Resolution of production processes:

The figure of the Technical Artist as a differentiating variable in the development of a video game

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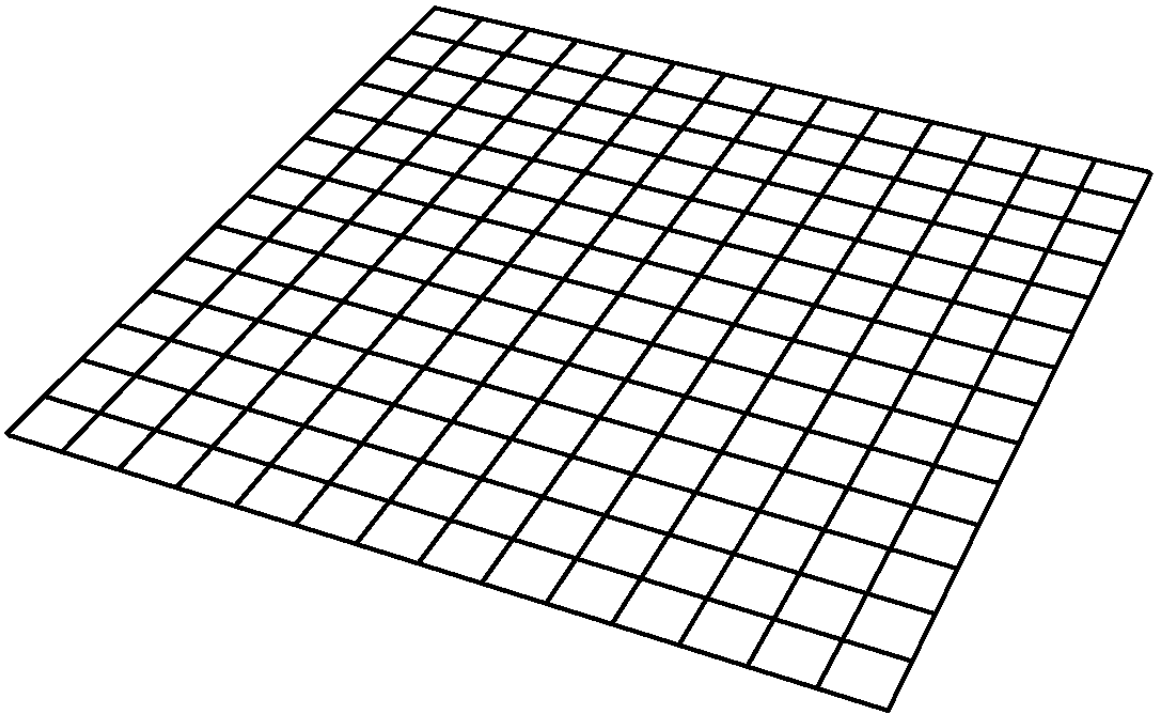

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Summary / Abstract

The objective of this research work is to study the figure of the Technical Artist from the framework of the production and development of video games, in order to have a clear definition of the role and understand what its influence is on the development of a video game. Investigate, contrast and validate processes of this role to include them in the administration and management of projects, which can incorporate these methodologies in the workflow of the company, structuring a system and streamlining processes that result in an improvement in development and final product.

Keywords / Keywords

Technical Artist, Pipeline, Video games, Project Management, Methodologies

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1. Introduction

If we decide to look for a job as a Technical Artist in the video game industry, or look for information on what he is or what he does as a developer, we will find that this is seen as a new concept within the video game industry (Career Explorer), however, we can see profiles with an experience of more than ten years, being a role long established in development studies around the world.

Despite this, it is still treated as something new both outside and within the video game industry. This fact, together with the wide range of tasks attributed to this position, could in many cases cause an ambiguity in the definition of the work that is carried out, which could, consequently, cause a limitation in its potential.

This has led us to consider a study defining the line of participation of a Technical Artist in the development of a video game, as well as its differentiating role in the production plan of a project. For this, we base our study on the implementations of the role, based on the possibilities it provides, parameterizing its contributions and applying them to a production system based on the queuing theory initially proposed by Agner Krarup Erlang.

We will also look for a vision, definition and function of the Technical Artist based on the current perception of the role in the industry, being able to introduce the result through Little's Law (Little, 1954) to calculate the performance of the production plan with and without this role within the team. We will therefore take an introductory role in *Tech Art*, as well as an exemplification and in-depth investigation of those skills and tasks that are sought in this profile based on the rest of the departments and members of the company.

An updated vision of the production techniques of a video game together with the simulation of a specific development context will be essential to analyse the position from a real perspective, so this work will have specific implementations that can be replicated. This will give the possibility of contrasting and expanding the research according to the needs of each project, generating a guide with which to propose the incorporation of the Technical Artist (onwards TA).

1.1. Hypothesis

Our assumption comes from the multitude of completely different tasks and skills that are required for this job (Jam City, 2009) due to which we believe that the figure of the TA is not yet too defined in the development of video games, in such a way that its worth ends up dilute into fields assigned to other roles. So, currently, the role can be incorporated in the production in an improper way, without squeezing to the maximum the possibilities that this position offers to a project.

1.2. Objectives and methodology

The main objectives of this study are the following:

- Define the figure of TA and its role in the development of a video game.
- Give a specific vision of their responsibilities and skills, defined in the different roles they play to strengthen the pipeline and the system / project architecture.
- Provide and validate examples regarding the improvement in production made by the figure within the team. Support this role as an indispensable resource for a fully optimized development in terms of time, quality, capital and cohesion of departments and diversity of roles.

To achieve these objectives, we will follow the following study methodology:

The work will start from an exhaustive analysis of the role to base the bases of the problem in terms of what is understood by AT. Through video game development documents and practical experiments, we can argue the objectives of the work. Thanks to this, we will be able to compare empirical data by contrasting real development processes in closed environments (through individual experiments in which we will use different tools and measure the results) or in complete developments from start to finish, through real documentation.

First, a study of the existing documentation on the subject to be dealt with will be carried out, around the figure, methodologies and agile processes in the development of video games. Next, we will approach the study, with a quantitative and qualitative approach, using direct, methodical and planned research techniques, conducting interviews and forms with those involved in development.

Experiments will be carried out at different profiles, both artistic and technical, in order to compare different development processes that we will propose; analysing how the figure of TA influences them. Finally, with the results obtained, it is expected to define the role and its importance within the development of a video game.

The key to the research will be experimentation with real individual processes, the documentation provided of production developments and the own experience of professionals in the sector with profiles based on different disciplines in the field of video-game development.

1.3. State of the question

Despite the incorporation of our role (TA) in the development of a video game a few years ago, this figure is not yet fully defined, unlike others such as level designers, physics programmers, concept artists (Liming and Vilorio, 2011). This definition varies according to the place where you are looking for or the specialization of the people who define it. Finally falling into a progressive accumulation of responsibilities that disorient the professional from his main function, the choice and development of pipelines (figure 1), workflow, streamlines, implementation and departmental cohesion of a project. (Hayes, 2008).

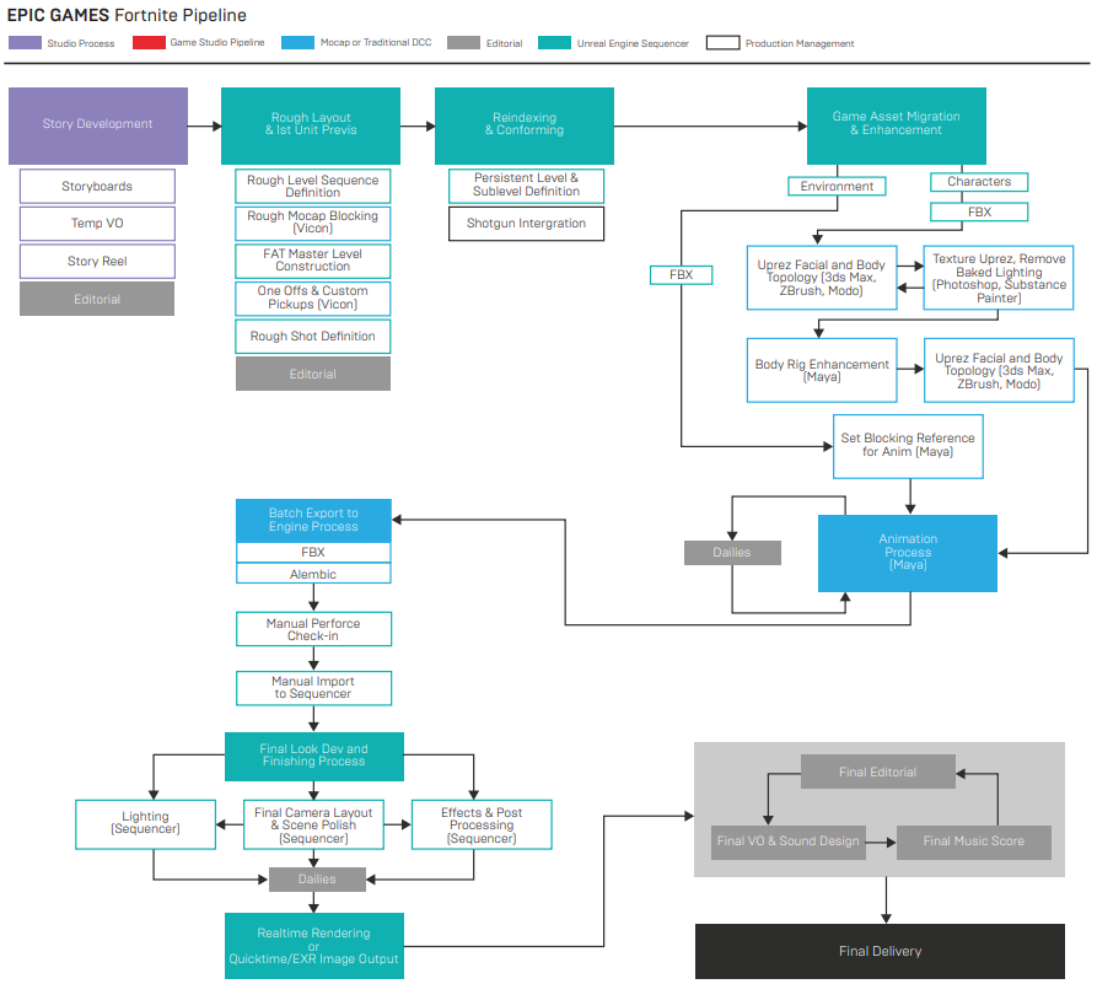

Figure 1: Fortnite Trailer. Real-Time Art / Visual Pipeline. Source: Epic Games

Most of the industry agrees that it is one of the most innovative roles currently, that more fields of knowledge require and that help the overall development of a video game. The responsibility that falls on this position is of special importance due to his transversal role in the project, hence the dissolution of the role, dividing this work into individual tasks. (Thoerzen, 2015).

The role is diluted, especially in the initial stages of developers career, that means, it is really difficult to know what qualities, skills and knowledge to learn, unlike in other roles where we find a fixed objective around which learning revolves (Liming and Vilorio, 2011). However, the definitions, share one conception in common: the need for the TA to see the project in a global way, quickly recognizing the start and end point of the entire development, and from there, draw the complex network that connects the two points.

Traditionally, our role is the one that acts as a bridge between programmers and artists within the development of a project. The qualities that are attributed to them in websites like Career Explorer[1], Get In Media[2] or Screen Skills[3], share in this description the creative, original and intuitive nature of this position, completely open to research and innovation of new techniques with which to broaden the horizons of the project in which they participate.

With this set of qualities, you need to develop a set of skills in order to carry out this job. For this, returning to the collective definitions that we can find in any specialized workspace, the TA must have extensive technical knowledge. Of course, the role must have a global vision of the art creation process in video games, know the tools and existing software, with the possibilities that these programs offer; in such a way that it can channel art from its initial stages in a concept art to the final result on the corresponding platform.

For this, both artistic and programming skills are needed, requiring a knowledge of different programming languages, in addition to a broad knowledge of APIs[4] or graphic libraries that we have at our disposal, with their respective shader languages. However, the knowledge of these languages, finally lies in the understanding of how a micro-programmable system works and how, through graphical computing, the usual working graphical environment has been reached in video game engines or any DCC.[5] software.

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[1] Career Explorer, Technical Artist: https://www.careerexplorer.com/careers/technical-artist/
[2] Get in Media, Technical Artist: http://getinmedia.com/careers/technical-artist
[3] Screen Skills, Technical Artist: https://www.screenskills.com/careers/job-profiles/games/technical-art/technical-artist/
[4]API: (Application Program Interface). Set of routines, protocols and tools to develop software applications.
[5] DCC: (Digital Command Control) standard for operating systems digitally.

This technical knowledge, which, a priori, might seem excessive for a profile that includes the word “artist” in its name, lies in the understanding that the TA makes posteriori for the tasks of optimization, data channeling or treatment of routines and databases. Being a key figure in solving problems and creating tools for both artists and programmers.

In addition to this, of course, we have the artistic role; which is not only about creating shaders or visual effects, but also an involvement in the process of creating models, textures, materials, UVs, lighting, post-processing, rendering, rigging, animation or even dev look. To be often responsible in addition to the simulation of tissue, fibers, muscle physics, destruction and infinite procedural processes.

After all this, when we review the list of knowledge, tasks and skills, we can quickly see that it extends by covering a large number of sections of the development of a video game, whose performances have associated specific roles. So how does TA deal with all of this? The answer is simple, it is the bridge between all these practices when developing the project. They don't have to be the one to make these tasks, but you do need to oversee them and build them together.

This is where the role of managing and producing the role in a project lies, its direct connection to development departments. Thus, in order to have a clear and schematic vision of the participation of this role in the different sections and development practices, we can elaborate a scheme that helps us to synthesize the work of this position.

