

# Crowdfunding in the development of social media fanbase – case study of two competing ecosystems

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## Abstract

*The aim of the explorative study is to understand the role of crowdfunding in the development of the fanbase using data from two recent cases of competing business ecosystems. We conducted an event study that employed social set analysis (SSA) of Facebook data to uncover and better understand the users' interactions and brand associations before, during and after a crowdfunding campaign event. Key contribution of the study is the introduction of a new data source on co-creative interaction between companies and their customers, as well as an approach to support the study of ecosystems from a customer perspective. Our paper focuses especially on the role of Jolla's tablet crowdfunding campaign in the development of its fanbase in relation with Nokia's tablet launch during Slush 2014 event. We discuss the results, present substantive interpretations of the findings, implications of crowdfunding on fanbase development and conclude with directions for future work.*

## 1. Introduction

Business ecosystems involve a heterogeneous and continuously evolving set of entities that are interconnected through a complex, global network of relationships [2]. Firms in business ecosystems come from a variety of market segments, each providing

their own unique value propositions [1]. The value creation and appropriation require orchestration between these firms across segments [9]. In the mobile ecosystem, for instance, the value for the users of tablets is co-created by integration of tablet designers and manufacturers, accessory makers, mobile network operators, operating systems and applications. Co-creation is an essential business ecosystem characteristic, because a continual realignment of synergistic relationships of resources is required for the growth of the system and responsiveness to changing internal and external forces [31].

Crowdfunding is a new approach for supporting (or funding) the development of business ecosystems. Crowdfunding can be used e.g. for identifying and involving new consumers, customers, and both individual and professional funders to ecosystems. Crowdfunding can also facilitate various different types of value co-creation between actors joined together with a crowdfunding platform and initiative [e.g. 30], and makes possible the formation of new types of service and value-exchange ecosystems [e.g. 36].

The aim of the explorative study is to understand the role of crowdfunding in the development of fanbase. In this paper, we confine to the definition of fanbase as the social media users that have performed one or more actions such as posting, commenting, liking or sharing on the Facebook page of a company.

The specific research question this paper addresses is: *what, if any, is the impact of crowdfunding campaigns on the development of social media fanbases of companies?*

The remainder of the paper is organized as follows. Section 2 presents and discusses relevant theories and concepts in crowdfunding. Section 3 presents methodological details on the case study in terms of case selection criteria, social data collection, data processing, data analysis etc. Findings are reported in Section 4 with their substantive discussion in Section 5 together with propositions derived from the case study, limitations and future research directions.

## 2. Crowdfunding –theory and concepts

### 2.1. Crowdsourcing

‘Crowd’ is defined as a group or a community consisting of a large number of people, each of them contributing little, but with a possible high combined impact [3,18]. Although there are many definitions of crowdsourcing within the context of developing new business ecosystems, we adopt the definition by Rubinton [32] wherein crowdsourcing is described a process of one achieving a goal by receiving small contributions from many in exchange for any form of value. There is ample evidence to support crowdfunding phenomenon being a subset of crowdsourcing [12,8,18].

Crowdfunding would never have emerged without the influence of crowd dynamics and social media i.e. the two main elements of “crowdsourcing”. Multiple papers [18,23,8] support this argument, while distinguishing crowdfunding as not only an idea generation initiative that emerges from crowd’s collective efforts, but it is about generating finances for a proposed initiative [11]. They further establish the fact that crowdfunding having precedents of crowdsourcing goes beyond just social network participation and gives more proactive roles to customers. The various definitions and perspectives of crowdfunding have been discussed in [17], wherein crowdfunding is defined as a “process of an individual or group of individuals raising capital for a cause; be it cultural, social or business by attracting small contributions from a large crowd by using social media and internet as the medium for communication”. We have used the same perspective in the context of this paper.

### 2.2. Elements of Crowdfunding

Reviewing the extant literature on crowdfunding we arrive at six core elements that constitute crowdfunding i.e. (1) crowd, (2) intermediaries or crowdfunding platforms, (3) project owners/fundraisers [3,17,40] (4) funding mechanism, (5) specialization and (6) return type [33].

1. **Crowd** - refers to large group or conglomeration of individuals or community of people contributing via the internet, by financially supporting a project or cause, taking a risk and expecting a certain payoff; financial or any other [17]. Crowd also refers to supporters who wish to co-produce a project they deem to be interesting [3].
2. **Project owners** - are project creators or entrepreneurs seeking capital [3]. Project owners could also be ones who use crowdfunding to get access to the market for both fund raising and sales from truly interested supporters [11]. In this paper, a project owner is an individual, group of individuals or organizations that use crowdfunding.
3. **Intermediaries** – are crowdfunding platforms i.e. a virtual hub for the crowd and project owners [17]. In the context of this paper, we refer specifically to Indiegogo; other examples are Kickstarter, Invesdor, etc.
4. **Funding Mechanism** – are the principles or rules the intermediaries set under which funding takes place [33]. E.g. Kickstarter adopts an all-or-nothing setting i.e. projects only receive funds when minimum amount is raised, while Indiegogo adopts a flexible funding approach i.e. project owners can decide to keep the funds raised even if targets are not met.
5. **Specialization** – refers to type of projects the intermediaries support. Kickstarter and Indiegogo support a wide range of categories be it creative like movies, art or new products, new businesses, etc. [17,33]. However, there are smaller intermediaries that support very specific causes – e.g. Mesenaatti.me is a Finnish platform that supports only projects related to public service, art, culture or music [17].
6. **Return Type** – is the return of investment or incentives for the crowd. They are classified into four types i.e. reward, equity, lending and donation [17]. E.g. Reward suits pre-sales and the returns are usually products or some type of tangible goods, with lending the ROI is usually interest on the investment made [17].

