MIS Quarterly Executive

Volume 21 | Issue 1 Article 4

March 2022

Different Strategy Playbooks for Digital Platform Complementors

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To survive, major and minor digital platform complementors need different strategy playbooks, which comprise synergistic combinations of the three complementor strategies described in this article. Following these playbooks enables executives to develop and provide a thriving complement product on digital platforms.[1,2]

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Complementors Are Crucial for Digital Platform Success

Many digital platforms, such as Apple's iOS App Store, Google's YouTube video streaming and Valve's Steam video games portal, orchestrate multisided marketplaces. On the supply side, platform complementors offer add-on products and services that ensure the platform remains valuable for the users on the demand side. The involvement of complementors is crucial for the network effects on which digital platforms thrive.[3] In return, platform complementors gain access to a large, qualified market for their offerings, such as mobile applications on iOS, media content on YouTube or video games on Steam.

To increase their chances of survival, platform complementors need to outcompete other players while providing value to the platform operator. Complementors' success is determined by their contribution to the quantity (e.g., downloads, views or sales) and quality of transactions (e.g., in-app purchases, advertising impressions or in-app time) on the platform.[4] From our previous work on digital platforms in the video games industry (see Appendix A), we have identified three generic strategies that complementors can follow to generate and sustain transactions for a platform.[5] However, our research shows that the execution of these strategies varies by the type of complementor, which leads us to propose substantially different strategy playbooks (i.e., synergistic combinations of strategies) for different types of complementors.

In this article, we describe how complementors can identify and execute the strategy that best suits them. Our findings are derived from our observations of the video games industry—

1 Varun Grover and Kalle Lyytinen are the accepting senior editor for this article.

2 The authors thank the special issue editors, two anonymous reviewers as well as participants of the special issue paper development workshop for their constructive feedback on earlier versions of this article.

3 Network effects describe how a firm's offering becomes more attractive to users as the network of suppliers and users grows. For a comprehensive review of network effects in multisided digital platforms, see Gawer, A. "Bridging Differing Perspectives on Technological Platforms: Toward an Integrative Framework," *Research Policy* (43:7), September 2014.

4 Content growth is a key determinant of platform success and platform operators actively seek to influence the direction of content growth. For more information, see Hukal, P., Henfridsson, O., Shaikh, M. and Parker, G. "Platform Signaling for Generating Platform Content," *MIS Quarterly* (44:3), September 2020.

5 Note that in identifying these strategies we excluded observations from mobile gaming to clearly distinguish dynamics unique to video games from other industries, such as mobile app development.

DOI: 10.17705/2msqe.00056

currently worth about $160 billion. This industry is representative of many digital platform markets that rely on collaborative innovation between platform operators and third-party complementors;[6] therefore, the strategies described in this article are relevant across a range of platforms and industries, including media (e.g., Spotify and YouTube), software (e.g., iOS and SAP), and services (e.g., Airbnb and Uber).

Differences between Major and Minor Platform Complementors

Platform complementors differ in various respects, such as the timing of joining a platform,[7] their motivation for platform participation[8] and the quality of their products, ranging from professional to amateur.[9] Given these differences, it is not surprising that different types of complementors execute different strategies.[10]

The differences between complementors can be categorized according to their relative value added to a platform (e.g., in terms of sales, users, downloads, etc.). Plotting complementors' individual value contributions produces the well-known long-tail distribution shown in Figure 1,[11] with a small number of "major" complementors in the head of the distribution providing high levels of value, and a long tail of "minor" complementors providing more modest value contributions.

Major complementors dominate value metrics such as sales, downloads or monthly users. We refer to them as "major" because of the general popularity of their products or services and their association with (or ownership by) large corporations. Minor complementors in the tail of the distribution range from small-scale businesses to individuals developing products in their free time.

As well as differences in the types of products or services offered on platforms, major and minor complementors compete in different ways. For instance, major complementors on the popular video games platform, Steam, develop mainstream game titles and have a large market share. Minor complementors, however, often produce independent games for niche audiences and generate fewer sales. Compared to major complementors, minor complementors are typically characterized by limited development budgets and cater to small segments of the market.

The distinction between major and minor complementors is typical for many digital platforms, such as iOS and Spotify, where both professional and amateur providers compete for market share.[12] The near-zero marginal costs of replication and virtually limitless "shelf space" for offerings make digital platforms a fertile ground for various complementors that serve ever-smaller niche market segments, provided

6 Digital platforms and their complementors are intertwined, and research has shown that the complexity of a platform's architecture affects complementors' performance. See, for example, Cennamo, C., Ozalp, H. and Kretschmer, T. "Platform Architecture and Quality Tradeoffs of Multihoming Complements," *Information Systems Research* (29:2), January 2018.

7 Complementors decide to join platforms at different points depending on their own experience as well as the lifecycle of a technology, and these choices affect their performance. For discussions on timing decisions, see: 1) Rietveld, J. and Eggers, J. P. "Demand Heterogeneity in Platform Markets: Implications for Complementors," *Organization Science* (29:2), April 2018; and 2) Ozalp, H. and Kretschmer, T. "Follow the Crowd or Follow the Trailblazer? The Differential Role of Firm Experience in Product Entry Decisions in the US Video Game Industry," *Journal of Management Studies* (56:7), April 2018.

8 For an overview of the motives for participating on platforms, see Boudreau, K. and Lakhani, K. "How to Manage Outside Innovation," *Sloan Management Review* (50:4), June 2009.

