. The “3P Challenge” game incorporates the conceptualization of multi-level governance structure of temporal organizing from a critical realist perspective, and its gaming cycle aims at activating participants reflexivity to consider competing demands in PPP contexts. Accordingly, the “3P Challenge” game simulates tendering invitations at market level interacting with the outcomes of the projects awarded. In this way we create a situation where public-private project teams are formed from the contracting process, emulating the dual position of project managers previously conceptualized. Additionally, the game includes the possibility to modify, adjust and even renegotiate initial agreements during the implementation phase to cope with eventual ex-ante poor decisions and uncertainty.

This papers continuous with the theoretical background on ex-ante and ex-post governance perspectives in PPPs. Then, it explains the gaming philosophy and describes in more detail the “3P Challenge” game, introduces the two gaming sessions and presents the results. The prototyping and development of the “3P Challenge” game included four initial sessions with students of Civil engineering and PhD researchers. The final design was played in

one session with practitioners and another one with MSc students of Construction Management and Engineering. The session with practitioners aimed to gain insights into the possibility of collaboration by contrasting the gaming experience and with their working experience, while the session with students aimed to gain insights on how the game provides an experience for assessing policy discourse on collaboration. One interesting insight from both experiences is that the game offers the space for collaboration on the project level, but also activates mechanisms preventing players to make use of this space. Finally, we discuss how the gaming mechanisms contribute to better understand the logic of compromising processes at the project level, even when the managers do not claim to feel part of a PPP team nor enact a partnership relationship. Additionally, we show how the game provides a venue for having a more situational understanding of opportunism, and critically reflect the policy and scholar discourse on collaboration in the delivery of public infrastructure.

EX-ANTE AND EX-POST GOVERNANCE PERSPECTIVES IN PUBLIC-PRIVATE PARTNERSHIPS

Governance scholarship tradition addresses the concern of relational risk, which compromises the very possibility to engage in agreements due to uncertainty or possibility of opportunistic behavior (Söderlund, 2011). The need for providing mutual safeguards is crucial to address the under-provision of public goods, which positive externalities imply that those who bear the cost cannot fully capture the benefits of their economic investments. (Rangan, Samii, & Van Wassenhove, 2006). Consequently, the discussion focuses on the underlying logic of value creation resulting in normative guidelines to define the desirable level of private autonomy or collaboration with the public sector to bring together complementary public and private resources in the most efficient way (Kivleniece, 2013; Kivleniece & Quelin, 2012). The fragmented value creation process in the construction industry represents additional difficulties such as controlling the outcomes of disparate teams increasing the risk of displaced-agency (Clegg, Pitsis, Rura-Polley, & Marosszeky, 2002; Hennisz, Levitt, & Scott, 2012), let alone the one-off nature of projects and high degree of planning uncertainty (Bygballe, Håkansson, & Jahre, 2013; Eccles, 1981). The PPP project delivery arrangement defines functional mechanisms to control fragmentation referring to the principle of aligning the material interest of actors along the entire project life-cycle (Hodge & Greve, 2017). The functional mechanisms of PPPs include financial discipline introduced by private financing (Dupas, Marty, & Voisin, 2011), minimization of short-term interest bounding the entire life-cycle responsibilities through a consortium (Levitt et al., 2014) and payments indexed to service levels or availability (Hartmann, Davies, & Frederiksen, 2010).

In a historical perspective, the adoption of PPP emerged in the UK and Australia to seize infrastructure boom, spread out in Europe and Canada to deal with the financial crisis and later to the Americas and China to get the economy going in a post-crisis situation (Hodge & Greve, 2017). Therefore, PPP refers to a political initiative for

introducing private finance with a positive policy language and as a mechanism to deal with risks when engaging in the process of delivering public infrastructure (Hodge & Greve, 2010). In both cases, the worth of the PPP concept is framed in terms of its *ex-ante* properties for aligning actors expectations towards the life-cycle of projects (Bing, Akintoye, Edwards, & Hardcastle, 2005; Clegg et al., 2002). The project engineering and management scholar community usually embrace the *ex-ante* perspective, in a quest for improving the governance structures of PPP agreements. As a matter of example, the institutional view of project organizational studies assesses the alignment of institutional frameworks with the needs of developing successful PPP programs (Matos-Castaño et al., 2014), and frame project difficulties as the result of the immature elaboration of the PPP norms, procedures and contracts in a specific institutional context (South et al., 2018).

Beyond the debate and PPP measures of success, there is increasing interest in examining the ex-post managerial capacities to enact contractual obligations and reaching satisfactory outcomes. It has been argued that PPP contracts do not directly impact project performance, as contracts effect on satisfactory projects is mediated by relational aspects (Benitez-Avila, Hartmann, & Dewulf, 2016; Klijn & Koopenjan, 2015). Therefore, close cooperation seems to be a necessary element for satisfactory project outcomes, even when PPP contracts push private managers to adopt autonomy-seeking solutions to project issues (Verweij, Teisman, & Gerrits, 2017; Warsen, Klijn, & Koppenjan, 2019). Based on these empirical insights, it appears that PPP policy and contracting embodies a pattern or relations assuming the emergence of collaboration from the accurate but discrete *ex-ante* allocation of responsibilities. This argument is persistent in the policy discourse, including the recent call for collaboration of the World Economic Forum based on contracting that enables shared risk management and optimal allocation of risk between parties in integrated procurement systems (Forum, 2018). Nevertheless, it can be the case that ex-post collaboration between managers requires to creatively enact the contractual form in a way to place between brackets the discrete responsibilities defines ex-ante in the contract (Benitez-Avila et al., In press). The concern is to understand the agential capacities of managers to reflect on the embodied pattern of relations in contractual forms and policy discourse, and their ability to re-shape them by means of governing activity and building relations overtime (Bakker et al., 2016; Sanderson, 2012; Sydow, Lindkvist, & DeFillippi, 2004). These relations cannot be built in anyway, but are somewhat dependent on the objective positions of the managers at the project level, not only conditioned by the relations embodied in the contract but embedded in organizational, network and field relationships (DeFillippi & Sydow, 2016).

From a critical realist perspective, adversarial or collaborative experiences of people governing ongoing projects are rooted in the demands of their dual position insofar organizational and contractual relations are enacted by the managers who put these relations simultaneously into operation (Benitez-Avila et al., In press; Donati, 2017; Reed, 2001). The structural characteristics of these relations can be conceptualized as necessary

at project level emerging from the contractual engagement, but contingent at organizational level as the operation of the parent organizations do not fundamentally depend on the partnership itself¹. Therefore, complementary or contradictory relationships between systems of penalties, rewards and beliefs can be related in either necessary or contingent fashion, shaping four types of situational logic that predispose actors to engage solidary, concessionary, opportunistic or competitive modes of interaction (Archer, 1995). Predisposition to solidarity emerges from the situational logic of protection when structural complementarities are related in a necessary fashion. Concessionary modes of interaction emerge from the corrective logic of situations where structural contradictions are related in a necessary fashion.

On the other hand, situational logic and predisposition to opportunism emerge from the contingent relation of structural complementarities, while predisposition to competitive modes of interaction emerges from the situational logic of elimination resulting from the contingent nature of contradictions. This conceptualization of opportunism is a “situational one” in contraposition of the “attributional one” adopted by economists, assuming intentions to actors (Williamson, 1981). The situational logic of opportunism focuses on the objective synergies in a relationship between entities that do not depend on the other to operate and therefore pushes actors to seize these opportunities regardless considering the relationship itself. Due to this contingent nature of relationships between organizations in the market, procurement and contracting processes lead to an organizational transformation that bound parent organizations in a necessary but temporal relationship, shaping project managerial roles in a rather dual situation. While the necessary relationship between managerial roles predisposed them to engage modes of interaction ranging from solidarity to compromise finding at the project level, the contingent nature of the relationship between parent organizations predispose the same actors to engage modes of interaction ranging from opportunism to competence. In this situation, it is expected that managers reflect upon this dual predisposition in ongoing PPPs, assessing, prioritizing and balancing competing demands with their professional practice, and partially re-shaping the situations where they are embedded.

GAMING PHILOSOPHY

Gaming provides a playful experience of real-world situations, meaningful in terms of learning, training and research (Harteveld, 2011), bringing together social and technical complexity (Mayer, 2009). The use of serious gaming in governance research of public project delivery has their origins in the classical game theory and behavioural experimental

¹ Necessity “only states that X cannot be what it is without certain constituents A, B, C, N' and the relations between them” (Archer, 1995, p. 174). This is a transcendental argument, which is deductive philosophical reasoning introduced by Kant. “The transcendental deduction (along with the Refutation of Idealism) is supposed to provide just such a proof and, thereby, to give a complete answer to the sceptic about the existence of things outside us” (Stroud, 1968, p. 242). Therefore, it is a logical construction of “what must be”, in order to make possible what we “see”.

economics (M. Altamirano & de Jong, 2009), which aim is testing (and predicting) how different incentives lead to specific patterns of behaviour. Serious games for procurement and project governance resembles the controlled-setting or closed system of experimental research, to "safely" explore/learn how specific rules would shape collaborative/adversarial relations in reality (M. Altamirano, Herder, & De Jong, 2008; Dzung & Wang, 2017; Nassar, 2003). However, the embracement of critical realism for conceptualizing project governing necessarily compels to re-frame the scope of serious gaming from an open-system perspective. This is not a minor epistemological and methodological challenge. Critical realism openly contradicts the core values of experimental research. According to critical realists, "it is a condition of the intelligibility of experimental activity that in an experiment the experimenter is a causal agent of a sequence of events but not of the causal law which the sequence of events enables him to identify" (Bhaskar, 2013, p. 1). In other words, scholars relying on social experimentation are running the risk of taking outcomes only achievable in a closed environment as misleading metaphors of human activity and organization that are inherently open to contingency and creativity (Archer, 2013).

