



Making 3D Accessible.

3D Workflows in Global E-Commerce

**Why your retail business needs a 3D & AR strategy,
and how to efficiently realize it on a large scale.**

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Within this whitepaper, we investigate the possibilities and current status of 3D experiences for E-Commerce, notably 3D web-apps, mobile Augmented Reality (AR) and Virtual Reality (VR) applications. We first analyze the benefits of 3D experiences for retailers. Then we describe typical 3D processing workflows in practice and highlight technical challenges, as well as potentials for enhancing scalability and reducing costs.

Benefits of 3D & AR in E-Commerce



3D Technology increasing Conversions

Recent studies indicate that the presentation of a product in an online or mobile marketplace has significant impact on the shopping behavior of consumers [1, 2, 3]. A 3D presentation, when integrated the right way, has been found to significantly contribute to better understanding of the product. It effectively increases confidence in a purchase. E.g. *Shopify* reported an up to 2x lift in the conversion rate when 3D & Augmented Reality (AR) technology was used in an online shop [4].

Like *Shopify*, many leading companies active in e-commerce have joined the Khronos group in 2019, forming the new working group *3D Commerce*. Members of the group include *wayfair*, *Target*, and many more notable companies that are currently pushing their 3D & AR pipelines and conduct similar studies. *IKEA*, as a technological leader in this area, is already a step ahead with its *Place AR* app, recognizing the value of AR for planning and visualizing furniture purchases directly inside people's homes. One of the 3D Commerce working group members reported to us a 3.4x increase in conversions using 3D technology.

72% of AR online-shoppers buy more than originally planned

Houzz, the largest online platform for interior design, reported an incredible factor of 11 in purchases for an AR furniture case study, also finding that 72% of AR shoppers buy more than they originally planned for [5]. The latter is also related to the fact that 3D and AR technologies typically increase the time users spend looking at a product online, which in turn has been found to increase the probability of a purchase.

Looking at the behavior of the millennial customer group, which is relying on smartphones and internet for shopping, it becomes evident that most in-store purchases have been planned beforehand. Consumers search for products that are locally available and inform themselves before visiting the closest furniture store by preparing shopping lists. At this point, online product visualization becomes crucial once again, as customers need to be convinced of the offering of a store before visiting it. Most benefits of 3D product visualization that can be observed in online shopping also impact the in-store shopping behavior of smart consumers [6].

3D Technology supporting In-Store Purchases

3D technology is not only applied in e-commerce, but also to support the shopping experience in-store [7]. At *Macy's*, for instance, in-store sales had up to 60% larger basket sizes when using AR and VR-technology, compared to those shops that were not equipped with these technologies [8]. Local furniture retailers will need to adopt to new technologies. Brick-and-mortar stores will continue to be important, since some people enjoy the experience of shopping in an actual store.

However, the true potential of the application of 3D technology is in e-commerce, where products are not physically perceivable and it is hard to build a first impression of a product. Especially AR is referred to as the natural bridge between digital (i.e., e-commerce) and physical retail, as it enables a deeper engagement with customers and ultimately increased sales [9].

3D Technology reducing Return Rates

New strategies in e-commerce may also lead to a reduction of returns, which is a key parameter for a profitable online business. Besides topics such as online responses to questions of shoppers and offering product reviews, a key improvement is the visual presentation of offered products. The aim is to bring the online shopping experience closer to the in-shop experience.

Many consumers believe return rates could be decreased by improving the product presentation, according to a survey [2]:

- "Photos of the product, e.g. showing product in different angles" (42%)
- "A detailed/accurate description of the entire product, e.g. describing materials used" (42%)
- "Videos of the product so that I can see it clearly" (37%)

All these points can be tackled with high quality 3D product presentations, as they allow for a detailed visual inspection of a product's shape and appearance from any angle.

