University and Animation Industry Collaboration: New Product Development Process

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Abstract

The purpose of this study is to acquire effective means of collaboration and the competent process to improve animation work for commercial and mutual benefits between the university and the industry. At present, The Thai government has been including creative economy policy as an integral part of the national policy. The animation industry is also considered as an important part of the creative industries where there is a continuous growth potential. This study conducted in-depth interviews with government, private sector, university lecturers and animation experts to determine the current collaboration pattern, including similarities and differences in terms of the animation production among the concerned parties in order to draw a conceptual model. It is hopeful that this model encourages the collaboration which will bring about the process to develop animation work for commercial purpose. Subsequently, focus group sessions where both the university lecturers and the animation experts took part in were conducted-which aimed at allowing both parties to comment and refine an appropriate collaborative model. The model is expected to effectively encourage the commercial cooperation between the university and the industry to create animation work which will lead to the industry's advancement itself,-which in turn, is expected to consistently drive the creative economy in Thailand.

Key Words: University Industry Collaboration, New Product Development, Innovation, Creative economy

1. Introduction

According to the report on Thai Digital Content Industry (2009), it is found that there is a potential growth in the animation industry at the rate of 7.07% between 2008 -2013. The report also predicted that the growth in value would reach THB 14,900 million in 2013. Thai animation industry is considered as one of the industries with high potential to generate foreign revenue. In 2008, the industry generated a comparatively high value from export at THB 715 million. Responding to the industry's potential, in April 2009, the government approved the budget of THB 20,000 million under the 2nd National Economic Stimulus Scheme through the Software Industry Promotion Agency (2009) to develop the framework for the development of creative industry in order to drive the national's creative economy. Additionally in the Thai Khem Khaeng Scheme (Thai Strength to Strength economic stimulus scheme 2012), or TKK 2012 the government has also incorporated the fortification of the creative industries in order to drive competitiveness of the country in the international market (Office of the National Economic and Social Development Board and Thailand Creative and Design Center, 2009).

Although, the continuous growth and stability of the industry derive from many factors, one of the major drives for the successful industry development is the collaboration between the university, the industry and the government. To achieve this, the university has to take a leading role in the alliance to drive innovations (Etzkowitz, 2002). The University-Industry Collaboration can be accomplished through research partnerships through an establishment of an organization to support the mutual Research and Development (R&D) (Parkmann and Walsh, 2007). The purpose of this study is to define a new product development process from the collaboration between the university and the animation industry which conforms to the government's policy to support the creative economy. To attain the insight, two methods of qualitative research have been administered; the in-depth interview and the focus group.

The in-depth interviews were conducted, five selected animation experts and lecturers from five universities; public and private (from the eighteen universities that offer animation classes as indicated by the Software Industry Promotion Agency in 2009) were interviewed. This was to study the current animation production process and the collaboration between the university and the industry. The findings were then taken as the guideline for developing and defining a conceptual model to develop animation work for commercial purposes under the university-industry collaboration. The result from the new product development process described with the model is the increased capability to deliver more new products to the market with the approval from the authority. The process consists of necessary guiding procedures to decrease the feasible risks and inefficiency of the products (Huang, 2007).

Next, focus group which consisted of seven specialists with both professional and academic experiences was held. Comments from the focus group were then analyzed and refine to identify the conceptual model which is contributable to an effective collaboration, and commercial, mutual benefits between the university and the industry in the process to produce animation work.

2. Literature Review

2.1 University-Industry Collaboration

Universities are regarded as the sources which incubate human resources and new business. Innovation is considered an essential part of the knowledge-based economy. The increased collaboration between the university and the industry is very important in the driving of innovations (Etzkowitz et al, 2000).

The keys to strategic alliance between the university-industry collaboration are the effective and distinctive personal and communicative social skills between university's personnel and the companies' executives (Dooley and Kirk, 2007).

