

Games Development: How will you feed the next generation of hardware?

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1 Introduction

In the early 1980s, a videogame was a six to nine month job for a single person. A typical team size these days sits around the 25-30 mark, and it's not uncommon to see games taking over 2-3 years to complete. With every new high-end platform we see an increase in complexity, both in terms of development techniques and in terms of quantity of art assets. On average each console is ten times more powerful than its predecessor and tends to require double the team size in order to cope. As development teams once again have new hardware fast approaching on the horizon, the question arises of how we will field the increase in content creation.

Companies will not be able to expand their teams into the hundreds, take 3 years to put out a title and then pray that it sells enough to support all those people and salaries. Simply bloating the old production model will not work. It's time for new solutions. With that in mind, the main thrust of this panel discussion will be to explore ways in which we can approach the challenge of making games of the complexity that new hardware will demand. The possible solutions are many, but are there any that will really allow teams to output both quantity and quality while still maintaining financial viability and manageable staff numbers?

2 Panelist: Emilie Saulnier

Vicarious Visions is a leading independent game development studio. Our studio has developed titles on diverse platforms, ranging from a mix of GBC, PC, PSX, N64, moving to larger teams for GBA, PS2, Xbox, and GC, and now looking at fielding teams for next gen handheld (PSP, Nintendo DS, etc) and console (XBox 2, PS3, others). We've seen development teams range from 3 person GBC teams to ~70 person multiplatform console teams. The timeframes have gone from a record 6 week GBC title to 18-24 months for major console development. Our rule of thumb is that development budgets and team sizes seem to double with each generation of hardware. When we look ahead to XBox 2 and PS3 and beyond this starts to look really scary! We can easily see game content that would require 200-400 people to create.

An independent developer having one 200-400 person team is not really conducive to long term survival – there's no way to survive a sudden cancellation, publisher bankruptcy, or a delay due to something like a movie schedule. Smoothing the production peaks

between projects, or surviving a cancellation or movie delay is a lot harder if we're talking about reassigning 100 artists and designers, versus 10 or 20.

Another dimension is that an independent developer survives the ups and downs of our publishers and platform manufacturers either because they struck a gold mine, or don't need mere money, or because they have a diverse, balanced portfolio of projects. We need to spread our risks between platforms and publishers. If each of these is a 200 person title, we stop being a small company and quickly start looking at Pixar-like sizes of 700 or more people. If only we had the revenue of Pixar!

Large conglomerates can take the approach of campus models, where they can field an army of artists and level designers, and build an infrastructure that can move huge numbers of people onto games for short production periods. But can we preserve the passion and creative force in our independent developer culture when we are working as an army of developers, each with visibility to only one small part of the overall creation?

Time isn't really an option, in terms of doing games that take longer. The time to market is driven by being able to quickly respond to entertainment events and pop culture trends. Being slower here is not a winning option.

So I would claim that an independent developer needs to find a clever way to do more with less. What this means:

- Production company model – we need to become a company of experts (all chiefs?) who field production teams from other specialist companies. This will always be part of the solution.
- Collaboration – teaming with complementary partners to share tech and tools investment, and possibly production resources. We're not going to do it all ourselves.
- Focus – just like when designing a game with limited resources, we need to focus our resources so we can differentiate in particular areas of excellence. We're not going to compete head-to-head with brute force of huge teams.
- Agility - do less things multiple times, do things faster. Make good tools, and reuse whatever we can.
- Finally, graphics content is not the only cool way to burn cpu – differentiate on the basis of design – better AI, more AI, more interactive environments.

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3 Panelist: James Spoto

I believe interactive entertainment must look to feature animation & visual effects for film as the template for next-generation development, not necessarily in terms of the content of the actual media, but in terms of how our production methods are converging with CG for film. Additionally, we should seek stronger ties to academia as a resource for internship, curriculum, and long-term research opportunities, to adequately address the significant problems posed by future game development.

In examining successful practices of making CG for film, as illustrated by a wealth of industry and SIGGRAPH publications, one can see:

- Strong emphasis on the creative process to drive development
- Breakdown of work into departments and specialization of craft
- Strong tracking of assets and associated costs (i.e. This character is “too expensive”)
- Emphasis on good production management
- Focus on sound pre-production prior to expensive development investments
- Culture clearly rooted in art

A supporting point for applying these practices to videogame development is that they may not necessarily be second nature to our industry, primarily because of our fundamentally different cultural roots. In making a game, the development team is ultimately building software, whereas film is ultimately a moving picture – photography and storytelling. Thus, the industry’s roots are in engineering and technology over art, and positions such as full-time art directors for games are a relatively new phenomenon not only because of technical limits, but also because of our past processes and traditions.