Based on different studies, schemes and work methodologies of different video game developers, as well as individual TAs, we can elaborate this scheme, based mainly on the vision of this question from some referents such as Jason Hayes (Lead Technical Artist, Rockstar) in " The Code / Art Divide: How Technical Artist Bridge the Gap ”, Tech Art Aid, Riot Games“ So you wanna make games ?? ”, “ Understanding Tech Art” by Ryan Brucks or “Video Games: An introduction to the industry” by Andy Bossom and Ben Dunning, where they make an exhaustive compilation of the existing roles in the production and development of video games, in addition to recreating the journey and future development of this industry.

We can distinguish between the roles, sections or departments with which our role is connected, and the processes and practices with which these departments unite. For example, the diagram is represented with Animation, typical of the role of animator, and the process or technique by which the TA participates in it would be tools, rigging, the simulation of physics in certain bones of the skeleton, procedural systems or blend shapes, etc. (Figure 2).

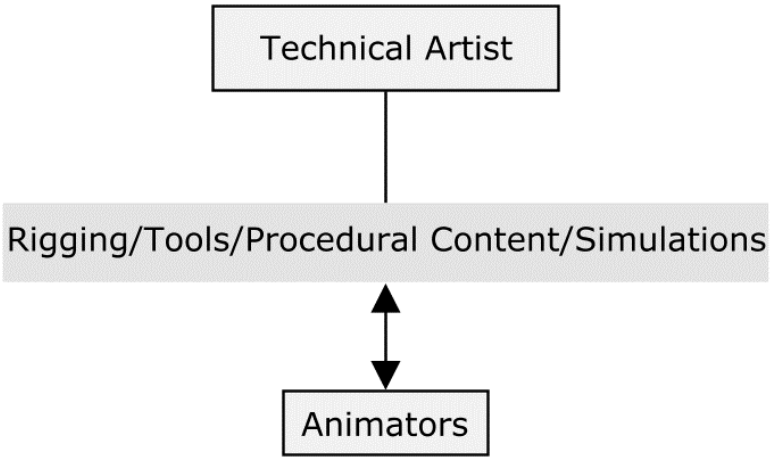


Figure 2: Process of relationship between roles and Technical Artist. Own source.

Following this scheme, we could limit the TA to nine roles or departments with which it has a direct connection:

- **Texture Artists:** it is given by the implementation of textures in the graphic engine, the treatment of them, the application of techniques with which to achieve greater efficiency through different channels, the preparation of these to create effects later or even the creation of masks and special maps for post-processing effects and shaders.

- **VFX:** technical skills in creating textures are required, as well as knowledge of particle systems and geometric effects, always taking into account hardware constraints (Bossom and Dunning, 2015). Due to its transversal role, it requires that they keep in contact with different departments, both design and art, to achieve the appropriate effect, keeping abreast of the technical requirements of the project.

  The role of the TA in this department, in addition to the standardization of the pipeline to carry out in the creation of these effects, becomes important in the incorporation of procedural systems and simulations.

- **Animators:** lays the foundation for this process in terms of animation work using rigging, blend shapes or mocap. For an animator to feel comfortable while performing his role, he must have all the possible tools at his fingertips, in addition to specific controls for each project: working on in-game characters, cinematic sequences, keyframes, locomotion systems or any other action that involve movement (Bossom and Dunning, 2015).

  As we have already introduced before, the differentiating variable in this process is the introduction of procedural systems in these animations, the possibility of creating animation sharing channels between models, the

creation even of tools that automate processes that could lengthen over time with traditional methods or research and develop solutions to specific problems.

- **Game Designers:** according to Bossom and Dunning, the game designer must be able to direct the audience through the narrative structures, balancing the game mechanics in pursuit of the expectations of the project being carried out, taking into account the schedule to which production is adjusted. So of course, any help to increase the testing processes of new mechanics and interactions will be beneficial for the development of the video game, very much in line with the Tools programmers and UX designers.

- **Lighting and Character / Environment / Level / Props artists:** as for lighting and 3D art in a video game, we have a lot of variables that can appear during development. Each project has a specific production plan, a specific artistic style and a standard of platforms on which it will be launched.

  This and many other factors alter the artists' workflow when it comes to sculpting, modeling, texturing, rendering, and lighting; therefore, they need to set standards when creating a workflow that the entire project must follow. The artist must consider, in addition to the visual requirements, the technical requirements of the graphics engine in terms of optimization and processing.

  These limitations, or specific treatments will be created by the TA based on the variables imposed by said project, such as artistic style, graphic engine, production plan or team size; Thus, establishing a work channel appropriate to the project, according to its qualities and needs.

- **Graphic Engineers and QA:** the joint work of our role together with Graphic Engineers and Quality Assurance lies in the visual optimization of the entire project. After or during the implementation of models, effects, animations, environments, textures and other assets[6] From the project, this team looks for ways to increase the graphic performance of the project, establishing and elaborating profiles according to what platforms, rendering levels and behaviour of the engine in the flow of graphic data.

- **Pipeline and Tool Programmers:** regarding the creation of tools both for the development team and for the graphics engine itself, whether it is its own or not, in the vast majority of cases it will be necessary to make some changes or modifications, in addition to adding new functionalities.

[6] Asset: those resources that can be included in the graphics engine.

Many of these requirements are being added by the system engineers, but many times a series of characteristics are necessary, which are not provided by the engine, or are provided to us in a different way. These characteristics can be part of any of the areas of the game, from the physics behaviour to tools that provide a channel for the distribution of texts for the dialogues of the video game.

- **Learning:** despite not being a section or department as such, a great part of the TA time tries to create documentation as well as solve doubts and problems within the project. All this series of own tools, research and development of new or specific techniques may be unknown to the rest of the team.

  This means that, just as we spoke before about the cohesive role of our role, this must also communicate with the engineers and transmit the messages to the art department, often acting as a translator between programming and art, and vice versa. Also teach and introduce new techniques to the work environment, as well as good practices when developing any model, effect, animation or texture. This is undoubtedly essential to avoid possible problems and setbacks in the future of the project.

- **Producers:** finally, producers, one of the roles that most concern us in this research, are and should be a crucial connection between the development team and the video game project. According to the definition that Bossom and Dunning give us: “the producer is the individual on whose shoulders the project is supported, with the main concern of the logistical process of development, ensuring, adjusting and meeting production times, in addition to fixing and not exceeding the budget managing the team ”.

  "The producer's job is to make everything run smoothly, everyone is happy, and no one feels oppressed." Dylan Bale, Chief Production Officer at Born Ready Games and Edge Case Games, interviewed at Video Games: An introduction to the industry.

  TA and Producer have the shared function of unifying departments. In many cases they act as negotiators looking after both. (Oscar Świerad, 2018). Just as the Producer introduces agile working methodologies to set production times, TA helps to achieve these times through its role in development. All the influence that exerts on each of the departments and aspects that we have seen in the previous sections, enable a series of possibilities in the production plan.

The Producer sets the pace for the development team, and the TA can and should accelerate it through its technical and production capabilities. Thanks to this synergy, a substantial change could be produced in the production of a video game, shortening processes that the Producer can take into account when preparing his plan.

However, this impulse or stimulation in the natural development of the project with the variable of the figure of the TA, must also assume the variable R&D (Research and Development), by which the role acquires a dimension of R + D + I, from there its investigative and creative position. This translates into time and workloads in the search for solutions, new technologies and implementation of said tools and features in the team workflow.

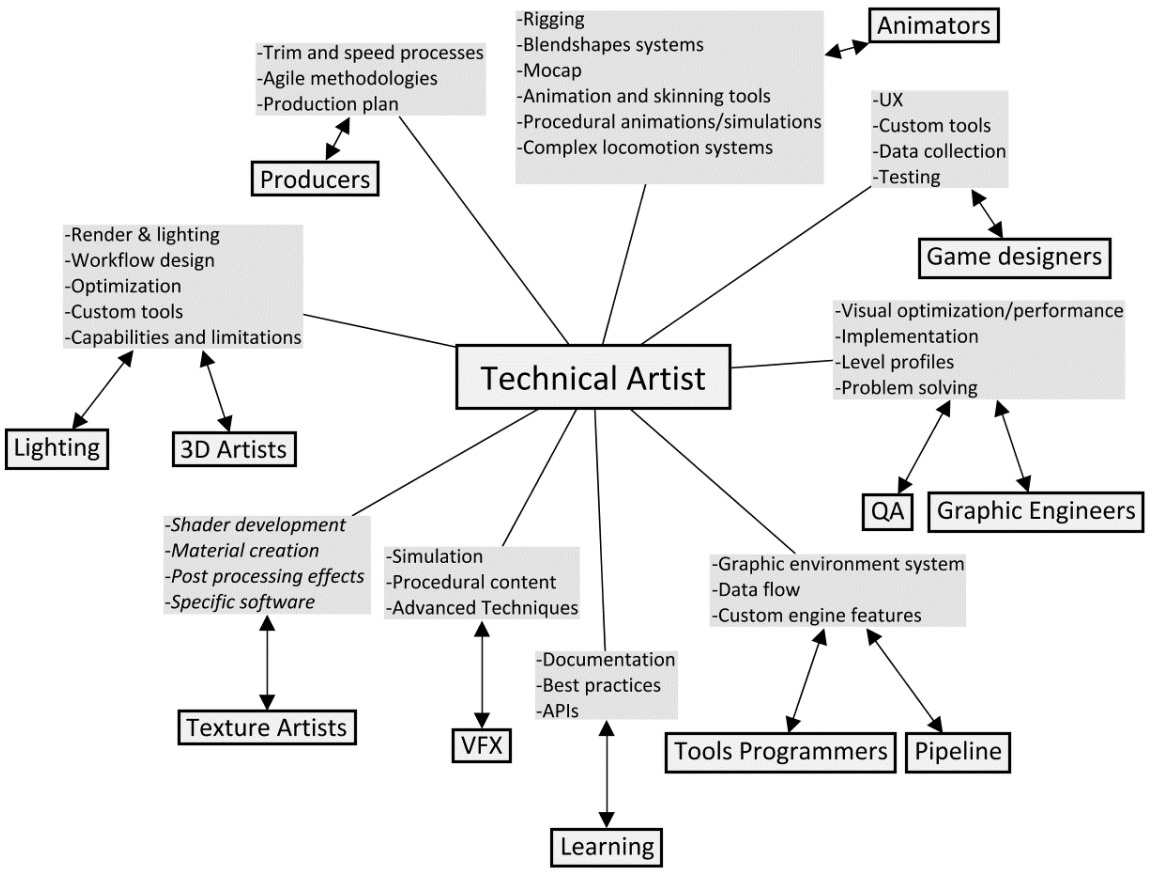


Figure 3: Interdepartmental participation diagram of the Technical Artist. Own source.

Regarding the definition that Bossom and Dunning give us about the role of TA, they raise and emphasize again their role as a bridge between the art and programming teams. They also affirm that the individual who reaches this position can come from both the discipline of art and programming since, as we have seen (Figure 3), they work both in visuals and technology of the video game engine, passing for the series of practices that we have been seeing throughout the work: tools, VFX, implementation, creation of shaders, pipeline ...

However, to enrich this definition, we can see how Jason Hayes delves further into what the role of the TA should be. In broad strokes, he solves the dilemma by specifying that this figure should be able to design and develop the entire channel of artwork necessary for the project. "Part of the role is to be pipelines and systems architects" (Hayes, 2008). Here we see a fundamental dimension in which planning methodologies and workflows becomes one of the primary qualities. These are based on a very extensive knowledge of hardware and software, as well as in many cases mathematical, physical and artistic. The support of the team in the position is almost always reciprocal, feeding back the knowledge of each department, finally evolving the project to a higher stage.

Our role not only designs and specifies these work systems (in coordination with other disciplines) but is what drives and defends changes. Due to their familiarity with these, it makes them the primary course of action for the team to follow, and they fix bugs in the tools developed to support channelling data and work (Hayes, 2008).

Seeing and establishing these knowledge and skills, it is to be expected that, in the meantime, there will be types of specialization. The role, then, can be ultra-specialized in different areas or sections of Tech Art. With the passage of time and the improvement of software and video game development systems, we have begun to endow certain roles with the adjective “Technical”, by just like with TA. It is normal given the number of techniques that a developer has at his disposal when creating a video game and how the same task can be performed according to what we want to achieve.

To illustrate the latter, we can see the case of the Technical Animator and the Animator. According to Anthony Castoro (Heatwave Interactive, co-founder and CEO) the difference between these lies in that the former is the one who makes the structure that enables the animation of the character, while the Animator is the one who gives the movement to the character. We observe this when we think of motion capture technologies, complex locomotion systems, blendshapes-based facial rigging, physics-based procedural animation, etc .; and how to develop the architecture of these systems, so that they flow in real time both in the graphics engine and in the final build. Thus, this technical distinction of creating animation systems, and the animation in keyframes itself is divided into two complementary roles, Animator and Technical Animator.

Therefore, we can specialize TA in disciplines, based on the needs and scope of the project. Dividing the role in general, of characters, vehicles, environments and cinematics or effects, as well as a director within the Tech Art department (Figure 4).