The collaboration between the university and the industry may be driven by the motivation from both parties. The university's drives for collaboration may contain 1) the expansion of learning and teaching channels, 2) the acquisition for additional sources of funding 3) the need to acquire the source of knowledge and empirical data, 4) the support from the government to the university which drives the economic growth as well as innovations, 5) the need to achieve the recognized reputation and, 6) the increased job opportunity for the new graduates into the market.

For the industry, motivation for collaboration, it may include 1) the need to acquire the source of scientific knowledge, 2) the technology and research skill within the university, 3) the decrease in R&D investment, 4) the opportunity to get access to the resource from the university laboratory, 5) the access to the qualified human resource from the university, 6) the demand to initiate a long term and consistent and stable research projects and, 7) the provided opportunity for employment and the efficacy in the recruitment (Rohrbeck and Arnold, 2006).

The study of the motivation for collaboration helps to give the clearer picture of the basis of the university-industry collaboration in terms of their relationship which triggers the knowledge flow which comprises of three different forms.

1) The knowledge flow from the university to the industry initiated by the units and institutions within the university where the university proposes the findings from scientific researches to the industry. The examples of such knowledge flow are;
    - The presentation of raw scientific results via conferences, workshops, publications and patents and the development of prototypes from the university.

- Scientific knowledge spillover via various channels such as employment for new graduates and trainings for the researchers from the organizations in the industry.

2) The reciprocal knowledge flow between the university and the industry attained through mutual R&D projects, collaborative supervision of Ph.D. and Master's thesis and the formation of new companies by the university members.

3) The knowledge flow from the industry to the university where the industry enumerates its market needs and its problems with the products and product development. To illustrate, this can be done through following channels.

- Sharing the findings from applied knowledge via alternative channels such as the conducting of training for the university, collaborative researches or by taking a consulting role for the university
- Sharing the current technological findings which focus on the expense reduction resulting from the application of scientific knowledge to handle the needs among the companies within the industry. This can be achieved through trainings for university members, collaborative researches or by taking a consulting role for the university.

These three knowledge flows lead to the consistency in the knowledge improvement in terms of effective university-industry relations. The consistent knowledge flow is critical for optimizing the technological potential. To support this, four factors are taken into consideration i.e. actors, channels, direction and content.

- Actors are those who are responsible for bonding the university-industry relations, such as academic scientists, animation experts, company directors, technology transfer officers and company researchers.
- Channels are means of knowledge transfer such as conferences and workshops, informal meetings, joint supervision of Ph.D. and Master's theses, recruiting university graduates as employees, licensing of university patents by firms, purchase of prototypes, joint publications, lectures/trainings at universities (held by firm members), lectures/trainings at firms (held by university members), contract research and consulting, new firm formation by university members, joint R&D projects and sharing facilities (e.g. laboratories and equipment) with universities.
- Direction is the source of knowledge flow that can be found, for example, from the university to the industry, from the industry to the university and by joint sharing between the university and the industry.
- Content is the essence of the knowledge transferred among institutions such as raw scientific results, scientific knowledge spillover, scientific-technological spillover, applied knowledge solutions, and current technological solutions (Zawislak and Dalmarco, 2011)

2.2 New Product Development Process

New Product Development (NPD) is a process which includes the process of product development and new product introduction into the market and is considered an essential part of the innovation process. The innovation process itself comprises of three sections. The first section is Fuzzy Front End (FFE) where the concepts of the new products are developed. These ideas are still unconstructed, unpredictable and have no standard framework. Next is the New Product Development (NPD) which can be operated with a process called the Stage-Gate. Many companies have applied the Fuzzy Front End into the Stage 1 and Stage 2 of the Stage-Gate process. The new concept will be completed and verified for further development only after passing the screening process from the third Gate of Stage-Gate process which in total consists of five Stages and five Gates. The final section is called Commercialization which is the last part of the innovation process. It is the section where the new products are developed for commercial market penetration. The study of innovation process has brought about the clear picture of how vital the New Product Development has towards the innovation (Koen, 2005).

