# Riskin':
# Software Risk Management as an Environmental Change Process for Providing Leadership Opportunities

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## ABSTRACT

*Developing and maintaining software is an extremely risky process. The success of the project demands effective management of the risks. Traditional theory of software risk management just includes the risks from the perspective of general project management, avoiding project environmental changes. Unlike traditional risk management theory, issues during a software development project are actually "change management" challenges. Successful change management requires leadership and effective teams. Any change could be either a potential crisis or a great opportunity, so leaders can make decisions for translating changes into opportunities. Risk management teaching strategies related to software projects leave aside the development of managerial and leadership skills. In addition, effective team characteristics affecting the project performance are avoided. In this paper, we propose Riskin', a game-based approach for teaching the importance of leadership decisions and effective team characteristics in change management process, and, therefore, risk management process. This game practice leads to a novel way to understand risks as leadership opportunities to develop effective teams.*

## INTRODUCTION

Risks are commonly faced by teams during software development process, mainly associated to development and maintenance phases (Kwak & Stoddard, 2004). Risks should be identified, addressed, and mitigated in a process known as risk management, a knowledge area of the Project Management Body of Knowledge (PMBoK; PMI, 2017) for leading to successful projects.

PMBoK practices lead project managers to drive risks as serious problems faced by teams during the project lifecycle, a well-known perspective from project management. According to Debnath *et al.* (2006), some risks are possible challenges introduced by the environment, especially in software projects. From such a perspective, risks can be addressed by change management theory instead of traditional project management, since they are actually *change management* challenges. Change management is the process of identifying, documenting, making decisions, and tracking organizational changes (PMI, 2017).

Leaders should gain awareness about such challenges in order to successfully follow change management guidelines. Consequently, a successful change management strategy is linked to leadership, a competency for developing effective teams (Debnath *et al.*, 2006). Change management challenges can be seen as potential crisis in projects, due to the catastrophic consequences they can generate; however, good leaders can see opportunities for improving processes. Then, decision-making is needed for creating good opportunities coming from change management challenges.

Some authors use traditional strategies for teaching risk management, like classroom lectures, case studies, and micro-worlds (Radakovic, 2015; Collofello *et al.,* 1997). However, managerial and leadership skills are difficult to develop by using traditional approaches. In addition, project performance based on the characteristics of effective teams is usually acquired by experience instead of traditional teaching strategies (Debnath *et al.,* 2006).

As a way to deal with the aforementioned problems, in this paper we design, develop, and practice a classroom game for

teaching the strong impact of leadership decision making and some characteristics of effective teams during the change management process, as a way to address the most common risks as change management challenges. Our game is named *Riskin'*, since we used as a template the game *Munchkin™*. Some of the most common software development risks are included in our game. This approach can be useful for leaders and effective teams as a novel way to understand the transition from risks to project teams opportunities in the context of software development processes.

The reminder of this paper is organized as follows. We present a theoretical framework and then a background related to the risk management teaching. Next, we propose the game design, development, and practice. Finally, we discuss conclusions and future work.

# THEORETICAL FRAMEWORK

## RISK MANAGEMENT:

Pressman (2008) defines risks as the possibility an adverse event, misfortune, or setback causes a loss. Risk corresponds to possibility of poor quality of a software solution, increased cost, failure or delayed completion in software development process (Tao 2008). Since a risk is only a future possibility, some management practices can prevent risks to occur.

PMBoK define project risk management as a set of processes for addressing risks (PMI, 2017). The project risk management processes are: (i) risk identification (identifying project, product, and business risks); (ii) risk analysis (assessing the likelihood and consequences of such risks); (iii) risk planning (drawing up plans to avoid or minimize the effects of the risk); (iv) risk monitoring (monitoring the risk throughout the project; Debnath *et al.,* 2006).

## CHANGE MANAGEMENT:

Craddock (2007) defines change as a movement from a current state to a future state. Management can be defined as the mechanism to process and ease such movement. Schiesser (2006), cited by Craddock (2007), defines change management as a process for controlling and coordinating all changes in a production environment.

