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## **WP5 - D5.1 – Game Design Document**

### **LEARN2LEAD (L2Lead)**

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## 5.1 – Game Design Document

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<p>Abstract: This document examines the challenges inherent in designing a game to train people in the skills and knowledge necessary to be a great leader. It analyses the current state of the art in educational games design. It identifies and describes an established educational model – Applied Behavior Analysis - which underpins the design decisions taken in the Learn to Lead project. It then describes, in detail, the mechanics of the Learn to Lead game. The game is broken up into five separate levels – each designed to target specific learning outcomes. The overall game mechanics are presented first, before each level is described in detail. Finally, we discuss a small number of issues that must be considered moving forward with Work Package 6.</p>	

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## **Abstract**

There has recently been a great deal of interest in harnessing the motivational qualities of computer games in order to create powerful, engaging educational tools. However, little is known about how, exactly, games achieve these motivational qualities. Consequently, very few of the educational games produced to date have demonstrated observable improvement in student learning. We propose that educational games must be designed with the same level of rigor that is observed in both entertainment game design, and in scientifically constructed educational programmes.

This document examines the challenges inherent in designing a game to train people in the skills and knowledge necessary to be a great leader. It analyses the current state of the art in educational games design. It identifies and describes an established educational model – Applied Behavior Analysis - which underpins the design decisions taken in the Learn to Lead project. It then describes, in detail, the mechanics of the Learn to Lead game. The game mechanics are presented first, before each level is described in detail. Finally, we discuss a small number of issues that must be considered moving forward with Work Package 6.

## Scope of this document

This document fulfills the three tasks proposed for WP 5. These are a) 5.1 – General Game Design, b) 5.2 – Scenario Design, and c) 5.3 – Additional Learning Materials. These tasks are listed in the project proposal document as below:

### **5.1: General Game design**

This task will define a general design common to all games played with Learn2lead. The design will specify:

- (i) goals of the game;
- (ii) the general mechanism of play;
- (iii) actions available to players;
- (iv) relevant rules;
- (v) information provided to players during play
- (vi) scoring mechanisms;
- (vii) patterns for human computer interaction;
- (viii) possibilities for game parametrization (ways of developing new games from a basic model)

This task has been fulfilled through the Outline Game Structure and Game Mechanics section of this document.

### **5.2 Scenario Design**

Scenario design: this task will define the specific scenarios to be used in the training modules defined in WP3. Each scenario will define the organizational setting for the game (e.g. a team working in a post office, a team in the branch office of a bank, a design team), the goals for the players (e.g. maximize profits, cut costs, maximize customer satisfaction), the starting conditions for the game (personalities, motivations and skills of team members) and constraints (ability of team leaders to hire and fire, ability to give incentives etc.). Scenario development will be conducted in close collaboration with the partners and 3rd party organizations involved in the trials

This task has been fulfilled through the design of separate game levels, each of which is outlined in detail in this document.

### **5.3: Additional learning materials**

This task will implement all learning materials required by teachers and learners (Fact sheets, scenario descriptions, additional reading materials etc).

This task is in progress, but has been initially outlined in the sections of this document that refer to the specifications of each individual game level.

## Introduction

In order to design a game that successfully teaches generalizable leadership skills and knowledge, there are a number of issues that must be considered. Firstly, we need to adopt an empirically established theory of leadership that is based on practical, observable behavior. Secondly, we need to review the state of the art, in order to understand the possibilities and limitations of computer games as educational tools. Thirdly, we need to choose an appropriate pedagogic approach through which to structure the learning outcomes. In fulfilling these three requirements, we will ensure that the Learn to Lead game is the most theoretically sound and practical tool for teaching leadership skills and knowledge available.

The first requirement, for an empirically established theory of leadership that is based on practical, observable behavior has already been solved. The outcome of WP 3 suggests that the Full Range Leadership (FRL) model is the ideal framework for designing the educational game, and we agree. In the following sections we will discuss the current state of the art in educational games design, and will introduce a pedagogic approach that we feel is ideal for the design of educational games.

## **Educational games – the state of the art**

There has recently been a great deal of interest in harnessing the motivational qualities of computer games in order to create powerful, engaging educational tools (e.g., Gee, 2003). However, little is known about how, exactly, games achieve these motivational qualities. Furthermore, there are very few practical recommendations made on how to recreate the motivation seen in entertainment games when designing educational games. Most literature that has been published on the design of games for education is purely descriptive and discusses why games *should* be good learning tools, rather than what can be done to make sure that they *are*. Perhaps as a consequence, the majority of educational games can be described as chocolate-covered broccoli (Bruckman, 1999): neither fun, nor of educational benefit.

### ***Games as Tools for Education***

Student motivation is a key predictor of successful educational outcomes (Malone, 1981; Malone & Lepper, 1987). Indeed, one of the most basic and important predictors of student achievement is the amount of time a student spends engaged in learning (or time-on-task; Admiraal, Wubbels & Pilot, 1999; Karweit, 1984; Frederick & Walberg, 1980; Turnbull, Lapkin, Hart & Swain, 1998). Traditional mainstream education has been criticised by many as being poor at motivating all but a small minority of learners (Skinner & Belmont, 1993).

Much criticism has been directed towards the lecture-based structure that is still ubiquitous in educational institutions today (Prensky, 2001; Olympia, Sheridan, Jenson & Andrews, 1994). Critics have typically asserted that the primary advantage of the lecture format is economical rather than pedagogical (Mayo, 2007). What appears to be needed is a medium that provides similar cost-effectiveness as the lecture format, but with the ability to retain rather than alienate learners (Mayo, 2007).

Video games have emerged as a technology that specialises in, and is hugely successful at, engaging and motivating users to spend time-on-task (Dondlinger, 2007; Gee, 2005; Mayo, 2007). It is clear that people are highly motivated to engage in these games (Prensky, 2001). In addition to the apparent motivational qualities of computer games, many have commented on how learning is an essential part of successfully playing a game (Gee, 2003; 2005; Koster, 2005; Prensky, 2003). Indeed, it could be argued that all commercial games are educational, as they train players to learn the skills needed for gaining success within that game. Essentially, it seems that games designers have hit on profoundly successful methods of getting people to learn and to enjoy learning (Gee, 2003; 2005; Koster, 2005).

Given that games specialise in engendering motivation, are hugely popular and already require players to learn, it should be no surprise that the creation of games that provide some form of learning experience for the player has been proposed (i.e., Pivec & Kearney, 2007; Ruben, 1999). Educational games appear to offer the potential to improve learner motivation, time-on-task and, consequently, learning outcomes.

### ***Existing games are not particularly successful***

While it seems apparent that games have the potential to function as valuable teaching tools, there is very little evidence that they 1) produce reliable, valid and long-lasting educational outcomes, or 2) do so better than traditional education structures. There is very little empirical work published that investigates the educational potential of games in any rigorous manner, and less still that measures the learning outcomes of games compared to other teaching methods (Mayo, 2007). Indeed, review articles (such as Gee, 2005; Dondlinger, 2007; Moreno-Ger, Burgos, Martínez-Ortiz, Sierra & Fernández-Manjón, 2008) tend to focus on pointing out reasons why games have the potential to constitute valuable learning tools, rather than reviewing any empirical evidence.

O'Neill, Wainess & Baker (2005) conducted a thorough review of articles published on educational computer games in the previous 15 years. They found that, despite the thousands of articles available, only 19 presented a rigorous quantitative or qualitative analysis of educational outcomes from computer games. Of those 19 articles, findings regarding the educational benefits of games were mixed, which echoes the findings of other commentators (see De Aguilera & Méndiz, 2003; Gredler, 2004; Rosas et al, 2003). Furthermore, in cases where positive educational outcomes have been found, it is possible that these can be attributed to the instructional design of the educational programme and not to games as a medium (see Clark, 1983 for a discussion on this point). O'Neill et al., conclude that, "the evidence of potential is striking, but the empirical evidence for effectiveness of games as learning environments is scant" (p. 468).

It is important to note that although reviews have pointed to a lack of convincing evidence for games as educational tools, this does not mean that there haven't been any games that have produced positive educational outcomes. For example, Lee, Luchini, Michael, Norris & Soloway (2004) found that students completed 3 times as many maths problems over 19 days using a computer game than they normally did using just worksheets. McLean Saini-Eidukat, Schwert, Slator and White (2001) found favourable results for games in comparison to other teaching methods, across a range of games that taught subjects as diverse as geology and biology. A randomised control trial of a diabetes-management game was found to reduce hospital visits for children aged 8-16 who played it (Lieberman, 2001). Indeed, every month there are growing numbers of studies that demonstrate how games can facilitate learning.

Despite this growing evidence base, it is questionable whether any greater level of understanding on how to best produce learning outcomes through game-based teaching programmes is being generated. Without a solid theoretical framework through which to design studies and interpret results, it is very difficult to differentiate which elements of a successful game were essential in producing those successful outcomes and which were not necessary. Thus, we have advocated Applied Behavior Analysis (ABA) as a particularly appropriate method of teaching via games. We have applied many of the principles of ABA to the design of the Learn to Lead game.

## ***The Science of Educational Games Design***

Given the apparent consensus that games should be effective tools for education, and, further, that some studies have found positive effects for games on educational outcomes, it is surprising to discover that there have been very few concrete, empirically validated suggestions on how to design successful educational games (Dondlinger, 2007; Garris, 2002; Gredler, 2004; Mayo, 2007; Moreno-Ger, 2008; O'Neil, Wainess & Baker, 2005). In fact, a large number of factors have been suggested as potentially important, but few have been demonstrated conclusively. For example, commentators have suggested that factors such as fun (Amory, Naicker, Vincent & Adams, 1999), flow (Kiili, 2005), engagement (Koster, 2004), feedback (Mayo, 2007; Malouf, 1987;), goals (Dondlinger, 2007; Swartout and van Lent, 2003), problem solving (Gee, 2005), game balance and pacing (Davies, 2009; Gee, 2005), interesting choices (Salen & Zimmerman) and fantasy narrative (Malone, 1981; Malone & Lepper, 1987), among many others are essential to the success of a game. Indeed, perhaps the most influential book in the field of educational gaming (Gee, 2003) mentions 36 possible ways that people *can* learn from games. What is missing is the evidence of components that *do* reliably predict successful outcomes.

One exception to this analysis appears to lie in the concept of *Intrinsic Learning* (Habgood, 2007). Intrinsic learning requires the embedding of learning outcomes of a teaching programme within the mechanics of a game. It appears crucial that the task learned in the game maps directly on to the challenge faced in the real world. Habgood investigated experimentally the importance of integrating learning content with the mechanics of a game. Specifically, in two studies, he found that a game in which learning was intrinsic to game play was motivationally and educationally more effective than an almost identical game in which learning was not intrinsic to game play. Thus it appears that we have at least one coherent, experimentally verified rule for designing educational games; a successful serious game must locate the learning within the game play mechanics, rather than as an addition to the game play mechanics. This concept will be central to the design of the Learn to Lead game.

## ***Learning from entertainment game design***

One of the key mistakes made by educational games designers lies in focusing too heavily on educational content to the detriment of the gameplay (Habgood, 2007). The reason why games have been proposed as good educational tools is that they are seen as intrinsically motivating. However, that does not mean that everything which is called a game, or looks like a game, will have those motivating qualities. Simply translating a standard textbook-style educational programme into a point-and-click computer programme, does not constitute game design. Rather, a similar approach must be taken to designing an educational game as that is taken to entertainment games.

In order to build a successful educational game, it is crucial to understand what is involved in designing a traditional computer game. From a review of the literature on game design (Björk and Holopainen 2004; Koster, 2005; Loftus &

Loftus 1983; Salen & Zimmerman, 2003) the following features appear important to most games:

Games typically present the player with a series of short, medium and long-term goals. Indeed, Swartout and van Lent (2003) found that goals of different levels help motivate learners to continue playing
Games typically require the player to take some actions or decisions in order to reach those goals
Games typically excel at providing immediate, appropriate and specific feedback to players. This feature is at the heart of the motivation, sustained attention, learning and fun experienced by game players (Loftus & Loftus, 1983)
Games often have a complex system for presenting players with rewards for achievement (ref something from GameStudies)
Games methodically teach players the skills needed to meet complex challenges. Long, complex tasks are broken down into short, simple components. These components are trained individually before being chained together (Gee, 2003; 2005; Koster, 2005)
Generally, players are expected to demonstrate excellent performance of a skill before they can advance to using that skill in a more challenging environment. Complex tasks, then, simply require the chaining together of these previously learned simple skills
Where games present the player with options for taking action, no one action should be obviously correct, while others are obviously incorrect (Gee, 2003; 2005; Koster, 2005; Mayo, 2007; Prensky, 2003).

