The Platformisation of the European Mobile Industry

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Abstract: This paper argues that the structure of the mobile communications industry is being decisively affected by 'platformisation', yet in a present context of strong 'platform ambiguity'. It introduces the concept of gatekeeper roles to compare current mobile platform initiatives, and proposes a typology of platforms to characterise the various models encountered.

Key words: Mobile Platforms, Business Models, Gatekeeping, Platform Typology.

While digital mobile communication arguably has constituted, in parallel with the Internet, the most impacting innovation of the past decades in terms of how people exchange information - and this first and foremost in Europe - its business and technological set-up is now facing profound change. Vertical coordination and integration have persisted in the mobile industry until very recently, with mobile telecom vendors driving and controlling technological innovation, and mobile network operators driving and controlling service provision (BOHLIN & BURGELMAN, 2004). However, the emergence of various types of software platforms and internet-like end-to-end architectures in mobile systems is now increasing the pressure on the dominant technological and business set-up, to the point of a reconfiguration of the entire mobile system (BALLON, 2007a).

The impact of this mobile-internet convergence for the structure of the mobile industry, and in particular for the position of mobile network operators as integrated service providers, has been a subject of heated debate for some time now. One particular stream of business and academic literature is arguing that the 'open and modular' internet architectures will (or should) wipe away the current 'closed and integrated' telecommunications architectures (see e.g. ZITTRAIN, 2008; JOAKAR & FISH, 2006). It is often implied that, as a result, (mainly US-based) internet and IT firms are bound to make significant inroads into the telecommunications market. By contrast, others anticipate that the advantages in terms of quality and security offered

by integrated telecommunications architectures will allow mobile operators to dominate the mobile internet and to capture a major share of all service revenues in this context (see e.g. KENNEDY, 2007).

Recently, however, a small body of 'revisionist' literature on modularity and the ICT industry has emerged that, if applied to the mobile internet, may challenge both visions. It argues that there is no automatic mirroring between technical modularity and market unbundling, and that, instead of relying on any outright 'open' or 'closed' strategy, successful ICT companies increasingly employ 'open but not open' platform strategies in order to combine advantages of diversity and complementarity with advantages of control and coordination (see e.g. GAWER, 2009; ERNST, 2005).

This paper will apply and extend this argument in the context of business models in the European mobile industry. Early 'new economy' approaches have defined a business model as simply "a way to make money" (see e.g. RAPPA, 2001), and have been subsequently criticised for their naive and de-contextualised mode of analysis (HAWKINS, 2003; PORTER, 2001). In response to this, a business model is increasingly seen as the way in which not just value streams, but also control architectures are configured within a network of firms (BALLON, 2007b). This approach refers to the tradition concerned with the political economy of ICT design, which stresses that control configurations, power relationships and different forms of bias pervade ICT design, and that they profoundly influence the outcome of the design in terms of individual, societal and economic value (MANSELL, 1993).

The aim of this paper is to verify whether platformisation is indeed affecting the mobile industry. In a context of strong uncertainty over what constitutes the central platform for mobile service provision, the paper will attempt to identify a set of core components that are common to all mobile platforms and to characterise the diversity of platform types encountered. The structure of this paper is as follows. Following this introduction, it is outlined how the mobile communications industry is decisively affected by 'platformisation', yet in a present context of strong 'interface ambiguity' or even 'platform ambiguity'. Subsequently, the concept of gatekeeper roles around which platforms are formed, is introduced. This concept is applied to the domain of mobile service provision. Through four industry cases, it is illustrated that the aim to control gatekeeper roles drives current platform strategies in the mobile industry. Finally, a platform typology is proposed based on a set of control parameters, and a number of conclusions are drawn.

■ The platformisation of mobile communications

It could be argued that mobile telecommunications has been among the last domains of the ICT industry to resist, at least to some extent, technical, and thus *a fortiori* market, modularity. However, the increasing move towards a modular technical architecture, without ensuring any specific predetermined outcome, does create the conditions for further market unbundling and opens up a range of platform strategies.

