MIS Quarterly Executive

Volume 21 | Issue 2 Article 3

June 2022

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The platform economy presents both enormous opportunities and threats to incumbent firms. Our analysis of eight platform projects within the Bosch Group, a German engineering and technology company, reveals common barriers experienced by incumbent firms related to learning platform business logic, proving platform value and building a platform organization. Based on lessons learned at Bosch, we describe the actions that managers in incumbent firms can take to overcome the barriers and prepare to enter the platform economy.[1]

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Incumbent Firms Are Building Platform Businesses

Microsoft, Apple, Amazon, Google and Facebook, which are five of the six most valuable companies in the world,[2] are building their success on platforms[3] that connect previously separated markets and thus create value. By nurturing flourishing ecosystems around their core businesses, these firms have revolutionized the way that major industries create value and have challenged incumbent firms in their home markets. In response, incumbent firms are building their own platforms to leverage their established market positions and expand their traditional businesses. The Bosch Group, a global supplier of technology and services, is a prime example of such engagement in platform activities. For example, Bosch has been rated as a leading Internet of Things (IoT) company, offering solutions for smart homes, smart cities, connected mobility and connected manufacturing.[4]

Over the past 20 years, 43 platform-based companies have been included in the Forbes Global 2000 list. These platforms have generated the same annual revenue (an average of approximately $4.5 billion) as their non-platform counterparts with half the headcount, twice

1 Martin Mocker is the accepting senior editor for this article.

2 For an overview of the most valuable companies in 2021 based on market capitalization, see *Global Top 100 companies—March 2021*, PricewaterhouseCoopers, available at https://www.pwc.com/gx/en/services/audit-assurance/publications/global-top-100-companies.html.

3 In this article, "platform" means the infrastructure and rules for a marketplace that brings producers and consumers together for mutual value creation. For more information, see Van Alstyne, M. W. and Parker, G. G. "Pipelines, Platforms, and the New Rules of Strategy," *Harvard Business Review* (94:4), April 2016, pp. 54-62.

4 *Bosch device management confirmed "Best in Class" for the second time*, PAC Radar, 2018, available at https://blog.bosch-si.com/bosch-iot-suite/bosch-device-management-confirmed-best-in-class-for-the-second-time/.

DOI: 10.17705/2msqe.00061

the operating profits and much higher market values and growth rates.[5] This efficiency is driven by digitalization, which makes platform building and scaling much easier and less expensive, enables seamless interactions, and enhances the ability to capture, analyze and exchange large amounts of data.

With the ongoing digital transformation of incumbents, platforms have become an essential part of the business landscape and are no longer solely the domain of digital natives. Established companies, including VW, Nike and Unilever, have introduced their own platforms as their digital business models have matured.[6] But in entering the platform economy, incumbents face very specific challenges. Whereas native platform companies naturally start with a strong market and ecosystem orientation, executives of incumbent firms build their platform businesses within the boundaries of long-standing corporate structures.

For decades, incumbent firms have achieved remarkable success by designing and optimizing internal value-creation processes. However, the increasing shift toward platform business models in traditional markets requires executives of incumbent firms to adopt new business practices. Platform businesses differ considerably from mature product businesses, so decision makers are confronted with new challenges that range from understanding the principles of a new business logic to seizing business opportunities and reconfiguring organizations to exploit them.[7] Thus, incumbent firms' platform activities may face internal barriers that impede launching a platform and prevent them from gaining the full potential advantages of platform business models.

In this article, we present an in-depth case study of Bosch's platform activities and, from the lessons learned, identify the unique barriers that incumbent firms face when entering the platform business. We identify the actions that executives at Bosch took to overcome these barriers and provide recommendations for implementing these actions successfully within the organizational structures of incumbent firms.

The Bosch Group and Its Platform Activities

The Bosch Group is a leading global supplier of technology and services headquartered in Gerlingen, near Stuttgart, Germany.[8] Bosch operates in four core business sectors:[9] mobility solutions,[10] industrial technology, consumer goods, and energy and building technology. In 2020, it had approximately 395,000 employees and revenues of €71.5 billion ($87.4 billion).[11] Bosch has been recognized as one of the world's most innovative companies.[12] Dr. Volkmar Denner, former Bosch Group Chairman, has set the company ambitious innovation targets. He wanted Bosch "… to become a leading AIoT[13] company."[14]

To achieve these goals, Bosch has initiated multiple platform activities that capitalize on the contributions and interactions of third parties, including digitally enabled business areas, such as the IoT and connected mobility, where platforms and network effects are becoming strategically relevant cornerstones of future business success. In this article, we focus on a sample of eight of Bosch's multisided platform projects, which we have labeled Alpha, Beta, Gamma, Delta, Epsilon, Zeta, Eta and Theta.[15] Many of these platforms operate in the mobility domain: improving driver safety by detecting potential traffic hazards

5 For more information on platform businesses' financials, see, see Yoffie, D. B., Gawer, A. and Cusumano, M. A. "A Study of More Than 250 Platforms Reveals Why Most Fail," *Harvard Business Review*, May 2019.

6 For details on incumbents entering platform businesses, see "The right digital-platform strategy," *McKinsey Quarterly*, May 2019, available at https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/the-right-digital-platform-strategy.

7 For more information, see Teece, D. J. "Business models and dynamic capabilities," *Long Range Planning* (51:1), July 2017, pp. 40-49.

8 The Bosch Group's annual report is available at https://www.bosch.com/company/annual-report/.

9 For facts and figures about Bosch, see *The Bosch Group at a Glance*, available at https://www.bosch.com/company/our-figures/.