Following the realist tradition, it is stated that the value of a controlled research environment relies on the opportunity to reflect on deeper levels of the reality that inspired the controlled research design for theorization and practice. Meaning, the game aims at enabling experiences to reflect on the conceptualization that inspired the game design itself. In this regard, the game philosophy brings together the principles of reflexivity and experiential learning theory. Reflexivity is "the regular exercise of the mental ability, shared by all (normal) people, to consider themselves in relation to their (social) context and vice versa" (Archer, 2007, p. 4). Experimental learning theory argues that "learning is the process whereby knowledge is created through the transformation of experience" (Kolb, Boyatzis, & Mainemelis, 2001, p. 38). Therefore, players are embedded in an experience shaped by a controlled setting, as an invitation to reflect on their interaction in the closed system (game) and the open system (practice) or academic discourse. This approach is inspired by the perspective of "contrast explanation" (Lawson, 2006), which includes the open-system context as a part of the question "in situation x, why do we get y and not z?" (Chivers, 2016, p. 47). Players are shortly brief about the general game objective and the rules of the game, in order to directly provide them with the game experience (Van Daalen, Schaffernicht, & Mayer, 2014). As the game evolves, the players run into "surprises" triggering them to reflect on their roles and relations defined by the rules of the game and the outcomes of their actions during the debriefing. Then, the facilitator aims at asking questions having in mind to inquire about "the influence of their relation(s) with relevant others on to themselves and vice versa"(Donati, 2016, p. 355). This makes games a suitable vehicle for investigating the ex-ante contractual conditions in tendering cycles, and the experience of governing PPPs (in the game and outside the game).

THE “3P CHALLENGE” GAME

OBJECTIVE

The "3P Challenge" game is designed as a research tool to better understand the possibility of managerial collaboration in PPPs, by reflecting with practitioners and civil engineering students on the synergies or tensions between contractual and parent organizational demands along the life-cycle of project delivery. The game design provides a venue where players playing the role of project managers find themselves with the possibility to collaborate at the project level, constrained by ex-ante choices made by players assuming the leadership of parent organizations under competitive pressure and uncertainty. Upon this experience, participants reflect on the solidary, competitive, opportunistic and concessionary interaction during the game, in relation to the actual practice of PPP collaboration or academic and policy discourse on collaboration.

DESIGN

The design of the game is inspired by M. Altamirano et al. (2008), who developed "Road Roles" as a serious game to explore how tendering impacts maintenance markets. The philosophy of their design is based on the "behavioural tradition", which research objective is transferring insights from the controlled setting to the reality based on the axiom of bounded rationality. According to their results, the Road Roles game brings into light how players assuming the role of firms under-estimate their offers for tenders based on lowest price, negatively affecting the market and the quality of the road over time. Due to the possibility to engage in collaborative research and teaching activity with the authors of the Road Roles game, we had a first-hand understanding of the game logic and how the set of game rules would lead to cost-underestimation deteriorating the long-term quality of the market and the road. Knowing that expected result of the conditions brought an experience of the difficulties to craft ex-ante regulated road markets and long-term performance-based contracts, we further developed the structure of the game to provide the experience of ex-post governing of the initial agreement introducing system dynamic simulation.

The “3P challenge” consists of tendering invitations at the market level, which lead to the implementation of the winning contract at the project level. The projects tendered/awarded are Design-Build-Finance-Maintain (DBFM) projects, being capital and maintenance investments defined by the firms upon service specifications defined by the authority. Therefore, there are two game levels (market and project levels) and three teams (road authority, firms and project teams). The road authority team is led by a “head” supported by (two) public contract managers. Likewise, in the firms' teams are headed by a CEO supported by (two) project managers. The PPP teams are constituted by a public contract manager and a private project manager of the firm that wins the tender.

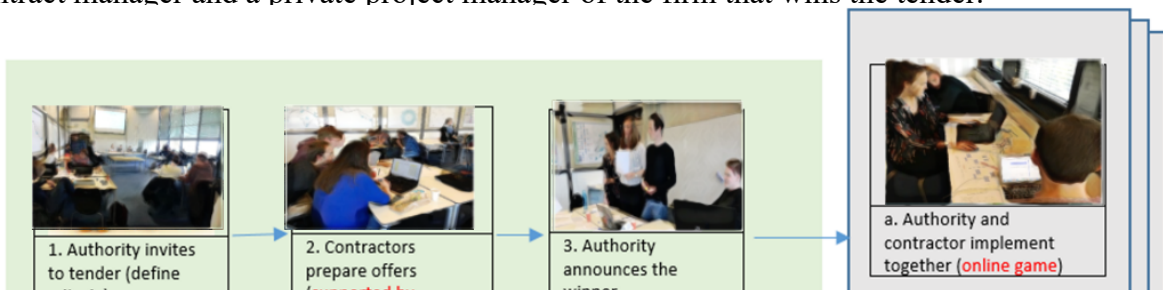


Figure 1: Game cycles at two levels: Market level and project level
(Art testing with Civil Engineering students)

MARKET LEVEL GAME

The market level is driven by regulation and competition, where interacting teams are the road authority and firms. The objective of the firms follows the logic of gain (maximizing money), while the aim of public authority is maximizing the quality of the road (minimizing roughness) and availability (minimizing interruptions for carrying out maintenance). The road authority issues an invitation to tender for a 20 years maintenance contract, exploring multiple types of contracting alternatives. The firms present offers including capital investment and a maintenance plan. For their estimations, firms make estimations based on a system dynamic simulation (flight simulation of the road deterioration). The firms can run different scenarios of initial investments and different combinations of heavy and low maintenance activities, estimating costs and trade-offs

between service levels. The head of the authority and the CEO's have the last word in the decisions made at the market level. The project level emerges from the results for each tendering round. Once the head of the authority selects the winner, he/she appoints a public contract manager for implementing the project with a private project manager appointed by the CEO winner. Likewise, the outcomes from the executed projects inform the authority and the market for adjusting tendering rules.

PROJECT LEVEL GAME

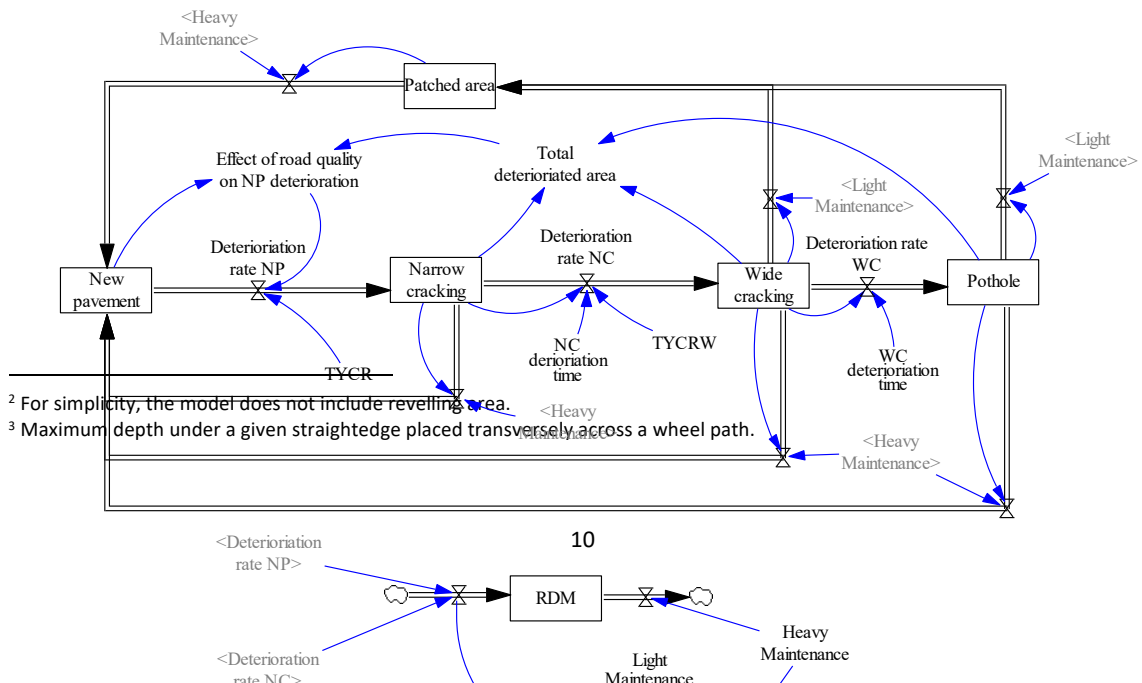
After signing a contract, public and private manager have to implement the offer in an online game. Public contract manager and private project manager control different decisions regarding the project (different screens and panel controls). The private project manager controls maintenance activities, while the public contract manager controls penalties/rewards/extra payments. However, both share the same info on key performance indicators (e.g. roughness index or days closed for deploying maintenance operations). The online game is based on the same simulator that firms used at the market level, but it includes random values for key indicators altering initial assumptions (and therefore actual cost). The game runs the project year-by-year, allowing managers to adjust their decisions to face overruns, but also constraints by their budget. Players are asked to feel free to negotiate/re-negotiate the initial conditions, taking into account that they need the authorization of their head/CEO. If there is no agreement, they can appeal to a tribunal (cards), which settles the conflict. In all times, there is a facilitator at project level assuming the role of the Bank, collecting the expenses related to capital and maintenance investments. The bank also controls that at the end of the project all debts are settled, and it issues the project report. The PPP winner team is the one which implements the project in the shortest time, with a "positive" project assessment of both managers.

