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On Intellectual Property in Online Open Innovation for SME by Means of Blockchain and Smartcontracts

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ON INTELLECTUAL PROPERTY IN ONLINE OPEN INNOVATION FOR SME BY MEANS OF BLOCKCHAIN AND SMARTCONTRACTS

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Abstract

Intellectual Property issues (IP) is a concern that refrains companies to cooperate in whatever of Open Innovation (OI) processes. Particularly, SME consider open innovation as uncertain, risky processes. Despite the opportunities that online OI platforms offer, SMEs have so far failed to embrace them, and proved reluctant to OI. We intend to find whether special collaborative spaces that facilitate a sort of preventive idea claiming, explicit claiming evolution of defensive publication, as so far patents and publications for prevailing innovation, can be the right complementary instruments in OI as to when stronger IP protection regimes might drive openness by SME in general. These spaces, which we name NIR (Networking Innovation Rooms), are a practical, smart paradigm to boost OI for SME. There users sign smart contracts as NDA which takes charge of timestamping any IP disclosure or creation and declares what corrective actions (if they might apply) might be taken for unauthorised IP usage or disclosure of any of the NDA signers. With Blockchain, a new technology emerges which enables decentralised, fine-grained IP management for OI.

1. Introduction

One might consider innovations uncertain processes that are only successful if several actors collaborate, whether they are willing to cooperate. And Intellectual Property Rights (IPR) is a main concern that refrains companies to cooperate. From our point of view, IP studies only cover the prevailing Open Innovation (OI) model by Chesbrough which highlights the need to open corporate innovation towards the corporation's outer and inner world. There is so far focus on outside-in innovation processes, where external actors participate in the corporation's innovation processes, which are one of the most commonly found business model for platform operators that implement a model by which their main clients publish a need (a problem or a "challenge") on the platform and then, a (larger) group of external solvers, a solver community, is expected to work on it. The type of need published may range from collecting bare ideas ("ideation") up to a specific solution leading to the creation of IPR in a cooperative agreement. In exchange for solving the problem, solvers often obtain a prize,

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and IP is key**.** Other modes of operation are the collection from ideas from user communities. In all, actors might be individuals or could be small and medium enterprises (SME), as proposed by Venharverbeke, in (Chesbrough et al., 2006) that are of our strong interest in this paper, broke the long term exclusion of SME from the mainstream discussion in OI research (Wynarczyk et al., 2013) (Lee et al., 2010)

Thus, changing the focus from corporate OI to SME innovation, despite the opportunities that online OI platforms offer, European SMEs have so far failed to embrace them, and proved reluctant to OI.

The digital platforms that implement the online Open Innovation (online OI), act only as a complementary tool for experts which their possibilities are underexploited. In fact, one might infer from the recent surveys (Bogers at al., 2017) (Gassman et al., 2010) that they are unchartered territories of huge bigdata effect, gamification approaches, artificial intelligence in the automation of ideation and project support services, as well as rewarding schemes with reputation and virtual money, or novel IP management, which need to be researched, developed, and tested in the online OI.

2. On the Prominence of IPR Concerns out of the Barriers for the SME adoption of OI

In this paper, we focus on IPR issues out of the main barriers to online open innovation, in general, and platforms in particular. We highlight the factors acting as hinderers to open innovation mentioned by the almost 300 SMEs and 35 innovation advisors participating in a needs assessment study (Bikfalvi et al., 2016). Our aim is to overcome these barriers through a smart platform built to address these stakeholders' necessities. More concretely, the three main **barriers mentioned by SMEs** are *i) worries about resources to be allocated, ii) difficulties to scout potential partners, and iii) concerns regarding IP*. It is interesting to observe, that beyond the main concern relative to resources –an issue inherent to their structural configuration- IP relative issues represent a major concern. Companies, in general, and SMEs in particular show a lack of trust regarding collaborative innovation due to uncertainty regarding information and data held in the cloud, especially when such data is related to IP and involves multiple other parties. Moreover, they call for support available when needed, which is not provided in the current configuration of some innovation agencies supporting collaborating SMEs. Complementary to the business vision, innovation advisors responded that main reasons of **reluctance from client SMEs** to participate in collaborative innovation are *i) protecting internal critical know-how, ii) concerns regarding IP, and iii) fear of losing control over the innovation process.* A further interpretation of these results, independently of the responding agent, point towards a general fear of know-how leaks or weak IP protection in the available solutions.