10 Bosch's mobility solutions exploit its comprehensive expertise in vehicle technology, together with associated software solutions and services.

11 Currency conversion rate as of January 2022.

12 See, for example, Columbus, L. *The Most Innovative Companies Of 2020 According To BCG*, Forbes, June 2020, available at https://www.forbes.com/sites/louiscolumbus/2020/06/28/the-most-innovative-companies-of-2020-according-to-bcg/.

13 The AIoT (Artificial Intelligence of Things) is the combination of AI technologies with the Internet of Things infrastructure to achieve more efficient IoT operations, improve human-machine interactions and enhance data management and analytics.

14 For Dr. Volkmar Denner's statement, see https://www.bosch-presse.de/pressportal/de/en/bosch-stays-on-course-through-the-coronavirus-crisis-to-achieve-a-positive-result-224064.html.

15 We did not use the actual names of the platform activities because of confidentiality concerns.

(Gamma), facilitating parking lot searches (Zeta), enabling the exchange of vehicle data (Epsilon), and bundling various mobility (i.e., transportation) services (Delta, Eta, Theta). Other platforms in the sample (Alpha and Beta) operate in the IoT domain, helping device manufacturers and developers more easily develop applications for smart devices. (See the Appendix for how the sample of eight platforms was selected and a brief description of each one.)

Barriers to Incumbents Entering the Platform Economy

The three major challenges (or barriers) faced by an incumbent firm as it transitions to a platform business are learning platform business logic, proving platform value and building a platform organization.[16] Below, we describe each of these barriers and identify the actions Bosch took in its platform projects to successfully overcome them. Figure 1 provides a summary of our findings, highlighting the application of actions to the identified barriers across the various Bosch platforms we examined.

Actions for Overcoming the Barrier to Learning Platform Business Logic

When the managers of Bosch set out to learn the new logic of a platform business, they faced the difficult barrier of becoming familiar with a new business logic that was far from intuitive, given the prevalent Bosch management style. As the head of platform engineering of Epsilon automotive data platform put it, "For some colleagues, it is not clear why a platform is needed."

Managers of an incumbent firm typically have decades of experience gained from working with linear value creation processes but lack knowledge about platform logic: "Our typical understanding of a platform is technology-based; we have a cloud and we have services—that's it. … which means we have a platform where you can build different vehicles really efficiently or a platform that offers different cloud services for a customer" (Director, Zeta parking platform).

Bosch has become very successful at managing linear businesses in industries where supplier structures and customer requirements are well established. The automotive industry, in which Bosch generates a major share of its sales, has been following this business logic for decades. Automobile manufacturers specify technologies, and suppliers build technology on this basis and arrange resources with other downstream suppliers. According to this business logic, decisive competitive advantages arise from pushing enough goods through an organization, maintaining quality and achieving healthy product margins. Thus, for Bosch's traditional way of working, a platform is a joint technical basis for developing different vehicle types, which is: "far from … commercial [digital] platforms with ecosystems connecting different partners. And that's incredibly difficult when you're discussing [platforms] and one person understands one thing and the other understands another" (Director, Zeta parking platform).

The basic purpose of digital platforms is to facilitate interactions between different parties in a way that adds value to one side or the other. As the number of platform participants increases, the value for others joining the platform increases, a phenomenon known as "network effects."[17] A two-sided ridesharing platform provides a simple example: each additional driver who joins the platform adds direct value to potential passengers, who experience richer supply as a result. In turn, each additional passenger who joins the platform adds direct value to potential drivers, who thus experience richer demand. The size and "generativity"[18] of a platform's network ultimately determine its competitive success.

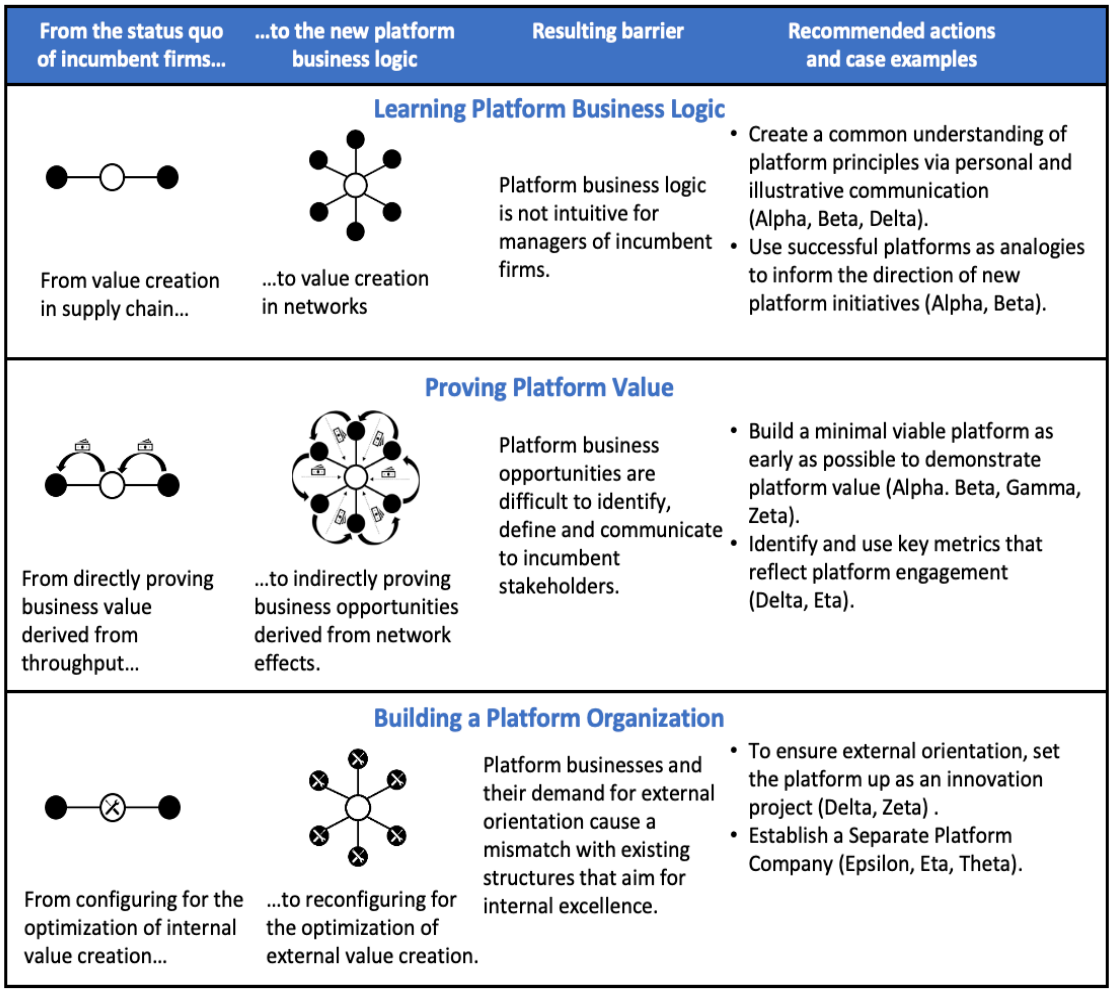
To enter the platform economy, managers of established incumbent companies therefore have to reorient their thinking away from identifying customers' requirements and passing them on to suppliers, to building ecosystems, stimulating transactions and promoting network effects. In

