OVERCOMING COST AND COMPLEXITY IN DIGITAL MARKETING

RETAIL IN TRANSFORMATION

EXECUTIVE SUMMARY

The retail shopping experience continues to change, especially with the growth of online shopping and the increased digital nature of retail. While the brick and mortar retail sector struggles, online retail sales continue to grow at a break-neck pace, growing 17.7 percent in 2018 alone[1]. Between 2008 and 2018, online retail sales grew 300 percent, according to the US Commerce Department, while during the same period, department store sales dropped almost 50 percent.[2] Brick and mortar retailers who fail to recognize the importance of this trend and delay digitizing their retail experiences are in peril. In just the first three months of 2019 alone, 5,994 brick and mortar retail stores closed, compared to 5,864 for all of 2018.[3]

User expectations for the digital shopping experience are also changing, driven by technology advancements in other consumer markets, such as smartphones, gaming, AR and VR. With the increased power of smartphones and increasingly larger screen sizes, smartphones are quickly becoming one of the most powerful online retail shopping devices. In the past, online shopping was done on computers, generally at home. Now consumers can shop anywhere, anytime − thanks to smartphones.

Smartphones alone are not driving online retail sales; a multitude of different platforms, including TVs, game consoles and VR headsets are now potential retail platforms. The digital transformation of retail has brought with it the era of omnichannel marketing, which allows for the creation of one asset that an advertiser distributes to multiple platforms across the world. As smartphone growth has leveled off,[4] brands and retailers are looking for new ways to digitally present their products, and AR promises to be a compelling and engaging way forward.

The current state of digital omnichannel marketing and configurators is unsatisfactory. Current solutions fail to deliver on the level of reality required to earn a customer's trust

[1] 2019 U.S. TOP 1000 Report
[2] Real Time Economics – WSJ
[3] What Retail Recovery? Malls Under Pressure as Stores Close
[4] Canalys Smartphone G.rowth Numbers

and aren't flexible enough to deliver the level of interactivity to satisfy the deep engagement with brands that consumers and brands seek in the decision-making process. Furthermore, many solutions fail to deliver these assets in the high-quality fashion that is commonly associated with a real-world product experience. Consumers want increased personalization and interactive experiences from digital product assets.

Because of the nature of a highly digital world, people expect more customized experiences. These include entertainment, products and shopping experiences. As the amount and quality of data collected about users improves, the ability to personalize advertisements and product marketing will increase across all potential platforms. The challenge, though, is to deliver personalization that appeals to the user without seeming intrusive. These digital marketing assets − be they served in an advertisement or a configurator − need to be close-to-real in terms of appearance and interactivity for them to be engaging. Providing the user with control over the experience can increase engagement without becoming intrusive.

The advertising industry is struggling with how to deliver personalized content with the rich levels of interactivity and quality that users expect. Advertisers also want to be able to deliver all content from a single source to maximize efficiency and responsiveness, without compromising the ability to address many different platforms simultaneously. The advertising industry and its clients are also struggling to deal with the cost and complexity of delivering and maintaining these kinds of experiences.

If manufacturers and ad agencies adopt the right technologies, they can solve the personalization and interactivity challenges. Additionally, they may be able to serve the same content on many different types of devices or platforms for effectively the same price. The market needs a real-time rendered solution that can dynamically address the constantly changing nature of product development and design as well as revisions. This solution needs to be real-time rendered to give customers the flexibility and interactivity they want and expect when engaging with a virtual version of an object in something like a product configurator. Ultimately, this solution should be designed to address the omnichannel nature of digital retail today and be able to address all kinds of devices that consumers are using to shop for products today and into the future. Future-proofing is a critically important consideration when selecting a toolchain for digital marketing.

Unity Technologies combines its expertise with data transformation, cross-platform, cloud and real-time rendering and physically-based materials to allow its customers to build real-time and cost-effective 3D advertisements and configurators for omnichannel

digital marketing. Unity also offers advanced features like real-time ray tracing, visual effects editing, visual post-processing, and the ability to output render layers. Unity's approach addresses a very broad market. Key characteristics correlated with a large benefit from a real-time 3D marketing pipeline are the availability of well-structured 3D product data, high-value products, B2C product categorization, frequent product changes and a high degree of product complexity.

