A New Paradigm for Secure Social Lending

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Abstract. Social Lending is one of the latest trends in Social Networking, offering a communication and financial channel between individual borrowers and lenders. The various Social Lending transaction schemes could be subject to multiple security threats, in both financial and technical terms, which could affect the integrity of the service as well as the trust of citizens. This paper provides an overview of the basic characteristics of Social Lending as well as an analysis the potential security issues suggesting some appropriate corrective measures. The ultimate target is to enforce the Social Lending effort with an information security foundation that could become an appreciable alternative to the "traditional" lending system.

Keywords: Social Lending, P2P Lending, Security, Trust, e-Services.

1 Introduction

Social Lending is also known as peer-to-peer (P2P) and person-to-person lending. It is, in its widest sense, the name given to a certain type of financial transaction which takes place directly between individuals ("peers") without the direct involvement of a traditional financial institution. P2P Lending is more commonly related to lending & borrowing, although other more complex transactions could be made possible. The major technology facilitator of this new trend has been the Internet, which due to its nature can be subject to multiple security threats. This paper analyses the main features and principles of Social Lending aiming to suggest technological and procedural measures that could increase the overall security of this transaction type and, eventually, aid to gain the trust of public as a legitimate alternative of financial transaction [1].

1.1 Evolution of e-Services

In order to illustrate the driving forces of Social Lending and understand its potential market value, one should examine the evolution of e-Services. e-Services are the services provided by an individual to another individual using IT as the provision medium. Any service could be provided with the participation of a third party acting as an intermediate, interpreter or service broker.

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At the beginning, the first e-Services were aiming on individual customers provided by commercial enterprises (Business-to-Consumer – B2C), such as e-shops, e-auction houses, e-banking etc. The next step was to provide e-Services between Businesses (Business-to-Business – B2B), enabling services such as e-procurements and e-invoicing. Inspired by these, governmental and public bodies started to provide services to individual citizens (Government-to-Citizen – G2C), such as e-taxing and e-certificates. Additionally, governmental and public bodies started to provide services to commercial organisations (Government-to-Business – G2B), as well, such as e-information exchange and e-certification. The latest e-Services breed involved services offered between Governments or public bodies (Government-to- Government – G2G). At the same time, a different type of e-Services has been developed between individuals acting as peers (Peer-to-Peer – P2P). This type is e-Services enabled e-File Sharing and many other similar services.

The latest trend of e-Services is inspired by both G2C and P2P, enabling services between individual citizens (Citizen-to-Citizen – C2C) and not just between anonymous Internet users as in the case of P2P. Examples of this kind of services are Wikis, Blogging and the hyper-trend of Social Networking.

1.2 What Is Social Lending

Social Lending is a special case of Social Networking that uses the networking attribute of the web to embrace financial transactions as well. The basic idea with Social Lending is that when someone needs money, other individual users will come with an offer for the loan terms and if the candidate loanne accepts that offer, the loan can be directly given without the intervention of any "traditional" loan party or financial institution, such as a bank.

Alternatively candidate lenders can pool their funds together and lend them at x% interest rate. Some existing web sites offering Social Lending services such as Prosper [2], use a credit score to determine the risk rate and then, based on that risk rate, there can be a bid for the loan according to the loanee's terms. What makes those sites popular is the "social" aspect which is translated to the ability for the candidate loanee to post his/her story about why they need the money and try to convince the potential lenders.

Social Lending is currently open to any individual person or company to participate (as a lender or borrower) allowing augmentation of the lending communities to a very large scale using the Web technologies. It is closely related to Microcredit which is loaning very small amounts to multiple borrowers.

1.3 Facts and Figures

Having presented the basic idea of Social Lending, it should be stressed that an attempt to secure such an e-Service would be highly appreciated from the lending communities, since there is a dramatic increase on the lending volumes. As mentioned by [3] "In 2005, there were 118 million $ of outstanding peer-to-peer loans. In 2006, there were 269 million $, and, in 2007, a total of 647 million $. The projected amount for 2010 is 5.8 billion $". Another source [4] reports that the total loan volume on the 30th of January 2009 for P2P Lending Companies was 800 million $ divided to 31 companies

around the world. This impressive growth rate signifies that the forthcoming e-era could be nearer than "traditional" financial institutions might think. As Gartner claims in [5] "By 2010, social-banking platforms will have captured 10% of the available market for retail lending and financial planning." These facts turn the security and trust aspects into two very urgent requirements for Social Lending adoption.

