Chapter 11
Serious Games as Positive Technologies for Individual and Group Flourishing

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Abstract By fostering continuous learning experiences blended with entertaining affordances, serious games have been able to shape new virtual contexts for human psychological growth and well-being. Thus, they can be considered as Positive Technologies. Positive Technology is an emergent field based on both theoretical and applied research, whose goal is to investigate how Information and Communication Technologies (ICTs) can be used to empower the quality of personal experience. In particular, serious games can influence both individual and interpersonal experiences by nurturing positive emotions, and promoting engagement, as well as enhancing social integration and connectedness. An in-depth analysis of each of these aspects will be presented in the chapter, with the support of concrete examples. Networked flow, a specific state where social well-being is associated with group flourishing and peak creative states, will eventually be considered along with game design practices that can support its emergence.

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11.1 Introduction

Serious applications for computer game technologies have become important resources for the actual knowledge society. Their use and effectiveness have been broadly acknowledged in different sectors, such as education, health, and business. By fostering continuous learning experiences blended with entertaining affordances, serious games have been able to shape new virtual contexts for human psychological development and growth. They have in fact supported the creation of socio-technical environments [1], where the interconnection between humans and technology encourages the emergence of innovative ways of thinking, creative practices, and networking opportunities. Further, serious games have been capable of supporting wellness and promoting happiness. That is why they can be considered as "positive technologies".

Positive Technology is an emergent field based on both theoretical and applied research, whose goal is to investigate how Information and Communication Technologies (ICTs) can be used to empower the quality of personal experience [2–4].

Based on Positive Psychology theoretical framework [5, 6], Positive Technology approach claims that technology can increase emotional, psychological and social well-being. Hence, positive technologies can influence both individual and interpersonal experiences by fostering positive emotions, and promoting engagement, as well as enhancing social integration and connectedness.

Starting from an introductory analysis of the concept of well-being as it has been framed by Positive Psychology research, this paper will reflect on the nature and the role of serious games as positive technologies. In particular, it will discuss how they can support, and train the optimal functioning of both individuals and groups, by contributing to their well-being.

Finally, it will present a practical exemplification of a serious game developed to promote networked flow, a peak creative state achieved when team members experience high levels of presence and social presence in a condition of "liminality" [7].

11.2 Positive Psychology

Inspired by the psychological and philosophical tradition that focused on individual growth and human empowerment, Martin Seligman and Mihaly Csikszentmihalyi officially announced the birth of Positive Psychology in 2000.

Within the first twenty-first century issue of the *American Psychologist*, the two authors identified an epistemological and theoretical limit for the modern psychology in the emphasis given to the study of human shortcomings, illnesses, and pathologies [6]. Therefore, psychology was perceived as "half-baked" [8], and a change in its focus from repairing deficits to cultivating human flourishing took place.

In this way, Positive Psychology emerged as the scientific study of "positive personal experience, positive individual traits, and positive institutions" [5, 6]. By focusing on human strengths, healthy processes, and fulfillment, Positive Psychology aims to improve the quality of life, as well as to increase wellness, and resilience in individuals, organizations, and societies.

Rather than representing a new formal sector or a new paradigm, Positive Psychology is a novel perspective to studying human behavior that encompasses all areas of psychological investigation [9]. Thus, the link with accurate and scientific methodological practices [10] has become the engine of interventions to study and promote the optimal expression of thought, emotions and behaviors. In particular, according to Seligman [11], three specific existential trajectories may be explored to reach such a complex goal:

- the *pleasant life*, marked by the presence of pleasure, and supported by positive feelings and emotions about the past, present and future;
- the *engaged life*, achievable through the exploitation of individual strengths and virtues, by pursuing enjoyable activities that are absorbing, and involving;
- the *meaningful life*, based on the possibility of identifying and serving of something larger than one's individual self.

Similarly, Keyes and Lopez [12] argued that positive functioning is a combination of three types of well-being: (a) high emotional well-being, (b) high psychological well-being, and (c) high social well-being. This means that Positive Psychology identifies three characteristics of our personal experience—affective quality, engagement/actualization, and connectedness—that serve to promote personal well-being. We will go into depth in each of them in the attempt to understand how they can be enhanced by technology and serious games.

11.3 The Hedonic Perspective: Fostering Positive Emotional States

The *pleasant life* and high emotional well-being have been investigated by the so-called hedonic perspective. It owes its name to the ancient greek vocabulary, where the word *edonè* means pleasure. Interpreted by Positive Psychology scholars as an essential feature of human nature, this construct encompasses a family of psychological experiences that make us feel good [13].

Although in an implicit form and with a different vocabulary, the concept of pleasure appeared several times in the psychological domain. The psychoanalytic model—in which the pleasure principle assumed a role of primary importance—or the behavioral approach—where pleasure focuses on the logic of reinforcement—are just two examples [13]. However, only thanks to the work of Kahneman et al. [14], hedonic psychology was eventually conceptualized as the study of "what makes the experience pleasant or unpleasant".

Among the different ways to evaluate pleasure in human life, a large number of studies have focused on the concept of subjective well-being (SWB), defined as "a person's cognitive and affective evaluation of his or her life as a whole" [15, 16]. Thus, SWB implies both emotional responses to life events, and cognitive judgment of personal satisfaction. At the cognitive level, opinions expressed by individuals about their life as a whole, and the level of satisfaction with specific life-domains, such as family or work, becomes fundamental. At the emotional level, SWB is indeed related to the presence of positive emotional states and the absence of negative moods.