Concerning better university and educational partnerships, computer graphics for film has benefited tremendously from cooperation with academia. In fact, the high degree of crossover among those doing academic research and those doing applied research in industry makes it difficult to imagine the computer graphics field as it is today, without this defining relationship – the luminaries in the field have almost exclusively been academics. I believe that the game industry should look to increasingly partner with educational institutions in an effort to foster similar relationships -- not just in visual areas, but also in the many other areas of research involving interface, interactive experience and narrative, and psychology and sociology. From these relationships, we can hope to help define curricula for interactive applications, attract graduate and undergraduate students for cooperative programs, and engage in collaborative long-term research involving industry and academia.

Finally, although we can use feature film as a template, it by no means addresses all of the issues facing the next-generation of interactive entertainment. I attribute this to the fact that although the asset creation component of making games looks more like it does for making films, largely because of the scale of the content now suitable for run-time applications, we still have our software-rooted issues to deal with. They are the additional problems of:

- Asset creation for robust, interactive applications (you can’t necessarily fix it in post!)
- Constraints of limited run-time resources in authoring complex content
- Economic viability: not every game will be able to push the envelope, just as not every film is a \$100M effects-laden extravaganza.

In summary, my aim in this position is to help indicate the order of magnitude of the problems facing us, in order to educate interested graphics professionals of the current state of the game industry, as well as educate educators themselves, as they work towards preparing students for professions in interactive entertainment.

2 Panelist: Frank Vitz

I am a visual effects supervisor who has made the transition from the world of film into that of video gaming. I am leading a new team at EA World Wide focused on Advanced Visualization for Next Generation Gaming Platforms. My team’s mandate fits the profile of this Siggraph Panel perfectly and there are many aspects of what we are doing that we can discuss.

Bringing the emotional impact of the linear cinema to interactive games is one of our goals. With the advances in hardware and software, the potential fidelity of the game experience is approaching that of the movies. One aspect of the challenge is to bring the high end visual effects that we see in the movies into the real time domain. Fast hardware alone is not sufficient. We have to develop algorithms and techniques that cut corners for speed without sacrificing the perceived quality. Next generation machines are likely to have multiple parallel processors with all the potential and coding problems that that implies. But even with machines that are 10 or 100 times as fast as today’s platforms it will still be a major challenge to shoehorn fancy new algorithms into tiny time slices.

With higher fidelity comes the problem of increasing asset sizes. Entire seamless photorealistic worlds will be made up of huge databases that will be impossible to build by hand, requiring instead new hybrid production pipelines that fuse procedural techniques with the ability to manually specify details at any level.

As these new production pipelines mature, pre-production will become increasingly important. With huge worlds to build and complex scenarios to orchestrate and manage, production teams will need to become much more efficient so that more of their effort will make it into the game.

And of course the bottom line is the experience. We need to develop production methodologies that enable the game makers to deliver compelling and satisfying stories. In many ways the gaming industry resembles the film industry in its early days. We are in the process of defining systems and ways of working that will define a new workflow. It may even be new genre; one that handles incredible complexity and huge amounts of data, but that provides a flexible and expressive vocabulary for the creation of the new and as yet unimagined entertainment classics of the future.

4 Conclusion

It should be clear that the games industry will shortly be facing some considerable challenges. The coming of new hardware can be seen by some as a great opportunity to produce truly remarkable content of unparalleled visual quality, but it can also be seen by others as the element that will see the collapse of common development practices. In each of those extremes, and anywhere in between, studios must start to evaluate how they will prepare themselves for the changes ahead.

This panel will be discussing the topic from both a business model and an advanced technology point of view. The ultimate goals of this talk will be two-fold.

Our first goal will be to expose and make clear the underlying real-world issues with developing an interactive entertainment project for next generation hardware. It is important for people throughout the CG industry to understand the level of power and visual capabilities of new game oriented hardware. People within our section of the industry must take note of the impact these machines will have on their studios. Equally, people currently working in other areas of CG should be made aware that there could be tremendous opportunities here for collaboration, research and of course employment.

The second goal of this panel discussion should be to explore a wide range of solutions to the problem. Hopefully we will be able to reach an agreement of which approaches would be most effective and which would be most feasible for an average studio. Where present technology and development strategies fall short of our anticipated needs we will obviously also indulge in discussing possible directions for future development.