The six core elements are exclusive characteristics and thus can be used to analyze and

study differences between various crowdfunding projects.

### 2.3. How a crowdfunding process works?

According to Collins & Pierrakis [8], the stages of an equity Crowdfunding process is divided into four stages as illustrated in Figure 1.

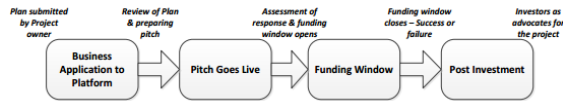


Figure 1. Crowdfunding process [16]

These same four stages are also applicable to other forms of Crowdfunding like Reward, Donation or Lending. Jolla had its campaign on Indiegogo and followed a reward based crowdfunding approach.

### 2.4. Motivation to Participate

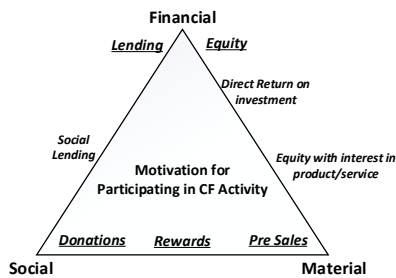


Figure 2. Motivations for crowdfunding Participation

The motivation for the crowd investing in crowdfunding initiative could be social return; financial return and material return [6] as illustrated in Figure 2. Furthermore the expectation of returns is dependent on the extrinsic or intrinsic factors motivating the crowd [3,11]. De Buysere et al. [6] further states that emotional and geographical connection of the crowd towards the project is another important factor [16].

According to [6,17], motivation to be active participants is dependent on the potential outcome of the participation and can be classified as in Figure 1,

- **Social return** – Participants participate solely on an intrinsic motivation to help and support the project succeed. E.g. Donation crowdfunding.
- **Material return** – Combination of social return and some reward or tangible benefit. E.g. Reward crowdfunding or pre-sales.
- **Financial return** – The motivation in this case is purely return on investment e.g. Equity, Loan.

Social lending is an example of a hybrid model of financial as well as social return [6].

So, why do companies or brands and organizations start a crowdfunding initiative? The very obvious answer is to raise money for their project or idea [17], while getting public attention and obtaining feedback is also equally important [3]. It might lead to word of mouth recommendation and social marketing thus forming a link between the product and its first customers [17]. The case study (Jolla) in this article focuses on this aspect, wherein gaining public traction and selling more was one of their main motivations for crowdfunding participation. In addition to these motivations, early insights on value creation dynamics, i.e., the features and offerings of consumers interest, the price that they would pay for these features and offerings.

### 2.5. Recent Developments in crowdfunding Research

Crowdfunding has been gaining the interest of the scientific community recently and the number of publications has been steadily rising, along with the approaches, methods and perspectives applied to study this new phenomenon. Table 1 showcases recent examples of research perspectives when it comes to crowdfunding. The research approach seems to have moved from qualitative case study approach e.g. [6,11,17] to extensive explorative quantitative analysis e.g.[3,23] given the increased maturity of data crawling algorithms, access to rich datasets and willingness of platforms to share data.

Table 1. Examples - Path of Crowdfunding research

Paper	Study & Findings	TC
[33]	Analyzed 108 crowdfunding projects from 20 platforms; Empirically proved a positive impact of idea creativity and hedonic value on the success of a campaign depending on the type of crowdfunding.	CF
[39]	Developed a model for measuring antecedents of crowdfunding project success using online surveys, analyzing 51 projects on a single crowdfunding platform.	CF
[23]	Extensive empirical explorative study of over 48500 projects from Kickstarter, providing descriptive insights into the dynamics of success and failure of crowdfunding ventures.	CF
[40]	Analyzed the network dynamics of the role of fundraisers who choose to back and invest in the projects of others to the success of one's own projects using data from 45,000 projects on Kickstarter. Empirically showed a positive relationship between them.	CF

[11]	Explorative study comparing two types of crowdfunding's, using in-depth qualitative analysis of three cases involving crowd-funding initiatives. A funding pattern in form of an S-curve established for the cases.	CF
[34]	Collected data from Indiegogo, Twitter, Facebook- Identified positive influence of social buzz and Facebook shares as factors for crowdfunding project success.	CF SM
[29]	Projects that do not have their own website or social media presence are more likely to fail.	CF SM