This can be illustrated by focusing on the segment of mobile service provision. The mobile telecommunications Operations Support Systems / Business Support Systems (OSS/BSS) frameworks that constitute an important part of the mobile system set-up, are increasingly being called into question by novel IT-oriented frameworks. OSS/BSS systems are usually proprietary and custom-built for specific operators and for specific applications. Typically, they follow the 'stovepipe model', in the sense that they are legacy services bought by the operator to solve specific problems, and that they tightly bind together access and core network management with central service management features (MARTIKAINEN, 2006). As the number of services and applications offered by mobile operators increased over the years, so did the amount of co-existing 'vertical' applications. This traditional approach has often been associated with the fragmentation and complexity of mobile operators' systems and with slow and expensive service launches in mobile markets. Also, the tight integration between applications and back-end systems, which traditionally forced the mobile industry to focus on a single 'killer application' that in itself should justify all investments associated with a new mobile generation, proved inept to the world of mobile data applications. It took the success of the Japanese i-mode ecosystem model to make the killer 'business model' instead of the 'killer application' the new primary concern for the mobile industry (LINDMARK *et al*., 2004).

The Vodafone Live! model is the prime example of the resulting walled garden models, that involved a mobile portal, a micropayment system and a revenue sharing model, a distinction between 'official' and 'non-official' content providers, and a number of dedicated handsets (TEE, 2005). However, the fragmentation of most mobile markets, the inability or unwillingness to conclude cross-operator arrangements to benefit content providers and application developers, the laborious nature of concluding contracts and the revenue sharing models that were deemed not attractive enough, all conspired to limit the success of these (semi) walled garden

models. While walled gardens relied on an externalised platform, it is clear that they constituted one-sided markets, in the sense that operators actively constrained the number of content and application providers, and strongly emphasised the integration of their services into an offering controlled and branded by the platform owner (EVANS *et al*., 2005). In sum, operators treated service developers as suppliers, whose number needed to be reduced and whose profit margins needed to be squeezed, instead of treating them as customers, whose numbers need to be maximised and whose ability to capture at least part of the value needs to be preserved. Consequently, the revenues from the services offered on the platform have remained at a disappointingly low level.

Over the last few years, however, alternative frameworks have been proposed and implemented, whereby services and service components can be re-used in a more generic way, in order to ensure cheaper and faster new service and applications development, and to force the transition to a multi-sided market. Frameworks such as IP Multimedia Subsystem (IMS) introduced a number of horizontal 'planes' on top of the network 'layer', containing several services and service components that can be used and re-used at will. IMS is generally regarded as a telecom operator-centric standard, as it enables the encapsulation and convergence of traditional, fixed and mobile circuit-switched communications into a packet-switched, IP-based system, and as it enables the bundling and control of any service including voice, video, web browsing, email, and internet messaging in the form of chargeable and manageable data 'sessions'. Also, current operator platform's initiatives are using distinct APIs to give external, 'third party' service providers access to selected network resources, including the GSMA OneAPI and the OMA IMS APIs .

This can be interpreted as a reply to a whole series of new service development and delivery environments that have been introduced by IT and handset vendors, and internet-based companies. They enable mobile applications to be built and distributed easily and often without the active involvement of the network operator. First of all, mobile operating systems such as Symbian, Windows Mobile, LiMo, Android and the Apple iPhone's OS X, that are running on high-end smartphones, are becoming increasingly powerful, and are supporting the development of 'third-party' applications, e.g. by releasing so-called software development kits (SDKs) and by setting up developer programmes. Secondly, a new range of web browsers are explicitly targeting the mobile phone and are starting to offer full support for the many developers familiar with 'fixed' web service development. As a prominent example, the SDK for the Opera browser has been designed

specifically to support the use of AJAX-based Web technologies for mobile phones - AJAX being a set of technologies, including the JavaScript application-scripting language, designed to make webpages behave more like regular applications. This enables a more attractive and rich user experience, as well as the porting of hugely successful 'fixed internet' websites such as YouTube, Facebook and eBay, to the mobile environment. Thirdly, application portals and stores for mobile devices, such as Apple's App Store or Google's Android Market, offer the possibility of easy access to, and purchase of, lightweight applications on the mobile phone.

It has been argued that all of these initiatives follow a platform leadership strategy, in the sense that they all attempt to establish a central system component and to structure the industry around this (BALLON, 2009; BALLON *et al.*, 2008). Commoditising potentially competing platforms, attracting large volumes of content/applications providers as well as end-users, and gaining control over crucial customer-related data and relationships appear to be essential elements of the strategies employed. Also, both technological and market convergence are clearly observable in these instances, as competition in the mobile service provision domain is now taking place between strongly different competitors including mobile operators, telecom manufacturers, software vendors, internet-based companies, who are primarily focusing on wildly different artefacts such as mobile operator portals, smartphone manufacturers, a social networking website and a container APIs. For a European mobile industry anchored around the 'traditional' mobile operators and mobile vendors, which are now being challenged by often US-based IT and internet firms, this 'platformisation' thus creates particularly strong challenges.