This point is of particular interest to the hedonic perspective. Unlike negative emotions, that are essential to provide a rapid response to perceived threats, positive emotions can expand cognitive–behavioral repertoires and help to build resources that contribute to future success [17, 18]. The salience of positive emotions in increasing well-being has been recently highlighted by the "broaden-and-build" model [17, 18]. According to Fredrickson, positive emotions broaden, on the one hand, the organism's possibilities with undefined response tendencies that may lead to adaptive behaviors and mitigate the impact of negative stressors. The elicitations of positive emotions, for example, make attentional processes more holistic and gestalt [19], stimulate a more flexible, intuitive [20], receptive and creative thinking [21].

Further, by encouraging a broadened range of actions, positive emotions build over time enduring physical, psychological, and social resources. For example, correlation with a faster recovery from cardiovascular diseases [22], an increase of immune function and lower levels of cortisol [23] have been highlighted. Moreover, the presence of positive emotions is an effective predictor of the level of happiness of individuals [24] and longevity [25], triggering a virtuous circle, that implements the possible use of other positive experiences.

11.3.1 Using Technology to Foster Positive Emotional States

The hedonic side of Positive Technology analyzes the ways technologies can be used to produce positive emotional states. On the basis of Russell's model, many researchers have acknowledged the possibility to modify the affective quality of an experience by manipulating the "core affect" [26, 27]. This is a neurophysiological state corresponding to the combination of hedonic valence and arousal that endows individuals with a sort of "core knowledge" about the emotional features

of their emotional experience. The "core affect" can be experienced as freefloating (mood) or attributed to some causes (and thereby begins an emotional episode). In this view, an emotional response is the attribution of a change in the core affect given to a specific object (affective quality).

Recent researches showed that the core affect could be manipulated by Virtual Reality (VR). In particular, Riva and Colleagues tested the potentiality of Virtual Reality (VR) in inducing specific emotional responses, including positive moods [28] and relaxing states [29, 30]. As noted by Serino et al. [4], the potential advantages of using VR technology in inducing positive emotions are essentially two:

- *Interactivity*, to motivate participants, including video and auditory feedback;
- *Manipulability*, to tailor each session in order to evaluate user's idiosyncratic characteristics and to increase task complexity as appropriate.

More recently, some studies explored the potentiality of emerging mobile devices to exploit the potential of positive emotions. For instance, Grassi et al. [31] showed that relaxing narratives supported by multimedia mobile phones were effective to enhance relaxation and reduce anxiety in a sample of commuters.

11.3.2 Can Serious Games Foster Positive Emotional States?

Serious Games and games in general are strictly connected to positive emotions, and to a wide variety of pleasant situational responses that make gameplay the direct emotional opposite of depression [32].

At first, serious games can evoke a *sensorial pleasure* throughout graphics, usability, game aesthetic, visual and narrative stimuli. This point has been analyzed by emerging trends, such as engineering aesthetics 2.0 [33] and hedonic computing [34], whose results will be able to significantly influence game design.

Secondly, serious games foster an *epistemophilic pleasure* by bridging curiosity with the desire of novelty within a protected environment where individuals can experience the complexity of their self, and developing mastery and control. In other words, they are able to recreate a "magic circle" [35], that enforces individual agency, self-confidence and self-esteem [36], by sustaining a process of acknowledgement of personal ability to perform well, solve problems, and manage with difficulties. Hence, empowered by new media affordances and possibilities, serious games can promote a dynamic equilibrium between excitement and security.

Thirdly, serious games promote the *pleasure for victory* and, by supporting virtual interactions with real people, they nurture a *social pleasure*, promoting collaborative and competitive dynamics, communication and sharing opportunities, even outside the context of the game [37].

Games have also been traditionally recognized as marked by a *cathartic pleasure* as they represent a relief valve for emotional tensions, anger and aggressiveness [38].

Finally, pleasure has a *neural* counterpart. An interesting example is that of dopamine, a neurotransmitter that affects the flow of information in the brain and that is often involved in pleasant experiences, as well as in different forms of addiction and learning. In a classic study made by Koepp et al. [39] to monitor the effects of video games on brain activity, a significant increase of dopamine (found in a quantity comparable only to that determined by taking amphetamines) was measured.

Good examples of Serious Games explicitly designed to foster positive emotion are *The Journey to Wild Divine* (http://www.shokos.com/The_Journey_to_Wild_Divine.html) and *Eye Spy: the Matrix*, *Wham!,* and *Grow your Chi*!, developed in Dr Baldwin's Lab at McGill University (http://selfesteemgames.mcgill.ca). In *The Journey to Wild Divine* the integration between usable biofeedback sensors and a computer software allows individuals to enhance their subjective wellbeing throughout a 3D graphic adventure. Here, wise mentors teach the skills to reduce stress, and increase physical and mental health.

Eye Spy: the Matrix, *Wham!,* and *Grow your Chi*! are indeed projects whose goal is to empower people with low self-esteem respectively by working on ignoring rejection information, throughout positive conditioning, or by focusing on positive social connections [40, 41].

11.4 The Eudaimonic Perspective: Promoting Individual Growth and Fulfillment

The *engaged life* is based on an eudaimonic definition of well-being. This perspective is associated with the possibility to fully realize human potential through the exercise of personal virtues in pursuit of goals that are meaningful to the individual and society [4, 9]. In the Greek tradition a *daimon* is in fact a divine spirit in charge of cherishing man, and pushing him towards happiness.