CF- Research papers studying only Crowdfunding Platform;  
CFSM- Papers studying impact of social media on Crowdfunding.  
TC – Type of contribution

Recent contributions in IS have also analyzed specific crowdfunding process challenges e.g. [33,39] etc. few of which have been described in Table 1. In addition to these, recent research papers have also looked at motivations for participation in crowdfunding [4], where-in [4,10,12] analyze crowdfunding project owners and backers from a perceived risk and individual decision making perspective respectively. Table 2 mostly highlights the contributions of data driven approach to research on crowdfunding using datasets that are extensive, reliable and very impressive both from Crowdfunding platforms themselves and also from other social media platforms from Twitter and Facebook, thus highlighting impact of social media on Crowdfunding success e.g. [19,29,34].

However, according to our analysis of previous literature, first, no previous studies have made to study the impact of crowdfunding on an organization's social media presence. Secondly, we found no studies that have used two or more cases using social media data to study the possible impact of crowdfunding to development of fanbase.

### 3 Method: case study

In this section, we present a case study where big social data of Jolla Oy and Nokia Oyj is collected from their respective Facebook pages. We employed SSA as a novel method to (a) understand temporal dynamics of interaction (b) detect crowdfunding campaign post hoc and, (c) conduct an event study of users' socio-technical interactions and brand associations before, during and after the detected crowdfunding campaign events. Event studies is a finance methodology to assess an impact on corporate wealth (e.g. Stock prices) due to events such as restructuring of companies, leadership change, mergers & acquisitions [5,20,21]. While there is no unique structure for event study methodology, at a higher level of abstraction, it

contains identifying three important time periods or windows. First, defining an event of interest (in our case, crowdfunding campaign) and identifying the period over which it is active (event window), second, identifying the estimation period for the event (pre-event or estimation window), and third, identifying the post-event window [20].

The following are the reasons to select these two companies for the event study: similar products and markets, same country of origin (Finland) and catering global markets. same launch date and venue (Slush 2014, Helsinki, Finland), different sales strategy – Jolla Oy, started crowdfunding campaign for selling and developing the Jolla Tablet, whereas, Nokia Oyj, used the traditional approach of launching a product and selling it to the target market.

We investigated the interactions of the fanbase for both the companies before, during and after crowdfunding campaign. We discuss the results, present substantive interpretations of the findings, implications of crowdfunding on fanbase development, and conclude with future work.

#### 3.1. Case Description

Nokia Oyj<sup>1</sup> currently focuses on large-scale telecommunications infrastructures, technology development and licensing and online mapping services. Nokia has approximately 57, 000 employees around the world, headquarters in Espoo, Finland. In 2014, Nokia employed 61,656 people across 120 countries, conducted sales in more than 150 countries and reported annual revenues of around €12.73 billion. Nokia N1 is an Android tablet developed by Nokia. Unveiled on 18 November 2014, it is Nokia's first mobile device since the sale of its original mobile phone business to Microsoft earlier that year.

Jolla Ltd.,<sup>2</sup> established in 2011, is a mobile company from Finland that is developing mobile devices and Sailfish OS, the independent mobile operating system. In November 2014 Jolla introduced the Jolla Tablet project, aiming to hit the markets in Q2/2015. Jolla has 125 employees working in (Helsinki and Tampere) Finland and Hong Kong.

#### 3.2 Sales Strategy: Nokia N1 v. Jolla Tablet

The launch of Nokia's tablet product was done in the traditional way, which means that they launched the concept and announced the release date for sales

<sup>1</sup> <http://company.nokia.com/en/about-us/ourcompany>

<sup>2</sup> <https://jolla.com/about/>

in China (January 2015) of Nokia N1 in Slush 2014. So, in essence, for Nokia, Slush was a Product Concept Launch and release date announcement platform.

### 3.3. Data Collection: SODATO

Table 2. Facebook data corpus

Attribute	Nokia	Jolla
From	2008-12-31	2011-10-01
To	2015-05-06	2015-05-04
Total Posts	2,808	1,439
Total Comments	847,323	7,247
Total Likes	14,473,345	103,369
Total Unique Actors	3,048,263	40,242

Facebook data was collected using the Social Data Analytics Tool (SODATO) [13,14,15]. SODATO enables the systematic collection, storage, and retrieval of the entire corpus of social data for a public Facebook wall (in our case for the official Facebook walls of Nokia<sup>3</sup> and Jolla<sup>4</sup>). Table 2 above provides a description of the Facebook data corpus.

**3.3.1. Data Processing.** We used data warehousing and on-line analytical processing technology using Microsoft SQL Server database to conduct temporal analysis. We designed a multidimensional data model for Facebook data using interactions as numeric/fact measures. The interactions measure data is further processed across several dimensions: temporal (daily, weekly, monthly, and yearly), actions (post, comment, and like), actors (admin and non-admin) and artifacts (posts and comments). Since the type of interactions that can be performed by various actors on a post artifact include comment and like, using a multidimensional approach is required.