2 Analysis of Social Lending

As it can be expected, the Social Lending trend could bring about several implications and leave additional room for extensions. Apart from the obvious technical and legal issues, there could also be important social and commercial issues and even political implications from the wider adoption of such as a trend. The following paragraphs attempt an analysis of the related issues.

2.1 Social Lending Models

Social Lending appears in two major forms: the "online marketplace" model and the "family and friend" model.

The first model of Person to Person Lending on the Internet makes possible for individual lenders to find individual borrowers and vice-versa. This model relates borrowers with lenders through an auction-like process in which the candidate lender willing to provide the lowest interest rate "wins" the borrower's loan. The marketplace schema may involve other intermediaries (such as specialized web sites) who package and resell the loans, but eventually the loans are sold to individuals (one lender for one borrower) or groups of individuals (many lenders for one borrower).

The second model ("family and friend") relinquishes the auction-like process completely and focuses on borrowers and lenders who already know each other, similarly to the situation where two (or more) friends or business associates formalize a personal loan. While the primary advantage of the marketplace model is the correlation aspect, the family and friend model emphasizes online collaboration, loan formalization and servicing.

This paper is concerned with the first model of Social Lending mainly because the issues of security and trust are of less importance for the second model. This argument is validated by the fact that the related bodies (borrowers and lenders) are already known to each other and thus taking much less risks by participating to that transaction. Another motive for focusing on the first flavor of Social Lending is the fact that most of the current loans are between individuals who were unknown to each other before the transaction.

2.2 Case Studies

There are currently more than forty major p2p lending web sites targeting more than 30 countries globally [6]. While most of them follow similar procedures, in order to demonstrate potential security threats it would be quite useful to present a couple of those cases.

Zopa [7] was launched in March 2005 by several people with previous experience in financial services. It was the first person to person lending and borrowing community in

the UK. Zopa currently has over 275,000 members [8] demonstrating a growth of 75000 members during the past 12 months. They claim that by combining a better interest rate to borrowers and a better return for lenders and a more community based approach, Zopa is essentially reinventing a model of friendly societies claiming to provide a more social and ethical financial service closely allied with mutual gain [8]. Zopa's current business model is based on borrowers paying a one percent (1%) exchange fee to Zopa upfront. In practice the site should offer lenders and borrowers value in that they get better rates of interest by cutting out a bank middleman. They also get more control over the lending process and establishing a mutually agreed loan rate. The financial risk for lenders on Zopa is reduced by spreading loans to multiple borrower. Each lender makes loans to at least 50 borrowers, and lenders' exposure to any one borrower is capped at £200. All loans are claimed to be backed by a "legally binding contract," which is a major concern for all participating individuals. If a Zopa borrower defaults on a payment, Zopa will use exactly the same recovery processes that banks use. An optional feature provided by is Zopa is the verification stage, during which they add in information from the candidate lenders credit file (their credit score, their employment history etc) to give a fuller picture of the candidate borrowers.

Prosper [2] has been another very successful case of P2P Lending in US. Until the fall of 2008, Prosper had enabled 25,000 loans between its 750,000 members that averaged $6,000 each, which made about $150 million in serviced loans. However during the past few months Prosper has been a target for shutting down by the US Securities and Exchange Commission (SEC) because the “loan notes issued between January 2006 and October14, 2008 are securities, and Prosper violated Section 5 (a) and 5 (c) of the Securities Act, which prohibits the offer or sale of securities without an effective registration statement or a valid exemption from registration” [9].

