

Towards Ethical Requirements for Addictive Technology: The Case of Online Gambling

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Abstract—Today many interactive online platforms are equipped with immersive and attention-grabbing elements to increase user engagement and persuade more online presence, interaction and transactions. Excessive and obsessive use of technology combined with harm can be seen as a behavioral addiction. While technology companies started to introduce tools to mitigate addictive behavior, their principles, design process and success are questionable. Given the potential conflict between the revenue model and such tools, our work aims to define ethical requirements categories that act as a reference point for analysts and designers. We base our discussion on online gambling, which provides a clear example of addictive technology. Reno Model I–V was examined to discover main guidelines for enabling conscious online activity. As a result, we identified three main ethical goals: 1) creating an environment that supports informed choice, 2) monitoring player data to identify risk factors, and 3) introducing measures to tackle problematic online behaviour. We then refined these upper level goals into more concrete functionalities and metrics.

I. INTRODUCTION

As human attention is a scarce resource, interactive online platforms are now equipped with attention grabbing and immersive techniques as this is considered essential for generating revenue [1]. This shift has raised ethical concerns. Design techniques aiming to maximize user engagement

may also be accountable for a loss of control over usage and in some cases digital addiction [2]. As a response, technology companies such as Facebook and Google have recently started to introduce self-regulation tools to limit excessive usage [3]. However, these tools usually act as reactive measures to decrease harm and are relatively simplistic in their approach towards limiting time and frequency, rather than providing substantial intervention [4]. To truly encourage conscious usage, systems should be designed to first, not trigger addiction and second, be proactive in predicting and handling it. Previous work has examined how ethical values could be followed in software specifications and in the software engineering processes [5] and how AI systems could be developed to be compliant with ethical codes [6]. While the present paper builds on similar concepts, it differs from the above mentioned works in two aspects. First, we not only focus on system behaviour, but also user behaviour in defining ethical requirements categories. This is due to the interactive nature of these platforms that may lead to impaired decision making and addiction. Secondly, we also aim to define the informational content which will fit such influence of technology towards informed and conscious usage, e.g. to educate users about how they may lose control

and what persuasive and immersive elements are embedded in the design.

We study a distinct domain for addictive technology, online gambling, to identify categories of ethical requirements necessary for a design that promotes conscious usage. While debates exist on whether social media and online game platforms cause addiction, gambling disorder is recognized by DSM-5 [7] as a mental disorder. Within the gambling domain conscious and self-regulated usage can be referred to as Responsible Gambling (RG). The RG concept may be perceived as an oxymoron because of the nature of gambling which is based on risk taking. However, in countries where gambling is legal, gambling operators are still required to take responsibility in diminishing excessive, compulsive, and unaffordable gambling.

This position paper aims to identify an initial set of ethical requirements categories to be considered when building addictive technology. We take online gambling platforms as an example. This paper is structured as follows: Section 2 describes the concept of RG and its relation to requirements engineering. Section 3 describes the methodology employed in our work to define categories of relevant ethical requirements. Section 4 describes the result of the study. Section 5 presents conclusion and considerations for future work.

II. RESPONSIBLE GAMBLING: A REQUIREMENTS ENGINEERING PERSPECTIVE

The global gambling market is on an accelerated rise with the expectation that its size will increase by 231.63 billion U.S. dollars between 2020-2024 [8]. While the majority of individuals seem to gamble responsibly for entertainment [9] certain players demonstrate problematic gambling activity [10]. In United Kingdom alone more than 400,000 players identify themselves as problematic gamblers [11]. Problematic gambling can be defined as disproportionate time and money spent on gambling due to loss of control [12]. Such gambling behavior has serious consequences as it can impair personal well-being, social connections and financial status [12]. Problematic gambling can result from interactions between many influences, such as biological

makeup, psychological state, environment and the nature of the game [13].