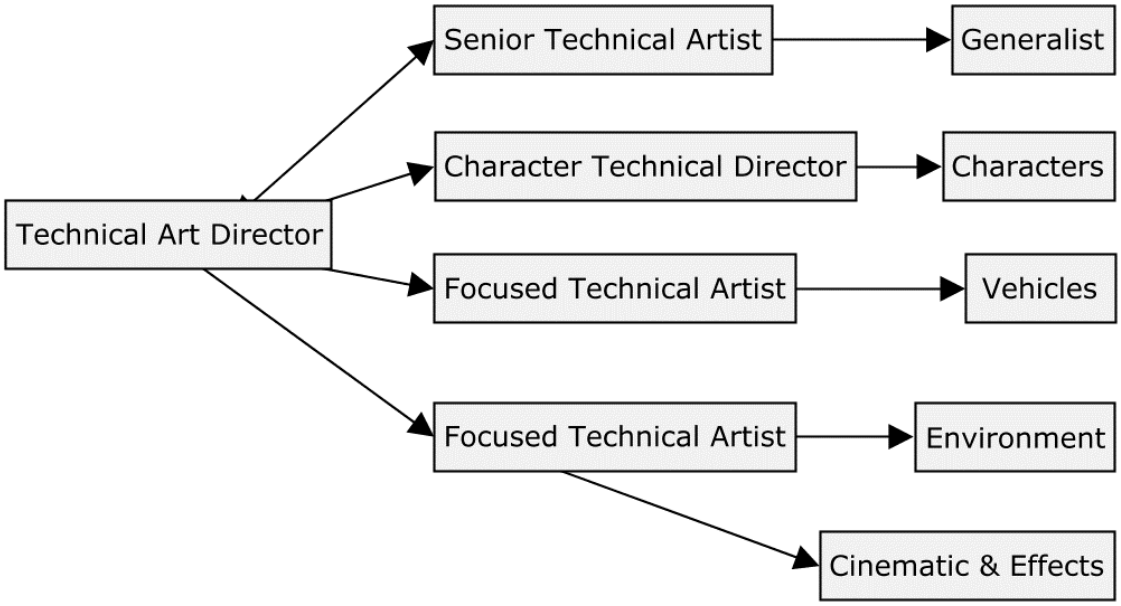


Figure 4: Typical structure of the Volition art team. Source: Jason Hayes

Finally, we should talk about the implementation of this role in the study and how to structure the team when it comes to having this variable in development. At this point of the question, currently, this position can be a differentiating variable in the production of a project, but how and to what extent we can see it through concrete examples, depending on the state of the project, its needs, the size of the team and other variables that must be studied from the production plan, including, for example, a total of three or four TAs in a team by eighty or ninety people, according to Jason Hayes.

There are many tasks, skills and competencies attributed to our figure, so limiting and focusing the efforts of this role is vital for the operation of the project's gears. As we have already seen, departmental cohesion and the new possibilities that development includes are large and varied as long as the focus is placed on those primary tasks of design and development of workflows, as well as research and application of new technologies.

2. Development

As we have seen previously, the involvement of our role in the project increases the possibilities that we have when creating workflows. This interdepartmental influence pivots on the Tech Art department, therefore it can function as a vital role in the video game production plan.

In this investigation we are going to address these two situations, both at the study and individual level, as well as observe the differences between their influence on different profiles, teams and situations. For this we will base the study on experimental tests with particular development tools, comparing the processes with and without our differentiating variable. In turn, we will correlate data based on surveys and interviews, varying between different roles, as well as TA professionals from small studios, medium-sized companies and large companies.

With this approach we will be able to contrast the vision of the profile regarding the team and project, seeing how our role behaves in various situations and if what is defined above is fulfilled. However, the expected approach should vary according to "Work for Play" or "Video Games: An Introduction to the Industry", so the answers will differ based on variables that we intend to recognize through this study of the role. Thus, from this starting point, research will be committed to these situational factors and how to perceive them in a real situation.

The next point in the work is the TA's approach to its production role: work plans such as pipelines or workflows and its social work for the team to work first-hand with the Producers of the project. One of the main questions of this study refers to how it participates in this cohesion of the project and if its value increases when it exercises a production role through the inclusion of agile methodologies, so it should finalize savings in costs and time of production.

Based on this, the research will be divided into three phases, where we will analyze in detail those data resulting from the survey, experiments and interviews, as well as the study in question of the application of queuing systems to the development of a video game, more specifically through Little's Law (Little's Law, 1954).

2.1. Survey

To carry out the research, it is necessary to collect and contrast the data and real experiences that involve the figure of the TA. For this reason, conducting a survey is essential for the correct interpretation of the role in a work environment. However, the data collection will not be limited to professionals in the sector, but we will extend the sample to developers and designers of audio-visual content from other industries such as film or television, as well as students, players or followers of the video game.

One of our main objectives is to specify the role, so we will need a global vision of this work, as well as the respective profiles of a company. On the other hand, the incorporation of students and players will allow us to recognize the visibility of the role in the public and non-professional profiles, being able to contrast and cross these results with those obtained according to the respondents, based on their role and situation.

With the use of such an open sample, we intend to contribute depth and find new unknowns to the research, so we can make a way for future studies based on the results.

The conduct of the survey has been divided according to the situation and environment of the respondent regarding our role, so we can differentiate the results in different blocks. These blocks are mainly divided into "I work professionally in video games", "I study video games", "I am a player or follower of the sector" and finally "I work in another sector of audiovisual design and development". This selection approaches the position from different areas, thinking of variables such as "experience", "role" or "sector" of the sample.

Once the division into profiles, we subdivide some of them again according to specializations. Thus, those who work professionally in video games will be able to differentiate themselves between TA or another, specifying in that case what their role is. During this landing we have laid the foundations for their answers and we will be able to correlate profiles with certainty, so that the following questions have a possible explanation, expanding the data collection to a further level.

Regarding the main battery of questions, we will analyse what the expectations of those profiles are about our role and how their participation and perception have been in the different projects in which the respondent has participated. These questions are oriented both to technical processes (Shader Development, Scripting, Rigging ...) and production processes (production and work plans, pipeline, workflow) to be able to study synergies between the different profiles and departments with the figure of TA as we have previously analysed.

2.2. Interview

These interviews will be directed exclusively at TAs. The objective of these is to collect examples, definitions (Annexed 1) or specific situations in which the role is involved. Thus, we will have information obtained first hand by specialists in this field, and the study can be supported by different professionals, illustrating the results through their experience.

2.3. Experiment

In this phase of the investigation we will carry out two experiments based on the performance of individual tasks, according to the needs of different projects. The tests will be carried out individually under supervision, indicating which practices must be carried out. These experiments have been developed specifically for this research based on the data that is to be collected, according to the tasks carried out in a video game company.

Both experiments focus on streamlining processes using techniques and tools developed by TA. In these cases, we have delimited the objective to scale the test to a simplified environment in which to carry out the experiment, to finally obtain these two tests based on increasing the speed of development of a specific task, with a plausible context:

- **Export of objects:** in this case, we start from the situation in which our development needs a modular design. To do this, the Environment Art team has created a series of assets in which it divides the environment so that they can then create it suitably to the specifications of the Level Design department.

  The creation of these assets has been done in 3DS Max in the same scene and the objective is to export these assets to a folder individually, correctly and in an orderly manner, a task that we could classify as tedious when it comes to many objects.

  The experiment will then consist of achieving this objective with and without the figure of TA in the process. Completion of the task without it will be free, they should only export these objects as indicated. Next, the process will be repeated but this time with a small tool developed to speed it up.

  This tool will only be a script (Annexed 2) with which to export several objects at the same time, preserving their nomenclature and modifications as well as the 3DS Max default method. Therefore, the experiment will be carried out with and without the implementation of said script in the export process.

- **Creation of Assets:** in this practice we will start from the situation in which a horror video game needs to streamline the process of creating certain assets in Maya, which will have a lot of weight on the environment to create an atmosphere of the genre. From the art direction, it has been decided to create a gore-themed stage, so 3D artists must create a large number of entrails, guts, blood, etc.

  The modelers have emphasized that the creation of realistic and varied entrails is a tedious and complex process if the VFX department also

wants to perform all kinds of effects and simulations with it. The objective of this experiment will then be to create the mesh of those entrails, as well as to prepare the UV mapping vertically so that a shader with a function that allows the displacement of the vertices can be easily applied.

In this case, we will study, as before, the realization of this task with and without the participation of our role. The practice without TA's participation will be free, without any type of method or technique to follow, only the approach that the subject chooses to follow. On the other hand, we will have the same process through a technique devised by the TA.

This technique consists of creating entrails in a dynamic way using the simulation tools of Maya (Figure 5). In this case, a system is created with which to create the assets with a cylinder, and then subdivide and recreate the animation of some entrails falling to the ground through a nHair.[7]. This simulation is completely procedural, so there will never be one asset the same as another.

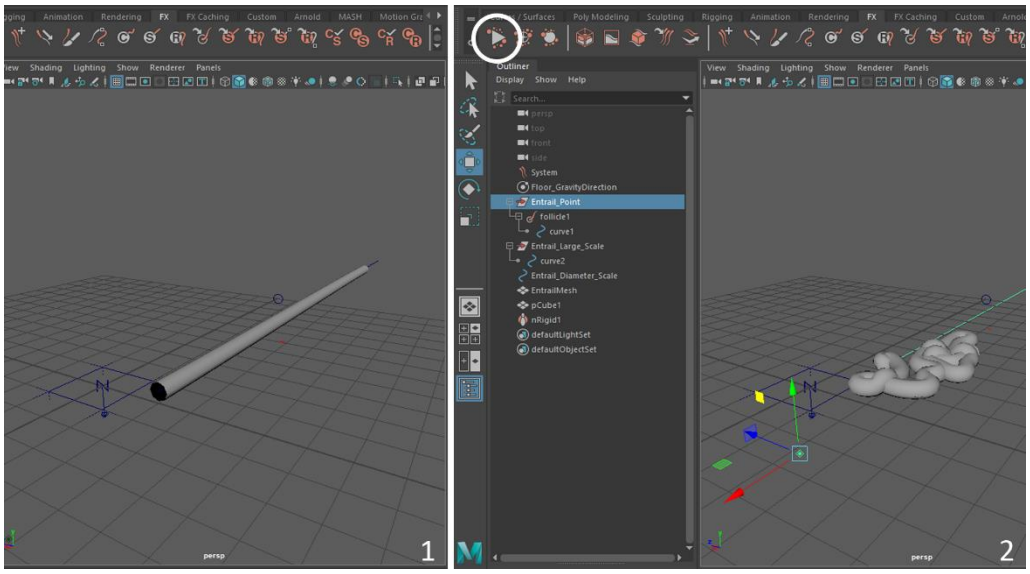


Figure 5: Physics and gravity simulation technique based on Maya nHair. Own source.

2.4. Applying Queuing Systems to Development: Little's Law

Finally, after developing this study, we will incorporate and contrast results obtained with the Little's Law theorem, seeing how the TA figure affects the workflow of the different departments of a project. This law applies to queuing systems that contain units (items) that arrive at the system, becoming waiting units that will become processed units when their waiting time in the queue ends, once they complete the process leaves the system and gives way to new units.

[7] nHair: https://knowledge.autodesk.com/support/maya/learn-explore/caas/CloudHelp/cloudhelp/2018/ENU/Maya-CharEffEnvBuild/files/GUID-AB32EA9E-90CE-4272-B523-D326864E9638-htm.html

Little's Law states that the average number of units in the system (L) is equal to the rate of units arriving in the system per unit time (λ) multiplied by the estimated waiting time that a unit remains in the system (W).

$$L = \lambda W$$

Figure 6: Little's Law theorem. Source: Jhon Little

This application can be given in any queuing system, from a queue of customers in a supermarket to a car assembly line. In this investigation we will apply the theorem to a video game development system, based on the study carried out by Justin Fischer in Game Planning with Science.

The choice of this formula, despite needing a stable and non-preventive system, comes based on the typical workflow system in a video game company with agile methodologies such as Scrum or Kanban. Although it is true that in the production of a video game we have a multitude of variables that can alter the results of this theorem, we can, however, parameterize the development time and optimize it depending on the context we are facing, preparing an ideal stage where enter the TA variable.

In order to see the practical use of this theorem, we will start from the situation raised by Justin Fischer about the process of developing a task in a video game. His approach imagines any creation process as a task subdivided into smaller tasks. These tasks are the units that Little presents to us in his theorem, units of work that must flow through the system in order to complete this major task. For Fischer this task is, for example, the creation of a character.

As in any design of a workflow, we must determine what steps we must take to get the work we propose to do. A pipeline that all workers follow, to determine the direction and progress of production together. Unpredictable changes or situations will always arise throughout the project, but from the first moment we must be clear about the steps to follow to successfully complete the tasks assigned to each department on time. If we are clear about this from the beginning, we can pivot in other directions when problems arise.

The pipeline designed for the video game, will have its peculiarities depending on the nature of the project, in this case, this is the flow diagram suggested by Fischer when creating a character.

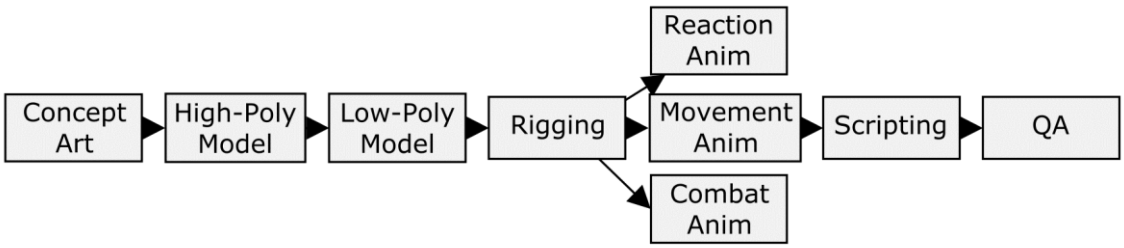


Figure 7: flow diagram in a hypothetical case to develop a character. Source: Game Planning with Science.

Each of these boxes will be our units throughout our workflow in any development. As we have already pointed out before, determining this will be crucial in developing our plan and being able to see Little's theorem in practice. To identify what are the tasks to be carried out to achieve the expected result is, furthermore, to set the stage to which the TA is subject when devising formulas with which to facilitate the progress of these units throughout the system.

The next concept Fischer introduces is bottlenecks. It is here where we believe that the role may have a fundamental task in the resolution of processes with which to reduce waiting times between units. And this is how bottlenecks are formed, creating accumulations of units in certain places in the system. These units become standby units, so they delay production in said pipeline.

These cases are initially seen in the work estimate that we attribute to the units, that is, the physical time, without interruptions, that a unit needs to be carried out. If in the proposed system, the Concept Artist realizes five character concepts in the time that the 3D artist sculpts a high-poly model, we would say that nothing serious would happen in the normal development of the character creation, since different designs are necessary until you find the right one.

