

The Evolution of Visual Narrative in Game Concept Art: From 2D to 3D Pipeline Innovation

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Abstract: Transitioning from traditional 2D concept artwork to modern 3D pipelines is a huge change in how visual narrative is made and told in the modern video game industry. This paper looks at the development of concept art methodologies over the last twenty years. It talks about progress in 3D modeling, real-time rendering, and procedural generation taking the creative process from still graphics to moving, interactives prototypes. We will show this through the case studies of modern-day game studios, and we look at different types of production pipeline on both Indie and AAA studio and that leads to quick turnaround for testing iteration, better cross dept communications and a better visualization of space and our play perspective. What I do find though is that 3D tools can make a huge difference on technical level and how to integrate the assets together, but sketches are still needed for ideas and art in a quick way. We offer a framework on how to combine 2D & 3D, what's good in both worlds to fix problems on training new skills, have enough money and software to use, and keep that art's vision when it goes on the production line. Outcome, it makes beneficial discoveries to the movies which are moving around in the world of changing concept art, it says trends that are going to create the way of doing visual development for the coming era.

Keywords: Concept Art Evolution; 2D to 3D Pipeline; Visual Narrative; Game Development Workflow; Hybrid Art Production

1. Introduction

Video game visual development has had dramatic changes as from when the industry started; concept art ties making vision happen technologically. In the first 30 years + of games, game developers used pencil drawings, marker

drawings, and digital paintings as visual concepts for levels and sprites. They were like static images to show to the devas who would work on creating modelers environment creators. and these 2D workflows might look like something an artist might use to quickly throw down some rough ideas. However, once the assets got turned into 3D game worlds, the tech artists and modelers found themselves having much explaining and changing to do [1,2].

In the 15 years leading up to it, the 3DCA working process in the game industry is becoming increasingly established. Software like Brush, Blender and Unreal Engine, and specifically, the kind of concept design software like Gravity Sketch, have made it possible for concept artists to assemble fully realized 3D concept models starting from scratch, and check spatial, scale and technical feasibility directly via the software, without having to rely on any other kind of medium to do so [3,4]. It also saw the real - time rendering technology speed up the process too, which allowed for artists themselves to do their work in the engine instead of just seeing references, as well as a prototype they can actually mess with [5]. This is starting to become a trend of games having more pipeline integrations. It's also where things like making traditional departmental separations of concepts and modeling all the way to level design are more likely [6].

But if adopting 3D Concept Art workflow there will be many problems with regards to art, and art skills and art expression. While 3D tools have some perks with regards to precision and adding the already made assets, countless professionals argue that 2D sketches are still better for quick ideas, gestural exploration, and grabbing the key emotion for a better visual story [7]. The learning curve of pro 3D software seems like a brick wall to a very large proportion of artists coming from traditional illustration who really want to avoid the potential trap of having this tech convenience compromise their own distinct

style [8]. and that extra first time to create the idea in 3D, as the time we start to create the thing we have an idea that can be a lot of different versions and then see which one feels good to us [9].

This type of study looks at how big game companies change from one normal way to draw 2D concept pictures to something that's completely different; it's a mixture of 2D and 3D, it sees how the little or big artist groups make decisions about which computer tools they should use for lots of jobs or kinds of pictures, how they learn and get better on their job, and how they keep their own special taste or view of things when they're working with all these computer tools in my work: new ideas on making the process more smooth, pointing out the old roadblocks for using 3D, how the tools that use rules to make scenes (procedural generation), taking real pictures and pictures and making them digital (photo scanning), and computers that make 3D shapes using pictures or words (AI-modeling) makes the idea that there will be a story to tell become a lot more interesting [10].

through looking at 8 different types of game development studios, some are small indie devas and others AAA titles, and how the new trend is to create modern concept art through analyzing the newest trends and tools being used within the very industry itself in order to create the most current picture of where the visual narrative of games is today and what its headed towards. We all kind of have an understanding with how 2D - 3D idea pipeline work, and we have an understanding of what is good for working in 2D, versus what is good to work with 3D, and we can give advice and suggestions on how to mix those elements together by using different tools and project specific needs, what are people on the team, and when does the project need to be done. We expand on understanding how it's like for people to get going with these tools and how do studios try to get better with visuals as more tools become more complex.