The launch of the New Product Development through the Stage-Gate process has been influenced by the process of NASA's project management in 1960s which is known as 'Phased Project Planning'. It is established from four phases of project management and project development which are Phase 1) Preliminary analysis, Phase 2) Definition, Phase 3) Design and Phase 4) Operation. There are also checkpoint reviews to monitor errors in each phase (Stamm, 2008). Cooper (2001) has explained that the Stage-Gate process is to separate a new product project into stages. In each Stage, essential information and methods will be collected for the project development which will be carried on in the next Gate. Each Gate will act as a quality control to screen and validate the result from each stage whether it should further proceed in the next Stage or be sent back for rectification.

The Stage-Gate process commences from discovering ideas and the ideas will be evaluated before being brought for further development exploiting the five Gates and five Stages as following.

Gate 1. Idea screening, Stage 1. Scoping,
Gate 2. Second screening, Stage 2. Building business case,
Gate 3. Go to development, Stage 3. Development,
Gate 4. Go to testing, Stage 4. Testing & validation,
Gate 5. Go to launch, Stage 5. Launch, which is followed by a post-launch review

2.3 Innovation

Von Stamm (2008) stated that innovation is creativity plus successful implementation while Smith (2006) explained that innovation is an invention which drives the products into the market with commercial prospects. There are three forms of innovation i.e. product, process and service. The typology of innovation is as following.

1) **Incremental** which is the innovation whose components have been modified whereas the system remains unaltered.
2) **Modular** which is the innovation with new components and the system remains unaltered.
3) **Architectural** which is the innovation whose components are modified and the system is changed with new configuration, and
4) **Radical** which is the innovation with new components and system is changed with new configuration

In this respect, the developed animation process would fall into Modular type of innovation in a sense that the new component is created by the collaboration of university and animation industry (acting as an Animation Center). On top of that, the process of collaborating is specifically designed for this particular joint which is also regarded as another new component. Whilst, the detailed procedures for animation production, including pre-production stage, production stage, and post production stage remain aligned with its existing platform.

3. Methods

Two types of qualitative methodology utilized in this research are the individual interview or depth interview and the group discussion or focus group. Beginning with the in-depth interview, animation lecturers from five universities and animation experts from five companies in the animation industry were involved to study the animation production process currently employed by companies and universities as well as the collaboration between the university and animation industry. The in-depth interview aimed to give the design of the conceptual model for the new product development process under the university-industry collaboration to mutually achieve commercial benefits. Afterwards, a focus group consisted of seven participants in which both the university lecturers and the animation experts was conducted. The aim of the focus group discussion was to allow both parties to give comments and mutually refine an appropriate collaborative model. The model is expected to effectively encourage the commercial cooperation between the university and the industry to create animation work.

3.1 Sampling

There were ten participants from both the industry and the universities. The participants were equally selected and consisted of five lecturers who are responsible of animation classes, where four of them are qualified with Master's degree and the other one with post-baccalaureate degree. There were two lecturers with three years of teaching experience, two with ten years of teaching experience and one with fifteen years of teaching experience. The other 5 participants comprised of five animation experts, three with master degree and two with bachelor degree. All of the animation experts have experiences in exposing animation work to the public with one co-producing animation for theater, two with the experience in producing animation for TV series, and one with the experience in creating animation for Visual Effects/ Post Production/Presentation and one with the experience in producing animation for TV commercial.

3.2 Procedures

The in-depth interviews were conducted with five animation lecturers and five experts from animation industry. The lecturers were from five leading universities out of eighteen that offer animation classes for undergraduate, where two were from the public universities and the other three from the private. The animation experts were from five well-recognized companies. The in-depth interviews aimed to study the current collaboration pattern.

It also included the similarities and differences in relation to the animation production among the concerned parties in order to define a conceptual model. Next, seven participants comprising of three university lecturers and four recognized and experienced animation experts took part in a focus group discussion to give opinions to refine and develop the conceptual model for the new product development process for commercial purposes through effective university-industry collaboration.