**Table 1: List of features seen in most entertainment games.**

Of course, this list is in no way exhaustive, and including these seven features will not guarantee a successful game. However, these features are observed in a lot of successful entertainment games, thus implying that they are useful in the engendering and maintaining of player motivation. So, when designing educational games, it appears important to take a pedagogical approach that allows for the inclusion of those features. This has lead us to choose ABA as the guiding pedagogic framework for the learn to Lead Game design, and has also informed a lot of the design choices, as discussed later.

## **Building educational games on empirically established pedagogy**

In order to design successful educational games we need to adopt an educational framework that is both successful and congruent with the goals of game design. We also need a method of instruction that takes greatest advantage of the benefits that medium of computer games offer; their ability to teach in a one-to-one manner, to adapt to the performance of each individual player, to deliver timely and specific feedback to players in a controlled manner, and to motivate players of a wide range of knowledge or skill levels. We propose that Applied behavior Analysis (ABA), as a framework, fulfills all of these requirements.

ABA programmes, such as Precision Teaching (e.g., Lindsley, 1971; 1991; 1992a), Direct Instruction (e.g., Engelmann, Becker, Carnine & Gersten, 1988), and the Personalized System of Instruction (Keller, 1968) are methods for teaching based on the findings of behavioural science. They are typically delivered on a one-to-one basis and reject the lecture format, relying on the teacher more as a coach. They are designed on the assumption that learning is maximised when high performance targets are set and teaching is focused on the individual. Indeed, unlike in traditional education, the passing criteria in behavioural education is not 40%, but typically somewhere around 90%. If the learner does not reach this stringent passing criterion, they are required to repeat the programme until they do reach it. We feel that designing the learn to Lead game with the concepts of ABA in mind will help produce a game that is both entertaining and educationally successful.

### ***ABA programmes are highly successful***

There has been a great deal of empirical support for the effectiveness of behavioural teaching programmes. Indeed, they have been extremely successful wherever implemented, from university modules (Saville, Zinn et al., 2006) to secondary school, (Olympia et al., 1994) primary school (Lindsley, 1971;; 1992a), driver education programmes (Bell, Young et al., 1991) and challenging populations (Christophersen & Mortweet, 200??). Behavioural teaching methodologies have been particularly successful as early interventions for children diagnosed with autistic spectrum disorders (Lovaas, 1987).

Despite the empirical evidence for the effectiveness of behavioural teaching methods, they have not yet been widely adopted within mainstream education in any country to date. A number of suggestions (e.g., Bell, Young, Salzburg & West, 1991; Lindsley, 1992b; Olympia, 2007; Saville et al, 2006) have been put forward to explain this situation. For example, educators may be hesitant to adopt instructional methods that are contrary to traditional pedagogical systems or are difficult to fit into the traditional academic calendar (Saville et al). Behavioural strategies require substantial planning, preparation of resources and training, which many educators have been unwilling to undertake (bell et al).

One of the core barriers to acceptance, according to Lindsley (1992), is the

focus on repetition and discipline within behaviour methodologies and how these do not fit well with current views commonly held by educators that learning should be fun. He draws a comparison between the attitudes of educators and those who coach in athletics and the performing arts. “It is amazing that educators and the public accept the need for disciplined regular daily practice in the performing arts and in athletics, yet reject it in academics.”

Crucially, computer games appear ideally suited to circumvent a large number of the factors that are holding back the uptake of these highly effective teaching programmes in mainstream education. The use of computer games requires no extra training for the teacher, can be fit within the traditional academic timetable, they require no resources other than the game itself, and they motivate players to engage in exactly the type of disciplined, repetitive rehearsal that Lindsley suggested as crucial to success in education. So, designing games based on ABA also has the advantage of getting these highly successful education programmes out to a wider audience.

### ***ABA is similar in structure to games***

Highlighting the appropriateness of ABA as a framework for educational games design, ABA programmes have structures that resemble computer games in many important ways. For example, in a Precision Teaching programme, the teacher defines each individual target behavior that the student needs to improve on. They also define a target frequency of that behaviour, and clearly state the rewards for reaching that target. The goal may be to answer forty 12-times-tables problems in a 30 second period. The student practices the behavior until the specified target is met. Once performance targets have been met, the student obtains the pre-defined reward and the teacher sets a new task. Students record their own performance under supervision of teachers on specially designed charts. From viewing these charts, students have constant access to feedback on their performance relative to previous sessions (see Lindsley, 1971; 1992b, for more information on the theoretical basis of precision teaching).

Interestingly, highly engaging games typically have clearly specified and measurable goals (such as to level-up), require a great deal of repetition of skills in order to reach that goal (fighting numerous similar enemies), are often conducted under time constraints, have clearly specified rewards for reaching the specified goal (stronger player/more weapons/access to new levels) and provide constant feedback from the game state on how successfully the player is performing. In addition, successful games pay a great deal of attention to the rate in which complexity is increased over the course of game levels and to the balance and pacing of player advancement through these levels. These issues of rates, balance and pacing appear to precisely parallel the process that the behaviour analyst undertakes in defining larger programmes for students.

### ***ABA games have been successful before***

Some researchers have already adapted and used games within behavioural education programmes. For example, Foxx, McMorrow and Mennemeier (1984) adapted a commercially available board game to train social and vocational skills

to developmentally delayed adults. The game contingencies increased social/vocational skills in all targeted areas. Medland and Stachnik (1972) successfully used a game to improve the classroom behaviour of fifth grade students. The game reduced the dependent measures from their baseline rate by almost 99% for one group and 97% for the other. Bay-Hinitz, Peterson and Quiltich (1994) used co-operative games to modify the aggressive and co-operative behaviours of young children. Cooperative behaviour increased and aggression decreased during cooperative games and these behaviours generalised to subsequent free-play sessions.

It appears that behaviour modification and teaching programmes can, and have, been delivered effectively via games. Indeed, Bay-Hinitz point out that there is a practical advantage to delivering behavioural interventions via games; “instructing children in the use of particular games is a simple strategy, particularly when compared to training a teacher to carry out a specific treatment plan using contingent reinforcement for certain responses” (p. 445). However, these findings have made little impact on the field of educational games in general.

In summary, it appears that ABA programmes are both highly successful methods for teaching, and also resemble games in a number of important ways. In fact ABA programmes appear ideally suited to taking advantage of the benefits that the medium of computer games offer; they excel in teaching in a one-to-one manner, they are adaptive to the performance of each individual learner, they are based on delivering timely and specific feedback to learners in a controlled manner, and they have been used to motivate players of a wide range of knowledge or skill levels. As games and ABA programmes share all of these important features, it should be possible to build games based on ABA principles without losing the motivation typically elicited by entertainment games. In the next section we will introduce the design requirements for the Learn to Lead game, based on what we have learned from educational games, entertainment games, and ABA programmes.

## **Design Requirements for the Learn to Lead game**

In this section we will very clearly state the implications of this state of the art review have on the design and development of the Learn to Lead game.

### ***The Importance of Feedback***

Engaging computer games excel at providing immediate, appropriate and specific feedback to players. This feature is at the heart of the motivation, sustained attention, learning and fun experienced by game players (Siang & Rao, 2003; Loftus & Loftus, 1983). Feedback has been consistently demonstrated as a key variable in the process of learning (see Catania, 1998; Ferster, Skinner, Cheney, Morse & Dews, 1957; Skinner, 1953; 1959; for in-depth analysis of this topic). Indeed, Loftus and Loftus (1983) suggest that successful entertainment games excel at delivering the correct type of feedback (both positive and negative) at the correct time. Thus, it appears that educational games designers must learn from the success of both entertainment games and ABA programmes, as the process of providing clear, immediate and specific feedback is essential in shaping behaviour.

### ***Structuring of Tasks***

Successful entertainment games often involve the presentation of complex cognitive and physical (motor) challenges to players. However, they do not simply present players with these complex challenges. Instead, designers of entertainment games have developed methods of teaching players these complex skills in a way that maintains their motivation to continue playing and ensures that all basic skills are learned before any more complex tasks are presented (Gee, 2003; 2005; Koster, 2005). This involves breaking long, complex tasks down into short, simple components. These components are trained individually before being chained together. At all stages, players are expected to demonstrate excellent performance of a skill before they can advance to using that skill in a more challenging environment. Complex tasks, then, simply require the chaining together of these previously learned simple skills. It could be argued that this highly structured programme of instruction is the secret to the motivation for learning and complex skill acquisition typically displayed by game-players (Gee, 2003; 2005; Koster, 2005; Mayo, 2007; Prensky, 2003; Woods, 2004).

Importantly, the process by which entertainment games teach complex behaviours to players is very similar to that which is used by behavioural psychologists to teach basic skills to children with learning difficulties (See Catania, 1998; Cooper, Heron and Heward; 2003; Engelmann & Carnine, 1982; Lindsley, 1964; 1971; 1991a; Skinner, 1968). Behavioural teaching programmes involve almost no lecturing and are based on the assumption that adaptive programs and high performance targets maximize learning. For example, Precision Teaching (PT) is very similar to the method in which athletics is coached. PT uses 'frequency,' rather than simply percentage correct, as its base

measure of success and all tasks are carried out repetitively and under time constraints (see Lindsley, 1971; 1991a; 1991b; 1992, for a full review of the theoretical basis of precision teaching). The precision teacher essentially performs as a coach, advisor, and instructional designer. The teacher arranges materials and methods for the students to teach themselves. For each program designed for each student, the teacher defines the target behaviour, the target frequency of this behaviour, and clearly states the rewards for reaching this target. The student then practices the behaviour under time constraints until the target is met. For example, the goal may be to answer forty 12-times-tables problems in a 30 second period. Once performance targets have been met, the student obtains the pre-defined reward and the teacher sets a new task. There is a clear parallel between this teaching structure and that found in entertainment games.

Thus, this process of breaking complex tasks down to simpler component behaviours, which learners perform repetitively until reaching mastery, is established in the best-practice of both game designers and behavioural psychologists and is extremely effective at engendering motivation and learning in both situations. Thus, incorporating this structure will be crucial to the success of the game developed in the Learn2Lead project.

### **Goals**

Games are goal-directed activities. Players are motivated to keep playing in order to meet short medium and long-term goals laid out by the game. Swartout and van Lent (2003) elaborated on the role of goals in effective video games, finding that goals of different levels help motivate learners to continue playing. "Game designers often seek to keep players engaged by creating three levels of goals: short-term (collect the magic keys), lasting, perhaps, seconds; medium-term (open the enchanted safe), lasting minutes; and finally, long-term (save the world), lasting the length of the game" and that the "interplay of these levels, with the support of the environment, is crafted to draw players into the storyline of the game" (p.34)

The breaking down of complex tasks into simpler component tasks and structuring learning so that more complex tasks are presented only once simpler tasks have been mastered, allows for the inclusion of short, medium and long term goals within the game structure, while also providing the opportunity to deliver regular, specific, corrective feedback to players. Thus, these three elements are inter-linked and inter-dependent and the careful implementation of them should ensure that the game developed maintains the attention and motivation of learners to continue playing.

### **Intrinsic Learning**

In addition, ensuring that the learning outcomes of the project are intrinsic to the mechanics of the game will ensure that players are guided towards the acquisition of useful skills. A successful serious game is one where the task learned in the game maps directly on to the challenge faced in the real world. This feature has been referred to by Habgood (2007) as intrinsic learning and by Bogost (2007) as

procedural rhetoric. Both authors essentially refer to embedding the learning outcomes of the project within the mechanics of the game. Bogost analyses a number of serious games that are deficient in procedural rhetoric (p. 49-51) and also a number of games that excel in this respect (p. 29). Habgood investigated experimentally the importance of integrating learning content with the mechanics of a game. Specifically, in two studies, the author found that a game in which learning was intrinsic to game play was motivationally and educationally more effective than an almost identical game in which learning was not intrinsic to game play. Thus, a successful serious game must locate the learning within the game play mechanics, rather than as an addition to the game play mechanics.