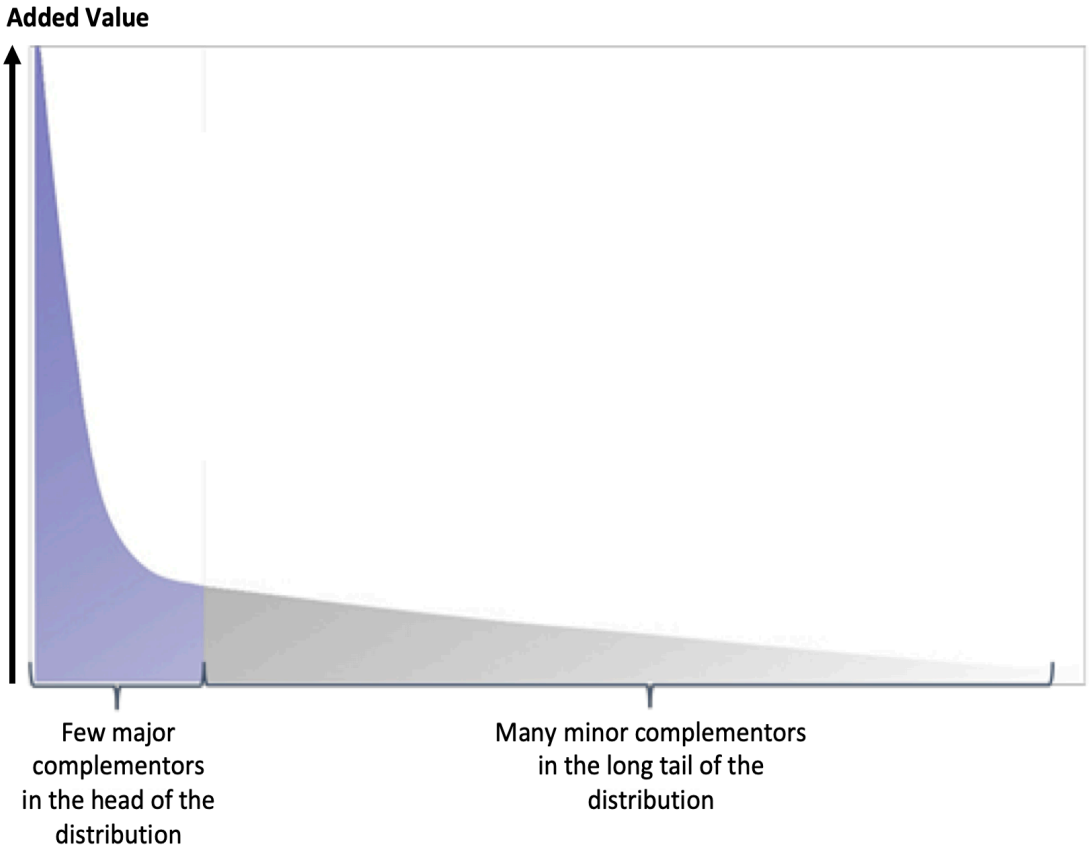
9 Research suggests that a delicate balance exists between the quality of complements and the expected pay-out. See Boudreau, K. J. Amateur, *Crowds & Professional Entrepreneurs as Platform Complementors*, National Bureau of Economic Research, Working Paper Series No. 24512, April 2018.

10 Researchers have observed that complementors use quality and reputation signals for their offerings to attract users to a platform. For an example from the Airbnb platform see, Wessel, M., Thies, F. and Benlian, A. "Competitive Positioning of Complementors on Digital Platforms: Evidence from the Sharing Economy," in *Proceedings of the International Conference on Information Systems: Transforming Society with Digital Innovation*, December 2017.

11 The long-tail steadily decreasing distribution shown in Figure 1 is derived from empirical observations on many platform markets. For a managerial perspective of this distribution, see Brynjolfsson, E., Hu, Y. J. and Smith, M. D. "From niches to riches: Anatomy of the long tail," *Sloan Management Review* (47:4), Summer 2006. For an academic study of the distribution, see Brynjolfsson, E., Hu, Y. J. and Simester, D. "Goodbye Pareto Principle, Hello Long Tail: The Effect of Search Costs on the Concentration of Product Sales," *Management Science* (57:8), August 2011.

12 The generic distinction between professional and niche (or amateur) providers applies to many "experience" offerings, both on digital platforms and offline, such as movies, music, art, etc. For instance, the market for movies can be divided into "blockbuster" and "independent" films based on their performance. For more information, see Eliashberg, J., Elberse, A. and Leenders, M. A. "The Motion Picture Industry: Critical Issues in Practice, Current Research, and New Research Directions," *Marketing Science* (25:6), November 2006.

Figure 1: Distribution of Major and Minor Complementors



their offerings generate some transactions on the platform.

Three Generic Strategies for Platform Complementors

In general, the strategies that platform complementors follow are similar, but executing these strategies varies depending on the complementors' relative positions along the long-tail distribution. The three generic complementor strategies we have identified are:

1. The *content discoverability* strategy, which focuses on a complementor's efforts to become visible and popular among users so it can exploit platform network effects.
2. The *selective modularization* strategy, where a complementor invests in technical features provided on the platform so it can gain market access and maintain competitiveness
3. The *asset fortification* strategy, where a complementor leverages unique resources to differentiate itself from competitors and manage its relationship with the platform operator.

Each strategy is described in detail below, illustrated by how major and minor complementors in the video games industry execute it, and how it is deployed in other industries. Both major and minor complementors will need to use a combination of the three strategies, as summarized in Table 1, which also gives a high-level view of the strategy playbook for each complementor type.

Content Discoverability Strategy

Because platform operators orchestrate a marketplace based on digital technology, they often use algorithms to decide which complementor receives visibility. These discovery

algorithms use metrics such as current and projected demand for complementors' offerings to decide when each one is visible and to whom. The goal of the content discoverability strategy for a complementor is to ensure that its offering is picked up by the platform owner's discovery algorithm and promoted as valuable "real estate" in the platform's marketplace.

This strategy exploits the network effects of digital platforms to increase the value capture from a complementor's offering. A complementor following the content discoverability strategy needs feedback loops from its existing network of users so it can reach out to potential new users. The more a complementor can play into this dynamic, the better it will fare on the platform because it will become more strongly aligned with the platform operator's strategy.[13] However, as described below, major and minor video game complementors have executed this strategy in different ways.