SYSTEM DYNAMICS MODEL

The development of the “3P challenge” includes a system dynamic simulator for supporting player estimations of capital investments, maintenance plans and expected performance, based on the Highway Design and Maintenance Standards model (HDM-III) previously developed for the World Bank (Watanatada et al., 1987). The HDM-III model is based on a deterministic conceptualization of the pavement deterioration in order to simulate life-cycle costs of highway construction, maintenance and vehicle operation. In particular, the game is based on road deterioration and maintenance submodel (Watanatada et al., 1987). It “estimates the combined effects of traffic, environment and age on the condition of the road, given data on its construction and materials, and proceeds year by year to predict the change of surface condition under specified maintenance and rehabilitation policies” (Watanatada et al., 1987, p. 67). For the game purposes, the HDM-III road deterioration and maintenance submodel was simplified and programmed as a System Dynamic simulation. System Dynamics modeling has been used for capturing the dynamics of road deterioration, providing insights on optimal maintenance policies (Fallah-Fini, Triantis, Rahmandad, & de la Garza, 2015; Fallah-Fini, Rahmandad, Triantis,

& de la Garza, 2010) and the optimal length of concession periods (Xu et al., 2012; Zhang, Jin, Li, & Skibniewski, 2017). In comparison to the optimizing concern, the use of the System Dynamic model in this research is providing a realistic representation of the project in order to enrich the game experience. Therefore, the modelling process was guided by the deliberative simplification of the model, having in mind the need to balance the three independent so-called worlds of reality, meaning and play for conveying the experience a serious game (Harteveld, 2011). This implies simplifying deterioration system components modelling and prioritizing behaviour validation over structure validation (Barlas, 1996), as it is not the primary objective to understand how deterioration behaviour emerges from the system structure.

In short, the core of the deterioration and maintenance model consists of five stocks closed system representing different levels of pavement distress: new pavement (NP), narrow cracking (NC), wide cracking (WC), and pothole(PO)². The simulation represents how the initial area starting at the “new pavement” stock transits to different deterioration stages, due to traffic, environment and age. The increasing levels of pavement distress lead to higher rut depth (RDM)³ and deviations of a surface from a true planar surface (measured as a roughness index-QI). This roughness index is the key variable to assess service, as higher deviations directly affect “vehicle dynamics, ride quality, dynamic loads and drainage” (Watanatada et al., 1987, p. 73). The simulation defines a range for possible initial values of construction and materials, representing the capital investments that can affect deterioration rates. For maintenance policies, the simulation includes an extra stock representing the patched area, which is governed by the implementation of light maintenance activities. For the sake of simplicity, the full deterioration process of the patched area was omitted, but instead, the model includes a direct non-linear relationship between the patched area and the rate of QI change. High maintenance activities resemble complete reconstruction, "resetting" the entire system to the original conditions (100% of the area in the new pavement stock and QI = 0).



TYRC (Years to the narrow cracking initiation since the last resurfacing)
 TYRCW (Years to the wide cracking initiation since the last resurfacing)
 NP (New Pavement area)
 NC (Narrow cracking area)
 WC (Wide cracking area)

Figure 2: Stock and flow diagram for the deterioration and road maintenance

The flight simulator is used for supporting the definition of capital/maintenance front-end choices under the competitive pressure at the market level (Screen in Annex 1). In the game, firms have to prepare their economic offers supported on the simulation, while the authority does not have access to it. The flight simulator has three areas: extra-capital investment, maintenance investment over time and key indicators to track road performance. Extra-capital investments can enhance strength coefficients (investing in the quality pavement) and layer thickness (investing in layer thickness), within the range set by Watanatada et al. (1987). Additionally, for increasing playability, players can invest in higher predictability of the deterioration rate⁴. Capital costs are fixed. Maintenance activities can be activated along the 20 years of the simulated project, having a fix and marginal cost depending on the area deteriorated. Key indicators include the visualization of the service variables (QI roughness index and non-availability – days closed for deploying maintenance activities), pavement quality (distress stocks), total cost (capital and maintenance costs) and a summary of the critical indicators over time.

On another hand, the multiplayer online game provides the possibility to introduce modifications of the maintenance choices upon the emergence of uncertainties (Screen in Annex 1). This possibility is a fundamental characteristic of the game at the project level, as it emulates how front-end project assumptions (defined by firms using the flight simulator) change once future (and uncertainty) unfolds. Therefore, the System Dynamic model that supports the online game modifies, randomly, the number equivalent of

⁴ In order to represent higher or lower predictability, the “deterioration times” were modelled as normally distributed random numbers using as mean the original time estimated for replicating Watanatada et al. (1987) model and a standard deviation defined by player decisions (Range 0,4 to 0,001) The higher the investment, the lower the standard deviation.

standard axle loads per year (traffic). Given the high-sensibility to this parameter, when managers have to implement the "winning" offer at the project level, they "run into the surprise" of sooner or faster deterioration. Once the players run the online simulation for the 20 years, both of them share the final screen reporting the performance of the key indicators. It includes information on the total years where the service level was below than the defined threshold (total years high QI and total years over max day closed), payments from the authority to the contractor (including awards), penalties paid by the contractor to the authority, expenses to payed to the bank (capital expenditures and maintenance operations), and a summary of the losses of the project, which require to be settled by the managers before closing the project.

PROTOTYPING, TESTING AND EVALUATION

The process of prototyping, testing/evaluating and re-designing aimed to reframe and complement the insights on public procurement and competition of the Road Roles game (M. Altamirano et al., 2008), in the light of the ex-post perspective of PPP governing (Benitez-Avila et al., In press). This process took as reference the triadic model of serious gaming of Harteveld (2011), who assesses the quality of game design as a balance between the three so-called words reality, meaning and play (See Table 1). To balance these words, the game was played in three preliminary sessions with Master and PhD students (n=33). The group included PhD students of the Department of Construction and Engineering, who assessed the flight simulator as a realistic representation of the dynamics of road deterioration and maintenance. It also included PhD students developing their own serious games based on Harteveld (2011) for managerial and engineering education. In a second validation stage, the final version was played with students of civil engineering at the Bachelors level (n=13). It aimed at testing the questionnaire to capture the interaction of players during the game, as well as establishing a benchmark for setting the terms of the debriefing. Table 1 summarizes the most important characteristics of the final design, including the (purposive) limitations after considering the feedback from the testing/evaluating process using the so-called three words of reality, meaning and play.

Table 1: Final game design characteristics after the prototyping-testing-redesigning process

<i>World</i>	<i>Characteristics</i>	<i>(Purposive) limitations</i>
<i>Reality: To what extent does the game connect to the social/physical word?</i>	<ul style="list-style-type: none"> • It connects to the multilevel structure of project governance, and the double role of managers at the project level and parent organization level. • It connects to public infrastructure procurement in competitive markets and the introduction of service contracts. 	<ul style="list-style-type: none"> • The dynamics of patch deterioration and maintenance alternatives were omitted • It does not include the logic of competitive dialogue for the tendering process • It does not include the role of banks in financing in DBFM contracting

	<ul style="list-style-type: none"> • It connects to the dynamics of road deterioration and maintenance • It connects to bundling principle of DBFM contracts, considering capex and opex 	<ul style="list-style-type: none"> • The length of service contracts is reduced from 30 to 20 years • It does not consider re-work and unforeseen circumstances for the building phase
<p><i>Meaning: To what extent does the game have a meaningful effect beyond the gaming experience itself?</i></p>	<p>For the players</p> <ul style="list-style-type: none"> • Understanding the effect of tendering conditions on public markets. • Understanding the effect of unforeseen situations in managerial decisions at the project level. • It provides a venue for discussing the opportunities to introduce “service thinking” <p>For the researchers</p> <ul style="list-style-type: none"> • It allows a venue for socializing and discussing the situational conceptualization of PPP governance problems. • It allows to confront and reflect expect types of interaction (solidarity, concessionary, competitive, opportunistic) with students and practitioners 	<ul style="list-style-type: none"> • It does not aim at directly transfer outcomes to principles of policy design • It does not allow to understand how pavement behaviour emerges from the structure of the simulation • Not all players have the same gaming experience (e.g. some firms might not win a tender, and the road authority does not use the flight simulator)
<p><i>Play: To what extent does the game have engaging goals and rules?</i></p>	<ul style="list-style-type: none"> • It includes permanent and contingent teams, with clear roles and gaming objectives • It is based on the flight simulator and online gaming • The dynamics of the game is engaging 	<ul style="list-style-type: none"> • The simulation-based elements (flight simulator and online gaming) implies a considerable cognitive load • It requires a large number of participants (12), and considerable time for playing (+3 hours)

GAME SESSIONS

In order to have a better understanding of the possibility of project collaboration considering the dual position of managers, the game was played with Dutch practitioners (n=12) and Master students of civil engineering (n=9). In the case of practitioners, the session was arranged as part of an applied research activity led by an organization interested in exploring service contracting to delivery green infrastructure. The session brought together eco-engineers and professionals with expertise in DBFM projects in the Netherlands. In the case of students, the game was arranged as a non-mandatory education activity for discussing the plausibility of the World Economic Forum calling for

collaboration in the industry due to the persistence of cost-overruns. The students had as theoretical background the recent debate between Flyvbjerg et al. (2018) and Love and Ahiaga-Dagbui (2018), the former arguing that large-infrastructure projects overruns are due technical uncertainty and complexity while the latter arguing that the roots of overruns are due decision makers delusion and deception. The sessions with practitioners aimed to gain insights into the possibility of collaboration by contrasting the gaming experience and with their working experience, while the session with students aimed to gain insights on how the game provides an experience for assessing policy discourse on collaboration (Forum, 2018), and academic discourse on roots of over-cost in road infrastructure (Flyvbjerg et al., 2018; Love & Ahiaga-Dagbui, 2018). Based on the conceptualization of the roles in the game from the realist lenses, participants were individually asked to identify the statement that best described their experience during the game -and why- along four types of interaction (competitive, opportunistic, solidarity and concessionary modes of interaction) (Annex 4).