However, if the project involves developing a multitude of characters and the next 3D artist ends the character retopology, in less time than Concept Artist and the high-poly manager perform their work with new characters, our bottleneck will begin to form. These waiting times until the unit advances to the next task, increase as the units advance in the system, causing queues to form in certain cycles in which the units wait too long, causing development jams.

These bottlenecks can also be formed in reverse. In this case, the 3D artist in charge of carrying out the retopology does not have units in which to work, so the work stops flowing due to a lack of tasks. In the other case, we have a unit that requires a greater amount of time to perform than others. This unit, if it has the same amount of resources to be developed, as the rest of the tasks, will clearly be a new bottleneck, since the previous units will be accumulated on standby. Both cases are complementary since in one way or another they are formed cyclically throughout development, let's say that they feedback based on the time that the units remain in the system.

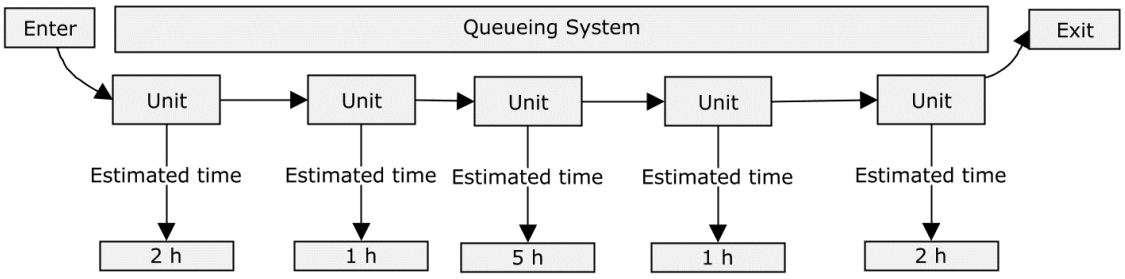


Figure 8: own diagram of a queuing system. Own source.

Once the elements of this system have been raised, we can numerically translate our workflow and manage the queuing system to identify and resolve these bottlenecks, through a capacity table. In this table we calculate the processing capacity that our system has, that is, we can approximate the time value that the units will have, the percentage of progress per time ratio or the use of active resources to process the units that enter and leave the system. To show this, Fischer compiles the following table according to the previously suggested pipeline.

	Resource Capacity					
Resource	**Unit Load (Days to make that field for one character)**	**Unit capacity (Characters / day)**	**Number of team members**	**Total characters per day**	**Process Capacity**	**ResourceUtilization**
Concept Artist	2.00	0.50	1.00	0.50		33.33%
HighPoly	5.00	0.20	1.00	0.20		83.33%
LowPoly	3	0.50	2.00	0.67		25.00%
Rigger	one	0.50	1.00	0.50		16.67%
Reaction Animator	3.00	0.33	1.00	0.33	0.17	50.00%
Movement Animator	5.00	0.20	1.00	0.20		83.33%
Combat Animator	7.00	0.14	2.00	0.43		58.33%
Scripter	6.00	0.17	1.00	0.33		100.00%
QA	3.00	0.33	1.00	0.33		50.00%

Table 1: Hypothetical case of resource capacity table for the development process of a video game character. Source: Game Planning with Science.

In Table 1 we can see the average time in which a unit is carried out (Unit Load), the progress of that task in a unit of time, in this case, one day (Unit Capacity), the number of members who carry out said task (Number of team members) or the progress of the task depending on the members participating in it (Total characters per-Day). But where we can really observe the practicality of this formula is in the process capacity (Process Capacity) and in the percentage of resources used (Resource Utilization).

The processing capacity will allow us to identify the percentage in which the units are being developed, that is, if we use 60%, this resource will remain 40% of its waiting time. Initially, under this situation, the expected thing would be to try to get the resources to maintain a very high percentage to minimize the waiting time, but ultimately, this produces a greater error, since if a unit reaches the limit of its capacity of resources (100%) will form the bottleneck that we indicated before.

In the suggested context, the workflow begins to slow down on the drive that belongs to the *Scripter.* To solve this problem, the logical thing would be to increase the number of members in carrying out this task, dividing the work into different workers. Another solution would be to shorten the production process of said unit by increasing the number of hours that member dedicates to this task. However, both solutions are wrong if we try to eliminate this bottleneck. To

explain this, we have replicated the case by incorporating another Scripter into our table.

	Resource Capacity					
Resource	**Unit Load (Days to make that field for one character)**	**Unit capacity (Characters / day)**	**Number of team members**	**Total characters per day**	**Process Capacity**	**ResourceUtilization**
Concept Artist	2.00	0.50	1.00	0.50		40.00%
HighPoly	5.00	0.20	1.00	0.20		100.00%
LowPoly	2.00	0.50	2.00	1.00		20.00%
Rigger	2.00	0.50	1.00	0.50		40.00%
Reaction Animator	3.00	0.33	1.00	0.33	0.20	60.00%
Movement Animator	5.00	0.20	1.00	0.20		100.00%
Combat Animator	7.00	0.14	3.00	0.43		46.67%
Scripter	6.00	0.17	2.00	0.33		60.00%
QA	3.00	0.33	1.00	0.33		60.00%

Table 2 [8]: Variation of the hypothetical case of resource capacity table for the development process of a Fischer video game character. Own source.

We can then verify that bottlenecks will always remain in the project. This resides in the process capacity of the project, which rests with the team members, not in their capacity for work, experience or time they devote to development, but in the situation and properties of the unit they process. Seeing the formula in this way, only, as Fischer ends up calculating, we will be able to optimize the queuing system as bottlenecks are formed. Little allows us to predict how and at what times this resource utilization will be affected by the natural development of the units through the system, so planning the process based on these bottlenecks is vital to design a plan with the least number of units on hold.

So, where this research focuses, it is in the optimization of this process of the units through the system. It is true that there are many possibilities that affect the model, all of these can be included in it, so the more forecast we introduce to the system, the greater the probability of developing a stable plan. In a real system we should introduce those variables that directly alter the production plan such as distinction of roles and professional experience, inclusion of activities and

[8] Capacity table: this table can be freely replicated through Annex 4.

festive periods, multidisciplinary profiles that perform more than one unit at the same time, etc.

The variable that we will introduce will be the figure of the TA in this system. To do this, it must meet those needs that units need to shorten the processes that generate bottlenecks. In this way we could solve the problem of waiting units and have one more tool when considering our pipeline, varying the processing capacity of a system without changing its number of members or total work units per unit of time.

As we have seen before, bottlenecks will continue to form, but once identified, our role will be able to resolve them before they form without having to increase or decrease the staff of members or increase working hours. The approach formed in this research, aims to confirm in a limited way this optimization of the work plan based on the experiments outlined above and thus, creating a simulated environment in which these “problematic” units can be solved in the most appropriate way for the draft.

The design proposed for the investigation will allow us to analyse the role as a differentiating variable in the production and development process of a video game. To do this, we must then analyse the phases in the order that we have previously proposed. This scientific analysis in stages will be based on the results obtained in order to finally be able to confirm whether the incorporation of TA in the planning and production of the video game will substantially affect its development. Being able to verify our hypothesis through the practical application of Little developed by Fischer, introducing in the model our differentiating variable.

Our analysis will have three stages. The first two will be studied individually in isolation, and then form a joint vision of both that can be applied to the third.

1. **First stage.**

   Current representation of the TA: we will study his figure based on the surveys and interviews carried out. We will obtain the global and individual vision and definition of the role according to the information collected from different profiles based on the video game industry, from professionals to students and players.

2. **Second stage.**

   Experimentation based on the figure of the TA in development processes: we will include the two experiments previously developed, collecting data during the process while we parameterize the techniques used by the subjects. After the end of the experiment, we will include a small battery of questions where to qualitatively study the answer to the incorporation of the new techniques they have used in the tasks they have performed.

3. **Third Stage.**

   Incorporation of the TA to the development model based on queuing systems: finally, we will turn all the previous analysis into the study of the possibilities that the incorporation of the role in the team allows. We will support our contributions in the previous stages to formulate a solid implementation, but open to the inclusion of new variables in the system.

The objective of this analysis by stages is to confront the study of the situation in such a way that the situation occurs in a real context. Carry out a contextual observation of the case through the different stages to finally, having applied an inductive method, progress or strengthen some bases for the position within the framework of a project.

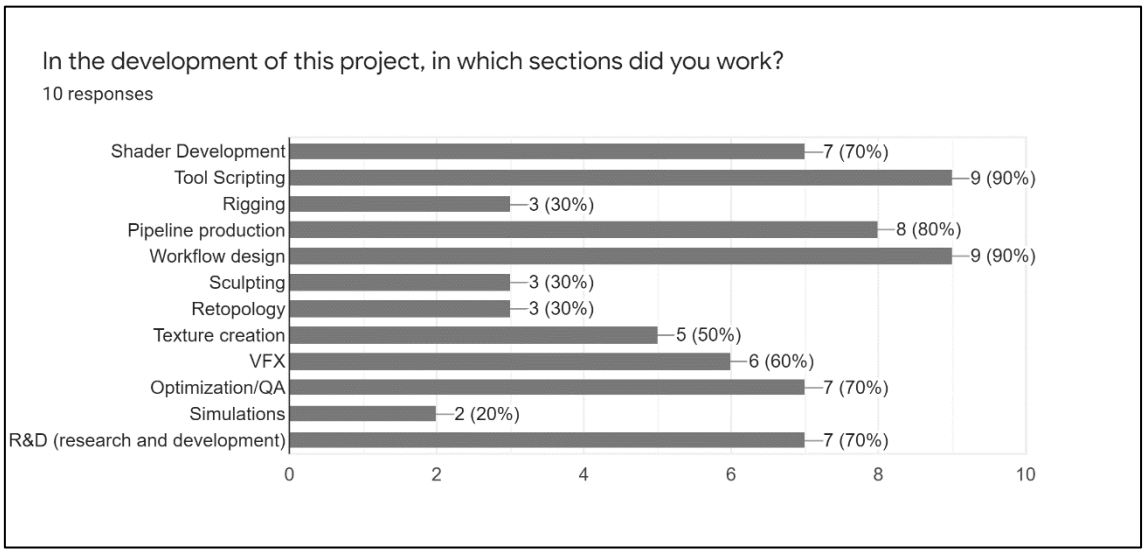
3. Analysis of results or implementation of contributions

3.1. Current representation of the Technical Artist.

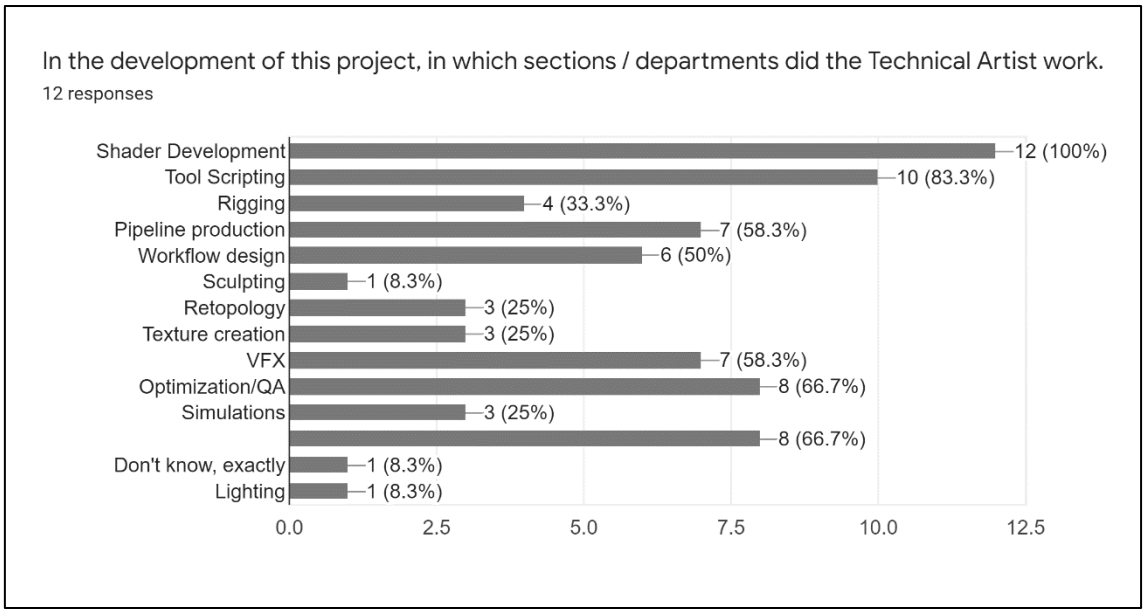
With 54 participants in our study, we have been able to assess the current perception of this role. The inclusion of different profiles and professionals has allowed different positions to be established despite finally observing some common features regarding the position of the role in the project (Annexed 6).

Regarding the development process in this research, we identified those tasks in which our role is most usually involved and asked the different profiles to what extent the department of *Tech Art* in said project. In turn, we divide the answers according to their position, that is, TA or other. Thus, we can see the result in two different tables, one from the perspective of the role and the other according to the perception of the rest of the team members.

Initially, the tasks that had been assigned to the role were objectively searched, being able to see how these tasks vary in pursuit of the origin of the individual, thus seeing the versatility of the position with respect to the company in which he works.



Graph 1: Development sections in which TA was involved. According to Tech Arts. Own source.