16 For more information, see: 1) Teece, D. J. "Explicating Dynamic Capabilities: The Nature and Microfoundations of (Sustainable) Enterprise Performance," *Strategic Management Journal* (28:13), December 2007, pp. 1319-1350, available at https://doi.org/10.1002/smj.640; and 2) Helfat, C. E. and Raubitschek, R. S. "Dynamic and Integrative Capabilities for Profiting from Innovation in Digital Platform-Based Ecosystems," *Research Policy* (47:8), October 2018, pp. 1391-1399, available at https://doi.org/10.1016/j.respol.2018.01.019.

17 Katz, M. L., and Shapiro, C. "Systems Competition and Network Effects," *Journal of Economic Perspectives* (8:2), Spring 1994, pp. 93-115.

18 In the literature on digital platforms, "generativity" is the ecosystem's capacity to foster complementary innovation from autonomous, heterogeneous firms.

Figure 1: Summary of Barriers Incumbents Face in Transitioning to Platform Businesses and Actions to Overcome Them



the words of the head of platform engineering at Epsilon, the tendency of established companies "to recreate a certain linearity," for example by selling white-label platform technology to an upstream customer, might lead to an understanding of platforms that is more familiar but that neglects the dynamics of network effects and the self-reinforcing growth that results from networks of participating partners.

Managers (and employees) of established companies who have extensive experience in linear business logic find it challenging to understand the new platform business logic and the underlying key concepts. Especially within engineering companies such as Bosch, this challenge is exacerbated by a technology-focused perspective of platforms, as in the automotive industry. The instinct of managers from traditional companies is to create value by selling a product in an industrial fashion rather than facilitating the value creation of others. Below, we describe the two actions Bosch took to overcome the barrier of learning platform business logic.

Create a Common Understanding of Platform Principles via Personal and Illustrative Communication. Bosch's exploratory Alpha platform project addressed the barrier to learning platform business logic by creating a common understanding among employees and external stakeholders right from

the beginning. Alpha was a three-sided platform. On one side, Alpha enabled manufacturers of smart devices to equip their devices with capabilities such as device management, connectivity and application programming interface (API) connections so they could market the data generated by their devices. On the second side, the platform provided customers who owned and used the smart devices with a standardized interface that facilitated the exchange of device data. On the third side, there were service developers that built services on top of the devices without having to deal with the specifics of each device.

Though Bosch has extensive experience in manufacturing all types of devices and connecting them to the internet, the multisided Alpha platform initiative was new. In particular, Alpha had built an external ecosystem of device manufacturers and third-party service developers. A key factor that helped create a shared understanding of Alpha's new business model among all employees was regular, open and authentic communication throughout the entire organization: "We openly shared the model with all employees and discussed it with them. For example, we organized town hall meetings where colleagues could ask questions about the platform. … In this way, we also created a common hook for what we wanted to achieve" (President, Alpha).

The town hall meetings were held multiple times in different locations so that all employees, even if they were not directly involved with the platform activity, had the opportunity to gain an understanding of the core business logic.

In addition, managers of the Alpha initiative prepared an illustrative white paper to facilitate an early exchange of knowledge about the platform. Rather than focusing on the technical details of the platform, the white paper highlighted Alpha's basic business logic, the various parties involved and the need to successfully establish participation. The white paper was specifically aimed at employees who were associated with Alpha, to create a common vision and a baseline for knowledge about platform business logic. This process was particularly necessary because the new business model—enabling exchanges of device data between device owners and service developers—differed significantly from the Alpha team's hitherto core business of developing in-house services. Although Alpha was discontinued after an early exploration phase, its management reported that the early sharing of platform business logic and Alpha's concrete vision established a broad understanding of the platform among the employees and stakeholders involved.