Additionally, the researchers use debriefing to collectively reflect on the gaming experience. In the case of the practitioners, the debriefing was designed as an open conversation where practitioners were asked to describe their experience in the game, explained what happened and relate to their experience. The choice for going to open conversation rather a detailed explanation of the behaviour of the rounds was due to time constrictions, prioritizing the insights on deeper levels of the reality in the practice activated by reflecting on the controlled game setting. In the case of the students, the debriefing focused on the interaction in the game and the reasons, and the dynamics of the game interaction round by round. The deeper reflection was captured by asking them to use the game experience in an assignment to assess the plausibility of the collaboration call in the policy discourse of the World Economic Forum and in the light of the debate between Flyvbjerg et al. (2018) and Love and Ahiaga-Dagbui (2018). The assessment of the game was favoured by the fact that out of the thirteen presenting the assessment, only six took part of the game.

RESULTS OF THE GAME

GAME PLAYED WITH PRACTITIONERS (N=12)

The game included five rounds of tendering invitations and corresponding project implementation. There were three firms competing. At the market level, the observations indicated that the head authority discussed with their public contract managers the terms of the tenders, and one contract manager particularly consulted the head for making decisions at the project level. The experience at the project level was shared by the contract managers to the head of the authority. At the project level, the interactions were rather

contingent to the project managers as is illustrated in the questionnaire answers. Table 2 summarizes the performance of key indicators of the game

Table 2: Game played with practitioners – tender conditions and performance indicators

Tender	Type	Tender conditions				Winner		Performance and assessment by managers								
		Threshold		Penalty/Rewards		Team	Price offered €	Years above		Penalty €	Rewards €	Public budget balance	Private Profit	Time execution	Satisfactory?	
		Max QI	Max NA	For QI	For NA			Max QI	Max NA						Public	Private
1	L	100	3	P	P	Firm 3	320	3	2	9	0	9	-11	7	Y	N
2	F	100	7	-	-	Firm 1	200	7	1,5	0	6	0	-3	14	N	N
3	L	120	5	P	R/P	Firm 2	190	5	0,5	50	0	50	-317	10	Y	N
4	F	82	6	R/P	R/P	Firm 1	149	6	1,5	42	32	61	-14	12	N	N
5	F	98	9	R/P	R/P	Firm 1	145	0	5	2	28	-171	8	10	N	Y

L=lowest price; F = Fix price; NA = Non-availability

In the debriefing, participants pointed out the similarity between the experience during the game and the current situation of PPPs in the Netherlands (DBFM contracts). Nowadays, the Dutch authority and market are less enthusiastic to engage new PPPs given the low margin of profit and high risk for contractors. Likewise, the players assuming the role of firms in the game identified a similar situation. The initial conditions defined by the authority and the additional risk introduced during the project level lead to non-marketable tendering invitations. Therefore, the first round turned out to be very influential for the attitude in the rest of the game. If in the first round a loss was made than the party tended to be very risk averse in the rest of the game. The burden of low-profit margins and high risk for the firms was not evident for the head of the authority, who was focused on avoiding budgetary overshoot. In his words “I was busy with my targets that I didn’t take into consideration other parties”. This example illustrated the point of the gaming experience: conflicting interaction in PPPs can emerge from the demands imposed by the assumed roles, rather than a deliberative effort for taking advantage of the counterpart (intentionally damage the counterpart).

Even when the game formally stated that there is an alternative for winning the game as the “best PPP team at project level”, the participants did not feel belonging to a “team” at the project level. Overall, they felt compelled to take care of the stake of their parent organization. On the one hand, drafting tendering conditions/proposals at parent organizational level pre-conditioned managerial interaction. On the other hand, each party was very focused on their own objectives (targets), and there was no real communication about their objectives to the other parties. This made collaboration very difficult and led more to competition than to teamwork at the project level. One public contract manager expressed her disappointment due to the “ill-intentioned” behaviour of the contractor. The contractor explained that he had to keep losses low given that initial estimations did not match the actual implementation of the project. The contract was concerned with addressing the problematic situation he faced, without considering the consequences for the authority. This inability to effectively communicate how circumstances lead to bad performance triggered distrust in the authority, regardless of the contractor’s good

intentions. In general, players felt the competition pressure, pushing them to prioritize winning the game over providing a good service. The game brought on the table the nature of DBFM contracts as an arrangement based on monitoring rather than collaboration, in spite of its framing as “Publiek-private samenwerking” in the policy discourse. However, there were cases of negotiations to settle conflictive interest at the project level, according to the evaluation forms filled individually. There is a clear difference between one contract manager engaging interaction and another one describing low interaction at the project level (Table 3)

Table 3: Interaction assessment - game with practitioners

Relation	Role	Reflection
Authority head and CEOs (Market mediated)	Authority head	"As head of the authority, I had no knowledge or considerations of other parties. And I had no interaction with other parties, except in the tendering. My concern was merely meeting my own target and setting parameters to stay within the financial bandwidth"
	CEOs	"We tried to maximize the profit of our company"
		"We decided not to do any maintenance and accept penalties, however, lead to competition in forcing us to do maintenance. This ended in costing us a lot of money" "At the end, we settled the difference, but only due loses of the project. Unfortunately, there was little interaction up front (during tender or award phase) with the authority. We did not invest in building a relationship"
Authority head and contract managers (Hierarchy)	Authority head	"We were risk-focused: trying not to fail rather than maximizing value. We did not have conflicts but aimed at helping each other, realizing our common goal. We didn't have a clear goal resolving conflicts"
	Public contract managers	"I always viewed us as one team, so we defined a strategy together and followed through"
CEOs and project managers (Hierarchy)	CEOs	"The decision to do maintenance helped in the satisfaction for the project. In retrospect, we should have asked for more money for this action"
		"Only when our bid strategically offered did not work out, we discussed on the overruns/ settlement. When starting the project we should have more time to discuss how to run the project over the 20 years. Including the re-definition of the maintenance when needed or even pro-actively"
		"We tried to maximize the profit of our company"
	Private project managers	"We just took into account the deadlines. We worked as a team"
		"We tried to maximize profit, without looking at other factors. We did not look at the implementation or satisfaction"
		"We offer too low price, with no financial buffer for developing quality. However, it was impossible to simulate a bid with a normal profit"
		"We tried to not invest in quality and perform maintenance to keep QI and accepting penalties. We were able to offer low prices, acceptable QI but breaching the promised days closed"
		"The time per round was too short of having conflicting interest internally. There was no distinction between the role as CEO as project manager, it was much more teamwork."
"The CEO was only consulted when a budget overrun was unavoidable. I was certainly a little late, but this was due to stress and information overload at the time this occurred. The CEO was very helpful and supportive, no conflicts had to be settled".		
Public contract manager and private project manager (Project)	Public contract managers	"There was not really an interaction. The respective plans were executed, and the lessons learnt feedback into the next tender round"
		"We perform different according to the situation"
	Private project manager	"I experienced two interactions/games. In on there was discussion interaction, and it was interesting to see that the public contractor did not want me to end up with a loss. In the other one, there was no discussion/ interaction. Our strategy (firm) was to accept the penalties and do not maintain. Of course, this led to a low-quality road (bad for the authority). [Initially] we did not change our strategy, because we believed that would be not possible for this low price. When the authority started to rise the penalties, we negotiated and chose for one big maintenance and compensation from authority.

		We had conflictive interest but we were able to settle these and look for mutual benefits. The penalties given were reasonable and sometimes even on the light side, this was due to the cordial relationship
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In a deeper level of reflection, participant highlighted as a key element the (in-house public) capability for contracting and assessing what can go wrong. Public contract managers might have insufficient knowledge about the technical possibilities and difficulties in the implementation phase. Therefore, the public contract manager also needs to understand the technicalities behind the service provided. In order to have a sustainable and good contract/partnership, the gap between the world of contracting and the world of the technical specialist needs to be bridged. According to the players with lower experience in DBFM, it was interesting to see that during the try-out round the authority asked for very high service delivery (high quality with no disturbances) for a very low price. This was not feasible, and the approach forced the market to enter with very high risks and made them accepting penalties (which was bad for the relationship). This illustrates that to start a good tender the authority needs to have some insight into the possibilities and limitations of the market (e.g. that high quality also means higher costs). To improve this, communication between the market and authority about interests and possibilities should happen both in the tendering phase (or even beforehand) and also during the execution phase. A tender without some degree of dialogue is a black box. The dialogue should include mechanisms of conflict resolution tailored to the type of technical uncertainties, as well as a clear definition of what is value beyond reducing risk. In this regard, the public officials recalled the early experiences of the authority applying using the European competitive dialogue procurement procedure that lead to misallocation of risk, given the tendency in the market to accept any risk, leading to conflict and renegotiation. Based on this learning, at the moment it is carefully selected in advance which risks will be transferred.