The two approaches differ in some key points [10]. Zopa stresses the risk management features to the lenders – investors. This is achieved by spreading the risk across multiple borrowers and forcing lenders to choose one or more borrowers to support lower interest rates. Prosper, unlikely Zopa, directly allows lenders to choose and finance individual borrowers. In this case, the Social Lending nature of the transaction is set off in another manner. Prosper uses a reverse auction to match parts of its loans, and the lenders choose who gets funded based not only on abstract figures (such as credit rating, income and previous lending reputation) but also on a personal statement. This may cause problems in some countries (or states) with interest rate regulations. That is, laws against usurious interest rates which prevent lenders from getting what they consider a suitable return to reimburse them for lending to borrowers with higher risk.

2.3 Issues

The case studies presented in the previous paragraph can become the basis for raising some questions regarding the proper function of the Social Lending schema. These questions are related to the security of transactions, the trust to the Social Lending model, the risk of financial frauds, the legal and regulatory obstacles that could affect the schema as well as the operational specifications that should be implemented to make this model viable. These key issues, as they are portrayed in the following sections, can be categorized to technical, legal, regulatory and operational issues.

2.3.1 Technical

Social Lending could cause a series of technical questions for the development of such a schema. Due to the fact that Social Lending is a form of Social Networking, the basic technology to implement it, is Web 2.0. This is second generation web development and web design, is recognized as a facilitator of communication, information sharing, interoperability and collaboration between the members of on-line community. It has also shown the way to the development and evolution of web-based communities, hosted services, and web applications.

Another very important technical issue is the need for a suitable correlation mechanism that could match the loan demand and the potentially related offers. A related attempt that could be used is [11] which "comprises a demand placement module, a supply providing module, and an algorithm linking the demand placement module to the supply providing module".

For the situations where the loan is spread across multiple lenders or borrowers, an appropriate mechanism for managing the microcredit distribution is essential. A suggested approach comes from [12] which could be adapted to Social Lending.

A different technical issue is the reputation mechanism that can be used for evaluating the risk of giving a loan to a specific individual. On a Social Lending scheme, the potential lenders can be benefited from a credit score of the potential borrower. This credit score is based on a reputation mechanism which evaluates the credit value of the potential borrower by combining factors, such as income, previous defaults and comments from other lenders. Similar approaches have been very useful for eBay [13] where "an online feedback mechanism that encourages buyers and sellers to rate one another seems to have succeeded in encouraging cooperative behavior in an otherwise very risky trading environment".

Apart from these technical issues that are related to the functional aspects, there are also issues related to the security aspects of Social Lending. These comprise the issues of integrity, privacy, confidentiality and anonymity, exposing questions such as:

- How is the transaction protected from a man-in-the-middle attack that could change the terms of the loan?
- How is the transaction protected from a "bad" lender or a "bad" borrower that could change the terms of the loan on his/her favor?
- How is the privacy of the lender and the borrower ensured?
- How is the anonymity of the lender and the borrower ensured, during the terms negotiation phase?
- How can the lenders and the borrowers trust the "intermediate" web site that provides the Social Lending service?

2.3.2 Legal

In addition to the technical issues there are also many legal issues concerning Social Lending. As stated by [14] "the legal framework of the EU member states does not yet appear to be suitable for the growth of microcredit. Statistics on micro-credit are not sufficiently developed in the EU, which is due to the fact that micro-credit is not foreseen either in national or in EU-legislation". This is also valid for US and most of the other countries proven by the rapid rise and fall of related attempts.

The legal questions that should be posed are:

- Are these transactions legally valid?
    - If not, how can these transactions can be legally valid?
- How is the legal responsibility divided between the dealing parties?
    - What is the legal responsibility of the lender?
    - What is the legal responsibility of the borrower?
    - What is the legal responsibility of the intermediate "web site"?
- How are the personal data protected?
- Should there be a tax deduction for these transactions?
    - Who (or how) should take care of tax deductions?

Some parts of these questions are answered by the EC directives 1999/93/EC[15] and 2000/31/EC[16]. However the call for "EU legislation to encourage microcredit schemes" reveals the existing legal gap. With this legislation [17], "EU aims to remove problems caused by competition and money-laundering rules, to allow more EU co-funding, to introduce a harmonised regulatory framework for microcredit providers and to raise their profile".