In Learn2Lead we are teaching players to understand the Full Range Leadership model and to successfully apply that theory to complex situations. So, the player must demonstrate, through the in-game tasks, that they understand the theory and how to apply it. Thus, the game mechanics must be based around the performance of leadership tasks only. Decisions made by players of Learn2Lead should be made based on the players understanding of the theory, and the success (or not) of the players decisions should be dependent upon whether that was the correct decision according to the theory. If the game is designed in this way, the only way a player can possibly gain success within the game is through demonstration of the knowledge and skills that we are trying to teach.

### **Summary**

1) For the reasons listed above, it appears essential for the development of any successful educational game to carefully structure game tasks so that the overall learning outcomes of the project (i.e., complex skills, behaviours and knowledge) are broken down into simple component behaviours, which are each trained in turn. Demonstration of mastery of each component should be required before progression to further stages. So, the game should be organised into Game Levels, where each level is designed to teach one particular behaviour (or set of behaviours, or component of the theory). Progression from simple to complex levels should be dependent upon successful mastery of the more simple levels.

2) The learning outcomes of the project must be specifically designed as central to the game play mechanics, rather than as an addition to the game play mechanics. The gameplay must require the player to demonstrate knowledge of the relevant theory and also display appropriate behaviours. Only through actions appropriate of a transformational leader can the player advance in the game and receive rewards from the game.

3) The FRL model of leadership emphasises the development of followers over time. The leader must be concerned not only with the performance of the organisation financially, but also with the skills, motivation and competence of their staff. Thus, the game design will need to represent the passage of time, and model the benefits of improving staff skills, motivation and competence. We need to reward managers who employ transformational leadership skills to both the performance of the organisation and the development of staff.

4) The game should automatically provide useful corrective feedback to players as they play. Because the learning outcomes of the project will be intrinsic to the mechanics of the game, when players are successful at the game, they will know that those behaviours (or decisions) that produced the successful outcome were the appropriate behaviours (or decisions). In this way, the game state indicators (score bars, indicators stating whether they are winning or losing, etc.) will give them feedback on whether they have learned the required information or skills. Thus, we must be careful to design the game so that the game state provides immediate and specific feedback on whether decisions made were correct or incorrect.

A detailed de-briefing session will be presented at the end of each level. This must be generated automatically and will be dependent on the game being able to recognise automatically what type of leadership style is represented by each choice made by the player and whether that choice was appropriate or not at that time.

5) The decisions that the leader makes should not have an obvious numerically assigned outcome within the game. Rather, the leader must read and understand the available behaviours and evaluate whether they will produce the desired requirements.

6) There is a question over whether game levels will be prescriptive, or will allow open sandbox play. Prescriptive levels could require a player to demonstrate particular behaviours of interest (i.e., “in this level, you should make decisions like a laissez-faire leader”), while open sandbox play would allow learners to make decisions in any way they wish and to observe the effects of those decisions. Our suggestion is that a combination of these approaches would probably be most effective, with a concentration of prescriptive scenarios in the earlier levels and more open play in the later levels.

## Outline of Learn to Lead Game Structure

Both this section and the Game Mechanic sections address WP 5.1 – General Games Design.

The narrative of the game involves a player being hired to work in a large corporation. The CEO has picked the player out as a future leader and has organised for them to follow a programme of on-the-job training, where they will learn all of the skills and knowledge necessary to become a great leader. The game is played across a number of levels. Across those levels the player will lead teams in a number of different departments of the corporation, from the catering department to the research and development department. The earlier levels involve managing teams of less highly skilled followers. As the player progresses through the game, the types of followers that they interact with become more complex, thus the skills needed to lead them effectively become more complex.

In order to explain the basic mechanics of the game, let's take the example of level 4 – the legal department. The player is the leader of the legal team. The player has two goals; to ensure that the company runs efficiently and productively, and to ensure that their followers develop appropriately, as outlined by the Full Range Leadership (FRL) model. The day-to-day running of the department involves accepting cases that have specified deadlines and workloads, and assigning staff to work on those cases. The player can also reward followers for meeting goals and punish them for not meeting them. Through astute management, it is possible to finish a respectable number of jobs within their deadlines.

However, leadership is more than management, and a player who employs a strategy for developing their followers can get a real advantage in the game. A player who considers their followers workload, ability, stress levels and personality while doing the typical management tasks of assigning players to cases will perform better than one who simply manages. In addition, the player has the option of running workshops, team-building events, performing one-to-one coaching, getting involved in the day-to-day work, sending memos, among other things in order to help develop their follower's ability and their intrinsic motivation. More developed followers can complete more jobs, thus, spending time on developing staff helps the player reach both goals of efficiency and development. The leaders working week is divided into ten half days - AM and PM for each of Monday, Tuesday, Wednesday, Thursday and Friday. We suggest that this should be displayed graphically as a diary. Each action the leader takes, uses up a specified number of these half days. Thus, when an action is taken, the relevant number of days are stricken from the diary.

Each level of the game is played across a number of weeks. In each week, the player can do a number of activities, each of which use some of the leaders time. Perhaps consider this game: <http://www.parliament.uk/education/online-resources/games/mp-for-a-week/> in which the game play takes place over the course of a week, and the player has the opportunity to take a number of different

actions over the course of each day within that week. So, an hour in that game equates to a day in our game. Each action costs the player some time. We were thinking that a similar system and method of representing time and activities would be good.

In our game, there are a number of different actions that the leader can take, each with a consequence on the followers' behaviour. The most basic action is assigning staff to work on different cases. Staff can be assigned to work on more than one case at a time (but that should not be necessary in the first few levels). There are other things that the leader can do with their time. They can reward or punish staff for good or poor performance, they can run workshops to increase followers abilities, they can have meetings where they make inspirational speeches, they can send emails reinforcing their ideals and goals for the company, they can call staff meetings, where the staff have input on the decision-making process, they can have a one-to-one coaching session with a particular staff member.

The ultimate goal is to achieve a balance between all of these activities in order to maximise the efficiency and development of their followers.

### ***Teaching strategy***

As mentioned above, the strategy we are employing draws heavily on a type of teaching called Applied Behavior Analysis (ABA). Of particular note, ABA is a method of teaching that holds learners to excellent standards. In ABA, complex problems and concepts are broken down into simpler components, and these components are assembled into a logical step-by-step structure. Learners do the most basic task first, then the next most complex etc. The ability to pass one task is always dependent on the knowledge and skills they acquired in the previous task.

ABA also requires excellent performance. Each task that is given to learner includes a high passing criterion (normally 90% approx.) Learners must repeat tasks in a disciplined manner until they pass this criterion. Once they do so, they advance to the next task. If they do not pass the next task after two attempts, they go back and do the previous task again, before repeating the more complex task. In this way ABA programmes guarantee that all learners demonstrate excellence.

In the Learn 2 Lead game, we have broken up the complex FRL theory into a number of logical steps. Players must demonstrate excellence at each step before being allowed to move on to the next. In this way we hope to guarantee that all players demonstrate excellent knowledge of world class leadership skills and theory.

### ***Learn2Lead is a puzzle game***

As Learn2Lead involves teaching players how to understand a complex model (The Full Range Leadership Model) and how to apply that knowledge to specific tasks, we would argue that Learn2Lead is essentially a puzzle game. Therefore, it seems appropriate to adopt the type of teaching structures and playful themes that

are prevalent in puzzle games.

We feel that this is appropriate, as puzzle games typically teach players to perform complex tasks and understand complex systems, but do so in a very easy to understand manner. Each necessary new skill is introduced clearly and players are allowed to experiment with using that skill in easier levels before applying it to more difficult levels. We suggest that *Fantastic Contraption* (<http://fantasticcontraption.com/>) and *World of Goo* (<http://www.worldofgoo.com/>) are good examples of this type of game.

### **General Structure**

In each level of the Learn2Lead game there will be an identical game structure and game mechanics. This is consistent with how puzzle games work. This core structure will be varied across levels by simply changing the values of a number of relevant variables, such as the challenges facing the player, the resources at their disposal and the complexity of the team of followers. The task of gaining success will become more complex as levels increase, primarily through the increasing complexity of the connectionist model of follower behaviour that will underlie the different levels. As the model becomes more complex across levels, the skill of analysing the situation and performing the appropriate behaviour will require better knowledge of the Full Range Leadership Model. Thus, as players progress across levels they will be presented with incrementally increasing levels of difficulty and more precise examinations of their knowledge of the underlying Full Range Leadership Model.

1. Each level will involve the presentation of 2 or 3 initial short mini games.
2. These mini games will be followed by a longer free play session.
3. Within each level, the action will be organised into a turn structure so that players actions can be recorded and reviewed in a very controlled manner.
4. Within each level and each bonus level, challenges will be posed, which the player must solve through actions deemed appropriate according to the FRL model.
5. Players will have a finite number of actions available to them per each turn.
6. These actions will be posed in the form of words, so that players will focus on the content of the sentences rather than simply looking at any appropriate symbols or numbers.

In each level the player will first be presented with a scenario describing the challenges posed in that level. They will also have some resources at their disposal. They will then take a limited number of actions. When these actions have been taken, they will press an 'end turn' button. At this point, the connectionist model will take the players' actions as input and calculate the consequences of those actions. This basic structure will be implemented across all game levels, including bonus levels.

Each of the full game levels will need to be quite a large number of turns (~15-20 turns). This is because the FRL model emphasises the development of staff over time, and the advantages of working towards long-term goals

(transformational leadership) rather than short term goals (transactional leadership).

### ***Turns***

In the learn2lead game, the action will not be live. Rather, as mentioned above, the game will be based on a turn structure. This is necessary due to the constraint that the game must be playable asynchronously online. However, this method of organising action is actually very popular in both board games and online strategy games and seems to be a good fit for the Learn2Lead game. It allows players sufficient time to contemplate the consequences of actions when taking complex decisions. Crucially, the turn structure also allows for the game state to provide very immediate and specific feedback to the player. Using this type of structure, players' actions can be recorded and reviewed later in a very controlled manner either automatically or in consultation with a tutor.

For the narrative purposes of the game, each game turn will refer to a week in the life of the "Chris Finch" character that the game player is portraying.

### ***Challenges***

Games must present challenges for players to overcome. In each level of the learn2Lead game the player will be presented with challenges and will have a number of options of how to solve those challenges. The efficiency with which the player solves the challenges presented will determine their score, and whether they move on to the next level.

Specifically, in each level the player will be presented with a number of tasks, each of which must be completed within a specified number of turns. Each task will take a certain amount of energy or effort in order to complete. For example, Task 1 could be to complete an audit, which must be done within 4 weeks and will cost 300 points to complete. The player can manipulate the amount of energy or effort that their team exert on each task during each turn through taking actions. When a task is completed within the specified time, the player earns points. The player also earns points for successfully developing the skills of their followers – as this is a key component of the FRL model.

### ***Taking actions***

There will be a number of actions available to players at each turn. These will be based heavily on the FRL contextualisation document provided by Barbaranelli et al. Each action will be associated with a cost and an effect – which can be either short-term or long-term. As each turn refers to one week in the life of the leader, the player will have five actions available to them each week – each of those corresponding to a day. Some actions may take more than one day (for example, running a team building course, sending followers for training with an external company), while others may take less time. Thus, the player must choose a balance between the number of actions taken and the usefulness of those actions.

Some actions may have a good short-term impact (transactional leadership) while others may have a poor short term impact but good long term impact

(transformational leadership). In order to achieve this balance, it will be important to ensure a method for followers' ability to increase over time as more and more transformational activities are engaged in. Conversely, transactional activities should boost short-term motivation, but have very little long-term effect.

It is important that it is not made obvious to the player which tasks represent which leadership styles by providing aids such as symbols or numerical ratings. Rather, the player should know from reading the literature whether the action described is appropriate or not. They cannot become good at the game through being good at manipulating symbols. They can only become good at the game through knowing the theory and when to take the different actions referred to by that theory.