Compared to traditional gambling, online platforms seem to increase the scale of the problem because of ease of access (through desktop and mobile device), marketing and advertising efforts, and the persuasive techniques used in these sites [14]. Moreover, the use of gambling data for targeted advertising further increases the risk tempting more gambling than what a player can afford [15].

As a response to concerns regarding problematic gambling, governments worldwide have introduced codes of conduct that encourage RG [16]. RG can be defined as “policies and practices designed to reduce and prevent potential negative consequences associated with gambling” [17, pg.308]. Accordingly, many online gambling operators adopt RG features as part of their corporate social responsibility to tackle excessive gambling and improve the image of their industry perception [18].

The foundational basis of online RG practices mainly rests upon the science-based framework Reno Model I–V [16], [17], [19]–[21], which was initially developed in city of Reno through roundtable meetings and was sponsored by both government and commercial gambling entities [21]. Since 2014, five journal articles are published to define RG policies with each having a distinct emphasis. Overall, the model’s main aim is to guide stakeholders (operators, consumers, governments, healthcare services) in producing RG measures that can empirically be tested [17]. In defining RG policies, the model stresses the importance of autonomy and informed choice. That is, the individual has the right to decide whether to gamble or not, but it is the duty of the operator to make sure that it is an informed one [19]. In light of the model, many online operators appear to use voluntary limit-setting and self-exclusion programs to tackle excessive gambling [22].

Although adopting RG features in online platforms is a good step to attain fair and safer gambling environments, the current practices seems less efficient for several reasons. First, most jurisdictions leave it to the operators to decide what measures to take, how to take them, and to what extent. As a

result, operators show differences with regards to the type and degree of measures they adopt [23]. Hence, the quality of adopted measures may be questioned. For example, [24] found that certain sites did not put RG educational content on the homepage. That is, RG content was hidden and could only be found through drop-down menus. Secondly, most of the RG measures adopted by online platforms target problem gamblers and act as reactive measures to decrease current harm. While measures such as self-exclusion schemes and warning messages are commonly used, proactive measures such as pre-commitment, structural modification to sites, and games are less common [25]. Such an approach limits the effectiveness and the scope of online RG measures. Lastly, many RG measures attempt to minimize harm through self-regulation tools focused on gameplay, putting the burden of responsibility mostly on the individual [22]. Though the individual must take responsibility for their actions, for RG to happen the platform itself must ensure that it provides a secure environment for RG to take place through site structure, gambling formats and business practices [26]. Considering the limitations of current practices, an effective and systematic way of enabling RG in online platforms could be realized by treating RG concerns as ethical requirements to be fulfilled both in the design process and also in the final product. In developing software, the most focal structures are requirements as they shape the final system [27]. Responsibility in addictive technology is still an emerging area in requirements engineering literature [28]. Treating responsibility as an ethical requirement can increase its integration into the fabric of gambling platforms through driving the design process, instead of having to introduce it as a reactive measure after the platforms are built. In addition, processes for requirements elicitation, prioritization, conflict resolution and documentation shall be followed, leading to more systematic and traceable approaches to embedding responsibility in addictive technology design.

III. METHOD

To identify a reference model for ethical requirements necessary for RG, we consider responsibility as a set of ethical goals that need measures and courses of actions to achieve. The steps involved in the goal identification process are shown in the flow diagram in Fig. 1.

In this paper, we derive a set of ethical requirements by looking at the intersection between the Reno Model of RG and the Corporate Social Responsibility (CSR) section of various international gambling laws. These sources helped us cover the ethical, conventional and legal aspects of responsibility requirements. The Reno Model I–V [16], [17], [19]–[21] which has already been adopted by the gambling sector was selected as the basis to identify ethical requirements categories that can guide the building of RG online platforms. First, Reno Model I–V articles were examined to identify the main RG guidelines. Guidelines relating to basing RG measures on operationalized variables and outcomes [17], respecting user autonomy and enabling informed choice [16], [19], accounting for cultural context in defining RG measures [20] and evaluating intervention impact [21] were defined and analyzed. In addition to the Reno Model, the social responsibility sections of United Kingdom, Australia, Canada, and Netherlands’ gambling laws were consulted to obtain an international perspective [29]. Guidelines that appeared common to both the Reno Model and the social responsibility sections of the gambling laws were then translated into distinct RG goals. Later, we refined the goals into concrete ethical requirements necessary to guide and also realize these goals. In defining requirements, care was given to balancing profitability against corporate responsibility.