Use Successful Platforms as Analogies to Inform the Direction of New Platform Initiatives. Bosch's Beta platform illustrates another action for efficiently disseminating knowledge about platform business logic. Beta connects smart cameras and enables the uniform development of applications (such as those used to track objects at an airport, on a road or in a production plant) while removing the need to deal with the complexity of each individual camera model. The platform links camera vendors, application developers and other partners to create an open ecosystem that enables vision-related applications. Although Bosch has extensive experience in building cameras, it did not have expertise in developing open platforms. To raise awareness of the related efforts being made not only within the organization but also between Beta partners, and to communicate the aims of the project, Bosch used analogies from well-known platforms.

Beta managers reviewed the history of successful platforms to find an appropriate analogy that was consistent with Beta's level of platform maturity. They identified the early smartphone ecosystem as a suitable analogy to clarify the need for a common open platform because, according to the former managing director of the Beta camera platform, "Google and Apple have changed this [the smartphone] game." Similar to the early smartphone ecosystem, the camera ecosystem was highly fragmented with different operating systems, standards and interfaces; thus, developing standardized software for camera devices was difficult. By recognizing these similarities and studying the pain points and approaches that had been pursued in the past, analogies were drawn between alliances in the early smartphone market and Beta's envisioned platform endeavors: "We took a close look at what Google was doing back then when the smartphones emerged,

particularly with the alliance foundation. [Google] founded an Open Handset Alliance together with a number of telecommunications companies" (Former Managing Director, Beta camera platform).

Highlighting these similarities provided the stakeholders involved in Beta with a concrete vision of the platform and a roadmap for the future direction. Using the early smartphone ecosystem as an analogy enabled the stakeholders to identify proven approaches and realize that the smart camera platform needed an architecture where intelligence is shifted to devices, all devices share a common operating system, and hardware-independent development and "app" commercialization are possible: "We have evolved the concept and formed an open safety & security alliance together with major camera manufacturers and other partners worldwide to specify common standards and technologies" (Former Managing Director, Beta camera platform).

The early smartphone phone market analogy helped to anchor the Beta platform's opportunities in their business reality. It also facilitated consistent communication and ensured broad commitment and contribution to the planned open platform. Thus, comparing Bosch's camera platform endeavors to widely known platform examples ("the Uber of …"; "the Google of ...") facilitated communication among employees and helped to explain how the platform business model worked.

Actions for Overcoming the Barrier to Proving Platform Value

The barrier to proving platform value is that the inherent value of a platform business is unclear to managers of incumbent firms because they are unfamiliar with platform principles. To gain the necessary top management commitment, those promoting platform opportunities must translate their ideas and visions into facts and figures that help decision makers determine the potential of platforms. They must make the case for investing in platforms in a way that is understandable to the decision makers of incumbent firms.

Decision makers at Bosch were used to forecasting, communicating and exploiting business opportunities in established linear industries, and investing in business opportunities that reduce production costs (e.g., through process optimization) or improve the ability to serve customers (e.g., by developing a new product feature). In linear businesses, proving investment value is usually linked to the output of a linear creation process (e.g., manufactured products or projects realized). However, proving the value of platform investments is not as straightforward.

Assessing platform business opportunities at Bosch involved estimating the future participation of third-party organizations or individuals on the platform and forecasting the "generativity" of an ecosystem that did not yet exist.[19,20] Thus, instead of leveraging Bosch's capabilities to optimally deploy resources to produce a new product, the involved managers needed to frame platform business opportunities based on their understanding of external players that were expected to participate in the platform to co-create value. As a consequence, it was more difficult for Bosch managers to predict and communicate the inherent business opportunities of a platform to the relevant stakeholders in the organization. The existing mindset in Bosch makes it difficult for them to forecast business value that is created outside the firm and is heavily dependent on the involvement of external third parties: "the company has grown up with a different philosophy, and it's hard to get away from a mindset that has worked well for the last 25 years" (Former Delta CEO).

The complexity involved in predicting and communicating the value of platform business opportunities contrasts starkly with the established businesses logic of incumbent firms, where customers order new product lines years in advance and business opportunities can be precisely calculated based on extensive experience: "a platform model is … different from a factory, where … I'm investing a billion, for example, and I already have the orders today; I can calculate exactly what capacity utilization I will have in order to achieve the return on investment again" (President, Alpha).

19 Cusumano, M. A., Gawer, A. and Yoffie, D. B. *The Business of Platforms: Strategy in the Age of Digital Competition, Innovation, and Power*, Harper Business, 2019.

20 Van Alstyne, M. W. and Parker, G. G. op. cit., April 2016.

To gain top-level support, managers promoting platform opportunities in incumbent firms must therefore prove the value of the opportunities, especially given the high upfront investments often associated with platform businesses. The two actions taken by Bosch to overcome the barrier of proving platform value are described below.

Build a Minimal Viable Platform as Early as Possible to Demonstrate Platform Value. The Gamma platform provides an example of how an early focus on a prototype can facilitate forecasting and communicating platform value, thus making business opportunities more tangible for involved stakeholders. Gamma informs drivers about potentially dangerous situations, such as a vehicle traveling in the wrong direction, based on data provided by other participating drivers. Data from participants' mobile apps and vehicle infotainment systems is fed back to the platform, increasing the accuracy of the detection of traffic hazards for all drivers. Thus, Gamma's network effects are based on its users and the data they provide, which means that a greater amount of location data leads to more accurate detection of hazards. Gamma's business model involves multiple players that integrate the service into their applications, including drivers, car manufacturers and third-party app providers.