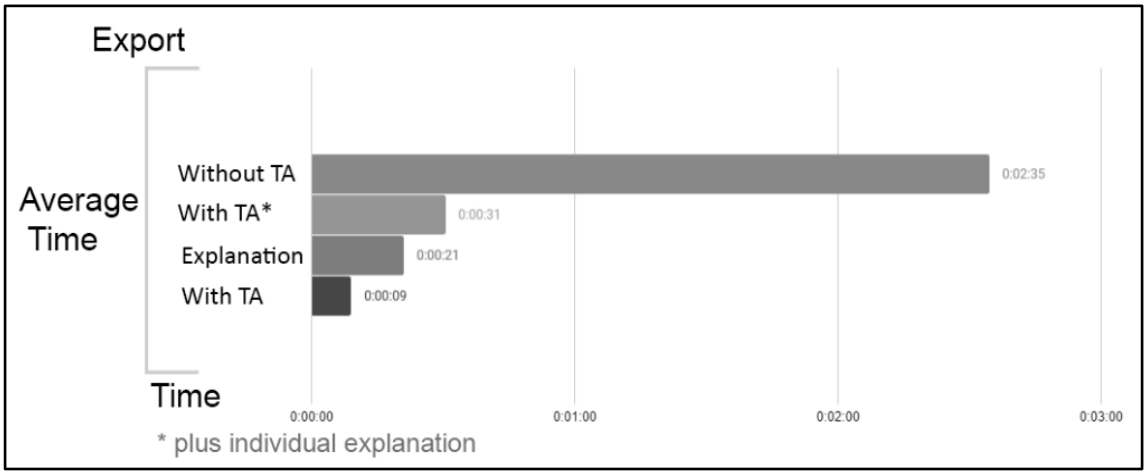
Graph 2: development sections in which TA was involved. According to the rest of the team members. Own source.

As you can see in Graphs 1 and 2, both TAs and the rest of the profiles, indicate different tasks when assigning a role to the position. In many cases, the activities attributed to it, despite being part of a discipline such as art or programming, are far apart. However, the sample tends towards Shader Development, Tool Scripting and optimization. However, this trend coincides and differs in other tasks depending on the company in which they work or the knowledge they have about the figure we are investigating, as well as their relationship with it.

3.2. Experimentation based on the figure of the Technical Artist.

Regarding the experiments developed previously, a total of 12 participants individually carried out two tests in which they carried out two tasks typical of developing a video game. Each individual performed both tests in turn, and then shared their impressions of both the tests and their vision of the role.

Regarding the “Export of objects” test, we have been able to observe that its entire foundation has an exponential character, so the level of optimization that we will obtain in development, based on the results obtained, will therefore go to the number of objects that we want to export. In this case, to speed up the process, we carried out the test with a total of eight objects, so if we wanted to calculate the experiment based on another number of objects, the resulting coefficient with the incorporation of the TA will not vary, while without it , the development time would increase exponentially.



Graph 3: average times in the asset export experiment. Own source.

Graph 3 shows the average time that a developer consumes in the export of only eight objects. Therefore, it will take 19.37 seconds to export an object, a figure that will increase exponentially depending on the battery of objects that we are going to export, unlike the technique presented by the TA, which will maintain the average export time regardless of the amount of assets we have. Thus, we will obtain a tool that will speed up the export process based on the battery of objects that the project needs, shortening the process depending on the tediousness of the task. Thus, the more assets we have, the greater the impact that the tool brings to the system.

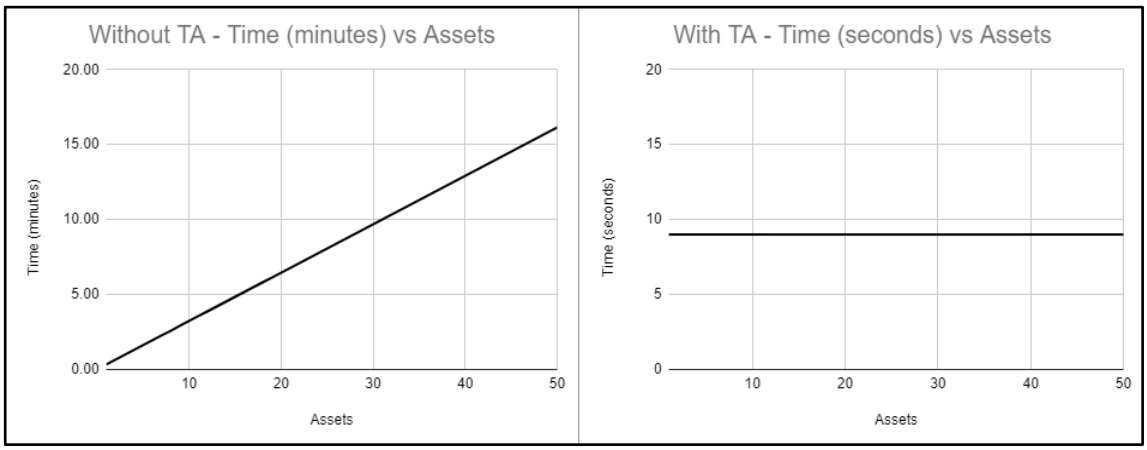


Chart 4: variation in the export of objects depending on the incorporation of the TA. Own source.

With such a technique, we can assign real values to processes that would be difficult to calculate based on the variability of the project, attributing a stable time to the development of certain assets. In this case, we represent the variance with an export tool, but through the TA, or a Tools Programmer if necessary, we could stabilize processes at easily recognizable periods of time for project production and ensure the development of tasks.

This leads us to the next experiment, creating assets specific ones whose development can suppose an important resource load in terms of time and equipment. These in many cases repetitive tasks, such as creating objects very similar to each other with similar characteristics but different shapes, can require a large number of hours in a process that we could solve procedurally.

The progressive extension, for example, of open-world video games, encourages developers to create more effective techniques for covering larger areas of land, as well as detailing spaces according to the technical and graphic expectations of current video games (Gordon, 2020). This leads to greater importance in R + D + I, where the Tech Art team can propose specific solutions to the project's own requirements.

We have simulated this situation with the participants who joined the experiment, recreating a context in which to develop certain assets, as in the previous experiment, with and without incorporating TA into the system. In this way we will be able to reflect another of its applications in the production of the project, including those techniques and tools that streamline the process, as in this test.

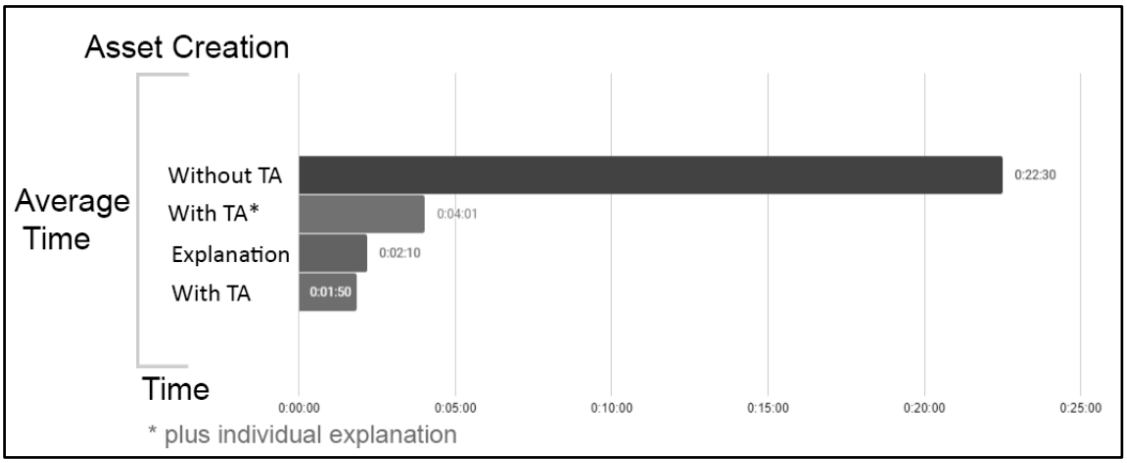


Chart 5: average times in the asset creation experiment. Own source.

The time that a developer uses in this task, is an average of 22 minutes 30 seconds. In this model, the participants contemplated different techniques when creating the asset, so the process varied in the technique used, but as we can see the average time used is still much higher despite the choice of different processes to obtain the same result. From a traditional extrusion-based process to NURBS[9] and creation of curves, the process that arises from the approach proposed by the TA, remains more efficient both in time and in quality of the final result.

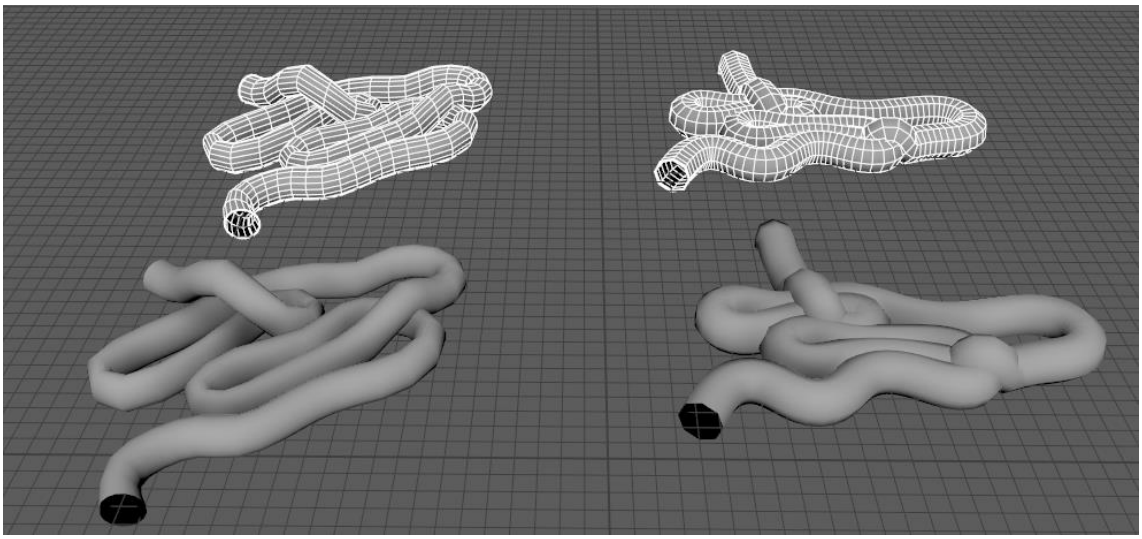


Figure 9: from left to right. Asset performed freely according to the participant and asset performed through the technique developed by the TA. Own source.

The time spent by the developer through the new tool, revolves around a fifth of the time used by the other techniques used. In addition, we have an explanation of the tool that consumes half of the entire process, so in this case it would further reduce development time. However, this study tries to represent the process more objectively, so, although in a real context, the TA could elaborate an internal API for developers and eliminate this additional time, we want to study and qualify the teaching character to which the role is submitted.

The latter is especially important after organizing the participant's impressions after the experiment, since the complete sample said to have learned during the duration of the test. After using the technique or tool, many of them highlighted the help that our role would be in a development when it comes professional growth, since, as in the experiment, there are processes that a certain profile would not have in mind when starting any development. Therefore, we can once again, underline the role that R + D + I has in transferring these new techniques and knowledge to the respective units of the system, in short, the rest of the team.

[9] NURBS: (Non-uniform rational basis spline) mathematical model to represent curves and surfaces.

The results obtained reflect, in both experiments, greater control over the natural development of the video game. Not only streamlining but also easing production at the level of each of the profiles, taking into account the different sections and adversities of the task carried out by each developer, in many cases provides a quality environment, improvement and learning, just as we have been able to contemplate in a simulated way in the experiments.

3.3. Incorporation of the Technical Artist to the development system based on queuing system.

After the approach and study of the TA figure in the production and development of a video game, we can address the impact that the role has on the system from the approach that we have proposed before according to Little's Law. For this, we only must analyse the project in the same way that we analyse a queuing system, applying the pipeline that best suits the process that we must carry out based on the position and context of the product that we have in mind.

The way to integrate the role, can be through one more unit or a system variable (video game) that encompasses the different subsystems (departments). In one way or another we can previously add the job position, as a figure that structures the units subsequent to it sequentially or globally. The choice of how to integrate the variable can be given depending on the size of the team as well as the existence or not of a Tech Art department that is divided into disciplines that cover different processes (Hayes, 2008).

Therefore, the role it assumes in the long-term production of a project is equivalent to that of an optimization tool of the system itself. As we saw previously, to free a bottleneck, we can resort to the variation of the resources that we attribute to the different units, that is, vary the number of workers or time that they dedicate to said task. Thus, we dissolve the bottleneck before too many units are formed or retained in one section of the system, ultimately optimizing the system.

This position, therefore, from the production and project approach, could incorporate those solutions that mitigate the retention of units in the system, as well as correct the deviations suffered by the pipeline due to problems or unforeseen throughout the process. So, combining this with the correction of bottlenecks based on the moderation of resources that we have just discussed, we have a much more solid production plan thanks, ironically, to the flexibility provided by the TA variable.

4. Conclusions

As we have observed throughout the study, the figure of the Technical Artist covers a wide range of tasks and processes in the development of a video game, causing, in effect, that there is no proper definition of the role. We can see in the annexes of this work and together with the results obtained, that many of the definitions and characteristics provided indicate the multidisciplinarity of the role as a fundamental quality of this position.

This nature therefore imposes, as we have already indicated, a transversal role in the project, with production being one of the sections where its role fully expresses its potential. Efficiency and agility in a role whose participation in the video game should hybridize development and production to optimize the needs of the team and the program both technically and administratively.

And it is that, in addition to the data collection that the survey phase has provided us, the experiments make clear in detail the impulse that the incorporation of the role both for the studio and for the video game, making development processes that previously would take hours, now could be a matter of minutes or even seconds.

The Technical Artist will oversee developing and researching those techniques and tools that we have already seen, and introducing them into the project's production plan, knowing beforehand how to facilitate the development team those tasks that involve further frustration, tediousness or time slots far superior to other processes. It will therefore continue to be a role that implies having a global vision of the real process that involves the development and production of a video game, to put that knowledge into practice when preparing a plan with which the project will obtain a substantial advantage in its development.

In this way we could manage to treat the role from a new proven point of view, now giving way to include this model in different teams to see the behaviour of this method in different productions. Introducing new variables and concepts as well as new techniques aimed at raising production will be essential to optimize the inclusion of this job position in the project, under the understanding of this as a system of queuing subsystems.

