Abstract— Online gambling produces a substantial turnover. Unfortunately for potential virtual world gamblers and gambling organizations alike, US law had forced the closure of gambling in the Second Life virtual world. However, an Open Grid Protocol could lead to the provision of off-shore gambling in this virtual world. Aside from legal issues, online gambling generally gives rise to ethical issues relating to prevention of harm. We considered the combined legal and ethical issues, and have proposed and begun to construct and evaluate a system with computational oversight: an ethical advisor. The system is grounded in recent research into Machine Ethics, which may offer insights into other legal and ethical matters, and provides a framework for responsible gambling in our EthiCasino (ethical virtual casino) in Second Life.

Keywords; EthiCasino, Machine Ethics, Virtual Worlds, Second life, Online Gambling, Responsible Gambling.

I. INTRODUCTION

Online gambling produces a substantial turnover, estimated to have revenues of over US$24m by 2010 [1]. However, online gambling brings with it a range of challenging issues. Different countries variously allow or disallow gambling or online gambling depending on religious and legal considerations. Where it is allowed, different age restrictions may apply. There are then ethical considerations relating to harm, through knowledge of risk aversion and loss aversion, to increased risk of addiction in the isolated online pursuit. Where problems exist in the real world, virtual worlds may produce their own variations yet are bound by the laws of the jurisdiction considered to be operating. For the Second Life virtual world, with their servers residing in the US, Linden Labs instituted US-centric terms and conditions whereby residents are expected to “comply with state and federal laws applicable to regulated online gambling” regardless of the current geographical location of the end user (resident). For users of Second Life, this acts as a ban on gambling in that virtual world, which has been enforced by the Federal Bureau of Investigations (FBI).

The construction of the Second Life Grid Open Grid Protocol (SLGOGP) [2] by IBM and Linden Labs allows avatars to move between virtual worlds, bringing with it the potential for interoperable virtual worlds. In principle, then, it would become possible to run a private virtual world in the same way that one can run a web server today. Prohibition of gambling in the core of Second Life may produce virtual world gambling “off grid”, in the virtual underworld. One question for the creators and maintainers of virtual worlds is whether gambling should take place at all? If the reputations of companies like IBM and Linden Labs could be negatively impacted by recognition that they are somehow condoning online gambling “off grid”, it is likely that they may like to exert some kind of control over what the protocol and software will allow. Since such companies may have a professional responsibility to ensure that such activities can take place in a safe environment, a framework must be considered to assure that their professional responsibility has been fulfilled. We believe that it should be possible to construct a system with computational oversight, an ethical advisor, which supports different regulations and ethical viewpoints, and assures that the system not only complies with the regulations, but also appreciates human values and social well-being.

In this paper, we discuss the design of EthiCasino based on prior literature and systems in Machine Ethics, including Truth-Teller [3], SIROCCO [4], MedEthEx [5] and EthEl [6]. We make a novel consideration of the application of machine ethics to gambling, with a focus on online gambling where individuals may act largely in an isolated context that may promote addiction, where assistance and advice may be less apparent or available [7]. We construct initial risk profiles based on the gambling knowledge of end users, and use these risk profiles as part of a monitoring mechanism. The aim is to inform both the less knowledgeable gamblers and those whose behaviours become increasingly risky of the potential for harm, and where such advice is ignored, to act accordingly. We expect that it will prove difficult to outlaw gambling in open virtual worlds, so would be hopeful that responsibility could be shared in an ethical framework: responsible gamblers and responsible casinos. However, this collaboration will not be possible unless a system can harmonize the actions for both sides. We refer to this framework, as implemented, as an EthiCasino, and discuss initial outcomes of this research.

