Structural Narrative Analysis as a means to unfold the Paradox of Control and Generativity that lies within Mobile Platforms.

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Abstract— **Mobile platform owners are faced with a tension. On one hand they foster generativity to enable third parties to innovate compelling services. On the other hand they regulate innovation on their platforms in order to protect their commercial interests. This tension leads to complex interactions between platform owners and third parties as they negotiate the extent and nature of innovation. This paper outlines on-going research that applies structural narrative analysis in order to simplify these complex interactions into sequences of simpler generic generative and controlling actions. It is intended that these simplified structured sequences of actions will facilitate the identification of the mechanisms that explain how platform owners manage innovation and the paradox of control and generativity. The approach to analysis is illustrated using empirical data concerning interactions that have occurred on the Apple iPhone and Google Android platforms. This data is sourced from blogs reporting events in the mobile industry.**

Keywords mobile platforms; control; generativity; innovation; structural narrative analysis

I. INTRODUCTION

At the heart of mobile digital ecosystems, such as those surrounding the iPhone and Android platforms, appears to lie a paradox. Convention [1] would have it, that attempts to control the third party development of mobile services as applications would lead to less innovation. Paradoxically it would appear that platform owners' ability to regulate third party development through control points [2] might actually enhance the innovative capacity of these digital ecosystems.

In this paper we detail research in progress. The aim of this research is to unravel the tensions between control and generativity in digital ecosystems, by deconstructing and simplifying the complex interactions between those parties attempting to innovate on mobile platforms and those parties who are attempting to regulate this innovation. In this paper, we focus on the methodology that we are employing as it may have application in helping to understand wider issues of innovation and the understanding of complex dynamics within mobile information systems in general.

Platforms lie at the core of service innovation within many mobile digital ecosystems. These service innovations are enabled by digital technology, which allows for the separation of service from physical hardware [3]. This separation allows certain actors to focus on developing particular layers as platforms upon which other actors can build other layers as modules, consisting for example of services and service enablers (Gawer et al. 2002; Tiwana et al. 2010). As a consequence the functionality of the digital ecosystem formed by these platforms and modules is further extended [4, 5].

Owners of mobile platforms, such as Apple and Google, ensure that their platforms are generative in order to attract external actors to their digital ecosystems. Generativity refers to "a technology's overall capacity to produce unprompted change driven by large, varied, and uncoordinated audiences" [6]. Generativity is "the ability of a self-contained system to create, generate, or produce new content, structure, or behavior without additional help or input from the original creators" [7].

However, there are occasions when the interests of external actors, who are seeking to extend a platform, conflict with those of the owners of generative digital platforms. This typically occurs when developers attempt to distribute services, which are against the interests of the platform owners. Consequently platform owners occasionally attempt to control the actions of these actors, for example by blocking, or not approving, the distribution of a service deemed undesirable, but which has been enabled by the generative qualities of the platform. Furthermore, commercial owners of platforms need to exercise a combination of economic, social and technological control in order to appropriate an economic rent from the digital ecosystem that they have enabled [5].

The platform owner exerts control over other actors in functional gatekeeping areas where it has management power, or the power to say "no" [8]. This power derives from the ownership of critical resources or functions, both limited in supply and high in demand, which are otherwise known as bottlenecks [9, 10] or control points [2]. Through ownership of a control point power is exercised by business, regulatory or technical-architectural means [11]. Figure 1 illustrates the digital ecosphere based around the Google Android platform as a value network. This representation is adapted from Goncalves et al [12] and illustrates not only the key actors within the value network, but also the key control points. With respect to the innovation of service enablers and services, our research is focused on power exercised through the control points of Developer Tools (CP 8) and Application Aggregation (CP 9), which are highlighted.

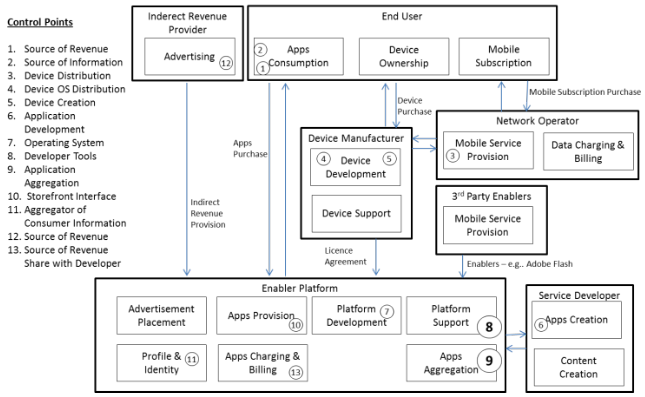

Figure 1. Android platform and ecosphere as a value network.