### ***The significance of game levels***

We have structured our learning outcomes into game levels in a similar way that a textbook structures learning outcomes into chapters. Each game level is designed to target a group of learning outcomes that centre around a similar topic. There are very specific things that we wish the learner to know after playing each level. Each of these is specified in the Level Design documents. It is important to remember that there are two types of learning outcomes – those that are specific to the playing of the game (i.e. game rules, knowledge of what the different indicators mean, how to take actions etc.) and those that are intended to generalise to other contexts (i.e. appropriate leadership behaviours). Each game level is made up of a number of distinct parts. There are four types of these:

- 1. Written material.** Each level will begin with a description of the learning outcomes for that level and an explanation of why those learning outcomes are important in the context of learning to be a leader.
- 2.** In a number of situations, a **walkthrough tutorial** may be necessary in order to point out specific features of the game to players.
- 3. Mini Games.** These will be short and specific. When any new learning outcome is introduced, we will demonstrate how it works via a mini game. In each of these, the only variable that can change is the one that is the focus of learning. So, players can see a direct, obvious cause-effect relationship between their actions and their effect on follower behaviour. There will be a pre-defined performance criterion for each mini game. The player will repeat the mini game until they have met that criterion. There will be more tutorials and mini-games in the earlier levels, and less in the later levels.
- 4. Free play.** As mentioned above, each new skill or concept is introduced to players through a mini-game. However, in the free play game, the player is expected to perform all of those previously trained skills in combination. We will pre-define a success criterion for each of these levels. If the player does not reach that criterion, they will be required to repeat it. If they do not

reach the criterion on their second attempt, they will be sent back to repeat the mini games.

### ***Mini Games***

Mini games are necessary in this game design for a large number of reasons, explained elsewhere. Here, we would like to re-emphasise their necessity due to 1) the complexity of the model, and 2) the need to break down long and complex learning outcomes into shorter more manageable chunks. In order to ensure that all players have the best possible opportunity to learn as much as possible about leadership from the game, we will teach each individual learning outcome separately.

In addition, we will not expect the learner to perform any task that we have not trained them to perform. The only novelty we will examine is in the logical integration of a number of previously learned lessons (In the exploratory games).

### ***Feedback***

One of the core reasons why computer games have been suggested as useful tools for education is their ability to deliver timely and specific feedback to every player, regardless of their ability and performance, without the need for any human intervention. In order to ensure we make best use of this potential, we must be very careful with how we provide feedback to players.

The chief educational benefit of the inclusion of mini games within the game structure is the ability to ensure that players definitely perform the desired behaviour and reach the desired learning outcome. We can isolate each behaviour that we wish to teach and, due to the reduced complexity, we can easily evaluate whether the player demonstrated that behaviour or not. In this simplified context, there is no way to achieve the desired result without performing the desired behaviour. Thus, simply performing the task successfully is demonstration of learning.

For these reasons, 1) the mini games are essential and 2) the design of those mini games is crucial to ensuring that players learn from the game – we need to know that those mini games are giving appropriate feedback to players.

So, the complex model of follower behaviour developed within the project will not always be necessary to use in mini games. Mini games need to have obvious, direct cause-and-effect mechanisms. The full model can be used in the free-play games, with elements 'turned on' as appropriate across game levels. Earlier levels will need the model to be simple, later levels will require the model to be more complex.

## **Learn to Lead - Game mechanics**

In each of the levels and bonus levels, there will be specific goals for the player to reach. This will necessitate some alteration in the game mechanics across levels. Any such alterations will be outlined in the design for that particular level. However, we describe below the general game mechanics that are invariant across levels.

### ***Goal***

Player behaviour in each level (particularly during exploratory play) is judged against two indices:

- **Efficiency:** the amount of jobs completed and the difficulty of those jobs. Jobs will be rated as either easy (1 point), medium (2 points) or hard (3 points)
- **Development:** any increase in the intrinsic motivation and ability (read: long-term effectiveness) of any follower over the course of a free play game or mini game. Any increase in any follower earns one development point.
- Add Efficiency and development points together to get total score for the level.

We need to remember this. These two indices should be the ultimate consequence of any positive action. For example, reducing a follower's stress levels should not be a goal in itself, as stress levels are not one of the measures above. Stress levels only matter in terms of increasing efficiency and development. So, the player will learn to keep their followers stress levels under control in order to gain the most benefit in terms of efficiency and development. If there is no impact on these variables when followers are over-stressed, then the players will learn to over-stress their workers.

Thus, we must be very careful to remember that these are the ultimate goals within this game design. Without these, there is no context within which to improve performance.

### ***Variables***

In each level there are four main variables that define game play:

1. **Week:** Progresses linearly every time the player advances to the following week. Each level has a set number of weeks.
2. **Day:** There are ten half days available to the leader in each week.
3. **Jobs open:** The number of jobs that have not yet been completed.
4. **Jobs completed:** The number of jobs that have been completed in that level.

Jobs have a number of variables that define them:

1. Workload: The amount of staff effort necessary to finish that job.
2. Deadline: The week by which the job must be finished.
3. Value: Finishing a job brings a specified reward. More difficult and longer jobs are worth more than easier and shorter jobs.

Leadership activities also have a number of variables that define them:

1. Their cost – in days – to the leader's time.
2. Their consequence. Consequences of leadership actions are outlined elsewhere and are never specifically stated to players. Rather, they must learn from using them and viewing the consequences.

Each follower has six characteristics:

1. Intrinsic motivation: This is long-term and difficult to alter. It cannot be reduced.
2. Extrinsic motivation: This is short-term and more dynamic.
3. Workload: The number of jobs that a player is assigned to at that time.
4. Ability: This is long-term and difficult to alter. It cannot be reduced.
5. Stress: The stress value that a follower is feeling at that time.
6. Personality: The followers personality type. Either Power, Affiliative or Achievement.

We must emphasise the importance of the game including some representation of short-term, extrinsic motivation, and separately, a representation of long-term intrinsic motivation. The names we have called these variables keep changing through versions, but the concept is the same. Transactional leadership should work on a short-term basis and transformational leadership should work on a long-term basis, but have less of a short-term impact. That is what the FRL says, and that is what the players must learn. It must be very clear to players that transactional leadership works short-term, while transformational activities work long-term.

### ***Beginning of Level***

At the beginning of a level,

1. Two jobs are assigned at random
2. Game Begins
3. No time limit – players can make decisions as quickly as they wish.

### ***During a Week***

During each week there are a number of actions that each player can take.

1. Assigning followers to jobs. Each follower assigned to a job costs 1 half day of the leader's time.
2. The leader can perform leadership tasks during a week.
  - a. Each task has individual properties.

- b. Transactional tasks have short term effects. Transformational tasks have longer term effects
3. Training tasks reduce followers ability to perform their work for that week.
  - a. When training is over, they do not need to be re-assigned to their job, they go back automatically, unless it has since been completed.

### ***End of Week***

When all of a leaders' five days have been used-up:

1. The connectionist model calculates what effect the leaders actions have had on followers attributes and the amount of work they will contribute that week.
2. For each job, the followers assigned to that job reduce the workload by the appropriate amount.
  - a. This is determined by the followers that have been assigned to it. (i.e. deducting follower points from job points).
3. If - Job not completed in time.
  - a. Double the remaining workload points
4. If - Job completed in time
  - a. Intrinsic Motivation + 1 for all staff in that team
  - b. Ability + 1 for one randomly chosen team member
5. Importantly, there is a system where the leader can draw 3 new potential jobs. The leader can review these three jobs and must keep at least one. The leader can also choose not to draw cards at all.
6. There must be a mechanic that reduces the impact of transactional tasks – they cannot work long-term. So, the followers' short-term extrinsic motivation must be reduced at the end of every week. We propose that 1/3 of the followers lose one point from their extrinsic motivation, while a further 1/6 followers lose two points. The followers who suffer this loss should be selected randomly each week. In this way, a player who chooses to consistently use transactional tasks will always be struggling to maintain staff motivation and productivity, while intrinsic motivation is unaffected.

### ***End of Level***

Success is determined by a combination of the number of tasks completed and follower development (i.e. the increase in staff intrinsic motivation and ability).

### ***Beyond Level 5***

We believe that the free play session in level 5 will be genuinely challenging and fun. We should allow players to play this final level over and over again, whenever they want, after they have finished all of the required tasks. This will allow players to experiment with the full complexity of the model and allow for a different style of

learning - simulation. In order to increase re-playability we should randomise the variables for number of weeks, number of followers, follower characteristics, job characteristics etc. Also, we should randomise the organisation type. So you can play a game with complex catering staff.

When a player finishes any level, they should have the option to go back and re-play that level. Some of them may want to do so in order to record high scores and practice the lessons taught therein.

There should also be an online leaderboard for this section – something for players who want to repeat the playing of the game and track their high scores against other people.

### ***Follower ability and workload***

Ability and workload are closely linked. If they are not matched appropriately, they cause stress in your followers. More skilled (higher ability) followers can do more work without getting stressed. In order to implement this we had to put some guidelines on what follower ability means.

The possible range for follower ability should be between 1 and 3. An employee with ability of 1 can do one job per week. An employee with ability 2 can do two jobs per week. An employee with ability 3 can do 3 jobs per week. ( There's no advantage to having more than 3 as there's only ever 3 jobs available. But we can change the number of jobs available if we need to). If a follower with ability=1 is assigned to 2 jobs, they are stressed and do not contribute.

In the interests of simplicity, if a follower is assigned to two jobs, and has an ability of 2 or higher, the consequence on the workload for that job is exactly the same as if two followers been assigned.

### ***Leadership actions***

All leadership actions will be available at all times during free play levels. It will always be possible to do all of these things. However, in some of the earlier levels, some of the tasks designed to target complex personality issues etc. won't have any effects. Those functions should be disabled. So, while it's always possible to take any of these actions, they will only be useful when applied at the appropriate times.

Note: We are still unsure of how personality will modulate the effects of these actions, so we have not mentioned personality here at all. Also, the stress variable should be controlled simply by the workload and deadline (possibly modulated by personality). So, only changing the follower's workload will have an effect on followers stress.

In implementing these tasks during free play, it is important that we do not spell out what the consequence of the action is. Rather, the player must do the action and watch the result. However, the consequence of those actions will have been previously explained through mini games. So the free play is like revision, remembering each of the individual lessons and applying them in a new context.

### **Basic actions**

<b>Leadership action</b>	<b>Cost</b>	<b>Consequence</b>
Assign follower to case	Half day per each follower assigned to a case that week. No cost to leave the follower on the case for following weeks.	The follower is now assigned to work on that case.
Implement weekly reviews (contingent reward and management by exception)	This deducts one half day from the leaders weekly diary per follower chosen for review.	This is a transactional task. It will increase extrinsic motivation of the designated followers by one point.
Work on the 'ground floor'	One day	One staff member, randomly chosen, will have an increase in intrinsic motivation.
Hold a team meeting	One day.	No consequences initially. When, at the end of turn, there comes the opportunity to undertake a new case, one of the options will have been chosen already. We will state that this choice has been made during the team meeting. Accepting the choice increases intrinsic motivation of 50% of followers. Rejecting the choice decreases intrinsic motivation of all followers.

Here's a suggestion for the remaining tasks. This is very simplified, will have to do a much more detailed version at a later date. Need consultation from you guys and from Barbaranelli. However, below are the kinds of things we could include.

### **Motivation actions**

Write an email commending the previous weeks work	Half a day	Extrinsic motivation increased for 50% of followers per email.
Write an email criticising the previous weeks work	Half a day	Extrinsic motivation lowered for 50% of followers per email.
Write an email unrelated to work	Half a day	Nothing.
Write a Memo reminding followers of strategic goals and company values	Half a day	One staff member, randomly chosen, will have an increase in intrinsic motivation.
Design and hang a poster urging that self-interests come after those of the group	Half a day	One staff member, randomly chosen, will have an increase in intrinsic motivation.

### **Training actions**

+One-to-one coaching with a follower (ability)	One day	That follower's ability increases by one point.
+One-to-one coaching with a follower (motivation)	One day	That follower's intrinsic motivation increases by one point.
+Prepare a personalised training programme for a team member	Two days	The chosen follower will increase in ability by one point and intrinsic motivation by one point every two weeks.
+Run a Workshop (ability)	Three days	Increases ability for 50% of assigned followers. Reduces contribution of each member of the workshop group by two points for that week (must be some short-term consequence of not being at work!).
+Run a Workshop (motivation)	Three days	Increases intrinsic motivation for 50% of assigned followers. Reduces contribution of each member of the workshop group by two points for that week (must be some short-term

		consequence of not being at work!).
+Run a team bonding day	One day	Increases intrinsic motivation for 33% of assigned followers.

We believe that these tasks, while not explicitly mentioning each concept of the FRL, do encapsulate the spirit of the theory. So, through written material, we can explain how the processes involved in the game parallel those in the theory.

### ***Reminder - Effects of leadership actions***

	Extrinsic Motivation (short-term effects)	Intrinsic Motivation (Long-term effects)
Transformational leadership	~	+
Contingent Rewards & Management by exception	+	~
Laissez Faire	~	~

## Learn to Lead – Learning outcomes and level specification

Both this section, and the individual level descriptions address WPS 5.2 and 5.3. Red text indicates issues that are not completely finished, as they require input from WP 6.