II. BACKGROUND

Gambling, generally, brings with it a host of ethical questions when within a social environment in which others are present. Online gambling changes the social dynamic by
disassociating the action from both a location and from the physical co-presence. Online gambling also causes difficulties for legislation. Virtual world gambling attempts to return some of the social dynamic but retains legislative complexity. These legislative complexities are rooted in the different approaches that countries take to online gambling, and can be divided into three main categories: (i) those who do not allow gambling [8]; (ii) those who allow gambling, but not online [9]; (iii) those who allow gambling.

Such clear delimitations should be simple enough, yet many suffer from the differences. Legal issues can become more complex when considering the differences in "minimum gambling age" in various countries (e.g. online gambling for UK and Germany is 18, Belgium 21, some parts of Greece 23). Gambling addiction is identified as one of the most destructive addictions which is not physically apparent (an invisible addiction [7]). Psychologists believe that online gamblers are even more prone to addiction mainly because users can play without distraction and recognition. However, users and their families are not the only ones suffering from negative impacts of addiction. This addiction is creating a negative image for businesses involved, which consequently keeps customers away through fear of addiction. Clearly, gambling organizations should take responsibilities for minimizing these negative impacts [10]. But would a single organization be able to deal, automatically, with variations in legal and ethical issues relating to online gambling around the world?

Steps towards ethical machines have been taken that focus on medical ethics, attempting to ensure human safety and social health. The literature largely discusses using Case-Based Reasoning and machine learning techniques to implement systems that can mimic the responses of the researchers [11, 12]. Such systems are intended towards understanding, and possibly reducing or avoiding, the potential for harm to an individual from, for example, unnecessary or incorrect medical intervention. Machine ethics, generally, is concerned with defining how machines should behave towards human users and other machines, with emphasis on avoiding harm and other negative consequences of autonomous machines, or unmonitored and unmanned computer programs. Researchers in machine ethics focus on constructing machines whose decisions and actions will honour privacy, protect civil rights and individual liberty, and further the welfare of others [13]. To produce ethical machines, it is necessary to understand how humans deal with ethics in decision making, and then try to construct appropriate behaviours within machines or autonomous avatars which, given 24/7 availability and unemotional responses, could start to replace human (ethical) advisors in a near future.

Machine ethics has not, until now, considered potential for avoidance of harm in relation to online gambling. Alongside a number of other pursuits, because gambling has potential for addiction it could be claimed that a system for ethical gambling may be as effective both for humans and social health as medical ethics. Machine ethics may not cure addiction, but it may be able to work towards reducing the likelihood of addiction. Such minimizing of the risks of forming an addiction to gambling could produce a concomitant reduction in social health and safety issues.

The online gambling industry, with its huge revenues, is suggesting that the expansion of this online revenue through virtual worlds is a significant proposition. One question for the creators of virtual worlds is whether gambling should only take place "off grid", or whether these creators have a professional responsibility to ensuring that such activities can take place in a safe environment. We have considered the latter position, and believe that it should be possible to construct a system with computational oversight which supports different regulations and ethical viewpoints and assures that the system is not only in conformity with regulations but also appreciates human values and social wellbeing, enabling the reconsideration of the legitimacy of gambling in virtual worlds.

Gambling was one of the few ways that SL residents could earn money, until the FBI banned it. The ban was enforced on the basis that the SL servers are located in America where online gambling is banned regardless of the geographical location of its users [14]. Closing the virtual casinos affected the residents of this virtual world as well its creator, Linden Labs [15]. Second Life has a chequered history in relation to financial controversies, with its own equivalent of a credit crunch in which a virtual world bank collapsed taking a reported $750,000 with it, and with questions over legislation of such banks and of virtual world stock exchanges [16].

The construction of the Second Life Grid Open Grid Protocol (SLGOGP) [2] between IBM and Linden Labs, allowing avatars to move between virtual worlds, brings the possibility for private virtual worlds. Prohibition of gambling in a "core" grid of Second Life may result in subsequent virtual world gambling taking place "off grid", the virtual underworld. We consider how to construct an ethical framework for gambling in virtual worlds that might prevent the construction of a virtual underworld.