Though Gamma clearly provides value by reducing the likelihood of traffic collisions, the underlying business opportunities resulting from its multisided nature—that is, the increasing service quality achieved through network effects—were difficult to assess. Managers of the Gamma project therefore needed to have detailed discussions with key stakeholders about the business rationale for Gamma. To facilitate these discussions, Gamma managers created a lightweight demonstrator that included the platform's current functionality (given its early position in the market), as well as indicating its intended future target position and the core value the platform offered based on expected network effects.

> *"We said this basic setup is important. So, the benefits need to be concrete. What really helped us was the early provision of an app with the main functions, which was a preliminary stage for the final integration into the car. The app may not have been the most obvious and technologically best solution, but it helped us to demonstrate the value of the platform. Not only outside at the customer's site but also here in internal discussions."* Head of Gamma Business Development and Partner Management

This minimal viable platform was developed using agile principles. It was a lightweight mobile app that included basic functionalities for user onboarding and thus was able to demonstrate the platform's network effects. As such, it enabled Bosch to gain an early understanding of the Gamma platform's underlying business opportunities. As reported by the Head of Gamma Business Development and Partner Management, "If you can show how a wrong-way driver is detected and a collision is prevented, that is quite impressive."

The decision to develop the Gamma prototype supported the project in two ways. First, the underlying business model and the associated business opportunities of the platform were made more explicit for Gamma's key stakeholders. Second, the prototype helped to validate the business model because it confirmed that potential users were willing to pay for participating on the platform. The latter was particularly important; the evidence gathered from users confirmed Gamma's underlying business opportunity and made communication with internal stakeholders more transparent.

Identify and Use Key Metrics that Reflect Platform Engagement. Once a platform is ready to launch, the insights and lessons gained from the demonstrations of the platform's business opportunities have to be validated through agreed-upon key metrics. Bosch's Delta platform demonstrates the importance of identifying and using platform metrics that reflect platform engagement, and thus network effects, rather than just focusing on the simple number of participants. Delta aggregated several modes of transportation on a single platform and allowed users to book rides. Its two-sided business model leveraged the network effects resulting from a growing number of transportation service providers, which increased the value for platform users. To strengthen the platform

on the user side, Delta offered free registration for service providers and free kilometers for users. As the platform matured, however, Delta's managers realized that the number of bookings on the platform had remained stable despite the increased number of users. This finding was particularly surprising because the transportation service providers had solid coverage in the cities where the platform was operating.

To make an informed decision about the next steps, a platform engagement metric was integrated into the Delta decision-making process. This metric had two components. First, the number of users who went through the registration process, browsed the app and finally booked a ride was determined. Second, recurring trip bookings were counted because the revenue that was generated and passed on to service providers fueled the network effects of the platform and was therefore critical to Delta's business success. The metric identified that, even with a solid established user base, platform engagement was low. It showed that sometimes, the application was downloaded but registration was not completed; or that a user only ever booked one trip.

> *"For us, it was not about blowing something up fast, no matter how long it takes. We know we need to have a product-market fit, which means we need a target group—a couple of people who are so enthusiastic about what we did that we can grow with that group. And that's what you have to show and report relatively early in the process of platform development."* Former Delta CEO

The metric enabled Delta's management to see that the benefits of the platform's core transaction (bringing transportation service providers and users together) were not sufficient to encourage users to return to the platform, and thus build a business around it. As the former CEO of Delta put it, "… we were able to show that there was no organic traction."

To remain accountable, Delta managers had to act on the information provided by the metric. They decided to shut down the platform and share the lessons they had learned throughout Bosch to prevent large investments from being made in platform ecosystems whose core transaction is insufficient to build a business. Delta's former CEO reported that:

> *"It's certainly not easy to shut down a platform project you've built. But you realize that people are spending more and more energy trying to justify why they should still be allowed to continue. This is where the situation becomes confusing. And this is why it's just as important to have functioning portfolio management that has concrete metrics to let go of projects."*

As a consequence of the metric-based decision to shut down the Delta platform, other Bosch business units operating platforms updated their portfolio evaluation metrics to assess their platform businesses in a more objective and platform-relevant manner.

Actions for Overcoming the Barrier to Building a Platform Organization

The external focus of platform businesses is a mismatch with existing organizational structures that in companies like Bosch are designed for internal excellence. This mismatch is a barrier for incumbents that need to build an organization to support their platform initiatives. At Bosch, value creation has historically taken place within the boundaries of the company. Raw materials are provided by downstream suppliers, and the materials, work, knowledge and processes are organized so that products can be delivered according to given customer specifications. Thus, the center of value creation in incumbents lies in the business itself.

Platform business logic shifts the core of value creation outside the boundaries of the firm to organizations in the ecosystem, such as those that create apps or provide specific offerings, with the platform provider setting rules to guide value creation. This shift in the location of value creation is fundamental to platform business logic, and a critical success factor for established companies is interacting with a variety of external stakeholders.[21] The focus is shifting from established firms aligning their processes with those of suppliers to persuading participants

21 Parker, G., Van Alstyne, M. and Jiang, X. "Platform Ecosystems: How Developers Invert the Firm," *MIS Quarterly* (41:1), January 2016, pp. 255-266, available at https://doi.org/10.2139/ssrn.2861574.

and applying appropriate ecosystem governance strategies. "We have good sales channels to our customers, but that's not the partner management … we need for a platform." Former Delta CEO

To support the new value creation logic based on the management of multiple players in a platform ecosystem, the structure and culture of an organization must be externally oriented. We observed that the externally focused Bosch platform projects were difficult to anchor within traditional processes, which led to a mismatch between the platform projects' requirements for building external value creation structures and established structures designed for internal efficiency. The two actions that Bosch took to overcome this barrier are described below.