Strikingly, all these 'platform wannabes' are attempting to obtain dominant positions related to service creation, execution and delivery, but they do so by exploiting very different network positions and core competencies. This indicates that 'traditional' modes of analysis of competing firms, strategies and/or business models, focusing on specific sectors, legacy configurations, specific 'layers' or parts of the value chain, are insufficient, and need to encompass a much wider range of stakeholders, technology and business configurations. The following sections will attempt to find a common ground for analysis of the different platform strategies by opening up the 'black box of platforms' and by focusing on the control configurations related to a number of crucial functions and roles.

■ Platforms and gatekeeper roles

In most instances, platforms are treated as a given and as a static 'black box'. However, some recent platform literature has started to explore 'platform (boundary) evolution' as a persistent characteristic of ICT platform markets (PARKER & VAN ALSTYNE, 2008; BOUDREAU, 2005). It has been convincingly argued that abstract and static conceptions of platforms need to be abandoned, and that research instead should concern itself with changing boundaries of platforms, both under the influence of discrete decisions of entry into a particular business and of incremental adaptations in relation to suppliers of complementary components.

A related notion is the concept, coined in information and communication studies, of 'interface ambiguity', i.e. 'uncertainty in the market over what constitutes the key interface' (FUNK, 2002). There seem to be at least two aspects to interface ambiguity. Ambiguity may exist because it is not clear which of several well-defined interfaces within a general architecture will end up being the strategically most important one, which will lead to 'network centrality'. Ambiguity may also exist because a single key interface is not well defined, i.e. it is only vaguely circumscribed and alternative interpretations and incarnations exist in parallel. In this case, simultaneous and interdependent competition 'between' and 'within' (aspiring) standards may be expected.

Based on the discussion in section two, it can be argued that the mobile communications industry, which is characterised by far-reaching technological as well as market convergence, currently not only deals with 'platform evolution' and 'interface ambiguity', but *a fortiori* with platform ambiguity. This means that there is fundamental uncertainty not only about the boundaries and interfaces, but about the nature itself of a mobile service platform. It follows that network operators, handset vendors, software developers, application providers and so on all find themselves involved in direct platform competition. The implication is that what constitutes a platform in the mobile industry should not be taken as given, but that this concept rather should be opened up for closer scrutiny. The central questions then become:

- What are the core components around which platforms in this industry arise? and
- How to characterise differences between platforms in this industry?

These questions will be addressed in the remaining sections of this paper. The notion of core components refers to the idea that some roles within a business configuration, as well as some functions in the technical architecture, carry more 'weight' than others, i.e. that they possess some characteristics, related to their position within the configuration, that endow them to play a structurally important role is (sometimes implicitly) present in several streams of academic literature. In areas such as transaction cost economics, anti-trust law, supply chain management, platform theory and design science, the concept of bottlenecks is well known. In these disciplines, bottlenecks are identified with the goal of optimising a system's behaviour, or of identifying the potential locus of competitive advantage cq. anti-competitive behaviour (see e.g. IANSITI & LEVIEN, 2004; REY & TIROLE, 2003; MORRIS & FERGUSON, 1993). Bottlenecks refer to scarce and critical resources. Bottleneck facilities are traditionally regarded as essential resources that are in fixed supply. In telecommunications, for instance, access to bottleneck facilities is prey to extensive regulation; in this context, bottlenecks are understood as a facility where the availability and/or terms of access fall below a benchmark or standard that has been deemed to be in the public interest (POEL & HAWKINS, 2001; TEECE, 1986).

Related to this, bottlenecks are also associated with constraints on performance. BALDWIN & CLARK (2006) distinguish between two sorts of bottlenecks, i.e. absolute bottlenecks and fractional bottlenecks, depending on their impact on overall system performance. They suggest that successful firms are those that possess architectural knowledge about bottlenecks and use this knowledge in order to shrink their 'footprint' and selectively outsource activities. In this way, they gain an advantage in terms of invested capital, while keeping control over the most critical bottlenecks.

