

Ecosystem Ethics:

An ethical analysis of orchestrators' ultimate power and the dilemma of ecosystem ruling

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Abstract. Ecosystems, platforms and app stores have become a *de facto* model for the modern software business. In the curated marketplaces of software ecosystems, independent software vendors are able to distribute their products and services to the customers. As the software industry has a tendency towards the winner-takes-all phenomenon, often only few of the competing ecosystems survive and share the market. As the software vendors are depending on the ecosystems to be able to publish their offerings, the orchestrators have achieved ultimate power to decide who are eligible to work and who are not. This study presents an ethical discussion on the *ecosystem ruling dilemma*: ecosystem focal company's right to orchestrate what they offer against restricting liberty of independent software vendors. In the analysis, John Rawls' theory of justice is used as a framing philosophical concept.

Key words: software ecosystem, ethics, app store, dilemma, orchestration, Theory of Justice, Rawls

1 Introduction

Software ecosystems and curated marketplaces, the *apps stores*, are nowadays commonplace in modern software business [1]. In the model, a focal company, *the orchestrator*, offers a software platform and a marketplace for independent software vendors (ISVs) to publish and share their products and services [2]. Classic and over-used examples of software ecosystems and curated marketplaces are iOS and Android operating systems and their respective marketplaces, Apple App Store and Google Play. Yet, the model has been widely adopted in several different segments of the software business from the gaming industry to operating system stores and business application marketplaces.

The orchestrator holds the ultimate power in a marketplace to decide what content and service are accepted in sale. As the software industry has a tendency towards winner-takes-all markets [3], often only one or few competing ecosystems survive [2]. This creates a dilemma as the orchestrators of the marketplace have the *right* to decide what they offer to customers (i.e. we cannot force a store to sell goods that they do not want to) and, at the same time, they are acting as ultimate gatekeepers in their respective domains (i.e. if a content is not published at the curated marketplace, it will not be published at all due to the winner-takes-all effect). That is, ecosystem orchestrators' own

the distribution channel and they have the right to orchestrate it to any direction they wish; however, at the same time, the ecosystem can be the only existing distribution channel and the direction where the orchestrator wish to develop the ecosystem might restrict software vendors' freedom of expression. We call this as the *Ecosystem ruling dilemma*.

The dilemma is not completely theoretical. In the mobile application ecosystems, Apple has censored for example the Wikileaks application [4], a political cartoon [5] as well as a serious game about sweatshops [6]. Apple's arbitrary process of rejecting and approving apps has provoked discussion and Hestres [7] has pointed out that guidelines based on app neutrality would make Apple's App Store more just for developers' perspective.

We can also adopt alternative viewpoint. Whilst thinking of current software ecosystems and the focal companies behind those, we cannot avoid coming up with one word: *monopoly* (or at least *oligopoly*). Those companies usually possess such power and position in the economy that they have grown into entities which cross the geographical, political and legislative borders and thus can be seen as global entities. And, as a result the outcome is not always what we would think of as being beneficial.

If we think about the dark side of value chains, we see the not so delightful world of monopolies/oligopolies[8]. In this study, we are using Apple Inc. as the example (even though there of course are many others, such as Steam in computer games or Google Play on the Android platform) of such aforementioned global entities which have gained dominance of their own market and can control almost the whole market even if they do not fully cover it. Like Clelland [8] states, Apple has created the value chain that has bright and dark side. The monetized, visible flows are the bright side and the other, not so agreeable sides are parts of a chain that uses child workforce (or at least a workforce with few if any rights), produces ecological problems in the manufacturing countries and so on.

However, we are not focusing on these kinds of problems of global market leaders here, even though those are important and worth of noticing. Instead, we are focusing on the following question:

RQ *What are the ethical problems that these kinds of dominating market positions—such as Apple Inc. has in its application ecosystems—have on individual level of user or potential user and the developers of products in the ecosystem?*

We are also looking at the ethical problems of such power from the perspective of societies and countries as they are a manifestation of social contracts made by people. To the best of the authors' knowledge, this study is among the first to raise the discussion of ethics in software ecosystems (cf. previous literature studies [9, 10]).

From a philosophical perspective, we base our study on the idea of *social contract* and the underlining theory. The most relevant recent social theorist in the field is John Rawls, and his *Theory of Justice* [11] is the central concept in this study.

The remaining of this study is structured as follows. Section 2 defines the core concepts as well as related work in this domain. It is followed by a discussion of philosophical argumentation as a research method in Section 3 and presentation of Rawls' philosophy in Section 4. Section 5 presents the analysis and Section 6 concludes the study.