MARKET PERSPECTIVES

Retail's challenges with personalization and customer engagement drive complexity and cost upwards due to a multitude of factors. Omnichannel marketing solutions are expensive and complex to build. Retailers must choose among many different players in the space, all offering solutions with varying capabilities, quality and performance. Product changes in traditional configurator workflows are slow and expensive to incorporate, which is contrary to the constant development process through which most products go. Manufacturers and retailers are constantly changing products based on supply chain and consumer feedback, changes which need to be incorporated in the new versions of that product and reflected in real-time experiences. With traditional digital marketing platform architectures, each additional option adds significant complexity, which makes deploying an option-rich, configurable solution a seemingly insurmountable task.

Deploying an omnichannel digital marketing solution that includes 3D distribution and configurable options is a complex task. Using on-premise servers at scale is expensive, inflexible and difficult to manage, leading much of the industry to move toward the cloud. Many are using cloud services to deliver their omnichannel marketing platforms with solutions from the leading cloud vendors such as Google, Microsoft and AWS, but even a cloud-enabled solution has its challenges. Rendering graphics in the cloud can be challenging, computationally expensive, and require experience in maximizing the performance of graphics hardware with the right graphical performance optimizations commonly found in game engines, and not all cloud-enabled solutions are equal.

A complete omnichannel solution renders the same high-quality asset on an Instagram feed, a web configurator, a mobile AR app or a link to a portfolio showing high-res images of the current version of the product 'as configured by the customer.' Being able to re-purpose the same 3D asset in a multitude of different ways allows a marketer or advertiser to leverage the same asset for different platforms and to do it in a way that matches exactly the perspective that the consumer wants to see, and with the options they've chosen to add or remove.

When these platforms use 3D graphics, they can become computationally expensive. Real-time 3D engines are the best solution for delivering these types of high-quality complex assets to consumers in a way that helps the consumer associate quality product imagery with a quality product. These engines also already run on many types of device platforms across multiple operating systems and screen sizes.

In addition to supporting real-time 3D graphics in the cloud, such a solution needs to support all of the ad platforms that exist today globally. This task is difficult because the platforms all require different file formats, have different graphical limitations and capture different types of metadata from the user. These different ad platforms also use different types of digital assets, which is why such a platform needs to have the maximum amount of graphical flexibility.

UNITY APPROACH

Unity Technologies utilizes three major pillars – Professional Services, Enabling Technologies and Cloud Configuration − to address the increasing costs and complexity of delivering personalized and engaging digital retail experiences to consumers. Unity also differentiates itself with a highly documented solution with no lock-in and which is designed to be as cost-effective as possible.

PROFESSIONAL SERVICES

Unity claims extensive experience in automating the conversion of content from one format to another in order to run smoothly on its platforms and those of its ad partners. Unity also claims it has the staff and expertise to train a company or ad agency's staff on how the automation works so that they can manage their content independently. Additionally, Unity offers ongoing Enterprise Support to help customers integrate its solution into their existing advertising pipeline and keep the platform running smoothly.

ENABLING TECHNOLOGIES

In 2018, Unity developed a technological and business partnership with PiXYZ[5] to unlock CAD data for the development of real-time assets. The partnership allows Unity and PiXYZ to deliver a complete solution that integrates Unity's Product Configurator Toolkit with PiXYZ and assets from the leading 3D authoring platforms like Siemens NX, Dassault Systémes CATIA or Autodesk's Inventor. The PiXYZ Plug-in for Unity allows a user of Unity's platform to import CAD models into any Unity project directly and has wide ranging capabilities, including options for mapping UVs and dialog controls for

[5] Unity Partners with PiXYZ Software to unlock CAD data for real-time development

scaling, orienting, repairing and tessellating a CAD model. Unity claims that this plug-in's real superpower is the ability to automate the data preparation process. The PiXYZ Plug-in for Unity even provides Live Link functionality so that changes to the source data can be quickly propagated into the Unity project without disrupting existing scripting, materials or animations. This ability is important because it allows for updates to the CAD model to be quickly updated without needing to rebuild a project, saving time and money.