3D Technology as a Future Must

Besides existing challenges 3D technology solves for e-commerce, there is also traditional marketing, 3D helps with better brand recall. A German furniture producer that dominates the national market stated in an interview with DGG:

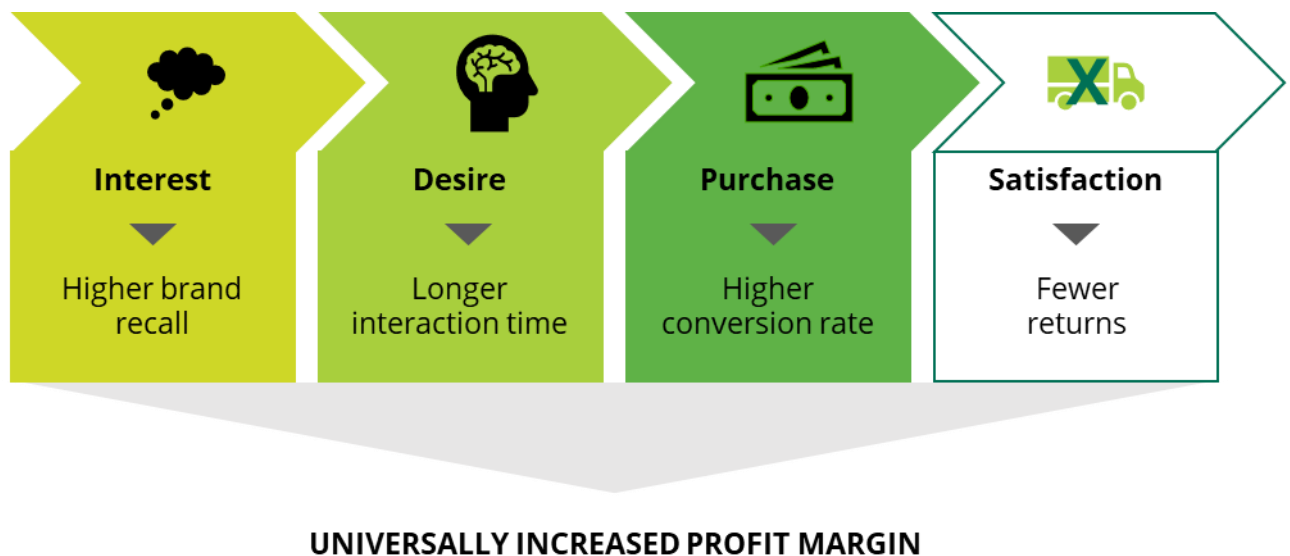
It's hard to simply measure what metrics make 3D and AR necessary, but we soon will reach a pivot point. Then it will be a matter of survival. The shopping landscape will

change. At some point one will not be able to operate without 3D data. It is rather a strategic question now - we certainly will need 3D data to survive.

We see this shift in the entire furniture industry: Directors of sales and marketing consider providing 3D visualizations on the Web and AR experiences to customers a mid-term *must*. Today, technology leaders set new standards and transform the shopping landscape. 3D data-processing pipelines will become as common as 2D-image-processing pipelines already are nowadays.

Supporting 3D & AR becomes a strategic matter for retailers.

Once 3D and AR become more widely deployed, many companies that are currently reluctant to work with these technologies due to its costs will suddenly find themselves faced with high follow-up pressure. This is intensified by the adaptation of customer expectations to state-of-the-art online shopping experiences.



Implementation of 3D & AR in businesses

Challenges in exploiting 3D and AR Opportunities

Retailers and producers typically have thousands of products they want to show online. A single product is often available in many configurations. Creating digital 3D representations for every product requires smart processes and - where possible - automation. We identify two main challenges within this process: master asset creation and conversion for real-time rendering.

Innovators use their available resources to avoid falling behind their competitors.

The first big challenge in creating a scalable 3D visualization process is the master asset creation. 3D scanning of all products in all variations takes time and, in most cases, not even state of the art scanners produce suitable results. Manual modeling processes lead to the best quality and the visual quality can compete with professional photography when it comes to product renderings for catalogues. It is time-consuming and expensive to employ large teams of 3D artists for 3D modeling. Innovators need to sacrifice these resources to be quick in their development and not fall behind their competitors. In many cases, this entails the outsourcing of tasks to offshore service providers, which again means coordination work and large communication efforts. Especially compiling requirements and creating guidelines to ensure consistent quality of results can become a tedious task. At the end of a 3D asset creation process, a digital twin of the product exists as 3D model and can be used in rendering scenarios. We refer to these models as “Master Models” as they are the very basis of all other process steps hereafter.

Once master asset creation is solved, the second challenge is to transform those assets into real-time ready variants.