2 Background

Brey [12] has analyzed the proper role of technology in society. He shows that technology *per se* has an effect in society which shapes it towards positive and negative directions instead of technology being neutral. Brey's analysis focuses on defining the criteria how technologies are contributing to the quality of the society. He presents two fundamental values (Well-being and Justice) and three necessary, instrumental values (Freedom, Democracy and Sustainability) for a good society, and technologies should fulfill those values to be seen as contributing technologies of a good society.

However, the contribution that this paper aims at is to show that the software ecosystems are more than the technologies that are analyzed as individual technological entities. Software ecosystems—or more accurately, the corporations behind them—are more influential actors than any technology (application or software) developed to be used in those ecosystems. Therefore, we claim that software ecosystems and corporations behind ecosystems should be analyzed more deeply, as they possess different magnitude of consequences for the society than single applications or software vendors do.

In the following, we will first define our basic concepts in Section 2.1. This section ends in the review of previous work on the presented dilemma in Section 2.2.

2.1 Platforms, ecosystems, & app stores

Software ecosystem, platforms and app stores are modern managerial fashion terms that are sometimes used interchangeably; this causes confusion in the research field [13]. Therefore, it is crucial for researchers to define well how and what they define to be an ecosystem. In this study we follow the view that a *software ecosystem* is derived from the more general *business ecosystem* concept presented by Moore [14, 15]. Thus, the software ecosystem is “*a set of actors functioning as a unit and interacting with a shared market for software and services, together with the relationships among them. These relationships are frequently underpinned by a common technological platform or market and operate through the exchange of information, resources and artifacts*” [16]¹.

The ecosystem consists of different kinds of actors [9]. In the simplest form of definition, there are three different actor classes [2]:

1. *Ecosystem orchestrator* is responsible for keeping the ecosystem. In the software industry, the orchestrator is often providing the software platform and also often the marketplace;
2. *Independent Software Vendors* are external actors who offer content, either products or services for the ecosystem; and
3. *Customers* are either individual persons or organizations using products or services of the ecosystem. They can also contribute to the ecosystem with creating value to the peers by, for example, giving verbal or numerical ratings of the users services and products.

Naturally, the orchestrator can also publish content for the ecosystem in the form of, e.g., applications.

¹ Emphasis added by the authors of this study.

There are several ways to classify ecosystems; however, the most used division has been seen between *open ecosystems* and *closed ecosystems*. Nonetheless, the bipartite classification is often too strict [17], and recent studies have focused on the level of openness instead of a black and white view. For example, Salminen and Teixeira [18] used a multidimensional approach to study the openness of Android, iOS and Windows Phone ecosystems. From these three, Apple's iOS was the most closed.

Often, the ecosystem has a central marketplace or several marketplaces, where the ecosystem complements are traded [1, 19]. As defined by Jansen & Bloemendal [1], an app store is “[a]n online curated marketplace that allows developers to sell and distribute their products to actors within one or more multi-sided software platform ecosystems.” Jansen and Cusumano [19] continued the work and identified different types of ecosystem marketplaces.

With the ecosystem ruling dilemma, we focus specifically on closed or semi-closed ecosystems where the orchestrator strictly controls the development of the ecosystem. The case example is Apple's iOS ecosystem with App Store marketplace. Apple has ultimate control over the software platform and strict control over who and what can be published in the extension market. While Google has a bit more open approach with Android and Google Play, they still keep the ultimate power, and have used it, to decide what can be sold in the marketplace.

Even though the Google Play environment as well as Steam or the Windows Store are semi-open, and the users can get and install apps from elsewhere than them as well, still the problem that potential buyers will go to these first (or even only) exists, as they dominate the market.

2.2 Related work

App stores have faced some criticism in the past due their usage of power towards consumers and developers. Sithigh [20] states that for example Apple has made a deliberate and conscious decision to ‘police’ its store. Apple argues that their way of controlling both App Store's content and the use of apps is a way of ensuring a quality experience for the users. However, there are several issues that can be seen as violations of user and developer rights despite this good intention. [20]

Apple and Google both hold a dominant status over their markets which allows them to regulate the content and the usage of the app stores. It can be claimed, that they have monopolies that do not allow competition, since for instance Apple does not allow people to download apps from anywhere else than its own app store and controls which apps are offered in the App Store and which are not. This makes it possible to reject apps that are in competition with store holder's own apps, making it impossible to compete with them, since there is no other marketplaces approved by manufactures. [20, 21]

Daly [21] states that despite the monopolistic position and complete control over the App Store there are is no legal justification to argue that for instance Apple is breaking jurisdictions with its anti-competitive behaviour. Daly notes that although there is no competition with apps, it can be argued that there has been competition before the device has been purchased. Thus, dominance can be seen as dominance of sub-market, not the whole market. [21] Sithigh [20] claims that laws could be used to promote user and developer rights but admits that this would need new laws not just adjusting the old ones,

since the nature of app stores differs from markets to which these laws are originally intended for.