The issue of managing digital ecosystem innovation can be seen as the continuous process of developers as protagonists seeking to engage in generative acts further expanding the platform functionality, and an opposing platform owner as antagonist serving the role as moderator and regulator [13] accepting or rejecting generative attempts through the application of control points. The core challenge of innovation in a digital ecosystem is to continuously engage in balancing control and generativity. The tension that results can be observed in the negotiation, made up of complex interactions, that occurs between the two sides.

This tension produces a paradox that is of interest. Whilst the unexpected and potentially undesirable results of a digital platform's generativity may cause its owners to enforce control, these attempts to limit the boundaries for emerging service innovation of new services, may also feed generativity. For example, control exercised by formal standards may facilitate low entry barriers for innovators, and clearly demarcated areas may provide boundaries within which to improvise and innovate [14]. For example, the policy of Apple and Google of limiting billing within services on their platforms to their own mechanisms may on the one hand appear restrictive. However, the fact that that this is partly enforced by providing billing tools to third party developers does, on the other hand, increase the generativity of their respective platforms.

The long term aim of our research is to answer the question: "How can the interactions that occur between actors involved in the digital innovation of mobile information services on digital platforms be understood?" Two further sub questions emerge: one, "How can these complex interactions be explained using a simpler repertoire of actions?" and two, "What are the mechanisms that help explain these sequences of actions and resulting interactions?" In answering these questions, it is hoped that the research can unfold the paradox of control and generativity.

There is a growing body of literature that investigates the relationship between control and innovation in mobile ecosystems [9, 10]. However, there are few, if any, studies that investigate this relationship by analyzing the interactions between platform owners and other external actors. It is proposed that insight into these complex interactions will contribute to a better understanding of the dynamics of services on mobile platforms. This is a justifiable contribution, as it concerns the interstices of a number of emerging IS and related domains, that are still poorly understood, and whose practical manifestations are contributing to our daily lives in both at home and at work.

This paper focuses on just one part of our research question, namely the means by which these complex interactions can be unraveled. The mechanisms which explain the sequences of actions that make up these interactions are the subject of forthcoming research. The remainder of this paper is structured as follows. First the method by which data is being collected for the research is described. Then the means by which the data is being analyzed in order to address the research question is explained. The method of analysis is illustrated with interim outline results that have been found in an initial round of data collection.

II. Data Collection

Qualitative research methods [15, 16] are being used to collect data. The aim of data collection is to build a corpus of qualitative data [17] of relevant texts, or discourses, that describe complex innovation interactions, which form the unit of analysis of this research. These texts will be treated as surface text enabling a structural narrative analysis, in order to identify underlying actions that make up these interactions. The specific focus of this research is on Apple's and Google's mobile platforms. The choice of Apple and Google is taken because their actions are closely followed by technology commentators and news media. These reports provide rich sources of data, relevant to the proposed research problem. Data is being collected concerning events that have occurred over the past three years since the launch of these platforms.

Given that direct access to these organizations for traditional ethnographic methods is not currently possible, publically available data concerning the actions taken by Apple and Google are being used. Web logs, generally known as blogs, are used as a source of data. As secondary or tertiary sources of information [18], blogs are highly suited to the form of analysis for reasons of relevance, quality and flexibility. Past IS research has sourced qualitative data collection from the Internet [19-21].

III. Data Analysis

We are using the approach of structural narrative analysis [22] for data analysis. The structuralist approach of narrative analysis [23, 24] facilitates the explanation of relationships between seemingly complex sets of events in narrative data. The approach identifies surface phenomenon within textual data, which is then interpreted in order to produce a deep structure, known as fabula, of generic underlying events. The mechanisms that link these underlying generic events within the fabula can be used as an explanation for what is seen in the surface phenomenon, and can be generalized to similar surface phenomena. Pentland [22] uses three analytic steps to uncover deep structure within narrative: (1) identify the narrative structures and stories including sequences of events around a theme, the focal actors expressed as protagonist and antagonist, and contextual factors such as social relationships, cultural values and assumptions made; (2) develop the fabula concerning a generic sequence of events involving focal actors which can be applied across different stories; and (3) the generation of mechanisms as "underlying structures that enable or constrain the fabula" [22].

Sufficient data has been collected to enable the first two steps of Pentland's narrative analysis to be outlined. The approach we have taken to this initial data analysis is now laid out with some examples.