Similarly, JACOBIDES *et al.* (2006) argue that bottlenecks not only drive the direction of innovative activity (by attracting focus to performance constraints), but also determine how an innovative combination creates and distributes value. Firms can benefit from innovation by managing the industry's architecture carefully so they become the "bottlenecks" of their industry. JACOBIDES *et al*. envisage bottleneck ownership and exploitation in terms of 'architectural advantage', and define bottlenecks in a strategic way, i.e. as 'segments where mobility (both in terms of switching costs and potential entry) is limited and competition is softened'.

Value chain analysis also acknowledges the existence of bottlenecks, and Porter's value chain concept incorporates the notion that firms owning a valuable part of the chain have incentives to try and close it off from

competition and thereby turn it into a bottleneck (PORTER, 1985). However, it can be questioned whether (monetary) added value needs to be high, in order for some parts of value chains to possess an important architectural position. In (value) network analysis, the notion of hubs is added, i.e. the notion that a structurally strong position arises from a relatively large number of connections of a node - but this may be partly tautological, as it can also be claimed that a high number of connections will derive from a structurally strong position in the first place.

Other explanations for structural or architectural advantage can be derived from platform theory. While most platform and two-sided market theory takes the existence and characteristics of a platform as a given, and focuses instead on stylising the relationships between platforms and their various customer constituencies, some authors have attempted to outline why platforms, in fact, become platforms. One answer is that they offer re-usable components or shared functionality in industries where complementarity exists and thus are able to generate economies of scale (BRESNAHAN, 1999). However, this is probably true for almost every product or component, at least in the ICT domain, which has led to exclamations such as "everything is a platform!"

Another common explanation of platform ownership lies in the ownership and specification of particular critical interfaces (GAWER & CUSUMANO, 2002). Obviously, the question is then why interfaces arise at certain points. BALDWIN (2007) has provided an argument for this based on transaction cost theory. She conceptualises systems of production as task networks, in which "thin crossing points" and "thick crossing points" exist. She argues that interfaces tend to arise at "thin crossing points" within a task network. Thin crossing points are associated with low transaction costs, (e.g. the costs of defining, counting, and paying for things transferred) and with 'information hiding' between the various stakeholders.

The discussion above provides a number of concepts related to the notion of leveraging particular structurally or architecturally important positions. Yet, it can be argued that one additional concept is needed, which deals specifically with the nature of information exchange. This is in line with arguments from information and communication studies that purely 'formalist' engineering approaches or 'reductionist' economic approaches, conceptualising communication processes as a flow of signals, respectively in terms of commodities being exchanged, fail to do justice to some of the essential properties of information, and obscure the consequences of information exchange (BABE, 1995).

Without denying that commoditisation of information does in fact take place on a large scale, it appears necessary to acknowledge the importance of qualitative transformations resulting from the accumulation, distribution and processing of information. Connecting this notion to the idea of controlling bottlenecks, the concept of gatekeeping functions and gatekeeper roles can be introduced. This concept joins the idea of a 'platform gatekeeper' (see e.g. FARRELL & WEISER, 2003; BAYE & MORGAN, 2001), controlling access in modular or partly-modular systems, with the concept of (information) 'gatekeepers' (see e.g. SHOEMAKER, 1996; LEWIN, 1951), which is commonly used in media and communication studies to describe persons and organisations selecting and processing ideas and information. Included in this concept is the notion that (information) gatekeepers not only filter and select information (i.e. the gatekeeper acts as a bottleneck) but also qualitatively alter the informational content (for better or for worse) through active accumulation, processing and packaging (i.e. the gatekeeper adds 'value').

In information and communication studies, the gatekeeper concept is usually taken as a given, and no in-depth discussion is offered of what functionalities specifically enable an entity to function as gatekeeper. The generic gatekeeper concept to specific information gathering, processing and filtering functionalities enables its owners to adopt a dominant position within the value network. In a context of 'platformisation' of the mobile industry, this would imply that gatekeeping functions and the associated gatekeeper roles are instrumental in strategies to open up information resources and thereby attract great numbers of customers, but at the same time allow to control and to lock in (at least to some extent) various types of customers.