In his theory of "developmentalism", strongly influence by Aristotelian naturalism and perfectionism, Kraut [42] introduced the term "flourishing". Humans are really able to flourish when they develop, interiorize and exercise their natural capacities on a cognitive, affective, physical and social level. From a psychological point of view, this conception had a strong influence on authors like Maslow [43], Allport [44], and Rogers [45]. In the works of these and other authors, individuals, groups, and organizations are no longer perceived as passive receptors of external stimulations, but as proactive agents, fully engaged in their actualization and fulfillment.

Thus, this approach focuses on the growth of individuals as a whole, rather than merely emphasizing the pursuit to pleasure and comfort. In this case, happiness no

longer coincides with a subjective form of well-being, but with a psychological one. This is based on 6 elements [46–48]:

- *Self-acceptance*, characterized by awareness and a positive attitude towards personal qualities and multiple aspects of the self, including unpleasant ones;
- *Positive relationships with others*, determined by the ability to develop and maintain social stable relationships and to cultivate empathy, collaboration and mutual trust;
- *Autonomy*, reflected by the ability of seeking self-determination, personal authority, or independence against conformism;
- *Environmental Mastery*, based on the ability to change the external environment, and to adapt it to personal needs or goals;
- *Purpose in life*, marked by the presence of meaningful goals and aims in the light of which daily decisions are taken;
- *Personal growth*, achievable throughout a continuous pursuit of opportunities for personal development.

Another author that has fully interpreted the complexity of the eudaimonic perspective is Positive Psychology pioneer Mihaly Csikszentmihalyi who formalized the concept of flow [49, 50]. The term expresses the feeling of fluidity, and continuity in concentration and action reported by most individuals in the description of this state [9]. In particular, flow, or optimal experience, is a positive, complex and highly structured state of deep involvement, absorption, and enjoyment [49]. The basic feature of this experience is a dynamic equilibrium perceived between high environmental action opportunities (challenges) and adequate personal resources in facing them (skills). Additional characteristics are deep concentration, clear rules and unambiguous feedback from the task at hand, loss of reflective self-consciousness, control of one's actions and environment, alteration of temporal experience, and intrinsic motivation.

11.4.1 Using Technologies to Promote Individual Growth and Fulfillment

Scholars in the field of human–computer interaction are starting to recognize and address the eudaimonic challenge. For example, Rogers [51] calls for a shift from "proactive computing" to ''proactive people," where "technologies are designed not to do things for people but to engage them more actively in what they currently do".

Further, the theory of flow has been extensively used to study user experience with Information and Communication Technologies. It is the case of internet [52], virtual reality [53, 54] social networks [55], video-games [56–59], and serious games [60].

In fact, all these media are able to support the emergence of a flow state, as they offer an immediate opportunity for action, and the possibility to create increasingly challenging tasks, with specific rules, as well as the opportunity to calibrate an appropriate and multimodal feedback.

In addition, some researchers have drawn parallels between the experience of flow and the sense of presence, conceived as the subjective perception of "being there" in a virtual environment [61]. Both experiences have been described as absorbing states, marked by a merging of action and awareness, loss of self-consciousness, and high involvement and focused attention on the ongoing. On these premises, Riva and colleagues postulated the power of "transformation-of-flow"-based strategies [3]. They can be conceived as individuals' ability to draw upon an optimal experience induced by technology, and to use it to promote new and unexpected psychological resources and sources of involvement.

11.4.2 Can Serious Games Promote Individual Growth and Fulfillment?

Bergeron [60] defined serious games as interactive computer applications, with or without a significant hardware component, that (a) have challenging goals, (b) are fun to play with and/or engaging, (c) incorporate some concepts of scoring, (d) impart to the user skills, knowledge, or attitude that can be applied in the real world.

Interestingly, all of these aspects can be easily overlapped to Csikszentmihalyi's theory of flow. Games are in fact "flow activities" [49, 50] as they are intrinsically able to provide enjoyable experiences [32, 62], creating rules that require the learning of skills, defining goals, giving feedback, making control possible, and fostering a sense of curiosity and discovery.

In addition, the intrinsic potential of flow that characterizes serious games can be even empowered by (a) identifying an information-rich environment that contains functional real world demands; (b) using the technology to enhance the level of presence of subjects in the environment, and (c) allowing the cultivation, by linking this optimal experience to the actual experience of the subject [3]. To achieve the first two steps, it is fundamental to look at the following game design elements [58]:

- *Concentration.* Serious games should stimulate a mental focus on in-game dynamics, by providing a set of engaging, differentiated and worth-attending stimuli that limit the influence of external variables. Along with other aspects, concentration can result in hyperlearning processes that consist of the mental ability to totally focus on the task by using effective strategies aligned with personal traits [50];
- *Challenge.* As noted by Gee [63], who claims that the game experience should be "pleasantly frustrating", challenges have to match players' skills/level and to

support their improvement throughout the game. During specific stages of the game, "Fish tanks" (stripped down versions of the real game, where gameplay mechanisms are simplified) and "Sand boxes" (versions of the game where there is less likelihood for things to go wrong) can support this dynamism;

- *Player Skills*. Games must support player skills and mastery throughout game usability, and specific support systems and rewards;
- *Control*. It is fundamental for players to experience a sense of control over what they are doing, as well as over the game interface, and input devices;
- *Clear goals*. Games should provide players with specific, measurable, achievable, responsible and time-bounded goals;
- *Feedback*. Players have to be supported by feedback on the progress they are making, on their action, and the ongoing situations represented in the virtual environment;
- *Immersion*. Players should become less aware of their surroundings and emotionally involved in the game dynamics;
- *Social Interaction*. Games should create opportunities for social interaction by supporting competition, collaboration, and sharing among players.