A. *Identifying narrative structures and stories*

Pentland's first step concerns the identification of stories and narrative structures within the data. Stories are coherent sequences of events that play out around a theme and are enacted by actors. The data that is being collected from blog entries is coded in such a way to enable the identification of common themes and narrative structural elements within them. These snippets of information are brought together around common themes as stories. For the sake of brevity Table 1 focuses on a few of the simpler stories that are found in the data. The first column lists each individual themed story row by row. Against these we list the key protagonist, attempting generative acts, and the key antagonist, attempting to control those generative acts. Column two first provides a brief overall description of the story, and then breaks it down into a sequence of actions concerning generative and controlling acts. This table provides the information that is later used for further narrative analysis.

B. *Developing structured sets of generative and controlling actions as fabula*

Pentland's second step develops fabula, or structured generic sequences of events concerning the focal actors. This step is the most detailed of Pentland's process and forms the heart of this paper. This step starts by identifying a compact cohesive set of structured actions carried out by both protagonist and antagonist using a static semantic analysis. Once this simplified set of actions is identified, these generic actions are then mapped against the stories. Once these stories are decomposed into generic actions, it allows for commonalities of structured sequences of actions to be found across them using a dynamic syntactical analysis. With further syntactical analysis it may become clear that the generic actions can be expressed as patterns of grammars which allows for all the stories to be expressed by the same structure. The various analyses that occur in this step are briefly illustrated using data concerning the four example stories identified above.

Example Cases	**Interaction Between Protagonist and Antagonist**	
1. Advertiser Block **Apple vs. Google**	**Outline Description:** Apple and Google tussle following the introduction of Apple's new developer terms. Under these new terms app developers are prohibited from using Google's AdMob platform for in app advertising.	
	Action#1	Apple initially allows the AdMob platform
	Action#2	Apple updates the terms of its Developer Program License Agreement, blocking the use of the AdMob platform
	Action#3	Following complaints, Apple updates its terms, making clear that alternative advertising platforms are allowed.
2. Oscar Wilde Book **Apple vs. Developers**	**Outline Description:** Apple and apps developers tussle over Apple's crack down on pornographic material leading to unintended consequences.	
	Action#1	Following Apple's crusade on pornographic material, comic version of "The Importance of Being Earnest" containing scenes of men kissing.is pulled from the app store.
	Action#2	After complaints, Apple is reverses its decision & the comic is reinstated unedited.
3. Newber **Apple vs. Developers**	**Outline Description:** Apple ignores the submission of a follow-me or personal numbering application	
	Action#1	Freedom Voice submit Newber to Apple
	Action#2	Apple ignores the submission.
	Action#3	After six months waiting Freedom Voice abandons its application
4. Podcaster **Apple vs. Developers**	**Outline Description:** Concerns the strategies used by a developer in order to have his podcast download application listed on the App Store.	
	Action#1	Apple rejects Podcaster App claiming that it duplicates Apple's own functionality
	Action#2	The developer tweaks the functionality of his application until it satisfies Apple, who then list the adjusted application.

Table 1 Summary of stories and their narrative form in terms of Protagonist vs. (Antagonist).

In order to identify a coherent and manageable set of generative and controlling actions taken by external actors as protagonists and platform owners as antagonists, we used the logic of the Semiotic Square [25]. The Semiotic Square emerged from the Paris School of Semiotics [26] and was developed by Greimas and Rastier [25] as a tool to enable opposition analysis. It allows for the logical articulation of a given opposition, such that the analytical classes arising from an opposition can be increased from two, to four and possibly eight or ten. Both generative and controlling acts consist of oppositions, such as blocking and enabling, and the semiotic square enables us to logically expand these classes of actions into a wider set to classify the possibilities taken by the actors being studied. A semiotic square is complete when at least four oppositional terms have been identified on the square that: exist in reality; can be expressed in common language; and that correspond to a semiotic act [26]. Outline semiotic squares pertaining to possible actions that can be taken by both a third party developer wishing to enable an application on a platform and the owner of a platform wishing to regulate this action, and the accompanying underlying logic, are illustrated in the figure 1 below.