3.3 Interview Questions

During the in-depth interviews, the university lecturers were asked questions regarding the animation production process in each university to determine the similarities and differences in their process as well as their current collaborations with the industry. For the animation experts, they were also asked questions on the animation production process in their companies to identify the similarities and differences in their process as well as their current collaborations with the university. Following the interviews, all participants in the focus group were asked for their views towards the conceptual model, concerning its advantages and drawbacks for further improvement. Participants were also asked for the collaborative guideline and formality between the university and the animation industry to enable the animation production process through the university-industry collaboration for a mutual commercial benefit.

4. Data Analysis

The interviews with the university lecturers and the animation experts were audio-taped and transcribed. Key findings from the discussion were captured to identify the form of collaboration between both parties. Additionally, the animation production process from participated universities and companies were studied to determine the similarities and differences. The findings were analyzed, adjusted, developed to design a conceptual model for the new process which both the university and the industry can employ to jointly produce commercial animation work. Next, the university lecturers and the animation experts participated in a focus group discussion. They were also audio-taped and transcribed. The new proposed conceptual model and formality of collaboration to produce animation work was used in the discussion by both parties to allow the participants to rectify any defects and add essential parts where necessary. The new proposed conceptual model and formality of collaboration were then adjusted accordingly for their efficiency until they met the expectations of all the participated experts in the focus group. The researcher, then, identified the essence of the findings to refine and design the conceptual model for the animation production process through the university-industry collaboration for a mutual commercial benefit.

5. Findings and Discussion

5.1 The current collaboration between the university and the animation industry

- Experts from the animation industry are invited to give lectures in the university.
- University students are encouraged to participate in job trainings in animation companies.
- Experts from animation industry are invited to be the committee for theses evaluation and for animation curricula in the university
- Activities such as animation contest and workshop among college students are held in partnership of both parties

5.1.2 The collaboration to be expected in the future

- Collaborative animation production from both parties
- Establishment of animation learning center for students and public
- Scholarship which the university offers for Master's degree to experts and animation experts from the animation industry while the industry offers funds to university lecturers for researches and opportunity to train with industry members.

5.2 New Product Development Process under University and Animation Industry

Although both the animation industry and the university have their own process of producing animation, they are quite similar. Their process can be divided into four major steps as 1. Pre-production, 2. Production, 3. Post-production, and 4. Launch. The process is linear where one step leads to the other. The concept of knowledge flow between each other is quite consistent and always put the four factors into consideration i.e. actors, channels, direction and content to establish the collaboration between the university and the industry.

The actors in the new process development are representative teams from the industry and the university while the channels are the contracted researches to jointly produce commercial animation work. Direction is the direction of working in partnership between both parties and, finally, the content is the application of knowledge and technology from various sources to create a new process for the animation industry in Thailand. In order to develop the new product development process under university and animation industry collaboration, team and process are two important factors to be taken into consideration.

5.2.1 Team

It consists of the representatives from the industry and the university. According to the findings of the qualitative research, another important party is the investors who finance animation projects. Moreover, the content experts are also essential since the content included in the animation production must meet the requirements and needs of the audiences. Hence, an overall team is made up to fulfill the required positions.