An interesting example of an eudaimonic serious game is *Reach Out Central* (ROC), developed by ReachOut.com (http://www.reachoutpro.com). It is a Cognitive-Behaviour therapy game that encourages users to develop psychological well-being. Studied for young people aged 14–24, ROC is a single-player role play game with innovative 3D graphics and real-life scenarios and characters. Here, players can see how their decisions and reactions affect their moods, and apply skills they learn offline in their day-to-day lives. An evaluation conducted by Shandley et al. [64] found that ROC reduced psychological distress, alcohol use, and improved life satisfaction, resilience, and problem-solving abilities.

11.5 The Social Perspective: Enhancing Integration and Connectedness

Networking and participation are becoming the foundations of human performance in educational, organizational and recreational settings [65]. Here, new communities of practice [66] are being established to promote an engagement economy that will be able to foster innovation and success by sustaining collective well-being and group flourishing [32, 67]. However, the enhancement of a human capital so dynamic and heterogeneous implies a deep involvement in nurturing a social form of well-being. In particular, social well-being indicates the extent to which individuals are functioning well in their social system and it is defined on five dimensions [68]:

- *Social integration*, conceptualized as the evaluation of the quality of personal relationships with a community or a society;

- *Social contribution*, evidenced by the perception of having something important to offer to society and the world at large;
- *Social coherence*, determined by the meaning given to the quality, organization, and operations that make up the social sphere;
- *Social acceptance*, based on the belief that people proactivity and agency can foster the development of societies and culture;
- *Social actualization*, determined by the evaluation of the potential and the trajectory of society.

11.5.1 Using Technologies to Enhance Integration and Connectedness

At this level, the challenge for Positive Technology is concerned with the use of new media to support and improve the connectedness between individuals, groups, and organizations, and to create a mutual sense of awareness. This is essential to the feeling that other participants are there, and to create a strong sense of community at a distance.

Short et al. [69] introduce the term "social presence" to indicate the degree of salience of the other person in a mediated environment and the consequent salience of their interpersonal interaction. On this point, Riva and Colleagues [61] argued that an individual is present within a group if he/she is able to put his/her own intentions (presence) into practice and to understand the intentions of the other group members (social presence). Techniques to promote such a "sense of being with another" throughout a medium have a long history, going back to the first stone sculptures that evoked a sense of some other being in the mind of an ancestral observer [70].

Nowadays, social presence has been empowered by advanced ICT systems. Groupware, for example, are computing and communication technology based systems that assist groups of participants engaged in a common task, supporting communication, coordination, and collaboration through facilities such as information, discussion forums, and messaging [71, 72]. The use of groupware has been particularly effective in distributed systems, where—because of the increasing complexity of the environment—single members can access only partially the whole problem. By enhancing social presence, it thus becomes possible to overcome major shortcomings and group's inefficiencies.

Further, assembling these basic concepts with the potential of the world wide web in its most recent version (web 2.0), enterprise 2.0 was born in the business context. It implies the emerging use of social software platforms within companies to facilitate the achievement of business objectives [73]. Thus, Enterprise 2.0 allows to work on reputation, (by both monitoring the internal reality of the organization, and identifying the dynamics implemented by external stakeholders and audiences),

collaboration (by developing internal communities), communication (by stimulating the development of interactive exchanges), and connectedness (by enriching the relational and logical transmission of information).

Other interesting phenomena linked to the interpersonal dimension are crowdsourcing and Collaborative Innovation Networks (COINs). The former represents an online, distributed problem-solving and production model that indicates the procurement of a set of tasks to a particularly broad and undefined group of individuals, called to collaborate through Web 2.0 tools [74]. The latter, indicates a "cyber-team of self-motivated people with a collective vision, enabled by the Web to collaborate in achieving a common goal by sharing ideas, information and works" [75].

All these technologies can promote the development of a peak collaborative state experienced by the group as a whole and known as "networked flow" [7]. Sawyer [76, 77], who referred to this state with the term of "group flow", identified several conditions that facilitate its occurrence: the presence of a common goal, close listening, complete concentration, control, blending egos, equal participation, familiarity, communication and the potential for failure. As noted by Gaggioli et al. [7], networked flow occurs when high levels of presence and social presence are matched with a state of "liminality". In particular, three pre-conditions have to be satisfied:

- group members share common goals and emotional experiences so that individual intentionality becomes a *we-intention* [78] able to inspire and guide the whole group;
- group members experience a state liminality, a state of "being about" that breaks the homeostatic equilibrium previously defined;
- group members identify in the ongoing activity the best affordances to overcome the situation of liminality.

11.5.2 Can Serious Games Enhance Integration and Connectedness?

Social presence and networked flow can be fostered by serious games as well. An interesting study realized by Cantamesse et al. [79], for example, examined the effect of playing the online game World of Warcraft (WoW), both on adolescents' social interaction and on the competence they developed on it. The in-game interactions, and in particular conversational exchanges, turn out to be a collaborative path of the joint definition of identities and social ties, with reflection on in-game processes and out-game relationships.

Another interesting example is *Mind the Game*^TM, developed by our research group [80] to enhance the optimal functioning of groups.

11.6 Mind the Game™: A Serous Game to Promote Networked Flow

Mind the Game™ is a multiplayer serious game developed to create a socio-technical environment [1] where the interconnection between humans and technology could encourage the emergence of networked flow.