IV. RESULTS

As a result of examining the Reno Model I–V and social responsibility sections of international gambling laws, three common goals were identified: a) create an environment that supports Informed Choice, b) monitor user data to identify risk factors and c) introduce measures to tackle problematic behaviour. The following sections will explore each

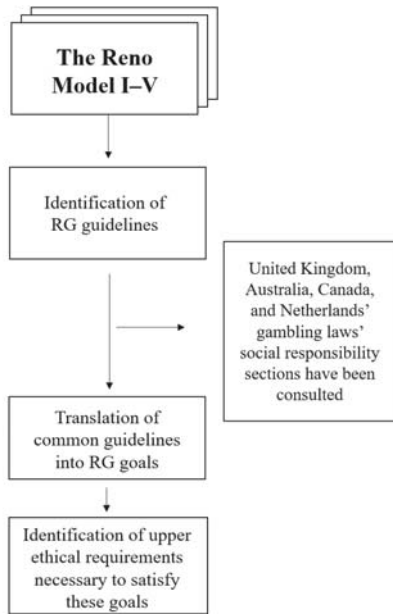


Fig. 1. Research method.

goal in detail, exploring ethical requirements which may be necessary to address that goal. A summary of suggested ethical requirements categories are shown in “Fig. 2”

A. Create an environment that supports Informed Choice

The Reno Model’s main assumption rests on the idea that the choice whether to gamble or not is the individual’s. However, the operator must ensure that the choice is an informed one [17]. Within the model, [19] defines Informed Choice as a reasoned decision based on understanding the essential information within a context without the presence of force, influence or incentive. According to this definition, the higher goal of creating an environment that supports Informed Choice could be divided into two sub-goals. This highlights two key elements in choice: providing sufficient information to enable Informed Choice; and limiting influence on user behaviour.

1) *Provide sufficient information to enable Informed Choice:* To enable Informed Choice, the

online platform needs to provide information about how the system functions and raise awareness of risks related to the online behaviour. One concern about this goal may be that in the case of addictive technology, users ability and willingness to perceive information and in translating that awareness into action may arguably be less unless they are willing to change. Nevertheless the platform needs to fulfil the conditions for Informed Choice. The following section will refine this ethical goal into more concrete requirement which fall into two categories a) what information to provide and b) how to provide information.

a) What information to provide:

- Characteristics and operation of games

One reason players demonstrate problematic gambling is because they hold false beliefs regarding cause and effect, skill, and chance [30]. This could be combatted by providing information about the characteristics and operation of games such as the probability of winning each game, potential costs, statistical independence amongst draws, and the cause and effect relationship regarding independent events.

- System behaviour

Like social media and e-commerce platforms, gambling platforms depend on prolonged user attention to make profit [1]. Accordingly, these systems are designed to be fundamentally persuasive and immersive in drawing user attention and retaining it [31]. An example of such an application is recommendation algorithms. Systems use recommendation algorithms which are fed by data to present content similar to user interests with the aim to increase engagement with the platform [32]. However, such recommender systems may hinder Informed Choice especially when users are not shown how and why AI makes such recommendations. To tackle this problem, Explainable AI could be adopted by addictive technologies. Explainable AI refers to empowering user understanding of why and how an AI system functions [33]. A better understanding of the system behavior would lead to more informed decisions whether or not to follow its recommendations and course of action.