The second aspect participants discussed was the type of desirable relationship to promote at the project level. The lack of communication within the project teams could have several causes in the game. One was the lack of time during the implementation of the contract in the game and short shared history hampering team formation. Also, in real life, stable staffing is not realistic for projects that last several years. Together with the fact that people act on behalf of their firm, participants pointed out the concern that it is unrealistic to rely on personal relationships and agreements within project teams. This hampers the strategy of doing something for the other without wanting something back (investing in the relationship). Additionally, it is also possible that the employees working in a project team can lose sight of the organizations' objectives because they are so focused on the project objectives. This could lead to conflicts within organizations. The underlying discussion was the extent to which the idea of "team-thinking" should be a cultural value to be promoted in projects.

Consultants having experience in DBFM contracting suggested that project managers should have a clear understanding of their role as agents of their parent organizations. On the other hand for a project manager with experience in Alliances, team-thinking is a must in the kind of projects she has worked in. One principle to settle the discussion is aligning expectations for "collaborative culture at project level " on an open acknowledgement of conflicts emerging from complying with the mandate defined by parent organizations.

GAME PLAYED WITH STUDENTS (N=9)

The game included three rounds of tendering invitations and corresponding project implementation. Only two firms were competing. At the market level, the observations indicated that the head authority takes the lead to define the tendering, but also struggled to be accurate in the definition of the contracting conditions. At the project level, there was a clear difference between the tenders. In the first, managers hardly interacted, while in the second there was a fierce adversarial interaction and the third there were concessions. The second and the third were implemented at the same time, but the attention of the room focused on the conflictual tender.

Table 4: Game played with students – tender conditions and performance indicators

Tender	Tender conditions					Winner		Performance and assessment by managers								
	Type	Threshold		Penalty/Rewards		Team	Price offered €	Years above		Penalty €	Rewards €	Public budget balance	Private Profit	Time execution	Satisfactory?	
		Max QI	Max NA	For QI	For NA			Max QI	Max NA						Public	Private
1	L	75	12	R	P	Firm 1	215	5	5	10	14	-40	-14	15	Y	N
2	F	120	15	P	A	Firm 2	190	2	0,5	30	85	-45	-56	19	Y	N
3	L	65	10	P	P	Firm 1	250	3	0,5	25	0	30	-22	20	Y	N

L=lowest price; F = Fix price; NA = Non-availability

In the debriefing, the students focused on the experience of the game itself, the fairness of the game and the reasons and consequences to “lie” in drafting proposals. The first aspect they pointed out was that in all projects with negative cash balance to firms the projects were negatively assessed. The firms expected to have a profit but they made losses during the implementation. This is aligned with the explanation of the positive assessment of public managers, who acknowledged that tender conditions were rather difficult to frame in advance, and the contractor did the most during the implementation considering their poor financial situation and uncertainty. Students explained that the problem was the underestimation of maintenance cost since it was not explicit that the online game included more risk than the one they could control for the capital investment. It only was stated that conditions of the implementation can change due to uncertainty.

In terms of type interaction, there was a clear difference between the three tenders. In the first, the players did not interact as they were focused on understanding the online game. There were involuntary mistakes controlling panels that lead to loses and bad performance. In the second tender, the interaction was adversarial as the public project manager due to the misspecification of the contract for a fixed price, defined as winning

criteria the lowest QI but set the penalty for a less demanding QI threshold. The misspecification opened the possibility to get a contract awarded, promising in non-feasible QI. Therefore, in the implementation, the contractor did not deliver as expected but in line with the contract terms, triggering a distrust environment and a discussion on money. The conflict required the court to be involved twice to settle the conflict. In the third round, the experience from the first round allowed the public contract manager to have a more consistent strategy to monitor the project. At the end of the contract, the contractor was eager to accept the penalty rather than implementing a more expensive extra maintenance activity. The public contract manager gave them extra money previously collected from penalties to carry out the maintenance.

The second round was further discussed, in terms of the extent to which the contractor “lied” or not. The competitors argued that they compromised the entire procedure by proposing a non-attainable threshold, taking advantage of the misspecification; while the winners claimed that their offer was legitimated as the offer complied with the authority requirements. When asked why this situation happened here and no other, the winner explained that extra criteria would have fixed the problem. The competition explains that better information at hand of the authority would have permitted them to know that the offer was no realistic, however, the point of the game set up was reflecting the assumption in service contracts that firms always know better than the authority. That is why they do not have the road simulator at hand. The head of the authority explained that they estimated the offers taking into account fragmented knowledge they had in advance, such as the calculation of capital cost – knowing the maximum investment firms could invest. However, the definition of tender conditions such as the number of awards and penalties were instead a blind estimation. For example, they did not have an idea if the penalties would compensate for the awards.

Table 5: Interaction assessment - game with students

Relation	Role	Reflection
Authority head and CEOs (Market mediated)	Authority head	“My perception was that the contractor did not consider the risk properly when they submitted their tenders. This lead in the case of the contractor 2 to situations when they were losing money. In this context, statement 2 (competition) describes the situation best. In this context, as contractor 2 negotiated intensively for sharing their losses due to uncertainty with authority. In the case of contractor 1, the contract was better specified, and this lead to better relations between authority and contractor. In the case of contractor 1 the interaction remaining fairly constant through the game. In the case of contractor 2, the interaction deteriorated when they risked losing a lot of money”
	CEOs	“At the beginning, both parties tried to maximize profit no matter what the loses of the other party was. Later, both parties tried to get consensus when they both experienced loses and tried to negotiate to share the losses. But always in their mind, there was opportunistic behaviour. Eventually, the project went twice to the court. In sum, there was not a good collaboration”
		“There was the case that the last maintenance would have costed more than the penalties. But in cooperation with the authority, we came to a situation where the quality was maintained and we did not lose much money”

Authority head and contract managers (Hierarchy)	Authority head	"There was not enough time to think together of a joint strategy. The projects did not run smoothly and expected but the interaction always remained friendly and there was a team spirit within the authority"
	Public contract managers	"You have to keep track of the total money. If all the public money is gone, things will end up bad as a high QI level. So you have a mutual interest in working together"
CEOs and project managers (Hierarchy)	CEOs	"We both had the same objective to maximize value for the company. We helped each other to get to this objective while negotiating which option was the best"
		"I always kept the profit for the company in mind and kept discussing with my project manager to get to a concession for both parties"
	Private project managers	"We shared the same goal of making money, but it turned out that the maintenance cost dramatically increased. We decided to make sure to lose as less as money as possible."
		"We did want to gain at first. But when we saw that we were losing money, we wanted our lose to be as small as possible. So we agreed with the authority." "We are on the same team, the same goal. So cooperation was a logical step."
Public contract manager and private project manager (Project)	Public contract managers	"At the end of the 20 years, the contractor does not want to expend extra money on maintenance. We used the penalty money to finance the final maintenance, because the authority does not have itself as a goal to collect most of the penalties possible. So, you could better help each other, knowing what was in on other best interest"
	Private project manager	"We compete to earn most of the money, after realizing that due unexpected cost would result in loses of both parties. We decided to share the extra cost in what the public manager helped us to reduce the losses and share the risk"
		"We didn't want to do maintenance, so we will lose less, but just accepting the punishment. But this was not the interest of the authority. So we settled what we will both lose"
		"The interaction (self-centred) changed to make concessions at the end of the service contract period, at the moment we indicating skipping maintenance and accepting a fine, resulting in a possible poor quality to be delivered. We then made a deal, resulting in minimizing loses for both parties"

Students taking part in the game and those who did not attend agreed that the most convincing argument was the behaviourist perspective of Flyvbjerg et al. (2018) to assess the plausibility of the World Economic Forum target on collaboration. They considered that the human aspect is more relevant to understand overruns and therefore conflicts in infrastructure projects. Nevertheless, students attending the game framed that human factors with lower emphasis on attributional characteristics of human behavior such as deception and delusion, and provided more elaboration to adversarial interactions emerging from uncertainty and complying with roles under competition. Students pointed out that game showed that once projects are awarded, they need adjustments, therefore the tender criteria need to be unambiguous, or actors will take advantage of ambiguity. Some even explained the problem of opportunism was a by-product of situations linked to the fair difficulty to frame unambiguous contracts or changing conditions during the implementation. For example, a student explained that when implementing, unexpected high costs were forcing the change of maintenance. Therefore, creating an atmosphere for not holding information, and trust would have to change the game. Another pointed out that the game allowed to experience the difficulty of staring and maintaining good relations. High uncertainty and lack of information indirectly forced both parties to work strategically against each other. Maybe the possibility of dialogue in advance would have to change the performance: once players engaged in antagonistic relations, it was even harder to bargain. Another aspect clear in the game and not considered by Love neither Flyvbjerg was the role of communication and relationship building for avoiding the

escalation of problems. When anger showed in the game, constructive dialogue is hard to find, and a lot of time and money is wasted on fines and bargaining.

One interesting aspect to point out is that some students not playing the game were more sceptical to the possibility of collaboration of the target vision. Actually, they identified in Flybjerg message a kind of dead end for any collaborative initiative. One student pointed out that Flybjerg's explanation is more convincing. Therefore, the student stated that collaboration of the target vision is not realistic due to it is a naïve view that private companies will share information, and the only way ahead is changing thinking and awareness. Another student also pointed out that behaviourist is a more convincing explanation, and in consequence, the vision is not attainable nor realistic. Authorities and clients will not collaborate, and therefore they will need a mindset change. By definition firms will always have little trust, we need collaboration but we do not know how. The evolutionist perspective would make the vision more plausible, but it is less convincing as the distribution of the dataset shows that cost-overruns are not due to chance.

