



Game Technology Takes Over the Film Industry

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The film industry is being changed dramatically by game and computing technologies. Soon there will be the position of chief scientist at all of the major film studios. This article discusses the scope of technology with which the chief scientist must portend.

The film industry is moving rapidly to replace many of its production ways with new technologies that require new hires, hires with the same skills as utilized by the much larger games industry. Universities that have robust computer science

programs that focus on game development will rocket into the stratosphere as the demand for talent from the film industry reaches their distant shores.

THE FILM INDUSTRY CHIEF SCIENTIST STEPS OUT ONTO SET ...

One of the crucial roles the film industry will require is that of a *chief scientist*, a computer scientist with a Ph.D. whose interests are broad, stretching across the entire computing field with agility (Figure 1). Such hires are rare

as most Ph.D.s in computer science are narrowly focused on research areas that make relatively small, nonbroad contributions to their selected field. This is the way our Ph.D. programs have operated and this continues when those Ph.D.s graduate and become assistant professors at universities. Most such assistant professors are told to continue the focus of their dissertation topic until nine years later, when they become full professor and are then “allowed” to remove the blinders from their eyes to much broader research and

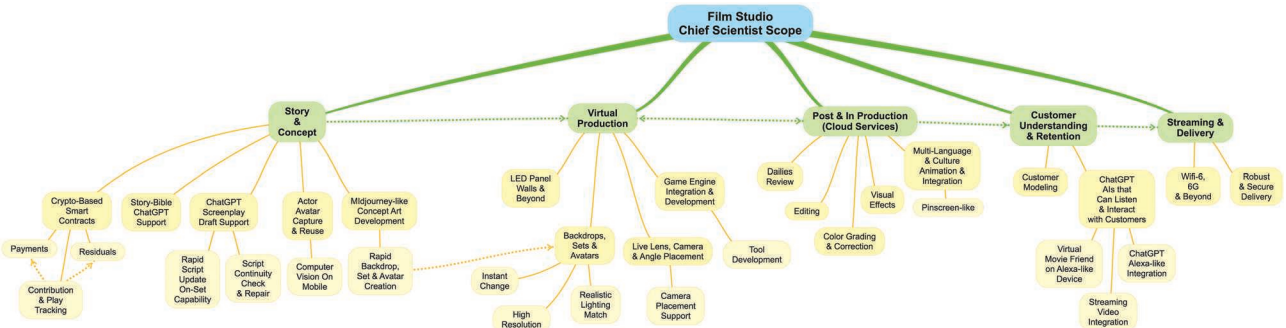


FIGURE 1. Chief scientist scope, the big picture.

development. Hence, the demand for broad Ph.D.s in computer science that also know the entertainment industry to fill chief scientist roles by the film industry will be hard due to supply shortages and burgeoning demand.

I was able to find this out firsthand over the last two months as I was asked to interview for the position of chief scientist for one of the largest tech-based studios in the city of Los Angeles, California. I did the first four interviews before the executive recruiter told me, “they now know how to draft the position description” from talking to me. For my own thinking purposes, I had put together a mind map of what I thought the chief scientist role ought to be and sent it to the interviewers as I met them. All of the interviewers were positive, one even asked if I could start “next week.” So, I thought I would take the mind map that I drew for this position, which was turned into the advertised “position description” by the second interviewer, and talk about it here in this month’s column.

STORY AND CONCEPT

By the way, I need to tell you that the chief scientist looks out three to five years ahead and tries to steer the studio toward working technological solutions to film industry problems. This is different than that of a chief technology officer (CTO). A CTO usually looks at technologies that have to be in place in the next 90 days, the

“things that are on fire” range. We are just going to talk about chief scientist and technologies that need solutions over the next three to five years.

There are five upper-level parts to the chief scientist mind map and the first one, *story and concept*, is the one I focused on initially. For purposes of this mind map, *story* means the document, or screenplay, that tells you what the film will be about and who says what. *Concept* means what the scene will look like when the film is shot, kind of like concept art (Figure 2).