2.3.3 Regulatory

On top of the previously mentioned legal issues, there are a series of regulatory concerns. The existing regulatory framework aims to reduce the risk generated by the various financial transactions. It is based on a set of rules regarding risk management which should be followed by any institution offering financial transactions. However this framework may require some sort of enhancement to cover questions such as:

- Should the existing Social Lending web sites follow the existing regulatory framework?
- Should the potential lenders and borrowers follow the existing regulatory framework?
- Which requirement should be asked from any Social Lending web sites?
- Are there any requirements for minimum capital?
- Who (and how) should supervise the Social Lending Market?
    - What should be the role of the National Banks?
    - What should be the role of the International Banks?
- Is Basel II applicable for Social Lending?

2.3.4 Operational

All three sections of the key issues mentioned before have a major effect on the operational aspect of Social Lending. From this perspective, the most important issue here is trust between the dealing parties. This is equally important for all: Lenders need to trust borrowers and the intermediate, borrowers need to trust lenders and the intermediate and the intermediate needs to trust lenders and borrowers.

Special care should be taken for the following issues in order to ensure the transaction:

- Money laundering
- Tax evasion
- Illegal export / import of exchange
- Identity manipulation / exploitation
- Default loans
- Graft

In order to manage the above issues, the following figures should be considered:

- Financial / Credit Risk
- Credit limits

2.4 Specifications

Having mentioned the issues that could affect the delivery of Social Lending services, Table 1 sums the necessary requirements.

Table 1. Requirements of Social Lending

Requirements of Social Lending
Operational
1. To enable individuals to borrow an amount money from one or many other individuals, according to commonly agreed terms.
Security
1. To secure the transaction for both parties (lenders and borrowers)
2. To discourage illegal transactions
3. To protect the private data of both parties (lenders and borrowers)
Legal – Regulatory
1. To give legal validity to the transactions
2. To manage the financial risk of the transactions
3. To tax the transactions
4. Reporting to regulatory authorities

3 Making Social Lending Safer

There are many possible ways of making a Social Lending model better, especially if one considers its multiple variations, but the following section focuses on security.

3.1 e-Services – The Next Generation

As mentioned in previous paragraphs, the latest trend of e-Services is inspired by both G2C and P2P, enabling services between individual citizens (Citizen-to-Citizen – C2C). The “Citizen” label distinguishes individual persons which are part of a traditional society or community from anonymous persons which have no connection relationships with traditional social structures.

The evolution of e-services would enable the provision of a new breed of e-services that would follow the C2C relationships but also benefit from the existence of a trusted intermediate party who could act as a broker between the two dealing parties of lenders and borrowers. This could potentially cover gaps identified in the previous sections and provide greater security and trust to the Social Lending e-service. A possible candidate for the role of the broker can be either a governmental body (such as the ministry of finance, a municipality or a national bank) or an existing private financial institution.

The participation of a broker should not eliminate the benefits coming from the principles of Social Networking. Instead, they should only provide the operating framework in order to achieve greater trust and validity for the loan transactions. A possible expression of this type of e-services could be something like C(2G)C for e-services enabled by governmental bodies and C(2B)C for e-services enabled by private bodies (businesses).

3.2 A New Paradigm

The next generation of e-services could also dictate some useful changes in existing Social Lending implementations.

3.2.1 Overview

The suggested new paradigm of Social Lending would transform the lending process as illustrated in the following scenario.

A candidate wishes to borrow an amount of money, e.g. 20000$. He accesses the Social Lending web site of the broker party and fills in the terms of the loan he wishes to receive. The terms include the amount of money, the loan period, the maximum interest that would be acceptable, his personal information as well as a supportive text that would aim to reason on loan purposes.

Following the completion of all the necessary information, the loan request is now recorded in the web site and can be evaluated by any possible candidate. So far, only the loan information is made available to the potential lenders, keeping the private data of the borrower secured.

At this point, the broker may choose to offer the potential lenders a few hints about the magnitude of the risk exposure that the lenders may face if they decide to provide this loan. This is done by using a reputation scheme similar to the one described in paragraph 2.3.1. The reputation scheme may associate previous defaults, opinions on the borrower from other lenders or the existence of the borrower to a bank “black list”. Additionally, they may require from the borrower to provide supplementary information such as income, existing deposits and list of guarantors.