2. Related Work

The evolution from 2D-3D concept art pipelines. We will cover several areas for 2D-3D concept art pipelines: digital production in art, the world of 3D videogaming, and creating visual artworks in an interactive space. Traditional 2D concept art is done in a quick manner through sketching and improving constantly repeatedly. It was

found in studies that an experienced artist could sketch around 30-50 thumbnails within one hour, which provided them with a much larger pool of creative material. Digital 2D like Photoshop, Procreate, make things like this better but they don't take away from the exploratory feeling the concept artist wants for their piece. Though with studies, it has shown that professionals within the world of digital 2D can form highly personalized and precise tool sets that suit themselves and their own method. On 2D concept Art, its communicative aspect is not only to look good, but also technical documents to balance artists' vision and making drawings clear enough for those tasked on making these drawings into reality.

When we talked about 3D modeling on concepts, it was a new paradigm. So, at first like 3D blackouts kind of became cool in the realm of Environment Design because once architects started doing large scale stuff they realized it was more accurate for them to use 3D blackouts instead of 2D paintings. Brush can go all clay for cars, but studies say 6 - 12 months on this for artists switching from 2D. Real time rendering engines have made 3D completely possible by ending the old rendering wait times. They are now "playable", the stakeholders will be able to walk through the environments that we propose Procedural Generation Tools make up Rules based Systems to make automatic design changes. The tools work great with buildings and machines, but they take a lot more depth than normal art classes to use them. Hybrid workflows mixing clever 2D & 3D methods & industry case studies on how a fast 2D sketch gets the comp first then moves to 3D for spatial checking. Based on my own research and experience when it comes to using collaborative workflows, 3D concepts help for departmental communication as reference and less mistakes on scale and proportions during production and what skills we need now, and their artist identity is becoming in places like education where they discuss if it's better to learn old traditional tools or new digital tools. Professional Survey's reaction is different too. Someone with 2D history will not like working with 3D since it goes against their identity, and new students will use it. From psychology, transitions are a way to add 3d tools rather than replace an artist's imagination. However, it does mention that there was no data on productivity vs creative output based off a dimensional approach, as well as no

explanation of the studio's implement approach, and no discussion of how choosing a pipeline will impact the final game and the end player.

3. Methodology

This is about the move from old school 2D concept art in current game dev to the new shiny 3d version. Use compare case study analysis and technical workflow analysis. The period is 10 months from March 2024 – Dec 2024, focuses on sizes, how to use that certain size of studio includes, balances, integrates dimensional in the visual development. We tried out various pipelines, looked at how people work with these tools, how artists are trained and what could be done to make it easier for all parts of the chain to produce better stuff. Data is collected by way of semi-structured interviews, workflow observation and production comparison by different means.

We selected eight factories for game development. Two major studios making \$100+ million budget, narrative focused games with over 300 people three mid-size studios, 80 – 150 employees, working on multiplayer and strategy games. Three different studios 8-25 people making all kinds of different movies. I selected the studios that made the transition from 2D workflow to hybrid 3D workflow within last 5 years that people can compare to their own firsthand experience. I interviewed 25 concept artists, 8 art directors, 5 tech artists, 6 environment design artists and 6 production leads (45-75 mins) about historical workflow practices and barriers, motivation to shift, current ecosystem of creative tools, training practices and perceptions on impact on creativity and productivity. Direct workflow observing was done in 3-5 days in five studios as notetaking of a process of starting on a concept art idea from the beginning to “ok” and recording a choice of all tools and revisions of artists in their studios as well as where they speak. Checking the quality with field notes and timestamps as well.

I did comparative production analysis for like six studios. I did a few projects per studio just looking at how much work did they put on a concept, how many iterations were required to arrive at an idea, how long it took to understand it, did you get the same thing if you did it in a 2D way or if you mixed 3D into everything? We look at old project information before taking something and make it new data, finding

changes in productivity and quality that we could recognize as numbers. I did Technical Exploration of some contemporary concept tools like Brush, blender, Unreal Engine, Gravity sketch and regular 2Dimensional software. I used them in basic concept art tasks and experimented with the tools' ability, workflow, and output. The qualitative interview data is viewed for patterns of artists' experiences with the use of thematic coding, and organization's strategies through thematic coding, and pipeline issues through thematic coding. Production metric data was qualitatively analyzed quantitatively using descriptives, comparing trend analysis in order to get an idea of synthesizing pipelines in review of studio art directors Protocol on obtaining informed consent and protecting data from being confidentially disclosed, studio specific proprietary information which will be anonymized, limited sample size, geographic restriction for Western studios only, possibly self-selection towards studios who are already predisposed towards 3D.