In each level we will introduce:

- 1) The learning outcomes that are being addressed specifically with that level
- 2) The game mechanics that address that learning outcome
- 3) Anything else that is new in that level

We will first provide an overview, before discussing more detail

Level	Role	Learning outcome	New Game Mechanics
Level 1	Supervisor	Basic mechanics.	All basic mechanics introduced.
Level 2	Manager	Contingent reward & Management by Exception. Transformational leadership overview.	Reward when meet or exceed targets. Punish when don't meet targets. All of the speeches, workshops, seminars etc. are introduced
Level 3	Leader	Intrinsic Motivation. Individualised Consideration – Stress. Individualised Consideration – Ability.	Workload & Deadlines now cause stress. Players now differ in terms of ability
Level 4	Leader	Individualised Consideration – Personality. Intellectual Stimulation. Individualised Consideration - Stress	Players now differ in terms of personality. Players can call team meetings.
Level 5	Leader	Follower interaction	Followers now effect each others' behaviour. Stress now caused by ability and personality in addition to workload and deadlines.

### **Level 1**

1. Explain what jobs are
2. Explain how to assign followers to teams
3. Managing your time

### **Level 2**

1. Explain that different leadership actions have different consequences on follower effort
2. Specifically, the impact of management by exception, contingent reward
3. Recognise that follower ability can increase over the long-term if appropriate leadership is displayed.
4. Recognise the different types of transformational leadership
5. Recognise their impact on longer-term player development (ability)

#### New mechanics

1. Implementing of weekly reviews
2. Transformational leadership tasks introduced.
3. Speeches, workshops, etc.

### **Level 3**

1. Individualised consideration – players now experience stress if managed incorrectly.
2. This is effected by their ability and workload
3. Intrinsic motivation – also effected by workload, which should be appropriate
4. Followers ability must be taken into account

#### New mechanics

1. Players begin level with different levels of ability
2. Less skilled followers are more sensible to behaviors and speeches that help them to develop their strengths (example: spend time teaching and coaching), or reassure and encourage them (example: express confidence that goals will be achieved).
3. More skilled followers, on the other hand, are more sensible to behaviors and speeches that recognize their value (example: speak about the awards that will be reached by the company, thanks to their important work)
4. It is now important to assign followers to more than one job – need some way of representing their individual workload, as well as the case workloads. Until this level, it should be possible, but unnecessary to assign followers to more than one job per week.

### **Level 4**

1. Individualised consideration – followers now have individual personalities. These personalities modulate the effect of leaders actions on motivation, ability and effort. Different leadership tasks affect these in different ways
2. Stress is now caused by ability and personality in addition to workload and deadlines.
3. Intellectual stimulation – can increase effort by calling team meetings.

#### New mechanics

1. Players begin level with different personality types (power, affiliative or achievement)
  - a. Explain what each of these mean in the real world!
  - b. Must be some simple representation of those personality types for the player to understand.
  - c. Essential to making this all comprehensible to the player, each follower will need to have a statistic for personality, for ability, for effort, for workload and for stress.
2. Players can call team meetings. This will take some of the decision making out of the hands of the leaders. For example, when choosing which new case to take on, the player can call a team meeting. Then, the team will recommend one of the options.

### **Level 5**

1. This level purely involves the model becoming more complex. Follower interaction now effects their effort, their stress etc.
2. Stress is now caused by ability and personality in addition to workload and deadlines.
3. Conflicts between followers can be resolved or attenuated through appropriate leadership actions.

## Level 1

### **Organisation Type**

The player is a supervisor in a catering company. The company caters for large events and must be well organised in order to ensure that each job is completed in time, so that events go ahead.

### **Learning outcomes**

After playing this level, all players should understand the challenge presented by the game, the mechanisms through which the game works and know physically how to do each task that is required in more complex levels.

1. Understand the problem presented by the game as a whole
2. Understand the basic mechanics of the game
3. Understand how to use those mechanics to solve the problems presented

### **Written material introduction**

In-game Tutor: "Welcome to the Learn 2 Lead game. Over the course of playing this game, you will learn about the most up-to-date theories and practices in leadership. The game will both teach you leadership strategies that have been demonstrated to work, and also allow you to experiment with being a leader in different types of roles. We will help you on your way in this task by providing reading material, tutorials and mini games, before allowing you to apply what you have learned. Through playing the game successfully, you will also be demonstrating the skills and knowledge needed to be a great leader."

CEO: "I see your ambition to succeed as a great leader. So, I have given you the opportunity to work in my multinational corporation. However, you have a lot to learn, so we will start you off near the bottom. You will begin as a supervisor in a small catering division. Show us what you can do in this position and you will be quickly promoted to more interesting and powerful jobs. Your tutor will guide you throughout this process – I see you've met them already. Listen to what they say and you will move up quickly. Fail to learn those lessons and you will be FIRED!

At all steps along the way we will be comparing your performance to that of others who we have hired to similar positions in other companies. Don't just prove your skills to us, prove it to all those people you will be competing with for jobs!"

<This is a suggestion. Perhaps an online leaderboard comparing player scores on the free play levels. This may fulfil the necessity for online asynchronous competition.>

### **Tutorials**

(We intend that this level should be purely a tutorial in order to show players how to interact effectively with the game. Please see <http://fantasticcontraption.com/> for an example of how puzzle games introduce these tutorials in a simple, effective manner. It is important to overlay the instructions on the interface, but without obscuring the important parts of the interface. Also, arrows pointing to the

parts that are being discussed are helpful – as seen in fantastic contraption).

In-game tutor: “Before you can become a great leader, you first need some basic management skills. Over the course of this game, if you show us you can learn quickly, you will work in a number of different jobs. Each of these jobs will form a level within the game. All levels will be based on the same basic principles. In this first level, we will explain how to play the game, and perhaps more importantly, how to win at the game!”

### 1. Explain the ‘jobs’

In-game tutor: “In each organisation, you will be in charge of a number of ‘followers’ – those staff members who are directly responsible to you. Your task is to make sure that your followers are working productively. In order to do this you assign them to work on jobs. In the first level, where you are working in the catering industry, these jobs represent large events that your team must cater for. Each job has different characteristics.

- a. Each job must be done within a certain, indicated number of weeks (point out ‘weeks’ indicator).
- b. Each task also takes a certain amount of follower ‘workload’ to complete (point out ‘workload’ indicator). In essence this is the amount of effort that is needed by your followers to complete that job.
- c. So, in order to understand what is required to finish a job, you must look at the amount of weeks before the deadline and the amount of workload (highlight again).”
- d. Each job is also worth a certain amount of Money. More complex tasks bring a greater financial rewards – and a happier boss!

### 2. Assigning followers to teams

In-game tutor: “Now that you understand how to recognise what a job involves, you need to assign followers to work on that job, so that it can be completed in time. Remember, jobs are undertaken not by you, but by your followers.

- a. Each follower can complete a certain amount of work in each week (point out indicator).
- b. So, you must assign the correct amount of followers to each job.
- c. First, go to your ‘to do list’
- d. Then, have a look at the current jobs that need to be done.
- e. Here is an example job (1 week, 4 points)
- f. To assign a follower click on the job button, then click on the follower button (point at the correct button)
- g. The follower will be assigned to that job

In-game tutor: “The aim, as always in the business world, is to work as efficiently

as possible. In this case, this means finishing as many jobs as possible. “

### **Mini Game**

“Now, let’s practice how to assign the correct number of followers to a job. ”

Number of Weeks	1
Number of followers	4
Follower characteristics	All four simply contribute one point each intrinsic motivation
Goal	Assign all four followers to that one job
Jobs available	1 week deadline, 4 workload points.
Misc	At the end of a week, we are not yet allowing players to pick new jobs. That will complicate things, so do not implement this in this mini game.

### **Tutorial**

#### 3. Managing your time

“Assigning followers to tasks is not the only activity that fills up your week. There are many things you can do within the 5 working days in every week. You will notice that you have a diary (point out the diary representation). Every activity takes a certain amount of your time. (point out indicator).

- a. For example, assigning a follower to a task takes a half of one day of your time (Demonstrate. Circle the diary, where the marker shows that a half day has been used up).
- b. Each action that you take within the game takes a different amount of your time to carry out. These actions will be available to you in later levels, but for now, we’ll concentrate on managing the staff.

#### 4. Follower skill changes depending on your actions

“So far we have discussed basic day-to-day management tasks. However, Leadership involves more than simply managing staff to complete jobs. Leaders are interested in developing their staff – a follower who is highly trained and intrinsically motivated can do more work in a week than. Fortunately, your staff are enthusiastic and improve dramatically over time with appropriate leadership.

- a. One of the simplest ways of improving staff ability and motivation, is through success. The amount of work that each follower can do each week can be increased by finishing tasks – for every task that is finished, <one> extra IM point is given to one of the team members

### **Mini Game**

“We’ll now give you the chance to practice what you have learned over a short number of weeks. Your task is to assign your staff to jobs appropriately in order to complete two jobs within the 3 weeks given.”

Number of Weeks	3
Number of followers	4
Follower characteristics	All four simply contribute one point each intrinsic motivation
Goal	Complete 2 jobs Get one development point.
Jobs (both jobs are available from week 1)	1. Deadline 2 weeks, workload 8 2. Deadline 3 weeks, workload 5
Misc	At the end of a week, we are not yet allowing players to pick new jobs. That will complicate things, so do not implement this in this mini game.

CEO: “Well done. I see you have an eye for this business. Keep up the good work, learn as much as possible and you will be soon moving up in the world.”

### **Free Play**

(There’s no free play in this level – they don’t know enough yet for it to be worthwhile. This will be available from level 2 onwards).

## Level 2

### **Organisation Type**

The player is a supervisor in a catering company. The company caters for large events and must be well organised in order to ensure that each job is completed in time, so that events go ahead. Each job will involve a specified workload, and a specified deadline.

### **Learning outcomes**

The previous level introduced the most basic mechanics of understanding the nature and challenge of the game. In addition, the players practiced assigning players to teams and were initially introduced to the idea that followers can develop over time and become more useful through appropriate actions from a leader. In this level we will discuss this idea of development further, and introduce the methods that can be taken to promote that development.

6. Explain that different leadership actions have different consequences on follower effort.
  - a. Recognise that follower ability can increase over the long-term if appropriate leadership is displayed.
7. Specifically, the impact of management by exception, contingent reward.
8. Recognise the different types of transformational leadership and their impact on longer-term player development (ability and intrinsic motivation).

New mechanics

4. Implementing of weekly reviews
5. Transformational leadership tasks introduced.
  - a. Speeches, workshops, etc.

### **Written material introduction**

CEO: "You have begun to show an understanding of the kind of skills that are necessary to become a good manager. You are clearly on a path right to the top if you continue with this progress! We think you are too important to remain a supervisor and promote you to the rank of manager within our catering division. The main difference is that you are now given responsibility for the development of your staff as well as the efficient running of your team. Do it!"

In-game tutor: "It looks like you're going to need some new skills in order to deal with these new demands! In the previous level we introduced you to the basic processes of running a successful team in the catering industry. We practiced assigning staff members to teams and introduced you to the idea that followers can develop over time and become more useful through appropriate actions from a leader.

1. Explain that different leadership actions have different consequences on follower effort.

In-game tutor: “In this level we will focus on the development of staff. We will first describe (briefly) some of the research about how you can lead effectively, and we will then show you how to apply this knowledge. Finally, we will allow you to run a company for 15 weeks in order to see how good a leader you really are! Let’s start.”

<Need a very low level intro to FRL and what the theory says about the development of followers. Primarily - Transactional Leadership, transformational will come next. Will write this intro to transactional leadership ASAP >

In-game tutor: “The most important thing to remember at this point is that different leadership styles have different consequences on follower behaviour. This is the essence of the leaders role. You must ensure that your followers are as productive as possible. There are certain things that you can do to make sure that this happens. We will start looking into those now.”

## **Tutorials**

### 2. The impact of management by exception, contingent reward

In-game tutor: “One way of ensuring that your followers are motivated to do their work is to make sure that they do! Monitor their performance closely and reward and punish behaviour as you see fit. Offering incentives for good work, and punishments for sloppy work, is a tried and tested way to ensure people are doing their jobs. In this game, you can easily ensure that followers are monitored closely by holding performance reviews every week. These reviews will ensure that your followers are working to gain their regular bonuses and avoiding punishments.