Having weighed up all above facts, the lenders may now make an offer for the loan. This is done by accessing the web site and “bidding” on the interest which should be lower than the maximum interest that would be acceptable by the borrower. When the individual with the lowest “bid” is found, the period when the loan request is closed. As an optional closing condition, there could be a fixed time period. Now, it is the lender’s turn to be checked by the broker. This assessment will secure that the borrower will get the amount requested with the terms mutually accepted.

When both parties are checked against the broker's reputation database, the loan should be signed. This is done by the use of digital signatures. Each party has his own digital certificate obtained by a trusted third party, according to the PKI model. The e-contract is compiled under the mutually agreed loan terms by the broker, who is acting like a digital notary. The e-contract is digitally signed by both parties and the lender should now transfer the amount agreed within a standard period of time (no more than a few days) to the borrowers account. The borrower is now bound to pay the installments as agreed in the contract.

There are a couple of optional steps in that paradigm of Social Lending. For example, the broker is able to spread the loan to multiple lenders so that the loan could be more easily funded and the risk of a default would not affect greatly the lenders. However, this would increase the operation overhead since each one of the lenders should sign the e-contract. Another optional step could be for the broker to allow the spread of the lender money to multiple borrowers. This tends to transform the lender to a traditional investor who would aim decrease the loan risk by spreading his investment portfolio to multiple targets.

On top of all these, the party acting as the broker is in the position to take advantage of the transaction by introducing a commission for each loan. This could be a standard amount or a percentage on the loan amount. This could make this scheme economically viable while keeping the deposit/loan gap closer than the one offered from the traditional financial institutions such as banks.

Table 2. Organizational Improvements

Organizational Improvements
Broker
1. Establish the role of a broker that would act as in intermediary.
2. The broker can be:
a. A governmental body (ministry of finance, a municipality or a national bank)
b. An existing private financial institution
c. An independent body
d. A non profit organisation
Legal
1. The legal framework should include on-line signing of private contracts.
2. The regulatory framework Specify and include the financial risk requirements for the brokers.
Broker responsibilities
1. Provide the communication medium between the lenders and the borrowers
2. Certify the identity of the lenders and the borrowers
3. Evaluate the profile of the lenders and the borrowers in terms of credit risk
4. Enable the compilation, signing and distribution of e-contract
Risk reduction
1. Spread loan on many lenders
2. Spread loan on many borrowers
3. Limit loan amount
4. Use reputation (credit score) schemes

Finally, the broker has the ability to perform a tax deduction on the loan based on the tax regulations. However, since tax regulation vary from country to country, this may be difficult to apply in an international level, leaving space for Social Lending legislation to deal with this issue. However, in a national or EU level this could be an interesting option for tax authorities.

3.2.2 Organizational Improvements

The scenario above leads to several suggestions that could improve Social Lending in both organizational and technical terms. The organizational improvements of Social Lending that use the information of the above scenario are summarized in Table 2.

3.2.3 Technical Improvements

The technical improvements of Social Lending combining the information of the above scenario are summarized in Table 3.

Table 3. Technical Improvements

Technical Improvements
Anonymity
1. Keep the personal data of the lenders and the borrowers hidden until they agree on the terms of the loan
Encryption
1. Encrypt the personal data of lenders and borrowers
2. Encrypt the information used in the transaction (amount, interests etc.)
Digital Certificate
1. Assign a digital certificate to each party (lenders and borrowers)
2. Obtain certificate from a Trusted Third Party
Digital Signature
1. Digitally sign the contracts between the lenders and the borrowers using their own certificates
e-Contracts
1. Compile private e-contracts for loans
2. Use the mutually agreed terms
3. Broker to act as a digital notary
Loan Community
1. Development of a wide and trustworthy loan community
2. Use Web 2.0 Technologies
Trust
1. Reputation mechanism based on existing credit evaluation (Banks' "black lists")
2. Anti - Money Laundering Mechanisms

4 Conclusions

The Internet has created some unique new situations and business opportunities for individuals. In today's environment, in which financial crisis left hardly any room for

high return investments with relatively low risk, Social Lending can be one of those few opportunities for both lenders and borrowers. This new kind of e-Service uses the Web to create a network of regular people who wish to borrow and lend money to one another, at agreed upon terms that are a result of bidding. These Web sites even allow pools of people to fund loans partially or in full.