4. From 2D to 3D: Pipeline Evolution and Technical Implementation

Going from a regular 2D concept art workflow to going into the realm of 3D in games is a huge leap in terms of visually creating a game. Our case studies show that it was not done by way of replacement, but rather in a kind of mixing of dimensions, as each project, group, and artistic creativity needs demanded. The studios that do 3D are doing it in different places – it's just an extra on top for some; it'll be full-on 3D first for others. Different studios will try to use 3D on their own based on what they can get from their own tech capabilities, into something they can have which is useful, something that is efficient and still under their own creative, production and organizational limitations.

Traditional 2D Workflow going down the regular route for concept designers to quickly do some thumbnail sketching first, explore comp options then move on to value studies and color stuff before landing on the final presentation. The artists said that they could come up with 15-30 rough concepts in 2-3 hours by using digital brushes to make more ideas. It can be a great tool at those moments when the feeling, style, direction are the focus; exactness can wait. When 2D ideas are started to be applied to game spaces that are 3D, the job of environment artists starts to have a problem of scale, perspective,

and area that needs extra interpretation to push the production length up. How 3D tools are applied, by the three types, hybrid exploratory employs 2D sketches for main ideas and 3D block outs for spatial verification, resulting in an approximate 25 - 35% fewer downstream implementation flaws; 3D primary goes on to make modeling into a much more progressed state with sculptures created in Brush and assemblies from unreal engine being main results which leads to a better handoff by over 40 - 50%; dimension agnostic treats both 2D and 3D as just simple tools chosen based off what's needed for any given project without being tied down to predefined pipeline steps.

Technical implementation stuff like game engines that do real time graphics without old speed bumps or creating quick stuff by changing numbers in models that have buildings sort of look, with pictures from camera making real feeling go inside photos, and ways to make things with touch or moving parts of your hand which feel natural or cool. But then there's the technical side of things. Once we get to a certain point in a scene it will be impossible to have it optimized enough to bring it down to being in real-time. 2D artists learning how to do 3D right and that generally takes 6-12 months of practice. Software license cost, those are north of \$5k. Workflow integration stutters are more than tech, it's orgs and artists too, with creators stating that they were feeling frustrated for a time, three to six months, until they could again pour out quality art as the situation improved. The studio dealt these issues with structuring the training for the group with mentoring between 3D and 3D, 3D and concept, and just slowly. So, they can keep their 2D workflow but transition into 3D Slowly, they realize that the dimensional approach is what we need so that the creative is not being dictated by the tool, but it's more that it lets the artist choose their tools but gives them the technical and developing of that for them.

5. Conclusion

Journey from old concept art being 2D to what we have now in the more integrated 3D workflow in games today. A mix of new technology, creative, and organization. As far as my result is concerned, when moving forward doesn't mean leaving behind the one-dimensional method to go through another. More like, it was widening my creative toolkit by being able to have both 2D and 3D methods

together and then place them together in a combination that suits a certain production situation. Of the three models - hybrid exploratory primary production and dimension agnostic - each has prioritized fast vs exploratory and spatially grounded, technically integrated and downstream process improvement differently. Studios who get good results can trust that using dimensional is working with their creative vision and isn't controlling it. But the artists still own that they are building. And that the artists are still building on top of the infrastructure that they've gotten and developing the skills to utilize to be able to take those tools and build the assets that they need to fit the task at hand, rather than having to use specific tools just because the pipeline tells you to.

The records show productivity gains, like one combo method doing 25-35% less going wrong on implementation, handing off bits to main form is 40-50% quicker. And it's asking so many investments for coaching, for buying programs, for re-organizing offices - it really showcases how beneficial it could be if you can make it work. But those numbers have to be weighed on how happy the artist is and how quickly and far they can progress creatively and protect those voices that give us visual identity against a capitalist market. From what we learned, we can see that the successful implementers saw 3D as a supplement in the artist's vision rather than a replacement of the artist's vision. Regardless of which dimensions will be used, the fundamental laws of design such as the basic theories of composition, color theory, conveying the narrative and spatial thinking will always exist. But techniques and methods can change with the development of new technology. Artists who go through this kind of passage will mix all the skills of using the ideas of evaluating artwork and combining them into the new knowledge learned about working with 3D modeling, on-the-spot displaying, and various ways to make designs. They might be used in lots of different situations: The future is going to be packed with a lot of new technologies. AI-assisted 3D creation, neural rendering, virtual reality sculpting environments, and all that shit is going to transform concept art pipelines. There's some dirt that we need to get into on these technological things and see what kind of cool and creative stuff is happening with them. And figured out how each studio can use this

technology in a fast-paced tech world and still maintain those irreplaceable human touches for creativity insight for visual dev of interactive entertainment.

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