Eaton et al. [22, 23] claim that at heart of the digital ecosystems lies a paradox. Although regulations could be seen as something that restrains innovation, they can actually foster generativity. Generativity refers to technology's overall capacity to produce unprompted and uncoordinated change due to complex interaction between developers, users and app store owners. These interactions can lead to results such change of regulations, bending the regulations or finding alternative ways to distribute products or content. In reality developers' alternatives are to obey or find alternative ways to distribute their products and users' options to use different devices or find a way around the restrictions [20].

Both developers and users have expressed discontent with the limitations of using a centralized distribution service that has many restrictions. This has led to growing resistance and increase of systematic jailbreaking of devices so that iOS devices can run applications not approved by Apple. Jailbreaking is not an illegal action, but it is highly disapproved through attempts to control jailbreaking by expiring warranties of jailbroken devices. People jailbreaking their devices are often trying to enhance their user experience by removing restrictions. [24] Thus, the motive for jailbreaking is often the same as the one Apple claims to be their motive behind controlling their app store.

Also the process of accepting or declining the application to App Store has provoked criticism. Hestres [7] argues that the process of gaining Apple's approval is opaque and arbitrary. He argues that Apple's developer guidelines are vague and allow the company to make rejection decisions that are unpredictable and can be affected by pressure applied from outside. As an example, Hestres [7] presents six applications that have been rejected at some point of the process. For example entertainment application the Drivers License that made humorous drivers' licences with funny names and low resolution images, was first accepted and then rejected because of a political figure objected to it and wrote a letter to Apple CEO Tim Cook. Similarly, apps like the Wikileaks and have been first accepted and then rejected due to external pressure. [7]

Also first rejected apps have been later accepted, like political satire the NetToons. The NetToons was rejected due to unprofessional material, although the author was considered to be professional elsewhere and won a Pulitzer-Price few months after the rejection. In this case journalists were expressing their worries about freedom of speech and made Apple accept the application. It seems that although Apple has provided guidelines to developers, Apple restrains the right to interpret them as they wish and change their mind in case of external pressure. [7]

Freedom of expression and democratic culture on-line have been matters that have provoked a lot discussion before. Hestres [7] calls for extending network neutrality to app sphere, so that app stores would no longer reject or accept apps arbitrarily or be so vulnerable to external pressure. Hestres proposes that app stores should follow basic guidelines that are anchored on widely accepted international laws and treaties such as the Universal Declaration of Human Rights and the International Covenant on Civil and Political rights. He suggest that Apple would reject apps that contain universally accepted illegal content, such as child porn, but would not reject apps that violate national laws that are in conflict with human rights. They also declare that Apple should institute clear,

unambiguous developer guidelines that are made public and when rejecting an app they should also provide clear reasons that refer explicitly to guidelines. This does not mean that Apple could not still reject apps based on technical reasons, such as potential damage or lacking reasonable technical specifications. Hesters also suggest that Apple should also establish a transparent appeals process for rejected apps. Appeals should be handled in reasonable time frame and decisions should be made based on guidelines and clear reasons provided to developers. [7]

Although Hesters' [7] guidelines for app neutrality are focused solely on Apple, it does not mean that these guidelines could not be used to make any approval process more just from developers perspective. However, these guidelines do not address issues with users and thus, do not make the system more just to them.

To summarize, while there are previous work published on this dilemma, no ethical discussion on this issue has been presented previously. In addition, the extant literature emphasizes the rights of the application developers as well as the consumers whereas the rights of the focal company are not addressed. Thus, we adopt a method of philosophical argumentation and discuss the ethics of the Ecosystem ruling dilemma.

3 Philosophical argumentation as an interpretative methodology

We chose philosophical argumentation approach as methodology instead of some other interpretative approach to show the problems of ecosystems controlled by few strong players on the field. The ethical analysis is needed to see what are the outcomes of current software ecosystems for society [see 12]. Ethics—also known as moral philosophy—is a discipline that focuses on questions on what is morally good and bad. This research question falls under the subfield of ethics called computer ethics or IT and ethics. Without going more deeply on the name of the field we focus on the research area of applied ethics to see what are the ethical consequences of modern IT for society.