**3.3.2 Data Analysis.** We empirically analyze the fanbase behavior for both the companies before, during and after Slush 2014. The aim of the case study is to analyze the impact of Jolla's crowdfunding campaign on Jolla's fanbase. This impact of crowdfunding will be compared with Nokia's traditional approach of launching a product and selling it on the market. We discuss the results, present substantive interpretations of the findings, implications of crowdfunding on fanbase development and conclude with directions for future work.

<sup>3</sup> <https://www.facebook.com/nokia>

<sup>4</sup> <https://www.facebook.com/jollaofficial>

Slush 2014 is the focal point for startups and technical talent to meet with top-tier international investors, executives and media in Finland. In 2014, Slush brought together over 14,000 attendees and probable fans and more than 3,500 companies for the two-day event.

### 3.4. Social Set Analysis

For big social data analytics of Facebook or Twitter data, the fundamental assumption of Social Network Analysis (SNA) that social reality is constituted by dyadic relations and that interactions are determined by structural positions of individuals in social networks [22] is neither necessary nor sufficient [37]. To overcome this limitation and address it, [38,29,25,39], have proposed an alternative holistic approach to big social data analytics called Social Set Analysis (SSA).

SSA is based on the sociology of associations and the mathematics of set theory and supports both interaction analytics in terms of actors involved, actions taken, artifacts engaged with as well as text analytics in terms of keywords employed, feelings expressed, pronouns used and topics discussed [38,29,25,39]. For the purposes of this paper, we employ SSA to uncover the temporal distribution of user engagement on the Facebook walls as well as with respect to the wall admin (the case company's Facebook wall account), and unique actor sets before, during and after events of theoretical interest (in our case, the crowdfunding campaign), and overall actor mobility between the two Facebook walls.

## 4. Findings

### 4.1. Distribution of Artifact Associations

Jolla launched the product concept and the crowdfunding campaign on the same day and at the same time in Slush 2014. This allowed the fans to see the product and invest in it (pre-purchase) at the same time.

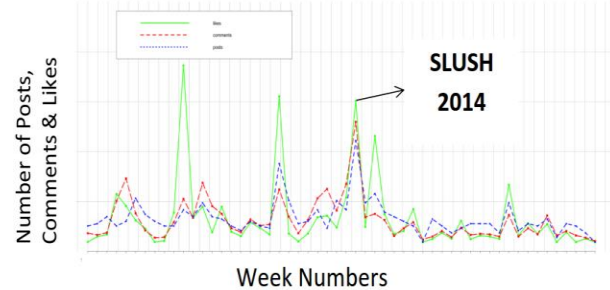


Figure 4. Temporal Distribution of Jolla's Facebook Dataposts (Posts, Comments and Likes)

Figure 4 shows that in Jolla's case, there is constant engagement in terms of likes and comments to the posts of Jolla on Facebook. The engagement with Jolla, in terms of comments reaches highest level during Slush 2014.

We also observed that unlike Nokia, users not only like and comment on admin's posts but they can also submit posts on Jolla's Facebook wall. Thus, Jolla's Facebook wall engagement consists of posts, comments and likes by both the admin (Jolla) as well as the Facebook users. To account for this crucial difference in user engagement modes between our two case companies, we conducted an additional temporal analysis of the Facebook users' engagement on posts and comments made by Jolla by filtering out the non-admin posts. Figure 5 shows the temporal distribution of posts and comments by Jolla and user engagement with them in terms of likes and comments.

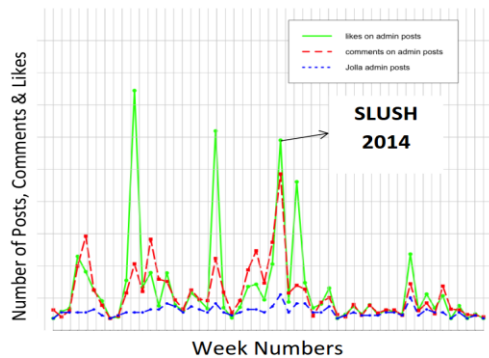


Figure 5. Temporal Distribution of Jolla's Admin Facebook Data (Posts, Comments and Likes)

Comparing Figure 4 (admin + non-admin engagement) with Figure 5 (non-admin or users) engagement on admin (=Jolla) posts and comments, we find that most of the user engagement was directed towards Jolla admin artifacts i.e. posts and comments made by the admin.

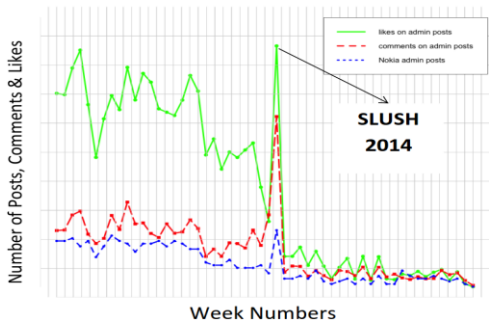


Figure 6. Temporal Distribution of Nokia's Admin Facebook Data (Posts, Comments and Likes)

Figure 6 shows that the number of likes to the posts by Nokia before Slush 2014 is significantly high. The number of likes drops significantly after Slush 2014. There is also a good user engagement towards Nokia in terms of comments to posts by Nokia before Slush 2014. This engagement to Nokia based on comments keeps declining but not as significantly as in case of likes after Slush 2014.