CHATGPT

Let’s start with ChatGPT, a large language model-based chatbot developed by OpenAI.¹ ChatGPT can be used by pretty much anyone willing to

download the software and play around with it; one does not have to have a Ph.D. in computer science to use ChatGPT. I have spoken to several screenwriters who are using it for quick first drafts of the next scene they need to write. The user has to provide ChatGPT text that roughly describes what the user wants ChatGPT to generate and the user can add more detail and run it again when it’s not quite right. In Zyda,² I handed ChatGPT two pages of a screenplay and a few extra answers to queries ChatGPT needed before it then produced a couple of pages of new screenplay.

SCREENPLAY DRAFT SUPPORT

So you can see that one of the bubbles underneath story and concept is

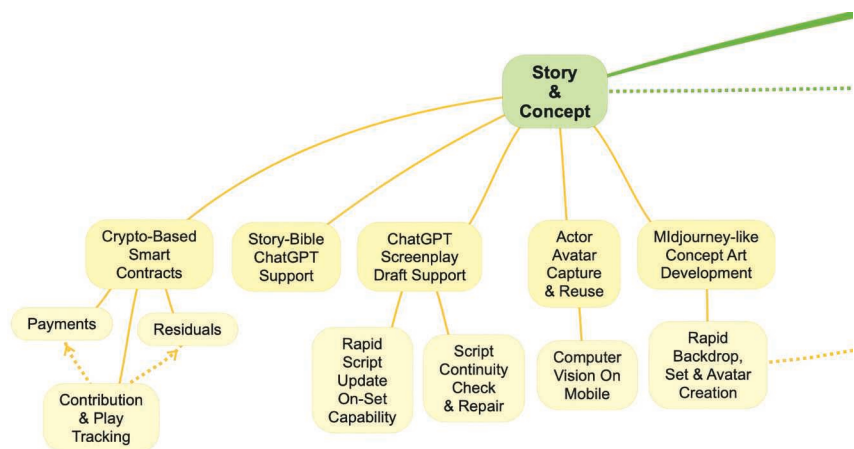


FIGURE 2. The story and concept part of the big picture.

ChatGPT screenplay draft support. Now, screenwriters are already using ChatGPT to quickly knock out their next scene but all of those writers will tell you is that, as writers, they then have to go through the ChatGPT written scene and “fix it.” The text requiring repair after ChatGPT has been quoted to me as 20% to 30%, the human writer having given ChatGPT sufficient upper-level spec and instructions so that ChatGPT kind of knew what to create. This is not putting someone out of work but rather helping the writer with a tool that increases their efficiency. This is not “full automation” but rather like the transition from slide rules to calculators in the classroom in 1974. So, we have ChatGPT now and perhaps the “support” part of this is to retrain writers to become facile with ChatGPT.

RAPID SCRIPT UPDATE ON-SET CAPABILITY

Underneath that support bubble, we see rapid script update on-set capability. And when we are shooting films, there is a large crew deployed and sometimes as scenes are acted, we discover that the dialogue and continuity are not right. *Continuity* is the flow from one scene to the next and we need that to flow story-wise and not be abrupt. So we also see ChatGPT enhancements that allow us to fix continuity and script problems on-set without having to send the entire crew out for too long a period.

STORY-BIBLE SUPPORT

Another bubble is story-bible ChatGPT support. Now, the *story-bible* for a long-running show or film sequel is the document that defines the personalities and behaviors of the major characters in the show. It also records any backstory previously provided or used. So ChatGPT support at the story-bible level is to examine how the writer has used characters it knows about and perhaps suggest character history or behavioral traits that might make the connection between what has gone before clearer. Some long-running shows, *Star Trek* for example, have long and detailed story-bibles that are best referenced

automatically rather than memorized by new writers on the show.

AVATAR CAPTURE AND REUSE

Under story and concept, we have actor avatar capture and reuse and computer vision on mobile. This is available now with the Epic Games Unreal Engine’s tool named *Metahuman*. This allows an actor to act out the part with visual capture of their facial gestures via a smartphone and the face of the actor replaced in real time with a fully made-up avatar that mimics the facial movements of the live actor. So, we don’t have to do makeup on a live person and the character filmed is exactly like our artist’s concept. This also gives us the ability to use the avatar skin of an actor no longer available for the essential backstory scenes in long-running series.