On the other hand, a study reported in (Wynarcyzk et al., 2013) confirms the relevance of the OI model for SMEs throughout a firm's value chain. Its quantitative analysis survey of 293 small and medium-sized manufacturers from 7 industries of the USA also revealed that OI is

dependent on right practices and partner choice. Accordingly, (Hidalgo and Albors, 2008) claimed that collaborative innovation must include a social network perspective. These requirements are included in NIRVANA despite of the fears of SME on IP and knowhow loss when working in cooperation/networked for OI, thus a novel, proper IP must be tackled by the online OI.

Of course, OI can be conducted without the use of online platforms. However, such platforms might offer a number of significant benefits, such as increased reach and connectivity, secure and comprehensive data management, IP protection, enhanced reporting, and instant accessibility on multiple devices. Therefore, it is important to ensure online OI is promoted and the IPR barriers highlighted above are overcome to enable its more widespread use.

3. Scouting the state of the art of the IPR solutions for OI

IP in (Gassman et al., 2010) is classified into a "the leveraging perspective" research stream of the OI. Existing research competencies and IP's multiplication into new market fields have still often been neglected, despite their potential to create new revenue streams. The involvement of business interest and models would be crucial (Kim and Mauborgne, 2004; Chesbrough, 2006, 2007), as long as created technology and IP's commercialization is of great interest of companies, and as well it is one of the demanded features of SME, this might well boost the adoption of online OI schemes.

At the organizational level, OI is associated with entrepreneurial and corporate opportunities, processes and outcomes. Specifically, OI can help entrepreneurs in identifying opportunities that are distant to their own knowledge endowments and, thus, to acquire superior vision of the opportunity landscape available to them (Gruber et al., 2013). Furthermore, an inbound OI strategy on behalf of large companies creates entrepreneurial opportunities that involve the front-end of innovation (Zahra and Nambisan, 2011) (e.g., OI strategies of large pharmaceutical companies create opportunities for biotech new ventures). (Van de Vrande et al., 2009) found that SMEs pursue OI primarily for market-related motives such as **meeting customer demands**, or **keeping up with competitors.** Finally, the more the extent of digitization of the opportunity (Lusch and Nambisan, 2015), the more accessible the opportunity will be to diverse types of external entities (Aldrich, 2014) that impact the features of the associated ecosystem in terms of governance and IPR.

(Lee et al., 2010) suggest the adoption of intermediaries in facilitating innovation, after proving the potential of OI for SME and indicate networking as one effective way to facilitate OI among SME, to support existing papers that pointed the 2.0 nature of the OI for SME (Lindermann et al., 2009)

Little is. in the state of the art, talking about IP in OI for SME[5] (Chesbrough and Ghafele, 2014) This paper contributes to the subject, with the aim to encourage the adoption of OI by SME, with a novel approach to IP, not only because of the adoption of the Blockchain and Smartcontracts, further explained in section 4, but because of the way SME disclose inventions and IP with a protective effect similar to preventive publishing at a fraction of their cost and with way much more powerful protection while doing OI. Bottom line, with Blockchain and Smartcontracts SME will be able to disclose inventions and IP with a protective effect similar to preventive publishing. And the online OI must provide the intermediary services for supporting this protection.