Readers who are not familiar with philosophical research may ask why this was chosen and not some other methodology from the field of IS—for example sociology. To answer this question, we need to understand the position of interpretative research in the field of information systems (IS) and close-by fields (such as software ecosystem research), and the position of philosophy in interpretative research. As Stahl et al. [25] state, the interpretative approach has been accepted as an important research approach in the field of IS. One influential paper that led to that acceptance was Geoff Walsham's [26] article about interpretive case studies in IS research. Stahl et al. [25] criticise the domination of empirical approach in interpretative research. They show that the philosophical roots of interpretative research do not provide justification for the status of empirical approach, because interpretative research is based on personal perceptions (second-order perception) of empirical data (first-order perception). They claim that philosophical argumentation as a methodology brings richer and more enlightening landscape of interpretative research by widening its scope.

Thus, we use philosophical argumentation as the method in this paper instead of empirical interpretative research. By doing so, we are enriching the field of software business and its subfield of software ecosystem research. We are using Rawls' work a theory of justice [11] as basis of our argumentation, focusing on concepts such as social

contract, veil of ignorance, original position and principles of justice. However, we note that our analysis is very straightforward because of the limitation of space and the focus of the paper. Thus, we propose that interested readers learn more about adapting Rawls in context of information systems and information technology from an excellent article written by Hoffmann [27]. It portrays well the basic ideas of Rawls' theory of justice and how it is used in fields related to information systems and information technology such as the field of software ecosystem research.

4 Ethical problem from perspective of social contract

A social contract is done between the members of a society, and those members are called citizens. The main problem is that we have created entities called juridical persons, also known as corporations.

The problem is that classical social theories do not deal well with the idea of juridical persons. For example, Locke [28] states that the social contract is done between humans and they agree that this contract is made because it will end the state of nature where everybody is in war against everybody else [see 29]. The reason behind social contract between people is to create a state where people give some rights to the state to ensure a stable and just society instead of being in a lawless, brutal world without hope of a stable future. Instead of going deeper on the works of Locke and Hobbes we move the base of our analysis towards more modern social contract philosophy developed by John Rawls.

Rawls [11] approached the social contract through his idea of the original position. The original position is the hypothetical situation where one cannot know the position in which one ends up in the society and is developed by rational and self-interested persons trying to create a just society. The veil of ignorance is a portrayal of Rawls' original position where those defining society—or the social contract—are without knowledge of their position in society. This steers the construction of social contract by its definers to be such that they, as rational and self-interested persons behind the veil of ignorance ensure that they will have a society where resources are distributed fairly and basic rights and duties are fairly allocated. The reason for this fair approach is that the people who are creating the rules of the society do not know what position they will end in that society and thus they decide to create fair rules. However, corporations are not part of those social contracts even if they are called juridical persons, based on the following reasons.

First, corporations are not entities which could even make decisions or claims for the good of the society. They are not entities which have consciousness and thus cannot decide to make or understand the social contract; they are not—and cannot be—rational, self-interested or certainly not moral actors.

Second, and more practical reason is that global corporations are international actors and social contracts are typically done at the state or nation level. The problem here is that legislative (and other) power of the state over a corporation is not strong enough. National legislation cannot control issues outside of its jurisdiction and we have seen how hard it is to create (just) global trade agreements without even thinking about the morality of those agreements.

Third, corporations are institutions that have one defining rule, and that rule is to only (unless specifically otherwise stated in their founding documents) create profit for

their owners. If we consider profit as the main motivation of the corporation we can plausibly state that they cannot be held as actor of holding two powers needed in making social contract. Those needed powers for designer of society are the capacity for a sense of justice and capacity to adopt and pursue conception of a good— good which Rawls' theory is designed to promote [see 27].

5 Ethical problem from perspective of users and software vendors

Rawls claims that behind the veil of ignorance in original position rational persons would agree with two principles of justice. We will use these two principles and the two priority rules mentioned below [11, pp. 266-267] as the main source of our argument.

First Principle: Each person is to have an equal right to the most extensive total system of equal basic liberties compatible with a similar system of liberty for all.

Second principle: Social and economic inequalities are to be arranged so that they are both: (a) to the greatest benefit of the least advantaged, consistent with the just savings principle, and (b) attached to offices and positions open to all under conditions of fair equality of opportunity.

First Priority Rule (The Priority of Liberty): The principles of justice are to be ranked in lexical order and therefore liberty can be restricted only for the sake of liberty. There are two cases: (a) a less extensive liberty must strengthen the total system of liberty shared by all; (b) a less than equal liberty must be acceptable to those with the lesser liberty.