MIDJOURNEY-LIKE CONCEPT ART DEVELOPMENT

Another aspect of production in film and entertainment is *concept art*. Long done by in-house artists and illustrators, there are now generative artificial intelligence (AI) art programs, such as Midjourney, Stable Diffusion, and Dall-E that are being considered instead. Midjourney takes prompts similarly to ChatGPT and creates images from the natural language descriptions.³ This does not replace concept artists but rather provides a tool that, once mastered, increases the speed at which an artist can be productive. Right now, the interface to Midjourney is poorly thought out and embedded inside of the worst social media tool ever invented, Discord. So, the work, over time, is to replace that interface with one that makes sense for concept artists. Additional work is to extend such generative AI concept art creation into 3D, such that we can rapidly create 3D backdrops, sets, and avatars for deployment during film shoot.

CRYPTO-BASED SMART CONTRACTS

Crypto-based smart contracts are something one naturally thinks of when

we start down the pathway of reusing the avatars of actors previously recorded or reusing characters created in a previous screenplay by a different writer. The idea with smart contracts is that each contributor to a film production can have a real-world contract that specifies payments and residuals, with those payments and residuals enforced through a crypto-based smart contract system that is connected to a contribution-and-play tracking system. A contribution-and-play tracking system is also connected to the real-world contract, with a percentage of contribution value that is used each time a film or show is played and hence tracked for residuals and payments.

POSTPRODUCTION HAPPENS AT THE SAME TIME AS VIRTUAL PRODUCTION

As we move to fully digital production and away from film stock, it becomes quite clear that virtual production and postproduction can happen nearly simultaneously. LED panel walls driven by game engines (Epic’s Unreal Engine, ...) provide virtual backdrops and avatars with live actors in the middle being able to be shot on digital against those LED panel wall virtual sets. Those backdrops and avatars can be changed quickly using game industry standard tools, and realistic lighting match can happen then instead of later in a postproduction process. If the digital shoot is placed in a cloud environment, then dailies can be reviewed, editing can happen immediately, color correction and grading can be performed, and visual effects added at a distance or locally by the distributed production team. As digital production tools get developed and more familiarity by the production team happens, film production becomes lower cost and requires less time (Figure 3).

Additional tools that can be near automated are multilanguage animation, where the lips and faces of the characters shot in English can be reanimated to a new language using AI tools similar to those currently available from the