## 4.2 Distribution of Actor Associations

Having analyzed the temporal distribution of user engagement as shown in Figures 4-6, we analyzed the patterns of actors by constituting sets across space (Facebook walls of Nokia and Jolla) and time (3-weeks before, during and after the Slush crowdfunding campaign).

**4.2.1. Actors Sets across Space.** Figure 7 presents the finding that there are only 16 actors (Facebook users) in common between the Nokia and Jolla Facebook walls. This is quite a surprising finding given the origins of Jolla from Nokia in terms of personnel and technology.

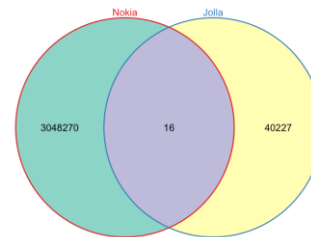


Figure 7. Social set analysis of Nokia and Jolla Facebook Actors

**4.2.2. Actors Sets across Time.** We then investigated Facebook actor sets with respect to the Slush crowdfunding campaign across 3-weeks periods before, during and after the Slush crowdfunding campaign. Figure 8 describes the number of unique and common fans on Facebook,

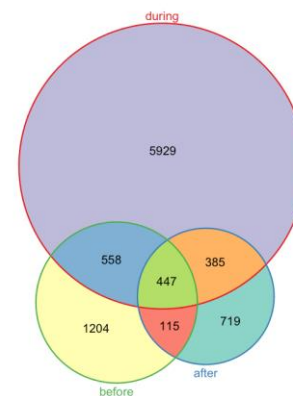


Figure 8. Social set analysis of Jolla Facebook data

For Jolla (Figure 8), there is a significantly larger (5929 unique actors) user engagement **during** the campaign period when compared to before (1204 unique actors) and after (719 unique actors) the campaign period. There are 447 unique actors involved in all the three stages (before, during and after).

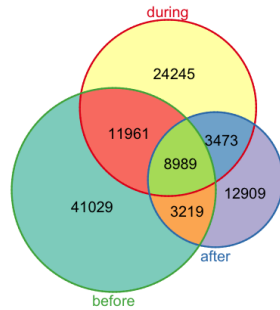


Figure 9. Social set analysis of Nokia Facebook data

In case of Nokia (Figure 9), there is a significantly large (41029 unique actors) user engagement **before** the campaign when compared to during (24245 unique actors) and after (12909 unique actors) the campaign. There are 8989 unique actors involved in all the three stages (before, during and after) of the campaign.

Table 3. Social Set Analysis

	Total No. of days	Jolla Oy	Nokia Oyj
Before Campaign	22	2324	65198
During Campaign	21	7319	48668
After Campaign	23	1666	28590
During Campaign + After Campaign	44	8985	77258
Fans/day (Before Campaign)	22	105	2963
Fans/day (During + After Campaign)	44	204	1756

To facilitate comparison of the two cases, we created the following formula to assess the impact of the different sales approaches on the user interaction:

$$I\% = \frac{T - B}{B}$$

- I* – Increase in the Interaction of Fans/day
- T* – Total of Fans/Day (During Campaign + After Campaign)
- B* – Total of Fans/Day (Before Campaign)

Using the formula and Table 3 we were able to calculate the increase in the user interaction for Jolla (194%) and the decline in the user interaction for

Nokia (40.7%) from before to after the campaign period.

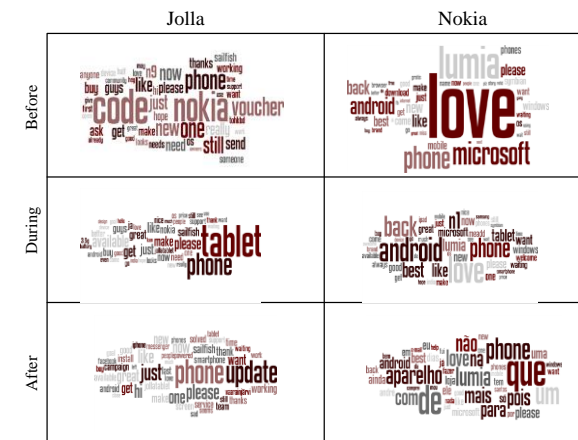
### 4.3 Distribution of Word Associations

As part of social text analysis of the data corpus, we conducted word cloud analysis of the 50 most frequent words in the content of posts and comments on Nokia and Jolla for 3-week periods before, during and after the Slush crowdfunding campaign. (We excluded the most frequent words “Nokia” and “Jolla” from their respective word clouds).