Execution of the Content Discoverability Strategy by Major Video Game Complementors. Major complementors have the resources to create offerings that capture large shares of the user base quickly, leading to a virtuous cycle where users help attract more users. Their superior resources enable them to engage in large-scale marketing efforts to promote their licensed content or strengthen their branding. Examples in the video games industry include players with valuable licensed assets such as FIFA, Call of Duty and Need for Speed. Such major complementors do not have to create new intellectual property (IP) from scratch. Instead, they have the resources to acquire or license IP, and manage existing portfolios of IP, all of which helps to strengthen their brand recognition.[14] Major video game complementors with successful titles can release sequels that are immediately attractive to the existing network of users. For instance, by producing a series of titles such as the yearly iteration of FIFA games, or mainstream game series such as Battlefield or Call of Duty, major video game complementors can leverage their existing IP portfolios. This approach increases the discoverability of major complementor products over the long term as users recognize and respect the brand.

Major video game complementors can rely on the large audience that is familiar with an earlier offering to increase initial demand for a new offering. Massively multiplayer online (MMO) games, for example, rely heavily on the existing large base of users to sustain momentum. Because immense resources are needed to develop, maintain and market such offerings, major complementors generally create and sustain networks of users for content that is easily discoverable on digital platforms. (More information on how a major video game complementor executed the content discovery strategy is described in the case vignette in Appendix B.)

In executing the content discoverability strategy, major complementors have the resources to carry out large-scale marketing efforts. For example, the 2009 marketing budget for the Modern Warfare 2 edition of the Call of Duty action game franchise was approximately $200 million.[15] Marketing activities include coverage in media outlets and engaging with the public at large industry conferences such as E3 and with key influencers on complementary platforms such as YouTube and Twitch through sponsored content.

Major complementors can also jointly participate in large-scale promotions with the platform aimed at directly enhancing the discoverability of their content. For example, major video game complementors often offer users temporary free access to one or more of their recent games on Steam ("Steam Free Weekend"), with the offer visibly highlighted on the platform. This approach to mainstream marketing allows the products of major

13 Researchers have found that platform complementors seek "endorsements" or certification from platform operators to gain visibility. For more information, see Rietveld, J., Schilling, M. A. and Bellavitis, C. "Platform Strategy: Managing Ecosystem Value Through Selective Promotion of Complements," *Organization Science* (30:6), September 2019.

14 Note that major video game complementors would prefer—if possible—to have self-owned IP (e.g., Call of Duty) rather than licensed IP (e.g., FIFA), because licensed IP reduces their profit margins. For an in-depth study of what drives creativity and complement design choices in the video games industry, see Tschang, F. T. "Balancing the Tensions Between Rationalization and Creativity in the Video Games Industry," *Organization Science*, 18(6), November 2007.

15 Fritz B. "Video Game Borrows Page from Hollywood Playbook," *Los Angeles Times*, November 18, 2009, available at https://www.latimes.com/archives/la-xpm-2009-nov-18-fi-ct-duty18-story.html.

Table 1: Summary of Strategy Playbooks for Major and Minor Complementors

	Strategy Playbook Summary	Content Discoverability Strategy	Selective Modularization Strategy	Asset Fortification Strategy
Major Complementors	Asset fortification is the base for competitiveness. Selective modularization and content discoverability then create synergistic effects with unique features and resources.	Leverage products through large-scale marketing efforts.	Invest in all available platform features to keep up with the competition.	Build and protect unique resources to differentiate and balance exclusivity on one platform and multihome across multiple platforms.
Minor Complementors	Limited resources determine complementor strategies; creating synergistic effects requires trade-offs between content discoverability, selective modularization and asset fortification.	Gather grassroots support to gain visibility on the platform.	Invest in selected go-to-market features.	Build and protect unique resources to define and compete in niche markets on one or multiple platforms.

complementors to be discovered while the link to popular and well-known offerings ensures that existing audiences remain locked-in across product generations.

Execution of the Content Discoverability Strategy by Minor Video Game Complementors. When executing the content discoverability strategy, minor video game complementors have significantly fewer resources available than major complementors. Minor complementors therefore cannot match the effort that major complementors put into developing and marketing products. Moreover, they have to rely on a different set of tactical actions to make their content visible on platforms, grow the user base for their offerings and exploit network effects. Their main tactic is to gather grassroots support to grow a niche audience, in the expectation that this will lead to the serendipitous yet organic discovery of their product through the demand side of a platform.

To promote discovery, minor complementors often engage with the gaming community on social media ahead of their product launches, with "fan art"[16] and feedback on feature requests being incorporated into their offerings. Once their products have been launched, these actions will help the products to become more visible via the platforms' discovery algorithms. For example, minor independent game developers make use of the "early access" programs on Steam and other digital platforms, which allows them to provide beta versions of their games prior to official launch. This allows minor complementors to continuously collect feature requests by early adopters of the beta version of the product, and to build an early fanbase ahead of the official release. Independent game developers also coordinate social media campaigns, have potential users on community discussion boards sign up to so-called "wishlists"[17] and design their Steam pages to leverage followers through the existing network on the platform.

All these actions promote grassroots activity to make minor complementors' content discoverable. A good example is provided by David Wehle, the sole developer of the popular independent game The First Tree (for more information, see The First Tree case vignette in Appendix B). He used social media and organic user demand to test designs, gauge desirability of features and drum up demand to gain

16 In the context of video games "fan art" is artwork created by users in the form of writings or visuals that is inspired by elements of specific game titles such as characters, objects, scenes, etc.

17 Wishlists allows users to add games to a list of titles to purchase on their Steam account. Steam uses wishlist data as one of the factors in its discovery algorithm.

favorable rankings in the discovery algorithms deployed on Steam—all of which helped to market the game.[18] Independent developers can also benefit when their games are picked up by influencers on Twitch and YouTube. The now popular game Among Us took off two years after its release thanks to influencers starting to play the game together. In summary, by leveraging the grassroots community—for example, via social media—minor games complementors can increase the discoverability of their products as the algorithmically managed "front shelf" and advertising on the focal platform makes their offerings more visible.