## EXHIBIT 1.
## RESULTS OF APPLYING THE GOMEZ METHOD FOR DESIGNING AND EVALUATING THE TEMPLATE. THE AUTHORS.

| # | Question | Answer | Score |
|---|---|---|---|
| 1 | Does the player who reaches the highest number of points win due to the benefits obtained from the resources? | yes | 1 |
| 2 | Do players exchange resources? | yes | 1 |
| 3 | Are there conflicts or circumstances participants should solve by communicating themselves? | yes | 1 |
| 4 | Do players have to strategically decide the movements to follow in order to maximize their benefits? | yes | 1 |
| 5 | Are there alternatives to counteract the impact of external events on the development of the game? | yes | 1 |
| 6 | Is one purpose of the game the way to simulate scenarios for participants to make decisions according to their proposed goals? | yes | 3 |
| 7 | Do events in each player turn depend on his/her location on the board? | yes | 3 |
| 8 | Is the game related to the risk concept? | yes | 3 |
| 9 | Has the board a start and an end? | yes | 3 |

## LEADERSHIP:

Stephen *et al*. (2001) describe in broad terms one perspective of the functional leadership approach: the leader relationship with the team. In this perspective, leadership is related to social problem-solving with the following tasks of the leader: (i) diagnosing any problems could potentially impede group and organizational goal attainment; (ii) generating and planning appropriate solutions; (iii) implementing solutions within typically complex social domains.

## EFFECTIVE TEAMS:

Katzenbach *et al.* (2001), define teams as "*a number of individuals brought together for a certain task, goal or objective, engaged in frequent face-to-face interaction to execute a task, while the individuals are mutually interdependent on each other with regard to the outcome of the task and its execution.*" According to Shameem *et al.* (2017)*,* software teams possess their own climate in order to exchange knowledge, a factor considered crucial on team performance. Teams should develop several characteristics from two perspectives for providing effective performance: climate based on the interaction among team members and climate based on team member personality. Some of them are: *common goal, open communication, mutual trust, support and respect,* and *constructive conflict resolution* (Debnath *et al.,* 2006).

Team members need to successfully integrate their individual actions and performance of each role contributes to collective success. Causes of team failure may reside in member inability and collective failure for coordinating and synchronizing their individual contributions (Stephen *et al*., 2001).

## LEADING THE CHANGE:

Debnath *et al.* (2006) establish and alternative point of view when they say risks are actually environmental changes.

### EXHIBIT 2
### RISKIN' DESIGN TEMPLATE. THE AUTHORS.

# DESCRIPTION OF THE GAME

**I. SPECIFICATIONS**

| Name | *Riskin'* |
|---|---|
| **Goal of the game** | Avoiding the occurrence of change management challenges (common risks of software companies) by leading and increasing the characteristics of effective teams. |
| **Amount of players** | At least 3; recommended 4 to 6. |

**II.  MATERIALS**

| Name | Quantity | Description |
|---|---|---|
| Cards | 185 | 35 challenge cards<br>90 situation cards:<br>    30 helper cards<br>    30 intensifier cards<br>    30 training cards<br>60 characteristic cards<br>    12 *common goal* cards<br>    12 *open communication* cards<br>    12 *constructive conflict resolution* cards<br>    12 *mutual trust* cards<br>    12 *support and respect* cards |
| Six sided-dices | 30 | Each player will have 5 six-sided dices, one for each characteristic card. |
| Reward | At least 1 | One big reward to motivate the game (chocolates, candies, and so on). |