A word cloud is a visual illustration to provide a visual view of an instance or a group of instances that have something in common (e.g., search results for a specific instance). In the word cloud, the terms are listed in an alphabetical order and the font size or color determines the importance of the word [7]

Table 4 presents the word clouds for Jolla and Nokia in the 3-week period before, during and after the Slush and Jolla’s crowdfunding campaign.

Table 4. Word Cloud of most frequent words



Based on Table 4, it can be observed that in Jolla’s Facebook discussions during the “Before” period, some of the most common words that appear are, Nokia, N9, Phone, Buy, Code, Need. Jolla is a spin-off company from Nokia based on Nokia’s N9 phone hence features amongst frequent words on Jolla’s Facebook page before the crowdfunding campaign period. In Jolla’s “During” period, the word cloud shows words like, Tablet, Phone, Buy, Need that indicate fans’ interest towards buying the tablet product and/or the phone product. Finally, the “After” period of Jolla indicates an enquiry from the fans towards the crowdfunded product. This is evident from words like, Please, Update, Want, Waiting, Get.

The word clouds for Nokia in the 3-week period before, during and after the Slush crowdfunding campaign are also presented in Table 4. It can be observed from “Before” period of Nokia that the words, Love, Lumia, Microsoft, Android, Phone indicate a transition from Nokia mobile phones to Microsoft for the fans and Android as an operating system for the phones. The product release for Nokia N1 tablet can be observed from “During” period of Nokia. The words N1, Tablet, Android, Love indicate towards the new Nokia N1 tablet and Android operating system. Whereas, “After” period for Nokia does not have the words; Tablet, N1 in the most frequent words giving an indication of reduction in interest towards the tablet product. A possible reason for this drop could be that – unlike Jolla did through the crowdfunding campaign – Nokia did not give any channel to the consumers to buy the product.

## 5. Discussion and conclusions

In this paper, we have introduced Social Set Analysis (SSA) to be used for visual business ecosystem analytics. SSA allows insights on the overall volume of a company’s fanbase activity. It also shows the ways that members of the fanbase move in between the key phases of company evolution. Here, we have used SSA to investigate how the fanbases of two competitive business ecosystems, Nokia and Jolla, have interacted with the companies before, during, and after a product launch. Moreover, using SSA, we analyzed the possible overlaps between their respective fanbases and showed that they share a very small amount of fans.

SSA results presented earlier showed the voluminous but also transient nature of interactions during crowdfunding campaigns and a diversity of aggregate user behavioral patterns. Overall, our findings are similar to prior results from SSA event studies of corporate social media crises [26,27]. It is interesting to note that social media crises and crowdsourcing campaigns share not only structural similarities from an event study methodologies perspective (before, during and after), but they also yield similar interactional patterns in terms of temporal dynamics and positive and negative brand associations.

We are aware of the fact that branding strategies and tactics differ significantly between an established brand such as Nokia and a new brand such as Jolla. Further, we are also not interested in isolating the effect of crowdfunding campaigns from a “treated” Jolla vs. “untreated” Nokia ecosystems comparison. Our application of SSA event study to the crowdfunding campaign was not concerned with the

“supply-side” marketing strategies and tactics of Nokia and/or Jolla in that context. Instead, our analytical objective was to employ SSA to uncover and better understand the “demand-side” dynamics of users’ brand associations in terms of “Facebook likes” on brand posts and keyword analysis of their comments aggregated as word clouds. We think that SSA combined with netnography and content analysis in terms of sentiment analysis and topic discovery can reveal the different strategies employed by the organizations to manage the crowdfunding campaigns. That is part of our proposed future work. Based on findings from SODATO analyses, we propose the following:

*Proposition 1. Crowdfunding increases fanbase engagement.*

SSA of Jolla shows a significant increase in user engagement (posts, comments and likes) of Facebook fans during and after the crowdfunding period when compared to before the crowdfunding period (Table 3). The rate of increase in fanbase engagement (see formula in section 4.2.2) related to the tablet product on a daily basis was 194% for Jolla from before to after the crowdfunding period. In case of Nokia, there was a decline in the user engagement. This decline was 40.7% for Nokia on the daily basis.

*Proposition 2. Crowdfunding contributes to sustainability of product brand associations.*

Based on calculation of ratio (Table 3) after/before fanbase engagement Jolla’s engagement (ratio of 0.72 after and before engagement in terms of comments, posts, and likes) is more sustainable compared to Nokia engagement (ratio of 0.44 after and before engagement). By looking at the trends Figure 5 of Jolla and Figure 6 of Nokia this impact to sustainability is easy to observe visually in a longer term

*Proposition 3. Crowdfunding speeds up the evolution of business ecosystems.*

This more generic proposition binds together the previous two propositions, and extends the implications to ecosystems level. This proposition is a preliminary one in the sense that we will need some additional data (for example, Facebook conversations between fans, crowdfunding platform data) to elaborate and validate it. This will be a topic to address in the next paper, where we will use the above additional data sources and analysis methods including Social Network Analysis.