Execution of the Content Discoverability Strategy in Other Industries. The content discoverability strategy is also important in many other types of digital platforms. For example, complementors on the Spotify music streaming service benefit from the visibility that results from their songs being featured in the playlists created by the discovery algorithm.[19] There will be a significant boost in downloads if an emerging artist is included in recommended playlists or appears in the "editor's pick" on iOS apps.

Other important factors for the survival of complementors are platform promotion, curation and certification efforts, which is why minor complementors tend to align themselves with the platform owner's actions. For example, a 2021 study[20] found that when the Kiva microlending platform certified its complementors to make them more discoverable, the complementors reoriented their product portfolios in line with the platform's certification and, as a consequence, benefited from increased demand.

Selective Modularization Strategy

The goal of the selective modularization strategy is to implement technical features that provide a complementor with the basis for competitiveness. Modularized software code allows platform operators to compartmentalize functionality into discrete components and make them available to complementors via standardized, stable interfaces. Platform operators—and sanctioned third parties—often use such capabilities to provide technical features to enable optional integration of complementor products.[21] This strategy therefore leverages the modular software architecture implemented on digital platforms.

Studies on the effect of modular platform features show that executing the selective modularization strategy increases sales for video game complementors (see Appendix A). But the variance in performance of different games suggests that, while these features are necessary, they are not sufficient for success. Though the features enable complementors to compete on the platform, they do not guarantee that they will succeed.

The selective modularization strategy is prevalent in the video games industry. For example, Valve (the operator of Steam) has released a slew of platform features over the years, including technical components for plug-and-play integration such as "achievements," "trading cards," "discussion boards" and "user generated content," all of which are aimed at streamlining the user experience by providing and standardizing nondifferentiating functionality.

This strategy can also be adopted in the video games industry by third parties that collaborate with platform operators to provide modularized packages. These so-called "middleware" infrastructure components allow games to be built on top of the provided tools rather than building them from scratch. Examples include the Unreal game engine, a comprehensive game development solution providing graphics and game logic, and the Havok physics engine,[22] which allows game developers to directly implement real-world simulations without undertaking the complex programming required

18 Listen to Wehle D. "No Time, No Budget, No Problem: Finishing The First Tree," *Game Developer Conference*, March 18-22, 2019, available at https://www.youtube.com/watch?v=g5f7yixtQPc.

19 Aguiar, L. and Waldfogel, J. *Platforms, Promotion, and Product Discovery: Evidence from Spotify Playlists*, National Bureau of Economic Research Working Paper No. w24713, June 2018, available at https://ssrn.com/abstract=3198015.

20 Rietveld, J., Seamans, R. and Meggiorin, K. "Market Orchestrators: The Effects of Certification on Platforms and Their Complementors," *Strategy Science* (6:3), August 2021.

21 Modularization is commonplace in the video games industry. See, for example, Kanat, I. E. and Hukal, P. "Integration of Platform Features and Intra-Platform Competition: A Study in the Video Game Industry," *Academy of Management Annual Meeting Proceedings 2020(1):13751*, August 2020.

22 A physics engine is computer software that provides an approximate simulation of certain physical systems, such as rigid body dynamics (including collision detection), soft body dynamics and fluid dynamics, for use in the domains of computer graphics, video games and film (CGI).

for such features.[23] Both of these engines enable game developers to mix and match various modularized software tools to seek performance gains. However major and minor video game complementors differ in how they select technical features for integration in their products.

Execution of the Selective Modularization Strategy by Major Games Complementors. Major games complementors are early adopters of nearly all technical integration features provided on platforms. However, the advantage gained from early adoption diminishes over time as know-how disseminates across the industry and technical platform features become part of infrastructure components (such as the Unreal and Havok game engines). As a result, these features become the de facto standard for game developers seeking to produce mainstream titles. To keep up with competitors, major video game complementors need to constantly dedicate substantial resources so they can implement all applicable features quickly. This is particularly important for major complementors in the head of the long-tail distribution because users expect a high-end game to provide all the latest compatibility features on a given platform.

Thus, integrating platform features is a necessary—but not sufficient—condition for major complementors to stay competitive,[24] as illustrated by our observation of the use of middleware in game development. Historically, major video game complementors invested in their in-house technologies to develop specialized and cutting-edge technical assets when compared to off-the-shelf game engines. Where they did adopt components from off-the-shelf solutions, they usually made significant enhancements or customizations (e.g., additional visual effects) to ensure their offerings were at the top of the competition (for more information, see the Call of Duty case vignette in Appendix B). This observation shows that competition between major complementors in the head of the distribution (see Figure 1) is so intense that competitive differentiation requires further investment in specialized resources above and beyond what is available on any given platform. Nevertheless, major complementors do need to implement the available platform features; not doing so would jeopardize their standing relative to other top complementors.

Execution of the Selective Modularization Strategy by Minor Games Complementors. Ready-made platform integration features enable minor video game complementors in the long tail of distribution shown in Figure 1 to reduce development effort and thus quickly bring their products to market and signal compatibility to operators and users. However, because these complementors have substantial resource constraints, they need to make conscious decisions on which platform integration features to prioritize. For example, independent game developers complement their limited resources by using game engines and other middleware to differentiate their products, rather than trying to develop everything from scratch themselves. Even more importantly, these middleware components enable them to enter the market for complements in the first place because they drastically reduce the costs and barriers of technical development (see The First Tree case vignette in Appendix B). Being able to signal that a little-known product meets the quality expectations of both the platform operator and users is valuable to independent developers.

On the other hand, some generic platform features might undermine a minor complementor's unique selling point and reduce its ability to differentiate the user experience of a gaming application in terms of design and look and feel. Thus, to create value from the selective modularization strategy, minor complementors must carefully choose those platform features that enhance their base offerings and help them compete successfully in their chosen niches.