Second Priority Rule (The Priority of Justice over Efficiency and Welfare): The second principle of justice is lexically prior to the principle of efficiency and to that of maximizing the sum of advantages; and fair opportunity is prior to the difference principle. There are two cases: (a) an inequality of opportunity must enhance the opportunities of those with the lesser opportunity; (b) an excessive rate of saving must on balance mitigate the burden of those bearing this hardship.

"It may be objected that expectations should not be defined as an index of primary goods anyway but rather as the satisfaction to be expected when plans are executed using these goods. . . . Justice as fairness, however, takes a different view. For it does not look behind the use which persons make of the rights and opportunities available to them in order to measure, much less to maximize, the satisfactions they achieve, Nor does it try to evaluate the relative merits of different conceptions of the good. Instead it is assumed that the members of society are rational persons able to adjust their conceptions of the good to their situation" [11, pp. 80-81].

As Rawls points out it is not the duty or the right of others to measure the personal conception of good. This means that if individuals aim to some good they see as fulfilling their need (good they are aiming) it should be respected if it does not violate the basic liberties of others. In this light, it seems unethical to prevent using or developing apps or software based on opinions of software ecosystem orchestrators (such as Apple, Google or Microsoft). Especially when we know that those decisions can be based on political

pressure or orchestrator attitudes. [See e.g. 7]. It will be limiting the equal basic liberties of individuals which is the first principle of justice.

Therefore, instead of limiting users and vendors we should aim towards ecosystem neutrality. This means that we should aim towards a situation where software ecosystems are not making conceptions of goods—which they now do—but would work as neutral platforms that leaves the possibility to providers to create services for people based on their justifiable needs. By justifiable needs we mean any needs—however odd or unconventional from the viewpoint of common opinion—if it does not cause danger; first, the basic liberties of others and secondly, those which cause unjust social or economical inequalities. The first demand is easier to achieve, as we need only secure that basic liberties are not violated by an app or software. The basic liberties presented by Rawls [11, p. 53] are the following ones:

“political liberty (the right to vote and hold public office) and freedom of speech and assembly; liberty of conscience and freedom of thought; freedom of the person, which includes freedom from psychological oppression and physical assault and dismemberment (integrity of the person); the right to hold personal property and freedom from arbitrary arrest and seizure as defined by concept of the rule of law. These liberties are to be equal by the first principle”.

It is hard to see that these are the liberties that were secured by the examples that Hestres [7] and Sithingh [20] presented. The second demand is harder to approach as there is different kind of stakeholders: Orchestrator of ecosystem, app/software providers and customers/users. However, it seems that the benefit from dominating the market gives the advantage for the orchestrator and it seems that it does not benefit the weakest members of society (here the ecosystem stakeholders) which can be the provider of application or the user depending on the case. From the provider’s perspective it seems that most benefits of controlling the ecosystem go to the controller and the provider, and may—not certainly, though—get a benefit if the orchestrator so allows.

However, aforementioned issues does not mean that ecosystem orchestrators should not make any observation of products that are provided through their platforms. They can still – and some situation they should – create technical restrictions, such as malware prevention, documentation demands, preventing illegal apps etc. Likewise, they could make a categorization of products to prevent their visibility to e.g. underage customers or customers who do not want to see products of specific categories.

6 Conclusions

This study contributes to emerging ecosystem literature in two ways. First, this study is among the first to open discussion on *ecosystem ethics* specifically on the case of software ecosystems. As the classic statement “*software is not like other businesses*” by Cusumano [30] reveals, the unique characteristics of software products and services make the industry special and ethical questions prevalent. However, this study only scratches the surface of ethical and moral questions present in ecosystems and future work is needed to conceptualize and analyze the field further. Likewise, the future research should also cover the other ecosystems beyond "classical" pair of iOS and Android.

Second, this study defined and presented the *Ecosystem ruling dilemma* illustrating the ethical conflict of a market leaders' right to orchestrate their own marketplace against restricting the software vendors freedom of expression and their economical goals. Likewise the right of user of ecosystems seem to be neglected as provider of ecosystem takes the role of police in ecosystem and decide what are the goods delivered through software ecosystem. In addition, we used John Rawls' [11] Theory of Justice to analyze the dilemma and define a partial solution. Nevertheless, more work is needed to completely analyze and guide us through this dilemma.

As is clear from the definition of App Stores by Jansen & Bloemendal [1], software ecosystems share some similarities with more general concepts of *two- or multi-sided markets* [31]. Thus, some of the ethical discussions present on software ecosystems in this study are generalizable to other kinds of two-sided markets.

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