Future work includes accessing and aggregating 1) data that represents the interconnections and interactions between individual social media actors and 2) data from the crowdfunding platforms representing the individual investments both for the



focal campaign(s) under investigations as well as related campaigns.

To investigate the structure of the two fanbases in more detail, we propose and plan to follow up this study with a more thorough investigation looking in the interconnections in between fanbase members. We assume that the structure of the fanbase does affect its activity at least in two ways. First, the fanbase should include tightly interconnected clusters of actors to support the development of local network effects. Second, the tightly interconnected clusters should be connected with each other with actors that provide bridges that serve as venues for global network effects to emerge. More specifically, the fanbase structure has to show small-world properties [22,36] in order to drive activity bottom up.

We suggest that this paper contributes to business ecosystem research in a major way. Crowdfunding campaign participants are among the lead users of new products and services, co-creating value with companies. As case Jolla shows, the focal company developing a business ecosystem is able to start building traction for ecosystem complementors as well by allowing them to co-offer new products that create additional value to the ecosystem. Case Jolla is particularly interesting from this approach as it introduces a way for complementors to develop hardware products. The kinds of insights stemming bottom up from consumers complement the other novel views into business and innovation ecosystem interconnections, including Deals and Alliances, Executives and Finance, Angels and Startups [2,31].

As for the limitations of this study, we currently only utilized data from one social media platform. We will explore also platforms such as Twitter, as well as crowdfunding platforms. These might provide support or refine the current propositions and help to further develop the propositions. Secondly, according to our definition of fanbase, we identify Facebook likers and commenters as company product fans in a rather straight-forward manner. In further studies, we will elaborate in more detail how social media likers and commenters are related to actual loyal fans of companies by using other data sources and interviews.

## 6. References

[1] Basole, R.C. Visualization of interfirm relations in a converging mobile ecosystem. *Journal of Information Technology* 24, 2 (2009), 144–159.

[2] Basole, R.C., Russell, M.G., Huhtamäki, J., Rubens, N., Still, K., and Park, H. Understanding Business Ecosystem Dynamics: A Data-Driven Approach. *ACM Transactions on Management Information Systems* 6, 2 (2015), 6.

[3] Belleflamme, P., Lambert, T., and Schwienbacher, A. Crowdfunding: Tapping the right crowd. *Journal of Business Venturing* 29, 5 (2014), 585–609.

[4] Bretschneider, U., Knaub, K., and Wieck, E. Motivations for Crowdfunding: What Drives the Crowd to Invest in Start-Ups? (2014).

[5] Bromiley, P., Govekar, M., and Marcus, A. On Using Event Study Methodology in Strategic Management Research. *Technovation* 8, 1-3 (1988).

[6] De Buysere, K., Gajda, O., Kleverlaan, R., Marom, D., and Klaes, M. A framework for European crowdfunding. *European Crowdfunding Network (ECN)*, (2012).

[7] Carmel, D., Uziel, E., Guy, I., Mass, Y., and Roitman, H. Folksonomy-Based Term Extraction for Word Cloud Generation. *ACM Trans. Intell. Syst. Technol.* 3, 4 (2012), 60:1–60:20.

[8] Collins, L. and Pierrakis, Y. The venture crowd: Crowdfunding equity investment into business. *Nesta*, 2012.

[9] Dhanaraj, C. and Parkhe, A. Orchestrating innovation networks. *Academy of management review* 31, 3 (2006), 659–669.

[10] Feldmann, N., Gimpel, H., Muller, M., and Geyer, W. Idea assessment via enterprise crowdfunding: an empirical analysis of decision-making styles. (2014)

[11] Fisk, R.P., Patrício, L., Ordanini, A., Miceli, L., Pizzetti, M., and Parasuraman, A. Crowd-funding: transforming customers into investors through innovative service platforms. *Journal of service management* 22, 4 (2011), 443–470.

[12] Gierczak, M., Bretschneider, U., and Leimeister, J.M. Is all that Glitters Gold? Exploring The Effects of Perceived Risk on Backing Behavior in Reward-based Crowdfunding. (2014).

[13] Hussain, A. and Vatrappu, R. Social Data Analytics Tool: Design, Development, and Demonstrative Case Studies. *Enterprise Distributed Object Computing Conference Workshops and Demonstrations (EDOCW)*, 2014 IEEE 18th International, IEEE (2014), 414–417.

[14] Hussain, A. and Vatrappu, R. Social data analytics tool (sodato). In *Advancing the Impact of Design Science: Moving from Theory to Practice*. Springer, 2014, 368–372.

[15] Hussain, A., Vatrappu, R., Hardt, D., and Jaffari, Z. Social data analytics tool: A demonstrative case study of methodology and software. *Analysing Social Media Data and Web Networks*, MC Rachel Gibson and S. Ward, Eds. Palgrave Macmillan 3, (2014).