Execution of the Selective Modularization Strategy in Other Industries. Selective modularization has been deployed in other industries, such as mobile application platforms, where developers integrate technical features provided by the platform operator to make

23 For more information, see Miric, M., Ozalp, H. and Yilmaz, E. D. *Tradeoffs to Using Standardized Tools: An Innovation Enabler or Creativity Constraint?*, USC Marshall School of Business Research Paper Series, June 2021, available at https://ssrn.com/abstract=3358801.

24 Though such investments are needed to remain competitive on a platform, they rarely provide differentiation. Researchers refer to this dynamic as "red queen" competition—a dynamic where organizations, markets or technologies "must evolve progressively faster just to keep up." For more information, see Agarwal, R. and Tiwana, A. "Editorial—Evolvable Systems: Through the Looking Glass of IS," *Information Systems Research* (26:3), September 2015.

sure that their apps are more specific to that platform.[25] For example, some mobile phone iOS apps align with native iOS or MacOS features such as TouchID, share via AirDrop and AppleMaps. As with our work in the video games industry, this observation shows that, though such synergistic specificity increases the value of a complementor's product for users, it does not guarantee financial success on a platform.

Asset Fortification Strategy

The goal of the asset fortification strategy is for complementors to build up and leverage unique resources that differentiate them from the competition and create exclusivity that they can use to balance the relationship with the platform operator. In the video games industry, examples of differentiating assets mostly come in the form of recognizable product features such as a unique art style, innovative gameplay elements or protected IP (for example, Star Wars franchise licenses).

Asset fortification enables complementors to create specific product features and protect unique resources to strengthen their positions vis-à-vis both competitors and the platform operator. Successfully executing this strategy will ensure that a complementor's product is unique and protected because it cannot easily be substituted. Complementors adopting this strategy can signal to the platform operator that retaining them is beneficial because demand for their products is linked to demand for the platform itself. An example of asset fortification is a popular video game that entices users to invest in a specific video games console, which will help to lock users into the operator's platform. Moreover, a complementor with a non-substitutable product resulting from asset fortification may gain sufficient traction and become sufficiently powerful to spin-off and start its own platform.

Execution of the Asset Fortification Strategy by Major Video Game Complementors. For major video game complementors, differentiation is ensured through the long-term exploitation of strong games portfolios (with protected IP). Even when a new game is launched, it is often done within the confines of well-defined genres and predictable technologies. The business imperative for multi-million-dollar development budgets pushes major complementors to act conservatively when it comes to innovation and experimentation.[26] Investors prefer to limit their risk by backing incremental changes to previously successful products.

Successful execution of the asset fortification strategy can result in an exclusive deal with the platform operator. With a successful and unique product, a complementor can benefit by gaining preferential treatment from the platform operator, even though this will mean foregoing potential profits and increased network size from "multihoming" (i.e., being available on other platforms). Deciding on whether to enter into an exclusive deal thus requires a complementor to make a trade-off between increased up-front benefits from a single platform against the benefits of being available on several platforms.

In the past decade, this trade-off has favored exclusivity over multihoming as a way for complementors to differentiate themselves, but the balance is now tilting in favor of multihoming. Examples in the gaming industry include the Metal Gear Solid and Final Fantasy series which used to be exclusive titles for the Sony PlayStation 1 and PlayStation 2 platforms. The major complementors were treated preferentially by Sony, the platform operator, in terms of early investments, development support, advertisements and product bundles. Increasingly, however, the industry has opened new opportunities by enabling compatibility, allowing major video game complementors to offer their products across platforms.

An extreme outcome of successful asset fortification and the resulting uniqueness of a complementor product is the complementor spinning off and creating its own platform. A good example from the video games industry is the case of Epic Games' popular title Fortnite. Fortnite was initially offered on the Apple App Store and the Google Play Store, but was removed from both platforms, and also from Steam and the iOS App Store, because of disputes about the share of in-app purchases with platform operators. Instead, Epic Games used the massive player base of Fortnite to launch its own platform, Epic Games

25 Tiwana, A. "Platform Synergy: Architectural Origins and Competitive Consequences," *Information Systems Research* (29:4), November 2018.

26 For details, see Tschang, F. T., op. cit., November 2007.

Store. This has caused lasting friction between Epic Games and platform operators. Fortnite now operates on Epic's own standalone platform (though it is occasionally available on other platforms).

Execution of the Asset Fortification Strategy by Minor Video Game Complementors. To successfully compete, minor video game complementors need to find a way to leverage their limited resources in a way that enables them to increase their performance in their chosen niche while also protecting their position. As a result, a great deal of the innovation in the video games industry is driven by minor complementors through their nimble use of limited resources. Despite the prevalence of copycats in the gaming market, substantial innovations in gameplay and storytelling have been pushed forward by independent development studios that populate the long tail of the distribution shown in Figure 1.

Following the asset fortification strategy can also help a minor video games complementor to strike an exclusivity deal for its independent titles. Though such deals are not commonplace, they provide resource-constrained developers with the breathing room to deliver high-quality games. The Cuphead game, for example, was awarded a time-limited exclusive deal for the Microsoft Xbox platform, partly because of its unique and innovative art style and design, which a major complementor would likely not have undertaken. This investment by Microsoft allowed Cuphead developers to evolve the game and create a higher-quality product than they otherwise would have done. In 2020, three years after the initial launch, Cuphead was released on the competing PlayStation platform—and is even offered as a game that can be played on the dashboard screen of Tesla cars.

Even with exclusivity deals, minor video game complementors are unlikely to have the resources to launch their own platforms. Instead, they should seek to exploit the resources that allow them to perform well in a market niche on one platform to serve the same niche segment on other platforms. Some of the most memorable independent games (e.g., Braid, Bastion, The First Tree, Undertale) of the last decade had hard-to-copy art styles or soundtracks underpinning their gameplay. Often, minor complementors will leverage their success and leapfrog to other platforms. Platform operators carefully curate content on their platforms, so it is hard for minor complementors to stand out from others in the crowded long tail. Minor complementors therefore often use success on one platform to signal quality as a trigger for moving laterally to the same segment on another platform. For example, PanicBarn used the success of its Not Tonight game on Valve's Steam platform to gain access to Nintendo's Switch.