| | III. RULES |
|---|---|
| **N°** | **Description** |
| 1 | First, we divide the cards into challenge cards and situation cards with the training cards aside |
| 2 | Each player should take two training cards and three situation cards. |
| 3 | Each player should take five six-sided dices. |
| 4 | Each player should take five characteristic cards:<br>• 1 *common goal* cards<br>• 1 *open communication* cards<br>• 1 *constructive conflict resolution* cards<br>• 1 *mutual trust* cards<br>• 1 *support and respect* cards |
| 5 | Dices indicate the level of the characteristic card; with no dice the level of the card is zero. |
| 6 | Players should mix training cards with the situation cards and shuffle the deck; also, they should shuffle each challenge deck. |
| 7 | Players should decide who plays first by rolling a dice. The player with highest number should start. |
| 8 | Turns are assigned in counter-clockwise direction. |
| 9 | Cards in front of the player are cards in-play; there the player needs to show to the other players team characteristics, experience points, and the realized training. Cards in play are public information and should be visible to the other players. |
| 10 | At the end of turn, the player should draw two situation cards. In addition, players should have no more than five cards at hand. |
| 11 | Each turn have different phases:<br>• **Trading phase:** In this phase the player can trade cards with other players.<br>• **Challenge mitigation phase:** In this phase the player should draw one card from the challenges deck and turn it face up. Then, the player try to mitigate a challenge by comparing their team characteristic level against the required challenge characteristic level. If player team characteristic levels are greater than the challenge required characteristic level, the player can mitigate the challenge, if is tied or lower the challenge remains unmitigated. If the challenge remains unmitigated, the player will roll one six-sided dice; if the result is less than 4, player will choose from which characteristic will lose 1 level of the challenge required characteristics. If the challenge is mitigated the player should draw as many situations cards as the challenge card suggests and choose one challenge characteristic and add one level. Other players can interfere with player challenge mitigation phase in several ways:<br>    ○ Another player can help by using a helper card (you can use as many as player want).<br>        • Another player can use a intensifier card to increase required challenge characteristics.<br>        • The player can ask for help to another player(s):<br>                • If the player is unable to mitigate challenge on his or her own, the player can ask for help.<br>                • The player can negotiate with other(s) player(s) with the challenge mitigation card rewards or cards in hand in order to get some help. |

| 13 | When the player mitigates two challenges, he/she increases level. |
|----|--------------------------------------------------------------------|
| **IV. WINNER SELECTION** | |
| The first player who mitigates ten challenges wins the game. | |

Consequently, the traditional way to deal with risks—*i.e.,* risk management—can be intended as change management related to the challenges coming from the environment. From this point of view, the leader role can be intended as a facilitator for change management, instead of a manager of risks. The way leaders can deal with change is now linked to the construction of effective teams.

## RELATED WORK

**GAMES AS LEARNING STRATEGIES:**

Gómez (2010) defines games as closed formal systems subjectively representing a subset of the reality. In such systems, each round of the game is considered a new version of the history. The outcome depends on the global conditions of the game, the features of the players, and the interaction among players.

Dempsey *et al.* (1996), as cited by Gómez (2010), define gaming as an interactive activity intended to replicate expected real-world conditions. Such an activity stimulates the decision-making process. The players in the competition accept some behavioral rules, and they make decisions affecting themselves and the other players.

Burgos *et al*. (2006) defines the following features for considering a game "educational": (i) a premise to-be-solved; (ii) at least one true solution; (iii) at least one learning strategy—*e.g.,* new knowledge generation, previously acquired knowledge reinforcement, skill exercise, concept discovery, creative development, and experience sharing.

## A GAME FOR RISK MANAGEMENT AS AN EN ENVIRONMENTAL CHANGE PROCESS FOR PROVIDING LEADERSHIP OPPORTUNITIES

This game is part of a course called *Management games* directed by Miguel David Rojas in the *Universidad Nacional de Colombia*. We use the method created by Maria Clara Goméz for the game design and implementation. In exhibit 1 we use the method for evaluating the game template (this game is based on a current role-playing game called *Munchkin™* created by Steve Jackson). In exhibit 2 we use a template for establishing the main features of the game.