To Ensure External Orientation, Set the Platform up as an Innovation Project. Bosch's Zeta platform, which enables car drivers to find unoccupied parking spaces, illustrates one approach an incumbent firm can take to building a platform organization and thus overcome the barrier associated with the shift to external value creation. The core participants in Zeta's ecosystem are parking space providers and car manufacturers. The more parking space providers that participate on the platform, the more attractive it becomes for car manufacturers to integrate Zeta into their vehicles and vice versa.

Zeta managers recognized early on that establishing the ecosystem would not only require advanced technical solutions but also pose considerable challenges related to business development and partner management within the established organizational structures of Bosch. To address these challenges, Zeta was established as an innovation project. Innovation projects within Bosch are characterized by greater flexibility in terms of the establishment of organizational structures, the management of budgets, the retention of dedicated employees (who are not accessible to other business units) and the reduction of reporting duties. Innovation projects have a degree of independence from established general Bosch policies, including partner management, and therefore facilitate the establishment of an organizational setup with the necessary degree of external orientation. "Especially in the beginning, we had a lot of freedom … and could act like a start-up because we were established as an innovation project. ... This gave us confidence and then also allowed us to act more independently and faster right from the beginning" (Director, Zeta parking platform).

This arrangement meant that not only could Zeta use the established Bosch customer base when needed, but could establish new partner structures easily, for example, with parking space providers. An important factor supporting Zeta's status as an innovation project was the documentation of key platform stakeholders' commitments at an early stage of the development process. In particular, the commitment of car manufacturers that later drove the network effects of Zeta was systematically documented through letters of intent.

Establish a Separate Platform Company. Bosch's Epsilon platform provides a striking example of how organizational barriers can be overcome by establishing a platform project as a separate business. Epsilon is a data marketplace that connects automobile manufacturers (with the goal of monetizing vehicle data) with service developers (with the goal of building innovative services). This data marketplace started out as a typical two-sided business model in which more data providers lead to more service developers and vice versa. The Epsilon platform was set up so that each participant retained full control over the data and services that it contributed to the marketplace (including ownership, pricing and visibility).

Unlike the other Bosch platform cases we examined, Epsilon has been established as an external company, with Bosch and other automotive companies as the shareholders. Thus, Epsilon is an independent venture with its own organizational structure that has two important features conducive to building an ecosystem. First, every Epsilon shareholder can also be a contributor to the platform—i.e., a data provider. Being a shareholder and contributor increases the commitment to the platform and thus enhances the "generativity" of the ecosystem.[22] Second, from its inception, Epsilon provided dedicated staff to help incumbent organizations integrate the platform into their strategic

22 Note that, to avoid potential conflicts of interest, the roles of shareholders and contributors are clearly separate in the Epsilon organization.

roadmaps, further facilitating the creation of an ecosystem. "We have access to decision makers and are involved in strategic initiatives, projects and workshops with our partners and shareholders, which a normal start-up certainly does not have and could not have built up in the short term" (Head of Platform Development, Epsilon).

Recommendations for Preparing Incumbent Firms to Enter the Platform Economy

The barriers and actions for overcoming them described above and summarized in Figure 1 provide a roadmap for incumbents that want to establish platform-based businesses in their organizations. Specifically, incumbents need to learn the new platform business logic, prove the value of platforms and build an organization that leverages a platform ecosystem. Based on the lessons we learned at Bosch, we provide three recommendations that incumbent firms can take to prepare themselves for entering the platform economy.

1. Establish Platform Learning Facilitators

To learn about platform business logic, we recommend that incumbent firms establish and institutionalize dedicated platform learning facilitators, which could be specific individuals, organizational units or employee communities, within their organizational structures. The Bosch case shows that an established company can host a wide range of platform projects with different levels of maturity that operate in different markets, all of which need to learn about and understand platform business logic and apply it to their specific market environments.

To systematically support this learning process, Bosch established a business model innovation department to provide courses, coaching and support for establishing new business models in the organization. Though this department's remit covered all types of business models, the need to support platform-based businesses was deemed particularly important as Bosch had limited knowledge about platform businesses: "We have only a few people in the organization who know platform business or have even worked on a platform project who you can speak to" (Former Delta CEO).

The business model innovation department fulfilled two important roles in relation to individual platform projects. First, it gathered knowledge from individual platform projects as well as from academia, and fed it back into the projects, accelerating the learning processes within Bosch's platform projects. Second, the department helped to tailor the platform knowledge to the very specific market characteristics of platform projects.

The employees of the business model innovation department successfully institutionalized platform learning facilitators by running an annual platform conference, which achieved three important goals. First, it enabled the directed sharing of platform knowledge with individuals within projects who actually needed it (instead of undifferentiated knowledge dissemination). Second, it enabled individuals involved in platform projects that otherwise were isolated from one another to become aware of each other and establish a dedicated knowledge exchange. Third, as the event matured, external platform experts from other business areas and academia were invited to participate, which enabled recent external knowledge to be integrated into the learning process of Bosch platform projects. The director of the corporate business model innovation department said: "We realized that each platform project somehow fights alone but, of course, also shares common issues along the way." Over several years, conference attendees formed a nucleus of employees who not only distributed common platform knowledge but also collected and shared insights from platform projects that extended beyond textbook knowledge.