Execution of the Asset Fortification Strategy in Other Industries. The asset fortification strategy is prevalent in industries where complementor offerings cannot be substituted easily across platforms and thus the complementor products available to customers are determined by the platforms they choose to use. Prime examples are streaming platforms that compete via the quality of their complementors' offerings, such as shows on HBO or Netflix.

As in the video games industry, asset fortification can result in complementor offerings that are unique enough to warrant the complementor spinning off its own platform. For example, Disney Studies used to be a complementor, providing its unique and IP-protected content on Netflix. These assets were eventually leveraged by Disney to launch its own platform, Disney+, which enabled it to vertically integrate and gain downstream control over distribution and customer interaction. Another example, from the media streaming industry, concerns R&B star Beyoncé, whose most recent tracks have been removed from music streaming platforms such as Spotify and are now exclusive to the newly spun-off platform, Tidal. Because Beyoncé could not be substituted as a complementor to streaming platforms, her popularity allowed her to break away from existing operators and distribute her content exclusively via a newly formed competitor.

Conversely, powerful complementors can leverage their exclusivity to manage the relationship with platform operators. A recent example is the well-known podcast "The Joe Rogan Experience" (a long-form audio talk show), which stopped distributing the shows via YouTube and its own website and signed a lucrative exclusive agreement with Spotify.

Many minor complementors in other industries have successfully executed the asset fortification strategy to create unique resources, enabling them to protect a niche that is unattractive to the operator or a major complementor.[27] This eventually allows minor complementors to leverage similar resources and use their protected assets to compete in the same segment on other platforms. For instance, once merchants on Amazon have secured a niche market, they can consider moving to a specialized web shop or a dedicated platform such as Etsy, or spinning-off their own independent store (for example through Shopify). Similar business dynamics can be seen in smartphone app platforms. A minor complementor releases an initial version of its app on one platform (e.g., Android), gains traction in its niche market and then leapfrogs and competes in the same niche on a different platform (e.g., iOS).

Summary of Complementor Strategies

The three complementor strategies described above and the way in which they have been executed by major and minor complementors are summarized in Table 2.

Strategy Playbooks for Major and Minor Complementors

In our studies of the video games industry, we have found that both major and minor complementors use a combination of content discoverability, selective modularization and asset fortification strategies, usually engaging in more than one strategy simultaneously or sequentially. However, it is important to recognize that some combinations are synergistic, while others may require trade-offs to be made. For example, a complementor leveraging an exclusivity deal through unique IP resources (i.e., following the asset fortification strategy) necessarily forgoes some of the benefits it can derive from brand recognition of its IP on other platforms (the content discoverability strategy). Similarly, a complementor adopting the middleware technology offered only on one platform (selective modularization strategy) may find it difficult to switch platforms because the complementor will need to find a substitute technology or create it from scratch. Following the selective modularization strategy may therefore limit the ability to capitalize on network effects from cross-platform activity (content discoverability).

Below, we describe the synergies that can be gained from the different combinations of strategies, highlighting the differences for major and minor complementors. These synergistic combinations form the strategy playbooks for both types of complementor.

1. Content Discoverability Synergies

The effectiveness of a content discoverability strategy is often weakened by the presence or absence of unique technical features in a major or minor complementor's product that allows the offering to be perceived as desirable when leveraging the platform's installed base. Both major and minor complementors engage in similar activities when combining content discoverability with other strategies to create synergies (e.g., playtesting,[28] providing beta versions, etc.). Yet, this similarity is superficial: major complementors thrive on asset fortification because they optimize around the edges of an industrial product while retaining proven content; minor complementors need to adopt selective modularization so they can focus their activity on changing the content of their complements while minimizing the technical implementation effort.

Content Discoverability Synergies for Major Complementors. We observed that the defining characteristic of the content discoverability strategy for major video game complementors is massive marketing campaigns aimed at leveraging familiar IPs in the form of brand, licenses or technical innovations. Intensive marketing makes complementor content more recognizable in the eyes of users and, in turn, incentivizes the platform operator to reward highly recognizable complementor products with visibility—for example, via the discovery algorithm or through promotions on the platform.

27 Merchants in different segments are under threat if their segment is growing and profitable relative to the small investment required to compete in that segment, which has substantial implications for complementors. For more information, see Zhu, F. and Liu, Q. "Competing with Complementors: An Empirical Look at Amazon.com," *Strategic Management Journal* (39:10), July 2018.

28 A playtest is the process by which a game designer tests a new game for bugs and design flaws before releasing it to market.

Table 2: Overview of Complementor Strategies

Strategy	Goal	Implementation by Complementor Type
Content Discoverability	Create critical mass for complementor products to exploit platform network effects.	*Major Complementor:* Leverage the familiarity of mainstream offers paired with large-scale marketing efforts *Minor Complementor:* Gather grassroots support to grow demand organically
Selective Modularization	Implement critical technology components for competitiveness.	*Major Complementor:* Use all available platform features to stay on par with the competition *Minor Complementor:* Select specific platform features for quality and fast market entry
Asset Fortification	Leverage unique resources and balance the relationship with the platform operator.	*Major Complementor:* Build and protect resources to balance exclusivity and multihoming *Minor Complementor:* Build and protect resources to compete in niche segments and leapfrog to other platforms

Major complementors can further benefit by providing users with opportunities for unique experiences of, and priority access to, their complements—i.e., by combining the content discoverability and asset fortification strategies. For example, major video game complementors use beta tests to drive both content discoverability and boost asset fortification. Providing users with early experience of the beta version of an upcoming complement and collecting their feedback helps the complementor to perfect the product without harming its image as a cutting-edge provider. When the product is officially launched, it should not only be bug-free, but there will likely be a high number of preorders as a result of the complementor's marketing efforts. (For an example of this type of synergy, see the Call of Duty case vignette in Appendix B.)