The Unity Product Configurator Toolkit (PCT) is a pivotal part of Unity's enabling technologies because it serves as the backbone for so many of its authoring and deployment capabilities for the future of online retail. The PCT has a specific workflow that is designed to facilitate the use of digital assets in marketing and advertising. This four-step process includes importing, data prepping with automation, authoring and then deployment. Unity's partnership with PiXYZ helps smooth the importing and data preparation portion of the workflow. It can import geometry and metadata from multiple sources, including CAD, DCC and VRED models. It can also automatically optimize a model for real-time 3D to deliver the performance and visual quality that users expect.

Additionally, the toolkit can import material definitions, variant data staging and incrementally update the project when the source data changes with live links. The PCT is a central place where a person building a Unity project for online retail purposes can manage product correct content definitions. It also has built-in logic to manage variants, option packs and default configurations for the configurator when building it. The PCT integrates with enterprise business systems and custom client UIs and is deployable on multiple platforms including the cloud, WebGL, POS and mobile apps, thanks to the Unity engine's flexibility. The PCT also has significant authoring capabilities, supports linking geometry and material switches to variants, and creation or modification of variant tables if they are not available in import. The result is an output that is a 150% configurable model that is updated as changes are made with the source files.

For deployment, the PCT can optimize the runtime file to match each target platform. The PCT has omnichannel output and supports the cloud (Linux or Windows), WebGL, Desktop (Windows or macOS), XR HMDs (Steam VR, Windows Mixed Reality, etc.), Mobile AR (Apple ARKit, Google ARCore), and package output to a viewer that can be used by marketing professionals. Unity also supports all of the important desktop browsers, including Chrome, Firefox, Internet Explorer, Microsoft Edge, Opera and Safari. In addition to desktop browsers, Unity also supports mobile browsers, including Chrome, Firefox, Safari, Android Browser & WebView and Microsoft Edge.

Unity's configurator viewer is another crucial part of the company's enabling technologies that help to meet the needs of today's digital retail marketers and advertisers. The viewer is squarely aimed at artists and marketing professionals to give them control of the final appearance of the authored assets deployed in the PCT. In the viewer, Unity created a special asset bundle for viewing assets in what one could consider a virtual photo booth which helps artists and marketing professionals select product environments, lighting and cameras and configure a marketing asset within defined constraints without having to know how to code. The Unity viewer will generate high quality renders up to 8K with an option for render layer outputs.

In the 2018.1 version of Unity, the company introduced the scriptable render pipeline (SRP) that allowed a Unity developer to create their render pipeline based on the needs of their project. SRP includes two ready-made pipelines called the Universal Render Pipeline and the High Definition Render Pipeline (HDRP). HDRP delivers high-quality renders in real-time for things like product visualizations. HDRP is designed for high fidelity and traditionally has been considered suitable for PC or console platforms, but that is changing with the addition of cloud GPU computing. HDRP includes upgraded materials (with conversion) and lighting including dynamic lighting. To further address certain types of lighting scenarios, Unity's HDRP also supports the Stack Lit shader for high quality car paint.

If HDRP and Stack Lit weren't enough to satisfy the image quality requirements of a designer or marketing professional, Unity also supports the most realistic of lighting techniques, ray tracing. Ray tracing has traditionally been too computationally expensive for widespread adoption and usually required CPU-acceleration, but the latest generation of GPUs is capable of ray tracing in real-time. NVIDIA was the first GPU vendor to disclose that they would be adding dedicated ray tracing cores into their RTX family of GPUs in late 2018, which kickstarted an arms race among the real-time 3D engine companies. Unity announced its support for ray tracing early in 2019 with NVIDIA GPUs, which improves the photorealism of objects rendered in Unity and enables rendering of those objects in real-time. Ray tracing will help marketers and advertisers showcase the high-quality nature of their product in the most photorealistic way possible.

Another component of Unity's HDRP is their VFX Graph, which allows for the creation and rendering of VFX in real-time. While VFX has a lot of potential implications, for Unity's render pipeline, it means adding effects like particles, smoke, fog, sparks and halo effects. There are also other traditional VFX like anti-aliasing (FXAA, Temporal AA), Ambient occlusion, screen-space reflections, eye adaptation, and dithering. The

VFX Graph is authored and stored within Unity's Visual Effects Assets and accessed via the Package Manager. The VFX Graph is also integrated with tools with which most Unity users are familiar, like Timeline, which makes implementing VFX easier. Because Unity has such a rich asset store, anyone wanting to utilize VFX without having a VFX artist can easily purchase different types of VFX from artists in the Unity Asset Store which makes designing a high-quality experience even easier and faster.