3.1 On defensive publishing

In a defensive publication, the scientists disclose details about their innovation to the public, thereby preserving their freedom to use the innovation by preventing others from patenting it. One reason why companies decide to use defensive publication over patents is cost, way lower than patent filing or paper publishing, even in open publications. The defensive publication route is especially useful for innovations that do not warrant the high costs incurred in patent applications but to which scientists do want to retain access[6]. It is vital that an organization wanting to protect its IP be able to do a defensive disclosure (but publishing) at the right time. In addition to controlling the timeliness of publication, it is fairly important to be capable of proving the date on which the publication was disclosed to the public.

One might try to disclose partly, not fully, or do it in reduced, manageable scale, that could be a workshop or seminar room, as an internal report, or similar instruments. Perhaps, it is time to have an online version of this features, so that the disclosure of ideas, know-how, the co-created or contributed concepts and projects with interesting IPR is tracked, accessible, time stamped, and easily reportable in case of need.

3.2 The networked innovation rooms as spaces where defensive publishing in online OI happens.

We intend to find whether special collaborative spaces that facilitate a sort of defensive publication, as so far patents and publications for prevailing innovation, can be the right complementary instruments facilitating the disclosure of knowledge-providing predictions in OI as to when stronger IP protection regimes might drive openness by SME in general. These spaces, which we name NIR (or Networking Innovation Rooms), are practical, smart paradigms to boost OI for SME.

Thus, any SME entering the NIR after (digitally) signing an NDA has the right to declare what IP or information is worth being stamped as its own contribution to the NIR. As well,

[5] http://www.iccwbo.org/Advocacy-Codes-and-Rules/Areas-of-work/Intellectual-Property/Innovation-and-intellectual-property/

[6] ftp://ftp.cgiar.org/isnar/publicat/bp-53.pdf

it can cite IP from previously claimed disclosures, thus being the NIR (or the IP) citable is a must to help the traceability of the IP.

We advocate that a (online) *room for innovation* could be the right paradigm for the IPR management in OI for SME, as long as it adopts Blockchain consensus approaches. It would be the metaplatform where all existing services will be made accessible to users and advisors where they connect and develop solutions by taking advantage of the enormous amount of OI services that will be provided online under the consensual supervision of the Blockchain technology. This is a novel Networking and Innovation Room (NIR) where innovation advisors and the SMEs interact to develop innovation partnerships and IP is protected by online means. In this paper, we will focus on the needs of IPR protection for OI by SME managed by NIR, analyse how to help SME enter the NIR, and how to automatically stamp IP through the NIR, and the technological solutions using the novel Blockchain and Smartcontracts technologies.

The NIR in the NIRVANA project[7] is a pioneering solution to overcome the difficulties of SME to embrace OI by boosting the networking and innovation support to the SMEs with an exquisite IP care: whatever is reported, disclosed, and created in an NIR is time-stamped, indexed yet preserved and traceable and reportable when required by the SME.