Embedding the potential of serious gaming, *Mind the Game*™ aims to expand the range of resources that groups can access in daily contexts, allowing a greater awareness of the skills possessed both individually and as a whole, and implementing an experiential learning process that supports shared optimal experiences. As a new medium aimed at facilitating change, the serious game generates a virtual environment where groups can express their potential, dealing with a reality that constantly redefines the balance between challenges and skills. This was studied to create a virtuous circularity that promotes collective peak experiences and high levels of perceived effectiveness, both in an individual and collective sense.

11.6.1 Technology

The serious game was created with Forio Simulate™ (www.forio.com), a software that allows the development of multiplayer online simulations, based on Adobe Flash Player. We designed an interface primarily textual, enriched multimodally by clips, images, and animated graphics that make the game more interactive (Fig. 11.1).

Mind the Game™ emerged as a multiplayer game studied for small groups of 5 people, that provides the facilitator/the researcher with the ability to monitor the progress of the game.

Eventually, the serious game was embedded in a specific website (www. mindthegame.it) that consists of a welcome page, a tutorial, and a questionnaire section to evaluate the game experience.

11.6.2 Sharing Goals and Emotional Experiences: Sport as a Narrative Tool

The narrative framework—especially in technological solutions based on a textual environment—is a core element for serious game design. Narratives have to be clear, straightforward, easy to understand and memorable to capture the interest of the user [81, 82]. Therefore, the choice of plots and settings will be decisive to bring the group out of the comfort zone, nurturing the onset of spontaneous

Fig. 11.1 The primarily textual interface of *Mind the Game*™ is enriched multimodally by clips, images, and animated graphics

behaviors, as well as promoting the emergence of we intentions [78], social presence and ingroup dynamics in multiplayer settings.

Moreover, the underlying potential of narratives can be amplified through the use of peculiar scenarios that have nothing to do with day by day experiences [83]. In this way, it is possible to modulate the impact of prior knowledge of users and to support common cognitive processes and knowledge sharing practices.

As a metaphor of life, sport is a powerful and effective training tool, capable of supporting learning and experiential transpositions. In particular, sport witnesses how beyond individual and team excellence there are challenges that do not end against the opponent, but in their relationship with the self.

According to the aforementioned considerations, we chose a little-known sport that could be used to promote networked flow: gliding. This is a discipline based on soaring flight, where, in the absence of the driving force of an engine, the pilot is required to take advantage of upward motions and movements of air masses [84]. In fact, thanks to the overheating of the soil and the atmospheric layers close to it, the air creates connective vertical motions, called thermals, that support the flight.

The development of the narrative plot structure on such a discipline can be particularly effective both because of an implicit and an explicit reason.

On the one hand, soaring flight embraces a deep archaic desire: the tension to the sky. Sky has represented a point of reference for a humanity that has begun to mature the dream of approaching it. Thus, before becoming the concrete possibility, outlined by the studies of Leonardo or by the efforts made by Wright and Montgolfier brothers, flight is synonym of purity and freedom, fantasy, hope, and imagination. It is the symbol of a challenge marked by a courageous and meaningful searching of the limit.

On the other hand, as a sport, gliding implies competition and collaboration. The first concept is well reflected by the Grand Prix, a race in which pilots directly compete one another. The goal is to go throughout a task—a plot delimited by specific turning points that are placed so as to form a polygon—in the shortest time. Generally, the Grand Prix is structured among several days, implying different tasks from time to time.

The choice of an individual sport to promote group creativity and of team working may instead appear paradoxical. But it is not: individual excellence is the tip of the iceberg beneath which team effort and coordination always make the difference. The collaborative dimension of gliding is present because, despite the solo flight of the pilot, his/her staff can support each step of the race from the ground. In fact, parameters to be taken into consideration are extremely numerous and they require the intervention of professionals specifically trained. In particular, according to the model described by Brigliadori and Brigliadori [85], five elements are fundamental:

- *Technical*. Managing an efficient flight and exploiting the energy available in the atmosphere in the best possible way, require specific skills: decision-making, problem-solving, control, and experience. Moreover, the maintenance of security and risk management are the foundation of successful flights.
- *Strategic*. The ability to take advantage of circumstances involves a process of decision-making able to take into account meteorological aspects, competitors, geography. The race is played on the ability to make the most from the opportunities that are revealed during the task.
- *Psychological*. Control of emotions, stress management, relaxation, high levels of concentration, resilience and self-efficacy are just some of the psychological components that may be decisive during a competition.
- *Athletic*. Pilots must take great care in athletic training, monitoring nutrition and fatigue management.
- *Meteorological*. Climate is a component whose analysis should be careful and meticulous in order to avoid unnecessary risks and make winning choices.
- *Organizational*. The athlete, together with the staff, is expected to prepare the race in every detail, monitoring equipment and logistics practices.

Thus, in the serious game users will not be asked to wear the shoes of gliding pilots: they will be the team members of an athlete that has to win the World Competition. In the effort to promote a more immersive user experience and increase the realism of the serious game we contacted a testimonial: Margherita Acquaderni, one of the best gliding pilots in the world, who holds 46 Italian records.

The sense of in-group belonging is first increased by the narrative framework, that immerses players in a collaborative environment. In this way, it is possible to encourage the emergence of a we-intention, whose genesis is the *conditio sine qua non* for the development and implementation of networked flow.