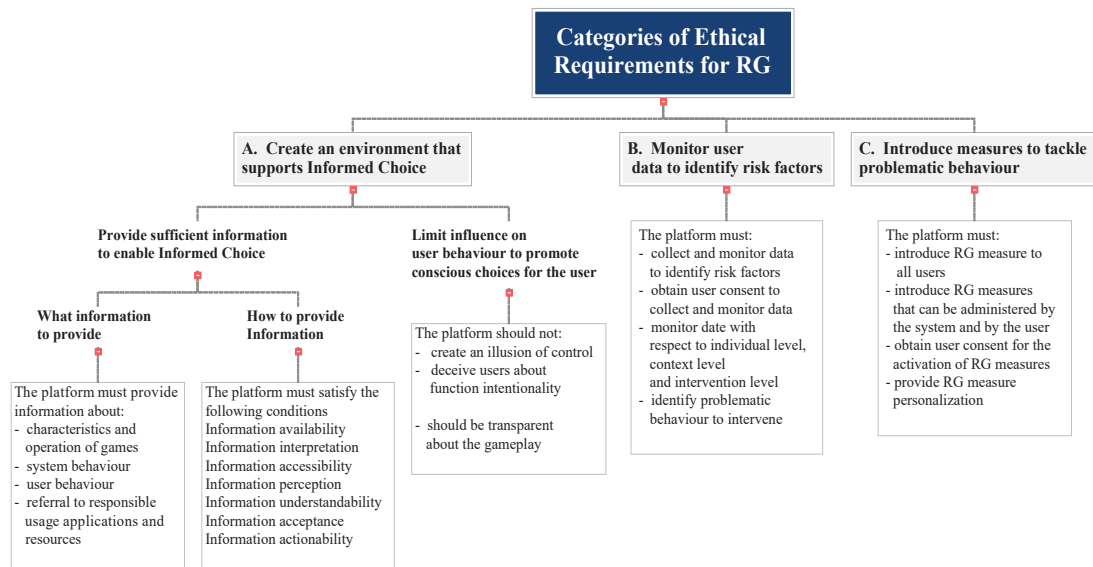


Fig. 2. Categories of ethical requirements for RG.

- User behaviour

Different from other addiction disorders such as alcohol and drug addiction, gambling addiction is considered to be an invisible disorder [21]. Therefore, to raise awareness about the risks problematic gamblers are facing it is important to make the negative consequences visible. To make risky situations visible, gambling behavioural data such as betting history (percentage of wins and losses), money and time spent on the platform, and multi-modal sensor data such as emotion and stress level could be made available to users [14]. More discussion on this topic will be provided within the second goal.

- Referral to responsible usage applications and resources

Providing information about the game, system, and user behaviour informs user about problem areas. To reassure Informed Choice, users should also be provided with information about RG applications and resources, e.g phone numbers and websites of care services. This information will guide their decision-making process.

b) How to provide information:

An important factor that enables RG online platforms is related to how the aforementioned information categories are provided to the users. This is because for Informed Choice to occur, the information provided needs to be useful in the sense that it helps users' decision making [34]. In the work for foundations for transparency requirements, [35] identified several dimensions to achieve information actionability. These dimensions could be regarded as examples of ethical requirements relating to how to provide information within RG online platforms.

- Information availability: relevant information needs to be provided by the operator following the qualities of correctness, completeness and timeliness.
- Information interpretation: operators need to present information in a certain manner so that it can be interpreted by the users
- Information accessibility: information needs to be visible and easily found
- Information perception: there needs to be a match between users' perception of trans-

parency with that of the information provider so that useful transparency could be achieved

- Information understandability: information needs to be comprehensible for all users through controlling for possible language, cultural and cognitive barriers
- Information acceptance: information needs to be accepted by the user either by confirming or challenging their beliefs
- Information actionability: information needs to trigger relevant user action

In order to validate these steps during the design process, requirement engineers could make use of several methods. Firstly, requirement engineers could translate some of these quality characteristics into functional requirements and constraints to validate these steps. Moreover, models from the media literature such as the limited capacity model of motivated mediated message processing could be consulted as a guide to design how to provide information [36]. With respect to testing an option could be hiring a usability inspector to evaluate the user interface. Usability testing could also be employed to observe real user feedbacks on how they interact with the information provided.