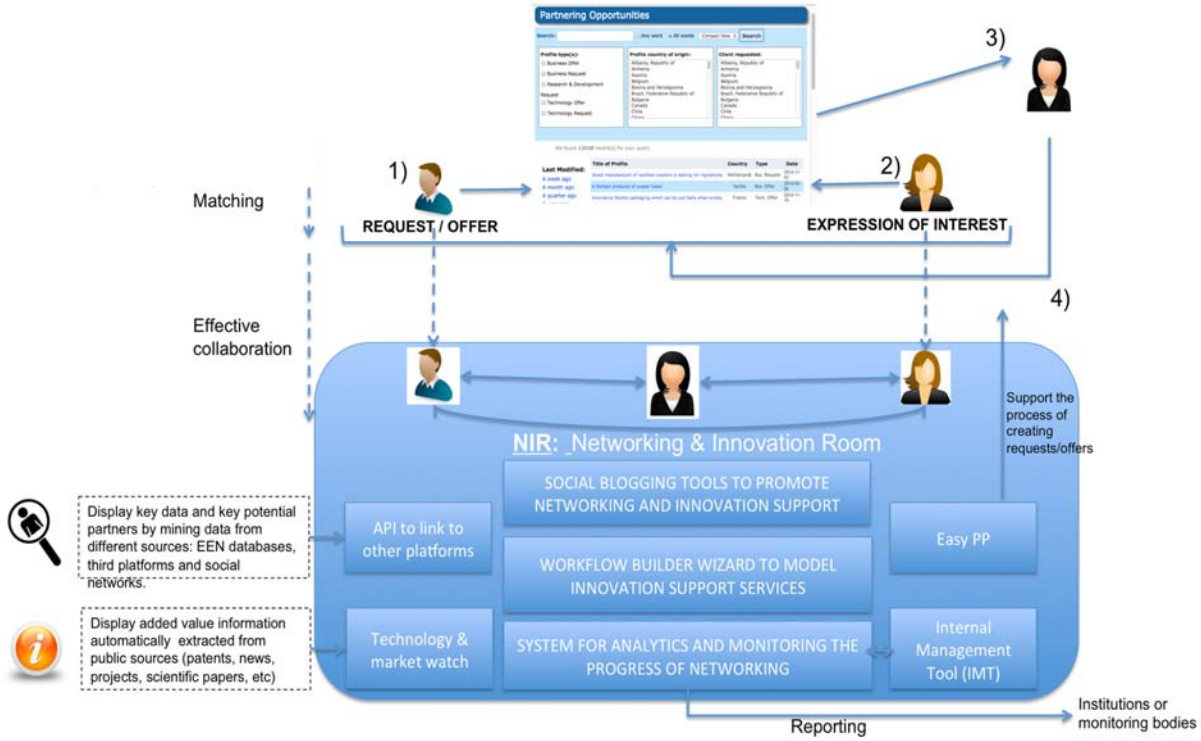

Fig. 1 NIRVANA

[7] NIR-VANA – num. 681787-2, **Networking Innovation Room** for Added Value Networking Alliances, INNOSUP-6-2015_Stage2, Coordination & support action, H2020-INNOSUP-2015-2

The Enterprise Europe Network (EEN), despite of its lacks, is considered as the biggest OI platform in Europe; we use their infrastructure to make the NIR development. Several integrated modules in NIRVANA are thought to support the EEN work developed by their advisors in the task of helping SME to kick collaborative, innovative projects, sort of online OI:

1) A SME's request/offer is recorded into the system. It is then integrated for being used www.imtdemo.eu which is a web based CRM tool for EEN consortia activities, progress follow-up and reporting, and www.easypp.eu which is a tool to co-create partnership profiles on-line between the SMEs and EEN advisors.
2) An EOI (Expression of Interest) is sent through NIRVANA by an organisation interested in the request/offer
3) An EEN advisor receives the EOI and finds interesting/interested partners.
4) The parties are invited to participate in a NIR to co-create a project and a collaboration might start. Interactions, data, and IP protection are developed in the NIR.

The modules proposed ensure the improvement of the current procedures and services. Those are integrated on a single layer flexible enough to be adapted on existing platforms and/or networks. When an EEN agency implements this new service, it will be able to create as many NIRs as innovation partnerships are being developed between SMEs.

4. On IPR protection in the NIR with Blockchain+ technologies

Once SMEs decide to collaborate, they will secure access to a safe collaboration environment, as the NIR is. This collaboration environment would be platform-independent, allowing it to be accessed through a range of different entry points (initially EEN and LinkedIn). The NIR offers a secure space in which the partners pursue their innovation goals, sharing information and carrying out joint activities in a structured fashion.

The approach of IP from protection to a tradable good, is about creating incentives to innovate, and doing it into a NIR is about enabling OI. This works by protecting innovators from imitators and, thus, enables them to gain temporary monopolistic profits. Although this is valid, it will be complemented by an attractive secondary market in which new players enter attracted by high turnovers, because of trade to realize profits. The trade in IP has just begun in Europe, but in the near future, a whole industry will arise around IP's secondary markets. New business models, of IP aggregators, IP insurers and even intellectual commons where IP is pooled and shared, are all springing up as part of this evolution. (Gassman et al., 2010).