11.6.3 Creating a Space of Liminality

With the support of a suggestive graphic environment and with an emotional clip, users are introduced to a letter written directly by Margherita Acquaderni. After introducing herself, the athlete said to be in Australia where she will compete in the last gliding race of the season. Here she can realize her dream: winning for the first time the World Competition. By showing the characteristics of the race, the pilot explains that the task is going to be very technical and complicated, stressing that every detail can make an important difference.

The user begins to realize his/her role in the simulation: he/she will not be called to be an athlete or an opponent of the athlete, but a member of her team. Each player will in fact be assigned one of the following roles: team manager, strategist, technical expert, meteorologist or doctor.

After that, the players are introduced to a tutorial that illustrates the basic rules of the game, and analyzes the structure of the interface and its iconography. It is then specified how, next to a shared goal (leading the athlete to win the World Competition), each character will be motivated by personal goals, different from those of the other participants.

Finally, the team's score is defined as a result of three parameters:

- Score obtained in the race by the athlete;
- The sum individual scores;
- Time Management as each task it time bounded.

The arrangement by which each character appears to the player is the same and tends to follow the systemic model proposed by Bowman [86]. It is marked by the definition of name, age, nationality, as well as the role played within the team and the tasks he/she has to preside. The user can then discover his/her background. This is realized on three levels, indicating aspects of the past, present and future. At the same time, the user can also view the individual goals of the character.

Finally, there is a brief personality description, borrowed, even in elementary form the Jungian psychological types and the Mayers-Briggs Type Indicator System [87] that arises from them.

11.6.4 Identifying a Common Activity to Overcome the Space
of Liminality

According to Steiner's model [88], it is possible to distinguish:

- *Additive* tasks, referred to situations in which the final result is determined by the sum of individual contributions;
- *Compensatory* tasks, where the result is determined as an average of the contributions made by individual subjects;

- *Conjunctive* tasks, where the success of the group depends on the success of each member;
- *Disjunctive* tasks, where each member can promote a solution of their own, knowing that the success of the group depends on a single correct alternative;
- *Complementary* tasks, that requires the sharing of knowledge, processes and methods so that the whole could exceed the sum of its single parts.

When the intention is then transformed into action, the serious game becomes functional to stimulate a synergistic collaboration. In line with the theory of Steiner [88], each task is in fact designed according to a *complementary logic*, in an attempt to involve each player. Specifically, players are called upon to deal with distributed decision-making environments in which real success can not depend on free-riding efforts, but on the emergence of group phenomena, such as social facilitation, social labouring, and team thinking.

Clearly, the effectiveness of the group will be marked by its specific characteristics, as well as on its communicative, emotional and hierarchical structure.

11.6.5 A Pilot Study

A pilot study was realized in order to gather initial and qualitative data on the impact the serious game had on the optimal functioning of different groups.

According to the taxonomy proposed by Arrow et al. [89] we organized focus groups with three different kinds of groups:

- *Task forces* (N = 4), temporary groups of business people formed to carry out a specific project, or to solve a problem that requires a multi-disciplinary approach. The task forces that participated to the study worked in four different business fields: fashion, graphic design, research, and food industry.
- *S*port teams (N = 4), stable groups of sportsmen that work together to achieve a common goal. Focus groups were conducted with the members of a football team divided according to their position (goalkeepers, defenders, midfielders, forwards).
- *Social groups* (N = 4), groups of peers where members are linked by informal relations.

A total of 60 subjects (age = 25.7, d.s: 7.15) participated to focus groups. Sessions were chaired by a facilitator, who began by introducing *Mind the Game*[TM] and explaining the reasons of the study.

Anagraphic and socio-demographic data, including age, gender, marital status, occupation, and education, were collected. Computer experience and skills were considered too. Then, groups played the serious game.