2) *Limit influence on user behaviour to promote conscious choices for the user:* To provide a fairer environment for informed decision-making it is important to decrease system influence acting on the user. This is because website design and game design may encourage poor decisions. For example, regarding the website design, providing contradicting options such as make deposit and self-exclusion on the same page could impair the user's decision-making process. Regarding the game design, near misses and stop buttons at electronic gaming machines can foster false beliefs about chance and control which could encourage further gambling [16]. Since gambling operators are economic entities seeking profit, it is not possible to completely remove such applications. However, it is important to limit their influence on user behaviour in a responsible manner. Ethical requirements related to limiting influence could be defined as design constraints. The mentioned examples could be turned into design constraints as follows:

- The platform should not create an illusion of control
- The platform should not deceive users about function intentionality
- The platform should be transparent about the gameplay

B. Monitor user data to identify risk factors

Reno Model I–V and international gambling laws state the necessity of gambling operators having a system to detect risky gambling behaviour. Such a system requires monitoring different types of data.

1) *The platform must collect and monitor data to identify risk factors:* Gambling operators could have different means of collecting relevant data for RG practices. Gambling operators collect player data showing betting history, money and time spent on the platform, navigation patterns within the site, and so on. It is suggested that most of the above mentioned data are already collected for marketing and advertising purposes and therefore could be made available for RG practices [18]. Other data for identifying risky gambling behaviour could be multi-modal sensors' data measuring users' emotions through digital devices, third party data collected with user consent from banks, self-reported data on demography, income, health, and self-administered data identifying gambling addiction level based on standardized questionnaires [14].

2) *The platform must obtain user consent to collect and monitor data:* The most important factor in collecting data for RG is to get user consent. Users should decide whether to share data or not and what type of data they are willing to make available to the system. Moreover, users should be notified what data about them will be collected, for what purposes their data will be used and given the freedom to opt out whenever they want.

3) *The platform must monitor data with respect to individual level, context level and intervention level:* Monitoring data will enable RG in online platforms in several ways. First, monitoring user data will help identify risks at the individual level. Such monitoring will help define player profiles with respect to risk and facilitate allocating RG resources accordingly. Moreover, algorithms could

be developed to detect potential problematic users early on [37]. Secondly, monitoring user data will help identify risks at the context level. For example, it is suggested that the COVID-19 lockdown puts problematic gamblers at a higher risk as they now have more hours to gamble [38]. Thus, monitoring data will help create context-awareness and the possibility to intervene. Lastly, monitoring user data will help identify risks at the intervention level. By monitoring data operators will be able to assess the effectiveness of RG interventions that are in place and control unintended consequences that may occur as a result of these interventions. An example of unintended consequence could be a player allocating a larger amount of money as pre-commitment so that he will not feel limited when playing [21]. Monitoring such behaviour will help decrease the side effects of RG interventions which were introduced to tackle the problem in the first place.

4) *Through monitoring data, the platform must identify problematic behavior in order to intervene:* Once data are obtained, the platform needs to compare this data with a baseline and observe whether the current data signals risky and excessive behaviour. The use of machine learning and novelty detection algorithms can be utilized in this direction [39]. By doing so the platform can intervene in response to suspected problematic behaviour and eliminate the risk. More discussion on this will be presented in section C.