This game is aimed to apply the Debnath *et al.* (2006) theory about leading the change in software risk management by

**EXHIBIT 3.**
**CHALLENGE CARD. THE AUTHORS.**
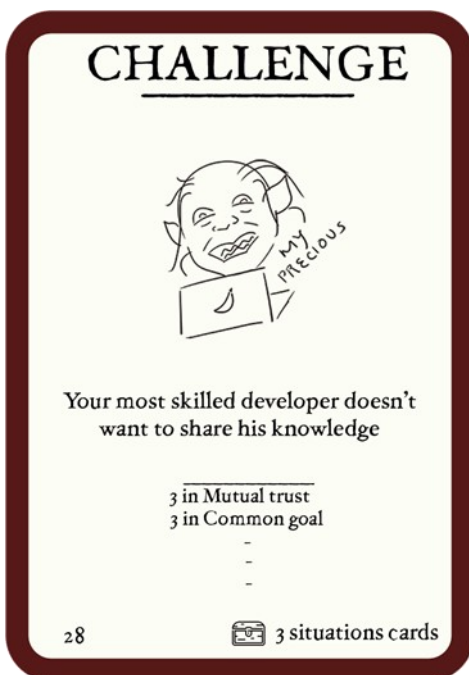


**EXHIBIT 4.**
**SITUATION CARD. THE AUTHORS.**
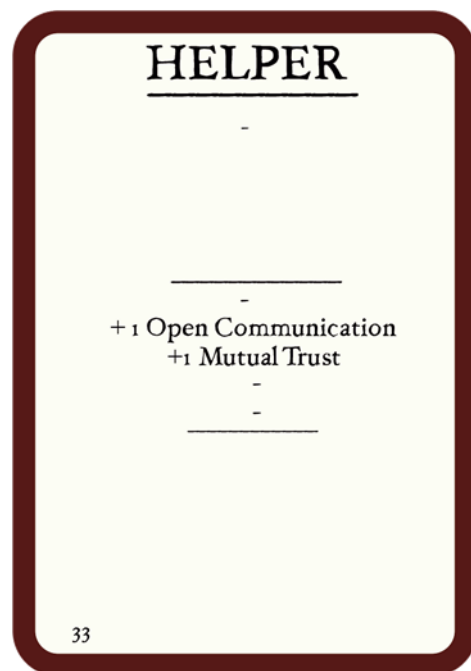
teaching the importance team effectiveness characteristics and the role of leadership for developing such characteristics.

The game is a card-based approach for representing the main concepts. The cards have the following meaning:

- **Challenge cards.** Related to the project environmental changes (challenges).
- **Situation cards.** Related to situations; according to the Merriam-Webster dictionary, a situation is *"all of the facts, conditions, and events that affect someone or something at a particular time and in a particular place"* (see https://www.merriam-webster.com/dictionary/situation). These cards can be only used one time.
  - Training cards. Related to ways to increase team effectiveness by increasing their characteristics.
  - Helper cards. Related to situations where the challenges are minimized or the team characteristics are increased.
  - Intensifier cards. Related to situations where the challenges are intensified.

## CONCLUSIONS AND FUTURE WORK

In this paper we designed, built, and applied *Riskin'*, a game for teaching risk management in a novel way: by understanding risks as change management challenges to be avoided by creating effective teams. Leaders are intended to apply this game for learning the relationship among risks, change management challenges, and effective teams. We applied the game to graduate students of the *Universidad Nacional de Colombia* as a part of the *Management game* course. Practitioners of the game could face the situations related to the challenges a software company face and then they acted according to the best way to build effective teams. This kind of simulation helped them to face in a better way the challenges posted by the environment in a safe way (with no real economic danger).

Several lines of future work can be defined from this game application (i) applying the game to software companies, in order to validate the main features we defined inside the game; (ii) creating new versions of the game related to other industries than software, in order to discover if software teams have similarities with other industry teams; (iii) including new types of cards, *e.g.,* effective leadership cards and project assets cards.

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