At the end of the game, each group was asked to identify ten factors that *Mind The Game*[TM] was able to stimulate. Results are shown in Figs. 11.2, 11.3 and 11.4.
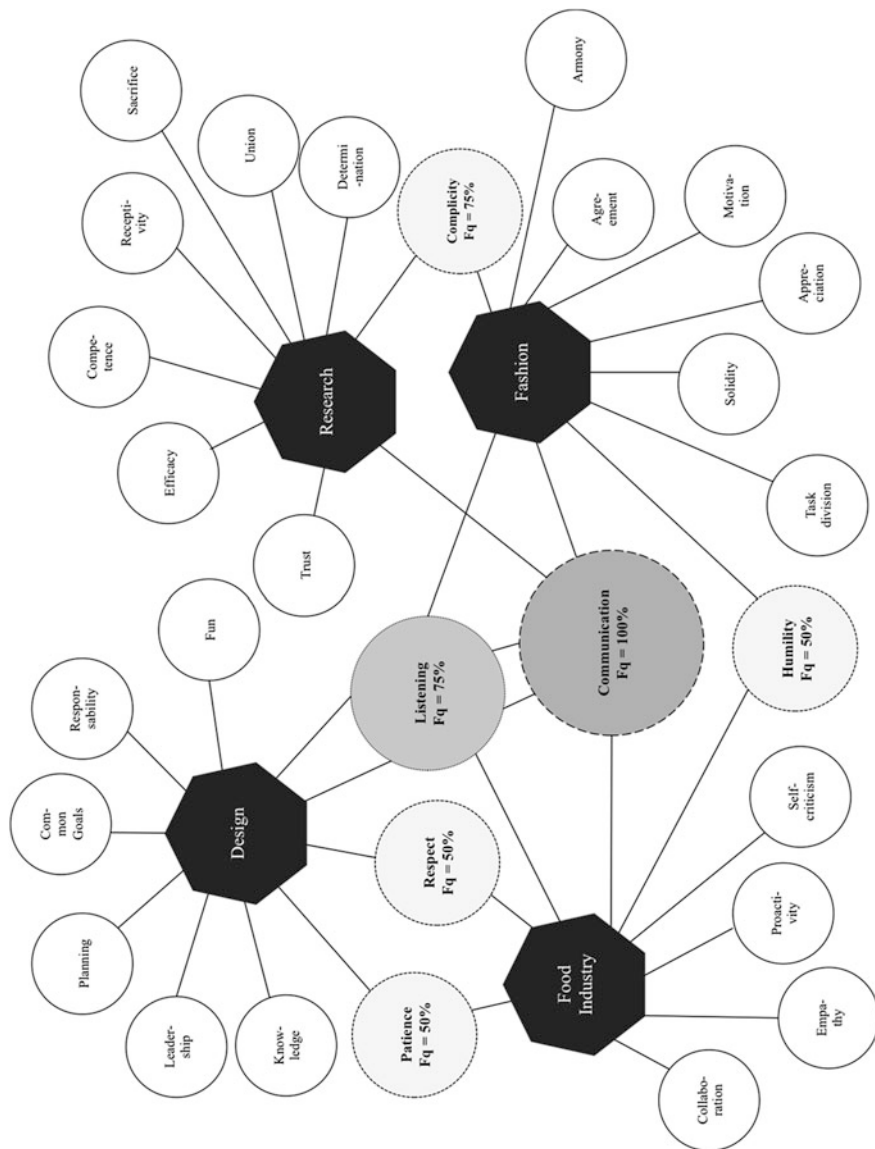
Fig. 11.2 After the homogenization of similar lexical forms, factors mentioned with a percentage of occurrence greater than 60 % were communication ($Fq = 100$ %), and listening ($Fq = 75$ %). Overall, task force members focus on personal characteristics (humility, patience, listening), as well as on their explication in a relational framework (communication, collaboration and respect)

All groups reported that the serious game had a strong impact on communication and collaboration, fostering active listening and collective efficacy.
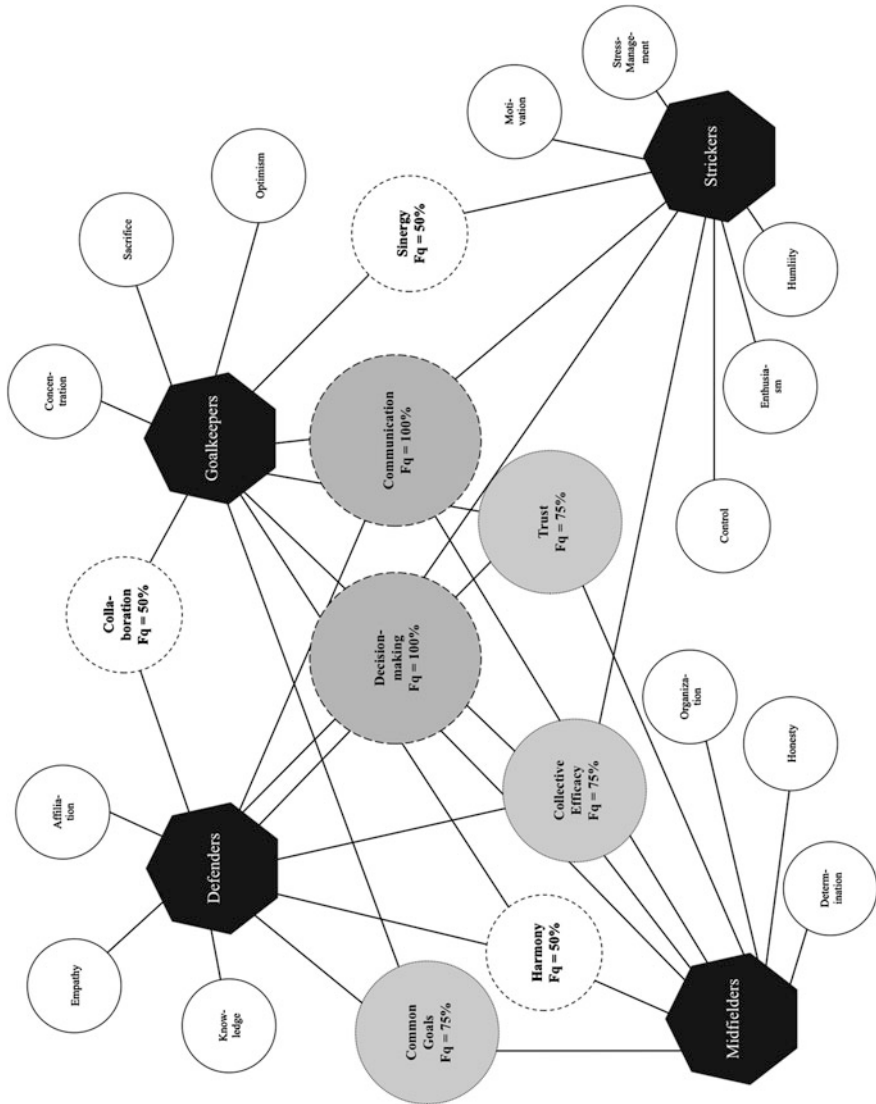
Fig. 11.3 Within the football team, communication and decision-making were mentioned by all groups (Fq = 100 %). Trust, collaboration and common goals had a high percentage of occurrence too (*Fq* = 75 %)

However, further research has to be done in order to gather empirical data on the topic.