We have carried out a concretion throughout this research work where we specify what the Technical Artist would be more effective, however, this itself serves as a starting point when preparing future research with the different roles that make up a company's team. This same hypothesis could be posed in specific departments and works, approaching a greater optimization in the resolution of processes for the production of a video game, through the systematic study of the different tasks that make up development.

Studying those art, programming or design tasks in detail will be the next step when it comes to optimizing each task in the system and allowing the other members of the team to fully develop their potential, introducing new optimizing variables to the video game and fine-tuning increasingly workflow. Since, as we have demonstrated the enormous impact that this role generates on production, we could begin new investigations characterized by other new roles that could lead to better techniques and tools that promote the quality of the final product, as well as better working conditions for the professional and personal development of the team.

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7. Annexes

Annex 1: Compilation of TA role descriptions

Question:

To help the research process of this work and the collection of data and descriptions about the figure of the Technical Artist, it would be extremely useful for us to share a description of the role based on your opinion and experience.

Answers:

“I think that the way that the TA works influent directly on the final expected work. Even the whole game will be personal for this TA, because it is himself the one that put a "face" to all the lines of code behind that game. Is grateful to see your art having live on that video game.”

"Optimizes the workflow and shows how things should be done."

“Tech Art seems to change a lot per studio, and per project needs. I think it's very important to be adaptable, and to adopt a wide skill set.”

“A bridge between both Programming and Art departments. It involves different tasks, depending on the project requirements, but mostly they can be summarized in Research & Development, Workflow / Pipeline design, Tools & Shader development and Optimization / QA.”

“I have worked as a technical artist at a number of companies and on many different games. The role can vary widely from project to project and based on the particular focus of the individual technical artist. I suppose the essence of the technical artist is to facilitate the production of the game, to provide a service to the various departments to help them achieve their goals, whether that be through a great rig, a tool to automate a repetitive process, a unique visual element to satisfy a design requirement or an optimization so the game can hit its framerate target. We provide solutions to the technical challenges of game development.”

"Inter-disciplinary problem solving for content creation."

"Optimization of the work pipeline"

"The Technical Artist needs to be on the forefront of the technology to get the more efficiency on the product results."

“It can mean several things, depending on pipeline, size of team, etc. But to me, it is the artist that is able to grab the concepts and ideas and see that they end up being implemented efficiently into the game while staying true to the original vision. Though often, they work more with the "technical" part of production, such as R&D, textures, simulations, etc. They are a critical role in the production and the designers need to be working with them constantly in order for a high quality and efficient product to be created.”

“A Technical artist bridges gap between art and code, they help to make the lives of both artists and programmers easier and they must therefore understand both roles. A tech artist must also be able to communicate effectively with both roles. A tech artist will help to solve any problems that occur within the development cycle and help to speed up repetitive tasks to bring out the best in the team. A tech artist will also help with R&D to discover new workflows and identify weaknesses in current pipelines. A tech artist is a very important member of the team and a great tech artist can accelerate the whole team production speed.”

“Technical Art is about streamlining the asset production pipeline, from asset creation, to import / export, evaluation and sharing.”

"A tech artist does research on technical aspects of the graphical side of game development and supports the artists in learning new tools, building new pipelines or doing technical work like writing shaders."

“It's the one who makes sure that the pipeline goes as smooth as possible organizing and helping the art department.”

“A technical artist fills a very supportive function for different art & dev teams inside a company. Technical artists create tools to speed-up the workflow, but also assist in production itself by creating assets (often to add to an internal library of assets) and by helping with optimization. Technical artists in my opinion are the bridge between artists and programmers as they understand both worlds.”

"Bridge between art and programming, often automation of art processes in games."

“Assuming that the role of technical artist is, as its definition says, a hybrid between art and programming. But to be more concise, I see him as the one that contributes the spark to art, be it through textures that only with images are not achieved, be it through a code that perhaps a programmer does not think of but being someone who belongs to the field of the arts has a better vision. I see it as

a very important role since it can be the bridge of communication between programmers and artists.”

“It is a bridge between Artists and the rest of the team. It is a role that knows from both sides and defines what it is possible or not to improve the quality of your games. Artists will ask you if something they want is possible to reproduce it in your engine, and the programming team will help you providing resources and tools to make that task possible. You will have to know a little bit about every process that involves making a game in both sides, programming and art, to complete the desires of artists with the efficiency and optimizations that programmers require. Shaders, lighting, mesh optimization, tools, pipeline and workflow definitions, world building ... you will be in the middle of two groups that create lot of content that needs to be cohesive by technical artists.”

“While a seemingly forgotten role, I believe technical artists have a huge responsibility when it comes to 3D details and the overall polish of environments and materials. It looks very tedious, but the results are amazing!”

“I do lots of different Things as a Tech Artist, I do research for different areas of the game, Like efficient Workflows and I build Pipelines for artists to work with, i also do sculpting and modeling from time to time, I've seen that Tech artists are pretty much Generalists in many cases, which also applies to me, I do a bit of everything. ”

“In my opinion, a tech artist is one that has skills in art and programming and can implement shaders, make code / tools to change visuals for designers to use, and optimize the previously mentioned for better performance.”

"You could say they are in charge of making the graphics section of the game I guess."

"It is a role between that of an artist and a programmer whose function is to create techniques that serve to facilitate or reduce the work of other workers and / or improve the quality of these."

"He is in charge of programming the game itself and creating it from scratch."

“For me, the Technical Artist does a little bit of everything and it is a way for everyone to adapt to a specific type of work. Everyone learns to develop the game in the same way and if there is a problem it is the one that solves it.”

Annex 2: Max Script developed to carry out the export experiment.

```
FbxExporterSetParam "lights" false
FbxExporterSetParam "cameras" false
FbxExporterSetParam "UpAxis" "Z"

if selection.count! = 0 then
(
	mySelection = selection as array
	deselect mySelection
	for obj in MySelection do

	(
		select obj

		if obj.isanimated == true then
		(
			FbxExporterSetParam	"Animation" true

		)
		else
		(
			FbxExporterSetParam	"Animation" false
		)

		savePath = maxfilepath
		pathName = savePath + obj.name + ".fbx"
		exportFile pathName #noPrompt selectedOnly: True using:
FBXEXP

	)
)
else
(
		messagebox "No Selection"
)
```

- To reproduce the experiment (once we have selected the objects we want to export) it is only necessary to copy this code in a ".txt" file and drag it to the "viewport" window of 3DS Max.

Annex 3: Tables of results in experiments.

Experiment 1: Export of assets in 3DS Max.

Export	Base time (without TA)	Time with TA (+ Explanation)	Explanation	Time with AT (unexplained)
	0:02:43	0:00:30	0:00:21	0:00:09
	0:02:21	0:00:29	0:00:21	0:00:08
	0:02:11	0:00:34	0:00:21	0:00:13
	0:02:12	0:00:30	0:00:23	0:00:07
	0:02:31	0:00:26	0:00:19	0:00:07
	0:02:16	0:00:23	0:00:20	0:00:03
	0:02:43	0:00:30	0:00:21	0:00:09
	0:03:02	0:00:36	0:00:25	0:00:11
	0:02:27	0:00:31	0:00:22	0:00:09
	0:02:38	0:00:33	0:00:18	0:00:15
	0:02:41	0:00:35	0:00:20	0:00:15
	0:02:51	0:00:36	0:00:28	0:00:08
	Normal time	Time with TA (+ Explanation)	Explanation	Time with TA(unexplained)
Average	0:02:35	0:00:31	0:00:21	0:00:09

Experiment 2: Creation of assets in Maya.

Asset Creation	Base time (without TA)	Time with TA (+ Explanation)	Explanation	Time with AT (unexplained)
	0:18:23	0:04:02	0:02:11	0:01:51
	0:34:58	0:04:42	0:02:28	0:02:14
	0:28:36	0:04:26	0:02:31	0:01:55
	0:21:14	0:04:15	0:02:19	0:01:56
	0:26:42	0:03:28	0:02:05	0:01:23
	0:22:56	0:02:58	0:02:01	0:00:57
	0:26:31	0:03:37	0:02:11	0:01:26
	0:15:56	0:03:25	0:02:05	0:01:20
	0:23:18	0:03:47	0:01:58	0:01:49
	0:22:03	0:04:32	0:02:09	0:02:23
	0:19:57	0:03:59	0:02:15	0:01:44
	0:19:09	0:04:03	0:02:08	0:01:55
	Normal time	Time with TA (+ Explanation)	Explanation	Time with AT (unexplained)
Average	0:22:30	0:04:01	0:02:10	0:01:50

Annexed 4: Hypothetical case of resource capacity table for the development of a video game.

Through the following link you can access a copy of the sheet with which to make your own development proposals based on queuing systems, downloading the file and applying it to any pipeline:

https://docs.google.com/spreadsheets/d/1B87g1EI5OTEktLMJlAhHZHpUH60VjGVj8gX1XnUXyjs/edit?usp=sharing

Annexed 5: Technique of asset creation.

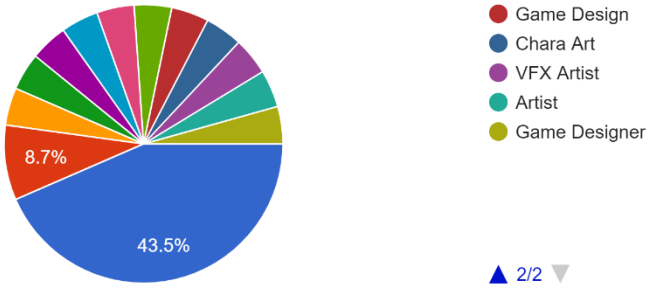
Through the following link you can access a copy of the Maya scene that was proposed to the participants in the second experiment:

https://drive.google.com/file/d/1tVFwpRz4fB-kP6ReeVTo8pGEN51v-fKn/view?usp=sharing

Annexed 6: Graphs resulting from the survey.

Within the production of a video game, what is your position? (role, job)

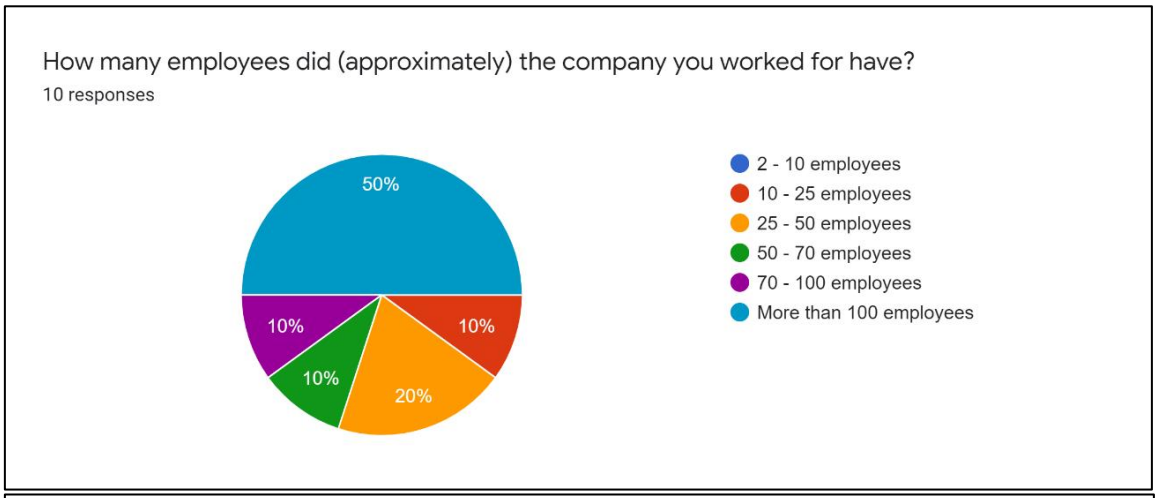
23 responses

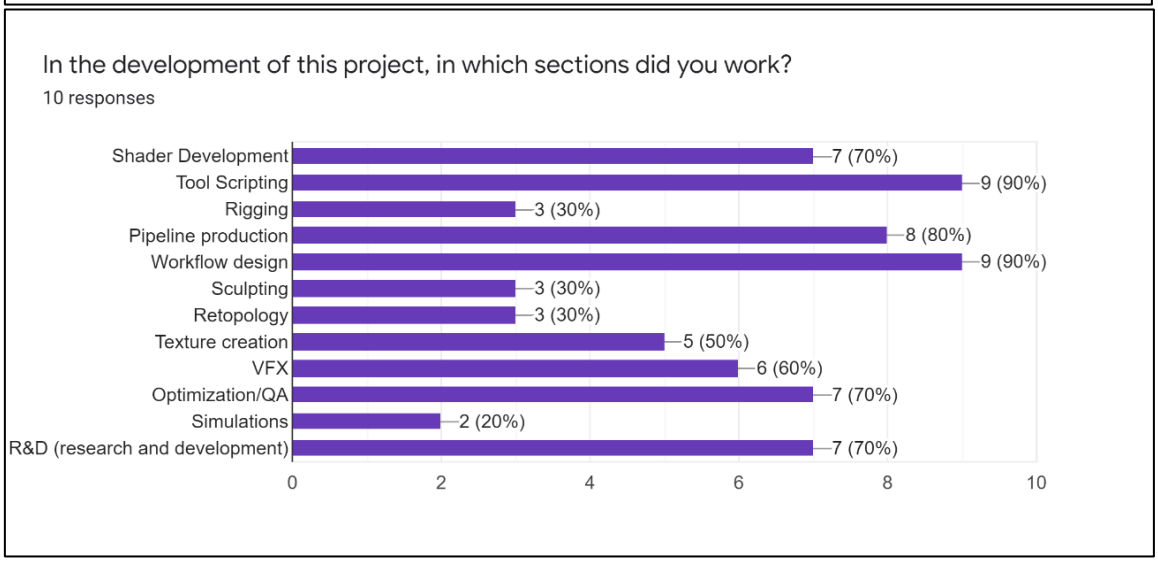


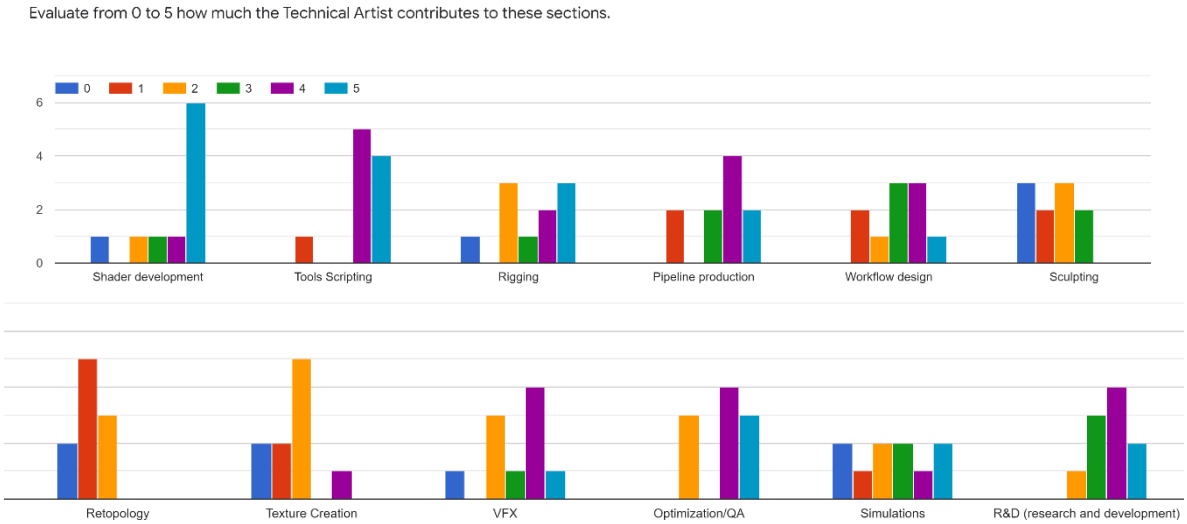
Did you work or study in the video game industry? If you work in another field of audiovisual development such as TV or Cinema, please indicate which one.