First, there is a Project Manager, to be taken part by the lecturer. He/she is responsible for the coordination with the alliance, and to control the overall animation production and to take care of the budget allocation and profit margin to assure that the participants from both parties receive rewarding compensation. There is then the Instructor, responsible also by the lecturer, to ensure that the work from the students is in line with the direction of the animation experts. Next is the Advisee or the students, who work under the supervision and guidance of the animation expert. An animation expert will be considered as the Advisor to supervise and control the students' animation production. There will also be the number one Content Provider, taken part by the project investor, who funds the production and propose the need of the investors to be considered in the animation production. The second or the number two Content Provider, who will play as the content expert, is the specialist in the particular subject matter of the animation that is capable of offering and verifying the content that will be produced for the animation. Finally, there is the End User, the audience, who is the target of the animation project.
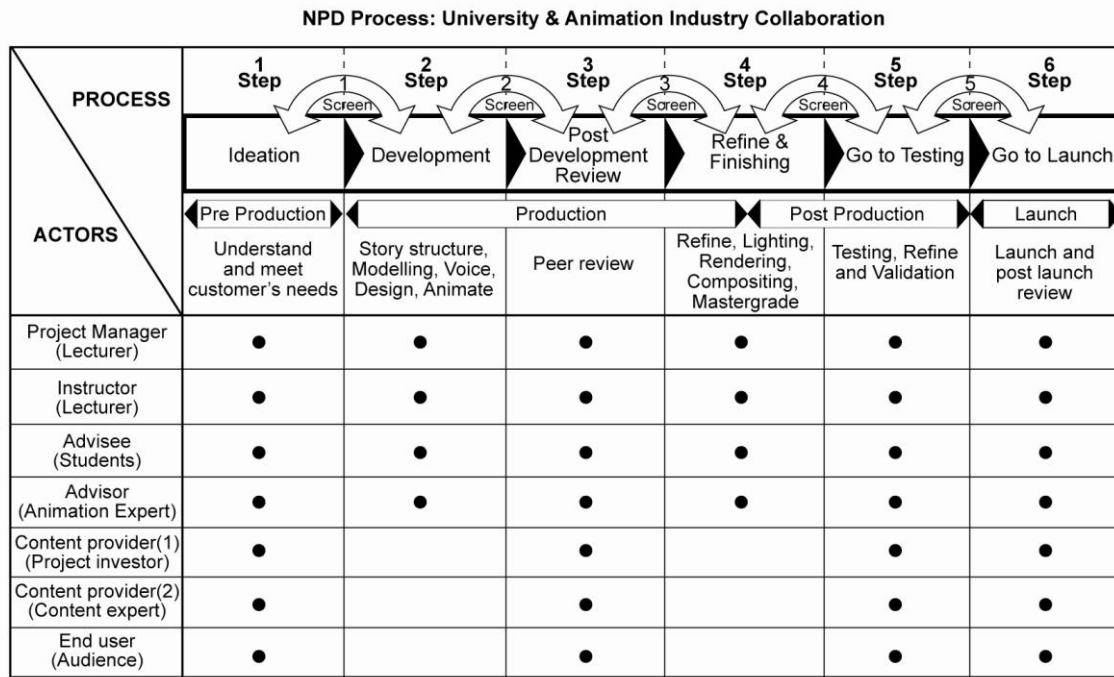
5.2.2. Process

It consists of six steps; 1) Ideation which is during the Pre-production, 2) Development, 3) Post-development Review which is during the Production, 4) Refine & Finishing which is in between the end of the Production and the beginning of the Post-production, 5) Go to testing which is during the Post-production, and 6) Launching which is during the launch itself. Between each step, there is a screening process to verify the quality of the content in each step to make sure that the content meets the required standard before it will be sent to the next step. The project manager, the instructor and the advisor are responsible for this screening process. Additionally, there will be the mission in each step. In Step 1, the mission is 'understanding and meeting customer's needs'. In Step 2, the mission is 'Story structuring, Modeling, Voice Designing and Animation'. In Step 3, the mission is 'Peer reviewing'. In Step 4, the mission is 'Refining, Lighting, Rendering, Compositing, Mastergrading'. In Step 5 and 6, the missions are 'Testing, Refining and Validating', and 'Launching and Post launching review' respectively. The mission in each step is only a guideline which can be augmented or reduced to conform to the work in each project and should be performed under the consideration of the project manager, the instructor and the advisor.