In-game tutor: “Performance reviews are one of a large number of actions that you can do every week. We will discuss further actions in one moment – but for the moment we will show you how to implement performance reviews.”

(we will need a way of designating which players are assigned to reviews every week. Suggestion below)

- a. All interactions you have with your staff need to be co-ordinated through your ‘to-do list’, so open the list (circle the appropriate button).
- b. Now click the option for ‘meet with staff’ <or whatever heading we choose. See Leadership actions table, in the ‘game structure and mechanics document’ – we need to group those actions meaningfully>
- c. The only option available here is for performance reviews. Choose this.
- d. Now you will see a list of your staff. Simply click on each staff member to implement performance reviews with those staff members.

- e. Now, go to your diary. You will see that each performance review for each staff member takes up one half of a day from your working week.

### **Mini Games**

3. Recognise that follower ability can increase over the long-term if appropriate leadership is displayed.

In-game tutor: “Importantly, taking the time to interact with your staff has long term consequences on how useful they are to your organisation. A good leader inspires their staff to excellent performance. In the following mini-game, we want to see you implementing performance reviews, in order to complete two challenging jobs in three weeks. Note that this is essentially the same task as was presented to you last time, but the jobs now require more work to finish them. Let’s see what you can do...”

Number of Weeks	3
Number of followers	4
Follower characteristics	All four simply contribute one point each intrinsic motivation
Goal	Complete 2 jobs
Jobs (both jobs are available from week 1)	3. Deadline 2 weeks, workload 8 4. Deadline 3 weeks, workload 10
Leadership actions	Weekly performance reviews – which increase extrinsic motivation by one point per follower.
Misc.	At the end of a week, we are not yet allowing players to pick new jobs. That will complicate things, so do not implement this in this mini game.

**(Players must repeat this until they pass. It should not be possible to click through these mini games without reaching the assigned goal.)**

In-game tutor: “Well done. As you can see, taking the time to interact with your staff and consider their performance has consequences on how useful they are to your organisation. Other tasks that focus on rewarding and punishment will also be introduced in later levels. However, in future we will not explain to you that those actions perform the function of rewarding and punishment. Rather, you must remember what you have learned here and examine your own actions in future to understand whether or not they fulfil this function.”

### **Tutorials**

1. Recognise the different types of transformational leadership and their impact on longer-term player development (ability and intrinsic motivation).

In-game Tutor: “So far, we have seen how transactional leadership (remember: offering rewards for achievement and punishing under-achievement) can help you

run a team in an efficient manner. This is certainly an effective strategy in the short-term and can be very effective in companies where the workforce is not highly skilled and the work is not highly specialised. However, there are some problems with transactional leadership. For example, almost as soon as you stop offering rewards and punishments, their effect will wear off and staff will slowly return to their initial effectiveness. So, while transactional leadership is good for a short-term boost to performance, it is not always the best approach for reaching long-term goals.

In-game Tutor: “Remember the CEO has big plans for you, so you must learn how to lead a world-class organisation. This involves understanding not only transactional leadership, but also transformational leadership – a style of leadership that inspires staff to reach for long-term success. It focuses on developing the skills and intrinsic motivation of your staff, so that success can be stable and long-term and staff will perform to world-class standards for you.

<Need a very low level intro to transformational leadership. Will write this ASAP. Include details of the different types of transformational leadership and examples of each type. They’ll need this in order to interpret the leadership actions. It should probably be available at all times. >

In-game tutor: “Remember, different leadership styles have different consequences on follower behaviour. You must ensure that your followers are as productive as possible. This is the essence of the leader’s role. We will now look at some further actions that you can take, as a leader, which can help in the development of your staff.

- a. Remember, all interactions that you have with your staff need to be co-ordinated through your ‘to-do list’, so open the list (circle the appropriate button).
- b. Now you will see that there are a huge array of options, from written communications, coaching and workshops, holding team meetings and even working on the ground floor with your staff.
- c. Each of these actions costs you a different amount of time to implement, and has specific consequences on follower actions.
- d. You will see that we have provided you with details of how much time each action takes. However, we have intentionally not been very specific with the consequences of those actions. That’s because we want you to consider what you have learned already about transformational leadership when making decisions, and to experiment.

### **Mini Games**

In-game tutor: “We will now give you the opportunity to experiment with using some of the newly introduced leadership actions. Again, this is essentially the same task as before. However, the workload has increased again, so we need to see more creative staff interaction from you in order to keep boosting productivity and efficiency.”

Number of Weeks	3
Number of followers	4
Follower characteristics	All four simply contribute one point each intrinsic motivation
Goal	Complete 2 jobs At least two development points.
Jobs (both jobs are available from week 1)	1. Deadline 2 weeks, workload 8 2. Deadline 3 weeks, workload 15
Leadership actions	All of the leadership actions are now available
Misc	At the end of a week, we are not yet allowing players to pick new jobs. That will complicate things, so do not implement this in this mini game.

In-game tutor: “Well done. Now, show us that again. Show us that we can trust you to run our company!”

Number of Weeks	3
Number of followers	4
Follower characteristics	All four simply contribute one point each intrinsic motivation
Goal	Complete 2 jobs At least two development points.
Jobs (both jobs are available from week 1)	1. Deadline 2 weeks, workload 8 2. Deadline 3 weeks, workload 15
Leadership actions	All of the leadership actions are now available
Misc.	At the end of a week, we are not yet allowing players to pick new jobs. That will complicate things, so do not implement this in this mini game.

CEO: “It looks like you’ve got the hang of managing your staff and reaching some short-term goals. However, the sign of a great leader is maintaining and improving performance over the long-term. We are now going to allow you to run the catering company for 15 weeks. Now you will see the true benefit of focusing on staff development. Show us what you can do!”

### **Free Play**

CEO: “Here’s what we want to see you do: We want you to finish 8 jobs in 15 weeks. We also want to see you improve your staff by at least 10 development points. Prove to us that you have what it takes, and we’ll get you moving up the ladder! When you finish this task, we will publish a story about your achievements online, where you can compare your performance to that of other budding leaders. In-game tutor: “One more thing, at the end of every week, you will have the opportunity to take on new jobs. It is vital that you continue to take on new jobs, but only take on an amount that you can finish. Remember, each job is worth a different amount to you when it is finished. Finishing easier jobs will not make the

bosses as happy as if you can finish more difficult jobs and bring in more money! ”  
 “When the week is over you will have the option to take on a new job. If you choose to do so, you **MUST** accept at least one of the three jobs that are then offered. Best of luck.”

Number of Weeks	15
Number of followers	4
Follower characteristics	All four simply contribute one point each intrinsic motivation
Goal	Attain 15 job points. (remember: some jobs contribute more points than others) At least 10 development points.
Jobs	Job list below
Leadership actions	All of the leadership actions are now available

<Remember, if they do not reach the goal, they should re-play it once. If they fail to pass on the second attempt, they should go back to the start of this level and do the tutorials and mini games again. It is not acceptable to allow them to move on before they have demonstrated that they have learned. Also, they should be allowed to re-play a level if they want to, even if they pass that level.>

Names change dependent on level	Weeks	Workload*	€€€€€€€€
1	1	6	1
2	1	5	1
3	2	10	1
4	2	14	1
5	3	20	2
6	3	14	2
7	4	16	2
8	4	20	2
9	4	28	2
10	5	30	3
11	5	20	3
12	6	36	3
13	6	45	3

\*These will need to be fine-tuned

<Also, I’ve just realised that jobs can not be entirely randomised. For instance, if there is only 4 weeks left in a level, the jobs available should only be four weeks in length Max. Or, better, there should definitely be a job that is only 4 weeks long available. >

CEO: “Well done, well done. You’ve earned yourself a promotion! You can stay on and try to do better in this position, or move on up – the choice is yours.”

## Level 3

### ***Organisation Type***

The player is a manager in the corporation's sales division. The jobs that the team must do involve selling a certain number of products. So, each job will, as usual involve a specified workload, and a specified deadline. The company must be well managed in order to ensure that each batch of items is sold within the given time.

### ***Learning outcomes***

5. Individualised consideration – players now experience stress if managed incorrectly.
  - a. This is effected by their ability and workload

#### New mechanics

5. It is now important to assign followers to more than one job – need some way of representing their individual workload, as well as the case workloads. (Until this level, it should be possible, but unnecessary to assign followers to more than one job per week).
6. Players begin level with different levels of ability
7. Less skilled followers are more sensitive to behaviours and speeches that help them to develop their strengths (example: spend time teaching and coaching), or reassure and encourage them (example: express confidence that goals will be achieved). More skilled followers, on the other hand, are more sensitive to behaviors and speeches that recognize their value (example: speak about the awards that will be reached by the company, thanks to their important work)

### ***Written material introduction***

In-game tutor: "The previous level introduced the idea that employee development is crucial to the success of an organisation, and that world-class leaders must use both transactional and transformational leadership techniques in order to ensure that employees develop successfully."

In-game tutor: "In this level we will introduce the importance of individualised consideration. In particular, assigning appropriate workloads to followers and monitoring stress levels can ensure that followers remain as productive as possible. Assigning too high a workload to followers can cause stress, which decreases follower productivity. In addition, assigning too low a workload leaves followers bored and unmotivated. Let's quickly have a look at how to monitor and affect this. So, considering the unique ability of each player when assigning jobs and ensuring that performance does not suffer due to stress will ensure that you perform well in this level."

<The model must specify how workloads and deadlines combine in order to generate stress. We should figure this out through prototyping the software version.>

### **Tutorials**

In-game tutor: “Until now, it has been possible to accomplish all goals by assigning followers to one job per week. However, sometimes it is necessary for followers to work on more than one job in a week in order that you can meet your deadlines. The important thing to do is to ensure that you do not over-work your followers. Over-worked followers succumb to stress and are not productive. Let’s have a look at how you assign followers to more than one job, and how you monitor their stress levels.”

- a. Remember, all interactions that you have with your staff need to be co-ordinated through your ‘to-do list’, so open the list (circle the appropriate button).
- b. Now, click on the ‘assign to jobs’ button.
- c. Now, you will see two jobs in the ‘jobs open’ panel
- d. Click on job one, then click on follower 1.
- e. Follower 1 will now be assigned to job 1
- f. Click on job two, then click on follower 1 again.
- g. Follower 1 is not assigned to both jobs 1 and 2.

“Of course, you cannot realistically hope to assign all of your staff to do every job every week. You must consider staff workload carefully in order that they do not suffer stress. You need to carefully monitor the stress indicator in order to ensure that workers remain as productive as possible.

<there must be a stress indicator. This should be easy to interpret at a glance.>

< stress mechanic: the possible range for follower ability should be 1-3. An employee with ability of 1 can do one job per week. An employee with ability 2 can do two jobs per week. An employee with ability 3 can do 3 jobs per week. (no advantage to having more than 3 as there’s only ever 3 jobs available. But we can change the number of jobs available if we need to). If a follower with ability=1 is assigned to 2 jobs, they are stressed and do not contribute.

If a follower is assigned to two jobs, its exactly the same as two followers being assigned to those jobs. Just to keep it simple.>

### **Mini Games**

In-game tutor: “We have a couple of very quick challenges for you now. Let’s see that you know how to make your followers more and less stressed, as appropriate. Let’s start by increasing the stress level of these poor, hard-working employees”

Number of Weeks	1
Number of followers	3
Follower characteristics	All followers have one ability point
Goal	Assign followers to two jobs each

Jobs (both jobs are available from week 1)	5. Deadline 2 weeks, workload 4 6. Deadline 3 weeks, workload 4
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In-game tutor: “Ok, lots of bosses are very good at increasing their followers stress – lets see you reduce your followers stress.”

Number of Weeks	1
Number of followers	3
Follower characteristics	All followers have one ability point only
Goal	Followers are already assigned to two jobs each. Assign followers to only one job each.
Jobs (both jobs are available from week 1)	1. Deadline 2 weeks, workload 4 2. Deadline 3 weeks, workload 4

In-game tutor: “You now have a basic understanding of how to increase and decrease your followers stress levels. Always remember to keep an eye on stress levels in order to ensure a successful working environment for your staff.

One more tip: stress increases as a deadline approaches. It is best to get as much work as possible done in advance, as doing a lot of work on the week of a deadline can hugely increase the stress levels of those followers who are working on that job.

<It's important to implement the above mechanic>

### **Tutorials**

In-game tutor: “We are now starting to understand the concept of individualised consideration better. You need to look after your staff, to ensure that their workload is appropriate and to develop their skills and ambition so that they can make a long-term contribution to the organisation.”

