"BRINGING YOUR VISION TO LIFE": PRODUCTION PLATFORMS AND INDUSTRY UNITY

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Introduction
Every day, thousands of software applications or apps are developed to create immersive experiences. Distributed via the app stores of Google, Apple, Tencent, and Samsung, immersive apps include games, but also architectural walkthroughs, film animations, and automotive simulations. Thus far, research on apps has predominantly focused on app distribution platforms, platform governance, app usage, and 'culture in the age of apps' (Morris & Murray, 2018). Less attention has been paid to a new class of digital platforms that operate business models oriented towards professionals instead of end-users and function as 'platform tools' (Foxman, 2019; Nicoll & Keogh, 2019). One of the dominant platforms tools is Unity by Unity Technologies. What began as a game engine to 'democratize game development' (Unity, 2010) has expanded into a pan-industry platform 'bringing your vision to life' (Unity, 2020). Similar to Adobe's Creative Suite and Microsoft's Office, Unity has emerged as the go-to software suite that provides an all-in-one set of tools, art assets, business analytics, and marketing support. Today, the real-time animation platform has been adopted by hundreds of thousands of developers and designers around the globe in growing segments of the cultural industries and far beyond.

For this paper our aim is to contribute to the debate on the 'platformization of cultural production' by examining the penetration of Unity's economic, infrastructural, and governance extensions beyond its platform boundaries (Nieborg & Poell, 2018). We argue Unity has become the de facto default for the development of apps thereby impacting the production and circulation of immersive content. To explore the impact of Unity's role in the wider process of platformization we draw on an archive of corporate documentation and promotional material, news coverage, and industry data, totaling 1,892 documents. This allows us to situate the platform within Unity Technologies' culture and business strategies, which enrolls and keeps developers 'tethered' to its proprietary platform (Zittrain, 2008). Our analysis signals a broader shift in the cultural production of apps where a small group of *production platforms* shape the production, distribution, and circulation of real-time animation products.

This paper takes place against the background of a wider debate about the political economy of platforms, digital labor, and content creation and distribution. In his survey of the political economy of 'platform capitalism', Nick Srnicek (2017, 6) argues that platforms 'emerged as a new business model, capable of extracting and controlling immense amounts of data, and with this shift we have seen the rise of large monopolistic firms.' Digital platforms have situated themselves as intermediaries that bring together end-users, advertisers, service providers, producers, suppliers, and physical objects. Simply put, platforms have invested in large-scale infrastructures to monopolize the markets for cultural production. This allows platform owners and operators to accumulate profits by charging users through a variety of revenue models, including subscriptions, advertising, and licensing. The question then emerges to what extent Unity Technologies is an exemplary of platform capitalism or, as a production platform, perhaps deviates from it? By taking a critical political economic approach to analyzing Unity's business models, its infrastructural features, and its governance framework we argue the former. While uniquely focused on content production rather than user connectivity or content distribution, Unity has ensured that the process of platformization has come to fully integrate content creation in all of its facets.

Life that Animates the Internet
One of the reasons to focus on the creation of real-time animations is because of the pervasiveness of immersive content across industry sectors. While game development and animated films are obvious sectors to utilize Unity's toolset, automotive companies use it to simulate product lifecycle management (PLM) before physical one-to-one prototyping, and architecture firms engage in building information modeling (BIM) to integrate physical infrastructures, such as public utilities, into an app's design. Numerous consumers have unknowingly used a Unity app when they interacted with a soon-to-be built condominium walkthrough or to select the interior of their next vehicle.

Unity's diffusion and growth as a platform has evolved along three lines, economic expansion, infrastructural integration, and regulatory control. First, it aimed at pan-industry usage by a series of acquisitions and business partnerships with industry-specific technology companies. The acquisition of 7 software companies in 2019 alone, including Obvioos' video streaming service for industrial product design and Artomatix's artificial intelligence technology to automate the creation of 3D content, underscore Unity's integration of industry software to direct workflow standardization. As such, Unity

follows the typical business strategy of creating a 'multi-sided market' that leverages 'network effects' (Nieborg & Poell, 2018). Second, Unity has allowed a wide variety of third-party technologies to integrate with its software, or vice versa, for app developers to export their finished designs to a variety of other distribution platforms. In practical terms, external technologies are either added into Unity's core software, or released as plugins which install into Unity's editing interface. Examples of external tools and technologies include GitHub for version control, Autodesk's computer assisted tools (CADs) like Maya and Revit, and NVIDIA's ray tracing graphics technology. As such, what appears as a generic professional tool to build digital games can quickly transform into a customizable platform geared towards any industry need. Third, because of its dominance, Unity has been able to standardize workflows and set (or perpetuate) proprietary software standards. The company has been able to do so, as argued by Nicoll & Keogh (2019), by framing its toolset as a contribution to the democratization of cultural production, as captured by its now dated slogan 'democratize game development.' This 'democratization *dispositif*' exemplifies a governance framework where accessibility and empowerment is exchanged for standardization.

Unity's approach to platformization has made it the standard for real-time animation content. While there are competing real-time animation platforms, such as Epic Games' Unreal Engine, Unity Technologies' focus on economic and infrastructural integration with industry-specific technologies and companies has made it indispensable for real-time animation workflows. As a result, global businesses such as Disney, Toyota, and Nintendo use Unity in their design process. What once could be chalked-off as one of the many software tools within the game industry has grown into a dominant production platform. In many ways, Unity not only animates the life of the internet, but it also brings to life visions of the material world around us.

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