6. Conclusions

The collaboration between the university and the industry is critical in the development of any fields of knowledge and is also an essential part in the innovation system. This is because each organization has its own strength. University is regarded as the source for new knowledge mostly derived from researches. Meanwhile, the industry is generally regarded as the center of professional experts. The purpose of this study is to design a model for new product development process to encourage the collaboration between the university and the animation industry for commercial purposes in response to the support from the government regarding the creative economy policy. This collaboration is expected to stimulate the knowledge flow between the two organizations in the hope that it will encourage a knowledge acquisition and development between each other which, therefore, will lead to the collaborative animation work that offers both academic and commercial benefits to all participated parties. The feasibility study indicated that the collaboration for the commercial animation production and the study of the current collaboration and production process in the university and the animation companies are indispensable. It is found that there is a collaboration in the form of invitations, where the experts from the animation industry are invited by the university to give lectures, either as a guest lecturer or a guest speaker, and to take part as a the committee for theses evaluations and for animation curriculum development in the university.

As for the animation production, the university and the industry follow their own process, however, there are quite similar. The similarity of the process can be described with four major steps of Pre-production, Production, Post-production, and Launch. The process is in a linear direction where one step leads to the other. Nevertheless, despites their collaboration and similar process of animation production, there has never been a commercial co-production of the animation due to the lack of clarity in the working process, the responsibility of the participants and the budget and profit management. Such problems have been adjusted and a new conceptual model for the process has been designed to allow the participants from both the university and the industry to share comments and to effectively refine and develop the conceptual model for New Product Development Process through University and Animation Industry Collaboration.

Figure 1: New Product Development (NPD) Process under University and Animation Industry Collaboration

NPD Process: University & Animation Industry Collaboration

1 Step	2 Step	3 Step	4 Step	5 Step	6 Step
Screen 1	Screen 2	Screen 3	Screen 4	Screen 5	
Ideation	Development	Post Development Review	Refine & Finishing	Go to Testing	Go to Launch

Step \ Actors	Project Manager (lecturer)	Instructor (lecturer)	Advisee (Students)
1. Step: Ideation	- Teams supervision - Brainstorming session - Observation, coordination - Project management - Screening (go/no go)	- Students supervision - Brainstorming session - Screening (go/no go)	- Understand customers' need by a research (Literature review & Indept interview) - Brainstorming & Ideation
2. Step: Development	- Production Team supervision - Brainstorming session - Observation, coordination - Screening (go/no go)	- Students supervision - Brainstorming session - Screening (go/no go)	- Technology and Artistic development
3. Step: Post Development Review	- Peer review - Post Development evaluation - Observation, coordination - Screening (go/no go)	- Peer review - Screening (go/no go)	- Feedback - Revision
4. Step: Refine & Finishing	- Students supervision - Refinement & finishing - Observation, coordination - Screen (go/no go)	- Students supervision - Refinement & finishing - Screen (go/no go)	- Refinement & finishing (Technology, Technique, Artistic)
5. Step: Go to Testing	- Testing - Observation & coordination - Screen (go/no go)	- Testing - Screen (go/no go)	- Observation
6. Step: Go to Launch	- Observation & coordination - Information gathering - Analysis & report	- Observation - Gain NPD knowledge	- Observation - Gain NPD knowledge