DISCUSSION

What can we learn from the reflection of practitioners and civil engineering students playing the “3P challenge” game? The results indicate that the game offered the space for collaboration on the project level but also activates mechanisms preventing players from making use of this space. This gaming experience for the practitioners allowed to critically assess the idea of “partnership” as “team” in the implementation of PPP projects. The prevalence of penalties as the mechanism to guide ex-post interaction in a so-called "partnership" implies a breach of meaning for practitioners, a living oxymoron. It little adds to the practice explaining to project managers that the meaning of “partnership” at the beginning was engaging private finance and overlooking the potential meaning it contains for working expectations in policy, management and academic discourse. Others have discussed the extent to which PPPs privilege commercial interests (Hodge et al., 2017), and even questioning the shortsightedness of construction management scholars and their uncritical compliance with banks stakes over public value (Sherratt & Sherratt, 2018). Our scope is different. The point is the extent to which the careless use of “partnership” in PPPs might create additional symbolic pressure for a "team mindset" when objective positions provide little grounds to build such identity. As working relations cannot be built in any way (Donati, 2010), the possibility of building a shared identity is constrained in the game as it is constrained in practice by the control mechanisms that support the implementation of PPPs.

This is an issue brought into light by the literature of temporal organizing, paying attention to the paradoxical demands of project members playing with multiple identities given the embeddedness of temporal agreements (DeFillippi & Sydow, 2016; Söderlund & Borg, 2018). Our findings point out that these paradoxical demands in the case of PPP

are embedded in the contradictions of its governance structure materialized in the contractual form. The reaction of practitioners in our game also brought into light their less enthusiasm for PPPs, specifically Design-Build-Finance-Maintenance contracts, as a vehicle for procuring public infrastructure. In Dutch, the translation of Public-Private Partnership is "Publiek-private samenwerking", that seems to be subject of a different interpretation by Dutch practitioners in the light of their corporatist culture and expectations for negotiated coordination of projects during their exploitation phase (Sminia, 2011). On the other hand, our findings are relevant as a word of caution on recent interest for instrumentalizing concepts such as "governmentality" with a voluntarist twist, as a strategy to shape shared identities of project members towards the mission by consent (Clegg et al., 2002; Müller, Zhai, & Wang, 2017). Research in infrastructure project management has already pointed out the limits of this strategy, taking into account the objective conflicts between project coalitions (van Marrewijk, Ybema, Smits, Clegg, & Pitsis, 2016). Similarly, organizational cultural studies have pointed out that interventions based on idealized narratives of change (e.g. collaboration) are counterproductive, reinforcing what it was supposed to change (Marrewijk & Veenswijk, 2016). The "P for partnership" can be likewise counterproductive when taking it as a taken-for-granted promise of collaboration.

As a caveat, the discussion requires to understand the possibility of collaboration embracing the weak grounds for building team identification at the project level. In this respect, there is no way to skip the classical concern of governance studies, emphasizing at the front-end the optimal allocation of risks and responsibilities to be enacted by project managers. However, this classical discussion can purposively include an explicit conceptualization of the implications of the discrete allocation of responsibilities to managers which are able to blend governance structures to move the project forward, address poor ex-ante choices and deal with uncertainty. This is nevertheless a discussion that necessarily requires to include time as the key element to understand the process through which managers can find innovative ways to enact governance structure in place by building a relationship that requires work and cannot be taken for granted. In the game, the practitioners pointed out that time is an element that cannot be naturally included in the gaming session, but in practice is what defines the possibility to run the risk of placing between brackets contractual entitlements. This is not an unknown phenomenon for organizational and project organizational studies (Gulati & Nickerson, 2008; Lewicki & Bunker, 1996; Meyerson, Weick, & Kramer, 1996). But usually, trust building is still framed as voluntarist outcome of actors (Poppo & Zenger, 2002), sometimes facilitated by external systems of shared-meaning (Bachmann & Inkpen, 2011; Swärd, 2016). Our findings call for better articulating trust development with actors capacity to re-shape objective initial contradictions and objective basis of the working relationship by their creative enactment of conflicting positions (Archer, 1995; Donati & Archer, 2015).

In this regard, the experience of gaming with students and their reflections on policy and academic discourse on collaboration and overruns was particularly insightful on how the game brings into light a situational perspective of opportunism. The “3P Challenge” game was useful to expand the boundaries of opportunism beyond of pure attributional phenomena. One can argue that students attending the game were able to conceptualize adversarial interaction emerging from an involuntaristic predisposition to assume an opportunist behaviour, specifically when in their interaction fail to explain how pitfalls emerge from uncertainty and trial and error process. In other words, the game provides a non-essentialist experience of opportunism. It is important to acknowledge that only a few students refer to both uncertainties (simulated by random changes in the online game), and the conflicting structure of game roles as the situational drivers of opportunism. Even when in the explanation of the game it was stated that during implementation managers would phase un-expected surprises, only in some cases players were able to articulate the roots of the conflict to involuntaristic contingencies.

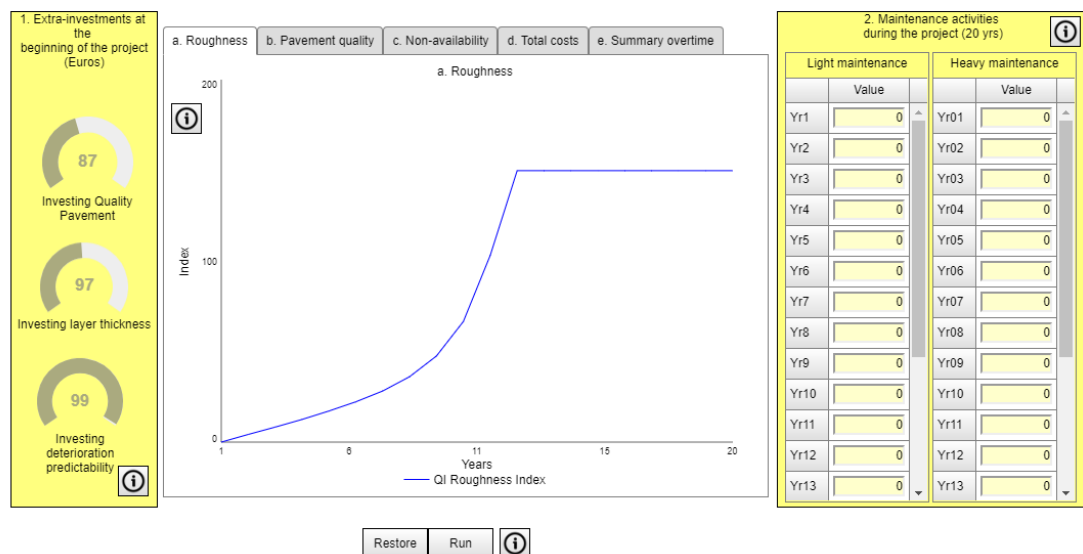
While the nature of opportunism is an ontological discussion, the ideological consensus among practitioners and scholars is that a "good relationship" at project level based on relational or cognitive scripts of behaviour might absorb "concerns" between contracting parts, creating an enabling environment to understand other's stake (Henisz et al., 2012; Levitt et al., 2014). Nevertheless, there is a mismatch between the expectations for shaping collaborative culture in practice and the scholar discourse about the governance problem. Project management scholarship keeps framing governance issues as the result of natural opportunistic behaviour of people (dispositional perspective). Management scholars are keen to explore other social disciplines to find governance solutions due to the restrictions of regulative governance mechanisms in practice (Henisz et al., 2012), without daring to question their behavioural conceptualization of governance problem. The game can be used as a venue to further elaborate on a consistent conceptualization of the governance problem from a situational perspective, and critically approach the dispositional perspective as the sole explanans or unique frame to understand and solve PPP conflicts.

CONCLUSION

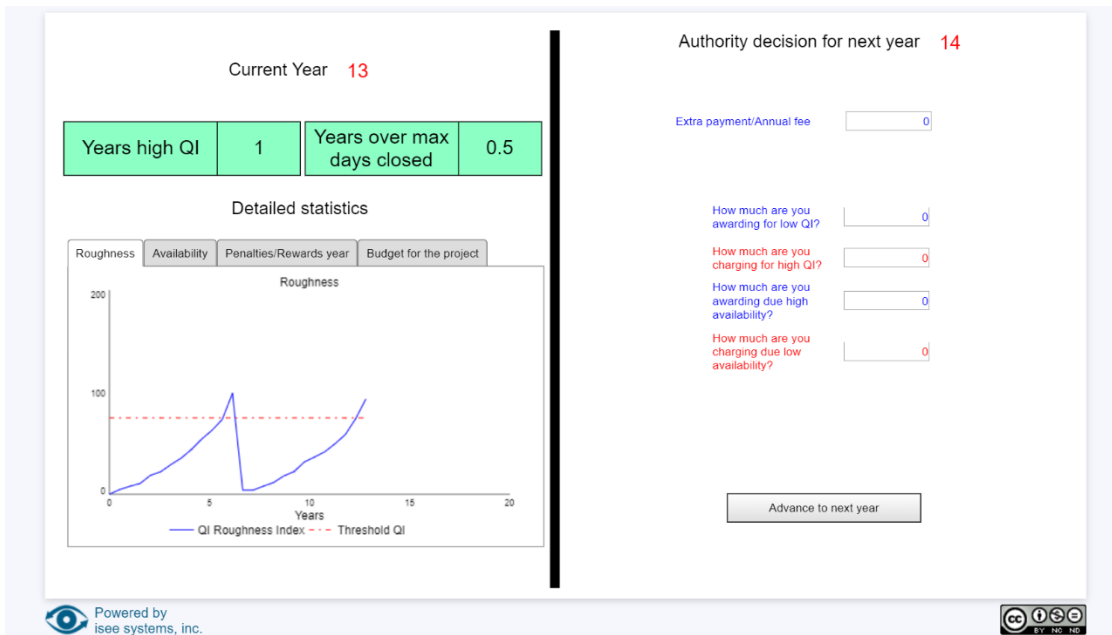
While serious games as research tools have been used to transfer insights from a controlled setting to reality (M. Altamirano & de Jong, 2009), the “P3 challenge” game is a research tool designed to activate reflexivity capabilities of players to consider the ex-post phase of PPP and the agency of project managers. This paper discussed the role of the game to understand the possibility of collaboration in PPPs with practitioners and students. Practitioners were asked to reflect on their practice compared to the game experience, while students used the game experience to reflect on policy and academic discourse on collaboration in the delivery of public infrastructure. The results suggest that the game provides an experience where participants run into conflicts, given the competitive