“It is important to point out now that all followers are not the same. Rather, each follower typically has a different level of ability. Have a look at the ability indicator”

6. Show three different staff members, each with a different ability level.

(Circle the ability indicator)

“Importantly, a follower’s ability level determines the number of jobs they can be assigned to every week before they will feel stressed. A follower with an ability of 1 can do one job per week, a follower with an ability of two can do two jobs per week etc. A great leader will always take into account the particular skills and abilities of followers when assigning workloads.

### **Mini Games**

“Now, let’s try a similar task to the last one. This time, I want to see you consider your followers abilities when increasing and decreasing their stress. First, increase the stress of two of your followers.

Number of Weeks	1
Number of followers	3

Follower characteristics	Follower 1. Ability = 1, stress = 0 Follower 2. Ability = 2, stress = 0 Follower 3. Ability = 3, stress = 0
Goal	Increase the stress of two of these followers (i.e. assign follower)
Jobs (all three jobs are available from week 1)	1. Deadline 2 weeks, workload 4 2. Deadline 3 weeks, workload 4 3. Deadline 1 week, workload 4

“Now let’s try to make two of your followers less stressed”

Number of Weeks	1
Number of followers	3
Follower characteristics	Follower 1. Ability = 1, stress = 1, assigned to two jobs Follower 2. Ability = 2, stress = 1, assigned to three jobs Follower 3. Ability = 3, stress = 0, assigned to three jobs
Goal	Decrease the stress of two of these followers
Jobs (both jobs are available from week 1)	3. Deadline 2 weeks, workload 8 4. Deadline 3 weeks, workload 15

In-game tutor: “Well done!”

### **Mini-game (No tutorial needed here)**

In-game tutor: “I think you are getting the hang of this! However, there is one more way in which follower ability affects a team’s effectiveness. Less skilled followers respond better to behaviours and speeches that help them to develop their strengths (example: spend time teaching and coaching), or reassure and encourage them (example: express confidence that goals will be achieved). Conversely, more highly skilled followers, are more sensitive to behaviors and speeches that recognize their value (example: speak about the awards that will be reached by the company, thanks to their important work). Let’s quickly try this out. First, here is a highly skilled follower.

**We must draw up a list of which leadership actions affect which types of followers. This is something, I imagine, that Barbaranelli should contribute to.>**

Number of Weeks	1
Number of followers	1
Follower characteristics	Ability 3
Goal	One development point Use Idealised attributes-type leadership actions
Jobs (both jobs are available from week 1)	1. Deadline 2 weeks, workload 8 2. Deadline 3 weeks, workload 15

Ok, good. Now here is a less highly skilled follower.

Number of Weeks	1
Number of followers	1
Follower characteristics	Ability 1
Goal	One development point Use coaching-type leadership actions
Jobs (both jobs are available from week 1)	1. Deadline 2 weeks, workload 8 2. Deadline 3 weeks, workload 15

In-game tutor: "Ok, I think you now have all of the skills necessary to demonstrate individualised consideration when dealing with your staff. However, before we hand over the company to you for a long time, we want to make sure you can demonstrate all of these skills over a shorter time. So, let's see you run the call centre for seven weeks, demonstrating a consideration for the skills, workload and stress of your followers. Demonstrating this type of individualised consideration will give the CEO confidence that you are up to the challenge of running the call centre for a long period of time. Let's see what you can do!"

Number of Weeks	7
Number of followers	4
Follower characteristics	All begin with stress = 0, ExM = 0 1 – Ability 1, IM = 1, 2 – Ability 2, IM = 0, 3 – Ability 2, IM = 1, 4 – Ability 1, IM = 0,
Goal	12 Job points. (We will need to prototype this. It should be impossible to finish this level without showing the skills taught above, so we need to know the limits in order to achieve this). 5 development points
Jobs (both jobs are available from week 1)	Use the entire list from below.

### Free Play

CEO: Ok, we think you have what it takes to be a great leader in this department. So, show us what you can do! Remember, your performance will be compared online with all other players of the game. If you do really well, we know where we want to employ you next! In this task, you will have 20 weeks to run the call centre. Each job refers to a certain amount of goods that you need to sell. Finish as many jobs as possible in this time frame. If you do not finish at least 14, we will not be impressed.

Number of Weeks	20
Number of followers	6
Follower characteristics	All begin with stress = 0, ExM = 0 1 – Ability 1, IM = 1, 2 – Ability 2, IM = 0, 3 – Ability 2, IM = 1, 4 – Ability 1, IM = 0,

Goal	Complete 22 job points. 27 development points
Jobs	Job list below

<Remember, if they do not reach the goal, they should re-play it once. If they fail the re-play, they should go back to the start of this level and do the tutorials and mini games again. It is not acceptable to allow them to move on before they have demonstrated that they have learned.

Also, they should be allowed to re-play a level if they want to, even if they pass that level.>

Names change dependent on level	Weeks	Workload*	€€€€€€€€
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7	4	16	2
8	4	20	2
9	4	28	2
10	5	30	3
11	5	20	3
12	6	36	3
13	6	45	3

\*These will need to be fine-tuned

We'll probably need more jobs eventually, but stick with this for the moment.

CEO: "Well done, well done. You've earned yourself a promotion! You can stay on and try to do better in this position, or move on up – the choice is yours."

## Level 4

### **Organisation Type**

The player is a manager in the corporation's legal division. Each job represents a case that the legal team must work on before going to court. So, each job will, as usual involve a specified workload, and a specified deadline. The division must be well managed in order to ensure that the corporation can function successfully.

### **Learning outcomes**

4. Individualised consideration – followers now have individual personalities. These personalities modulate the effect of leaders' actions on motivation, ability and effort. Different leadership tasks affect these in different ways
5. Intellectual stimulation – can increase effort by calling team meetings.

#### New mechanics

3. Players begin level with different personality types (power, affiliative or achievement)
  - a. Explain what each of these mean in the real world!
  - b. Must be some simple representation of those personality types for the player to understand.
4. Essential to making this all comprehensible to the player, each follower will need to have a statistic for personality, for ability, for effort, for workload and for stress. Perhaps something like football manager, or, like the way these types of stats are represented in The Sims. I'm also a fan of the suggestion to have the abilities and stats laid out narratively in text rather than graphically, but that is something we will discuss over the coming weeks.
5. Players can call team meetings. This will take some of the decision making out of the hands of the leaders. For example, when choosing which new case to take on, the player can call a team meeting. Then, the team will recommend one of the options.

### **Written material introduction**

1. Individualised consideration – followers now have individual personalities. These personalities modulate the effect of leaders' actions on motivation, ability and effort. Different leadership tasks affect these in different ways

CEO: "We are excited about how quickly you have moved up through our organisation. We think that you are the ideal person to lead our legal division. This is a big job, a complex job, with highly skilled staff, who each need great leadership to succeed in their jobs."

In-game tutor: “While the CEO is excited about your progress, there are still some issues that you need to learn! In particular, you need to understand how to deal with staff who have different personality types. Interacting effectively with staff who have different types of personalities is essential to keeping the team productive, and as always, developing those staff to have better skills and higher intrinsic motivation. Be warned that managing such a highly skilled workforce is considerably more difficult than those teams that you have managed until this point. However, we aim to provide you with the training, information and confidence you need in order to succeed – just as you must do with your staff”

“We will begin by describing the three personality types that you will encounter in the legal department. **<we need to write this material ASAP. It should be a summary of McClellands theory>**”

### **Mini Games**

In-game tutor: “Now that you understand, in theory, how the three typical personality types need to be managed differently, we will show you how to do so in the game. For the moment, we will ignore the stress variable and concentrate purely on performance. In this situation you are presented with three followers. Do three leadership actions - one action that will improve the performance of each follower. Be careful not to annoy any of the followers. Remember what you have learned previously about leadership actions, and also about personality types.

Number of Weeks	1
Number of followers	3
Follower characteristics	The only follower characteristic that’s relevant here is personality, so ignore all the others. 1. Personality Power 2. Personality Achievement 3. Personality Affiliation
Goal	Do three leadership actions - one action that will improve the performance of each follower. Be careful not to annoy any of the followers.

In-game tutor: “You now have an idea of how to carry out leadership actions appropriately. Each follower must be considered individually, and actions that are applied to all followers at the same time may not always be appropriate (although sometimes they are!).”

### **Mini-Game**

**(this one may not be necessary. Perhaps its one mechanic too far. I will include it here and we can decide later whether it is necessary or not.)**

In-game Tutor: “We will now introduce you to the final leadership action available. One behaviour that has been consistently demonstrated as useful for leaders is Intellectual Stimulation. Stimulating a followers intellect can help ensure high intrinsic motivation over a long period of time **<write more stuff on this. How**

involving them in the decision making process is good>.

“In this game it is possible to call team meetings during a week. These meetings each take up one day of your time. They also take some of the decision making power out of your hands. Specifically, if you call a team meeting, the team will decide which job you take on next week. That decision is taken away from you. While you lose some power, your followers gain the benefits of being involved in the decision making process.

Number of Weeks	2
Number of followers	2
Follower characteristics	Both have IM = 1 No other attributes mentioned
Goal	Just do the team meeting action

### Free Play

CEO: “We are now going to trust you with the running of our legal department. Don’t mess it up! And don’t annoy our valuable and highly skilled staff.”

Remember, your performance will be compared online with all other players of the game. If you do really well, we know where we want to employ you next!

In this task, you will have 20 weeks to run the legal department. Each job refers to a case that you must take on and complete before the assigned court date. Finish as many jobs as possible in this time frame. If you do not finish at least 12, we will not be impressed.

Number of Weeks	20
Number of followers	6
Follower characteristics	All begin with stress = 0, ExM = 0 1 – Ability 1, IM = 1, Power 2 – Ability 2, IM = 0, Affiliative 3 – Ability 2, IM = 1, Achievement 4 – Ability 1, IM = 0, Power 5 – Ability 1, IM = 1, Affiliative 6 – Ability 2, IM = 0, Achievement
Goal	20 job points. 18 development points
Jobs	Job list below

<Remember, if they do not reach the goal, they should re-play it once. If they fail the re-play, they should go back to the start of this level and do the tutorials and mini games again. It is not acceptable to allow them to move on before they have demonstrated that they have learned.

Also, they should be allowed to re-play a level if they want to, even if they pass that level.>

Names change dependent on level	Weeks	Workload*	€€€€€€€€
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1	1	6	1
2	1	5	1
3	2	10	1
4	2	14	1
5	3	20	2
6	3	14	2
7	4	16	2
8	4	20	2
9	4	28	2
10	5	30	3
11	5	20	3
12	6	36	3
13	6	45	3

\*These will need to be fine-tuned

CEO: "Well done, well done. You've earned yourself a promotion – if you want it! You can stay on and try to do better in this position, or move on up – the choice is yours."

Level 5

### **Organisation Type**

The player is the leader of the research and development team. Each job represents a new product that the team must research, design and develop. So, each job will, as usual involve a specified workload, and a specified deadline. The division must be well managed in order to ensure that the corporation can function successfully.

### **Learning outcomes**

As with the previous level, the key is to represent follower's statistics for personality, for ability, for effort, for workload and for stress as comprehensible as possible, so that players can make sensible, informed decisions, and hence learn from their experience.

1. Followers now interact with each other. Interaction now effects their effort, their stress etc.
  - a. Distance creates conflicts. Followers assigned to the same jobs must have compatible personality types. So staff must be assigned with this in consideration.
2. Certain leadership actions can decrease these conflicts when they happen, or prevent them from happening.

<I suggest that this works through stress. Conflicts create stress. Stress reduces productivity. This way we don't need a separate way in which productivity is altered, we use one they already are watching for. So stress can now be caused by workload, deadlines or personality conflicts>.

### **Written material introduction**

CEO: "You have done fantastically well in your short time with us. You have shown that you understand some of the knowledge and skills necessary of a great leader. So, we've decided you are the perfect person to lead our R&D department. This decision means we are putting a lot of trust in you. Our researchers are very hard working, skilled and creative people. We trust you to lead them appropriately."

In-game tutor: "The CEO has, indeed, placed a great deal of trust in you. The R&D team are creative people, and where you have creativity, you often have conflict. This team will provide the perfect environment in which to learn your final two lessons about world-class leadership. The first, is that conflict can often arise when incompatible personality types must work together. The second is that there are steps you can take to prevent or alleviate this conflict."