Rendered images are often unrealistically flawless and therefore appear artificial. Post processing, which Unity accomplishes with its post processing stack, is an important step to delivering the highest visual quality for rendered products. This stack applies a whole host of post-processing effects to the final rendered image to tweak it to exactly how the artist or client wants it to look. These effects include exposure compensation, bloom, chromatic aberration, color grading, depth of field, film grain, lens distortion, motion blur and vignetting. These post-processing effects allow creators to have more creative control of the final image and help add realism to the rendered image. Many of these post-processing features are designed to add certain effects that make it appear that the image is not rendered but rather a photo captured with flaws like vignetting and film grain or exposure compensation. Giving nearly final renders an added aspect of realism helps to bridge the artificial valley that some digitally created assets can have and allows the consumer of the content to believe they are looking at a real representation of the object even though that object is being rendered in real-time through Unity's platform.

Cloud Configuration

Unity has a high-performance and cost-optimized cloud streaming solution and claims to leverage the best available technologies in the market today to deliver the best performance and value. Unity also optimizes GPU usage to deliver the best available combination of cost and performance. Web-based configurator sessions frequently are active for 10 minutes or more but with relatively intermittent rendering demand. Unity's GCP-based solution is able to serve a larger number of sessions at lower cost by taking advantage of this intermittent usage.

Unity employs the industry standard WebRTC protocol for optimized performance which allows for web browsers and mobile applications to have a real-time, peer-to-peer connection, minimizing the number of plugins needed. Because network conditions vary wildly between devices, networks and operators, Unity's solution has a variable bit rate and resolution to adapt to varying network connection quality. While 5G may change the

need for this, 4G LTE still may not be fast enough to deliver the best possible experience everywhere with the same bit rate. Variability ensures lag does not occur.

Unity's cloud streaming solution for its platform can also load balance across multiple regions. Load balancing is important for solutions to scale and serve the entire globe with the same solution and not be limited to certain countries or cities. Google's Cloud Platform powers Unity's streaming solution and enables deployment in most major regions. However, Unity supports multiplay with dynamic provisioning and load balancing and does support Microsoft Azure using Furioos and Amazon AWS cloud, as well, which covers the majority of cloud service providers around the globe, outside of China.

Unity's cloud-based configurator framework combines the company's cloud capabilities and optimizations with the company's PCT to create an easily deployable product configuration solution and makes Unity's platform a complete digital retail solution. Unity also combines these different technological capabilities with publisher-delivered business logic to create a more personalized experience for each user, maximizing the quality of the user engagement. Ultimately, platforms like Unity Technologies' are only as good as the quality of the interaction that consumers have with the product, and that interaction can only improve if business logic (an application coordination layer between the UI and data sources) is added to the complete solution. There's very little point in offering virtually every possible configuration if the advertiser or marketer can't at least offer a reasonably anticipated configuration and prepare the necessary assets to ensure a quality experience for the user. The scale of these experiences will vary, and not all marketers want to offer the user every imaginable version of the product to look at or configure. Anticipating users' needs will be important for success.

CONCLUSION

Brick and mortar retail is changing toward a model that is increasingly dependent on the power of digital advertising and the ability to deliver omnichannel assets to consumers on many different screens. The world of retail was moving toward a reality of hyper-personalization and increased user engagement which adds cost and complexity to meet consumers' wants and needs. Cost and complexity must be overcome to effectively deliver the types of experiences consumers crave. Unity Technologies has a complete solution with a three-pronged approach that addresses the industry's challenges with a mixture of professional services, unique enabling technologies and cloud-powered configuration. Unity Technologies' solution addresses the challenges posed by the new digital retail reality and does so in a way that can scale into the future.

When building an omnichannel digital retail marketing and sales solution, we recommend considering Unity's platform and solution.

IMPORTANT INFORMATION ABOUT THIS PAPER

CONTRIBUTOR
Anshel Sag, Analyst at Moor Insights & Strategy

PUBLISHER
Patrick Moorhead, Founder, President, & Principal Analyst at Moor Insights & Strategy

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