■ Gatekeeper roles in mobile communications

Are the platform strategies in the mobile industry in effect centred on the control of specific gatekeeper roles? Currently, various competing as well as highly diverging approaches to mobile service platforms can be observed in the market. Mobile service platform configurations range from modest, application-specific platforms to all-encompassing service development and deployment environments integrating low-level as well as high-level telecommunications and IT capabilities. In particular, entirely different 'archetypical' platform architectures can be observed in the current mobile

service provision market, i.e. resulting in 'telco-centric', 'device-centric', 'aggregator-centric' and 'service-centric' business models. However, as the subsequent discussion of cases will illustrate, all of these models aim at the control of four crucial gatekeeper roles (see also BALLON *et al*., 2008; VAN BOSSUYT *et al*., 2007): the service creation environment for third-party service developers; the profile and identity management component; the service brokerage (or portal) function; and the charging and billing modules.

The first business model currently encountered can be labelled the telco-centric model. This model has been common in the mobile industry for several years. A real-life example is the Vodafone Live! Platform. This model places the majority of roles within the domain of one real-life stakeholder, the telecom carrier, which acts as portal provider, service aggregator, network operator and platform operator. In this model, the user accesses services *via* a portal screen. The portal provider is incorporated in the network and platform operator. The platform operator provides technical tools to facilitate network access and portal provisioning. Service aggregation can also be carried out within the portal environment. These four actors in real life all coincide with the telecom carrier. The carrier typically makes specific and even exclusive deals with service providers and aggregators that can publish services on the portal. The user pays the carrier for access, and the carrier pays service providers for delivered services.

Within this model, all four gatekeeper roles are owned and controlled by the network carrier, which performs the actor activities of platform operator, portal provider and network operator. Service Creation is not open to everyone. Whether services are made available on the portal is the result of specific negotiations with the mobile operator. Profile and Identity information is managed by the mobile network operator, as it knows the identity of the user accessing the network and can gather information on the user's activities on the portal. Service Brokerage is taken up by the mobile carrier. The carrier decides which service providers can create services for the portal. Concerning Charging and Billing, the customer has a direct billing relationship with the carrier for access to the network and to the portal.

The second business model that can be discerned is the device-centric model. This is a model where the main service platform is incorporated in, or tied together with, the mobile device. A real-life example is the Apple iPhone offering. The introduction of the iPhone presented the industry with a number of business model innovations. In this model, the user purchases a device which offers several integrated services. The device manufacturer takes up the portal provisioning and platform operation activities. The device

manufacturer offers mobile versions of services it already provides on other devices. The device is in some cases bundled with a subscription from a carrier.

When analysing the configuration of the gatekeeper roles, it is clear that the device manufacturer in this model is shifting control over them away from the operator. Service Creation is open to any developer, but services have to be approved by the device manufacturer, and a revenue sharing deal exists between the manufacturer and the providers. Some Identity information resides with the network operator, but most Profile information is gathered by the device manufacturer, as he can access user activities on the device, i.e. content purchases. Concerning Service Brokerage, the device manufacturer keeps quite tight control on which applications and/or services can be placed on the device, e.g. through an applications store, thus brokering between service developers and end users. Related to Charging & Billing, the user is charged by the network operator for access, but pays directly to the device manufacturer for any third-party service.

The third business model that can be distinguished is the aggregator-centric model. A service portal is an obvious way to disclose services to a user, but this model takes it a step further, in the sense that the actor role of portal provider is taken over by a service aggregator independent of the mobile network operator. A real-life example is the Facebook Mobile platform. In this model, the user gains access to network *via* network operator. The service aggregator plays the role of portal provider, allowing the user to select individual services. The service aggregator is typically not bound to any specific network operator. The platform is operated by the service aggregator, who is defining the development language. The service developers create applications that can run on the portal. Some services can be accessed outside of portal, i.e. *via* the web browser.

In this instance, Profile and Identity information is kept and monetised by the service aggregator, who is also acting as a Broker between the end user and individual applications. The advertising models and the associated revenue sharing mechanisms to be adopted in this model are at this moment still unclear. What is clear is that again, the platform owner is consciously attempting to control and shape the gatekeeper roles. While there is no tight control on the services that end up on the portal, and Service Creation is open to almost anyone without any authentication process from the aggregator, developers are still bound to the technical platform offered by the aggregator. The user has a direct Billing relationship with the network operator for access, but not necessarily with the service aggregator.

Monetization in this particular model is not clear and can for example rely on advertising revenues, collected by the aggregator.

Finally, the service centric model constitutes a more or less theoretical model for now. It is a.o. based on plans and models surrounding Google's Open Social initiative regarding open API's for social networking applications, including mobile applications. In this model, the user connects *via* the mobile network operator and selects services on a case-per-case basis. The service providers each operate a specific platform. A meta-platform operator (e.g. Open Social) allows developers to link services together and exchange information. Services outside of the meta-platform are available, but not connected.