2. Clearly and Consistently Communicate Platform Strategies to the Business

To gain the full commitment of decision makers for new platform projects, it was imperative that Bosch communicated its platform strategies and their competitive advantages in a systematic and comprehensible way. Although minimal viable platforms offer a tangible approach to demonstrating value to platform contributors, they do not provide a mechanism

for systematically communicating the strategic thinking and reasoning associated with a platform business. Bosch therefore supported its initiatives by using a structured schema to consistently map platform strategies and lay the foundation for discussions with decision makers. These discussions were complemented both by online seminars that provided basic information and by systematized workshops. The seminars and workshops introduced and explained fundamental terms, such as platform owners and complementors.

Bosch also used graphical schemes to convey the concepts of control points and monetization points and map them to specific examples within the platforms. These graphical schemes allowed the competitive advantages of platforms to be systematically shown, as emphasized by a manager in the business model innovation department:

> *"To support the projects, we of course worked with familiar schemas, such as the Business Model Canvas. However, these are rarely sufficient for a platform business. So, we've also introduced more specific frameworks that allow platform projects to think more systematically about the different sides that are involved in the platform, where they want to scale, and where they want to monetize."*

The structured framework and the graphical schemes significantly improved the dialog between the different platform endeavors and Bosch's senior management. The recurring and consistent use of a common language across multiple platform projects increased the confidence of decision makers when dealing with the complexity of platform projects.

3. Establish Mechanisms for Integrating Autonomous Platform Projects into Incumbents

Managing platform initiatives within an incumbent requires the firm to strike a balance between integration and autonomy. Although integration creates synergies with the existing core business, autonomy is a prerequisite for speed and momentum. An incumbent firm must therefore have mechanisms for enabling the smooth integration of a platform project into the organization. Bosch used two approaches for establishing a link between platforms and the existing organization.[23]

The first approach involved the establishment of an advisory board at the start of platform projects. These boards provided informal access to decision makers from established business sectors and a forum for exploiting common strategies and potential synergies. At later stages of a platform project, the established link to decision makers helped to integrate it into existing Bosch structures because the relevant business sectors already understood their strategic fit with the platform project.

The second approach to integrating autonomous platform projects is illustrated by the Epsilon automotive data platform, which was set up as a completely separate organization outside of Bosch. The key to Epsilon's success was locating employees from the established Bosch organization on-site in the new platform business, which guaranteed the proper use of the platform by established Bosch business units and its integration into those units. These employees were not sponsored by Epsilon but by Bosch, and they committed a certain percentage of their working hours to the integration of the platform.

This second approach facilitated seamless integration in two main ways. First, the on-site Bosch employees ensured that the business units used the automotive data flows enabled by Epsilon in a consistent way, and thus allowed Bosch to take full advantage of its role as a platform contributor while also enhancing the "generativity" of the platform. Second, the on-site employees enabled Epsilon's managers to better understand the incumbent organization's processes and decision making, which further strengthened the bond between the platform and the incumbent firm, as emphasized by Epsilon's head of platform engineering: "Our colleagues in the business sectors help us maneuver the many particular interests that simply exist in a large hierarchy such as our partners in the automotive industry usually have. That helps so that we can move forward and be fast."

23 Note that there are many other approaches that incumbents can use to integrate platform projects.

Concluding Comments

To keep up with current market developments, incumbent firms must prepare to enter the platform economy. "Sit back and do nothing" is not an option. As the Bosch case shows, incumbents must learn the new platform business logic, prove the inherent value of platforms and build organizations that can leverage platform ecosystems. The actions and guidelines we have identified from the Bosch case provide a roadmap for incumbent organizations as they navigate the shifts associated with setting up platform businesses. Following our recommended actions will enable incumbents to be better placed to exploit and actively shape emerging platform opportunities rather than having to respond to market pressures.

Appendix: About the Research

Methodological Approach

The research for this article was based on an in-depth case study of the Bosch Group. We began by screening platform projects of different sizes within the broader organizational boundaries of the Bosch Group. After discussing the nature of each project with the managers involved and removing projects that did not follow a multisided platform business logic, we selected eight platform projects as the focus of our research. We conducted semistructured interviews with the managers involved in each of the eight projects to gain a deep understanding of the platforms' business models and the challenges involved in establishing these business models within the Bosch organization. We concentrated on the project leaders and executives of the respective platform projects to gain a management-level perspective. The interviews were conducted between March and May 2019 in the Stuttgart metropolitan area at the headquarters of the respective platform projects, with follow-up meetings in July and August 2019, and August 2020. The interviews explored the following three major themes:

1. **Nature of the platform project:** We asked interviewees about the platform project they have been involved in or are currently active in, and how they characterized the underlying business model of that project. These questions provided us with descriptions, contexts, stakeholder networks, revenue models and historical developments of the platform projects.
2. **Barriers to cultivating platform business:** We asked about the barriers encountered when cultivating a platform business, in particular those caused by intraorganizational factors. We were provided with descriptions of the barriers

Case	Interview position	Length of interview
Alpha Smart Device Platform	President	45 min
Beta Camera Platform	Former managing director	45 min
Gamma Traffic Hazard Platform	Business development and partner management	65 min
Delta Transportation Aggregator Platform	Former CEO	55 min
Epsilon Automotive Data Platform	Head of platform development	60 min
	Team lead	50 min
Zeta Parking Platform	Director	50 min
Eta Commuting Platform	Head of business development Europe	50 min
Theta Multimodal Transportation Platform	Project leader	50 min
Corporate Business Model Department	Director	45 min
	Senior manager	45 min