We advocate that participants in the NIR might declare what is the contributed IP and knowledge, and the NIR will timestamp and store it so that it might be citeable and disclosed at the time the SME who owns the NIR needs it for the fulfilment of a project consortium, for future project proposals, or for defending its options in the co-created solutions. The process of obtaining protection for IP is still a cumbersome process that involves filing the necessary applications, multiple times in few cases and waiting for a long time for the authorities to verify and grant protection. Doing it decentralized will fit more precisely to the

network effect dimension of the online OI platforms. Blockchain based Proof-of-Existence (PoE) provide an alternative for both individuals and companies alike to document their creations, or discoveries and knowhow, and handle IP disputes more efficiently in online OI. PoE must provide a smart tamper-proof way of storing encrypted information on a blockchain. Each file stored on the blockchain will be associated with a unique irreplicable transaction hash. These transaction hashes will act as a reference to the documents stored on the blockchain. Therefore, anything once written on to the blockchain will be stored forever, without any way of deleting it and that is what makes it an ideal electronic system to certify and store documents. What is amazing of our proposal is that, contrarily to the Gassman et al.'s statement, we advocate for cutting out middlemen for IP baseline functions. In some industries, including IPR, middlemen charge insane sums for merely storing, securing, or transferring data. Now, Blockchain can replace these middlemen, thus it saves money It must have be remarked that with our approach, unfortunately, we are not replacing IP intermediaries (lawyers, judges, and all) but get some notarizing work significantly reduced or at least better adapted to the online OI.

A relevant aspect to be taken into account is the fact that files or information stored in the blockchain will be done as a hash. Thus, content will not be publicly disclosed as opposed to traditional defensive publication strategies. It should be assessed up to which point the private disclosure of IP would be enough, together with the blockchain mechanism, to ensure an alternate mechanism to traditional defensive publication. Anyway, the Blockchain technology will act as an irrefutable proof that some IP was disclosed in a NIR or any other private online environment.

In the paper, we propose an IP approach for OI with Blockchain and Smartcontracts technologies, genuinely conceived and used for digital currencies like Bitcoin but that are now going well beyond the financial services, presuming an important role in a wide range of applications, notably insurance, health, and security. Having hit the headlines in the banking world, other applications are considered and sometimes, already tested to the point of designating the Blockchain as a revolution, as fundamental as the internet and online themselves. Blockchain technology looks complex, but the idea is indeed simple, yet today implementation still might be pretty inefficient. At its most basic, Blockchain is a largely global distributed database (ledger) that might be running on billions of devices and open to anyone, where not just information but assets or anything of value – money, titles, scientific discoveries, IP, music, art, votes, diamonds, gold, and even referrals and deeds – can be moved and stored securely and privately. On the Blockchain, trust is achieved not by always intermediaries like banks, public bodies, associations, and companies of all types, but through mass collaboration and smart code. Blockchain ensure integrity and trust between strangers, making it difficult to cheat.

A Blockchain definition as "a distributed database that maintains a continuously-growing list of data records hardened against tampering and revision" among many other definitions might apply (Tapscott, 2016). Eventually, the Blockchain would become a "new infrastructure for exchanges" on a decentralized basis. The potential of this new "Internet of transactions" largely lies in smart contracts, standalones programs encoded on the Blockchain that execute all or part of a contract without any human intervention. Once a preprogrammed condition of the contract is met, the corresponding contractual provision is

executed. They allow two partners to establish a business relationship without any authority or central intervention. In other words, the honesty of a transaction is secured and guaranteed not by the agents, but by the system itself. We advocate that, shipping it onto the NIR might fix the security need of (online) OI users.