"Be warned - while creative teams are often subject to conflict, they are not the only teams that suffer conflicts. The skills you learn in this level will be appropriate regardless of the type of team you lead, and regardless of the skill level of your followers. For the moment, lets concentrate on these highly skilled followers."

<We need a detailed theoretical description of how personality types interact with

each other. More detail than provided in internal document. Will do this ASAP>  
<Perhaps this would be a good place to re-cap all of the theoretical explanations presented so far. Allow the user access to use this whenever they want from now on. Some sort of ebook>

### **Mini Games**

In-game tutor: “We will now quickly demonstrate how personality conflicts between workers can affect those workers’ productivity. Try assigning these followers to teams in order to cause stress.

Number of Weeks	1
Number of followers	3
Follower characteristics	The only follower characteristic that’s relevant here is personality, so ignore all the others. 1. Personality Power 2. PersonalityPower 3. Personality Affiliation
Jobs	Two jobs available
Goal	Assign the two power personalities to the same job.

In-game tutor: “Good. Now try assigning these followers to teams in order to cause as little stress as possible.

Number of Weeks	1
Number of followers	3
Follower characteristics	The only follower characteristic that’s relevant here is personality, so ignore all the others. 1. Personality Power 2. PersonalityPower 3. Personality Affiliation
Jobs	Two jobs available
Goal	Assign the two power personalities to different jobs.

In-game tutor: “We will now allow you to experiment with assigning followers of different personality types to teams. You can try this as many times as you want – experiment and find out the best way to manage these people. You will need this information to perform well in the following game.

Number of Weeks	2
Number of followers	6
Follower characteristics	The only follower characteristic that’s relevant here is personality, so ignore all the others. 1. Personality Power 2. Personality Achievement

	3. Personality Affiliation 4. Personality Power 5. Personality Achievement 6. Personality Affiliation
Jobs	3 randomly drawn jobs available
Goal	No goal, just allowing them to assign different combinations to see the results.

<So, players will have the opportunity to try this as many or as few times as they wish.>

### Free Play

CEO: “We are now going to trust you with the running of our R&D department. Don’t mess it up! And make sure to take care of our valuable and highly skilled staff. Remember their development is key to your successful running of the company.”

In-game tutor: “As usual, your performance will be compared online with all other players of the game.

In this task, you will have 20 weeks to run the R&D department. Each job refers to a new product that you must, research, design and develop. Finish as many jobs as possible in this time frame. If you do not finish at least 12, we will not be impressed.

Number of Weeks	20
Number of followers	6
Follower characteristics	All begin with stress = 0, ExM = 0 1 – Ability 1, IM = 1, Power 2 – Ability 2, IM = 0, Affiliative 3 – Ability 2, IM = 1, Achievement 4 – Ability 1, IM = 0, Power 5 – Ability 1, IM = 1, Affiliative 6 – Ability 2, IM = 0, Achievement
Goal	25 job points. 14 development points
Jobs	Job list below

<Remember, if they do not reach the goal, they should re-play it once. If they fail the re-play, they should go back to the start of this level and do the tutorials and mini games again. It is not acceptable to allow them to move on before they have demonstrated that they have learned.

Also, they should be allowed to re-play a level if they want to, even if they pass that level.>

Names change dependent on level	Weeks	Workload*	€€€€€€€€
1	1	6	1
2	1	5	1
3	2	10	1
4	2	14	1

5	3	20	2
6	3	14	2
7	4	16	2
8	4	20	2
9	4	28	2
10	5	30	3
11	5	20	3
12	6	36	3
13	6	45	3

\*These will need to be fine-tuned

### Mini Games

In-game tutor: “You have done really well to reach this point. There is one final skill that you will need in order to become a world-class leader. You may have noticed in the previous game that it is almost inevitable that conflicts arise between followers. Sometimes it is impossible to keep incompatible team members apart. Luckily, there are actions that you can take to prevent or alleviate this conflict. These are the same leadership actions that you have been doing through all of the previous levels. However, some of them now alleviate conflicts, while some of them exacerbate conflicts.

We will now allow you some time to experiment with intervening on follower conflicts. Assign your followers to jobs. Watch whether there is conflict or not between players. Then, perform leadership tasks and see whether they have been alleviated or not. The better you understand how this works, the better you will perform in the game – so we recommend trying this again and again and again!”

<perhaps, after this mini game has been finished, they should be allowed to do it again, in order to remember what works and what does not. So, when they are playing any game after this point, they should be able to pause it & go back and try this out? Maybe that should be the case with all mini games?>

<Question: should conflict be obvious within the week, or should it happen at the end of the week, and only be discernable after the week has finished? If the conflict is visible straight away it will be easier to understand, but if its not visible straight away, players will watch out for it and this lesson may last longer. Interesting research question!! >

Number of Weeks	3
Number of followers	6
Follower characteristics	The only follower characteristic that's relevant here is personality, so ignore all the others. 1. Personality Power 2. Personality Achievement 3. Personality Affiliation 4. Personality Power 5. Personality Achievement 6. Personality Affiliation
Jobs	3 randomly drawn jobs available
Goal	No goal, just allowing them to assign

	different combinations, then perform leadership tasks to see the results.
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<Should do this over and over again. Assigning followers to different jobs, watching the conflict arise and experimenting with leadership actions. We should require at least 4 repetitions.>

### **Free play**

CEO: “We now consider you fully trained. However, you are still a little inexperienced. Let’s see you apply all of the lessons that you have learned so far in order to lead this team of world-class researchers. You have 20 weeks in which to complete 14 jobs at least. Don’t be satisfied with the minimum – let’s see you compete with all others in your position. Can you show you understand all of these complex processes that go into leadership.”

<Here is where they definitely need access to all of the written materials and mini games. That way they can refresh any lessons that they can’t remember completely. >

Number of Weeks	20
Number of followers	6
Follower characteristics	6 followers Randomise follower characteristics
Goal	30 job points. 20 development points
Jobs	Job list below

<Remember, if they do not reach the goal, they should re-play it once. If they fail the re-play, they should go back to the start of this level and do the tutorials and mini games again. It is not acceptable to allow them to move on before they have demonstrated that they have learned.

Also, they should be allowed to re-play a level if they want to, even if they pass that level.>

Names change dependent on level	Weeks	Workload*	€€€€€€€€
1	1	6	1
2	1	5	1
3	2	10	1
4	2	14	1
5	3	20	2
6	3	14	2
7	4	16	2
8	4	20	2
9	4	28	2
10	5	30	3
11	5	20	3
12	6	36	3

13	6	45	3
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\*These will need to be fine-tuned

CEO: "We now consider you fully trained to be a leader in our organisation, or any other organisation. The skills and knowledge you have learned here should generalise to working in any capacity in any organisation.

<some sort of cheesy reminder of what leadership is – and how we can all show leadership – whether we are the CEO, supervisor, team leader, Dad, friend etc. >

## **Beyond Level 5**

We believe that the final level will be genuinely challenging and fun (we will need to fine tune some issues along the way). We should allow players to play this final level over and over again. In order to increase playability we should randomise the variables for number of weeks, number of followers, follower characteristics, job characteristics. Also, we should randomise the organisation type. So you can play a game with complex catering staff.

There should also be an online leaderboard – something for players who want to repeat the playing of the game and track their high scores against other people.

## **Unresolved issues of direct significance to WP 6**

All of these issues have arisen from the detailed drawing up of the game design documents. Through reading those documents, you will see where, when and why these issues are relevant.

### ***Theoretical Introductory Text***

We need to produce textual resources for each level. There should be written descriptions of each of the different concepts mentioned in the theory. These descriptions should be at an appropriate level of complexity and should be always available for players to consult. I have mentioned in the level design documents where these materials should be presented to participants. We are willing to put these together, but the Barbaranelli group may also want to contribute.

### ***Online leader board***

We suggest the implementation of an online leader board for each of the free play sessions within the game. Scores on each level can be compared against other players. This may fulfil the necessity for online asynchronous competition. It will also increase the replayability of every one of the free play sessions, where players may re-play games in order to set the high score.

### ***Jobs***

When jobs become available to players at the end of every week, this should not be entirely random. For instance, if there is only 4 weeks left in a free play session, there should definitely be a job available that is only 4 weeks in length. Otherwise, the player may not have anything to do for the final few weeks of a level. It is exactly in these weeks that they should be trying desperately to maximise their score, so we should allow them to do that.

The job list only has 13 possible jobs in it at the moment. We can increase this when necessary, it should be easy to do. But a smaller list should be more manageable for prototyping, so stick with this for the moment.

### ***The stress variable***

This seems problematic, as we have a definition of how it would work before doing the game design. So, I have made the following suggestion, which is implemented in levels 3, 4 and 5.

### ***Mechanic***

Stress is related to follower ability. More able followers can do more work without getting stressed. In order to implement this we had to put some guidelines on what follower ability means. The possible range for follower ability should be between 1 and 3. An employee with ability of 1 can do one job per week. An employee with ability 2 can do two jobs per week. An employee with ability 3 can do 3 jobs per week. ( There's no advantage to having more than 3 as there's only ever 3 jobs available. But we can change the number of jobs available if we need to). If a

follower with ability=1 is assigned to 2 jobs, they are stressed and do not contribute.

In the interests of simplicity, if a follower is assigned to two jobs, and has an ability of 2 or higher, the consequence on the workload for that job is exactly the same as if two followers been assigned.

### ***Deadlines***

Previously it was suggested that stress increases as a deadline approaches. We have not figured out how to implement this, and leave it up to the implementation workpackage. The model must specify how workloads and deadlines combine in order to generate stress. We should figure this out through prototyping the software version.

### ***Indicator***

There must be a stress indicator. This should be easy to interpret at a glance.

### ***Follower interaction and conflict***

In the interest of simplicity, we suggest that this works through stress. Simply, conflicts create stress. Stress reduces productivity. This way we don't need a separate way in which productivity is altered, we use one that players already are watching for. So stress can now be caused by workload, deadlines or personality conflicts.

### ***When do consequences become clear?***

This is an open question: should conflict between followers be obvious within a week, or should it only be discernable after the week has finished? When you assign two followers who are incompatible to one job, should you know instantly that they are incompatible, or should it only be obvious after you have moved on to the next week?

If the conflict is visible straight away it will be easier to understand, but if its not visible straight away, players will watch out for it and this lesson may last longer. This is an interesting research question but we must make some decision on it for implementation.

### ***Goals***

We have stated goals for each mini game and free-play session. When the game is implemented and we can play these levels, we will be able to fine tune the goals. Remember, having the goals appropriate is vital. If its possible to finish a mini game or free play session without using the skills we have taught, then players will probably not use the skills. In order to know that they have learned, our goals must be appropriate.

There should also be an online leaderboard – something for players who want to repeat the playing of the game and track their high scores against other people.

### **Leadership actions**

We haven't finished this part. It is very complex and will need careful consideration from all partners involved in development (Lincoln, ISTC-CNR and Barabaranelli.) I will lay out the problem so you can see how complex it is, and can have a think about how to simplify it. Maybe I just need a few days away to think clearly about it too.

Each leadership action will have specific consequences. These consequences will be different depending on 1) the followers personality, 2) the followers ability, 3) the followers stress. So each action will need to have at least 9 separate outcomes (just from follower characteristics) and will need to be modulated by stress. So each will have to be defined like this:

<b>Name</b>	<b>Type of leadership (from FRL)</b>	<b>Cost to leader</b>	<b>Who m</b>	<b>A1 Po</b>	<b>A2 Po</b>	<b>A3 Po</b>	<b>A1 Ach</b>	<b>A2 Ach</b>	<b>A3 Ach</b>	<b>A1 Aff</b>	<b>A2 Aff</b>	<b>A3 Aff</b>
email	IC	1 day	Group	IM + Ab +	IM + Ab +	IM- Ab +	IM- Ab +	IM~ Ab +	IM~ Ab +	IM + Ab +	IM + Ab +	IM + Ab +

IC = Individualised Consideration

IM = Intrinsic Motivation

Ab = Ability

A1 = Ability1 (low ability)

A2 = Ability 2 (medium ability)

A3 = Ability3 (high ability)

Po= Power

Ach = Achievement

Aff = Affiliative

Group = who does the action apply to. A single follower, a group of followers, or all followers

As you can see, figuring this out for every individual combination is the kind of thing a computer should be doing! So, I presume it will be done internally by the model. For the moment, I have included a list of types of leadership actions that can be implemented. Hopefully this should provide you with enough information to develop the first version. Add to these as you wish.

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