One thing to consider, is that data monitoring requirement may raise privacy concerns, as monitoring user data may override privacy requirements. Informed consent theory within the medical domain may shed light on the conflict between monitoring user data for RG and user privacy. RG services are offered as to provide duty of care to preserve users from negative consequences and for these services to function the user needs to give consent. This is similar to the practice of getting informed consent for medical intervention in which the patient has to give permission before a medical intervention to be conducted [40]. With informed consent theory, [41] suggest that both respect for autonomy and beneficence are important moral principles that guide

medical conduct, but neither holds a domination in every instance. That is, under certain conditions beneficence may override respect for autonomy to attain the most suitable professional care and vice versa. Therefore, in the case of monitoring user data for RG it can be argued that suitable care may necessitate sacrificing a degree of privacy. Different measures could be taken to minimize this consequence. For example, user data can be anonymised by assigning unique identifiers to real identities and storing these datasets separately [18].

C. Introduce measures to tackle problematic behaviour

Detecting risk factors signalling problematic gambling is a valid step in enabling RG at online platforms. However, to eliminate risk and facilitate RG for players, the system needs to provide measures to intervene with identified and/or potential problematic gambling behaviour. This view is supported by the Reno Model I–V and the international gambling laws.

1) *The platform must make Responsible Gambling measures available to all users:* To provide a safe environment for RG to take place, online platforms should make RG measures available to all users before they sign up to the website. Targeting all users from the start is a proactive strategy that will help them understand their gameplay and help manage it before problems occur. As a result, harm caused by gambling can be reduced. Such an approach can enable sustainable business for operators as users will continue to remain as customers without having to put in place extreme measures like self-exclusion.

2) *The platform must introduce Responsible Gambling measures that can be administered by the system and by the user:* Measures to tackle problematic gambling could be administered by the system itself or made available as tools for users to use themselves [42]. For example, the same persuasive tools used by the system to encourage user engagement such as reduction and tunnelling could be used to promote RG by decreasing the appeal of the interface [31]. On the user side introduction of self-regulation tools on budget and

time spent, and self-exclusion options could help decrease problematic gambling.

3) *The platform must obtain user consent for the activation of Responsible Gambling measures:* Just as in monitoring user data, RG measures should only be active when the user gives consent. While RG measures should be provided by the platform, it should be the user who decides to activate them. Such an approach will empower the user and help operators balance profitability against corporate responsibility with regards to RG practices.

4) *The platform must provide Responsible Gambling measure personalization:* In terms of what RG measures to offer and in what format, facilitating personalization is important since not all measures work the same for everyone and tailored messages are more effective than generic messages [43]. Firstly, personalization will empower users to choose the RG measures they think would work best for them. The platform could make recommendations to users about what RG measures to take based on monitored player behaviour. Secondly, personalization will enable the individual to choose the format and the frequency of the intervention. Such modification will ensure these measures do not decrease the enjoyment of gambling activity. However, for RG measures to work effectively, baseline limits should be introduced by the system based on player data.

V. CONCLUSION

Addictive technology has significant implications for public health and ethics. While technology companies have recently started to introduce ad on tools to limit excessive usage, their effectiveness is questioned. Within the online gambling domain, this paper suggests that an effective and systematic way of enabling RG could be realized by defining categories of ethical requirements to guide the software development. While system goals obtained from Reno Model I–V and international gambling laws help define possible ethical requirements categories relating to RG, it should be noted that the defined requirements address not only gambling but addictive technology in general. In defining categories of ethical requirements for addictive technologies,

the purpose of this work is not to present a final selection of such family of requirements. Rather it is to highlight the ethical, conventional and legal aspects of responsibility requirements which can act as a reference point for analysts and designers. Future work needs to focus more on the requirement engineering process: how to elicit, document, adapt, prioritize, and validate ethical requirements to embed responsibility in addictive technology design. Moreover, in the present study categories of ethical requirements are derived from the intersection between ethical and legal requirements. While such an approach helps link research with practice, more work needs to focus on ethical requirements regardless of regulatory requirements to develop a more encompassing reference model.

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