Smartcontracts lie on a computer coding: programs that formally encode conditions and results. Said code requires agreement of the contracting parties. A a more advanced Blockchain version devoted to smartcontracts was launched: Ethereum, which works with ether, a virtual currency used to pay for the execution of smartcontracts that can consume significant resources. Volunteers earn the ether when validating transactions, securing the network in the meantime.

Regarding IP, users will establish the paternity of their work through the Blockchain, protect it against unauthorized use, and define the terms of a smart contract in which granted licenses will be stipulated (and executed). A possible extension would be that the Blockchain could instantly register and apply for free patent open source objects, since a patent basically only is a concept stamped and kept in a place where it is unfalsifiable, and publicly accessible. IP management could be developed as smart contracts for copyright licenses, as are financial cryptography schemes for financial contracts. Admission control schemes and other quality of service mechanisms might help online service-level agreements for IP [8]. There are blossoming services like Stampery.com, monegraph.com or artinpocket.cat to assure types of intellectual or digital assets protection in art [9], or in the case of creativechains, creativechain.org and ascribe for copyright or Bernstein for IP protection, (described in the next section).

5. Scouting the market of Blockchained IP

A project named Ascribe help creators secure their copyright through the Blockchain. Ascribe applies to every license, including Creative Commons licenses (CC). The service was originally designed to allow right holders to control the distribution of their work on the Internet. Creators thus might register their work under a CC license on the Blockchain according to the following process:

1. Go to http://cc.ascribe.io; Load the concerned work and enter the appropriate metadata: title, author and year; Select CC license and click “Register”
2. The service will then register securely the file – stamped under the conditions of license – on the Blockchain, with all metadata that was provided. There is a path to convert CC licenses into “smart contracts”, ensuring creators greater traceability of their work over the traffic and online reuse.

[8] https://en.wikipedia.org/wiki/Smart_contract
[9] https://erikk.quora.com/Learn-the-Blockchain-Ownership-Space-contracts-IP-art-cars-photos-and-other-digital-assets

Another project http://creativechain.org/ is devoted to create a copyright registry and keep track of the content creation and distribution chain, enabling backwards compensation to any author so that the composition of new works based on existing creations share the rewards according to the license stamped in the Blockchain.

And finally, a company www.bernstein.io will launch a service aiming at the same goal of notarizing inventions on the Blockchain to enable innovators to quickly prove existence, integrity and ownership of their creations by registering inventions at a very early stage, link subsequent updates and proof of use; and optionally disclose them on a public database and IPFS. Notarizing a document on the Blockchain does not make it public, the Blockchain will only contain its cryptographic fingerprint.

6. A Smartcontracts Implementation

NDA as Smart Contracts – The Non-Disclosure Agreement (NDA) is digitally accepted, and might be signed, at the moment a user enters the NIR. Thus, the contract explicitly describes the IP and co-creations that will be protected (see time stamping in previous section) and how restricted usages will be for the users that are in the NIR. See an example in the end of this section. The Ethereum.org platform is used for implementing Smartcontracts.

Time Stamping – At any moment a user declares IP, it is stamped and added to the Blockchain for the PoE (Proof of Existence), but not published at any license unlike Ascribe.io but more in the expected line of Bernstein with the difference that it is disclosed inside a NIR under a NDA Smartcontract. How safe is it to use block.timestamp as the IP registered time? There is no cryptographic way to verify the timestamp itself; only the ordering of certain cryptographic structures. If a miner provides an incorrect timestamp in a block header, it is uncertain how much can it be off before it is rejected by other nodes. Therefore block.timestamp needs to be supplemented with some other strategy yet to be discovered as future work. From the Solidity documentation[10] the solution is: You publish or disclose IP at a time X, this transaction contains some code that calls block.timestamp and is included in a block whose timestamp is Y and this block is included into the canonical chain (published) at a time Z. The value of block.timestamp will be identical to Y, and X <= Y <= Z

Proof of Stake (PoS)- As Ethereum and similar Blockchain enabled systems may distribute the verification of the ledger, but they are still centralized systems that easily become controlled by a few big players with more infrastructure resources. The contracts and transaction ledger may be decentralized, but the infrastructure may not. To reduce this drawback, we redefine the PoS of our NIRVANA platform where all those who want IP protection in the NIR need to install a client that will do peer validation of IP in other NIR. This give and take rule makes all online participants contribute to the IP timestamp. So, miners in our proposal are not specialized nodes but all participants to the online OI platform.