pressures, the difficulty to define accurate tender conditions, and the uncertainty and emerging interaction of players assuming roles. The game activated a discussion between the imperative of collaboration linked to the positive language of PPP and embedded relations in a PPP contract, which does not provide objective grounds for building a team. The students used the game as a reference to understand the situational dimension of opportunistic situations, beyond the popularity of its attributional conceptualization. There are a number of limitations of our research. First of all, the game does not fully articulate the role of lenders in the ex-ante governance design and ex-post activity (Dupas et al., 2011), neither the current procurement procedures such as competitive dialogue (Hoezen, 2012). Therefore, the gaming experience can be further developed in that direction. The discussion on partnership promises needs to be understood in the Dutch context, which has been characterized as a corporatist culture. It can be the case that in another context other values and meanings of partnerships are taken to reflect on the consequence of PPPs. This trans-cultural perspective suggests playing the game from a comparative perspective.

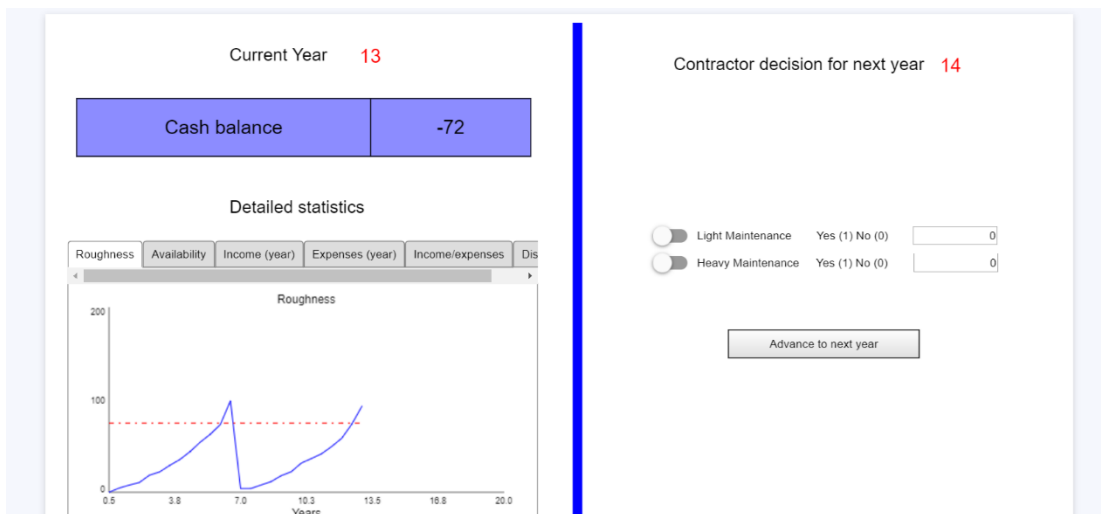
ANNEXES



Annex 1: Flight simulator for preparing economic offers at market level



Annex 2 : Online game screen for implementing the project year by year (Authority)



Annex 2b: Online game screen for implementing the project year by year (contractor)

Annex 3: Statements

FINAL ASSESSMENT HEAD OF THE AUTHORITY

Please tick which of the following statements best describes your interaction as a head of the authority with **contractors during the tendering rounds**

- We (authority and contractors) seized **opportunities** to unilaterally maximize value (e.g. quality under budget for me as authority, maximizing profit for contractors), without even thinking how unilateral decisions might affect the others (e.g. my actions affecting profit for contractors, their actions affecting quality under budget).
- We (authority and contractors) **competed** against each other, knowing that unilateral actions (e.g. contractors actions for incrementing profit; and my actions for quality under budget) would deteriorate/jeopardize counterpart value (e.g. my actions deteriorating the profit for contractors, their actions jeopardizing quality under budget)
- We (authority and contractors) **helped** each other, knowing that unilateral actions (e.g. contractors actions for incrementing profit; and my actions for quality under budget) would maximize counterpart value (e.g. my actions contributing to contractors profit, their actions contributing to quality under budget)
- We (authority and contractors) settled conflictive interest (e.g. quality under budget for me as authority, maximizing profit for contractors), knowing that maximizing value depended on making **concessions** to the other (e.g. profit for contractors depending on my actions, quality under budget depending on their actions)

Please tick which of the following statements best describes your interaction as a head of the authority with your **public contract managers during the implementation of projects and cost settlement**

- We (head and public contract managers) seized **opportunities** to unilaterally maximize value (e.g. overall portfolio quality under budget for me; fast and satisfactory project for managers), without even thinking how unilateral decisions might affect the other (e.g. my actions affecting fast implementation/satisfaction at project level; their actions affecting overall portfolio quality under budget).

- We (head and public contract managers) **competed** against each other, knowing that unilateral actions (e.g. managers actions for fast implementation/satisfaction at project level; my decisions for quality under budget of all portfolio) would deteriorate/jeopardize counterpart value (e.g. manager actions deteriorating overall quality under budget for me; my decisions jeopardizing fast implementation/satisfaction at project level for managers)
- We (head and public contract managers) **helped** each other, knowing that unilateral actions (e.g. managers actions for fast implementation/satisfaction at project level; my actions for overall portfolio quality under budget) would maximize counterpart value (e.g. managers actions contributing to the overall quality under budget for me; my decisions contributing to the fast implementation/satisfaction at project level for managers)
- We (head and public contract managers) settled conflictive interest (e.g. overall portfolio quality under budget for me; fast and satisfactory project for managers), knowing that maximizing individual value depended on making **concessions** to the other (e.g. overall portfolio quality under budget depending on their actions; fast implementation/satisfaction at project level depending on my actions)

FINAL ASSESSMENT CEO

Please tick which of the following statements best describes your interaction as a CEO with the authority during the tendering rounds

- We (authority and contractor) seized **opportunities** to unilaterally maximize value (e.g. quality under public budget for the authority, maximizing profit for my company), without even thinking how unilateral decisions might affect the other (e.g. authority actions affecting the chance to get profit, my actions affecting quality under public budget).
- We (authority and contractor) **competed** against each other, knowing that unilateral actions (e.g. my actions for profit; and authority actions for quality under public budget) would deteriorate/jeopardize counterpart value (e.g. authority actions deteriorating chances to get profit, my actions jeopardizing quality under public budget)
- We (authority and contractor) **helped** each other, knowing that unilateral actions (e.g. my actions for profit, authority actions for quality under budget) would maximize counterpart value (e.g. authority actions increasing contractor chances to get profit, my actions contributing to quality under public budget)
- We (authority and contractor) settled conflictive interest(e.g. quality under public budget for the authority, maximizing profit for my company), knowing that maximizing value depended on making **concessions** to the other (e.g. profit for contractors depending on authority actions, quality under public budget depending on my actions)

Please tick which of the following statements best describes your interaction as a CEO with your private project managers during the implementation of projects and cost settlement

- We (CEO and private project managers) seized **opportunities** to unilaterally maximize value (e.g. profit for my company, fast and satisfactory project for managers), without even thinking how unilateral decisions might affect the other (e.g. my actions affecting fast implementation/satisfaction at project level; their actions at project level affecting profit for the firm).