This paper has presented the current variations of Social Lending stressing their weak points and suggesting a new approach that is enforcing security and trust by the introduction of a broker role in the C2C relationship. This broker role can be performed either by a governmental – public body or by a private body.

4.1 Benefits

Social Lending models try to bring in again the social features that are neglected in traditional centralized banking models, while offering a balance of social and financial e-service. This is opposed to the strict profit-centric approach of typical financial institutions. They also challenge current practices to benefit from the lack of significant operating costs that are common in other online and offline institutions. Consequently, they accomplish the reduction of infrastructure expenses (such as physical branches) which are common place for traditional lending institutions, such as banks. These increasing savings can be used to narrow the deposit/loan spread.

For instance, a bank may offer to its customers a poor 1% return for any deposit, nevertheless, when they lend those same customer funds (on deposit) to the bank's other customers who need to borrow, they do so at a much higher rate of interest, despite the fact that they keep the difference as a profit. Social Lending aims to correct this anti-social feature and form a community which would allow those who have funds to lend at a better return, while it provides a better interest rate to those who need to borrow, by removing the bank from the equation.

Additionally, this model permits potential lenders to directly manage the distribution of their own funds, as opposed to the traditional bank lending models which pool all funds as one and entirely ignore the individuals who actually own the money from the decision-making process regarding the rates and terms of who may borrow that money, for how long they may borrow it and how they are going to return the money.

The new paradigm described above offers a few advantages comparing to the existing the common Social Lending implementations. These are summarized in Table 4.

4.2 Further Evolution and Improvements

The attempt presented introduced the role of a broker that could act as a security enabler for Social Lending schemes. As it can be understood, this attempt can be further evolved and improved. Since, most of the improvements are technically feasible and available; one should focus on the organizational aspects. A possible expansion could be to investigate the exact operating requirements for an existing financial institution that wishes to act as a broker. This could be very interesting for banks who wish to get into the new market of Social Lending. However should be dealt with caution in order to prevent the cannibalization of their existing markets. Another possible improvement could be to investigate the legal framework and try to suggest a Social

Table 4. Benefits of the new social lending paradigm

Benefits of the new paradigm
To individuals
1. Ensure the legal validity of transaction
2. Terms are well known and agreed between the lenders and the borrowers
3. Reduce investment risk for lenders
4. Get a loan otherwise rejected by a "traditional" bank
5. Lower interest rates for loans
6. Higher interest rates for deposits / investments
To participating financial institutions
1. Lower operating cost
2. Profit obtained by commission
3. Greater liquidity
4. Get into a new market
To participating governmental institutions
1. Provide social service for citizens with low credit score
2. Provide risk management service for citizens with funds
3. Profit obtained by commission
To tax authorities(s)
1. Immediate tax deduction
2. Greater liquidity
3. Real time Anti-money laundering control
4. Immediate audit of transactions
To regulatory authorities
1. Immediate audit of transactions

Lending Implementation in a way that a broker would not need to comply to the regulatory requirements of financial authorities. However the "Holy Grail" of Social Lending would be a variety that would not need any central gathering of the loan information, as in the case of P2P file sharing.

4.3 Summary

Social Lending is one of the latest trends in Social Networking, offering a communication and financial channel between individual borrowers and lenders. Although it has demonstrated a significant growth, it still has several issues, related to security, trust and legal validity. This paper has proposed the introduction of a new role within Social Lending in order to tackle some of these issues. The broker role could be performed by a private or governmental body. So far it seems more possible and legally feasible to adopt the private body scenario, especially in the case where the private body is an existing financial institution. This would result multiple benefits for all participating parties. The second version of the new paradigm of Social Lending, redefines the role of governmental bodies, adding a financial service to public services. This version, although more trustworthy if implemented, is more difficult to be adopted due to political and commercial reasons. In any case, Social Lending is a very

hot topic that would interest the online community from social, commercial and political point of view.

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