[10] https://solidity.readthedocs.io/en/latest/frequently-asked-questions.html#are-timestamps-now-block-timestamp-reliable

The measure of the stake and currency behind the platform (for rewarding miners for the PoS) must be the “wits”, a virtual currency formulated by (Carrillo and de la Rosa, 2007) for acknowledging content that makes sense to someone else apart to oneself, that is easily adaptable to the formulation of the NIR and the disclosed IP and further stuff that can be measured in wits, which are unlocked to all validating nodes in the NIRVANA platform as a sort of the Ethereum’s gas

For example, a forbidden disclosure of protected IP might be programmed in smartcontracts like this in Solidity language:

```
Contract NDA {

   address user;
   address public company;
   uint public quantity;
   bool NDAaccepted;
   string disclosedIP;
   bool IPviolated;

   modifier solouser () {
      if (msg.sender != user) throw;
      _
   }

   modifier solocompany(){
      if (msg.sender != company) throw;
      _
   }

   event thereisIPviolated();
   event acceptNDA();

   function IPdisclosure (address _user, address _company, string disclosedIP) {
      user = _user;
      company = _company;
      disclosedIP = _disclosedIP;
      block.timestamp (disclosedIP) // Timestamp of the current Block
   }

   function getQuantity () returns (uint) {
      return quantity;
   }

   function IPviolated () solocompany () {
      if (IPdisclosure (user, company, disclosedIP) {
         IPviolated = true;
         thereisIPviolated ();
      }
   }

   function checkCompensation() solouser() {
      if (IPviolated) {
         compensate ();
```

```
    }
  }

  function compensate() private solouser () {
    user.send(1 szabo);  // implementation in Ethereum with gas as the computing power currency
  }
}
```

The keypoint is that NDA might be implemented as smartcontracts so that IP is being stamped and managed at the access and report levels.

7. Final Comments

This is a fairly preliminary work on the right IP protection in OI for SME powered by online platforms, well adapted to work at the internet scale with the advent of novel Blockchain and Smartcontracts technologies. Our novel proposal to develop a specially protected area is named Networked Innovation Rooms (NIR) wherein the NDA is implemented as Smartcontracts powered by a novel *wits* currency that nicely develops the concept of controlled disclosure that we advocate. It will be useful for lowering the concerns of SME about IP in OI. This work, exploratory in nature needs of open exchange of points of view and platform oriented solutions to this important barrier for the adoption of OI by SME at the largest.

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References

(Aldrich, 2014) Aldrich H. E. (2014). “The democratization of entrepreneurship? Hackers, makerspaces, and crowdfunding”. Annual Meeting of the Academy of Management, Philadelphia, August 2014.

(Bogers et al., 2017) Bogers M., Zobel A-K., Afuah A., Almirall A., Brunswicker S., and 15 more authors, “The Open Innovation Research Landscape: Established Perspectives and Emerging Themes Across Different Levels of Analysis, Forthcoming in Industry and Innovation” Electronic copy available at: http://ssrn.com/abstract=2817865

(Bikfalvi et al., 2016) Bikfalvi A., de la Rosa JL., van Haelst, S., Gorini, M., Pelizzaro, A., Haugk, S. “Study report to characterize the target groups in relation to the project topics: SMEs and innovation advisors”, internal report published http://dugi-doc.udg.edu//handle/10256/13269.