Content Discoverability Synergies for Minor Complementors. Minor complementors can leverage product developments by executing the content discoverability strategy in combination with selective modularization. If a minor complementor engages successfully with a community of involved users, grassroots support can go beyond providing an initial demand boost on a given platform. The synergies from combining these two strategies arise because the complementor can receive detailed information that informs the next strategic steps (e.g., through feature requests, bug reports, user feedback, etc.). This input can, for example, help the complementor select ready-made modular components for integration that it would not have otherwise considered. To combine the content discoverability and selective modularization strategies, minor complementors should therefore seek out information flows that link demand in their products to further developments.

2. Selective Modularization Synergies

Major and minor complementors gain different benefits from selective modularization. Major complementors combine selective modularization with other strategies to create further differentiation, whereas the survival of minor complementors is highly dependent on selective modularization. Minor complementors' offerings are built by mixing and matching existing platform components, and in deciding which components to use, they need to make trade-offs to avoid certain features undermining the uniqueness of their products.

Selective Modularization Synergies for Major Complementors. For major complementors, differentiation not only comes from integrating widely available technical platform features but is often achieved by creating distinctive product features. These features can take the form of unique resources used in the development or maintenance of

the complementor's product or the unique positioning of the product (e.g., IP, franchises, exclusivity, etc.). Major complementors should therefore combine selective modularization with asset fortification. This approach allows the complementor to deliver all nondifferentiating features of a product—wholly or in parts—by using standardized components and with the support of the platform operator or third parties. However, to truly differentiate its offerings, a major complementor needs to identify and defend unique resources above and beyond off-the-shelf features. For example, cutting-edge technology developments or IP portfolios (brand, licenses, franchises) provide opportunities to bundle off-the-shelf and bespoke resources. (For an example of how a major video games complementor successfully adopted this approach, see the Call of Duty case vignette in Appendix B).

Selective Modularization Synergies for Minor Complementors. Minor complementors must carefully select those features that reduce development effort and shorten the time to market, while also avoiding undermining the uniqueness of their offerings that define their niche and enables them to compete in it. The choice of which features to integrate is fundamental for the success of minor complementors; thus, their initial choice of platform should carefully consider the availability of features needed for a timely launch of their offerings. Moreover, the time and budget constraints of minor complementors mean they need to select beneficial features while also allowing for meaningful asset fortification by building unique resources on the chosen platform. This implies that minor complementors need a different combination of selective modularization and asset fortification compared to major complementors. The latter have mostly a synergistic relationship between these two strategies, whereas minor complementors must manage the potential trade-offs between these two strategies to have a truly synergistic outcome.

3. Asset Fortification Synergies

Asset Fortification generally supplements the other two complementor strategies. For instance, while selective modularization enables complementors to obtain a position that allows them to compete, only the successful protection of unique resources and features will truly differentiate them from competitors. Similarly, signaling that it has a unique resource that either allows it to operate at scale (major complementor) or cater to otherwise ignored niches (minor complementor) is an important tactic for making content more discoverable by respective audiences, thus enabling the content discoverability strategy.

Asset Fortification Synergies for Major Complementors. It is important to note that there is a crucial difference between major and minor complementors in their engagement with the asset fortification strategy. To remain competitive, major complementors must leverage their resource base for meaningful differentiation in the quality of their product. Without differentiation, even top complementors are vulnerable to imitation by other deep-pocketed competitors. Thus, asset fortification forms the backbone of the strategy playbooks of major complementors.

As described above, one important source of competitive strength for major complementors is their IP, which is bundled into a portfolio of differentiating resources easily recognized by users. In many industries, a mainstream complementor product—be it a game, a movie or a software application—will not remain successful in the long term without asset fortification. A natural result of successfully executing the asset fortification strategy is that it boosts content discoverability, because users familiar with a stand-out mainstream complementor product will seek out additional offerings from that complementor without a prompt.

Asset Fortification Synergies for Minor Complementors. To stand out from the packed long tail of complementors, minor complementors need to focus on innovation. Success depends on them deploying their limited resources on efforts that 1) cater to a well-defined segment, and 2) carve out a segment that is small enough to not be of primary interest to major complementors. If a minor complementor has clear lines of communication with a well-defined niche of platform users, asset fortification can boost its content discoverability efforts. In particular, grassroots discoverability

will likely snowball (through word of mouth, recommendations and even via influencers) if the complementor's product has unique features that are valued by users but not available in the mainstream. Eventually, strong demand for a minor complementor's offering may result in the platform itself boosting content discoverability—for example, by the discovery algorithm highlighting the offering or through the platform operator's promotion campaigns.

Concluding Comments

All complementors on digital platforms strive for the same goal: using market access on a platform to create many high-quality transactions. However, there is a wide range of platform complementors, from a small number of major players with extensive resources to one-man bands. This creates the long-tail distribution, where a small percentage of complementors command a large share of the market while the vast majority of complementors cater to niches in the remaining market. As a consequence, their paths to achieving the common goal differ widely.

In this article, we have highlighted the unique dynamics of digital platforms beyond their multisidedness. The use of digital technology—discovery algorithms, application programming interfaces (APIs) and modularized platform features to name but three—fundamentally impacts the interaction between a complementor and a platform.

We have also described the three generic strategies that complementors can adopt to ensure their survival (content discoverability, selective modularization and asset fortification). These strategies are used in combination, resulting in different playbooks for major and minor complementors. To create the optimum strategy playbook, organizations and individuals that develop and provide complementor offerings need to understand the unique nature of the target platform in terms of 1) other competing complements, 2) the characteristics and segmentation of the demand, and 3) the role of digital technology for the platform operator.

Appendix A: Data and Evidence

The table below summarizes the data collected and evidence generated through our work on digital platforms in the video games industry. Collectively, these past studies have informed the derivation of the complementor strategies described in this article and their varying implementations by major and minor complementors.