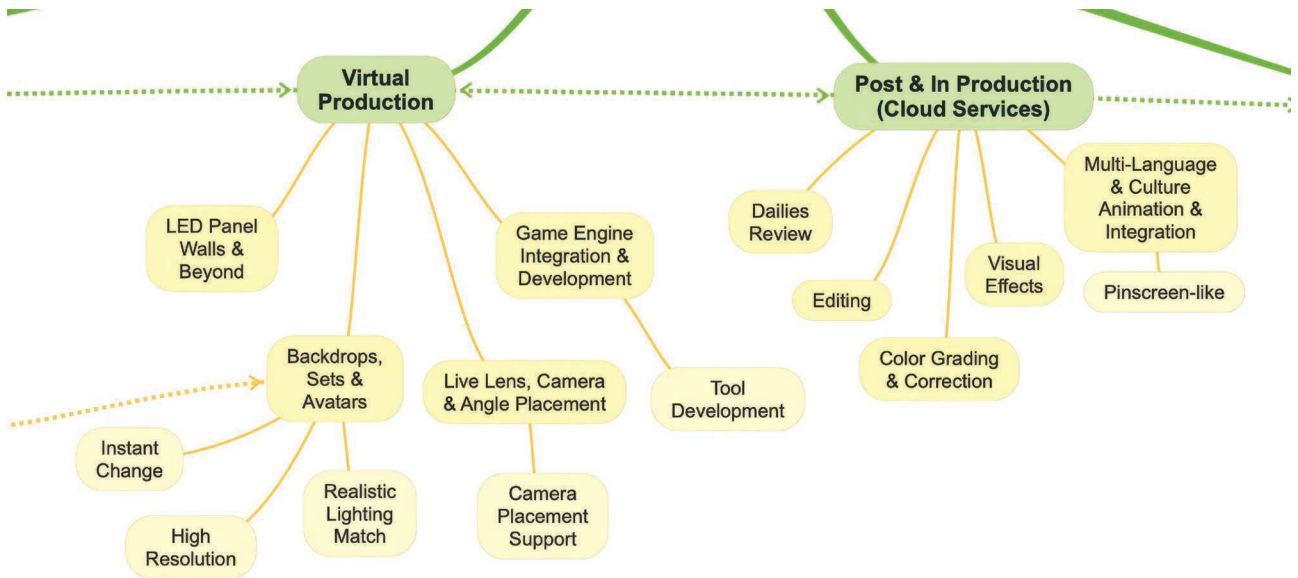


FIGURE 3. The virtual production and postproduction parts of the big picture.

company Pinscreen, which currently does this for Netflix on contract.⁵

CUSTOMER UNDERSTANDING AND RETENTION

Some of the additional things the chief scientist has to focus on are technologies for customer understanding and retention. Customer modeling for the

film and television realm means that we have to collect interactions by customers with the streaming channel's interface, such that we can make decisions as to what to present to those customers (Figure 4). Interesting AI things going on in this space are visible from companies like Versusgame⁶ that creates interactive games from prior customer interactions (interface clicks, webpages read, ...). In the interest of full-disclosure, I am an advisor to Versusgame. In fact, I am advisor to 20+ start-ups.

ChatGPT gives us the opportunity to create AIs that can listen and interact with the desires and past experiences with customers. With such interactions, we could have a virtual movie friend running on an Alexa-like device that listens to our comments on films and then, perhaps, suggests the next thing to watch.

STREAMING AND DELIVERY

Modern streaming network architectures do rather well today but the chief scientist needs to think three to five years out. With mobile networks beyond current 5G, some of the focus may be on the question, "Will the current way we stream our entertainment work well as much of the streamed

entertainment moves across a mobile network infrastructure?" Things perform differently in mobile and this will be something that needs to be prepared for.

Robust and secure networking is something all of the streaming services do well with now but there are always new challenges. If we look back to Sony's 23-day 2011 Playstation Network outage, we all know what happens if there is even the smallest crack in our infrastructure security. And it's only going to get worse when we have quantum computing that breaks our password security models nearly instantly.

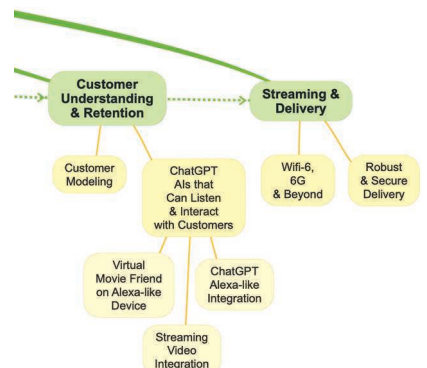


FIGURE 4. The customer understanding and retention part of the big picture.

COMMENTS?

If you have comments about this article, or topics or references I should have cited or you want to rant back to me on why what I say is nonsense, I want to hear. Every time we finish one of these columns, and it goes to print, what I'm going to do is get it up online and maybe point to it at my Facebook (mikezyda) and my LinkedIn (mikezyda) pages so that I can receive comments from you. Maybe we'll react to some of those comments in future columns or online to enlighten you in real time! This is the "Games" column. You have a wonderful day.

DID I GET THE CHIEF SCIENTIST POSITION?

Well, it is still under discussion and probably not knowable until past this column's turn-in date! I have gone through six rounds of interviews, several asking "can you start next week?" and another indicating "I hope to see you at xxx soon!". We will see ...

ACKNOWLEDGMENT

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