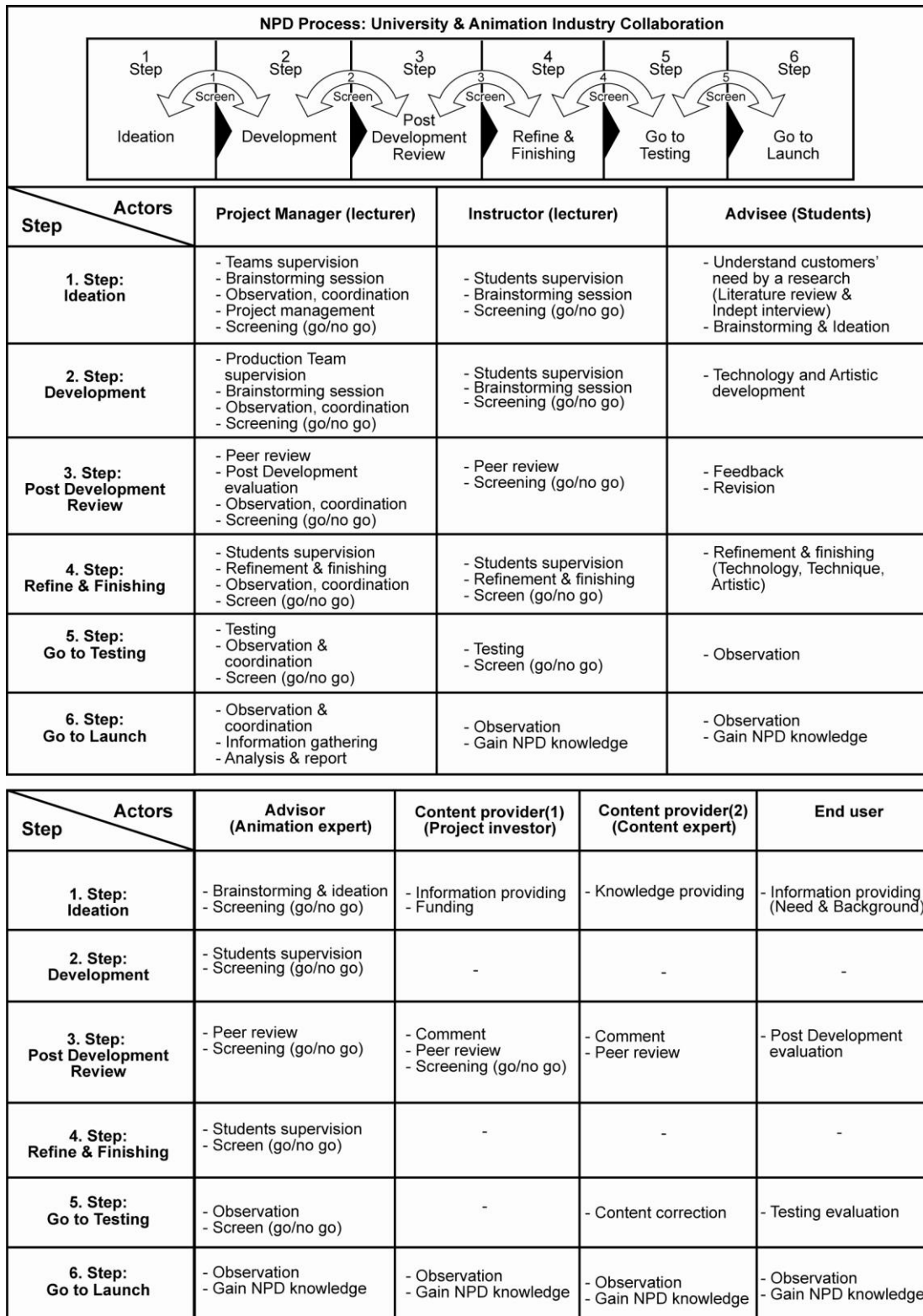| Step \ Actors	Advisor (Animation expert)	Content provider(1) (Project investor)	Content provider(2) (Content expert)	End user
1. Step: Ideation	- Brainstorming & ideation - Screening (go/no go)	- Information providing - Funding	- Knowledge providing	- Information providing (Need & Background)
2. Step: Development	- Students supervision - Screening (go/no go)	-	-	-
3. Step: Post Development Review	- Peer review - Screening (go/no go)	- Comment - Peer review - Screening (go/no go)	- Comment - Peer review	- Post Development evaluation
4. Step: Refine & Finishing	- Students supervision - Screen (go/no go)	-	-	-
5. Step: Go to Testing	- Observation - Screen (go/no go)	-	- Content correction	- Testing evaluation
6. Step: Go to Launch	- Observation - Gain NPD knowledge	- Observation - Gain NPD knowledge	- Observation - Gain NPD knowledge	- Observation - Gain NPD knowledge

Figure 2: The actors' activities in each step, along with the New Product Development (NPD) Process under University and Animation Industry Collaboration

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