Appendix B: Case Vignettes

Case vignettes of a major complementor and a minor complementor, both from the video games industry, are presented below.

Major Complementor Vignette: Activision's Call of Duty

Call of Duty: Black Ops III is the 2015 installment of a series of mainstream video games developed for Activision (publisher) by development studio Treyarch. Treyarch is one of several studios Activision owns and commissions for Call of Duty games. In its first three days on the market, Call of Duty: Black Ops III generated $500 million in revenues. This product illustrates how major complementors execute the three complementor strategies.

Content Discoverability. Activision carefully planned the campaign leading to the launch of Call of Duty: Black Ops III. For an earlier game of the series, Activision spent $50 million on development and $200 million on marketing. Ads for Call of Duty air on mainstream TV, even as Superbowl commercials. Activision's dominant position in the industry means it is given preferential access to games media and journalists, which it uses to create a demand pull. This pull is strengthened for mainstream titles such as the Call of Duty franchise because of the strong brand recognition. Another strong driver of content discoverability was the one-week beta test held three months before the official release. The heavy advertising spending and the beta test created immense visibility on game publishing platforms and ensured high demand when Call of Duty: Black Ops III was launched, which was reinforced by the platform operator generating more transactions by promoting this well-known game series to as many users as possible.

Selective Modularization. Activision regularly implements all applicable technical platform features. But because this alone does not ensure differentiation, it uses a heavily modified—and constantly updated—version of

Table 2: Overview of Complementor Strategies

Study	Focus	Data	Finding
Kanat, Hong, Gu and Raghu (2017)[29]	Add-on content and user engagement on digital platforms	In-game usage data on 7,323 video game titles on Steam from 2015 to 2016.	Complementors can leverage add-on content (user and developer generated) to gain an advantage over competitors. Combining product features with add-on content enables unique strategies.
Kanat, Raghu and Vinze (2020)[30]	Network effects in the long-tail market for digital goods	Sales data from 8,000 game developers of 1,975 video games on Steam.	Niche complementors stand to gain more from network effects, but product features that rely solely on network effects (i.e., large-scale multiplayer games) remain a risky bet for niche complementors.
Kanat and Hukal (2020)[31]	Platform complementors integrating optional technical features on platforms	Sales data for 2,946 newly released games on Steam from 2015 to 2018 across major and minor developers	Both major and minor complementors boost their sales performance when integrating platform features, but these effects differ in intensity over time by the type of complementor.
Ozalp and Kretschmer (2019)[32]	Effects of internal and external factors on choice of niche market for a developer's game	Data on 3,802 video game releases for PCs in the U.S. market from 1991 to 2010.	Complementors' previous experience in a market segment is important in their product release decisions. Experience helps a complementor to quickly follow up a competitor's product in a segment, as well as to "filter out" noisy information.
Cennamo, Ozalp and Kretschmer (2018)[33]	Quality outcomes for multihoming complements across architecturally different platforms	Data on 790 video game releases for 7th generation consoles (Xbox 360, PlayStation 3, Wii) in the U.S. from 2005 to 2009.	Complementors face trade-offs when multihoming (i.e., offering their product across platforms). Multihoming games can underperform on a technologically more complex platform due to insufficient co-specialization needed for a complex architecture.
Miric, Ozalp and Yilmaz (2021)[34]	Effect of the use of third-party middleware in game development on the success and novelty of the game	Data on 1,112 video game releases in the U.S. for Xbox, Xbox 360, PlayStation 2 and PlayStation 3 from 2000 to 2007	Games developed using third-party middleware are associated with higher market success, but success is mostly not due to novelty, but more to middleware's benefit in go-to-market activities.

id Software's idTech 3 Engine, called "IW engine." This engine enables the development of games that go beyond the necessary conditions to compete in the top end of the market. It provides developers with customizable features for creating new functionality, as well as the ability to alter key technical resources (3D objects, sound, filters, etc.). In turn, this use of selective modularization enables Activision to execute the asset fortification strategy.

Asset Fortification. The Call of Duty series consists of 18 games for PC and video game consoles in the main franchise and about 12 more for mobile and handheld devices. Over time, this has led to Activision developing unique IP resources, which it manages by commissioning multiple development studios to work on sub-franchises simultaneously. As the IP-holder, Activision orchestrated the development of new games by mixing and matching features that retain the look and feel of the game. In addition,

these efforts are combined with adjacent activities, such as the graphic novels that take place in the Call of Duty "universe," and are aimed at increasing brand recognition of the IP (i.e., asset fortification), which in turn reinforces content discoverability for future titles.

Minor Complementor Vignette: David Wehle's The First Tree[35]

David Wehle developed The First Tree game in his spare time, working nights and weekends over an 18-month period while also holding down a full-time job. The total development cost was just $10,000. The game went on to earn accolades and was even featured in the Smithsonian Museum. The actions taken by David Wehle illustrate how minor complementors execute the three complementor strategies.

Content Discoverability. David posted regular updates on social media to create a community interested in the game. He credits his success to a post on the Reddit internet user forum on launch day that was seen by three million people. Prior to launch, he also reached out to journalists and streamers to engage them with his game early on. At launch, David carried out what he calls a "social media blitz," with the aim of driving traffic to his Steam store page. All of these efforts were designed to enhance the performance of the game at launch, to ensure that Steam's discovery algorithm featured The First Tree and to gain visibility on the platform's front page.

Selective Modularization. David Wehle says he adopted "low-time/high-impact" strategies. Because of the resource limitations that an independent developer has, he recommends using existing resources (3D models, sound, music) as much as possible. He also emphasizes the need to be selective in choosing which platform features to use, noting that using integration features "like trading cards" has been a cause of failure in past projects.

Asset Fortification. As a technical artist, David was able to take existing artwork resources and modify them for his own purposes. Though he used licensed works that were available to everyone, he always modified the artwork to create a unique style. He notes that the unique art style of The First Tree enabled him to attract a lot of attention as part of his content discoverability efforts.

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