### III. DESIGN AND IMPLEMENTATION

We base the design of EthiCasino on prior literature and systems in Machine Ethics, including Truth-Teller [3], SIROCCO [4], MedEthEx [5] and EthEl [6]. Truth-Teller and SIROCCO implement case-based reasoners, comparing structured descriptions of the current scenario with previously resolved cases to support decision-making. Since each user's session is likely to have some unique characteristics, case-bases may need to be populated with large number of variant cases comprising different outcomes. MedEthEx and EthEl are based on prima facie duties as introduced by Ross [17] and extended by Garrett [18]. Here, defined duties are not "absolute rules": not following a specific duty does not mean the rule is broken. But it may be difficult to construct sets of absolutes in relation to gambling behaviour.

For EthiCasino, we have addressed 5 main, often interdependent, stages involving legal and ethical considerations:

#### A. Stage 1: Legal considerations

Consideration of legal issues involved extensive research into the acceptability and, where acceptable, age restrictions in 100 countries. The system then needs to capture location information to confirm that the end user is being honest, and to confirm the age of the end user. Should the location of the end
user change over time from the original registration, the legal situation may change accordingly. Consequently, only users who are above the “minimum age”, and located in countries where online gambling is allowable, are able to play.

B. Stage 2: Knowledge of Risk

Decisions related to financial risks may be taken in a number of business environments, especially in relation to stock markets and world economies. Those involved in taking such decisions are usually considered well-informed and have a number of checks and balances against which to validate their decisions or off-set their risks and/or losses. The person's knowledge is the effective tool in making the final decision. Unfortunately, because of the “entertainment” aspect of gambling, it is less important for users to have such knowledge or to consider how to off-set risks and losses. To evaluate the likely riskiness of end users, we designed a questionnaire comprising 20 questions: 12 related to gambling facts and fictions; 8 related to risk and loss aversion. Within one week we obtained 61 responses, all from Second Life users. Questions were weighted based on associated risk or negative impact on users in the absence of knowledge, leading to a division of questions into four categories:

1. **Low risk**: users should be able to learn quickly or lack of knowledge will not have much negative impact. e.g. Q3: “Some people are luckier than others” (fact or fiction)

2. **Medium risk**: users may believe in luck. e.g. Q6: “My lucky number will increase my chance of winning the lottery” (fact or fiction)

3. **Medium-high risk**: questions relate to calculations and predictability of results. e.g. Q14: “Assume you bet $1 on the toss of a coin the chances of heads or tails are 50/50. If you win and 'house edge' is 10% how much you will be paid? (10c, 50c, 90c, $1)”

4. **High risk**: question regards perceptions of earning money and realistic facts of gambling. e.g. Q1: “Gambling is an easy way to make money” (fact or fiction)

User answers and weightings over questions leads to three classes of users, important so that the system can help them to avoid negative impacts of incorrect decisions:

- **Group one**: Those who need information about the games (low and medium risk questions)
- **Group two**: Those who need to be reminded about the facts (medium-high risk questions), and
- **Group three**: Those who need full monitoring because they might be more prone to addiction (high risk questions)

To evaluate the behaviour profiles, we analysed the results to determine whether there were dependencies between the responses or whether these questions could be considered as independent. We analysed the correlations between the 20 questions for 50 users, hoping that diversification would exist across the various responses. The resulting correlation matrix showed maximum correlation between 18 of the questions of less than 0.5 (-1/+1), suggesting that the questions themselves had a reasonable degree of independence. On this basis, the risk classification becomes the important factor since the individual questions themselves do not act as a reliable predictor for others in the same class.