(Carrillo and de la Rosa, 2007) Carrillo C., de la Rosa J. Ll., and Canals A. (2007), "Towards a Knowledge Economy", *International Journal of Community Currency Research*, (11): 84-97
(Chesbrough 2003) Chesbrough, Henry (2003) "The logic of open innovation: managing intellectual property." *California Management Review* 45.3: 33-58.
(Chesbrough et al., 2006) Chesbrough, H.W., West, J. and Vanhaverbeke, W. (2006) "Open Innovation: Researching a New Paradigm". Oxford: Oxford University Press.
(Chesbrough et al., 2007) Chesbrough, H. W., and M. M. Appleyard. (2007). "Open innovation and strategy." California Management Review 51 (1): 57-76
(Chesbrough and Ghafele, 2014) H. Chesbrough, R. Ghafele (2014) "Open Innovation and Intellectual Property: A Two Sided Market Perspective", in H. Chesbrough, W. Vanhaverbeke and J. West ed., New Frontiers in Open Innovation, Oxford University Press, Oxford, 2014, 191-207
(Gans et al., 2013) Gans, J. S., Murray, F. E., & Stern, S. (2013). *Contracting over the disclosure of scientific knowledge: Intellectual property and academic publication* (No. w19560). National Bureau of Economic Research.
(Gassman et al., 2010) Gassmann, O., Enkel, E., & Chesbrough, H. (2010). The future of open innovation. R&D Management, 40(3), 213-221.
(Gruber et al., 2013) Gruber, M., MacMillan I.C., and Thompson J. D. (2013). "Escaping the prior knowledge corridor: What shapes the number and variety of market opportunities identified before market entry of tech. start-ups?" Organization Science 24(1):280-300.
(Hidalgo and Albors, 2008) Hidalgo A and Albors J (2008) Innovation management techniques and tools: A review from theory and practice. *R&D Management* 38(2): 113–127.
(Kim and Maugborgne, 2004) Kim, W.Ch. and Mauborgne, R. (2004) "Blue ocean strategy". Harvard Business Review, 82, 10, 76–84.
(Lee et al., 2010) Sungjoo Lee, Gwangman Park, Byungun Yoon, Jinwoo Park (2010) Open innovation in SMEs—An intermediated network model, Research Policy 39 (2010) 290–300, doi: 10.1016/j.respol.2009.12.009
(Lindermann et al., 2009) Lindermann, N., Valcárcel, S., Schaarschmidt, M., & von Kortzfleisch, H. (2009). SME 2.0: Roadmap towards Web 2.0-Based Open Innovation in SME-Networks–A Case Study Based Research Framework. In *Information systems–Creativity and innovation in small and medium-sized enterprises* (pp. 28-41). Springer Berlin Heidelberg.
(Lusch and Nambisan, 2015) Lusch, R. F., and Nambisan S. (2015). "Service innovation: A service-dominant logic perspective." MIS Quarterly 39 (1): 155-175.
(Tapscott, 2016) Tapscott D., Tapscott A. (2016) "Blockchain Revolution: How the Technology Behind Bitcoin is Changing Money, Business, and the World", Penguin Random House
(Van de Vrande et al, 2009) Van de Vrande V, De Jong JPJ, Vanhaverbeke W, De Rochemont M, "Open innovation in SMEs: Trends, motives and management challenges", Technovation 29 (6), 423-437
(Wattenhofer, 2016) Wattenhofer, R. (2016), "The Science of the Blockchain" , Inverted Forest Publishing.
(Wynarczyk et al., 2013) Pooran Wynarczyk and Panagiotis Piperopoulos (2013) , Open innovation in small and medium-sized enterprises: An overview, International Small Business Journal 31(3) 240–255
(Zahra and Nambisan, 2011) Zahra, S. A., and S. Nambisan (2011). "Entrepreneurship in global innovation ecosystems." AMS Review 1 (1): 4-17