- We (CEO and private project managers) **competed** each other, knowing that unilateral actions (e.g. managers decisions for fast implementation/satisfaction at project level; my decisions for maximizing profit) would deteriorate/jeopardize counterpart value (e.g. managers actions deteriorating profit for my company, my decisions jeopardizing fast implementation/satisfaction at project level for the manager)
- We (CEO and private project manager 1) **helped** each other, knowing that unilateral actions (e.g. managers decisions for fast implementation/satisfaction at project level; my decisions for maximizing profit) would maximize counterpart value (e.g. managers actions contributing to the profit for my company, my decisions contributing to fast implementation/satisfaction at project level for the managers)
- We (CEO and private project manager 1) settled conflictive interest (e.g. profit for my company, fast and satisfactory project for managers), knowing that maximizing individual value depended on making **concessions** to the other (e.g. company profit depending on managers actions, fast implementation/satisfaction at project level depending on my actions)

FINAL ASSESSMENT PUBLIC CONTRACT MANAGER

Please tick which of the following statements best describes your interaction as a public contract manager with **the head of the authority during the **implementation of projects and cost settlement****

- We (head and public contract manager) seized **opportunities** to unilaterally maximize value (e.g. overall portfolio quality under budget for the head; fast and satisfactory project for me), without even thinking how unilateral decisions might affect the other (e.g. his/her actions affecting fast implementation/satisfaction at project level; my actions affecting overall portfolio quality under budget).
- We (head and public contract manager) **competed** against each other, knowing that **unilateral actions** (e.g. my actions for fast implementation/satisfaction at project level; his/her decisions for quality under budget of all portfolio) **would deteriorate/jeopardize counterpart value** (e.g. my actions deteriorating overall quality under budget for the head; head actions jeopardizing fast implementation/satisfaction at project level for me)
- We (head and public contract manager) **helped** each other, knowing that **unilateral actions** (e.g. my actions for fast implementation/satisfaction at project level; his/her actions for overall portfolio quality under budget) **would maximize counterpart value** (e.g. my actions contributing to the overall quality under budget for the head; his/her actions contributing to the fast implementation/satisfaction at project level for me)
- We (head and public contract manager) settled conflictive interest (e.g. overall portfolio quality under budget for the head; fast and satisfactory project for me), knowing that maximizing individual value depended on making **concessions** to the other (e.g. overall portfolio quality under budget depending on my actions; fast implementation/satisfaction at project level depending on his/her actions)

Please tick which of the following statements best describes your interaction as a public contract manager with **the private project managers during the **implementation of projects and cost settlement****

- We (public and private managers) seized **opportunities** to unilaterally maximize value (e.g. quality under budget for me as part of the authority, maximizing profit for contractors), without even thinking how unilateral decisions might affect the other (e.g. my actions affecting profit for contractors, their actions affecting quality under budget).
- We (public and private managers) **competed** against each other, knowing that unilateral actions (e.g. contractors actions for incrementing profit; and my actions for quality under budget) would deteriorate/jeopardize counterpart value (e.g. my actions deteriorating profit for contractors, their actions jeopardizing quality under budget)
- We (public and private managers) **helped** each other, knowing that unilateral actions (e.g. contractors actions for incrementing profit; and my actions for quality under budget) would maximize counterpart value (e.g. my actions contributing to contractors profit, their actions contributing to quality under budget)
- We (public and private managers) **settled** conflictive interest (e.g. quality under budget for me as authority, maximizing profit for contractors), knowing that maximizing value depended on making concessions to the other (e.g. profit for contractors depending on my actions, quality under budget depending on their actions)

FINAL ASSESSMENT PRIVATE PROJECT MANAGER

Please tick which of the following statements best describes your interaction as a private project manager with **your CEO during the **implementation of projects and cost settlement****

- We (CEO and private project manager) seized **opportunities** to unilaterally maximize value (e.g. overall profit for the CEO; fast and satisfactory project for me), without even thinking how unilateral decisions might affect the other (e.g. his/her actions affecting fast implementation/satisfaction at project level; my actions affecting overall profit).
- We (CEO and private project manager) **competed** against each other, knowing that unilateral actions (e.g. my actions for fast implementation/satisfaction at project level; his/her decisions for overall profit) would deteriorate/jeopardize counterpart value (e.g. my actions deteriorating overall profit for the CEO; CEO actions jeopardizing fast implementation/satisfaction at project level for me)
- We (CEO and private project manager) **helped** each other, knowing that unilateral actions (e.g. my actions for fast implementation/satisfaction at project level; his/her actions for overall profit) would maximize counterpart value (e.g. my actions contributing to the overall profit; his/her actions contributing to the fast implementation/satisfaction at project level for me)
- We (CEO and private project manager) settled conflictive interest (e.g. overall portfolio quality under budget for the head; fast and satisfactory project for me), knowing that maximizing individual value depended on making **concessions** to the other (e.g. overall profit depending on my actions; fast implementation/satisfaction at project level depending on his/her actions)

Please tick which of the following statements best describes your interaction as private project manager with **the public contract manager during the **implementation of projects and cost settlement****

- We (public and private managers) seized **opportunities** to unilaterally maximize value (e.g. quality under budget for public contract managers, maximizing profit for me as a part of a firm), without even thinking how unilateral decisions might affect the other (e.g. their actions affecting profit, my actions affecting quality under budget).
- We (public and private managers) **competed** against each other, knowing that unilateral actions (e.g. my actions for incrementing profit; and their actions for quality under budget) would deteriorate/jeopardize counterpart value (e.g. their actions deteriorating profit, my actions jeopardizing quality under budget)
- We (public and private managers) **helped** each other, knowing that unilateral actions (e.g. my actions for incrementing profit; and their actions for quality under budget) would maximize counterpart value (e.g. their actions contributing to profit, my actions contributing to quality under budget)
- We (public and private managers) settled conflictive interest (e.g. quality under budget for public contract managers, maximizing profit for me as a part of a firm), knowing that maximizing value depended on making **concessions** to the other (e.g. profit depending on their actions, quality under budget depending on my actions)

Annex 4: Summary reflection on the plausibility of vision target

No attending	Attending
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<ul style="list-style-type: none"> • Behaviourist most relevant in pre-construction and evolutionist to be more relevant in the construction stage in terms of explanation of overruns. The ex-ante allocation of risks lowers winners course, and publicity of estimates are consistent with the behaviourist perspective on establishing a structure incentive in advance. • Behaviorist is more consistent to explain due to the biased distribution and the "behaviorist revolution". Collaboration of the target vision is not realistic due to it is naïve that private companies will share information. The only way ahead is changing thinking and awareness. • Behaviorist perspective is more convincing but it does not give space for the vision, as transparency will not provide a mean for collaboration. If the problems are defined as Love does, the target vision is achievable. • The evolutionist does not provide grounds for the target vision as it does not recognize that lack of cooperation between people is the core of the issue. The target vision is based on the behaviorist assumptions (more convincing), as well as the focus on sharing risk by contracting ex ante. • Taking as a reference behaviorist (more convincing), the vision is not attainable nor realistic. Authorities and clients will not collaborate, and therefore they will need a mindset change. By definition, firms will always have little trust. We need collaboration but we don't know how. • Behaviorist is more convincing and fitting to the current industry, no very innovative. Therefore, it is questionable if the government can engage collaborative tendering, or if firms can collaborate. Only conflict management would be a more realistic alternative. • The behaviorist vision is more convincing, but the target of collaboration is not attainable from this perspective. In particular, behaviorist points that (public) client risk appetite has to be de-biased, but as the root is poor collaboration itself there will be always a chance for overruns. The evolutionist perspective would make the vision more plausible, but it is less convincing. 	<ul style="list-style-type: none"> • Choose a mixed approach in normative terms, as the behaviorist RCF tool allows better ex-ante estimation, but it does not point out that projects needs to be carefully ex-post managed. The game allowed show me the importance to understand unbalanced or unclear risk allocation, and how it led to an infinite expansion of contractual liabilities. The authority often ignores the most beneficial distribution of risk. • Collaboration is possible taking into account the evolutionist approach, but not the behaviorist approach. The game reinforced the idea that conflicts are due to human behavior, while the pillar call for more collaborative environment not taking human behavior. The game brought the insight that competition plays a role in estimating the capital investments right, but they are not mentioned either in the behaviorist nor evolutionist. • Collaboration and cooperation is linked to human behavior, and I take the side of Flybjerg that costs underestimation is due to optimism bias and deception to favour one party. The vision pointed out that collaboration emerges from contractual types that provide incentives to collaborate. The game showed once projects are awarded, they need adjustments. Also that the tender criteria need to be unambiguous, or actors will take advantage of ambiguity. Construction remains a process of managing stakeholders and their behavior. • On the one hand, the vision emphasizes transparency and that perspective is aligned with Love, and on the other hand, the vision pointed out suboptimal risk allocation that would reduce the human biases. I find Flybjerg perspective more accurate in terms of human bias and underestimation due to a lack in understanding the risk of the project. In the game we use the simulator to present the proposal, without considering that things can be turn out different. When implementing, there were unexpected high costs forcing us to change the maintenance. Creating an atmosphere for not holding information, and trust would have change the game. • Flybjerg has arguments in accordance with the industry consensus, as the divergence goals of institutions set a context where it is in the interest of parties to incur in strategical misrepresentation a tendency for optimist in risk assessment. The path ahead should be in consequence be more related to the behavioral explanation than evolutionist, however, it does not provide all mechanism that would be needed to tackle the problem as the target vision points out. My participation in the game allowed me to experience the difficulty of staring and maintaining good relations. High uncertainty and lack of information indirectly forced both parties to work strategically against each other. Maybe the possibility of dialogue in advance would have changed the performance. Once players engaged antagonistic relations, was even harder to bargain. • Behaviourist and evolutionist perspective is aligned with the pillar vision, which focuses on risk allocation, suitable procurement procedures and collaboration. Love focuses on available information and Flyvbjerg focuses on the purposive human deceive behavior that can be rational in decision making. Both aspects were in the game, for example, decisions made in the tender-phase turned out to be short-sighted when
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	<p>looking at uncertainty in the implementation phase. But also one contractor hides information to win, and the game also showed that at the end of the project some contractors can be sleazy because they cannot be kicked out from the project. Overall, human bias is the most important problem to tackle. One aspect clear in the game and not elaborated in both papers was the need for proper communication and trust during the entire project. When anger showed in the game, constructive dialogue is hard to find, and a lot of time and money is wasted on fines and bargaining.</p>
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