C. Stage 3: Boundaries for time and money

For a user to stay in control, part of the main challenge of gambling, the system should allow them to opt for boundaries. Considering that each user background and experience is different, and that there is such variation across responses to 20 questions about gambling, it is unethical to enforce boundaries without end user permissions. Users are asked to define their own boundaries both for the amount of time and the amount of money they plan to spend: these two elements are core in addiction and harm. The user's choice of boundaries is checked against their apparent riskiness. For users with profiles in Groups 1 and 2, the system will allow users to participate with limited interference; users in Group 3 will receive a moderated limit as the maximum boundary (Fig. 1).

D. Stage 4: Appropriate reminders: “nagware”

In Ethicasino, to minimize the potential for destructive behaviours, we adopt the idea of “nagware” as used by a number of software providers to remind users of specific actions, e.g. that they should pay for the software they have been using. In Ethicasino, this nagware has been called VIKI and undertakes specific responsibilities:

- **Artificial ethical conscience**: suggestions allied to risk taking and user’s circumstances, e.g. “high risk of losses, do you still what to bet?”
- **Educational**: providing access to information about each game, risks and odds associated to it, e.g. “roulette, your odds are 35 to 1”
- **Nagging**: Regularly reminding users, depending on their risk profiles, about the time and money spent, as both diminish.

Figure 1: Maximum boundaries for each category

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1 The idea to describe this as “nagware” was introduced by Prof. Allen, Indiana University (personal discussion, 16/6/2008)

2 Virtual interactive Kinetic Intelligence (VIKI) is a fictional computer introduced by Isaac Asimov. She serves as a central computer for robots to provide them with a form of “consciousness” recognizable to humans.
Users receive reminders depending on how they approach their own specified limits. Those identified as having riskier behaviours will receive fewer reminders compared to other users. Those who have spent their money more quickly may be tempted to spend more, sometimes chasing losses. Those who manage not to make losses within the initial time period may be encouraged to continue and to make assumptions over the likelihood of larger future wins. Of course, user profiles may change over time depending on the increased or decreased risky behaviour of the end user (Fig. 2).

E. Stage 5: Boundary conditions

After users get their final reminder from VIKI, users will be prevented from further gambling. The purpose here is to ensure the user’s own boundaries are enforced and to ensure the risky behaviours do not lead to harms (EthiCasino preventing behaviours that might lead to addiction). Those continuing beyond their own limits may be going beyond their own limits of rational behaviour. A virtual doorman who ejects non-conforming end users is a possible future consideration. The prototype framework is relatively well-developed, however a large-scale user-based evaluation is needed in order to fully explore the effectiveness of such a framework. Such an evaluation presents a *Catch-22:* it is currently difficult to conceive of such an evaluation since this testing would entail gambling being possible in this particular virtual world.

IV. SYSTEM EVALUATION

Most systems in machine ethics are based on application of absolute rules; of those which are not, a few consider *prima facie* duties e.g. MedEthEx and EthEl. For gambling, where end user behaviours vary, as demonstrated using the correlation matrix, absolute rules are not suitable. EthiCasino needs to cover a wide range of duties to give possibilities of change and to meet the unique requirements of each organization. EthiCasino employs 6 of Ross’ 7 duties and all 3 duties defined by Garret in different stages [17, 18]. Using these Prima facie duties will give the required flexibility to system to learn from users’ behaviour even if they might not match exactly the original definition of the duties while involvement of 9 out of 10 duties will still assure systems ethicality. An evaluation outside the virtual world is therefore planned as part of the next phases of our development of the EthiCasino.

V. CONCLUSION

EthiCasino’s goal is to prevent online gambling ethical and legal dilemmas to be raised, not to solve them. EthiCasino is a prototype system that implements specific ethical theories and learns about the risky behaviour and (lack of) knowledge of its users. It is an attempt to prevent harm through increased risk taking. The majority of existing Machine Ethics systems provide advice to help users, often medical practitioners, to make decisions that are ethically acceptable. EthiCasino takes a step forward with a testable implementation of its framework in Second Life which tries to improve not only the users decision but also its own ethicallity through different stages.

REFERENCES