This is a very open model in the sense that both service developers and users are free to choose whether they want to use any common platform functionality cq portal, or not. In terms of the implementation of the gatekeeper roles, these are less concentrated with one particular stakeholder than in previous models, but rather distributed over various individual service providers. Still, it is clear that Google counts on leveraging the profile data through the meta-tools that it offers to the individual service providers, and is intending Open Social to influence control over the gatekeeper roles that were identified. Service Creation is open to anyone, as there is no central platform, yet service developers wanting to make use of the meta-platform functionalities need to take into account compatibility with this actor. Profile and Identity information is managed by the individual service providers to which the end users subscribe, but is exchanged through the meta-platform. There is no central Brokering entity between service developers and end users, but some form of brokerage may reside with the meta-platform operator, allowing for interaction between different services. In terms of Charging and Billing, it needs to be highlighted that the monetisation models for this scenario have not crystallised in real life yet. There can be a direct billing relationship if a service developer charges the end user for access to the service, but advertisement-based models, facilitated by the meta-operator, are also very likely.

As these cases have illustrated, platform competition is permeating the mobile service provision market. These platform strategies appear to be oriented towards control over four crucial gatekeeper roles. Emergent business models championed by non-operators focus on exposing capabilities and on offering service enablers through a platform, and on migrating control over the gatekeeper roles away from the operator.

■ Towards a typology of platforms

While the previous section illustrated that highly diverging initiatives such as Vodafone Live!, the Apple iPhone, Facebook Mobile and Google's Open Social can be compared in terms of the gatekeeper roles they are attempting to control, it also demonstrated that they constitute very different types of platforms. This section will argue that current mobile platforms do not simply differ in terms of ownership (i.e. whether they are owned by a mobile operator, device manufacturer and so on), but also in terms of the additional roles that they integrate beyond the gatekeeper roles, and in terms of how they interact with customers at multiple sides of the platform.

Fairly little attention has been devoted until now to the specific characteristics of, and differences between, several types of platforms. While a number of tentative conceptualisations of types of ICT platforms have been put forward in scholarly literature already, they do not appear suited to capture the types of platform models encountered in the mobile industry. SCHIFF (2003) distinguishes between a platform that delivers an active 'matching service', and a platform that passively mediates. However, most of the mobile service platforms at the same time provide active matching services (e.g. through personalisation features) as passive mediation (e.g. through offering an SDK).

EISENMANN (2007) identifies proprietary platforms, which have a single provider that individually controls its technology, and shared platforms, in which multiple firms collaborate in developing the platform's technology, and then compete by offering users different but compatible versions of the platform. However, various platforms discussed above can be characterised as hybrids, externalising mostly proprietary technologies, but at the same time incorporating open, standardised and/or shared functionalities.

EVANS *et al.* (2005) distinguish between matchmakers, which aid members of one or both sides in their quest for a match on the other side, audience-makers, which bring advertisers and audiences together, transaction-based businesses, which meter transactions between the two sides of a market, and shared-input platforms, which include hardware and software platforms where participants on at least one side need to obtain access to the platform to provide value to participants on at least one other side. But again, it can be argued that mobile service platforms may fulfil all these functions, instead of being limited to one of them.

Returning to this paper's focus on control configurations, what does appear to distinguish the various types is the question whether control over assets is linked to control over customers. Platform leaders were equalled in this paper to actors controlling crucial gatekeeping roles. However, as the cases demonstrated, to control these roles does not necessarily mean that the platform owner also has control over the customer (i.e. end-user) relationship, or has control over all, or even most, assets needed to 'assemble' the value proposition. In fact, it could be argued that it is even a central tenet of platform literature that these forms of control can and will to an extent reside outside of the platform (making the platform model 'open'), while the platform only monopolises control over the roles that bestow most 'architectural advantage' (making the platform model 'open but not open'). Reinterpreting the business models currently employed in the mobile communications industry in this light, four basic platform types can be distinguished.

Among the cases discussed in this paper, the IMS platform and the related network operator APIs that expose network functionalities such as voice or messaging to third party service providers, seem to constitute a sort of 'Enabler Platform'. This refers to the case where the platform owner controls many or most of the assets involved in mobile service provision, but leaves the customer relationship to third-party developers. In platform literature, Intel is a well-known example of such a mobile enabler platform.