For many retailers the 3D master models are primarily intended for offline rendering, rather than real-time applications. This makes a big difference, since a 3D artist will create a 3D master model for a specific purpose and the toolsets and formats used significantly differ between both worlds. A model created for offline rendering will be tailored towards a professional photorealistic rendering solution such as V-Ray or Corona. These tools allow retailers to create catalogue images with a stunning degree of realism, in most cases and for most people indistinguishable from photos. Since this process is already common, many manufacturers and retailers have built a large library of 3D master models for offline rendering. When master assets aren't already available with a material model that is ready for use with real-time engines, a second asset, the Real-Time Master must be created. This variant of the original 3D master model for offline rendering will instead make use of real-time-ready materials for Physically Based Rendering (PBR).

One notable example of such a real-time-ready-material model is the one used by the **glTF format**. This format can be obtained by converting from existing production data sets in Autodesk's **FBX format** directly to glTF, for example. However, when using for instance 3ds Max as a content creation tool and using V-Ray as a renderer, 3ds Max cannot save the complex, V-Ray-based material information in the FBX format. A lengthy manual process is needed to transform each original V-Ray-based asset and equip it with PBR materials. When scaling up 3D pipelines, this problem is a major bottleneck.

Compact 3D models enable cross-device representations.

Automating this material conversion stage is therefore the first step towards a scalable, multi-channel distribution for real-time applications, such as mobile AR apps on different consumer devices or 3D viewers on the Web.

Optimized 3D models for a specific end user application contain all relevant details, such

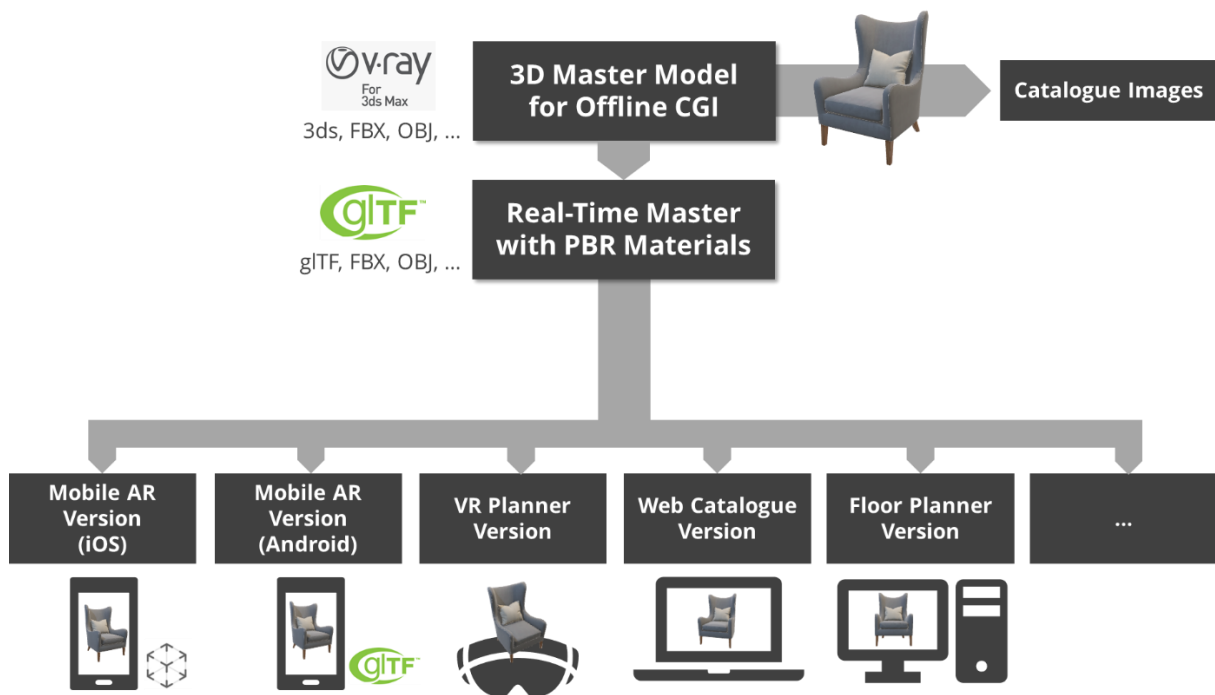
as reflection properties and color tones, while being small enough for easy up- and download and visualization on a diverse range of devices, which is key for a good user experience.