- [16] Lasrado, L.A. Crowdfunding in Finland—A new Alternative Disruptive Funding Instrument for Business. Tampere University of Tecnology, 2013.
- [17] Lasrado, L.A. and Lugmayr, A. Crowdfunding in Finland: A New Alternative Disruptive Funding Instrument for Businesses. Proceedings of International Conference on Making Sense of Converging Media, ACM (2013), 194.
- [18] Lehner, O.M. Crowdfunding social ventures: a model and research agenda. *Venture Capital* 15, 4 (2013), 289–311.
- [19] Lu, C.-T., Xie, S., Kong, X., and Yu, P.S. Inferring the Impacts of Social Media on Crowdfunding. Proceedings of the 7th ACM International Conference on Web Search and Data Mining, ACM (2014), 573–582.
- [20] MacKinlay, A.C. Event Studies in Economics and Finance. *Journal of Economic Literature* 35, 1 (1997), 13–39.
- [21] McWilliams, A. and Siegel, D. Event Studies In Management Research: Theoretical And Empirical Issues. *Academy of Management Journal* 40, 3 (1997), 626–657.
- [22] Mizruchi, M.S. Social network analysis: Recent achievements and current controversies. *Acta sociologica* 37, 4 (1994), 329–343.
- [23] Mollick, E. The dynamics of crowdfunding: Determinants of success and failure. SSRN scholarly paper. Social Science Research Network, Rochester, NY, (2012).
- [24] Mukkamala, R.R., Hussain, A., and Vatrappu, R. Towards a set theoretical approach to big data analytics. *Big Data (BigData Congress)*, 2014 IEEE International Congress on, IEEE (2014), 629–636.
- [25] Mukkamala, R.R., Hussain, A., and Vatrappu, R. Fuzzy-Set Based Sentiment Analysis of Big Social Data. *Enterprise Distributed Object Computing Conference (EDOC)*, 2014 IEEE 18th International, IEEE (2014), 71–80.
- [26] Mukkamala, R.R., Sorensen, J.I., Hussain, A., and Vatrappu, R. Detecting Corporate Social Media Crises on Facebook Using Social Set Analysis. 2015 IEEE International Congress on Big Data (BigData Congress), (2015), 745–748.
- [27] Mukkamala, R.R., Sorensen, J.I., Hussain, A., and Vatrappu, R. Social Set Analysis of Corporate Social Media Crises on Facebook. Proceedings of the 19th IEEE International Conference on Enterprise Distributed Object Computing.
- [28] Mukkamala, R.R., Vatrappu, R., and Hussain, A. Towards a formal model of social data. IT-Universitetet i København, 2013.
- [29] Müllerleile, T. and Joenssen, D.W. Key Success-Determinants of Crowdfunded Projects: An Exploratory Analysis. In *Data Science, Learning by Latent Structures, and Knowledge Discovery*. Springer, 2015, 271–281.
- [30] Quero, M.J., Kelleher, C., and Ventura, R. Value-in-context in Crowd-funding ecosystems: how context frames value co-creation. (2014).
- [31] Rubens, N., Still, K., Huhtamaki, J., and Russell, M.G. A network analysis of investment firms as resource routers in Chinese innovation ecosystem. *Journal of software* 6, 9 (2011), 1737–1745.
- [32] Rubinton, B.J. Crowdfunding: disintermediated investment banking. Available at SSRN 1807204, (2011).
- [33] Schulz, M., Haas, P., Schulthess, K., Blohm, I., and Leimeister, J.M. How Idea Creativity and Hedonic Value Influence Project Success in Crowdfunding. (2015).
- [34] Thies, F., Wessel, M., and Benlian, A. Understanding the Dynamic Interplay of Social Buzz and Contribution Behavior within and between Online Platforms—Evidence from Crowdfunding. (2014).
- [35] Vargo, S.L. and Lusch, R.F. It’s all B2B... and beyond: Toward a systems perspective of the market. *Industrial Marketing Management* 40, 2 (2011), 181–187.
- [36] Vargo, S.L., Wieland, H., and Akaka, M.A. Innovation through institutionalization: A service ecosystems perspective. *Industrial Marketing Management* 44, (2015), 63–72.
- [37] Vatrappu, R., Mukkamala, R.R., and Hussain, A. A Set Theoretical Approach to Big Social Data Analytics: Concepts, Methods, Tools, and Findings. *ECCS Satellite Workshop 2014*, (2014), 22–24.
- [38] Vatrappu, R., Mukkamala, R.R., and Hussain, A. Towards a Set Theoretical Approach to Big Social Data Analytics: Concepts, Methods, Tools, and Empirical Findings. *International Conference on Social Media and Society Conference*, (2014).
- [39] Zheng, H., Wan, N., Chen, D., and Wang, T. Antecedents of Project Implementation Success in Crowdfunding. 18th PACIS, Chengdu, China, (2014), 1–13.
- [40] Zvilichovsky, D., Inbar, Y., and Barzilay, O. Playing both sides of the market: success and reciprocity on crowdfunding platforms. Available at SSRN 2304101, (2014).