In the Vodafone Live! and the Apple iPhone case, which were also outlined earlier, many or most of the assets related to the value proposition, as well as the customer ownership, are in the hands of the platform owner. Still, this actor actively facilitates and encourages entry of 'third parties' to constitute a multi-sided market, e.g. by not 'squeezing' complementary actors out of the market. In other words, it allows competing service providers to use its platform, in order to increase the value of both this platform and its own end-user service offering. This second type of platform can be labelled a 'System Integrator Platform'. One typical example of such a platform model that has been often described in platform literature is Microsoft.

Google's Open Social initiative constitutes a third type of platform, which keeps its distance from the eventual value proposition as well as from the customer relationship. This can be labelled a 'Neutral Platform'. It refers to the case in which the platform owner does not control most of the assets necessary for the value proposition (because apart from controlling the gatekeeper roles it has hardly any assets related to the value proposition

itself), and on top of this does not have customer ownership (because it does not establish a billing relationship with the end-user and may be even invisible to the end-user). Another example of a neutral platform is Paypal or the LiMo platform.

In the Facebook Mobile case, the platform relies on other actors that control many or even most of the assets for establishing the value proposition, but does integrate customer ownership. This fourth type could be labelled a 'Broker Platform'. Mobile web marketplaces such as GetJar are also examples of such a broker. Outside of the mobile industry, a dating club or eBay constitute examples of such a platform.

In summary, the proposed platform typology, based on a number of control-related parameters and derived from the cases cited above, can be represented as follows:

Table 1 - Typology of platform models

	No control over customers	*Control over customers*
Control over Assets	Enabler Platform	System Integrator Platform
	The platform owner controls many of the necessary assets to ensure the value proposition, but does not control the customer relationship	The platform owner controls many of the assets to ensure the value proposition, and establishes a relationship with end-users. Entry of 'third-party' service providers is actively encouraged
	Examples: IMS, Intel	*Examples: iPhone, MS*
No Control over Assets	Neutral Platform	Broker Platform
	The platform owner is strongly reliant on the assets of other actors to create the value proposition, and does not control the customer relationship	The platform owner is strongly reliant on the assets of other actors to create the value proposition, but does control the customer relationship
	Examples: Open Social, PayPal	*Example: Facebook Mobile, dating clubs*

Naturally, this typology needs to be further refined and validated. However, on the basis of the analysis presented here it can be suggested that it may serve to operationalise various forms of control leading to different platform models, to explore the different characteristics of the platform types and to link these to various outcomes in terms of value being created for service developers as well as for end users.

■ Conclusion

The European mobile industry is being shaken up under the influence of technological and market convergence. This paper argued that platformisation is increasingly and structurally affecting the business models governing this industry. The dominant stakeholders in mobile service provision, i.e. mobile network operators, have been confronted with limitations when trying to attract users and service developers to their platform due to a walled garden approach. Emergent platform business models championed by other types of actors focus on exposing capabilities and on offering service enablers in a more open manner, while migrating control over some, or all, of the gatekeeper roles away from the operator.

It was argued that the mobile industry currently is not only faced with platform evolution and interface ambiguity, but *a fortiori* with platform ambiguity, and that as a result, very different types of platforms and platform strategies are being introduced. These do not simply differ in terms of ownership (i.e. whether they are owned by a mobile operator, device manufacturer and so on), but also in terms of the additional roles that they integrate beyond the gatekeeper roles, and in terms of how they interact with customers at multiple sides of the platform. The various platform types were characterised as enabler, system integrator, neutral or broker models, dependent on the platform owner's control over assets on the one hand, and its control over the customer relationship on the other hand.

To which extent these findings related to the platformisation of the mobile industry are comforting or discomforting is really in the eye of the beholder. In any case, what can be already indicated, is that the abundance and commoditisation created by platform models on the different sides of the multi-sided platform will as a rule be accompanied by strategies of control and scarcity around gatekeeper roles, regardless of the type of actor controlling the platform. This should at least temper any illusions about the completely open nature of competition in the 'mobile internet' world. It also implies that policy makers and regulators should not take for granted that simply allowing and facilitating the influx of IT and internet services and technologies will result in an unbundled, open mobile marketplace in which competition will flourish. Rather, platform business models are bound to arise that may again trigger regulatory concerns, and that, if the archetypical Microsoft platform is anything to go by, may even prove to be harder to delineate and to regulate than the current telecommunications market.

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