Case	Focus Area	Integration in Bosch[26,27,28]	Starting Year	Current Status
Alpha Smart Device Platform	IoT	Part of an established Bosch division.	2018	Discontinued after pilot
Beta Camera Platform	Building Technologies	Lightweight organization within Bosch.	2017	Operating
Gamma Traffic Hazard Platform	Mobility	Part of an established Bosch division.	2018	Operating
Delta Transportation Aggregator Platform	Mobility	Lightweight organization within Bosch.	2016	Discontinued after launch
Epsilon Automotive Data Platform	Mobility	External organization with Bosch as a shareholder.	2017	Operating
Zeta Parking Platform	Mobility	Lightweight organization that was subsequently integrated into an established division	2015	Operating
Eta Commuting Platform	Mobility	External business with Bosch as a shareholder that was subsequently integrated into an established division.	2014	Discontinued after launch
Theta Multimodal Transportation Platform	Mobility	Part of an established Bosch division.	2015	Discontinued after launch

encountered during the evolutionary course of a platform project and the associated challenges faced in managing them.

3. **Approaches to overcoming barriers:** We asked about how the barriers encountered were overcome, particularly intraorganizational barriers, when cultivating a platform business. From this question, we gathered descriptions of the strategies, activities and best practices used to overcome the barriers.

To facilitate a systematic analysis of the data, all the interviews were transcribed and coded (using NVivo qualitative data analysis software), and frequently recurring codes were identified by the authors.[24,25] The table on the previous page provides details on the interviewees, their respective roles in the eight studied platforms, and the corporate business model innovation department, and the duration of the interviews.[26,27,28]

The Eight Bosch Platforms Studied

Alpha Smart Device Platform. The three-sided Alpha platform involved smart device manufacturers, device owners and service developers. The platform enabled an ecosystem in which standardized pricing based on device data is possible for device owners, and service providers could seamlessly create software based on available device data. Alpha could be deployed across a wide range of domains. It was shut down after an initial exploration phase.

Beta Camera Platform. The two-sided Beta platform is operated by a Bosch subsidiary and involves camera manufacturers and service developers. The platform is organized as an open platform—i.e., as an open-source operating system that is developed and driven by an open

24 This approach to data analysis follows the proven case study methodology of Yin, R. K. *Case Study Research: Design and Methods*, Sage, 2016.

25 The descriptions of the eight platforms and all the quotes included in this article have been verified for correctness by the respective interviewees.

26 "Platform is part of the Bosch organization" means that the platform is integrated into one of the established Bosch divisions.

27 "Lightweight organization within Bosch" means that the platform is located in an incubator or in a separate legal entity that allows for more autonomy but is still integrated into the Bosch organization.

28 "External organization with Bosch as a shareholder" means that the platform is largely independent of Bosch. Bosch acts as a shareholder with the associated rights and obligations.

alliance. The platform enables the uniform and standardized development of vision-related applications independent of the underlying camera devices. The Beta platform is mainly used in the field of building technology.

Gamma Traffic Hazard Platform. The two-sided Gamma platform is operated by Bosch's mobility division. Platform participants play a dual role as producers and receivers of traffic hazard data (similar to messenger networks). The platform aims to detect dangerous traffic hazards, such as wrong-way drivers. The more data providers on the platform, the better the detection of hazards and thus greater value for data receivers. The platform can be integrated by third-party vendors using software development kits, thus increasing the installed base. The platform targets car integration.

Delta Transportation Aggregator Platform. The two-sided Delta platform was established in a Bosch incubator and involved transportation service providers on one side and consumers wanting to book rides on the other side. The platform aimed to make several transportation modes available on a single platform, allowing users to book rides with multiple transportation service providers using a single application. Delta was shut down after an initial launch in Germany.

Epsilon Automotive Data Platform. The two-sided Epsilon platform operates as a separate business outside the Bosch Group, with Bosch both a shareholder and platform participant. On one side are car manufacturers that provide vehicle data, with an ecosystem of service developers that are mainly from the automotive aftermarket. Epsilon provides an entire billing and pricing infrastructure and unified data exchange. The platform is set up as an open alliance where participants can become shareholders. The Epsilon platform is mainly active in mobility (i.e., transportation) and adjacent domains.

Zeta Parking Platform. Zeta is a two-sided platform operating within the mobility division of Bosch and involves parking space providers and car manufacturers. The platform allows car drivers to automatically identify empty spaces in parking garages. Network effects take hold when more parking garages support it and more car manufacturers integrate Zeta into their vehicles. The platform started as an innovation project within the Bosch Group and was integrated into the mobility division as its business relevance increased.

Eta Commuting Platform. Eta began outside Bosch and was integrated into the Bosch Group as the platform matured. The platform enabled employees to share their car commute rides to work and thus involved ride providers and ride seekers who had similar working locations. The higher the number of ride providers, the higher the value for ride seekers and vice versa. The platform operated as an exploration project and was discontinued after an initial launch in Germany and the U.S.

Theta Multimodal Transportation Platform. The two-sided Theta platform was located within the mobility division of the Bosch Group. Theta provided recommendations for optimal routes by combining several means of transport (e.g., public transportation, bicycle, walking, carsharing). The more transportation providers there were on the platform, the more attractive it was to users. The Zeta platform had a modular structure and could be extended with additional functions—e.g., integration of payment. After an exploration phase, Bosch discontinued its involvement on the Theta platform.

The table on the previous page provides key information about the eight Bosch platforms we studied.

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