Scaling up 3D pipelines

Once a real-time 3D master model has been obtained by applying real-time-ready PBR materials, it serves as a basis for optimized variants in compressed formats, to be used for delivery. Master models are great for offline renderings, but too heavy for visualization on the web, on mobile devices, in Augmented or Virtual Reality or any other real-time use-case. To optimally serve real-time applications, master models need to be transformed into highly optimized low-poly models that still contain all important visual details. Various software tools are used by 3D designers in practice to go through all needed

steps, and today manual workflows still dominate this part of the process. As for asset creation, manual 3D modeling work is expensive and time-consuming. Most companies who want to get this step done today are outsourcing the effort (which comes with its own challenges).

To enable in-house processing of 3d data at scale, the usage of advanced software solutions is key. Efficiency is increased through the reduction of manual work. Innovative tool providers already offer such solutions today, like DGG with RapidCompact: A software to automatically get master models ready for different visualization scenarios. It requires only seconds of processing time per model variant and reaches up to 100x faster processing times while simultaneously providing consistent results.



A typical workflow for the automatic generation of real-time-ready 3D data, for the use in AR and other interactive applications. From top to bottom: Offline 3D master model, master model with real-time-ready PBR materials, optimized variants for different devices and apps.

Conclusion

Summing up, 3D product visualizations can have a massive impact on the behavior of online shoppers. Since customers base their purchasing decision on a virtual product presentation, a realistic impression is key. 3D technologies bring products closer to online shoppers, increasing interaction and lowering return rates. Looking at the immense growth potential of e-commerce and the changing consumer behavior, businesses will need to implement 3D technologies, as consumers will increasingly demand 3D content. Leading retailers already invest heavily in applications like Augmented Reality mobile apps or 3D room planners and build processes to create and manage 3D assets.

Typical 3D processing workflows rely on manual work, are time-consuming and involve a complex toolset. But certain technical challenges can be tackled today with software solutions to automate large parts of the process chain. When it comes to generating different variants for various applications and end-user devices, processes can be sped up by two orders of magnitude with automatic software solutions such as DGG's RapidCompact.

In case you have comments or questions, please contact the authors at Darmstadt Graphics Group (felix@dgg3d.com).

References

- [1] C. Wilson, "6 Most Common Reasons for eCommerce Returns," 2015. [Online]. Available: <https://www.i95dev.com/6-most-common-reasons-for-ecommerce-returns/>.
- [2] Digital Marketing Community, "Important Features That Can Support In Reducing Brands Online Returns," 2019. [Online]. Available: <https://www.digitalmarketingcommunity.com/indicators/reducing-online-returns-2019/>.
- [3] K. Gilsenan, "Online Shopping Returns: Everything Retailers Need to Know," Global Web Index, 2018. [Online]. Available: <https://blog.globalwebindex.com/chart-of-the-week/online-shopping-returns/>.
- [4] shopify, "Shopify will be the first commerce platform to natively support 3D and AR shopping experiences," 2019. [Online]. Available: <https://www.khronos.org/news/permalink/shopify-announces-first-commerce-platform-to-natively-support-3d-and-ar-shopping-experiences>.
- [5] High Point Market, "We're Talking About AR Evolution - Augmented Reality generates purchases by enhancing the consumer shopping experience," [Online]. Available: <https://www.highpointmarket.org/products-and-trends/ar-revolution>.
- [6] KPMG, "Auf Zukunft eingerichtet - Studie zur Zukunft des Möbelmarktes in Deutschland," 2018. [Online]. Available: <https://hub.kpmg.de/auf-zukunft-eingerichtet>.
- [7] AT&T Shape, "The Future of Immersive Branding and Retail," 2018. [Online]. Available: <https://shape.att.com/blog/future-of-immersive-branding-and-retail>.
- [8] ARPost, "Macy's Uses Immersive Technology to Enhance In-Store Shopping Experience," 2018. [Online]. Available: <https://arpost.co/2018/09/21/macys-uses-immersive-technology-to-enhance-in-store-shopping-experience/>.
- [9] Engine Creative, "AR in retail: putting the consumer at the centre of the shopping experience," [Online]. Available: <https://www.enginecreative.co.uk/blog/ar-in-retail-putting-the-consumer-at-the-centre-of-the-shopping-experience/>.
- [10] K. Saleh, "E-commerce Product Return Rate – Statistics and Trends," investp, [Online]. Available: <https://www.invespcro.com/blog/ecommerce-product-return-rate-statistics/>.