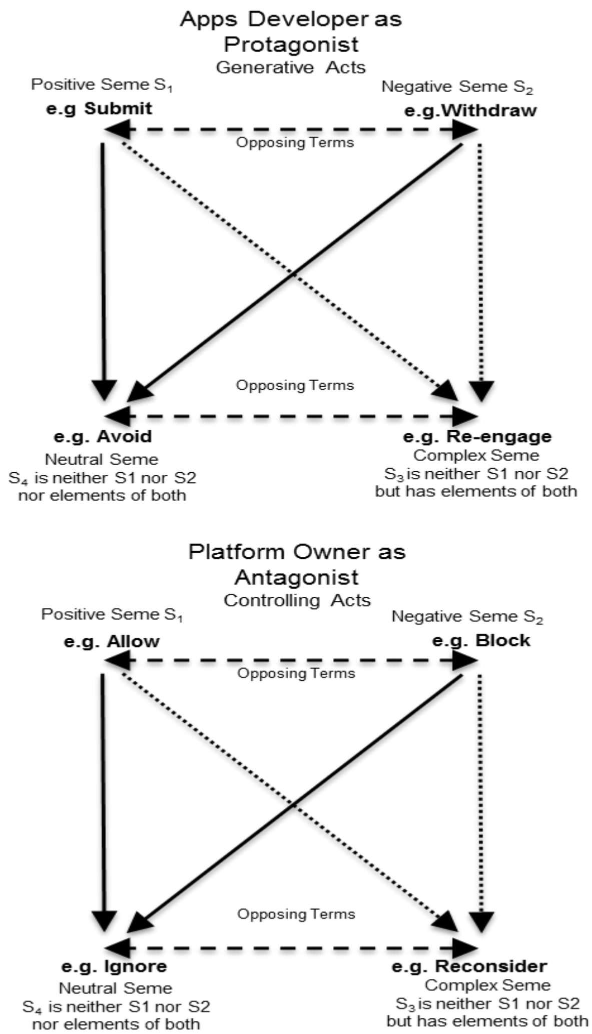

Figure 1. Semiotic Square representing simplified repertoires of actions of ecosystem actors.

In a semiotic square, the positive seme is the first to be identified. In the case of the developer, this is best represented by the possible generic and generative act of "submitting" an application to the platform owner for approval. The corresponding negative seme in opposition to the positive seme is identified as the possible generic action of "withdrawing" an application from a platform. The third seme is that of the complex seme, which is neither the act of submitting nor of withdrawing, yet has elements of both. This class of action is identified as "re-engaging", which allows for the protagonist to remain in a relationship with the platform owner, but to try something different, such as adapting the generative act and requesting approval again or requesting approval for a completely new act. The final seme is the neutral seme, which is neither the act of "submitting" nor "withdrawing" nor does it contain any elements of either. In this case the most appropriate class of action was "avoiding", when the protagonist takes its generative act elsewhere to an alternative platform, or gives up.

Applying the same logic to the part of the platform owner, the first class of generic action identified is the positive seme "allowing". The second class of action, the negative seme, is the antagonist "blocking" the generative request. The complex seme for the antagonist is the act of "re-engaging", which signifies the antagonist partially reversing a previous decision. The final class of generic action of control is the neutral seme, which does not contain elements of the positive or the negative seme. This class of action implies "ignoring" a generative request.

Terms identified in the semiotic square can be extended from a static semantic analysis to a dynamic syntactic analysis, which allows for the study of these actions as they occur in sequence. In practice, this allows for the study of sequences of generative and controlling acts. This allows recognizable patterns of sequences of actions can be identified in the complex interactions that make up the innovation of information services on digital platforms. The complex interactions that make up this phenomenon form a sequential narrative that can be observed in stories or reports of actual example of digital platform innovation. These narratives are seen in the public domain, as their unfolding is reported in both traditional and digital media. Table 2 below shows the mapping of the generic action against the illustrative stories we identified earlier.

Story	**Newber**	**Podcaster**	**Advertiser Block**	**Oscar Wilde Book**
Protagonist	Apps Developer	Apps Developer	Google	Apps Developer
Antagonist	Apple	Apple	Apple	Apple
Action#1	Submit	Submit	Submit	Submit
Action#2	Ignore	Block	Allow	Allow
Action#3	Avoid	Re-engage	Block	Block
Action#4		Reconsider	Reconsider	Reconsider
Outcome	Antagonist Wins	Protagonist Wins	Protagonist Wins	
Plot	***Protagonist Concedes***	***Protagonist Persists***	***Antagonist Relents***	

Table 2 Stories grouped as plots, sharing similar sequences of generic actions.

The simplification of stories into grammars of sequential generic actions enables the clustering of stories together into groups that have similar plots. In the table it can be seen that the final two stories share the same sequences of actions and can therefore be clustered together. As a result of this four stories can be reduced to three plots or sequences of generic actions between protagonist and antagonist. The first plot concerns the sequence of events when a platform owner as antagonist "ignores" the "submission" of an app by the developer as protagonist, who is then forced to concede or "avoid" dealing with the platform owner any further, as was the case in the story concerning Newber. The second plot concerns the sequence of events when the platform owner "blocks" an application after the developer has "submitted" it. The developer persists by "re-engaging" the platform owner by submitting a modified form of the app, which the platform owner then allows after "reconsidering". The third plot concerns the platform owner as antagonist relenting or "reconsidering" after blocking an application, possibly after the intervention of a third party such as a regulator.