54 responses

Section: Im a Technical Artist

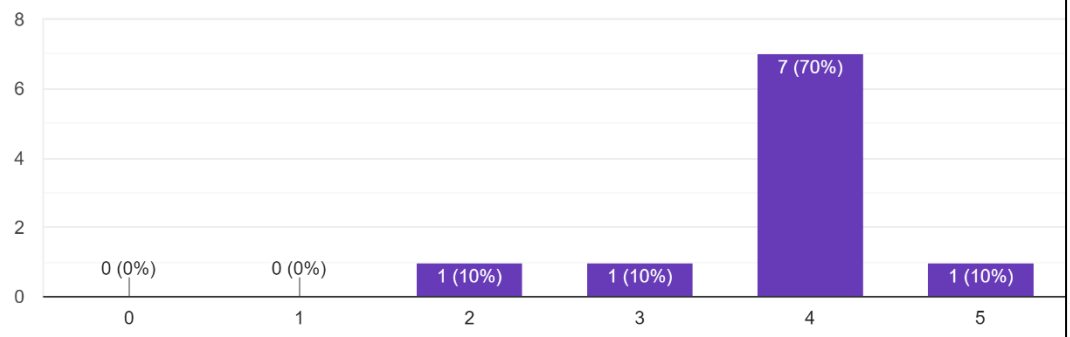






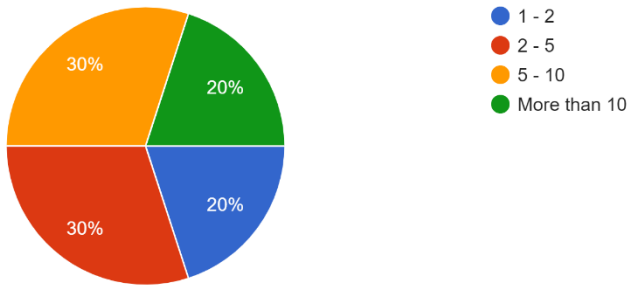
From 0 to 5 globally evaluate your involvement creating a work plan for the project (production, pipeline, workflow)

10 responses



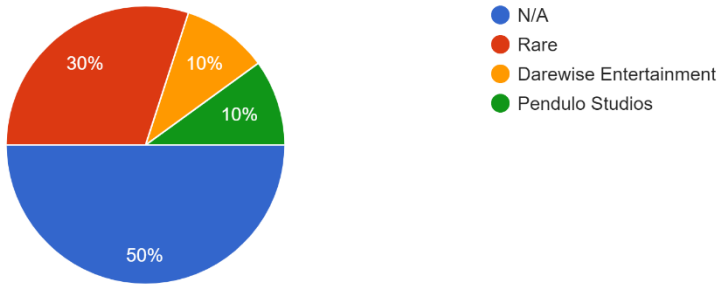
Indicate how many years you have been working on video games professionally.

10 responses



What is the most recent company you have worked for? If you do not agree to disclose this information, please indicate with N / A.

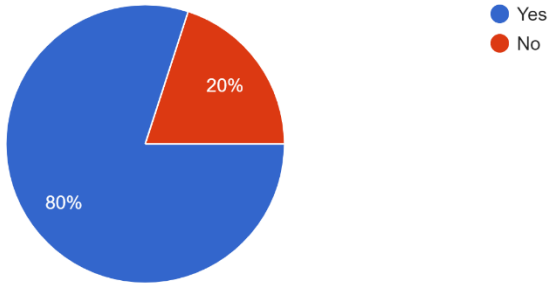
10 responses



Section: I work in video games or another audio-visual field

Do you know or have you ever worked with one or more Technical Artists on the team?

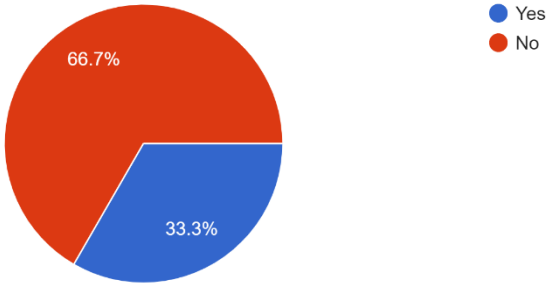
15 responses



Section: I have not worked with a TA

Do you know what is the position / role of a Technical Artist?

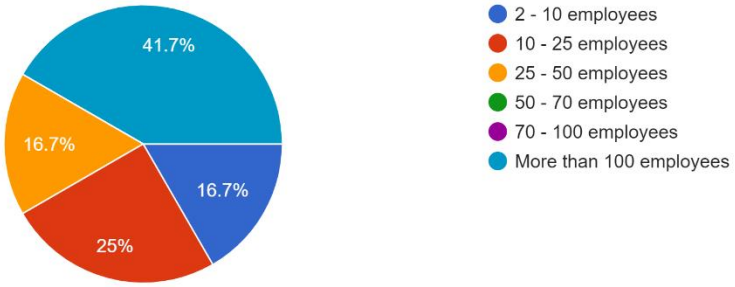
3 responses

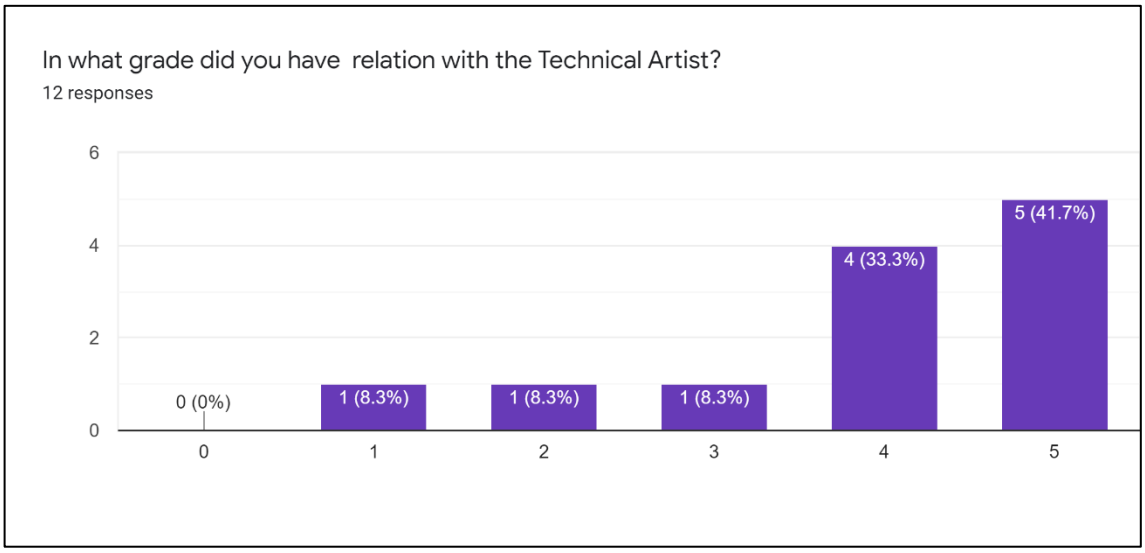


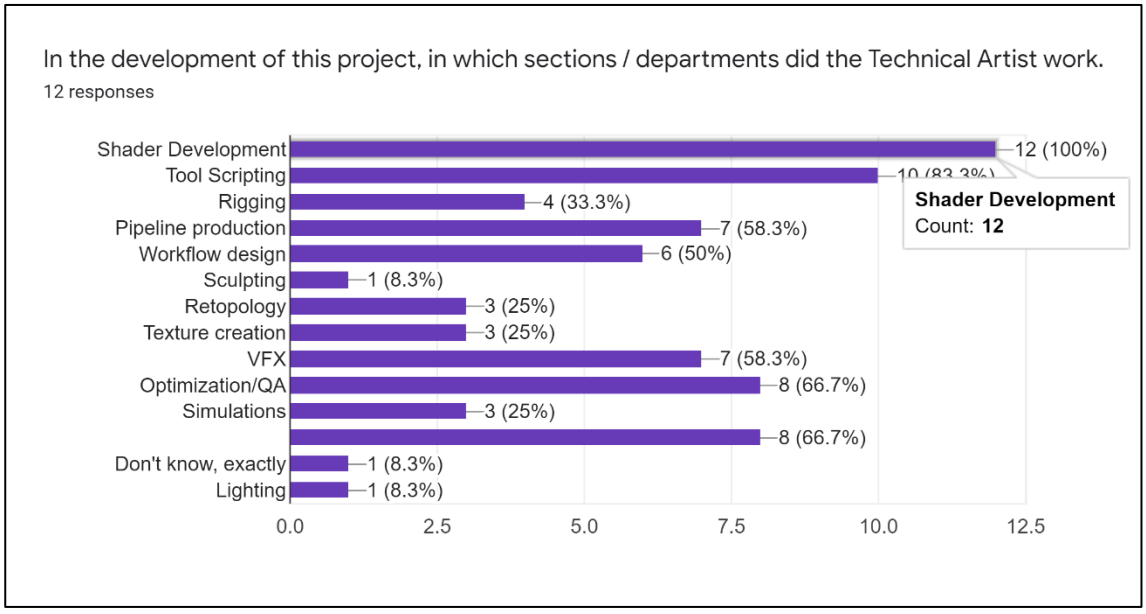
Section: I have worked with a TA

How many employees did (approximately) the company you worked for have?

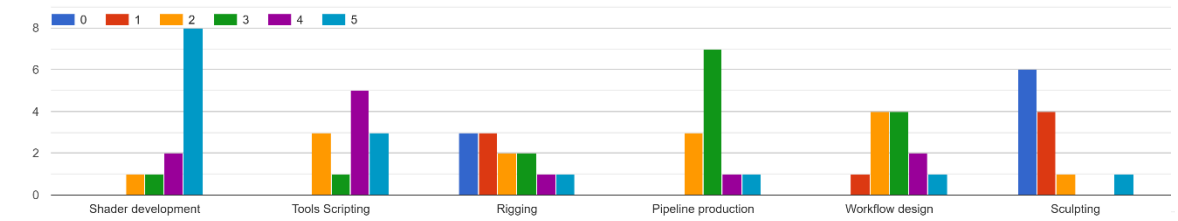
12 responses

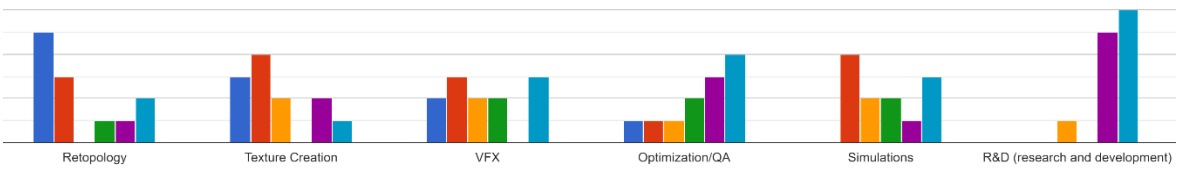






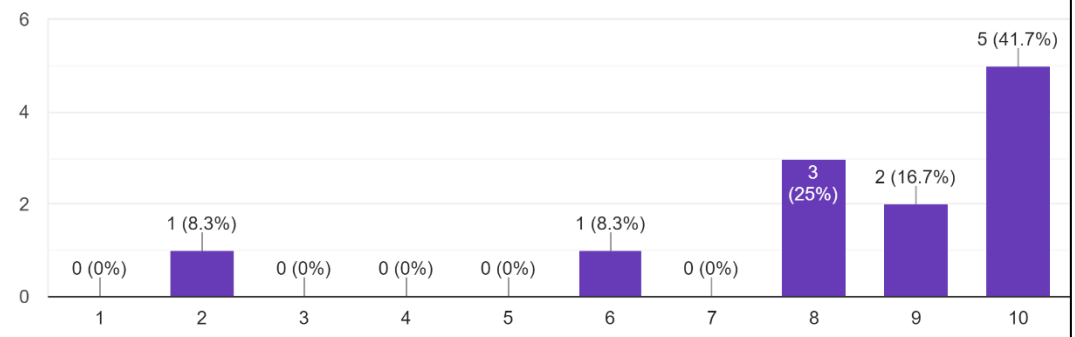
Evaluate from 0 to 5 what the work of the Technical Artist should be in these sections.