Moreover, the identification of the ten factors supported the development of a detailed discussion that focused on strengths and weaknesses of the game. Overall,
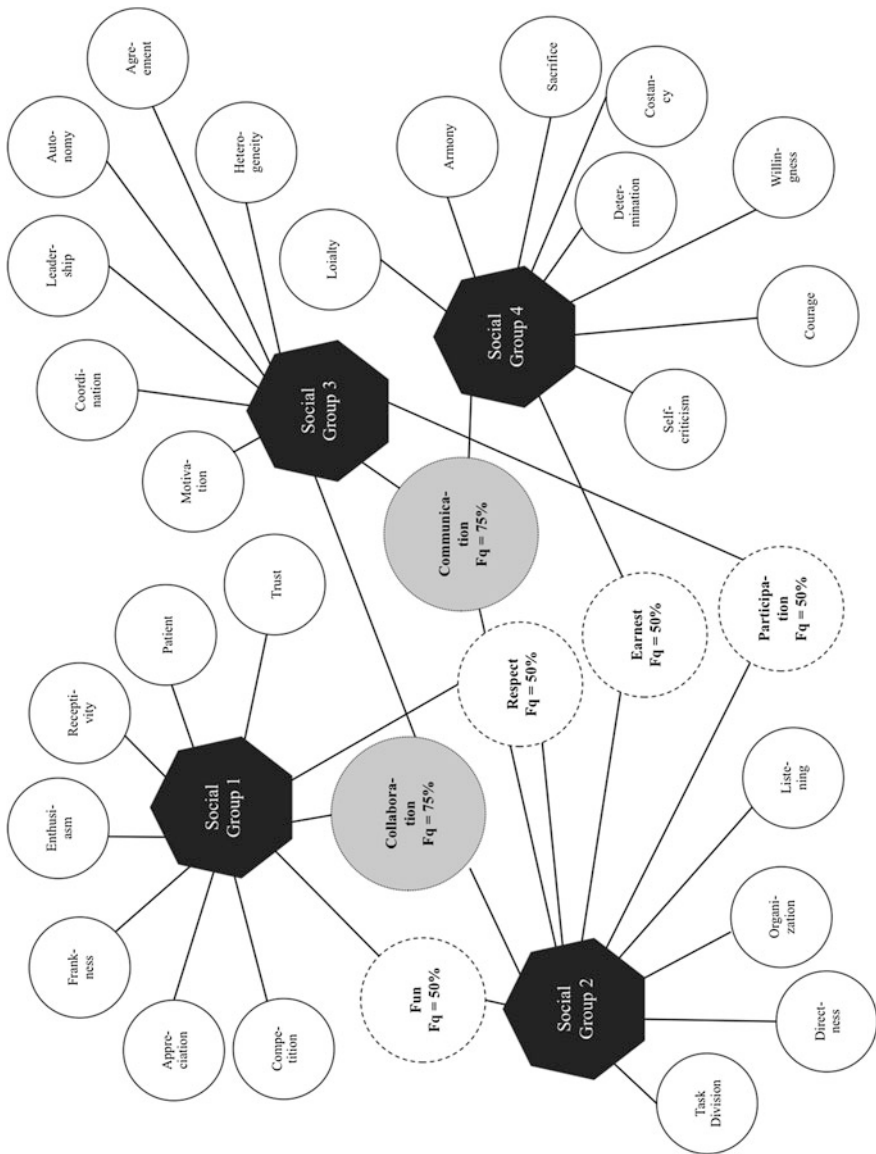
Fig. 11.4 Within social groups, the factors mentioned with the highest frequency were communication and collaboration ($Fq = 75$ %), followed by fun, respect, participation, and earnest (50 %)

participants reported that *Mind the Game*[TM] has the potentiality to become an effective positive technology to empower team working and networked flow.

On the one hand, *Mind the Game*[TM] might be considered as a tool to both train and assess individual and social skills. Team and individual measures may be

considered along with outcome and process measures. Moreover, within an assessment perspective, the SG could be considered as an assessment tool itself, allowing an on-line evaluation of human behaviours, or it can be integrated with other assessment instruments.

On the other hand, it can be used to maintain high levels of ecological validity and experimental control, giving the researcher the possibility to manipulate specific variables in everyday life environments.

11.7 Conclusion

In this chapter we discussed the role of serious games as positive technologies. According to Positive Psychology theoretical framework and Positive Technology approach, we demonstrated that these applications are able to promote the three life trajectories identified by Seligman [11]: *the pleasant life, the engaged life, and the meaningful life.*

First of all, serious games can foster positive emotional states by enhancing the different forms of pleasure they are intrinsically made of. In particular, we discussed the importance of sensorial, epistemophilic, social, cathartic and neural pleasure.

Secondly, serious applications for computer game technologies can be associated with flow experiences and, thus, with psychological well-being. Throughout high level of presence and flow, technologies can, in fact, promote optimal experiences marked by absorption, engagement, and enjoyment.

Finally, serious games are able to increase connectedness and integration. To achieve such a complex goal they have to work on a mutual sense of awareness, as well as social presence and situations of liminality. In this way, groups can access peak creative states, known as networked flow optimal experiences, that are based on shared goals and emotions, collective intentions, and proactive behaviors. We eventually presented an empirical exemplification of how all these three aspects may be implemented by psychology-based user experience design.

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