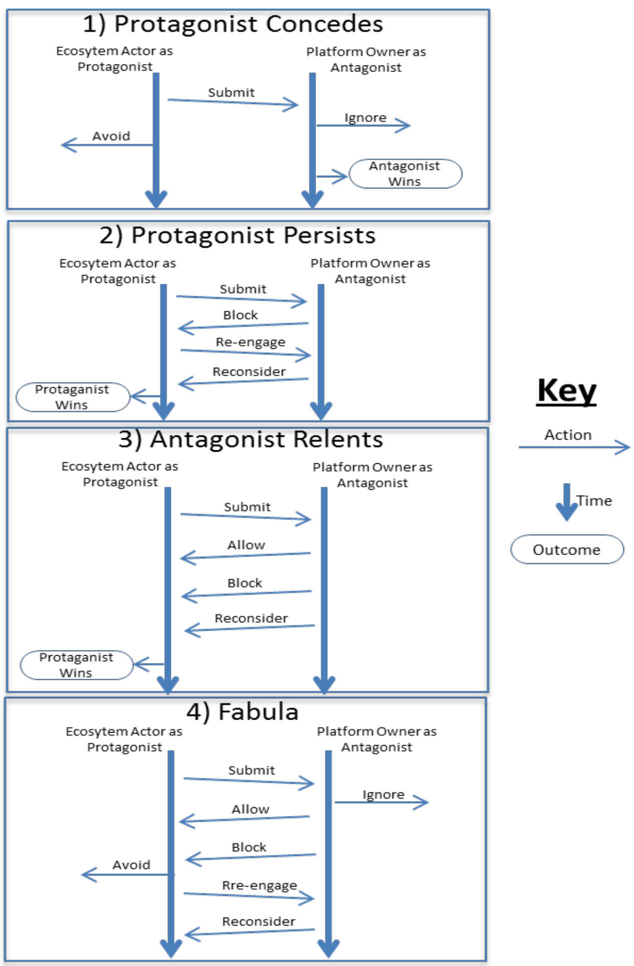

Figure 2. Sequence charts representing the underlying story plots and the final fabula.

The three plots can be illustrated as sequence charts, adapted from message sequence charts [27], and these are shown in figure 2. On inspection of the message sequences, it can be seen that the plots share elements of common sequences of generic actions. By finding that grammars within some clusters formed subsets of grammars within others, it becomes possible to identify a common structure of actions that may or may not be taken. This is illustrated in the fourth sequence chart in figure 2. This common deep structure, or fabula, can be used to describe any of the observed stories.

IV. Discussion and Conclusion

This paper describes how structural narrative analysis can be used to simplify and explain the complex interactions that occur between actors attempting to innovate on mobile platforms and platform owners seeking to regulate their actions.

The paper attempts to illustrate this method of analysis with a number of examples. Some generic actions identified in the semiotic squares, such as a protagonist withdrawing their generative act, were not seen in the examples. Stories containing these actions do exist, but limitations of space have mean that they are not documented in this paper. Furthermore there are many outcomes from stories that are not documented. Some of these stories, such as when a platform owner fully "accepts" a generative act, are not documented as they do not represent examples of tensions that arise when control is applied.

This paper represents research in progress and there are three obvious areas for improvement. First, it would be advantageous to obtain primary data, possibly obtained from interviews, to supplement the secondary data, which is obtained from blogs. Whilst this would strengthen the foundations of the stories, it is difficult to gain access to the companies involved in this research. Second, additional stories will be identified and analyzed. These include complex and well documented stories such as attempts to hack or "jailbreak" Apple's iPhone, efforts to constrain generative enablers such as developer tools provided by Adobe and other third parties, and the use of "Kill Switches" to disable and remove malicious applications that were initially allowed onto a mobile platform. The third area concerns the applying the final part of Pentland's approach to narrative analysis [22] which is to identify and explain mechanisms which constrain the fabula, which lead to the actors taking the actions that they do. This final area will help explain how platform owners manage the paradox of control and generativity.

In conclusion this paper contributes to the academic understanding of innovation of services on mobile platforms. It explains how complex interactions that occur as platform owners and third parties negotiate as the expansion of mobile platform functionality can be simplified into sequences of generic generative and controlling acts. It is intended that this will facilitate the understanding of how platform owners manage innovation and the paradox of control and generativity on their platforms, which will in turn benefit both academia and practice.

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