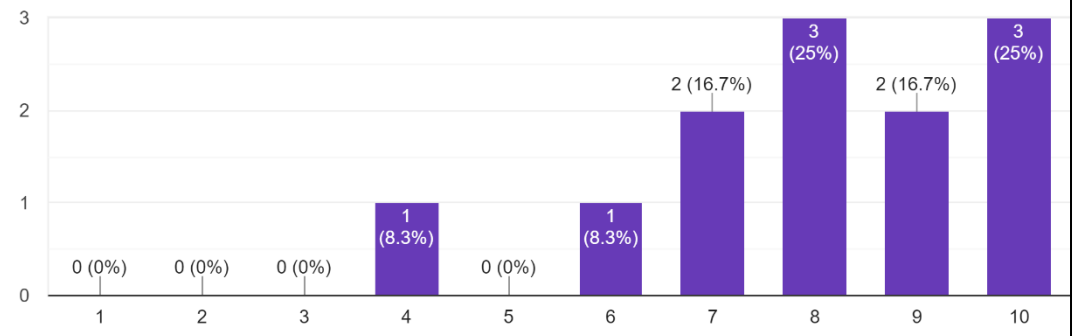
From 1 to 10 evaluate globally how involved the Technical Artist should be in the production plan of the project.

12 responses



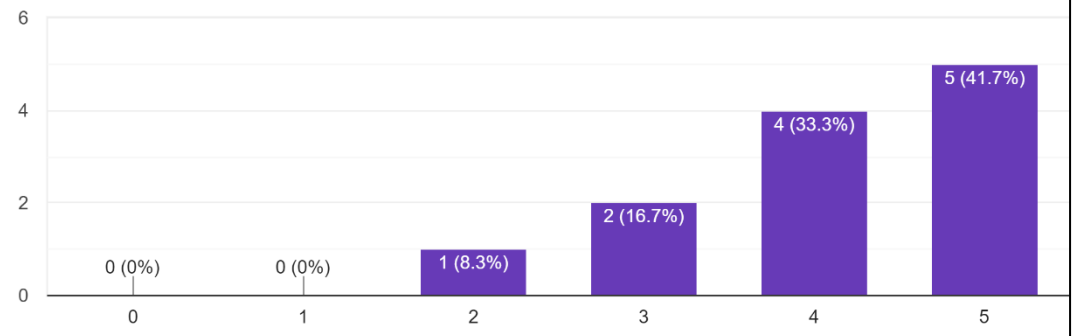
From 1 to 10, evaluate how the figure of the Technical Artist influenced the development of your individual work in the team.

12 responses



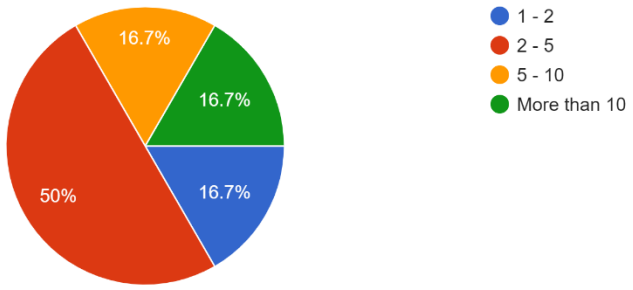
Did the Technical Artist influence your learning? (New techniques, optimization, new resources, new possibilities)

12 responses



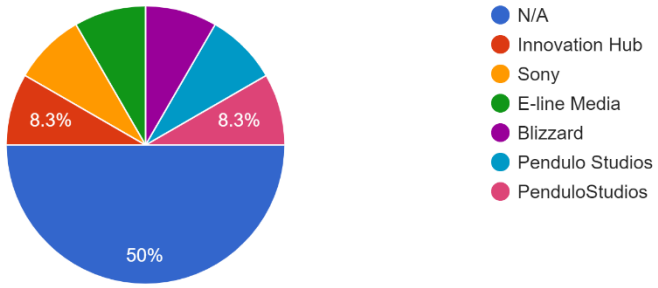
Indicate how many years you have been working on video games professionally.

12 responses



What is the most recent company you have worked for? If you do not agree to disclose this information, please indicate with N/A.

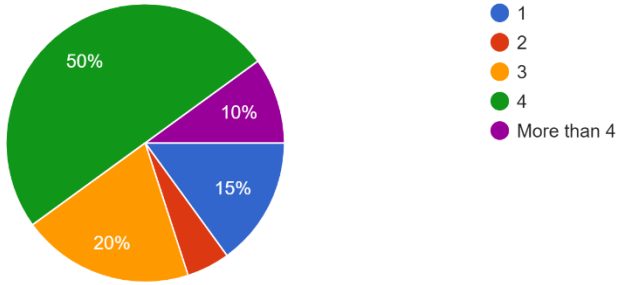
12 responses

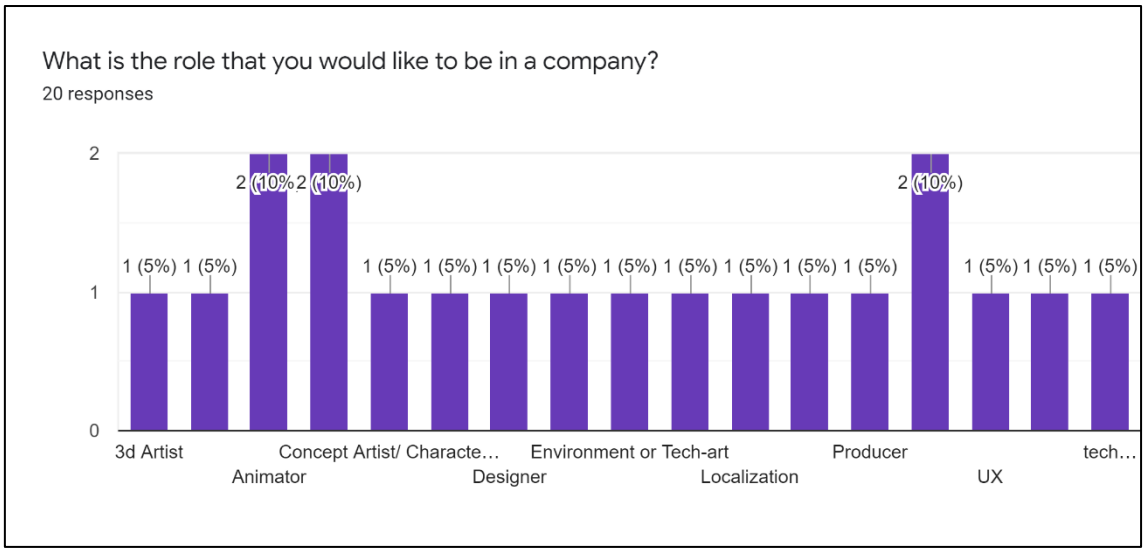


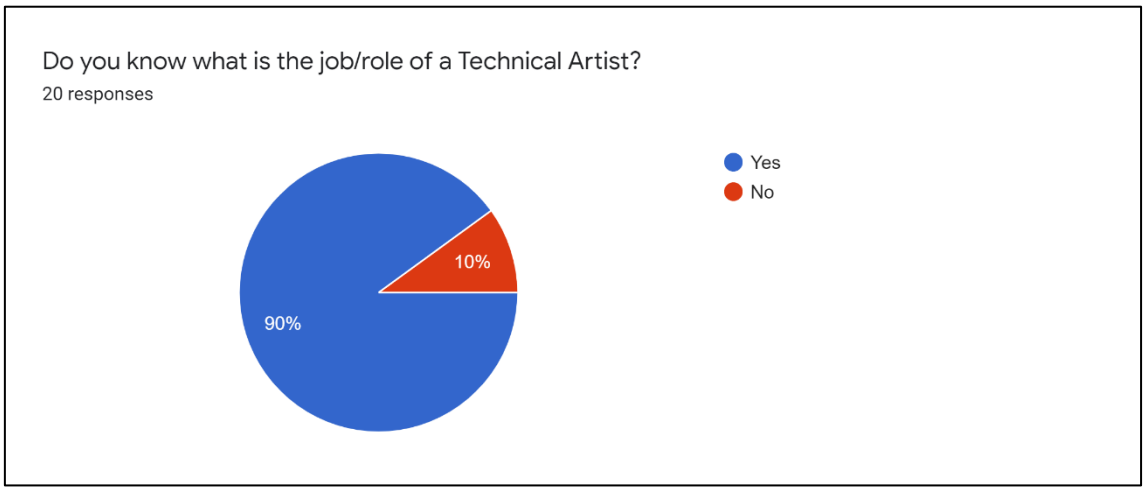
Section: I study videogames

How many years have you been studying video games?

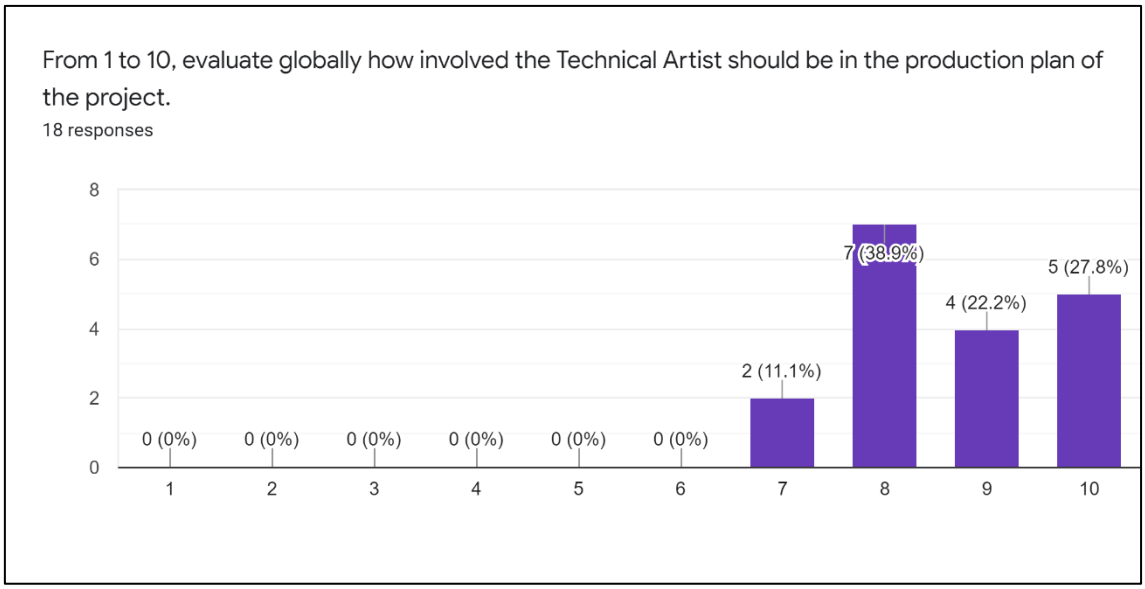
20 responses



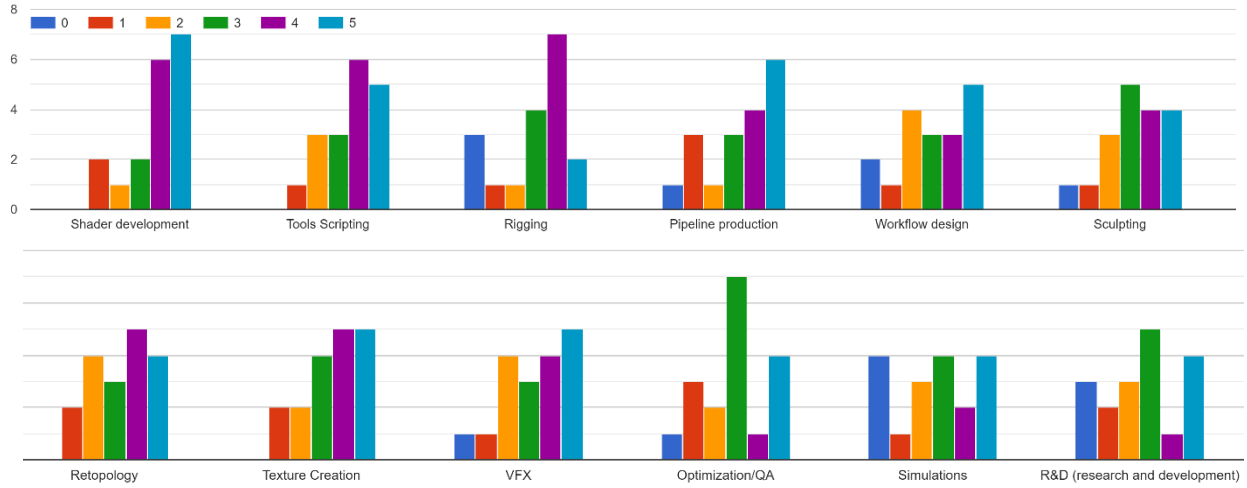




Section: I study videogames and I know what a TA is

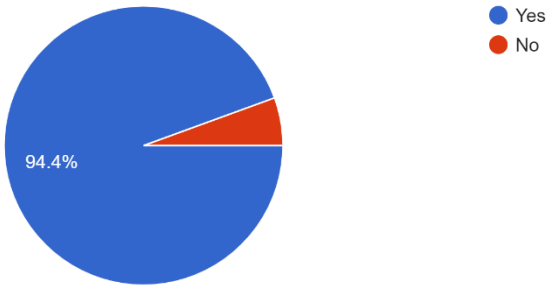


Evaluate from 0 to 5 what you think should be the work of the Technical Artist in these sections.



Do you think the Technical Artist is tasked with influencing the learning of team members?

18 responses



Section: I'm gamer / I love videogames

Do you know what the role of Technical Artist is?

9 responses